WIRELESS NETWORK CONSULTING

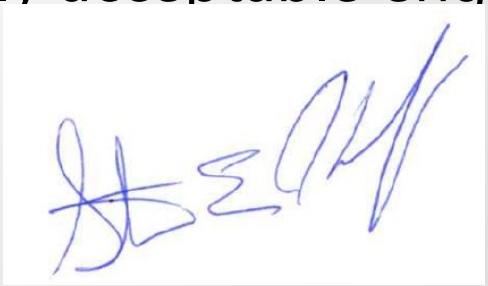
ID-5107 The Sheriff / Verizon THE-SHERIFF Site
Capacity Cell Split

DRIVE TEST REPORT
06/12/25

Certification

This analysis and report was completed by Steven Kennedy an Independent Radio Frequency Engineer with over 35 years of experience in Wireless Network Engineering.

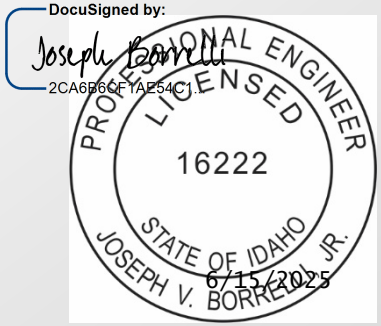
I certify that the attached RF analysis and report is correct to the best of my knowledge, and all calculations, assumptions and conclusions are based on generally acceptable engineering practices



Steven E Kennedy

Idaho Engineer Seal

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:



Joseph V. Borrelli, PE

Drive Test Overview

- This test was performed to show what the coverage is in the field to validate the propagation models and show the carriers signal strength around the proposed site
- A roof mount external antenna and GPS antenna was utilized with an industry standard scanner (PCTEL G-Flex Scanner)
- A 2nd scanner (WilsonPro Cellular Network Scanner 5G Kit-910060) was used in a stationary location to review the active channels in the area and validate against the PCTEL blind scan
- Active call testing was performed by (3) phones, (1) each on AT&T, T-Mobile and Verizon networks and performing a download throughput test
- Drive tests were performed on March 27th, 2025
- The scanner processed signal detail from AT&T, T-Mobile and Verizon networks
- The drive route was created based on the primary coverage objective for the site as well as the propagation of the proposed

Blind Scan

- A “blind scan” was completed at a stationary location that has visibility to all (4) major carriers to decode active channels in the area prior to drive testing
- The drive test scanner gear decodes the following for each channel:
  - Date/Time
  - GPS Coordinates
  - Cell ID/PCI
  - For Sync, Reference Signal and, Physical Broadcast Channel (PBCH)
    - Reference Signal Received Power (RSRP)
    - Reference Signal Received Quality (RSRQ)
    - Signal to Interference & Noise Ratio (SINR)
- To show the signal levels, this report will focus on the RSRP from the transmitters as this is the value that shows the coverage from the sites
- The bands/channels shown in this deck are:
  - 700MHz & 850MHz low band
  - 1900MHz & 2100MHz mid band
  - 3800MHz high band

Frequency Bands/Channels

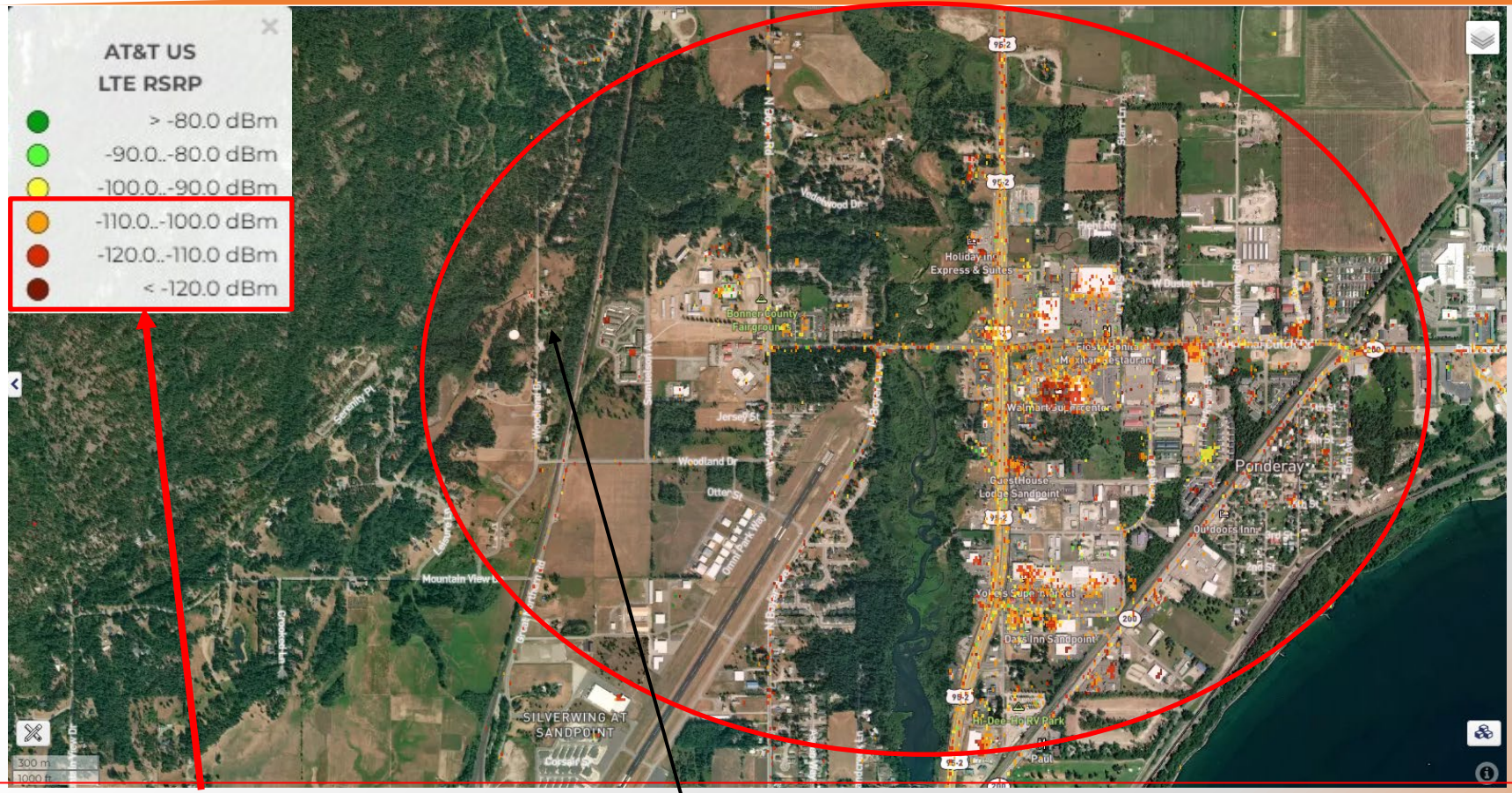
- Below are the active frequency bands and channels for the area

			Frequency	Downlink	Channel	
Carrier	Technology	Band	Block	Frequency (MHz)	Bandwidth (MHz)	EARFCN
AT&T	4G	12	700	739	10	5110
AT&T	4G	14	700	763	10	5330
AT&T	4G	4	AWS1	2115	10	2000
AT&T	4G	4	AWS1	2135	10	2200
T-Mobile	4G	12	700	731.5	5	5035
T-Mobile	4G	2	PCS	1952.5	5	825
T-Mobile	5G	2	PCS	1964.55	20	392910
T-Mobile	4G	4	AWS1	2147.5	15	2325
T-Mobile	5G	41	EBS	2510.55	90	502110
T-Mobile	5G	41	BRS	2600.55	100	520110
Verizon	4G	13	700	751	10	5230
Verizon	4G	5	850	885	10	2560
Verizon	4G	2	PCS	1945	10	750
Verizon	4G	4	AWS1	2125	10	2100

- EARFCN – EUTRA Absolute radio-frequency channel number
- Over 90% of the spectrum utilized by wireless operators are mid or high band spectrum.

LEGEND	
	In-Building (-85 dbm)
	In-Vehicle (-95 dbm)
	Outdoor (-106 dbm)
	Marginal (<-106 to -120 dbm)
	Low to No Service (<-120 dbm)

Ookla AT&T 4G



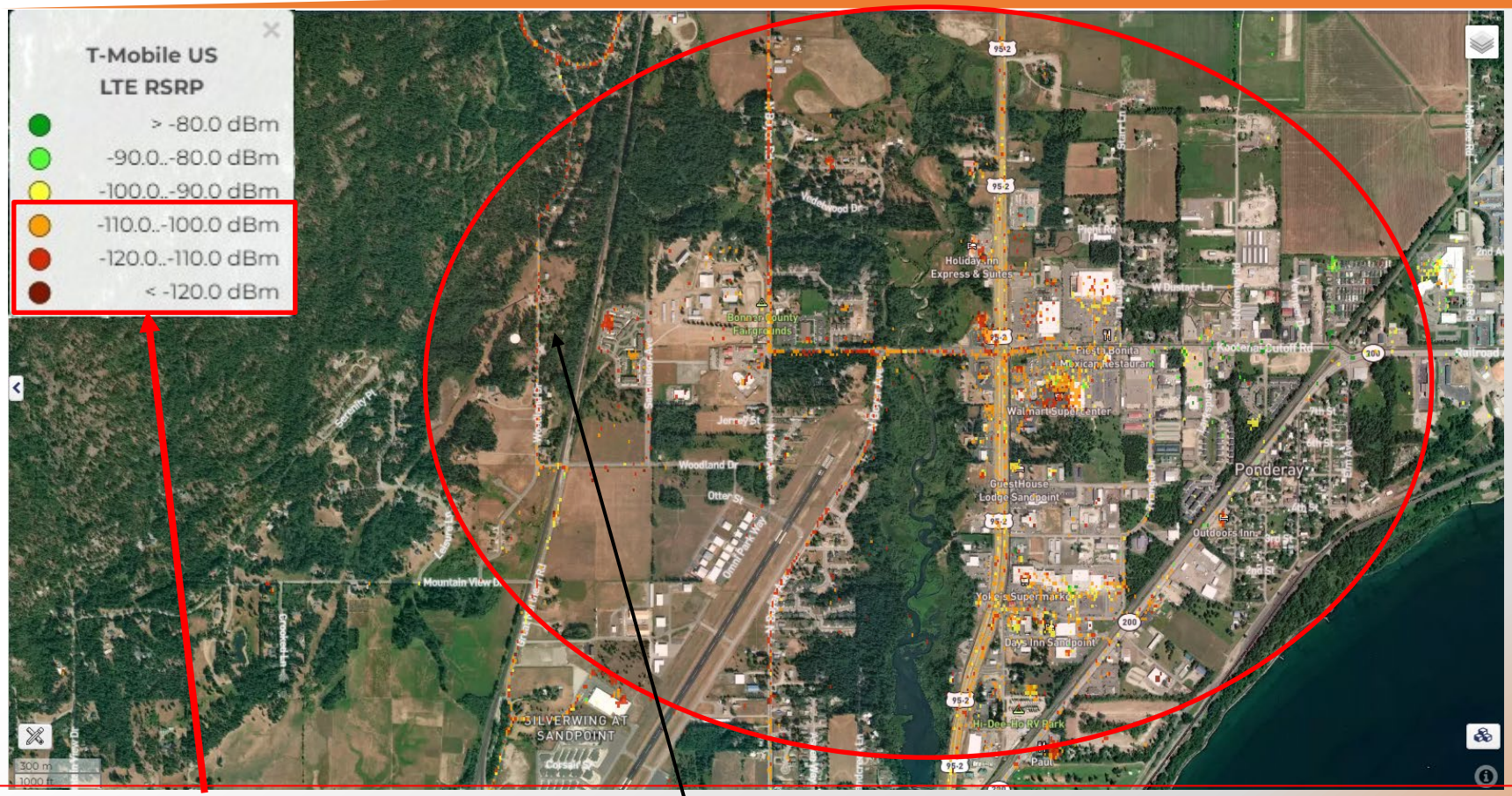
Less than on Street Coverage

Proposed Site

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

The area is showing a significant number of mobiles reporting less than outdoor service

Ookla T-Mobile 4G



Less than on Street Coverage

Proposed Site

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LEGEND	
	In-Building (-85 dbm)
	In-Vehicle (-95 dbm)
	Outdoor (-106 dbm)
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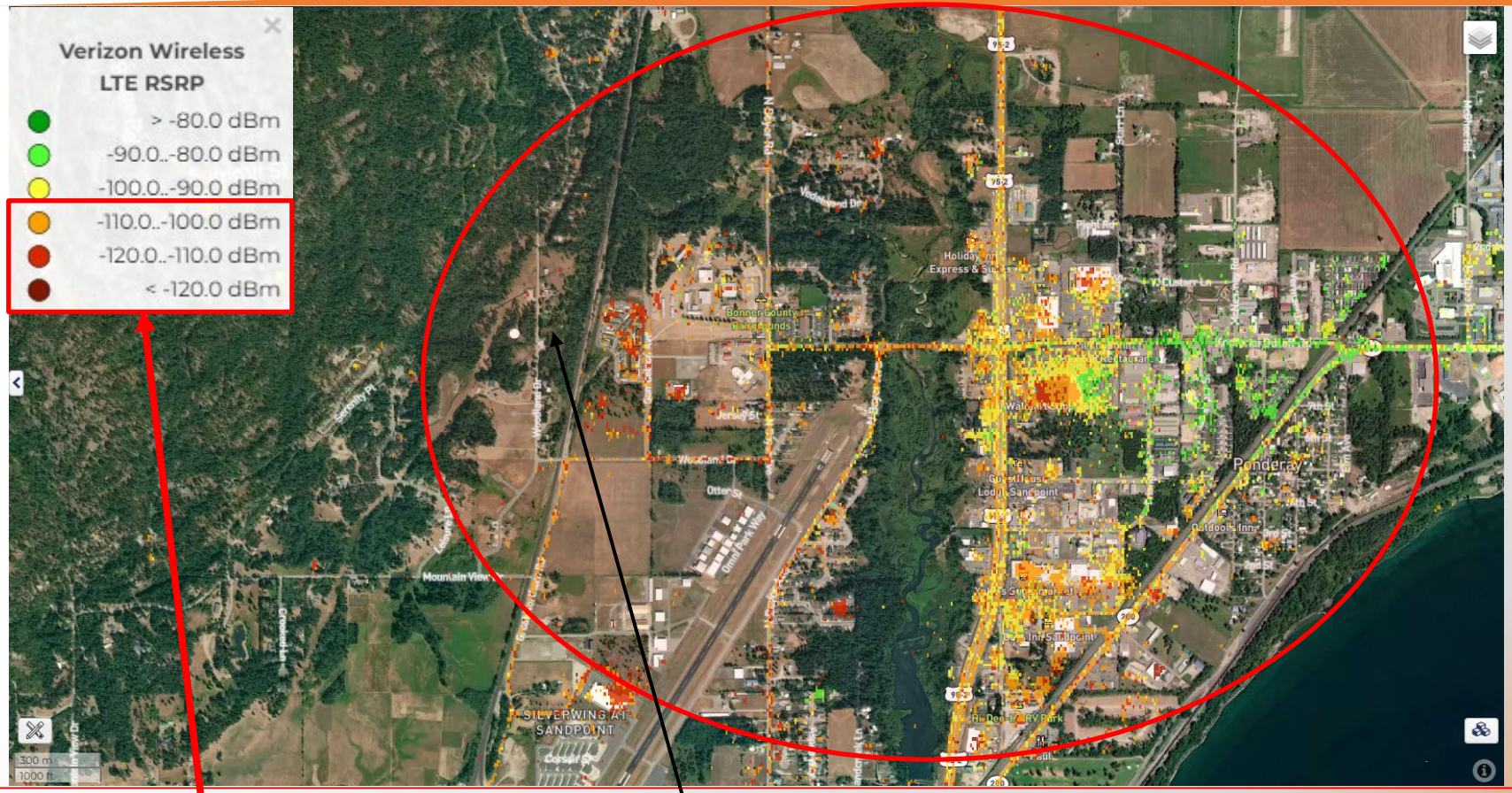
	Low to No Service (<-120 dbm)

Ookla Verizon 4G



Less than on Street Coverage

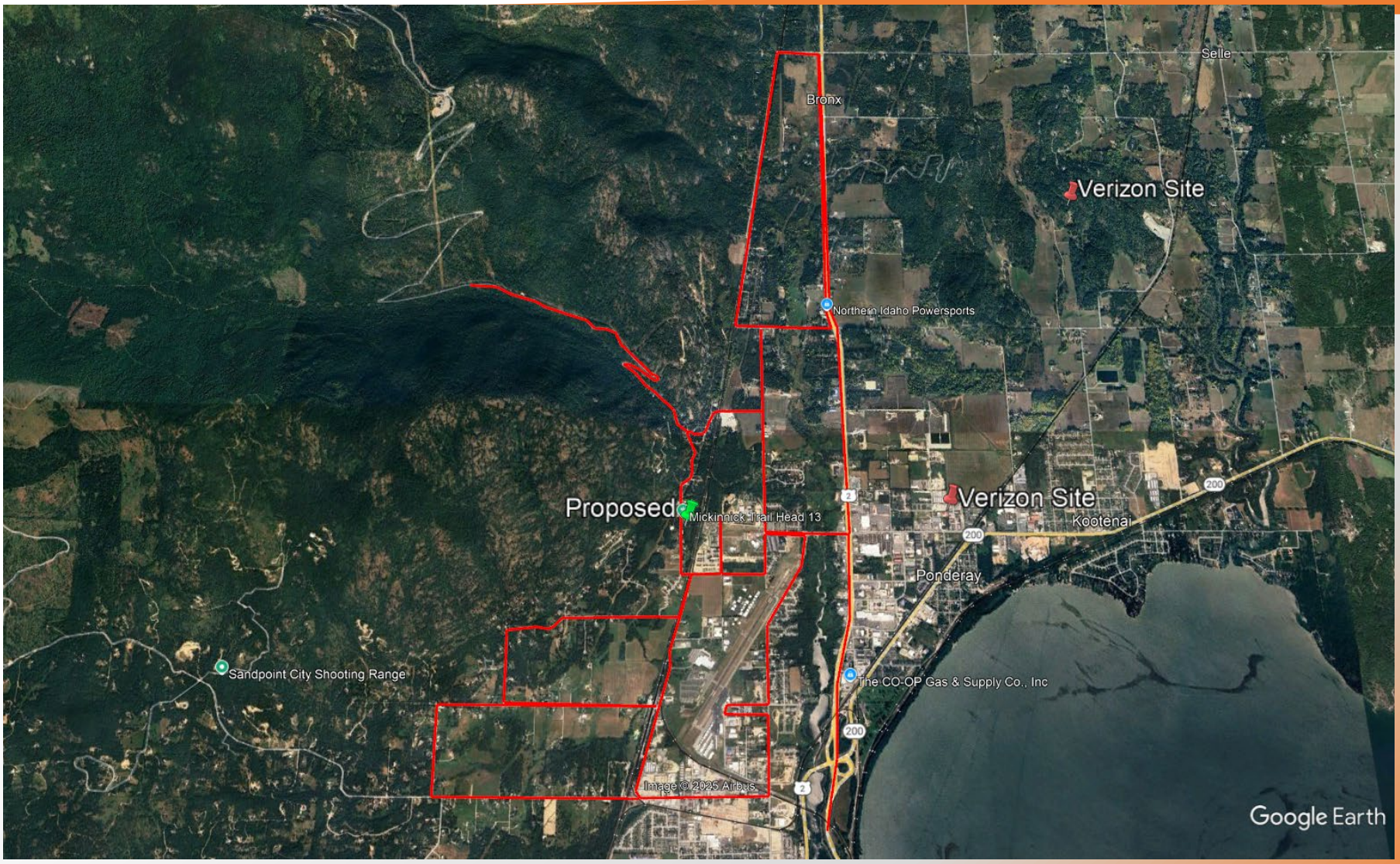
Proposed Site

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

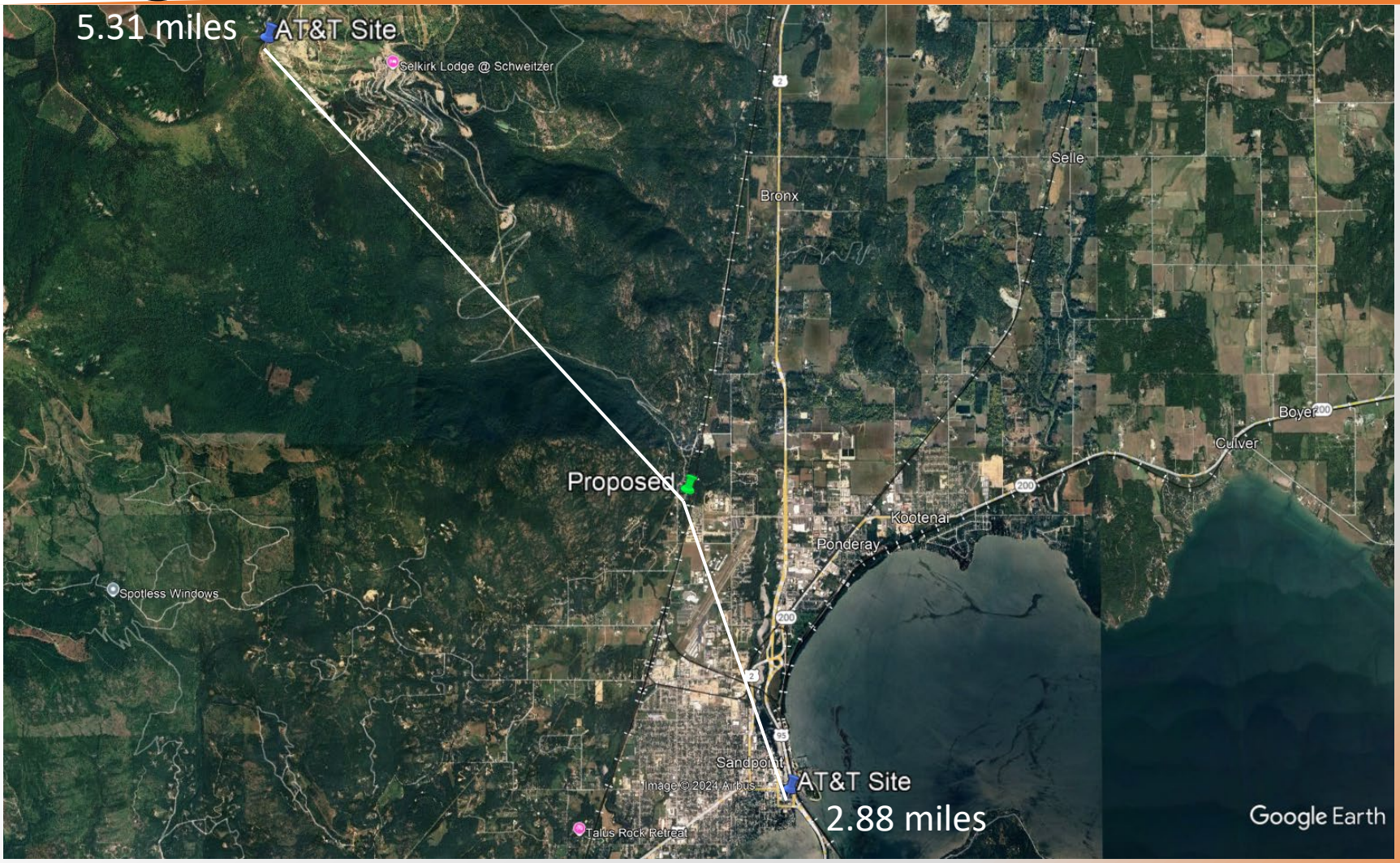
The area is showing a below outdoor service near the proposed and in vehicle to the East of the proposed

2024
06/12/2025

Drive Test Route Overview



Distance from proposed to AT&T neighbor sites

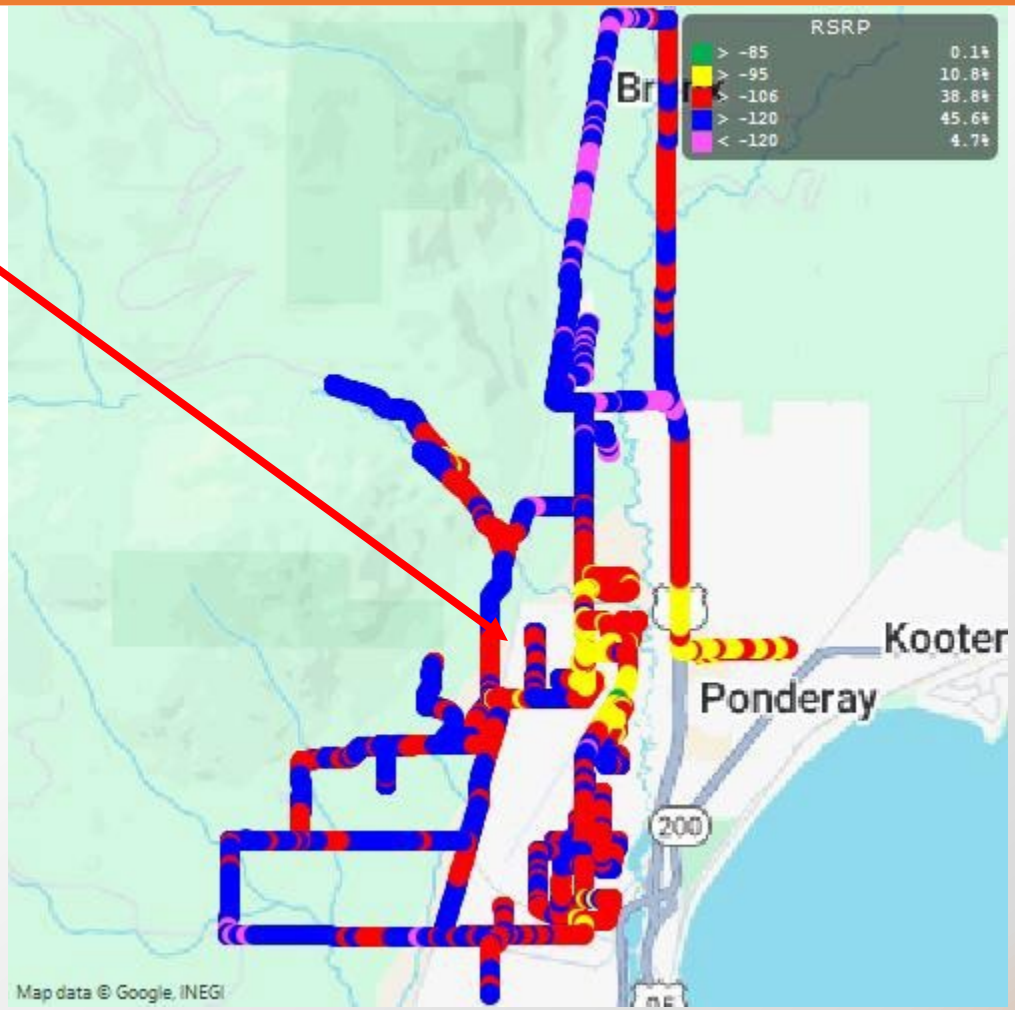


AT&T 739MHz channel Scanner Data - Overview

LEGEND
In-Building (-85 dbm)
In-Vehicle (-95 dbm)
Outdoor (-106 dbm)
Marginal (<-106 to -120 dbm)
Low to No Service (<-120 dbm)

Proposed Site

This is RSRP and shows coverage around the proposed is outdoor and marginal coverage in low band

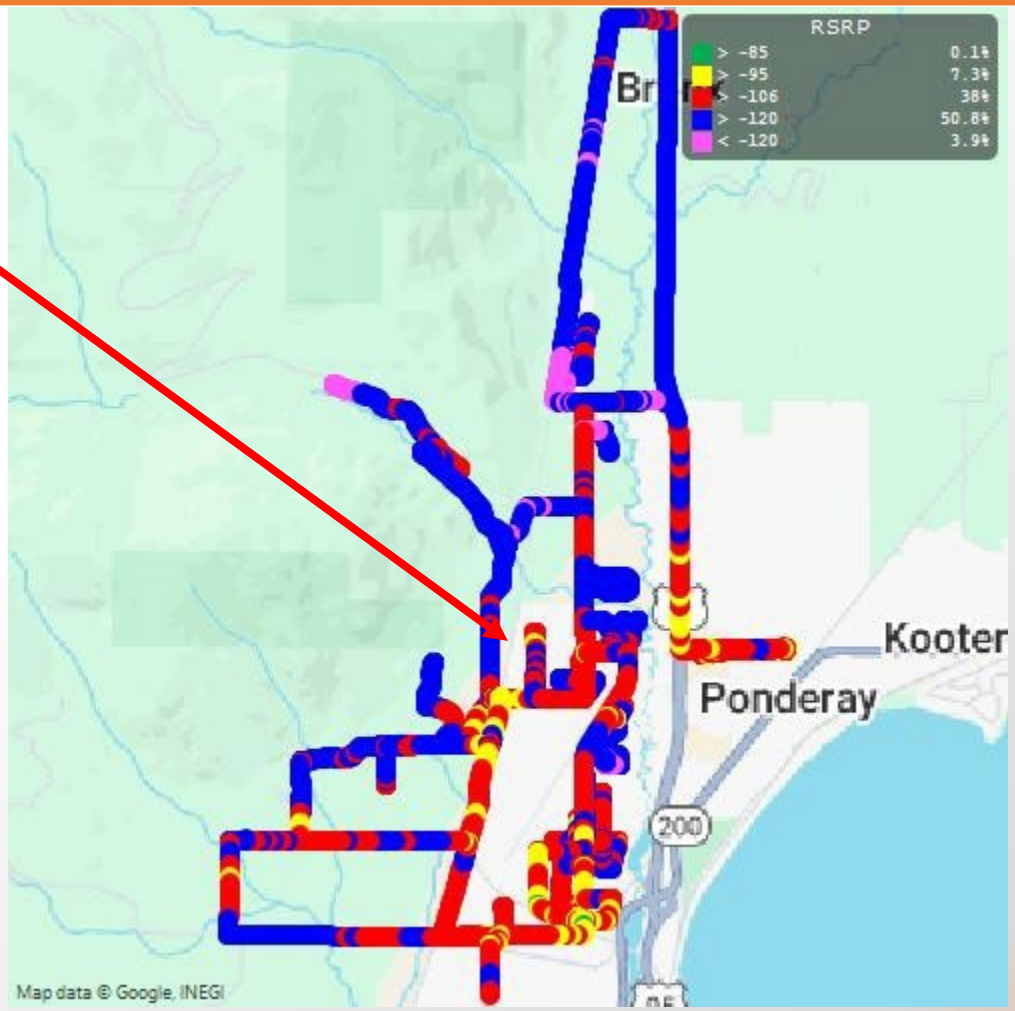


AT&T 2115MHz channel Scanner Data - Overview

LEGEND
In-Building (-85 dbm)
In-Vehicle (-95 dbm)
Outdoor (-106 dbm)
Marginal (<-106 to -120 dbm)
Low to No Service (<-120 dbm)

Proposed Site

This is RSRP and shows coverage around the proposed is outdoor and marginal coverage in mid band

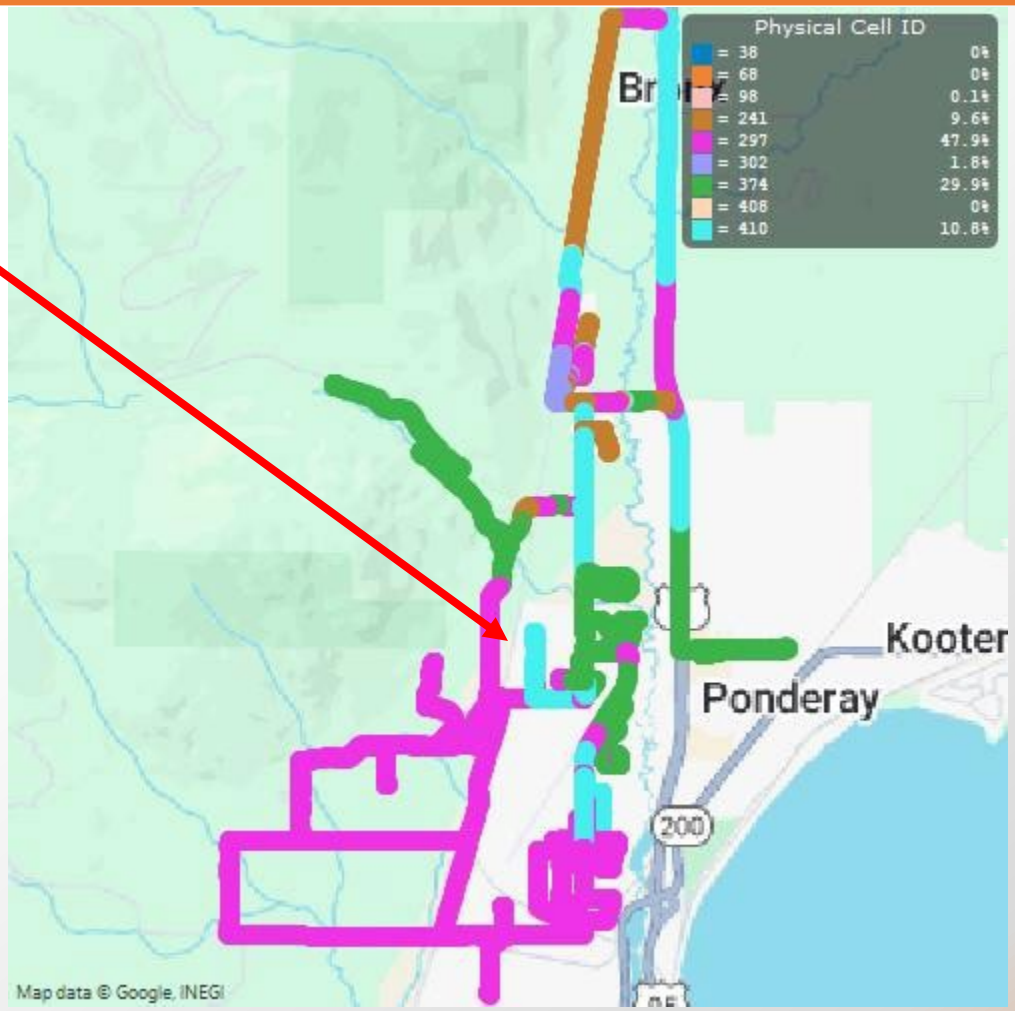


Active Call Testing – AT&T Physical Cell ID

LEGEND
In-Building (-85 dbm)
In-Vehicle (-95 dbm)
Outdoor (-106 dbm)
Marginal (<-106 to -120 dbm)
Low to No Service (<-120 dbm)

Proposed Site

This plot shows the serving sector in a particular area. This shows there is a mix of sectors covering around the proposed and there is no dominant site

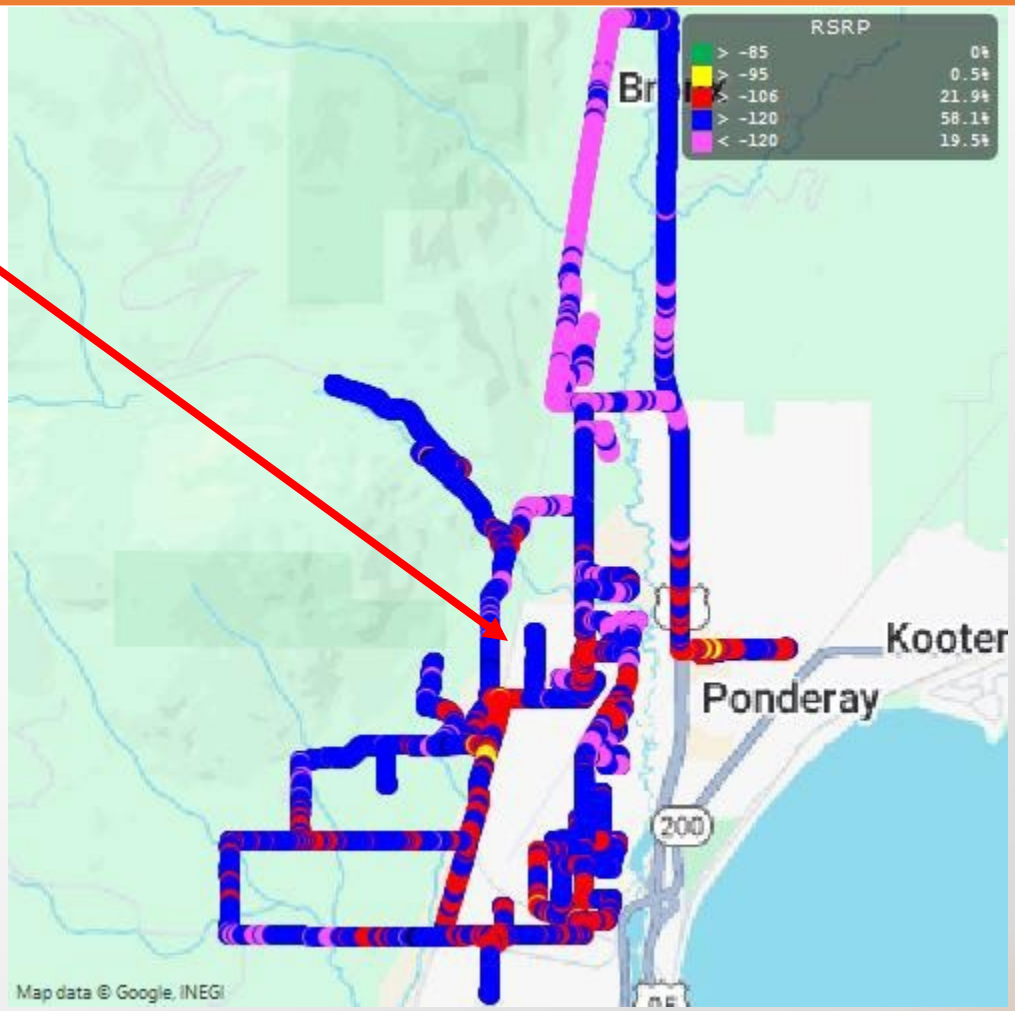


Active Call Testing – AT&T RSRP

LEGEND
In-Building (-85 dbm)
In-Vehicle (-95 dbm)
Outdoor (-106 dbm)
Marginal (<-106 to -120 dbm)
Low to No Service (<-120 dbm)

Proposed Site

This plot shows the Received Signal Reference Power (RSRP) for the AT&T phone. Note that in the area around the proposed is showing marginal and low to no service coverage levels. The sites to the North and South for AT&T are too far away to provide quality service

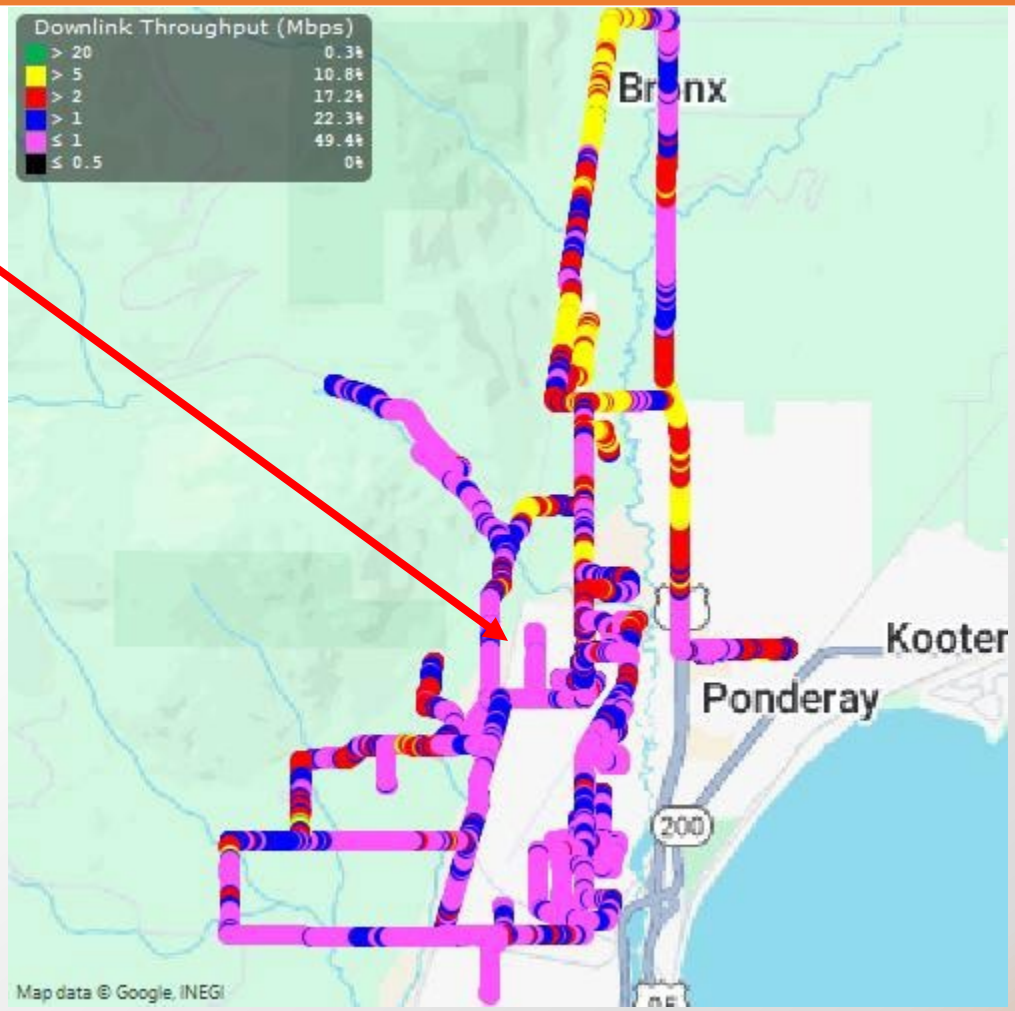


Active Call Testing – AT&T Throughput

LEGEND
In-Building (-85 dbm)
In-Vehicle (-95 dbm)
Outdoor (-106 dbm)
Marginal (<-106 to -120 dbm)
Low to No Service (<-120 dbm)

Proposed Site

This plot shows the throughput on the Downlink speed test. Around the proposed the mobile is reporting less than 1Mbps and less then 500 kbps. This is very low throughput per customer



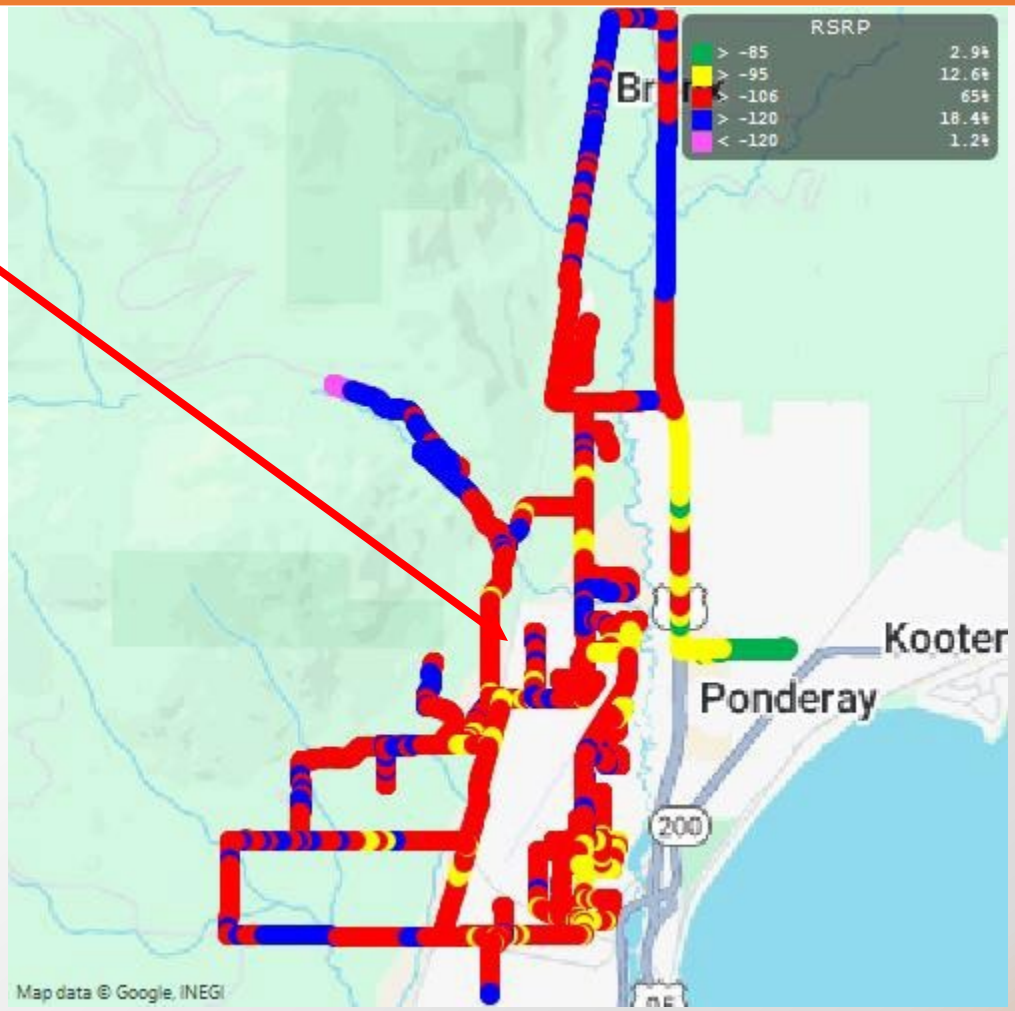
T-Mobile Sites

T-Mobile 731.5MHz channel Scanner Data - Overview

LEGEND
In-Building (-85 dbm)
In-Vehicle (-95 dbm)
Outdoor (-106 dbm)
Marginal (<-106 to -120 dbm)
Low to No Service (<-120 dbm)

Proposed Site

This is RSRP and shows coverage around the proposed is outdoor and marginal coverage in low band

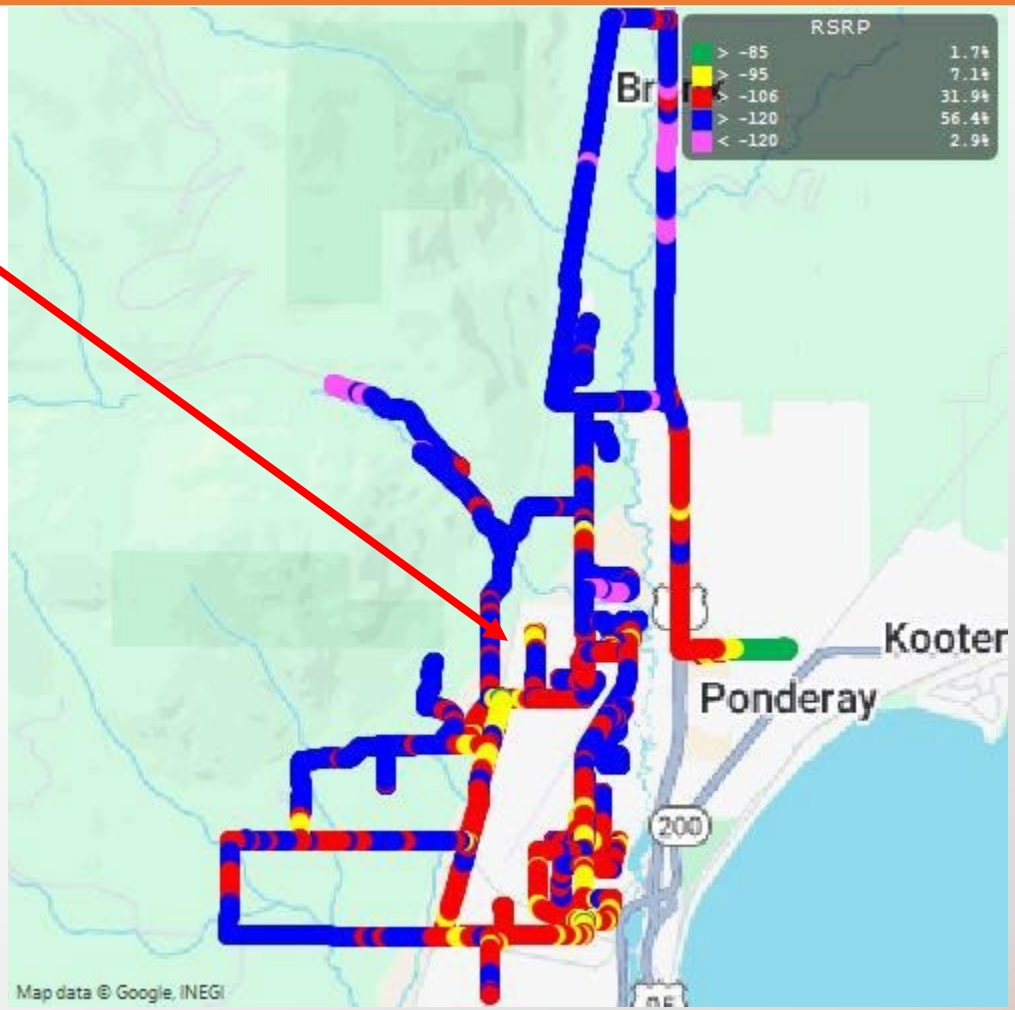


T-Mobile 1932.5MHz channe
Scanner Data - Overview

LEGEND
In-Building (-85 dbm)
In-Vehicle (-95 dbm)
Outdoor (-106 dbm)
Marginal (<-106 to -120 dbm)
Low to No Service (<-120 dbm)

Proposed Site

This is RSRP and shows coverage around the proposed is mostly marginal coverage in mid band

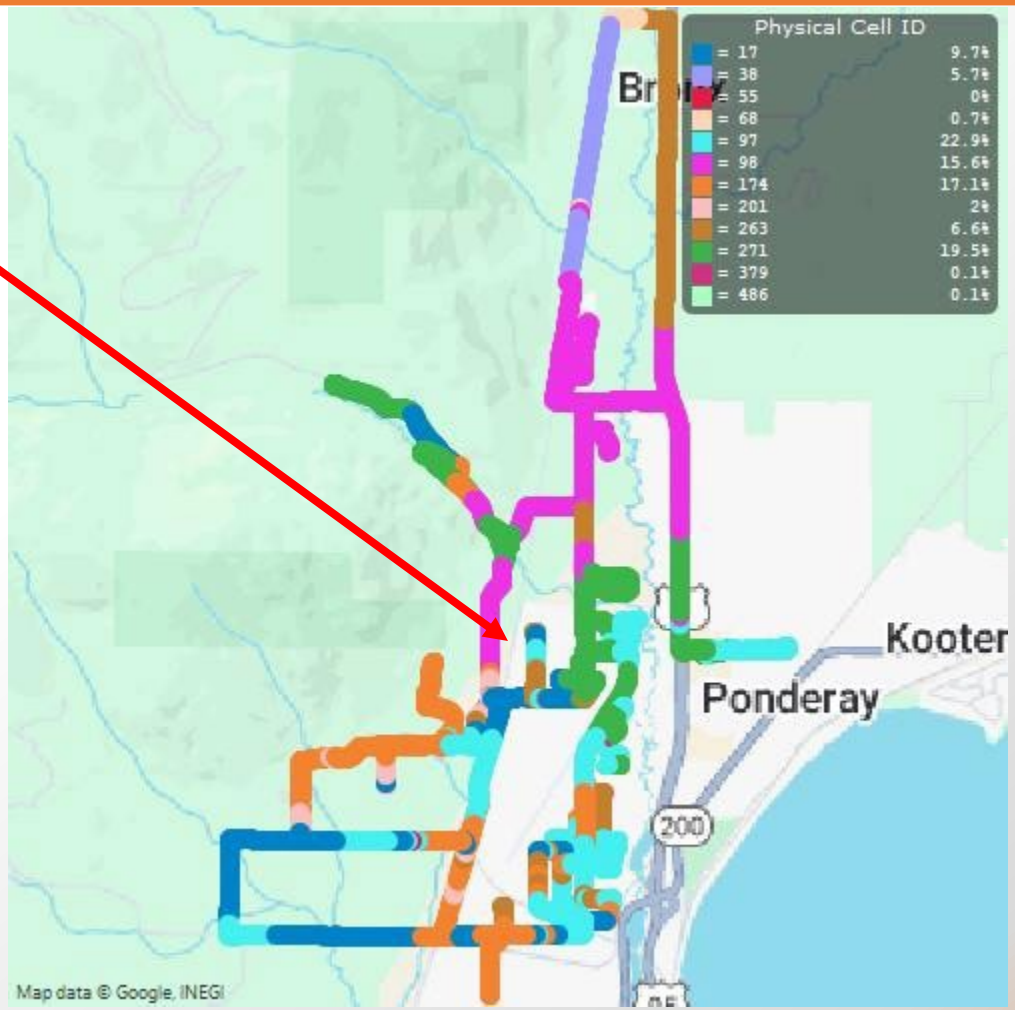


Active Call Testing – T-Mobile Physical Cell ID

LEGEND
In-Building (-85 dbm)
In-Vehicle (-95 dbm)
Outdoor (-106 dbm)
Marginal (<-106 to -120 dbm)
Low to No Service (<-120 dbm)

Proposed Site

This plot shows the serving sector in a particular area. This shows there is a mix of sectors covering around the proposed and there is no dominant site

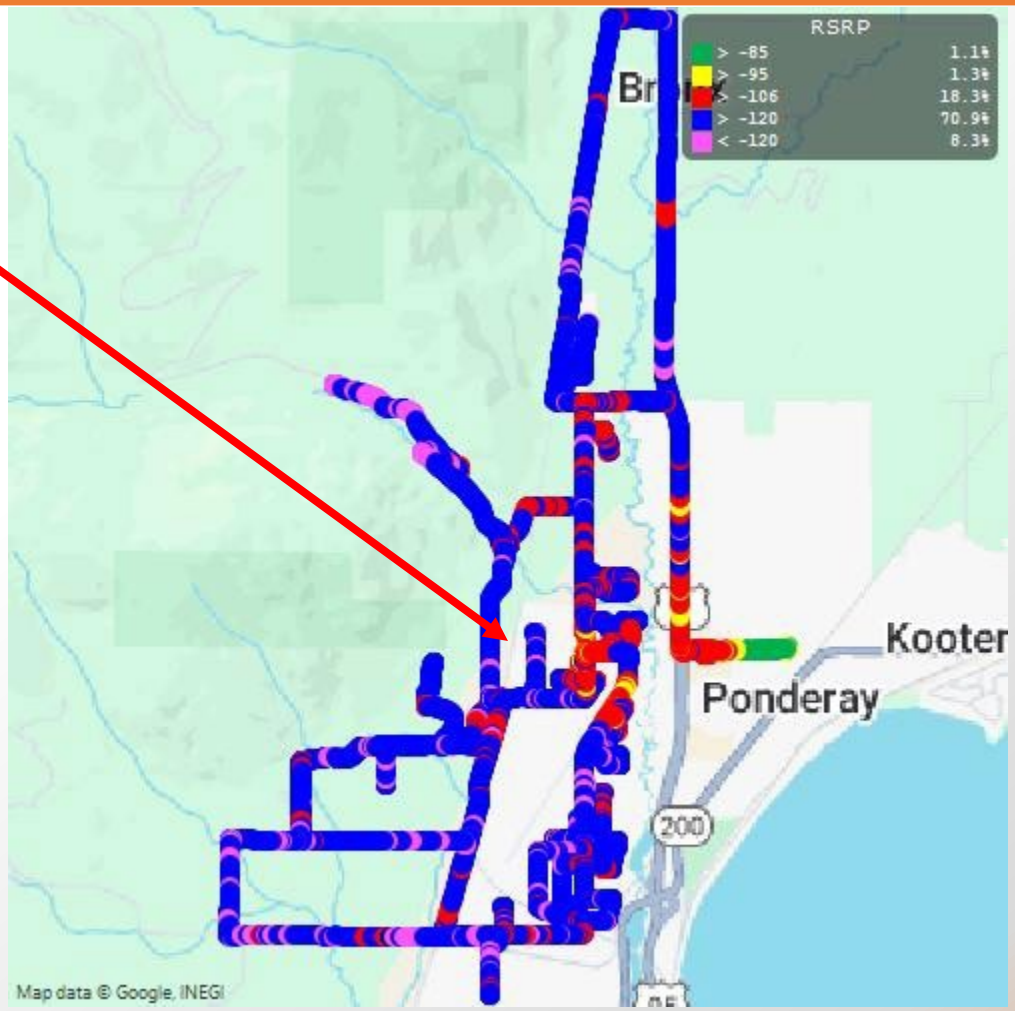


Active Call Testing – T-Mobile RSRP

LEGEND
In-Building (-85 dbm)
In-Vehicle (-95 dbm)
Outdoor (-106 dbm)
Marginal (<-106 to -120 dbm)
Low to No Service (<-120 dbm)

Proposed Site

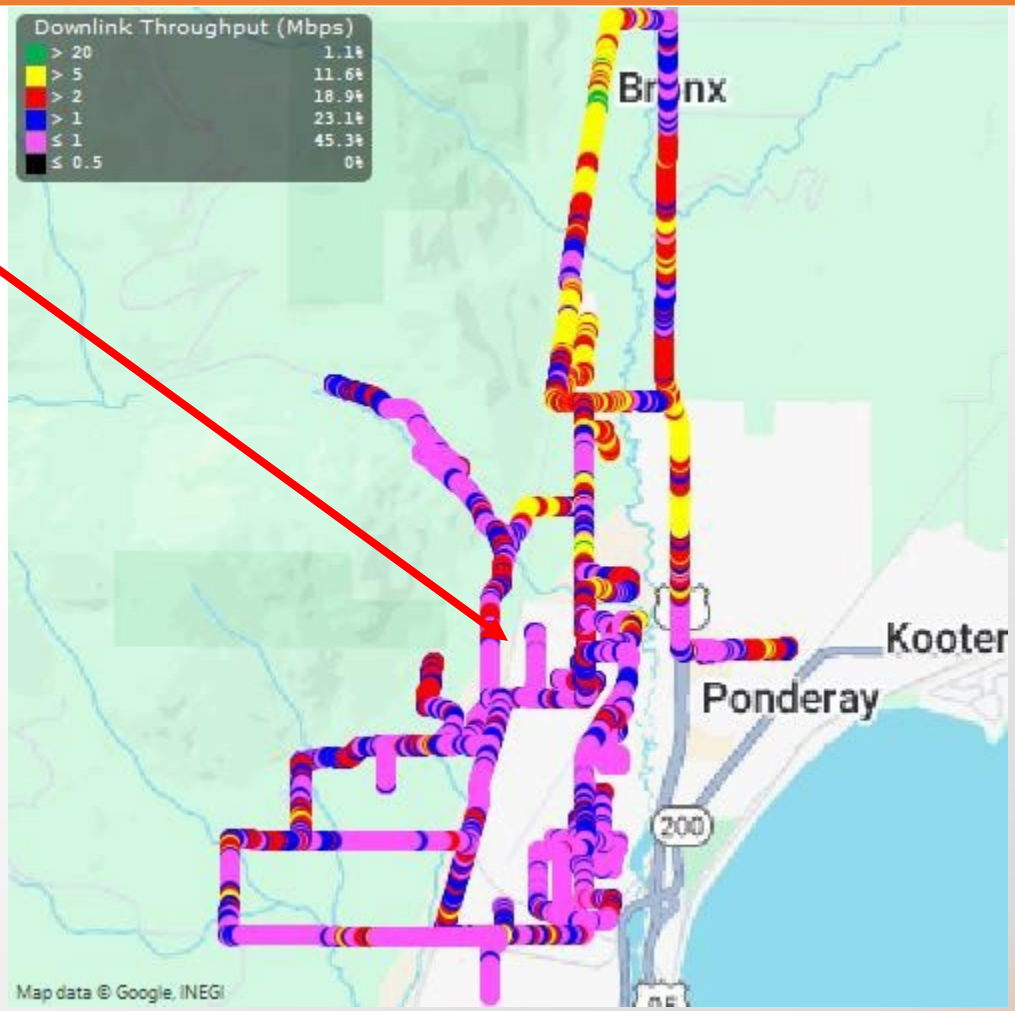
This plot shows the Received Signal Reference Power (RSRP) for the T-Mobile phone. Note that in the area around the proposed is showing marginal service coverage levels. The sites to the North, South and East for T-Mobile are too far away to provide quality service



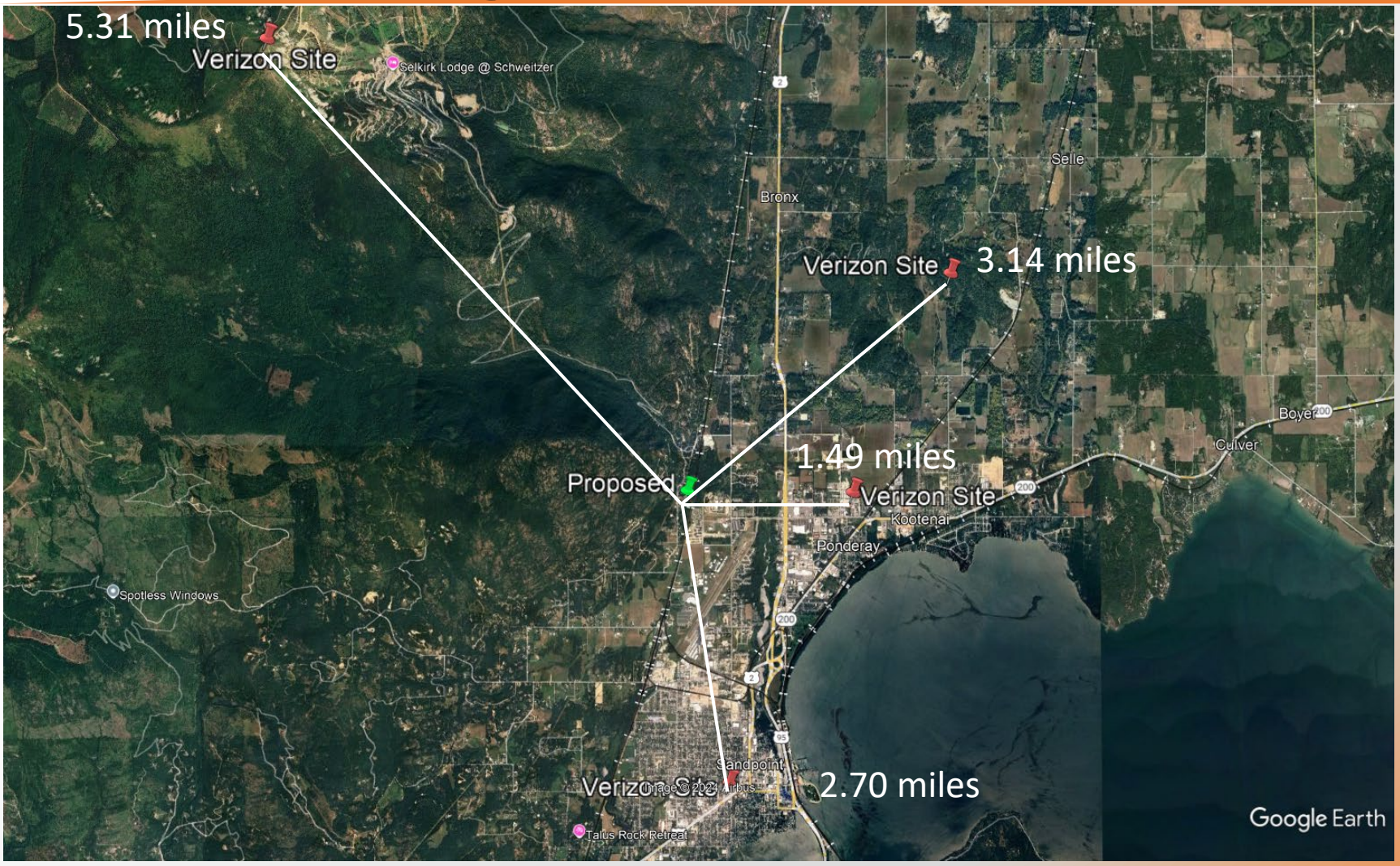
Active Call Testing – T-Mobile Throughput

Proposed Site

This plot shows the throughput on the Downlink speed test. Around the proposed the mobile is reporting less than 1Mbps. This is very low throughput per customer



Distance from proposed to Verizon neighbor sites

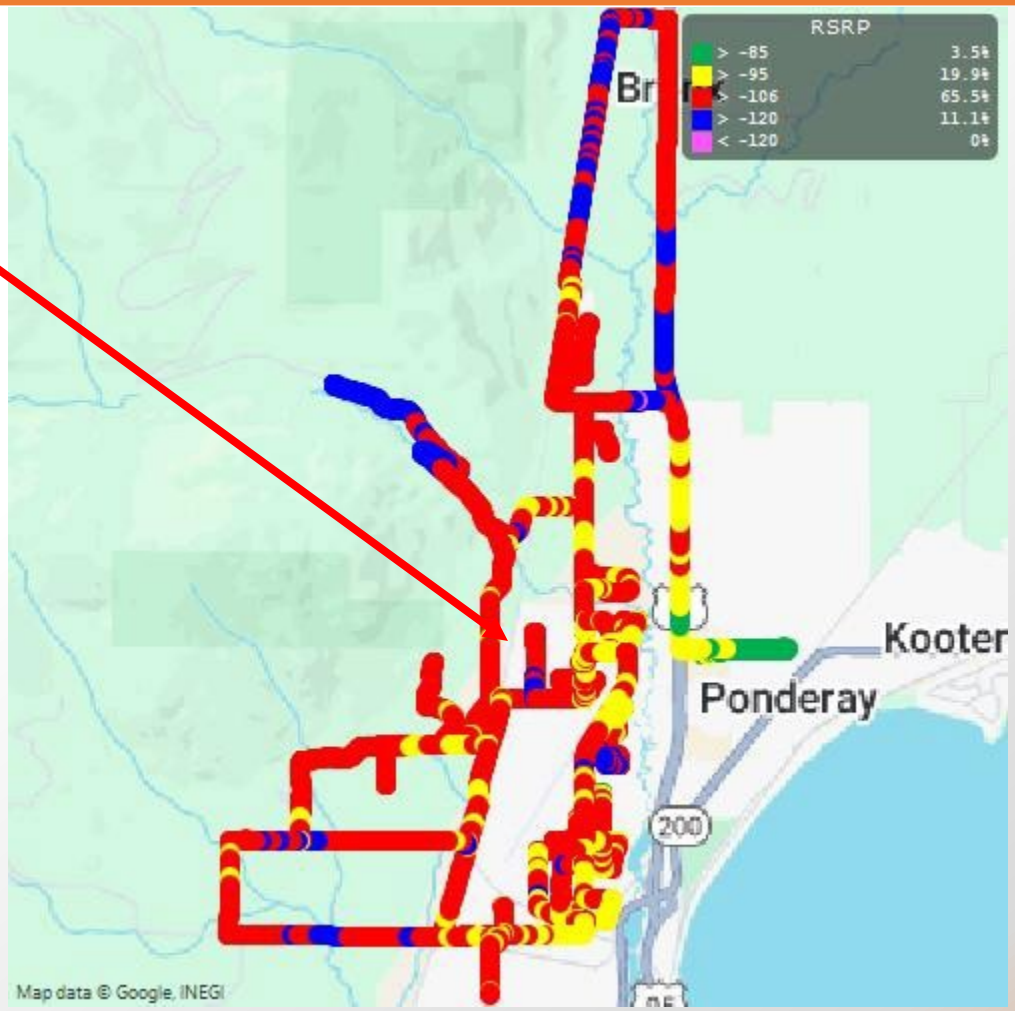


Verizon 751MHz channel Scanner Data - Overview

LEGEND
In-Building (-85 dbm)
In-Vehicle (-95 dbm)
Outdoor (-106 dbm)
Marginal (<-106 to -120 dbm)
Low to No Service (<-120 dbm)

Proposed Site

This is RSRP and shows coverage around the proposed is mostly outdoor coverage in low band

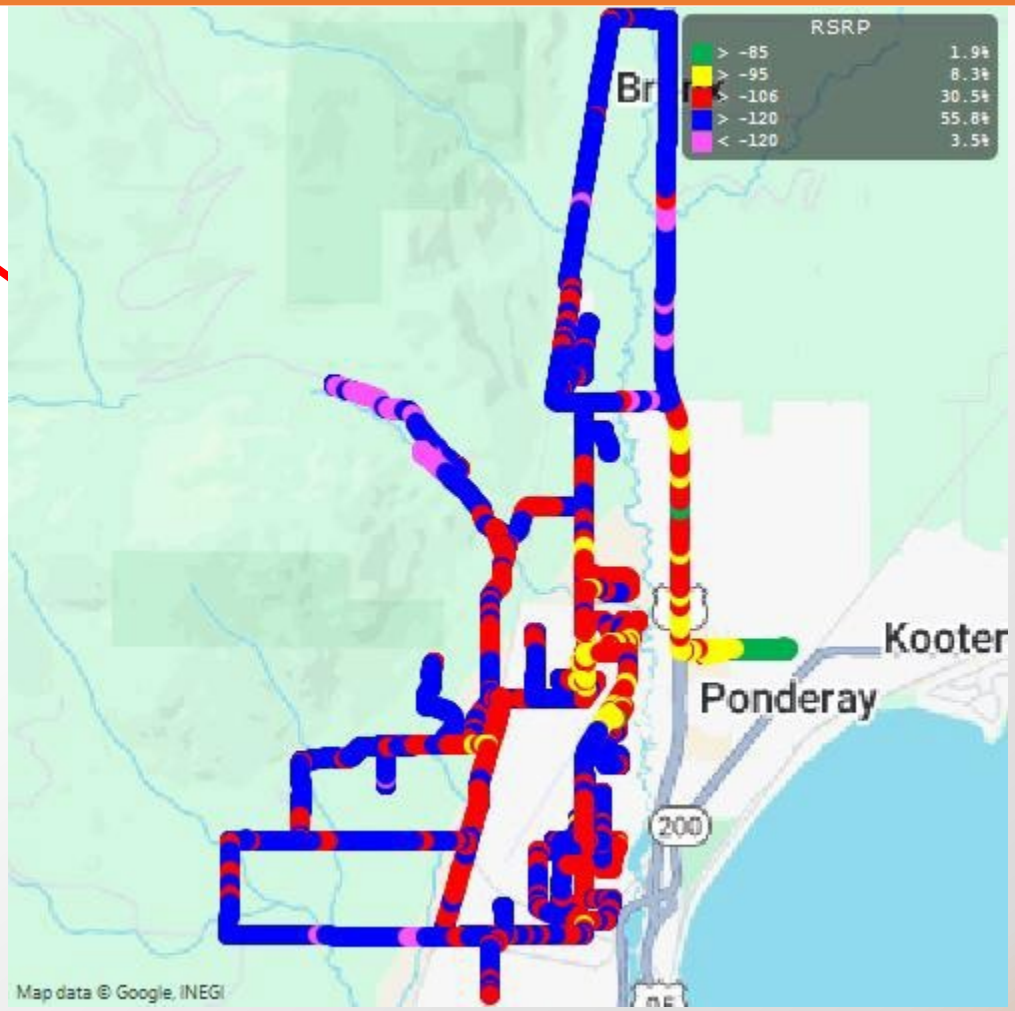


Verizon 2125MHz channel Scanner Data - Overview

LEGEND
In-Building (-85 dbm)
In-Vehicle (-95 dbm)
Outdoor (-106 dbm)
Marginal (<-106 to -120 dbm)
Low to No Service (<-120 dbm)

Proposed Site

This is RSRP and shows coverage around the proposed is outdoor and marginal coverage in mid band

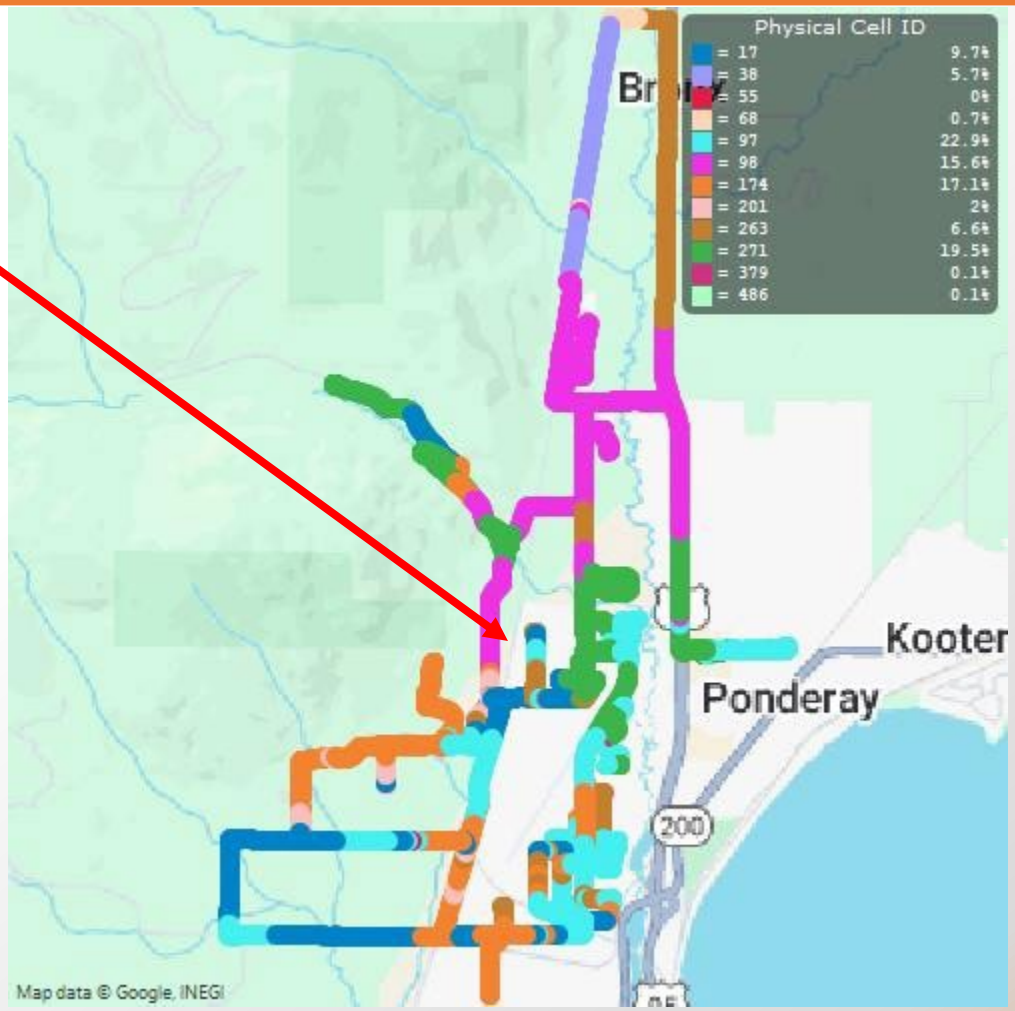


Active Call Testing – Verizon Physical Cell ID

LEGEND
In-Building (-85 dbm)
In-Vehicle (-95 dbm)
Outdoor (-106 dbm)
Marginal (<-106 to -120 dbm)
Low to No Service (<-120 dbm)

Proposed Site

This plot shows the serving sector in a particular area. This shows there is a mix of sectors covering around the proposed and there is no dominant site

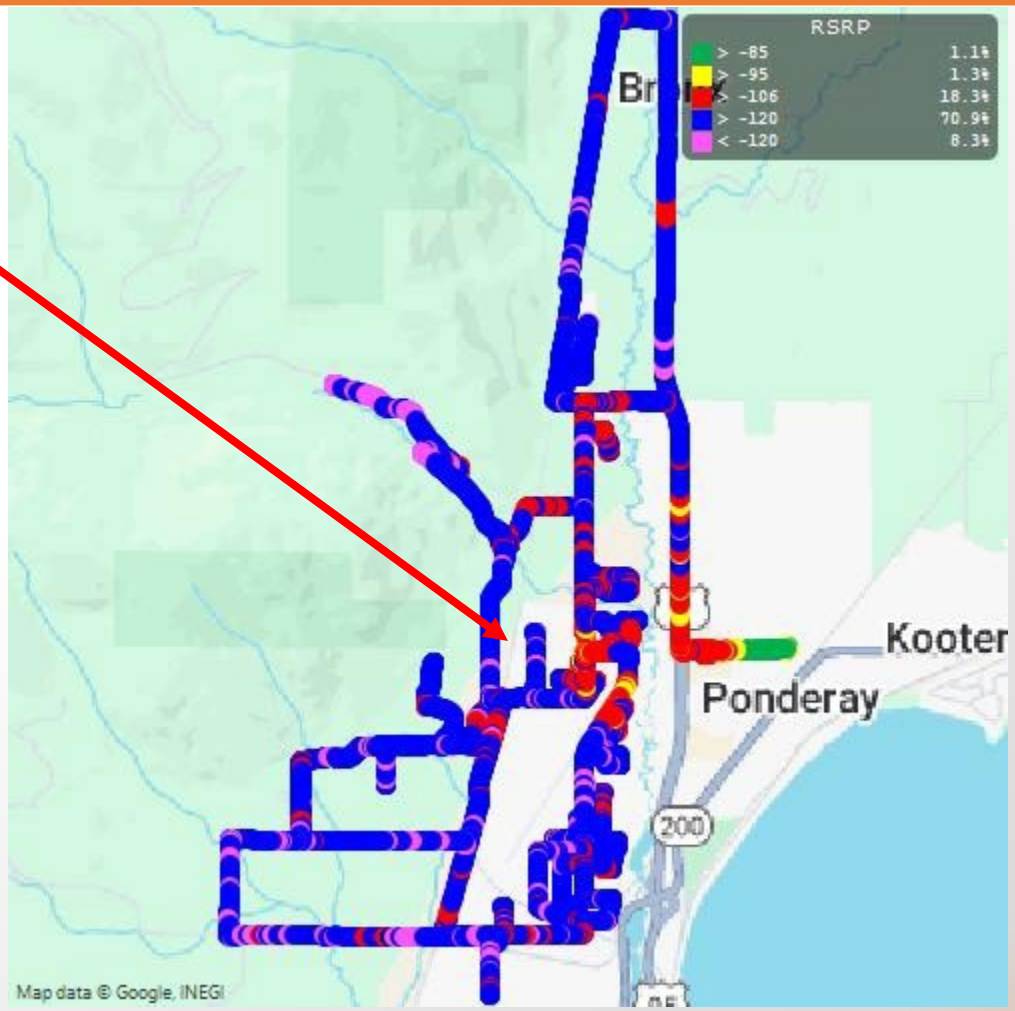


Active Call Testing - Verizon RSRP

LEGEND
In-Building (-85 dbm)
In-Vehicle (-95 dbm)
Outdoor (-106 dbm)
Marginal (<-106 to -120 dbm)
Low to No Service (<-120 dbm)

Proposed Site

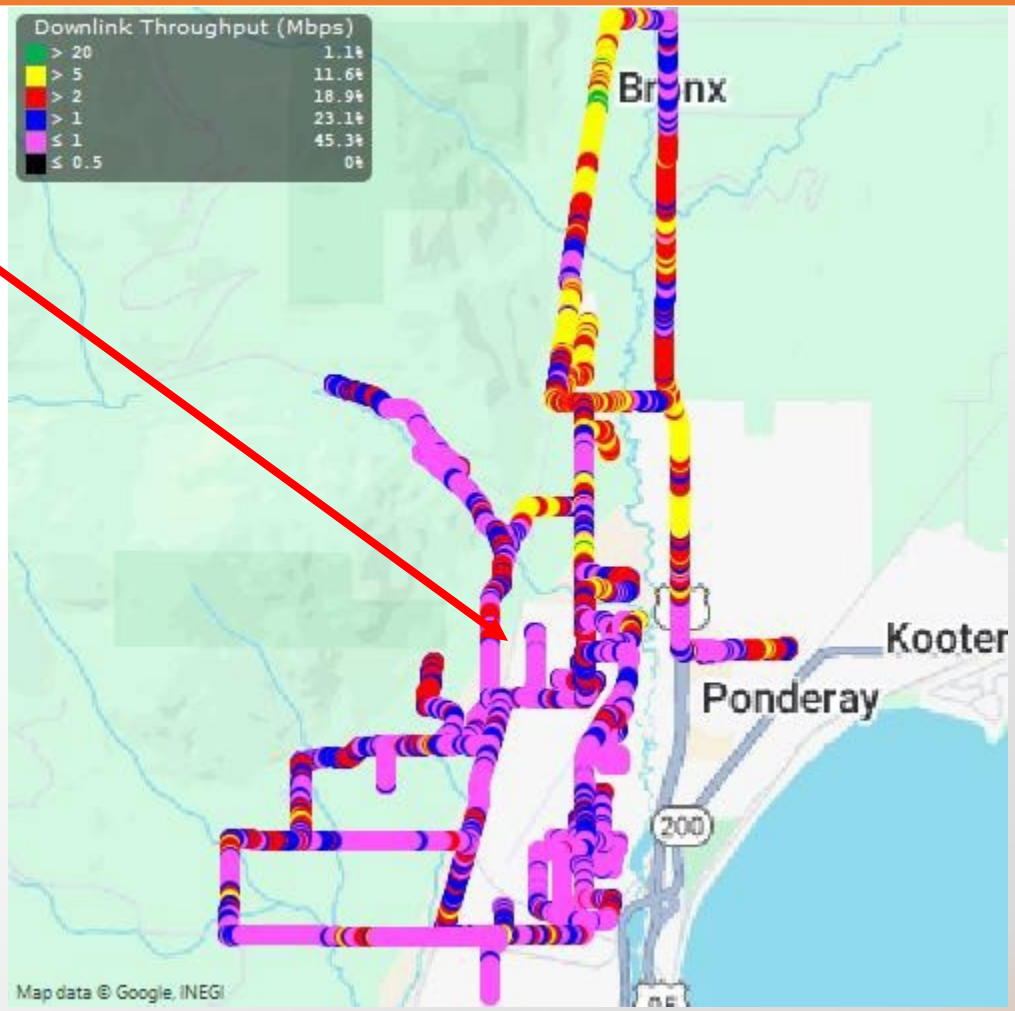
This plot shows the Received Signal Reference Power (RSRP) for the Verizon phone. Note that in the area around the proposed is showing marginal service coverage levels. The sites to the North, South and East for Verizon are too far away to provide quality service



Active Call Testing - Verizon Throughput

Proposed Site

This plot shows the throughput on the Downlink speed test. Around the proposed the mobile is reporting less than 2Mbps. This is very low throughput per customer



Conclusion

- The Scanner recorded frequency bands for AT&T, T-Mobile and, Verizon in the area.
- The existing sites do not provide the level of service needed in the area. There is a significant gap in quality service for at least 2 miles around the proposed. This is the same poor service for all (3) major carriers
- The throughput levels on the active call testing all show below 1Mbps for (2) carriers and below 2Mbps for Verizon.
- Recommend approval of the proposed site

Appendix

Frequency Bands

- For both 4G and 5G there are FCC allocated bands
- 4G – https://en.wikipedia.org/wiki/LTE_frequency_bands
- 5G - https://en.wikipedia.org/wiki/5G_NR_frequency_bands

RSRP

- RSRP is short for Reference Signal Received Power, used when measuring LTE networks. A cellular phone or another LTE-equipped device would display signal strength in RSRP, measured 0dBm (best signal) to -110dBm (weakest/no signal). An RSRP of -95dBm would be a strong signal whereas -115dBm would be very weak. Many devices show RSSI for LTE connections along with RSRP, but RSRP is a better indicator of LTE signal strength.
- Sources
  - https://5gstore.com/blog/2021/04/08/understanding-rssi-rsrp-and-rsrq/
  - https://blog.solidsignal.com/tutorials/what-is-rsrp/

RSRQ (a ratio using RSRP)

- RSRQ is Reference Signal Received Quality. This again only applies to LTE networks and is a measure of the signal quality of a cellular connection. RSRQ is typically displayed in a range from 0dB (highest quality) to -20dB (lowest quality). Typically better signal quality results in a more reliable connection.
- Sources
  - https://5gstore.com/blog/2021/04/08/understanding-rssi-rsrp-and-rsrq/
  - https://blog.solidsignal.com/tutorials/what-is-rsrp/

SINR (a ratio using RSRP)

- SINR (Signal to Interference & Noise Ratio) measures signal quality: the strength of the wanted signal compared to the unwanted interference and noise. Mobile network operators seek to maximize SINR at all sites to deliver the best possible customer experience, either by transmitting at a higher power, or by minimizing the interference and noise.
- Sources
  - https://5gstore.com/blog/2021/04/08/understanding-rssi-rsrp-and-rsrq/
  - https://iscointl.com/sinr-optimization/