

# COVERAGE OBJECTIVE & ENGINEERING JUSTIFICATION

T-Mobile Site ID: BA90123B  
Widow White Creek

4/19/2024  
Prepared by: Chris Cubanske



# COVERAGE JUSTIFICATION

## OVERVIEW

Vertical Bridge is proposing to build a new structure for the future collocation of multiple carriers at 1710 Norton Rd in McKinleyville, in Humboldt County. T-Mobile is proposing to collocate its equipment at the 95' elevation (antenna tip height) on the new structure.

This proposed facility meets T-Mobile's coverage objectives by providing in-building wireless coverage to the residential neighborhoods within the vicinity of Murray Rd to Airport Road in northern McKinleyville including Terminals at Humboldt County Airport which is currently not adequately served by T-Mobile's network. This coverage objective was determined through a combined analysis of customer complaints, service requests, and radio frequency engineering design. This facility will allow T-Mobile to provide more reliable wireless service with fewer dropped calls, improved call quality, and improved access to additional wireless services that the public now demands. This includes emergency 911 calls throughout the area.

## COVERAGE JUSTIFICATION (CONT.)

**FEDERAL LAW** The Telecommunications Act of 1996 prohibits a local jurisdiction from taking any action on a wireless siting permit that “prohibit[s] or [has] the effect of prohibiting the provision of personal wireless services.” 47 U.S.C. § 332(c)(7)(B)(i)(II).

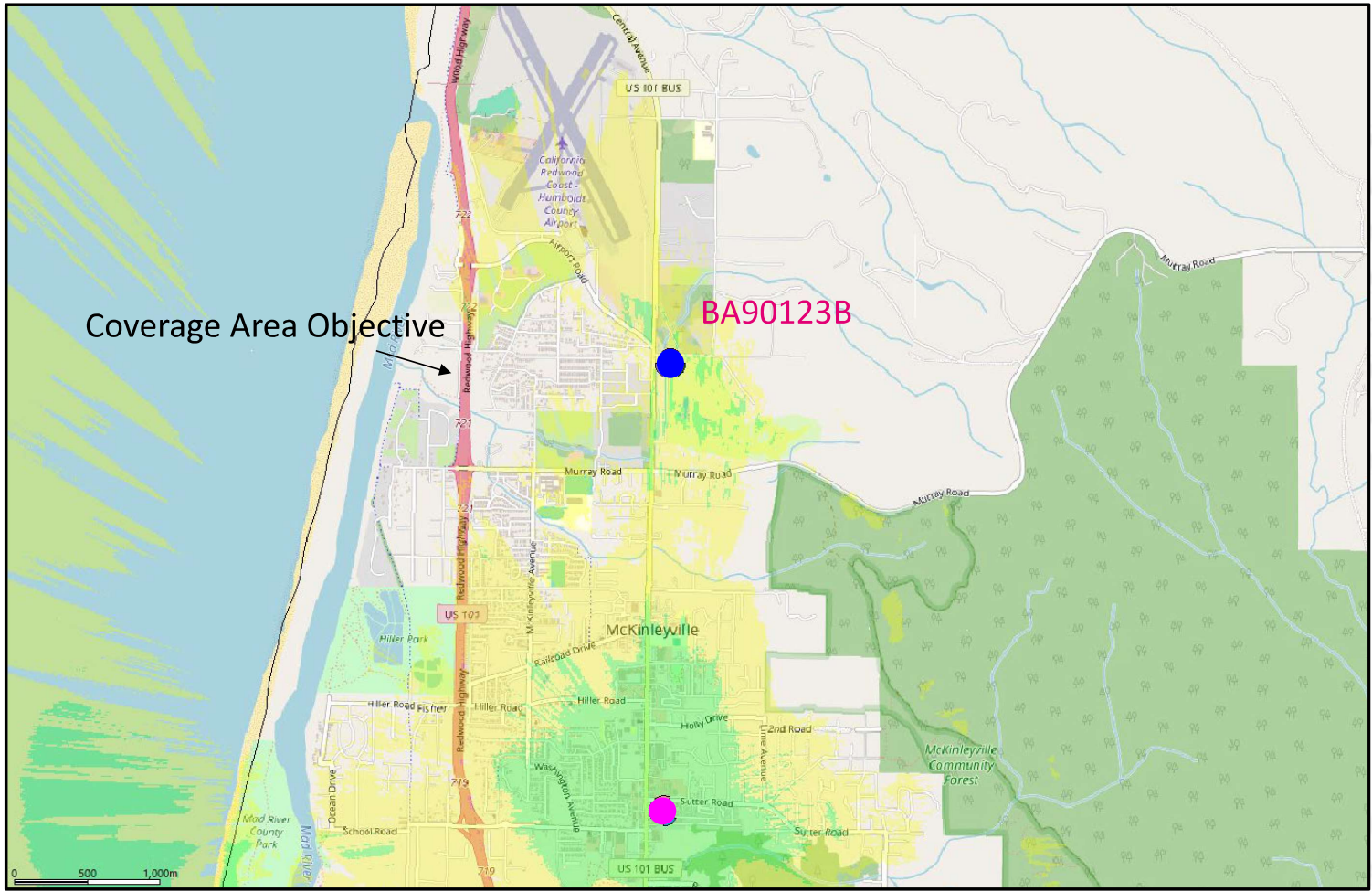
- According to the Federal Communications Commission (“FCC”) Order adopted in September 2018, a local jurisdiction’s action has the effect of prohibiting the provision of wireless services when it “materially limits or inhibits the ability of any competitor or potential competitor to compete in a fair and balanced legal and regulatory environment.” Under the FCC Order, an applicant need not prove it has a significant gap in coverage; it may demonstrate the need for a new wireless facility in terms of adding capacity, updating new technologies, and/or maintaining high quality service.
  - *Accelerating Wireless and Wireline Broadband Deployment by Removing Barriers to Infrastructure Investment*, Declaratory Ruling and Third Report and Order, WT Docket No. 17-79, WC Docket No. 17-84, FCC 18-133 (rel. Sept. 27, 2018); 83 Fed. Reg. 51867 (Oct. 15, 2018), *affirmed in part and vacated in part*, *City of Portland v. United States*, 969 F.3d 1020 (9th Cir. 2020), *cert. denied*, 594 U.S. \_\_\_, 141 S.Ct. 2855 (June 28, 2021)(No. 20-1354) (“FCC Order”).
- A local government’s denial of an application to install a personal wireless service facility has the effect of prohibiting the provision of personal wireless service if materially inhibits or limits T-Mobile’s ability to deploy the facilities, technologies, or services that conform to T-Mobile’s network standards and objectives.

## COVERAGE JUSTIFICATION (CONT.)

### COVERAGE OBJECTIVE

- **Figure A —Existing T-Mobile Coverage** shows existing T-Mobile wireless services in the general area of the proposed new site, which demonstrates the current deficiency in coverage in the targeted service area. The Blue Dot indicates the location of the proposed new WCF. The Magenta Dot indicates the location of existing T-Mobile WCF sites; coverage from T-Mobile existing WCF sites is shaded in green. As can be seen, there is a coverage deficiency in all areas not shaded in green. Currently, the target coverage area has minimal to no 4G/5G in-building voice service and does not have adequate 4G/5G service
- **Figure B—Projected New T-Mobile Coverage** identifies the projected coverage from the proposed new WCF with the requested antenna tip height of 95 ft. The proposed antenna tip height is the minimum necessary to help fill the coverage objective relative to nearby complementary wireless facilities. This is also the height where a T-Mobile wireless device can be reliably used to make and receive telephone calls and use data service in the presence of varying signals
- **Figure C – Projected Coverage from Existing SBA Tower** identifies the projected coverage from an existing SBA tower located approximately 1.4 miles away from the proposed location. T-Mobile’s analysis determined that collocating at this existing facility was not feasible because its located too far outside of the search area and would not meet T-Mobile’s service objective.

**FIGURE A – EXISTING SERVICE WITHOUT BA90123B**

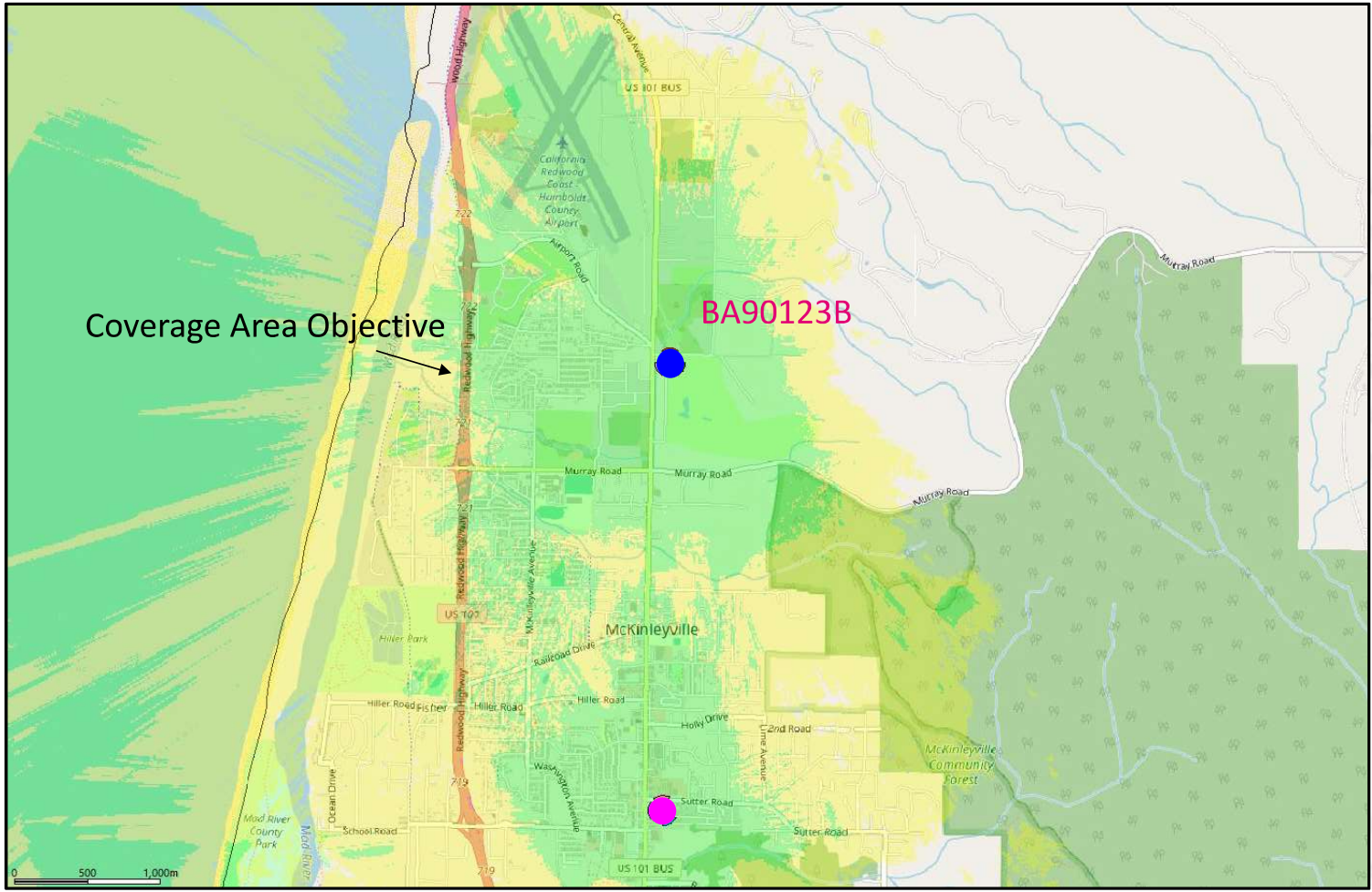


Legend	Coverage	RSRP	Pops
	Reliable Coverage (Indoor)	-100dBm < RSRP	3,153

<span style="color: magenta;">●</span>	Existing T-Mobile Facilities
<span style="color: blue;">●</span>	Proposed Facility

<span style="color: green;">■</span>	Reliable Coverage: -100dBm < RSRP
<span style="color: yellow;">■</span>	Marginal Coverage : -115dBm < RSRP < -100dBm

**FIGURE B – EXISTING SERVICE WITH BA90123B**



Legend	Coverage	RSRP	Pops
	Reliable Coverage (Indoor)	-100dBm < RSRP	8,537

<span style="color: magenta;">●</span>	Existing T-Mobile Facilities
<span style="color: blue;">●</span>	Proposed Facility

<span style="color: green;">■</span>	Reliable Coverage: -100dBm < RSRP
<span style="color: yellow;">■</span>	Marginal Coverage : -115dBm < RSRP < -100dBm



Customer Driven. Locally Focused. Magenta Built.

• 5,384 Additional Indoor Pops covered with the addition of BA90123B



# ALTERNATIVE SITE ANALYSIS

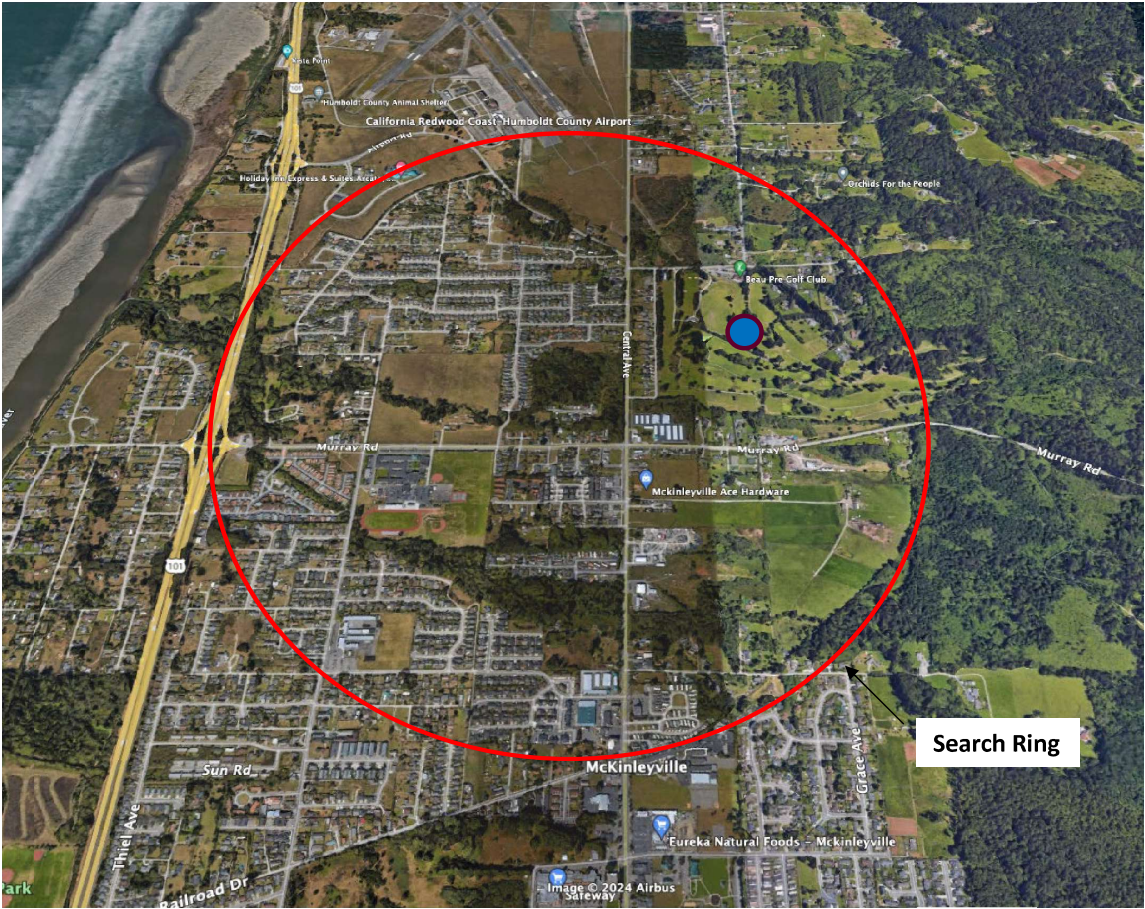
## SEARCH RING


- T-Mobile’s radio frequency (“RF”) engineers performed an RF engineering study, considering multiple objectives, to determine the approximate site location and antenna height required to fulfill the noted network objectives for the targeted service area. From this study, T-Mobile’s RF engineers identified a “search ring” area where a WCF may be located to provide effective service in the target coverage area.
- **Figure D —Targeted Search Ring** indicates the search ring T-Mobile’s RF engineers established for this proposed site. A discussion of the methodology T-Mobile’s RF engineers used to identify the search ring is included at the end of this RF Justification document.

## ALTERNATIVE SITES EVALUATED

- Whenever possible, T-Mobile seeks to construct new sites on existing infrastructure before proceeding with the construction of a new free-standing facility. Before allocating a search ring to an infrastructure provider like Vertical Bridge, T-Mobile conducts thorough research, ensuring all collocation opportunities are explored and exhausted. T-Mobile analyzed the area within the targeted search ring and found that there are no existing towers within or just outside the search radius to collocate on. As a result, it was determined that construction of a new free-standing facility would be required. Please see further discussion in Figure D.

# FIGURE D – TARGETED SEARCH RING



Proposed Site Location 

There are no existing towers located within the search radius. All of the existing towers just outside the search radius were deemed to be infeasible collocation opportunities.

The nearest tower is an existing SBA tower located at 40.960716670, -124.069743800, approximately 1.4 miles east of the Proposed Site. T-Mobile determined this tower was not a feasible collocation opportunity because it is located too far outside the designated search radius. An analysis of this facility determined that 1,236 fewer residents would be provided with reliable in-building service as compared to the proposed site. As a result, the SBA tower was deemed not to be a feasible alternative. Please refer to Figure C for additional detail.

The next nearest tower is an existing AT&T tower located at 40.9289, -124.1, approximately 2.5 miles south of the Proposed Site, which places it well outside the designated search area. T-Mobile is already collocated at this facility; which provides service to a different part of the County, and due to its location, it cannot meet the service objectives for the targeted service area of the proposed site.

# COVERAGE METHODOLOGY

T-Mobile's RF engineers use the following signal strength standards to demonstrate the quality of coverage depicted on the maps herein.

- **Reliable Coverage.** **Green** represents minimum signal strength of -97dBm, T-Mobile's design criteria for reliable in-building voice coverage at 2100 MHz. This signal strength is required for customers to take advantage of T-Mobile's Home Internet services.
- **Marginal Coverage.** **Yellow** represents minimum signal strength of -114dBm, but less than -97dBm, T-Mobile's design criteria for in-vehicle coverage at 2100 MHz.
- **No Coverage.** Signal strength less than -114dBm is not shown, as it does not meet T-Mobile's design standards for reliable in-building or in-vehicle coverage.

## SEARCH RING METHODOLOGY

T-Mobile's RF engineers used coverage propagation software systems to predict the coverage provided by the proposed new WCF. The software and T-Mobile's RF engineers considered the general factors outlined below, as well as more project-specific factors such as the type of antenna, antenna tilt, etc. Within coverage areas, network changes, traffic volume, outages, technical limitations, signal strength, customer equipment, obstructions, weather and other conditions may interfere with service quality and availability.

- **Coverage.** The antenna site must be located in an area where the radio frequency broadcasts will provide adequate coverage within the targeted service area. The RF engineer must take into consideration the coverage objectives for the site as well as the terrain in and around the area to be covered. Because radio frequency broadcasts travel in a straight line and diminish as they travel further away from the antennas, it is generally best to place an antenna site near the center of the desired coverage area. However, in certain cases, the search ring may be located away from the center of the desired coverage area due to the existing coverage, the surrounding terrain, or other features that might affect the radio frequency broadcasts, *e.g.*, buildings or sources of electrical interference.
- **Clutter.** T-Mobile's WCFs must "clear the clutter"—the WCF site must be installed above or close to RF obstructions (the "clutter") to enable the RF signals to extend beyond and clear the clutter. T-Mobile radio frequencies do not penetrate mountains, hills, rocks, or metal, and are diminished by trees, brick and wood walls, and other structures. Accordingly, T-Mobile's antennas must be installed above or close to the "clutter" to provide high quality communications services in the desired coverage areas. Additionally, if the local code requires us to accommodate additional carriers on the support structure, the structure must be even taller to also allow the other carriers' antennas to clear the clutter.
- **Call Handoff.** The WCF site must be in an area where the radio broadcasts from the site will allow seamless "call handoff" with adjacent WCF sites. Call handoff is a feature of a wireless communications system that allows an ongoing telephone conversation to continue uninterrupted as the user travels from the coverage area of one antenna site into the coverage area of an adjacent antenna site. This requires coverage overlap for a sufficient distance and/or period of time to support the mechanism of the call handoff.
- **Quality of Service.** Users of wireless communications services want to use their services where they live, work, commute and play, including when they are indoors. T-Mobile's coverage objectives include the ability to provide indoor coverage in areas where there are residences, businesses and indoor recreational facilities.

## SEARCH RING METHODOLOGY (CONT.)

- **Radio Frequencies Used by System.** The designs of wireless communications systems vary greatly based upon the radio frequencies that are used by the carrier. If the carrier uses radio frequencies in the 600 MHz to 850 MHz range, the radio signals will travel farther and will penetrate buildings better than the radio frequencies in the 2100 MHz band. As a result, wireless communications systems that use lower radio frequencies will need fewer sites than wireless communications systems that use higher radio frequencies.
- **Land Use Classifications.** T-Mobile's ability to construct a WCF site on any particular property is affected by state and local regulations, including zoning and comprehensive plan classifications, goals, and policies. T-Mobile's search rings take these laws and regulations into consideration.

## CONFIDENTIALITY NOTICE

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## **Declaration**

I, Chris Cubanske, state that I am a qualified and experienced Communications Engineer whose work is a matter of record in over 100 jurisdictions in the State of California.

I am a Network RF Engineer for T-Mobile and am responsible for the Northern California Market. My formal education includes Electrical Engineering (E.E.) I have over 25 years of experience in radio frequency analysis, engineering, RF exposure studies, interference mitigation, wireless communications radio frequency networks, and the design of new wireless communications sites for new networks as well as sites to fill in gaps in coverage and capacity for existing networks.

I prepared the attached “Coverage Objective & Engineering Justification” dated April 19, 2024, and have reviewed the attached project narrative detailing the technical requirements for the site and the alternatives analysis.

- Based on my background (detailed above) as a radio frequency engineer, and my comprehensive analysis of the data associated with this proposed site and the T-Mobile network, I hereby certify that my RF Justification and the project narrative are true and accurate, to the best of my knowledge, and form the basis of my analysis.
- Based on the information submitted to Humboldt County, I have concluded that T-Mobile’s attachment of a wireless facility to the proposed Vertical Bridge tower with an antenna tip height of 95’ is the minimum height required to meet T-Mobile’s needs for improved quality and service and will significantly improve service to the community.

### **Additional Considerations:**

- The previous RF engineering maps that were submitted with the Vertical Bridge application were produced by an outside vendor for T-Mobile using an older version of RF modeling software, which is why some of the coverage predictions differ from the attached Justification.

- I completed new RF engineering maps using the latest version of modeling software, incorporating updated geodata, clutter data (buildings, vegetation, etc.) specific to this location within Humboldt County, and incorporating technical parameters that are tuned specifically for T-Mobile's network frequencies and characteristics.
- The search ring included in the attached is a more precise version of the search ring previously provided to Humboldt County, as different iterations of search rings are provided to site acquisition teams as signal propagation models are developed for potential site locations that are being considered.

*Chris Cubanek*

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RF Engineering, T-Mobile

Dated: 8/7/24