

WIRELESS NETWORK CONSULTING

AZ-7050 / T-Mobile PH68124A

Coverage Cell Split

RF DESIGN ANALYSIS



Coverage vs Capacity

- † **Capacity is providing bandwidth or processing capacity to service the customers in the area.**
 - Areas where large numbers of users are in a specific geographic areas
 - Areas where users are demanding higher data rates for services
 - Areas with a large amount of mobile phone service users
- † **Coverage is Providing Service where service does not exist, calls drop, or “no service”.**
 - Areas where sites are farther apart
 - Areas where terrain or buildings block signals
 - Areas where indoor service is low or nonexistent

Objective of new site

† Capacity

- Provide bandwidth for customers in the area surrounding the proposed site

† Coverage

- Provide coverage for T-Mobile users Southwest of Maricopa

† Why is this site important?

- 96% of Americans own a Cellular Phone
- 57% of American Homes rely exclusively on cellular phones
- 84% or more of 9-1-1 emergency calls are made from wireless devices

Proposed Site

† 110' Mono-Elm Tower

- 992 South Rincon Road, Maricopa, AZ 85139
 - Latitude: 32.870933 N (NAD83)
 - Longitude: -112.132236 W (NAD83)
 - Ground Elevation: 1588.6' (NAVD88)
 - Anchor tenant is T-Mobile
- Antenna Centerline at 105' AGL

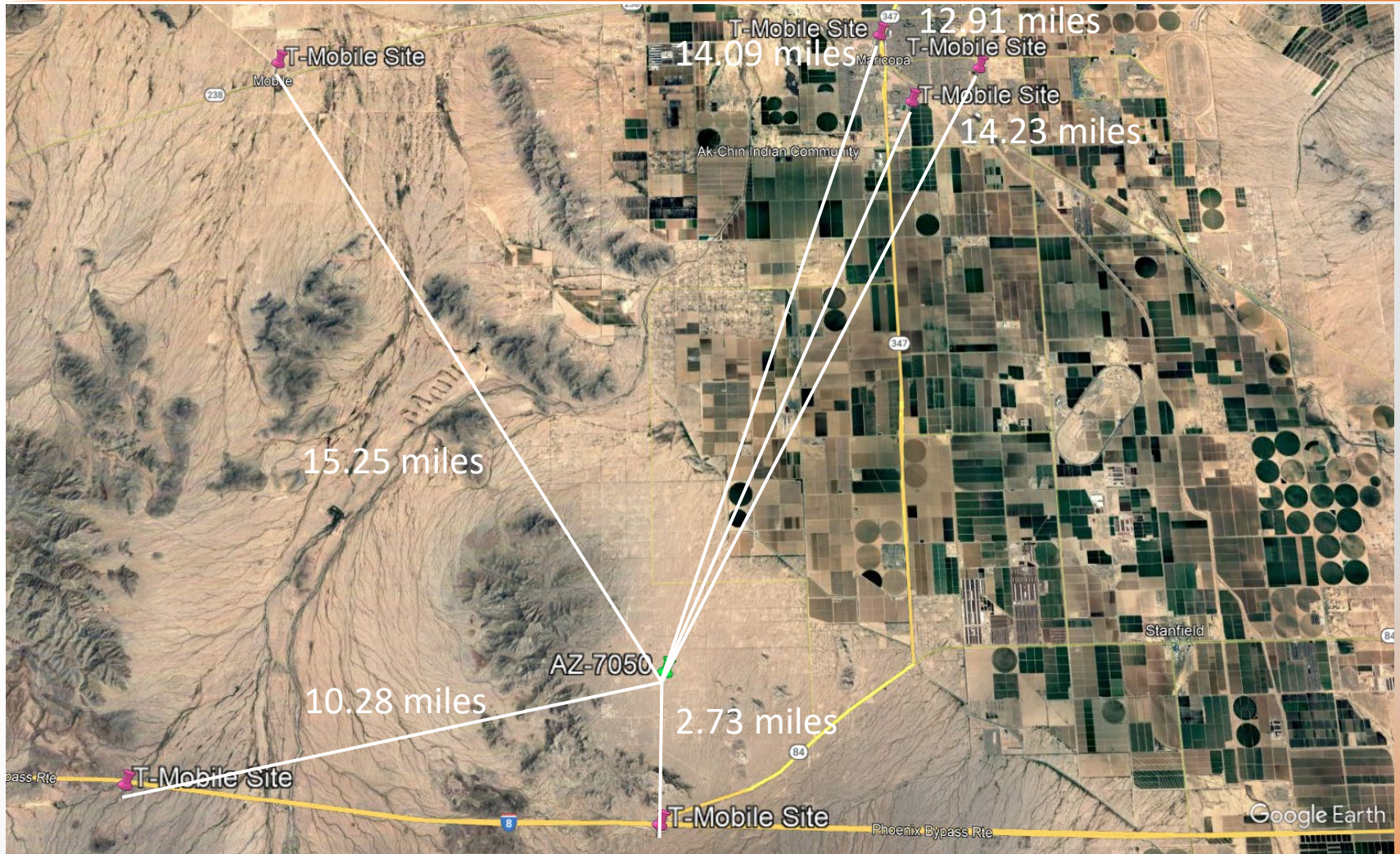
Why here?

- † Lack of coverage Southwest of Maricopa
- † Lack of services in the surrounding rural areas
- † This area is shown in propagation maps and end user mobile reports as a “Significant Gap in Service” area
- † Significant amount of increased network use in the suburban and rural areas of Arizona as more people are working from home and T-Mobile is expanding into these areas

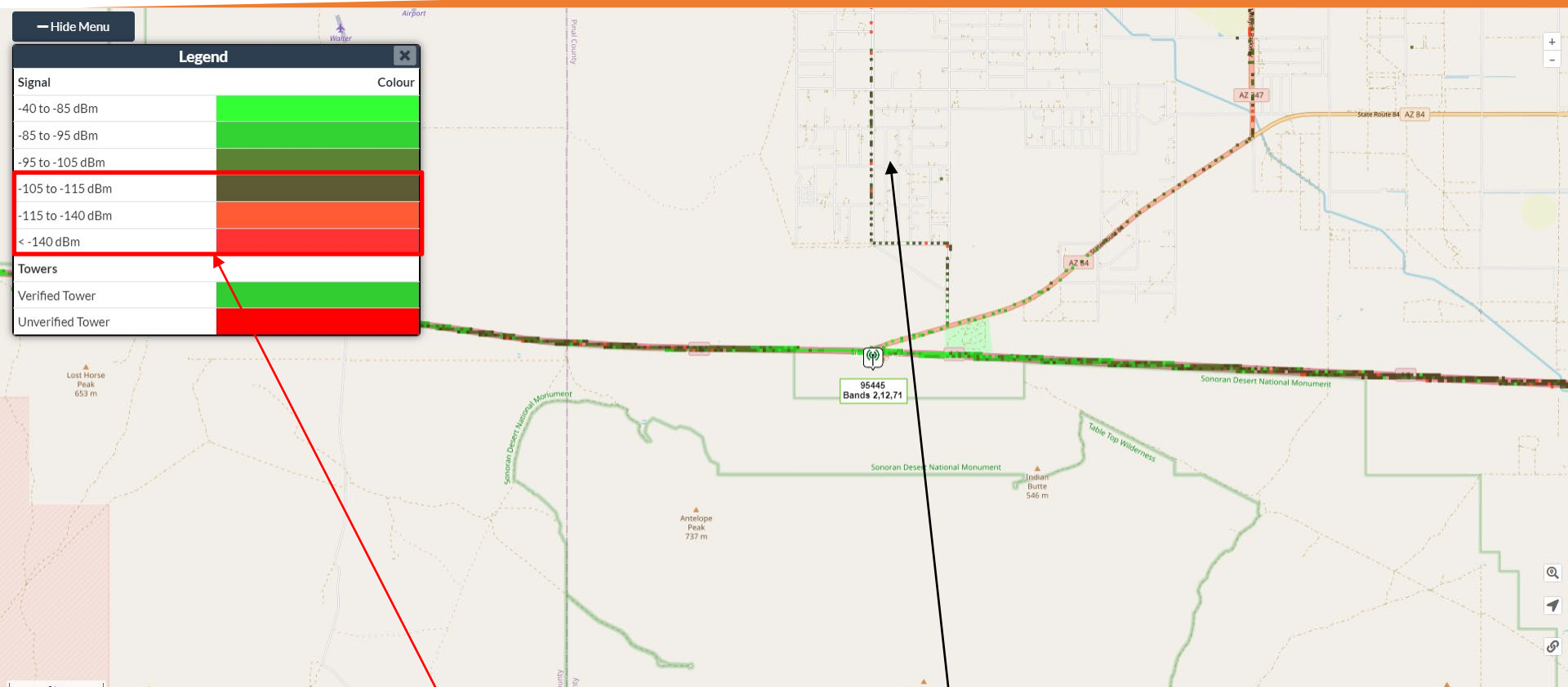
Zoom – proposed site



T-Mobile Sites

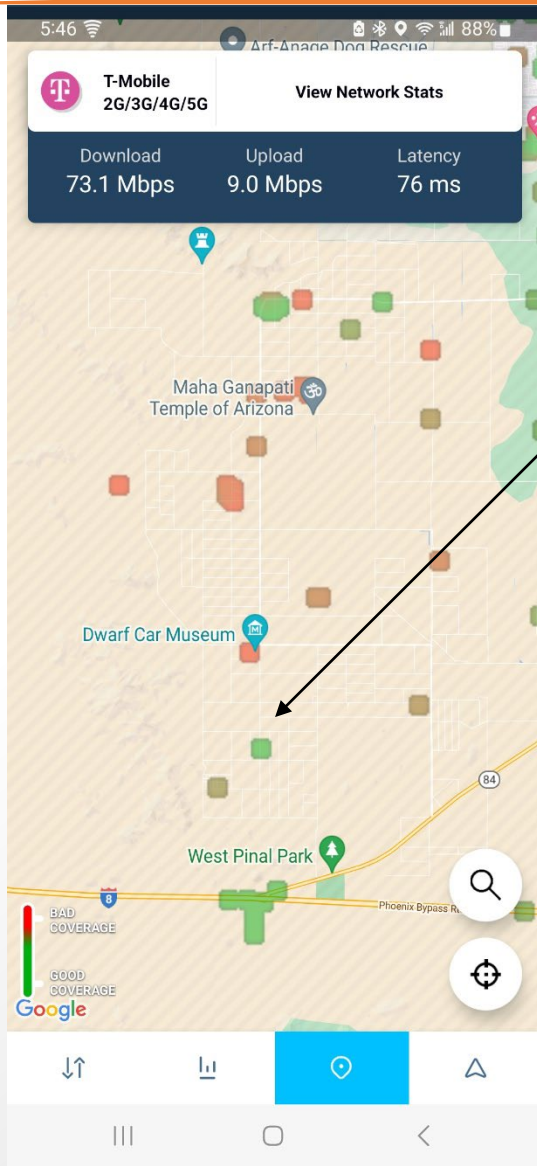


T-Mobile CellMapper



Poor Service Quality

Open Signal T-Mobile Quality Map

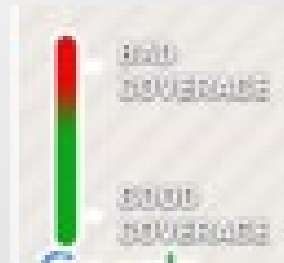


This map show mobiles reporting quality of their connections to the network. This is crowdsource data from T-Mobile users made available by the OpenSignal App:

<https://www.opensignal.com/apps#section-os-app>

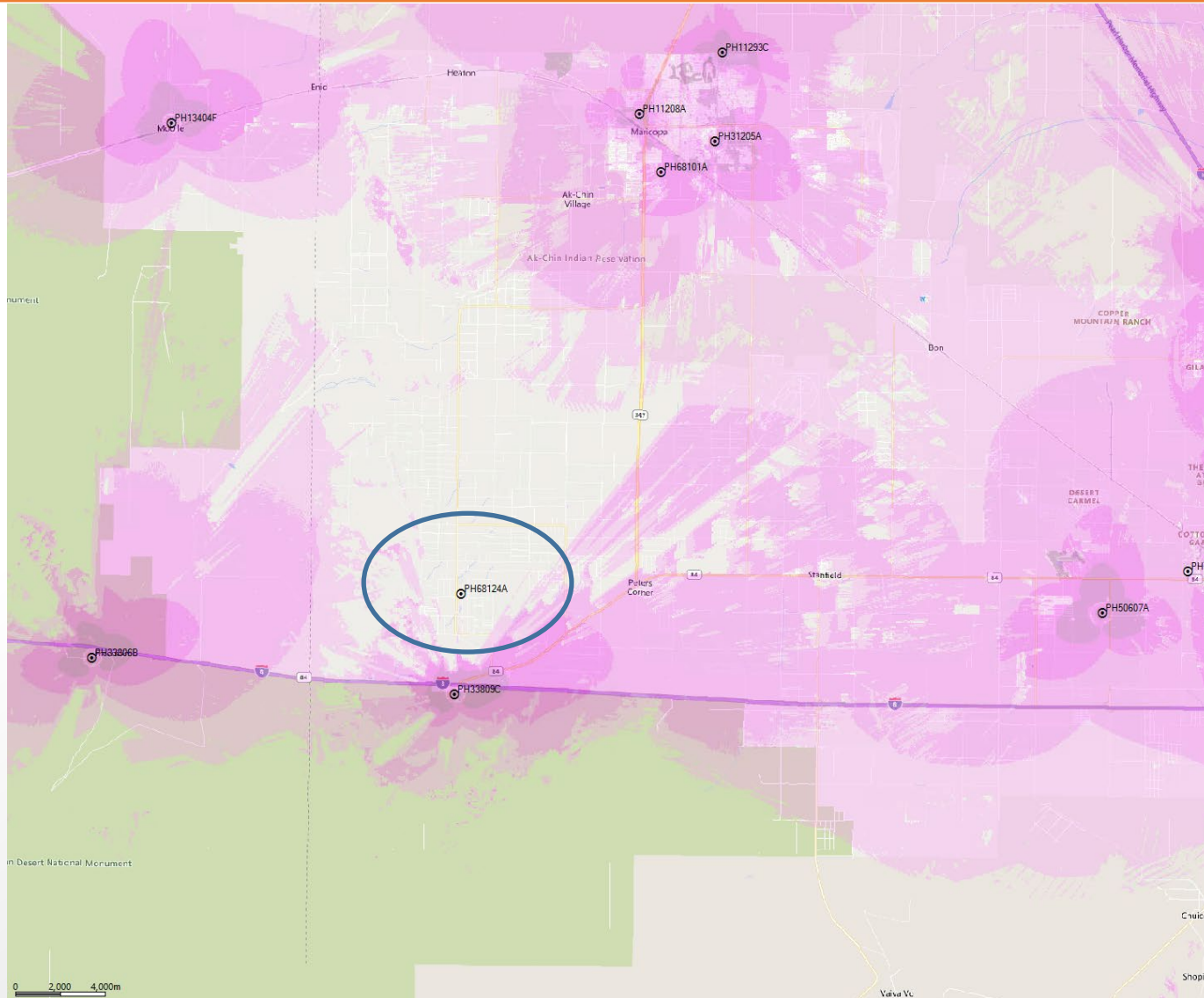
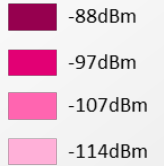
Green data points show good coverage and red data points show bad coverage and lack of data points show no coverage

Note the amount of mobile user reports in the area showing bad coverage



RSRP – Current Coverage

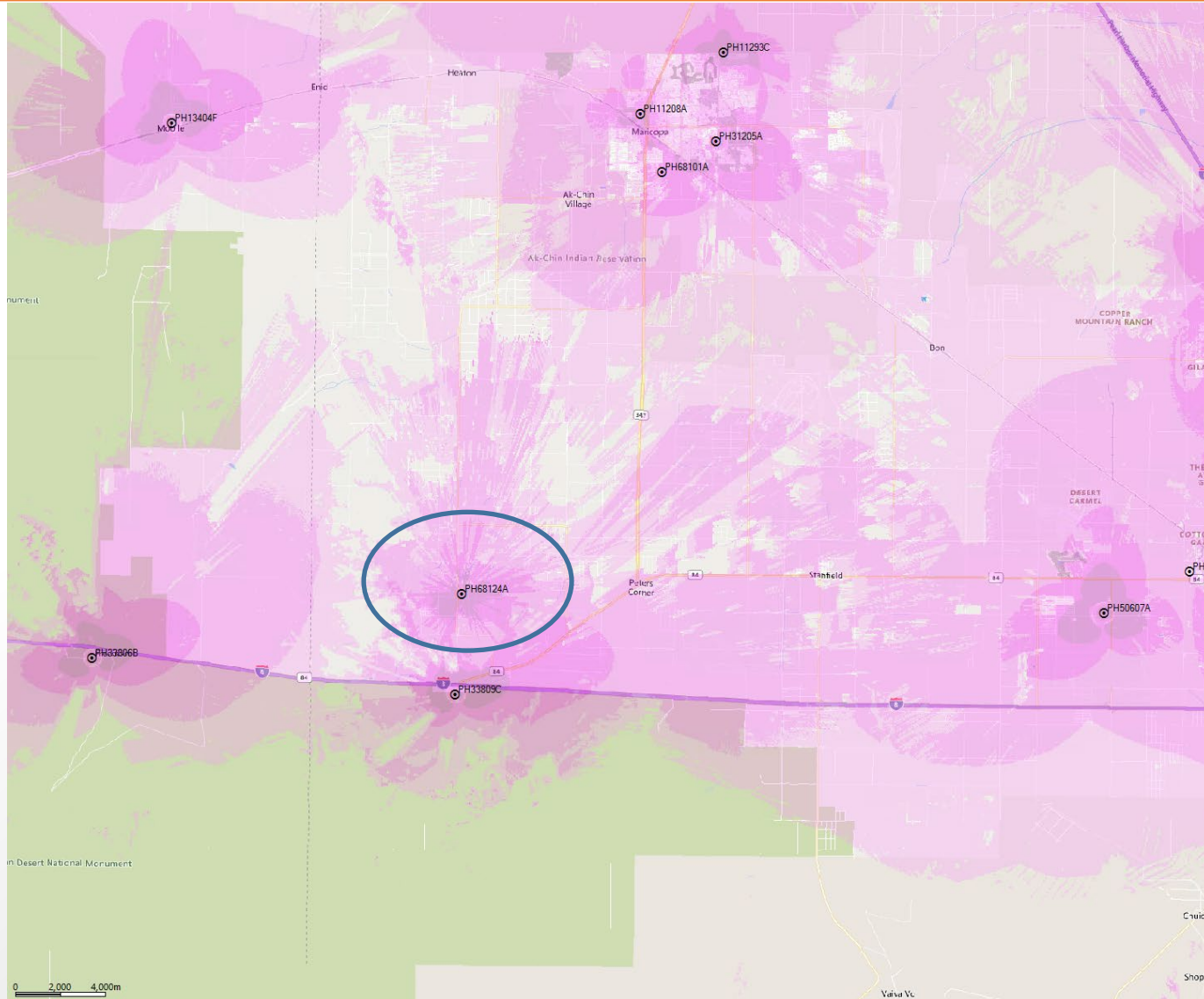
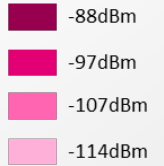
Legend



2023

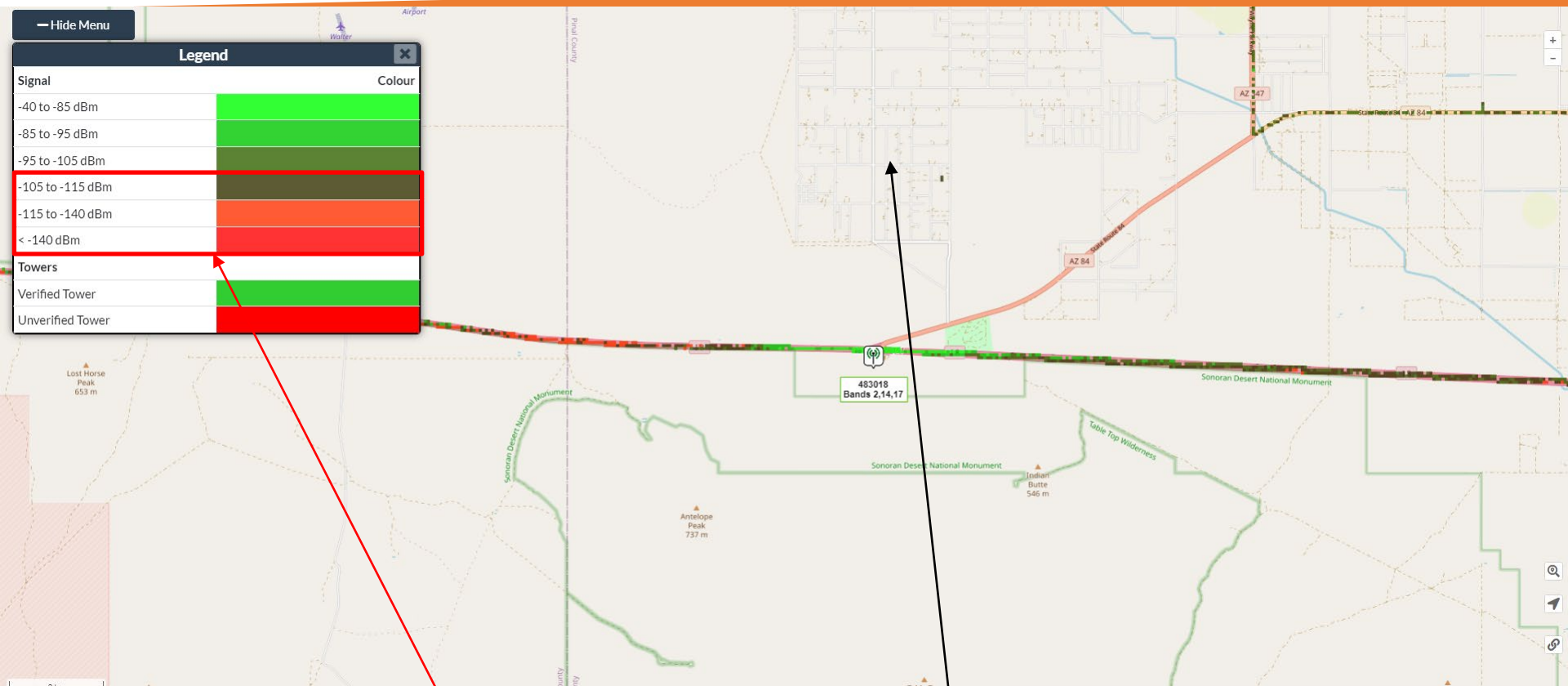
RSRP – Proposed Coverage Mid Band

Legend



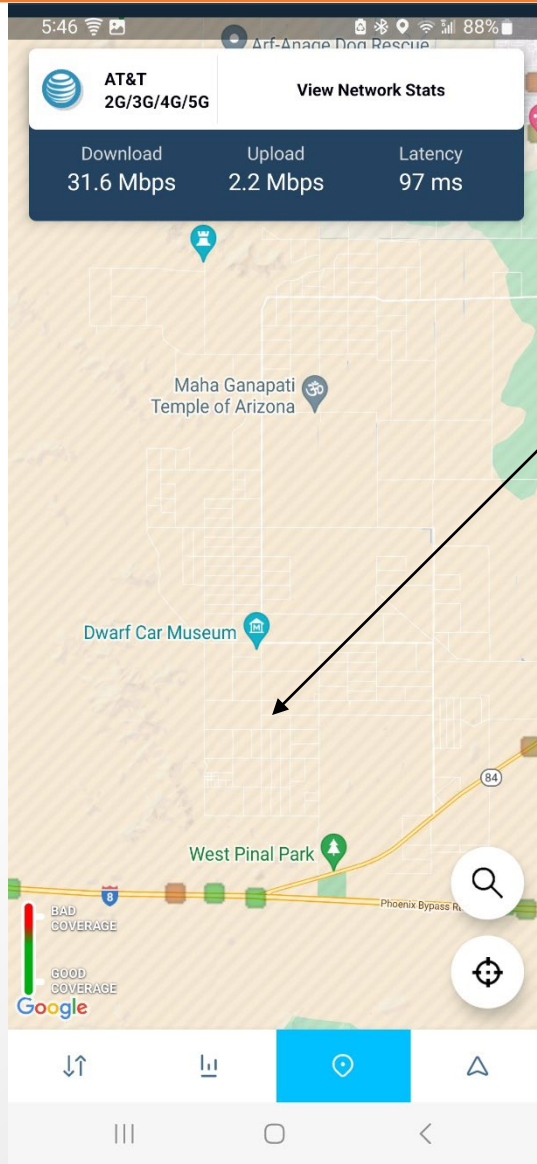
2023

AT&T CellMapper



Poor Service Quality

Open Signal AT&T Quality Map

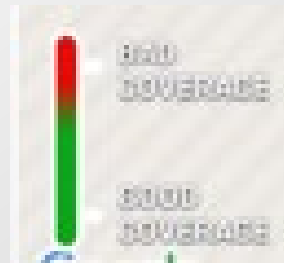


This map shows mobiles reporting quality of their connections to the network. This is crowdsource data from AT&T users made available by the OpenSignal App:

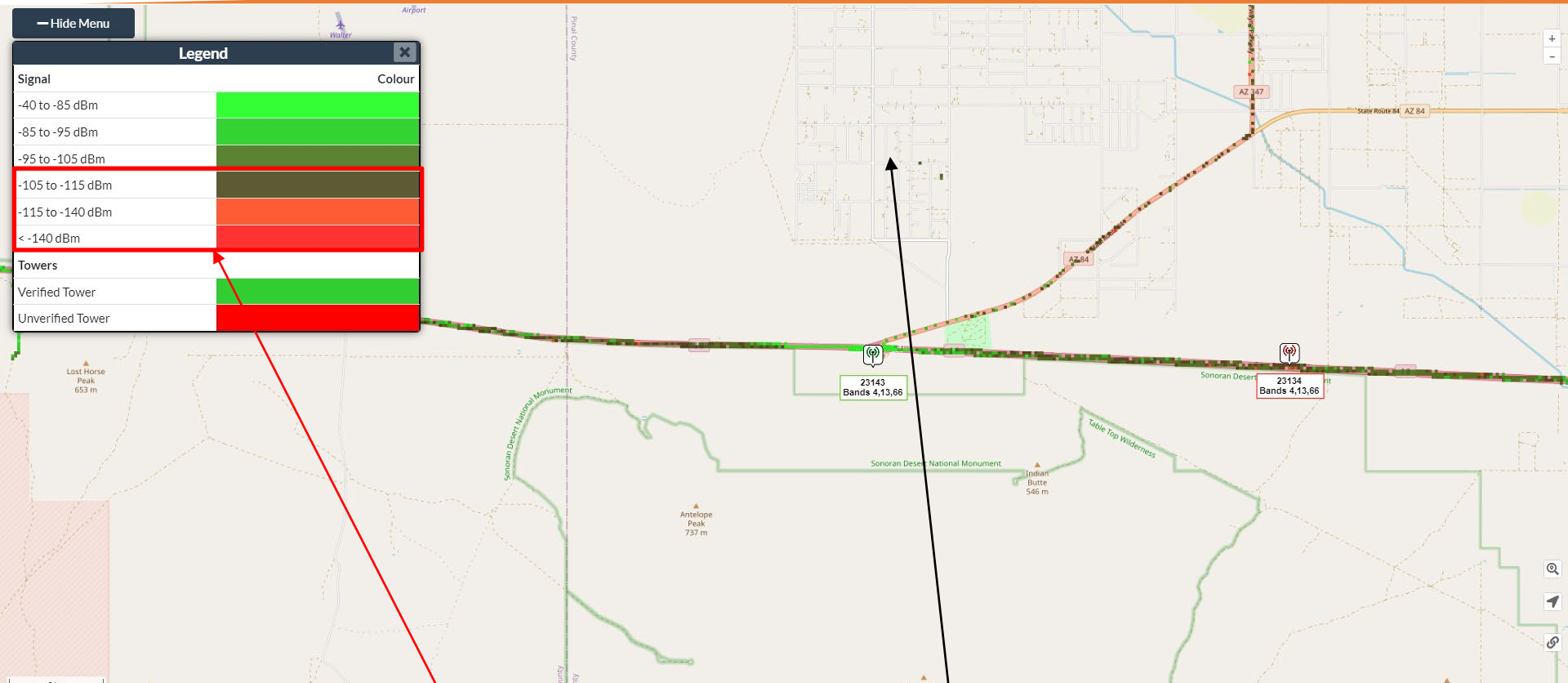
<https://www.opensignal.com/apps#section-os-app>

Green data points show good coverage and red data points show bad coverage and lack of data points show no coverage

Note the lack of mobile user reports in the area showing little to no coverage

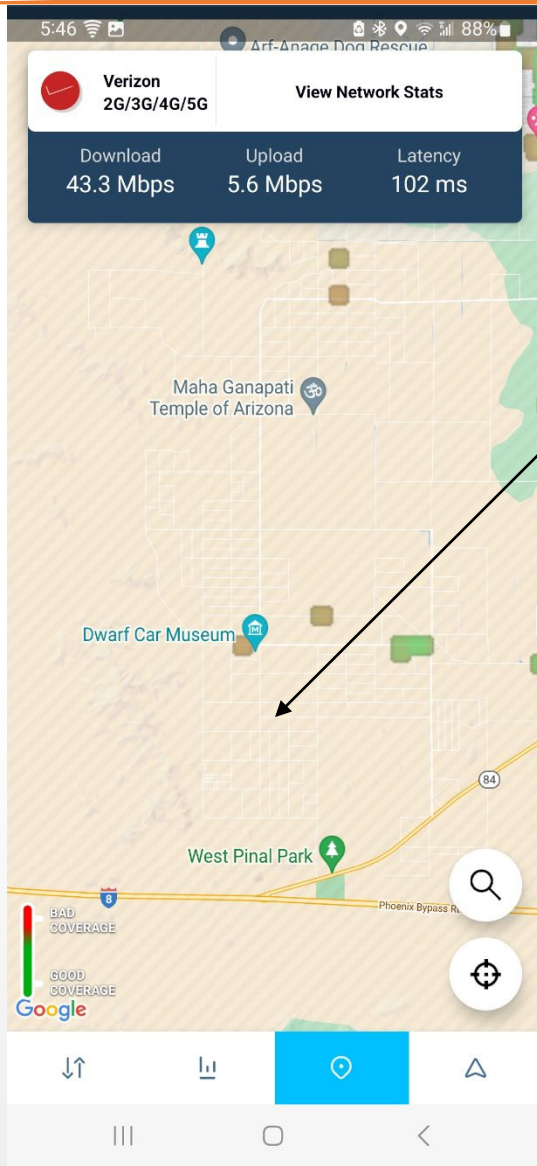


Verizon CellMapper



Poor Service Quality

Open Signal Verizon Quality Map

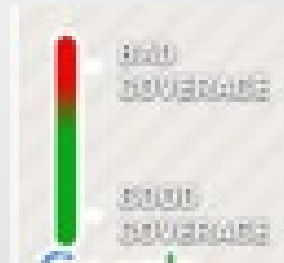


This map show mobiles reporting quality of their connections to the network. This is crowdsource data from Verizon users made available by the OpenSignal App:

<https://www.opensignal.com/apps#section-os-app>

Green data points show good coverage and red data points show bad coverage and lack of data points show no coverage

Note the amount of mobile user reports in the area showing bad coverage



Coverage Comparison

RSRP – 105' vs 85' AGL

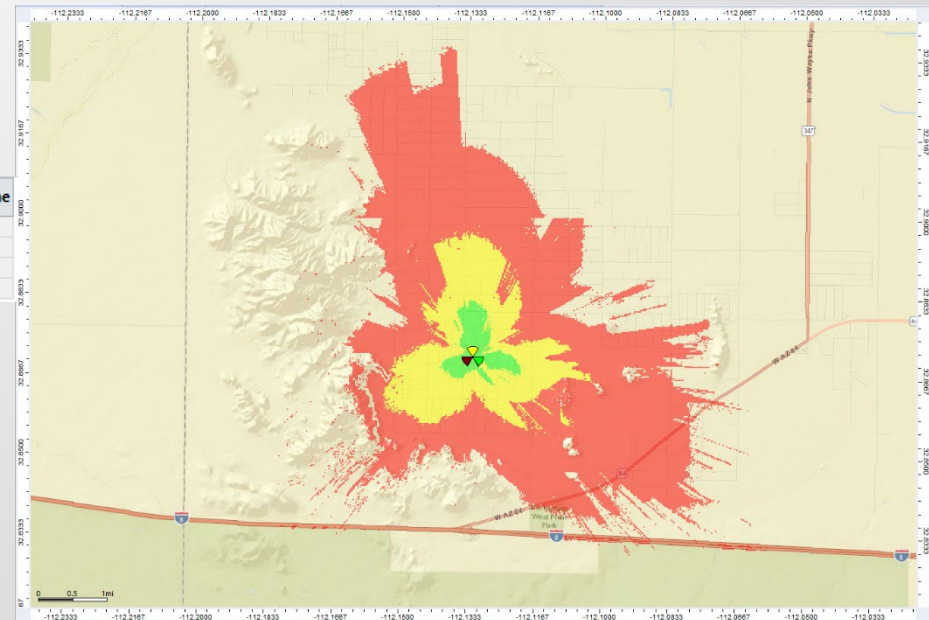
LEGEND	
	Indoor >= -85 dbm
	In-Vehicle >= -95 dbm
	On-Street >= -106 dbm



Zone	Prediction	Legend	Zone Surface (km ²)	Surface (km ²)	% of Covered Area	% Focus Zone
Focus Zone	LTE_NW-Mobility_RSRP-dBm (0)		209.882393	78.0606	100	37.2
		RSRP Level (DL) (dBm) >= -85		3.3948	4.3	1.6
		RSRP Level (DL) (dBm) >= -95		16.182899	20.7	7.7
		RSRP Level (DL) (dBm) >= -106		78.0606	100	37.2

Above shows 105' AGL data showing 3.39 square kilometers are covered with indoor service vs 85' AGL data showing 1.46 square kilometers covered with indoor service.

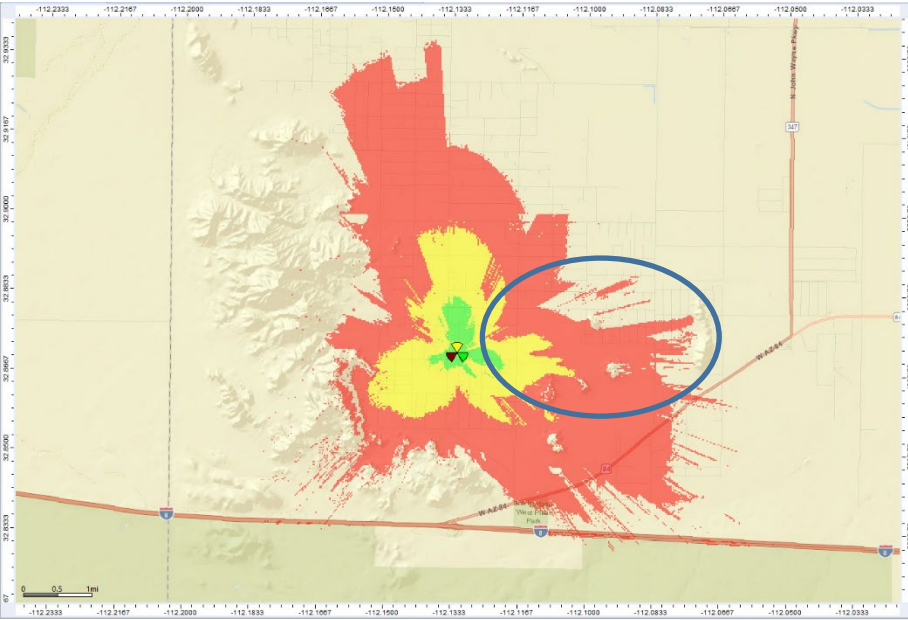
Zone	Prediction	Legend	Zone Surface (km ²)	Surface (km ²)	% of Covered Area	% Focus Zone
Focus Zone	LTE_NW-Mobility_RSRP-dBm (0)		209.882393	49.817699	100	23.7
		RSRP Level (DL) (dBm) >= -85		1.4634	2.9	0.7
		RSRP Level (DL) (dBm) >= -95		10.163699	20.4	4.8
		RSRP Level (DL) (dBm) >= -106		49.817699	100	23.7



Coverage Comparison

RSRP – 75' vs 55' AGL

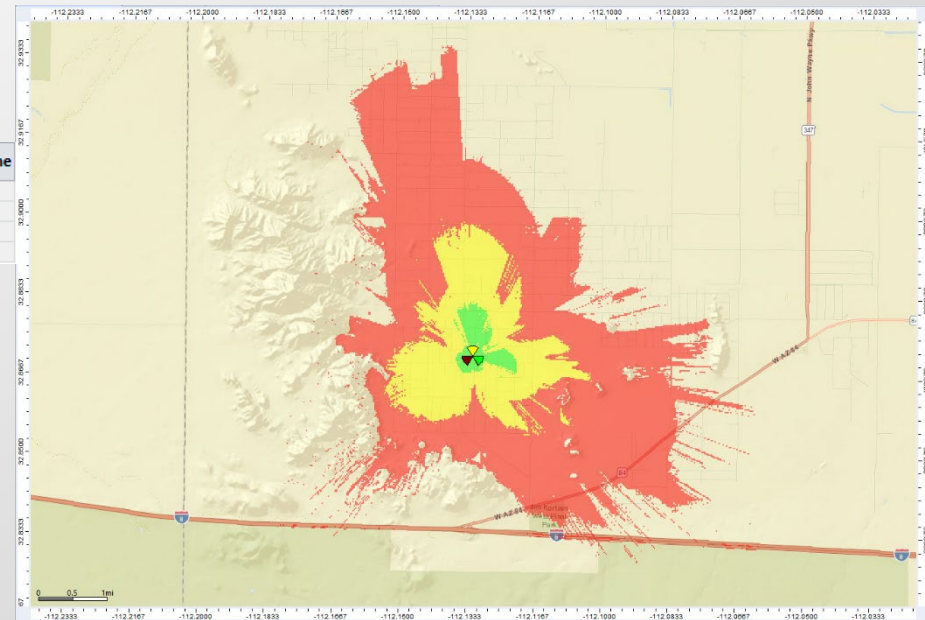
LEGEND	
	Indoor >= -85 dbm
	In-Vehicle >= -95 dbm
	On-Street >= -106 dbm



Zone	Prediction	Legend	Zone Surface (km ²)	Surface (km ²)	% of Covered Area	% Focus Zone
Focus Zone	LTE_NW-Mobility_RSRP-dBm (0)		209.882393	50.0247	100	23.8
		RSRP Level (DL) (dBm) >= -85		1.2735	2.5	0.6
		RSRP Level (DL) (dBm) >= -95		10.1907	20.4	4.9
		RSRP Level (DL) (dBm) >= -106		50.0247	100	23.8

Above shows 75' AGL data showing 1.27 square kilometers are covered with indoor service vs 55' AGL data showing 1.16 square kilometers covered with indoor service.

Zone	Prediction	Legend	Zone Surface (km ²)	Surface (km ²)	% of Covered Area	% Focus Zone
Focus Zone	LTE_NW-Mobility_RSRP-dBm (0)		209.882393	49.531498	100	23.6
		RSRP Level (DL) (dBm) >= -85		1.1664	2.4	0.6
		RSRP Level (DL) (dBm) >= -95		10.7955	21.8	5.1
		RSRP Level (DL) (dBm) >= -106		49.531498	100	23.6



Conclusions

- † It is recommended to approve the taller tower so that 3 carriers can provide service to the area
- † If the lower height is approved the chances for more than 1 tower being needed in the area is high
- † Based on coverage objectives and crowdsourced data analysis it looks as though at least one of the other carriers may be searching for a site location due to capacity and indoor service needs
- † If any, my recommendation is to increase the height of the tower by 45' to a 150' AGL tower