

# **ATTACHMENT B**

## **Appendix A-3 VHF Enhanced Design**

## **EXBIBIT A.3 VHF ENHANCED DESIGN**

# **Contractor Engineering Study Concerning VHF Coverage Improvements in targeted areas within the County**

### **Base documentation:**

#### ***VHF Enhanced Design Purpose:***

This study is provided to document details for the Enhanced Coverage in selected areas as realized in the coverage predictions located in Attachment 2. It is important to note that the County did not issue any written guidelines for the quote and as such it is important to understand that a detailed discussion and Q and A period is was needed to ensure the Request includes all of the services and materials the County is expecting. This detailed discussion has been completed.

#### ***1. Coverage improvements:***

##### *Background:*

CONTRACTOR and the COUNTY have been proposing changes for coverage improvements over a 12-month period with many iterations of the design. Each iteration provided different predictions using different sites.

##### *Change Summary:*

Attachment 2 is the coverage prediction for this change request. All other coverage predictions in the iterative process are obsolete and no longer valid.

It must be noted the Architectural and Engineering services provided by Tower Systems are estimates and subject to change in scope and cost. It should also be noted that Nokia costs are also estimates from Nokia and are subject to change after they perform their on-site surveys and path studies.

#### ***2. New Site Details:***

The coverage prediction adds a host of new sites that augment VHF Coverage in selected areas. The table below summarizes the VHF Site Additions:

Site Name	Remarks
City Fire Station 7	New site
Buellton	New site
Betteravia	Add VHF Equipment to an existing UHF Site
Davidson Library	New site
White Hills	New site

### **3. New Site Equipment:**

*Indoor:*

Each site will have 6 Atlas 4500 repeaters and filter equipment identical to the equipment used at sites in the current contract. In addition to RF gear, the sites will have redundant GPS and network equipment using the same models as used in the current contract. New sites will have new DC plants and existing sites will have their current plants augmented with additional rectifiers and batteries to increase the plant capacity. Each new site will have an SNMP Site alarm panel installed and wired to sensors provided by the County. A power monitor will be supplied for each site to monitor the combiner output for issues. Equipment will be mounted in rack bays complimented with grounding and power distribution.

*Outdoor:*

Each site is outfitted with a transmission line, grounding kits, and lightning protection. In addition, costs are included for a nominal TX and RX antenna. Antenna selection will be made as part of the FCC Lic process and as such subject to change.

**4. M/W and MPLS:**

Each site will be connected by one or more microwave links to a site in the current contract. In Attachment 1, EFJ provided the path studies from Nokia. It is noted the path studies for some sites include multiple M/W path options; however only one path is in the rests for most sites. (The chart below lists paths included in the change request). Some existing sites will be augmented with additional equipment to terminate the links from the new site as seen in the table below. In addition to M/W connections, the system SAR 8 will be ready to support FO connections for some new sites as seen in the table below. The M/W cost includes but is not limited to 9500 Indoor MPR radios, filters and diplexer gear, SAR 8 routers, power distribution, racks and power distribution. Each path in the solution is configured as (2 +0) meaning that there are two active radio paths for maximum traffic capacity. In addition, each new site will receive a dehydrator, waveguide, and dishes See the table below for details:

SAR 8	Freq	Path		Freq	SAR 8
1	11 Gz	FS7	La Cumbre	11 Gz	1
1	6 Gz	Davidson Lib	La Cumbre	6 Gz	
1	6 Gz	Buellton	Santa Ynez	6 Gz	1
1	11 Gz	White Hills	Sudden	11 Gz	Not needed
	6 Gz	White Hills	Harris	6 Gz	Not needed
Not needed	Not needed	Betteravia		Not needed	Not needed

County to supply FO Conn
FS7
Davidson Lib
Buellton

**5. Service:**

*Program Services Overview:*

The project includes the following services:

LMR Specific	M/W Specific	LMR Installation	Misc
Program Management	Program Management	Program Management	Populating Asset
System Engineering	Path Design	Rack Installation	Mgt Solution
Field Engineering	Path Survey	DC Plant Activations	FCC Lic
Network Engineering	Freq Coord / FCC Lic	Transmission Line and	
Staging	System Eng	Antenna Installation	
Installation Supervision	Staging	Network Connections	
Coverage Testing	Installation	No Decommissioning	
Site Testing	No Decommissioning		
System Testing			

LMR specific services will be provided by the CONTRACTOR staff. It is envisioned the current project staff will be used to implement this new activity as part of the current program as long as the Change Order No. 6 is fully-executed in the next 60 days. If this decision to purchase is postponed, then the current staff may not implement the work and the service costs could go higher. **Inbuilding Coverage Testing is not included in this Change Request.**

M/W Specific services will be provided by Nokia staff. The current Nokia staff is ready to incorporate this activity into their project as long as Change Order No. 6 is fully-executed in the next 60 days. If this decision to purchase is postponed, then the current staff may not implement the work and the service costs could go higher. Installation services will be performed by Applied Technology Group.

MCMTech will provide services to incorporate all of the new materials into the Commshop Databases.

EZ-Spectrum will do the FCC Licensing for the new transmitters

*Architecture and Engineering services:*

Tower Systems will continue to provide A&E service for the program. The scope is to generate a 100% CD as for the sites in the current contract that have major construction.

	Betteravia	Buellton	City Fire Station 7	Davidson Lib. USBC	Harris Grade	La Cumbra	Santa Ynez	Sudden Peak	White Hills
Architectural and Engineering	Update	New Activity	New Activity	New Activity	Update	Update	Update	Update	New Activity
Tower Mapping & Structural					Update	Update	Update	Update	
Federal Aviation Administration		New Activity	New Activity						New Activity
Local, State, and Federal Environmental and Historical Requirements									
Zoning and Permitting		New Activity	New Activity						New Activity
Documentation	Update	New Activity	New Activity	New Activity	Update	Update	Update	Update	New Activity
Mod-Demob Project Management	Update	New Activity	New Activity	New Activity	Update	Update	Update	Update	New Activity

Activity at existing RF sites will be limited to updating the Structural Analysis and Tower profile drawings. In the case of Betteravia and Davidson Lib, the cost includes designing new VHF antenna mounts.

Activity at new sites will include services such as site surveys, Lease Exhibit generation, Geotech surveys (where needed), Topo surveys (where needed), Electrical Design, and generating a 100% CD.

## 6. Warranty and Maintenance

### General:

The program includes an extended 2 year W/M plan that matches the tenets of the Agreement

In addition to the CONTRACTOR warranty, we have included a 2 yr Nokia W/M service package with the items listed below in accordance with the Agreement.

### Nokia Support

301090767	9500 MPR Tech Support - Gold( 24 T/Rs)
301090791	9500 MPR Adv Repl Next Bus Day - Gold( 24 T/Rs)
3HE15358AA	(6) 7705 SAR-8 TS Gold with Adv Exchange 1BD
3HE01807AB	(6)7705 SAR-8 Software Subscription Plan (SSP)
301013231	Technical Support Gold NSP
3HE10161AA	Software Release Subscription (SRS) NSP

### Spares:

This Change included a very limited number of spares. The current spares pool will be increased with the following components:

3354521112	ATLAS 4500 DC VHF PHASE 1 CONVENTIONAL SIMULCAST	2
TBD	Ant Contingency incase the new ant are unique	1
3DB19060AA	MPT-HLC XCVR L6 GHz (5720 - 6425)	1
3DB76050GA	MPT-HLC Plus XCVR 11GHz	1
3DB76050CB	MPT-HLC XCVR 11 GHz HP W/OUT COMBINER (10700 - 11700)	1
3EM20277AA	Optics SFP GigE 850 NM Multimode 550 Meter	2

Attachment 1 Santa Barbara County M/W Path Studies







## MEMORANDUM

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To Alan Proctor

From Joey Bunting

Date February 9, 2023

CC Sung Tran  
Dave Robb

Ref Preliminary Path Study | EF Johnson | County of Santa Barbara | Revision 10 - VHF Sites

Attached are a system map, profiles and path calculations for six paths in California. The path design uses the Wavence radio in the 5.925 - 6.425 GHz and 10.700 - 11.700 GHz band.

The following assumptions were used:

- Site coordinates are from the customer. The site coordinates were provided using the North American Datum of 1983 (NAD83).
- Ground elevations at each site are taken from the USGS 10 meter terrain database.
- Profile data is from the USGS 10 meter terrain database.
- Paths were designed for a poor propagation area.
- Centerlines used were selected by Nokia.
- The main antenna clearance criteria is the higher of:
  - 30% of the 1st Fresnel zone @  $K=2/3$  or 100% of the 1st Fresnel zone @  $K=4/3$
- Paths were designed to a 2-way availability of 99.999% per year, using the  $10^{-6}$  bit error rate threshold. Paths were also designed using a minimum fade margin to protect against obstruction fading and ducting conditions.

**Nokia strongly recommends that a field survey be performed to verify site coordinates, path clearances and obstruction heights.**

Attached is a copy of our 'Microwave Path Engineering Warranty' which should be included with any transmittals of feasibility studies, proposals and/or final designs and frequency coordination.

Joey Bunting

# Microwave System Feasibility Report

EF Johnson | County of Santa Barbara

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*This report is intended to discover the feasibility of constructing a microwave system to meet the customer's needs as outlined to Nokia. It is based on customer supplied data unless noted otherwise. This information should be used solely to determine if a more formal engineering effort is worthwhile.*

*No equipment orders, site work, tower structural analysis, frequency coordination or similar activity should be based on this document.*

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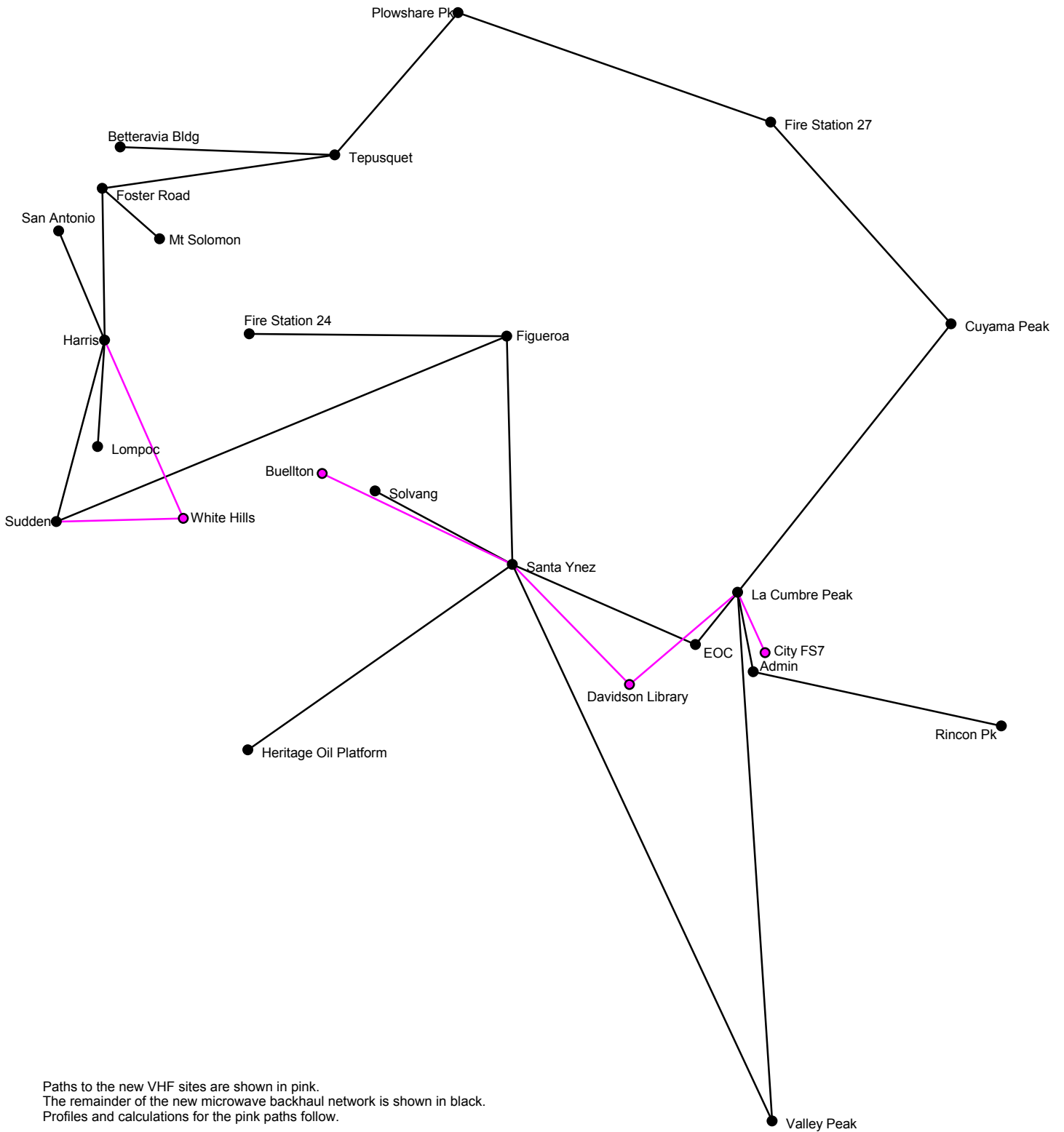
This document was prepared by: Joey Bunting  
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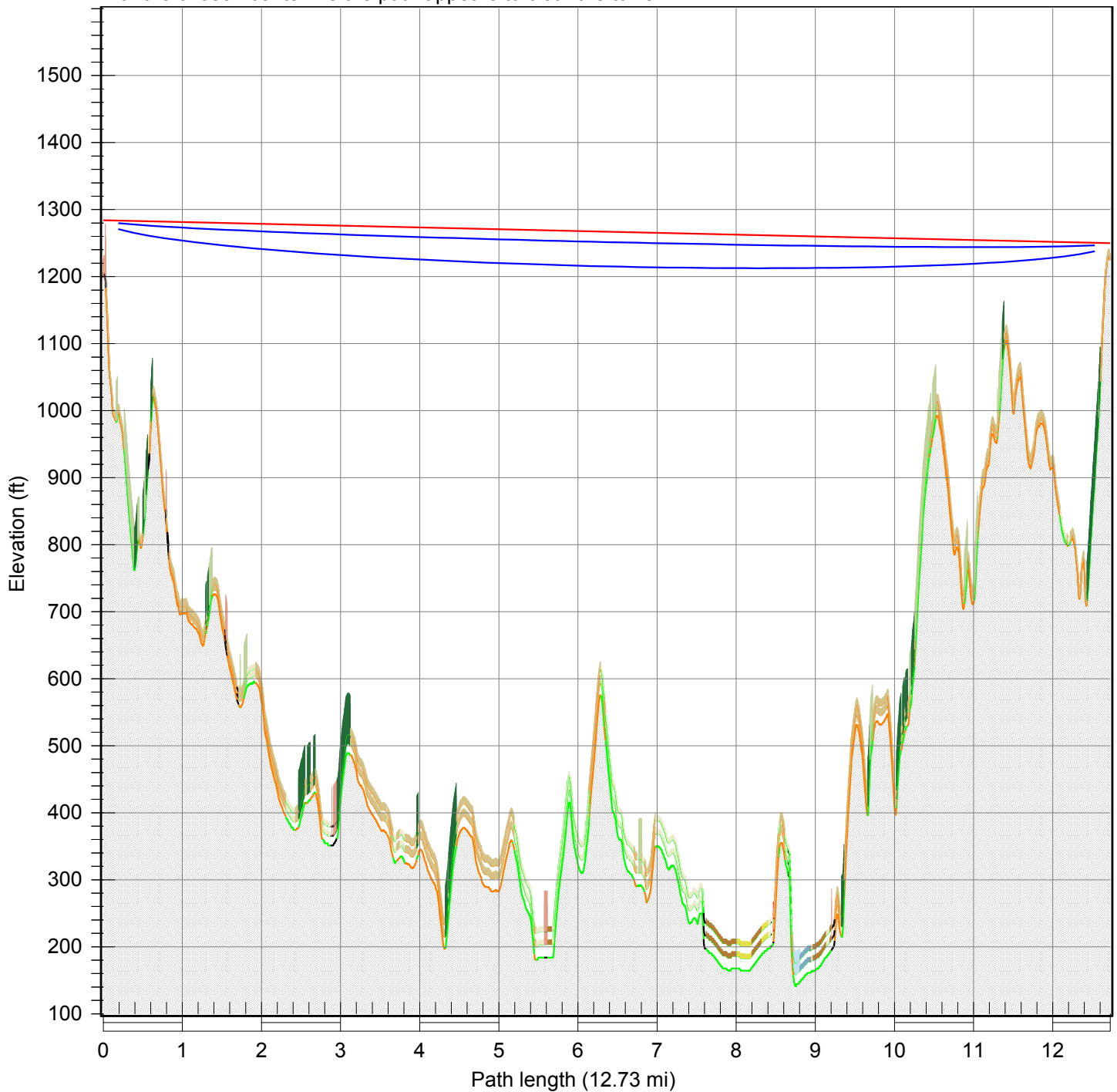
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Paths to the new VHF sites are shown in pink.  
The remainder of the new microwave backhaul network is shown in black.  
Profiles and calculations for the pink paths follow.

The centerline at Harris is controlled by an on-path tower within the Harris site.  
 With the chosen centerline the path appears to clear the tower.



Harris	
Latitude	34 44 18.70 N
Longitude	120 26 44.90 W
Azimuth	155.88°
Elevation	1199 ft ASL
Antenna CL	85.0 ft AGL

Frequency (MHz) = 6175.0
K = 1.33, 0.67
%F1 = 100.00, 30.00

White Hills	
Latitude	34 34 12.00 N
Longitude	120 21 16.56 W
Azimuth	335.93°
Elevation	1225 ft ASL
Antenna CL	25.0 ft AGL

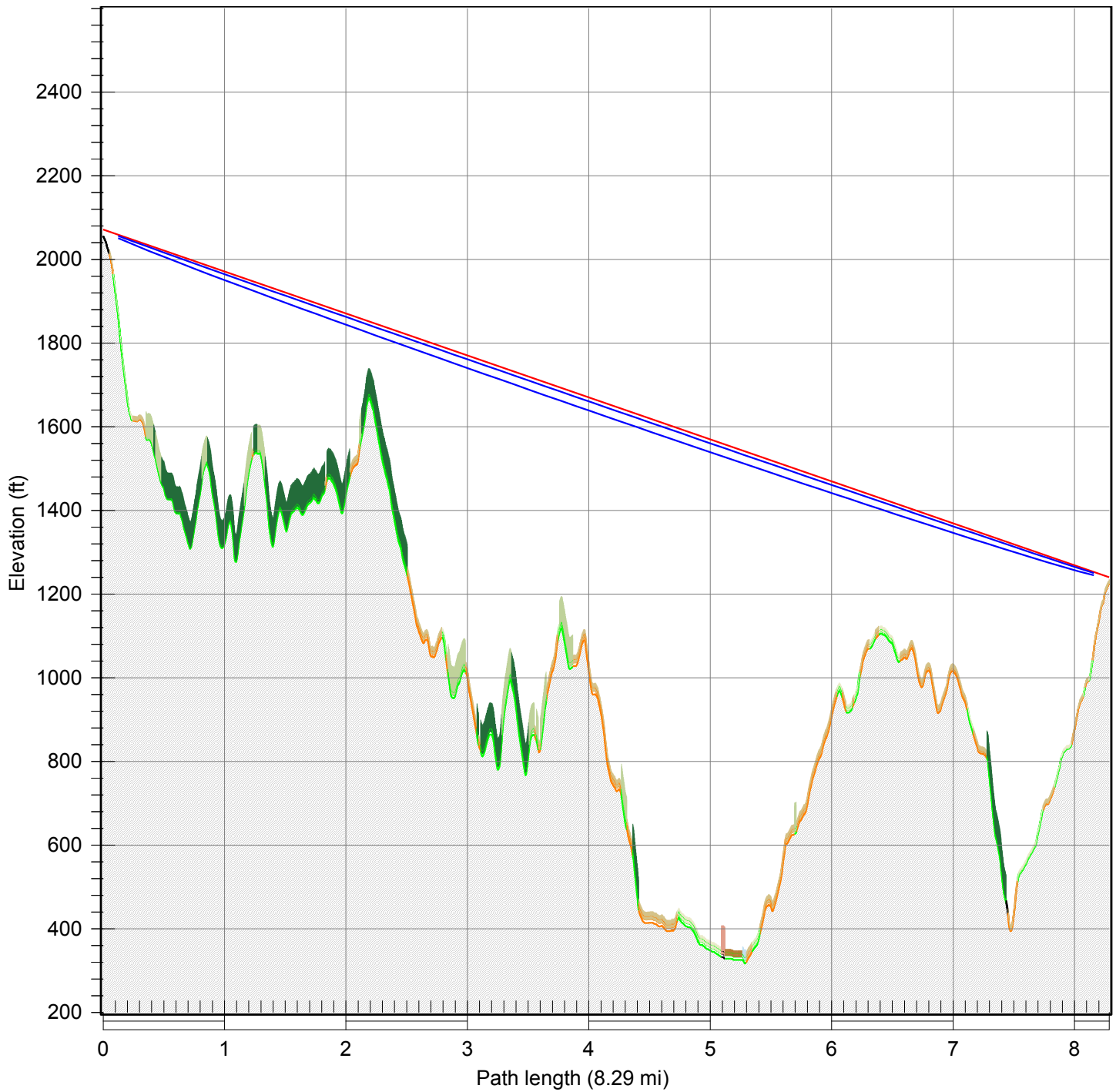
## Transmission details (Harris-White Hills.pl5)

	Harris	White Hills
Latitude	34 44 18.70 N	34 34 12.00 N
Longitude	120 26 44.90 W	120 21 16.56 W
True azimuth (°)	155.88	335.93
Elevation (ft)	1199.00	1224.80
Tower height (ft)	100.00	50.00
Tower type	self supporting	
Antenna model	USX6-6W (TR)	USX6-6W (TR)
Antenna gain (dBi)	38.80	38.80
Antenna height (ft)	85.00	25.00
TX line model	EW52	EW52
TX line unit loss (dB/100 ft)	1.18	1.18
TX line length (ft)	145.00	85.00
TX line loss (dB)	1.71	1.00
Circulator branching loss (dB)	0.60	0.60
TX filter loss (dB)	1.30	1.30
RX filter loss (dB)	1.60	1.60
Frequency (MHz)	6175.00	
Polarization	Vertical	
Path length (mi)	12.73	
Free space loss (dB)	134.51	
Atmospheric absorption loss (dB)	0.18	
Net path loss (dB)	63.90	63.90
Configuration	NSB Diplexer Main	NSB Diplexer Main
Radio model	WVCE61-L-1024A30S-230	WVCE61-L-1024A30S-230
Radio file name	wvce61_l_1024a30s_230	wvce61_l_1024a30s_230
Emission designator	30M0D7W	30M0D7W
XPD fade margin - multipath (dB)	39.01	39.01
Climatic factor	2.00	
Terrain roughness (ft)	140.00	
C factor	0.52	
Average annual temperature (°F)	59.94	
Fade occurrence factor (Po)	1.669E-002	

	TX power (dBm)		RX threshold level (dBm)		EIRP (dBm)		Receive signal (dBm)		Thermal fade margin (dB)		Flat fade margin - multipath (dB)	
1024 230	31.50	31.50	-60.50	-60.50	66.69	67.40	-32.40	-32.40	28.10	28.10	27.07	27.07
512 208	31.50	31.50	-63.70	-63.70	66.69	67.40	-32.40	-32.40	31.30	31.30	29.63	29.63
256 185	32.50	32.50	-67.10	-67.10	67.69	68.40	-31.40	-31.40	35.70	35.70	33.69	33.69
<b>128 163</b>	<b>32.50</b>	<b>32.50</b>	<b>-70.10</b>	<b>-70.10</b>	<b>67.69</b>	<b>68.40</b>	<b>-31.40</b>	<b>-31.40</b>	<b>38.70</b>	<b>38.70</b>	<b>35.84</b>	<b>35.84</b>
64 138	32.50	32.50	-73.00	-73.00	67.69	68.40	-31.40	-31.40	41.60	41.60	37.36	37.36
32 115	32.50	32.50	-74.90	-74.90	67.69	68.40	-31.40	-31.40	43.50	43.50	38.61	38.61
16 91	32.50	32.50	-78.30	-78.30	67.69	68.40	-31.40	-31.40	46.90	46.90	40.18	40.18
4 44	32.50	32.50	-89.00	-89.00	67.69	68.40	-31.40	-31.40	57.60	57.60	47.47	47.47

	Worst month multipath		Annual multipath		Annual rain		Total annual (2 way)	Time in mode (2 way)
1024 230	99.9967	99.9967	99.9990	99.9990			99.9980	99.9980
512 208	99.9982	99.9982	99.9994	99.9994			99.9989	0.0009
256 185	99.9993	99.9993	99.9998	99.9998			99.9996	0.0007
<b>128 163</b>	<b>99.9996</b>	<b>99.9996</b>	<b>99.9999</b>	<b>99.9999</b>			<b>99.9997</b>	<b>0.0002</b>
64 138	99.9997	99.9997	99.9999	99.9999			99.9998	0.0001
32 115	99.9998	99.9998	99.9999	99.9999			99.9999	0.0000
16 91	99.9998	99.9998	99.9999	99.9999			99.9999	0.0000
4 44	99.9999	99.9999	99.9999	99.9999			99.9999	0.0001

Multipath fading method - Vigants - Barnett



Sudden	
Latitude	34 33 59.10 N
Longitude	120 29 59.40 W
Azimuth	88.25°
Elevation	2056 ft ASL
Antenna CL	15.0 ft AGL

Frequency (MHz) = 11200.0  
 K = 1.33, 0.67  
 %F1 = 100.00, 30.00

White Hills	
Latitude	34 34 12.00 N
Longitude	120 21 16.56 W
Azimuth	268.33°
Elevation	1225 ft ASL
Antenna CL	15.0 ft AGL

## Transmission details (Sudden-White Hills.pl5)

	Sudden	White Hills
Latitude	34 33 59.10 N	34 34 12.00 N
Longitude	120 29 59.40 W	120 21 16.56 W
True azimuth (°)	88.25	268.33
Elevation (ft)	2056.10	1224.80
Tower height (ft)	160.00	50.00
Antenna model	SHPX3-11W (TR)	SHPX3-11W (TR)
Antenna gain (dBi)	38.70	38.70
Antenna height (ft)	15.00	15.00
TX line model	EW90	EW90
TX line unit loss (dB/100 ft)	3.06	3.06
TX line length (ft)	75.00	75.00
TX line loss (dB)	2.30	2.30
Circulator branching loss (dB)	0.90	0.90
TX filter loss (dB)	1.40	1.40
RX filter loss (dB)	1.70	1.70
Frequency (MHz)	11200.00	
Polarization	Vertical	
Path length (mi)	8.29	
Free space loss (dB)	135.95	
Atmospheric absorption loss (dB)	0.21	
Net path loss (dB)	68.26	68.26
Configuration	NSB Diplexer Main	NSB Diplexer Main
Radio model	WVCE11-L-1024A30S-230	WVCE11-L-1024A30S-230
Radio file name	wvce11_l_1024a30s_230	wvce11_l_1024a30s_230
Emission designator	30M0D7W	30M0D7W
XPD fade margin - multipath (dB)	33.14	33.14
Climatic factor	2.00	
Terrain roughness (ft)	140.00	
C factor	0.52	
Average annual temperature (°F)	59.59	
Fade occurrence factor (Po)	8.358E-003	
Polarization	Vertical	
Rain region	San Luis Obispo, California	

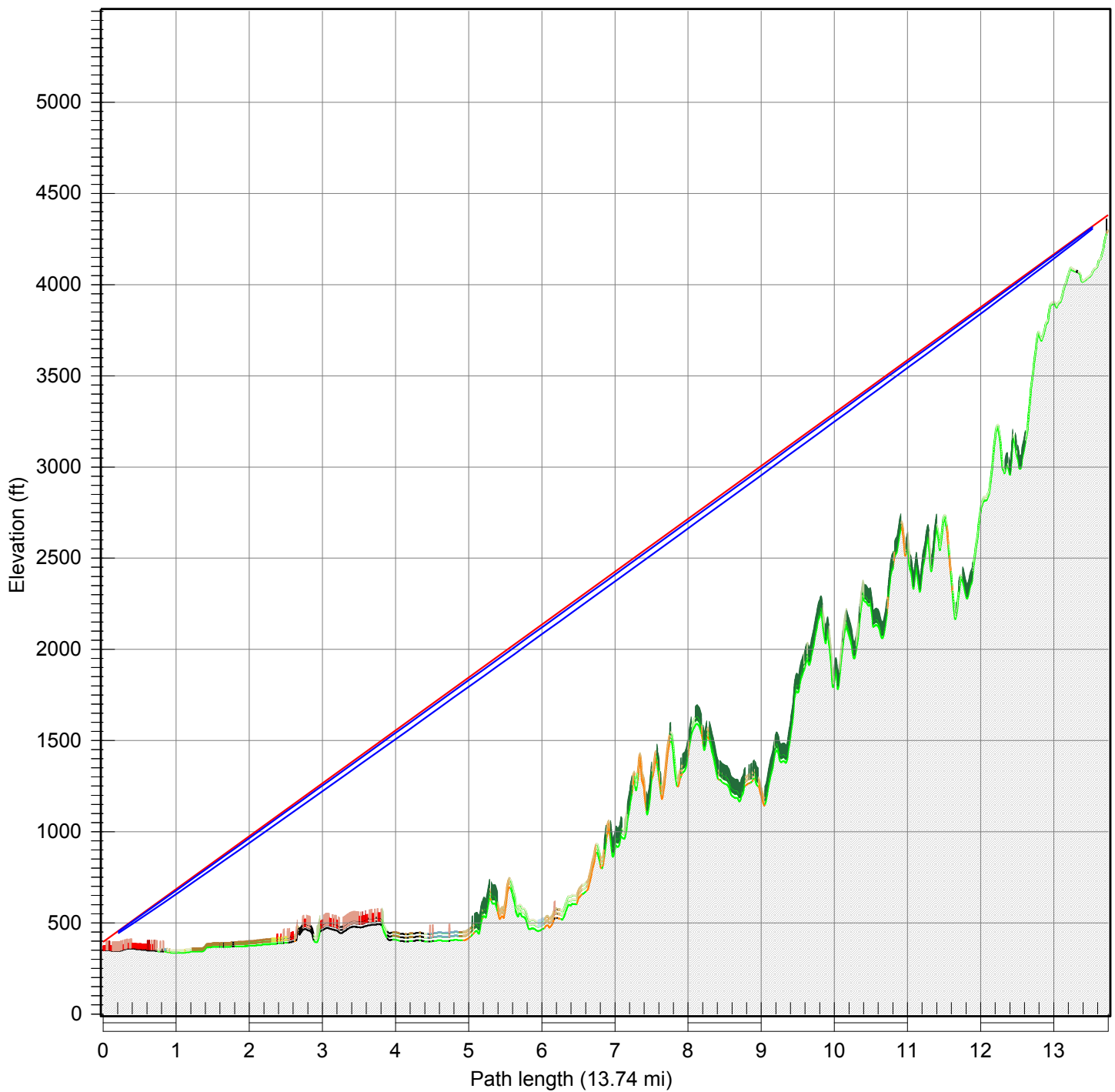


	TX power (dBm)		RX threshold level (dBm)		EIRP (dBm)		Receive signal (dBm)		Thermal fade margin (dB)		Flat fade margin - multipath (dB)	
1024 230	33.00	33.00	-60.00	-60.00	67.10	67.10	-35.26	-35.26	24.74	24.74	23.02	23.02
512 208	33.00	33.00	-63.20	-63.20	67.10	67.10	-35.26	-35.26	27.94	27.94	25.28	25.28
256 185	33.00	33.00	-66.60	-66.60	67.10	67.10	-35.26	-35.26	31.34	31.34	28.70	28.70
<b>128 163</b>	<b>34.00</b>	<b>34.00</b>	<b>-69.60</b>	<b>-69.60</b>	<b>68.10</b>	<b>68.10</b>	<b>-34.26</b>	<b>-34.26</b>	<b>35.34</b>	<b>35.34</b>	<b>31.09</b>	<b>31.09</b>
64 138	34.00	34.00	-72.50	-72.50	68.10	68.10	-34.26	-34.26	38.24	38.24	32.28	32.28
32 115	35.00	35.00	-74.40	-74.40	69.10	69.10	-33.26	-33.26	41.14	41.14	33.61	33.61
16 91	35.00	35.00	-77.80	-77.80	69.10	69.10	-33.26	-33.26	44.54	44.54	34.86	34.86
4 44	35.00	35.00	-88.50	-88.50	69.10	69.10	-33.26	-33.26	55.24	55.24	41.85	41.85

	Worst month multipath		Annual multipath		Annual rain		Total annual (2 way)	Time in mode (2 way)
1024 230	99.9958	99.9958	99.9988	99.9988	99.9999	99.9999	99.9974	99.9974
512 208	99.9975	99.9975	99.9993	99.9993	99.9999	99.9999	99.9985	0.0010
256 185	99.9989	99.9989	99.9997	99.9997	99.9999	99.9999	99.9993	0.0008
<b>128 163</b>	<b>99.9993</b>	<b>99.9993</b>	<b>99.9998</b>	<b>99.9998</b>	<b>99.9999</b>	<b>99.9999</b>	<b>99.9996</b>	<b>0.0003</b>
64 138	99.9995	99.9995	99.9999	99.9999	99.9999	99.9999	99.9997	0.0001
32 115	99.9996	99.9996	99.9999	99.9999	99.9999	99.9999	99.9998	0.0001
16 91	99.9997	99.9997	99.9999	99.9999	99.9999	99.9999	99.9998	0.0001
4 44	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	0.0001

Multipath fading method - Vigants - Barnett  
Rain fading method - Crane

The centerline at Santa Ynez is controlled by an on-path tower within the Santa Ynez site.  
 With the chosen centerline the path appears to clear the tower.



Buellton	
Latitude	34 36 46.80 N
Longitude	120 11 45.60 W
Azimuth	115.51°
Elevation	348 ft ASL
Antenna CL	47.0 ft AGL

Frequency (MHz) = 6175.0
K = 1.33, 0.67
%F1 = 100.00, 30.00

Santa Ynez	
Latitude	34 31 37.00 N
Longitude	119 58 42.90 W
Azimuth	295.63°
Elevation	4291 ft ASL
Antenna CL	90.0 ft AGL

## Transmission details (Buellton-Santa Ynez.pl5)

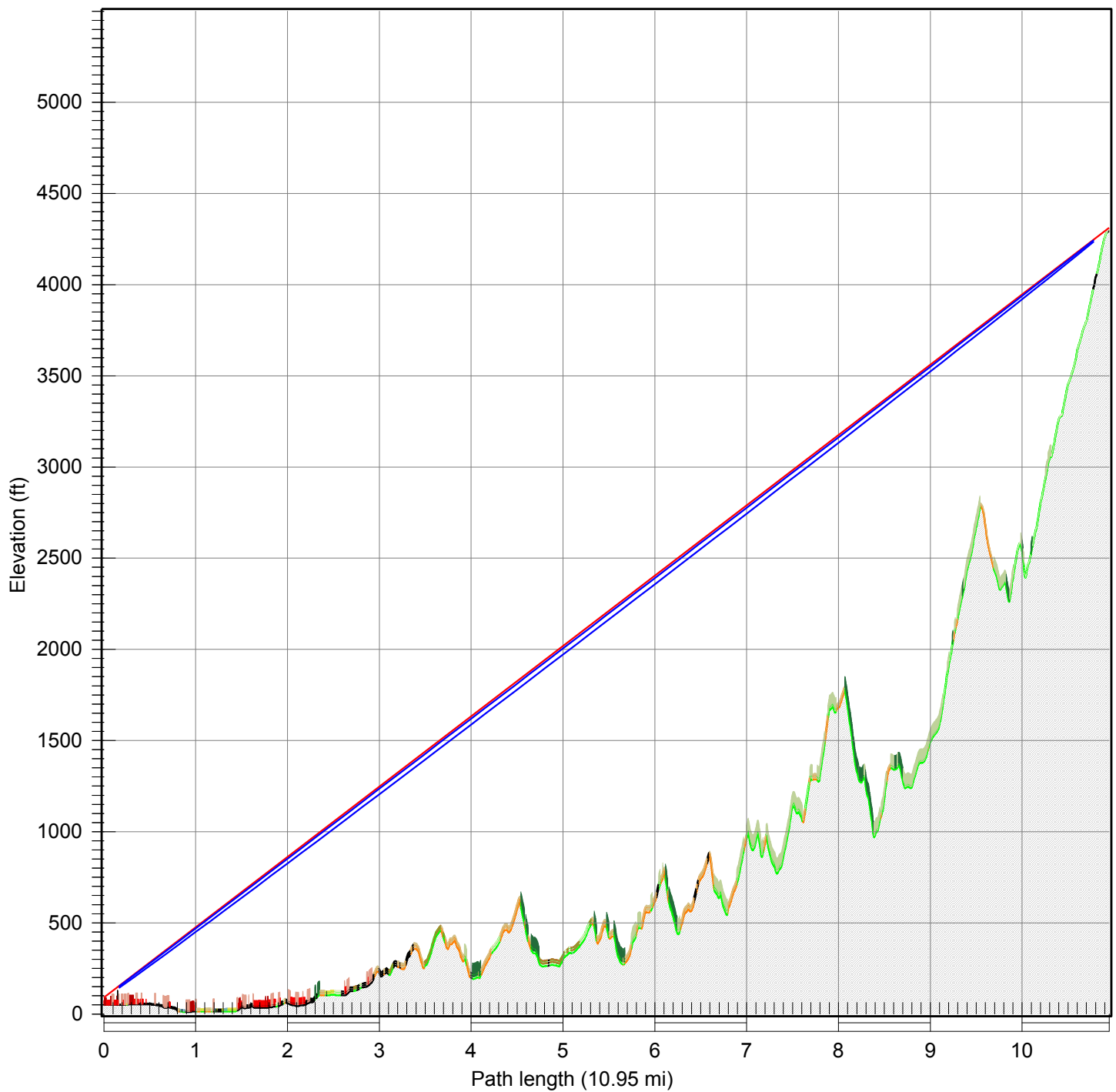
	Buellton	Santa Ynez
Latitude	34 36 46.80 N	34 31 37.00 N
Longitude	120 11 45.60 W	119 58 42.90 W
True azimuth (°)	115.51	295.63
Elevation (ft)	347.77	4291.01
Tower height (ft)	50.00	60.00
Tower type		self supporting
Antenna model	USX6-6W (TR)	USX6-6W (TR)
Antenna gain (dBi)	38.80	38.80
Antenna height (ft)	47.00	90.00
TX line model	EW52	EW52
TX line unit loss (dB/100 ft)	1.18	1.18
TX line length (ft)	87.00	200.00
TX line loss (dB)	1.03	2.36
Circulator branching loss (dB)	0.60	0.60
TX filter loss (dB)	1.30	1.30
RX filter loss (dB)	1.60	1.60
Frequency (MHz)	6175.00	
Polarization	Vertical	
Path length (mi)	13.77	
Free space loss (dB)	135.19	
Atmospheric absorption loss (dB)	0.19	
Net path loss (dB)	65.26	65.26
Configuration	NSB Diplexer Main	NSB Diplexer Main
Radio model	WVCE61-L-1024A30S-230	WVCE61-L-1024A30S-230
Radio file name	wvce61_l_1024a30s_230	wvce61_l_1024a30s_230
Emission designator	30M0D7W	30M0D7W
XPD fade margin - multipath (dB)	38.66	38.66
Climatic factor	2.00	
Terrain roughness (ft)	140.00	
C factor	0.52	
Average annual temperature (°F)	59.24	
Fade occurrence factor (Po)	2.112E-002	

	TX power (dBm)		RX threshold level (dBm)		EIRP (dBm)		Receive signal (dBm)		Thermal fade margin (dB)		Flat fade margin - multipath (dB)	
1024 230	31.50	31.50	-60.50	-60.50	67.37	66.04	-33.76	-33.76	26.74	26.74	25.90	25.90
512 208	31.50	31.50	-63.70	-63.70	67.37	66.04	-33.76	-33.76	29.94	29.94	28.56	28.56
256 185	32.50	32.50	-67.10	-67.10	68.37	67.04	-32.76	-32.76	34.34	34.34	32.67	32.67
<b>128 163</b>	<b>32.50</b>	<b>32.50</b>	<b>-70.10</b>	<b>-70.10</b>	<b>68.37</b>	<b>67.04</b>	<b>-32.76</b>	<b>-32.76</b>	<b>37.34</b>	<b>37.34</b>	<b>34.94</b>	<b>34.94</b>
64 138	32.50	32.50	-73.00	-73.00	68.37	67.04	-32.76	-32.76	40.24	40.24	36.60	36.60
32 115	32.50	32.50	-74.90	-74.90	68.37	67.04	-32.76	-32.76	42.14	42.14	37.91	37.91
16 91	32.50	32.50	-78.30	-78.30	68.37	67.04	-32.76	-32.76	45.54	45.54	39.60	39.60
4 44	32.50	32.50	-89.00	-89.00	68.37	67.04	-32.76	-32.76	56.24	56.24	47.02	47.02

	Worst month multipath		Annual multipath		Annual rain		Total annual (2 way)	Time in mode (2 way)
1024 230	99.9945	99.9945	99.9984	99.9984			99.9968	99.9968
512 208	99.9970	99.9970	99.9991	99.9991			99.9982	0.0015
256 185	99.9988	99.9988	99.9997	99.9997			99.9993	0.0011
<b>128 163</b>	<b>99.9993</b>	<b>99.9993</b>	<b>99.9998</b>	<b>99.9998</b>			<b>99.9996</b>	<b>0.0003</b>
64 138	99.9995	99.9995	99.9999	99.9999			99.9997	0.0001
32 115	99.9997	99.9997	99.9999	99.9999			99.9998	0.0001
16 91	99.9998	99.9998	99.9999	99.9999			99.9999	0.0001
4 44	99.9999	99.9999	99.9999	99.9999			99.9999	0.0001

Multipath fading method - Vigants - Barnett

These centerlines assume that the antenna at Davidson Library will be carefully sited, to keep the path from crossing the UCSB Library building.



<b>Davidson Library</b>	
Latitude	34 24 46.80 N
Longitude	119 50 42.00 W
Azimuth	315.88°
Elevation	49 ft ASL
Antenna CL	41.0 ft AGL

Frequency (MHz) = 6175.0
K = 1.33, 0.67
%F1 = 100.00, 30.00

<b>Santa Ynez</b>	
Latitude	34 31 37.00 N
Longitude	119 58 42.90 W
Azimuth	135.81°
Elevation	4291 ft ASL
Antenna CL	20.0 ft AGL

## Transmission details (Davidson Library-Santa Ynez.pl5)

	Davidson Library	Santa Ynez
Latitude	34 24 46.80 N	34 31 37.00 N
Longitude	119 50 42.00 W	119 58 42.90 W
True azimuth (°)	315.88	135.81
Elevation (ft)	49.21	4291.01
Tower height (ft)	50.00	60.00
Tower type		self supporting
Antenna model	USX6-6W (TR)	USX6-6W (TR)
Antenna gain (dBi)	38.80	38.80
Antenna height (ft)	41.00	20.00
TX line model	EW52	EW52
TX line unit loss (dB/100 ft)	1.18	1.18
TX line length (ft)	81.00	130.00
TX line loss (dB)	0.96	1.53
Circulator branching loss (dB)	0.60	0.60
TX filter loss (dB)	1.30	1.30
RX filter loss (dB)	1.60	1.60
Frequency (MHz)	6175.00	
Polarization	Vertical	
Path length (mi)	10.98	
Free space loss (dB)	133.22	
Atmospheric absorption loss (dB)	0.15	
Net path loss (dB)	62.36	62.36
Configuration	NSB Diplexer Main	NSB Diplexer Main
Radio model	WVCE61-L-1024A30S-230	WVCE61-L-1024A30S-230
Radio file name	wvce61_l_1024a30s_230	wvce61_l_1024a30s_230
Emission designator	30M0D7W	30M0D7W
XPD fade margin - multipath (dB)	37.92	37.92
Climatic factor	2.00	
Terrain roughness (ft)	140.00	
C factor	0.52	
Average annual temperature (°F)	58.64	
Fade occurrence factor (Po)	1.071E-002	

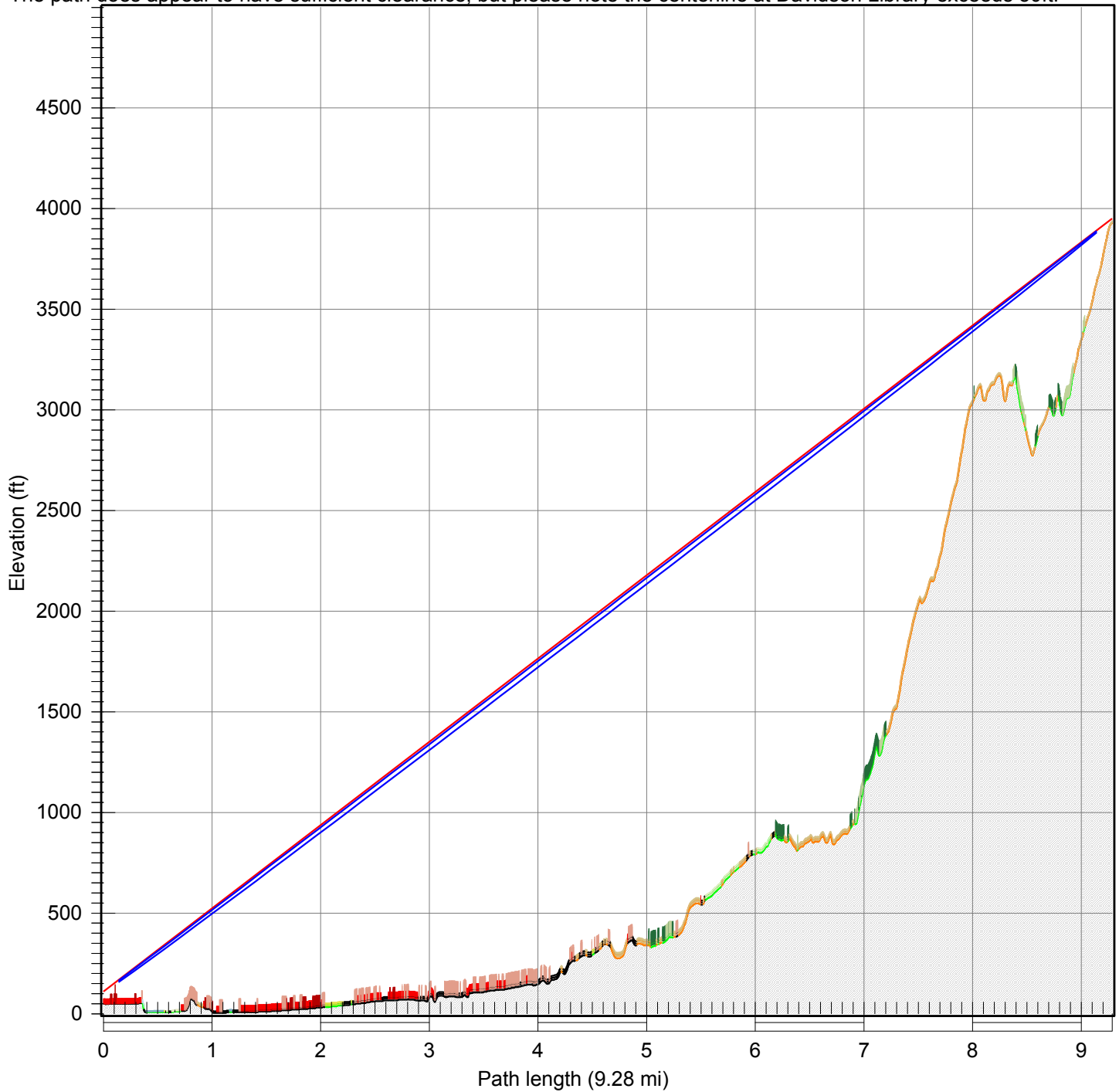
	TX power (dBm)		RX threshold level (dBm)		EIRP (dBm)		Receive signal (dBm)		Thermal fade margin (dB)		Flat fade margin - multipath (dB)	
1024 230	31.50	31.50	-60.50	-60.50	67.44	66.87	-30.86	-30.86	29.64	29.64	27.92	27.92
512 208	31.50	31.50	-63.70	-63.70	67.44	66.87	-30.86	-30.86	32.84	32.84	30.15	30.15
256 185	32.50	32.50	-67.10	-67.10	68.44	67.87	-29.86	-29.86	37.24	37.24	34.06	34.06
<b>128 163</b>	<b>32.50</b>	<b>32.50</b>	<b>-70.10</b>	<b>-70.10</b>	<b>68.44</b>	<b>67.87</b>	<b>-29.86</b>	<b>-29.86</b>	<b>40.24</b>	<b>40.24</b>	<b>35.92</b>	<b>35.92</b>
64 138	32.50	32.50	-73.00	-73.00	68.44	67.87	-29.86	-29.86	43.14	43.14	37.09	37.09
32 115	32.50	32.50	-74.90	-74.90	68.44	67.87	-29.86	-29.86	45.04	45.04	38.21	38.21
16 91	32.50	32.50	-78.30	-78.30	68.44	67.87	-29.86	-29.86	48.44	48.44	39.53	39.53
4 44	32.50	32.50	-89.00	-89.00	68.44	67.87	-29.86	-29.86	59.14	59.14	46.58	46.58

	Worst month multipath		Annual multipath		Annual rain		Total annual (2 way)	Time in mode (2 way)
1024 230	99.9982	99.9982	99.9995	99.9995			99.9990	99.9990
512 208	99.9990	99.9990	99.9997	99.9997			99.9994	0.0004
256 185	99.9996	99.9996	99.9999	99.9999			99.9997	0.0004
<b>128 163</b>	<b>99.9997</b>	<b>99.9997</b>	<b>99.9999</b>	<b>99.9999</b>			<b>99.9998</b>	<b>0.0001</b>
64 138	99.9998	99.9998	99.9999	99.9999			99.9999	0.0000
32 115	99.9998	99.9998	99.9999	99.9999			99.9999	0.0000
16 91	99.9999	99.9999	99.9999	99.9999			99.9999	0.0000
4 44	99.9999	99.9999	99.9999	99.9999			99.9999	0.0001

Multipath fading method - Vigants - Barnett

These centerlines assume that the antenna at Davidson Library will be carefully sited, to keep the path from crossing the 90ft trees to the NE of the building. The path controlling point becomes Broida Hall.

The path does appear to have sufficient clearance, but please note the centerline at Davidson Library exceeds 50ft.



Davidson Library	
Latitude	34 24 46.80 N
Longitude	119 50 42.00 W
Azimuth	49.57°
Elevation	49 ft ASL
Antenna CL	60.0 ft AGL

Frequency (MHz) = 6175.0
K = 1.33, 0.67
%F1 = 100.00, 30.00

La Cumbre Peak	
Latitude	34 30 01.00 N
Longitude	119 43 16.20 W
Azimuth	229.64°
Elevation	3930 ft ASL
Antenna CL	20.0 ft AGL



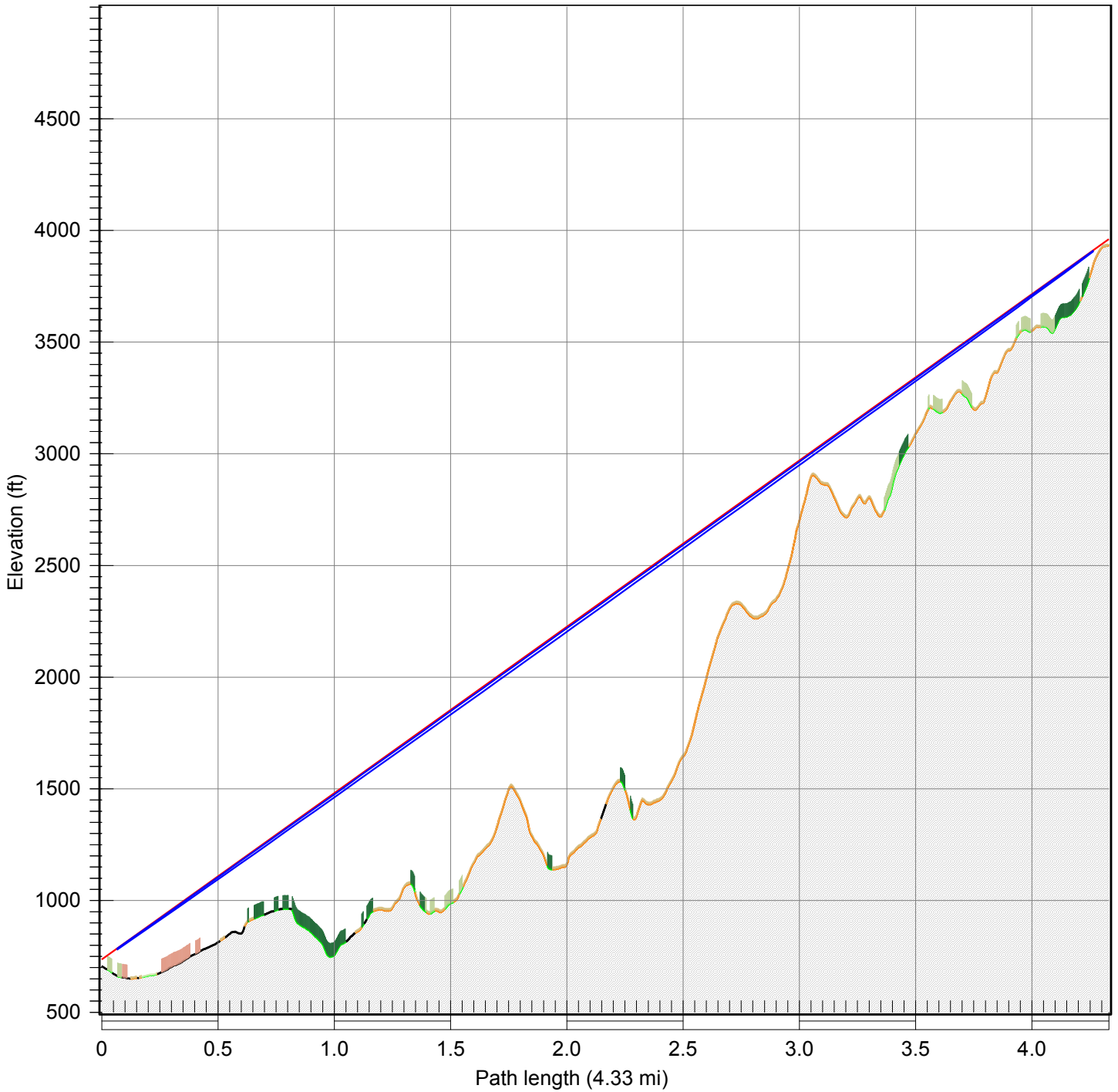
## Transmission details (Davidson Library-La Cumbre Peak.pl5)

	Davidson Library	La Cumbre Peak
Latitude	34 24 46.80 N	34 30 01.00 N
Longitude	119 50 42.00 W	119 43 16.20 W
True azimuth (°)	49.57	229.64
Elevation (ft)	49.21	3929.95
Tower height (ft)	50.00	100.00
Tower type		self supporting
Antenna model	USX6-6W (TR)	USX6-6W (TR)
Antenna gain (dBi)	38.80	38.80
Antenna height (ft)	60.00	20.00
TX line model	EW52	EW52
TX line unit loss (dB/100 ft)	1.18	1.18
TX line length (ft)	100.00	70.00
TX line loss (dB)	1.18	0.83
Circulator branching loss (dB)	0.60	0.60
TX filter loss (dB)	1.30	1.30
RX filter loss (dB)	1.60	1.60
Frequency (MHz)	6175.00	
Polarization	Vertical	
Path length (mi)	9.31	
Free space loss (dB)	131.79	
Atmospheric absorption loss (dB)	0.13	
Net path loss (dB)	60.43	60.43
Configuration	NSB Diplexer Main	NSB Diplexer Main
Radio model	WVCE61-L-1024A30S-230	WVCE61-L-1024A30S-230
Radio file name	wvce61_l_1024a30s_230	wvce61_l_1024a30s_230
Emission designator	30M0D7W	30M0D7W
XPD fade margin - multipath (dB)	37.38	37.38
Climatic factor	2.00	
Terrain roughness (ft)	140.00	
C factor	0.52	
Average annual temperature (°F)	58.58	
Fade occurrence factor (Po)	6.540E-003	

	TX power (dBm)		RX threshold level (dBm)		EIRP (dBm)		Receive signal (dBm)		Thermal fade margin (dB)		Flat fade margin - multipath (dB)	
1024 230	31.50	31.50	-60.50	-60.50	67.22	67.57	-28.93	-28.93	31.57	31.57	28.89	28.89
512 208	31.50	31.50	-63.70	-63.70	67.22	67.57	-28.93	-28.93	34.77	34.77	30.77	30.77
256 185	32.50	32.50	-67.10	-67.10	68.22	68.57	-27.93	-27.93	39.17	39.17	34.55	34.55
<b>128 163</b>	<b>32.50</b>	<b>32.50</b>	<b>-70.10</b>	<b>-70.10</b>	<b>68.22</b>	<b>68.57</b>	<b>-27.93</b>	<b>-27.93</b>	<b>42.17</b>	<b>42.17</b>	<b>36.14</b>	<b>36.14</b>
64 138	32.50	32.50	-73.00	-73.00	68.22	68.57	-27.93	-27.93	45.07	45.07	37.04	37.04
32 115	32.50	32.50	-74.90	-74.90	68.22	68.57	-27.93	-27.93	46.97	46.97	38.09	38.09
16 91	32.50	32.50	-78.30	-78.30	68.22	68.57	-27.93	-27.93	50.37	50.37	39.24	39.24
4 44	32.50	32.50	-89.00	-89.00	68.22	68.57	-27.93	-27.93	61.07	61.07	46.15	46.15

	Worst month multipath		Annual multipath		Annual rain		Total annual (2 way)	Time in mode (2 way)
1024 230	99.9991	99.9991	99.9997	99.9997			99.9995	99.9995
512 208	99.9994	99.9994	99.9998	99.9998			99.9997	0.0002
256 185	99.9998	99.9998	99.9999	99.9999			99.9999	0.0002
<b>128 163</b>	<b>99.9998</b>	<b>99.9998</b>	<b>99.9999</b>	<b>99.9999</b>			<b>99.9999</b>	<b>0.0000</b>
64 138	99.9999	99.9999	99.9999	99.9999			99.9999	0.0000
32 115	99.9999	99.9999	99.9999	99.9999			99.9999	0.0000
16 91	99.9999	99.9999	99.9999	99.9999			99.9999	0.0000
4 44	99.9999	99.9999	99.9999	99.9999			99.9999	0.0000

Multipath fading method - Vigants - Barnett



City FS7	
Latitude	34 26 34.80 N
Longitude	119 41 24.00 W
Azimuth	335.75°
Elevation	706 ft ASL
Antenna CL	30.0 ft AGL

Frequency (MHz) = 11200.0  
 K = 1.33, 0.67  
 %F1 = 100.00, 30.00

La Cumbre Peak	
Latitude	34 30 01.00 N
Longitude	119 43 16.20 W
Azimuth	155.73°
Elevation	3930 ft ASL
Antenna CL	30.0 ft AGL

## Transmission details (City FS7-La Cumbre Peak.pl5)

	City FS7	La Cumbre Peak
Latitude	34 26 34.80 N	34 30 01.00 N
Longitude	119 41 24.00 W	119 43 16.20 W
True azimuth (°)	335.75	155.73
Elevation (ft)	705.71	3929.95
Tower height (ft)	50.00	100.00
Tower type		self supporting
Antenna model	SHPX3-11W (TR)	SHPX3-11W (TR)
Antenna gain (dBi)	38.70	38.70
Antenna height (ft)	30.00	30.00
TX line model	EW90	EW90
TX line unit loss (dB/100 ft)	3.06	3.06
TX line length (ft)	70.00	80.00
TX line loss (dB)	2.14	2.45
Circulator branching loss (dB)	0.90	0.90
TX filter loss (dB)	1.40	1.40
RX filter loss (dB)	1.70	1.70
Frequency (MHz)	11200.00	
Polarization	Vertical	
Path length (mi)	4.37	
Free space loss (dB)	130.40	
Atmospheric absorption loss (dB)	0.11	
Net path loss (dB)	62.61	62.61
Configuration	NSB Diplexer Main	NSB Diplexer Main
Radio model	WVCE11-L-1024A30S-230	WVCE11-L-1024A30S-230
Radio file name	wvce11_l_1024a30s_230	wvce11_l_1024a30s_230
Emission designator	30M0D7W	30M0D7W
XPD fade margin - multipath (dB)	31.06	31.06
Climatic factor	2.00	
Terrain roughness (ft)	140.00	
C factor	0.52	
Average annual temperature (°F)	58.49	
Fade occurrence factor (Po)	1.229E-003	
Polarization	Vertical	
Rain region	Los Angeles, California	

	TX power (dBm)		RX threshold level (dBm)		EIRP (dBm)		Receive signal (dBm)		Thermal fade margin (dB)		Flat fade margin - multipath (dB)	
1024 230	27.50	27.50	-60.00	-60.00	61.76	61.45	-35.11	-35.11	24.89	24.89	22.33	22.33
512 208	28.00	28.00	-63.20	-63.20	62.26	61.95	-34.61	-34.61	28.59	28.59	24.48	24.48
256 185	29.50	29.50	-66.60	-66.60	63.76	63.45	-33.11	-33.11	33.49	33.49	28.43	28.43
<b>128 163</b>	<b>30.50</b>	<b>30.50</b>	<b>-69.60</b>	<b>-69.60</b>	<b>64.76</b>	<b>64.45</b>	<b>-32.11</b>	<b>-32.11</b>	<b>37.49</b>	<b>37.49</b>	<b>30.17</b>	<b>30.17</b>
64 138	30.50	30.50	-72.50	-72.50	64.76	64.45	-32.11	-32.11	40.39	40.39	30.94	30.94
32 115	30.50	30.50	-74.40	-74.40	64.76	64.45	-32.11	-32.11	42.29	42.29	31.94	31.94
16 91	30.50	30.50	-77.80	-77.80	64.76	64.45	-32.11	-32.11	45.69	45.69	33.02	33.02
4 44	30.50	30.50	-88.50	-88.50	64.76	64.45	-32.11	-32.11	56.39	56.39	39.87	39.87

	Worst month multipath		Annual multipath		Annual rain		Total annual (2 way)	Time in mode (2 way)
1024 230	99.9993	99.9993	99.9998	99.9998	99.9999	99.9999	99.9995	99.9995
512 208	99.9996	99.9996	99.9999	99.9999	99.9999	99.9999	99.9997	0.0002
256 185	99.9998	99.9998	99.9999	99.9999	99.9999	99.9999	99.9999	0.0002
<b>128 163</b>	<b>99.9999</b>	<b>99.9999</b>	<b>99.9999</b>	<b>99.9999</b>	<b>99.9999</b>	<b>99.9999</b>	<b>99.9999</b>	<b>0.0000</b>
64 138	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	0.0000
32 115	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	0.0000
16 91	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	0.0000
4 44	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	0.0000

Multipath fading method - Vigants - Barnett  
Rain fading method - Crane



## **MICROWAVE PATH ENGINEERING WARRANTY**

### **FEASIBILITY STUDIES**

Nokia provides feasibility studies of microwave radio paths in support of bidding efforts or when purchased by the Customer. Feasibility studies are performed using information provided by or on behalf of the Customer. Results of the feasibility study are provided to the Customer and may include (i) a system map, (ii) a path profile, (iii) path performance calculations, and (iv) a technical report.

Feasibility studies are preliminary in nature and are not intended to represent a final design. Therefore no representations, warranty or guarantee is implied or provided. Customer agrees to assume all risks associated with installing any equipment based on spiderweb maps, preliminary network and system maps, preliminary path profiles (including antenna size and location), path calculations (estimated performance), Google Earth, and topology studies normally presented with a feasibility study.

### **PATH SURVEYS (DETAILED SURVEY WITH REPORT)**

Nokia offers detailed path surveying services to determine or verify site coordinates, site access, location, ground elevation, on-path obstruction location and height, tower information, proposed antenna centerline information, and other parameters required to engineer and implement a microwave radio link. The present and anticipated future effect of observable on-path obstructions, such as vegetation and buildings, are also evaluated and incorporated into the path design where applicable. Where appropriate, roof top access may be utilized in the survey effort. Existing towers are not climbed as a part of this activity.

The results of the path survey are documented and presented in a formal survey report or technical report, as required, to the Customer. Some items performed and included in a formal survey report may include: site location map, site topographic map, access information, site plot plans, existing tower elevation profile, site photographs, site and path observations, path terrain feature descriptions, critical point data, engineering notes, path profiles, and proposed performance calculations.

For detailed Path Surveys, Nokia warrants that geodetic coordinates are accurate to within +/- 1- second of latitude, +/- 1-second of longitude, ground elevations are accurate to within +/- 1 meter, and that heights of identified on-path obstructions at critical points are accurate to within 5-feet. Nokia warrants only the actual paths surveyed.

### **LINE OF SIGHT SURVEYS (LOS - CLEARANCE VERIFICATION)**

Nokia offers a simplified microwave path survey service (from that described above) to determine "line of sight" (LOS) and adequate clearance conditions exist for a planned microwave link. This survey approach is best suited for urban and suburban environments. It can include driving the path as done in a traditional path survey, flashing the path, mirrors, or binoculars methodology. The line of sight survey may also ascertain site coordinates, site access and location, ground elevation, on-path obstruction location and height, tower information, proposed antenna centerline information, and other basic parameters required to

evaluate and design a microwave radio link. The present and anticipated future effect of observable onpath obstructions, such as existing vegetation and existing buildings, are evaluated and incorporated into the path design where applicable and appropriate. Where appropriate, roof top access may be utilized in the survey effort. Existing towers are not climbed as a part of this activity.

For line of sight (LOS) surveys, Nokia warrants that geodetic coordinates are accurate to within +/- 1-second of latitude, +/- 1-second of longitude, and ground elevations are accurate to within +/- 1 meter. Nokia warrants only the actual paths surveyed.

## **PATH DESIGN**

Nokia offers path design services. Path design services are based on formal field survey data gathered by Nokia path surveyors and is warranted. Path designs include profiling a path to determine antenna centerline requirements, and path calculations to determine the antenna and radio types necessary to meet the Customer's microwave link performance and availability objectives. Recommended antenna centerlines are determined for a range of K-factors expected to occur during an average year and by the Fresnel zone clearance criteria stipulated by Bell Laboratories. For areas where poor propagation conditions are known to exist, paths are assessed for susceptibility to obstruction fading outages using the Bell Laboratories Obstruction Fading (OBSFAD) model. Additionally, paths are analyzed for ground-based reflections.

Microwave link availability (path availability) is evaluated using current North American industry accepted models for predicting outage times and diversity improvement factors associated with normal atmospheric multipath fading (flat and dispersive), rain fading, and obstruction fading. Every effort is made by Nokia to anticipate the probable occurrence of abnormal propagation conditions based on historical documentation, experience, geographical location, and field survey data.

The final path design documentation will include one or more of the following, depending on the services purchased by the Customer: (i) a system map, (ii) a final path profile, (iii) final path performance calculations, and (iv) a technical report.

If a radio path using Nokia equipment is installed based on Nokia's recommended path design, then Nokia warrants the radio path calculations shall conform to the Customer's availability objective for normal atmospheric multipath fading. Nokia will not be held responsible for excessive outages or degraded performance due to abnormal fading conditions. Abnormal fading conditions include, but are not limited to:

Formation of extreme radio refractivity gradients associated with:

- Exceptionally large temperature inversions
- Abnormal temperature/humidity layers
- Fog formation
- Signal trapping caused by surface or atmospheric ducting

Reflections from unusual or unidentifiable on-path or off-path terrain features, physical structures, or atmospheric layers.

Rain fading due to rainfall rates that are in excess of the published rates or charts used to predict rain induced outages.

If Nokia suspects that abnormal propagation conditions are the cause of degraded system performance, Nokia will assist the Customer in verifying the conditions leading to the degraded system performance. After the problem has been identified, Nokia will support the Customer in identifying possible solutions to the problem and assess the incremental improvement expected from corrective actions. Any Implementation of corrective action to remedy this type of problem shall be the sole responsibility of the Customer.

## **FREQUENCY PLANNING**

Nokia offers frequency planning services including frequency selection, prior coordination process, interference case resolution, and FCC license application documentation preparation and submittal. Nokia warrants that the interference studies will be conducted using industry-accepted North American methods, hardware, software and algorithms; and that the frequency database will be maintained as accurately as possible at the time of the study. Nokia will not be held responsible for interference cases that arise due to errors or omissions in the database. Upon completion of the frequency planning services, some or all of the following documentation is provided to the Customer:

- Prior Coordination Notice
- Frequency Coordination Data Sheet
- Supplemental Showing pursuant to FCC Rules Part 101.103(d)
- Completed FCC Form 601 License Application and Preparation

In the event harmful frequency interference is detected during the implementation of a microwave line in which Nokia provided the frequency planning services, Nokia's total liability is limited to selection of an alternate frequency or frequencies. Should harmful interference occur after the microwave link is deemed operational and accepted, corrective action is the sole responsibility of the Customer.

## **WARRANTY**

Nokia warrants its path surveys and path designs to be substantially free of engineering defects and errors for a period of 12 months from the date of delivery of the study to the Customer. Nokia warrants its line of sight surveys to be substantially free of engineering defects and errors for a period of 6 months from the date of delivery of the study to the Customer. Nokia warrants its frequency planning and Form 601 License Application preparation to be substantially free of engineering defects and errors for a period of 6 months from the date the path was prior coordinated. Except as further limited above, in the event of a proven breach of warranty, the Customer's sole remedy under this warranty shall be that Nokia will provide the incremental labor and material beyond what would have been required during initial installation to correct for the particular error in the path survey or path design. In no case shall Nokia be held liable for any indirect damages including but not limited to incidental, consequential or loss of capital, data, revenue or profit. In the event that such error is not solely and directly related to Nokia's path engineering efforts, expenses for such labor and material shall be borne by the Customer.



Attachment 2 Santa Barbara County VHF County Wide Simulcast Coverage Predictions

**EF Johnson Technologies, Inc.**  
a JVKENWOOD Company  
1440 Corporate Drive, Irving, TX 75038  
972.819.0700



Santa Barbara County, CA  
VHF County Wide Simulcast Conventional System  
Round Trip Coverage Maps by Region

□

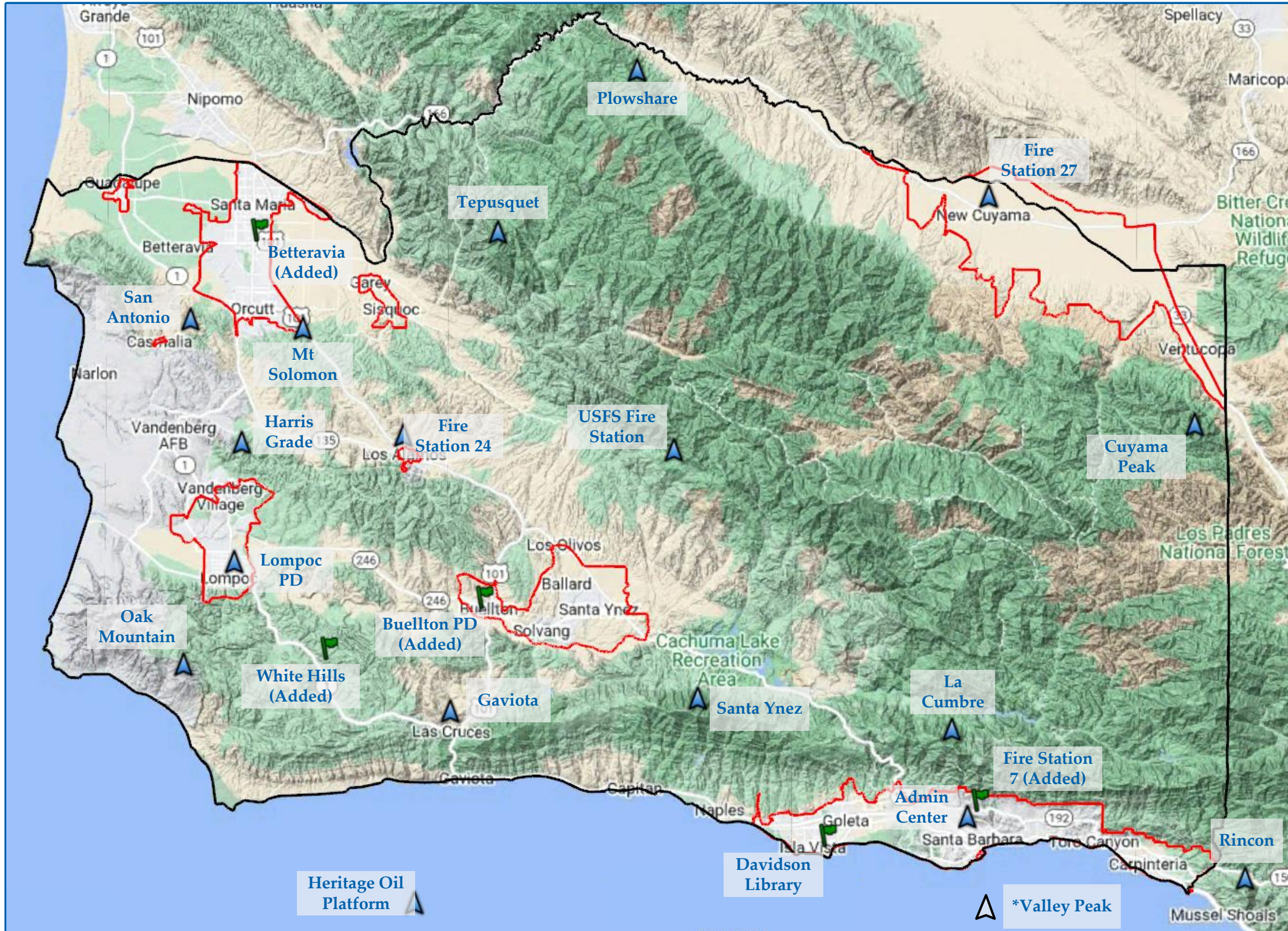
Revision 2.1



# EF Johnson Company

## Santa Barbara County, CA Coverage Service Areas

- Urban Service Area
- Rural Service Area
- ▲ Existing Design Site
- Added Site



Count	Site Name	Add / Existing	Site Name	Add / Existing
1	Admin	Existing	La Cumbre Peak	Existing
2	Betteravia	ADD	Mount Solomon	Existing
3	Buellton	ADD	Oak Mtn-GATR	Existing
4	City Fire Station 7	ADD	Plowshare	Existing
5	Police HQ Lompoc	Existing	Rincon	Existing
6	Cuyama Peak	Existing	San Antonio	Existing
7	Davidson Library	ADD	Santa Ynez	Existing
8	Fire Station 24	Existing	USFS Fire Station	Existing
9	Fire Station 27	Existing	Tepusquet	Existing
10	Gaviota	Existing	Valley Peak	Existing
11	Harris Grade	Existing	White Hills	ADD
12	Heritage Oil Platform	Existing		

❖ Distance from Valley Peak to Santa Barbara Coastline is not to scale



## Enhanced Fire VHF Conventional System Solution

Site	Latitude	Longitude	RX Center Rad	TX Center Rad	Existing/ Added
Admin Center	34.42506	-119.70350	71	71	Existing
Betteravia	34.92173	-120.42889	60	60	ADD
Buellton	34.61362	-120.19599	80	95	ADD
City Fire Station 7	34.44342	-119.69050	50	50	ADD
City Police HQ Lompoc	34.63815	-120.45320	35	35	Existing
Cuyama Peak	34.75404	-119.47612	105	80	Existing
Davidson Library UCSB	34.41354	-119.84550	45	45	ADD
Fire Station 24	34.74523	-120.27980	100	100	Existing
Fire Station 27	34.94581	-119.68212	100	100	Existing
Gaviota	34.51368	-120.23116	34.5	38.7	Existing
Harris Grade	34.73856	-120.44578	94.5	90	Existing
Heritage Oil Platform	34.35167	-120.26778	120	120	Existing
La Cumbre Peak	34.5003	-119.72112	66	66.7	Existing
Mount Solomon	34.83475	-120.38319	94.5	98.7	Existing
Oak Mtn-GATR	34.55206	-120.50238	42.5	25	Existing
Plowshare	35.05006	-120.04102	75	76.7	Existing
Rincon	34.37286	-119.42106	99	76.1	Existing
San Antonio	34.84197	-120.49917	72.5	48.7	Existing
Santa Ynez	34.52663	-119.97845	80	90	Existing
Tepusquet	34.91507	-120.18269	125	121.7	Existing
USFS Fire Station	34.73351	-120.00309	100	100	Existing
Valley Peak	33.99893	-119.68361	35	36.7	Existing
White Hills	34.57019	-120.35460	50	50	ADD

## Channel Performance Criterion (CPC) defined

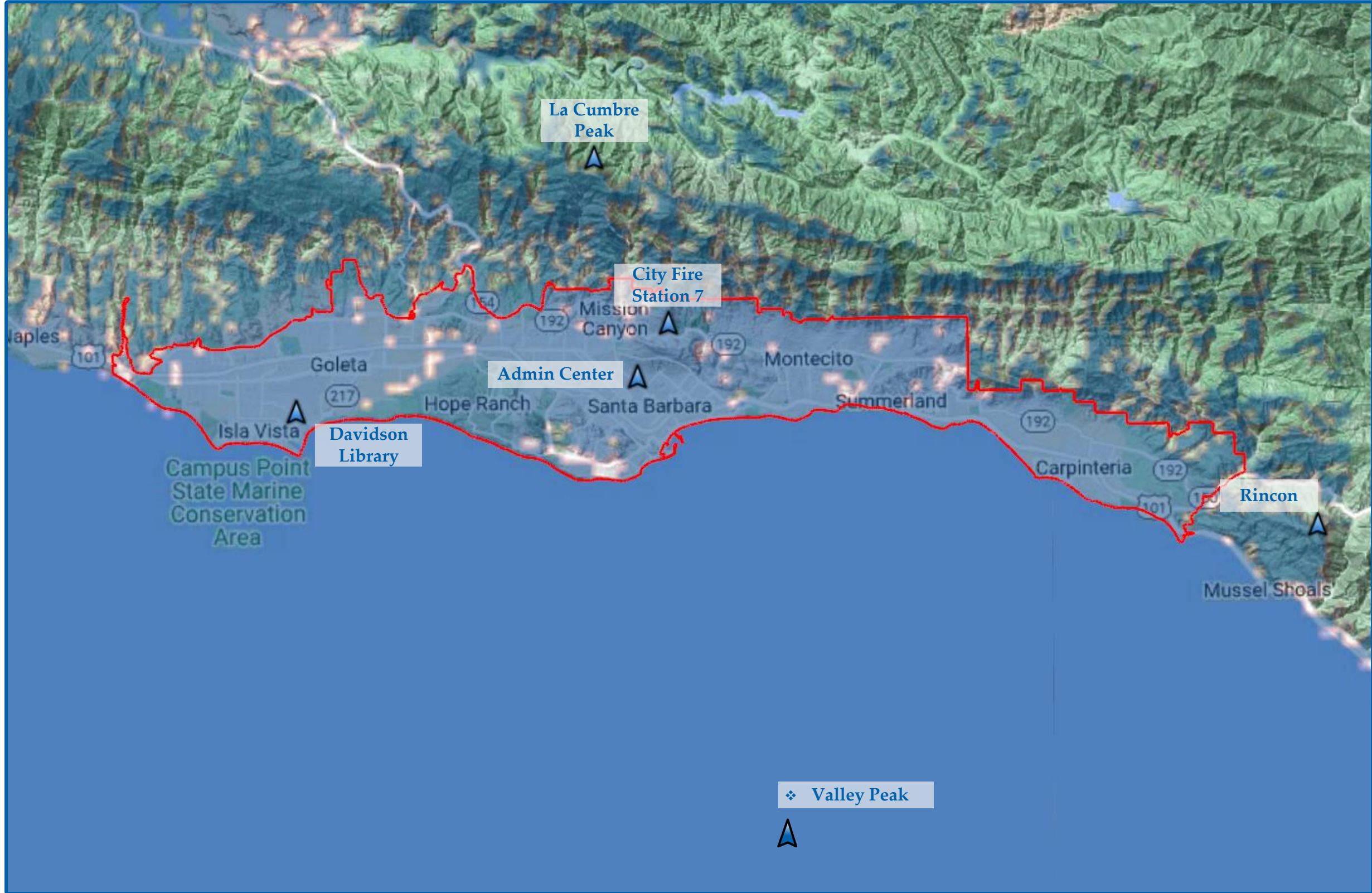
The CPC is the specified minimum design performance level for communications in a faded environment. Specified in the terms of Delivered Audio Quality or DAQ, the CPC defines the minimum acceptable quality of a radio call. Simply stated, the CPC refers to the quality of the calls on the system after implementation.

The County of Santa Barbara has been analyzed for a CPC of Public Safety Grade (DAQ3.4) and Public Service Grade (DAQ3.0). Delivered Audio Quality 3.4 is characterized as *“Speech understandable with repetition only rarely required Some Noise / Distortion”* whereas Delivered Audio Quality 3.0 is characterized as *“Speech understandable with slight effort. Occasional repetition required due to Noise/Distortion”*. See the table below.

*Table Delivered Audio Quality Definitions*

Delivered Audio Quality (DAQ)	Grade of Circuit Performance
1	Unusable. Speech present but unreadable.
2	Understandable with considerable effort. Frequent repetition due to Noise/Distortion.
3	Speech understandable with slight effort. Occasional repetition required due to Noise/Distortion.
<b>3.4</b>	<b>Speech understandable with repetition only rarely required. Some Noise/Distortion.</b>
4	Speech easily understood. Occasional Noise/Distortion.
4.5	Speech easily understood. Infrequent Noise/Distortion.
5	Speech easily understood.





# EF Johnson Company

## Santa Barbara County

**Santa Barbara Fire Service Area**  
 Portable In-15dB-BLDG Round Trip  
 Coverage  $\geq 93.98\%$  @ DAQ 3.4

Roundtrip Calls are Talk-Back Limited

Likely Call Successful @ DAQ 3.4

Clear Likely Call Unsuccessful @ DAQ 3.4

Focused Fire Service Area

### Recommended Configuration

#### Main Contributing Sties:

- Admin Center (Existing)
- Davidson Library (Added)
- City FS 7 (Added)
- La Cumbre Peak (Existing)
- Rincon (Existing)
- \* Valley Peak (Existing)

❖ Distance from Valley Peak to Santa Barbara Coastline is not to scale







# EF Johnson Company

## Santa Barbara County

**Santa Barbara Fire Service Area**  
Portable In-15dB-BLDG Round Trip  
Coverage  $\geq 99.048\%$  @ DAQ 3.0

Roundtrip Calls are Talk-Out Limited

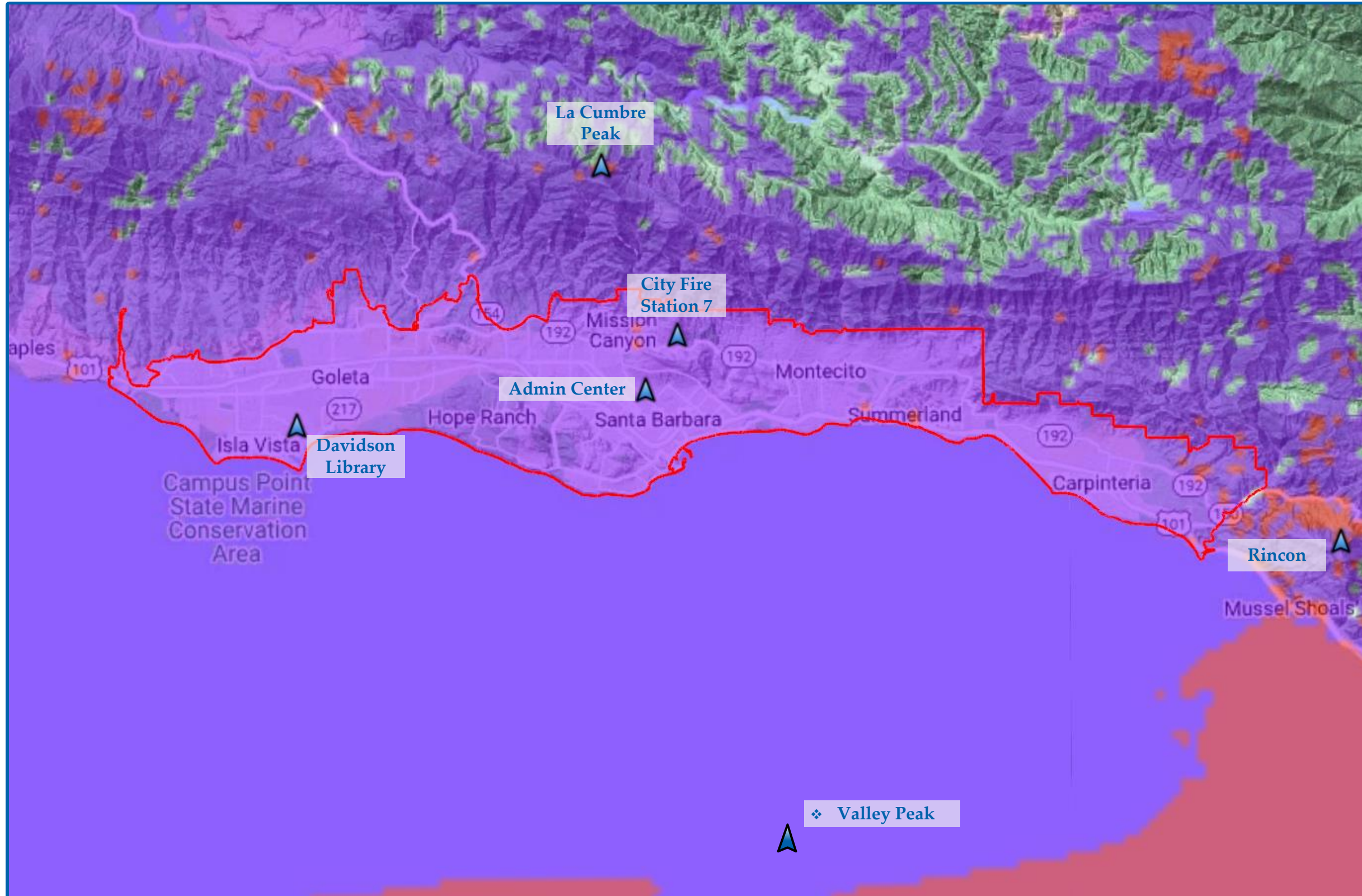
-  Likely Call Successful @ DAQ 3.0
-  Likely Call Unsuccessful @ DAQ 3.0
-  Potential TDI DAQ < 3.0 Call Unsuccessful
-  Focused Fire Service Area

### Recommended Configuration

#### Main Contributing Sties:

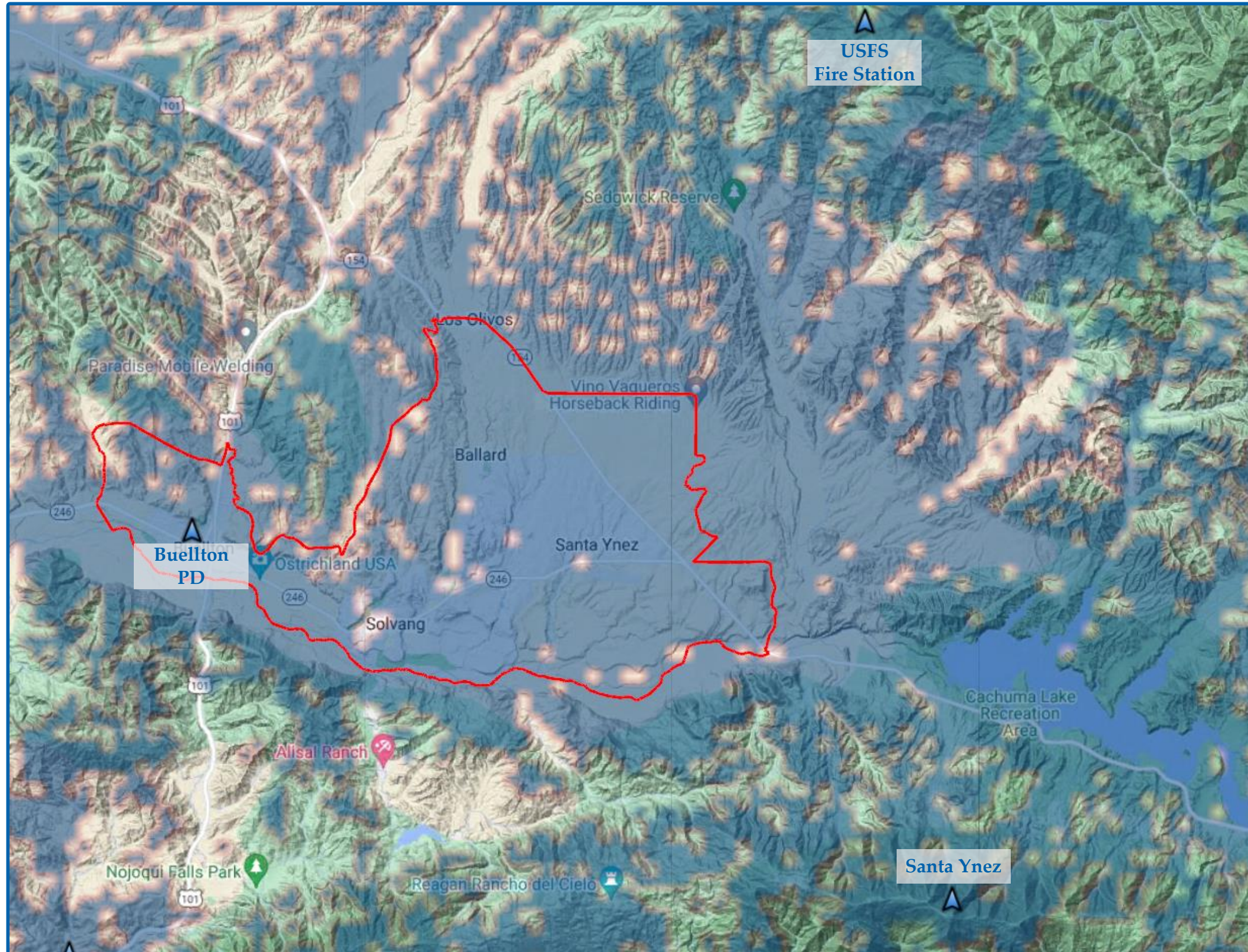
- Admin Center (Existing)
- Davidson Library (Added)
- City FS 7 (Added)
- La Cumbre Peak (Existing)
- Rincon (Existing)
- Valley Peak (Existing)

❖ Distance from Valley Peak to Santa Barbara Coastline is not to scale



Santa Barbara Fire Service Area	Enhanced VHF Portable Talk-Out In 15 dB Building			Enhanced VHF Portable Talk-Back In 15 dB Building		
	RSSI	Delay	Coverage	RSSI	Delay	Coverage
DAQ 3.4 Talk-Back Limited	-69.2 dBm	72 μS	96.092%	-72.2 dBm	n/a	93.988%
DAQ 3.0 Talk-Out Limited	-87.2 dBm	82 μS	99.048%	-90.2 dBm	n/a	99.95%





# EF Johnson Company

## Santa Barbara County

**Santa Ynez Fire Service Area**  
 Portable In-15dB-Building Round Trip  
 Coverage  $\geq 93.71\%$  @ DAQ 3.4

Roundtrip Calls are Talk-Back Limited

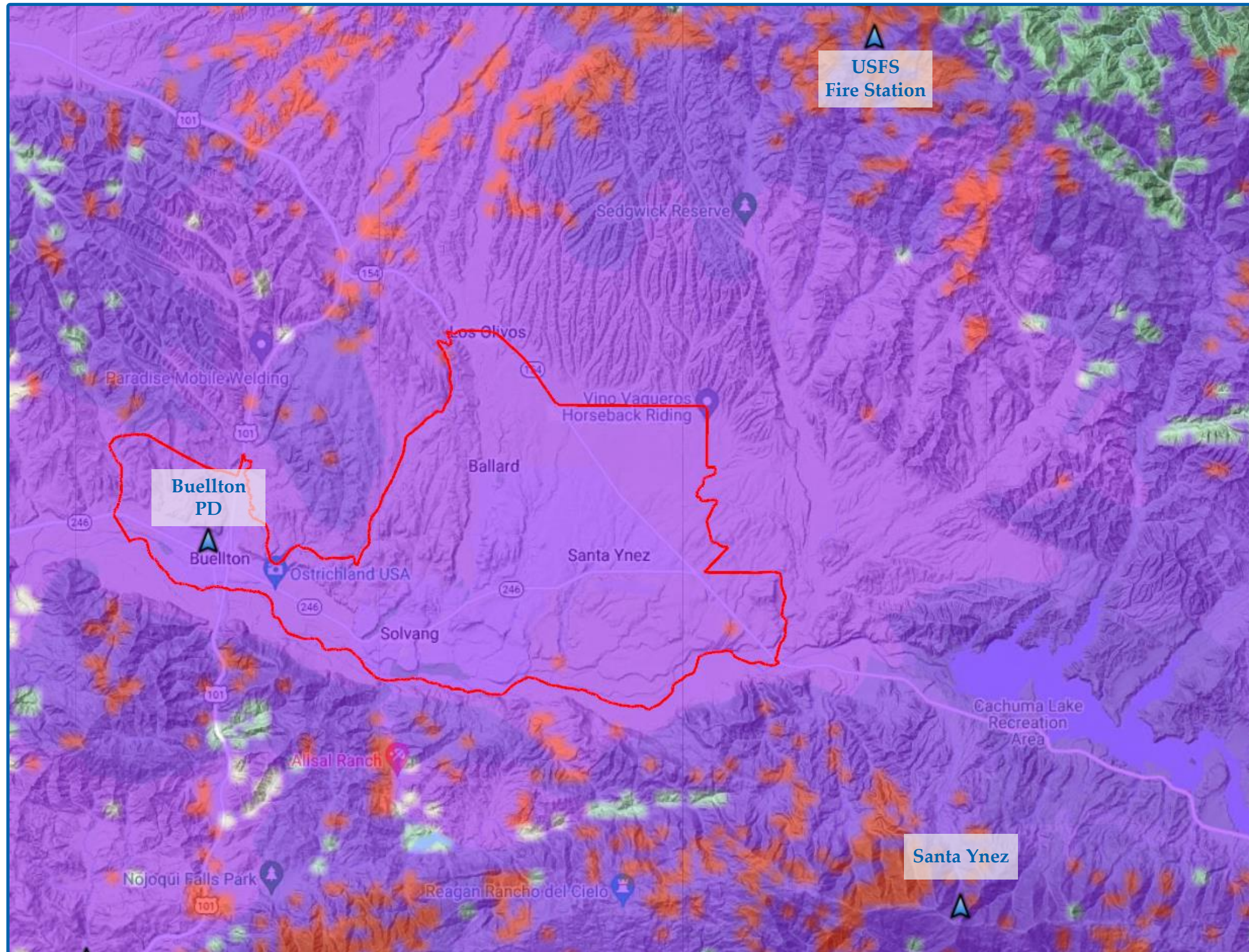
- Likely Call Successful @ DAQ 3.4
- Likely Call Unsuccessful @ DAQ 3.4
- Focused Fire Service Area

### Recommended Configuration

#### Main Contributing Sties:

- Buellton PD Site (Added)
- USFS Fire Site (Existing)
- Santa Ynez Site (Existing)





**EF Johnson Company**

**Santa Barbara County**

**Santa Ynez Fire Service Area**  
 Portable In-15dB-BLDG Round Trip  
**Coverage ≥ 99.705% @ DAQ 3.0**

Roundtrip Calls are Talk-Out Limited

- Likely Call Successful @ DAQ 3.0
- Likely Call Unsuccessful @ DAQ 3.0
- Potential TDI DAQ < 3.0 Call Unsuccessful
- Focused Fire Service Area

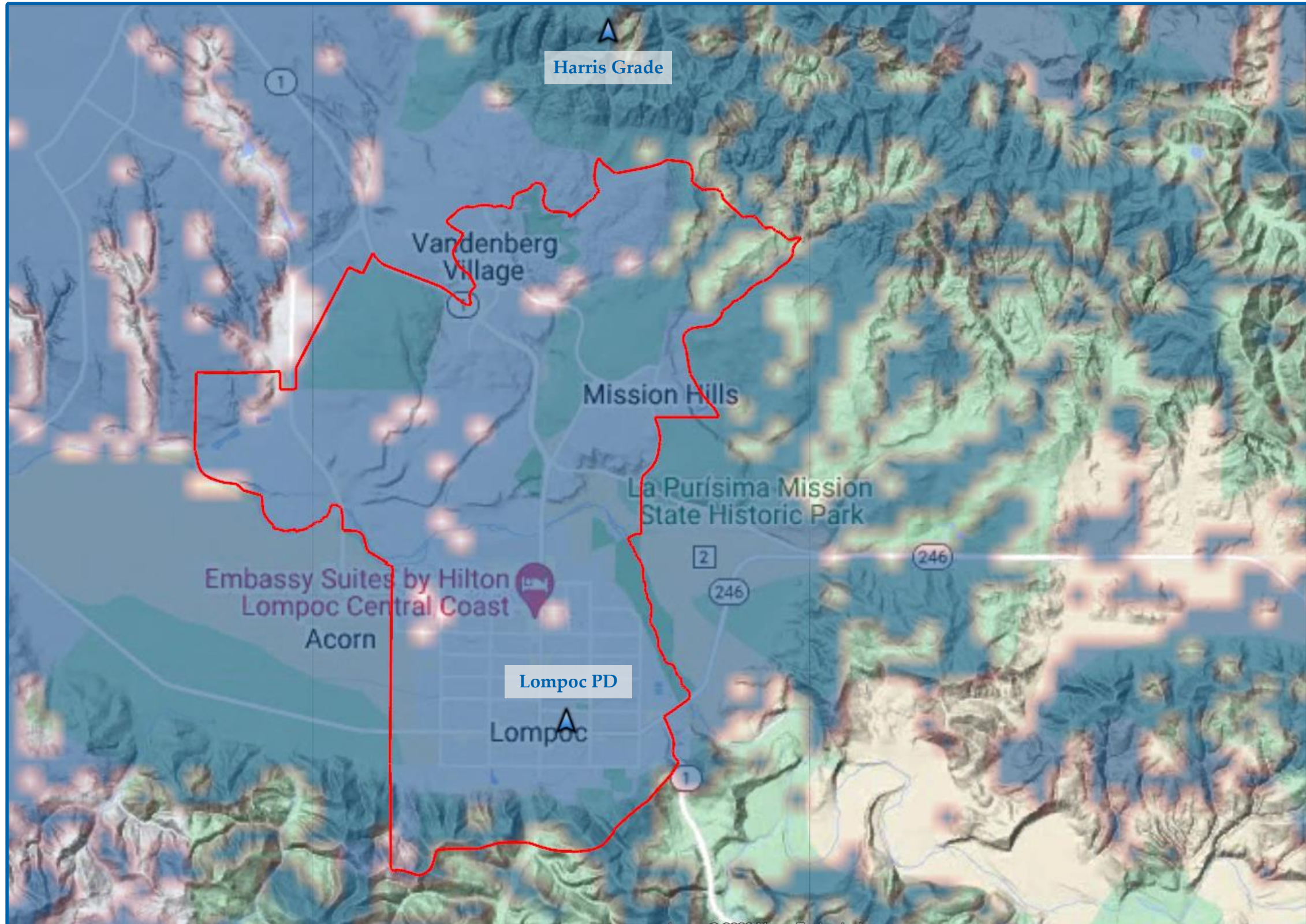
**Recommended Configuration**

**Main Contributing Sties:**

- Buellton PD Site (Added)
- USFS Fire Site (Existing)
- Santa Ynez Site (Existing)



Santa Ynez Fire Service Area	Enhanced VHF Portable Talk-Out In 15 dB Building			Enhanced VHF Portable Talk-Back In 15 dB Building		
	RSSI	Delay	Coverage	RSSI	Delay	Coverage
<b>DAQ 3.4 Talk-Back Limited</b>	-69.2 dBm	72 µS	97.542%	-72.2 dBm	n/a	<b>93.707%</b>
<b>DAQ 3.0 Talk-Out Limited</b>	-87.2 dBm	82 µS	<b>99.705%</b>	-90.2 dBm	n/a	100.00%



# EF Johnson Company

## Santa Barbara County

**Lompoc Fire Service Area**  
 Portable In-15dB-Building Round Trip  
 Coverage  $\geq$  94.225% @ DAQ 3.4

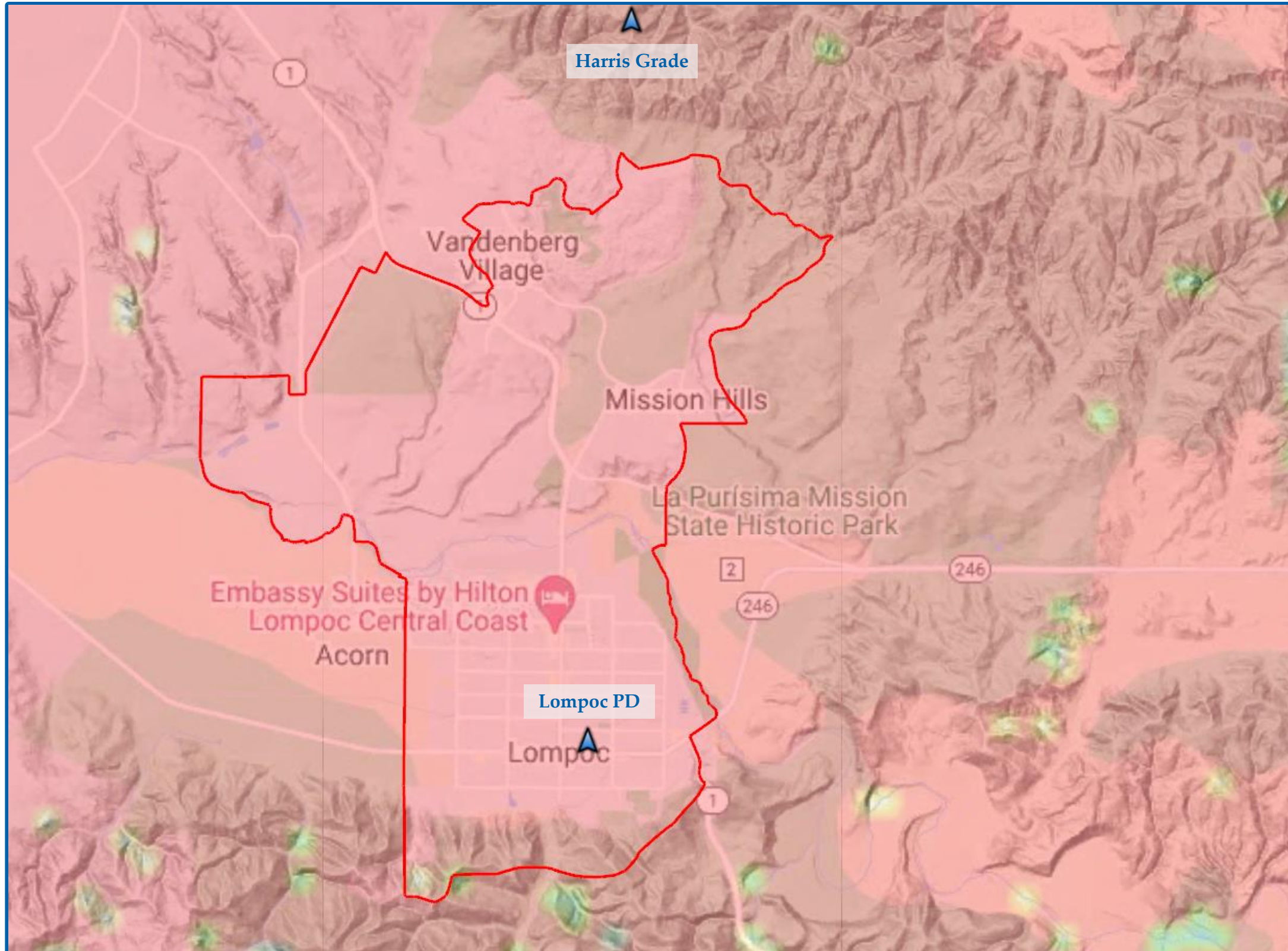
Roundtrip Calls are Talk-Back Limited

- Likely Call Successful @ DAQ 3.4
- Likely Call Unsuccessful @ DAQ 3.4
- Focused Fire Service Area

### Recommended Configuration

- Main Contributing Sties:**
- Lompoc PD Site (Existing)
  - Harris Grade Site (Existing)





# EF Johnson Company

## Santa Barbara County

**Lompoc Fire Service Area**  
 Portable In-15dB-BLDG Round Trip  
 Coverage  $\geq 99.85\%$  @ DAQ 3.0

- Roundtrip Calls are balanced  
Talk-Out to Talk-Back
- Likely Call Successful @ DAQ 3.0
- Likely Call Unsuccessful @ DAQ 3.0
- Focused Fire Service Area

### Recommended Configuration

- Main Contributing Sties:**
- Lompoc PD Site (Existing)
  - Harris Grade Site (Existing)

Lompoc Fire Service Area	Enhanced VHF Portable Talk-Out In 15 dB Building			Enhanced VHF Portable Talk-Back In 15 dB Building		
	RSSI	Delay	Coverage	RSSI	Delay	Coverage
<b>DAQ 3.4 Talk-Back Limited</b>	-69.2 dBm	72 μS	96.739%	-72.2 dBm	n/a	<b>94.255%</b>
<b>DAQ 3.0 Balanced</b>	-87.2 dBm	82 μS	<b>99.845%</b>	-90.2 dBm	n/a	99.845%





# EF Johnson Company

## Santa Barbara County

**Casmalia Fire Service Area**  
 Portable In-15dB-Building Round Trip  
 Coverage  $\geq 95\%$  @ DAQ 3.4

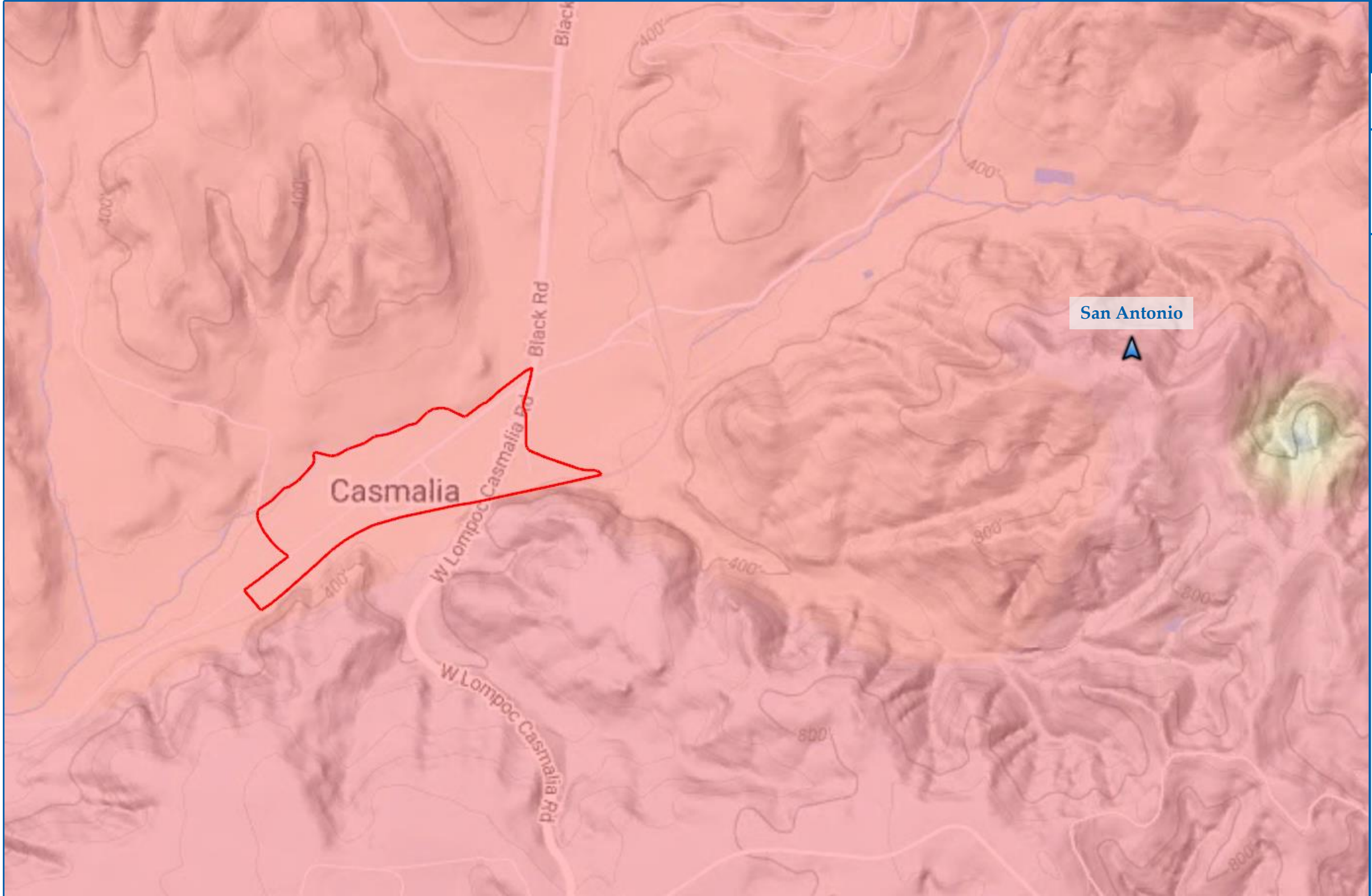
Roundtrip Calls are Talk-Back Limited

- Likely Call Successful @ DAQ 3.4
- Clear
- Likely Call Unsuccessful @ DAQ 3.4
- Focused Fire Service Area

### Recommended Configuration

**Main Contributing Sties:**  
 → San Antonio Site (Existing)





# EF Johnson Company

## Santa Barbara County

**Casmalia Fire Service Area**  
 Portable In-15dB-BLDG Round Trip  
 Coverage  $\geq 95\%$  @ DAQ 3.0

- Roundtrip Calls are balanced  
Talk-Out to Talk-Back
- Likely Call Successful @ DAQ 3.0
- Likely Call Unsuccessful @ DAQ 3.0
- Focused Fire Service Area

### Recommended Configuration

**Main Contributing Sties:**  
 → San Antonio Site (Existing)



<b>Casmalia Fire Service Area</b>	<b>Talk-Out In 15 dB Building</b>			<b>Talk-Back In 15 dB Building</b>		
<b>DAQ 3.4 Talk-Out Limited</b>	RSSI	Delay	Coverage	RSSI	Delay	Coverage
	-69.2 dBm	72 μS	98.150%	-72.2 dBm	n/a	100.000%
<b>DAQ 3.0 Balanced</b>	RSSI	Delay	Coverage	RSSI	Delay	Coverage
	-87.2 dBm	82 μS	100.000%	-90.2 dBm	n/a	100.000%






# EF Johnson Company

## Santa Barbara County

**Santa Maria Fire Service Area**  
Portable In-15dB-Building  
Round Trip @ DAQ 3.4

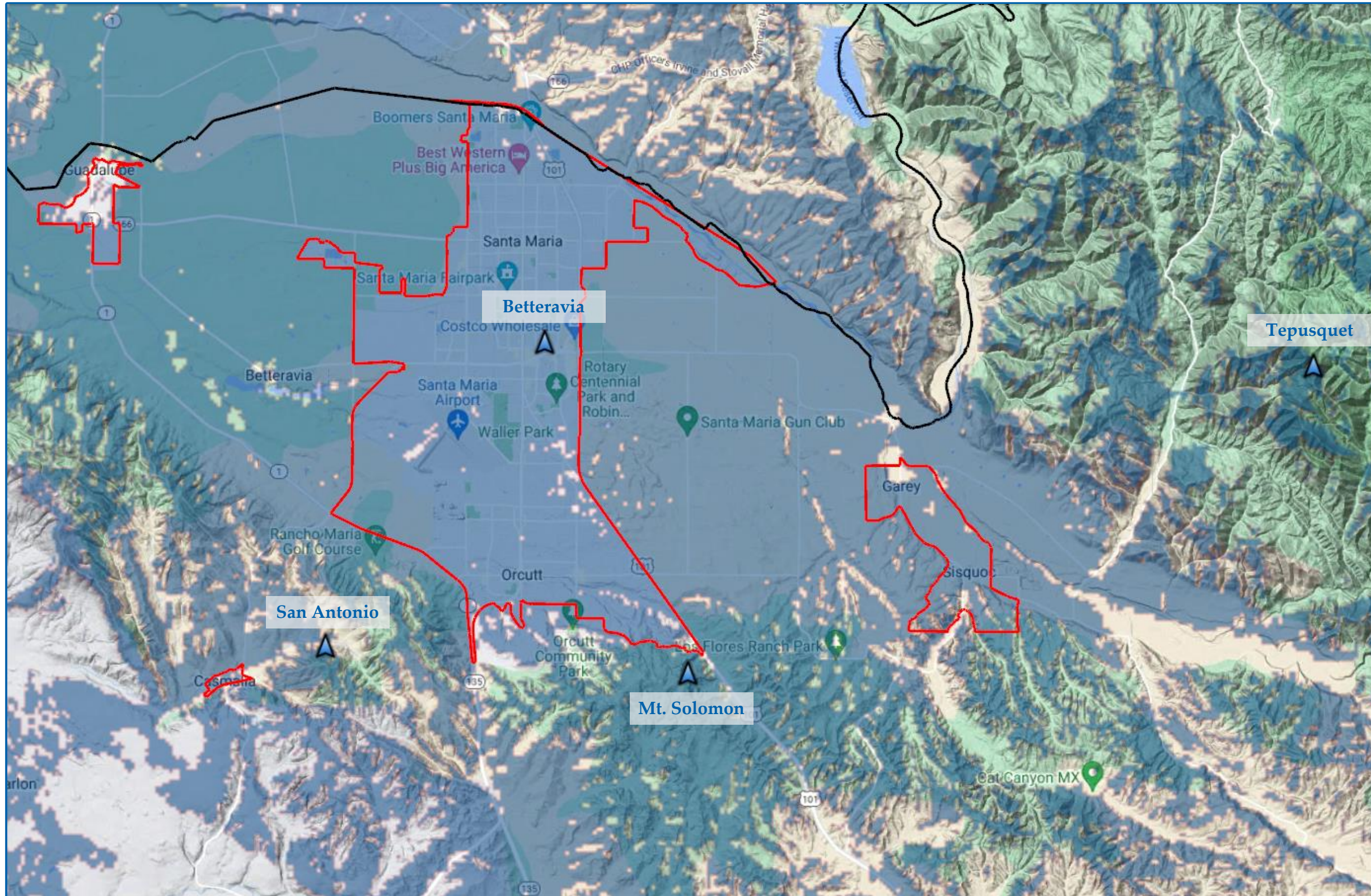
Roundtrip Calls are Talk-Back Limited

-  Likely Call Successful @ DAQ 3.4
-  Likely Call Unsuccessful @ DAQ 3.4
-  Focused Fire Service Area

### Recommended Configuration

#### Round Trip Coverage:

**Santa Maria** ~ 98.4%  
**Guadalupe** ~ 57.9%  
**Sisquoc/Garey** ~ 93.7%








# EF Johnson Company

## Santa Barbara County

### Santa Maria Fire Service Area Portable In-15dB-Building Round Trip @ DAQ 3.0

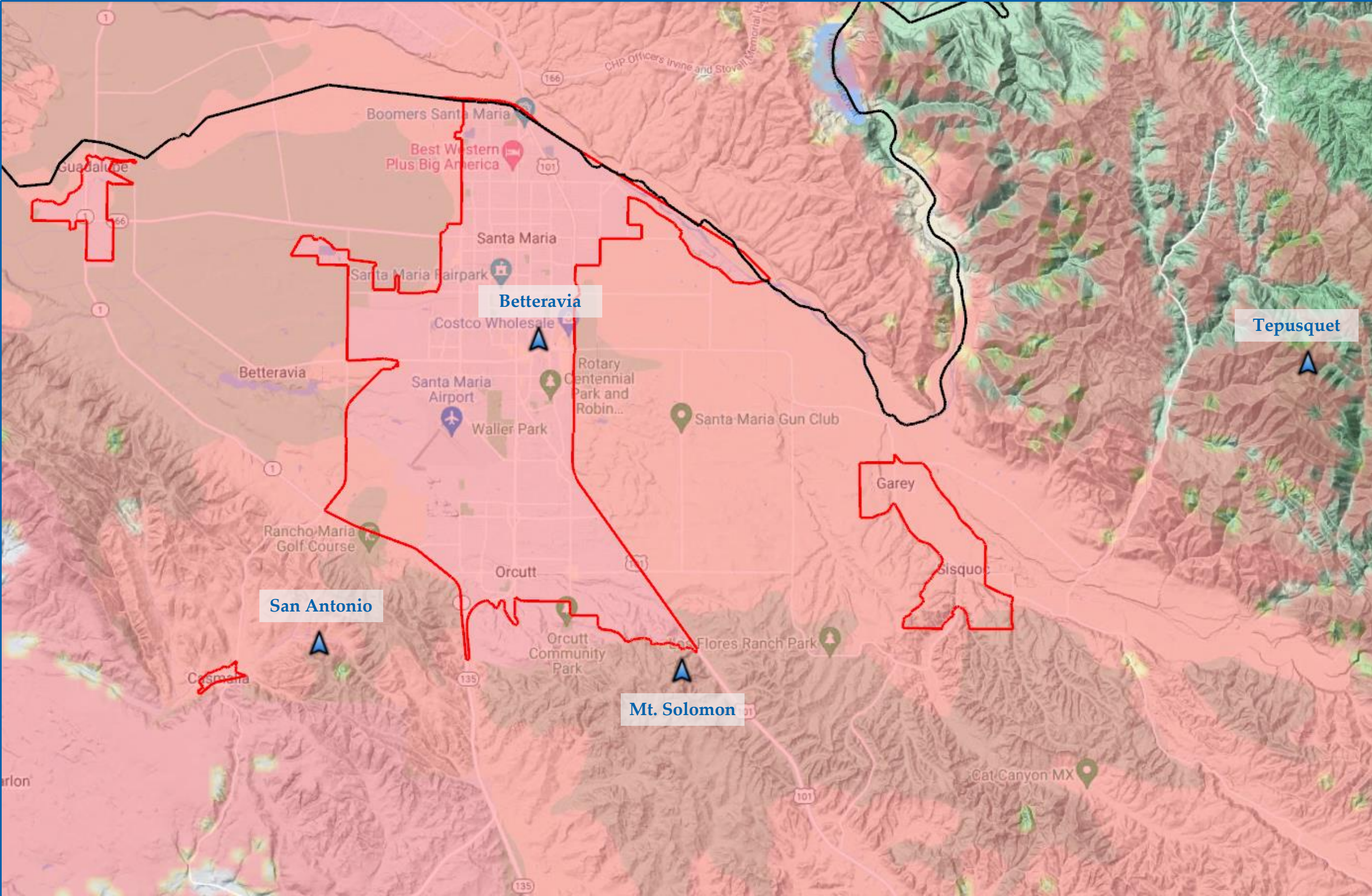
Roundtrip Calls are balanced  
Talk-Out to Talk-Back

-  Likely Call Successful @ DAQ 3.0
-  Likely Call Unsuccessful @ DAQ 3.0
-  Focused Fire Service Area

#### Recommended Configuration

#### Round Trip Coverage:

- Santa Maria ~ 99.64%**
- Guadalupe ~ 99.42%**
- Sisquoc/Garey ~ 99.89%**



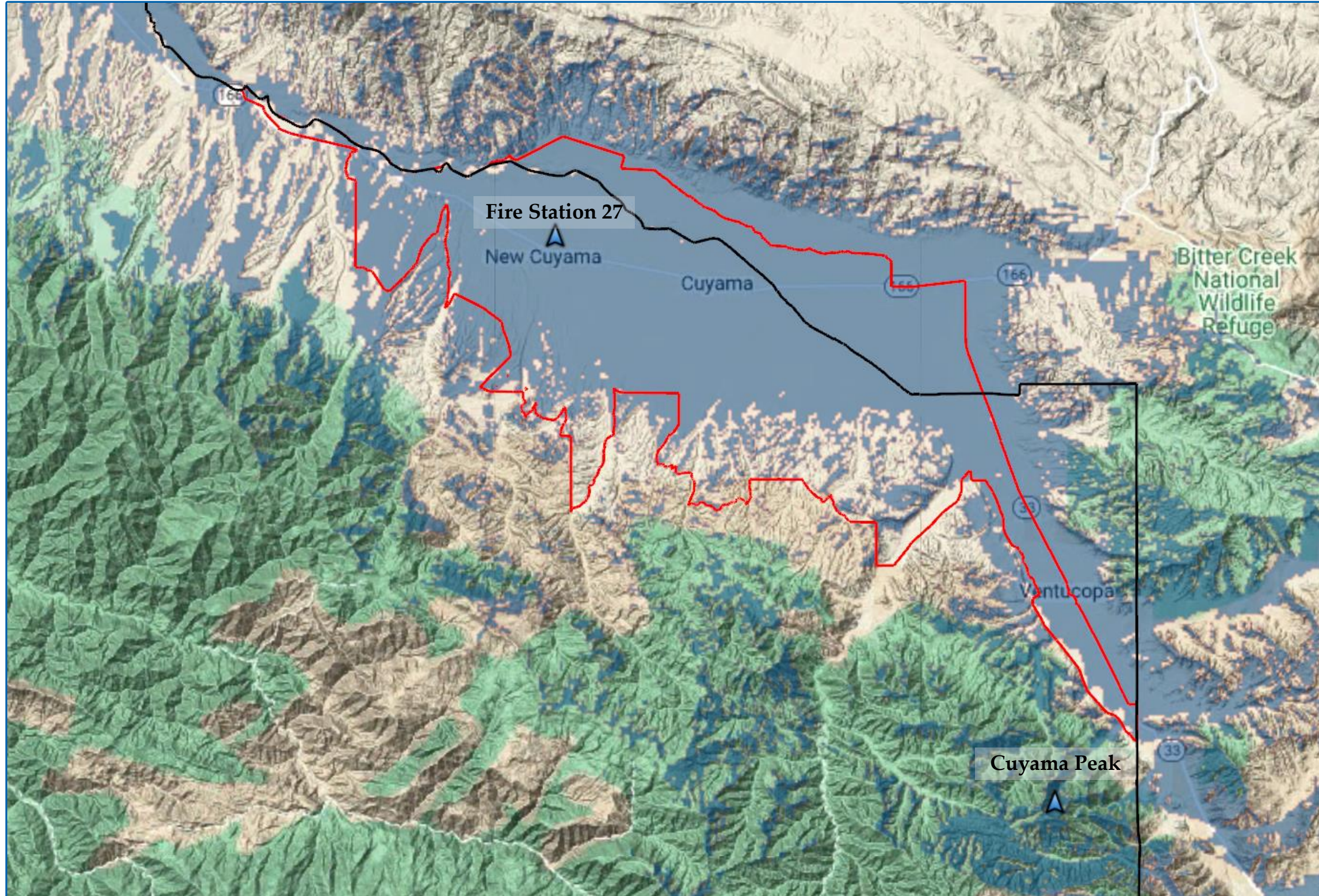


Santa Maria Fire Service Area	Enhanced VHF Portable Talk-Out In 15 dB Building			Enhanced VHF Portable Talk-Back In 15 dB Building		
DAQ 3.4 Talk-Back Limited	RSSI	Delay	Coverage	RSSI	Delay	Coverage
	-69.2 dBm	72 μS	98.490%	-72.2 dBm	n/a	98.790%
DAQ 3.0 Balanced	RSSI	Delay	Coverage	RSSI	Delay	Coverage
	-87.2 dBm	82 μS	99.641%	-90.2 dBm	n/a	100.000%

Guadalupe Fire Service Area	Enhanced VHF Portable Talk-Out In 15 dB Building			Enhanced VHF Portable Talk-Back In 15 dB Building		
DAQ 3.4 Talk-Back Limited	RSSI	Delay	Coverage	RSSI	Delay	Coverage
	-69.2 dBm	72 μS	78.950%	-72.2 dBm	n/a	57.900%
DAQ 3.0 Balanced	RSSI	Delay	Coverage	RSSI	Delay	Coverage
	-87.2 dBm	82 μS	99.419%	-90.2 dBm	n/a	100.000%

Sisquoc/Garey Fire Service Area	Enhanced VHF Portable Talk-Out In 15 dB Building			Enhanced VHF Portable Talk-Back In 15 dB Building		
DAQ 3.4 Talk-Out Limited	RSSI	Delay	Coverage	RSSI	Delay	Coverage
	-69.2 dBm	72 μS	97.300%	-72.2 dBm	n/a	93.670%
DAQ 3.0 Balanced	RSSI	Delay	Coverage	RSSI	Delay	Coverage
	-87.2 dBm	82 μS	99.899%	-90.2 dBm	n/a	99.899%





# EF Johnson Company

## Santa Barbara County

**Cuyama Valley Fire Service Area**  
 Portable In-15dB-Building Round Trip  
 Coverage ~ 85.48% @ DAQ 3.4

Roundtrip Calls are Talk-Back Limited

- Likely Call Successful @ DAQ 3.4
- Likely Call Unsuccessful @ DAQ 3.4

Focused Fire Service Area

Recommended Configuration

- Main Contributing Sties:**
- Cuyama Peak
  - Fire Station 27






# EF Johnson Company

## Santa Barbara County

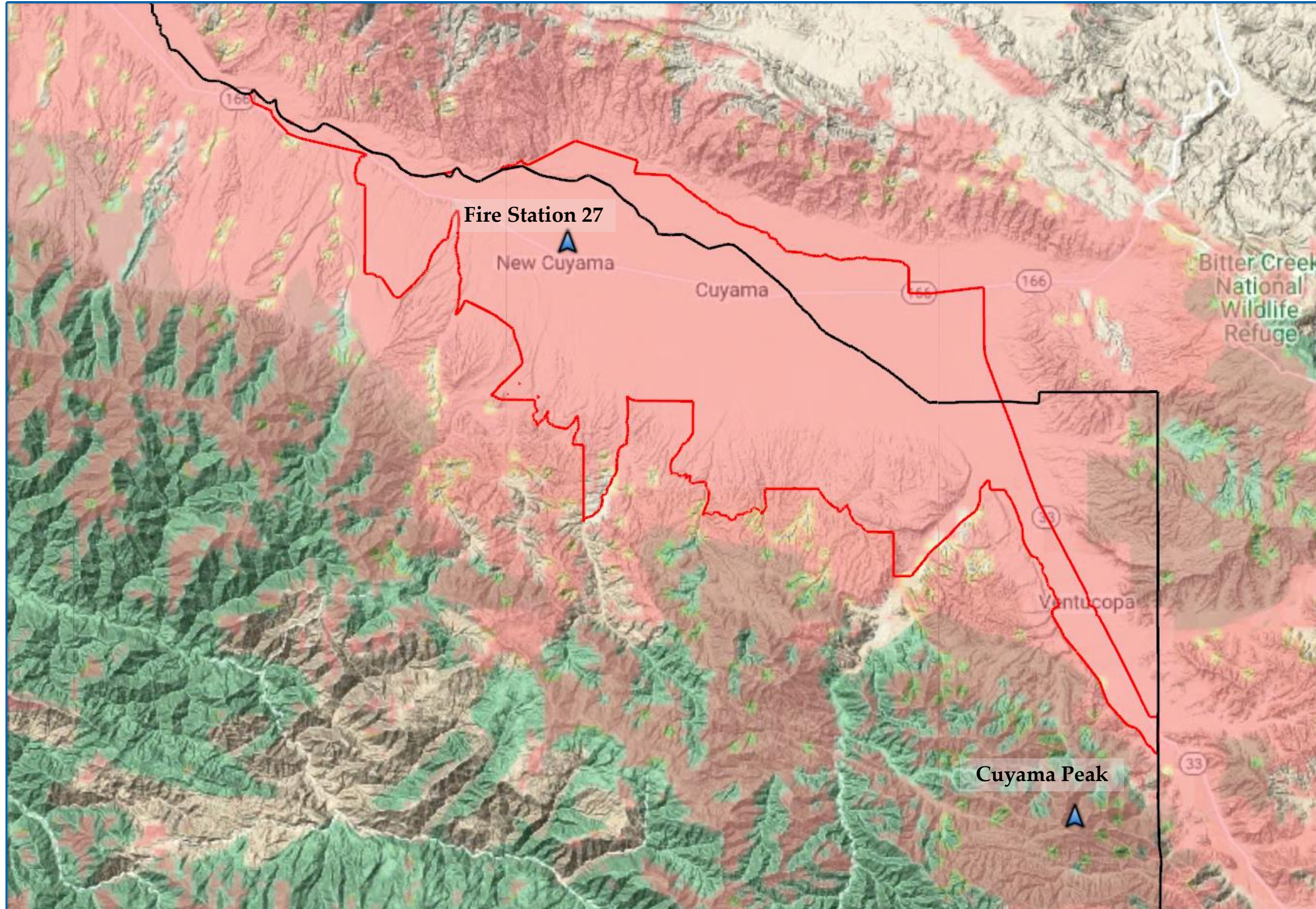
**Cuyama Valley Fire Service Area**  
Portable In-15dB-BLDG Round Trip  
Coverage ~ 98.60% @ DAQ 3.0

Roundtrip Calls are balanced  
Talk-Out to Talk-Back

-  Likely Call Successful @ DAQ 3.0
-  Likely Call Unsuccessful @ DAQ 3.0
-  Focused Fire Service Area

### Recommended Configuration

- Main Contributing Sties:**
- Cuyama Peak
  - Fire Station 27





Cuyama Valley Fire Service Area	Enhanced VHF Portable Talk-Out In 15 dB Building			Enhanced VHF Portable Talk-Back In 15 dB Building		
	RSSI	Delay	Coverage	RSSI	Delay	Coverage
<b>DAQ 3.4 Talk-Out Limited</b>	-69.2 dBm	72 µS	88.932%	-72.2 dBm	n/a	<b>85.484%</b>
<b>DAQ 3.0 Balanced</b>	-87.2 dBm	82 µS	<b>98.594%</b>	-90.2 dBm	n/a	98.613%



# EF Johnson Company

## Santa Barbara County

**South County Coastline**  
 Portable On-Street Round Trip  
 Coverage ≥ 97.780% @ DAQ 3.4

Roundtrip Calls are Talk-Out Limited

- Likely Call Successful @ DAQ 3.4
- Likely Call Unsuccessful @ DAQ 3.4
- Potential TDI DAQ < 3.4 Call Unsuccessful
- Focused Fire Service Area
- South County Coastline Service Area

❖ Valley Peak

❖ Distance from Valley Peak to Santa Barbara Coastline is not to scale





# EF Johnson Company

## Santa Barbara County

**South County Coastline**  
 Portable In-15dB-Bldg Round Trip  
 Coverage ~ 88.814% @ DAQ 3.4

Roundtrip Calls are Talk-Back Limited

- Likely Call Successful @ DAQ 3.4
- Likely Call Unsuccessful @ DAQ 3.4
- Focused Fire Service Area
- South County Coastline Service Area

❖ Distance from Valley Peak to Santa Barbara Coastline is not to scale




# EF Johnson Company

## Santa Barbara County

**South County Coastline**  
Portable On-Street Round Trip  
Coverage ~ 99.16% @ DAQ 3.0

Roundtrip Calls are Balanced

 Likely Call Successful @ DAQ 3.0

 Likely Call Unsuccessful @ DAQ 3.0

 Focused Fire Service Area

 South County Coastline Service Area

❖ Distance from Valley Peak to Santa Barbara Coastline is not to scale





# EF Johnson Company

## Santa Barbara County

### South County Coastline

Portable In-15dB-BLDG Round Trip

Coverage ~ 92.21% @ DAQ 3.0

Roundtrip Calls are Talk-Back Limited

 Likely Call Successful @ DAQ 3.0

 Likely Call Unsuccessful @ DAQ 3.0

 Focused Fire Service Area

 South County Coastline Service Area

❖ Distance from Valley Peak to Santa Barbara Coastline is not to scale





Southern County Coastline Service Area	VHF Portable Talk-Out			VHF Portable Talk-Back		
DAQ 3.4	RSSI	Delay	Coverage	RSSI	Delay	Coverage
In 15 dB Building (Information Only)	-69.2 dBm	72 μS	91.915%	-72.2 dBm	n/a	88.814%
On-Street	-84.2 dBm	72 μS	97.780%	-87.2 dBm	n/a	98.743%
DAQ 3.0	RSSI	Delay	Coverage	RSSI	Delay	Coverage
In 15 dB Building (Information Only)	-72.2 dBm	82 μS	94.428%	-75.2 dBm	n/a	92.208%
On-Street	-87.2 dBm	82 μS	99.162%	-90.2 dBm	n/a	99.288%



**White Hills Site**

Portable On-Street Round Trip  
Stand Alone @ DAQ 3.4

-  Likely Call Successful @ DAQ 3.4
-  Likely Call Unsuccessful @ DAQ 3.4



White Hills

Image © 2023 Maxar Technologies  
Image © 2023 CNES / Airbus



**White Hills Site**

Portable On-Street Round Trip  
Stand Alone @ DAQ 3.0

-  Likely Call Successful @ DAQ 3.0
-  Likely Call Unsuccessful @ DAQ 3.0





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