



Biwabkos Consultants LLC

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November 20, 2025

Harmoni Towers
Attn: Chad Rumsey
6210 Ardrey Krell Road Suite 375
Charlotte, NC 28277

Re: Harmony WA0007224 Mossyrock – RF Supplemental – transmitter analysis

Mr. Rumsey,

I have been requested to review the list of antenna locations that were provided to me by Bill North.
Enclosed is the list of transmitters that are on the website www.antennasearch.com based on the address of the proposed Harmoni Tower.

The antenna list is below.

| Source | www.antennasearch.com | | | | | | |
|--------|------------------------------------------------------------------|-------------------------------------------|--------------------|----------|-----------|---------------------|-------------------------|
| ID | Multiple Antennas - Carrier/Owner | Frequency (MHz) | ERP (watts) | Latitude | Longitude | Structure Type | Structure Height (feet) |
| 1 | Deogoede Bulb Farms, Inc | 152.2775, 152.3825 | 25, 25 | 46.5324 | -122.5175 | Building w/ Antenna | 29.5 |
| | Deogoede Bulb Farms, Inc | 152.2775, 152.3825 | 50, 50 | 46.5324 | -122.5175 | Building w/ Antenna | 29.5 |
| | Deogoede Bulb Farms, Inc | 153.17, 153.515, 158.22, 159.93, 159.96 | 5, 5, 5, 5, 5 | 46.5324 | -122.5175 | | |
| 2 | Mossyrock School District | 159.585, 159.69, 159.72, 160.005, 160.185 | 45, 45, 45, 45, 45 | 46.5325 | -122.4847 | | |
| | Mossyrock School District | 152.93, 153.11 | 45, 45 | 46.5325 | -122.4847 | Building w/ Antenna | 24.9 |
| 3 | City of Mossyrock | 153.815 | 50 | 46.5288 | -122.4817 | Building w/ Antenna | 26.2 |
| | Lewis County Fire District #3 | 154.19, 155.685 | 150, 100 | 46.5288 | -122.4817 | Building | 36.7 |
| 4 | Mayfield Lake Youth Camp | 151.655, 151.745 | 5, 5 | 46.5164 | -122.4844 | | |
| | Mayfield Lake Youth Camp | 151.655, 151.745 | 5, 5 | 46.5165 | -122.4846 | | |
| | Single Antennas - Carrier/Owner | | | | | | |
| 5 | Gerald T Girard | 151.925 | 60 | 46.5421 | -122.5309 | Building | 26.2 |
| 6 | Lewis County Fire District #3 | 154.19 | 150 | 46.5609 | -122.5165 | Building | 38.1 |

See below for a review of each location

Location 1:

Deogoede Bulb Farms, Inc

29.5' AGL structure height – multiple frequencies at location

Latitude: 46.5324

Longitude: -122.5175

Antennas mounted on rooftop tripods



Above is a screenshot from the Google Earth Street View and the transmitting antennas are located on the roof of the existing structures. This height is significantly lower than the proposed tower and they are farther South of the Verizon search ring and are lower in ground elevation by around 465' AMSL. This location does not meet the needs of the carrier.

Location 2:
Mossyrock School District
24.9 AGL structure height – multiple frequencies at location
Latitude: 46.5325
Longitude: -122.4847
Antenna mounted on short pole



Above is a screenshot from the Google Earth Street View and the transmitting antenna is located a short pole to the East of the school property. This height is significantly lower than the proposed tower and they it is farther South of the Verizon search ring and is lower in ground elevation by around 390' AMSL. This location does not meet the needs of the carrier.

Location 3:

City of Mossyrock / Lewis County Fire District #3

36.7 AGL structure height – multiple frequencies at location

Latitude: 46.5288

Longitude: -122.4817

Antenna mounted on short pole



Above is a screenshot from the Google Earth Street View and the transmitting antenna is located a short pole to the East of the school property. This height is significantly lower than the proposed tower and they it is farther South of the Verizon search ring and is lower in ground elevation by around 390' AMSL. This location does not meet the needs of the carrier.

Location 4:

Mayfield Lake Youth Camp

No height given– multiple frequencies at location

Coordinates on antennasearch.com incorrect

Latitude: 46.5019

Longitude: -122.5569

Unable to find exact location of antennas via Google Earth



Above is a screenshot from the Google Earth and unable to find exact location of antennas. This height is significantly lower than the proposed tower and they it is farther SW of the Verizon search ring and is lower in ground elevation by around 542' AMSL. This location does not meet the needs of the carrier.

Location 5:

Gerald T Girard

26.2 AGL– antennas mounted on roof – single frequency at location

Latitude: 46.5421

Longitude: -122.5309

Unable to find exact locations of antennas via Google Earth



Above is a screenshot from the Google Earth and unable to find exact location of antennas. This height is significantly lower than the proposed tower and they it is farther SW of the Verizon search ring and is lower in ground elevation by around 487' AMSL. This location does not meet the needs of the carrier.

Location 6:

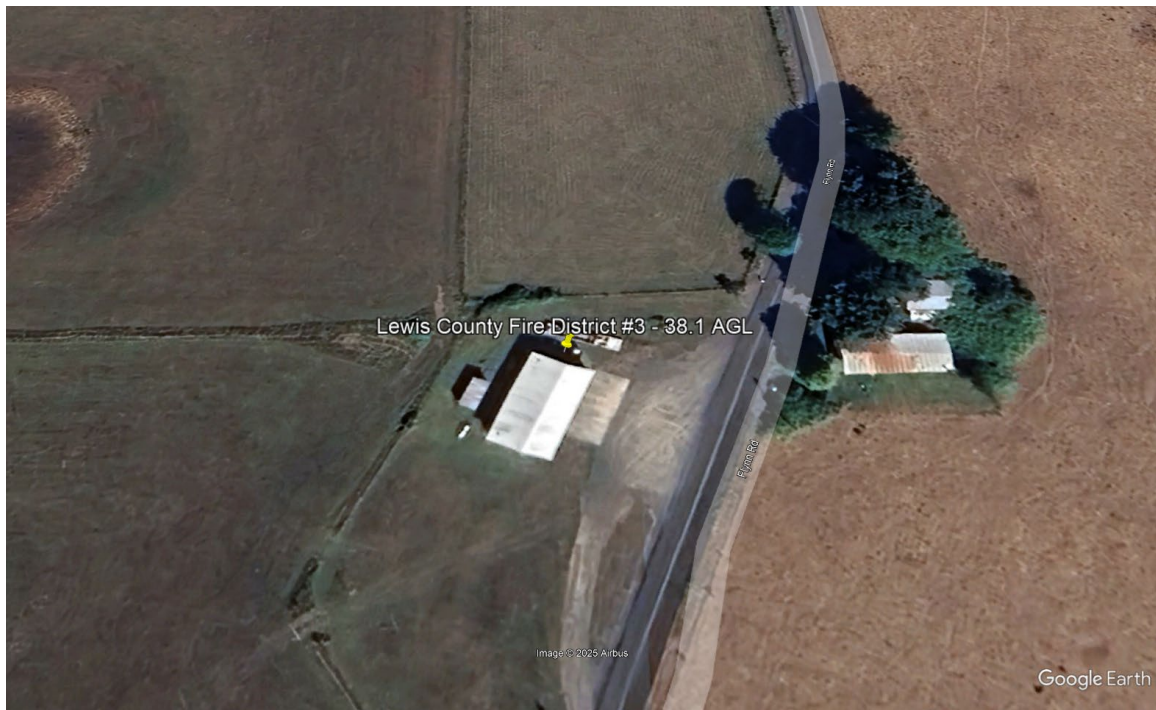
Lewis County Fire District #3

38.1 AGL— antennas mounted on roof – single frequency at location

Latitude: 46.5609

Longitude: -122.5165

Unable to find exact locations of antennas via Google Earth



Above is a screenshot from the Google Earth and unable to find exact location of antennas. This height is significantly lower than the proposed tower and it is farther NW of the Verizon search ring and is lower in ground elevation by around 443' AMSL. This location does not meet the needs of the carrier.



The locations brought up from antennasearch.com do not provide the level of service needed to resolve the carriers issues and in most cases are rooftops or short poles. The proposed site provides the coverage needed by the carrier.

Steven E Kennedy

COO & President
Biwabkos Consultants LLC



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MEMORANDUM

Date: October 21, 2025

To: Preston Pinkston
Lewis County Community Development
125 NW Chehalis Ave
Chehalis, WA 98532

From: Bill North
The North Group, Inc.

Subject: WCF25-0002 Harmoni Towers/Verizon Wireless
Mossyrock
Additional information

Please find the attached documents as supplemental information to include with application WCF25-0002.

The documents provide additional information in response to LCMC 15.50.025, 15.50.040.1.e, 15.50.040.2.d&e(iii)

The following documents are enclosed:

Mossyrock RF Design Analysis
Mossyrock NIER report

If you have any questions regarding the enclosed materials please feel free to contact me at 425.876.2909.

A handwritten signature in black ink that reads "Bill North".

Bill North for Harmoni Towers and Verizon Wireless



Biwabkos Consultants LLC

RF Safety and NIER Analysis Report

October 20, 2025

Site: Mossyrock

MOSSYROCK, WA

Prepared for:

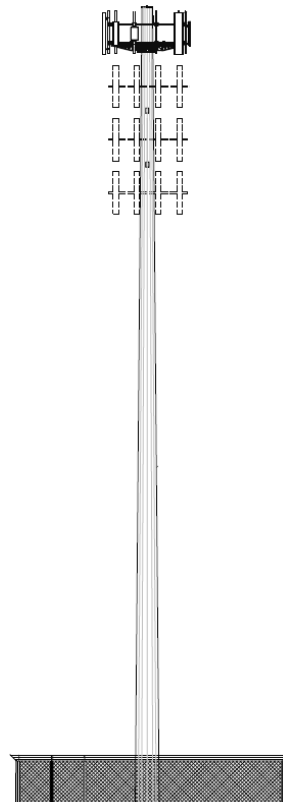


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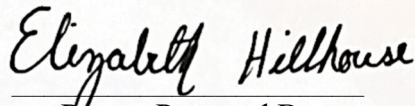
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1 Certification

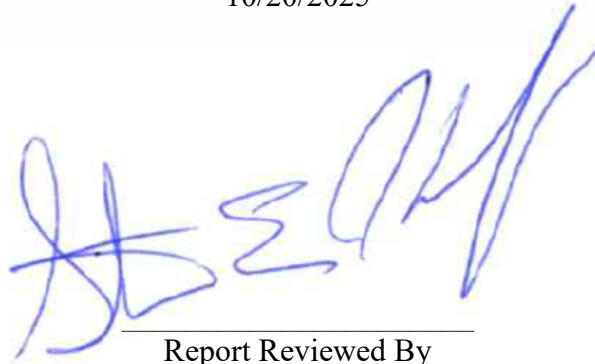
This report, prepared by Biwabkos Consultants LLC for **Harmoni Towers**, is intended to document compliance, and evaluate power density levels as outlined in the report. The computations, analysis, and resulting report and conclusions were based on applicable FCC guidelines and regulations for maximum permissible exposure to humans consistent with FCC 19-126 and OET-65.

Additionally, Biwabkos Consultants LLC certifies that the assumptions are valid, and that the data used within Biwabkos Consultants' control are accurate, including information collected as part of Biwabkos Consultants' field surveys (if applicable). Biwabkos Consultants LLC does not, however, certify the accuracy or correctness of any data provided to Biwabkos Consultants LLC for this analysis and report by Harmoni Towers.

I certify that the attached RF exposure analysis and report is correct to the best of my knowledge, and all calculations, assumptions and conclusions are based on generally acceptable engineering practices:



Report Prepared By
Elizabeth Hillhouse, RF Engineer
10/20/2025



Report Reviewed By
Steven Kennedy, Engineering Manager
10/20/2025

This analysis and report were completed by Elizabeth Hillhouse an RF Engineer. The analysis and report were also peer reviewed by Steven Kennedy an RF Engineer with over 35 years of experience in Wireless Network Engineering.

I certify that the attached RF analysis and report is correct to the best of my knowledge, and all calculations, assumptions and conclusions are based on generally acceptable engineering practices:










10.20.25

2 Executive Summary

This report provides the results of an RF power density analysis performed for **Harmoni Towers** at site **MOSSYROCK** in accordance with the Federal Communications Commission (FCC) rules and regulations for RF emissions described in FCC 19-126

This report addresses RF safety for two classified groups defined by FCC 19-126: Occupational/ Controlled and General Population/ Uncontrolled. Based on the analysis, this site will be **Compliant** with FCC rules and regulations and Harmoni Towers' Signage and Barrier Policy since the mitigation details provided in Table 1 are implemented.

| Minimum Required For Compliance | | | | | | | |
|---------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Mitigation Information |  |  |  |  |  |  |  |
| | Notice | Caution | Warning | Guidelines | Site Info | Barrier | Marker |
| Access Point | X | | | X | X | | |
| Alpha | | | | | | | |
| Beta | | | | | | | |
| Gamma | | | | | | | |
| Delta | | | | | | | |
| Omni | | | | | | | |

| Notes/ Additional Compliance Requirements(s): |
|------------------------------------------------------------------------------------------|
| No Mitigation Required |
| Adding RF Guidelines, Site Info and Blue Notice signs on the Access Gate is recommended. |

Table 1: Mitigation Requirements for Compliance

2.1 Conclusion and Recommendations:

- The results of the analysis indicate that the power density levels in the generally accessible areas on the Ground level will not exceed the FCC's MPE limit for both General Population and Occupational environment.
- The max theoretical cumulative % MPE (Occupational) is 1.3% inside the compound which is not accessible to the General Public.
- No mitigation is required.
- This site will operate in general compliance with FCC 19-126 and Harmoni Towers' Signage and Barrier policy.

3 Introduction

The purpose of this analysis and report is to evaluate the cumulative power density levels of all non-excluded antennas located on the Monopole and identify any areas of concern that require mitigation. This report also assesses the Monopole's compliance with FCC 19-126 ; "Guidelines for Human Exposure to Radio-frequency Electromagnetic Fields".

The power density simulation performed for this site utilized RoofView® analysis software. All antennas were assigned an operating frequency and transmit power and were deemed to be operating at 100% of their rated output power.

3.1 Site Description:

- **Site Name:** MOSSYROCK
- **Street Address:** 262 SKYVIEW DR MOSSYROCK, WA 98564
- **Latitude:** 46° 32' 44.85" N
- **Longitude:** 122° 30' 16.60" W
- **Structure Type:** Monopole
- **Structure Height:** 150' AGL
- **BTS Equipment Location:** Within the shelter inside the fenced-in compound.
- **Co-Locators/ Other Antennas:** Total of (3) co-locators and (27) antennas
- **Access:** Access is through a locked gate on the South-West side of the fenced-in compound.
- **Other Notes:** There are no other adjacent structures where the General Population would get within an unsafe distance.

3.2 Site Configuration Being Modeled:

- This site has (1) carrier with (3) sectors
- There is a total of (12) antennas
- Each sector supports various LTE carriers including, but not limited to 600 MHz, 700 MHz, 850 MHz, 1900 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3700 MHz, and 3800MHz frequencies.
- All LTE supports MIMO.

3.3 Assumptions:

- The fenced-in compound will remain locked and is not accessible to the General Population.

4 Predictive Analysis Details:

For purposes of this analysis, RoofView® was configured to provide an output based on the appropriate MPE limit(s) published in the FCC's guidelines. The antenna information was loaded into RoofView®, an MPE predictive analysis tool by Richard Tell and Associates, Inc.

4.1 Analysis Locations:

Number of Elevations Analyzed: 1

- The Ground level is accessible to the General Population outside the fenced-in compound and is accessible to the Occupational population within the fenced-in compound.

4.2 Antenna Inventory:

The following table contains the technical data used to simulate the power density that may be encountered with all antennas simultaneously operating at full rated power with the exception of any excluded antennas cited in this document. If Co-Locator antennas exist and specific antenna details could not be secured, generic antennas, frequencies, and Tx powers were used for modeling. The assumptions used are based on past experience with communications carriers.

| ID | Name | (MHz) Freq | Trans Power | Trans Count | Mfg | Model | (ft) Z | Type | (ft) Aper | dBd Gain | BWdth Pt Dir |
|-------|-------|---------------|----------------|----------------|--------------|-----------------|-----------|-----------|--------------|-------------|-----------------|
| VZA1A | L700 | 730.00000 | 40.0 | 4 | Commscope | NNSS-65C-HG-R2B | 146.0 | Octoport | 8.0 | 13.75 | 72;15 |
| VZA2A | L1900 | 1960.00000 | 60.0 | 4 | Ericsson | AIR3283 | 150.0 | Multibeam | 4.0 | 20.75 | 65;15 |
| VZA2B | L2100 | 2150.00000 | 80.0 | 4 | Ericsson | AIR3283 | 150.0 | Multibeam | 4.0 | 21.55 | 120;15 |
| VZA3A | L3700 | 3700.00000 | 5.0 | 64 | Ericsson | AIR6419 | 151.5 | Multibeam | 2.6 | 22.85 | 65;15 |
| VZA3B | L3800 | 3800.00000 | 5.0 | 64 | Ericsson | AIR6419 | 151.5 | Multibeam | 2.6 | 22.85 | 65;15 |
| VZB1A | L700 | 730.00000 | 40.0 | 4 | Commscope | NNSS-65C-HG-R2B | 146.0 | Octoport | 8.0 | 13.75 | 72;135 |
| VZB2A | L1900 | 1960.00000 | 60.0 | 4 | Ericsson | AIR3283 | 150.0 | Multibeam | 4.0 | 20.75 | 65;135 |
| VZB2B | L2100 | 2150.00000 | 80.0 | 4 | Ericsson | AIR3283 | 150.0 | Multibeam | 4.0 | 21.55 | 120;135 |
| VZB3A | L3700 | 3700.00000 | 5.0 | 64 | Ericsson | AIR6419 | 151.5 | Multibeam | 2.6 | 22.85 | 65;135 |
| VZB3B | L3800 | 3800.00000 | 5.0 | 64 | Ericsson | AIR6419 | 151.5 | Multibeam | 2.6 | 22.85 | 65;135 |
| VZC1A | L700 | 730.00000 | 40.0 | 4 | Commscope | NNSS-65C-HG-R2B | 146.0 | Octoport | 8.0 | 13.75 | 72;255 |
| VZC2A | L1900 | 1960.00000 | 60.0 | 4 | Ericsson | AIR3283 | 150.0 | Multibeam | 4.0 | 20.75 | 65;255 |
| VZC2B | L2100 | 2150.00000 | 80.0 | 4 | Ericsson | AIR3283 | 150.0 | Multibeam | 4.0 | 21.55 | 120;255 |
| VZC3A | L3700 | 3700.00000 | 5.0 | 64 | Ericsson | AIR6419 | 151.5 | Multibeam | 2.6 | 22.85 | 65;255 |
| VZC3B | L3800 | 3800.00000 | 5.0 | 64 | Ericsson | AIR6419 | 151.5 | Multibeam | 2.6 | 22.85 | 65;255 |
| VZC2B | L2100 | 2150.00000 | 80.0 | 4 | JMA WIRELESS | MX10FRO860-03 | 66.0 | Ten-Port | 8.0 | 15.85 | 55.5; |
| VZC3A | L3700 | 3700.00000 | 5.0 | 64 | Ericsson | AIR6419 | 68.7 | Multibeam | 2.6 | 22.85 | 65; |
| VZC3B | L3800 | 3800.00000 | 5.0 | 64 | Ericsson | AIR6419 | 68.7 | Multibeam | 2.6 | 22.85 | 65; |

Table 2- Antenna Inventory

4.3 RF Emissions Diagram(s)- All Transmitters:

The following Diagram(s) represent the theoretical spatially averaged Maximum Permissible Exposure (MPE) percentages that are expected for each study's elevation from all Transmitters.

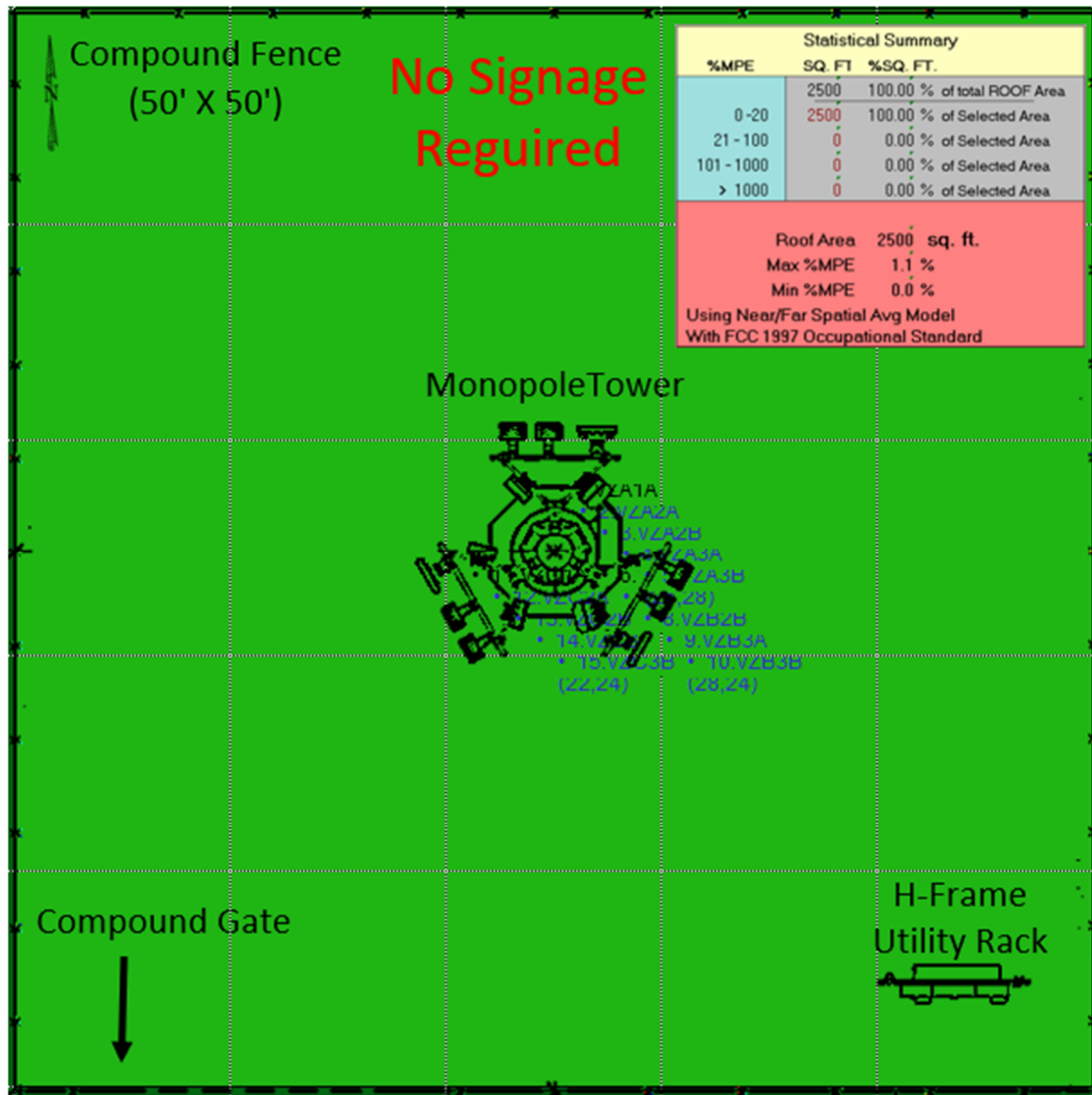


Diagram 1- MPE% (Occupational) for Ground Level

Green ≤ 20% Occupational Limit (≤ 100% General Population Limit)
 Blue > 20% through 100% Occupational Limit (> 100% General Population Limit)
 Yellow > 100% through 1000% Occupational Limit
 Red > 1000% Occupational Limit

5 Signage/ Mitigation:

5.1 Signage/ Barrier Detail








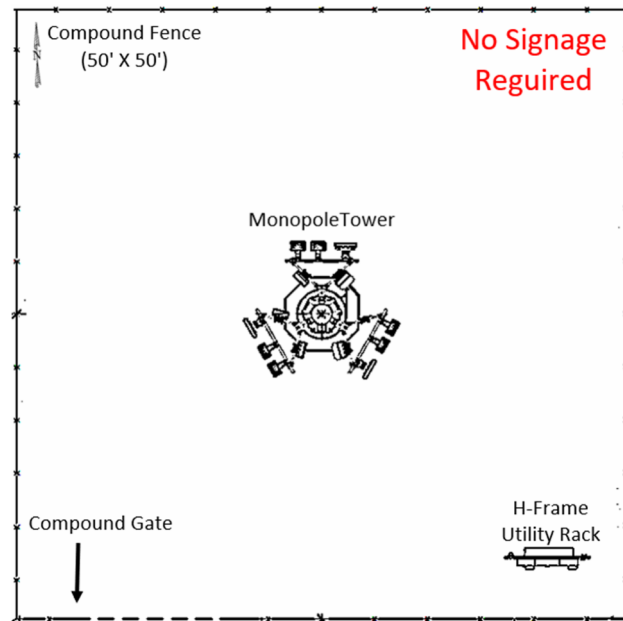
| Minimum Required For Compliance | | | | | | | |
|---------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Mitigation Information |  |  |  |  |  |  |  |
| | Notice | Caution | Warning | Guidelines | Site Info | Barrier | Marker |
| Access Point | X | | | X | X | | |
| Alpha | | | | | | | |
| Beta | | | | | | | |
| Gamma | | | | | | | |
| Delta | | | | | | | |
| Omni | | | | | | | |

Table 3-Mitigation Requirements for Compliance

| Notes/ Additional Mitigation Details from Audit: |
|------------------------------------------------------------------------------------------|
| No Mitigation Required |
| Adding RF Guidelines, Site Info and Blue Notice signs on the Access Gate is recommended. |



5.2 Signage/ Barrier Diagram

Conclusions and Recommendations:

- The results of the analysis indicate that the power density levels in the generally accessible areas on the Ground level will not exceed the FCC's MPE limit for both General Population and Occupational environment.
- The max theoretical cumulative % MPE (Occupational) is 1.3% inside the compound which is not accessible to the General Public.
- No mitigation is required.
- This site will operate in general compliance with FCC 19-126 and Harmoni Towers's Signage and Barrier policy.

Note: Modifications to the site; and/or increases in channel counts or power levels exceeding those listed in this report will require additional evaluation to determine compliance

6 Appendix A: FCC Compliance and RF Safety Policies

In August of 1997, the FCC published OET Bulletin 65 Edition 97-01 to regulate methods for evaluating compliance with FCC guidelines for human exposure to radiofrequency (RF) electromagnetic fields. The FCC guidelines for human exposure to RF electromagnetic fields incorporate two categories of limits; namely "Controlled" (a.k.a. Occupational) and "Uncontrolled" (a.k.a. General Public). The guidelines offer suggested methods for evaluating fixed RF transmitters to insure that the controlled and uncontrolled limits deemed safe by the FC for human exposure are not exceeded.

OET Bulletin 65 recommended guidelines are intended to allow an applicant to "make a reasonably quick determination as to whether a proposed facility is in compliance with the limits." In addition, the guidelines offer alternate supplementary considerations and procedures such as field measurements and more detailed analysis that should be used for multiple emitter situations.

These guidelines define RF as emissions in the frequency range of 300 kHz to 100 GHz. The FCC define Maximum Permissible Exposure (MPE) limits within this frequency range based on limits recommended by the National Council on Radiation Protection and Measurement, the Institute of Electrical and Electronics Engineers (IEEE), and by the American National Standards Institute (ANSI).

The specific MPE limits defined by the FCC are as follows:

| Limits for Occupational/Controlled Exposure | | | | |
|---------------------------------------------|-----------------------------------|-----------------------------------|-----------------------------------------|--------------------------------------------|
| Frequency Range [MHz] | Electric Field Strength (E) [V/m] | Magnetic Field Strength (H) [A/m] | Power Density (S) [mW/Cm ²] | Averaging Time E ^2, H ^2 or S [minutes] |
| 0.3 - 3.0 | 614 | 1.63 | 100* | 6 |
| 3.0 - 30 | 1842/f | 4.89/f | 900/f ² * | 6 |
| 30 - 300 | 61.4 | 0.163 | 1 | 6 |
| 300 - 1,500 | - | - | f/300 | 6 |
| 1,500 - 100,000 | - | - | 5 | 6 |

| Limits for General Population/Uncontrolled Exposure | | | | |
|-----------------------------------------------------|-----------------------------------|-----------------------------------|-----------------------------------------|--------------------------------------------|
| Frequency Range [MHz] | Electric Field Strength (E) [V/m] | Magnetic Field Strength (H) [A/m] | Power Density (S) [mW/Cm ²] | Averaging Time E ^2, H ^2 or S [minutes] |
| 0.3 - 3.0 | 614 | 1.63 | 100* | 30 |
| 3.0 - 30 | 842/f | 2.19/f | 180/f ² * | 30 |
| 30 - 300 | 27.5 | 0.073 | 0.2 | 30 |
| 300 - 1,500 | - | - | f/1500 | 30 |
| 1,500 - 100,000 | - | - | 1 | 30 |

f = frequency

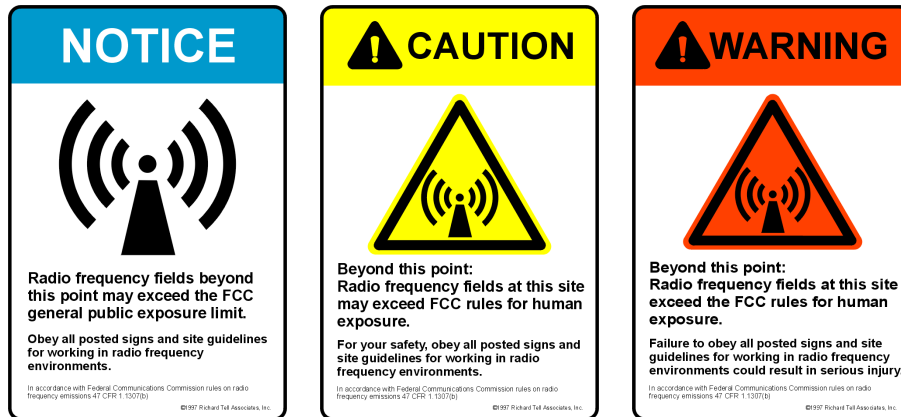
*Plane-wave equivalent power density

The FCC states that “Occupational/ Controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for Occupational/ Controlled exposure also apply in situations when an individual is transient through a location where Occupational/ Controlled limits apply provided he or she is made aware of the potential for exposure.”

For General Population/ Uncontrolled limits, the FCC states that “General Population/ Uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not fully be aware of the potential for exposure or cannot exercise control over their exposure.”

For purposes of this analysis, all limits are evaluated against the Power Density limits.

Typical guidelines for determining whether Occupational/ Controlled limits can be applied include insuring the environment (such as a rooftop) as limited/controlled access via locked doors or physical barrier that are preferably controlled by a landlord that is aware of the situation and can inform anyone going through the locked door of the existence of the RF emissions. Such notification/awareness is typically accomplished by means of signage on the door, or other access to the area of concern, as well as signage on or near the antennas. Examples of such signs include the following:



Standards for when to use each of the above signs for Occupational situations are as follows:

No sign required: <20% of Occupational MPE
Blue Sign, Notice: 20% to <100% of MPE
Yellow Sign, Caution: 100% to <1000% of MPE
Red Sign, Warning: >1000% of MPE

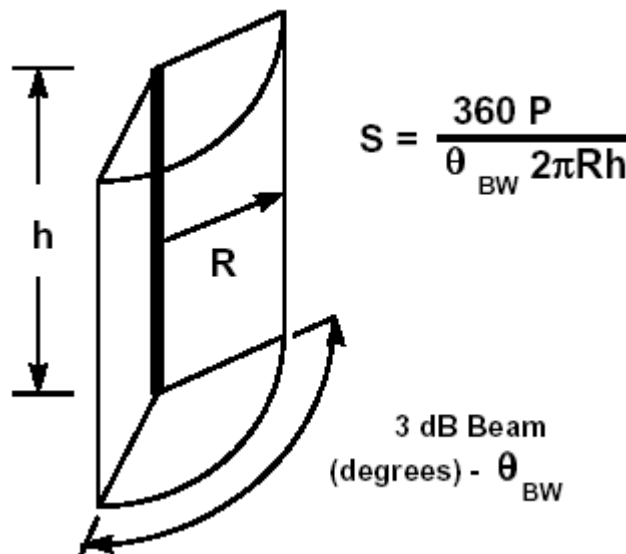
All MPE references are to the FCC Occupational limits.

7 Appendix B: Overview of RoofView® Functions and Assumptions

RoofView® is a tool developed and supported by Richard Tell Associates, Inc. to be used for analysis of RF field levels at telecommunications sites produced by antennas of the type commonly used in cellular, paging, SMR, PCS and two-way radio communications services. Although its name suggests that the tool is only for use in evaluating emissions for roof top applications, it can also be used to evaluate ground level effects of tower facilities.

RoofView® allows the user to apply near field, far field, or a combination of near and far field computational methods as desired by the user. For this analysis, near field computations are used for areas within the near field, and far field computations are used beyond the near field. Specific break points are dynamic based on the aperture of the antenna being analyzed.

The near field methodology is based on a cylindrical model that assumes the power into an antenna is distributed as a cylinder around the aperture of the antenna. Research by Richard Tell Associates, Inc. found that using such a model, along with corrections for height and antenna pattern, is very accurate, if not slightly conservative in estimating RF exposure. FCC Bulletin 65 recognizes the use of the cylindrical model for near field calculations. The following picture and corresponding equation summarizes the computations used by RoofView® on a bin-by-bin basis when the near field method is used:



Each bin's results are then also adjusted by spatially averaging the portion of a 6 foot tall human that intercepts the aperture over 6 feet. Once the antenna is completely above (or below) the height that corresponds to a 6 foot tall human, the cylindrical results are reduced

to 10% of their results and then dissipated inversely in proportion to the square of the distance.

Once bins being analyzed fall outside of the near field (as determined by a method and variable that is user-selectable; see below for method and variable used in this analysis), a far-field spatial average is calculated. Spatially averaged power density in the far-field is calculated by reducing the spatially averaged power density inversely, by the square of the distance from the antenna(s).

There are several input variables to RoofView® that can impact the results produced when evaluating specific cell sites. Those variables are summarized accordingly:

Standard

FCC 1997 Occupational (default)
FCC 1997 General Population (as applicable)

Model

Near/Far Spatial Average

Uptime

100% (vary as applicable)

Near/Far Field Transition Method

X ApHt

Near/Far Field Transition At Ht Factor

1.5

8 References

FCC (1997). “Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields”; Federal Communications Commission; Office of Engineering and Technology, OET Bulletin 65, Edition 97-01, August.

Richard Tell Associates, Inc. (2003). RoofView® User Guide Version 4.15, Richard Tell Associates, Inc., February 10, 2003.

9 Limited Warranty

Biwabkos Consultants LLC warrants that this analysis was performed in good faith using the methodologies and assumptions covered in this report and that data used for the analysis and report were obtained by Biwabkos Consultants LLC employees or representatives via site surveys or research of Harmoni Towers available information. In the event that specific third party details were not available, best efforts were made to use assumptions that are based on industry experience of various carriers' standards without violating any confidential information obtained under non-disclosure terms.

Biwabkos Consultants LLC also warrants that this analysis was performed in accordance with industry acceptable standards and methods.

There are no other warranties, express or implied, including but not limited to, the implied warranties of merchantability and fitness for a particular purpose, relating to this agreement or to the services rendered by Biwabkos Consultants hereunder. In no event shall Biwabkos Consultants be held liable to Harmoni Towers, or to any third party, for any indirect, special, incidental, or consequential damages, including but not limited to loss of profits, loss of data, loss of good will, and increased expenses. In no event shall Biwabkos Consultants be liable to Harmoni Towers for damages, whether based in contract, tort, negligence, strict liability, or otherwise, exceeding the amount payable hereunder for the services giving rise to such liability.

WIRELESS NETWORK CONSULTING

Harmoni WA0007224 Mossyrock
Verizon Harmony
Capacity Site

RF DESIGN ANALYSIS



Certification

This analysis and report was completed by Steven Kennedy an Independent Radio Frequency Engineer with over 36 years of experience in Wireless Network Engineering.

I certify that the attached RF analysis and report is correct to the best of my knowledge, and all calculations, assumptions and conclusions are based on generally acceptable engineering practices

A handwritten signature in blue ink, appearing to read 'SEK', is shown within a white rectangular box.

Steven E Kennedy

Coverage vs Capacity

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

Objective of new site

† Capacity

- Provide additional bandwidth for customers in the area surrounding the proposed site
- Provide better throughput for indoor users in the area
- Offload sites to the West and SE that are overloaded

† Coverage

- Provide coverage in Mossyrock and North in the rural areas
- Provide coverage along Hwy 12 and feeder roads in the area

† Why is this site important?

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

Proposed Site

† 150' Monopole

- 262 Skyview Drive Mossyrock, WA 98564
 - Latitude: 46.545793 N (NAD83)
 - Longitude: -122.504611 W (NAD83)
 - Ground Elevation: 1061.8' (NAVD88)
 - Anchor tenant is Verizon
- Antenna Centerline at 146' AGL

Why here?

- † Surrounding area has lack of quality services
- † All (3) carriers are lacking quality service in the area
- † Many of the users' mobiles are reporting low quality connections from Crowd Source (CellMapper and FCC broadband maps).
- † Significant growth in wireless network utilization in the rural areas of Washington.
- † Sites to the West and SE are over capacity (throughput limitations)
- † Coverage quality will increase in the area with the proposed tower

Tower Infrastructure

- † Lack of existing verticality around the proposed
- † Some structures are 2 stories high (approximately 24')
- † Area requires a tower structure to provide better service in the area
- † There are no vertical structures within the area of the proposed and it's coverage area

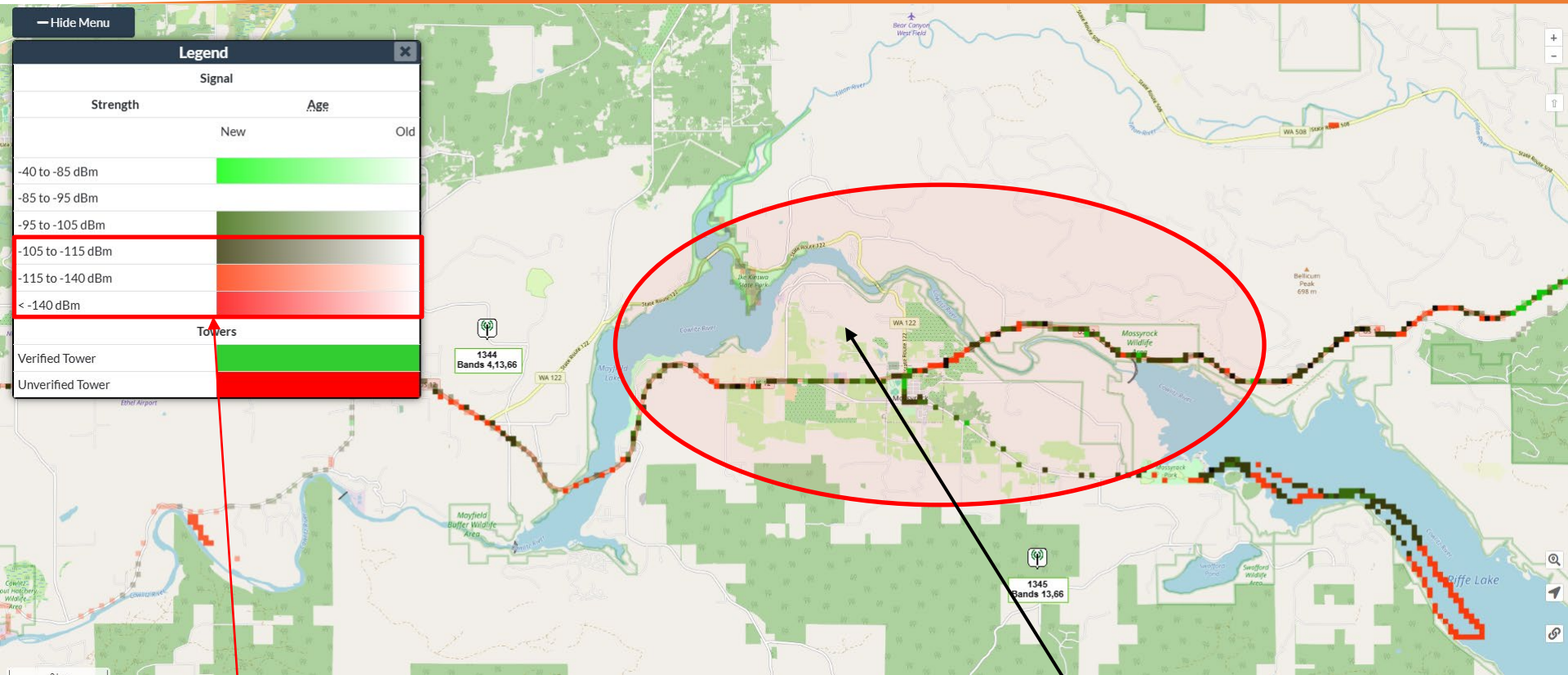
Zoom – proposed site



Distance from proposed to Verizon neighbor sites



Verizon CellMapper



Less than on Street Coverage

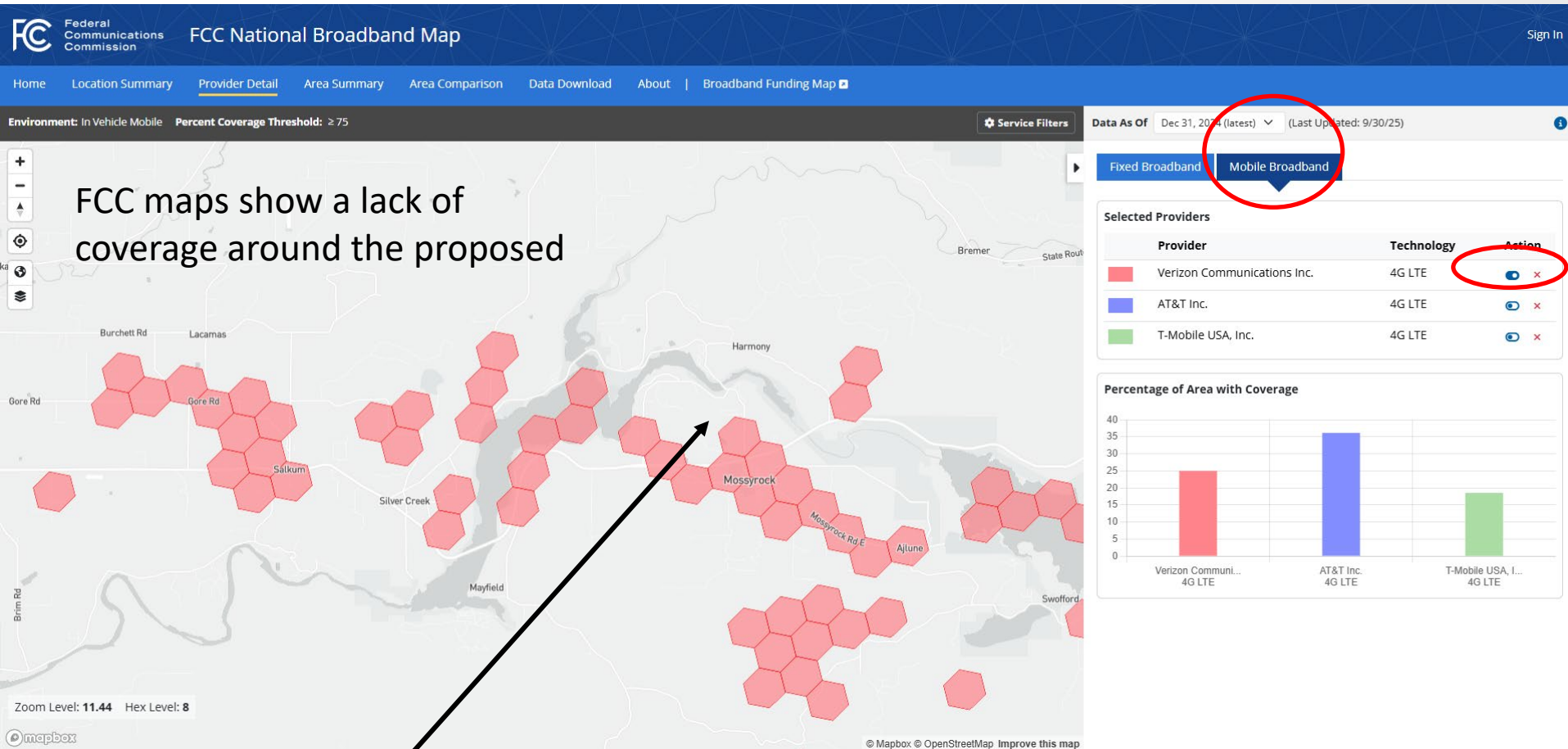
Proposed Site

The area in the red circle is what the proposed site would impact

This area is showing less than in-vehicle/outdoor service in the area

FCC Broadband Map




Verizon In-Vehicle Mobile

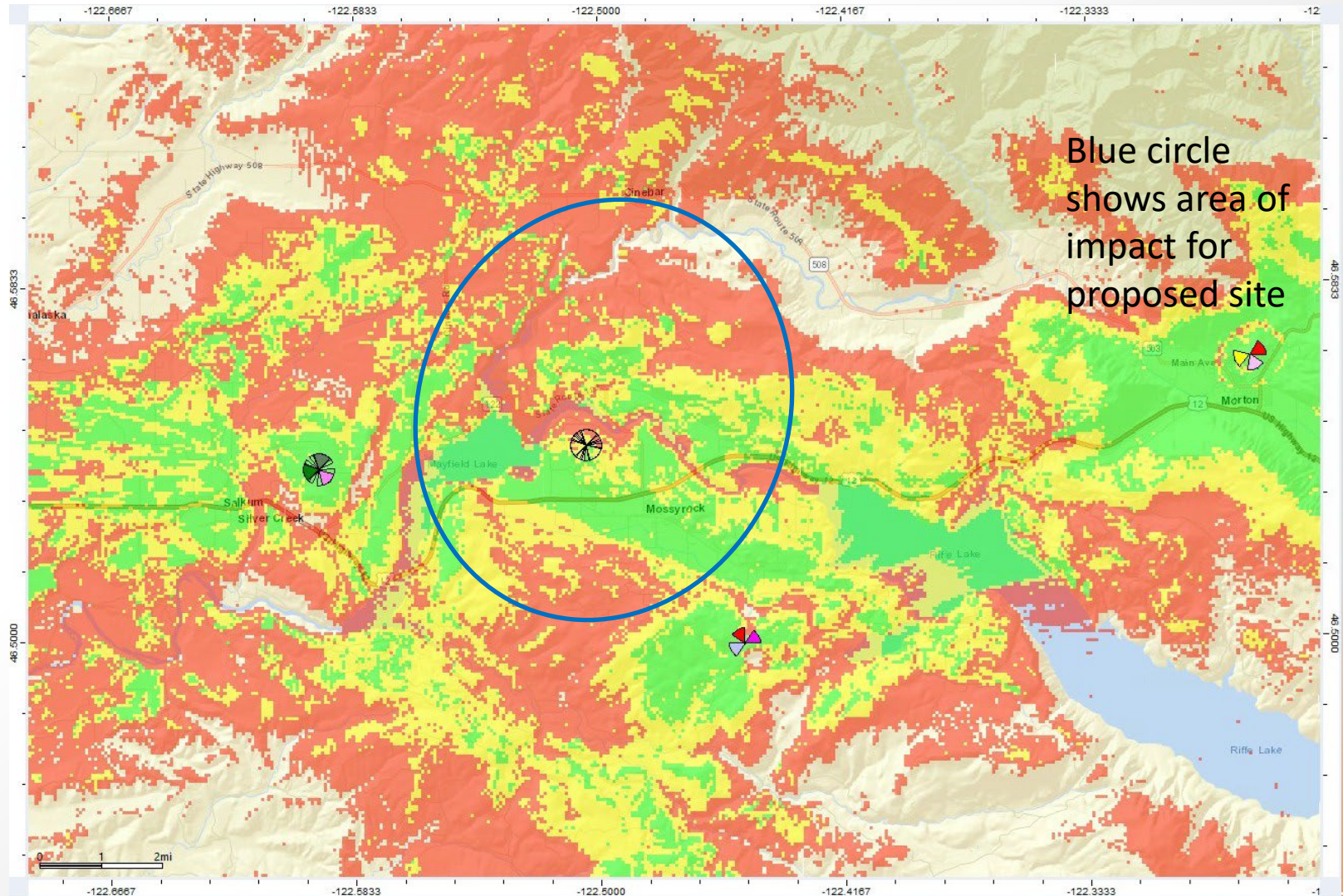


Source: <https://broadbandmap.fcc.gov/home>

2025




Current Coverage – 751 MHz

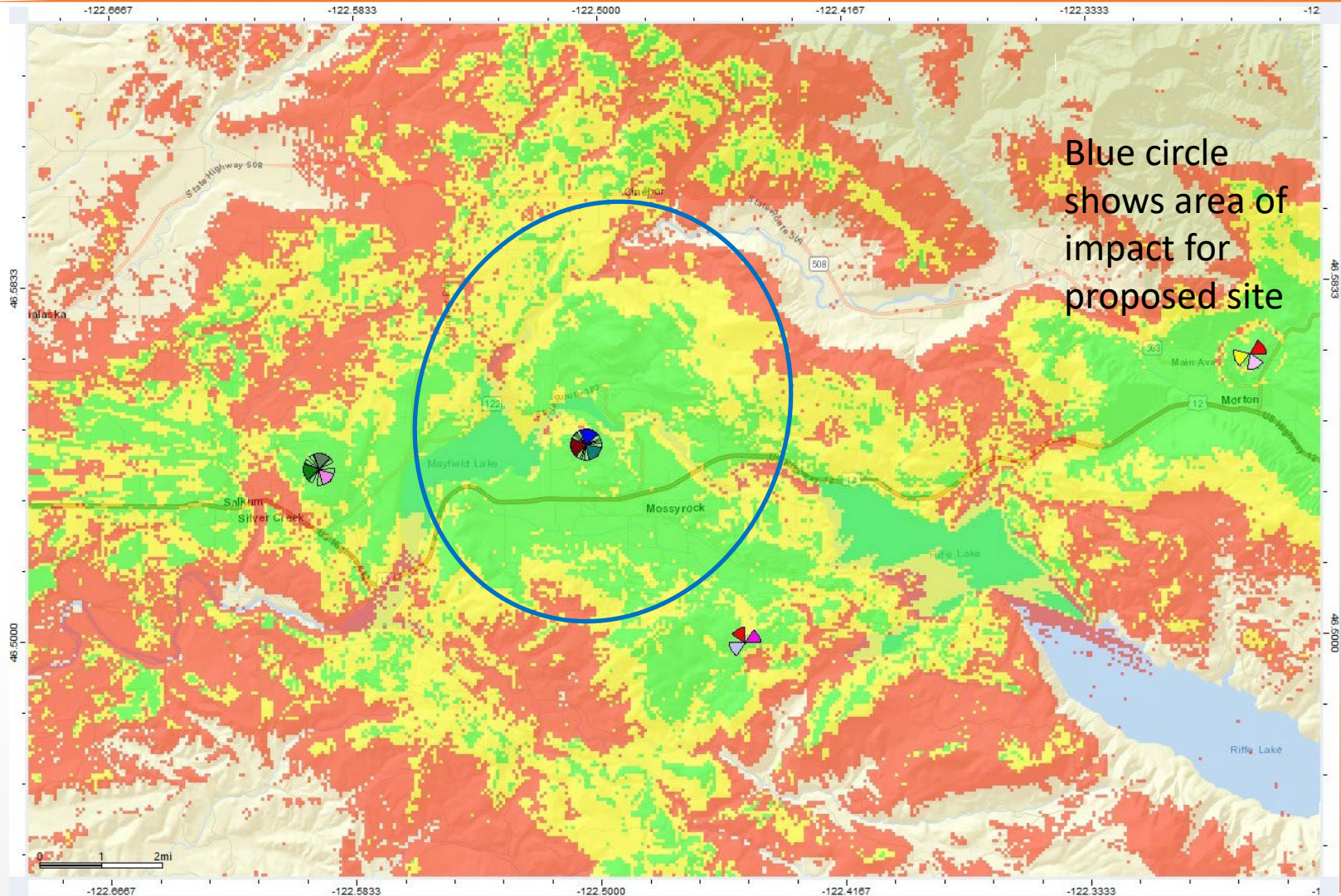
| LEGEND | |
|-----------------------------------------------------------------------------------|---------------------------|
|  | Indoor ≥ -85 dbm |
|  | In-Vehicle ≥ -95 dbm |
|  | On-Street ≥ -106 dbm |



Verizon RSRP

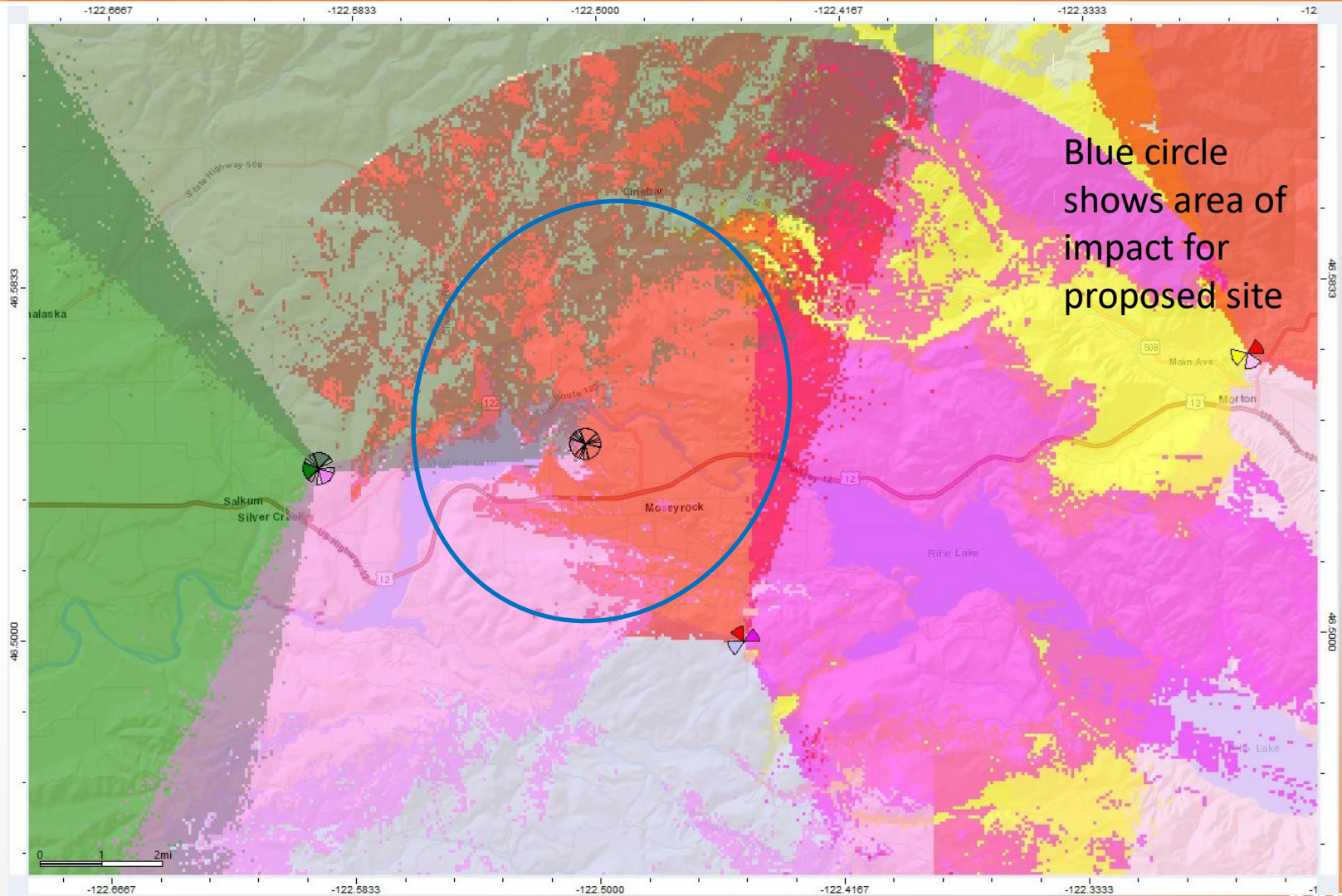
Proposed Coverage – 751 MHz

| LEGEND | |
|-------------------------------------------------------------------------------------|---------------------------|
|  | Indoor ≥ -85 dbm |
|  | In-Vehicle ≥ -95 dbm |
|  | On-Street ≥ -106 dbm |



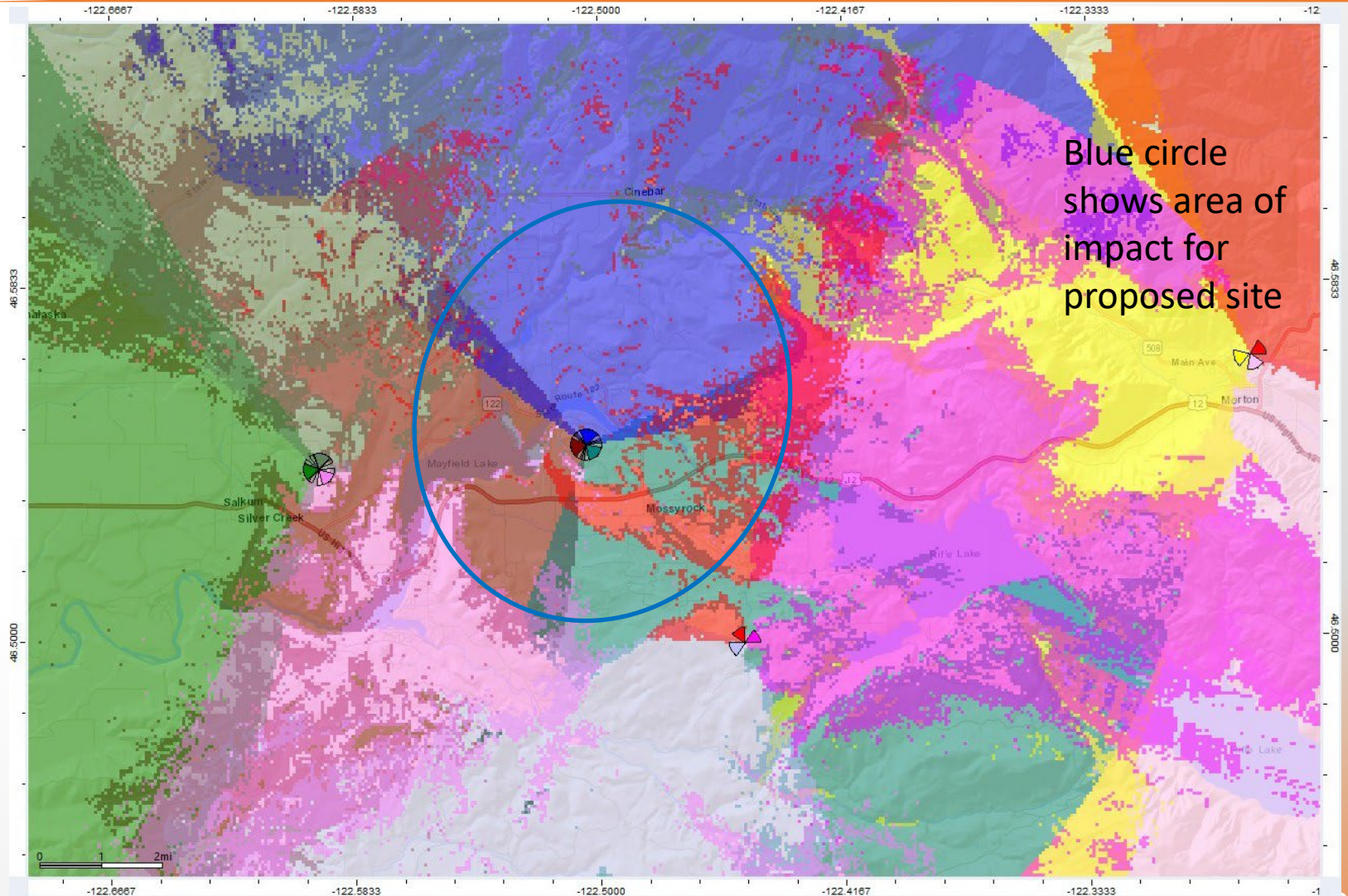
Verizon

Current Best Server – 751 MHz





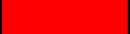
Verizon

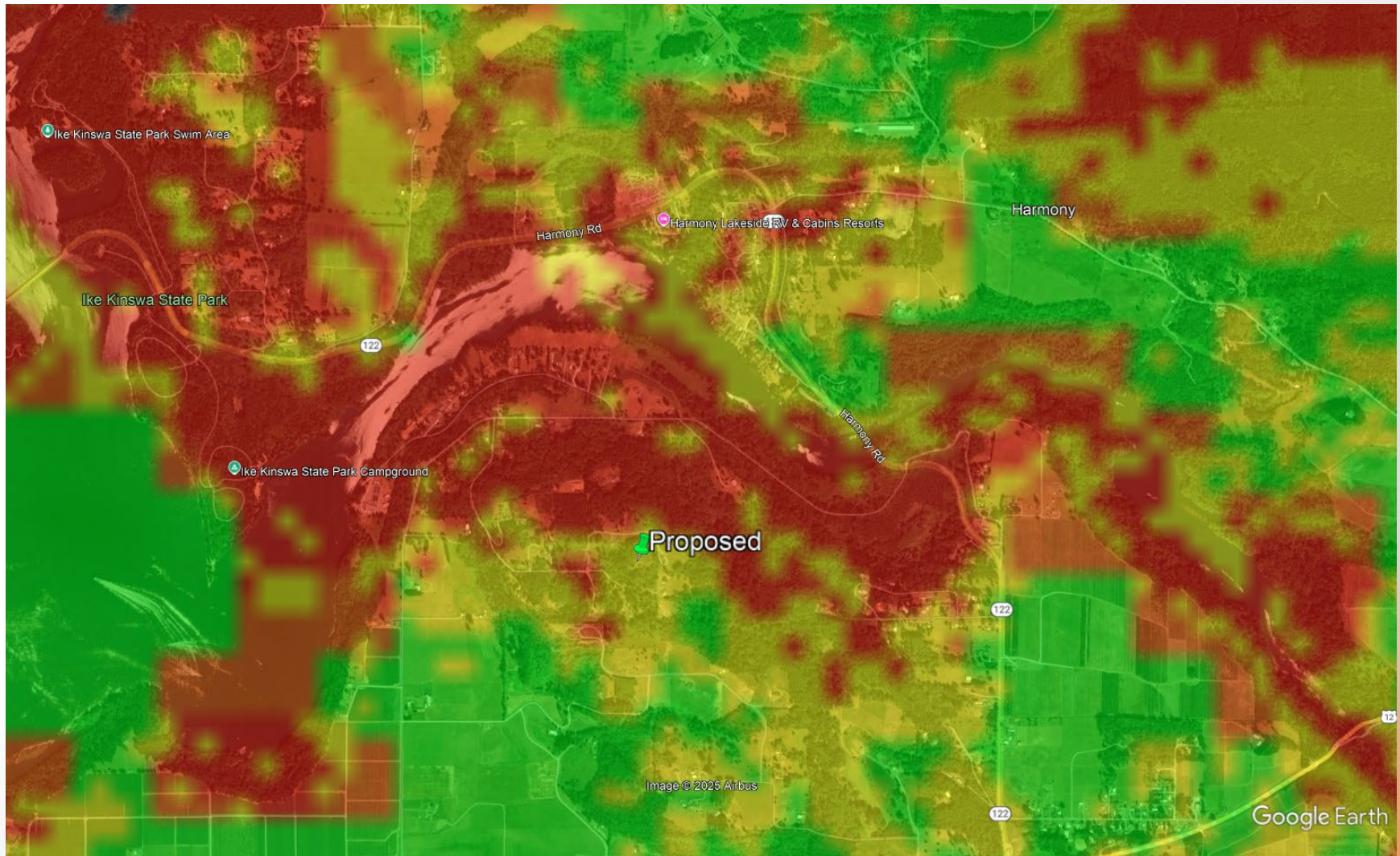
Proposed Best Server – 751 MHz



Verizon RSRP – 751 MHz




Current Coverage - zoomed

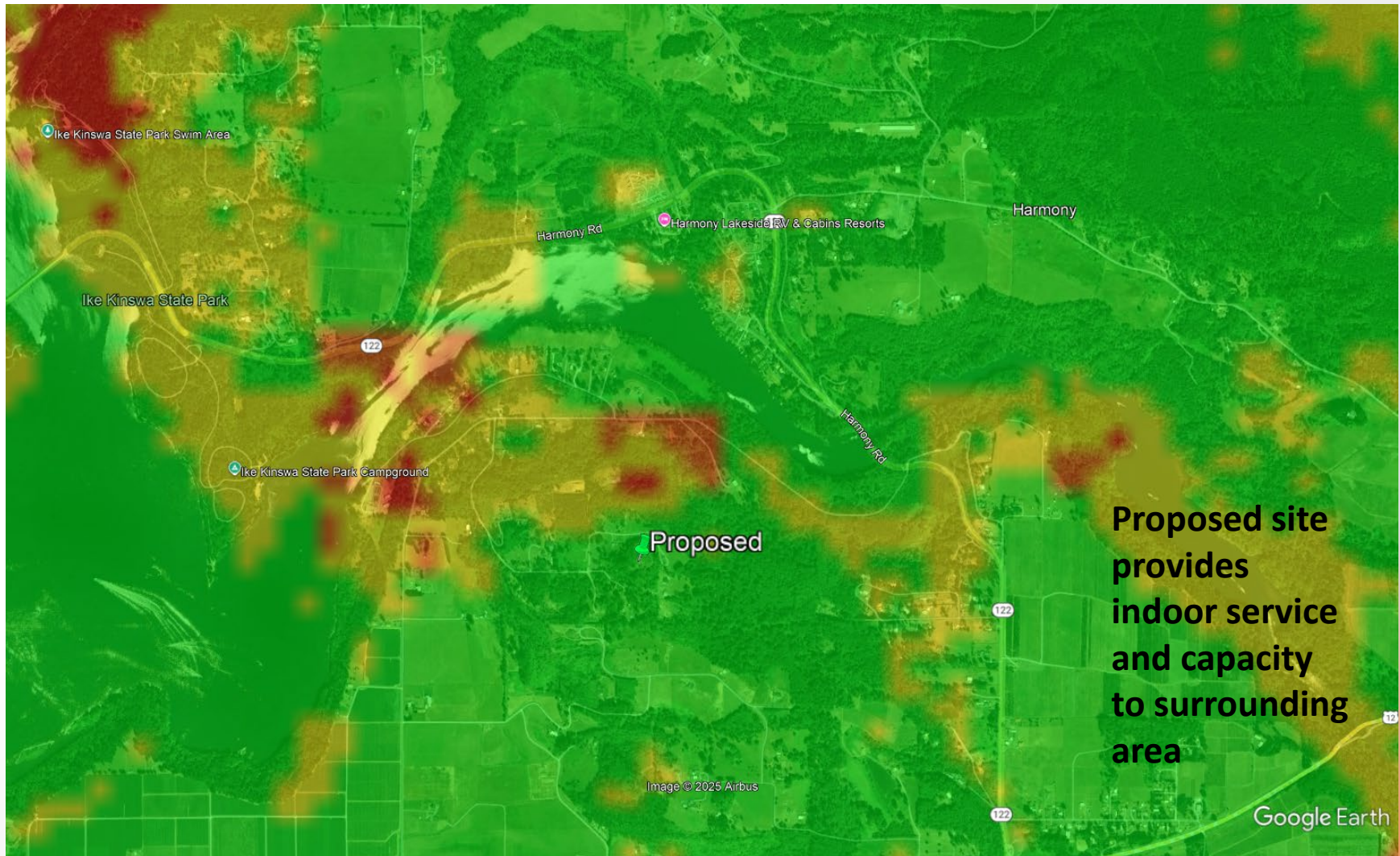
| LEGEND | |
|-------------------------------------------------------------------------------------|---------------------------|
|  | Indoor ≥ -85 dbm |
|  | In-Vehicle ≥ -95 dbm |
|  | On-Street ≥ -106 dbm |





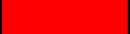
Verizon RSRP – 751 MHz

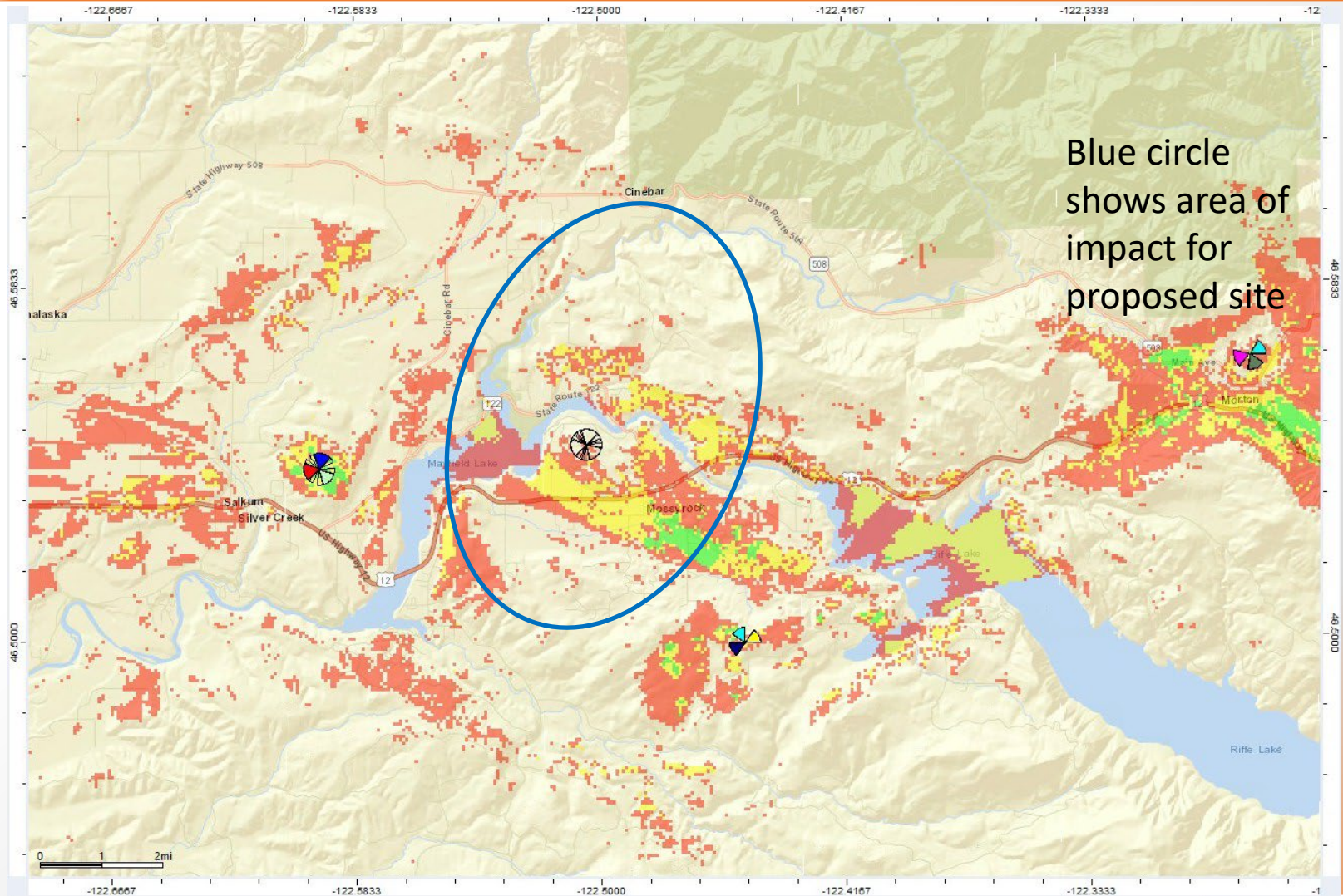
Proposed Coverage - zoomed

| LEGEND | |
|-------------------------------------------------------------------------------------|---------------------------|
|  | Indoor ≥ -85 dbm |
|  | In-Vehicle ≥ -95 dbm |
|  | On-Street ≥ -106 dbm |



Verizon RSRP Current Coverage – 2120 MHz




| LEGEND | |
|-------------------------------------------------------------------------------------|---------------------------|
|  | Indoor ≥ -85 dbm |
|  | In-Vehicle ≥ -95 dbm |
|  | On-Street ≥ -106 dbm |

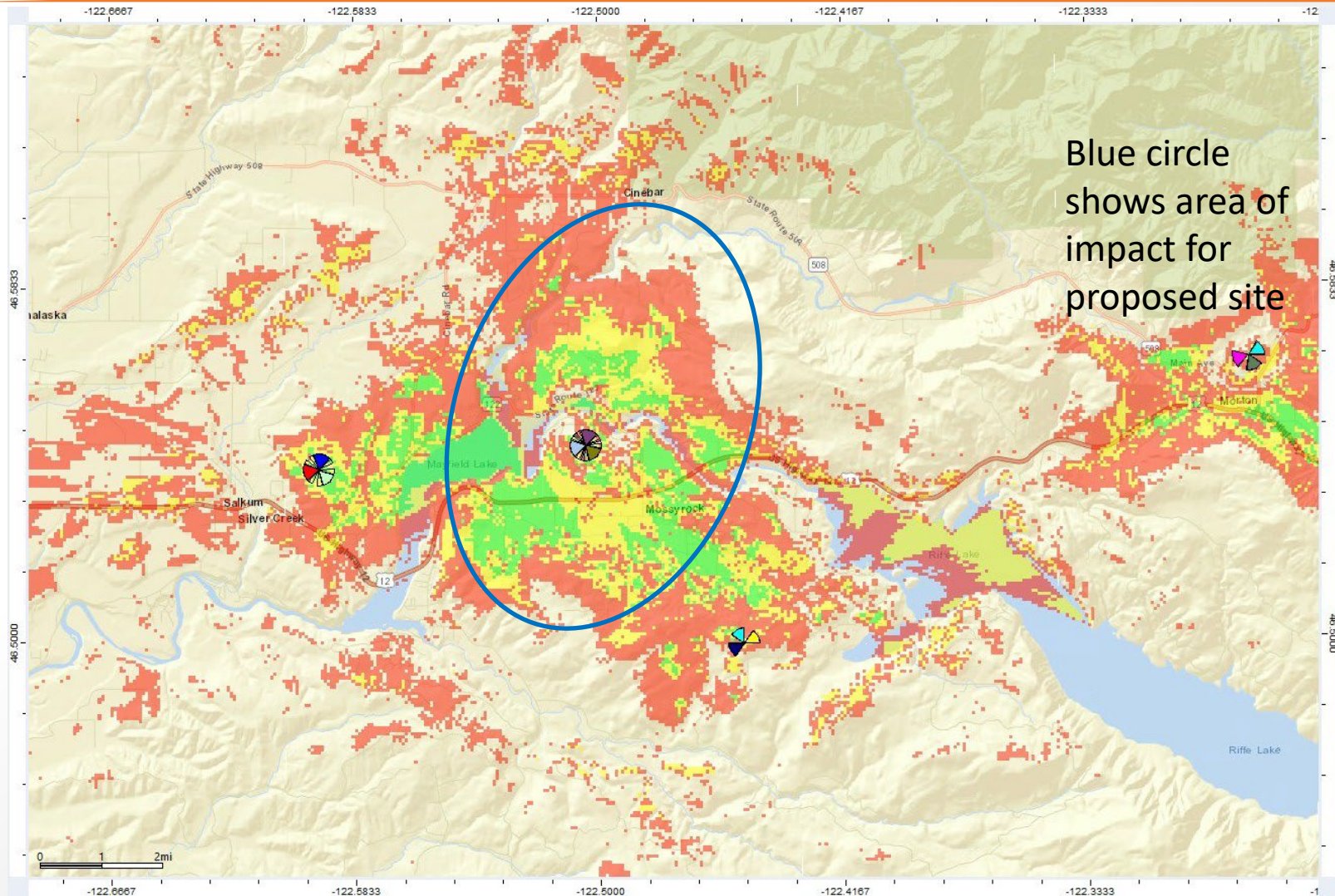


Blue circle
shows area of
impact for
proposed site

Verizon RSRP

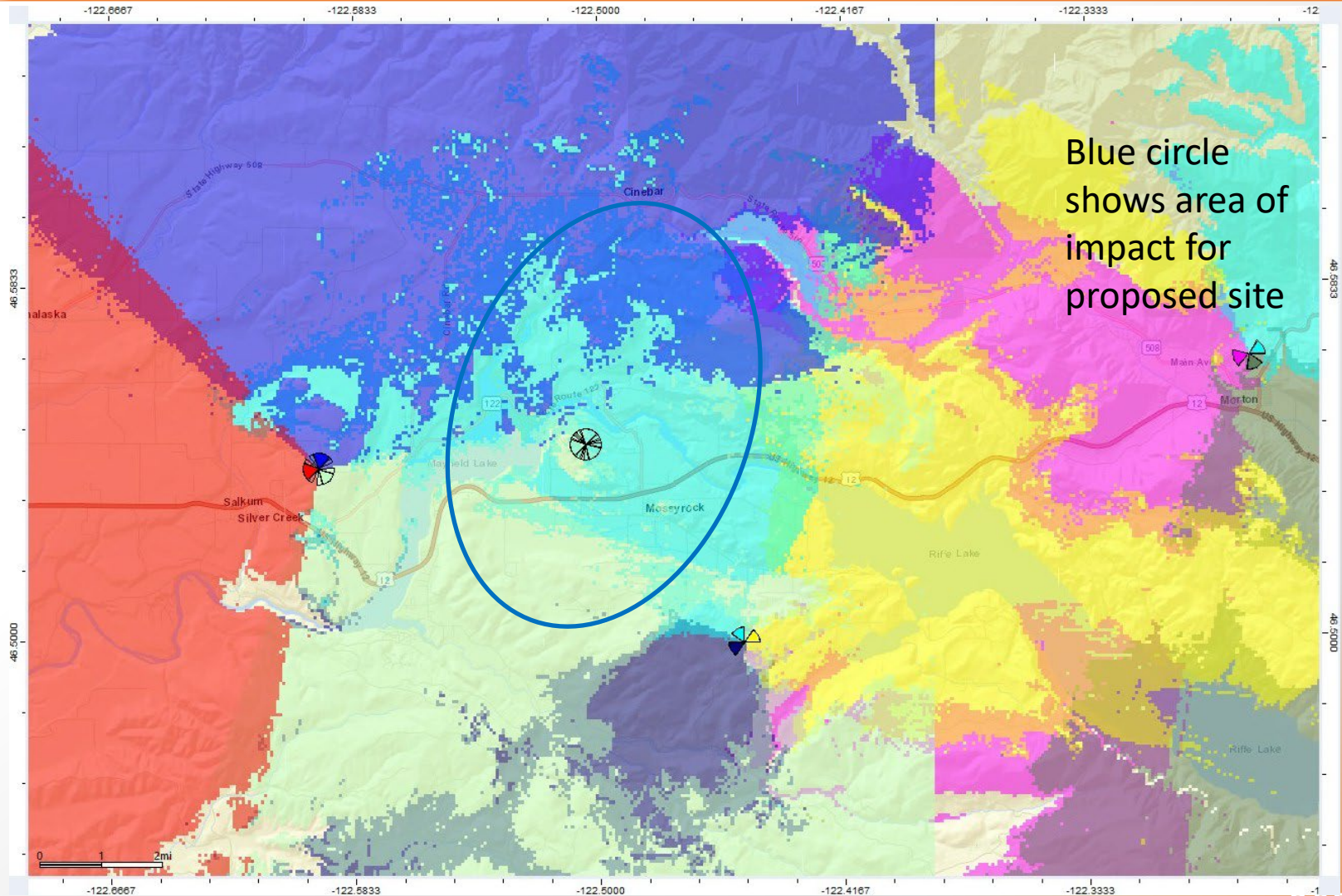
Proposed Coverage – 2120 MHz

| LEGEND | |
|-------------------------------------------------------------------------------------|---------------------------|
|  | Indoor ≥ -85 dbm |
|  | In-Vehicle ≥ -95 dbm |
|  | On Foot ≥ -106 dbm |



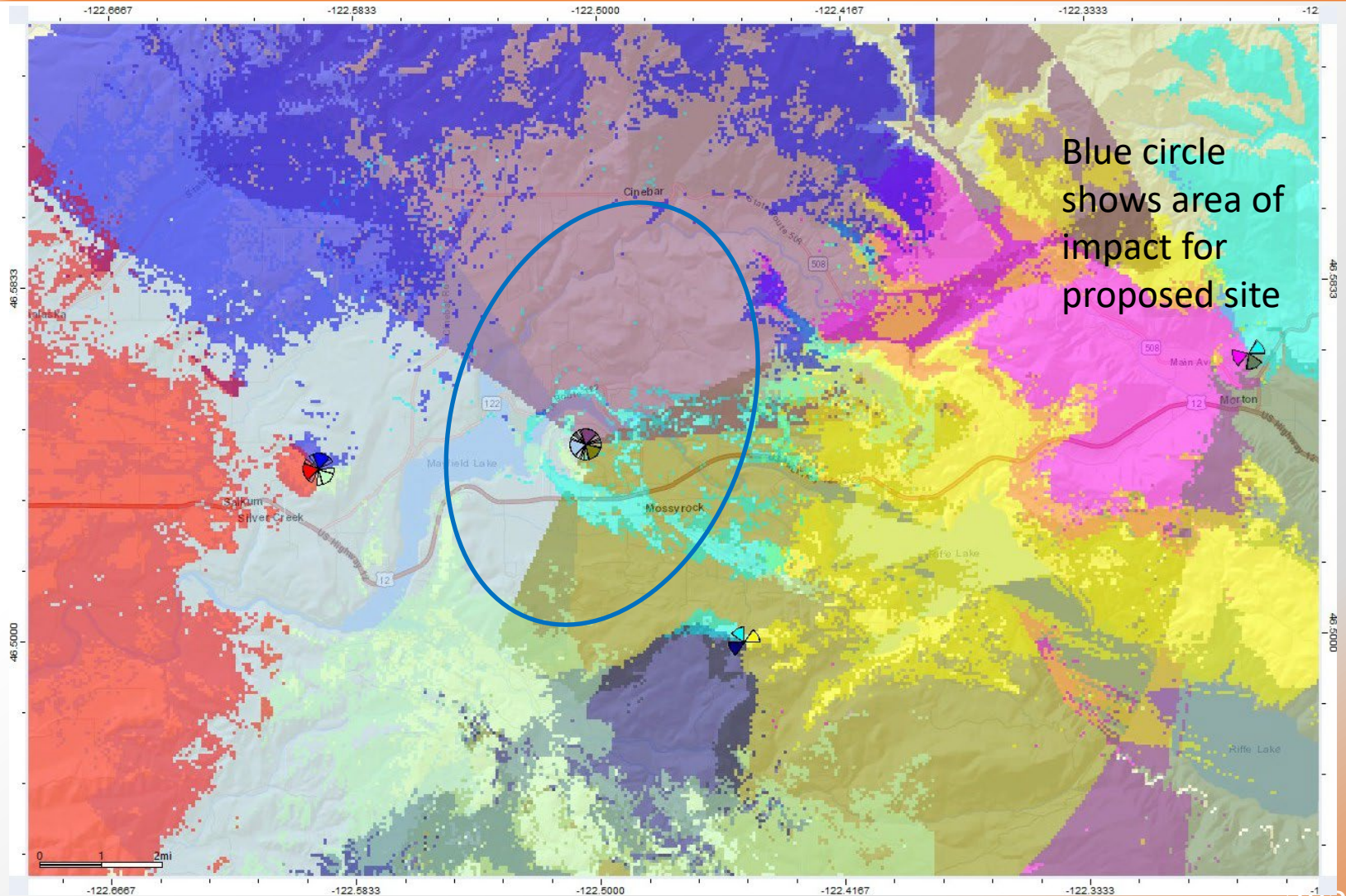
Verizon

Current Best Server – 2120 MHz





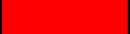
Verizon

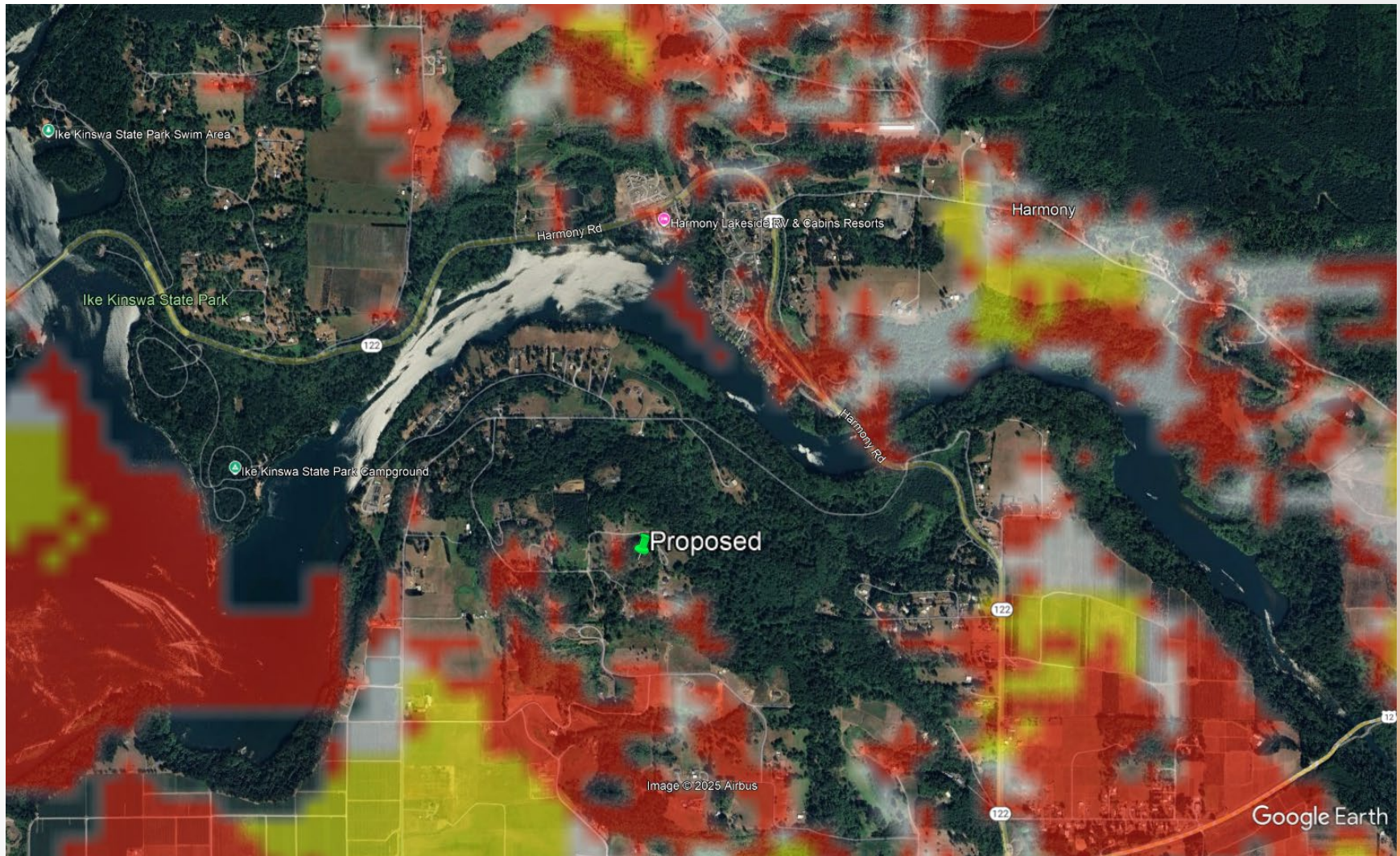
Proposed Best Server – 2120 MHz



Verizon RSRP – 2120 MHz

Current Coverage - zoomed




| LEGEND | |
|-------------------------------------------------------------------------------------|---------------------------|
|  | Indoor ≥ -85 dbm |
|  | In-Vehicle ≥ -95 dbm |
|  | On-Street ≥ -106 dbm |

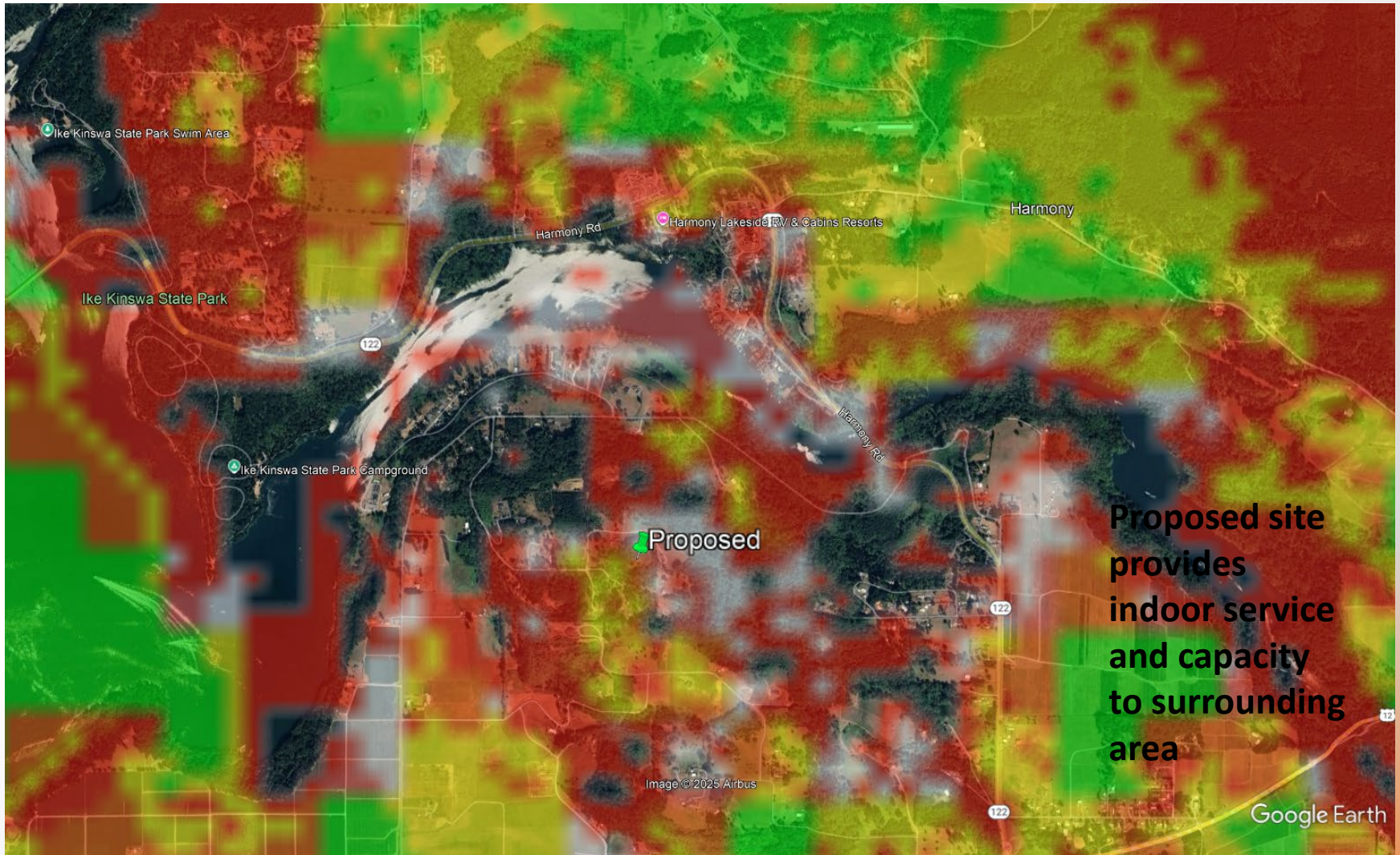


2025

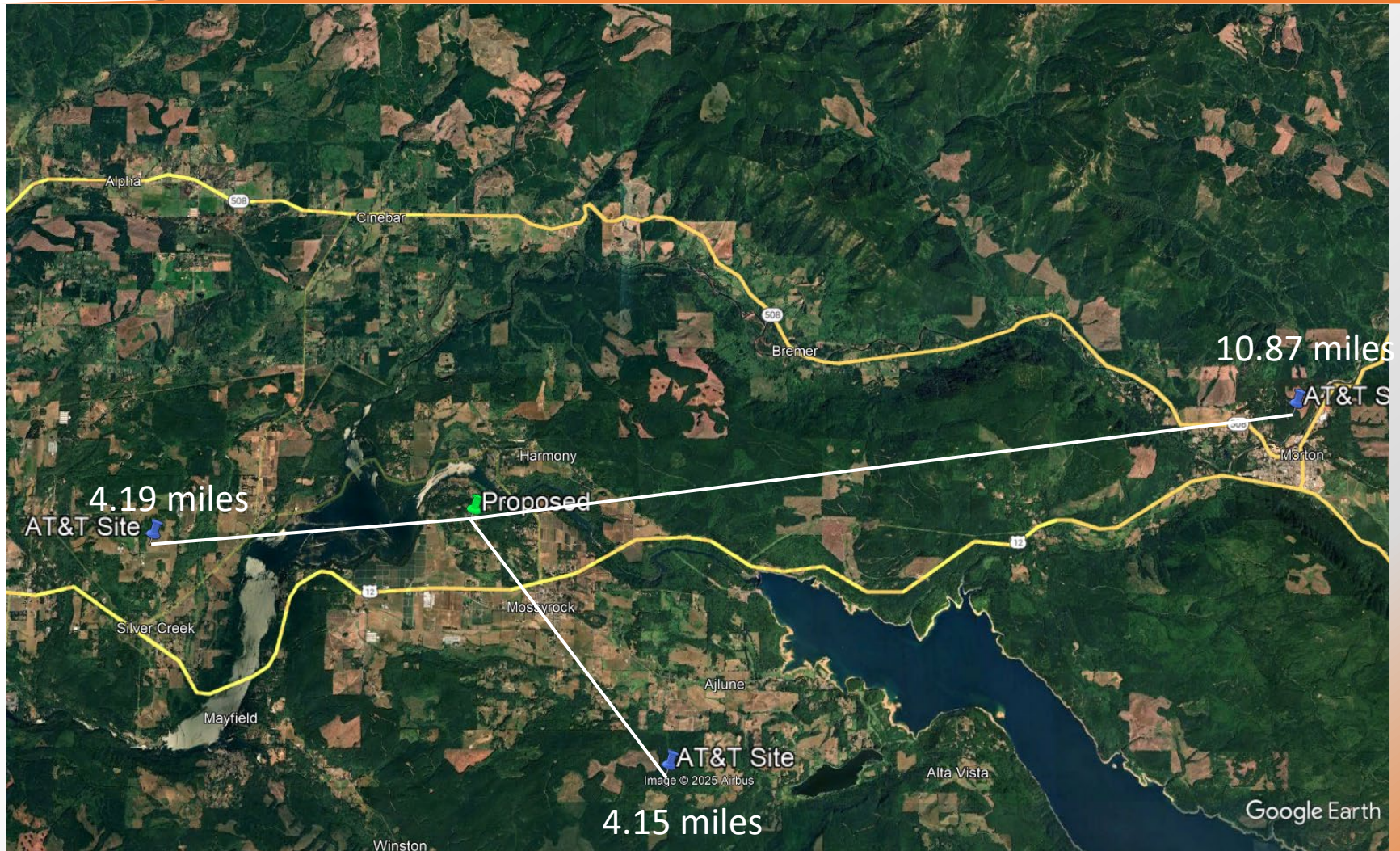
Verizon RSRP – 2120 MHz

Proposed Coverage - zoomed

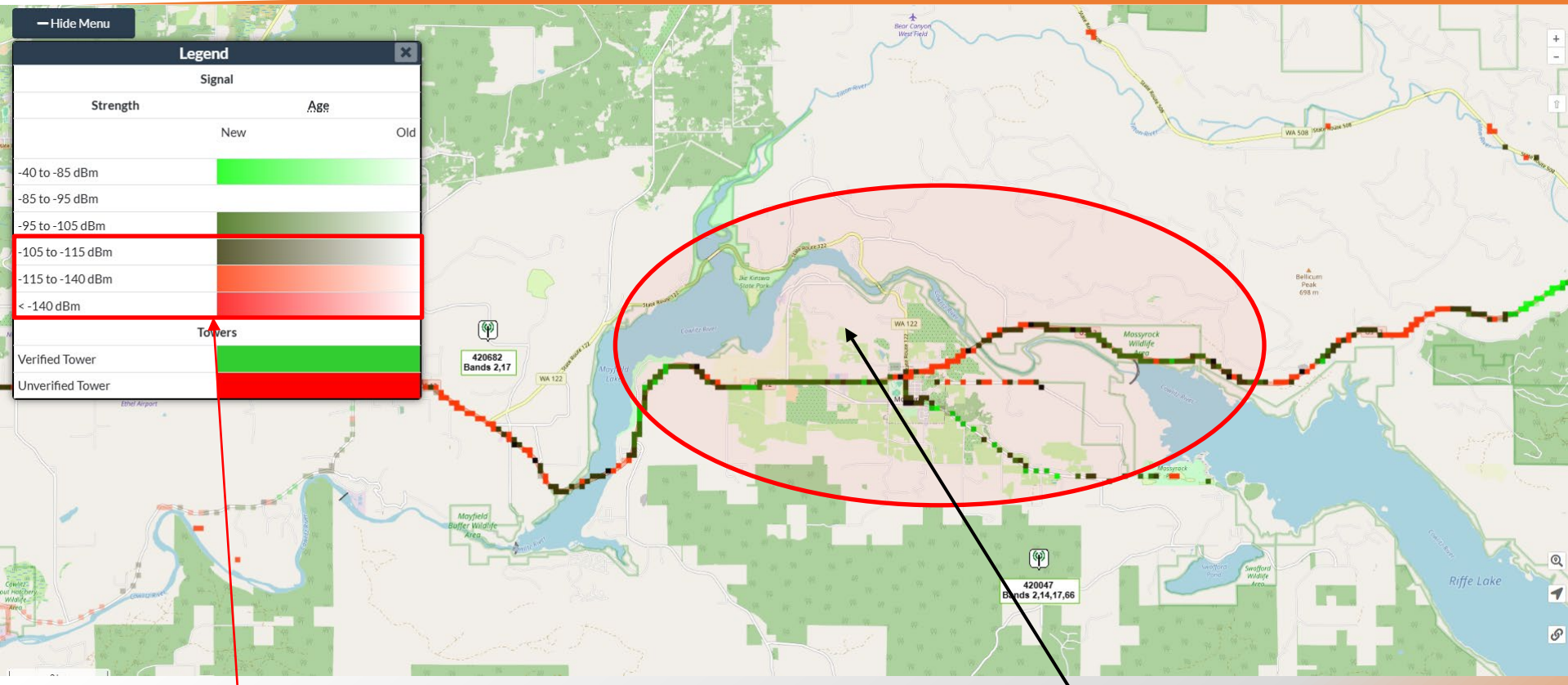
| LEGEND | |
|-------------------------------------------------------------------------------------|---------------------------|
|  | Indoor ≥ -85 dbm |
|  | In-Vehicle ≥ -95 dbm |
|  | On-Street ≥ -106 dbm |



Distance from proposed to AT&T neighbor sites



AT&T CellMapper



Less than on Street Coverage

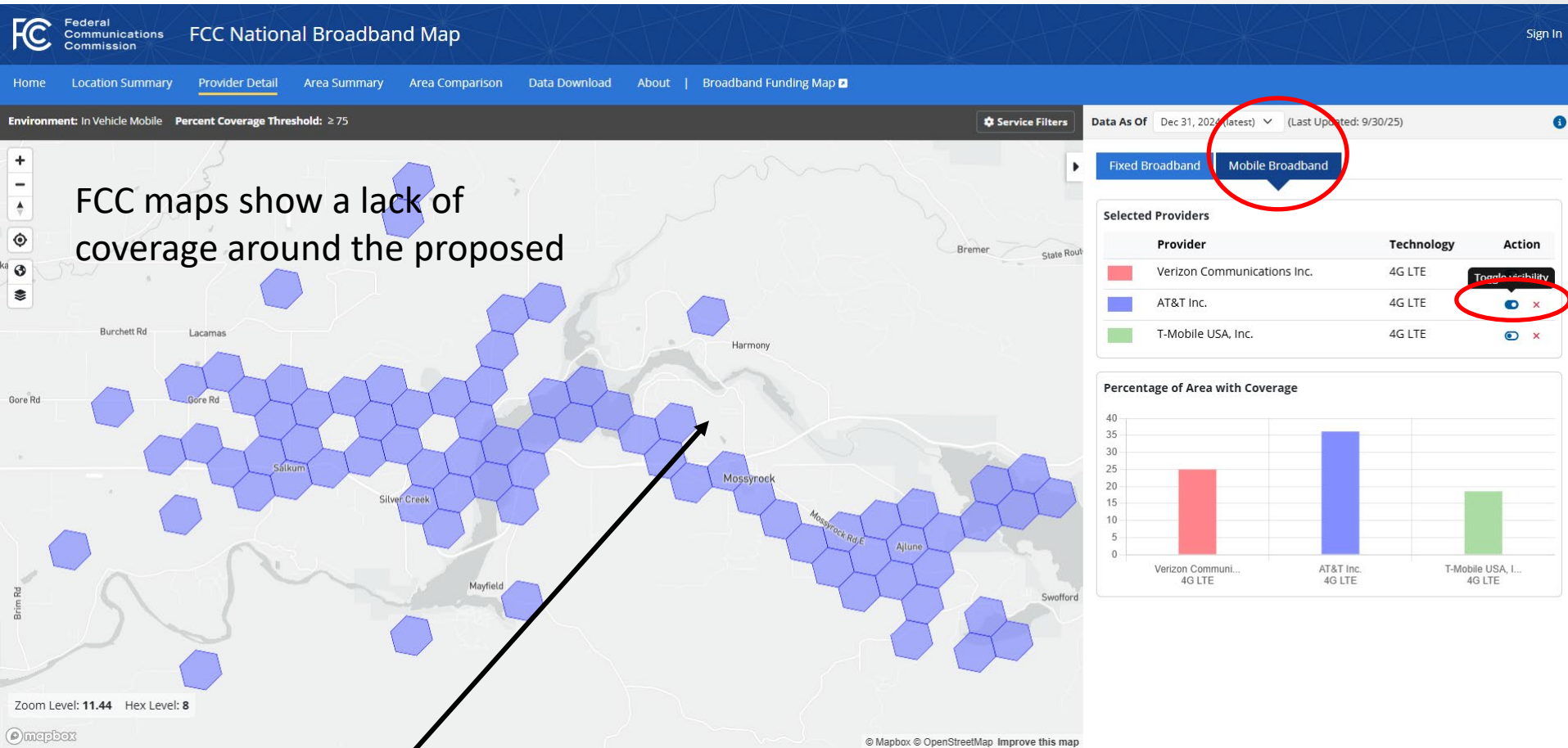
Proposed Site

The area in the red circle is what the proposed site would impact

This area is showing less than in-vehicle/outdoor service in the area

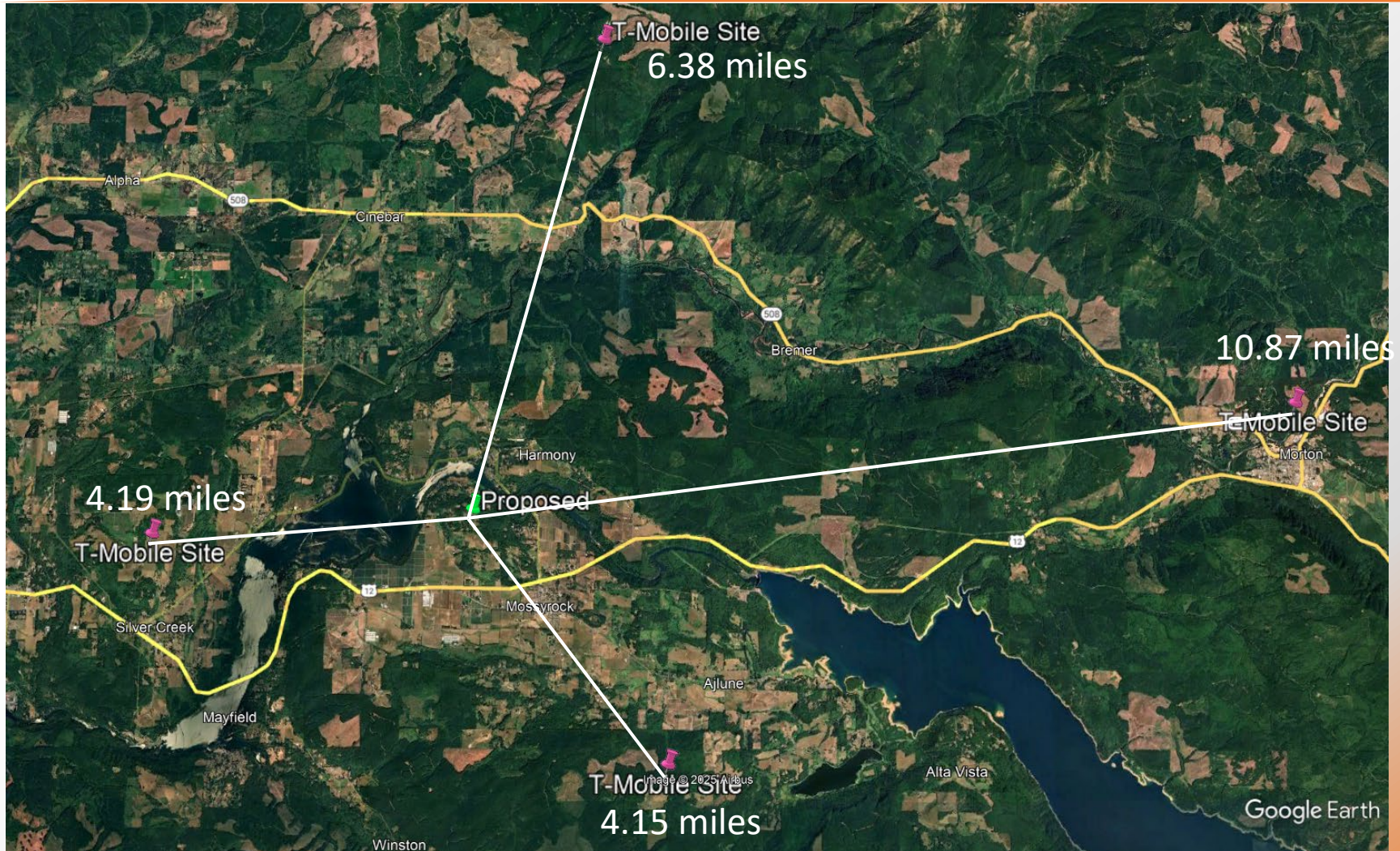
FCC Broadband Map

AT&T In-Vehicle Mobile

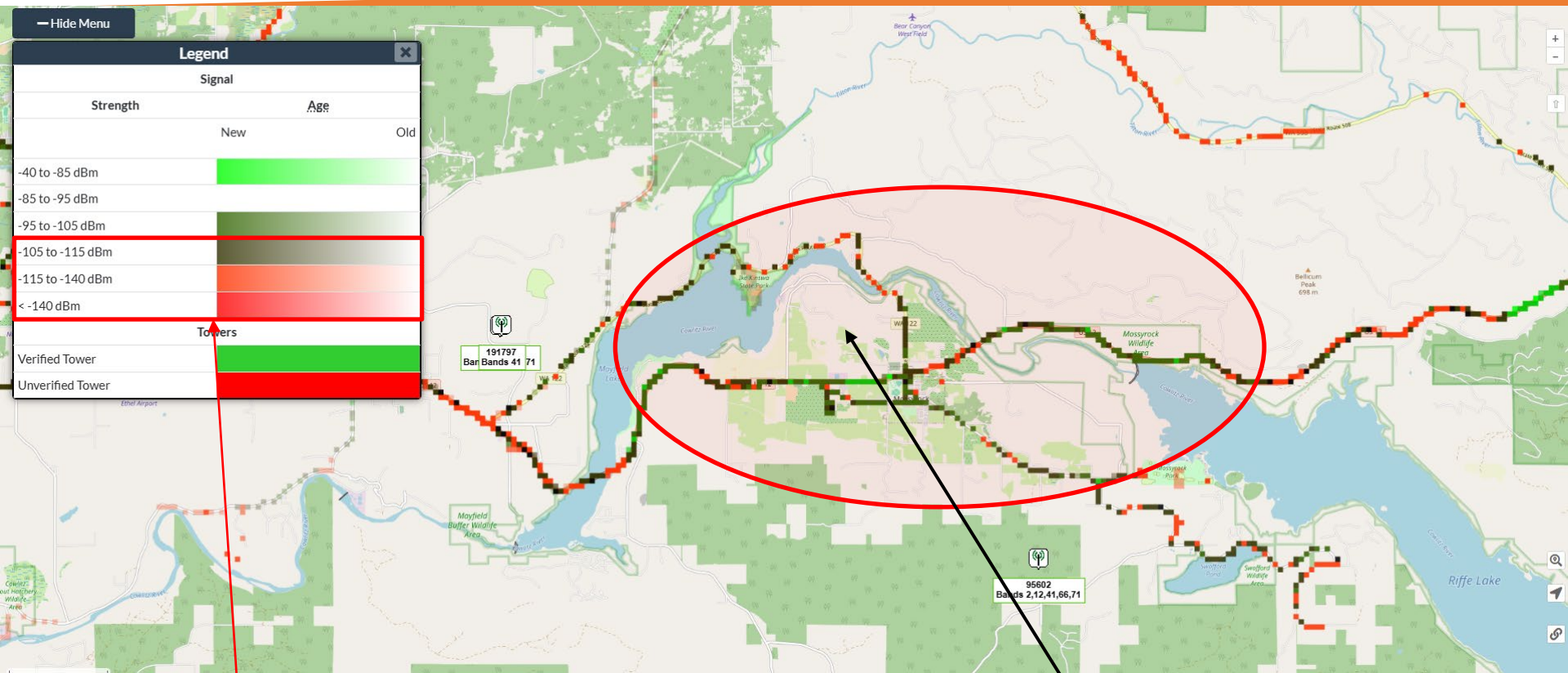


Source: <https://broadbandmap.fcc.gov/home>

Distance from proposed to T-Mobile neighbor sites



T-Mobile CellMapper



Less than on Street Coverage

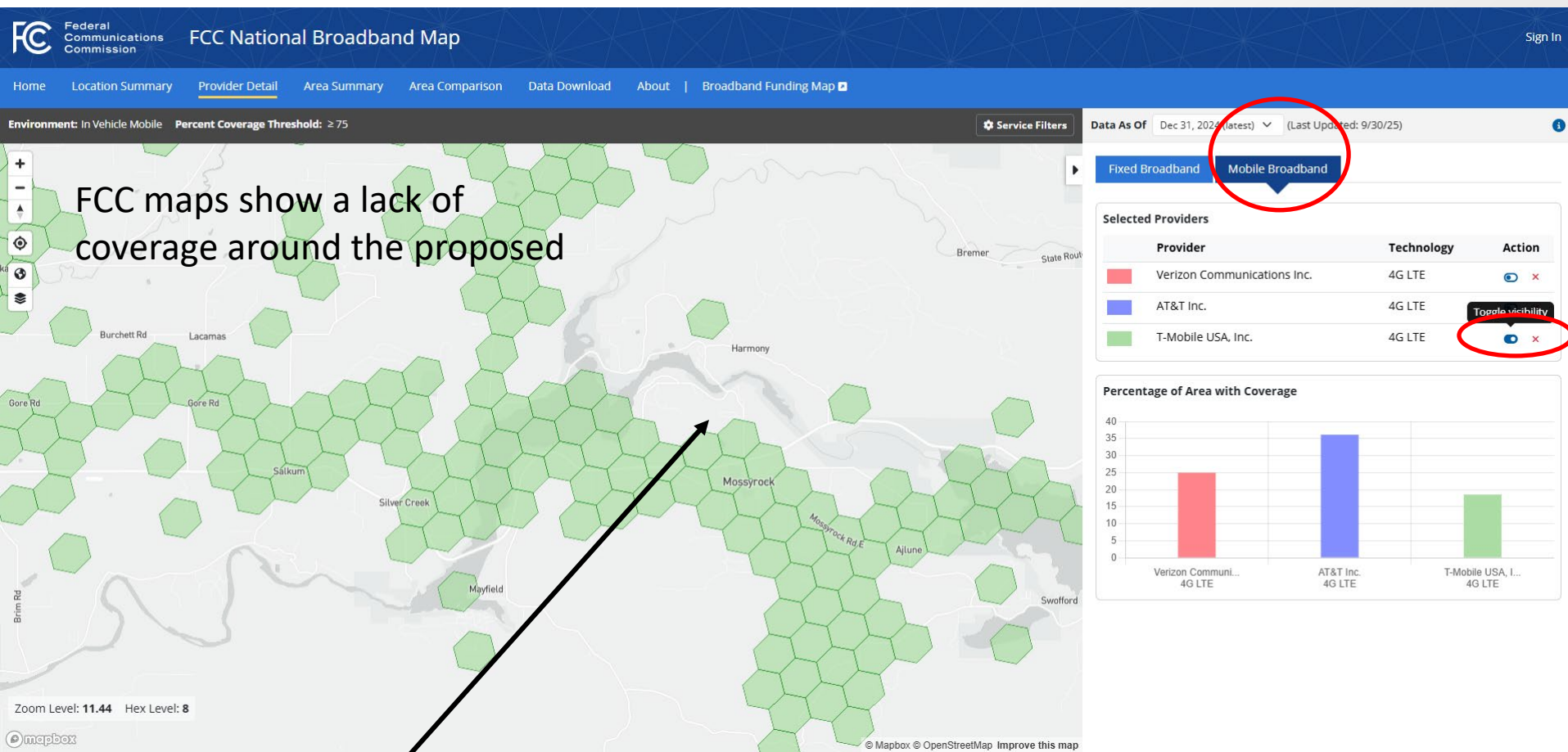
Proposed Site

The area in the red circle is what the proposed site would impact

This area is showing less than in-vehicle/outdoor service in the area

FCC Broadband Map

T-Mobile In-Vehicle Mobile



Conclusion / Recommendation

- † Poor service quality along Hwy 12 and Harmony Road as well as all feeder roads
- † A lack of throughput and quality along Hwy 12 and Harmony Road
- † A lack of quality throughput per subscriber in the area
- † The existing sites are over capacity and need offload from a new site
- † Other carriers have the same level of service in the area and the tower will most likely be collocated with other tenants who will need the height
- † **Recommend approval of the proposed tower at the height requested**