

The logo for Golden State Net features a white outline of the state of California on the left. From the bottom right corner of the state outline, several curved lines radiate outwards, each ending in a small orange dot, symbolizing a network or fiber optic connections. The background of the top half of the slide is a scenic landscape of rolling hills and mountains under a warm, orange and yellow sunset sky.

# GOLDENSTATENET

## Statewide Middle-Mile Network Design

April 22, 2022

# Design Process

- Analyzed extensive mapping resources to understand: existing technical and telecom assets, road and highway systems, topological factors, socioeconomic composition by region, broadband speeds (or lack thereof) by region, among other factors.
- Used CPUC middle-mile recommendation routes as anchors for most route solutions adding regional rings.
- Engaged with a diverse set of community groups to understand needs, requirements, existing assets, and potential opportunities.
- Engaged service providers (carriers, vendors, ISPs, etc) to examine potential solution sets.
- Integrated proposed 18 projects into the initial statewide network recommendation.
- Identified regions where the unserved population is >50 miles from current design to build fiber paths where feasible.
- Estimated the cost for building proposed routes in preparation for an optimization analysis.

# Design Factors

- Primarily utilize new fiber-optic cable construction where feasible (Caltrans Right of Way).
- Seek joint build partnerships to reduce costs to the state and to partners.
- Use long-term Dark Fiber IRUs where appropriate to reduce cost, time to service, and to add resiliency.
- Align to organizations with existing regional, state, and federal broadband infrastructure funding to maximize investments, e.g. CASF-funded organizations.
- Aim for “early wins” to meet expectations of residents, policymakers, and other stakeholders.
- Utilize well-established best practices in network design principles, protocols, engineering, and operation.

# Support for Optimization Process

Inform CDT to enable partner-based optimization and application of available budget. This includes:

- Providing comprehensive information to drive decision-making for Build vs. Buy vs. Joint Build
- Working with CDT to determine contingency reserve percentage against \$3.2B budget (typically 10-20%)

Steps to achieving optimization:

- Show total routes, mileage, and projected cost of statewide Middle Mile Network that would be 100% newly-built fiber, including required equipment and facilities
- Determine newly-built routes that are *no regrets* and most *feasible* within available budget
- Determine routes for dark fiber IRUs within remaining budget
- In addition, determine joint-build portions of MM network within remaining budget

Final CDT decisions for all MM network segments within \$3.2B budget (minus contingency):

- 18 Initial Projects
- Newly built fiber routes
- Dark Fiber IRU routes
- Joint build routes
- Equipment and facilities

# STATEWIDE MAP

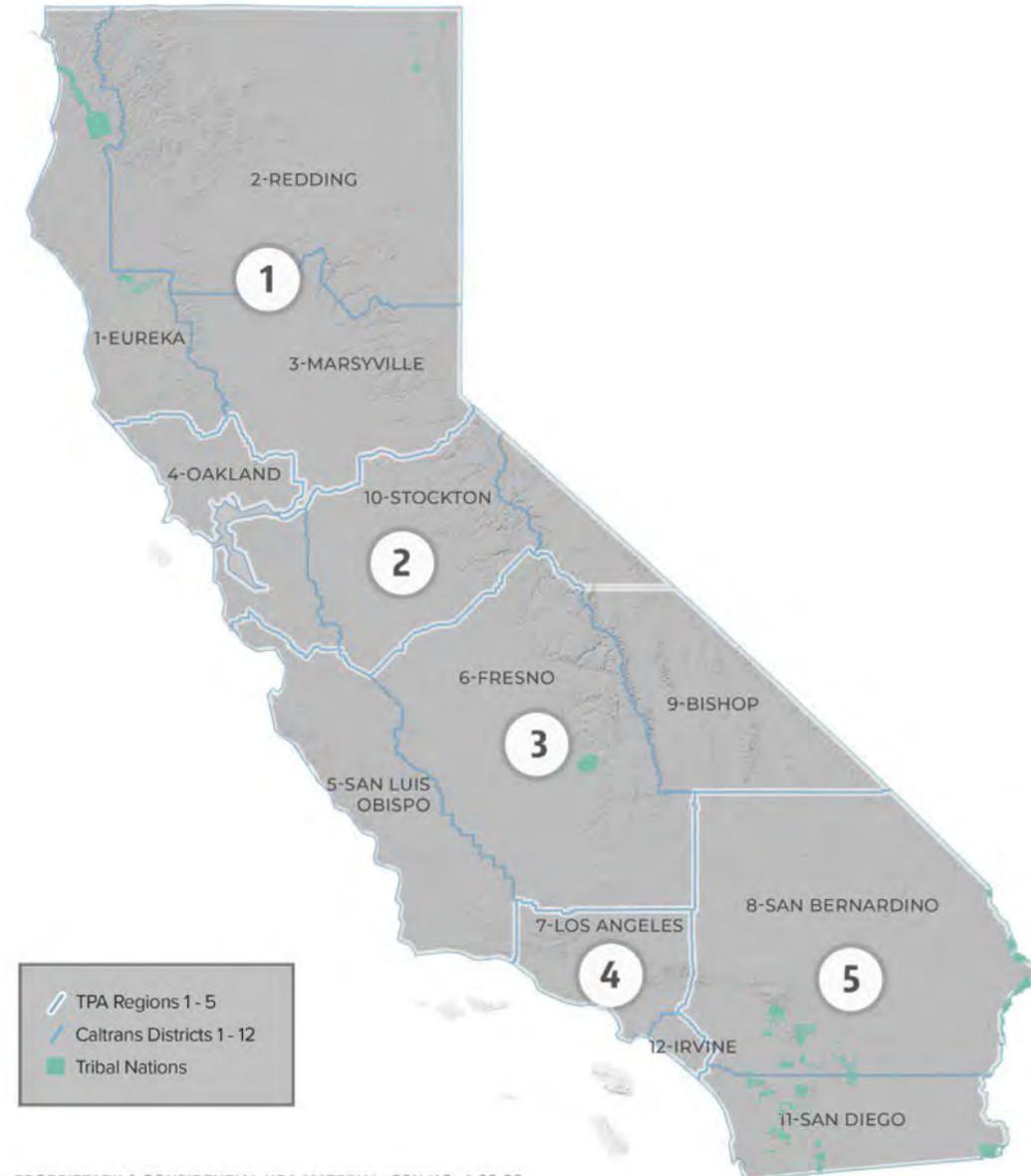
**Region 1:** Caltrans Districts 1, 2, 3

**Region 2:** Caltrans Districts 4, 9 (portion), 10

**Region 3:** Caltrans Districts 5, 6, 9 (portion)

**Region 4:** Caltrans Districts 7, 12

**Region 5:** Caltrans Districts 8, 11



# STATEWIDE MAP

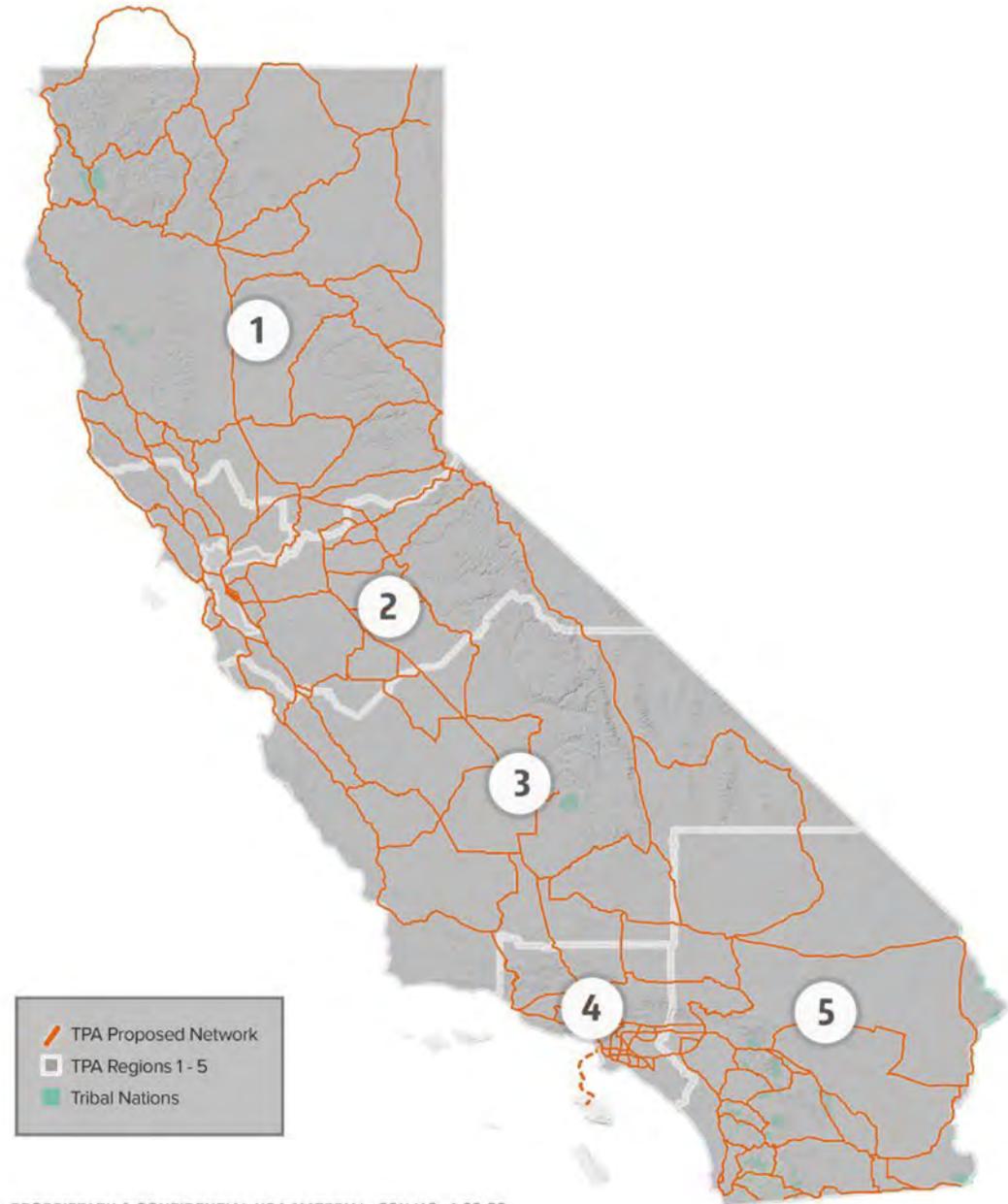
**Region 1:** Caltrans Districts 1, 2, 3

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**Region 3:** Caltrans Districts 5, 6, 9 (portion)

**Region 4:** Caltrans Districts 7, 12

**Region 5:** Caltrans Districts 8, 11



# REGION 1

# REGION 1 OVERVIEW MAP

- Regions 1 - 5
- TPA Proposed Network
- Tribal Nations



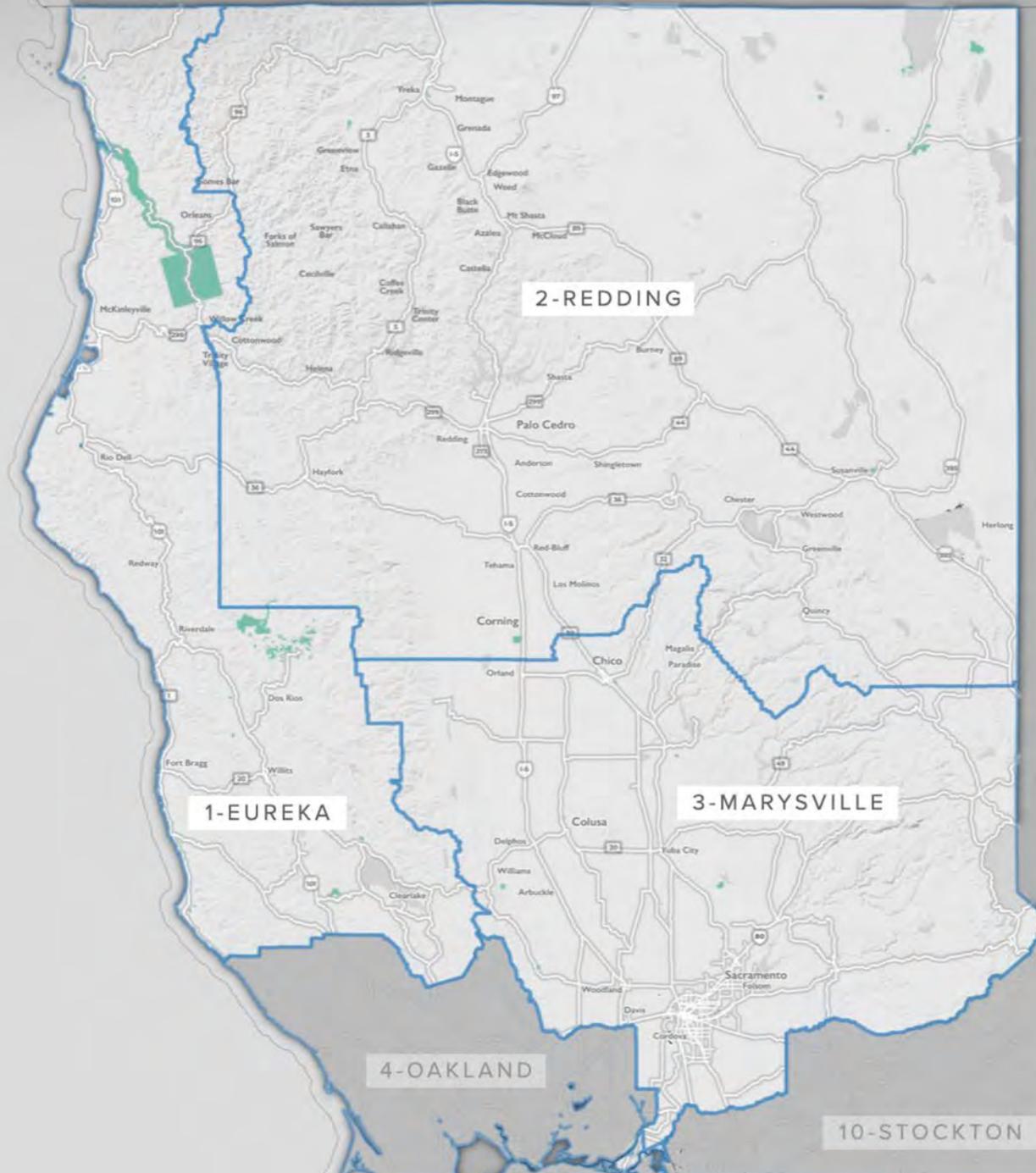
## LEGEND

- State & National Highways
- Tribal Nations
- Caltrans Districts
- Initial 18 TPA Projects
- CalREN Backbone
- Recommended Hut Locations
- TPA Proposed Network
- CPUC Anchor Builds



# REGION 1

- State & National Highways
- Tribal Nations
- Caltrans Districts

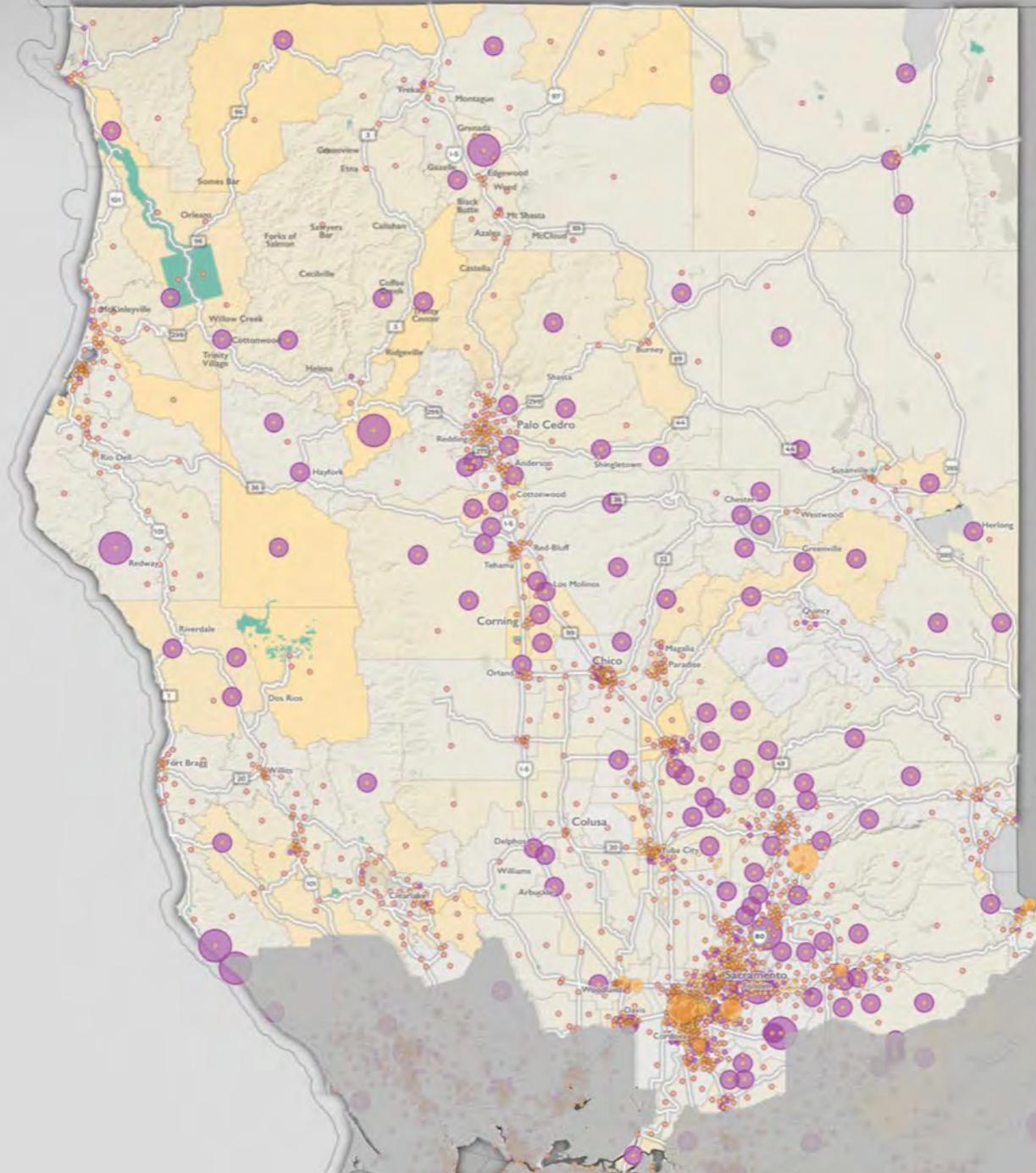


**LEGEND**

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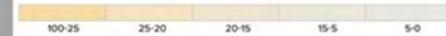
# REGION 1

- CPUC Unserved Residential & Non-Residential
- Percent Households Below Poverty Line



### Unserved Residential & Unserved Non-Residential

- > 2,000 - 5,574
- > 1,500 - 2,000
- > 1,000 - 1,500
- > 500 - 1,000
- > 1 - 500



### Percent Households Below Poverty Line

Census tract data from U.S. Census Bureau's American Community Survey (ACS) - 2015-2019 5-year estimates

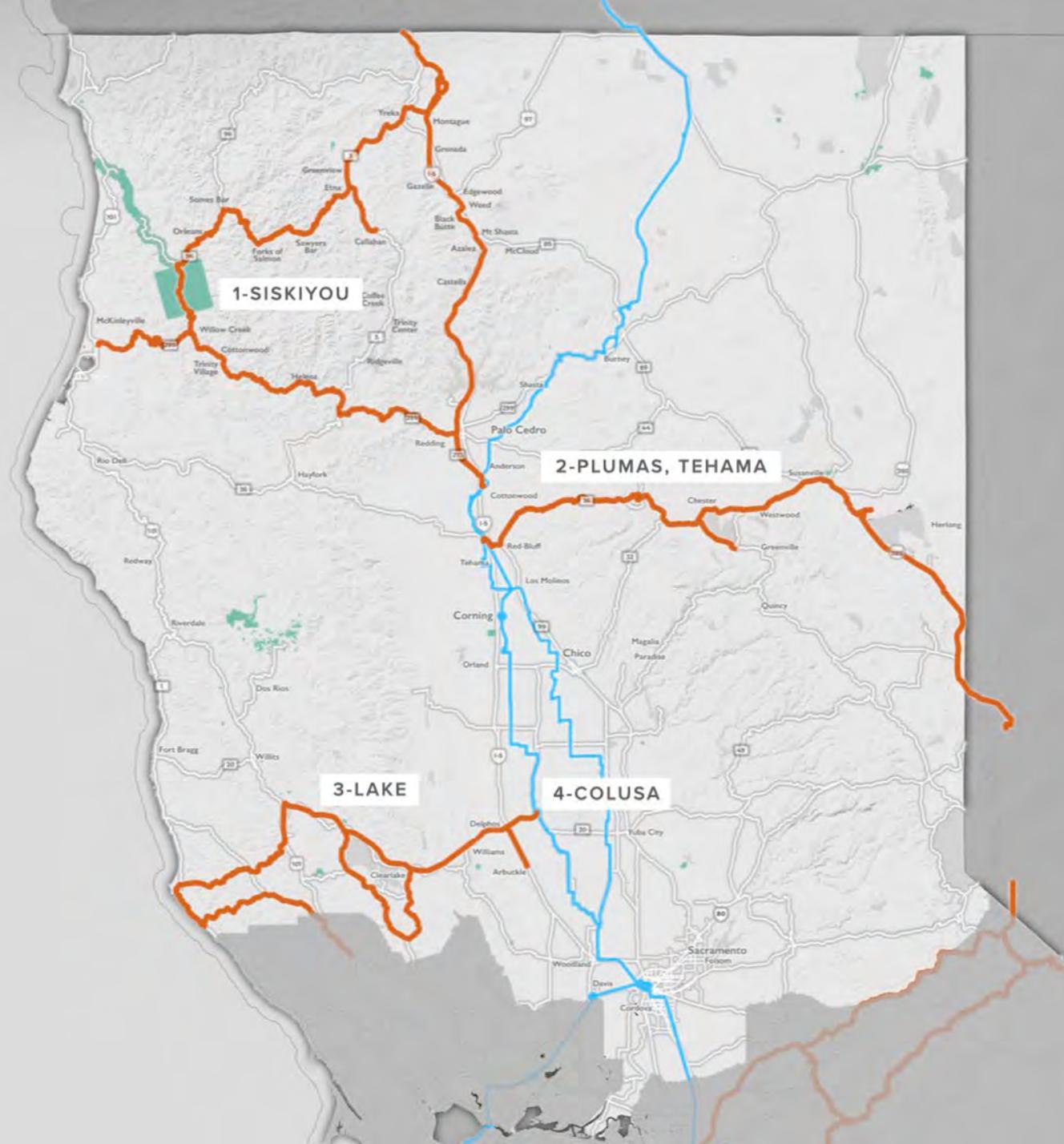
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# REGION 1

- Initial TPA Projects - 1/31/22
- CalREN Backbone



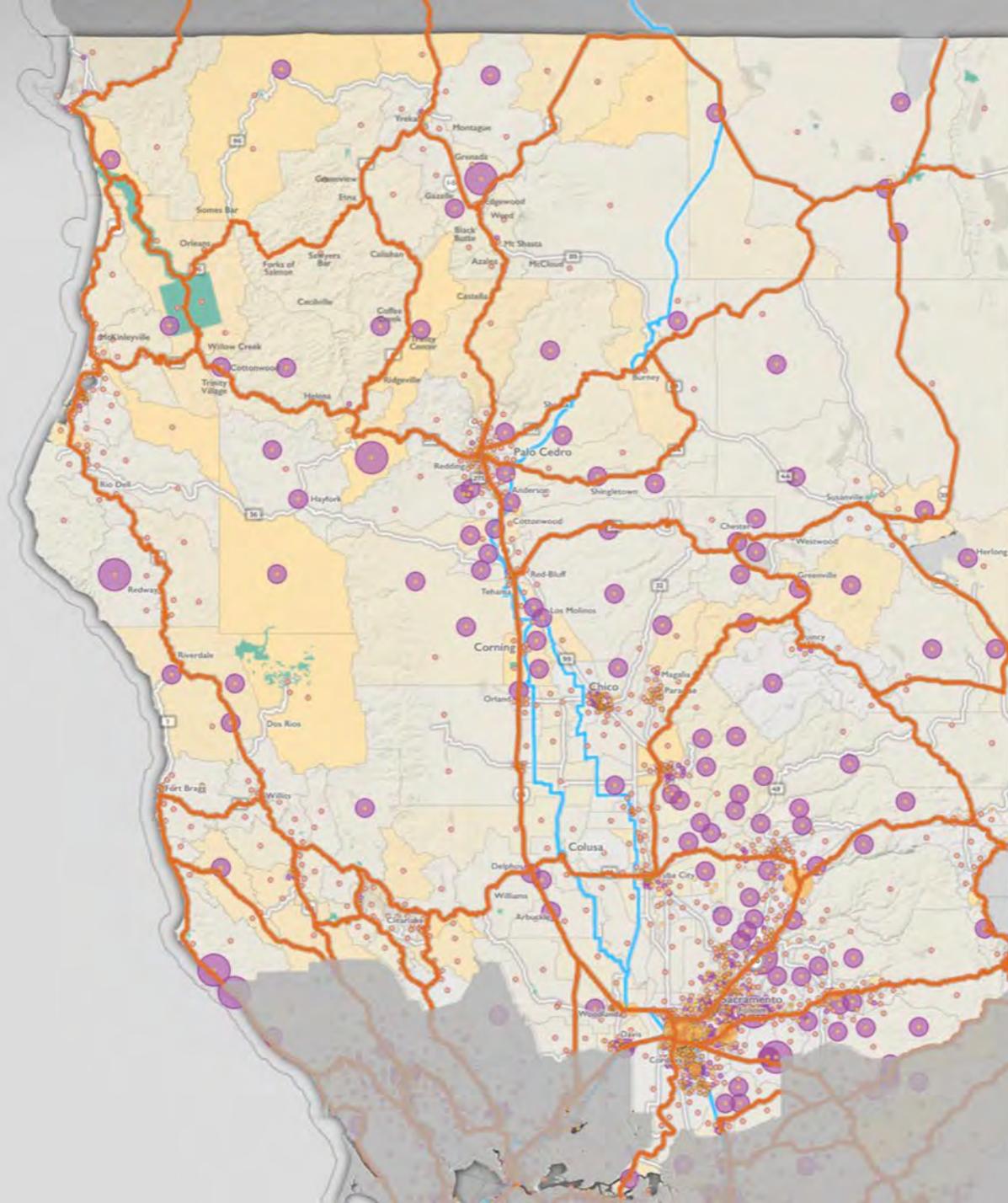
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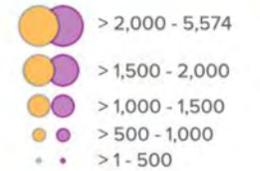


# REGION 1

- TPA Proposed Network
- CPUC Unserved Residential & Non-Residential
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### Unserved Residential & Unserved Non-Residential



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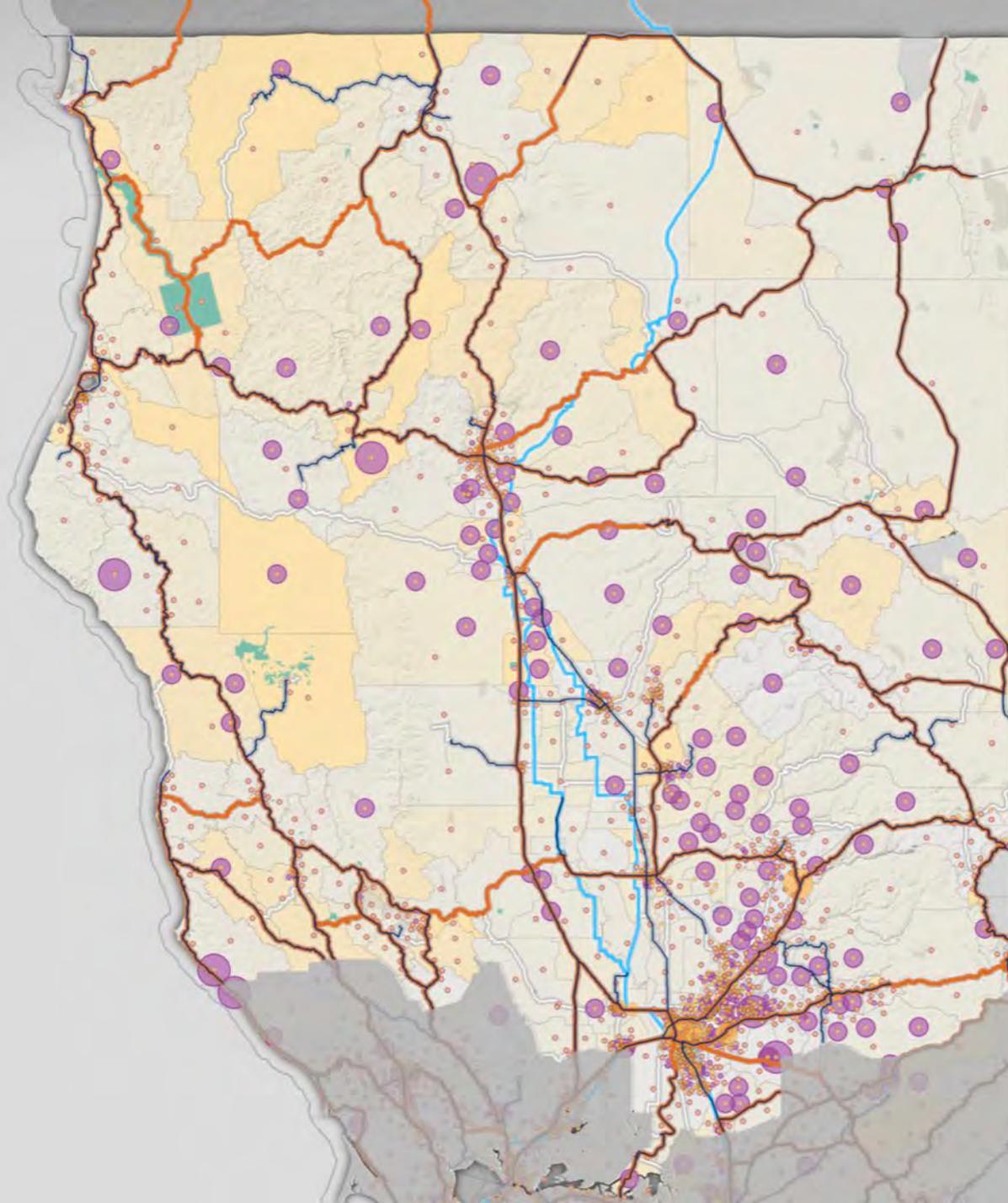
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# REGION 1

- TPA Proposed Network
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### Unserved Residential & Unserved Non-Residential



### Percent Households Below Poverty Line

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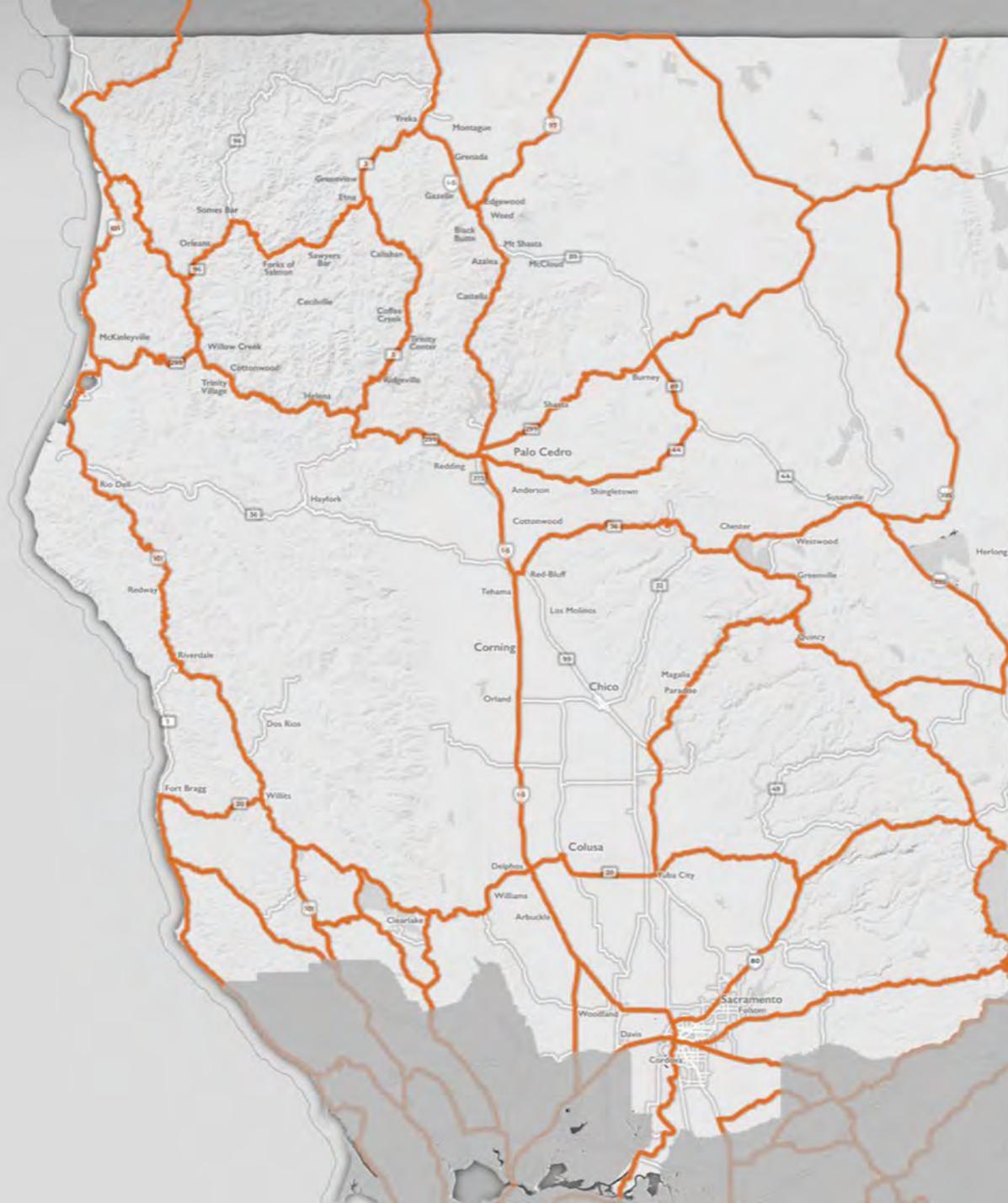
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# REGION 1

- TPA Proposed Network



**LEGEND**

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- Recommended Hot Locations
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# REGION 1: KEY HIGHLIGHTS

## **Geographic/Environmental:**

- Vastly underserved area of the state
- Prone to catastrophic outages, fire hazard zone

## **Population:**

- Includes California's two largest Tribal Nations: Hoopa Valley Tribe and Yurok Tribe

## **Technical/Business-related:**

- First collaborative effort with a small local exchange carrier - Siskiyou Telephone
- Opportunity for cooperation and collaboration with Tribal Nations to build resiliency and connectivity within the region.
- Minimal availability of existing fiber to support IRUs.

# REGION 2

# REGION 2 OVERVIEW MAP

- Regions 1 - 5
- TPA Proposed Network
- Tribal Nations

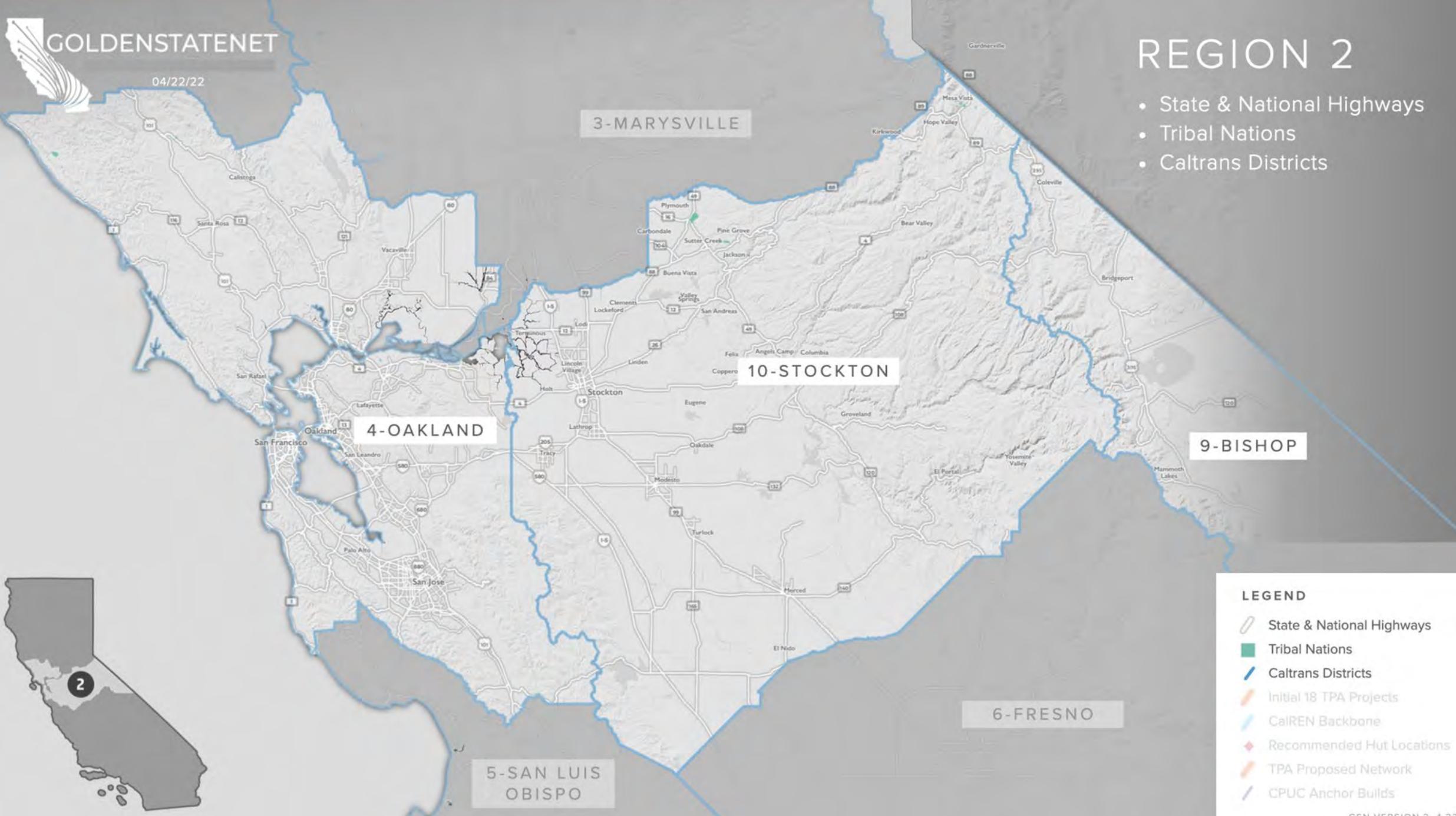


## LEGEND

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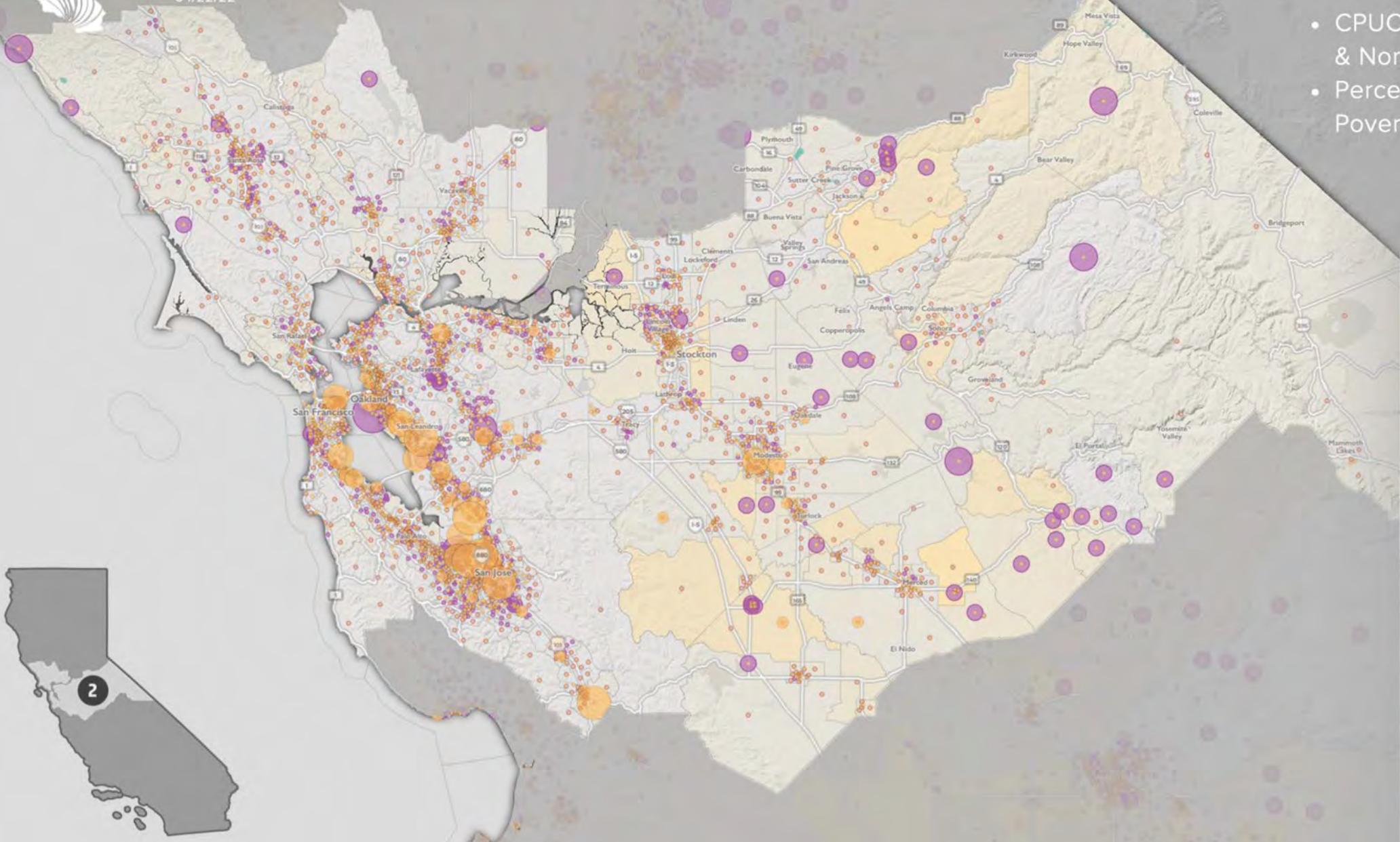


**LEGEND**

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# REGION 2

- CPUC Unserved Residential & Non-Residential
- Percent Households Below Poverty Line



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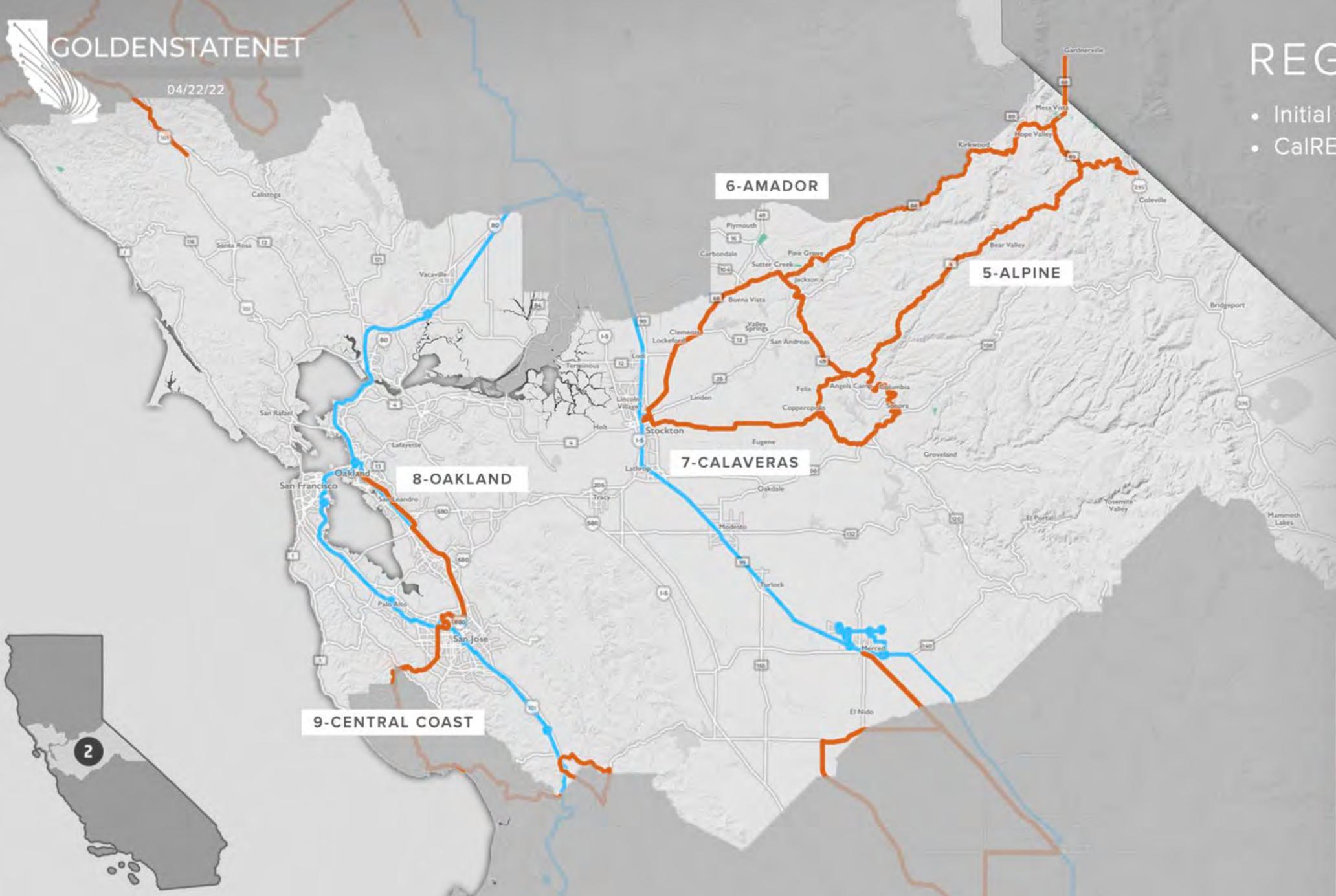
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- Initial TPA Projects - 1/31/22
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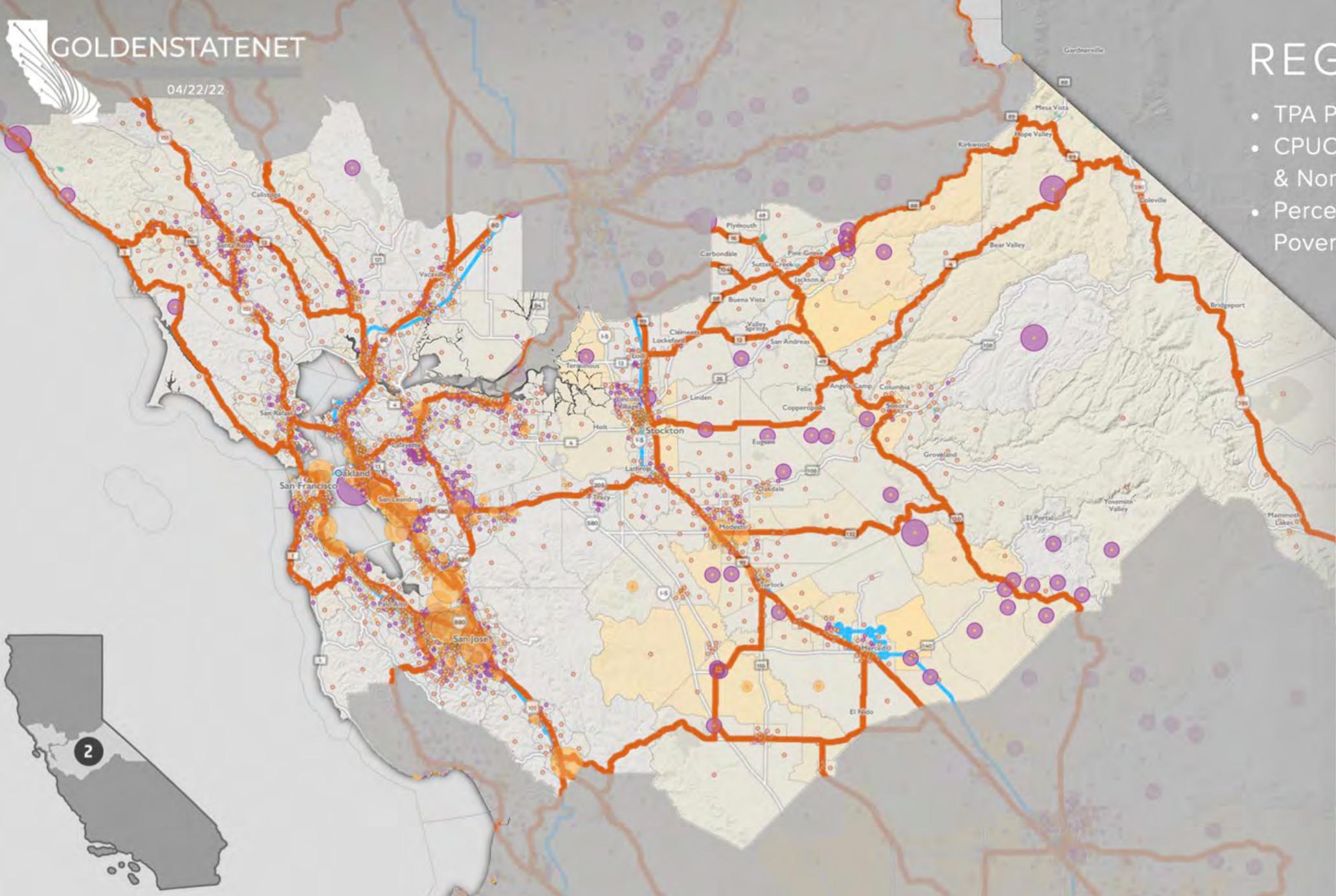
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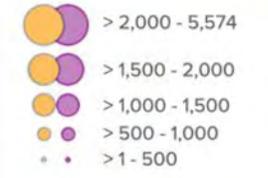


# REGION 2

- TPA Proposed Network
- CPUC Unserved Residential & Non-Residential
- Percent Households Below Poverty Line



### Unserved Residential & Unserved Non-Residential



### Percent Households Below Poverty Line



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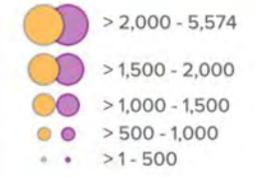
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# REGION 2

- CPUC Anchor Builds
- TPA Proposed Network
- CPUC Unserved Residential & Non-Residential
- Percent Households Below Poverty Line

### Unserved Residential & Unserved Non-Residential



### Percent Households Below Poverty Line

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### LEGEND

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# REGION 2: KEY HIGHLIGHTS

## **Geographic/Environmental:**

- Includes densely populated urban areas and sparsely populated mountainous regions.
- Certain areas considered high risk fire hazard zones.

## **Population:**

- Service affordability will be key due to socioeconomic factors in parts of the region.

## **Technical/Business-related:**

- Significant joint build opportunities.
- May require further analysis with federal partners on some routes.
- Varies from CPUC recommendations in a few locations.
- Eastern parts of the region lack Caltrans ROW and may require further evaluation.

# REGION 3

# REGION 3 OVERVIEW MAP

- Regions 1 - 5
- TPA Proposed Network
- Tribal Nations



**LEGEND**

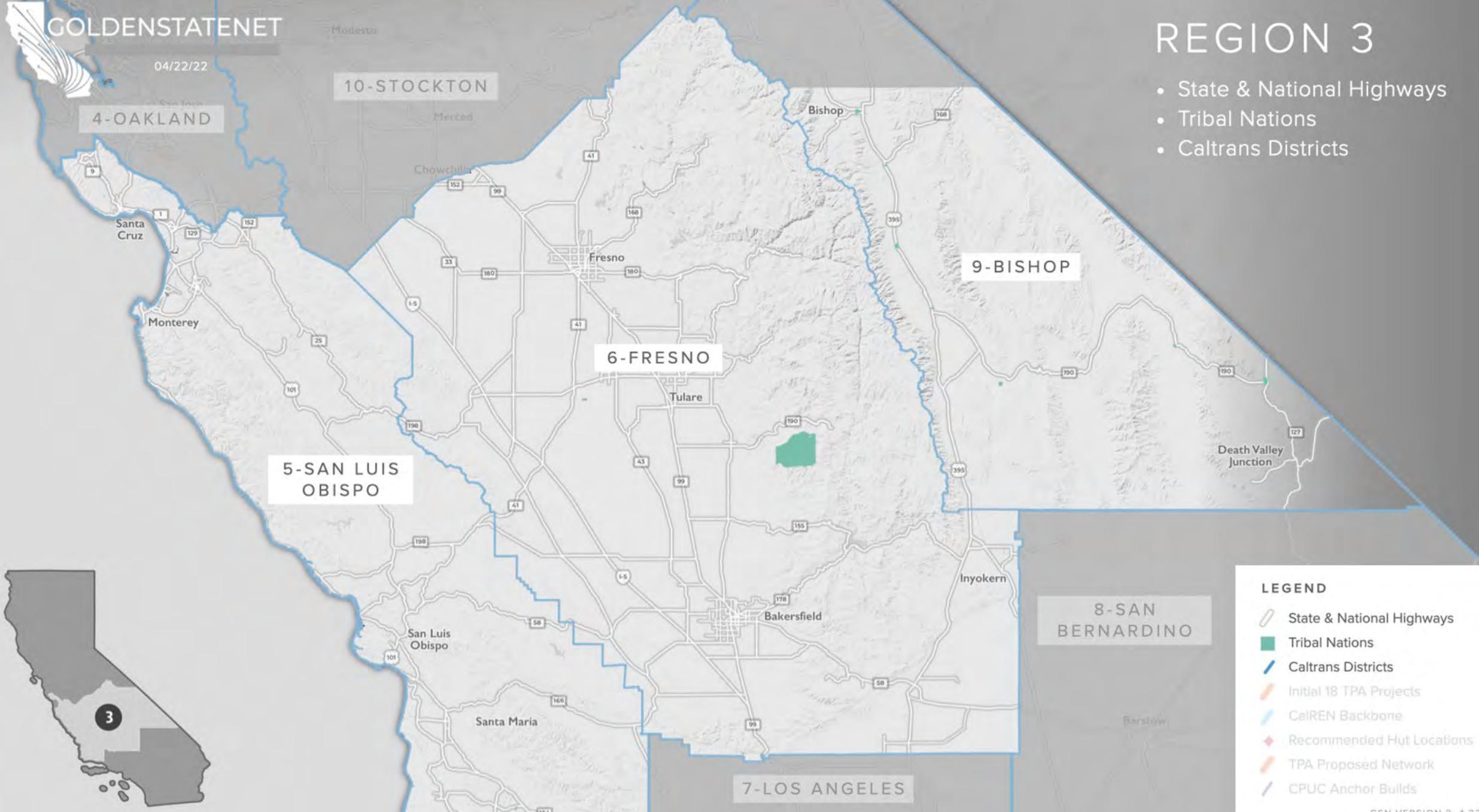
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# REGION 3

- State & National Highways
- Tribal Nations
- Caltrans Districts



5-SAN LUIS OBISPO

6-FRESNO

9-BISHOP

8-SAN BERNARDINO

7-LOS ANGELES

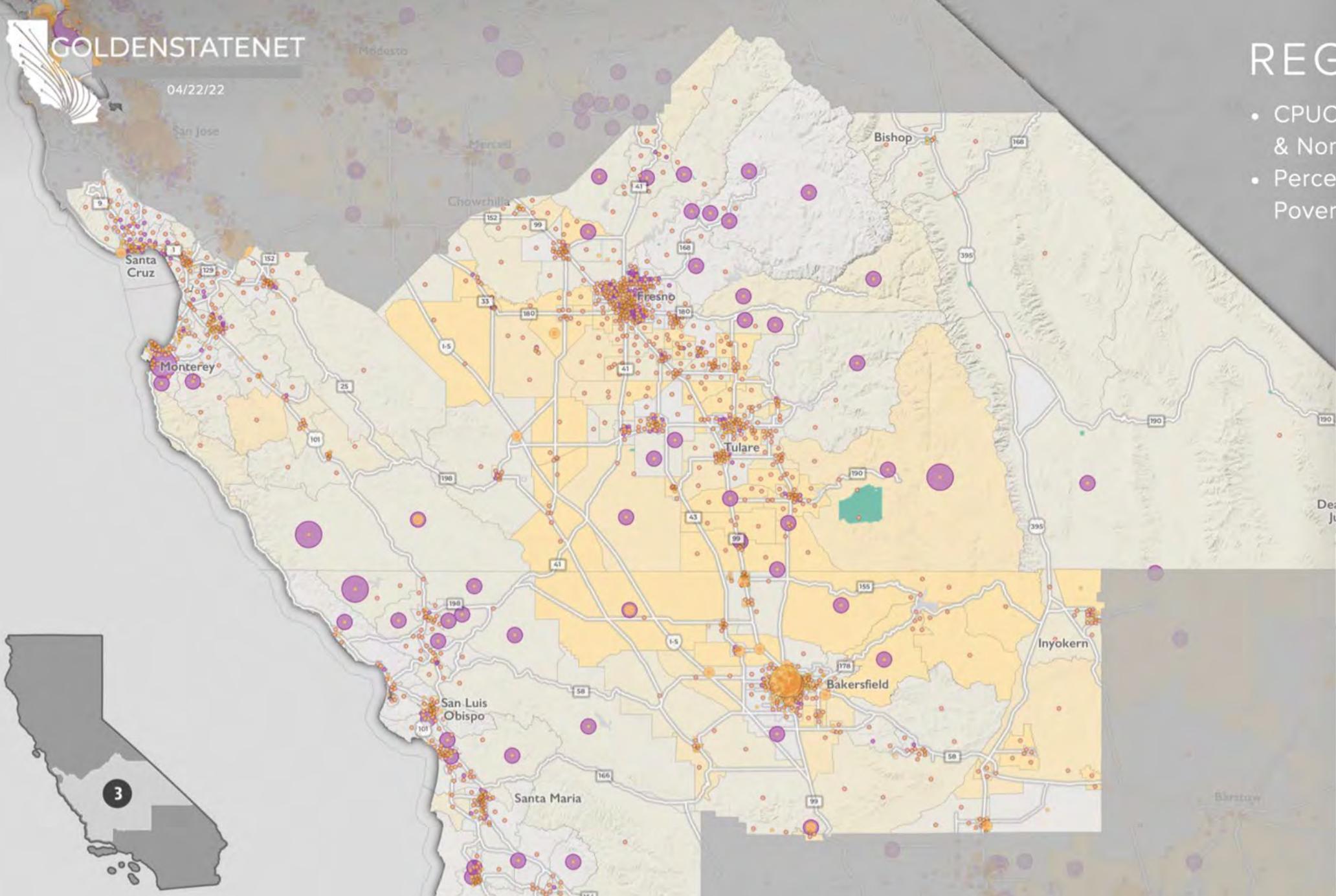
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04/22/22

# REGION 3

- CPUC Unserved Residential & Non-Residential
- Percent Households Below Poverty Line



### Unserved Residential & Unserved Non-Residential

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### Percent Households Below Poverty Line

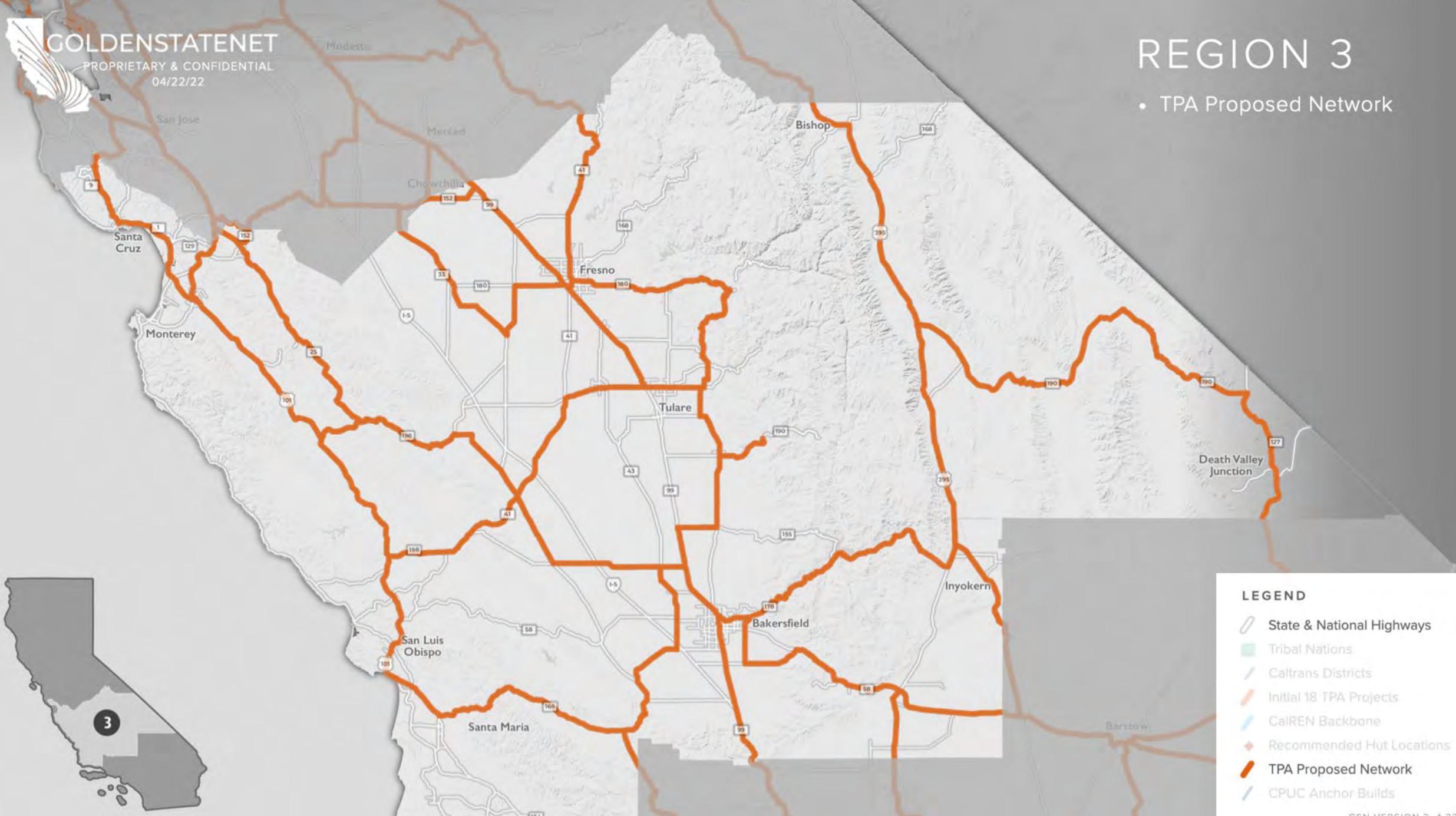
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- TPA Proposed Network



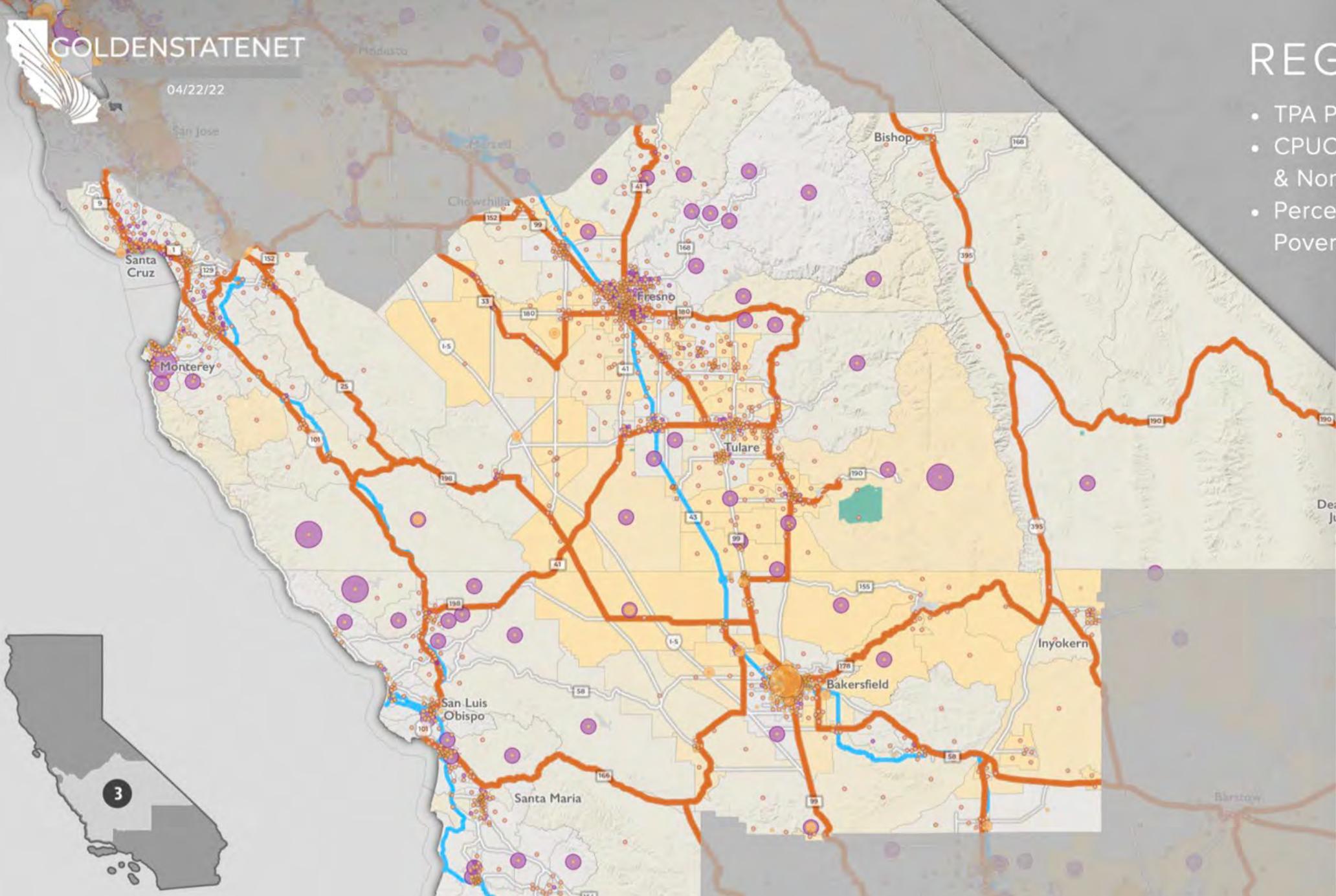
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04/22/22

# REGION 3

- TPA Proposed Network
- CPUC Unserved Residential & Non-Residential
- Percent Households Below Poverty Line



### Unserved Residential & Unserved Non-Residential

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### Percent Households Below Poverty Line

Census tract data from U.S. Census Bureau's American Community Survey (ACS) - 2015-2019 5-year estimates

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04/22/22

# REGION 3

- CPUC Anchor Builds
- TPA Proposed Network
- CPUC Unserved Residential & Non-Residential
- Percent Households Below Poverty Line

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### Percent Households Below Poverty Line

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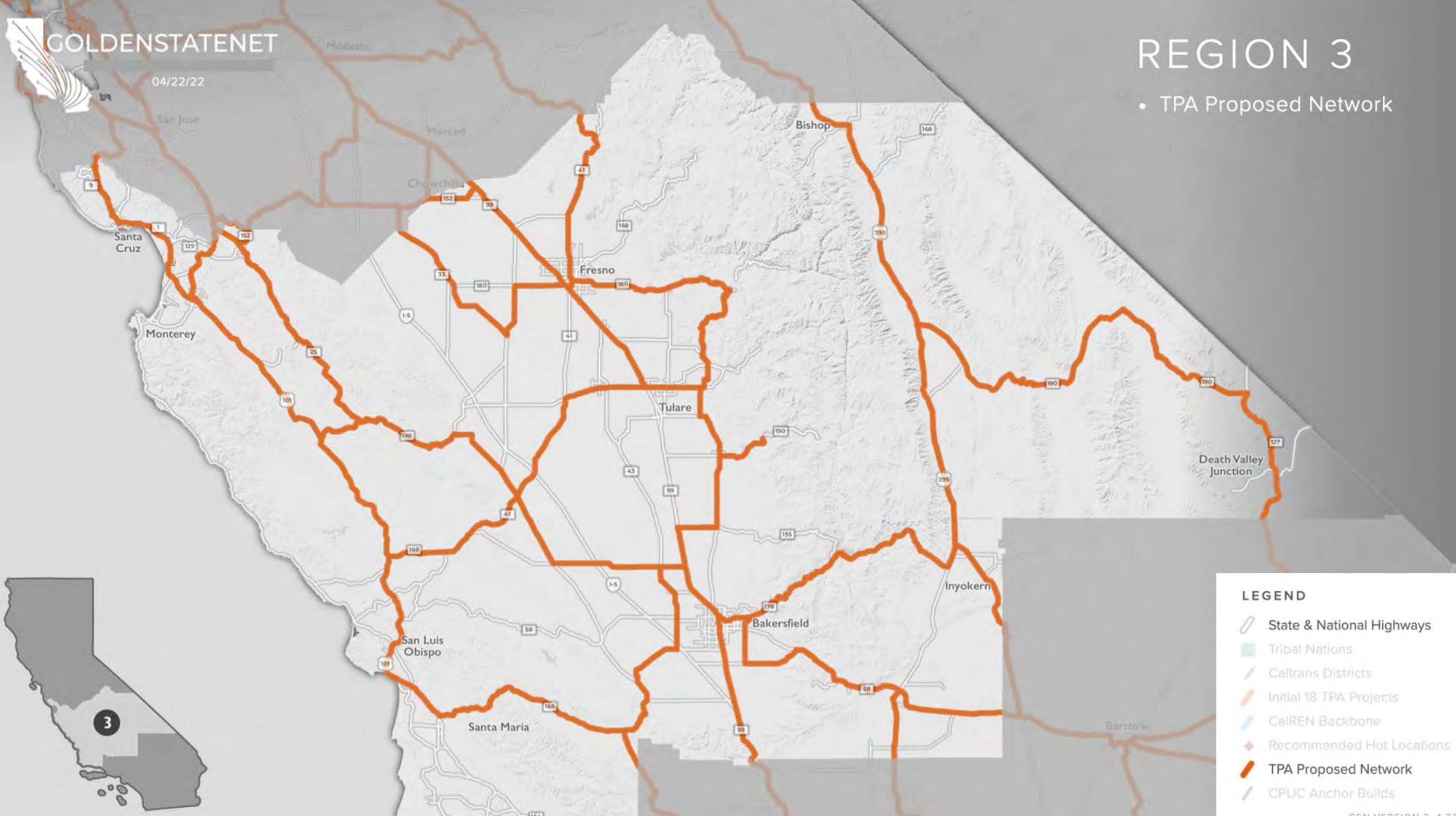
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04/22/22

# REGION 3

- TPA Proposed Network



**LEGEND**

-  State & National Highways
-  Tribal Nations
-  Caltrans Districts
-  Initial 18 TPA Projects
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-  Recommended Hut Locations
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-  CPUC Anchor Builds

# REGION 3: KEY HIGHLIGHTS

## Geographic/Environmental:

- Includes densely populated urban areas and sparsely populated mountainous regions.
- Certain areas considered high risk fire hazard zones.

## Population:

- Forthcoming opportunities for Tule River Tribal Nation with ongoing engagement.
- Service affordability will be key due to socioeconomic factors in parts of the region.

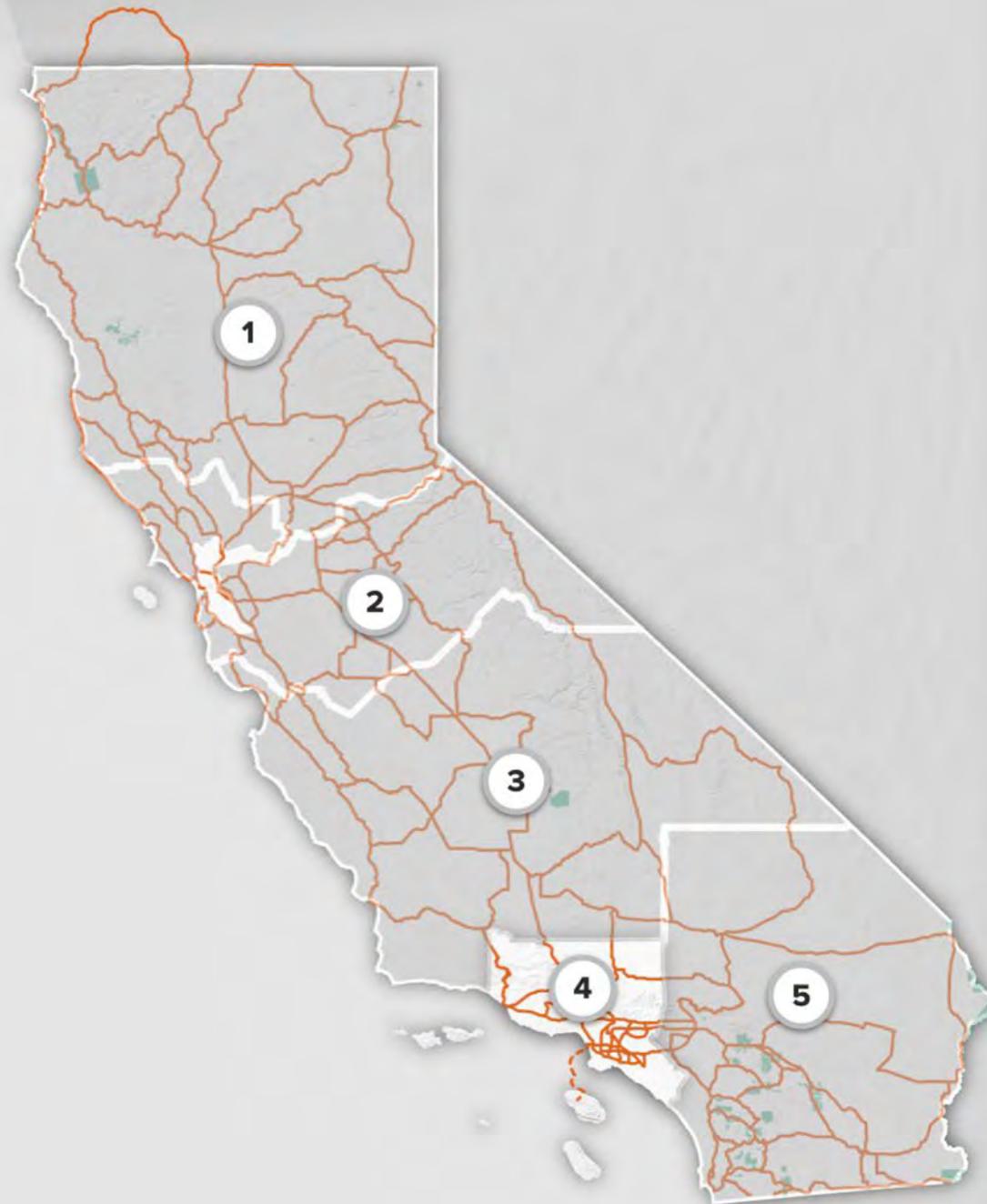
## Technical/Business-related:

- Significant joint build opportunities.
- Existing commercial infrastructure for IRU potential solutions.
- Eastern parts of the region lack Caltrans ROW and may require further evaluation.

# REGION 4

# REGION 4 OVERVIEW MAP

- Regions 1 - 5
- TPA Proposed Network
- Tribal Nations



## LEGEND

- State & National Highways
- Tribal Nations
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GOLDENSTATENET

04/22/22

6-FRESNO

5-SAN LUIS OBISPO

# REGION 4

- State & National Highways
- Tribal Nations
- Caltrans Districts

7-LOS ANGELES

8-SAN BERNARDINO

12-IRVINE

11-SAN DIEGO

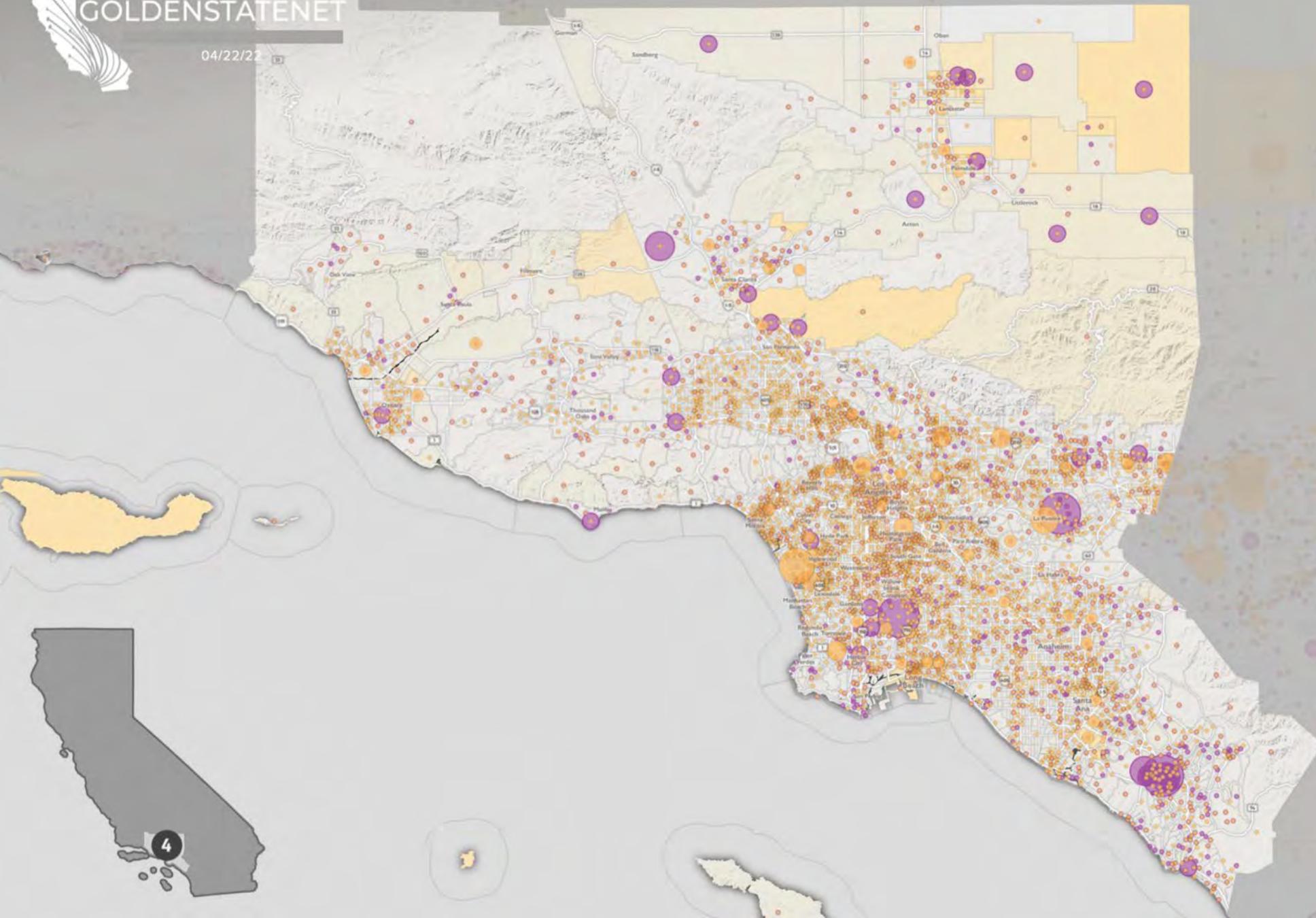


### LEGEND

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# REGION 4

- CPUC Unserved Residential & Non-Residential
- Percent Households Below Poverty Line



### Unserved Residential & Unserved Non-Residential

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### Percent Households Below Poverty Line

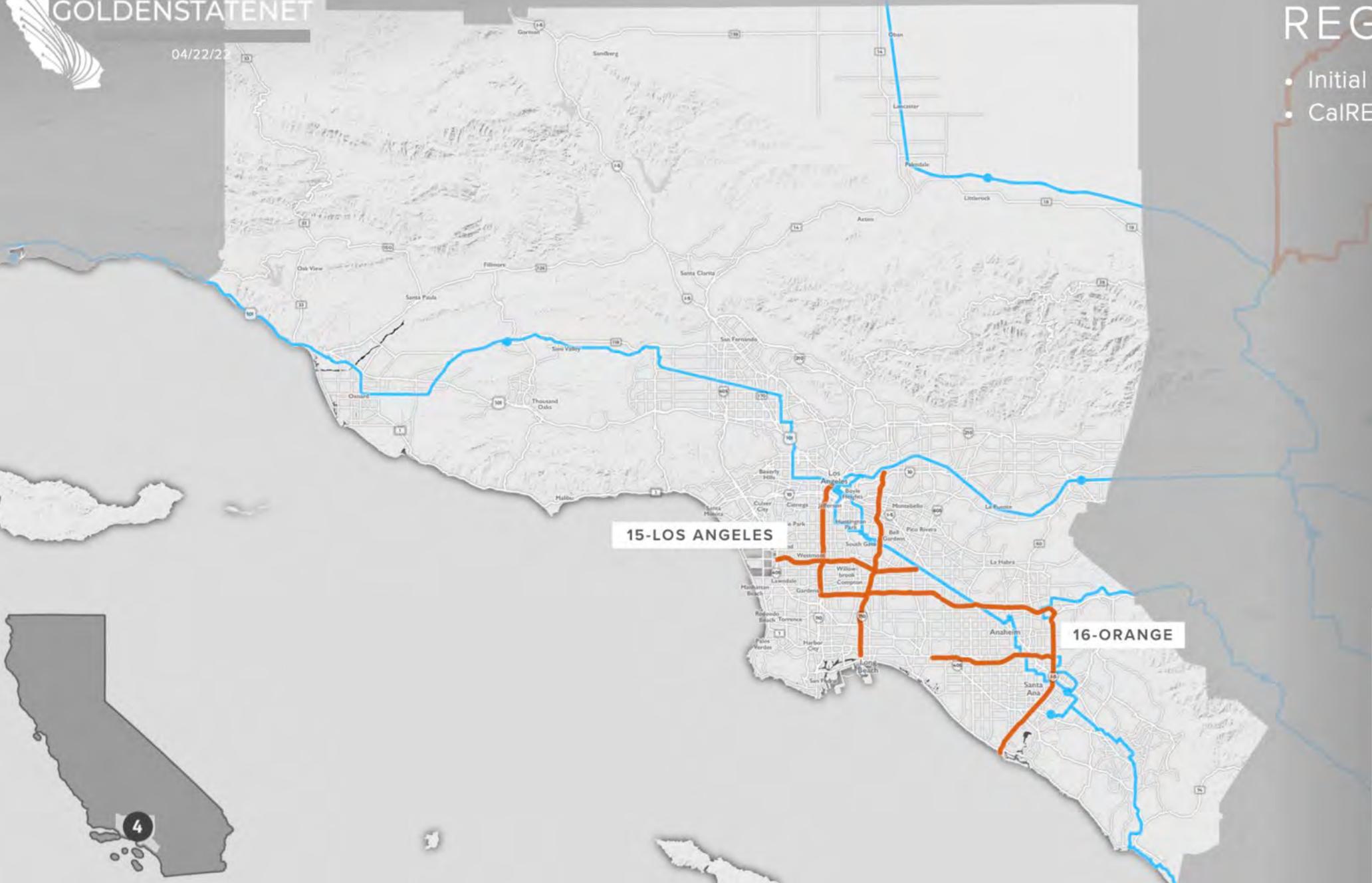
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# REGION 4

- Initial TPA Projects - 1/31/22
- CalREN Backbone

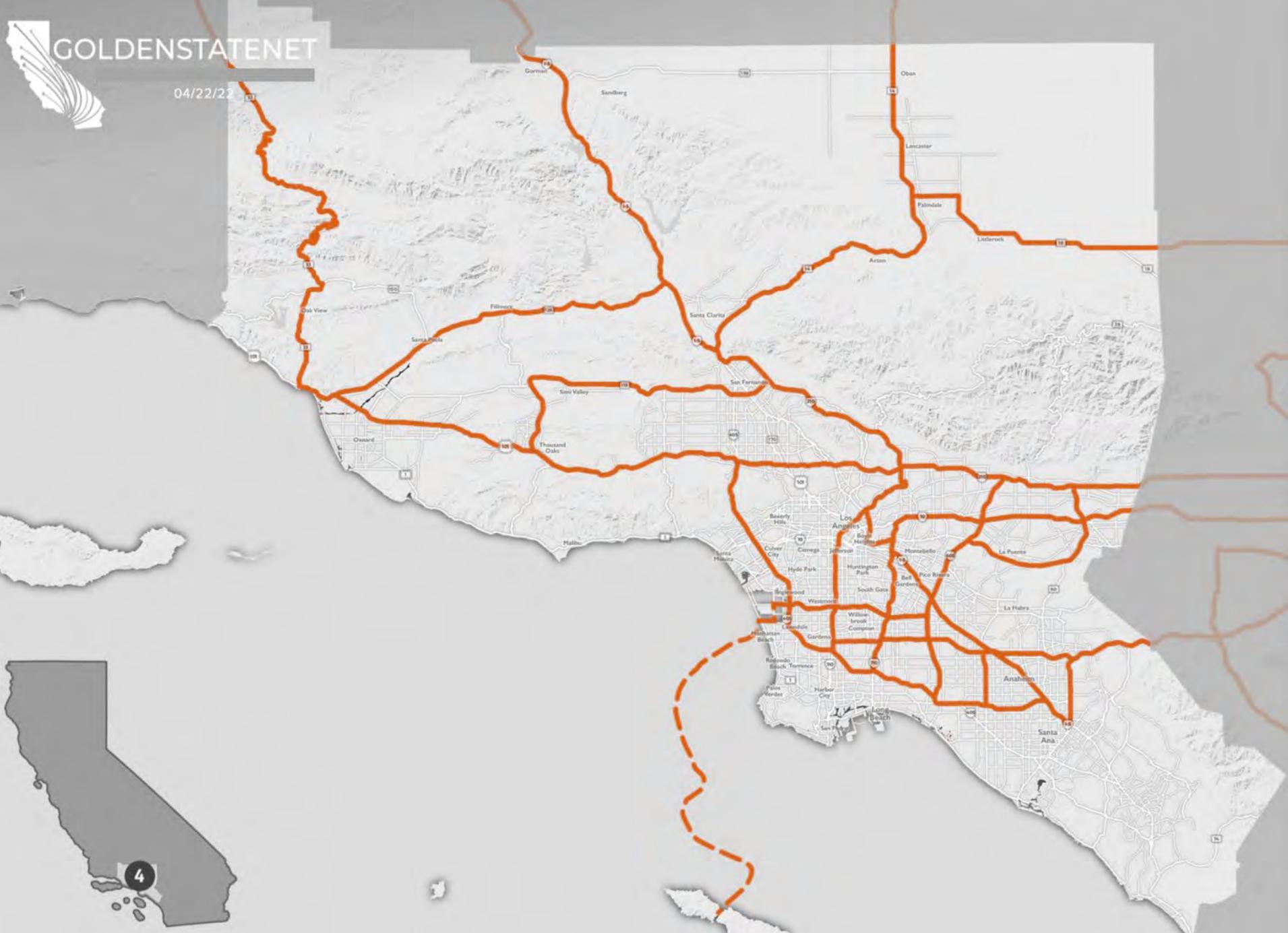


15-LOS ANGELES

16-ORANGE

- LEGEND**
- State & National Highways
  - Tribal Nations
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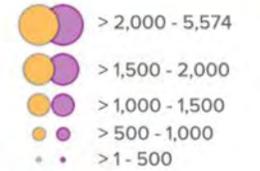
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# REGION 4

- TPA Proposed Network
- CPUC Unserved Residential & Non-Residential
- Percent Households Below Poverty Line

### Unserved Residential & Unserved Non-Residential



### Percent Households Below Poverty Line

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### LEGEND

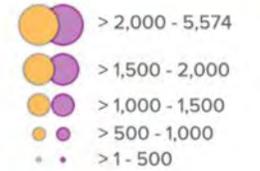
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# REGION 4

- CPUC Anchor Builds
- TPA Proposed Network
- CPUC Unserved Residential & Non-Residential
- Percent Households Below Poverty Line

### Unserved Residential & Unserved Non-Residential

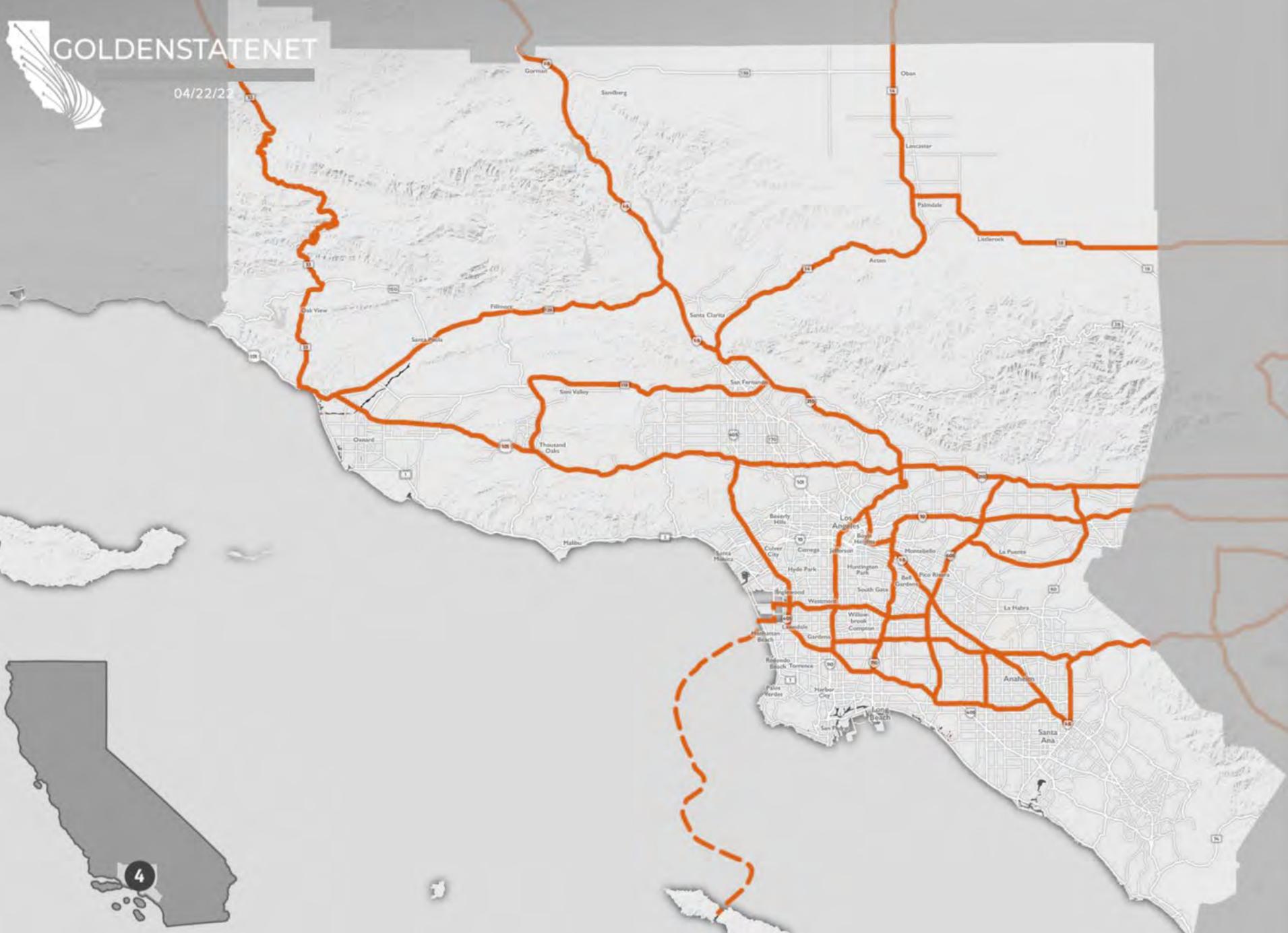


### Percent Households Below Poverty Line

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**LEGEND**

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# REGION 4: KEY HIGHLIGHTS

## **Geographic/Environmental:**

- Portions of region are densely populated urban areas.
- Further analysis required for Catalina Island.

## **Population:**

- Service affordability will be key due to socioeconomic factors in parts of the region.

## **Technical/Business-related:**

- Significant joint build opportunities.
- Multiple telecom carriers and considerable existing fiber in some areas create opportunities for IRU alternatives.
- Northeast area of the region lacks Caltrans ROW and may require further evaluation.

# REGION 5

# REGION 5 OVERVIEW MAP

- Regions 1 - 5
- TPA Proposed Network
- Tribal Nations



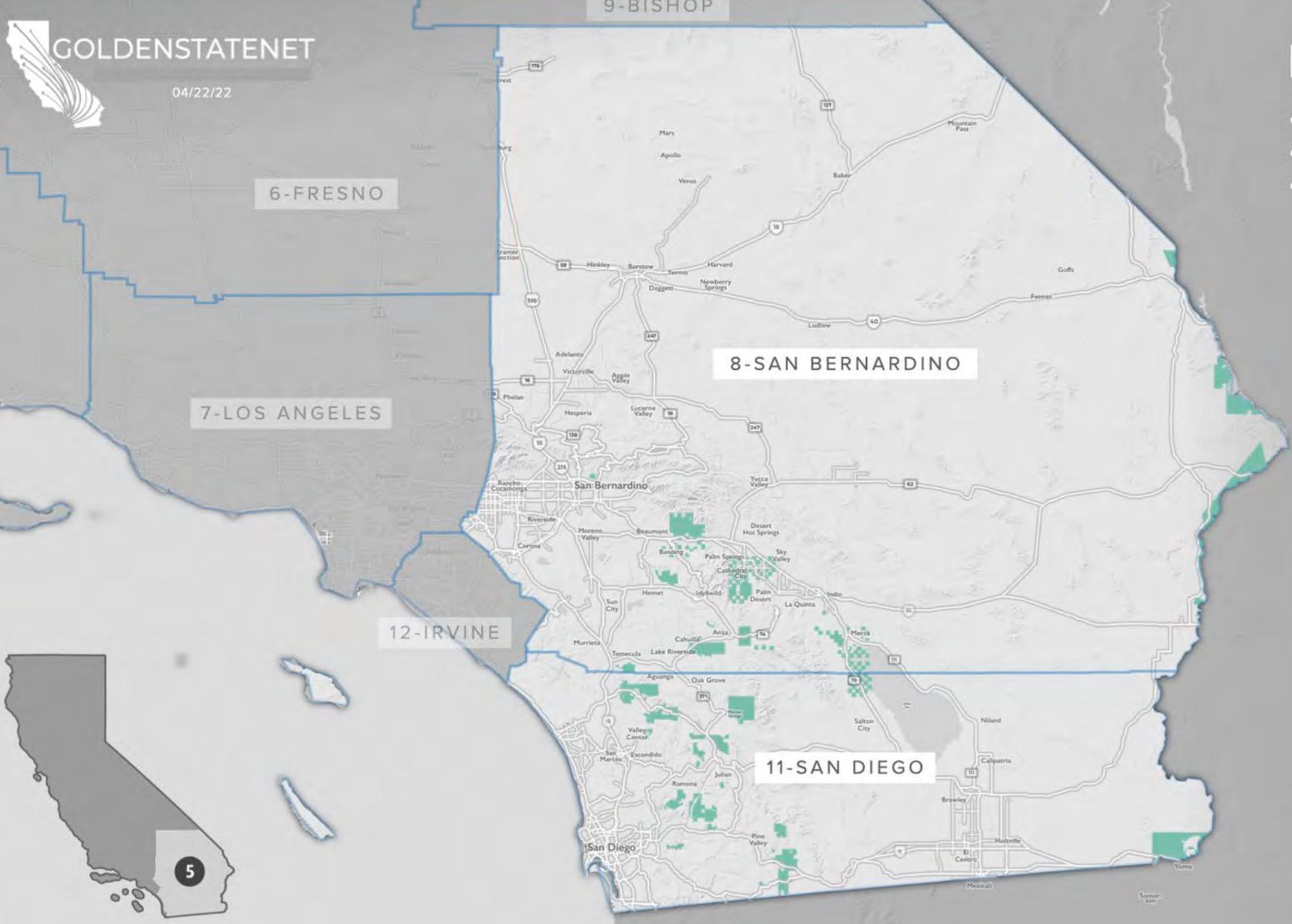
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# REGION 5

- State & National Highways
- Tribal Nations
- Caltrans Districts

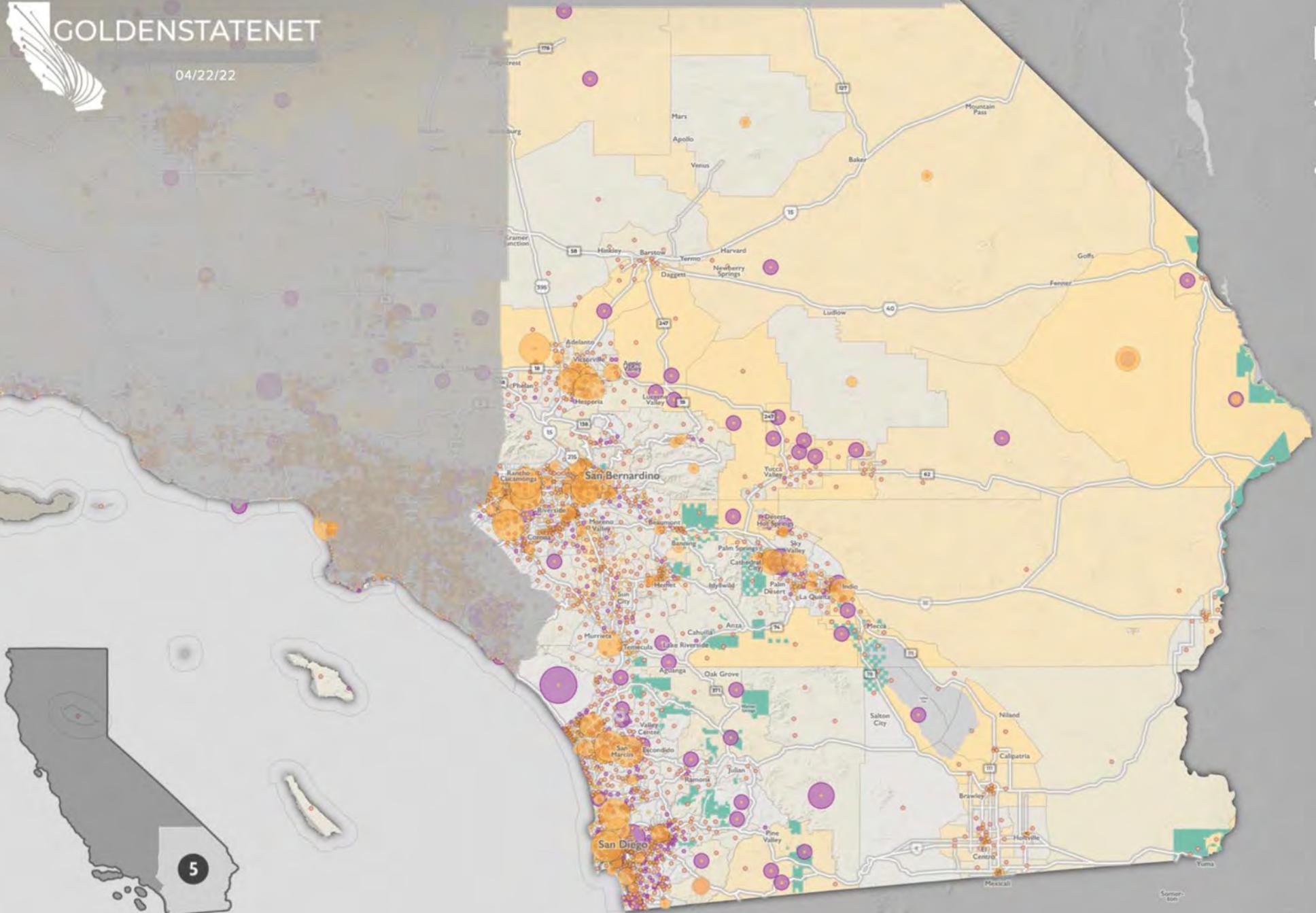


**LEGEND**

- State & National Highways
- Tribal Nations
- Caltrans Districts
- Initial 18 TPA Projects
- CalREN Backbone
- Recommended Hut Locations
- TPA Proposed Network
- CPUC Anchor Builds

# REGION 5

- CPUC Unserved Residential & Non-Residential
- Percent Households Below Poverty Line



### Unserved Residential & Unserved Non-Residential

- > 2,000 - 5,574
- > 1,500 - 2,000
- > 1,000 - 1,500
- > 500 - 1,000
- > 1 - 500



### Percent Households Below Poverty Line

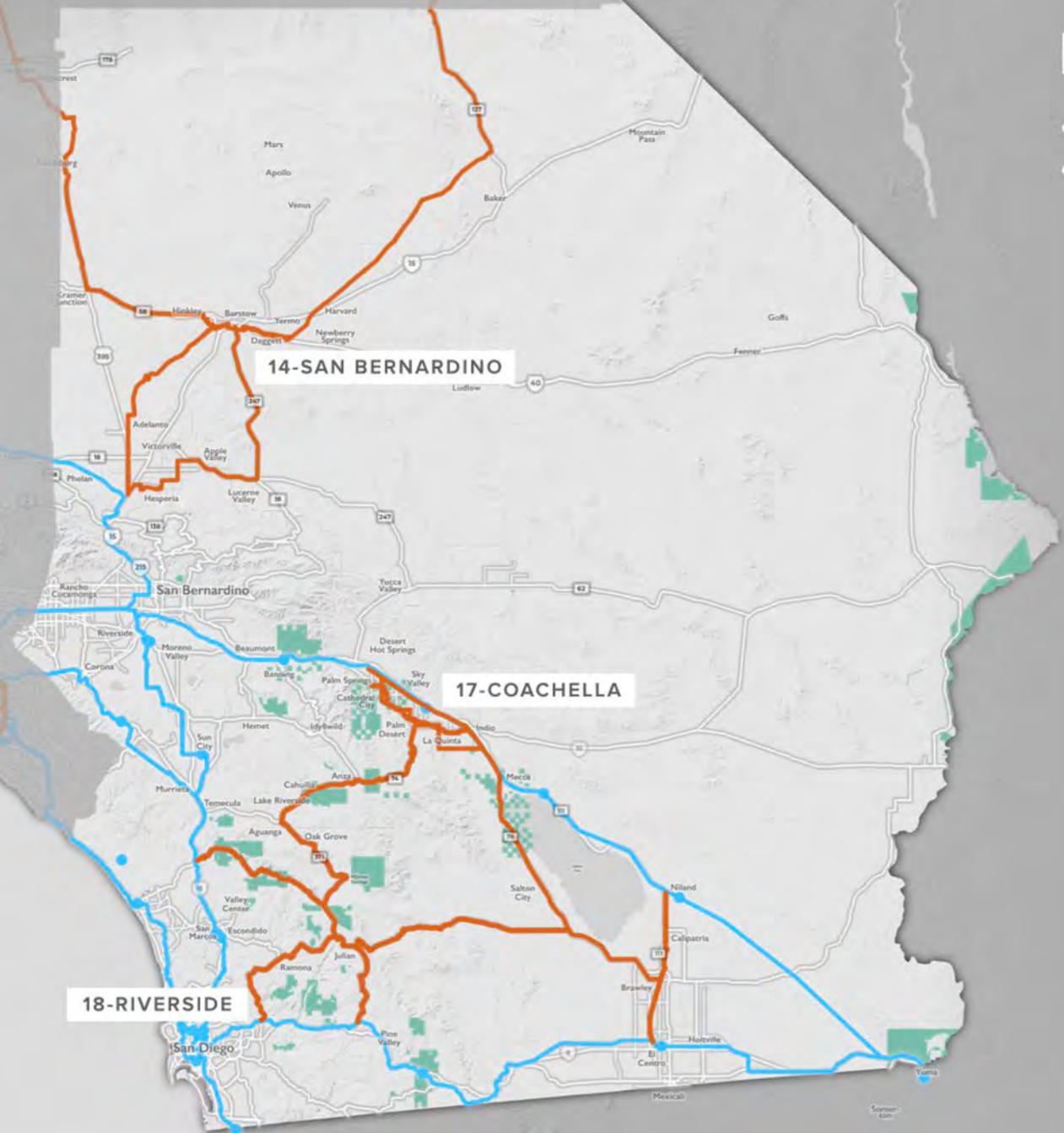
Census tract data from U.S. Census Bureau's American Community Survey (ACS) - 2015-2019 5-year estimates

### LEGEND

- ▬ State & National Highways
- Tribal Nations
- ▬ Caltrans Districts
- ▬ Initial 18 TPA Projects
- ▬ CalREN Backbone
- ◆ Recommended Hut Locations
- ▬ TPA Proposed Network
- ▬ CPUC Anchor Builds

# REGION 5

- Initial TPA Projects - 1/31/22
- CalREN Backbone



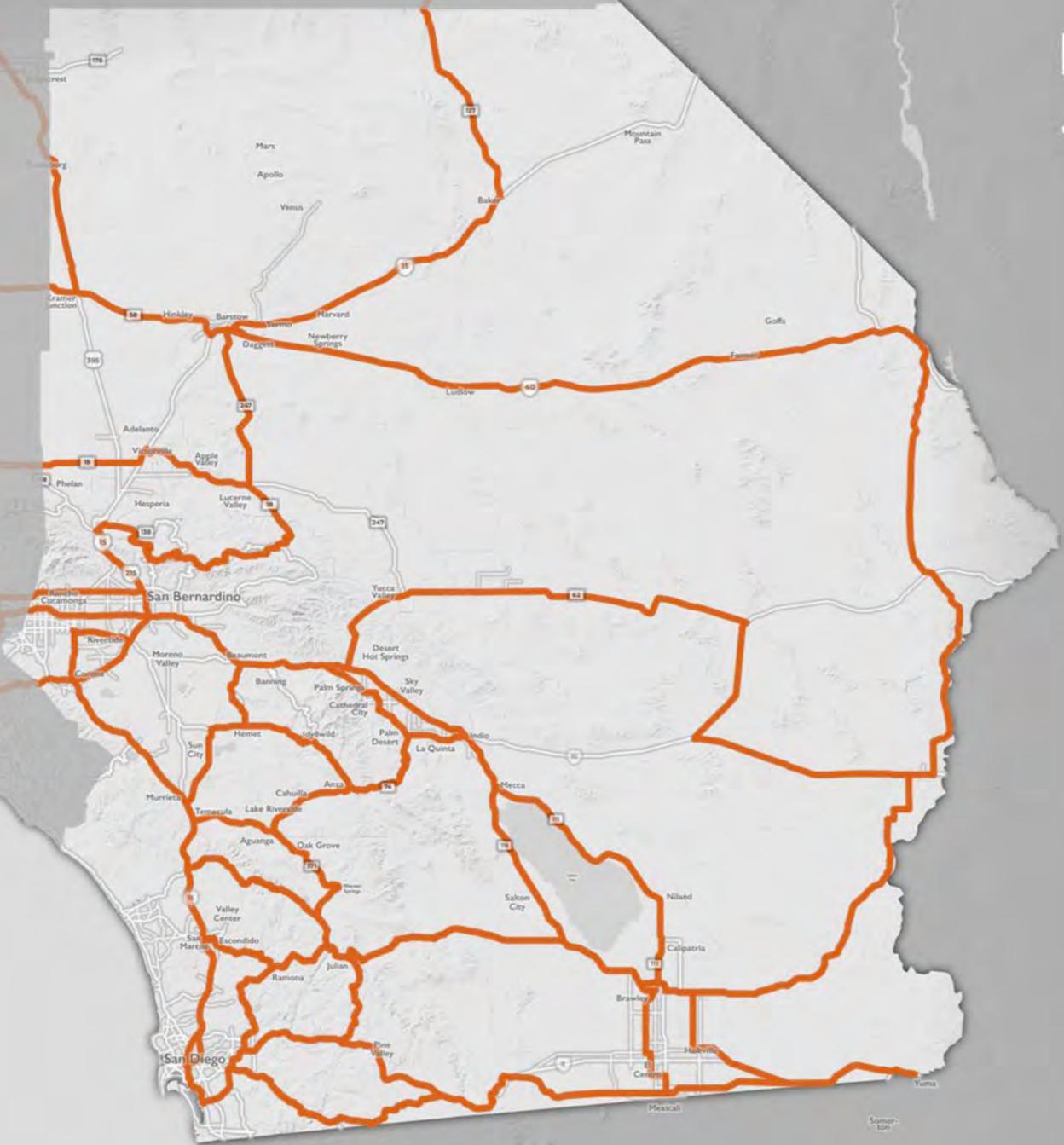
**14-SAN BERNARDINO**

**17-COACHELLA**

**18-RIVERSIDE**

**LEGEND**

-  State & National Highways
-  Tribal Nations
-  Caltrans Districts
-  Initial 18 TPA Projects
-  CalREN Backbone
-  Recommended Hwt Locations
-  TPA Proposed Network
-  CPUC Anchor Builds



**LEGEND**

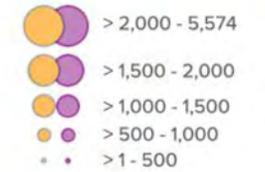
-  State & National Highways
-  Tribal Nations
-  CalREN Backbone
-  Initial 18 TPA Projects
-  CalREN Backbone
-  Recommended Hot Locations
-  TPA Proposed Network
-  CPUC Anchor Builds

# REGION 5

- TPA Proposed Network
- CPUC Unserved Residential & Non-Residential
- Percent Households Below Poverty Line



### Unserved Residential & Unserved Non-Residential



### Percent Households Below Poverty Line

Census tract data from U.S. Census Bureau's American Community Survey (ACS) - 2015-2019 5-year estimates

### LEGEND

- State & National Highways
- Tribal Nations
- Caltrans Districts
- Initial 18 TPA Projects
- CalREN Backbone
- Recommended Hut Locations
- TPA Proposed Network
- CPUC Anchor Builds

# REGION 5

- CPUC Anchor Builds
- TPA Proposed Network
- CPUC Unserved Residential & Non-Residential
- Percent Households Below Poverty Line

### Unserved Residential & Unserved Non-Residential



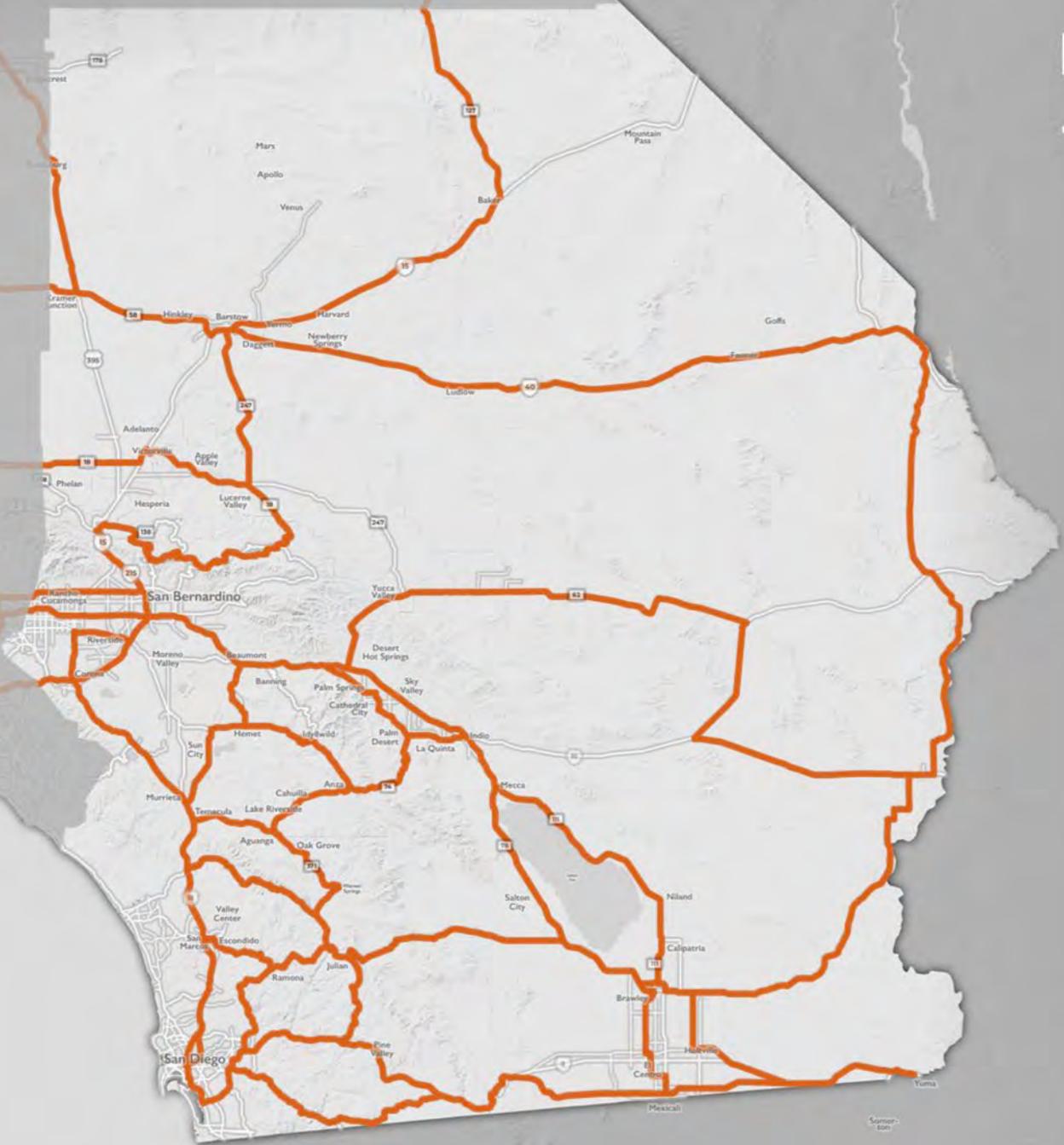
### Percent Households Below Poverty Line

Census tract data from U.S. Census Bureau's American Community Survey (ACS) - 2015-2019 5-year estimates

### LEGEND

- State & National Highways
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**LEGEND**

-  State & National Highways
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-  Recommended Hvt Locations
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-  CPUC Anchor Builds

# REGION 5: KEY HIGHLIGHTS

## **Geographic/Environmental:**

- Includes densely populated urban areas as well as desert regions prone to extreme heat.

## **Population:**

- Significant number of Tribal Nations in the region will be positively impacted by suggested routes.
- Service affordability will be key due to socioeconomic factors in parts of the region.

## **Technical/Business-related:**

- Significant opportunities to connect to other major Internet hubs in the West.
- Multiple telecom carriers and considerable existing fiber in some areas create opportunities for IRU alternatives.



GOLDENSTATENET

04/22/22

## OVERVIEW MAP

- TPA Proposed Network

