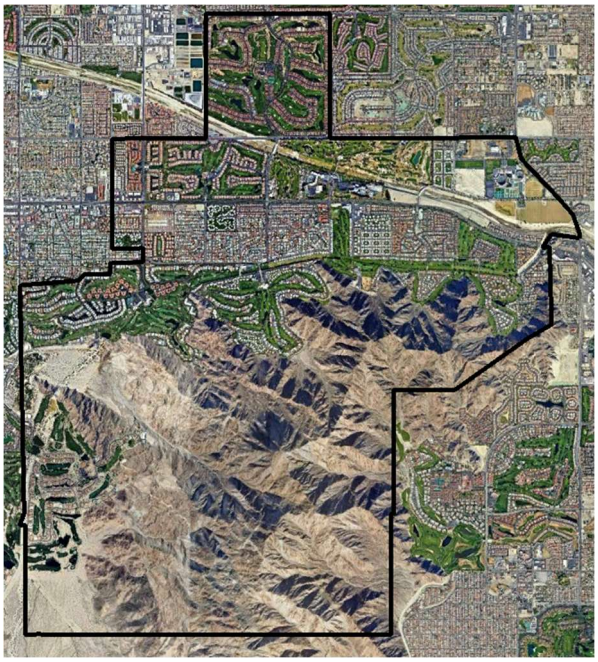
Indian Wells - Wireless Master Plan

Final Report



Submitted To:	**City of Indian Wells**
Submitted By:	CelPlan Technologies, Inc.
Date:	*April 2, 2026*
Version:	*3.0*

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1 Executive Summary

This Wireless Master Plan provides the City of Indian Wells with a technical and regulatory framework to understand existing cellular conditions, identify service gaps, and support future improvements in wireless infrastructure. The study combines field measurements, existing asset verification, predictive modeling, zoning analysis, and candidate site recommendations to create a practical roadmap for improving wireless service while preserving the City's visual character and land-use objectives. The work was developed to support both day-to-day connectivity needs and broader public safety and emergency communication goals.

The assessment began with multiple days of drive test across the City collecting both scanner and handset measurements for AT&T, T-Mobile, and Verizon. CelPlan collected and analyzed 4G and 5G data across the active low-, mid-, and high-band channels serving Indian Wells, and used those results to calibrate predictive coverage simulations. In parallel, CelPlan reviewed the City's Conditional Use Permit records, zoning data, and supporting site documentation, and compared those records with field observations to compile an updated inventory of existing wireless infrastructure. This process confirmed that the City's current wireless environment is served by a limited number of concentrated sites, with some infrastructure having been decommissioned, transferred, or not fully reflected in existing records. The analysis also recognized that several sites located outside Indian Wells currently contribute meaningful coverage inside the City and therefore must be considered in any accurate systemwide assessment.

The predictive analysis shows that cellular coverage in Indian Wells is unevenly distributed. Existing service is strongest around the Indian Wells Tennis Garden, Renaissance/Esmeralda area, Hyatt resort area, and portions of The Vintage Club, where wireless infrastructure is already concentrated. In contrast, poor coverage persists across northern areas, southwestern portions of the City, mountain-adjacent areas, and large portions of Golf and Recreation and Residential areas. The report explains these differences in terms of both engineering and land use: low-band frequencies provide the broadest blanket coverage, while mid- and high-band frequencies are more limited in reach and are typically used for added capacity rather than broad area service. The analysis further shows that zoning constraints, limited siting opportunities, and uneven distribution of existing assets all contribute to the City's current service gaps.

To address this, the report evaluates the City's current regulatory framework, including Section 21.90.060 (Antenna), Chapter 21.48 (Telecommunications Overlay Development Standards), and Chapter 12.05 (Wireless Facilities in Public Rights-of-Way), and identifies how these provisions influence practical siting feasibility. Together, these sections show that Indian Wells already has an established framework for wireless deployment through both traditional zoning-based siting pathways and a separate right-of-way process for smaller wireless facilities, while also highlighting where current height, setback, visibility, and permitted-use limitations continue to constrain macro-cell solutions in the areas where coverage needs are greatest. While Indian Wells already has concealment and design requirements intended to protect aesthetics, the current framework favors deployment in only a limited set of areas and does not fully support macro-cell solutions in several locations where coverage needs are greatest. The report therefore recommends targeted zoning amendments and land-use clarifications, particularly in Golf and Recreation, Watercourse, Public Facility, and overlay-related areas, so that wireless facilities can be considered in appropriate support locations such as clubhouses, maintenance areas, parking areas, perimeter zones, and selected public properties, while still avoiding placement in visually sensitive or functionally inappropriate areas such as active fairways

and greens. The recommendations are intended to improve predictability for carriers, support collocation, and maintain compatibility with community design expectations.

Building on the current coverage analysis and zoning review, the report presents a set of candidate new site locations and evaluates their expected impact using additional low-band coverage simulations. The focus is on broad-area service improvement rather than carrier-specific capacity planning. The proposed deployment strategy is intended to improve service in the parts of the City that are not well served today, especially Golf and Recreation and Residential areas. The report quantifies these benefits using both zoning-based and census-based analyses. Under the modeled scenarios, the proposed deployments produce major gains in service quality, including an average improvement of 33.23% in Residential areas and 48.3% in Golf and Recreation areas, corresponding to relative gains of approximately 57.9% and 117.6%, respectively. In practical terms, the recommended sites would significantly expand the portion of these areas receiving strong and reliable service.

The report also addresses public safety implications, particularly on golf course properties where cellular coverage is currently inconsistent and where golf carts are the primary mode of transportation across large areas. Because emergency communication reliability is directly affected by macro coverage conditions, the study concludes that improved cellular infrastructure is the foundational requirement for effective golf cart emergency notification solutions. LTE/5G-enabled devices are identified as the most scalable long-term option once macro coverage is improved, with other technologies potentially serving complementary roles for operational tracking or non-critical functions.

2 Drive Test Methodology and Existing Assets

2.1 Introduction

The City of Indian Wells released a 'Request for Proposal' for a Wireless Master Plan to describe the current assets owned and used adequately to indicate a solution on how to improve the coverage and service delivered by cellphone carriers. CelPlan, as an awardee of this contract, presents in this portion of report the results of the drive test, and list of wireless telecom infrastructure (assets) identified within the City's boundaries with information on their current status.

The following deliverables are related to the drive test and existing wireless infrastructure investigation:

- Drive Test Methodology and Existing Assets (this report)
- Documentation on wireless telecom assets identified within the City's boundaries according to City's inputs
- Documentation on other wireless telecom assets identified during the drive test
- Wireless Telecom assets, findings and zoning layer.
- Drive test Results

The following documents are being delivered in conjunction with this report:

- Indian Wells Assets - CUP log - CelPlan Findings_v3.2
- Tower Assets - Indian Wells - v1
- Indian Wells Assets_v6
- Drive Test Report - Indian Wells - v4

2.2 Drive Test

This section provides additional technical details in respect to the drive test performed for the City of Indian Wells.

The purpose of the drive test as proposed was to support the studies requested by the City of Indian Wells for determining current cellular coverage in the region by the three major operators: Verizon, T-Mobile and AT&T. Data collection took place over 3 days and data was post-processed for presentation and further in-depth analysis of current cellular coverage. CelPlan provided two engineers onsite for 3 days with equipment to collect the RF data required for the evaluation.

2.2.1 Drive Test Equipment Set up

The procedure below describes the methodology used.

- Drive testing included:
  - One software-defined scanner (CellScanner) for collecting cellular coverage from all frequencies used within the area of interest
    - One scanner collected both 5G & 4G frequency bands
  - Three cell phones collected data to reflect user experience from the three major cellular operators
    - One phone collected Verizon 5G and 4G frequencies as best served
    - One phone collected T-Mobile 5G and 4G frequencies as best served
    - One phone collected AT&T 5G and 4G frequencies as best served
  - One Receiver antennas
    - One external antenna used for 5G & 4G samples collection with scanner
  - One Garmin GPS 18x USB
    - One GPS antenna used for 5G & 4G samples collection with scanner
  - One laptop utilizing CellScanner for data collection
    - One laptop used to record 5G & 4G samples collected with scanner
  - CelPlanner/CellDesigner Suite Post Processing Tools
- The drive test (DT) equipment was installed in a commercial vehicle in Indian Wells, CA by CelPlan and tested prior to the start of the project.
- The first day was used for determining frequency bands to be measured for each carrier/operator.
  - Several static tests around the area of interest collected all frequency bands known to be active for 5G or 4G within city limits
  - The static testing utilized the scanner and all 3 phones
- Once all active frequency bands were identified, CellScanner software was configured to scan only those bands
- The remainder of the days were used for data collection in the multiple bands.

Drive test equipment was set up according to best practices in the industry:

- Antenna mounted on car rooftop, away from any obstructions (e.g. roof racks.) Antenna installed centered and level on the car's roof.
- GPS receiver mounted on dashboard with an unobstructed view of the sky as sometimes GPS satellites can be captured low and close to the horizon.
- The remainder of the equipment was installed inside the car.

- An Ethernet cable (black line in Figure 1) connected the CellDigitizer 18000 receiver to the laptop.
- The GPS receiver was connected via USB cable to the laptop.

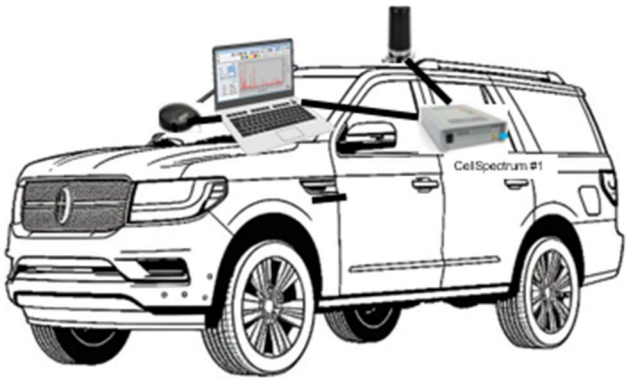


FIGURE 1- DRIVE TEST SETUP WITH (OPTIONAL) FILTER

2.2.2 Drive Test Equipment - Equipment Calibration Procedure

CellDigitizer 18000 receiver is calibrated in CelPlan's labs before each project. R&S SMBV100 Signal Generator and a R&S FSV Signal Analyzer were used for calibration. No further calibration is necessary after lab calibration is complete. Section 2.6 contains the equipment datasheet.

2.3 Drive Test Route Planning

2.3.1 Area of Interest (AOI) coverage

The area of interest (AOI) is a region (yellow polygon in Figure 2) within the city boundaries (red polygon in Figure 2.) The drive test campaign covered approximately 95% of the primary streets and roadways within the AoI; the route included both public roadways and accessible golf cart paths where applicable.



FIGURE 2- CITY LIMITS AND AOI

2.3.2 Static Test Planning

The static test planning is important to determine what are the active frequency channels within the AoI. Once the active channels are identified, the CellScanner software can be configured to collect data for just those channels.

Static testing locations are determined by, but not limited to:

- Centralized location within AOI
- Edge of AOI
- Topography heights (terrain)
- Morphology heights (land use/land cover)

2.3.3 Route planning

Route planning is required to gather information of important points within the AoI. The following is a list of some of the items that should be considered when planning a route:

- Known areas that have poor coverage.
- Known areas that have good coverage.
- Topography with drastic changes in height should also be considered.
- Different types of morphology that may block signals should also be considered.
- Specific points of interest within the site coverage area.

Also noting that the route planned is not written in stone and may differ from reality, for example, sites may not cover as much of the area as initially predicted and there might not be enough strength for the collection, or roads can be closed.

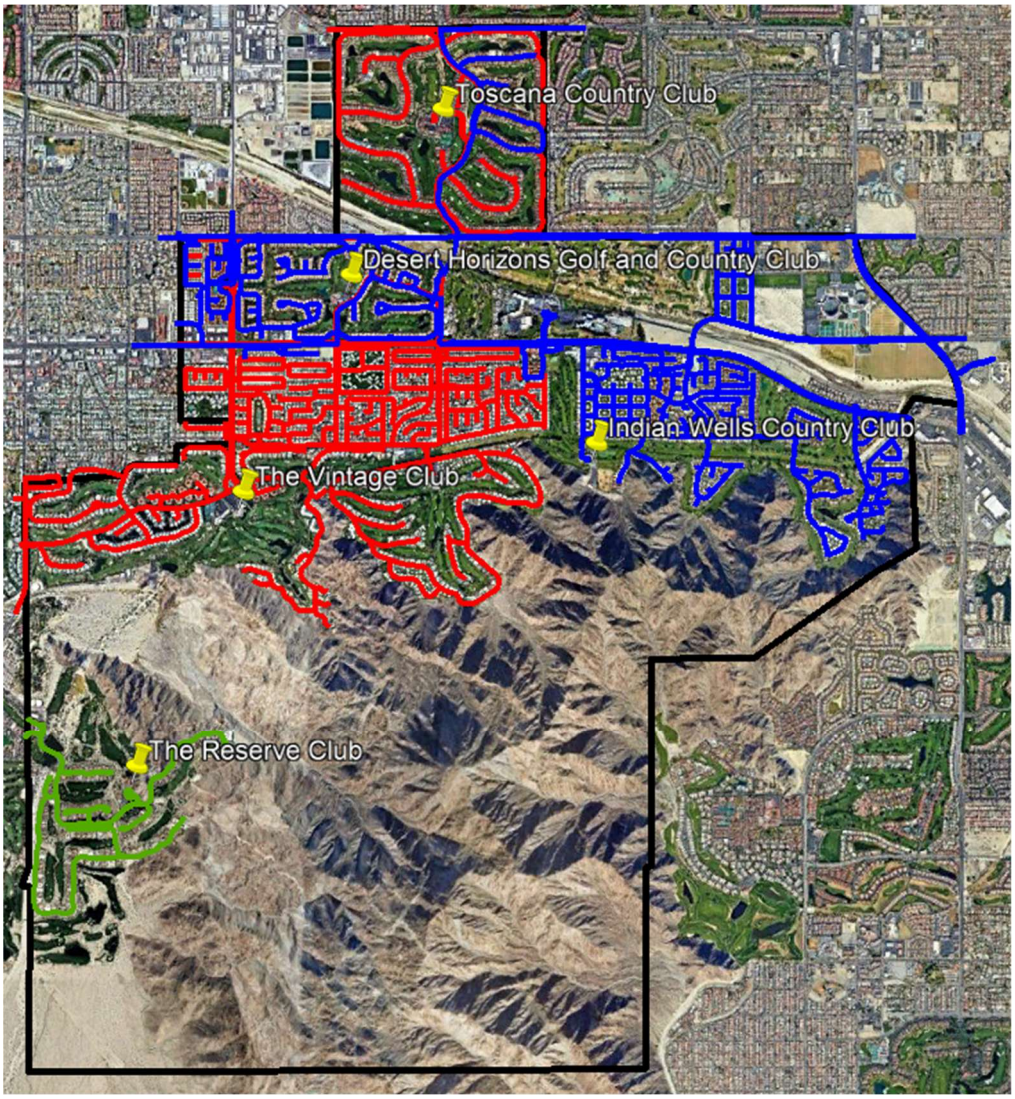


FIGURE 3- EACH COLOR REPRESENTS A DAY OF DRIVE TEST ROUTE

2.4 Drive Test Data Collection

CelPlan conducted a drive test in Indian Wells collecting data on the different frequency channels that were identified during the static test. These frequency channels were programmed in the scanner to measure signal strength and quality of the multiple carriers within city limits. The purpose of the drive test is to identify areas with poor coverage or service and determine the likely location of the transmitting antenna by correlating test results with data provided by the City and assets observed in the field. Using this information, CelPlan analyzed the frequency bands transmitted by each carrier to develop a current carrier-by-carrier coverage and service profile to identify existing gap areas (see Section 3).

Table 1 summarizes the technologies, channels, frequencies and bands configured for collection in the scanner. Table 2 summarizes the technologies, channels, frequencies and bands captured by the phone.

TABLE 1 – SCANNER FREQUENCY TABLE

Operator	Network Mode	MHz	LTE/4G Band	5G Band	Band type
ATT	LTE/4G	739	12	-	low
ATT	LTE/4G	1955	2	-	mid
ATT	LTE/4G	2164.9	66	-	mid
ATT	LTE/4G	2355	30	-	mid
ATT	5G	3851.04	-	n77	high
T-Mobile	LTE/4G	649.5	71	-	low
T-Mobile	LTE/4G	731.5	12	-	low
T-Mobile	LTE/4G	1937.5	2	-	mid
T-Mobile	LTE/4G	2112.5	66		mid
T-Mobile	LTE/4G	2145	66	-	mid
T-Mobile	5G	632.65	-	n71	low
T-Mobile	5G	1981.25	-	n2	mid
VZW	LTE/4G	751	13	-	low
VZW	LTE/4G	1970	2	-	mid
VZW	LTE/4G	2125	66	-	mid
VZW	LTE/4G	2175	66	-	mid
VZW	5G	873.35	-	n5	low
VZW	5G	3730.08	-	n77	high
VZW	5G	3809.28	-	n77	high

TABLE 2 – PHONE FREQUENCY TABLE

Operator	Network Mode	MHz	LTE/4G Band	5G Band	Band type
ATT	LTE/4G	739	12	-	low
ATT	LTE/4G	763	14	-	low
ATT	LTE/4G	1955	2	-	mid
ATT	LTE/4G	2164.9	66	-	mid
ATT	LTE/4G	2355	30	-	mid
ATT	5G	3851.04	-	n77	high
T-Mobile	LTE/4G	649.5	71	-	low
T-Mobile	LTE/4G	731.5	12	-	low
T-Mobile	LTE/4G	1937.5	2	-	mid
T-Mobile	LTE/4G	2145	66	-	mid
T-Mobile	5G	632.65	-	n71	low
T-Mobile	5G	1981.25	-	n2	mid
T-Mobile	5G	2506.95	-	n41	mid
T-Mobile	5G	2606.55	-	n41	mid
VZW	LTE/4G	751	13	-	low
VZW	LTE/4G	1970	2	-	mid
VZW	LTE/4G	2125	66	-	mid
VZW	LTE/4G	2175	66	-	mid
VZW	5G	3730.08	-	n77	high
VZW	5G	3809.28	-	n77	high

A compilation of the data collected in the drive test is presented in the file: "Drive Test Report - Indian Wells - v4"

2.5 Documentation of Existing Assets

The City provided several documents containing CUP requests, site project files, public right-of-way documentation, and land-use maps. These materials were used to compile and summarize the telecommunications assets within the City in the file "Indian Wells Assets – CUP Log – CelPlan Findings_v3.2."

CelPlan documented the existing assets in four formats:

- This report, which provides an overview of the assets analyzed and compares the data supplied by the City with field observations;
- A spreadsheet summary containing key information;
- A Google Earth (KMZ) file to provide the City with enhanced geographic visualization;
- A PowerPoint presentation with photos documenting the assets.

Figure 4, Figure 5 and Figure 6 summarizes the CUPs.

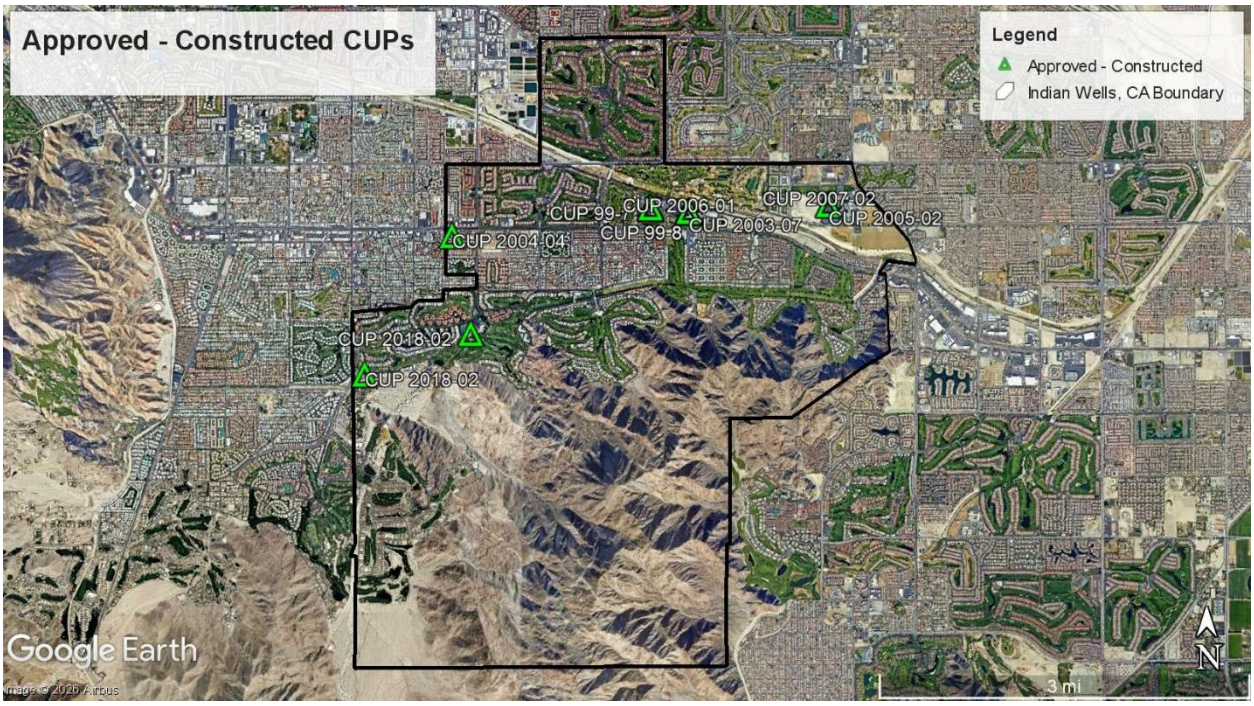


FIGURE 4 - APPROVED AND CONSTRUCTED CUPS

Figure 4 also includes CUPs that were issued to companies no longer in the market. These CUPs are operational under AT&T, T-Mobile or Verizon.

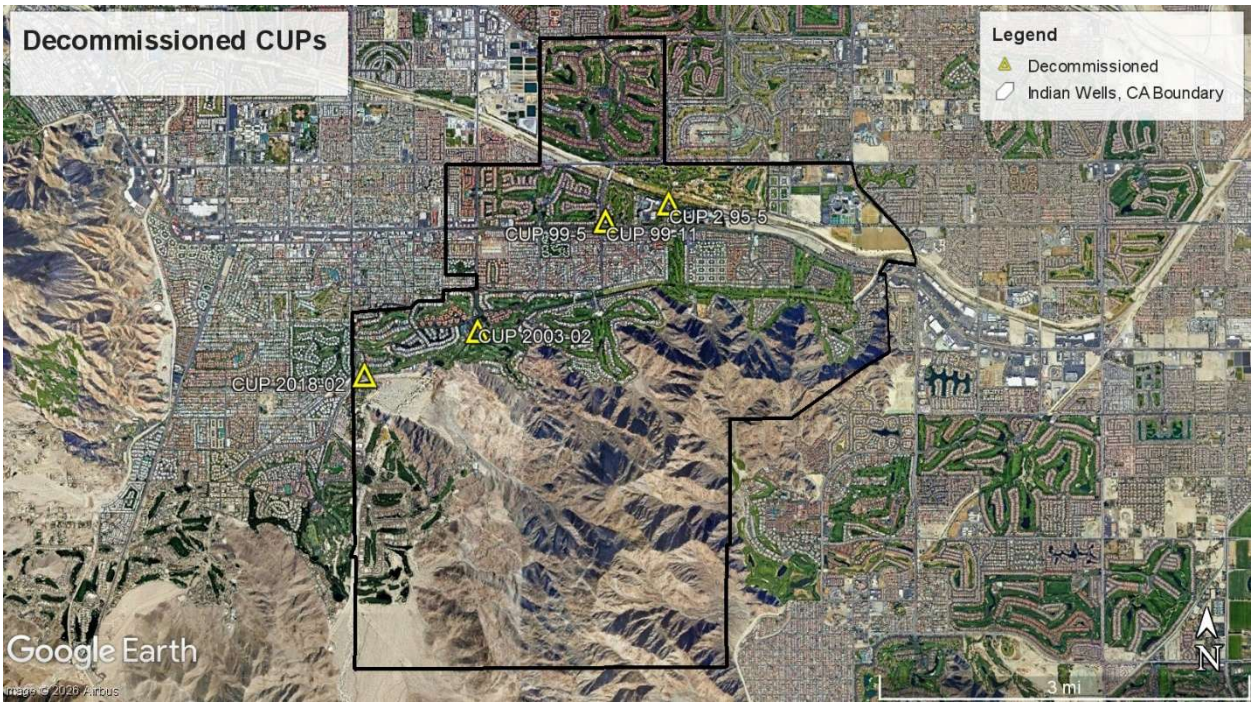


FIGURE 5 – DECOMMISSIONED CUPS

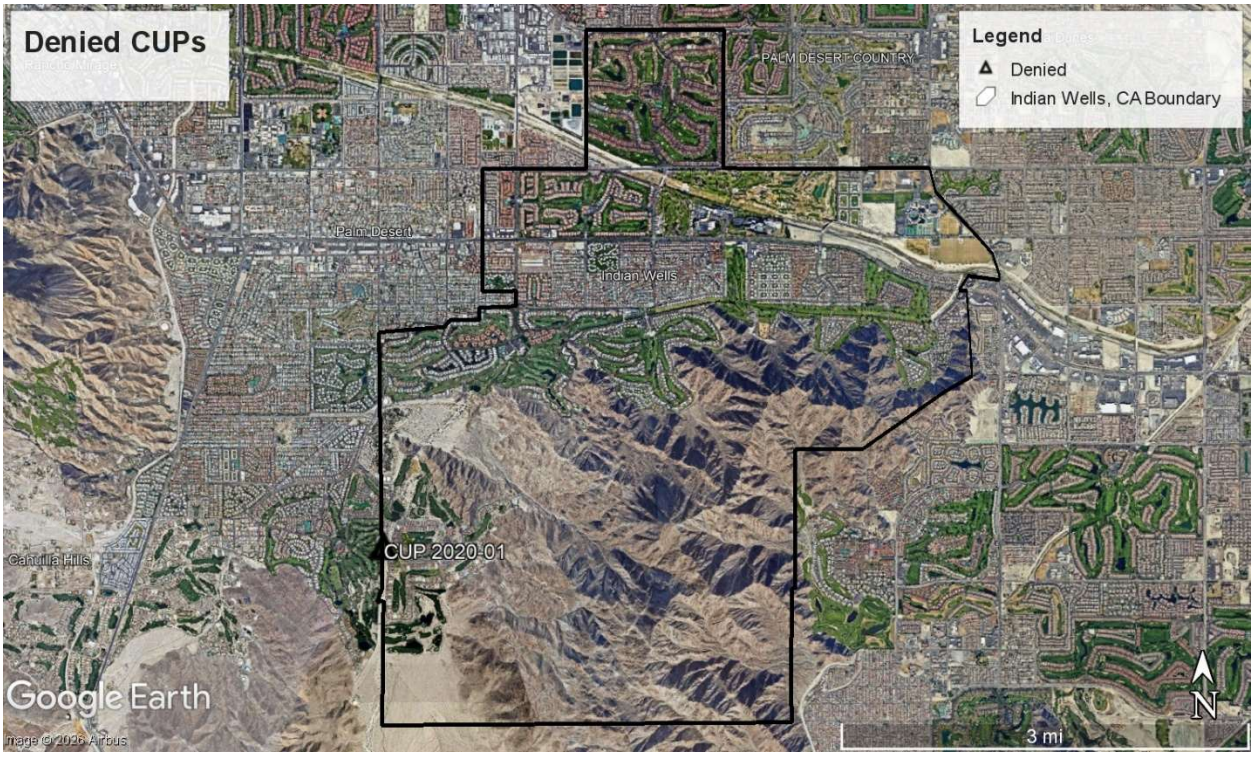


FIGURE 6 - DENIED CUPS

The city provided the map with zoning types and HOAs. Figure 7 shows the zoning types plotted on Google Earth and Figure 8 shows the visited HOAs.

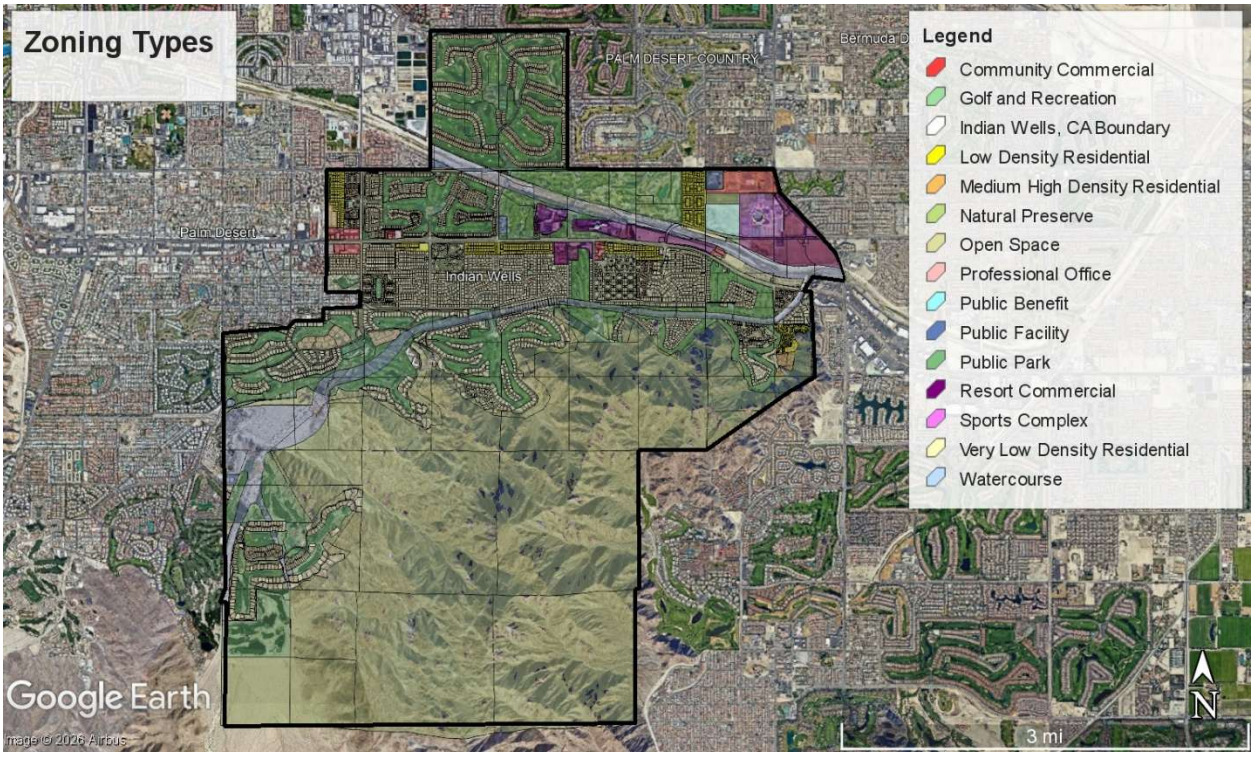


FIGURE 7 - ZONING TYPES

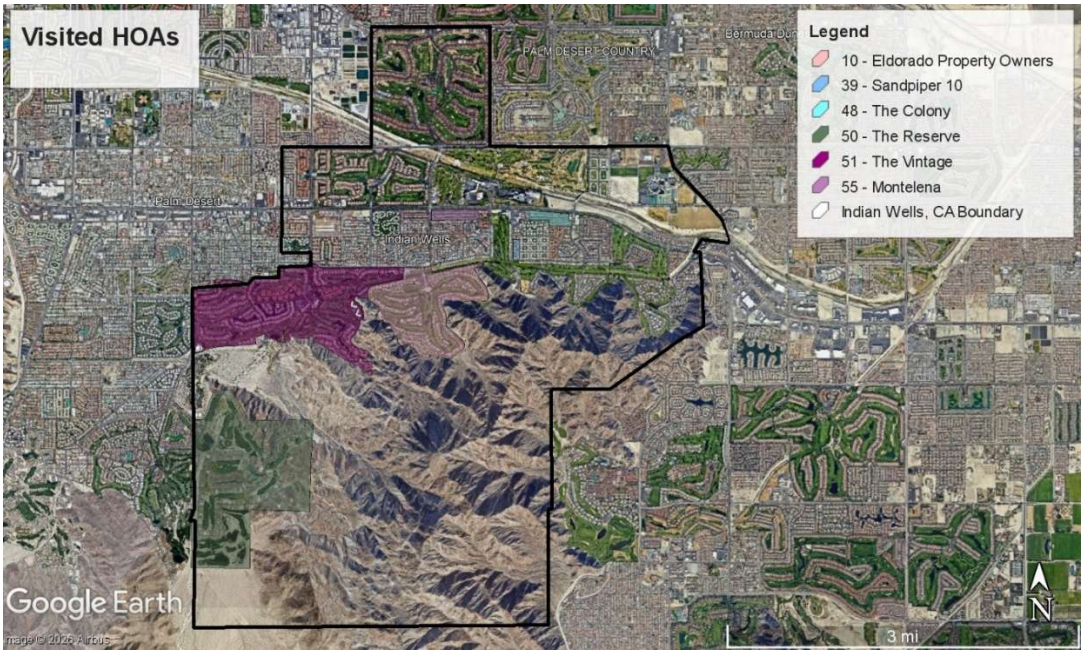


FIGURE 8 – VISITED HOAS

CelPlan correlated the wireless sites identified during the drive test with the Conditional Use Permit (CUP) documentation provided by the City. The objective of this process was to determine whether the City's records accurately match the infrastructure found in the field. To support this analysis, CelPlan created an asset log consolidating all collected information. Key fields in this document include: CUP, Status, Carrier, CelPlan Status, Latitude, Longitude, and Zoning Type, as presented in *"Indian Wells Assets – CUP Log – CelPlan Findings_v3."*

Table 3 summarizes the main information for each CUP, comparing the City's records with CelPlan's observations, comments, and revisions based on the drive test and site survey.

One site located within the Vintage Club does not correspond to any CUP record. CelPlan labeled this location "Cell Tower," and initial analysis suggests that it is a Distributed Antenna System (DAS) deployed to enhance 2G/3G coverage within the golf course.

The Zoning Type field identifies the zoning designation of the area where each site is located, using information provided by the City. This information is important because it shows which zoning categories currently contain wireless infrastructure. CelPlan's review found that the City's wireless regulatory framework is broader than the Telecommunications Overlay alone. While the overlay applies to selected zoning contexts such as Resort Commercial (RC), Sports Complex (SPX), and certain RVLD golf-course-related areas, Section 21.90.060 (Antenna) also conditionally permits commercial antennas and wireless communication facilities in Office Professional (OP), Resort Commercial (RC), Community Commercial (CC), Sports Complex (SPX), Public Facility (PF), and Public Parks/Recreation (PP) zones, and prohibits them in Natural Preserve (NPR), RVLD, RLD, RMD, RMHD, Watercourse (WC), Public-Owned Open Space (POS), and Country Club Open Space (COS). These zoning distinctions are important for understanding both the current distribution of wireless infrastructure and the siting constraints affecting the candidate locations evaluated in Section 5.

Based on the drive-test data collected and the information provided by the City, CelPlan analyzed a total of 18 sites. The status of each site is summarized on Table 3.

TABLE 3 – EXISTING ASSETS SUMMARY

Application Number	CelPlan - Status	Design	Carrier	Latitude	Longitude	Zoning Type	Date
CUP 2018-02	Constructed	Monopalm - 9 Stealth Antennas 70 feet	AT&T	33°42'32.91"N	116°21'25.60"W	Golf and Recreation	March 15, 2018
CUP 2018-02	Constructed	Monoeucalyptus - 12 Stealth Antennas 51 feet -Sector A - Tower height 61 feet	AT&T	33°42'15.96"N	116°22'18.68"W	Golf and Recreation	March 15, 2018
CUP 2007-02	Constructed	AT&T Monopole 111 ft at IWTG	AT&T	33°43'26.87"N	116°18'25.70"W	Sports Complex	July 9, 2012
CUP 2008-02	Constructed	3 antenna arrays 76 feet - Stealth Wireless Communications Facility at Esmeralda Resort	Verizon	33°43'23.95"N	116°19'36.10"W	Resort Commercial	June 19, 2008
CUP 2006-01	Constructed	3 antenna arrays 76 feet Renaissance Rooftop facility	T-Mobile	33°43'23.95"N	116°19'36.10"W	Resort Commercial	June 7, 2007
CUP 2005-02	Constructed and Transferred to AT&T	Cingular Wireless 111 ft high Monopole at IWTG	Cingular	33°43'26.87"N	116°18'25.70"W	Sports Complex	August 4, 2005
CUP 2004-04	Constructed and transferred to T-Mobile/Verizon	Screened Wireless Facility at Village 1	Nextel	33°43'13.29"N	116°21'26.12"W	Professional Office	November 18, 2004
CUP 2003-07	Constructed	76 feet - Stealth Facility at Renaissance Rooftop	Verizon	33°43'23.95"N	116°19'36.10"W	Resort Commercial	January 29, 2004
CUP 2003-04	Constructed and Transferred to T-Mobile	76 feet - Sprint Wireless at Renaissance Rooftop	Sprint PCS	33°43'23.95"N	116°19'36.10"W	Resort Commercial	August 21, 2003

Application Number	CelPlan - Status	Design	Carrier	Latitude	Longitude	Zoning Type	Date
CUP 99-7	Constructed	AT&T Rooftop of Hyatt	AT&T	33°43'25.46"N	116°19'55.29"W	Golf and Recreation	April 6, 2003
CUP 2002-03	Constructed and Transferred to T-Mobile	2 Sector - 42 feet Nextel Hyatt Rooftop	Nextel	33°43'25.46"N	116°19'55.29"W	Golf and Recreation	August 1, 2002
CUP 99-8	Constructed and Transferred to T-Mobile	Sprint Hyatt Rooftop	Sprint PCS	33°43'25.46"N	116°19'55.29"W	Golf and Recreation	October 19, 2000
CUP 2018-02	Not constructed	Monoeucalyptus - 6 Stealth Antennas 38 feet -Sector B - Tower height 61 feet	Dish Network Collocation	33°42'15.96"N	116°22'18.68"W	Golf and Recreation	March 15, 2018
CUP 2003-02	Decommissioned	Antenna in Country Club Open Space	Telemasters	33°42'34.31"N	116°21'22.12"W	Golf and Recreation	June 5, 2003
CUP 99-11	Decommissioned	City Hall rooftop	Digital Internet Service Corporation (DISC)	33°43'20.29"N	116°20'17.93"W	Public Facility	October 28, 1999
CUP 99-5	Decommissioned	City Hall rooftop	Digital Internet Service Corporation (DISC)	33°43'20.29"N	116°20'17.93"W	Public Facility	October 28, 1999
CUP 2-95-5	Decommissioned	Maintenance yard - 40 ft Monopole	Pacific Bell Mobile Services	33°43'27.55"N	116°19'46.16"W	Golf and Recreation	April 18, 1996
CUP 2020-01	Denied	Monopalm 70 foot Reserve Tower	Verizon	33°41'21.45"N	116°22'22.52"W	Watercourse	6/24/2021

2.6 CellScanner Spec Sheet

The following pages include the specs of CellScanner.



CellScanner™

9 kHz to 8 GHz / 18 GHz / 27 GHz

CellScanner is a specialized and detailed Technology Analyzer for the main wireless technologies in the industry today. Our development team strives to keep the tool updated as new technologies become available in the market; the software can be easily upgraded and there's no need to make changes to the hardware. The tool collects and parses digitized samples for use in optimization and network performance analysis.

CellScanner works with a Software-Defined Radio Receiver, ***CellDigitizer***.

The receiver samples and digitizes up to 100 MHz of spectrum at a time (real time collection and recording capabilities) with a sampling rate of up to 125 MSamples/s and 14-bit digitization - all samples can be geotagged.

CellDigitizer has a wide dynamic range and automatic input level regulation to avoid saturation when close to transmitters. With a small form factor, it is light weight with low power consumption.







The three models of ***CellDigitizer*** cover the following frequency ranges: CD08 (8 GHz), CD18 (18 GHz), CD27 (27 GHz).

CellScanner processes 3GPP technologies (GSM, UMTS, LTE, and 5G) on frequencies and channel bandwidths compatible with ***CellDigitizer***.
CellScanner collection features include:

- Geotagged samples (with and without interpolation)
- Capture of multiple bands per scan
- Collection of samples in sequence from multiple bands (round-robin) in a single drive test
- Simultaneous detection and analysis of 2G, 3G, 4G and 5G signals
- Samples snapped to drive route (for GPS positioning error compensation)
- Multi-measurement concatenation and multi-data visualization

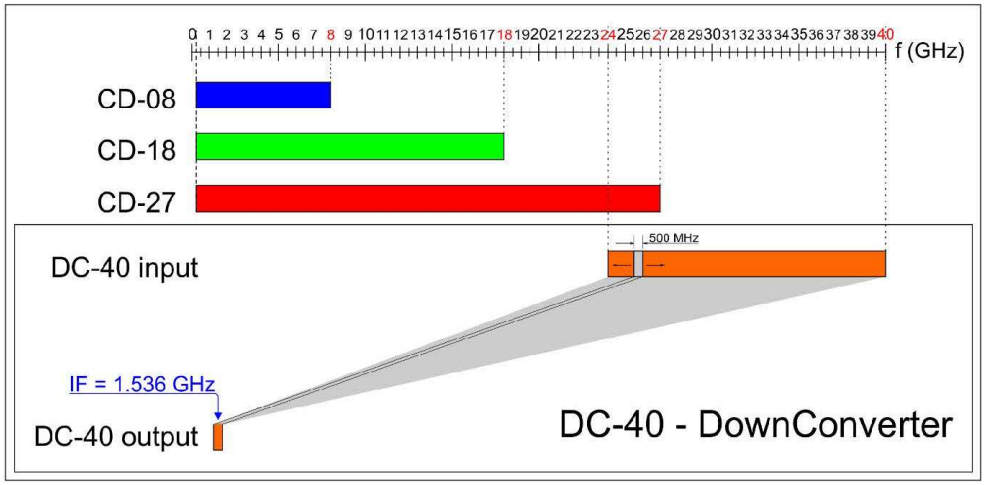
CellScanner™

9 kHz to 8 GHz / 18 GHz / 27 GHz

CellDigitizer main characteristics include:

- Simultaneous operation in multi-band, multi-channels and multi-technology modes
- Operation on licensed, unlicensed or user-defined bands and channels
- High Dynamic Range
- High sensitivity with a front-end amplifier[1] allowing measurement of signals close to the noise floor.
- Automatic front end gain control for protection against receiver saturation
- Cost-effective, small form factor and light weight with low power consumption (fanless)
- Capable of spectrum recording: ideal for off-line and forensic analysis
- Capable of recording I/Q data

Additionally, DC40 (Downconverter) can translate frequencies from 24 to 40 GHz to a 1.536 GHz center frequency band.



[1] CD18 and CD27 only

CellScanner™

9 kHz to 8 GHz / 18 GHz / 27 GHz

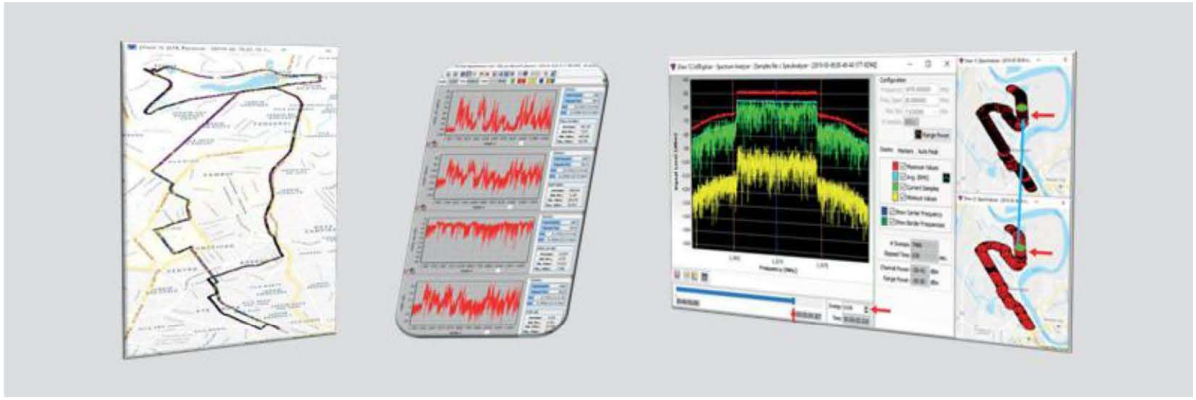


CellScanner will control both devices to allow synchronized operation to sweep all bands using the LAN port.

CellScanner™ Applications

CellScanner main applications include:

- Network Planning, Optimization, and Performance Analysis of multi-technology networks
- Deployment evaluation: cross feeders, coverage footprint, cluster behavior, frequency plan checking
- Collection of network statistical information for report generation





Spectrum analyzer capabilities can be added to the system by a simple software upgrade (***CellSpectrum***), allowing users to also perform propagation model tuning, spectrum field measurements, long term spectrum monitoring, spectrum clearance and interferer location.

CellScanner is supplied in a certified-waterproof, crushproof, dustproof maximum-size airline carry on suitcase.

Backpack available for walk-test and indoor collection.

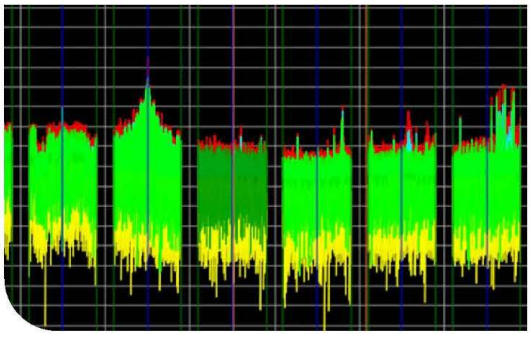
CellScanner™ Applications



Wide Frequency Range

The frequency bands and channel bandwidths used in commercial wireless systems have been increasing steadily to accommodate the growing demand for larger data rates.

CellScanner can process and extract information from 3GPP technologies and is prepared to incorporate future technologies, enabling testing of modern systems from narrowband to wideband channels.



Wide Signal Dynamic Range and Saturation avoidance

CellDigitizer allows users to adjust gain of the input signal to create an effective dynamic range for measurements by avoiding saturation of samples collect close to the transmitter and by increasing sensitivity to weaker signal.



Real-Time Acquisition and Spectrum Recording

3GPP technologies employ packet-based signaling techniques. ***CellScanner*** allows real-time acquisition and recording of spectrum for report generation and/or further analysis. Playback mode is very convenient for post-processing tasks and allows users to add new markers and change the configured Resolution Bandwidth (RBW).



High Measurement Rates

The measurement rate reflects how many channels can be analyzed per second.

CellScanner collects information related to each technology and channels configured by the user.

Location can be scanned in advance to search for channels maximizing the measurement rate.

Fast setup times and sophisticated capture control allow the tool to work with high measurement rates even when collecting multiple technologies.



Channel Bandwidth flexibility

The wide application of wireless technologies requires scanners to cover from narrow channels in IoT applications up to wide LTE-Advanced channels; the configuration flexibility of ***CellScanner*** allows the tool to easily tackle this challenge.



Portable and flexible

Besides providing the means for capturing and processing digitized samples, ***CellScanner*** also offers a wide variety of information manipulation and visualization options that, along with ***CellDigitizer***'s small form factor, makes the combo very portable and flexible.

Easy 'Drive Test Setup'

Outdoor Measurement Collection







CellScanner is quickly & easily installed for a drive test campaign. Al items are packaged in an airline carry on suitcase.

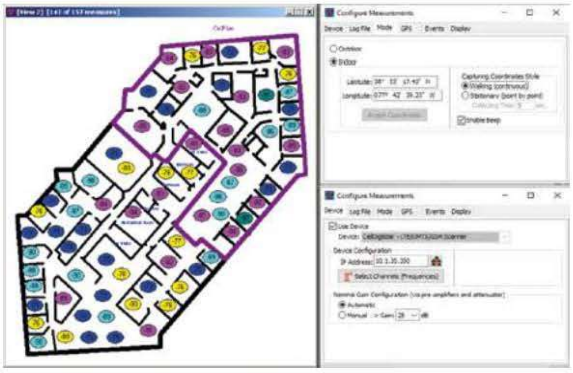
Magnetic mounts for the wide band antenna and GPS module are easily installed in the vehicle roof.

Due to the low power consumption an external DC converter is needed.

Extensive support, training and documentation is provided to allow fast and painless drive test campaigns.

Easy 'Click and Go'

Indoor Measurement Collection



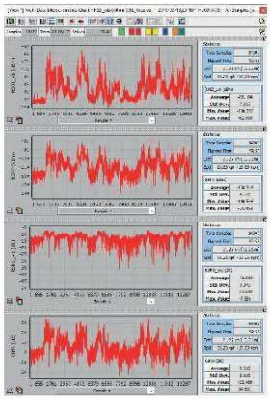
Just click on a point in the visualization window and samples are collected, even when no GPS is available.

Floor plan can be imported, geo-tagged and made available for a walk test. ***CellScanner*** options includes stationery and walking (continuous) measurement.

Easy 'See and Conclude'

Analysis capability





Select what you want to see from the information available. Charts, maps, and detailed collection data are displayed to help with your analysis.

Rec #	Date	Time	Latitude	Longitude	Tech	Band	Duplex Mode	Channel Number	Frequency (MHz)	PCI	RSRP (dBm)	RSRQ_crs (dB)	RSRQ_wb (dB)	RSRQ_mib (dB)	CINR (dB)	Avg.NoisePw (dBm)	Noise Power (dBm)	RSSI_crs (dBm)	RSSI_wb (dBm)	RSSI_mib (dBm)	Frame Load (%)
1	04/22/2019	13:09:35.787	32.512004	-93.743673	LTE	36	TDD	36960	1931	375	-80.21	-10.79	-11.86	-11.14	39.71	-119.92	-119.92	-69.42	-60.57	-61.29	100
2	04/22/2019	13:09:35.830	32.512004	-93.743673	LTE	36	TDD	36960	1931	375	-80.2	-10.79	-11.87	-11.15	39.65	-119.89	-119.85	-69.41	-60.56	-61.27	100
3	04/22/2019	13:09:35.871	32.512004	-93.743673	LTE	36	TDD	36960	1931	375	-80.25	-10.79	-11.87	-11.16	37.7	-119.14	-117.95	-69.46	-60.59	-61.31	100
4	04/22/2019	13:09:36.006	32.512004	-93.743673	LTE	36	TDD	36960	1931	375	-80.27	-10.79	-11.89	-11.18	39.83	-119.36	-120.1	-69.48	-60.6	-61.31	100
5	04/22/2019	13:09:36.039	32.512004	-93.743673	LTE	36	TDD	36960	1931	375	-80.23	-10.79	-11.86	-11.14	38.3	-119.18	-118.53	-69.44	-60.58	-61.3	100
6	04/22/2019	13:09:36.082	32.512004	-93.743673	LTE	36	TDD	36960	1931	375	-80.2	-10.79	-11.86	-11.15	38.45	-119.09	-118.66	-69.41	-60.56	-61.28	100
7	04/22/2019	13:09:36.124	32.512004	-93.743673	LTE	36	TDD	36960	1931	375	-80.26	-10.79	-11.89	-11.18	41.86	-119.41	-122.12	-69.47	-60.59	-61.31	100
8	04/22/2019	13:09:36.191	32.512004	-93.743673	LTE	36	TDD	36960	1931	375	-80.23	-10.79	-11.86	-11.15	37.63	-119.19	-117.86	-69.44	-60.59	-61.3	100
9	04/22/2019	13:09:36.222	32.512004	-93.743673	LTE	36	TDD	36960	1931	375	-80.22	-10.79	-11.88	-11.16	39.65	-119.26	-119.88	-69.43	-60.56	-61.28	100
10	04/22/2019	13:09:36.265	32.512538	-93.744262	LTE	36	TDD	36960	1931	375	-80.22	-10.79	-11.86	-11.15	43.57	-123.79	-123.79	-69.43	-60.58	-61.29	100

Technology Specifications

LTE / 5G Characteristics		
Frequency bands supported	All Licensed and Unlicensed FDD/TDD Bands plus User defined frequencies	
Channel Bandwidth	1.4 MHz	
Maximum number of channels	256	
Measurement Elements	Synchronization (PSCH and SSCH) / Resource Elements (RE)	
Measurement information	Per channel: PCI, SSB Index, RSSI, RSRP, RSRQ, SINR, Cyclic Prefix, RSRP, RSRQ, Noise Power, Average Noise (LTE), CNIR (LTE)	
Information Set Measurement Rate	Up to 40 channels/s	
CINR Dynamic Range	- 10 to + 20 dB	
Automatic Gain Control	- 30 to + 25 dB gain - 30 to 0 dB gain	CD18, CD27 CD08
RSRP Sensitivity	- 135 to - 20 dBm	
CINR / RSRP Accuracy	± 2 dB / ± 2 dBm	

GSM Characteristics		
Frequency bands supported	All 3GPP Bands plus User defined frequencies	
Maximum number of channels	256	
Measurement information	BSIC, RSSI, C/I, BER	
Measurement speed	Up to 30 channels/s	
C/I range	5 to 20	
Automatic Gain Control	- 30 to + 25 dB gain	
BSIC Detection Level @ 5% BER maximum	- 102 to - 20 dBm	
C/I / RSSI Accuracy	± 2 dB / ± 2 dBm	

UMTS Characteristics		
Frequency bands supported	All 3GPP Bands plus User defined frequencies	
Maximum number of channels	256	
Measurement information	RSSI / RSCP / E_cI_o / Delay Spread	
Measurement speed	Up to 30 channels/s	
RSCP Sensitivity / E_cI_o range	- 110 dBm / - 20 dB	
C/I / RSSI Accuracy	± 2 dB / ± 2 dBm	

RF and Digitalization Specifications		
Frequency Range	9 kHz to 8, 18, 27 GHz, possible extent to 40GHz using DC-40 (downconverter)	
Max. Instantaneous Bandwidth	100 MHz (extended using SW features to ***CellDigitizer*** frequency range)	
Max. Dynamic Range / Noise Figure	100 dB / < 15 dB	
Real Time Bandwidth (RTBW)	0.1 / 10 / 40 / 100 MHz	
Maximum Safe RF Input Level	+10 dBm, DC 10 V	
Programable Attenuation and Gain	CD08: - 30, - 20, - 15, - 10, - 5, 0 dB CD18, CD27: - 30, - 20, - 15, - 10, - 5, 0, 5, 15, 25 dB	
Spurious Free Dynamic Range (SFDR)	60 dBc (typical) 70 dBc (typical) 100 dBc (typical)	100 MHz RTBW 10 / 40 MHz RTBW 0.1 MHz RTBW
Amplitude Accuracy (25 °C ± 5 °C)	± 2.0 dB (typical)	
A/D Converter Sampling Rate and Resolution	125 MSa/s, 14 bits for each I and Q 300 kSa/s, 24 bits	10 / 40 / 100 MHz RTBW 0.1MHz RTBW

Specifications

Frequency		
Frequency Range	9 kHz to 8, 18, 27 or 40 GHz	
Frequency Reference	± 1.0 ppm ± 1.0 ppm 0 °C to 55 °C ± 1.0 ppm per year	Accuracy at room temperature Stability over temperature Aging
Probability of Intercept (POI)	≥ 25.552 µs signal duration ≤ 17.360 µs signal duration	For 100% POI For 0% POI

Amplitude		
Amplitude Accuracy 25 °C ± 5 °C	± 2.00 dB typical	for frequencies between 50 MHz to 27 GHz
Measurement Range	DANL to levels in table below	
Maximum Safe RF Input Level	+10 dBm, Max DC: 10 V	

Displayed Average Noise Level (DANL)

At 25 °C ± 5 °C, typical

Frequency (GHz)	CD08	CD18	CD27
0.1	-157 dBm/Hz	-161 dBm/Hz	-160 dBm/Hz
0.5	-155 dBm/Hz	-160 dBm/Hz	-159 dBm/Hz
1.0	-156 dBm/Hz	-160 dBm/Hz	-159 dBm/Hz
2.0	-154 dBm/Hz	-154 dBm/Hz	-153 dBm/Hz
3.0	-152 dBm/Hz	-158 dBm/Hz	-157 dBm/Hz
4.0	-151 dBm/Hz	-162 dBm/Hz	-162 dBm/Hz
5.0	-150 dBm/Hz	-158 dBm/Hz	-158 dBm/Hz
6.0	-149 dBm/Hz	-157 dBm/Hz	-157 dBm/Hz
7.0	-150 dBm/Hz	-153 dBm/Hz	-155 dBm/Hz
8.0	-144 dBm/Hz	-160 dBm/Hz	-161 dBm/Hz
9.0		-158 dBm/Hz	-161 dBm/Hz
10.0		-160 dBm/Hz	-161 dBm/Hz
11.0		-156 dBm/Hz	-160 dBm/Hz
12.0		-158 dBm/Hz	-157 dBm/Hz
13.0		-151 dBm/Hz	-157 dBm/Hz
14.0		-154 dBm/Hz	-154 dBm/Hz
15.0		-160 dBm/Hz	-157 dBm/Hz
16.0		-157 dBm/Hz	-157 dBm/Hz
17.0		-150 dBm/Hz	-156 dBm/Hz
18.0		-144 dBm/Hz	-156 dBm/Hz
19.0			-149 dBm/Hz
20.0			-154 dBm/Hz
21.0			-153 dBm/Hz
22.0			-152 dBm/Hz
23.0			-153 dBm/Hz
24.0			-155 dBm/Hz
25.0			-153 dBm/Hz
26.0			-150 dBm/Hz
27.0			-148 dBm/Hz

Specifications

Spectral Purity

SSB Phase noise	Offset	
25 °C ± 5 °C	100 Hz	-90 dBc/Hz
At, 1 GHz, measured with	1 kHz	-93 dBc/Hz
external oscillator not	10 kHz	-98 dBc/Hz
present	100 kHz	-106 dBc/Hz
	1 MHz	-120 dBc/Hz

Power and Physical

Power Supply / Consumption	12 V_{DC} / 17 W – CD08 12 V_{DC} / 23 W – CD18 12 V_{DC} / 23 W – CD27	Use AC Wall Power adaptor provided At room temperature	Input AC 100 – 240 V
Operating Temperature Range	0 °C to 50 °C		
Enclosure Dimensions / Weight	257.3 (L) x 193.7 (W) x 66.0 (H) mm / 2.7 kg 10.13 (L) x 7.63 (W) x 2.61 (H) inches / 6 lbs		
Warm up time	30 minutes		

Conectors

RF in	SMA female, 50 Ω
10 MHz Reference In and Out	SMA female, 50 Ω
Analog I and Q Out	SMA female, 50 Ω
HIF Out	SMA female, 50 Ω
10 / 100 / 1000 Ethernet	RJ45
USB Console	Type B - mini
GPIO	25-pin male D-Subminiature
Power	Coaxial Type A: 5.5 mm, OD 2.5 mm ID

Regulatory Compliance

FCC / RoHS Compliance / Mark (CE)		
EMC Directive 2014/30/EU	EN 61326-1:2013	Electromagnetic Compatibility
Low Voltage Directive 2006/95/EC	EN 61010-1-2010 Class 1	Safety
Humidity & Temperature	MIL-STD-PRF-28800 Class 2	
Shock & Vibration	MIL-STD-PRF-28800 Class 2 MIL-STD-PRF-28800 Class 3	


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3 Current Coverage Analysis

3.1 Introduction

This section shows the wireless carrier coverage within the City in three frequency ranges: low bands (649.5 to 873.35 MHz), mid bands (1937.5 to 2175 MHz), and high bands (3730.08 to 3851.04 MHz) with full site predictions simulated to match the data collected during the drive test. City regulations regarding wireless communication facilities are also highlighted together with census information to identify areas of interest and potential for additional infrastructure deployment.

Wireless carriers use multiple spectrum bands because each band serves a different purpose in the network. Lower-frequency bands propagate farther and perform better over broad geographic areas, making them the primary layer used to provide blanket coverage and basic access to the network. Mid- and higher-frequency bands typically serve a different role: they cover smaller areas and are deployed to add capacity where many users are concentrated within a limited space. Because the purpose of this study is to evaluate broad-area service availability and identify major coverage gaps across Indian Wells, the analysis focuses primarily on the low-band layer, which best represents the portion of the network responsible for wide-area coverage.

The following deliverables are part of this section:

- low bands, mid bands, and high bands predictions matching data collected on drive test
- Key city regulations
- Industry Incentives for wireless deployments
- Census at block level

3.2 Predictions

CelPlan used its proprietary tool named CelPlanner to run simulations with the objective of matching the data collected in the field. The goal of this simulation is to visually represent the coverage of the city mainly in the lowest frequency range, which represents the “blanket” coverage to allow mobile devices to connect to the carrier’s network. These simulations were adjusted to show the Reference Signal Received Power (RSRP) collected in the drive test and may not necessarily match perfectly with the parameters of radios and antennas used by the carriers; these specific parameters are not publicly available, thus CelPlan approximated using values based on industry standards and calibrating them with the collected data. Even though the values may not be a perfect match, they provide a good compromise for analyzing the coverage area of each site.

Section 3.6 contains explanations on radio frequency propagation and propagation models to further assist the reader in understanding how the predictions were generated. Understanding this, however, is not crucial to follow the scope of this report.

Table 4 shows 19 total frequency channels used by T-Mobile, Verizon and AT&T. CelPlan ran 10 predictions, one per carrier, technology and band type, combining the frequency ranges as indicated in Table 5 to Table 7.

TABLE 4 – ALL BANDS AND FREQUENCIES MEASURED

Operator	Network Mode	MHz	LTE/4G Band	5G Band	Band type
ATT	LTE/4G	739	12	-	low
ATT	LTE/4G	1955	2	-	mid
ATT	LTE/4G	2164.9	66	-	mid
ATT	LTE/4G	2355	30	-	mid
ATT	5G	3851.04	-	n77	high
T-Mobile	LTE/4G	649.5	71	-	low
T-Mobile	LTE/4G	731.5	12	-	low
T-Mobile	LTE/4G	1937.5	2	-	mid
T-Mobile	LTE/4G	2112.5	66		mid
T-Mobile	LTE/4G	2145	66	-	mid
T-Mobile	5G	632.65	-	n71	low
T-Mobile	5G	1981.25	-	n2	mid
VZW	LTE/4G	751	13	-	low
VZW	LTE/4G	1970	2	-	mid
VZW	LTE/4G	2125	66	-	mid
VZW	LTE/4G	2175	66	-	mid
VZW	5G	873.35	-	n5	low
VZW	5G	3730.08	-	n77	high
VZW	5G	3809.28	-	n77	high

TABLE 5 – LOW BANDS GROUPED PER CARRIER

Operator	Network Mode	MHz	LTE/4G Band	5G Band	Band type
ATT	LTE/4G	739	12	-	low
T-Mobile	LTE/4G	649.5	71	-	low
T-Mobile	LTE/4G	731.5	12	-	low
T-Mobile	5G	632.65	-	n71	low
VZW	LTE/4G	751	13	-	low
VZW	5G	873.35	-	n5	low

TABLE 6 – MID BANDS GROUPED PER CARRIER

Operator	Network Mode	MHz	LTE/4G Band	5G Band	Band type
ATT	LTE/4G	1955	2	-	mid
ATT	LTE/4G	2164.9	66	-	mid
ATT	LTE/4G	2355	30	-	mid
T-Mobile	LTE/4G	1937.5	2	-	mid
T-Mobile	LTE/4G	2112.5	66		mid
T-Mobile	LTE/4G	2145	66	-	mid
T-Mobile	5G	1981.25	-	n2	mid
VZW	LTE/4G	1970	2	-	mid
VZW	LTE/4G	2125	66	-	mid
VZW	LTE/4G	2175	66	-	mid

TABLE 7 – HIGH BANDS GROUPED PER CARRIER

Operator	Network Mode	MHz	LTE/4G Band	5G Band	Band type
ATT	5G	3851.04	-	n77	high
VZW	5G	3730.08	-	n77	high
VZW	5G	3809.28	-	n77	high

3.2.1 Reference-Signal-Received-Power (RSRP) Definition

These predictions were calculated using the Reference-Signal-Received-Power (RSRP) which is a common measure to determine service level in 4G LTE and 5G systems. The goal of this section is to elaborate on the meaning of the measurements to support the understanding of each map provided.

In cellular networks, your phone (or device) moves from one area to another, switching between different coverage zones called "cells." To ensure your connection stays smooth, your phone constantly measures how strong and clear the signals are from nearby cell towers.

In LTE networks, two key measures are used:

- RSRP (Reference Signal Received Power): Think of this as the signal's strength. It measures how much power is received from the cell tower's signal, helping the phone decide which tower to connect to. This is important when your phone is idle (not actively transmitting data) to pick the best cell.
- RSRQ (Reference Signal Received Quality): This measures how clear the signal is by considering both its strength (RSRP) and any interference or noise around it. This is especially useful when the signal strength alone isn't enough to decide whether to switch to another tower or stay connected.

If the signal is not strong or clear enough, your phone might struggle to stay connected, drop calls, or have slower data. These measurements guide decisions for smooth handovers (when your phone switches from one tower to another) or for selecting the best tower in an area.

Sometimes, just looking at signal strength (RSRP) isn't enough because it doesn't account for interference from nearby towers or noise. Therefore, RSRQ comes in to provide a better picture.

LTE technology is flexible: it can use RSRP, RSRQ, or both to ensure the best possible connection. RSRP quality is given in dBm. RSRQ is discussed here only for general context, while siting recommendations in this report are based primarily on RSRP signal-strength patterns. The values on Table 8 are commonly used in the industry to indicate system quality. Low RSRP signal level indicates coverage problems and therefore CelPlan used that as the main parameter analyzed to determine where additional towers might be required.

TABLE 8 - REFERENCE-SIGNAL-RECEIVE-POWER (RSRP) DEFINITION

		RSRP (dBm)	RSRQ (dB)	What does it mean for the user?
RF Conditions	Excellent	> -80	> -10	You'll get the strongest connection with the fastest possible data speeds.
	Good	-80 to -90	-10 to -15	Your connection is solid, with good data speed for streaming, browsing, and calls.
	Mid Cell	-90 to -100	-15 to -20	Your connection might still work, but data speed might be slower, and drop-outs may happen. As the signal gets closer to -100 dBm, performance will significantly decline.
	Cell Edge	< -110	< -20	Your phone will have a hard time connecting, leading to dropped calls and no internet access.

3.2.2 Assumptions

3.2.2.1 Geographical Information System (GIS) data

Geographical Information System (GIS) data is an important input into the design of any network as digital maps that represent terrain characteristics, such as elevation, and clutter type and height. Terrain elevation is referred to as topography, and clutter, as morphology; both are represented by raster files. CelPlan used 30 meters GIS data sourced from the USGS for this analysis. Due to the nature of the design, streets and roads were carved in the database to add the capability of analyzing signal propagation behind and adjacent to existing structures (e.g. buildings and houses). The topography was interpolated between bins to smoothen any sharp transitions in terrain. While the database is not highly detailed and not meant to represent each individual building and structure in the city, it does give a general idea of the density of the environment (e.g. highly urban, suburban areas) allowing estimation of the coverage area of each cell. Details about source and resolution of the data are provided below.

3.2.2.1.1 MORPHOLOGY

USGS NLCD Morphology layer (30 m morphology layer)

- Resolution: 1 ArcSec (~ 30 m)
- Date: 2001-2007
- Source: USGS NLCD 2001 with 18 terrain types

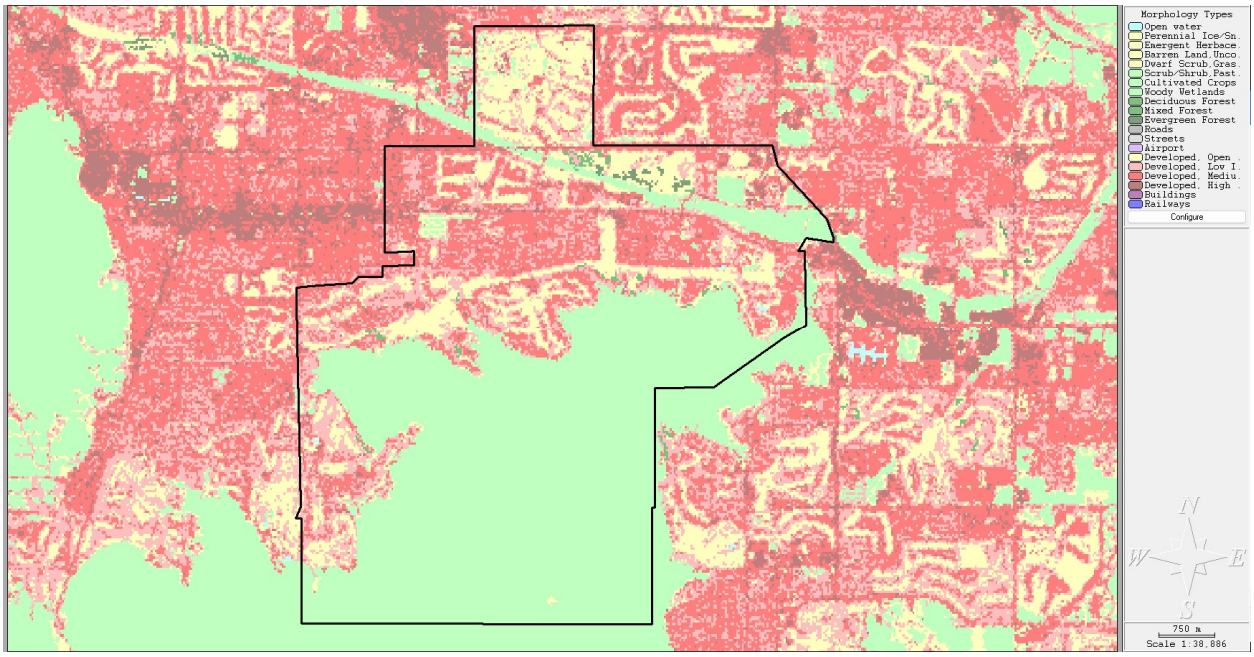


FIGURE 9 – MORPHOLOGY LAYER

3.2.2.1.2 LAYER TYPE: RASTERTOPOGRAPHY

USGS NED Topography layer (30 m topography layer)

- Source data: topographical maps, aerial photos
- Source resolution: 30 m
- Source dates: 1925 – 2002
- Source type: Bare-earth
- Vertical accuracy: 2.44m RMSE (root mean square error) measured

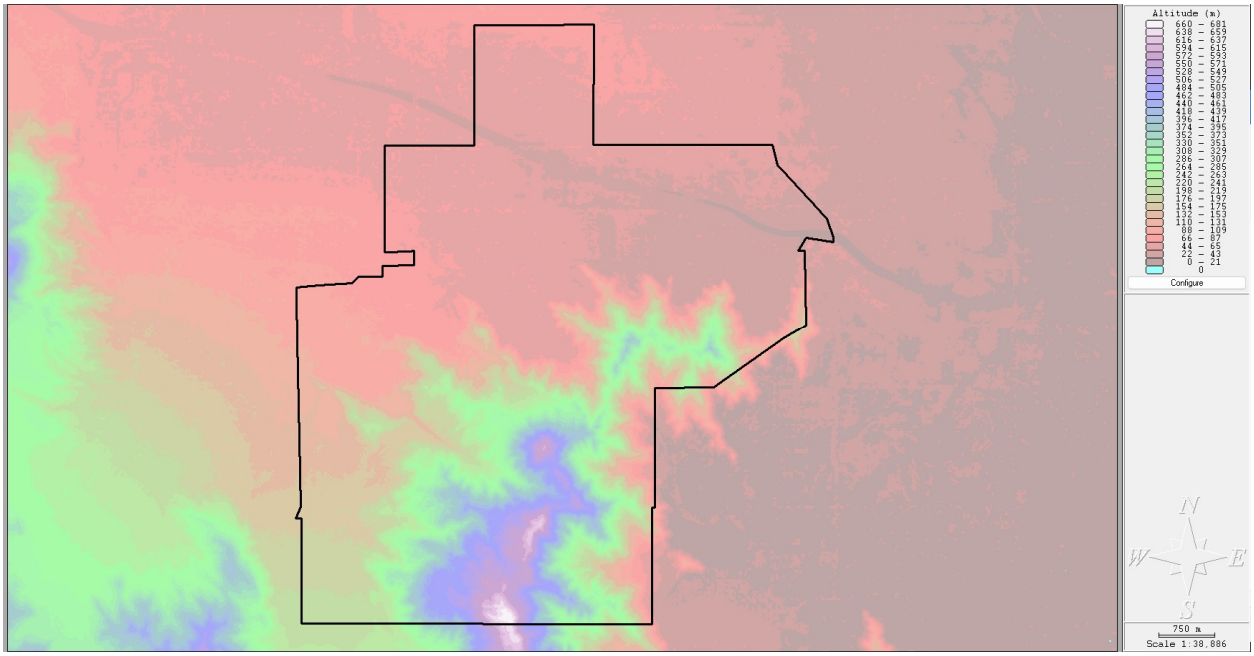


FIGURE 10 – TOPOGRAPHY LAYER

Figure 11 shows a sample of geographic profile cut with the terrain (gray) and clutter (shades of red) on the propagation path and the resulting path loss on the graph above.

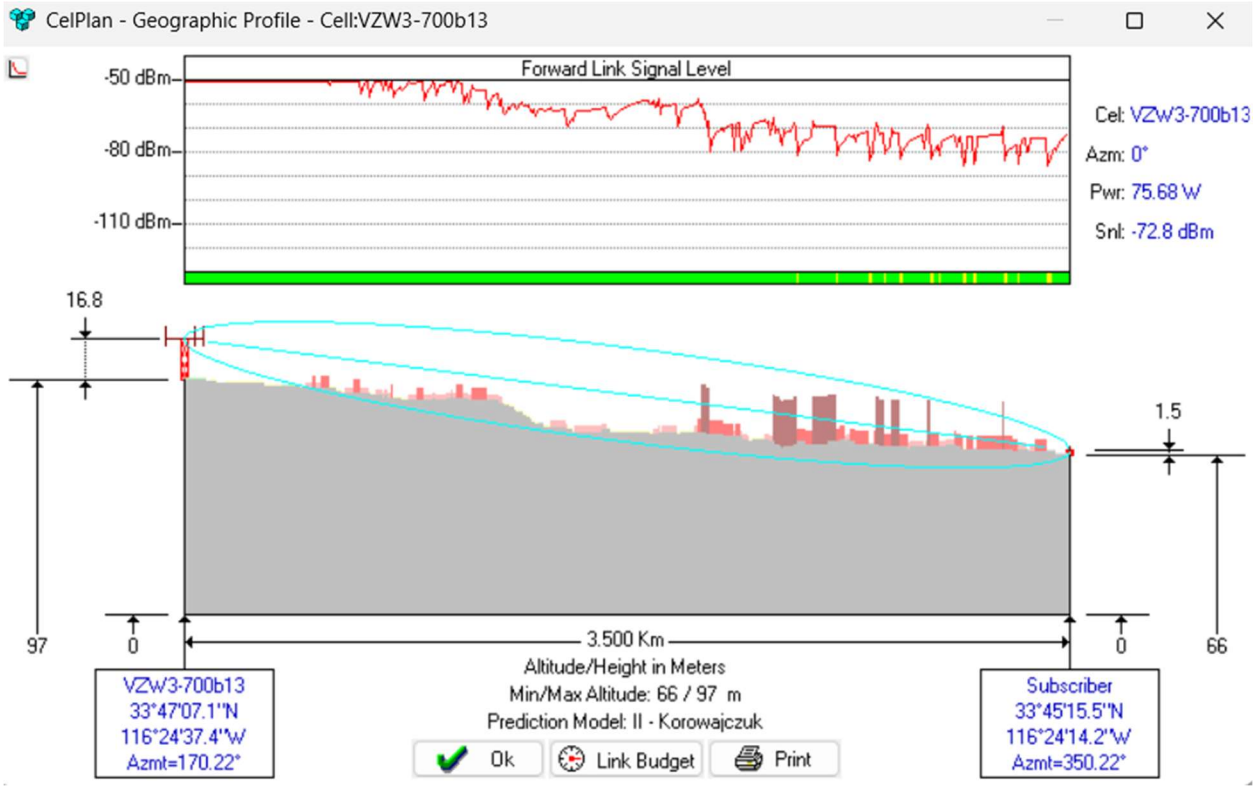


FIGURE 11 - GEOGRAPHIC PROFILE

3.2.2.2 Antenna and Link Budget

Several assumptions related to the site and antenna configuration were also made. CelPlan used different techniques to adjust and configure the cells. The first method used to estimate the antenna heights was a combination of visual inspection, Google Earth estimates and height information provided in the documents shared by the City. The outcome of this method was used as the final antenna height for each cell.

Another key information on the antenna is its azimuth. The antenna configurations are not publicly available therefore CelPlan does not know what type of equipment is installed and how it is configured. CelPlan decided on the approach of using a standard omni antenna (CELOMNI pattern) to simulate the combined result of multiple directional antennas. Where that was not possible, standard directional antennas were used to match better the drive test results. The same applies to antenna tilt. The idea was to match the predictions to the data collected in the field. The red square in Figure 12 highlights these settings.

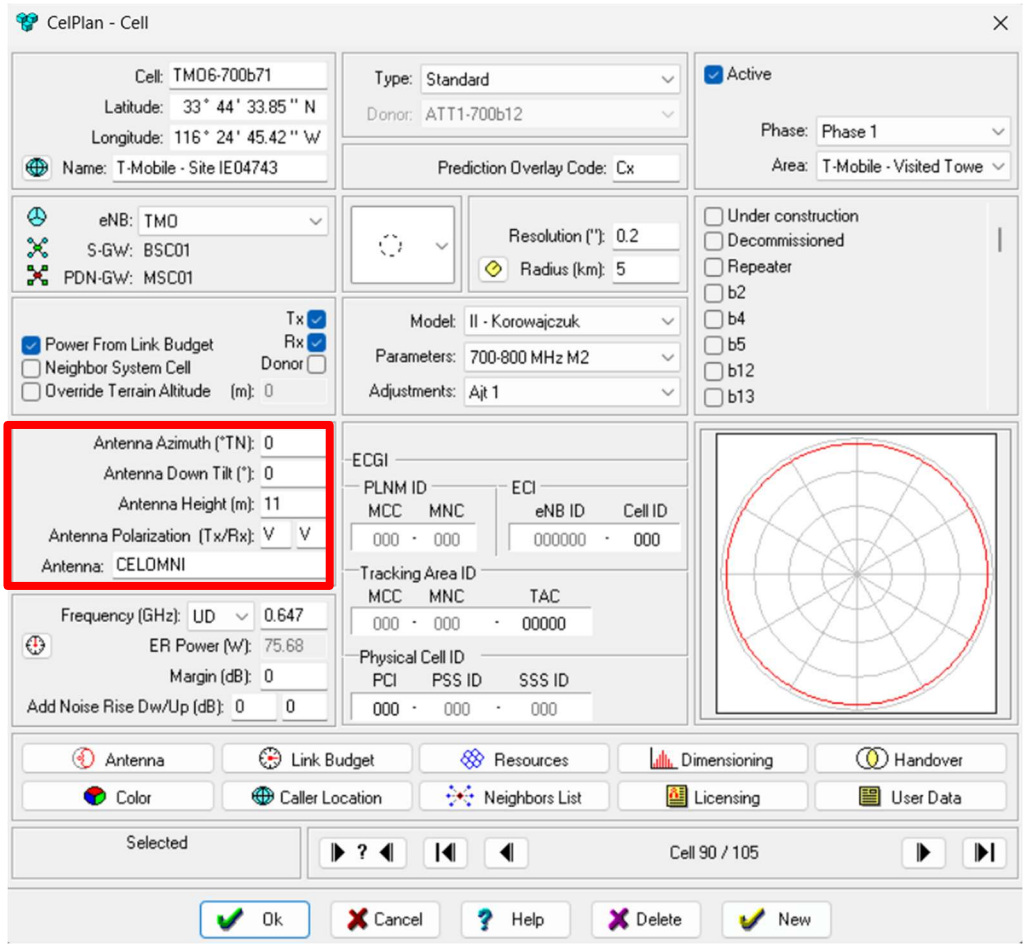


FIGURE 12 – CELL CONFIGURATION

The other set of assumptions include parameters related to link budget. Figure 13 show several parameters that need to be configured by carriers to optimize each site's effective radiated power (ERP). Once again, because this is not publicly available information, CelPlan configured these to match the drive test results.

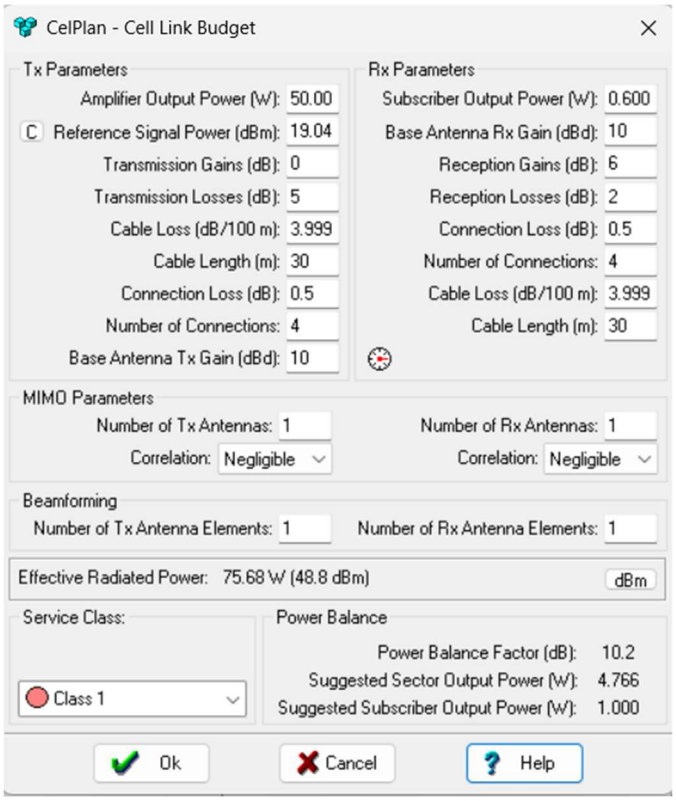


FIGURE 13 - LINK BUDGET CONFIGURATION

3.2.2.3 Sites outside Indian Wells

Some of the macro sites ("Other City Towers" or CUP_OTH) that influence Indian Wells' wireless performance are located just outside the City's boundary. These "external" towers, owned and operated by carriers such as AT&T, T-Mobile, Verizon in neighboring communities, already provide measurable coverage and capacity within portions of Indian Wells today. Excluding them from the analysis would therefore remove infrastructure that is actively serving Indian Wells and would misrepresent current network conditions.

For that reason, these "external" towers are included in the coverage maps and (where appropriate) the supporting statistics. This methodology reflects how carriers design and operate networks: coverage is engineered for continuity across a market area, not constrained by municipal borders. If a nearby AT&T, T-Mobile, or Verizon site outside the City already covers part of Indian Wells, the carrier is unlikely to duplicate that coverage with a new tower inside Indian Wells solely to satisfy a boundary-based analysis. Removing these sites from the analysis would distort the real picture of existing coverage and could lead to incorrect conclusions about where additional infrastructure is truly needed.

3.3 Existing City Coverage

This section presents existing wireless coverage maps for the City of Indian Wells segmented by technology, carrier, and bands. Figure 14, Figure 15, and Figure 16 illustrate the combined coverage for each carrier, representing the aggregate user experience across all deployed technologies and bands within each network. The maps Section 3.1 can be used in parallel with Figure 4 which contains the label for each site.

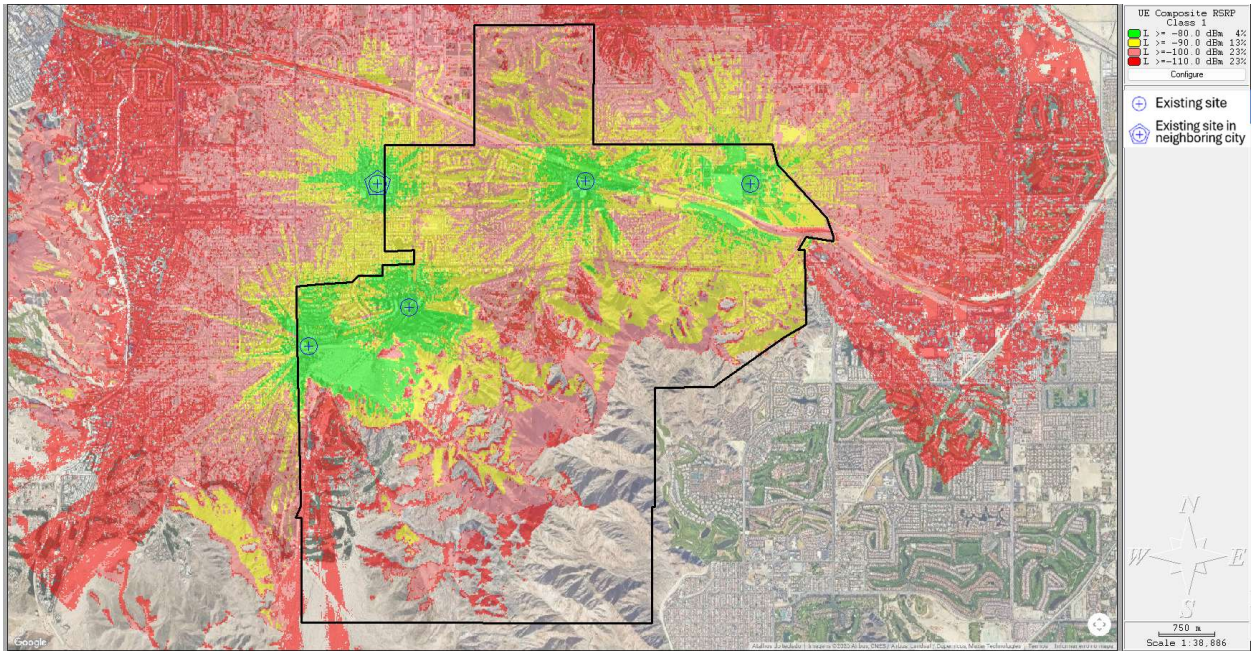


FIGURE 14 – EXISTING AT&T COMBINED COVERAGE

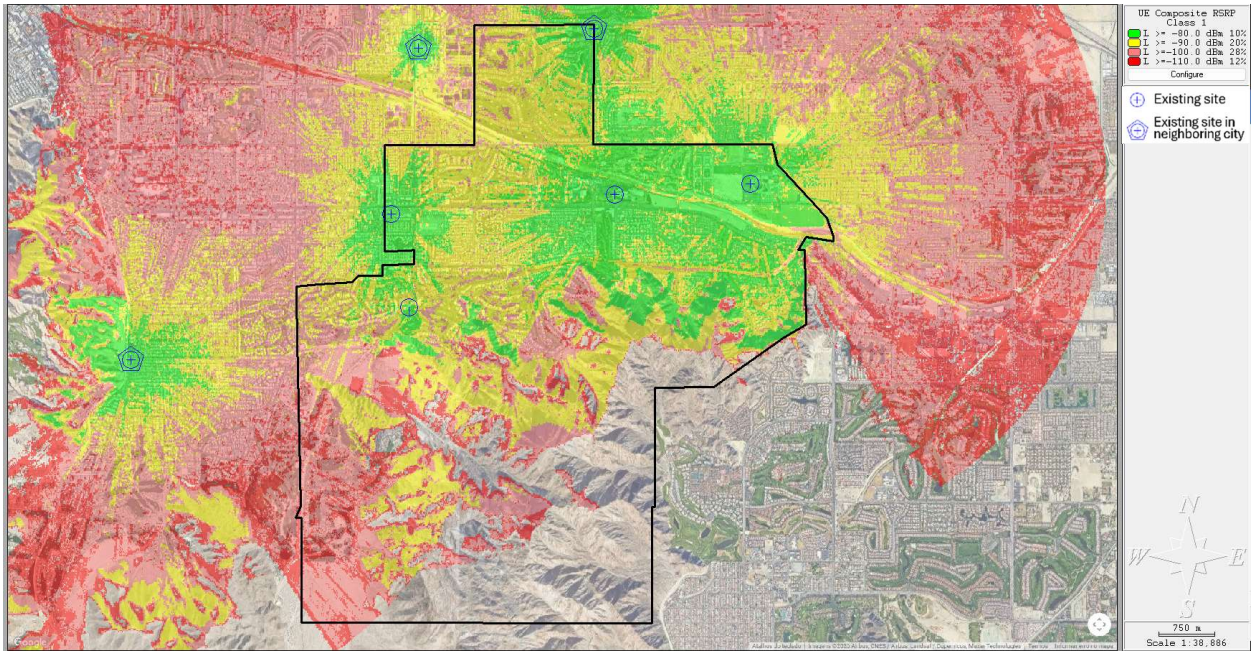


FIGURE 15 - EXISTING T-MOBILE COMBINED COVERAGE

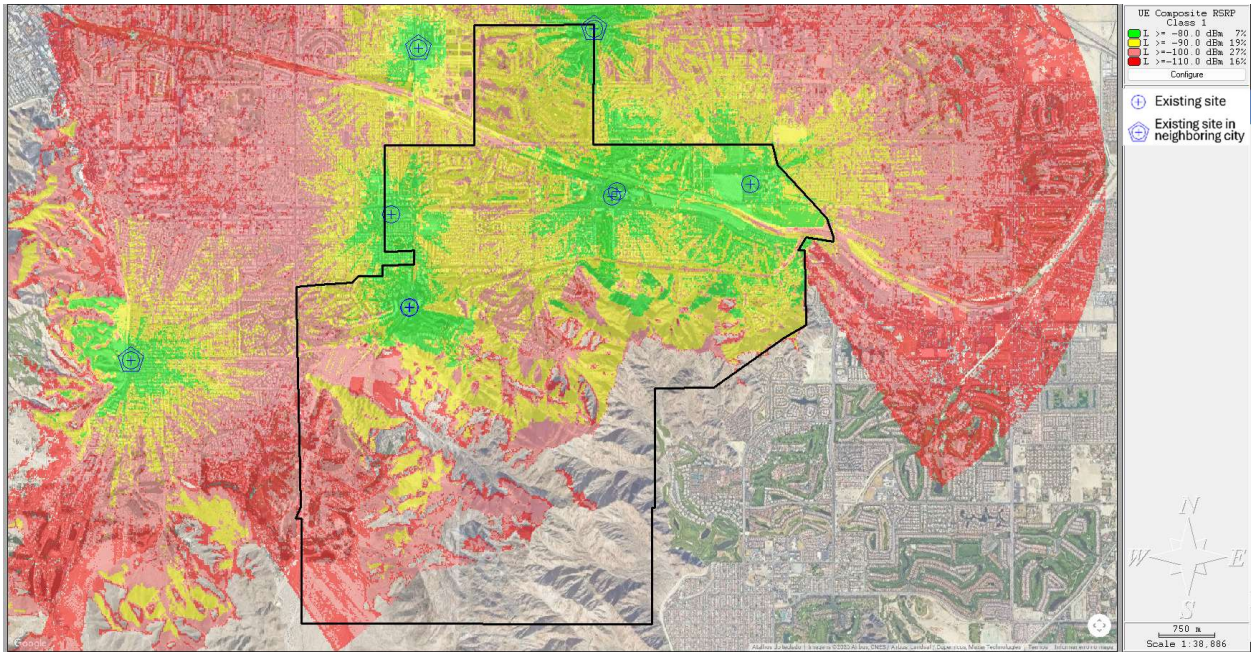


FIGURE 16 - EXISTING VERIZON COMBINED COVERAGE

3.3.1 5G

3.3.1.1 AT&T High Bands

Figure 17 shows the compiled and filtered RSRP drive test results of AT&T 5G high bands. Figure 18 shows high band predictions according to the same configuration. The light blue highlighted sites indicate the site selected during the map production process and do not carry any specific meaning or significance.

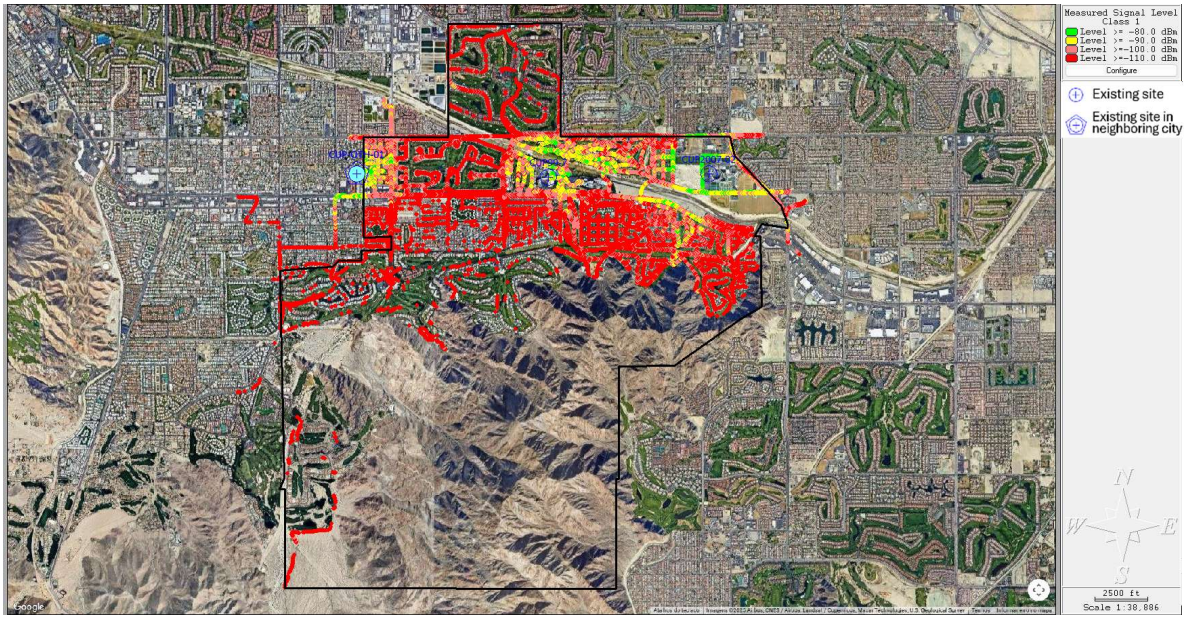


FIGURE 17 - DRIVE TEST RESULTS FOR AT&T 5G HIGH BANDS

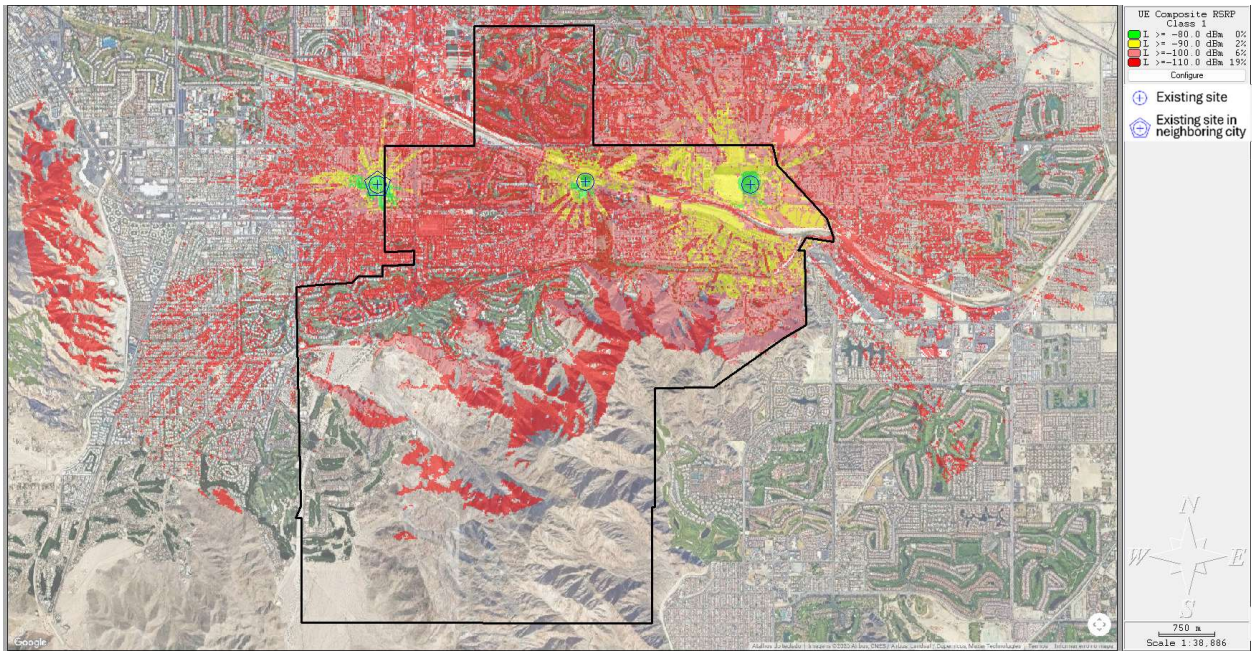


FIGURE 18 - EXISTING AT&T 5G HIGH BANDS PREDICTION

3.3.1.2 T-Mobile Low Bands

Figure 19 shows the compiled and filtered RSRP drive test results of T-Mobile 5G low bands. Figure 20 shows low band predictions according to the same configuration. The light blue highlighted sites indicate the site selected during the map production process and do not carry any specific meaning or significance.

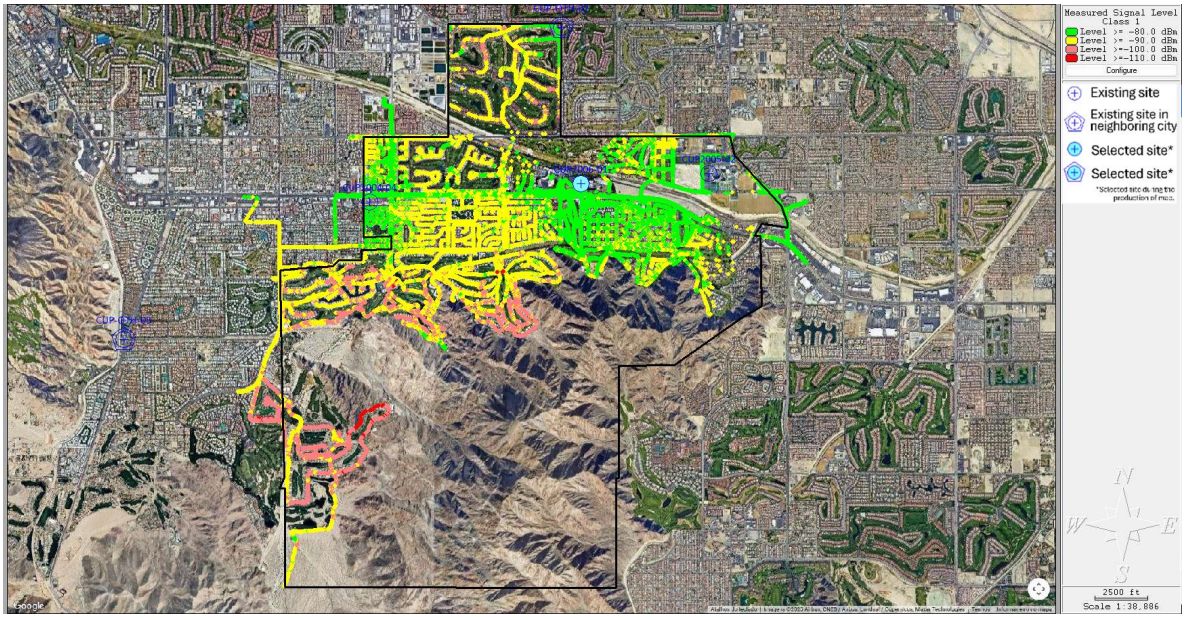


FIGURE 19 - DRIVE TEST RESULTS FOR T-MOBILE 5G LOW BANDS

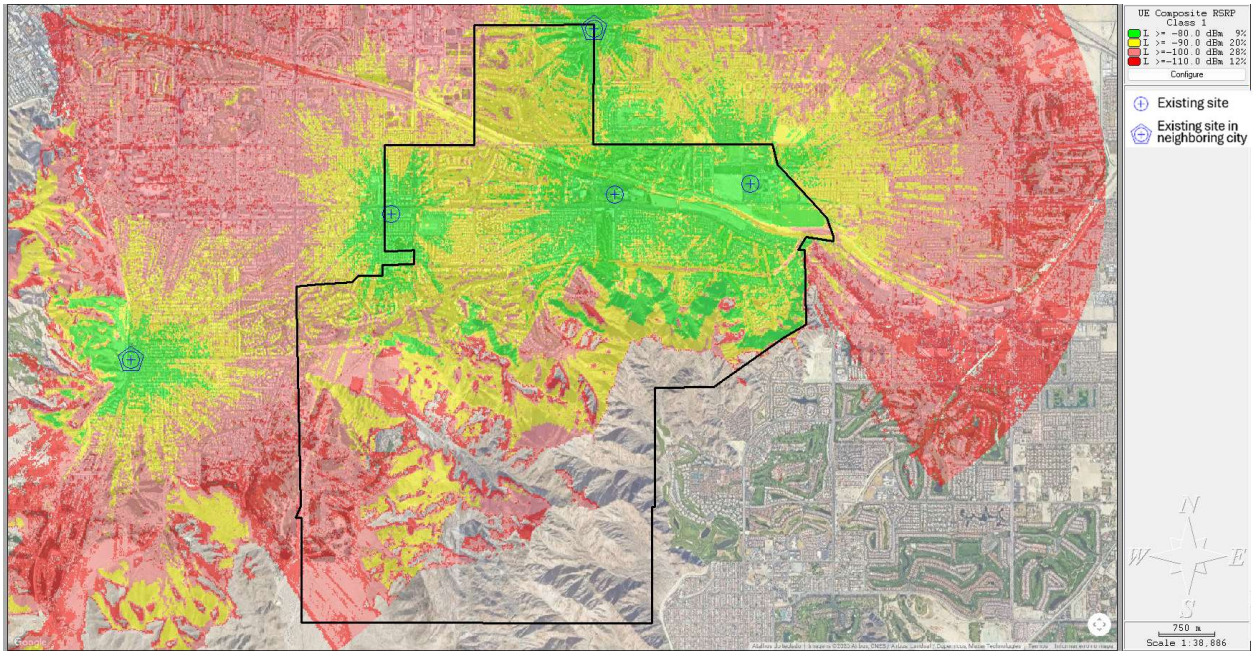


FIGURE 20 - EXISTING T-MOBILE 5G LOW BANDS PREDICTION

3.3.1.3 T-Mobile Mid Bands

Figure 21 shows the compiled and filtered RSRP drive test results of T-Mobile 5G mid bands. Figure 22 shows mid band predictions according to the same configuration. The light blue highlighted sites indicate the site selected during the map production process and do not carry any specific meaning or significance.

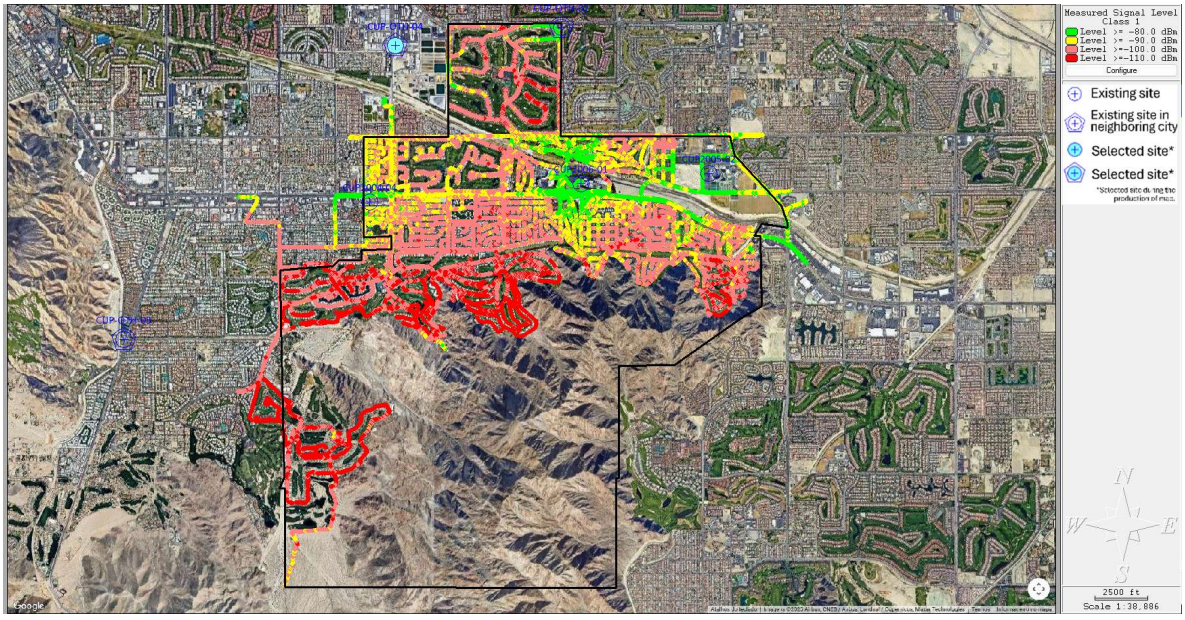


FIGURE 21 - DRIVE TEST RESULTS FOR T-MOBILE 5G MID BANDS

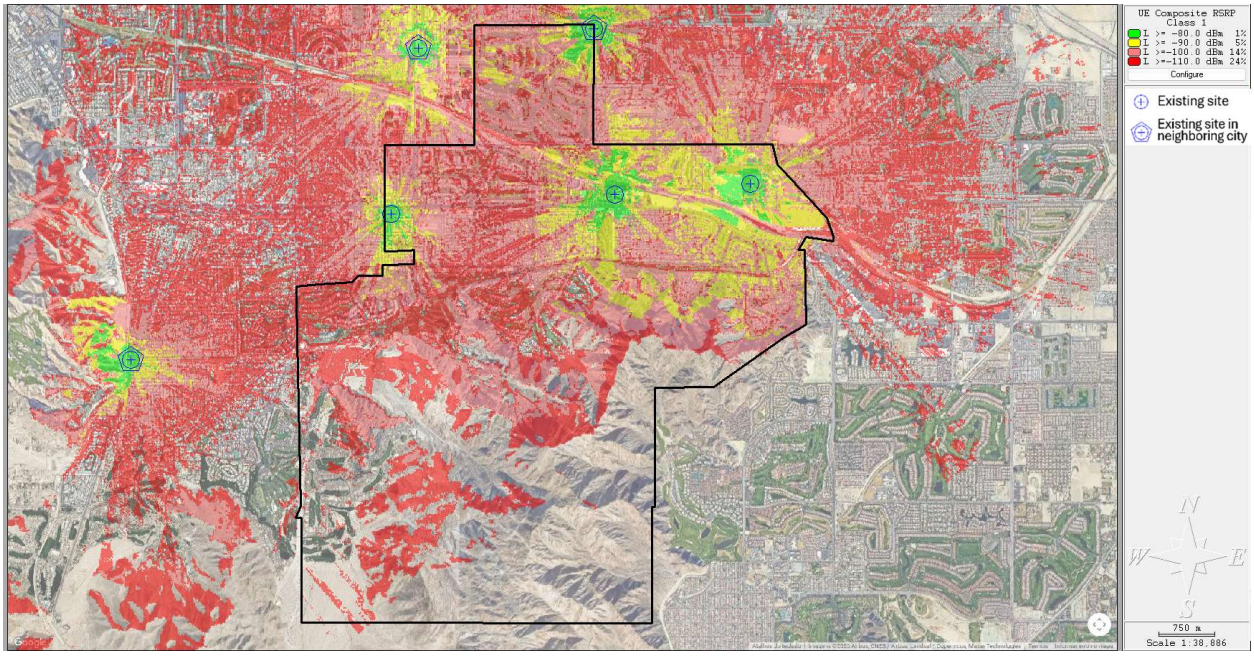


FIGURE 22 - EXISTING T-MOBILE 5G MID BANDS PREDICTION

3.3.1.4 Verizon Low Bands

Figure 23 shows the compiled and filtered RSRP drive test results of Verizon 5G low bands. Not enough samples were collected on these bands to generate a matching prediction. The light blue highlighted sites indicate the site selected during the map production process and do not carry any specific meaning or significance.



FIGURE 23 - DRIVE TEST RESULTS FOR VERIZON 5G LOW BANDS

3.3.1.5 Verizon High Bands

Figure 24 shows the compiled and filtered RSRP drive test results of Verizon 5G high bands. Figure 25 shows high band predictions according to the same configuration. The light blue highlighted sites indicate the site selected during the map production process and do not carry any specific meaning or significance.

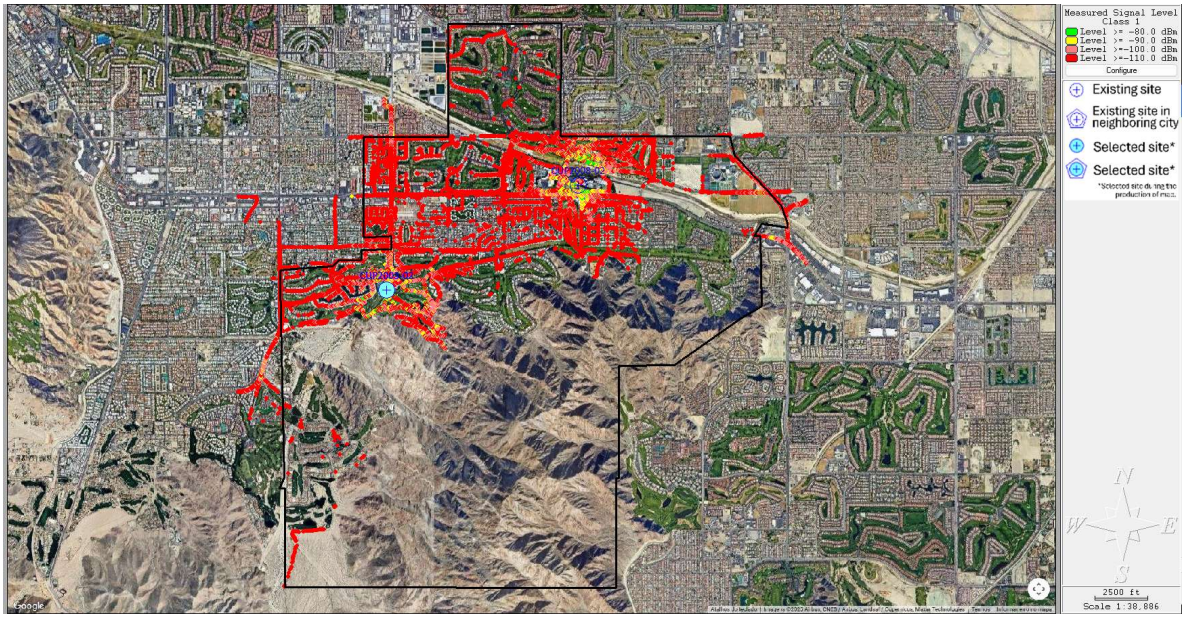


FIGURE 24 - DRIVE TEST RESULTS FOR VERIZON 5G HIGH BANDS

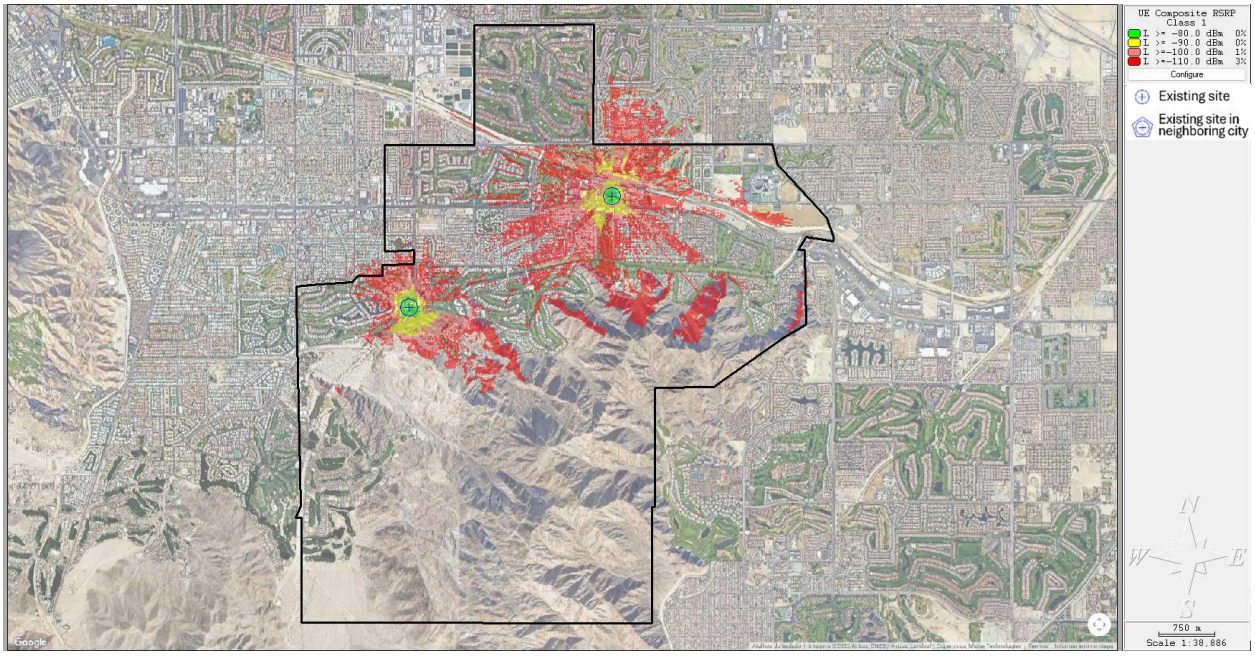


FIGURE 25 - EXISTING VERIZON 5G HIGH BANDS PREDICTION

3.3.2 LTE/4G

3.3.2.1 AT&T Low Bands

Figure 26 shows the compiled and filtered RSRP drive test results of AT&T LTE/4G low bands. Figure 27 shows low band predictions according to the same configuration. The light blue highlighted sites indicate the site selected during the map production process and do not carry any specific meaning or significance.

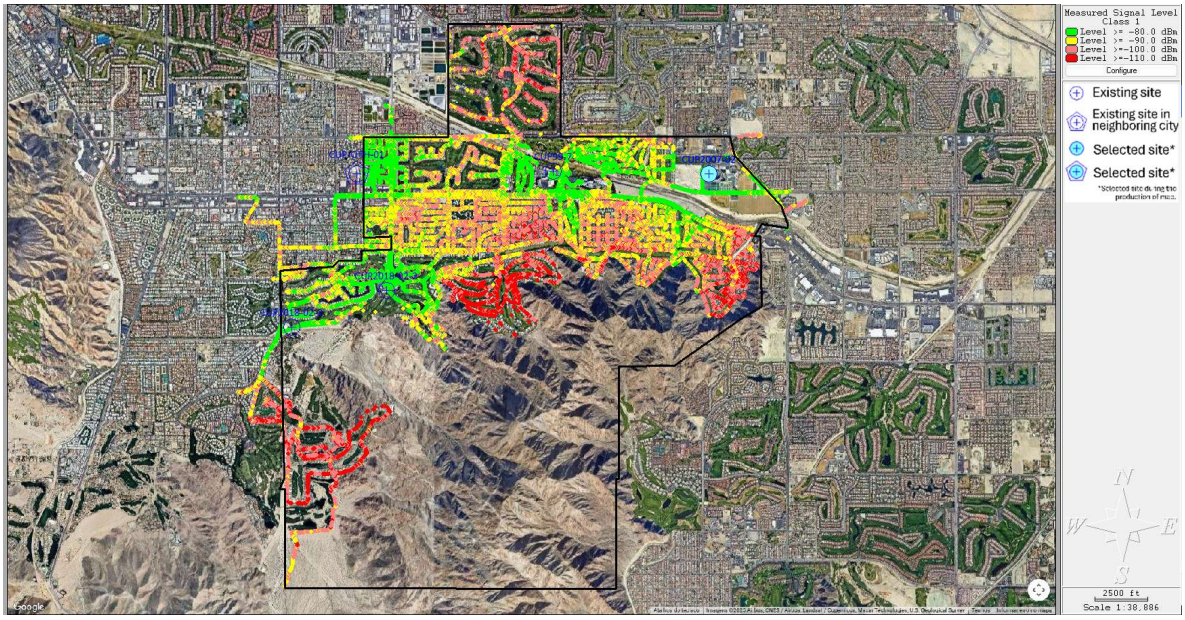


FIGURE 26 - DRIVE TEST RESULTS FOR AT&T LTE/4G MID BANDS

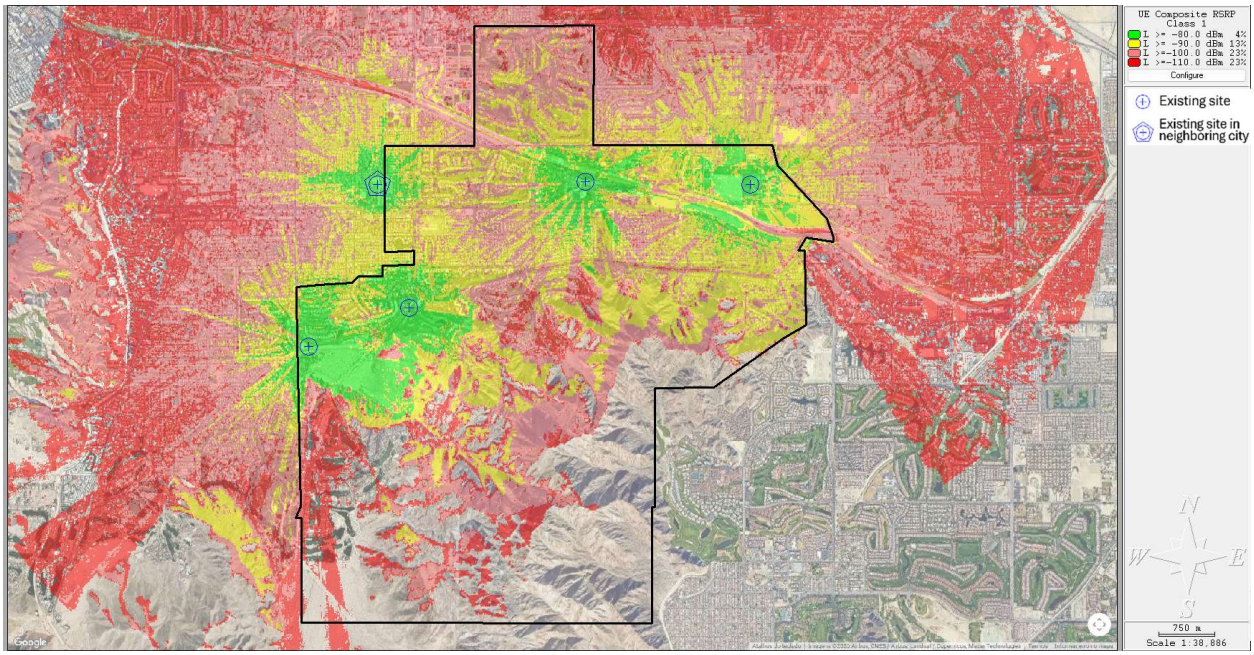


FIGURE 27 - EXISTING AT&T LTE/4G LOW BANDS PREDICTION

3.3.2.2 AT&T Mid Bands

Figure 28 shows the compiled and filtered RSRP drive test results of AT&T LTE/4G mid bands. Figure 29 shows mid band predictions according to the same configuration. The light blue highlighted sites indicate the site selected during the map production process and do not carry any specific meaning or significance.

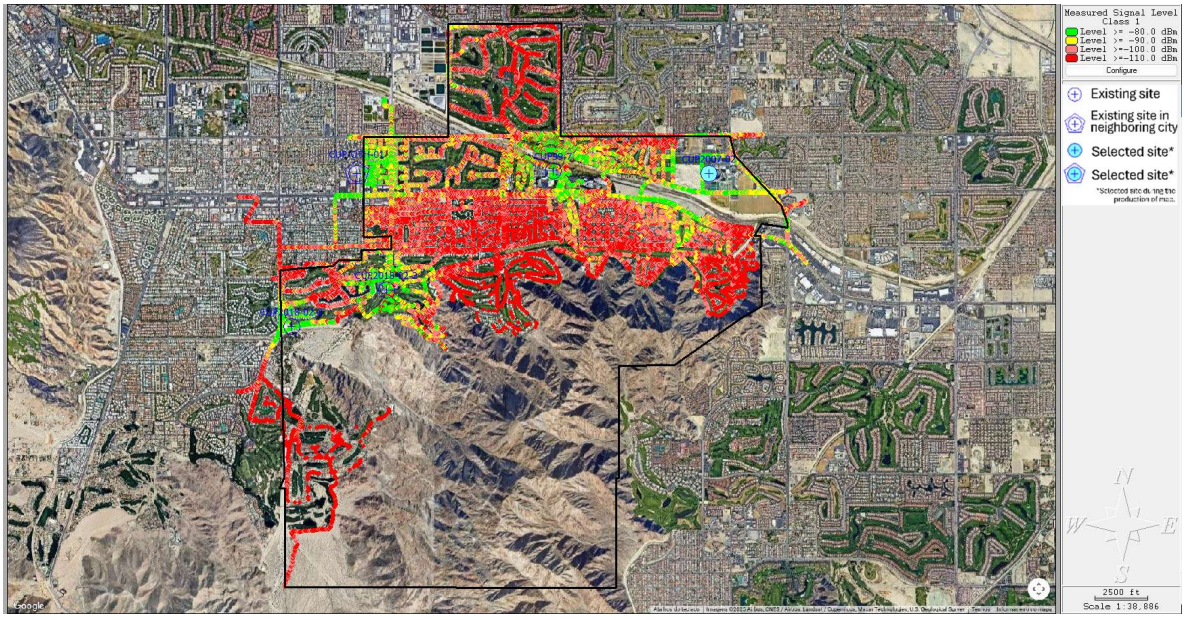


FIGURE 28 - DRIVE TEST RESULTS FOR AT&T LTE/4G MID BANDS

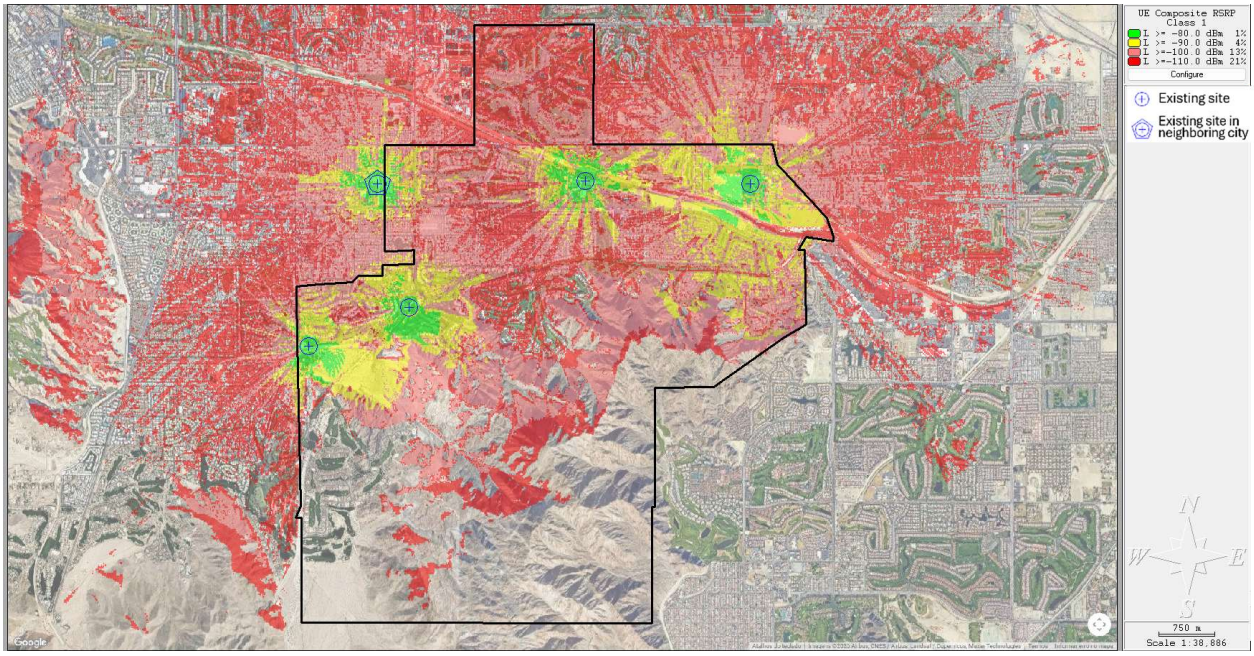


FIGURE 29 - EXISTING AT&T LTE/4G MID BANDS PREDICTION

3.3.2.3 T-Mobile Low Bands

Figure 30 shows the compiled and filtered RSRP drive test results of T-Mobile LTE/4G low bands. Figure 31 shows low band predictions according to the same configuration. The light blue highlighted sites indicate the site selected during the map production process and do not carry any specific meaning or significance.

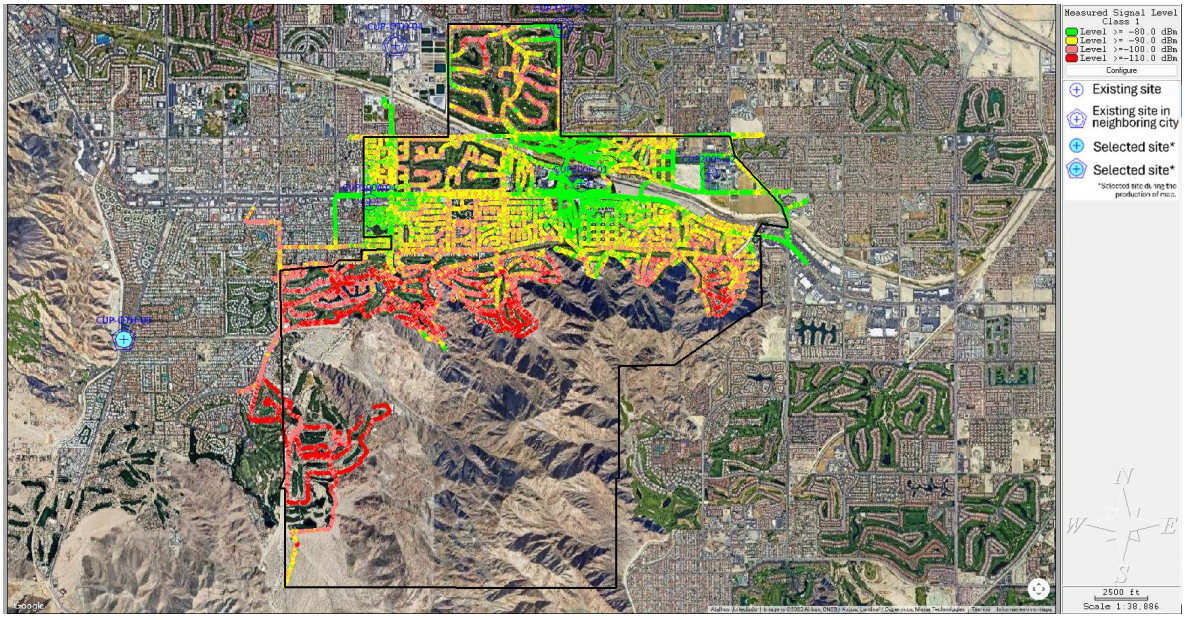


FIGURE 30 - DRIVE TEST RESULTS FOR T-MOBILE LTE/4G LOW BANDS

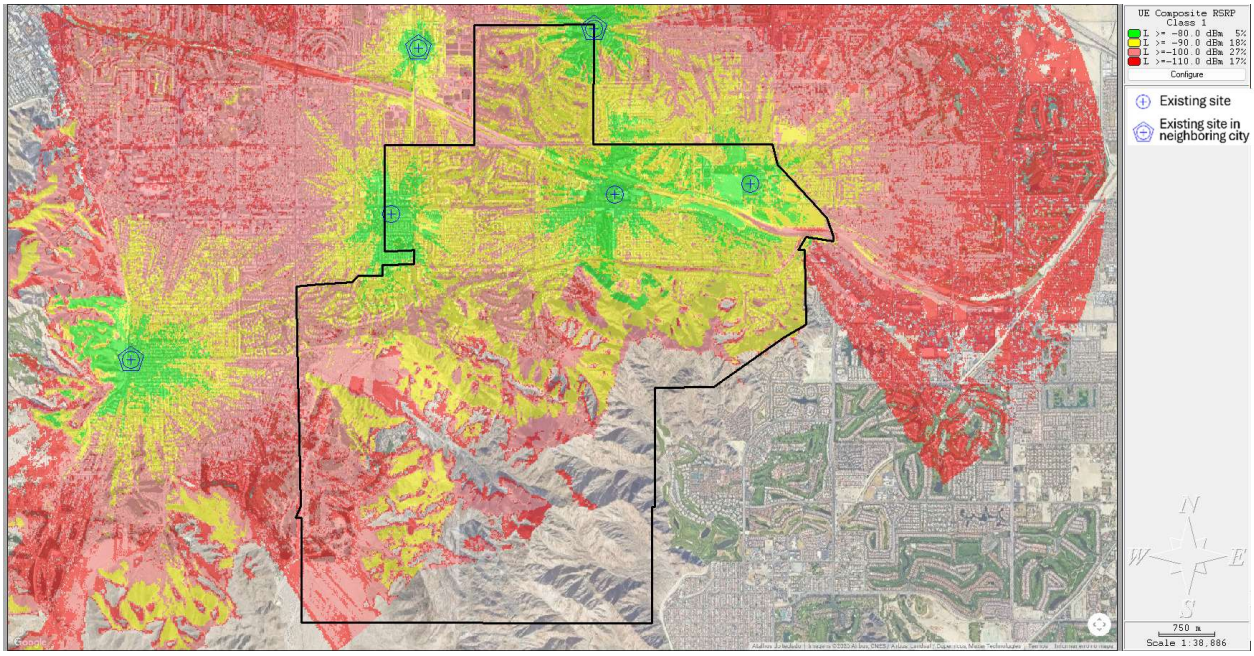


FIGURE 31 – EXISTING T-MOBILE LTE/4G LOW BANDS PREDICTION

3.3.2.4 T-Mobile Mid Bands

Figure 32 shows the compiled and filtered RSRP drive test results of T-Mobile LTE/4G mid bands. Figure 33 shows mid band predictions according to the same configuration. The light blue highlighted sites indicate the site selected during the map production process and do not carry any specific meaning or significance.

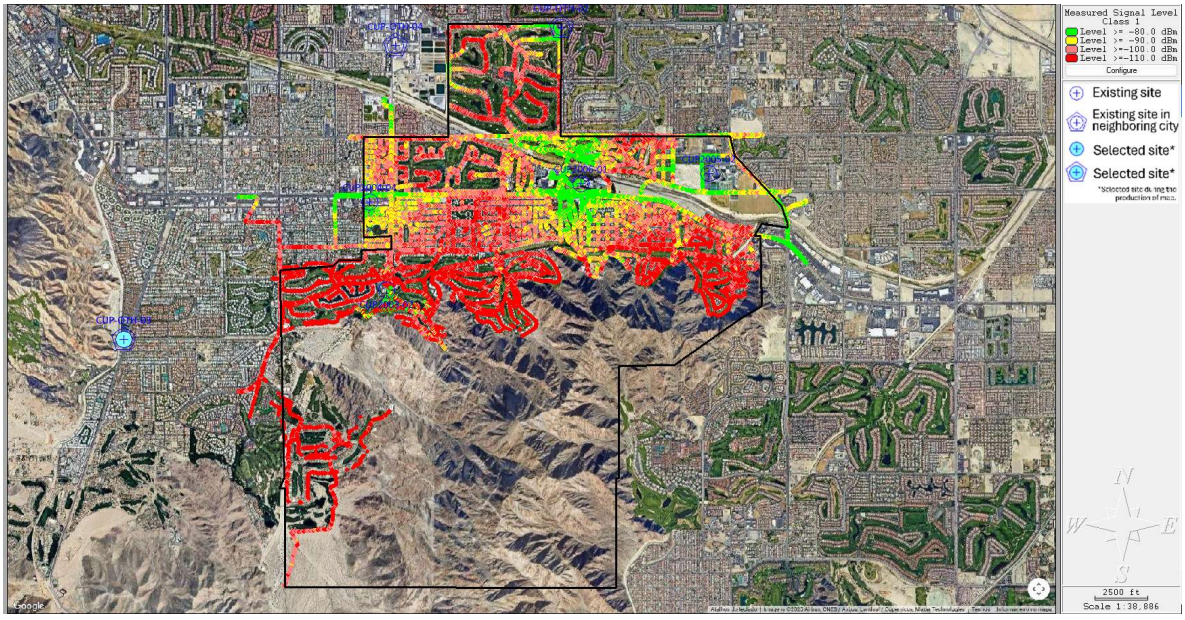


FIGURE 32 - DRIVE TEST RESULTS FOR T-MOBILE LTE/4G MID BANDS

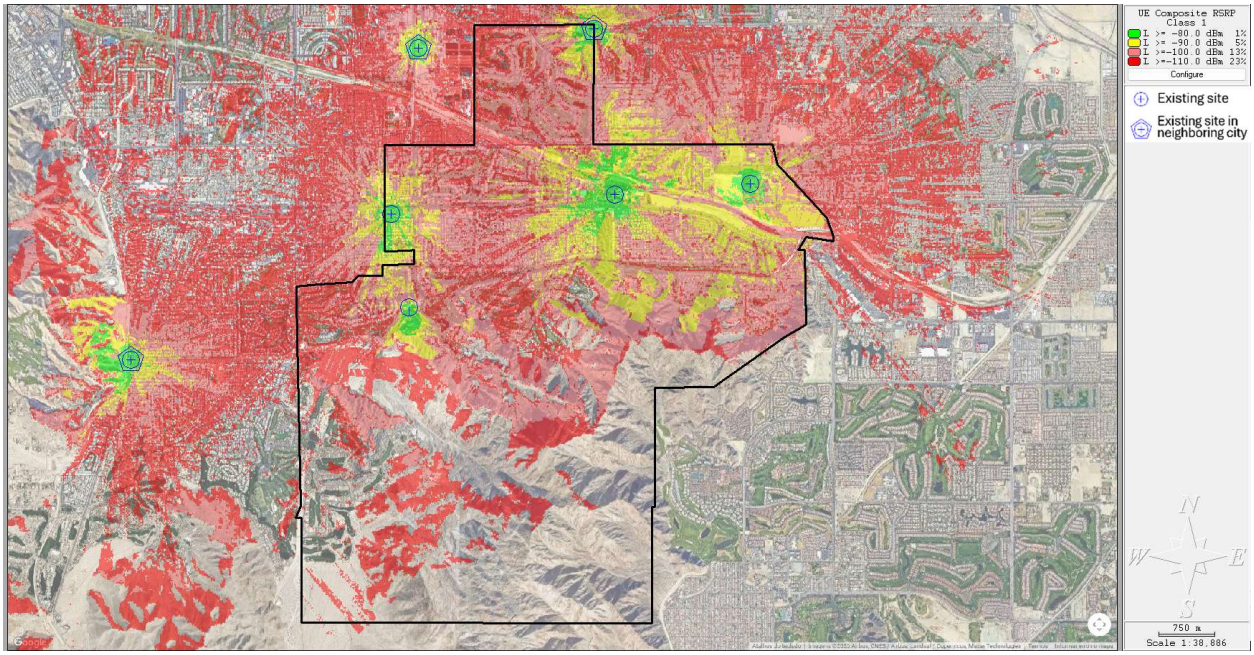


FIGURE 33 - EXISTING T-MOBILE LTE/4G MID BANDS PREDICTION

3.3.2.5 Verizon Low Bands

Figure 34 shows the compiled and filtered RSRP drive test results of Verizon LTE/4G low bands. Figure 35 shows low band predictions according to the same configuration. The light blue highlighted sites indicate the site selected during the map production process and do not carry any specific meaning or significance.

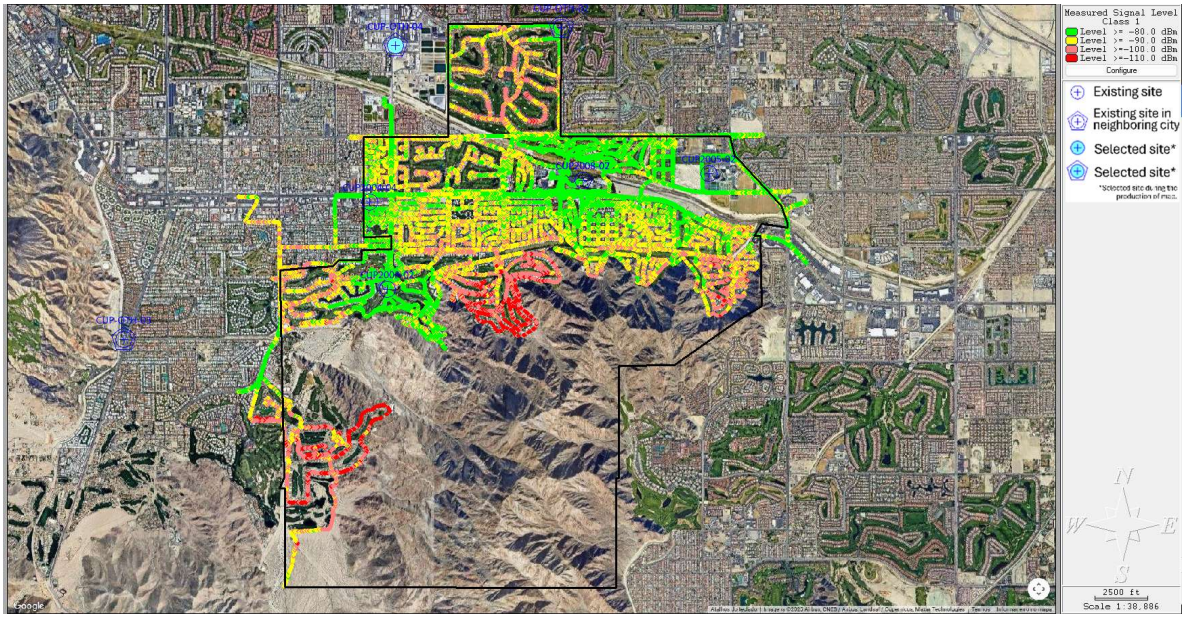


FIGURE 34 - DRIVE TEST RESULTS FOR VERIZON LTE/4G LOW BANDS

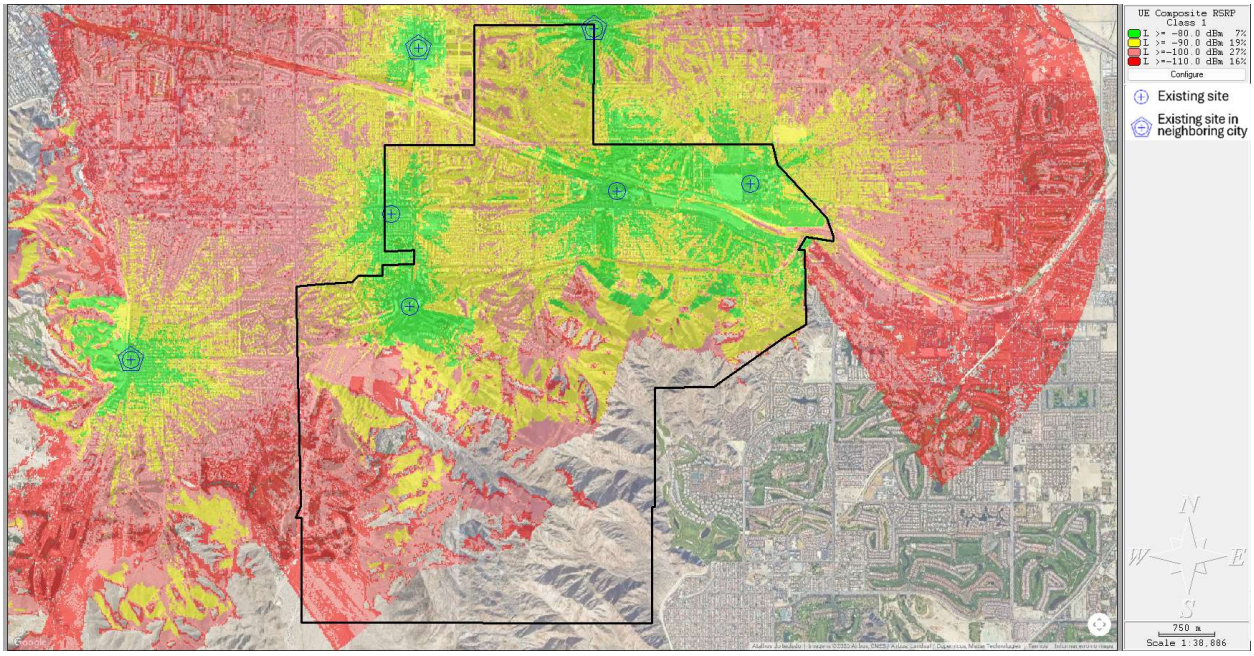


FIGURE 35 - EXISTING VERIZON LTE/4G LOW BANDS PREDICTION

3.3.2.6 Verizon Mid Bands

Figure 36 shows the compiled and filtered RSRP drive test results of Verizon LTE/4G Mid bands. Figure 37 shows mid band predictions according to the same configuration. The light blue highlighted sites indicate the site selected during the map production process and do not carry any specific meaning or significance.

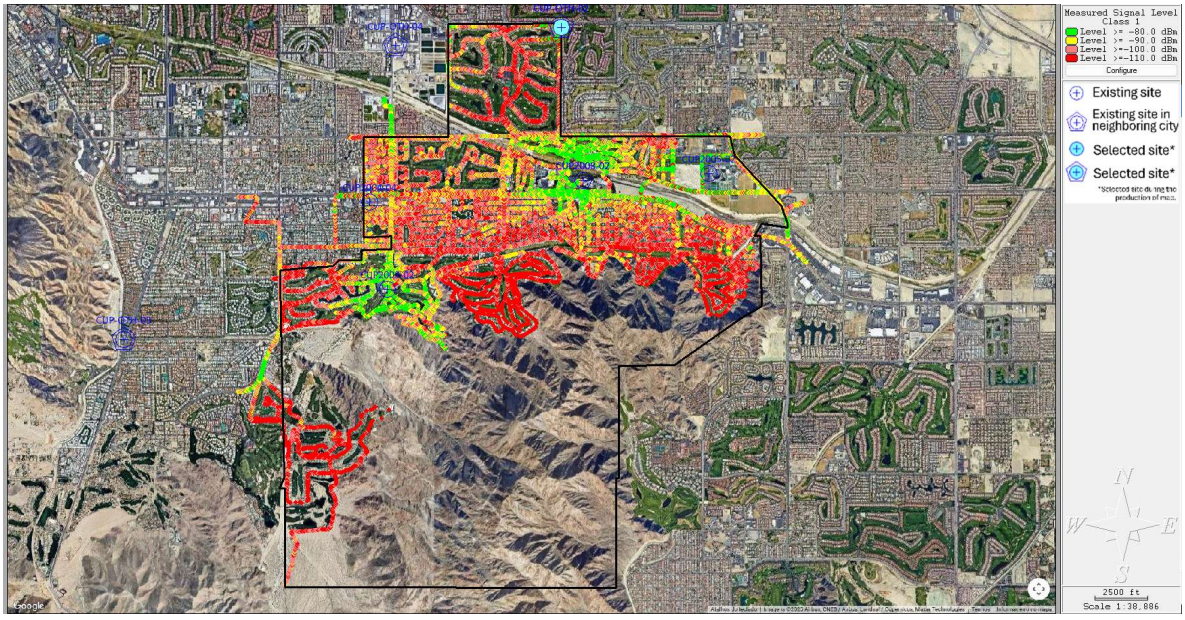


FIGURE 36 - DRIVE TEST RESULTS FOR VERIZON LTE/4G MID BANDS

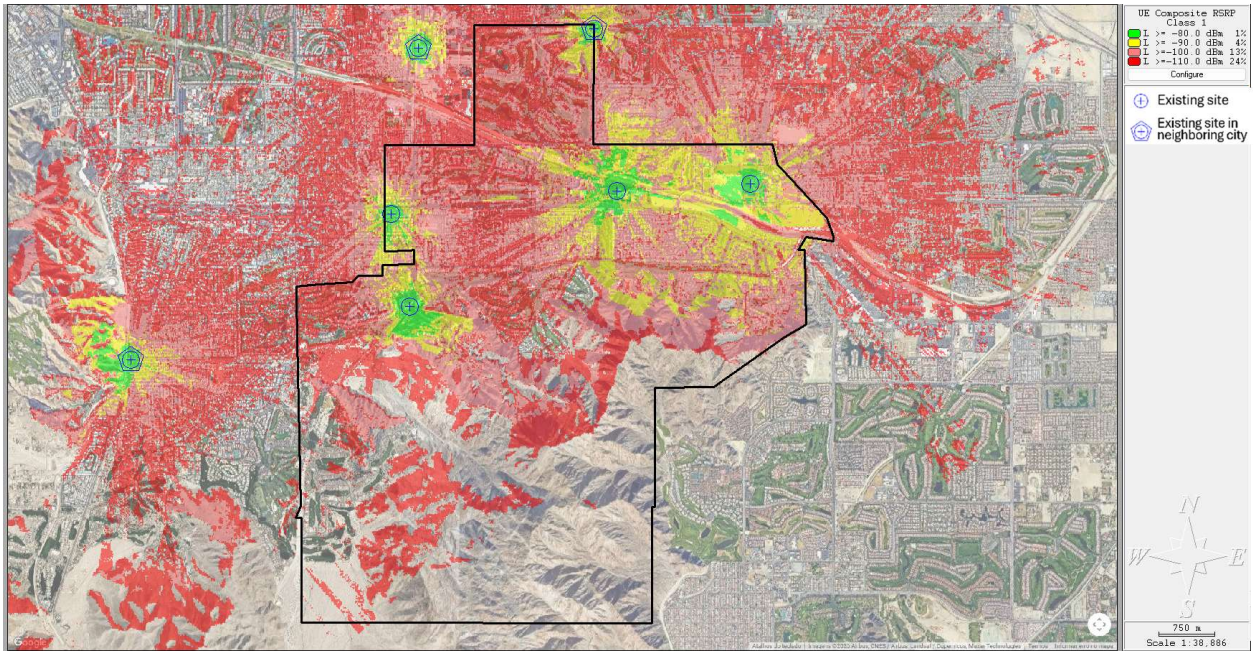


FIGURE 37 - EXISTING VERIZON LTE/4G MID BANDS PREDICTION

3.3.3 Prediction Analysis

The predictions presented in sections 3.3.1 and 3.3.2 illustrate the cellular coverage in Indian Wells, segmented by technology, carrier and band type. These visualizations reveal a clear concentration of sites in five areas of the city. This was already known based on the map of active sites provided by the City. The uneven distribution of cell towers across the city results in coverage disparities. These findings align with previous insights derived from the 'Cell Tower Log' and drive test results, but the predictions offer an added dimension by visualizing RSRP (Reference Signal Received Power) across the city's entire territory rather than being limited to street-level evaluations.

The predictions confirm several notable patterns. For example, significant coverage gaps persist in the north, southwest and close to the mountain range, while areas near the Indian Wells Tennis Garden, Renaissance Esmeralda Resort, Hyatt Indian Wells Resort and The Vintage Club benefit from relatively stronger signals. The enhanced signal strength along these facilities can be attributed to the zoning in those areas, which will be explained in greater detail in section 3.4.

3.4 Indian Wells Regulations

The City of Indian Wells regulates wireless communication facilities through two complementary code frameworks: Section 21.90.060[1] (Antenna and Wireless Communication Facilities), which establishes the City's baseline citywide rules for commercial antennas and wireless communication facilities, and Chapter 21.48[2] (Telecommunications Overlay Development Standards), which adds location, height, design, and review standards for selected overlay areas. Together, these sections define where facilities may be considered today, which types of projects may follow an administrative pathway, which require a Conditional Use Permit (CUP), and what physical and visual limitations apply to deployment. This regulatory framework is important to the coverage analysis because practical wireless deployment is influenced by the availability of viable sites, the type of structure that can be approved, and the extent to which concealment, setback, and height restrictions limit coverage.

Under Section 21.90.060, commercial antennas and wireless communication facilities are conditionally permitted in the Office Professional (OP), Resort Commercial (RC), Community Commercial (CC), Sports Complex (SPX), Public Facility (PF), and Public Parks/Recreation (PP) zones, subject to the applicable review process and development standards. By contrast, commercial wireless facilities are not permitted in Natural Preserve (NPR), Residential Very Low Density (RVLD), Residential Low Density (RLD), Residential Medium Density (RMD), Residential Medium High Density (RMHD), Open Space Watercourse (WC), Public-Owned Open Space (POS), and Country Club Open Space (COS). The City's wireless framework is broader than the Telecommunications Overlay alone, but it contains prohibitions that affect several of the areas where this study identified coverage limitations.

Section 21.90.060 also establishes different review pathways depending on facility type and visibility. Certain façade-mounted facilities that are integrated with the architecture and materials of the supporting structure, and certain roof-mounted facilities that are set back sufficiently so they are not visible from the public right-of-way or adjacent property, may follow the administrative review path described in the ordinance. In contrast, facilities that do not comply with those standards, freestanding

[1] Chapter 21.90.060 Antenna
[2] Chapter 21.48 Telecommunications Overlay Development Standards

monopoles or lattice towers except where otherwise allowed under Chapter 21.48, and facilities in a public or private right-of-way or easement require a CUP and full public review. Facilities in the right-of-way or easements also require an encroachment permit, and the City separately addresses wireless facilities in the public rights-of-way under Chapter 12.05. In addition to defining where facilities may be considered, Section 21.90.060 imposes several citywide limitations that are relevant to site feasibility. Commercial facilities must comply with the setbacks of the base zoning district unless acceptable technical evidence demonstrates that strict compliance would be technically infeasible. The height of freestanding commercial antennas and wireless communication facilities generally may not exceed the height limit of the base zoning district, although collocated facilities may exceed the base height by up to fifteen feet where the City finds that the increased height produces less visual impact than separate nearby structures.

A common concern in wireless planning discussions is whether approval of a new or existing wireless facility could later allow additional equipment or height increases outside the scope originally contemplated by the local review process. Because this question often arises when communities evaluate new siting options, it is helpful to distinguish between the zoning and permitting framework applicable to new facilities and the separate federal rules that apply only to certain modifications of existing facilities. Certain federal regulations, such as Section 6409 of the Spectrum Act, create a separate framework for certain modifications to existing wireless facilities. Section 6409, in particular, is part of a federal regulatory framework adopted by Congress in 2012 and implemented through FCC rules. The City's proposed zoning changes in this report are focused on new macro-cell facilities needed to address existing coverage gaps and are not dependent on Section 6409 of the Spectrum Act, which instead applies to certain requests to modify an existing wireless tower or base station through collocation, removal, or replacement of equipment.

Request for modifications of existing facilities remains outside the streamlined federal path if it constitutes a substantial change, including where it exceeds the applicable size limits, adds equipment beyond the allowed thresholds, extends outside the current site, defeats concealment elements, or violates prior siting approval conditions. For Indian Wells, this is especially important for stealth facilities, since changes that undermine the approved concealment design fall outside Section 6409 and remain subject to normal local discretionary review and approval processes. For that reason, CelPlan does not recommend additional zoning amendments specifically for eligible facilities requests; rather, the City's best protection is to maintain clear height limits, concealment requirements, and permit conditions for existing facilities so that future modifications can be evaluated against those standards.

Chapter 21.48 should therefore be understood as an additional layer of standards that applies in selected overlay areas, rather than as the City's only wireless regulatory framework. In practical terms, the current code already provides a pathway for wireless facilities in several non-overlay districts, but it does not distribute those opportunities evenly across the City, and it continues to prohibit facilities in several zoning categories that coincide with existing service gap areas. For that reason, the regulatory discussion in the remainder of this report distinguishes between: (i) areas where facilities are conditionally permitted today under the base antenna ordinance; (ii) areas where the Telecommunications Overlay provides more specific siting or design standards; and (iii) areas where amendments or clarifications would likely be required to support future coverage objectives. Section 4 builds on this framework and identifies targeted zoning and land-use modifications that could improve siting flexibility while preserving the City's aesthetic and community character objectives.

3.4.1 Wireless Communications Currently Approved Zoning Districts

Indian Wells regulates wireless facilities through two related code frameworks. Chapter 21.48 provides the overlay-specific standards that apply in selected areas of the City, while Section 21.90.060 establishes the broader citywide rules that determine where commercial wireless facilities may be considered, what review path applies, and what general siting limitations remain in effect. Together, these provisions define the practical regulatory framework for future wireless deployments in Indian Wells.

To present this framework clearly, the following three tables summarize the current standards in a coordinated format. Table 9 summarizes the overlay-based height limits by zone. Table 10 summarizes the review process by zone and facility type, showing where administrative review may be available and where a Conditional Use Permit (CUP) is required. Table 11 summarizes the broader citywide antenna ordinance limitations, including where commercial wireless facilities are currently allowed, where they are prohibited, and the key siting constraints that affect deployment feasibility outside the overlay areas.

Taken together, Table 9 explains the current height framework in the overlay areas, Table 10 explains the applicable entitlement path, and Table 11 shows the broader zoning and siting constraints that continue to shape where wireless infrastructure can realistically be deployed in the City today.

TABLE 9 - SUMMARY TABLE: TELECOM OVERLAY HEIGHT LIMITS BY ZONE

Zone	Standard Maximum Height	Extended Maximum	Colocation Bonus	Review Process
Telecommunications Overlay in Sports Complex (SPX)	54 ft 6 in (stadium height)	93 ft (if integral to stadium)	+15 ft	Administrative or CUP
Telecommunications Overlay in Resort Commercial (RC)	Height of resort structure	Per exception process	Not specified	Administrative or CUP
Telecommunications Overlay in RVLD with Golf Course Overlay within a Gated Community with a Clubhouse Facility	Height of golf clubhouse	Per exception process	Not specified	CUP required for all

Table 9 summarizes the height framework that applies in the City's Telecommunications Overlay areas. These standards are specific to the overlay zones and should be read together with the broader citywide antenna ordinance summarized in Table 11. .

TABLE 10 - SUMMARY TABLE: REVIEW PROCESSES BY ZONE (CHAPTER 21.48)

Zone/Facility Type	Administrative Review Available?	CUP Required?
Telecommunications Overlay in Sports Complex (SPX)	Yes, if compliant with standards	Required for height exceptions or non-compliant designs

Telecommunications Overlay Resort Commercial (RC)	Yes, if integrated with resort or properly camouflaged	Required if facility does not meet overlay design / siting criteria
Telecommunications Overlay in RVLD-GCO	No	All facilities require CUP
§ 21.90.060 – Eligible non-overlay districts (OP, CC, PF, PP, and qualifying RC/SPX cases outside the overlay summary above)	Yes, for qualifying façade-mounted or roof-mounted facilities	Required if facility does not qualify for administrative review
§ 21.90.060 – Freestanding monopole, lattice tower, or other stand-alone structure	No	Yes
§ 21.90.060 – Public / private right-of-way or easement	No	Yes, plus encroachment permit

Table 10 summarizes the primary entitlement pathways under the current code. In general, concealed building-mounted facilities may qualify for administrative review, while freestanding facilities, non-compliant designs, and facilities in rights-of-way or easements require CUP review.

TABLE 11 - SUMMARY TABLE: ANTENNA ORDINANCE LIMITATIONS BY ZONE TYPE (§ 21.90.060)

Zone / Area	Standard Maximum Height	Extended Maximum	Colocation Bonus	Review Process
Office Professional (OP)	Per base zoning district	Not specified	+15 ft	Administrative or CUP, depending on facility type and visibility
Community Commercial (CC)	Per base zoning district	Not specified	+15 ft	Administrative or CUP, depending on facility type and visibility
Public Facility (PF)	Per base zoning district	Not specified	+15 ft	Administrative or CUP, depending on facility type and visibility
Public Parks/ Recreation (PP)	Per base zoning district	Not specified	+15 ft	Administrative or CUP, depending on facility type and visibility
Resort Commercial (RC)	See Table 9 where overlay applies; otherwise per base zoning district	Per exception process where applicable	+15 ft under § 21.90.060 for qualifying collocation	Administrative or CUP, depending on facility type and visibility
Sports Complex (SC)	See Table 9 where overlay applies; otherwise per	Per overlay/ exception process	+ 15 ft	Administrative or CUP, depending on facility type and visibility

Zone / Area	Standard Maximum Height	Extended Maximum	Colocation Bonus	Review Process
	base zoning district	where applicable		
Natural Preserve (NP)	Not permitted	N/A	N/A	Not permitted
Residential Zones (RVLD, RLD, RMD, RMHD)	Not permitted, except where a specific overlay provision applies	N/A	N/A	Not permitted unless separately authorized by overlay
Open Space Watercourse (WC)	Not permitted	N/A	N/A	Not permitted
Public-Owned Open Space (POS)	Not permitted	N/A	N/A	Not permitted
Country Club Open Space (COS)	Not permitted	N/A	N/A	Not permitted
Public / Private Right-of-Way or Easement	Not specified in baseline height rule	N/A	N/A	CUP + encroachment permit; see also Chapter 12.05 for public rights-of-way

Table 11 summarizes the broader citywide limitations established by Section 21.90.060. In permitted districts, height generally follows the underlying zoning district, with a potential 15-foot allowance for qualifying collocation; the ordinance also applies setback, visibility, and location constraints, and facilities in the public right-of-way remain subject to separate City requirements, including Chapter 12.05 where applicable.

3.4.1.1 Sports Complex Zone (SPX)

The Sports Complex Overlay Zone (SPX), shown in Figure 38, is designed to encourage the placement of commercial antennas and wireless communication facilities within the Sports Complex by establishing sites, location, and design standards that minimize visual impact and ensure compatibility with surrounding land uses. The City emphasizes maintaining aesthetic quality, protecting the natural environment, and safeguarding community welfare while enabling effective wireless coverage. Facilities in this zone may not exceed the Tennis Stadium height of 54 feet 6 inches unless they are integrated into the stadium structure, in which case they may reach up to 93 feet. Co-located facilities may exceed the height limit by an additional 15 feet.

Exceptions to height limits may be granted if applicants demonstrate that no suitable existing structures are available, that additional height is technically necessary, and that the proposal complies with all design standards. Any height exception requires a Conditional Use Permit supported by an independent RF analysis confirming coverage deficiencies that cannot be resolved from sites outside the SPX. Setback requirements follow the underlying zoning district unless otherwise allowed. Design standards require facilities to be concealed or architecturally integrated, so they are not easily identifiable as wireless infrastructure. Installations on or replacing light standards must mimic existing structures in form, color, and materials, and all freestanding facilities must support co-location whenever feasible.

Applicants must provide a notarized statement addressing co-location capability, and the City may engage an RF expert at the applicant's expense to verify claims. Facilities must be disguised or hidden from public view through thoughtful design, such as façade-mounted antennas, architectural extensions, or other aesthetic treatments that blend with their surroundings.

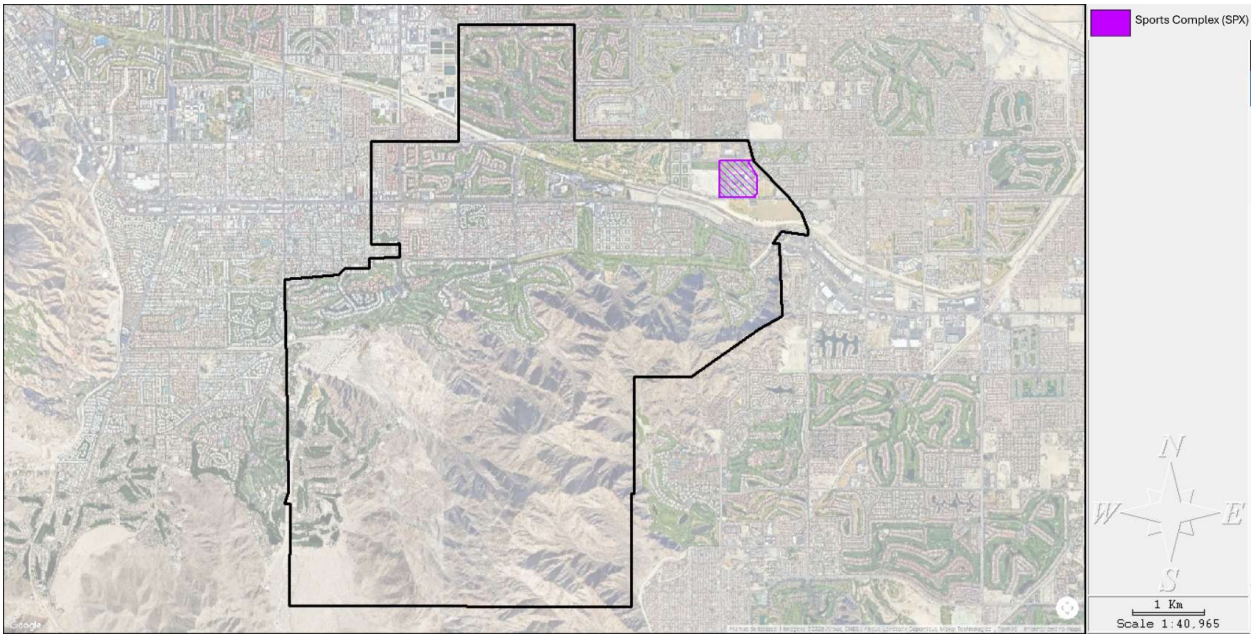


FIGURE 38 - SPORTS COMPLEX ZONE (SPX) ZONE

3.4.1.2 Resort Commercial Zone (RC)

The Resort Commercial Overlay Zone (RC), shown in Figure 39, is intended to encourage commercial antennas and wireless communication facilities to locate within the Resort Commercial Zone by establishing siting, location, and design standards that minimize visual impacts, ensure compatibility with surrounding land uses, preserve the natural environment, and protect community welfare and property values. The zone offers opportunities to integrate wireless facilities into existing resort structures in ways that meet both technical requirements and the City's aesthetic expectations. New facilities are expected to be located on or be architecturally integrated with resort buildings to take advantage of existing structure heights and reduce visual intrusion. Installations that comply with integration and camouflage requirements may proceed through an Administrative Review process; projects that do not meet these criteria must undergo a Full Public Review.

Height limits require that facilities do not exceed the maximum height of the resort structure on which they are located unless specific exceptions apply. Height measurements follow Section 21.90.060(e)(3)(ii). Exceptions may be granted if applicants demonstrate that additional height is necessary, no adequate alternative structures exist within the service area, electromagnetic interference issues justify added height, and that the design supports future antenna adjustments or co-location. Applications exceeding height limits require a Conditional Use Permit, a full public review, and an independent RF analysis confirming that service gaps cannot be resolved from outside the RC zone and that denial would violate federal or state telecommunications provisions.

Setback requirements follow the underlying zoning district unless otherwise permitted. Design standards mandate that building-mounted antennas and equipment be architecturally integrated, visually unobtrusive, and screened through design techniques such as placement within attics, towers, parapets, or compatible architectural additions. Antennas must match the building's color and materials when viewed directly against the façade. Roof-mounted equipment must be set back from building edges and camouflaged if visible from 300 feet at five feet above ground level unless deemed infeasible. All installations must avoid unreasonable interference with neighboring property views and must blend into the surrounding environment through appropriate concealment and architectural integration.

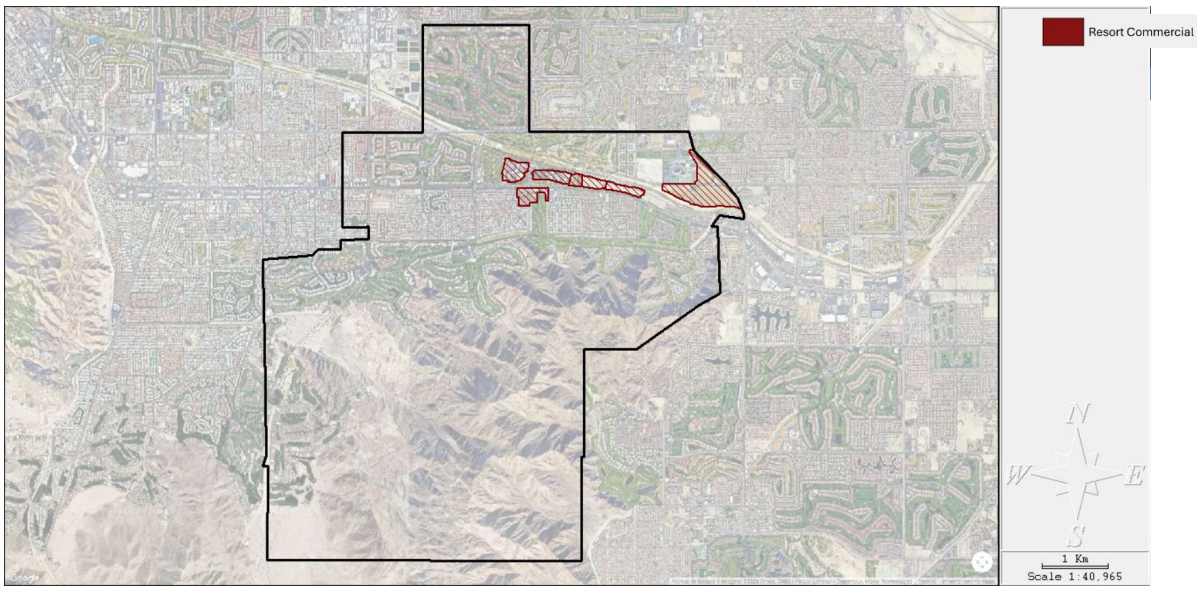


FIGURE 39 - ZONE (RC) ZONE

3.4.1.3 RVLD-GCO (Telecommunications Overlay – Section 21.48.080)

This Telecommunications Overlay applicability area should be understood narrowly. As currently written, Section 21.48.080 does not establish a broad Telecommunications Overlay across all golf-course property, HOA property, or open areas within a gated community. Rather, it is a clubhouse-centric provision intended to allow wireless facilities to be integrated with clubhouse structures in a manner that minimizes visual impacts while taking advantage of existing building height.

Under the current code framework, the principal siting concept is architectural integration with the clubhouse environment, not broad siting flexibility across the larger golf property. This distinction is important because the presence of golf-course land, HOA land, or other support areas within a gated community should not be interpreted to mean that those areas are already covered by a generalized wireless overlay. The current standards are more limited and are primarily oriented around the clubhouse setting shown in Figure 39.

The current constraints are also reflected in the height provisions. The base height allowance is tied to the height of the golf clubhouse, and the exception language further requires that any approved extended height integrate into the existing clubhouse architecture so as not to appear as an addition to the structure. In practical terms, this means that the current code is best suited to clubhouse-integrated solutions and does not clearly provide the same siting flexibility for areas away from the clubhouse. As a result, locations such as parking lots, maintenance areas, perimeter landscape zones, or other support areas may be important from an engineering standpoint, but they are not clearly established today as part of a broad existing overlay entitlement path under Section 21.48.080.

Consistent with this interpretation, the current standards should be read as supporting wireless deployment where facilities can be concealed within or closely integrated with clubhouse architecture and designed to minimize visual intrusion into the golf-community setting. Additional siting flexibility in support areas away from the clubhouse would require the zoning clarifications and amendments discussed later in this report.

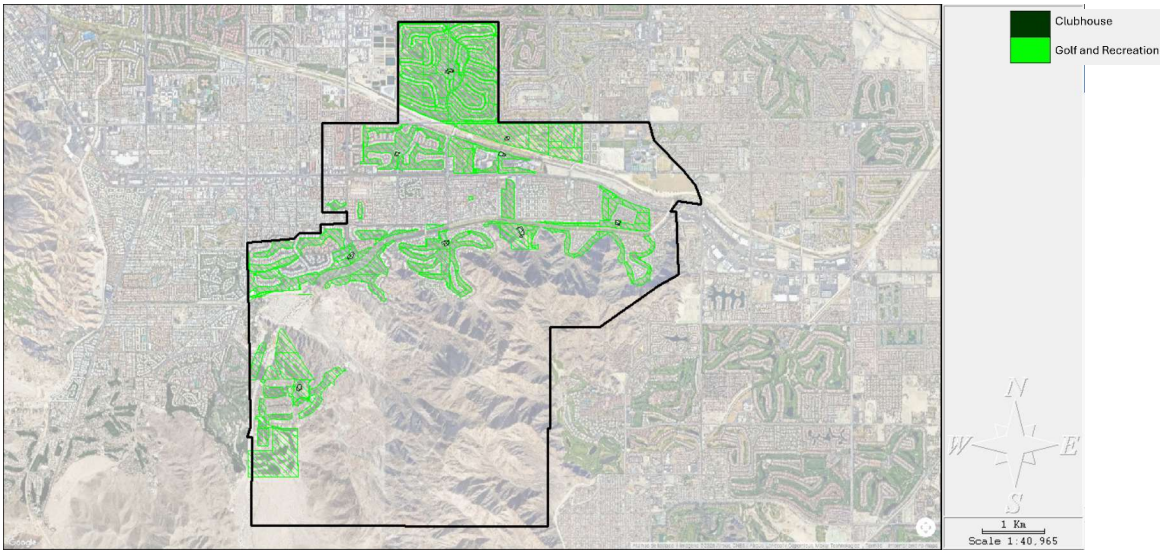


FIGURE 40 - RVLD-GCO (EXISTING CLUBHOUSE-CENTRIC OVERLAY CONTEXT)

Figure 39 is intended to illustrate the current clubhouse-centered overlay context and should not be interpreted as showing a broad telecommunications overlay across all golf-course or HOA property.

3.4.2 Other Zoning Districts

Other zoning districts in Indian Wells, including the Community Commercial (Figure 41), Professional Office (Figure 42), and Public Facility (Figure 43), may provide additional opportunities for future wireless facilities under the City's baseline wireless regulations in Section 21.90.060, subject to the applicable review pathway and any district-specific constraints. In Sections 4 and 5, CelPlan evaluates these districts using the same engineering siting methodology applied elsewhere (coverage need, candidate asset screening, constructability, concealment feasibility, and collocation potential), while documenting where tailored standards or zoning refinements could improve predictability or expand feasible siting options.

In the absence of zone-specific regulations, height, setback, and design considerations will follow the established framework used in other districts. Height exceptions will require technical justification and robust screening measures, while setback and aesthetic requirements will prioritize land-use compatibility, view preservation, and architectural coherence. By applying a uniform regulatory methodology across all zoning districts potentially hosting wireless infrastructure, In Section 4, CelPlan ensures a consistent, comprehensive, and defensible evaluation of the suitability of additional zoning districts for wireless infrastructure deployment.

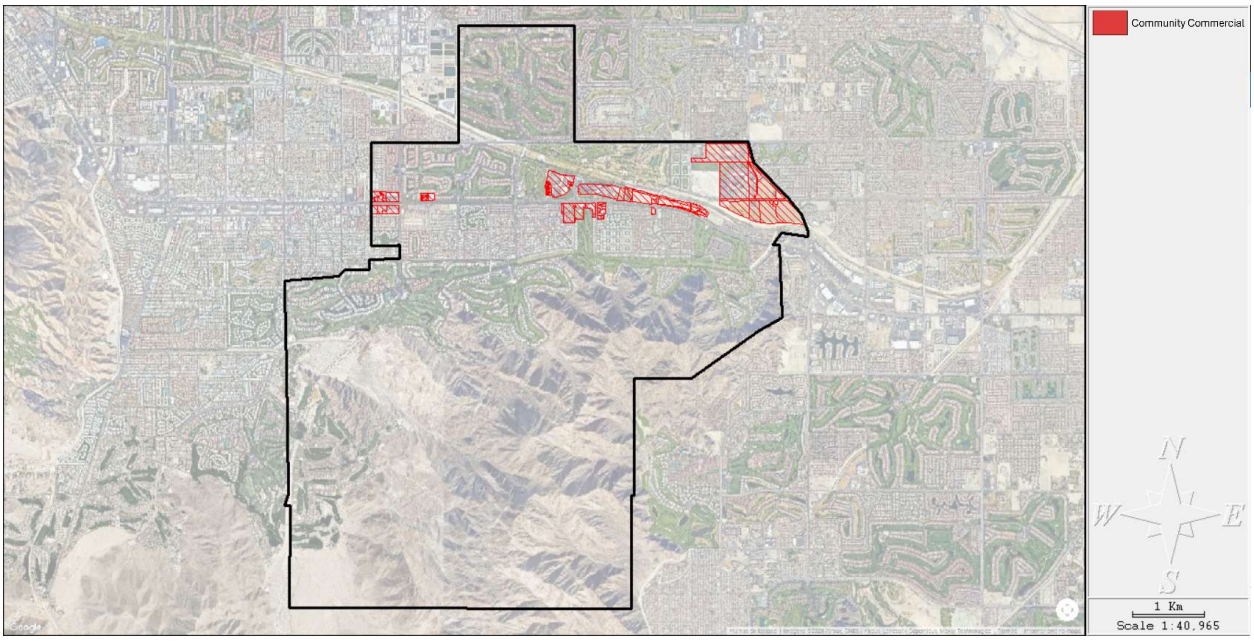


FIGURE 41 - COMMUNITY COMMERCIAL ZONE

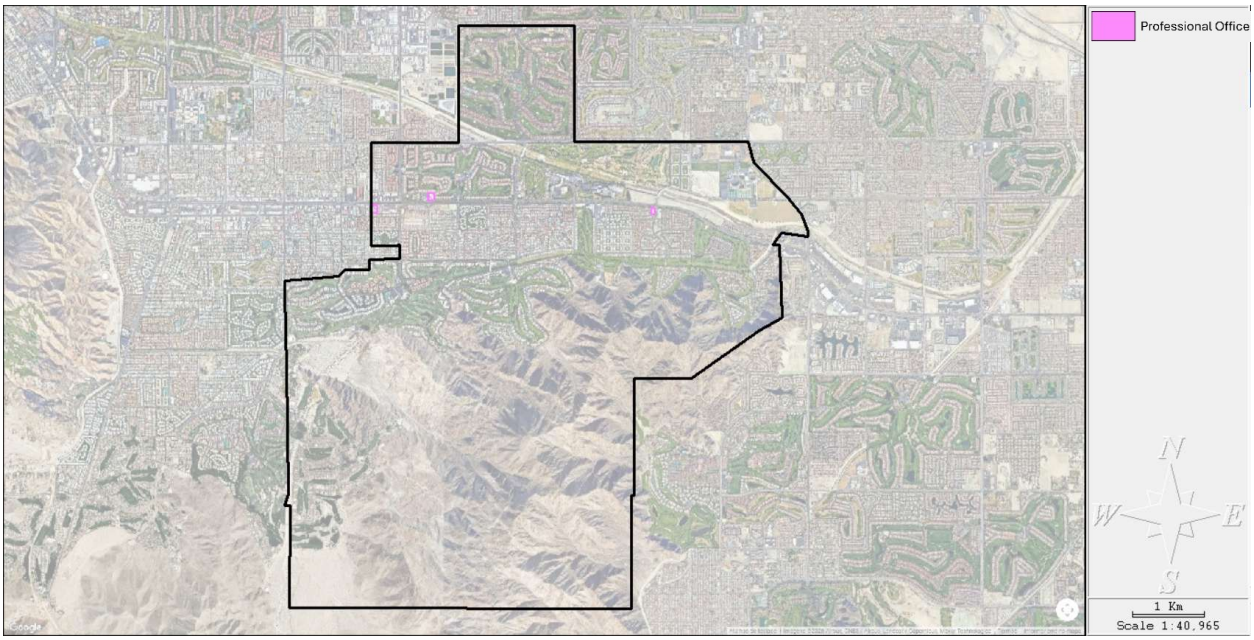


FIGURE 42 - PROFESSIONAL OFFICE ZONE

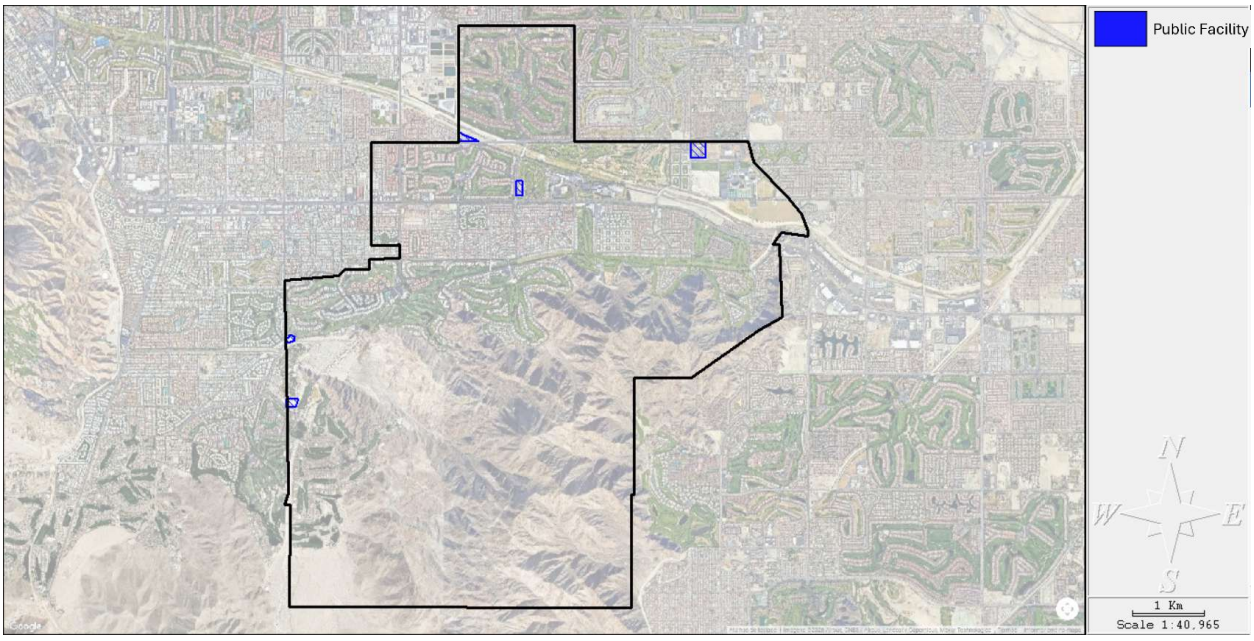


FIGURE 43 - PUBLIC FACILITY ZONE

3.5 Industry Incentives for Wireless Carrier Deployment

Federal guidance, and state-level policy analyses consistently show that wireless carriers prioritize predictability, regulatory clarity, and reduced deployment risk over direct financial incentives[3]. These factors are especially critical for 5G and small cell deployments, which require dense site placement and repeated municipal approvals. Jurisdictions that reduce uncertainty and administrative friction are more likely to be prioritized by carriers for early and sustained investment.

Guidance from national and county-level organizations emphasizes that carriers favor municipalities that act as partners in deployment rather than purely as regulators. Clear assignment of authority, consistent interpretation of zoning regulations, and early coordination with applicants materially reduce entitlement risk and improve deployment outcomes

Closely related is the importance of a streamlined and predictable permitting process. Federal policy and state legislation increasingly reinforce defined review timelines, standardized application requirements, and administrative approvals for facilities that meet established criteria[4]. Predictability, knowing what standards apply and how long review will take, is often more valuable to carriers than absolute speed alone.

Proactive municipal coordination and asset readiness is also a key incentive. Municipalities that pre-identify suitable zoning districts, public facilities, rights-of-way, and other deployable assets significantly reduce site acquisition challenges and upfront engineering costs. Maintaining organized inventories of candidate sites allows carriers to efficiently evaluate feasibility and prioritize deployment.

Another recurring theme is design standardization and aesthetic predictability. Subjective or ambiguous design requirements increase redesign cycles and delay approvals. Best practices recommend clearly codified design standards, preferred facility typologies, and visual examples to provide certainty while maintaining community character.

Policies that prioritize reuse of existing structures (through reduced review requirements or expedited approvals) lower deployment costs, minimize visual impacts, and align municipal and carrier objectives.

Finally, reasonable and cost-justified fees are also an important supporting incentive. While excessive fees can deter deployment, carriers are primarily concerned with transparency and consistency. Clearly documented fee schedules tied to actual administrative costs reduce negotiation friction and improve budgeting certainty.

Maintaining a structured, well-documented, and accessible municipal framework is a critical incentive for carriers. Centralized zoning data, height limits, design standards, review pathways, fee schedules, and asset inventories (publicly available or accessible upon request) significantly improve carrier engagement and investment decisions.

[3] Next Generation Local Zoning Authority: 5G Wireless Broadband 101
[4] Mobile 5G and Small Cell 2022 Legislation

Table 12 summarizes the main categories the City should consider upon encouraging carrier engagement.

TABLE 12 - INCENTIVES SUMMARY

Incentive Category	Industry Standard	Indian Wells – Current Status
Regulatory Efficiency & Municipal Partnership	Clear regulatory authority, consistent interpretation, early coordination with carriers	**Partial** – Zoning framework exists, but no formalized carrier partnership or single point of coordination
Streamlined & Predictable Permitting	Defined review timelines, administrative approvals for compliant projects, standardized applications	**Partial** – Administrative and CUP pathways exist, but timelines and predictability are not consistently formalized
Proactive Municipal Coordination & Asset Readiness	Pre-identified candidate zones and public assets; organized site inventories	**Not Established** – No centralized inventory of public assets or preferred wireless siting locations
Design Standardization & Aesthetic Predictability	Codified design standards with clear concealment expectations and visual examples	**Established** – Clear design, concealment, and integration standards across zones
Collocation & Infrastructure Sharing	Priority given to collocation through reduced review and regulatory incentives	**Established** – Collocation encouraged, but incentives are indirect rather than procedural
Reasonable & Cost-Justified Fees	Transparent, documented fees tied to actual administrative costs	**Unclear**
Structured & Accessible Regulatory Framework	Centralized, organized data publicly available or provided upon request	**Partial** – Regulations exist, but information is fragmented and not carrier-oriented
Public Transparency for Carriers	Online or request-based access to zoning maps, height limits, review processes	**Limited** – Information available but not consolidated into a single deployment framework

3.5.1 Example of Regulations: Naperville, IL

A state law adopted in 2018 by Illinois state governs the installation of small cell wireless facilities. This law gives wireless service providers broad permission to install small cells within the public right-of-way. The law was designed to ensure "providers of wireless access have a fair and predictable process for the deployment" of this new technology. The law was not designed to give municipalities control over the location and number of small cells within their jurisdictions. In fact, it restricts zoning review, caps permit and rental fees and limits the time a municipality can take to evaluate applications.

An order from the Federal Communications Commission in 2018 similarly limits municipal control over small cell facilities, with the intent of streamlining the rollout of 5G services nationwide.[5]

One point to consider is that wireless service providers are looking to expand their capabilities in 5G networking by building small cell wireless facilities in the communities they cover. 5G signals, while higher in frequency than 4G signals, do not travel as far. So instead of traditional, or "macro" cell towers that are usually 200 feet or more in height, wireless service providers are turning to smaller facilities -bundles of antennas, transmitters and other equipment called small cells. Small cells are typically 30 feet tall or less; however, due to their lower height, they must be installed in closer proximity to provide coverage for the areas they serve. So, the law aimed at the installation of these small cells.

3.5.1.1 The Role of the City of Naperville (example)

According to IL state law, much of the regulatory authority over small cell wireless facilities is outside of City control. Here is what the City CAN and CANNOT do to oversee this new technology.

The City CAN require wireless service providers to:

- Get a permit to install a small cell wireless facility on a City streetlight or utility pole.
- Follow objective City's design rules and concealment standards
- Provide structural integrity specifications for each proposed site.
- Provide photos and exact locations of streetlight or utility poles where small cell wireless facilities would be installed.
- Limit the height of a small wireless facility to 10 feet above the streetlight pole, utility pole or other structure on which the equipment is mounted.
- Comply with safety standards for construction in the right-of-way as well as standards for wiring, cabling, grounding, streetlight or utility pole extensions and signage.
- Install new streetlight or utility poles, at the provider's cost, if existing poles are not strong enough to support small cell wireless equipment.
- Ensure small cell wireless facilities do not interfere with public safety communications or other utilities; permits may be terminated by the City if interference occurs.

The City CANNOT:

- Enact a ban on small cell wireless facilities.
- Require zoning review for locations of small cell wireless facilities if they are on any property zoned for commercial or industrial use, or if they are in the right-of-way - even in residential areas.
- Deny an application to prevent a small cell wireless facility at a specific site, unless it fails to comply with standards for location, size, surface area, height or construction safety, or causes interference with public safety communications.
- Deny a proposed location for a small cell-wireless facility without providing an alternate location within 100 feet.
- Grant exclusive rights to any one wireless service provider to install small cell wireless facilities in City right-of-way.

[5] https://www.naperville.il.us/globalassets/media/projects/5g-and-small-cell/streamlining-a-city-wide-process-for-optimal-small-cell-site-locations---award-write-up.pdf

- Regulate the level of radio frequency emissions. This is the responsibility of the Federal Communications Commission.

The experience of Naperville includes a plan to deal with these demands.

The City of Naperville has designed a thorough plan-review process, which ensures that installation of every small cell is conducted in a way that promotes safety, responsibility, cleanliness, restoration of property and the least impactful construction process possible.

Even before an application is received, City staff members evaluate proposed small cell locations and consult with wireless service providers through an award-winning pre-application process. This process has been recognized with the Exemplary Systems in Government Award for Enterprise Systems from URISA, the Urban and Regional Information Systems Association. This early review helps providers choose optimal sites where small cells will not interfere with utilities or public safety communications.

Once an application is submitted, it is reviewed by a team including staff members from the Electric and Water utilities as well as Legal, Public Safety, Planning and Engineering and other departments. These reviewers ensure that each proposed facility meets standards for electrical safety, structural integrity and aesthetics and that it complies with state and federal law. Once an application is approved, the wireless service provider is given a permit to begin work.

Once a permit is issued for a specific location, utility crews mark the placement of their lines as a safeguard to ensure digging for a new small cell site will not disrupt water, electric or other services. Several inspections take place during and after construction to ensure that the foundation is structurally sound, electrical connections meet code and the parkway is restored without divots or damaged grass.

This entire process benefits City residents and constituents by providing small cell installations that are safe and complaint from conception to completion.

3.5.1.2 The Installation Process

Installation of a new small cell wireless facility typically takes place in separate phases during several weeks. Here is a look at the process:

Fiber:	Before installation can begin, underground fiber-optic cable must already be in place. Cellular providers have been working for the past few years to install this fiber infrastructure throughout the City.
Foundation:	Digging out and pouring a foundation for a new streetlight or utility pole is the first construction step residents and property owners will see after a small cell wireless facility has received a permit.
Electrification:	Once a foundation is set, City Electric Utility crews will connect service to the site to power the equipment within the small cell.
Pole Replacement:	Wireless service providers will erect a new streetlight or utility pole at each small cell location. These new poles are stronger and structurally sufficient to hold the required communications equipment. The old pole will be removed.
Restoration:	Wireless service providers, as a condition of their permit, are required to restore the area around the new streetlight or utility pole to meet the standards of a City inspection.

Small cell equipment can be added, with sleek concealment, in a box to a new or existing streetlight or utility pole. Figure 44 and Figure 45 show some of the first 5G installations in Naperville, giving a close-up look of how well-concealed small cell equipment can be.[6]

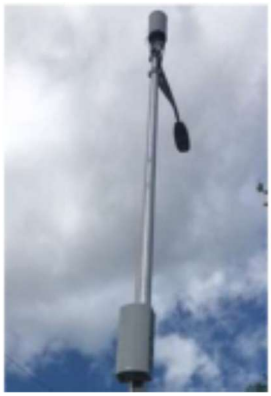


FIGURE 44 - POLE AND SMALL CELL EQUIPMENT



FIGURE 45 - SMALL CELL EQUIPMENT DETAIL

The City of Naperville developed a Small Cell Wireless Facility Locator Map which is interactive and shows streetlight and utility poles within the City of Naperville. Color-coding identifies poles where wireless service providers have applied for small cell permits, as well as poles for which a permit has been issued and poles where small cell construction is complete. The interactive map shown in Figure 46 can be used to check whether there are any small cell wireless facilities planned or underway and to find out the pole number, permit number and contact information for the wireless service provider responsible for the equipment.[7]

[6] https://www.naperville.il.us/projects-in-naperville/5g-and-small-cell-wireless-facilities/
[7] https://experience.arcgis.com/experience/0f705ec3ad7d415db8c3fa4e4e4aa82b/

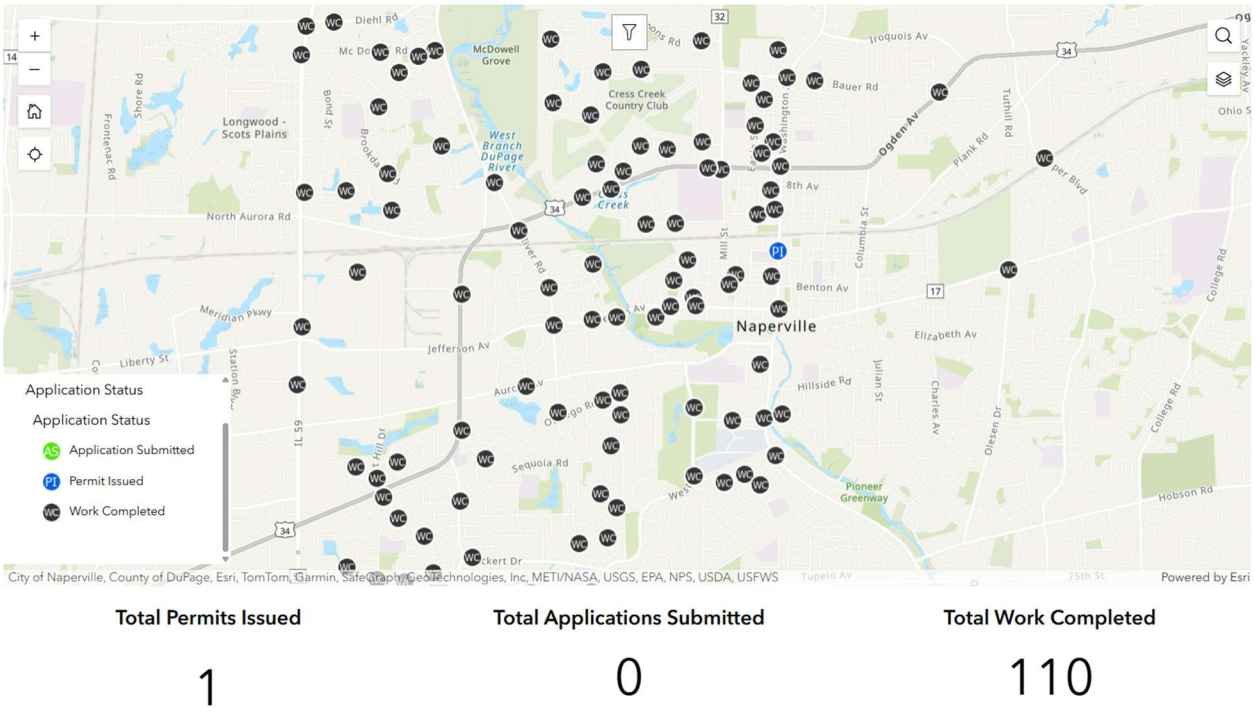


FIGURE 46 – NAPERVILLE SMALL CELLULAR PERMIT APPLICATIONS MAP

A possible use of this approach in Indian Wells could be in the traffic lights in several crossings such as Figure 47.



FIGURE 47 –LIGHT POLE WITH SMALL CELL EQUIPMENT

3.5.2 Small Cell Regulations in the City of Indian Wells

Indian Wells is already taking steps to support future small-cell deployment. In addition to the broader zoning and antenna provisions discussed in this report, the City has adopted Chapter 12.05, Wireless Facilities in Public Rights-of-Way, which establishes a permitting framework for wireless facilities in the public right-of-way and recognizes the importance of wireless infrastructure to provide high-quality communications service to residents and businesses. That chapter defines small cell facilities and creates a wireless encroachment permit process for their placement or modification in the right-of-way, showing that the City is already building a regulatory path for these types of deployments.

From a network engineering standpoint, small cells are an important part of the long-term solution, but they serve a different purpose than macro sites. As discussed elsewhere in this report, low-band macro infrastructure is typically used by carriers to provide the main blanket coverage layer across a market because these frequencies propagate farther and cover larger geographic areas. By contrast, mid- and high-band deployments are generally used to add capacity in higher-demand areas. For that reason, small cells should be viewed primarily to supplement capacity, improve localized user experience, and support growing traffic demand once broad-area service is in place, rather than as a substitute for macro-cell coverage.

This distinction is particularly important in Indian Wells. The drive-test results and predictive analysis show that the City's principal challenge is not limited to localized congestion; it includes large-area coverage gaps across residential areas, golf and recreation properties, and terrain-constrained portions of the City. Those types of deficiencies are more appropriately addressed through strategically placed macro sites, especially in lower frequency bands, because macro facilities are designed to deliver the broad-area coverage footprint required for reliable initial access, mobility, and emergency communications. Small cells can then play a valuable follow-on role by strengthening capacity in targeted corridors, activity centers, and rights-of-way as more users gain access to the network and utilization increases.

Accordingly, Indian Wells' current approach should be understood as complementary rather than interchangeable: macro-cell deployment is needed to close the City's broad coverage gaps, while small-cell deployment in the public right-of-way can help carriers incrementally densify the network and add capacity where demand justifies it. This is a positive regulatory signal to carriers. It shows that the City is not only considering larger macro solutions where they are technically necessary, but is also preparing for the next phase of network evolution by enabling smaller right-of-way facilities that can support capacity growth over time, subject to the design, safety, and public right-of-way management standards established in Chapter 12.05.

3.6 Basics of Radio Frequency Propagation

Radio frequency (RF) propagation refers to how electromagnetic waves, such as radio waves or microwaves, travel through different environments from a transmitter to a receiver. These waves travel through the air (and sometimes through other mediums) and are subject to various influences, including the Earth's terrain, obstructions, atmospheric conditions, and the frequency of the signal.

The propagation of RF signals can be categorized into several main mechanisms:

Line-of-Sight (LoS):	Signals travel directly from the transmitter to the receiver without obstructions. This is the ideal condition for high-frequency signals (e.g., microwaves).
Reflection:	Signals can bounce off large objects such as buildings, mountains, or water bodies.
Refraction:	Signals bend as they pass through different mediums, especially when atmospheric conditions (like temperature and humidity) cause changes in the air's density.
Diffraction:	Signals can bend around obstacles or edges of buildings and other structures, allowing them to reach areas that might otherwise be blocked.
Scattering:	The radio waves may scatter in different directions when they hit small objects, like foliage or uneven surfaces.

The propagation characteristics of RF signals are highly dependent on the frequency band. Higher frequencies tend to have shorter ranges and are more easily blocked by obstacles, while lower frequencies can travel farther and are less affected by obstacles.

3.6.1 Propagation Models

Propagation models are mathematical or empirical models used to predict how radio waves will propagate under different conditions. These models are essential for planning communication networks and understanding how signals will behave in different environments.

Propagation models consider various environmental factors, such as terrain, buildings, and vegetation, and they can estimate signal strength, coverage area, and link reliability.

Propagation models should be calibrated using measurements and considering the environment, antenna heights, and geographic database (topography and morphology).

3.6.1.1 Topography and Morphology

Topography refers to the physical characteristics of the Earth's surface, including mountains, valleys, and bodies of water. These features influence RF signal propagation, as they can block, reflect, or scatter signals. Figure 10 shows a geographic database that contains topography information.

Morphology refers to the shape and structure of the terrain or environment through which the radio waves propagate. It includes details like the height of buildings, vegetation, presence of water, and other obstacles. Morphological features impact the way RF signals are reflected, refracted, or diffracted.

Both topography and morphology play a critical role in determining the behavior of radio waves in specific locations. For example, mountainous areas may cause signals to be reflected or blocked, leading to poor coverage, while flat terrain with few obstacles allows for relatively unrestricted signal propagation. Antenna height compared to the surrounding morphology height could define if the signal is blocked or not.

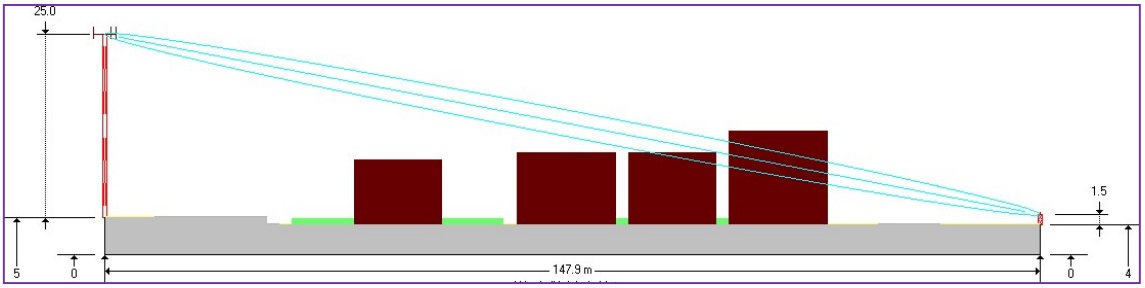


FIGURE 48 – DIRECT PATH IS OBSTRUCTED

Additional considerations include mobile antenna height and penetration losses. Operators estimate expected coverage at different service levels considering different users profiles (on street, in car, first floor near window, second floor near window)

3.6.1.2 Morphology Heights and Antenna Heights

Morphology Heights refer to the heights of various physical structures in the environment, including buildings, trees, hills, or towers. The height of obstacles in the signal path can affect propagation by causing diffraction or reflection, which may reduce signal quality or coverage.

Antenna Height refers to the height at which antennas (both transmitter and receiver) are placed above the ground. The antenna height significantly affects the range and reliability of the signal. For instance, placing antennas higher in the air allows the signal to "see" beyond local obstacles (such as buildings or trees), improving the coverage area and reducing the impact of line-of-sight obstructions.

In general, higher antenna heights lead to improved propagation, particularly in areas with many obstacles, since they help to avoid interference and reduce the effects of diffraction and scattering.

Figure 49 shows a vertical cross section of an RF signal prediction.

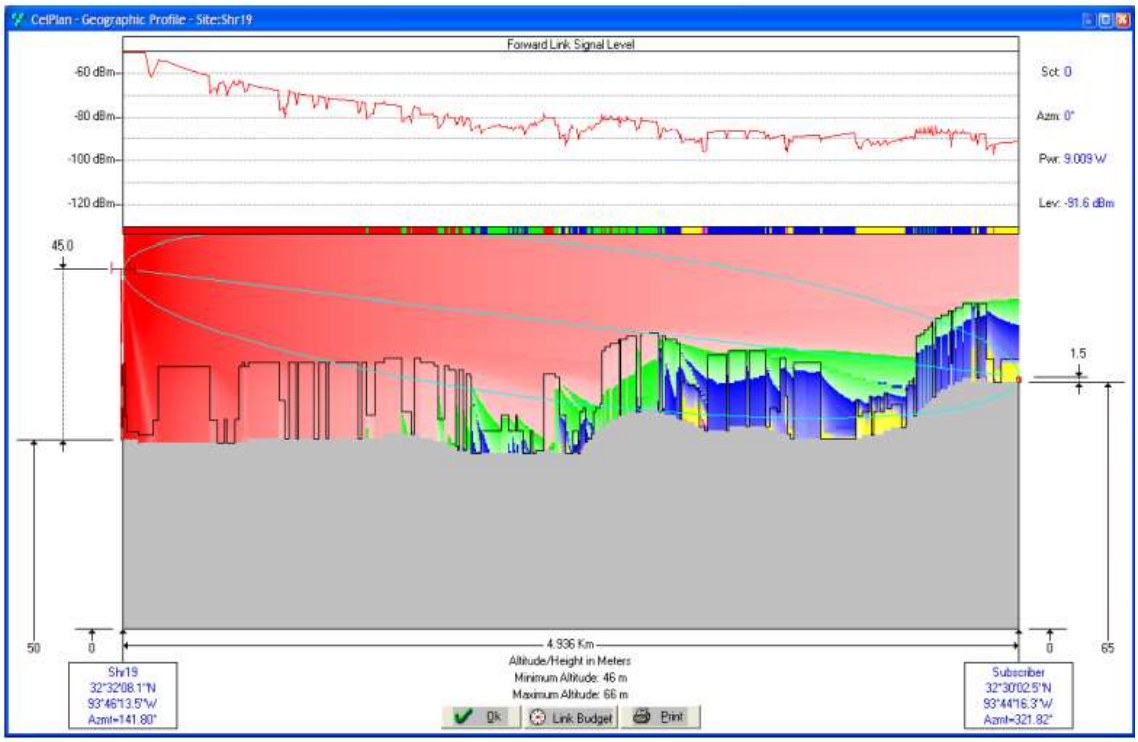


FIGURE 49 – VERTICAL CROSS SECTION

3.6.1.3 Frequency Bands and Their Effects on Propagation

Different frequency bands exhibit distinct propagation characteristics. The frequency band used for a particular communication system determines how far the signal will travel and how susceptible it will be to various forms of interference. The lower the frequency, the better it can propagate over long distances and through obstacles. The higher the frequency, the more limited the range becomes, and the more sensitive it is to environmental factors.

4 Zoning Recommendations

4.1 Proposed Zoning Amendments and Modifications

As part of the Wireless Master Plan, CelPlan conducted field measurements and predictive simulations that identified persistent wireless coverage gaps across several areas of the City of Indian Wells. These gaps are particularly pronounced within large golf and recreational properties and near key infrastructure assets, where limited cellular coverage affects both everyday connectivity and the City's ability to support reliable emergency communications.

To address these deficiencies, CelPlan identified a set of technically viable candidate sites, shown in Section 5, that would significantly improve coverage if enabled for macro-cell deployment. Because wireless facilities are not currently permitted by right at many of these locations, each proposed site is presented under a New Conditional Use Permit (NCUP) framework. This report provides zoning and land-use recommendations to support the City's review of these applications while maintaining consistency with community aesthetics, environmental considerations, and long-term planning objectives.

It is also important to note that Direct-to-Cell satellite services such as Starlink should not be viewed as a practical solution to the golf-course coverage deficiencies identified in Indian Wells. Currently service of this type is available through T-Mobile/Starlink. This service is positioned for areas where no terrestrial carrier coverage is available, and SpaceX (the company that owns Starlink) similarly describes it as extending connectivity to previously unreachable locations or supporting communications when ground-based infrastructure is unavailable, including during disaster scenarios. At present, the service is limited primarily to texting and select satellite-enabled applications in outdoor areas with a clear view of the sky, and it may involve delays, gaps, time-outs, and limited or unavailable text-to-911 functionality; SpaceX has also indicated that voice capability is still forthcoming. In a setting such as Indian Wells, where public carrier signal is present but often weak or unreliable, users should not be expected to transition automatically from marginal terrestrial service to satellite connectivity. For that reason, Starlink Direct-to-Cell is more appropriately understood as a supplemental dead-zone and disaster-recovery tool, rather than a substitute for robust, ground-based wireless coverage needed for routine use and dependable emergency communications on golf courses.

4.2 Current Wireless Communications Approved Zoning Districts

As discussed in Section 3.4, Indian Wells' current wireless regulatory framework is not limited to the Telecommunications Overlay. At the citywide level, Section 21.90.060 conditionally permits commercial antennas and wireless communication facilities in the Office Professional (OP), Resort Commercial (RC), Community Commercial (CC), Sports Complex (SPX), Public Facility (PF), and Public Parks/Recreation (PP) zones, subject to the applicable review process and development standards. Chapter 21.48 then adds more specific overlay standards for selected areas, including height, concealment, and review requirements. For this reason, the City's currently approved wireless geography should be understood as a combination of base ordinance eligibility and overlay-specific standards, rather than as the overlay districts alone.

The current code framework nevertheless remains restrictive in several locations that are important from a coverage standpoint. Section 21.90.060 prohibits commercial wireless facilities in Natural Preserve, residential districts, Watercourse, Public-Owned Open Space, and Country Club Open Space.

As a result, several areas where this study identified limited or uneven service do not presently offer a straightforward wireless siting path, even where engineering analysis indicates that additional infrastructure would improve service continuity and emergency communications. This is one of the key reasons why the recommended candidate areas in later sections are presented as zoning and land-use opportunities requiring clarification, expansion, or targeted amendment rather than as by-right deployment areas.

From a practical standpoint, the most deployment-ready areas under the current code are those where either: (i) the base ordinance already allows facilities and the project can be integrated into an existing building or structure in a manner consistent with the administrative review pathway; or (ii) the site falls within an overlay area that already contemplates wireless infrastructure subject to defined standards. Existing wireless concentration in locations such as the Sports Complex, Resort Commercial properties, and certain resort or clubhouse-related areas is consistent with this framework. By contrast, broader macro-cell expansion into golf-course-adjacent, watercourse-adjacent, and other constrained areas is more difficult under the current code because those areas either lack clear siting language, are subject to narrow overlay conditions, or fall within districts where commercial facilities are prohibited today.

This section should therefore be read together with the summary tables in Section 3.4, which identify the key current limitations affecting wireless site feasibility, including base-district height limits, collocation incentives, setback requirements, review pathways, visible-facility spacing expectations, and right-of-way permitting considerations. Rather than repeat those tables here, the focus of the following subsections is to identify where the current code can be clarified or expanded so that future facilities may be considered in locations that better align with the City's actual coverage needs. In particular, the following analysis examines Golf and Recreation, Watercourse, Public Facility, and Telecommunications Overlay provisions to determine where the existing ordinance already provides a foundation for wireless deployment and where additional siting flexibility would likely be required.

4.3 Golf and Recreation Zoning Areas (Chapter 21.40)

4.3.1 Change Reasoning and Objective

The main objective of this proposed change is to allow telecom infrastructure where it makes sense (clubhouse, parking, maintenance, perimeter) while explicitly prohibiting it on the active golf course itself (fairways, tees, greens).

Improved cellular coverage within Golf and Recreation zones is critical to supporting public safety and emergency communications, particularly for golf cart operations. Golf carts are the primary means of transportation across these properties and frequently operate in areas where cellular coverage is currently limited or unavailable. Field measurements and predictive simulations identified coverage gaps across fairways, course perimeters, and areas adjacent to terrain features, which restrict the effectiveness of emergency communications.

By enabling macro-cell deployments in these zones, the City supports the use of cellular-based emergency notification systems integrated into golf carts, allowing golfers and staff to initiate emergency alerts with precise location information as well as regular communication. This capability is essential for timely response to medical incidents, accidents, or other emergencies occurring across expansive course areas.

The following is a list of proposed site locations that would benefit from changes to the Golf and Recreation Zoning Areas. Availability for adding wireless infrastructure in these locations is essential to improve wireless coverage within golf courses and surrounding areas.

- NCUP-2026-01 (The Reserve Country Club – Options A and C)
- NCUP-2026-02 (Eldorado Country Club)
- NCUP-2026-04 (Villagio)
- NCUP-2026-05 (Toscana Country Club – Options A and B)
- NCUP-2026-06 (Dorado Villa Country Club)

4.3.2 Redefining "Golf Course"

In the current zoning definitions (Chapter 21.08, §21.08.260), the City defines "Golf course" but there is no distinction made for: "golf play area" (e.g. fairway, green, tee) vs. "support facilities;" that is, the definition treats the golf course as a single land-use unit, not functionally subdivided into play and non-play components. Thus, from a zoning standpoint, everything inside the golf course boundary is the same.

The idea of this change is to carve out clearly delineated areas so zoning decisions can be weighed differently when the target area is an actual golf play area versus a support/maintenance facility. In essence, the change should start by introducing the definition of a "Golf Course Play Area" (tees, greens, fairways, practice greens, bunkers/hazards) and "Golf Course Support/Ancillary Areas" (clubhouse, parking lots, cart barns, maintenance yards/sheds, perimeter landscape strips, entry monuments, restrooms/shelters, internal service roads, etc.)



FIGURE 50 – ELIGIBLE AREAS FOR CONSTRUCTION - IMAGE GENERATED USING CHATGPT (OPENAI), MARCH 2026

The proposed amendments clarify the internal organization of golf course and recreation lands by distinguishing between active golf play surfaces and support and perimeter facilities. Similar distinctions are already used in zoning and land-use codes in peer jurisdictions in California and nationwide, including Florida and South Carolina, where golf course definitions expressly identify tees, fairways, and greens as protected play areas while treating clubhouse and support facilities as separate land-use components. This clarification is consistent with the City's intent to preserve the visual and environment of golf courses, while allowing limited infrastructure improvements to be sited

in support areas where such facilities can be appropriately designed, screened, and integrated with their surroundings.

4.3.2.1 Example of Golf Course Definition For Zoning

La Cañada Flintridge (Los Angeles County, California)

The City of La Cañada Flintridge has released the second draft of its Zoning Code Update as of January 2026, incorporating revisions based on feedback from the Planning Commission. This updated draft aims to align local zoning regulations with the city's long-term development goals. In their zoning review, one of the chapters specifically targets "definitions." In this draft zoning document, the City of La Cañada defines "Golf Course (land use)" as the actual activity area (holes with tee, fairway, putting green) and then expressly excludes the clubhouse and other ancillary recreation uses.

> *"**Golf Course (land use).** An area of land laid out for the activity of playing golf, with a series of nine (9) or eighteen (18) holes, each including tee, fairway, and putting green and often one or more natural or artificial hazards, not including any associated club house, pool, tennis court, or other similar ancillary recreational facilities."*

https://lcf.ca.gov/wp-content/uploads/2025/12/12.19.25_Part_7_Definitions_Public-Review.pdf

4.3.2.2 Proposed Changes in Zoning Definition (Chapter 21.08)

Current Definition:

> *§ 21.08.260 Golf course. "Golf course" shall mean a lot or portion of a lot used for playing golf, including pitch-and-putt courses, but excluding driving ranges, miniature golf courses or other similar commercial enterprises, unless expressly permitted. (Ord. 387 § 1, 1996)*

Proposed Change:

> "Golf course" shall mean a lot or portion of a lot designed and used for the playing of golf, including pitch-and-putt courses. The term includes:
>
> (1) Golf Course Play Areas, consisting of fairways, greens, tees, practice greens, practice tees, bunkers, and other areas primarily maintained for golf play; and
>
> (2) Golf Course Support Facilities, consisting of clubhouses, parking areas, maintenance and operations facilities, cart barns, internal access drives, and perimeter landscaped areas supporting golf course operations.
>
> Driving ranges, miniature golf courses, and other similar commercial enterprises are excluded unless expressly permitted.

4.3.3 Wireless Communications as Part of Golf Course Operation

Chapter 21.40 of the City Zoning Code, describes the permitted uses of golf course overlay zones as "only uses and facilities directly related thereto which are necessary for the operation and maintenance of the subject golf course shall be permitted in this district."

Following this definition, it is important to recall that modern golf course operations rely on wireless communications to support player safety, emergency response, maintenance coordination, weather monitoring, and operational management.

Wireless communications infrastructure, when appropriately sited and designed, functions as essential service infrastructure that supports the safe and effective operation of golf course facilities and enhances emergency response capabilities for players, staff, and first responders

4.3.3.1 Proposed Changes in Golf Course Overlay (Chapter 21.40)

Current Definition:

> *§ 21.40.030 Permitted uses. Only uses and facilities directly related thereto which are necessary for the operation and maintenance of the subject golf course shall be permitted in this district. (Ord. 387 § 1, 1996)*

Proposed Change:

> § 21.40.030 Permitted uses. Only uses and facilities directly related to and necessary for the operation and maintenance of the subject golf course shall be permitted in this district. For purposes of this Section, facilities necessary for operation and maintenance may include infrastructure that supports player safety, emergency response, maintenance coordination, weather monitoring, and operational communications, provided such facilities are appropriately sited and designed and comply with all applicable requirements of this Title.
>
> Wireless communications infrastructure, when appropriately sited and designed, shall be considered essential service infrastructure supporting the safe and effective operation of golf course facilities, including reliable access to emergency services for players and staff, coordination of maintenance and operations, and communication with first responders, provided such facilities are located outside of active Golf Course Play Areas (*§ 21.08.260)* and comply with all applicable provisions of this Title, including Chapter 21.48 (Telecommunications Overlay).

4.3.4 Height Limitations

Another important point that needs to be addressed is the current verbiage that ties the maximum allowed height for wireless communications facilities to the height of the clubhouse[8]. While this section of the document also describes exceptions to the height standards[9]. The limitation we see here is that there's a final paragraph under the exceptions criteria that states:

> *"The Applicant's proposal complies with the design standards set forth in Section 21.48.080(e) and that the extended height shall integrate into the existing club house architecture so as not to appear as an addition to the structure."*

[8] Telecommunications Overlay Development Standards § 21.48.080 (b)
[9] Telecommunications Overlay Development Standards § 21.48.080 (c)

This paragraph seems to indicate that the height exception applies only to club-house integrated facilities and excludes parking lots, maintenance areas, perimeter landscape zones and similar locations. This requirement for integration to the club house would also eliminate the possibility of installing free standing stealth structures such as eucalyptus or clock towers. CelPlan understands that this limitation is due to visual compatibility with the golf course setting and not because such structures would be unsafe. Stealth freestanding structures (clock towers, trees, public art) are acceptable in this zoning document for other zones, for example in the Sports complex Telecommunications Overlay Zone[10]:

> *"The Applicant's proposal cannot easily be distinguished as a commercial antenna and wireless communication facility and is disguised in a manner so it enhances the property and community, such as a flagpole, light standard, realistic grouping of palm trees, clock tower, or public art."*



FIGURE 51 – STEALTH FACILITIES EXAMPLE - IMAGE GENERATED USING CHATGPT (OPENAI), MARCH 2026

The use of stealth freestanding designs that mimic existing landscaping elements, as well as architecturally integrated rooftop installations on clubhouse structures or free standing stealth structures that match architectural style, preserves the visual character and premium aesthetic of golf course properties. These design approaches align with the City's aesthetic standards while enabling technically viable infrastructure capable of addressing documented coverage deficiencies.

4.3.4.1 Example of Exemption for Free Standing Structure in Golf Course

City of Anaheim (Orange County, California)

A California Notice of Exemption for Anaheim describes a proposed "stealth wireless communications facility designed as a faux pine tree" located within a golf course maintenance yard area[11].

[10] Telecommunications Overlay Development Standards § 21.48.060(d)(1)

[11] https://files.ceqanet.lci.ca.gov/267433-1/attachment/fsYdN-z4rInRyRZNcVtXj9SYPZXcszIuxmxZvnxPhtxmSTVIUQfUrb55W9NMBUx0geeODj0jisuU73CA0

"The applicant proposes to install a new ground-mounted 85-foot high stealth wireless communications facility designed as a faux pine tree for AT&T. The applicant would install the stealth facility within the golf course maintenance yard area."

Palm Beach County, FL

As an exception to standard siting provisions, the applicant requested approval to amend the Master Plan to permit an additional 150-foot stealth (flagpole-style) commercial wireless communication facility within the Westchester Club Golf Course Recreation Pod. County staff reviewed the applicant's justification and responses to each of the standards and found that the request achieved an appropriate balance between the demonstrated need for the proposed change and the potential impacts associated with it, recommending approval of the request.[12]

"The Applicant is requesting a DOA and CA to reconfigure the Master Plan to add an additional 150ft. tall Stealth (Flagpole) Commercial Communication Tower within the Westchester Club Golf Course (Recreation Pod) … The 150-ft. tall Tower is designed as a flagpole on an existing golf course. Many sporting venues have flagpoles making the Stealth Tower consistent with the character of the existing use on site."

4.3.4.2 Proposed Changes in Development Standards (Chapter 21.48)

Current Definition:

§21.48.080(a) Location. It is the intent of the Residential Very Low Density Zone with a Golf Course Overlay to allow a Telecommunications Overlay Zone that would permit new telecommunication facilities to integrate with the clubhouse structures to take advantage of the height these structures provide and to minimize aesthetic impacts.

Proposed Change:

Location. It is the intent of the Residential Very Low Density Zone with a Golf Course Overlay to allow telecommunications facilities to integrate with clubhouse structures and other golf course support facilities to take advantage of the height these structures provide or to integrate with the golf course environment through architecturally or visually compatible freestanding stealth designs.

In addition to architecturally integrated installations on clubhouse structures, telecommunications facilities may be permitted as freestanding stealth facilities where such facilities are fully concealed or camouflaged and are designed to blend with existing landscaping elements or architectural features characteristic of the golf course environment, including but not limited to clock towers, tree-like structures (such as eucalyptus), light standards, or public art features.

(1) Preferred Locations.

[12] https://discover.pbcgov.org/pzb/zoning/Hearings-Meetings-ZC/2019-02-07-05.pdf

Telecommunications facilities shall be located in the following order of preference, provided that all facilities comply with applicable design, height, and review requirements of this Section and Chapter 21.48:

1. Clubhouse buildings, where facilities are architecturally integrated into the structure;
2. Maintenance or operations buildings, where facilities are architecturally integrated or concealed;
3. Parking areas, including stealth poles, light standards, or similar concealed designs;
4. Landscaped areas located outside the active golf play surfaces, including areas adjacent to public rights-of-way or within open space portions of the site, where facilities are designed as freestanding stealth structures that mimic existing landscape or architectural elements.

4.3.4.3 Proposed Changes in Height Exceptions (Chapter 21.48)

Current Definition:

§21.48.080(b) Height. Commercial antenna and wireless communications facilities shall not exceed the maximum height of the golf clubhouse where the facility is located in the Residential Very Low Density Zone with a Golf Course Overlay.

§21.48.080(c) Exception to Height Standards. Commercial antennas and wireless communication facilities may exceed the maximum height standards set forth in Section 21.48.080(a) under the following conditions:

(1) The Applicant shall provide plans that fully screen the proposed facility from the view of surrounding properties and the public view unless it is co-located with existing facilities or structures. The communication facilities shall not create substantial visual, noise or thermal impacts and must be consistent with the character of the surrounding development, and;

(2) The Applicant provides substantial evidence that there are no existing structures or freestanding wireless communication facilities within the geographic area of sufficient height to meet the Applicant's requirements and the deficiency in height cannot be remedied at a reasonable cost, and;

(3) The Applicant provides substantial evidence that the extra height is necessary to avoid electromagnetic interference with other structures including existing wireless communications facilities within the geographic area, and;

(4) The Applicant provides written documentation, to the satisfaction of the Planning Commission/City Council, that the extra height is necessary to allow for future rearrangement of antennas and/or to accept additional antennas of other service providers, and;

The Applicant's proposal complies with the design standards set forth in Section 21.48.080(e) and that the extended height shall integrate into the existing club house architecture so as not to appear as an addition to the structure.

Proposed Changes:

§21.48.080(b) Height. When mounted on or architecturally integrated into a clubhouse structure, commercial antenna and wireless communications facilities shall not exceed the maximum height of the golf clubhouse where the facility is located when mounted on or integrated into clubhouse structures.

Freestanding stealth telecommunications facilities located within golf course support facilities may exceed the height of the clubhouse, provided that the facility is fully concealed or camouflaged, designed to blend with existing landscaping or architectural features, and approved through the Conditional Use Permit process pursuant to subsection (c).

§21.48.080(c) Exception to Height Standards. (add the following clarification for freestanding stealth structures and replace last paragraph)

The exception to height standards may apply to both architecturally integrated facilities on clubhouse or support buildings and to freestanding stealth facilities, including but not limited to clock towers, tree-like structures, or public art features, where the Planning Commission finds that:

1. The facility is located outside of active golf play areas, including fairways, greens, tees, and practice areas;
2. The facility is designed as a stealth or concealed structure that preserves the visual character and premium aesthetic of the golf course property;
3. The additional height is necessary to achieve reliable communications for player safety, emergency response, or golf course operations; and
4. No feasible alternative exists at a lower height that would provide comparable service while maintaining compliance with applicable design standards.

The Applicant's proposal complies with the design standards set forth in Section 21.48.080(e) and demonstrates that any extended height is fully integrated into either the architecture of an existing clubhouse or support structure or a freestanding stealth design that is architecturally or visually compatible with the surrounding golf course environment, such that the facility does not appear as a conventional telecommunications tower or as an incongruous addition to the site.

4.4 Watercourse Zone (Chapter 21.46)

4.4.1 Change Reasoning and Objective

The objective of the proposed change to the Watercourse Zone is to establish a clear and limited regulatory pathway for the consideration of telecommunications infrastructure where such facilities can be demonstrated, through rigorous engineering analysis, to pose no adverse impact to flood control, public safety, or environmental resources. Under the current zoning framework, telecommunications facilities are not contemplated within Watercourse Zones, resulting in a blanket prohibition that does not distinguish between inherently incompatible uses and infrastructure that may be safely accommodated under controlled conditions. This absence of a conditional review mechanism restricts the City's ability to address documented wireless coverage gaps in areas that are unsuitable for alternative siting options.

Modern telecommunications infrastructure increasingly serves critical public safety and operational functions, including reliable access to emergency services, coordination of first responder activities, and support for emergency notifications during flood events or other natural hazards. Watercourse corridors often traverse developed and undeveloped areas alike and may represent the only feasible locations to provide continuous wireless coverage across adjacent neighborhoods, transportation routes, and recreational areas. Allowing telecommunications facilities to be considered conditionally within Watercourse Zones recognizes this functional reality while preserving the City's primary objectives of flood protection, environmental stewardship, and public safety.

The proposed amendment does not weaken existing floodplain or environmental protections. Instead, it explicitly requires that any telecommunications facility proposed within a Watercourse Zone be subject to Conditional Use Permit review and demonstrate full compliance with applicable FEMA Flood Insurance Rate Maps, state and county flood control regulations, environmental requirements, and structural safety standards. Approval would be contingent upon licensed engineering analyses confirming that the proposed facility will not obstruct flood flows, reduce channel capacity, increase flood elevations, compromise channel stability, or create hazards during flood events.

By requiring independent, professional certification of technical compliance as a condition of approval, the City ensures that responsibility for design, safety, and regulatory compliance remains with the applicant and their licensed professionals, while the City's role remains focused on land-use compatibility, policy oversight, and enforcement of adopted standards.

Our proposal is to tie eligibility to technical performance and safety outcomes rather than zoning exclusion. This approach provides the City with a defensible framework for evaluating proposals without assuming technical design liability. The amendment proposed is consistent with practices adopted by peer jurisdictions in California and other states, where telecommunications facilities are permitted within flood control channels, washes, or drainage corridors only when stringent engineering, environmental, and safety criteria are met.

Proposed site NCUP-2026-01-B (The Reserve Country Club) would benefit from such zoning changes. The possibility of adding wireless infrastructure within approved locations in the Watercourse zone would open the possibility of further improving wireless service in other areas of the City as well.

4.4.2 Applicability of the Telecommunications Overlay (Chapter 21.48)

Under §21.48.030 (Telecommunications Overlay Zone), the Overlay is currently applicable only to the Sports Complex Zone (SPX) and the Resort Commercial Zone (RC). Watercourse Zones are not included within the scope of the Telecommunications Overlay. As a result, any proposal to install telecommunications infrastructure within a Watercourse Zone is therefore prohibited by zoning, rather than by engineering feasibility, flood safety considerations, or environmental performance standards, and the code provides no conditional review pathway comparable to the Conditional Use Permit (CUP) exceptions available in other zoning districts.

Chapter 21.46 (Watercourse Zone) is primarily focused on flood control, runoff, erosion and siltation, ensuring public safety during flood events, and preserving environmental and habitat resources. The chapter does not expressly prohibit vertical infrastructure.

The proposed amendment adds conditional consideration of telecommunications infrastructure where engineering analysis demonstrates no adverse impact to flood control, public safety, or environmental

functions and providing CUP-level discretion to ensure that approval is granted only where stringent technical and policy criteria are satisfied.

4.4.2.1 Example of Floodplain Permitted Use for Wireless Facility

City of Huntingburg, Indiana

Huntingburg's Floodplain Overlay District (F-O) is expressly tied to FEMA's Flood Insurance Study (FIS) and FIRMs, and it allows "wireless communications facility" "provided that no material storage or enclosed buildings are located in the floodway" as a listed use in the overlay. It also requires development in the floodway to obtain state approval (IDNR).

> *"The purpose of the Floodplain Overlay District ("F-O") district is to regulate development within the floodplain areas and to comply with the regulations of the Federal Emergency Management Agency (FEMA).*
>
> *The Floodplain Overlay District shall consist of the following areas:*
>
> *• Areas subject to periodic flooding and as last updated in the Websoil Survey, operated by the USDA Natural Resources Conservation Service, as being "subject to flooding;" and*
>
> *• Areas classified as floodway or special flood hazard areas in the Flood Insurance Study (FIS) and the accompanying Flood Insurance Rate Maps (FIRMs) dated October 16, 2014, as amended and issued by FEMA including all digital data developed as part of the Flood Insurance Study.*
>
> *Development in this district must comply with the Flood Hazard Area Ordinance adopted by the City of Huntingburg in conjunction with the National Flood Insurance Program (NFIP). Development of any kind within the regulatory floodway of a waterbody will require the approval of the Indiana Department of Natural Resources (IDNR), under the authority of IC 14-28-1."*[13]

City of Palm Springs, California

The City of Palm Springs provides a relevant peer-city precedent for the conditional accommodation of telecommunications infrastructure within areas subject to flood hazard regulation. Palm Springs regulates wireless and commercial communication antennas as a permitted but controlled land use through its zoning ordinance, allowing such facilities to be reviewed and approved through architectural review or a Conditional Use Permit (CUP) based on visual impact and site context.

Separately, Palm Springs manages flood hazard areas through its Flood Damage Prevention regulations, which require development within mapped flood hazard areas to comply with the FEMA Flood Insurance Rate Maps (FIRMs) and Flood Insurance Studies (FIS) and to obtain a floodplain development permit prior to construction. In designated floodway areas, Palm Springs prohibits encroachments unless a registered professional civil engineer certifies that the proposed development will not result in any increase in flood levels during the base flood discharge.

[13] https://www.huntingburg-in.gov/egov/documents/1627061959_17506.pdf - p.52

"Within an adopted regulatory floodway, the city of Palm Springs shall prohibit encroachments, including fill, new construction, substantial improvements, and other development, unless certification by a registered civil engineer is provided demonstrating that the proposed encroachment shall not result in any increase in flood levels during the occurrence of the base flood discharge."[14]

4.4.2.2 Proposed Changes in Zoning Purpose Definition (Chapter 21.46)

Current Definition:

§21.46.010 Purpose. The purpose of the Watercourse Zone is to restrict development in identified flood- plain areas, and minimize increases in runoff, erosion, and siltation of watercourse areas that may adversely impact drainage requirements. (Ord. 387 § 1, 1996)

Proposed Change:

§21.46.010 Purpose. (current text stays and adds the following paragraph)

The purpose of this Chapter is also to ensure that essential public and utility infrastructure may be considered where appropriate, provided such facilities are demonstrated through technical analysis to pose no adverse impact to flood control, public safety, or environmental resources.

4.4.2.3 Proposed Changes in Property Development Criteria (Chapter 21.46)

Current Definition:

§21.46.030 Property development criteria. No structure shall be located, constructed, or substantially improved; and no land form modifications may occur on properties which are within watercourse designations, unless such structures constitute flood control improvements approved by the flood control district and such improvements will not substantially impede the flow of water or result in any increase in flood levels during the occurrence of the one hundred (100) year flood discharge. Non-habitable structures may be exempted from this requirement upon approval of the flood control district.

Pursuant to a Conditional Use Permit, the following uses may be authorized if it is deemed that they are compatible with maintaining the natural condition of the property and are consistent with the General Plan:

(a) Game preserve, scientific and educational facilities (public or private) or study programs. (Ord. 387 § 1, 1996; Ord. 414 § 2, 1998)

Proposed Change:

§21.46.030 Property development criteria. No structure shall be located, constructed, or substantially improved, and no land form modifications may occur on

[14] Palm Springs Municipal Code, Chapter 8.68 — Flood Damage Prevention https://ecode360.com/42996853#42996853

properties within watercourse designations unless such structures constitute flood control improvements approved by the flood control district, or are otherwise authorized pursuant to this Section, and provided that such improvements will not substantially impede the flow of water or result in any increase in flood levels during the occurrence of the one hundred (100) year flood discharge. *Non-habitable structures may be exempted from this requirement upon approval of the flood control district.*

Pursuant to a Conditional Use Permit, the following uses may be authorized if it is deemed that they are compatible with maintaining the natural condition of the property and are consistent with the General Plan:

(a) Game preserve, scientific and educational facilities (public or private) or study programs. (Ord. 387 § 1, 1996; Ord. 414 § 2, 1998)

(b) Telecommunications Facilities. Wireless communication facilities may be permitted within the Watercourse Zone subject to approval of a Conditional Use Permit and compliance with all applicable provisions of this Title.

4.4.2.4 Proposed Changes to Submittal Requirements (Chapter 21.46)

Current Definition:

§ 21.46.040 Submittal requirements. Prior to the issuance of any building permits or approval of a Conditional Use Permit, the applicant shall submit grading and erosion control plans, and a hydrology study which shall be approved by the City Engineer. The plans and study shall illustrate how the flood capacity of the watercourse will be preserved, and that there will not be any substantial increase in runoff, erosion or siltation. (Ord. 387 § 1, 1996)

Proposed Change:

§ 21.46.040 Submittal requirements. (current text stays and adds the following paragraphs)

(a) Wireless communication facilities proposed within the Watercourse Zone shall comply with the following:

1. Flood Control and Environmental Compliance. Wireless communication facilities proposed within the Watercourse Zone shall comply with all applicable flood control, environmental, and safety regulations, including but not limited to the Federal Emergency Management Agency Flood Insurance Rate Maps and Flood Insurance Studies, state and county flood control requirements, the California Building Code, and the California Environmental Quality Act.
2. Engineering Analysis and Certification. Approval of any wireless communication facility within the Watercourse Zone shall be contingent upon submission of hydraulic, hydrologic, geotechnical, and structural analyses prepared by a licensed professional engineer demonstrating that the proposed facility will not obstruct flood flows, reduce channel capacity, increase flood elevations, compromise channel stability, or create hazards during flood events.
3. Floodway Restrictions. Within designated regulatory floodways, no encroachment, including structures or equipment, shall be permitted unless certification by a

registered professional civil engineer demonstrates that the proposed development will not result in any increase in flood levels during the occurrence of the base flood discharge.

4. Design and Siting Standards. Wireless communication facilities permitted within the Watercourse Zone shall be sited and designed to minimize visual impacts and to avoid interference with flood control operations and maintenance access. Where feasible, facilities shall be located outside of active low-flow channels and integrated into channel edges, maintenance access areas, or adjacent upland portions of the watercourse corridor.
5. Cross-Reference to Telecommunications Standards. Wireless communication facilities permitted within the Watercourse Zone shall comply with all applicable design, concealment, and siting requirements of Chapter 21.48 (Telecommunications Overlay), where such standards are relevant and feasible.

4.5 Public Facility Zoning Areas (Chapter 21.38)

4.5.1 Change Reasoning and Objective

Public Facility zoning areas present a unique opportunity to support efficient and well-managed wireless infrastructure deployment because these properties are often owned or controlled by the City or by public-serving entities. When wireless facilities are located on publicly owned or publicly managed land, the City is better positioned to streamline the permitting process, establish clear access and lease terms, and enforce consistent site design and safety requirements. This approach reduces uncertainty for wireless carriers, accelerates deployment timelines, and allows the City to directly oversee compliance with adopted aesthetic, operational, and public safety standards, while also creating the potential for long-term lease revenue through collocation by multiple carriers.

In the specific case of electrical substations, confirming property ownership is a critical first step in evaluating suitability for telecommunications infrastructure. Where parcels are owned by entities such as Southern California Edison, coordinated planning among the City, the utility, and wireless carriers can facilitate shared-use agreements that balance utility operations with telecommunications needs. Utilities are currently undergoing significant modernization efforts, deploying advanced monitoring, automation, and control technologies that depend on reliable and resilient communications networks. As a result, utilities are increasingly investing in telecommunications infrastructure and may have a direct interest in accommodating wireless facilities on their own property when space and operational conditions allow. Where facilities are publicly owned or jointly managed, the City is uniquely positioned to facilitate access, support collocation, and establish long-term infrastructure planning frameworks that benefit both utility operations and broader community connectivity.

Suitable opportunities for wireless deployment may exist on a range of Public Facility properties beyond substations alone. Other City-owned parcels, including water facilities, public works yards, and similar infrastructure sites, may be viable locations for wireless facilities with fewer land-use conflicts than private properties.

The amendment is intended to maintain appropriate safeguards by requiring compliance with applicable California Fire Code provisions and Federal Communications Commission radiofrequency exposure limits, while allowing the City to maintain discretion for siting on school district property where local policy preferences or operational considerations may come into play.

The following is a list of proposed site locations that would benefit from changes to the Public Facilities Zoning Areas. Availability for adding wireless infrastructure in these locations is essential to improve wireless service availability and quality in the city.

- NCUP-2026-03-A (SCE Indian Wells Substation)
- NCUP-2026-03-B (SCE Indian Wells Substation)

4.5.1.1 Example of Telecom Assets Near Substation

Figure 52 and Figure 53 show telecom assets deployed next to a substation in San Miguel, CA.



FIGURE 52 - EXAMPLE OF TELECOMMUNICATION TOWER NEXT TO A SUBSTATION 1 (VIEW FROM TOP)



FIGURE 53 - EXAMPLE OF TELECOMMUNICATION TOWER NEXT TO A SUBSTATION 2 (SIDE VIEW)

4.5.2 Permitted Use of Public Facilities (Chapter 21.38)

On § 21.38.020 (Public facilities), the permitted uses list one option that could easily be interpreted to accommodate telecommunications infrastructure: "Other public uses which the City Council may designate from time to time"

The proposed amendment adds conditional consideration of telecommunications infrastructure where safe, appropriate, and compatible with surrounding uses, while maintaining sensitivity to schools, fire stations, and other public-serving facilities.

Public Facility properties are already conditionally eligible for commercial wireless facilities under Section 21.90.060. For that reason, any recommendation in this section should be framed as a clarification or coordination effort, not as the creation of a new entitlement path. This is particularly important because height and setback standards for PF sites already default to the base zoning district under the antenna ordinance.

The proposed amendments in this section do not include specific language addressing fee structures or lease terms associated with the siting of telecommunications facilities on City-owned property. This omission is intentional, as fee schedules, lease rates, and revenue arrangements are more appropriately addressed through separate City policies, master license agreements, or administrative processes rather than through zoning code provisions. However, it is noted that other California jurisdictions have adopted formal policies governing the use of publicly owned property for wireless facilities. For example, the City of Temple City, mentioned in the next section, has implemented a comprehensive framework for licensing telecommunications facilities on City property, including standardized lease terms and fee structures. These policies can be used as a reference for the City to establish a structure for managing telecommunications siting and revenue on publicly owned land.

4.5.2.1 Example of Public Facilities Allowance for Wireless Infrastructure

City of La Puente (Los Angeles County)

La Puente's zoning code has a Public Facilities Zone (PF) use table that lists "Wireless Communications Facilities" as an allowed use type with new facilities requiring a Conditional Use Permit and co-locations Permitted by-right[15].

City of Woodland (Yolo County)

Woodland's ordinance text expressly allows:

> *"(ii) Telecommunications facilities located on public or private school sites, supported and/or initiated by the applicable school district or governing entity, subject to the review procedures as set forth in subsection (b)(3) Director Review, or subsection (b)(5) Conditional Use Permit, are satisfied and provided the facilities meet the location and design standards set forth in this section, except historic properties and sensitive habitat areas.*

[15] https://codelibrary.amlegal.com/codes/lapuente/latest/lapuente_ca/0-0-0-38339 10.16.020 Land Use Regulations.

(iii) Telecommunications facilities within the public right of way (PROW) or on city-owned property (including parks), provided the applicant procedures set forth in subsection (b)(3) Director Review, or subsection (b)(5) Conditional Use Permit, are satisfied and provided the facilities meet the location and design standards set forth in this section, except historic properties and sensitive habitat areas."[16]

City of Temple City (Los Angeles County)

Temple City's ordinance includes a dedicated section to describe construction/repair obligations, access protections, etc when the telecom structure is located in city property:

"Additional conditions of approval for wireless telecommunications facilities co-located on primary use owned by the city: Any wireless telecommunications facility permitted to be colocated on a primary use that is owned by the city shall comply with all of the following additional conditions…"[17]

The city also implements a licensing fee policy:

"A wireless telecommunications antenna facility subject to this section and that is colocated on city-owned property will be subject to an annual license fee, set by the director no later than the time of issuance of the permit. The first annual license fee shall be paid no later than 15 days after installation of the wireless telecommunications antenna facility. Thereafter, permittee shall make an annual license fee payment on each July 1…[18]

4.5.2.2 Proposed Changes in Zoning Purpose Definition (Chapter 21.38)

Current Definition:

§21.38.020(a) The purpose of the Public Facilities Zone is to provide a zone which encompasses the existing City Hall, Fire Station, and maintenance yard on Eldorado Drive, just north of Highway 111, and other uses such as power substations, reservoirs, and pump stations.

Proposed Change:

§21.38.0(a) Purpose. (current text stays and adds the following paragraph)

The purpose of this Chapter is also to recognize that certain public facility properties may accommodate essential infrastructure necessary to support public safety, municipal operations, and modern utility and communications needs, provided such infrastructure is sited and designed to ensure compatibility with surrounding uses and compliance with applicable safety and operational standards.

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[16] https://www.cityofwoodland.gov/DocumentCenter/View/1220/25-21-80---Wireless-Communication-Facility-PDF

[17] https://www.templecityca.gov/DocumentCenter/View/4905/Wireless-Communications-Facilities-Draft-Ordinance?bidId=

[18] https://www.templecityca.gov/DocumentCenter/View/4905/Wireless-Communications-Facilities-Draft-Ordinance?bidId=

4.5.2.3 Proposed Changes in Zoning Permitted Uses (Chapter 21.38)

Current Definition:

> *§21.38.020(b) Permitted Uses: (1) City Hall; (2) Fire Station; (3) Maintenance Yard; and (4) Other public uses which the City Council may designate from time to time.*

Proposed Change:

> §21.38.020(b) Permitted Uses: (1) City Hall; (2) Fire Station; (3) Maintenance Yard; (4) Telecommunications facilities; and (5) Other public uses which the City Council may designate from time to time.
>
> §21.38.020(b)(1) Telecommunications Facilities. Wireless communication facilities may be permitted within Public Facility zoning areas subject to approval of a Conditional Use Permit and compliance with all applicable provisions of this Title.

4.5.2.4 Proposed Changes to Development Standards (Chapter 21.38)

Current Definition:

> *§21.38.020(c) Development Standards. Development(s) within this zone shall be in accordance with detailed plans approved by the City Council at a duly convened public hearing. All such development shall be compatible with the very low density residential character of the City. (Ord. 387 § 1, 1996)*

Proposed Change:

> §21.38.020(c) Development Standards. (current text stays and adds the following paragraphs)
>
> The following requirements apply specifically to telecommunication facilities:
>
> (1) Applicability and Intent. Telecommunications facilities permitted pursuant to this Section shall be limited to locations that support public safety, municipal operations, utility modernization, or community communications needs and shall not interfere with the primary function of the public facility.
> (2) Sensitive Uses and Safety Protections. Telecommunications facilities shall be sited and designed to avoid interference with the operation of schools, fire stations, emergency response facilities, and other sensitive public uses. Facilities shall comply with all applicable provisions of the California Fire Code and all Federal Communications Commission radiofrequency exposure limits. Nothing in this Section shall be construed to require the City to approve facilities on school district property where such siting is inconsistent with district policy or operational considerations.
> (3) Ownership and Coordination. Where a proposed telecommunications facility is located on property owned or operated by a public utility or another public-serving entity, approval shall be conditioned upon coordination among the City, the property owner, and the facility operator to ensure compatibility with existing operations and long-term infrastructure planning objectives.
> (4) Design, Siting, and Collocation. Telecommunications facilities permitted within Public Facility zoning areas shall be sited and designed to minimize visual impacts and to support collocation where feasible. The City may require

architectural integration, screening, or concealment measures to ensure compatibility with surrounding development and the character of the site.

(5) Cross-Reference to Telecommunications Standards. Telecommunications facilities permitted under this Section shall comply with all applicable design, siting, and operational requirements of Chapter 21.48 (Telecommunications Overlay), where such standards are relevant and feasible.

4.6 Telecommunications Overlay Development Standards (Chapter 21.48)

4.6.1 Change Reasoning and Objective

The purpose of this change is to clarify and strengthen the City's approach to the design and siting of wireless communication facilities by consolidating all stealth, concealment, and visual design requirements into a single, citywide set of standards. Under the existing code structure, similar design concepts are repeated across multiple Telecommunications Overlay sections, which can lead to inconsistent interpretation, overlapping requirements, and uncertainty during project review. Establishing one consolidated design standards section improves clarity, ensures consistent enforcement across zoning districts, and simplifies long-term maintenance of the Code.

A central objective of this change is to reinforce the City's longstanding policy that wireless facilities must be effectively concealed or architecturally integrated into their surroundings. By clearly stating that visually apparent telecommunications towers are not acceptable and that stealth or camouflage is a prerequisite for approval, the City provides a predictable and enforceable framework for applicants while preserving community character. The consolidated standards also allow the City to articulate clear, uniform criteria for evaluating freestanding stealth structures, such as tree-like monopoles, clock towers, light poles, or similar, without relying on zone-by-zone repetition or interpretation.

The applicability of the Telecommunications Overlay is also amended to include additional zones, including Watercourse and Public Facility zones, where wireless infrastructure may be appropriate. All zone-specific limitations related to flood control, public safety, environmental protection, and operational compatibility remain fully in effect through existing zoning provisions.

Finally, the consolidated design standards are explicitly coordinated with the technical and safety requirements of Section 21.90.060, which continues to govern Federal Aviation Administration compliance, Federal Communications Commission radiofrequency exposure limits, structural safety, screening, and access requirements. The design standards supplement these provisions by addressing visual design and environment compatibility.

4.6.2 Add Watercourse and Public Facilities to Telecom Overlay Zone

Current Definition:

§ 21.48.030 Location of the Telecommunications Overlay Zone.

The Telecommunications Overlay shall apply to the Sports Complex Zone (Chapter 21.35) and the Resort Commercial Zone (Chapter 21.34)

Proposed Change:

§21.48.030 Applicability of Telecommunications Overlay Zone.

The Telecommunications Overlay Zone establishes standards and procedures for the siting, design, and review of wireless communication facilities within the City. The Overlay Zone may apply to properties within zoning districts where wireless communication facilities are otherwise permitted or conditionally permitted, including but not limited to Resort Commercial areas, Sports Complex areas, Golf Course and Recreation areas, Public Facility zoning areas, and Watercourse zones, subject to compliance with the applicable provisions of this Title.

Application of the Telecommunications Overlay Zone does not create a by-right entitlement to construct wireless communication facilities. All facilities shall be subject to the required discretionary approvals, design standards, and technical requirements set forth in this Chapter and elsewhere in the Code.

§21.48.030(a) Relationship to Other Zoning Chapters

Where wireless communication facilities are proposed within zoning districts subject to the Telecommunications Overlay Zone, including but not limited to Sports Complex areas, Resort Commercial areas, Golf Course and Recreation areas, Public Facility zoning areas, and Watercourse zones, the provisions of this Chapter shall apply in conjunction with the applicable requirements of the underlying zoning chapter. In the event of a conflict between the provisions of this Chapter and zone-specific requirements, the more restrictive standard shall apply.

§21.48.030(b) Design Standards Applicability

All wireless communication facilities subject to the Telecommunications Overlay Zone shall comply with the consolidated wireless design standards set forth in Section 21.48.055, regardless of zoning district, unless expressly modified by zone-specific provisions of this Title.

4.6.3 Proposed New Section: Consolidated Wireless Design Standards

A new Section 21.48.055 is added to establish consolidated wireless facility design standards. The section is numbered 21.48.055 to preserve the existing organization and numbering of Chapter 21.48 and to avoid renumbering existing sections referenced elsewhere in the Zoning Code.

§21.48.055 Wireless Facility Design Standards

(a) Purpose and Applicability

The purpose of this Section is to establish uniform, citywide design standards for wireless communication facilities in order to minimize visual impacts, preserve the City's character, and ensure that telecommunications infrastructure is integrated into its surroundings through effective stealth and camouflage design techniques. These standards shall apply to all wireless communication facilities permitted within the City, including but not limited to facilities located in resort commercial areas, sports complexes, golf course properties, watercourse zones, and public facility sites, unless expressly modified by zone-specific provisions elsewhere in this Title.

(b) Mandatory Stealth and Concealment

All wireless communication facilities shall be designed as stealth or camouflaged facilities. Facilities that are readily identifiable as conventional commercial antenna or wireless communication facilities, including exposed monopoles, lattice towers, or visible antenna arrays, shall not be permitted. Approval of a wireless facility shall require demonstration that the facility is effectively concealed within, integrated into, or designed to replicate an architectural, landscape, or contextual feature that enhances the property and surrounding community.

Stealth and camouflage techniques may include, but are not limited to, integration into buildings; concealment within freestanding structures designed to resemble flagpoles, light standards, realistic groupings of palm or other trees, clock towers, public art, or similar contextual elements; or incorporation into existing infrastructure where the telecommunications equipment is not visually distinguishable as such. Simply painting or coloring antennas or support structures to reduce contrast shall not, by itself, be considered an acceptable stealth design.

(c) Building-Mounted Facilities

Building-mounted antennas and any ancillary equipment shall be in scale with, and architecturally integrated into, the building design in a manner that renders the facility visually unobtrusive. Screening techniques may include, but are not limited to, placement within attics, steeples, towers, behind or below parapets, or within architecturally compatible building extensions or façade elements.

When antennas are viewed directly against a building wall, the colors, materials, and finishes of the antennas and associated equipment shall match the exterior of the building or the antenna's background. Roof-mounted antennas and equipment shall be located as far as feasible and aesthetically desirable from the edge of the building and shall be architecturally compatible with the building.

All building-mounted wireless facilities that are visible at five (5) feet above ground level from a distance of three hundred (300) feet from the base of the building shall incorporate appropriate techniques to camouflage or disguise the facility and to blend it into the surrounding environment, unless evidence acceptable to the Planning Commission demonstrates that such camouflaging is infeasible. Building-mounted facilities shall avoid unreasonable interference with views from neighboring properties.

(d) Freestanding Stealth Facilities

Freestanding wireless communication facilities shall be designed to minimize visual impacts and shall not present the appearance of conventional lattice or monopole towers. Freestanding facilities shall instead be designed as stealth structures that blend with existing architectural features, landscaping elements, or site characteristics.

Acceptable freestanding design approaches may include, but are not limited to, facilities concealed as trees or other landscape features, clock towers, light standards, flagpoles, public art elements, or similar structures that are compatible in scale, form, materials, color, and finish with the surrounding environment. Where freestanding facilities are proposed to replace or be incorporated into existing light standards, the

facility shall, to the greatest extent possible, mimic the height, width, color, material, density, and overall appearance of the existing standards.

The height and proportions of freestanding stealth facilities shall be limited to the minimum necessary to achieve the intended service objectives and shall be visually compatible with surrounding vegetation, structures, or topographic features. Where a freestanding facility exceeds the height of nearby structures or landscaping, additional design measures may be required to mitigate visual prominence.

Freestanding facilities shall be sited to avoid interference with the primary use of the property and shall maintain required setbacks, access clearances, and safety separations. Equipment cabinets, ground-mounted infrastructure, fencing, and service areas shall be fully screened or integrated into the overall stealth design so as to avoid visual clutter.

(e) Collocation and Shared Use

As a condition of approval for any Conditional Use Permit, applicants proposing freestanding wireless communication facilities shall cooperate with other service providers in the siting of equipment and antennas in order to accommodate the maximum number of operators at a given site where found to be feasible and aesthetically desirable.

The applicant shall submit a notarized statement indicating whether the proposed facility is designed to accommodate collocation of additional antennas for future users and, if not, the reasons collocation is not feasible. In cases where collocation is represented to be infeasible, the City may retain a qualified radiofrequency engineering expert to evaluate the feasibility of collocation based on the design configuration most accommodating to shared use. The cost of such technical review shall be borne by the applicant.

(f) Coordination with Technical and Safety Standards

All wireless communication facilities shall comply with the applicable technical, safety, and operational standards set forth in Section 21.90.060, including but not limited to Federal Aviation Administration requirements, Federal Communications Commission radiofrequency exposure limits, structural safety standards, screening, landscaping, and access requirements. Where provisions of this Section and Section 21.90.060 address similar topics, the more restrictive standard shall apply.

Compliance with the design standards of this Section shall not be construed as evidence of compliance with the technical, safety, or regulatory requirements of Section 21.90.060. Wireless communication facilities must independently satisfy all requirements of Section 21.90.060 in addition to the design standards set forth herein.

(g) Authority and Supersession

The Planning Commission or other approving authority may require modifications to the design, materials, color palette, siting, or concealment approach of a proposed wireless communication facility as a condition of approval to ensure compliance with these standards and compatibility with the character of the surrounding area.

> The design standards set forth in this Section shall govern the visual design, concealment, and aesthetic treatment of all wireless communication facilities and shall supersede any other design or concealment standards contained elsewhere in this Chapter. Any overlay zone or zoning provision addressing wireless facility design shall be interpreted as referencing and incorporating the standards set forth herein.

4.6.4 Add Design Standards Clarification to Antenna Section

Add the following statement to 21.90.060 to make the relationship between the sections explicit without creating redundancy.

> §21.90.060 (g) Design Standards Coordination. In addition to the technical, safety, and regulatory requirements set forth in this Section, wireless communication facilities shall comply with the applicable design, concealment, and visual compatibility standards of Chapter 21.48, including the consolidated wireless design standards in Section 21.48.055, where such standards are applicable.

4.6.5 Review of Sections on Design Standards per Zone

This section reviews the existing Development Standards contained within Chapter 21.48 of the Zoning Code and identifies targeted revisions needed to align those sections with the proposed consolidated Wireless Facility Design Standards. The intent of the proposed changes is not to alter zoning eligibility, height limits, or zone-specific findings, but to remove or streamline design and concealment provisions that would otherwise be duplicated across multiple overlay sections. By relocating these design standards into a single, citywide section, the Code maintains clarity and consistency while preserving the underlying zoning framework and discretionary review processes already in place.

Current Definition:

> *§ 21.48.060 Development standards—Sports complex Telecommunications Overlay Zone.*
>
> *(d) Design Standards. In addition to the requirements of Section 21.90.060(e)(4) of the Antenna Ordinance, the following standards shall apply:*
>
> > *(1) The Applicant's proposal cannot easily be distinguished as a commercial antenna and wireless communication facility and is disguised in a manner so it enhances the property and community, such as a flagpole, light standard, realistic grouping of palm trees, clock tower, or public art.*
> >
> > *(2) Freestanding commercial antenna and wireless communication facilities that are proposed to either replace or be incorporated onto existing light standards shall, to the greatest extent possible, mimic the height, width, color, finish, material, density and look of the existing light standards.*
> >
> > *(3) All freestanding commercial antenna and wireless communication facilities shall be required as part of the conditions of approval for Conditional Use Permits to cooperate with other service providers in the siting of equipment and antennas to accommodate the maximum number of operators at a given site where found to be feasible and aesthetically desirable. The Applicant shall*

provide a notarized Statement as to whether construction of their proposed freestanding commercial antenna will accommodate co-location of additional antennas for future users and if not why it will not. In the event co-location is represented to be not feasible, the City may retain a technical expert in the field of RF engineering to verify if co-location at the site is not feasible or is feasible given the design configuration most accommodating to co-location. The cost for such a technical expert will be at the expense of the applicant.

(4) The Applicant's proposal is hidden from public view or designed to blend with existing structures in a manner so that it cannot easily be distinguished as a commercial antenna and wireless communication facility, such as a facade mounted antenna, chimney, building extension, or parapet addition.

Proposed Change:

§ 21.48.060 Development standards—Sports complex Telecommunications Overlay Zone.

(d) Design Standards. Wireless communication facilities permitted under this Section shall comply with the consolidated wireless design standards set forth in Section 21.48.055, in addition to the technical and safety requirements of Section 21.90.060.

Current Definition:

§ 21.48.070 Development standards—Resort Commercial Telecommunications Overlay Zone.

(e) Design Standards. In addition to the requirements of Section 21.90.060(e)(4) of the Antenna Ordinance, the following standards shall apply:

(1) Building mounted antennas and any ancillary equipment shall be in scale and architecturally integrated with the building design in such a manner as to be visually unobtrusive. Screening may include designs such as locating the facility within attics, steeples, towers, behind and below parapets, or concealed within a new architectural addition to a building or structure which is architecturally compatible with the building.

(2) When viewed directly against a building wall, colors and materials of the antennas shall match the existing building. Antennas attached to the building shall be painted or otherwise treated to match the exterior of the building or the antenna's background color.

(3) Roof mounted equipment and antennas shall be located as far away as feasible and aesthetically desirable from the edge of the building. All commercial antenna and wireless communication facilities that are visible at five (5) feet above ground level, three hundred (300) feet from the base of the building shall incorporate appropriate techniques to camouflage or disguise the facility, and/or blend it into the surrounding environment unless evidence, acceptable to the Planning Commission shows that such camouflaging is infeasible.

(4) Building mounted antenna and any ancillary equipment should avoid any unreasonable interference with views from neighboring properties. (Ord. No. 511 § 3, 2002)

Proposed Change:

§ 21.48.070 Development standards—Resort Commercial Telecommunications Overlay Zone.

(e) Design Standards. Wireless communication facilities permitted under this Section shall comply with the consolidated wireless design standards set forth in Section 21.48.055, in addition to the technical and safety requirements of Section 21.90.060.

Current Definition:

§ 21.48.080 Development standards—Residential Very Low Density Zone with a Golf Course Overlay within gated communities with a clubhouse facility Telecommunications Overlay Zone.

(e) Design Standards. In addition to the requirements of Section 21.90.060(4) of the Antenna Ordinance, the following standards shall apply:

(1) Building mounted antennas and any ancillary equipment shall be in scale and architecturally integrated with the building design in such a manner as to be visually unobtrusive. Screening may include designs such as locating the facility within attics, steeples, towers, behind and below parapets, or concealed within a new architectural addition to a building or structure which is architecturally compatible with the building.

(2) When viewed directly against a building wall, colors and materials of the antennas shall match the existing building. Antennas attached to the building shall be painted or otherwise treated to match the exterior of the building or the antenna's background color.

(3) Roof-mounted equipment and antennas shall be located as far away as feasible and aesthetically desirable from the edge of the building. All commercial antenna and wireless communication facilities that are visible at five (5) feet above ground level, three hundred (300) feet from the base of the building shall incorporate appropriate techniques to camouflage or disguise the facility, and/or blend it into the surrounding environment unless evidence, acceptable to the Planning Commission shows that such camouflaging is infeasible. All such roof-mounted equipment must be architecturally compatible with the building.

(4) Building mounted antenna and any ancillary equipment shall not interfere with views from neighboring properties.

Antenna and Wireless Communication Facilities

All commercial antenna and wireless communication facilities must be designed and located to minimize their visibility to the greatest extent feasible, considering technological requirements, by means of placement, screening, and camouflage.

Based on potential aesthetic impact, the order of preference for facility type is: façade mounted, roof mounted, ground mounted, and freestanding tower. Below are examples of acceptable and unacceptable building and roof treatments….

Proposed Change:

§ 21.48.080 Development standards—Residential Very Low Density Zone with a Golf Course Overlay within gated communities with a clubhouse facility Telecommunications Overlay Zone.

(e) Design Standards. Wireless communication facilities permitted under this Section shall comply with the consolidated wireless design standards set forth in Section 21.48.055, in addition to the technical and safety requirements of Section 21.90.060.

4.7 Examples of Stealth Wireless Infrastructure

The following pictures show examples of concealed/stealth wireless infrastructure. These examples are intended to be illustrative and not restrictive to other types of camouflage or stealth solutions. All pictures sourced from Diamond Communications (https://www.diamondcomm.com/)



FIGURE 54 - TREE CONCEALMENTS



FIGURE 55 - CUSTOM TOWER CONCEALMENTS

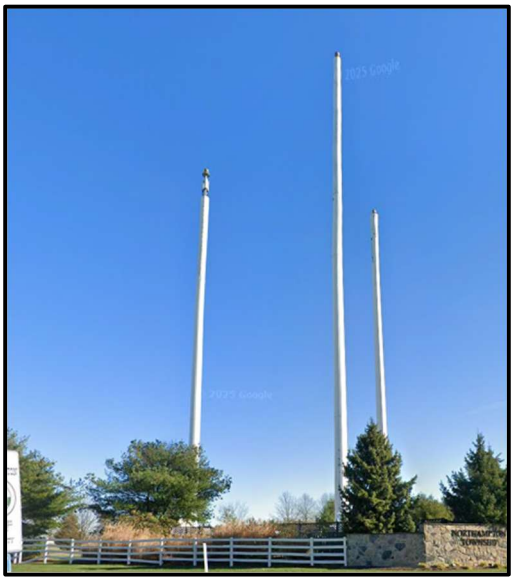


FIGURE 56 - POLE CONCEALMENTS



FIGURE 57 - STEEPLE CONCEALMENTS

4.8 Conclusion

The proposed zoning amendments and modifications along with land-use clarifications will enable macro-cell deployment in the City of Indian Wells improving wireless service availability and quality. These recommendations are technically justified, aligned with industry best practices, and support improved public safety, emergency communications, and long-term wireless infrastructure resiliency across the City.

5 Proposed New Sites, and Predictions

5.1 Introduction

This section of the report focuses on the identification of potential locations for new wireless infrastructure and the corresponding coverage predictions associated with low-band frequency deployments. Low-band frequencies are emphasized due to their superior propagation characteristics and ability to provide reliable, wide-area blanket coverage, an essential requirement for the City's residential neighborhoods and golf and recreation areas. No new high-frequency (capacity-driven) site recommendations are included in this section, as such deployments are typically driven by carrier-specific traffic demand and utilization metrics rather than municipal coverage objectives.

The analysis in this section builds upon the validated field measurements documented in Section 2 and the calibrated predictive simulations developed in Section 3. This section evaluates the performance impact of the proposed sites through two complementary analytical methodologies.

1) The Zoning-Based Analysis quantifies coverage improvements across the City's zoning classifications, with particular emphasis on Residential and Golf & Recreation areas.
2) The Census Block Analysis utilizes 2020 Census data to assess population-level benefits and estimate the number of residents and businesses positively impacted by the proposed deployments.

Together, these approaches provide both geographic and demographic perspectives on network enhancement.

This section also addresses emergency communication considerations for golf course operations. Section 5.4 presents an overview of technologies and vendors capable of supporting golf cart-based emergency notification systems. These solutions are evaluated in the context of macro cellular coverage improvements to ensure that safety enhancements are technically feasible, scalable, and aligned with the City's regulatory framework.

5.2 Proposed New City Coverage

Using the same methodology from Section 3, CelPlan used its proprietary tool named CelPlanner to run simulations of both existing and proposed infrastructure together. The goal of this simulation is to visually represent the coverage of the city in the lowest frequency range, which provides the main service layer for wireless carriers. This section of the report is to evaluate the performance impact of newly proposed sites.

The purpose of the proposed sites is to enhance overall coverage and reliability in targeted areas of the City. Coverage predictions in the low-band frequency range focus on broad-area service, as these frequencies are typically used by carriers to provide market-wide blanket coverage due to their superior propagation characteristics and ability to serve larger geographic areas. In contrast, higher frequency bands such as 1900 MHz, 2100 MHz, and 3500 MHz are primarily deployed to increase network capacity in high-demand or high-density environments. This analysis focuses in increasing the service area in the City of Indian Wells, future capacity assessments will be done by each operator themselves as demand increases.

CelPlan has provided the City of Indian Wells with a set of site options tailored to the major wireless carriers coverage gaps within city boundaries, with a primary focus on improving coverage across golf

club and reserve areas. These options include macro-cell installations in the form of camouflaged sites designed to blend with the surrounding environment and support collocation among multiple carriers, as well as architecturally integrated rooftop installations on country club facilities. The proposed sites are contingent on targeted zoning modifications that would allow such facilities to be constructed, as outlined in Section 4.

All proposed locations are identified as NCUP sites, indicating that new Conditional Use Permits will be required for development. These sites were selected to address coverage deficiencies in areas where additional infrastructure is necessary to meet service objectives. Table 13 summarizes the ten locations expected to benefit most from new site deployments. For several addresses, CelPlan proposed multiple alternatives identified as Options A, B, and C, each representing a slightly different facility location within the same property. These alternatives are supported by corresponding coverage predictions to provide flexibility and enable informed decision-making during the site selection and entitlement process.

5.2.1 Overview of Proposed Sites

The proposed NCUP sites include locations within golf and recreation areas, watercourse-adjacent parcels, and public facility properties. These locations were selected based on predicted coverage improvements, proximity to existing infrastructure, and the ability to employ stealth design techniques.

The candidate sites include:

- The Reserve Country Club (NCUP-2026-01, Options A, B, and C)
- Eldorado Country Club (NCUP-2026-02)
- SCE Indian Wells Substation (NCUP-2026-03, Options A and B)
- Villagio (NCUP-2026-04)
- Toscana Country Club (NCUP-2026-05, Options A and B)
- Dorado Horizon Country Club (NCUP-2026-06)

Latitude and longitude coordinates, and summarized comments are provided on Table 13 for each option to support precise evaluation during the permitting and environmental review process. Figure 58 shows the NCUP displayed on a map. It is suggested that Figure 1Figure 58 is used together with figures shown in Section 5.2.2 and 5.2.3.

TABLE 13 – NEW SITES BASED ON LOW COVERAGE LOCATIONS

Site Name	Address	Zoning Type	Notes	Latitude	Longitude
NCUP-2026-01-A	The Reserve Country Club	Golf and Recreation	Eucalyptus to allow collocation	33.688686	-116.365569
NCUP-2026-01-B	The Reserve Country Club	Watercourse	Eucalyptus to allow collocation	33.689325	-116.372914
NCUP-2026-01-C	The Reserve Country Club	Golf and Recreation	Eucalyptus to allow collocation	33.684653	-116.368939
NCUP-2026-02	Eldorado Country Club	Golf and Recreation	Golfclub House rooftop	33.711417	-116.339144
NCUP-2026-03-A	SCE Indian Wells Substation	Public Facility	Eucalyptus to allow collocation	33.729997	-116.347256
NCUP-2026-03-B	SCE Indian Wells Substation	Public Facility	Eucalyptus to allow collocation	33.729211	-116.345342
NCUP-2026-04	Villagio	Golf and Recreation	Eucalyptus to allow collocation	33.714383	-116.309239
NCUP-2026-05-A	Toscana Country Club	Golf and Recreation	Eucalyptus to allow collocation	33.737628	-116.340911
NCUP-2026-05-B	Toscana Country Club	Golf and Recreation	Eucalyptus to allow collocation	33.741853	-116.338831
NCUP-2026-06	Dorado Horizon Country Club	Golf and Recreation	Eucalyptus to allow collocation	33.724397	−116.347075

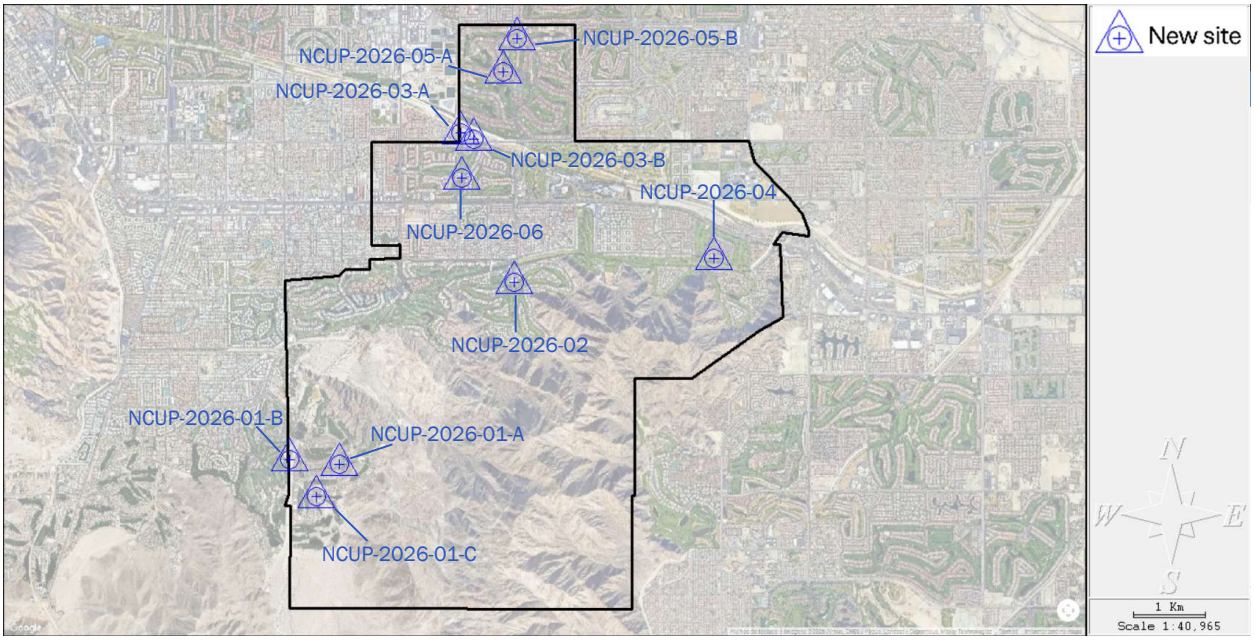


FIGURE 58 - NEW SITES MAP

5.2.2 City New Coverage Maps

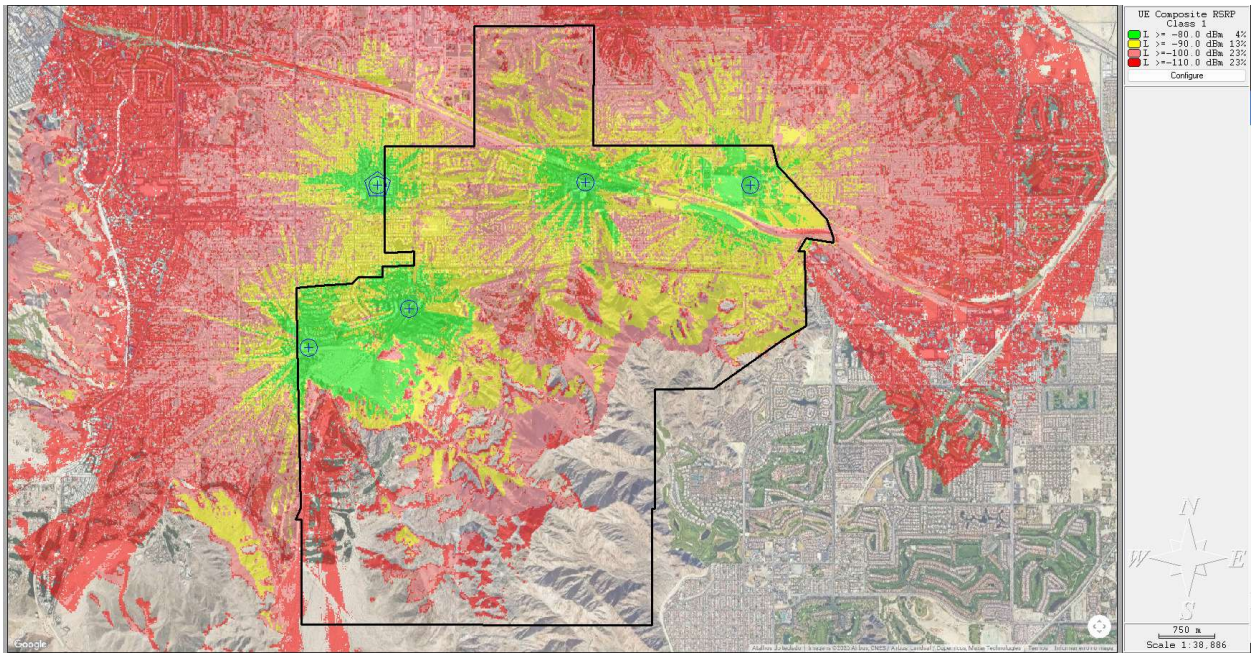


Figure 14, Figure 15 and Figure 16 are the new coverage maps for AT&T, T-Mobile and Verizon with new sites on the coordinates indicated on Table 13.

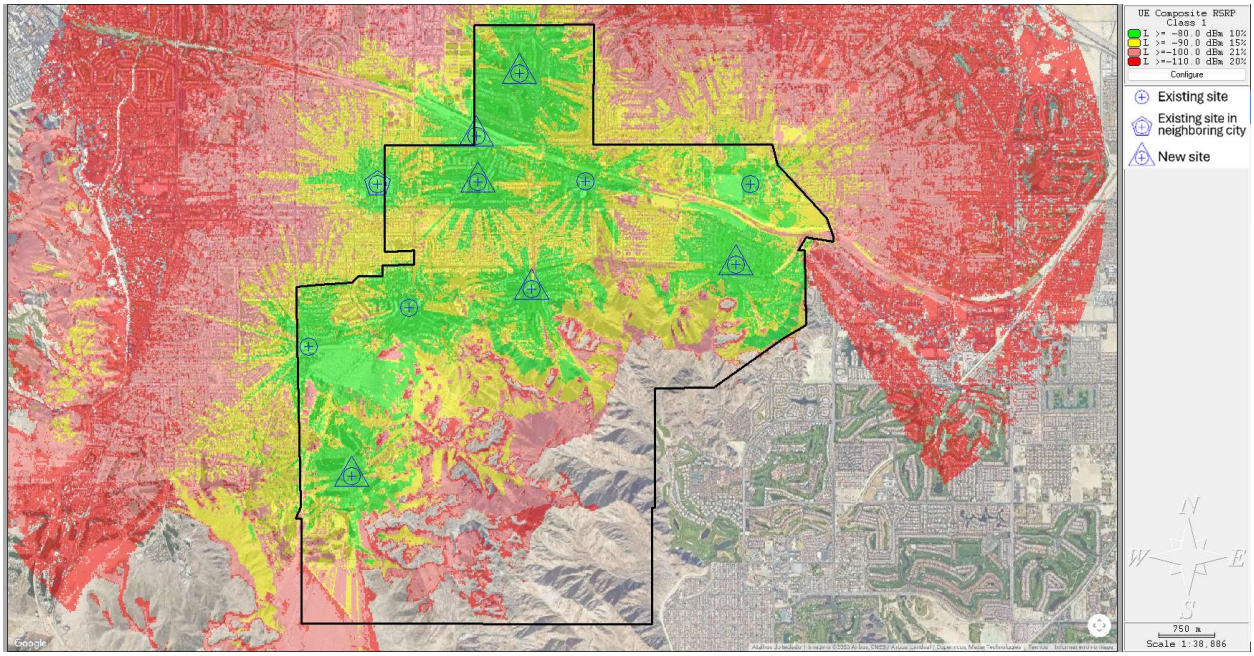


FIGURE 59 - AT&T COMBINED COVERAGE WITH NEW SITES - OPTION A SITES (BEST OPTION SERVICE)

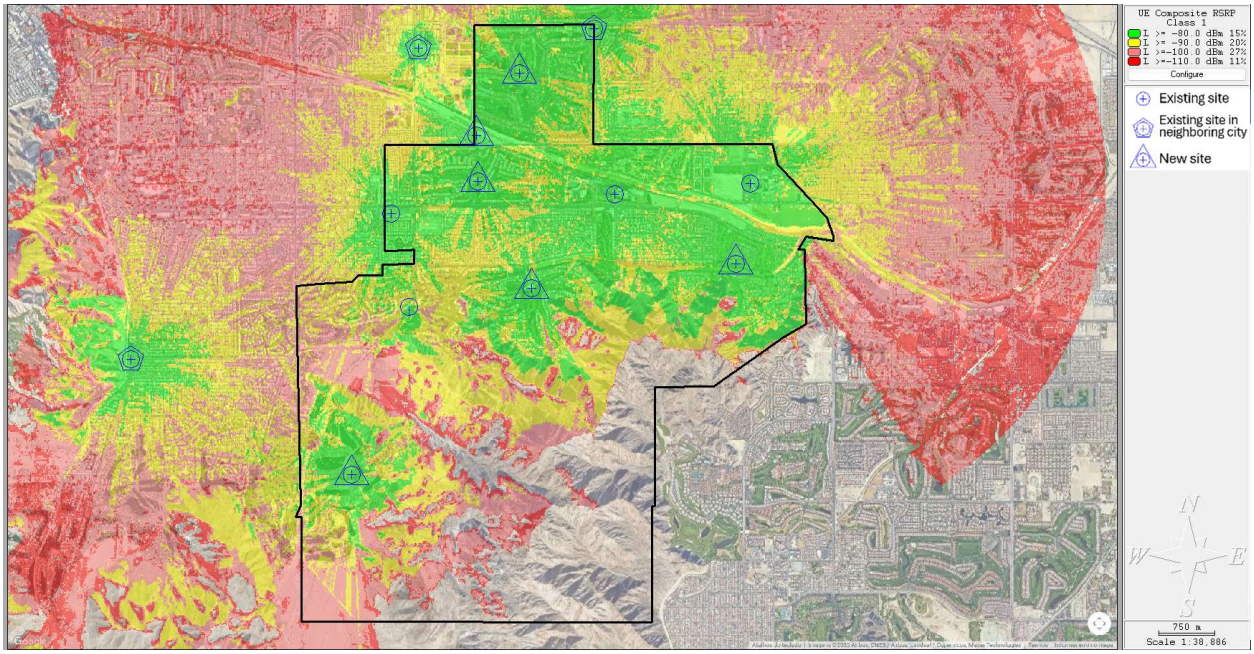


FIGURE 60 - T-MOBILE COMBINED COVERAGE WITH NEW SITES - OPTION A SITES (BEST OPTION SERVICE)

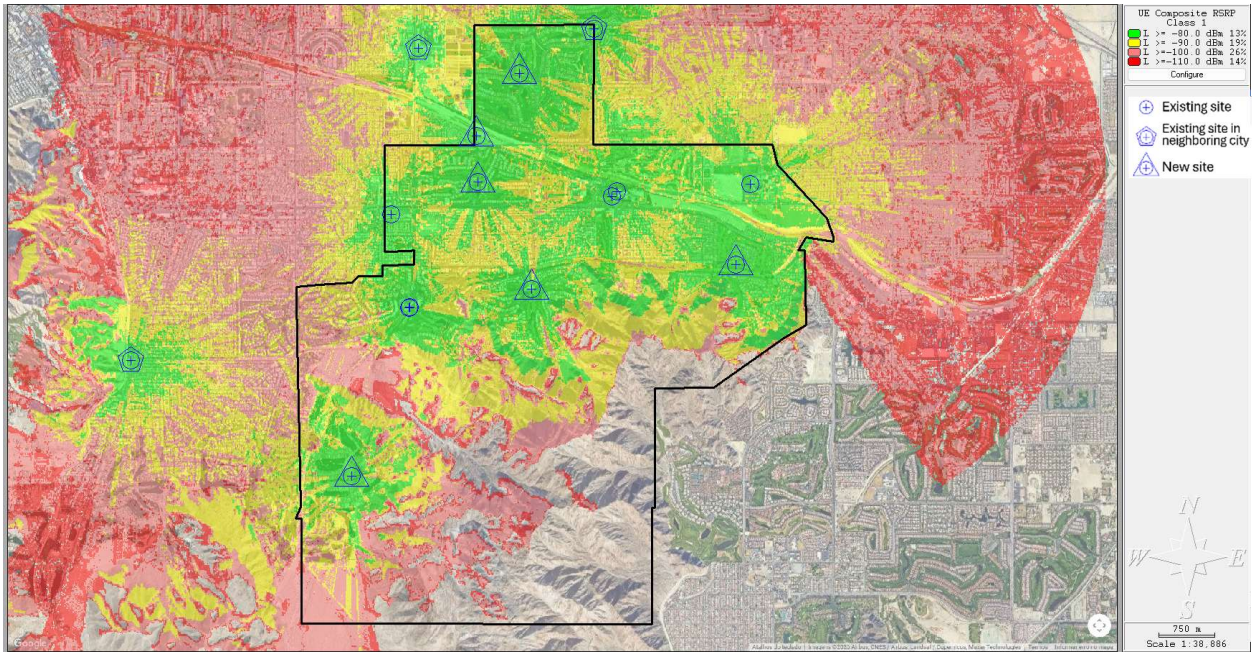


FIGURE 61 - VERIZON COMBINED COVERAGE WITH NEW SITES - OPTION A SITES (BEST OPTION SERVICE)

5.2.3 Proposed Coverage per Area

5.2.3.1 The Reserve Club

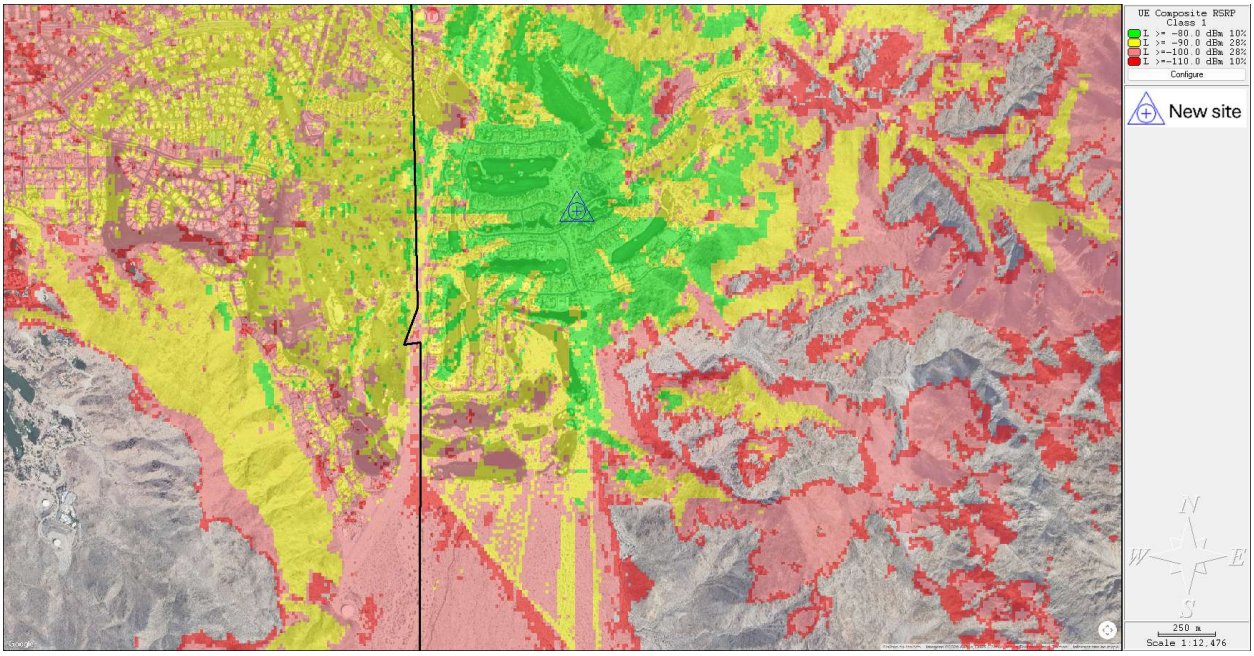


FIGURE 62 - AT&T THE RESERVE CLUB COVERAGE WITH NEW SITES– MAP OPTION A

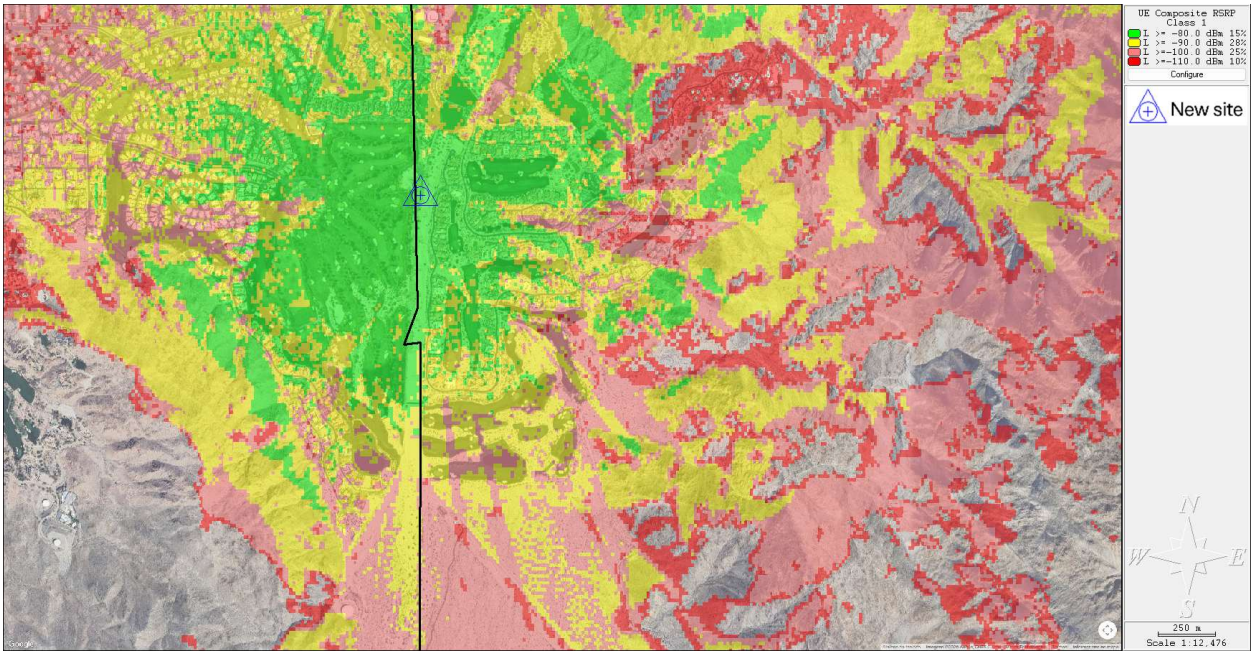


FIGURE 63 - AT&T THE RESERVE CLUB COVERAGE WITH NEW SITES– MAP OPTION B

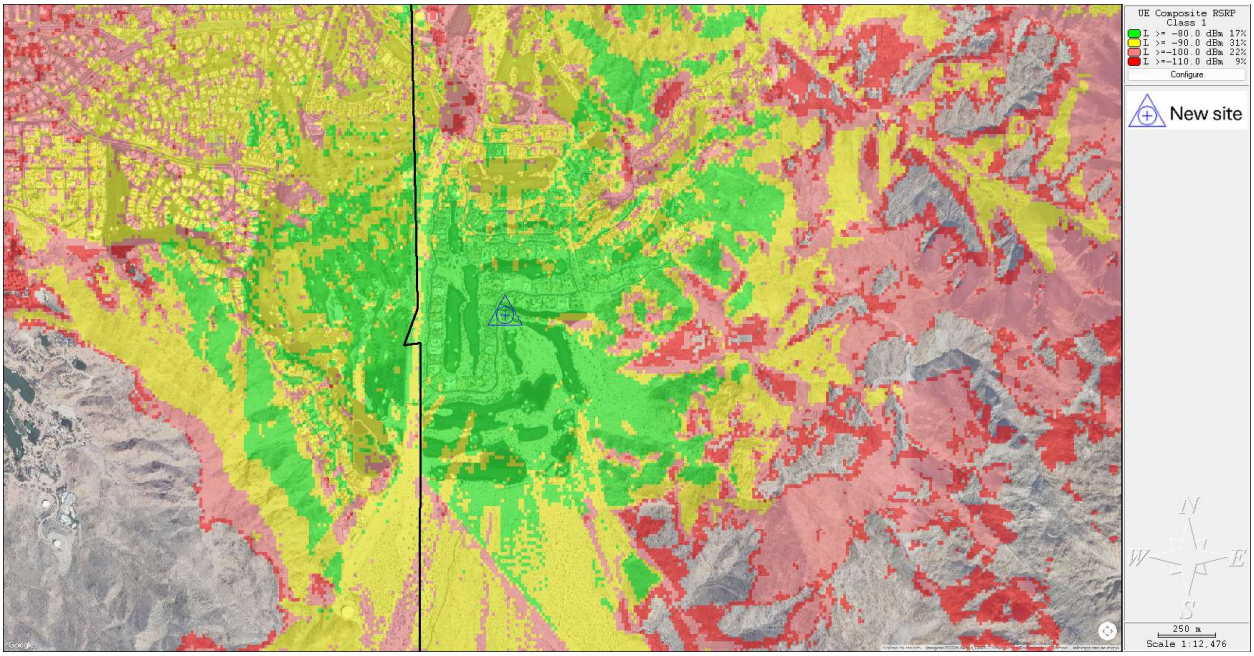


FIGURE 64 - AT&T THE RESERVE CLUB COVERAGE WITH NEW SITES– MAP OPTION C

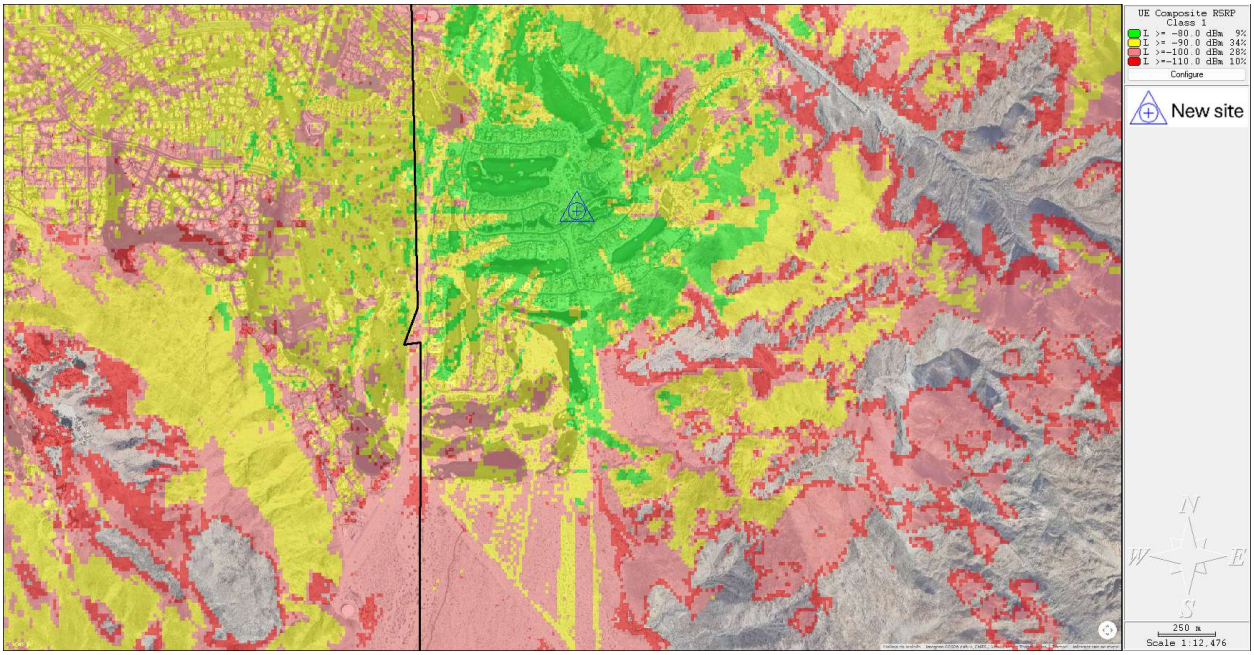


FIGURE 65 – T-MOBILE THE RESERVE CLUB COVERAGE WITH NEW SITES– MAP OPTION A

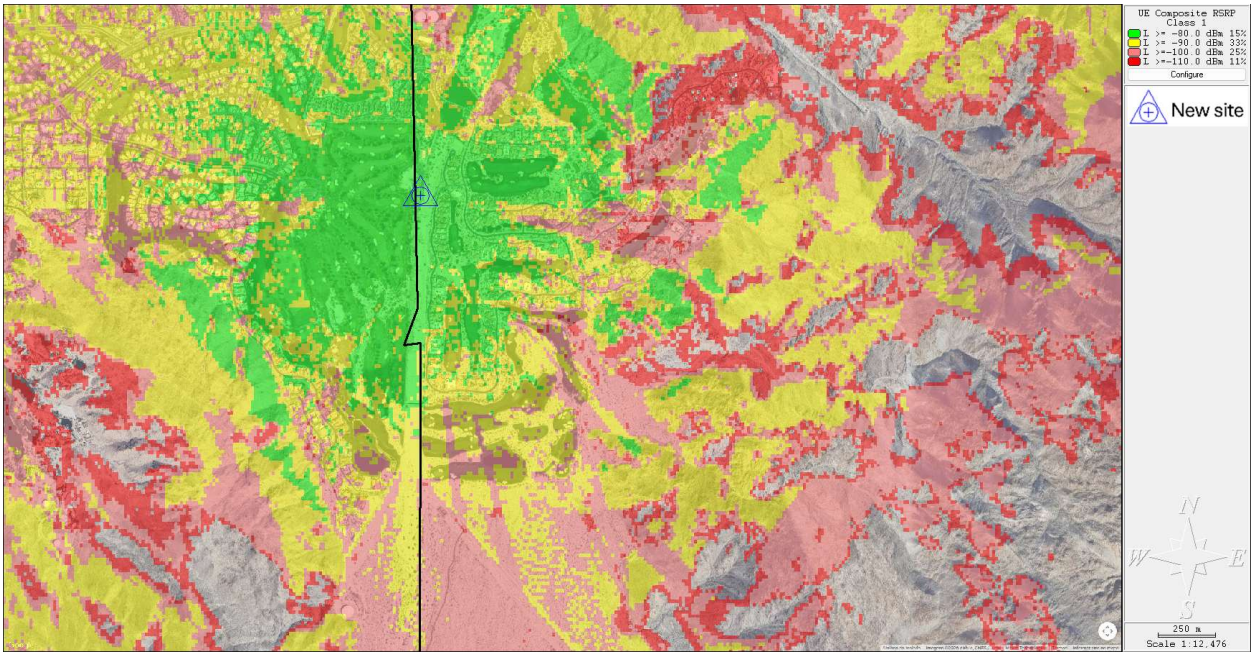


FIGURE 66 - T-MOBILE THE RESERVE CLUB COVERAGE WITH NEW SITES– MAP OPTION B

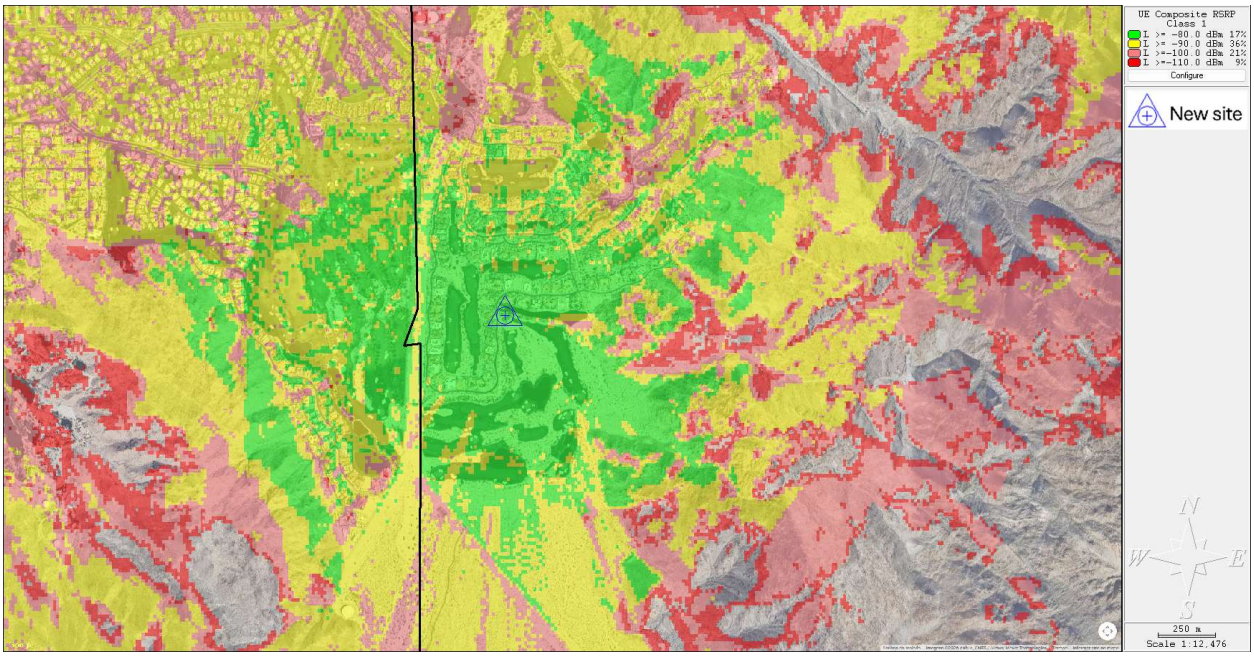


FIGURE 67 - T-MOBILE THE RESERVE CLUB COVERAGE WITH NEW SITES– MAP OPTION C

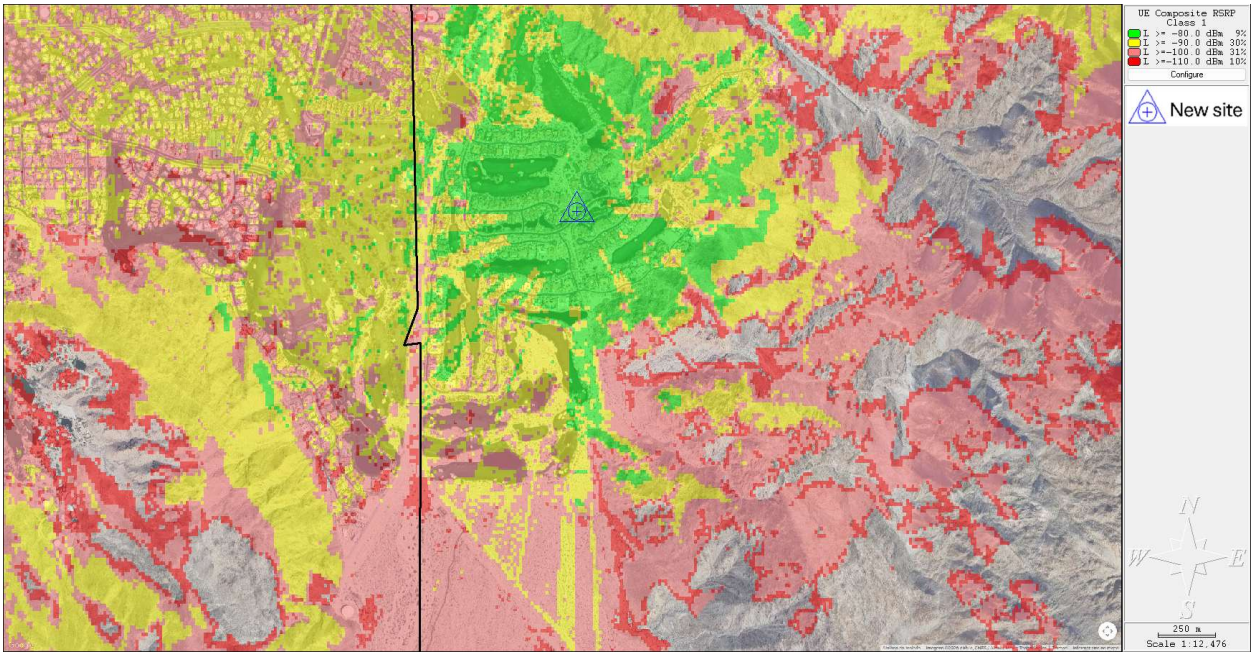


FIGURE 68 - VERIZON THE RESERVE CLUB COVERAGE WITH NEW SITES– MAP OPTION A

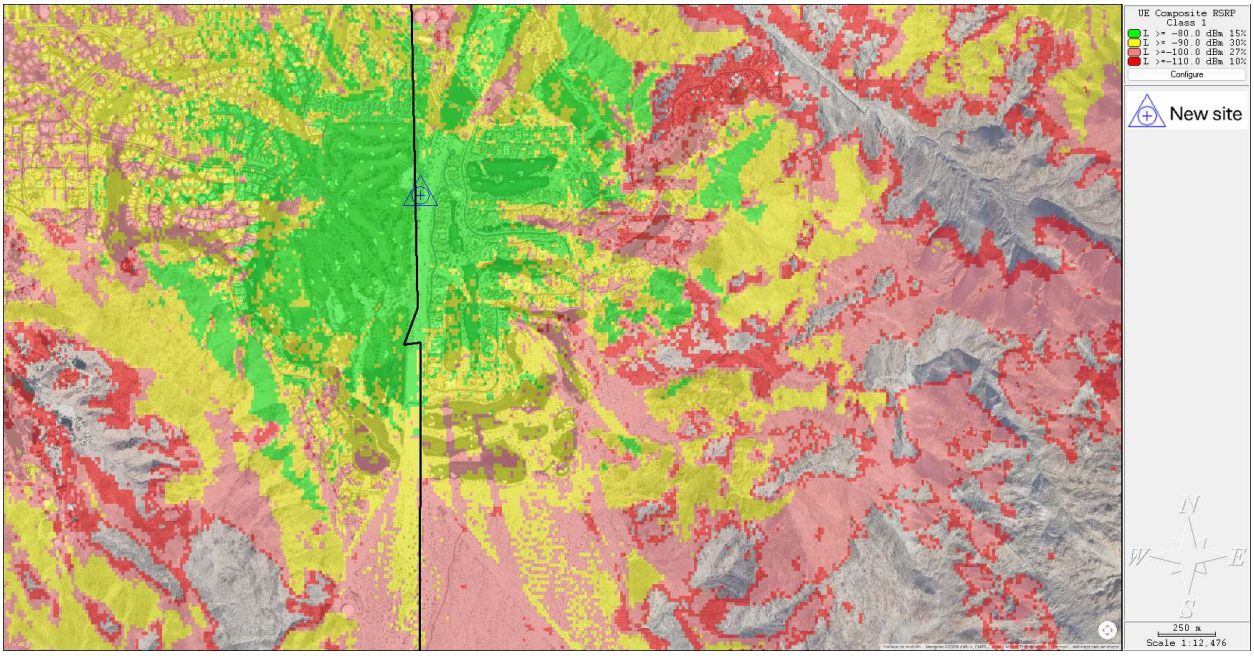


FIGURE 69 - VERIZON THE RESERVE CLUB COVERAGE WITH NEW SITES– MAP OPTION B

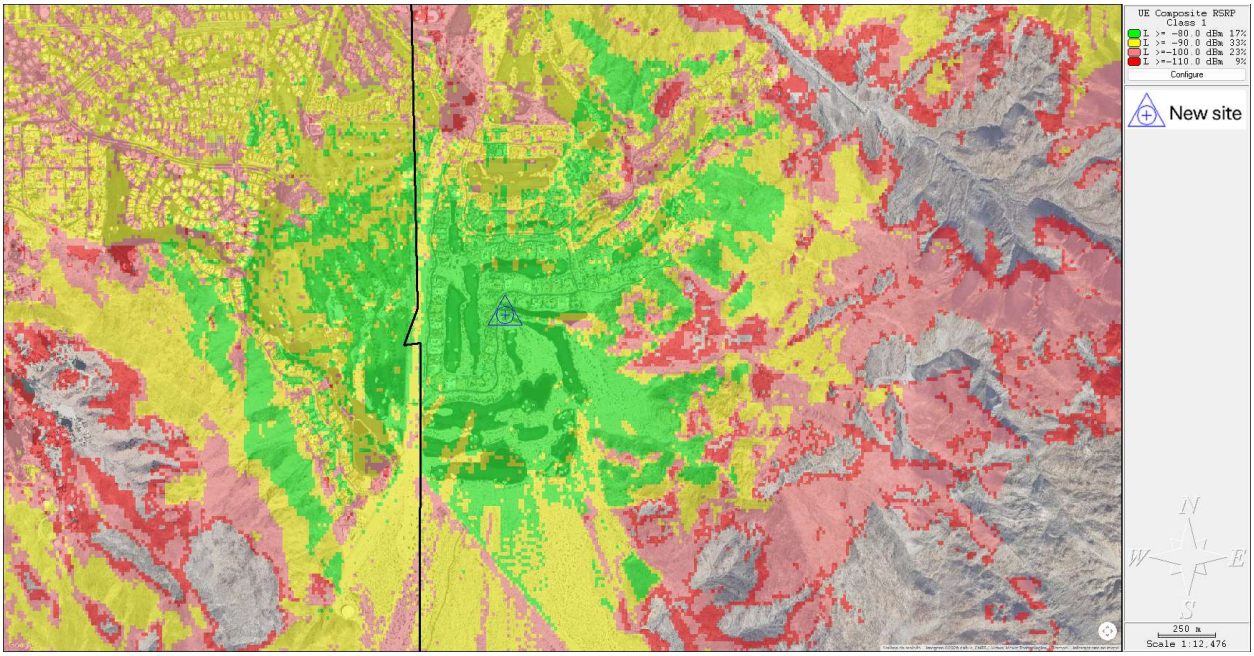


FIGURE 70 - VERIZON THE RESERVE CLUB COVERAGE WITH NEW SITES– MAP OPTION C

5.2.3.2 Eldorado Country Club

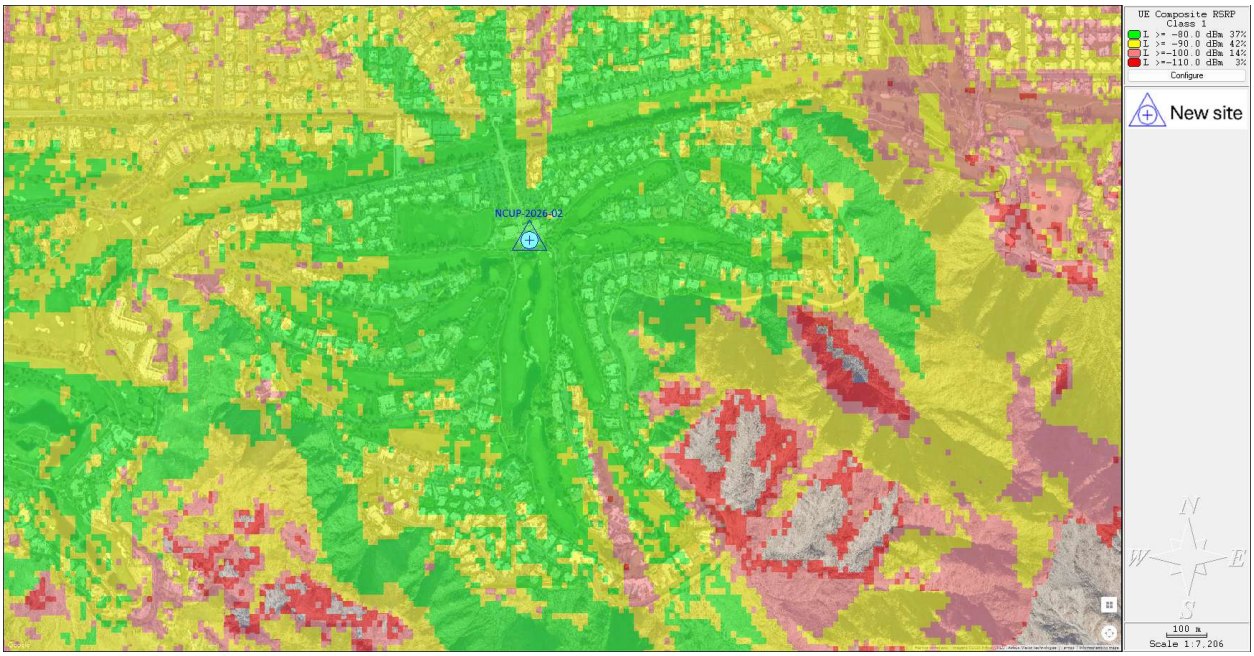


FIGURE 71 - AT&T ELDORADO COUNTRY CLUB COVERAGE WITH NEW SITES

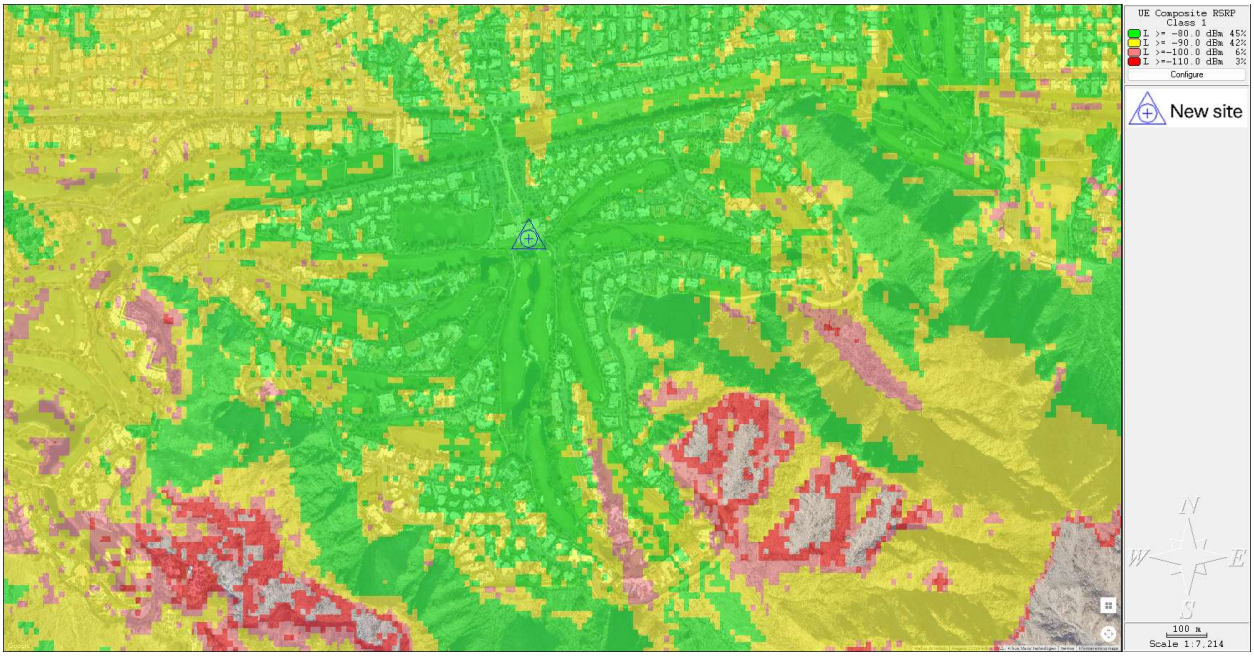


FIGURE 72 – T-MOBILE ELDORADO COUNTRY CLUB COVERAGE WITH NEW SITES

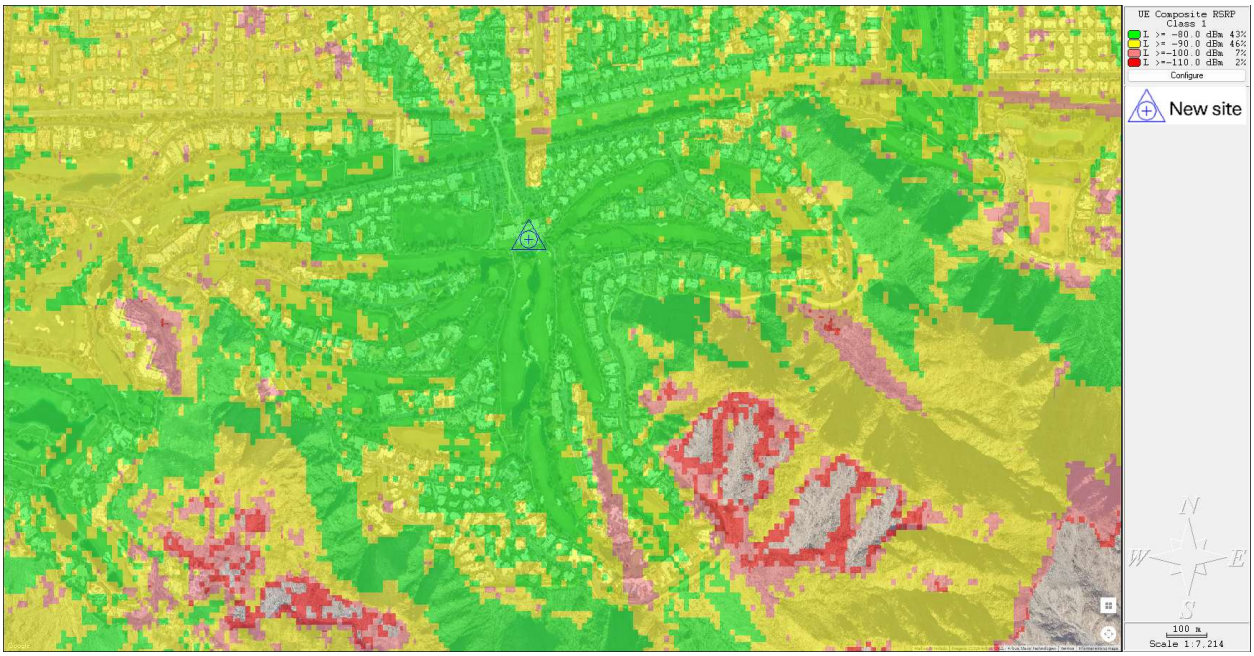


FIGURE 73 - VERIZON ELDORADO COUNTRY CLUB COVERAGE WITH NEW SITES

5.2.3.3 SCE Indian Wells Substation

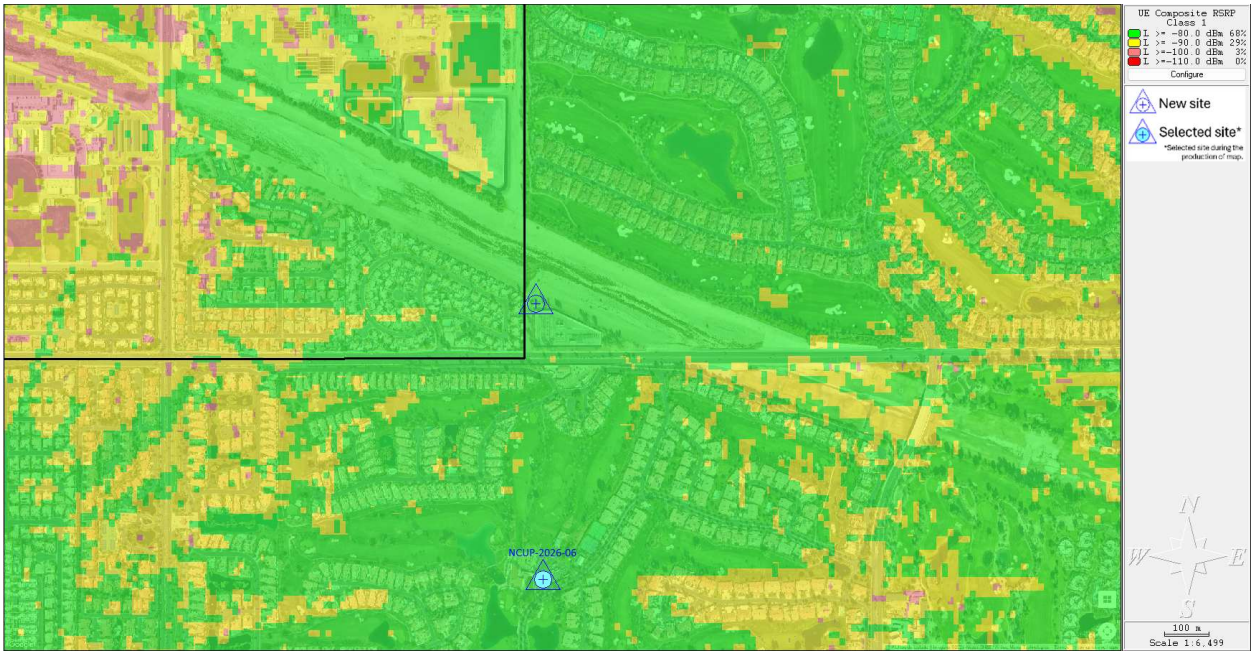


FIGURE 74 - AT&T SCE INDIAN WELLS SUBSTATION COVERAGE WITH NEW SITES – OPTION A

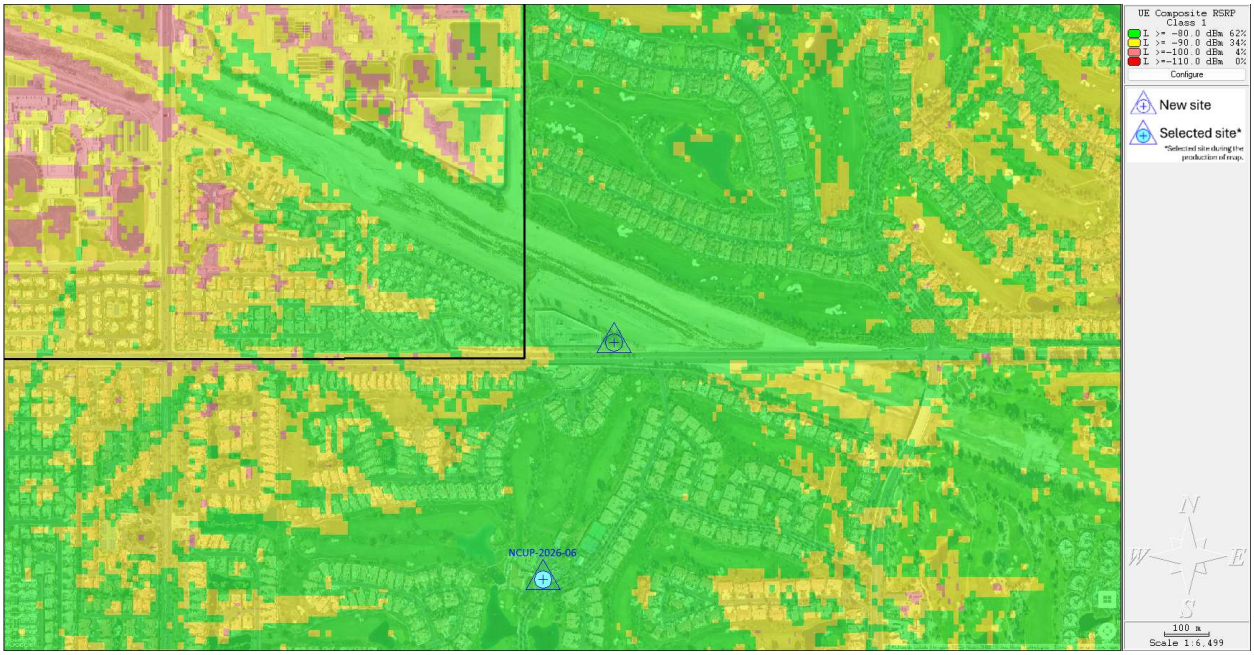


FIGURE 75 - AT&T SCE INDIAN WELLS SUBSTATION COVERAGE WITH NEW SITES – OPTION B

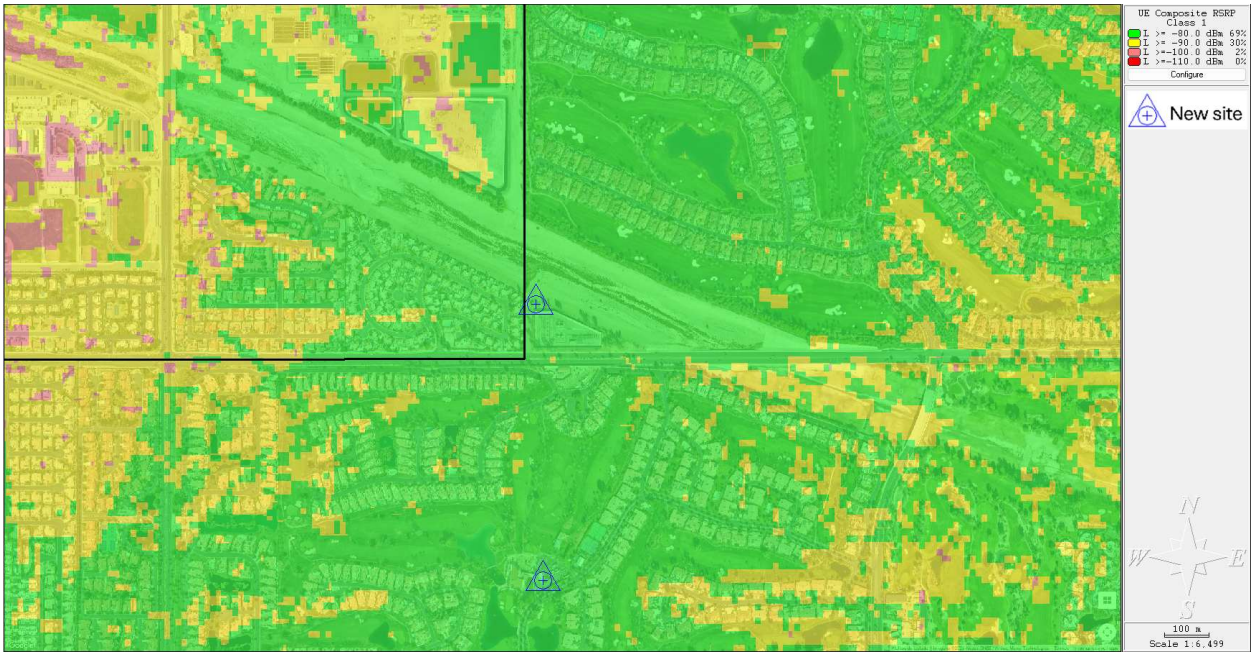


FIGURE 76 – T-MOBILE SCE INDIAN WELLS SUBSTATION COVERAGE WITH NEW SITES – OPTION A

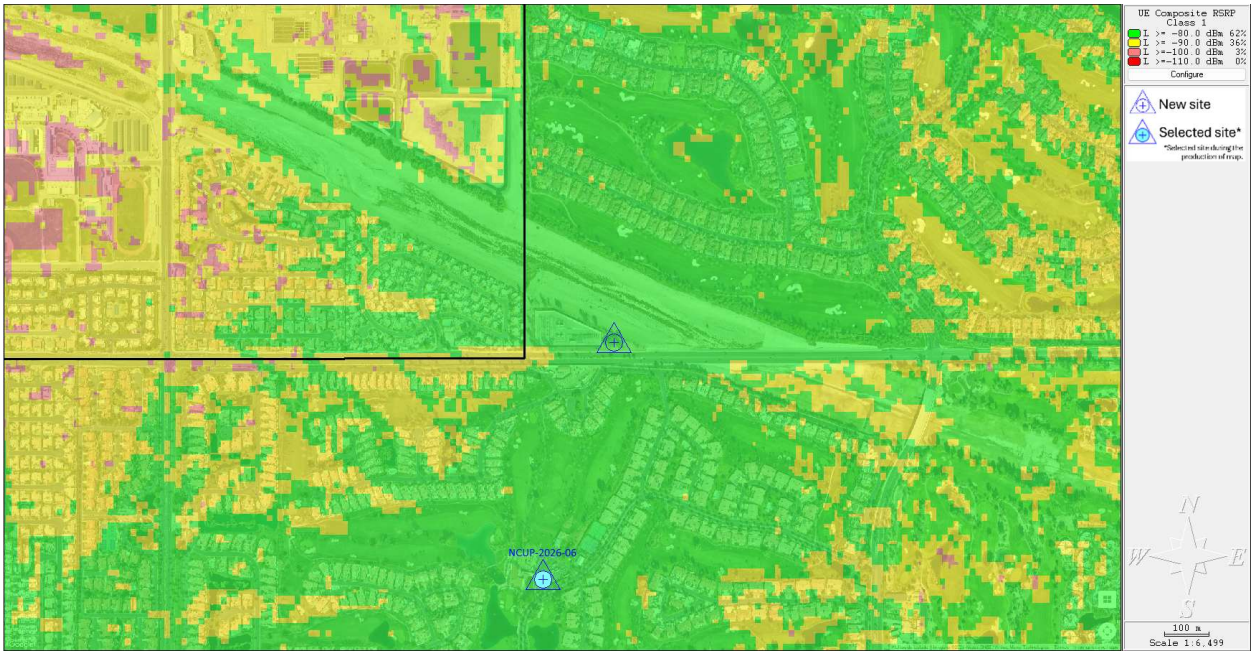


FIGURE 77 - T-MOBILE SCE INDIAN WELLS SUBSTATION COVERAGE WITH NEW SITES – OPTION B

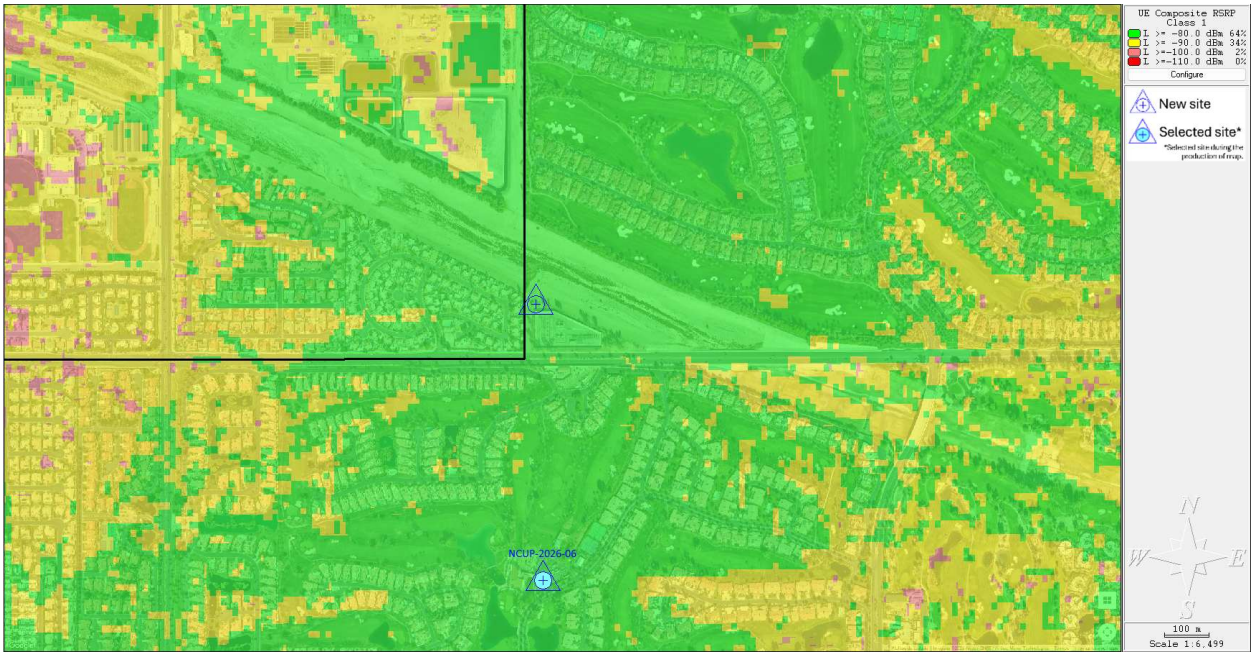


FIGURE 78 - VERIZON SCE INDIAN WELLS SUBSTATION COVERAGE WITH NEW SITES – OPTION A

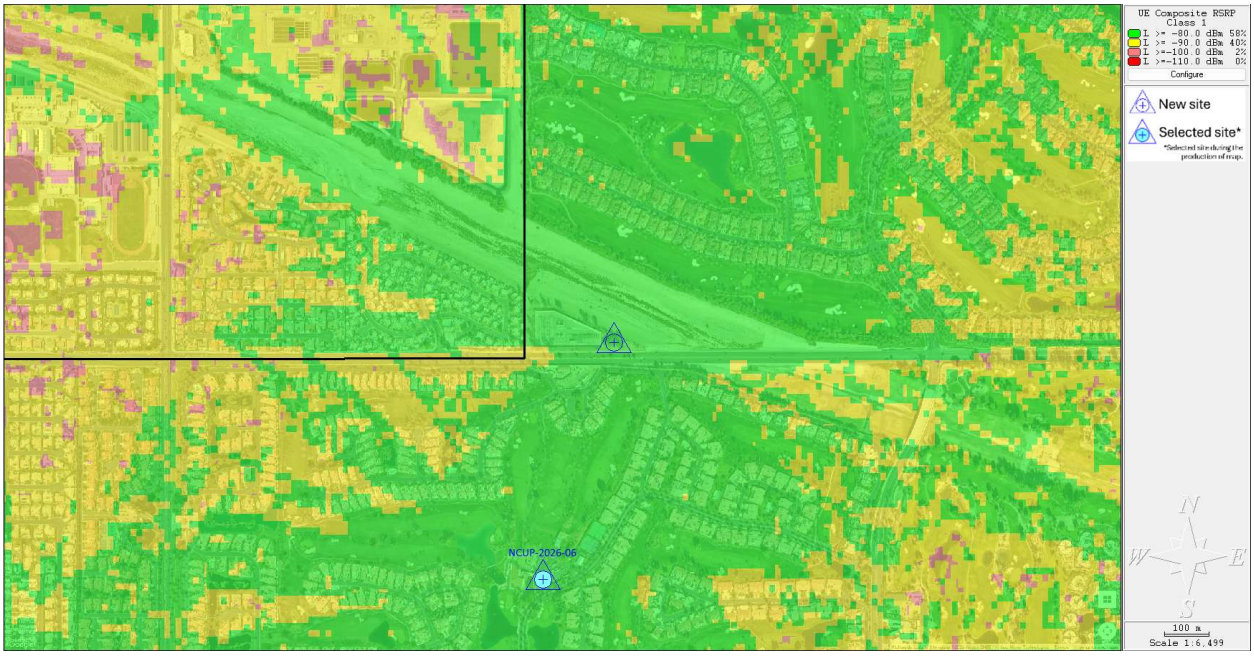


FIGURE 79 - VERIZON SCE INDIAN WELLS SUBSTATION COVERAGE WITH NEW SITES – OPTION B

5.2.3.4 Villagio

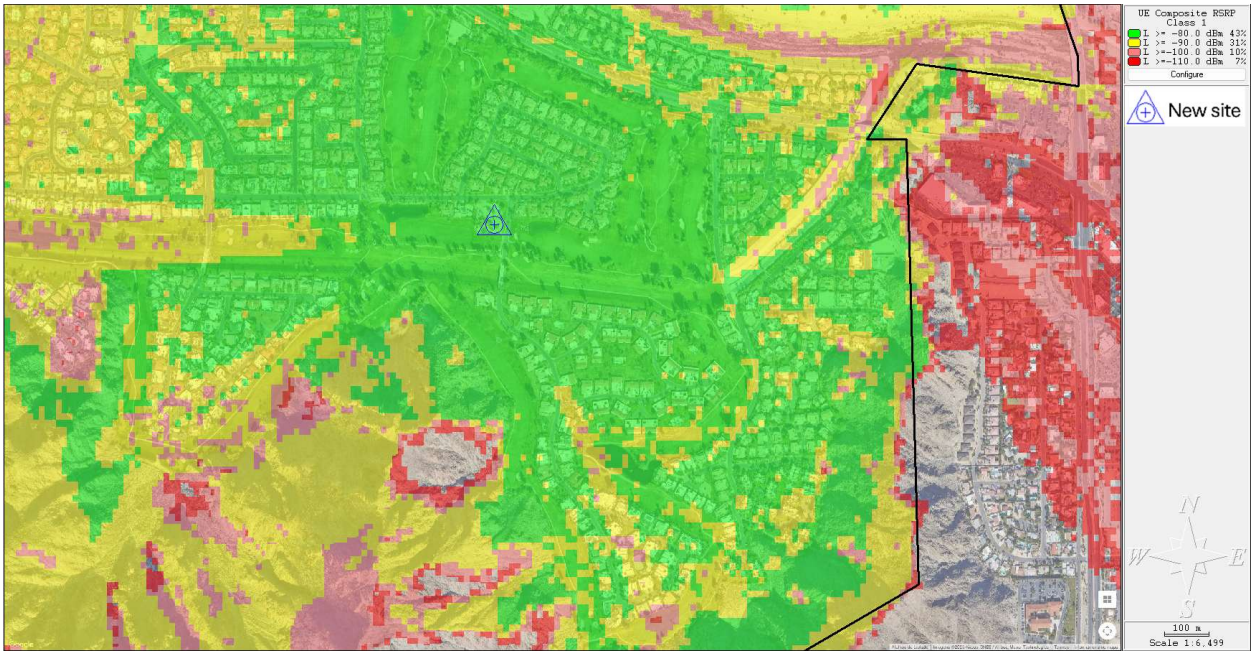


FIGURE 80 - AT&T VILLAGIO COVERAGE WITH NEW SITES

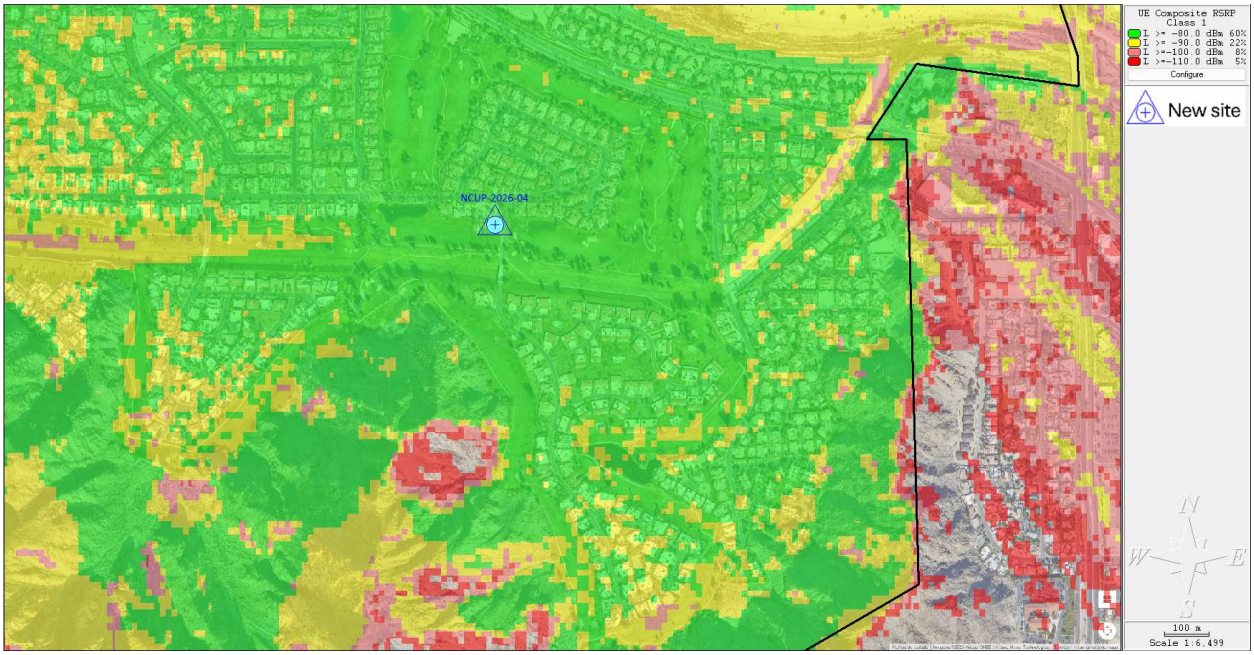


FIGURE 81 – T-MOBILE VILLAGIO COVERAGE WITH NEW SITES

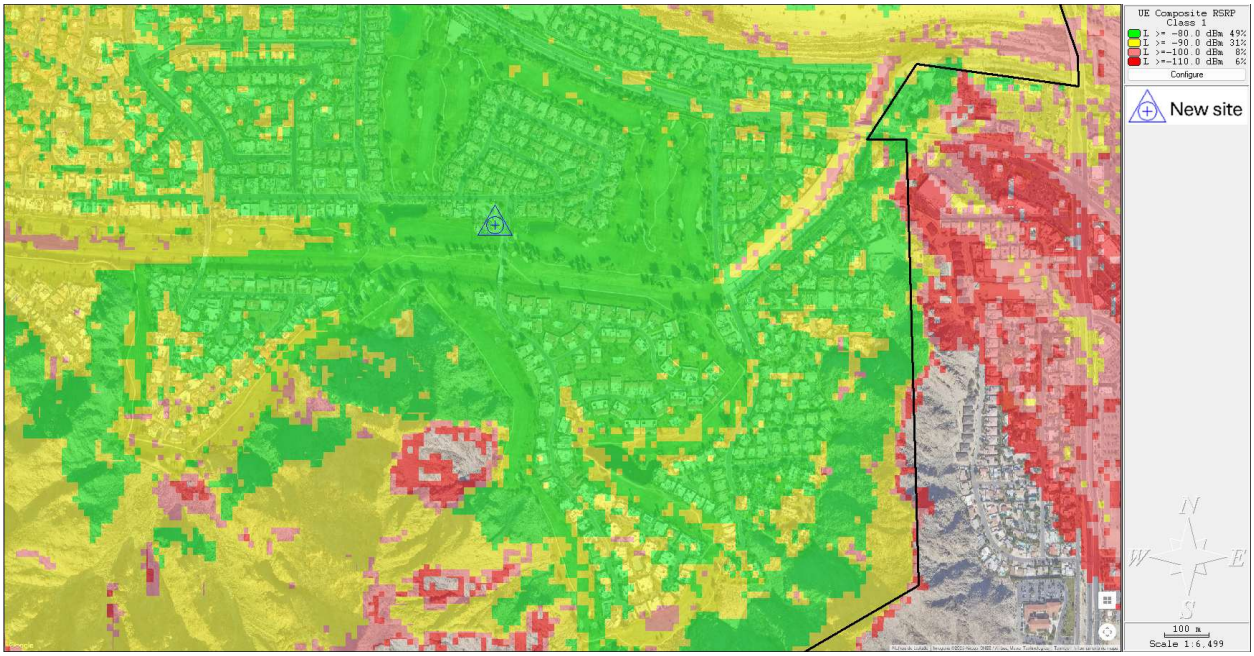


FIGURE 82 – VERIZON VILLAGIO COVERAGE WITH NEW SITES

5.2.3.5 Toscana Country Club

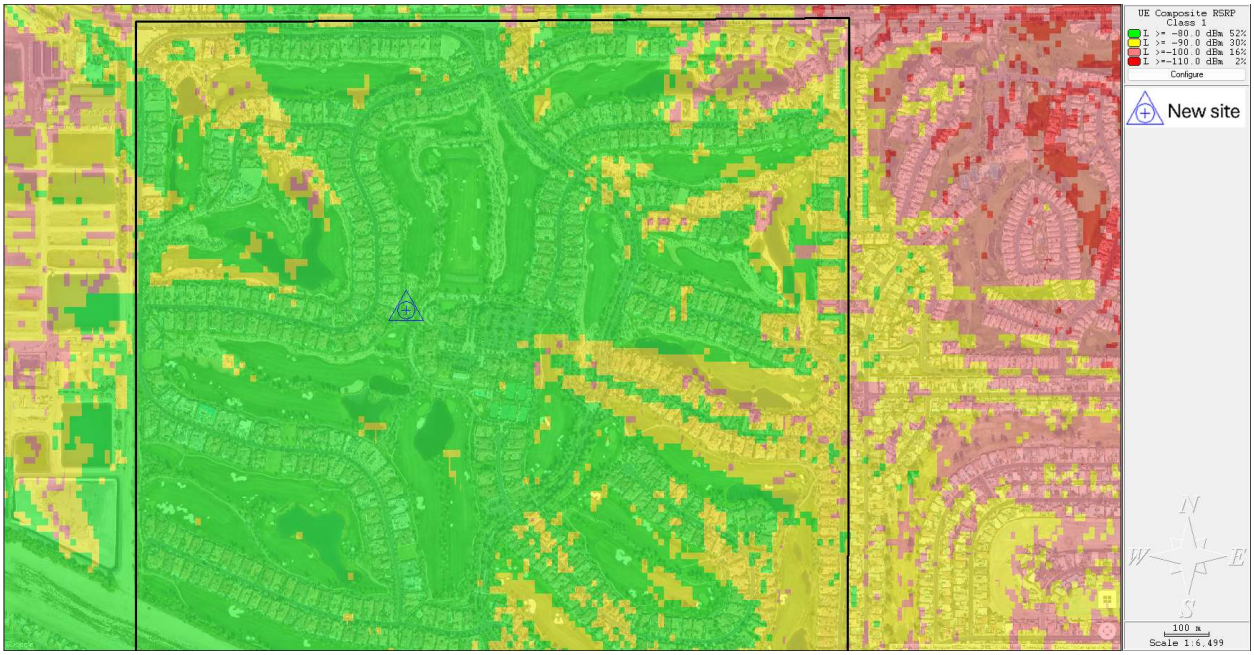


FIGURE 83 - AT&T TOSCANA COUNTRY CLUB COVERAGE WITH NEW SITES – OPTION A

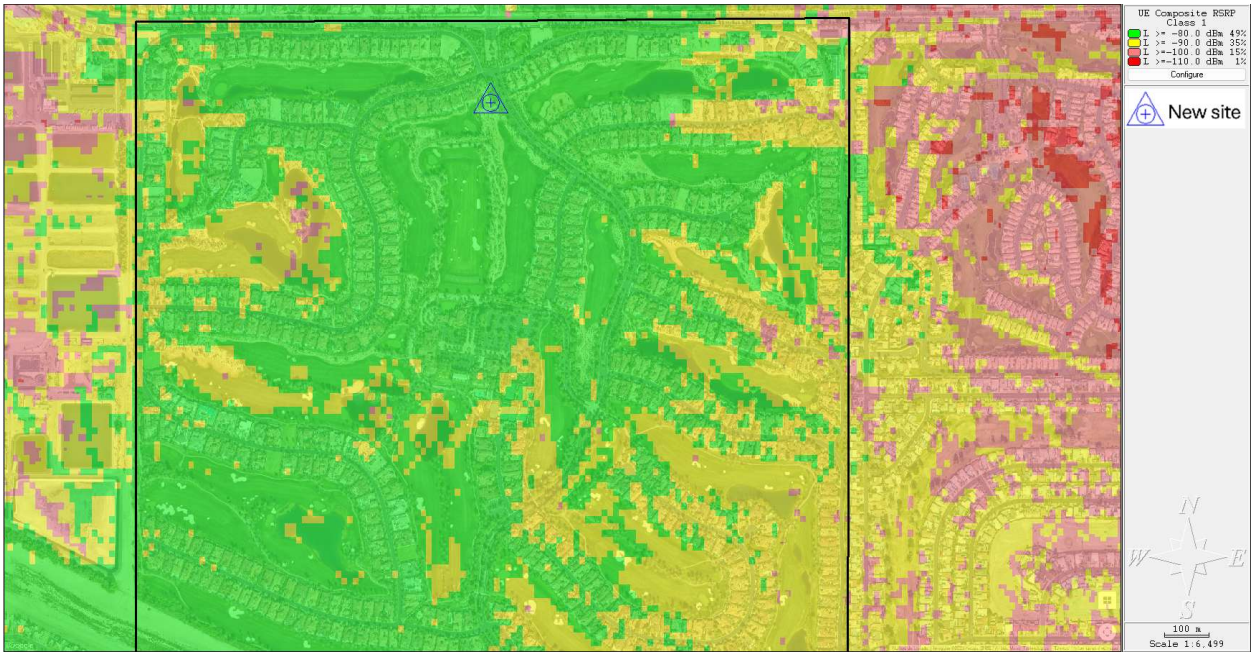


FIGURE 84 - AT&T TOSCANA COUNTRY CLUB COVERAGE WITH NEW SITES – OPTION B

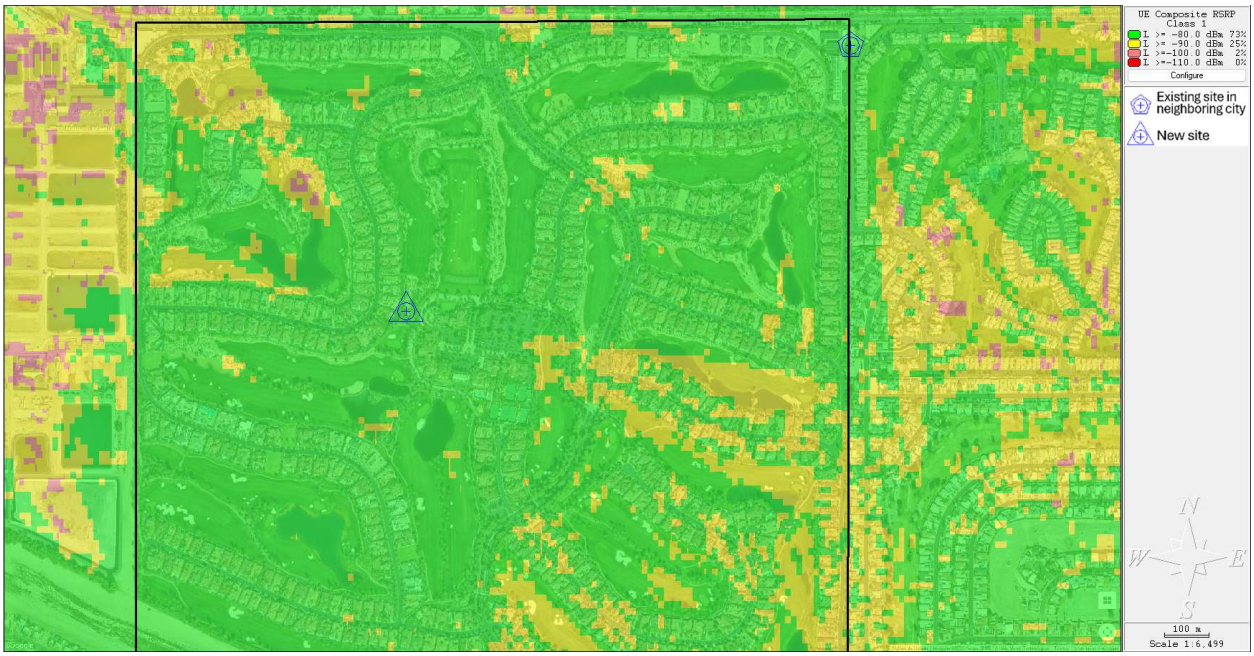


FIGURE 85 – T-MOBILE TOSCANA COUNTRY CLUB COVERAGE WITH NEW SITES – OPTION A

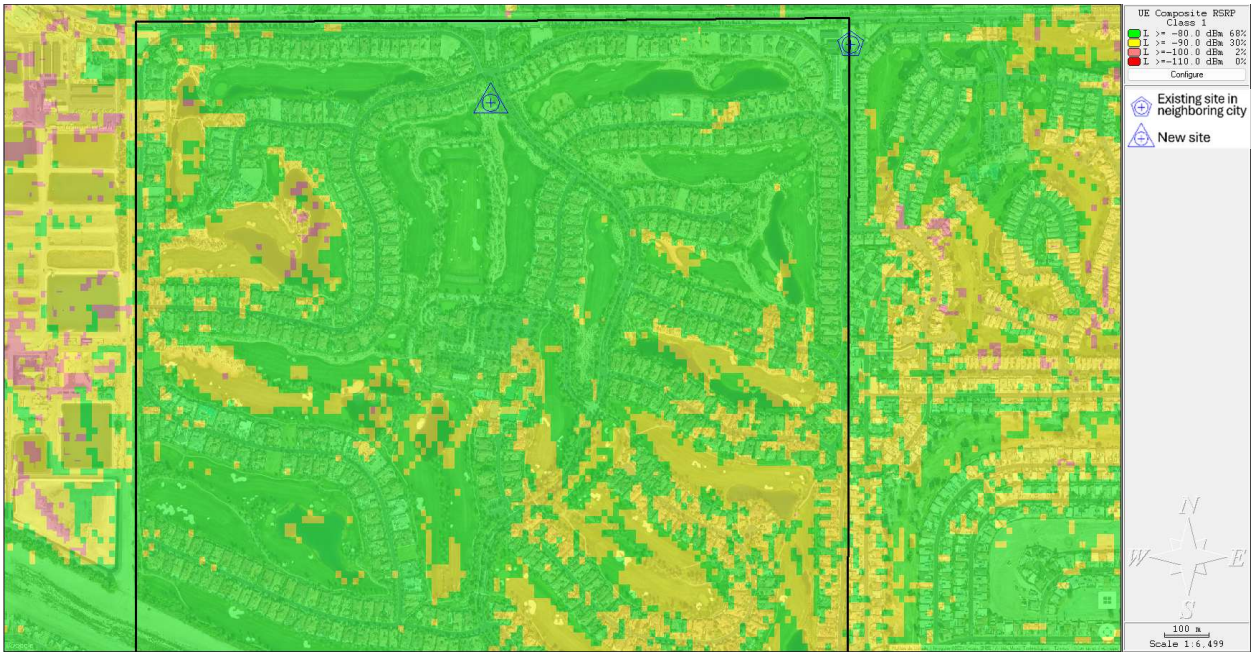


FIGURE 86 – T-MOBILE TOSCANA COUNTRY CLUB COVERAGE WITH NEW SITES – OPTION B

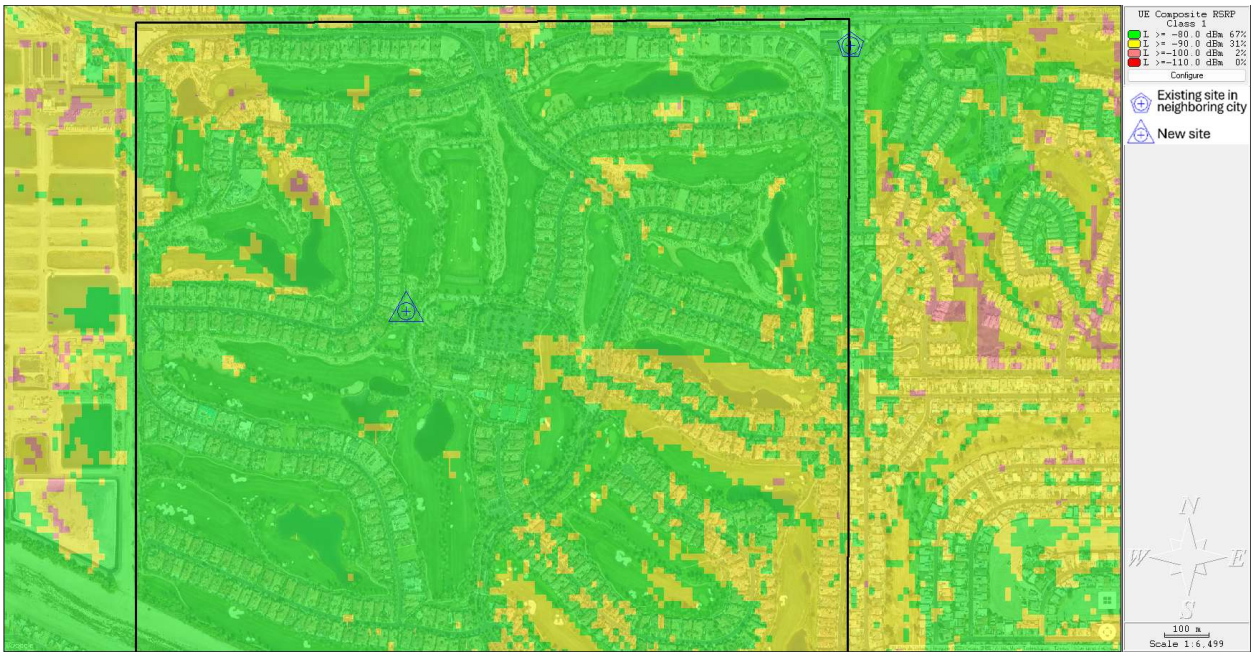


FIGURE 87 – VERIZON TOSCANA COUNTRY CLUB COVERAGE WITH NEW SITES – OPTION A

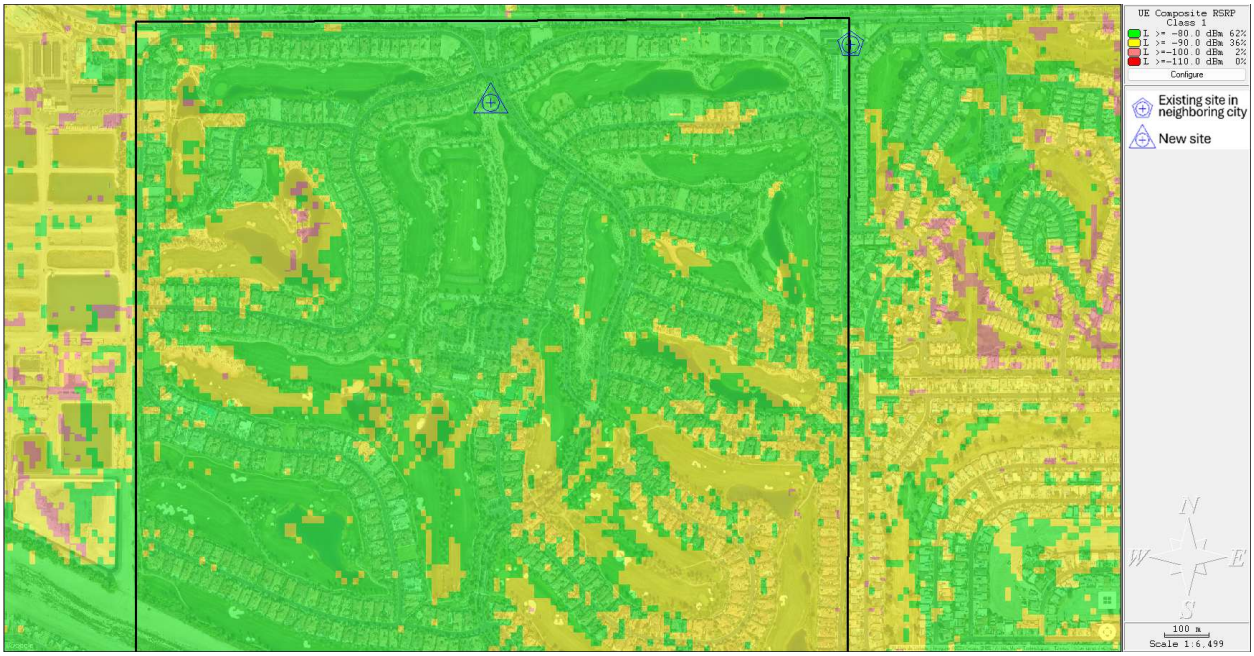


FIGURE 88 – VERIZON TOSCANA COUNTRY CLUB COVERAGE WITH NEW SITES – OPTION B

5.2.3.6 Dorado Horizon Country Club



FIGURE 89 - AT&T DORADO HORIZON COVERAGE WITH NEW SITES

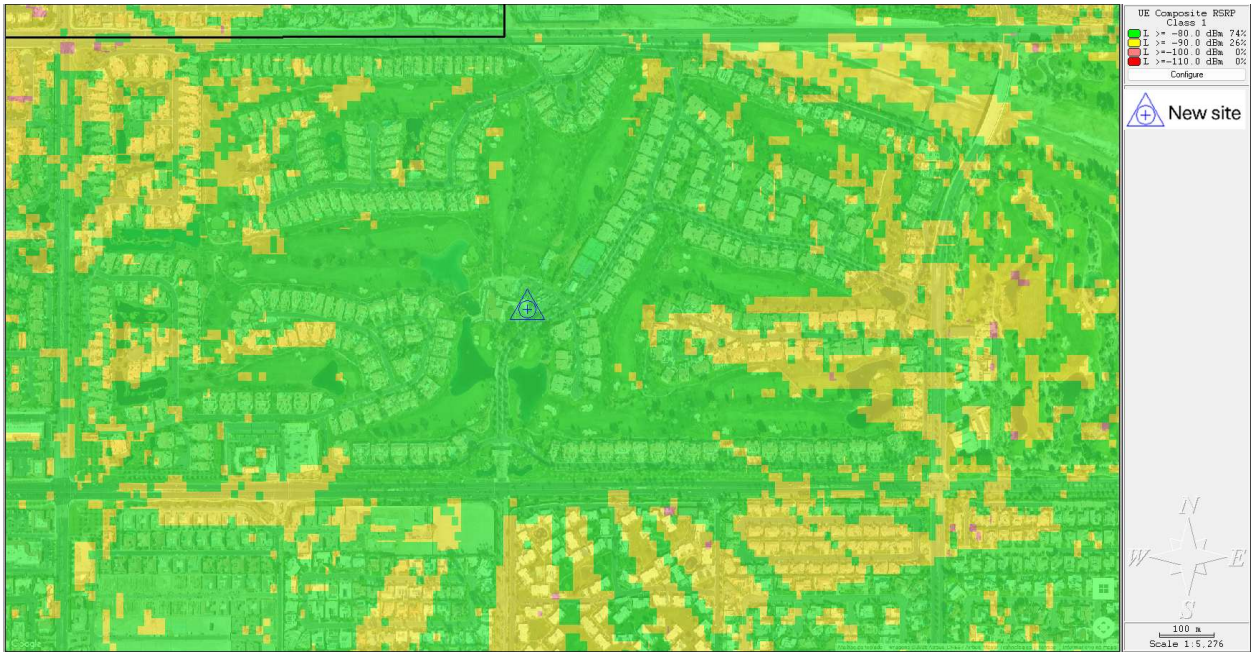


FIGURE 90 – T-MOBILE DORADO HORIZON COVERAGE WITH NEW SITES

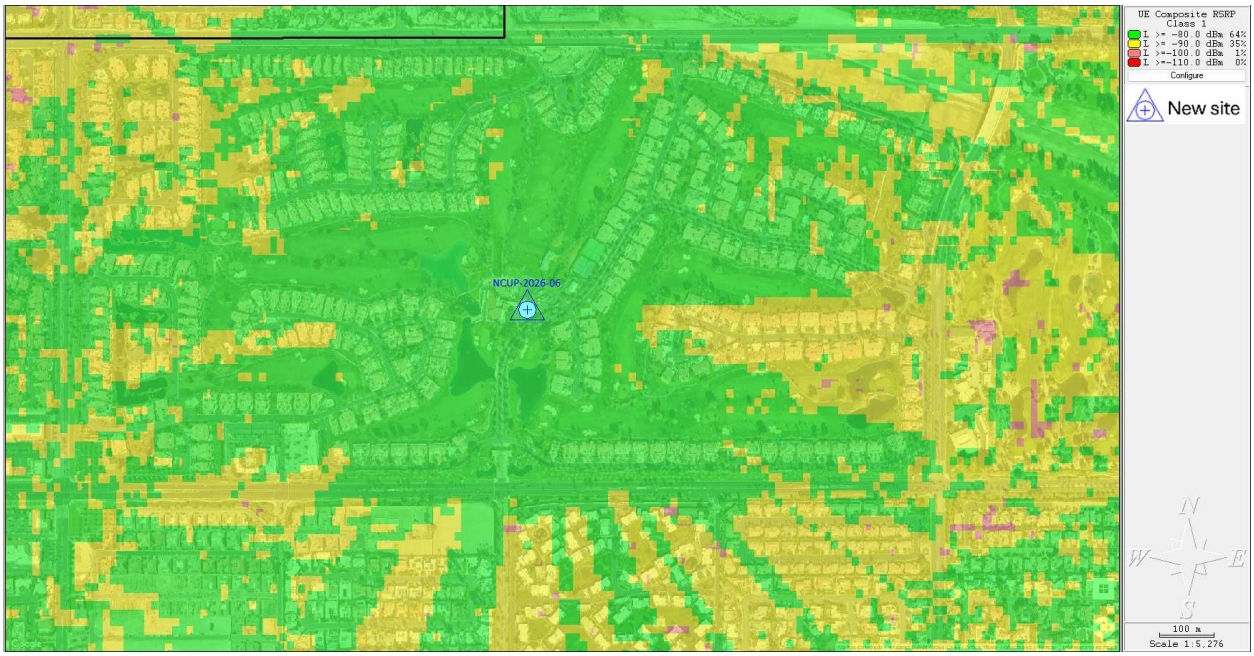


FIGURE 91 – VERIZON DORADO HORIZON COVERAGE WITH NEW SITES

5.3 Prediction Analysis

The predictions illustrate the cellular coverage in Indian Wells, segmented by technology, carrier and band type. While the coverage images provided in section 0 and 5.2.3 illustrate geographical enhancements, additional statistical analyses can further refine the insights. The goal of this analysis is to provide a numerical value to the coverage improvements achieved through the proposed site deployments in Indian Wells. The evaluation integrates two key data sources (polygons):

- Indian Wells Zoning (Figure 92)
  - Residential
  - Golf and Recreation
  - Open Space
  - Commercial
  - Civic
- Census 2020[19]. Database (Figure 93)

Zoning types (Residential in yellow, Golf and Recreation in green, Open Space in dark green, Commercial in red, and Civic in blue) are analyzed to demonstrate how the proposed deployments address coverage gaps, with percentage improvements highlighted for each zoning type. Section 5.3.1 includes comparative tables showcasing the current and proposed scenarios, accompanied by graphs that highlight detailed service improvements.

By utilizing census data, CelPlan also quantified the enhancement in terms of population coverage, emphasizing the benefits for residents and businesses. It demonstrates how strategic site placement aligns with the city's diverse zoning framework, ensuring equitable service improvement across all zones.

[19] TECHNICAL DOCUMENTATION:2020 Census National Redistricting Data (Public Law 94-171) Technical Documentation Prepared by the U.S. Census Bureau, 2021

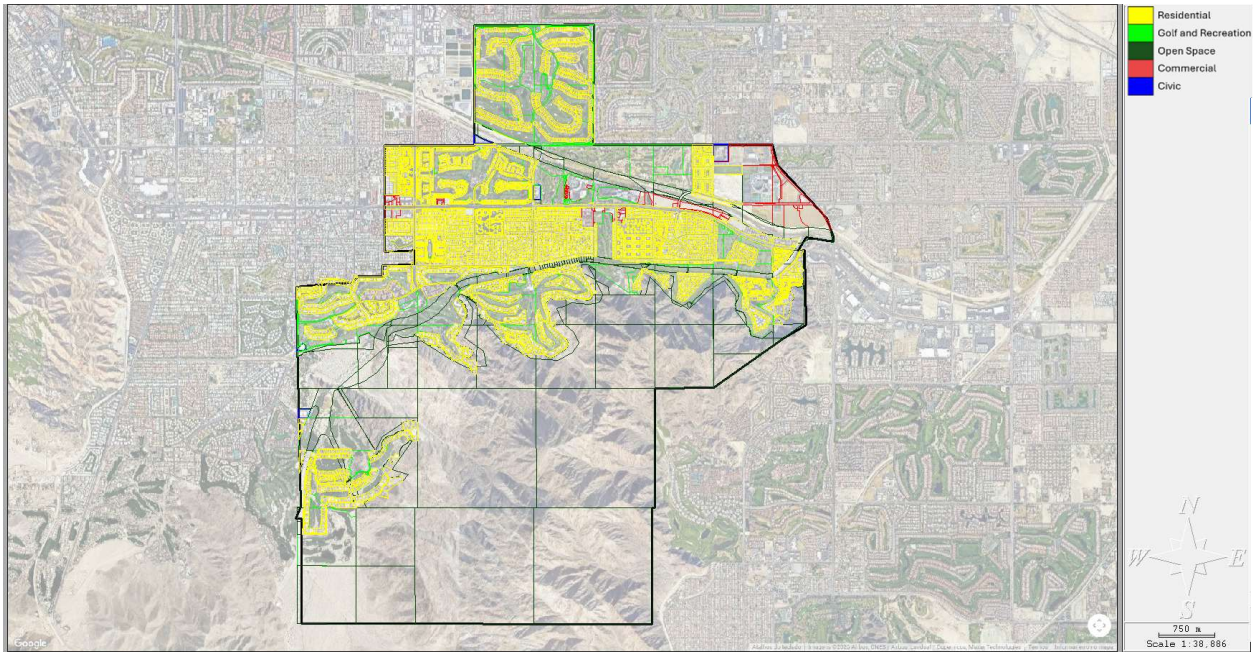


FIGURE 92 – INDIAN WELLS ZONING LIMITS

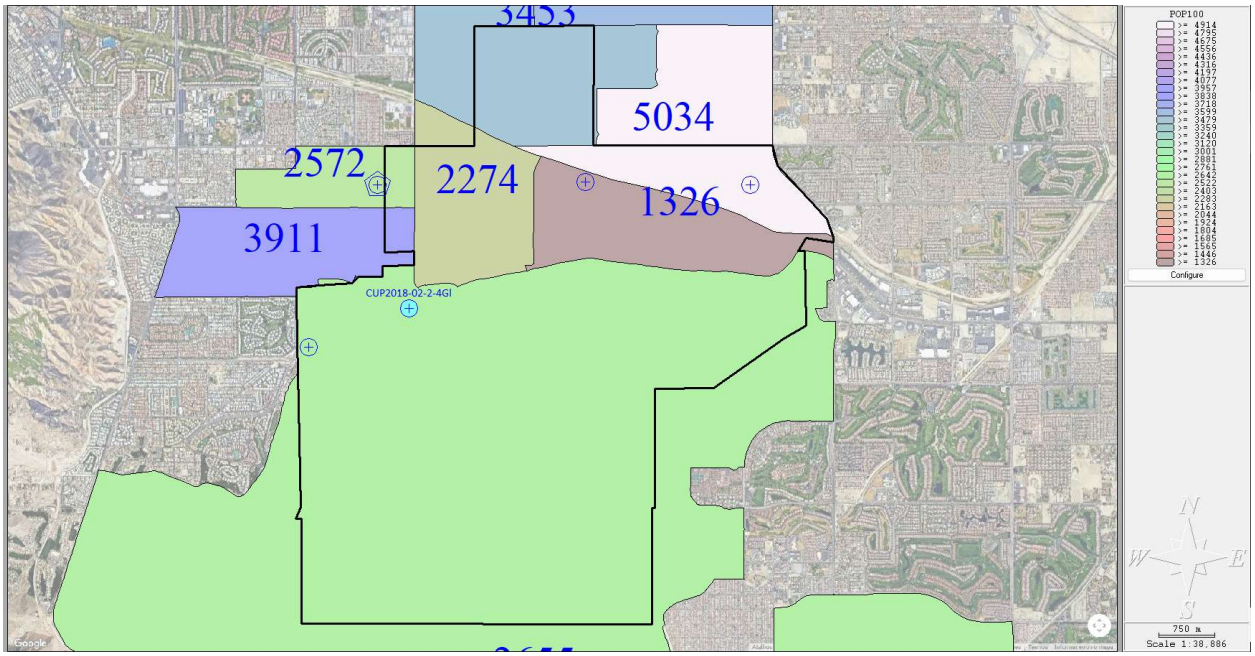


FIGURE 93 - CENSUS 2020 BLOCKS WITH POPULATION AS ATTRIBUTE

5.3.1 Census at Block Level

This report utilized data from the 2020 Census, which was the 24th census in U.S. history and represented the official count of residents in the United States. Specifically, the analysis used census tract data containing population (pop100).

Census tracts are relatively permanent statistical subdivisions of counties that typically have a population size between 1,200 and 8,000 people, with an optimum size of 4,000 people. These tracts are designed to be relatively homogeneous with respect to population characteristics, economic status, and living conditions.

The data was obtained through TIGER (Topologically Integrated Geographic Encoding and Referencing), which is the Census Bureau's geographic database system. TIGER/Line Shapefiles provide geographic and cartographic information in a format that can be used with Geographic Information Systems (GIS).

For the 2020 Census, it's important to note that the population counts were subject to the Census Bureau's Disclosure Avoidance System (DAS), which adds random noise to the data to protect respondent privacy while maintaining statistical accuracy.

5.3.2 Indian Wells Zoning

CelPlan calculated the percentage of service in each specific region for each operator and frequency band. The results are presented for each operator as follows:

5.3.2.1 AT&T Analysis per Zoning Type

CelPlan analyzed all bands and compared the percentage of the area covered by a each service grade (see Table 8 for details about service grade). Results are provided in Table 14 and additional graphs illustrate four specific zones in more detail: Residential (Figure 94), Golf and Recreation (Figure 95), Open Space (Figure 97), and Commercial (Figure 97).

The strategy focused on enhancing and expanding the quality of service in Residential, Golf and Recreation, Open Space and Commercial. As a result, coverage in the Civic zoning has also improved, as illustrated in Table 14.

TABLE 14 - AT&T ALL BANDS SERVICE DISTRIBUTION BY ZONING

AT&T - All Bands - Option A						
		Served Area (%)				
Region	Scenario	Excellent	Good	Average	Poor	Sum
Residential	Current	10.7%	46.5%	33.2%	6.4%	96.8%
	Proposed	49.4%	45.8%	4.6%	0.2%	100.0%
Golf and Recreation	Current	14.7%	37.8%	29.4%	9.3%	91.2%
	Proposed	66.5%	29.5%	3.9%	0.1%	100.0%
Open Space	Current	11.3%	36.9%	24.6%	11.6%	84.40%
	Proposed	43.8%	36.6%	12.8%	2.0%	95.2%
Commercial	Current	39.0%	47.9%	13.1%	0.0%	100.00%
	Proposed	46.5%	45.0%	8.5%	0.0%	100.0%
Civic	Current	20.0%	20.0%	40.0%	20.0%	100.00%
	Proposed	40.0%	20.0%	20.0%	20.0%	100.0%
Total	Current	12.9%	39.6%	27.0%	9.6%	89.0%
	Proposed	49.3%	37.6%	9.2%	1.2%	97.3%

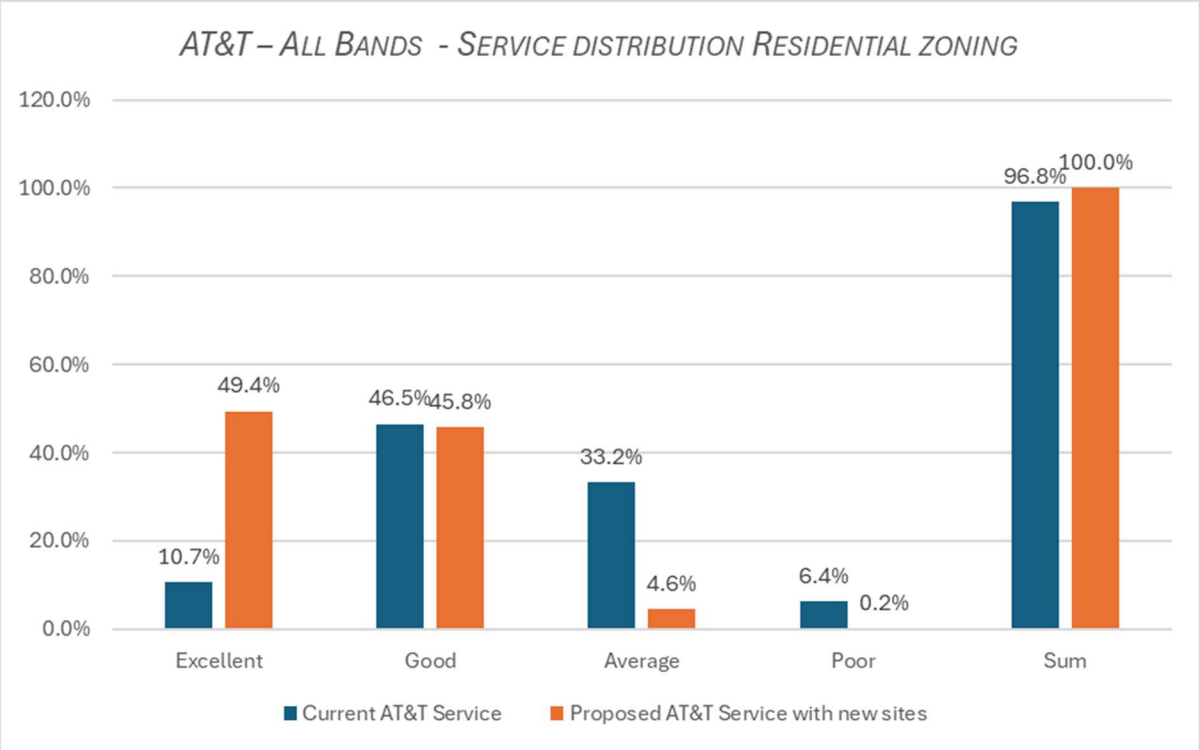


FIGURE 94 - AT&T – ALL BANDS- SERVICE DISTRIBUTION RESIDENTIAL ZONING – OPTION A

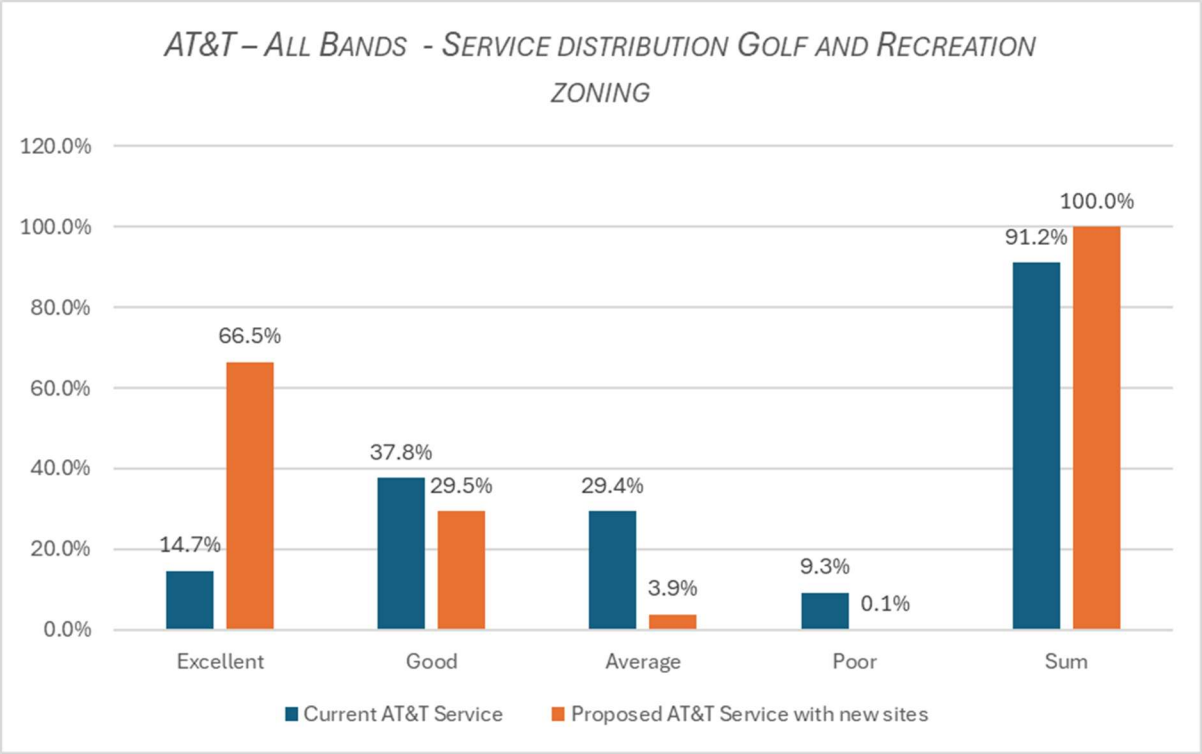


FIGURE 95 - AT&T – ALL BANDS - SERVICE DISTRIBUTION GOLF AND RECREATION ZONING– OPTION A

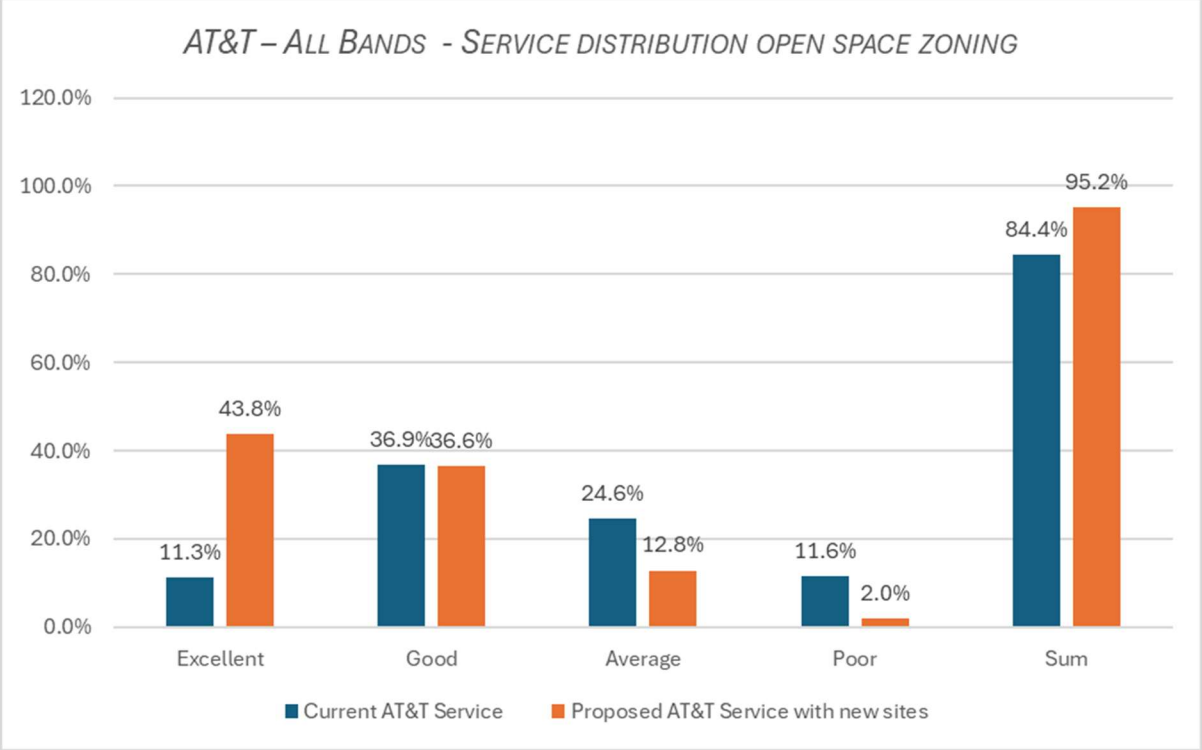


FIGURE 96 - AT&T – ALL BANDS - SERVICE DISTRIBUTION OPEN SPACE ZONING– OPTION A

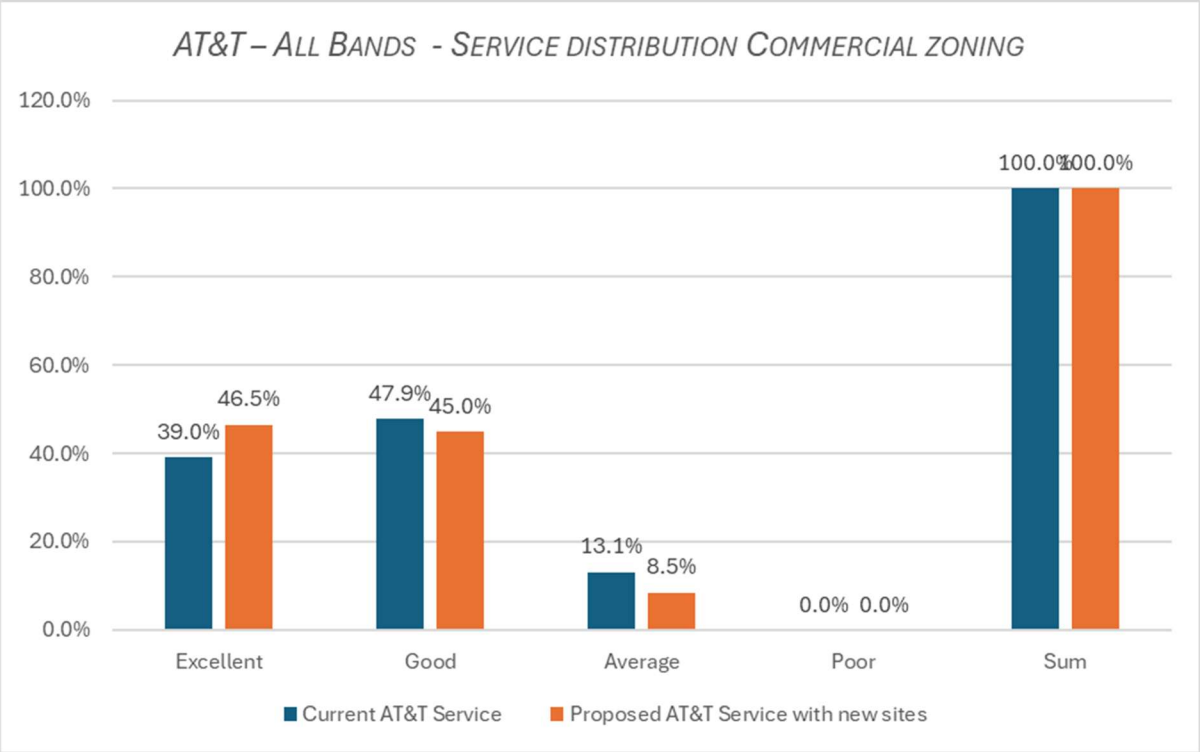


FIGURE 97 - AT&T – ALL BANDS - SERVICE DISTRIBUTION COMMERCIAL ZONING – OPTION A

5.3.2.2 AT&T Analysis per Census 2020 Database

Results for population served with different service quality (considering a homogeneous distribution within each Census tract) are provided in Table 15 and Figure 98. Option B shows better results due to new sites being located closer to residential areas.

TABLE 15 - AT&T ALL BANDS SERVICE DISTRIBUTION BY CENSUS2020 POPULATION

	ATT - all bands - Census 2020 - Option B				
	Distribution per Population - Census 2020				
UE Measurement RSRP (dBm >=)	Excellent	Good	Average	Poor	Sum
Service by current sites	1069	2983	3629	2908	10589
Service by proposed sites	3008	3903	3530	1715	12156

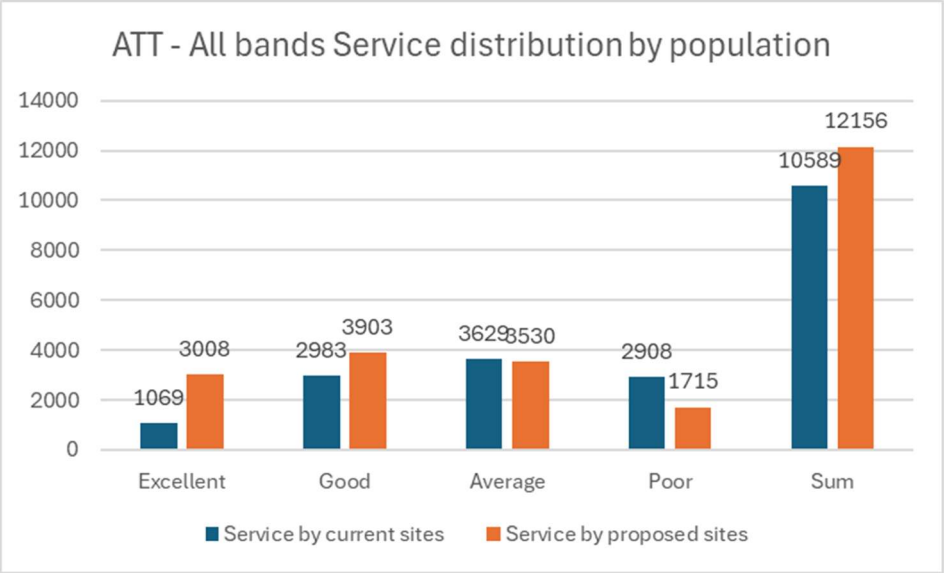


FIGURE 98 - AT&T – ALL BANDS - SERVICE DISTRIBUTION COMMERCIAL CENSUS2020 POPULATION – OPTION B

5.3.2.3 T-Mobile Analysis per Zoning Type

CelPlan analyzed all bands and compared the percentage of the area covered by a given service grade. Results are provided in a Table 16 and additional graphs for four specific zonings: Residential (Figure 99), Golf and Recreation (Figure 100), Open Space (Figure 101), and Commercial (Figure 102).

The strategy focused on enhancing and expanding the quality of service in Residential, Golf and Recreation, Open Space and Commercial. As a result, coverage in the Civic zoning has also improved, as illustrated in Table 16.

TABLE 16 – T-MOBILE ALL BANDS SERVICE DISTRIBUTION BY ZONING

T-Mobile - All Bands - Option A						
		Served Area (%)				
Region	Scenario	Excellent	Good	Average	Poor	Sum
Residential	Current	38.3%	46.8%	12.2%	2.2%	99.5%
	Proposed	66.1%	30.9%	2.7%	0.3%	100.0%
Golf and Recreation	Current	20.8%	54.7%	18.3%	5.1%	98.9%
	Proposed	66.3%	28.8%	4.9%	0.0%	100.0%
Open Space	Current	31.1%	33.7%	19.3%	8.1%	92.20%
	Proposed	54.6%	28.0%	9.9%	2.7%	95.2%
Commercial	Current	86.4%	13.6%	0.0%	0.0%	100.00%
	Proposed	91.5%	8.5%	0.0%	0.0%	100.0%
Civic	Current	20.0%	20.0%	40.0%	20.0%	100.00%
	Proposed	40.0%	20.0%	20.0%	20.0%	100.0%
Total	Current	32.9%	39.7%	16.9%	6.0%	95.4%
	Proposed	60.7%	28.0%	7.0%	1.6%	97.3%

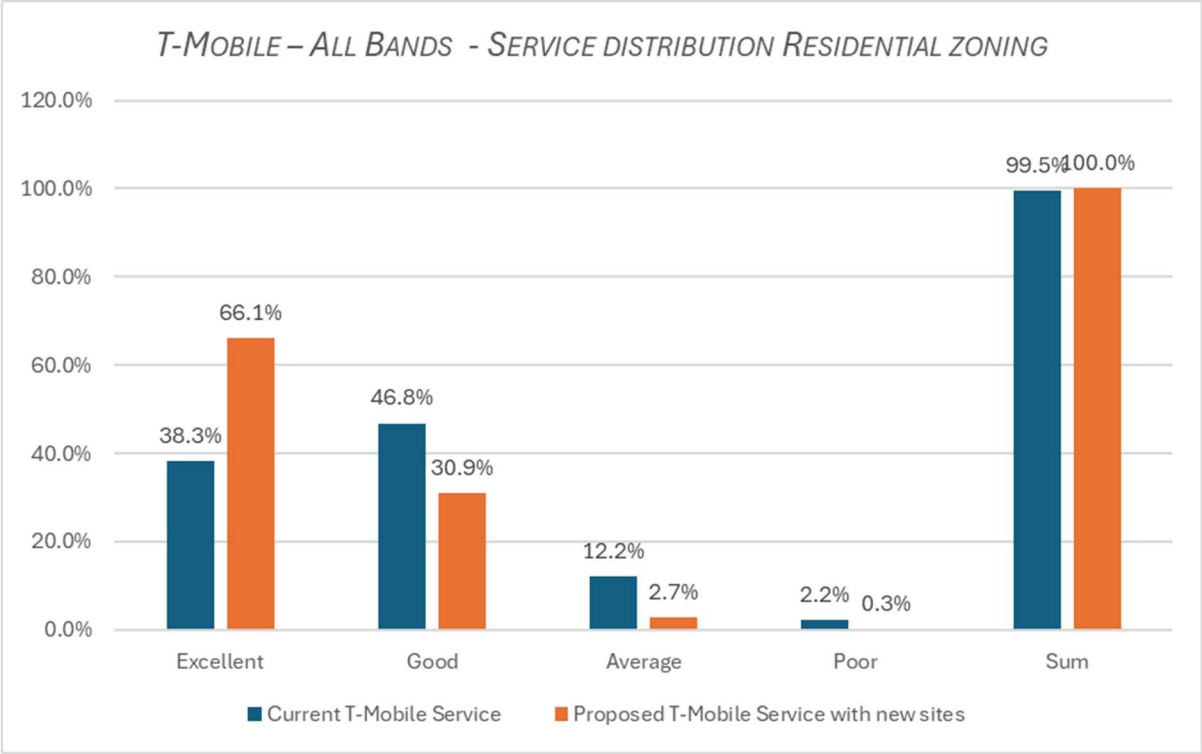


FIGURE 99 - T-MOBILE – ALL BANDS - SERVICE DISTRIBUTION RESIDENTIAL ZONING – OPTION A

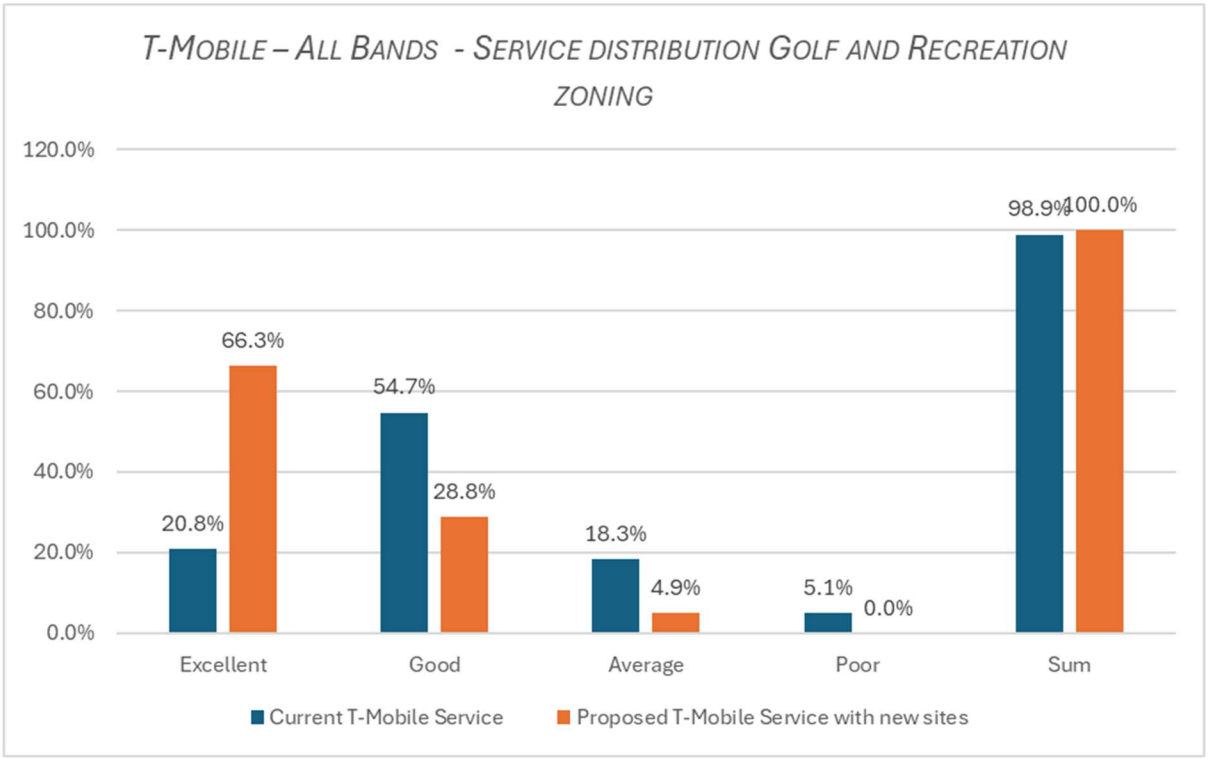


FIGURE 100 - T-MOBILE – ALL BANDS - SERVICE DISTRIBUTION GOLF AND RECREATION ZONING– OPTION A

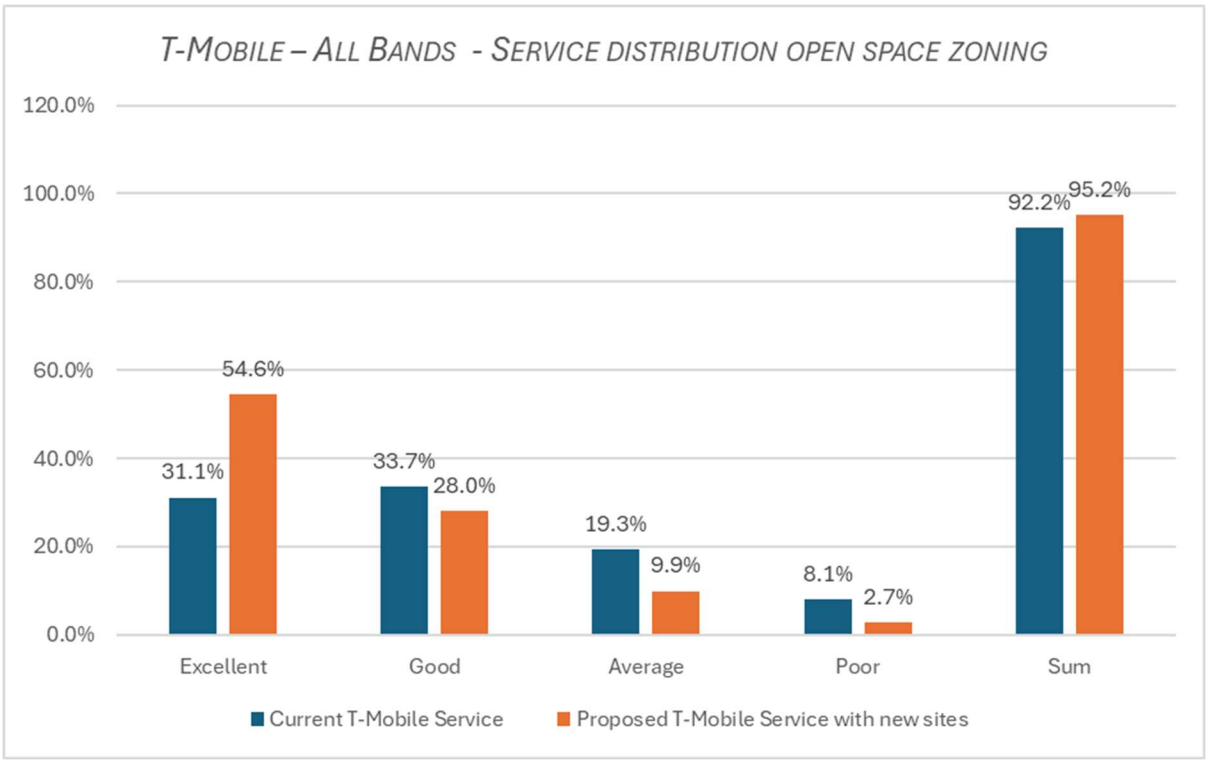


FIGURE 101 - T-MOBILE – ALL BANDS - SERVICE DISTRIBUTION OPEN SPACE ZONING– OPTION A

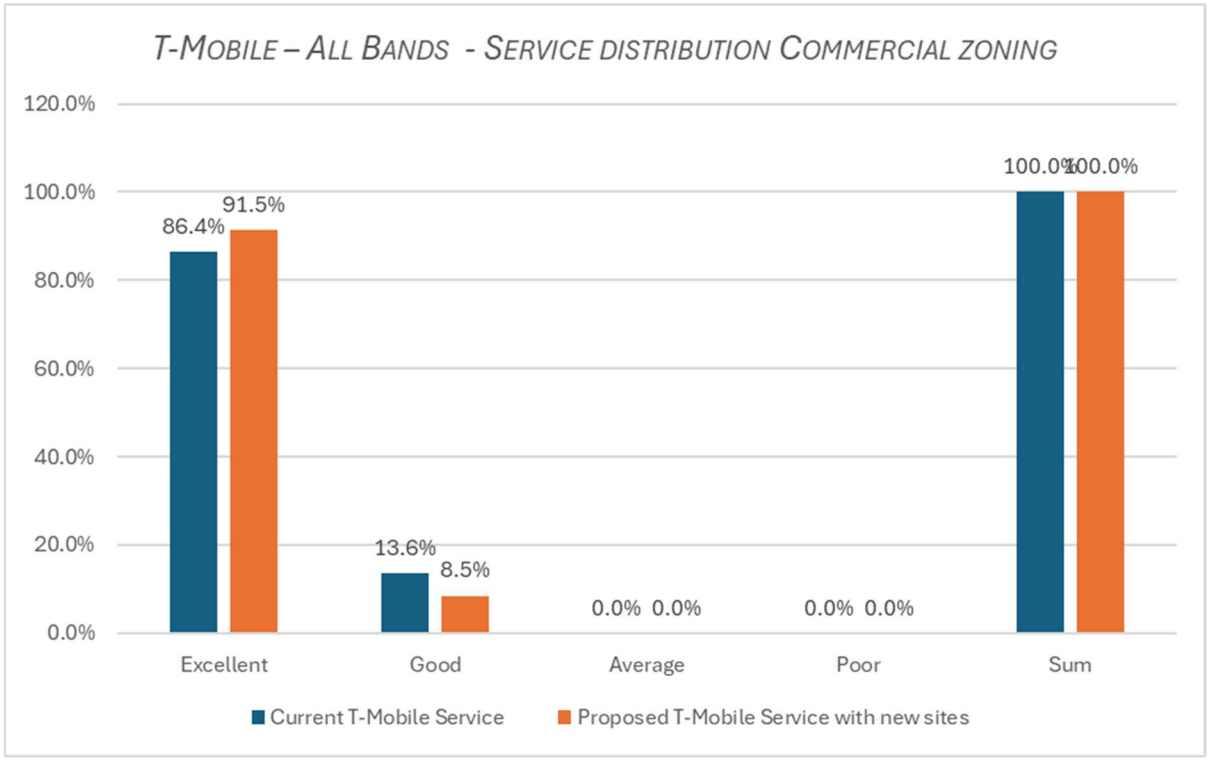


FIGURE 102 - T-MOBILE – ALL BANDS - SERVICE DISTRIBUTION COMMERCIAL ZONING– OPTION A

5.3.2.4 T-Mobile Analysis per Census 2020 Database

Results for population served with different service quality (considering a homogeneous distribution within each Census tract) are provided in Table 17 and Figure 103. Option B shows better results due to new sites being located closer to residential areas.

TABLE 17 – T-MOBILE ALL BANDS SERVICE DISTRIBUTION BY CENSUS2020 POPULATION

	T-Mobile - all bands - Census 2020 - Option B				
	Distribution per Population - Census 2020				
UE Measurement RSRP (dBm >=)	Excellent	Good	Average	Poor	Sum
Service by current sites	2461	4400	3555	944	11360
Service by proposed sites	3977	4276	3356	969	12578

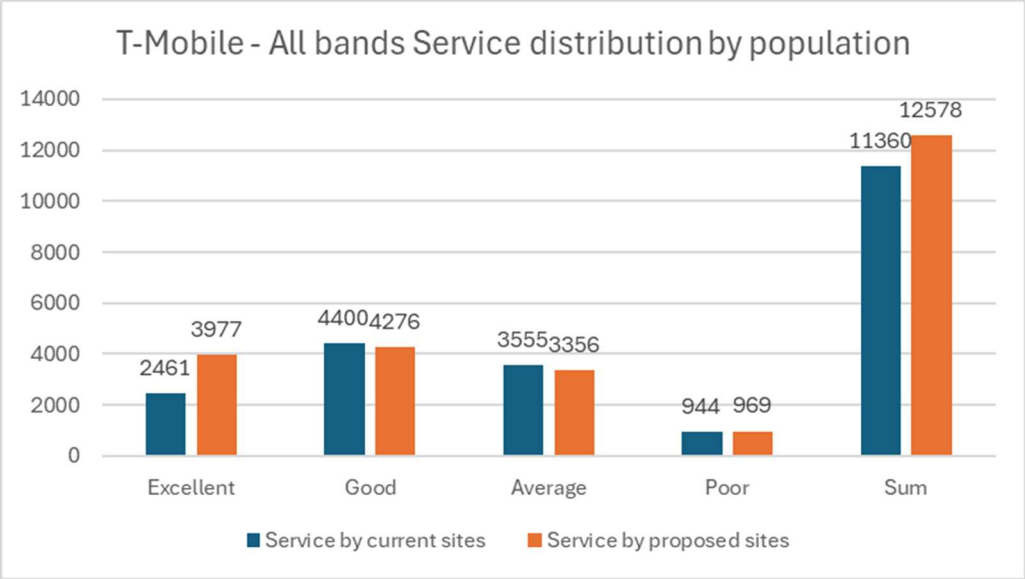


FIGURE 103 – T-MOBILE – ALL BANDS - SERVICE DISTRIBUTION COMMERCIAL CENSUS2020 POPULATION – OPTION B

5.3.2.5 Verizon Analysis per Zoning Type

CelPlan analyzed all bands and compared the percentage of the area covered by a given service grade. Results are provided in Table 18 and additional graphs for four specific zonings: Residential (Figure 104), Golf and Recreation (Figure 105), Open Space (Figure 106), and Commercial (Figure 107).

The strategy focused on enhancing and expanding the quality of service in Residential, Golf and Recreation, Open Space and Commercial. As a result, coverage in the Civic zoning has also improved, as illustrated in Table 18.

TABLE 18 – VERIZON ALL BANDS SERVICE DISTRIBUTION BY ZONING

Verizon - All Bands - Option A						
		Served Area (%)				
Region	Scenario	Excellent	Good	Average	Poor	Sum
Residential	Current	25.2%	55.2%	15.7%	3.3%	99.4%
	Proposed	58.4%	38.5%	3.0%	0.1%	100.0%
Golf and Recreation	Current	16.7%	50.3%	24.6%	7.0%	98.6%
	Proposed	64.3%	29.7%	5.8%	0.2%	100.0%
Open Space	Current	22.0%	39.0%	21.6%	9.4%	92.00%
	Proposed	49.4%	33.9%	10.0%	2.1%	95.4%
Commercial	Current	69.0%	29.6%	1.4%	0.0%	100.00%
	Proposed	74.6%	25.4%	0.0%	0.0%	100.0%
Civic	Current	0.0%	60.0%	20.0%	20.0%	100.00%
	Proposed	20.0%	40.0%	20.0%	20.0%	100.0%
Total	Current	23.5%	44.4%	20.1%	7.3%	95.2%
	Proposed	60.6%	31.3%	6.4%	0.6%	99.0%

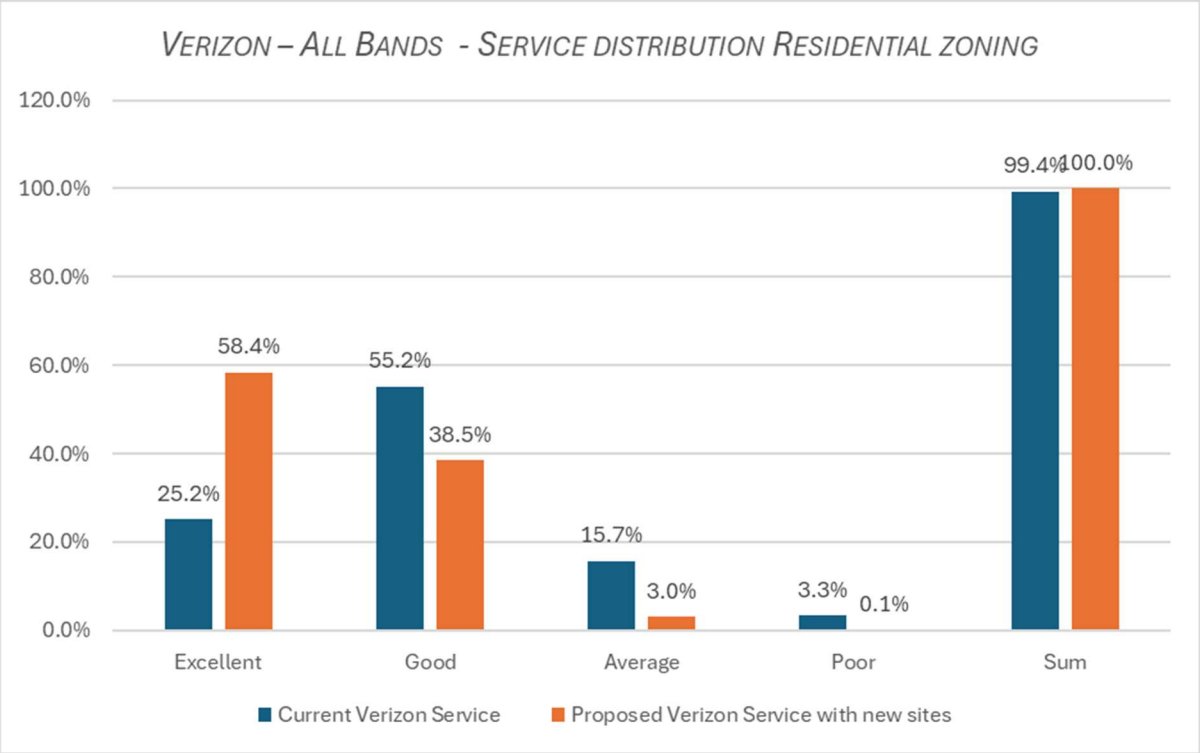


FIGURE 104 - VERIZON – ALL BANDS - SERVICE DISTRIBUTION RESIDENTIAL ZONING – OPTION A

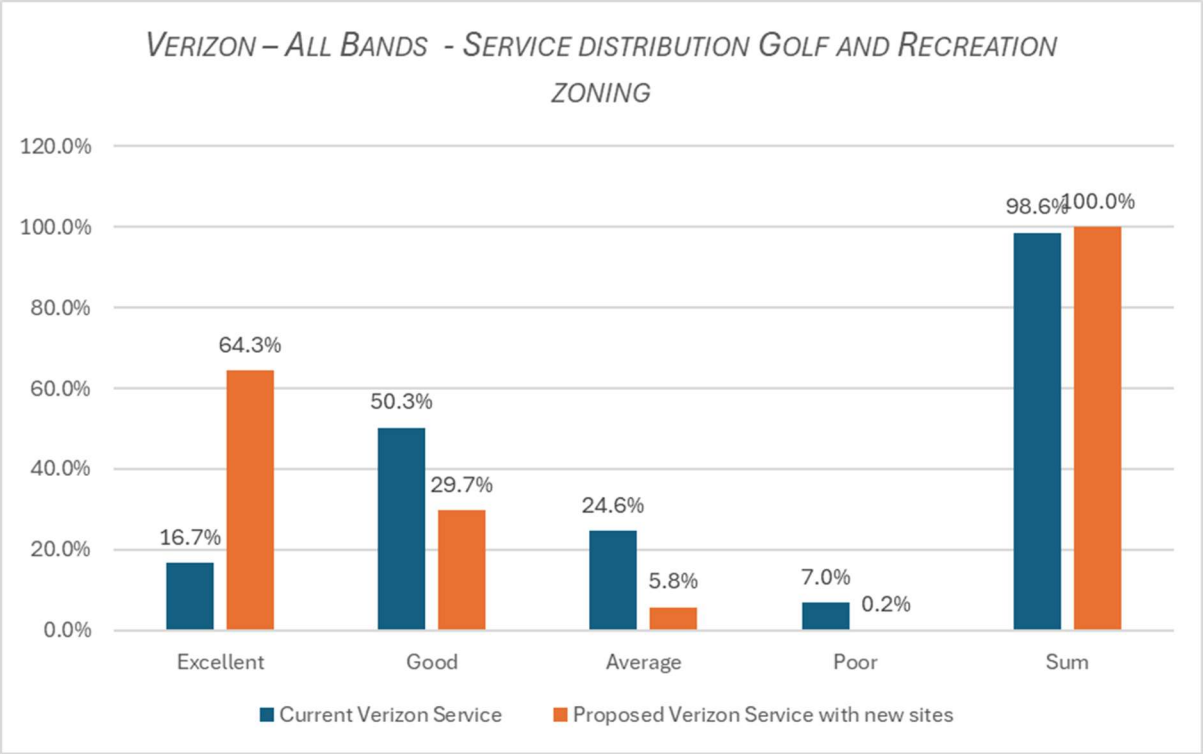


FIGURE 105 - VERIZON – ALL BANDS - SERVICE DISTRIBUTION GOLF AND RECREATION ZONING– OPTION A

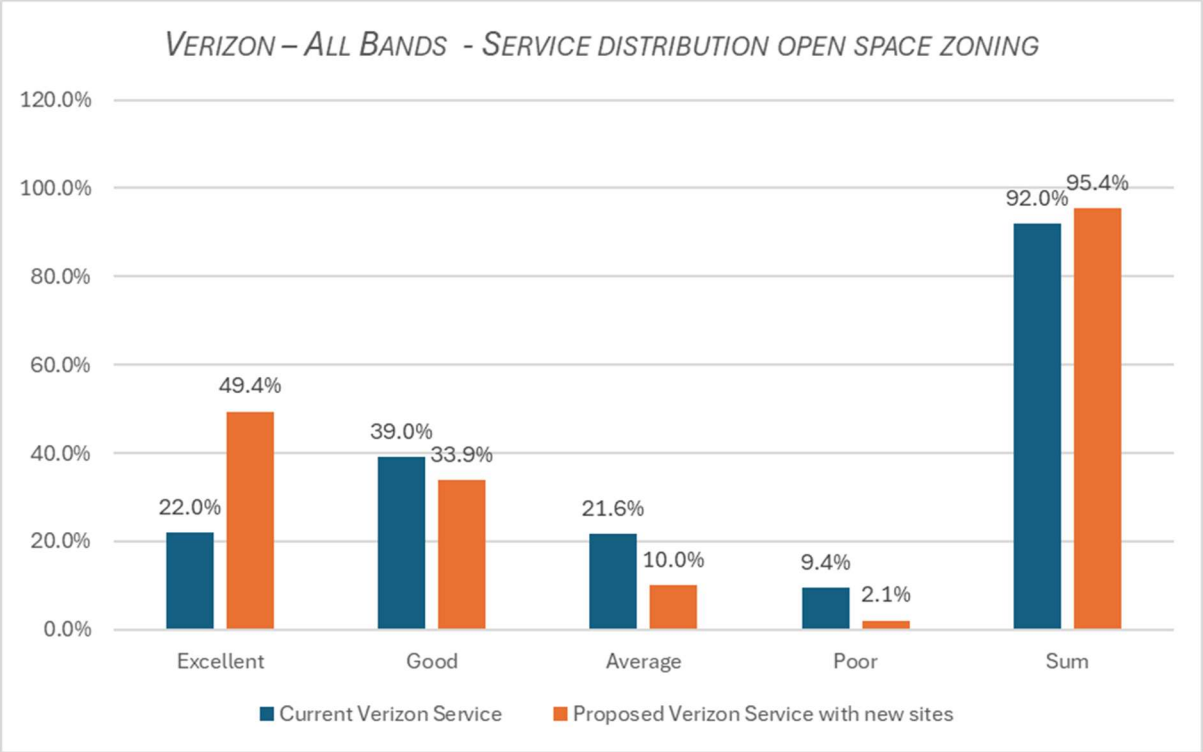


FIGURE 106 - VERIZON – ALL BANDS - SERVICE DISTRIBUTION OPEN SPACE ZONING– OPTION A

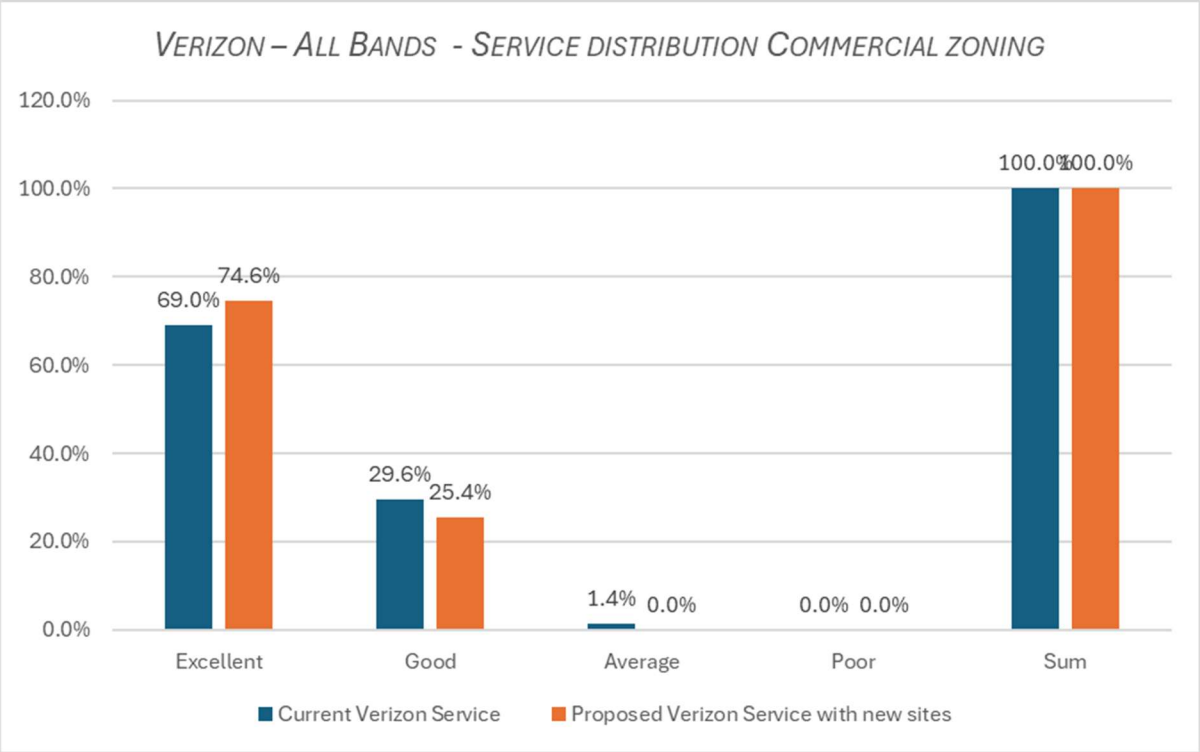


FIGURE 107 - VERIZON – ALL BANDS - SERVICE DISTRIBUTION COMMERCIAL ZONING– OPTION A

5.3.2.6 Verizon Analysis per Census 2020 Database

Results for population served with different service quality (considering homogeneous distribution within each Census tract) are provided in Table 19 and Figure 108. Option B shows better results due to new sites being located closer to residential areas.

TABLE 19 – VERIZON ALL BANDS SERVICE DISTRIBUTION BY CENSUS2020 POPULATION

	Verizon - all bands - Census 2020 - Option B				
	Distribution per Population - Census 2020				
UE Measurement RSRP (dBm >=)	Excellent	Good	Average	Poor	Sum
Service by current sites	1914	4301	3803	1218	11236
Service by proposed sites	3629	4201	3580	1093	12503

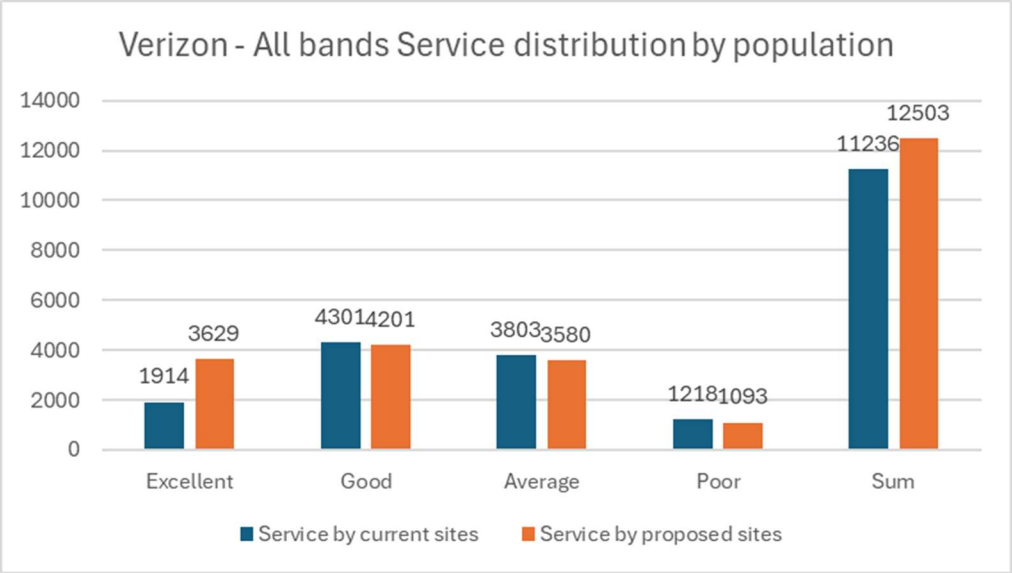


FIGURE 108 – VERIZON – ALL BANDS - SERVICE DISTRIBUTION COMMERCIAL CENSUS2020 POPULATION – OPTION B

5.3.3 Overall Zoning Analysis

The analysis in Section 5.3.1 quantifies the percentage of geographic areas served with Excellent, Good, Average, and Poor coverage across zoning classifications for each carrier and frequency range. The evaluation emphasizes improvements in the Excellent category, as it represents the best performance tier in terms of signal strength, reliability, and user experience. Focus is placed on the Residential and Golf & Recreation zoning types, which are of primary interest to the City and historically exhibit the poorest baseline coverage levels. The percentage increases shown for each zoning category reflect the direct impact of the proposed site deployments and associated infrastructure enhancements. Table 20 summarizes the distribution of service levels under current and proposed scenarios, while Table 21 presents the overall average absolute improvement, calculated as the mean of the absolute percentage-point increases achieved by each operator.

In addition to RSRP improvement, a Relative Gain metric was calculated to normalize the improvement against baseline conditions. Relative Gain was derived by dividing the average absolute improvement by the average baseline service level for each zoning category. This method provides a proportional measure of network enhancement and highlights the structural impact of the proposed deployment. Based on this calculation, Residential coverage increased by approximately 58% relative to its baseline performance, while Golf & Recreation coverage increased by approximately 118% relative to baseline conditions. In practical terms, this indicates that Residential zones improved by nearly half of their original service level, whereas Golf & Recreation zones more than doubled their baseline performance.

TABLE 20 – ALL BANDS SERVICE DISTRIBUTION BY ZONING AND OPERATOR

All Bands Service - Option A				
Region	Scenario	AT&T Served Area (%) Excellent	T-Mobile Served Area (%) Excellent	Verizon Served Area (%) Excellent
Residential	Current	10.7%	38.3%	25.2%
	Proposed	49.4%	66.1%	58.4%
Golf and Recreation	Current	14.7%	20.8%	16.7%
	Proposed	66.5%	66.3%	64.3%

TABLE 21 – AVERAGE IMPROVEMENT OF SERVICE PER ZONE TYPE

Zone Type	Average Improvement	Relative Gain from baseline
Residential	33.23%	57.9%
Golf and Recreation	48.3%	117.6%

5.4 Golf Cart Coverage Improvement

Golf course properties in Indian Wells currently experience areas with lack of cellular coverage to reliably support communication including emergency communications. The lack of consistent connectivity places citizens and staff at increased risk in the event of a medical emergency, accident, or other incident requiring immediate response.

As part of the Wireless Master Plan effort, CelPlan conducted field measurements and predictive simulations that consistently demonstrate deficient cellular coverage across several golf courses within the City. Given the expansive layouts of these properties reliable communication capability is a critical public safety consideration.

Golf courses in Indian Wells present unique challenges for wireless service: large geographic footprint, limited vertical infrastructure, vegetation density, and proximity to mountainous terrain. The City has expressed concern regarding emergency communication reliability on these properties, particularly because golf carts serve as the primary mode of transportation across large areas where immediate access to fixed communication systems is not available. Based on these findings, CelPlan evaluated both infrastructure-based and device-based solutions capable of improving emergency notification capabilities on golf carts and across golf course facilities.

5.4.1 Findings and Priority Locations

CelPlan's drive testing and predictive modeling confirmed that improved macro cellular coverage would enhance emergency communications across multiple golf courses. The analysis indicates that strategic macro-cell deployments in low-band frequencies would significantly improve blanket coverage and enable reliable device connectivity.

With the addition of strategically placed macro cells to address known coverage gaps, the following country clubs would directly benefit the most from cellular-based emergency solutions:

- The Reserve Club
- El Dorado Club
- Toscana Country Club
- Villagio
- Desert Horizons HOA
- Dorado Horizons

For these locations, macro-cell enhancements would enable the use of LTE/5G-based emergency devices without reliance on dense Wi-Fi infrastructure or distributed local gateways throughout the course. Improved macro coverage would provide consistent connectivity across fairways, cart paths, clubhouse perimeters, and remote course segments where current service is unreliable.

5.4.2 Solution Approaches Evaluated

CelPlan evaluated four primary solution categories, each with varying infrastructure dependencies, operational complexity, and performance characteristics.

5.4.2.1 Cellular-Based Emergency Solutions (Preferred Long-Term Option)

With adequate macro coverage in place, golf carts can support direct cellular connectivity, enabling reliable emergency alerts and real-time location reporting across the entire property. Adequate coverage would allow for:

- LTE/5G-enabled panic buttons mounted on golf carts
- Embedded cellular modules with GPS location reporting
- No dependency on local Wi-Fi infrastructure
- Direct alert routing to club security, monitoring centers, or public safety dispatch

This approach aligns with public safety best practices by leveraging carrier-grade reliability. It minimizes operational burden on private clubs, avoids the need for extensive on-course infrastructure, and scales effectively across large outdoor environments.

CelPlan considers this the preferred long-term solution, contingent upon improved macro coverage.

5.4.2.2 Hybrid Bluetooth / Wi-Fi Emergency Solutions

Hybrid emergency systems rely on Bluetooth-enabled panic buttons that interface with smartphones or with Wi-Fi access points distributed throughout the golf course. This architecture introduces multiple dependency layers, including continuous smartphone availability, active application status, battery management, and consistent Wi-Fi signal propagation across large outdoor areas. As a result, infrastructure requirements increase significantly, along with installation, monitoring, and long-term maintenance complexity. Although device acquisition costs may be lower, open-course environments will see reduced RF reliability as terrain variations and vegetation can impact system performance.

While technically viable, hybrid systems inherently introduce operational variability and user-dependent failure points. For these reasons, they are best positioned as interim or supplemental solutions where macro cellular upgrades are pending. They are not recommended as the primary long-term emergency communication strategy for large-area golf course deployments where reliability, simplicity, and direct public safety integration are critical.

5.4.2.3 Smartphone-Based Emergency Applications

Smartphone-based emergency applications are widely available and can provide SOS activation, GPS location sharing, and monitoring center integration with minimal hardware investment. However, their effectiveness is directly dependent on reliable LTE/4G (and increasingly 5G) macro coverage. In the current golf course environments evaluated, cellular signal degradation and coverage gaps significantly limit the reliability of app-based emergency notifications, particularly in large open areas with terrain variations and vegetation. Additionally, these solutions depend on user behavior, device battery life, and application readiness at the time of an incident. For these reasons, while smartphone applications can serve as a supplemental safety layer, they should only be considered for broader deployment once macro cellular coverage improvements have been implemented to ensure consistent and dependable connectivity across the courses.

5.4.2.4 LoRaWAN Closed Wireless System

An alternative approach involves deployment of a private, closed wireless network using LoRaWAN (Long Range Wide Area Network) technology.

This solution is designed to support connectivity throughout the course for asset tracking and immediate emergency notification using a secure, low bit-rate wireless system. LoRaWAN-enabled tracking and alert devices can be installed on golf carts, providing location awareness and emergency signaling without relying on public cellular networks. This approach provides the golf course with a fully integrated view of assets and operational activity, including secure emergency notifications.

However, LoRaWAN systems require installation of outdoor standalone gateway infrastructure across the property and ongoing system management. While cost-effective for asset tracking and operational monitoring, they do not directly integrate with public cellular networks and may require additional routing mechanisms to notify external emergency services.

5.4.3 Vendor Landscape and Technology Providers

CelPlan reviewed commercially available solutions compatible with golf cart deployment, asset tracking, and public safety notification workflows. The vendors below represent established providers across standalone cellular, embedded IoT modules, smartphone platforms, and private LoRaWAN systems. Table 22 summarizes the technologies available and Table 23 provides a list of potential vendors for these solutions.

TABLE 22 –TECHNOLOGIES SUMMARY

Solution Type	Reliability	Infrastructure Required	Operational Complexity	Public Safety Integration
Cellular (LTE/5G)	High (with macro coverage)	Carrier Macro-cell support	Low	Direct integration possible
Hybrid Bluetooth/Wi-Fi	Moderate	Additional WiFI Infrastructure throughout golf course	High	Indirect
Smartphone App	Low–Moderate	Carrier Macro-cell support	User dependent	Limited
LoRaWAN Private Network	High (local coverage)	Additional LoRa Gateway Infrastructure throughout golf course	Moderate	Requires integration

TABLE 23 - VENDOR SUMMARY

Category	Vendor	Technology Type	Key Capabilities	Typical Use Case
Standalone Cellular Panic Buttons	React Mobile	LTE-enabled panic buttons with GPS and cloud alerting	One-touch SOS, real-time GPS, cloud dashboard, integration with security teams	Direct emergency notification from golf carts
	SaferCity	4G GPS panic devices with two-way voice	SOS activation, live tracking, voice communication	Emergency alerting with voice support
	TOPVICO (and similar LTE SOS devices)	Standalone LTE panic buttons	SOS alerts via SMS/voice, GPS location reporting	Low-cost cellular panic solution
Embedded Cellular / IoT Modules (Custom Integration)	Telit Cinterion	LTE/5G IoT modules with GNSS	Embedded connectivity, telematics support, scalable device integration	Custom golf cart-mounted safety systems
	Cavli Wireless	Cellular IoT modules with global SIM	Integrated SIM, cloud device management	Fleet-based cart connectivity
Smartphone / App-Based Platforms	React Mobile (App version)	Smartphone-based SOS app	App-based alerting, GPS location sharing	Supplemental safety solution
	GPS BodyGuard	Mobile emergency application	SOS button, monitoring center integration	Personal safety app for staff or members
Private LoRaWAN Systems	Codepoint Technologies – Cora-Alert	LoRaWAN-based asset tracking and emergency alert system	Closed-network operation, long-range low-power tracking, IT dashboard integration	Course-wide asset tracking and emergency signaling without cellular subscriptions

5.4.4 CelPlan's recommendation

CelPlan concludes that enhancing macro cellular coverage is the foundational prerequisite for establishing reliable golf cart emergency communication systems across Indian Wells golf courses. Existing coverage deficiencies directly limit the effectiveness of cellular-based safety technologies. Once these gaps are addressed through targeted macro infrastructure improvements, LTE/5G-enabled emergency devices mounted directly on golf carts represent the most scalable, resilient, and public safety-aligned solution. This approach minimizes operational complexity, supports direct integration with monitoring centers or public safety dispatch, and provides consistent performance across large outdoor environments.

LoRaWAN-based systems present a viable complementary solution, particularly for asset tracking and internal course operational management within a closed-network environment. These systems can deliver high reliability within the defined course footprint and may offer cost efficiencies where subscription-based cellular connectivity is less desirable. However, they require additional backend integration to support direct emergency dispatch communication and therefore function best as a supporting layer rather than a primary public safety mechanism.

CelPlan recommends a coordinated strategy that prioritizes macro cellular coverage enhancements, followed by the deployment of standardized LTE/5G-based emergency notification systems. When appropriate, supplemental LoRaWAN solutions may be incorporated to strengthen asset visibility and operational control. This integrated approach will improve citizens safety, emergency responsiveness, operational awareness, and long-term wireless resiliency across golf course properties in Indian Wells.

6 Conclusion

This Wireless Master Plan demonstrates that the City of Indian Wells' wireless service challenges are not the result of a single deficiency, but rather the combined effect of uneven existing site distribution, terrain and land-use constraints, limited siting flexibility in key areas, and the practical limitations of current zoning pathways. Through field measurements, asset verification, calibrated propagation modeling, and regulatory review, CelPlan developed an integrated understanding of how current infrastructure performs, where meaningful service gaps remain, and what actions are most likely to improve conditions.

The study confirms that existing wireless infrastructure provides relatively strong service in portions of the City associated with established commercial and resort properties, but that significant gaps remain in northern, southwestern, mountain-adjacent, residential, and golf-related areas. These are also the areas where the City's public safety and service reliability concerns are most pronounced. The report shows that low-band macro-cell deployments remain the most effective way to improve broad-area coverage and create the foundational communications layer needed for reliable everyday service, stronger emergency connectivity, and future wireless expansion.

At the same time, the report makes clear that improved coverage cannot be achieved through engineering alone. A successful implementation path depends on a regulatory framework that allows infrastructure to be considered in the locations where it is actually needed, while still preserving Indian Wells' strong aesthetic standards. For that reason, the recommended zoning amendments and land-use clarifications are a central part of the Wireless Master Plan. They are intended to provide the City with a clearer and more defensible structure for evaluating future wireless proposals, especially in Golf and Recreation, Watercourse, Public Facility, and related overlay areas, and to give carriers a more predictable pathway for deploying well-concealed facilities in appropriate locations.

The candidate site analysis further demonstrates that targeted new deployments can materially improve service where it matters most. The modeled scenarios show substantial improvement in both Residential and Golf and Recreation areas, with especially strong gains in the latter, where baseline service is weakest today. These improvements are important not only from a consumer connectivity perspective, but also from a public safety standpoint. On golf course properties in particular, stronger macro coverage is a prerequisite for dependable emergency notification and response solutions tied to golf cart operations and other mobile field activity.

Moving forward, CelPlan recommends that the City use this Master Plan as the basis for refining its zoning framework, prioritizing candidate siting areas, and engaging carriers on future deployments that align with both community character and long-term communication needs.