



## T-Mobile Wireless Communications3 Location Closure Assessment Riverside, CA

**Objective:** To determine among three strategies:

1. Increase Tower signal range by 5km;
2. Increase tower height by 10m; or
3. Increase tower site location by 3 towers.

which strategy will maximize T-Mobile cellular coverage in L.A. County.

**Methodology:**

First, GCG determined the current T-Mobile coverage with the existing 105 site locations. Site locations, transmitter height (tower/site height), as well as topographical consideration were considered in a viewshed analysis. Viewshed analysis determined that currently, T-Mobile has total land area coverage of 26.95%. (See 'Current Coverage')

Topography and population density were examined relative to T-Mobile's current coverage area. Current tower locations are clustered in the most heavily populated areas of the county. However, prominent gaps in coverage in populated places are evident. (See 'Coverage / Population Density')

The first option was to increase the power output and thus range of the transmitters to increase coverage from 25km to 30km. In reviewing the new viewshed analysis of this option, we do see some increased coverage, resulting in approximately a 3% boost to coverage area. However, it should be noted that much of the additional coverage area is realized in less densely populated areas. (See 'Option 1: Extended Tower Range')

Next, GCG explore the effect of increasing the height of each tower by 10m towards achieving increased coverage area. As evidenced by the viewshed analysis, this was the least effective strategy resulting in negligible increased coverage area. The high terrain topology of the region greatly limits the results of this option, more suitable to flat terrain areas. (See 'Option 2: 10m Increase in Tower Height')

The last option that we examined was to add 3 new lower locations. In making site recommendations, we attempted to site the towers in areas under-served by the coverage and that have higher population densities. The locations we chose sought to site on the highest available ground and suggest a tower height of 90m. The locations selected are:

1. 34.469022, -118.574715
2. 34.046348, -118.791279
3. 34.465256, -118.214738

The site locations would improve coverage area in Malibu, Santa Clarita, and Acton. While the statistical data indicates a 1.35% increase in land area coverage, GCG believes that this added footprint impacts the greatest population areas.

**Recommendations:**

In making our recommendation, GCG considered many data points, including:

- Topography
- Population density
- Statistical land area

**Final Recommendation:**

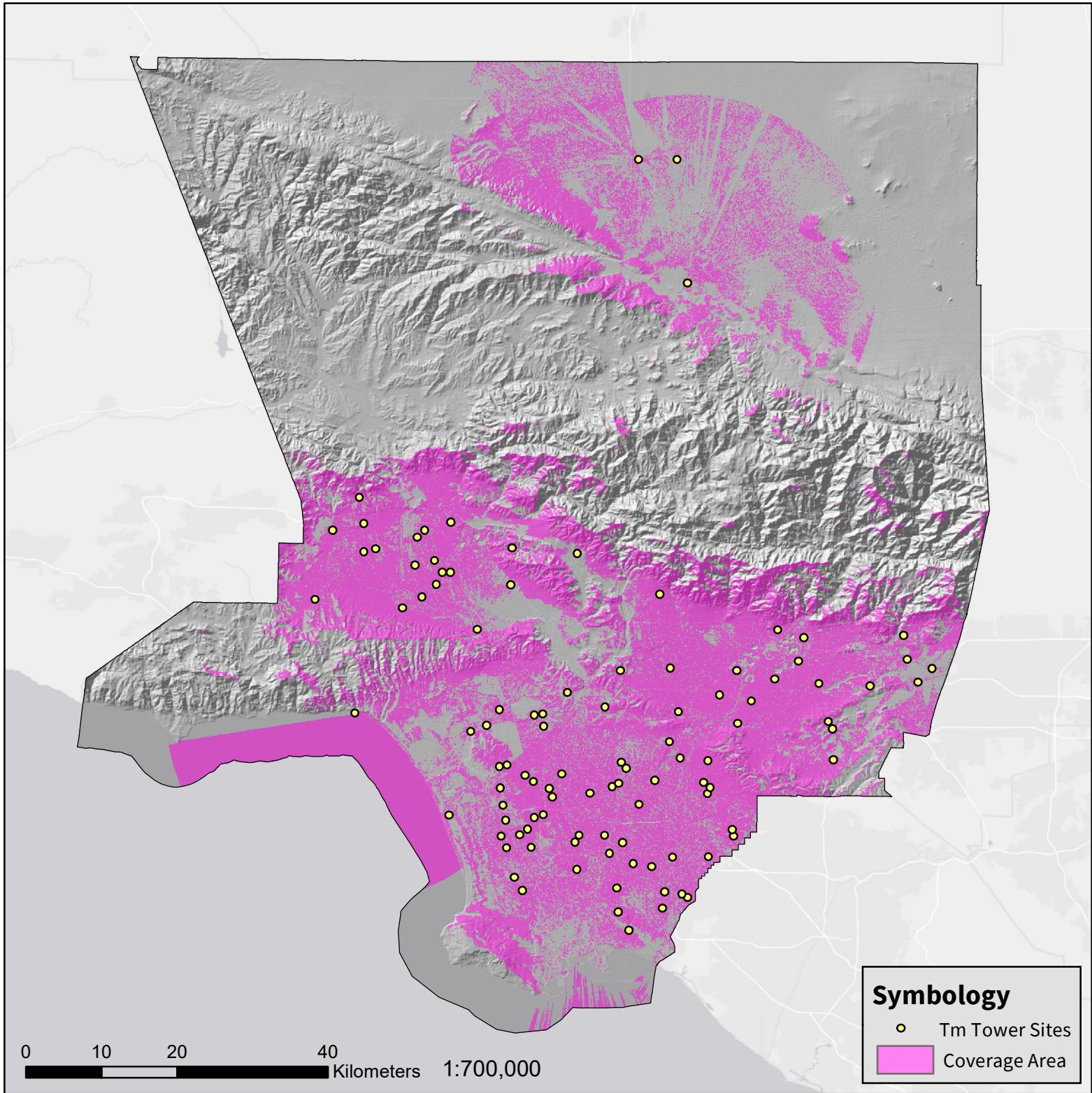
It is the recommendation of GCG that T-Mobile consider siting 3 new towers. The tower locations suggested in this report are not definitive, but representative of areas with under-served populations. Upon acceptance of this strategy, CGC could take a more in-depth analysis of other siting options that have the potential to further maximize the land area coverage and population served.

# T-Mobile Expansion

## L.A. County, CA

### Current Coverage

Objective: Improve Coverage  
Current Sites: 105  
Current Coverage: 26.95%



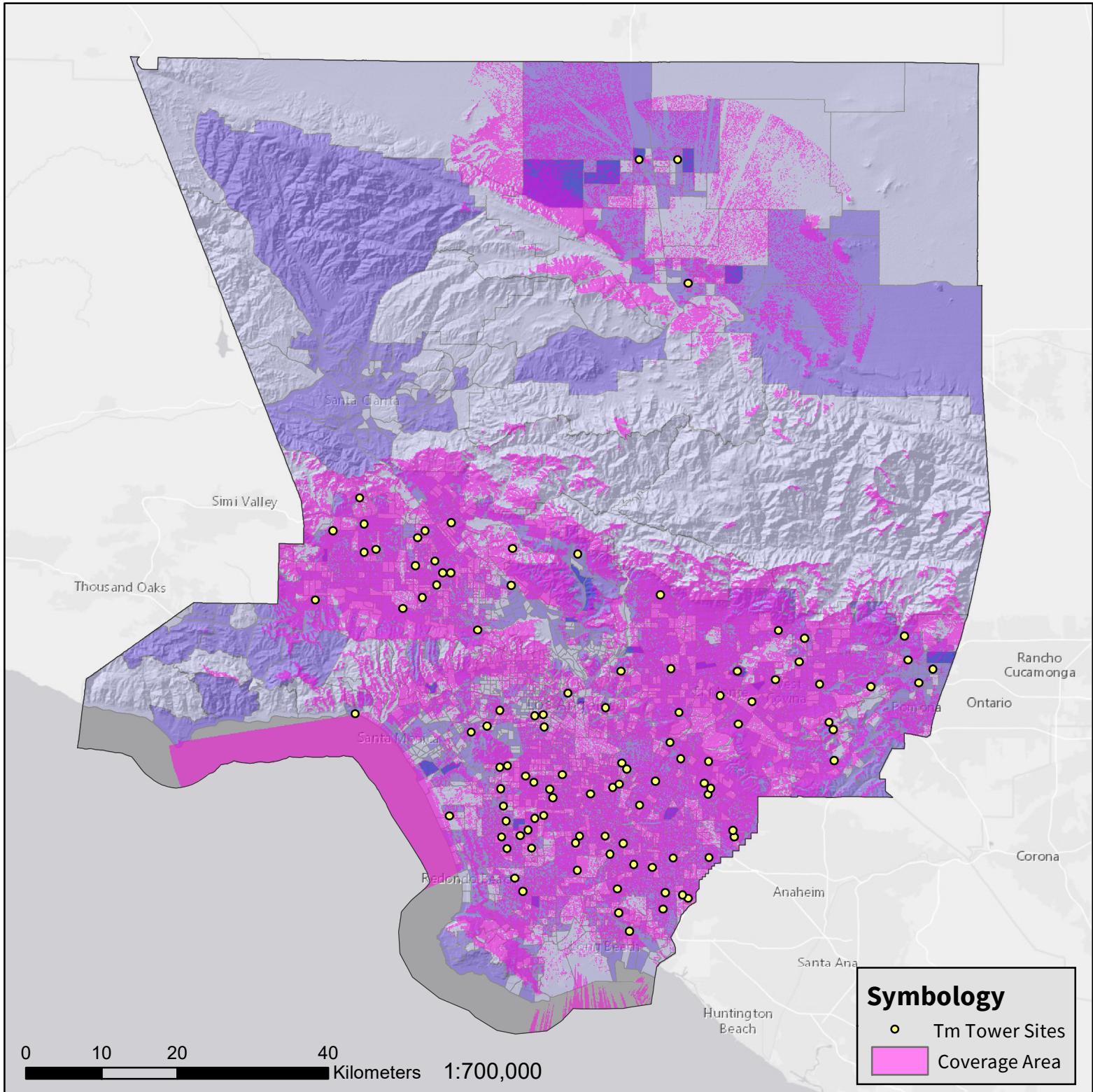
Data Source: T-Mobile, Tower Sites, UCLA GEO-LX-169 course website; LA County, DEM, USGS Earth Explorer, <https://earthexplorer.usgs.gov/>

Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

#### Current T-Mobile Cellular Coverage in LA County

Current land area coverage: 26.95%

Current uncovered land area: 73.05%

**GcG****Grady Consulting Group****T-Mobile Expansion****L.A. County, CA****Coverage / Population Density****Objective: Improve Coverage****Current Sites: 105****Current Coverage: 26.95%**

Data Source: T-Mobile, Tower Sites, UCLA GEO-LX-169 course website; LA County, DEM, USGS Earth Explorer, <https://earthexplorer.usgs.gov/>; Population, USCB, ACS, 2019 - 5yr Estimates, <https://data.census.gov/cedsci/all?y=2018&tid=ACSDT5Y2018.B00001&d=ACS%205-Year%20Estimates%20Detailed%20Tables&hidePreview=false> Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

**Population Symbology**

People	
0.0 - 4,000	
4000.1 - 8,000	
8,000.1 - 12,653	

**Cartography by Dan Grady, GCG**

# T-Mobile Expansion

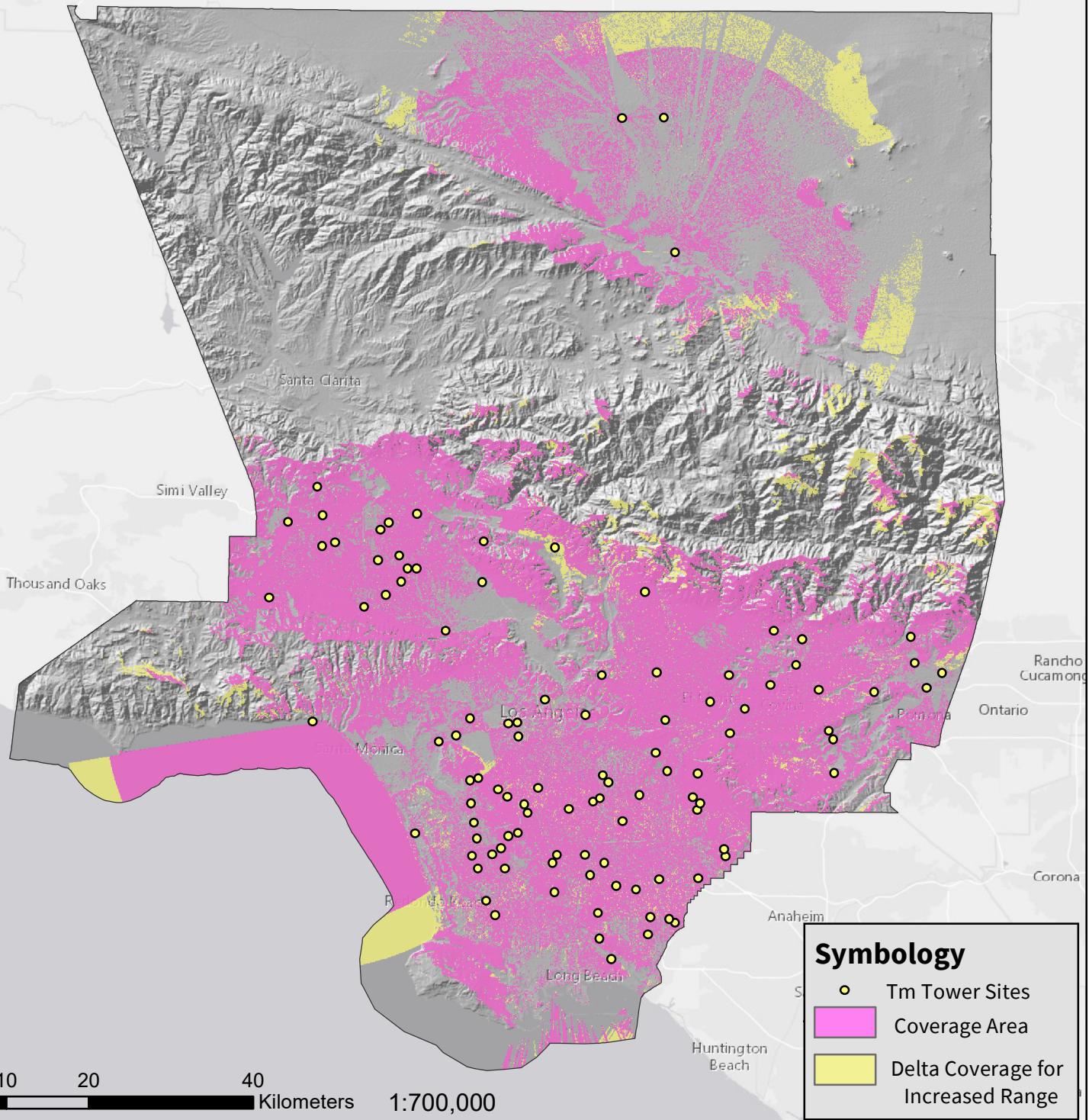
## L.A. County, CA

Objective: Improve Coverage

Current Sites: 105

Current Coverage: 26.95%

Option1: Extended Tower Range



Data Source: T-Mobile, Tower Sites, UCLA GEO-LX-169 course website; LA County, DEM, USGS Earth Explorer, <https://earthexplorer.usgs.gov/>; Population, USCB, ACS, 2019 - 5yr Estimates, <https://data.census.gov/cedsci/all?y=2018&tid=ACSDT5Y2018.B00001&d=ACS%205-Year%20Estimates%20Detailed%20Tables&hidePreview=false>. Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

**Option 1: Increase Cell Tower Range by 5,000m**  
**Increased coverage area as a percent of total land area in LA County is marginal with a 3% increase. Additionally, the increased coverage does not significantly impact underserved population areas.**

**Improved total land area coverage: 30.1%**

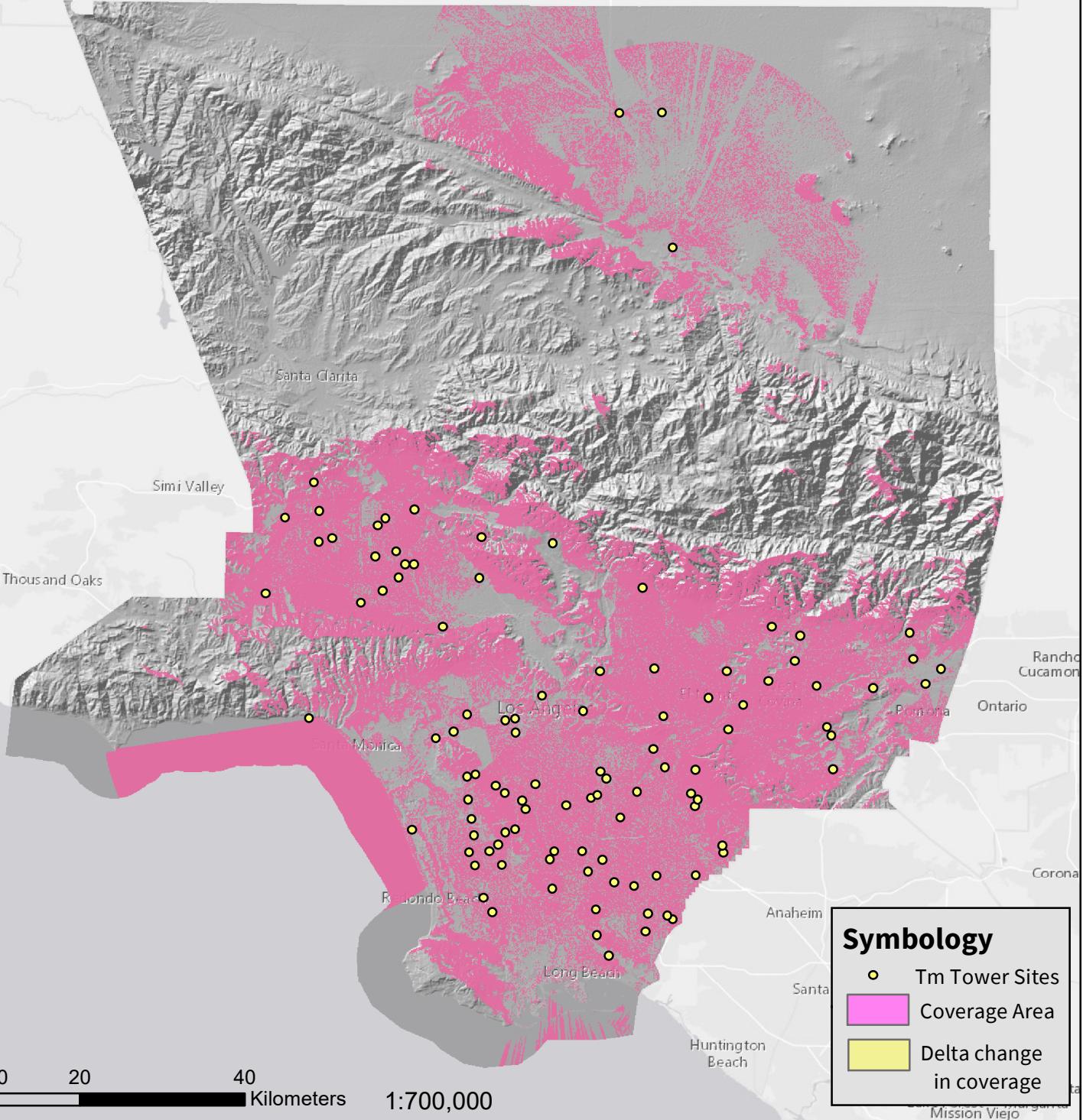
Cartography by Dan Grady, GCG

# T-Mobile Expansion

## L.A. County, CA

Objective: Improve Coverage  
 Current Sites: 105  
 Current Coverage: 26.95%

Option2: 10m Increase in Tower Height



Data Source: T-Mobile, Tower Sites, UCLA GEO-LX-169 course website; LA County, DEM, USGS Earth Explorer, <https://earthexplorer.usgs.gov/>; Population, USCB, ACS, 2019 - 5yr Estimates, <https://data.census.gov/cedsci/all?y=2018&tid=ACSDT5Y2018.B00001&d=ACS%205-Year%20Estimates%20Detailed%20Tables&hidePreview=false>. Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

### Option 2: Increase Tower Height by 10m

Increasing the tower height by 10 meters has a negligible effect on improving the coverage area in LA County. It provides a less than 1% improvement in coverage.

Current coverage of land area: 26.95%

Improved coverage of land area: 26.95%

Cartography by Dan Grady, GCG

# T-Mobile Expansion

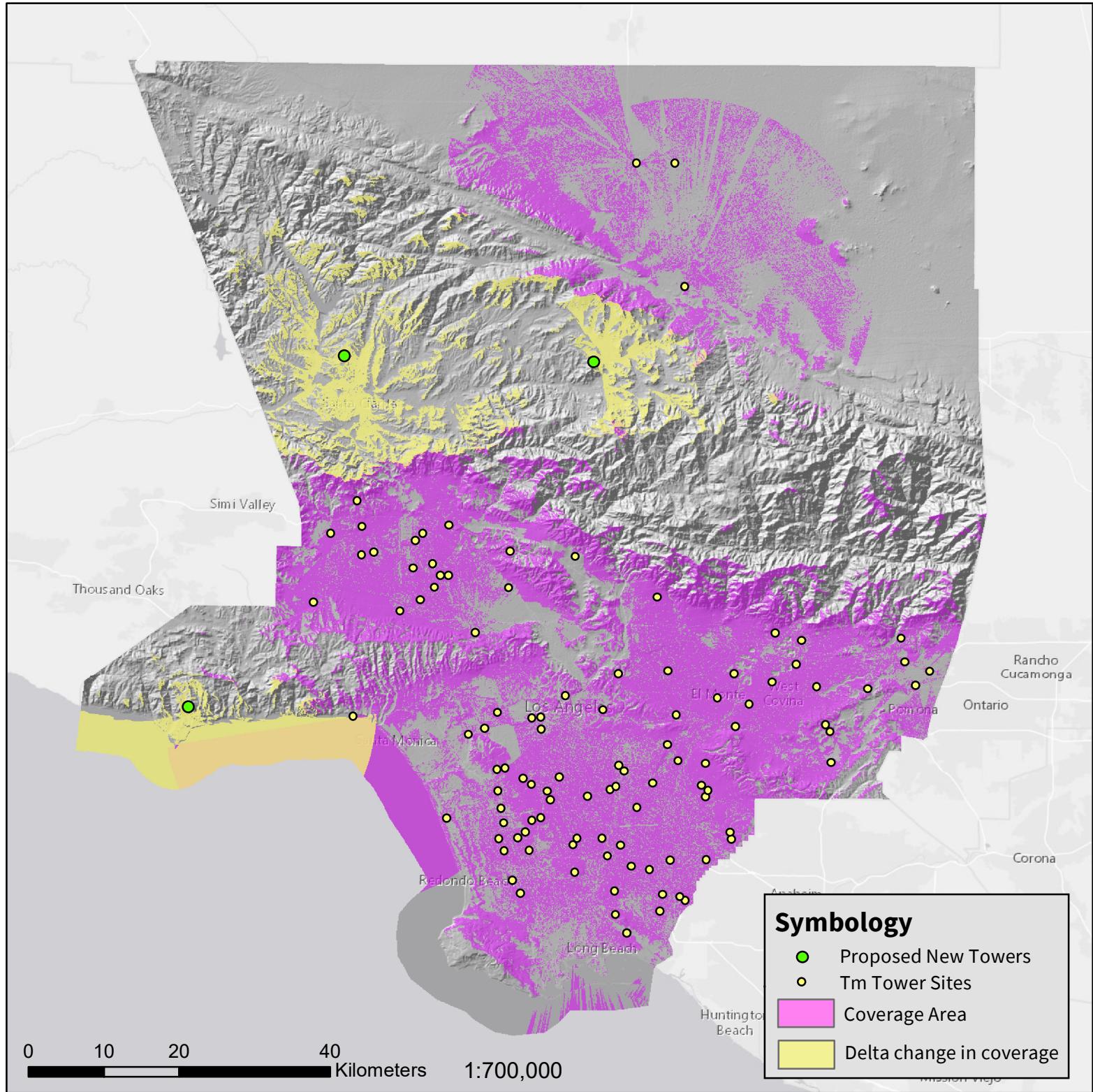
## L.A. County, CA

Objective: Improve Coverage

Current Sites: 105

Current Coverage: 26.95%

### Option3: Site 3 New Towers



Data Source: T-Mobile, Tower Sites, UCLA GEO-LX-169 course website; LA County, DEM, USGS Earth Explorer, <https://earthexplorer.usgs.gov/>; Population, USCB, ACS, 2019 - 5yr Estimates, <https://data.census.gov/cedsci/all?y=2018&tid=ACSDT5Y2018.B00001&d=ACS%205-Year%20Estimates%20Detailed%20Tables&hidePreview=false>. Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

### Option 3: Site 3 New Towers

Increasing the tower height by 10 meters has a negligible effect on improving the coverage area in LA County. It provides a little more than 1% improvement in coverage.

Current coverage of land area: 26.95%

Improved coverage of land area: 28.3%

Cartography by Dan Grady, GCG

## T-Mobile Expansion

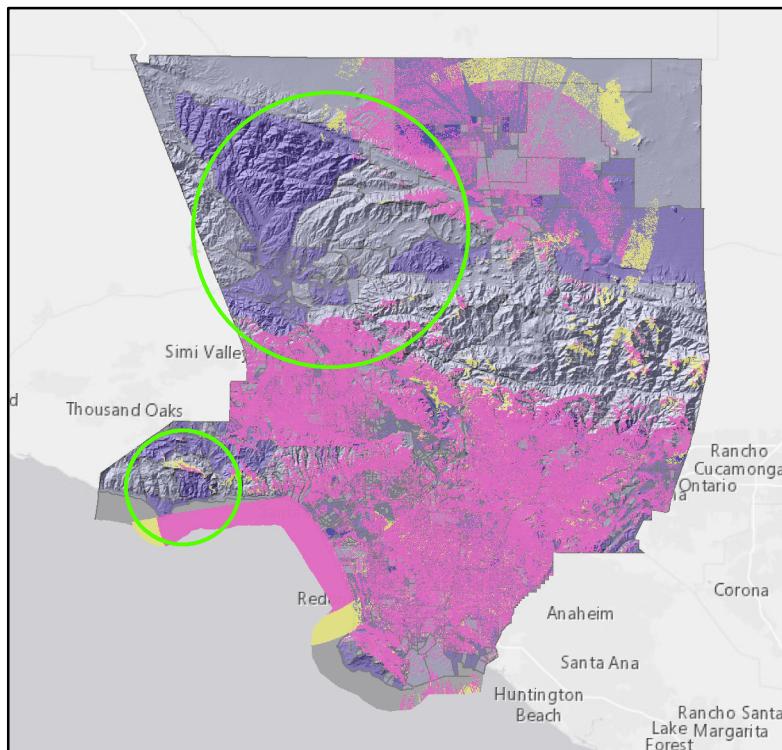
L.A. County, CA

## Comparative with Population Data

Objective: Improve Coverage

Current Sites: 105

Current Coverage: 26.95%



## Option 1: Increase Tower Range by 5km

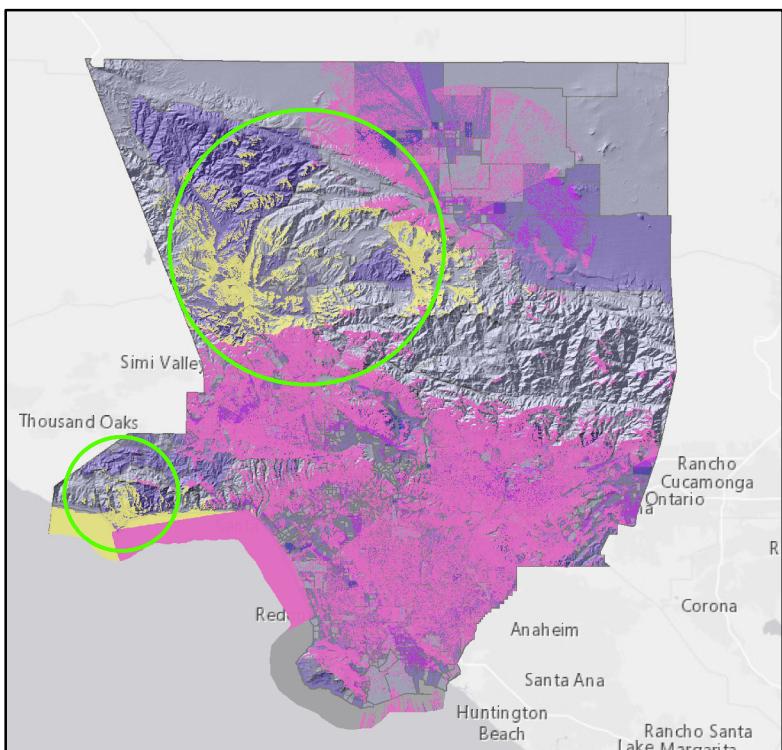
It is factual that by increasing the tower range by 5km, we obtain the largest increase in total land area coverage. However, by viewing this data in context of population, we see that the added coverage is achieved in areas of lesser density.

## Symbology

<span style="background-color: #f08080; border: 1px solid black; display: inline-block; width: 15px; height: 15px;"></span>	Current Coverage Area
<span style="background-color: #ffff00; border: 1px solid black; display: inline-block; width: 15px; height: 15px;"></span>	Delta Change in Coverage

## Population Density

<span style="background-color: #d9e1f2; border: 1px solid black; display: inline-block; width: 15px; height: 15px;"></span>	0. - 4000
<span style="background-color: #6a8dca; border: 1px solid black; display: inline-block; width: 15px; height: 15px;"></span>	4001 - 8000
<span style="background-color: #000080; border: 1px solid black; display: inline-block; width: 15px; height: 15px;"></span>	8001 - 12653



## Option 3: Add 3 New Tower Sites

While it is factual that the 3 new towers as placed in this report do not provide the statistically larger increase in total land coverage, we can see from the illustration to the left that the addition of new towers, strategically located around under-served population areas, achieve a greater result in increasing coverage over targeted population areas.

## Symbology

<span style="background-color: #f08080; border: 1px solid black; display: inline-block; width: 15px; height: 15px;"></span>	Current Coverage Area
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