

Baraboo, Wisconsin
Application for Minor Modification of FM Translator W247CY
On Channel 247
by
Magnum Communications, Inc.

Exhibit 13
Interference Analysis

April 2019

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Declaration

I declare, under penalty of perjury, that I am a technical consultant to broadcasting and other communications systems, that I have over twenty-five years of experience in the engineering of broadcast and other communications systems, that I am familiar with the Federal Communications Commission's Rules found in the Code of Federal Regulations Title 47, that I am a Professional Engineer registered in North Carolina, that I have prepared or supervised the preparation of the attached Exhibit 13, Interference Analysis, for Magnum Communications, Inc., and that all of the facts therein, except for facts of which the Federal Communications Commission may take official notice, are true to the best of my knowledge and belief.



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24 April 2019

Narrative

This Exhibit supports a minor modification application for FM translator construction permit W247CY, on Channel 247 in Baraboo, Wisconsin. Allocation details are provided in this exhibit. This proposal complies fully with the requirements of 74 C.F.R. §74.1204(a), with the exception of facilities protected under 47 C.F.R. §74.1204(d) by the Undesired to Desired (U/D) method described below. The proposed modified facilities create no mutual exclusivities with any licensed facilities, construction permits, or applications as shown in the allocation table in this exhibit.

The changes are a new site, an increase in height, and a new omnidirectional antenna, with half wavelength spacing.

Figure 1 shows the authorized and protected contours, and fill-in compliance.

Allocations

This application proposes service to Baraboo, Wisconsin, on channel 247. An updated Table 1: Allocations is included in this exhibit with a list of the stations, construction permits, allocations, and applications studied. All are protected under §74.1204(a) contour protection by this application, with the exception of facilities protected by the Undesired to Desired (U/D) method. Facilities protected by the U/D method are listed in Table 2. The allocations table was prepared using the GLOBE 30 terrain database which is described below. Where the outgoing protection is provided by interference contours with a separation of less than 3.2 kilometers (2 miles), the lack of overlap is plotted in figures in this exhibit, and the output of

the FM Over program is provided. For this application, there is one (1) facility for which additional detail is provided.

Table and Figure	Call Sign	Location	Channel, class and relationship
3	W247CI	Middleton, Wisconsin	247D, co-channel

Table 1: Allocations

Allocation Study Magnum Communications, Inc.											
REFERENCE		CH# 247D - 97.3 MHz, Pwr= 0.25 kw, HAAT= 136.2 M, COR= 436 M						DISPLAY DATES			
43 30 32.0 N.		Average Protected F(50-50)= 15.0 km						DATA 04-24-19			
89 51 10.0 W.		Omni-directional						SEARCH 04-24-19			
CH CITY	CALL	TYPE	ANT STATE	AZI. <--	DIST FILE #	LAT. LNG.	Pwr(kw) HAAT(M)	INT(km) COR(M)	PRO(km) LICENSEE	*IN* (Overlap in km)	*OUT*
247D Baraboo	W247CY!	CP	C WI	115.2 295.3	9.85 BNPFT20171201AEB	43 28 16.0 89 44 32.0	0.250	300	---Reference--- Magnum Communications, Inc		
249D Baraboo	W249EA	CP	C WI	90.0 270.0	0.02 BNPFT20180508ABQ	43 30 32.0 89 51 09.0	0.250	1.1 432	15.7 Baraboo Broadcasting Corpo	-16.7*	-16.8*
Protected by Undesired to Desired Signal Ratio Studies. See text and figures.											
246C1 Sparta	WCOW-FM	LIC	CN WI	302.6 121.9	95.66 BLH19881215KB	43 58 06.0 90 51 35.0	100.000 179	94.2 465	62.6 Sparta-tomah Broadcasting	-13.9	9.2
247D Middleton	W247CI	LIC	C WI	150.6 330.8	53.49 BLFT20161102ABJ	43 05 21.8 89 31 44.1	0.040	14.2 340	4.4 Immaculate Heart Media, In	24.6	2.4
247C3 Epworth	KGRR	LIC	CX IA	213.1 32.5	138.95 BLH20090924AAS	42 27 29.0 90 46 40.0	25.000 100	120.1 381	44.3 Radio Dubuque, Inc.	3.6	43.5
247B Milwaukee	WRNW	LIC	CN WI	105.2 286.5	161.92 BLH19840925DP	43 06 41.0 87 55 38.0	15.500 278	125.1 491	64.3 Capstar Tx, Llc, As Debtor	20.9	29.9
246L1 Madison	WIXL-LP	LIC	WI	138.0 318.4	66.28 BLL20070813AQM	43 03 52.4 89 18 24.3	0.075 35	311	Lake City Church, Inc.	41.9	36.9
247C1 Rhinelander	WHDG	LIC	NCX WI	14.0 194.4	214.64 BLH20090720AAZ	45 22 50.0 89 11 22.0	100.000 168	158.7 664	61.4 Raven License Sub, Llc	39.3	99.8
249D Madison	W249DH	LIC	DV WI	149.7 329.9	58.90 BLFT20161027ABQ	43 03 03.0 89 29 13.0	0.225	0.2 398	4.8 Mid-west Management, Inc.	43.9	50.9
245D Dodgeville	W245DE	CP	C WI	199.3 19.1	69.40 BNPFT20171219ACC	42 55 10.0 90 08 06.0	0.250	1.1 472	14.1 Dodge Point Broadcasting C	53.5	53.1
244D Madison	W244DR	LIC	C WI	147.6 327.9	71.76 BLFT20170817AAF	42 57 47.0 89 22 47.0	0.230	1.1 422	14.2 Mid-west Management Inc.,	55.8	55.6
248B Rockford	WZOK	LIC	CX IL	153.8 334.4	151.99 BLH20070731ALC	42 16 45.0 89 02 15.0	50.000 138	77.0 378	64.1 Townsquare Media Rockford	60.4	59.0
250C1 Stevens Point	WSPT	LIC	CN WI	10.1 190.3	116.25 BLH19961015KB	44 32 17.0 89 35 43.0	100.000 103	6.2 436	52.9 Muzzy Broadcast Group, Llc	93.5	62.2
248D Wisconsin Rapids	W248DE	CP	C WI	0.8 180.8	100.78 BNPFT20180425AAE	44 24 55.0 89 50 09.0	0.250	22.3 435	14.8 Seehafer Broadcasting Corp	62.3	62.6
249C3 Lancaster	WGLR-FM	LIC	C WI	224.1 43.6	99.50 BLH20000119AAI	42 51 48.0 90 42 11.0	11.500 147	3.5 443	34.9 Queenb Radio Wisconsin, In	81.0	63.0
244C2 Whiting	WHTQ	LIC	CX WI	360.0 180.0	126.22 BLH20090713ABV	44 38 39.0 89 51 12.0	26.500 207	5.8 559	51.8 Nrg License Sub, Llc	104.3	73.3

Terrain database is GLOBE 30 Sec, R= 73.215 qualifying spacings or FCC minimum spacings in KM, M= Margin in KM
 In & Out distances between contours are shown at closest points. Reference Zone= East Zone, Co to 3rd adj.
 All separation margins (if shown) include rounding. Call signs with exclamation marks need not be protected.
 Ant Column: (D= DA Standard, Z= DA 73.215, N= Not DA 73.215, _= Omni), Polarization (C,H,V,E), Beamtilt(Y,N,X)
 "*"affixed to 'IN' or 'OUT' values = site inside restricted contour.

Table 2: Facilities Protected by U/D Method

Facility	W249EA.C Baraboo, Wisconsin
Relationship	249D, second adjacent
Distance (km)	.02
Bearing (degrees)	90
ERP (kW, on azimuth)	.25
HAAT (m, on azimuth)	146.9
Ratio	40
Signal Strength (dBu)	133.99
Translator Signal Strength	176.99
Translator distance (km)	.0002

Undesired to Desired Method under §74.1204(d)

Protection to some facilities is provided through the use of Undesired to Desired Signal Strength Ratio (U/D) calculations. Table 2 lists the parameters studied. The proposed antenna is an SWR FMEC/2-HW two level directional antenna array with bay spacing of half wavelength, as designed by the manufacturer. The elevation pattern is shown in Figure 4. The elevation of the 176.99 dBu contour is shown in Figure 5.

The W249EA.C field strength calculated at ground level at the proposed W247CY site is 133.99 dBu, using the FM Curves calculator on the FCC web site. For the translator interference contour, free space calculations are used. The corresponding 176.99 dBu field strength distance is .0002 kilometers (0.2 meters) in the horizontal plane. The proposed antenna location is 71 meters above ground. As Figure 6 shows, the 176.99 dBu signal level does not reach ground level. The lowest elevation is 70 meters (230 feet) above ground.

In reality, both translators propose the use of the same structure, with vertical separation. It is not possible for either to exceed a 40 dB ratio with respect to the other, while operating at the same power.

Figure 6 is a topographic map of the transmitter site, showing that the site is on gently rolling terrain. Figure 7 is a Google Earth aerial photograph with a 176.99 dBu field strength line plotted. At this scale, the contour is too small to be clearly visible. There is no population within the predicted interference area and therefore this facility is permitted under §74.1204(d).

The applicant recognizes that the U/D method is only a tool for predicting likely interference. Should any actual interference be experienced, the applicant will cooperate fully in correcting the interference. Corrective steps may require changes in the transmitting antenna or other steps which would require Commission authorization, may require that the translator cease operation except for brief equipment tests, or may require filtering at the receivers which report interference.

Source of Data

Transmitter location, effective radiated power, directional antenna pattern, and elevation data are extracted from the Commission's CDBS. All contours for existing and proposed facilities are calculated using height above average terrain calculated at one degree horizontal increments.

The contours were evaluated using terrain extracted from the GLOBE 30 arcsecond terrain database, formatted by V-Soft Communications to work with its allocation and mapping programs.

Table 3: FM Over Output for Protection of W247CI

04-24-2019 Terrain Data: GLOBE 30 Sec FMOver Analysis

W247CI BLFT20161102ABJ

W247CY.C

Channel = 247D
 Max ERP = 0.04 kw
 RCAMSL = 340 m
 N. Lat. 43 05 21.8
 W. Lng. 89 31 44.1
 Protected
 60 dBu

Channel = 247D
 Max ERP = 0.25 kw
 RCAMSL = 436 m
 N. Lat. 43 30 32.0
 W. Lng. 89 51 10.0
 Interfering
 40 dBu

Azimuth (degrees)	ERP (kw)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kw)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
271.0	000.0400	0039.5	005.1	155.5	000.2500	0102.6	051.1	37.56	
272.0	000.0400	0039.9	005.1	155.5	000.2500	0102.6	051.0	37.60	
273.0	000.0400	0040.4	005.2	155.5	000.2500	0102.6	050.9	37.64	
274.0	000.0400	0040.1	005.2	155.4	000.2500	0102.8	050.9	37.68	
275.0	000.0400	0040.4	005.2	155.4	000.2500	0102.8	050.8	37.71	
276.0	000.0400	0040.2	005.2	155.3	000.2500	0103.0	050.7	37.75	
277.0	000.0400	0040.2	005.2	155.3	000.2500	0103.1	050.6	37.79	
278.0	000.0400	0040.9	005.2	155.3	000.2500	0103.1	050.5	37.83	
279.0	000.0400	0041.6	005.3	155.3	000.2500	0103.2	050.4	37.87	
280.0	000.0400	0042.7	005.3	155.3	000.2500	0103.1	050.3	37.91	
281.0	000.0400	0043.9	005.4	155.3	000.2500	0103.1	050.2	37.96	
282.0	000.0400	0044.8	005.5	155.3	000.2500	0103.1	050.1	38.00	
283.0	000.0400	0044.8	005.5	155.2	000.2500	0103.3	050.0	38.04	
284.0	000.0400	0043.5	005.4	155.1	000.2500	0103.6	050.0	38.08	
285.0	000.0400	0041.1	005.2	154.9	000.2500	0104.1	050.0	38.10	
286.0	000.0400	0038.2	005.0	154.6	000.2500	0104.7	050.1	38.11	
287.0	000.0400	0035.5	004.8	154.4	000.2500	0105.2	050.1	38.13	
288.0	000.0400	0033.1	004.7	154.2	000.2500	0105.8	050.2	38.15	
289.0	000.0400	0030.8	004.5	154.0	000.2500	0106.4	050.2	38.16	
290.0	000.0400	0029.3	004.4	153.9	000.2500	0106.7	050.2	38.19	
291.0	000.0400	0028.6	004.4	153.8	000.2500	0106.8	050.2	38.22	
292.0	000.0400	0028.6	004.4	153.7	000.2500	0107.0	050.1	38.26	
293.0	000.0400	0028.7	004.4	153.7	000.2500	0107.2	050.1	38.29	
294.0	000.0400	0028.5	004.4	153.6	000.2500	0107.5	050.0	38.32	
295.0	000.0400	0028.0	004.4	153.5	000.2500	0107.7	050.0	38.36	
296.0	000.0400	0027.6	004.4	153.5	000.2500	0107.9	049.9	38.39	
297.0	000.0400	0027.3	004.4	153.4	000.2500	0108.2	049.9	38.43	
298.0	000.0400	0026.9	004.4	153.3	000.2500	0108.4	049.8	38.46	
299.0	000.0400	0026.5	004.4	153.3	000.2500	0108.7	049.8	38.50	
300.0	000.0400	0026.1	004.4	153.2	000.2500	0109.0	049.7	38.53	
301.0	000.0400	0025.4	004.4	153.1	000.2500	0109.3	049.7	38.57	
302.0	000.0400	0024.4	004.4	153.0	000.2500	0109.5	049.7	38.60	
303.0	000.0400	0023.0	004.4	152.9	000.2500	0109.8	049.6	38.63	
304.0	000.0400	0021.2	004.4	152.9	000.2500	0110.0	049.6	38.67	
305.0	000.0400	0019.7	004.4	152.8	000.2500	0110.3	049.5	38.70	
306.0	000.0400	0019.0	004.4	152.7	000.2500	0110.6	049.5	38.73	
307.0	000.0400	0018.4	004.4	152.6	000.2500	0110.8	049.5	38.76	
308.0	000.0400	0018.0	004.4	152.6	000.2500	0111.1	049.4	38.79	
309.0	000.0400	0018.0	004.4	152.5	000.2500	0111.4	049.4	38.82	
310.0	000.0400	0018.5	004.4	152.4	000.2500	0111.6	049.4	38.85	
311.0	000.0400	0019.0	004.4	152.3	000.2500	0111.8	049.3	38.87	
312.0	000.0400	0019.2	004.4	152.2	000.2500	0112.0	049.3	38.90	
313.0	000.0400	0019.4	004.4	152.1	000.2500	0112.2	049.3	38.92	
314.0	000.0400	0020.0	004.4	152.0	000.2500	0112.4	049.3	38.94	
315.0	000.0400	0021.1	004.4	152.0	000.2500	0112.6	049.2	38.96	
316.0	000.0400	0022.8	004.4	151.9	000.2500	0112.8	049.2	38.98	
317.0	000.0400	0024.5	004.4	151.8	000.2500	0112.9	049.2	39.00	
318.0	000.0400	0025.7	004.4	151.7	000.2500	0113.0	049.2	39.01	
319.0	000.0400	0025.8	004.4	151.6	000.2500	0113.1	049.2	39.02	
320.0	000.0400	0025.0	004.4	151.5	000.2500	0113.1	049.1	39.03	
321.0	000.0400	0023.6	004.4	151.4	000.2500	0113.2	049.1	39.04	
322.0	000.0400	0022.1	004.4	151.3	000.2500	0113.2	049.1	39.04	
323.0	000.0400	0021.0	004.4	151.3	000.2500	0113.2	049.1	39.05	
324.0	000.0400	0020.6	004.4	151.2	000.2500	0113.1	049.1	39.05	
325.0	000.0400	0020.7	004.4	151.1	000.2500	0113.1	049.1	39.05	
326.0	000.0400	0021.1	004.4	151.0	000.2500	0113.0	049.1	39.05	
327.0	000.0400	0021.5	004.4	150.9	000.2500	0113.0	049.1	39.05	
328.0	000.0400	0021.1	004.4	150.8	000.2500	0112.9	049.1	39.04	

329.0	000.0400	0019.6	004.4	150.7	000.2500	0112.7	049.1	39.04
330.0	000.0400	0017.6	004.4	150.6	000.2500	0112.6	049.1	39.03
331.0	000.0400	0015.7	004.4	150.5	000.2500	0112.5	049.1	39.03
332.0	000.0400	0014.3	004.4	150.4	000.2500	0112.4	049.1	39.02
333.0	000.0400	0014.0	004.4	150.4	000.2500	0112.2	049.1	39.01
334.0	000.0400	0014.4	004.4	150.3	000.2500	0112.1	049.1	38.99
335.0	000.0400	0014.6	004.4	150.2	000.2500	0111.9	049.1	38.98
336.0	000.0400	0013.8	004.4	150.1	000.2500	0111.8	049.1	38.97
337.0	000.0400	0012.6	004.4	150.0	000.2500	0111.6	049.1	38.96
338.0	000.0400	0012.0	004.4	149.9	000.2500	0111.5	049.1	38.95
339.0	000.0400	0012.3	004.4	149.8	000.2500	0111.4	049.1	38.93
340.0	000.0400	0013.6	004.4	149.7	000.2500	0111.3	049.1	38.92
341.0	000.0400	0015.2	004.4	149.6	000.2500	0111.2	049.1	38.91
342.0	000.0400	0016.4	004.4	149.6	000.2500	0111.1	049.2	38.90
343.0	000.0400	0017.3	004.4	149.5	000.2500	0111.1	049.2	38.89
344.0	000.0400	0018.2	004.4	149.4	000.2500	0111.0	049.2	38.88
345.0	000.0400	0019.0	004.4	149.3	000.2500	0111.0	049.2	38.87
346.0	000.0400	0019.9	004.4	149.2	000.2500	0110.9	049.2	38.86
347.0	000.0400	0020.7	004.4	149.1	000.2500	0110.9	049.3	38.85
348.0	000.0400	0021.1	004.4	149.0	000.2500	0110.9	049.3	38.84
349.0	000.0400	0021.4	004.4	148.9	000.2500	0110.9	049.3	38.83
350.0	000.0400	0022.0	004.4	148.9	000.2500	0111.0	049.3	38.82
351.0	000.0400	0022.9	004.4	148.8	000.2500	0111.0	049.4	38.81
352.0	000.0400	0024.1	004.4	148.7	000.2500	0111.1	049.4	38.81
353.0	000.0400	0025.9	004.4	148.6	000.2500	0111.1	049.4	38.80
354.0	000.0400	0027.9	004.4	148.5	000.2500	0111.2	049.4	38.79
355.0	000.0400	0029.3	004.4	148.5	000.2500	0111.3	049.5	38.78
356.0	000.0400	0030.2	004.5	148.4	000.2500	0111.3	049.5	38.78
357.0	000.0400	0030.8	004.5	148.3	000.2500	0111.5	049.5	38.78
358.0	000.0400	0032.3	004.6	148.1	000.2500	0111.6	049.4	38.82
359.0	000.0400	0033.9	004.7	148.0	000.2500	0111.8	049.4	38.85
000.0	000.0400	0035.5	004.8	147.8	000.2500	0112.0	049.3	38.89
001.0	000.0400	0036.3	004.9	147.7	000.2500	0112.2	049.3	38.90
002.0	000.0400	0037.1	005.0	147.6	000.2500	0112.4	049.3	38.91
003.0	000.0400	0037.6	005.0	147.5	000.2500	0112.5	049.4	38.91
004.0	000.0400	0037.5	005.0	147.4	000.2500	0112.7	049.4	38.90
005.0	000.0400	0037.2	005.0	147.3	000.2500	0112.7	049.5	38.88
006.0	000.0400	0036.1	004.9	147.3	000.2500	0112.8	049.6	38.83
007.0	000.0400	0035.3	004.8	147.3	000.2500	0112.8	049.7	38.80
008.0	000.0400	0034.6	004.8	147.2	000.2500	0112.9	049.8	38.77
009.0	000.0400	0034.9	004.8	147.1	000.2500	0113.0	049.8	38.76
010.0	000.0400	0035.3	004.8	147.1	000.2500	0113.1	049.9	38.75
011.0	000.0400	0035.3	004.8	147.0	000.2500	0113.2	049.9	38.74
012.0	000.0400	0035.3	004.8	146.9	000.2500	0113.3	050.0	38.72
013.0	000.0400	0035.7	004.9	146.8	000.2500	0113.4	050.0	38.71
014.0	000.0400	0037.0	004.9	146.7	000.2500	0113.5	050.0	38.72
015.0	000.0400	0038.8	005.1	146.5	000.2500	0113.7	050.0	38.74
016.0	000.0400	0040.3	005.2	146.3	000.2500	0114.0	050.0	38.76
017.0	000.0400	0041.2	005.2	146.2	000.2500	0114.1	050.0	38.76
018.0	000.0400	0041.6	005.3	146.1	000.2500	0114.3	050.1	38.74
019.0	000.0400	0042.3	005.3	146.0	000.2500	0114.4	050.1	38.73
020.0	000.0400	0043.4	005.4	145.9	000.2500	0114.6	050.1	38.73
021.0	000.0400	0044.7	005.5	145.8	000.2500	0114.8	050.2	38.74
022.0	000.0400	0045.6	005.5	145.6	000.2500	0115.0	050.2	38.73
023.0	000.0400	0045.4	005.5	145.6	000.2500	0115.1	050.3	38.70
024.0	000.0400	0044.7	005.5	145.6	000.2500	0115.2	050.4	38.66
025.0	000.0400	0044.5	005.5	145.5	000.2500	0115.3	050.5	38.64
026.0	000.0400	0045.4	005.5	145.4	000.2500	0115.4	050.6	38.62
027.0	000.0400	0046.8	005.6	145.3	000.2500	0115.7	050.6	38.62
028.0	000.0400	0048.1	005.7	145.1	000.2500	0116.0	050.6	38.62
029.0	000.0400	0048.8	005.7	145.0	000.2500	0116.2	050.7	38.61
030.0	000.0400	0048.8	005.7	145.0	000.2500	0116.3	050.8	38.58

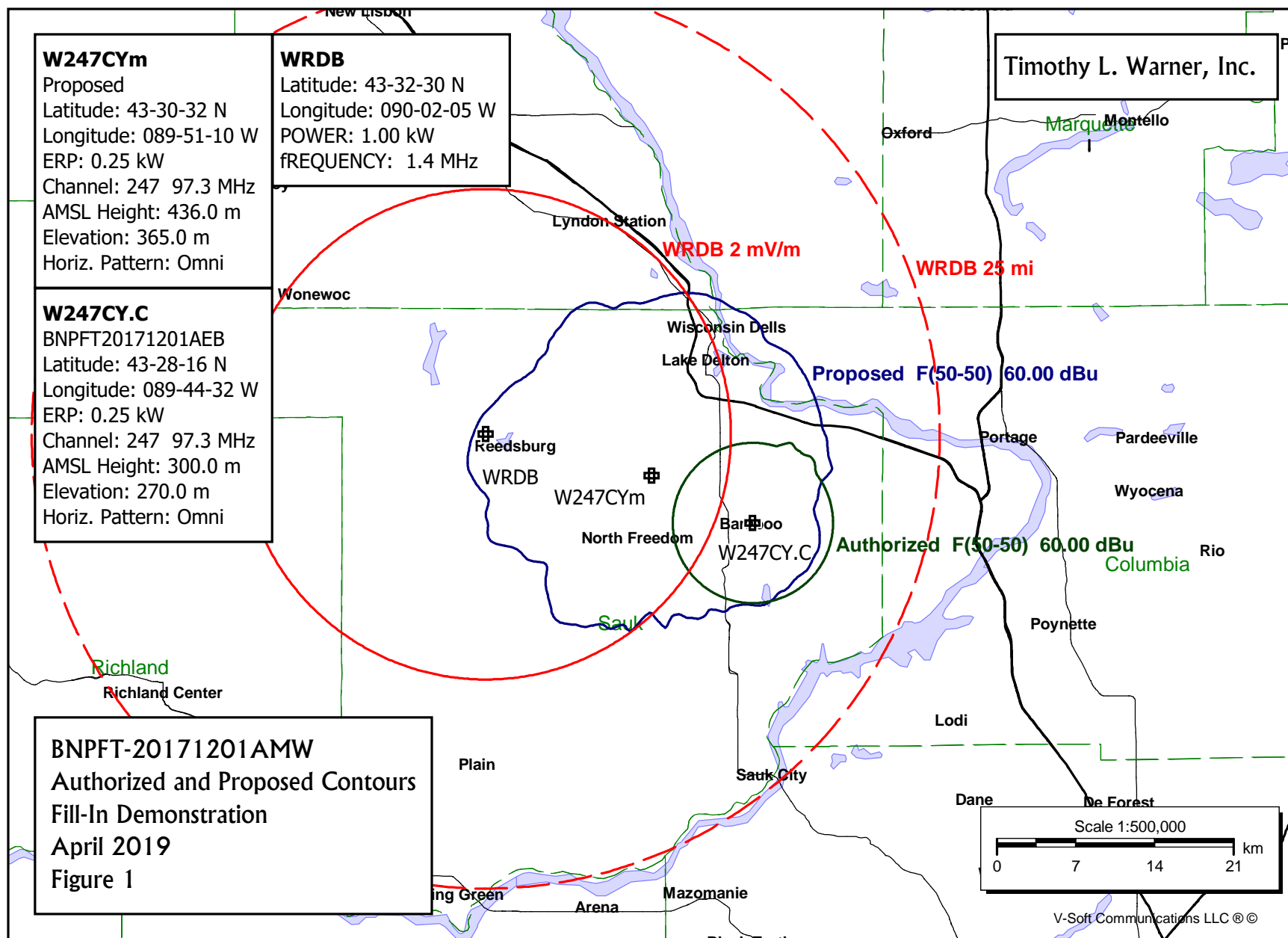
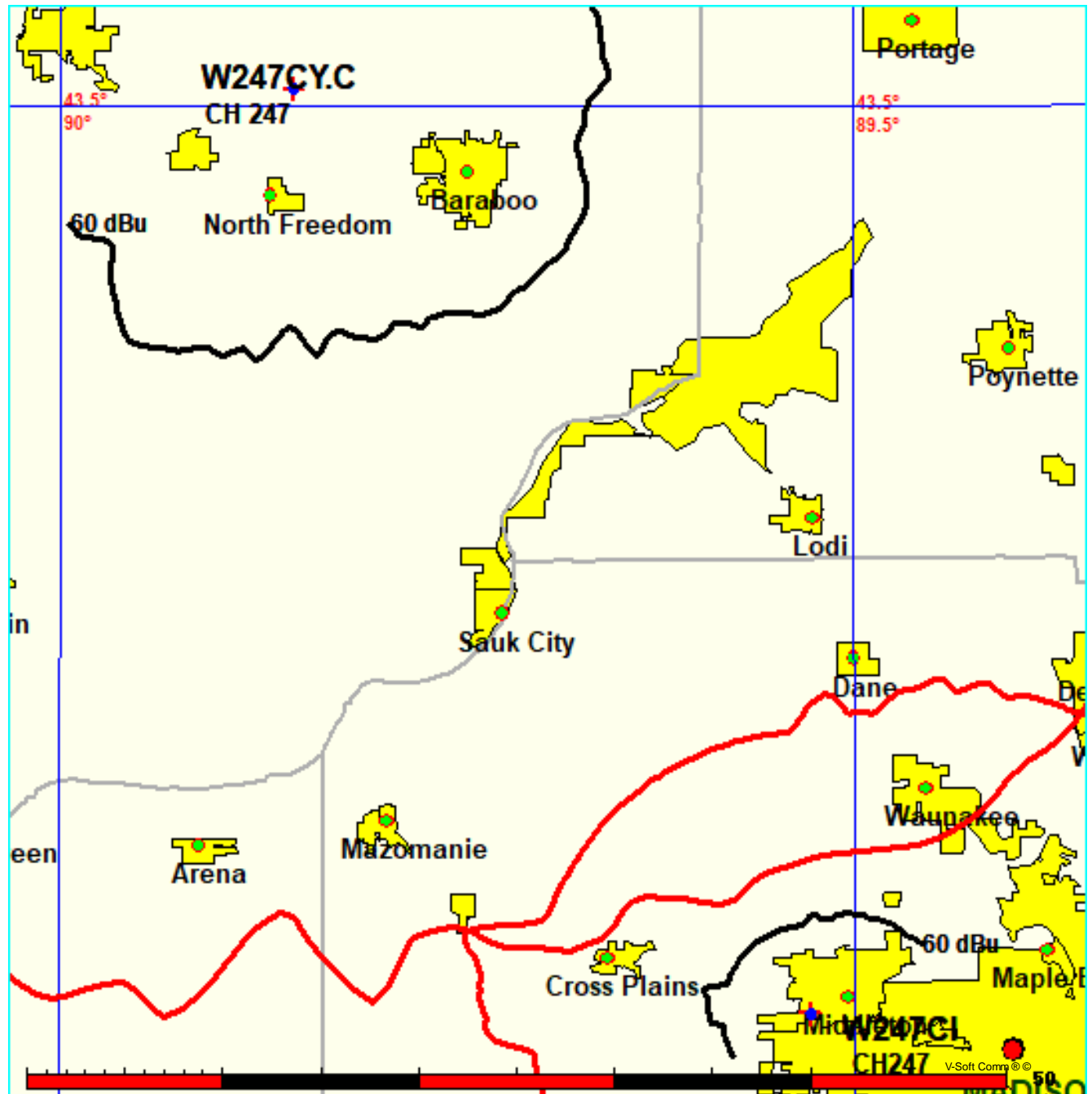


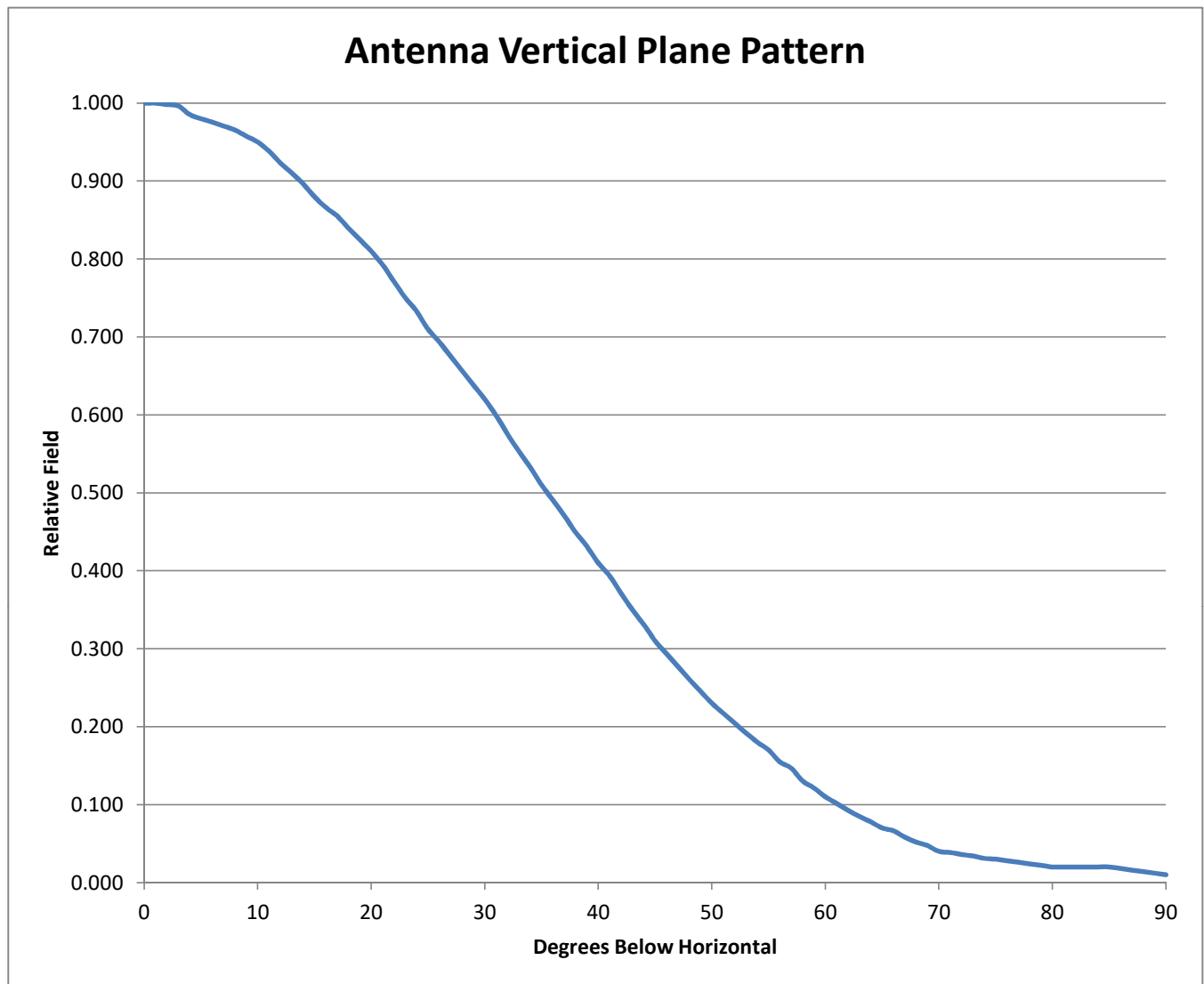
Figure 3: Allocation Study: W247CI
Magnum Communications, Inc.

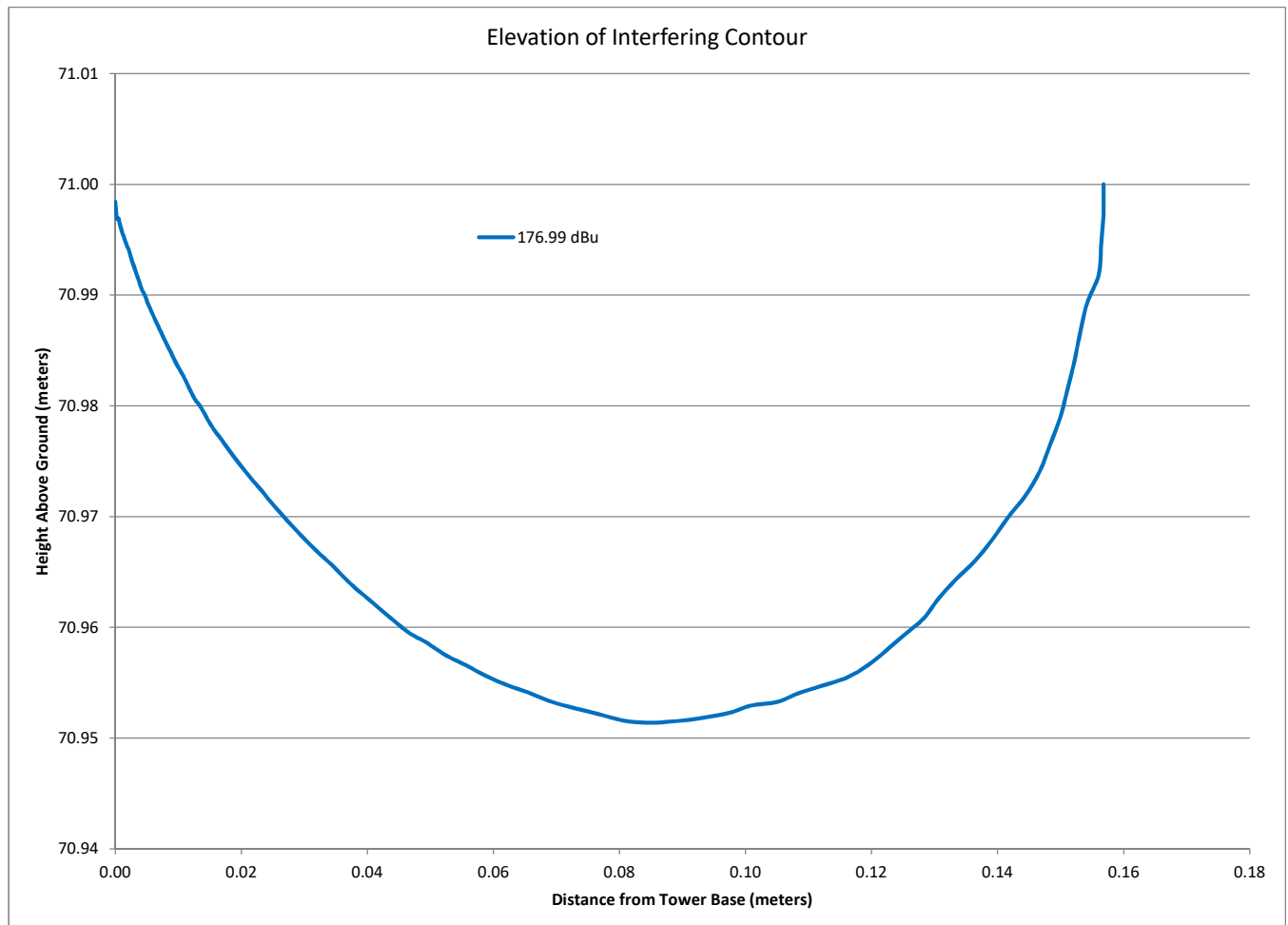
FMCommander Single Allocation Study - 04-24-2019 - GLOBE 30 Sec
W247CY.C's Overlaps (In= 24.64 km, Out= 2.45 km)

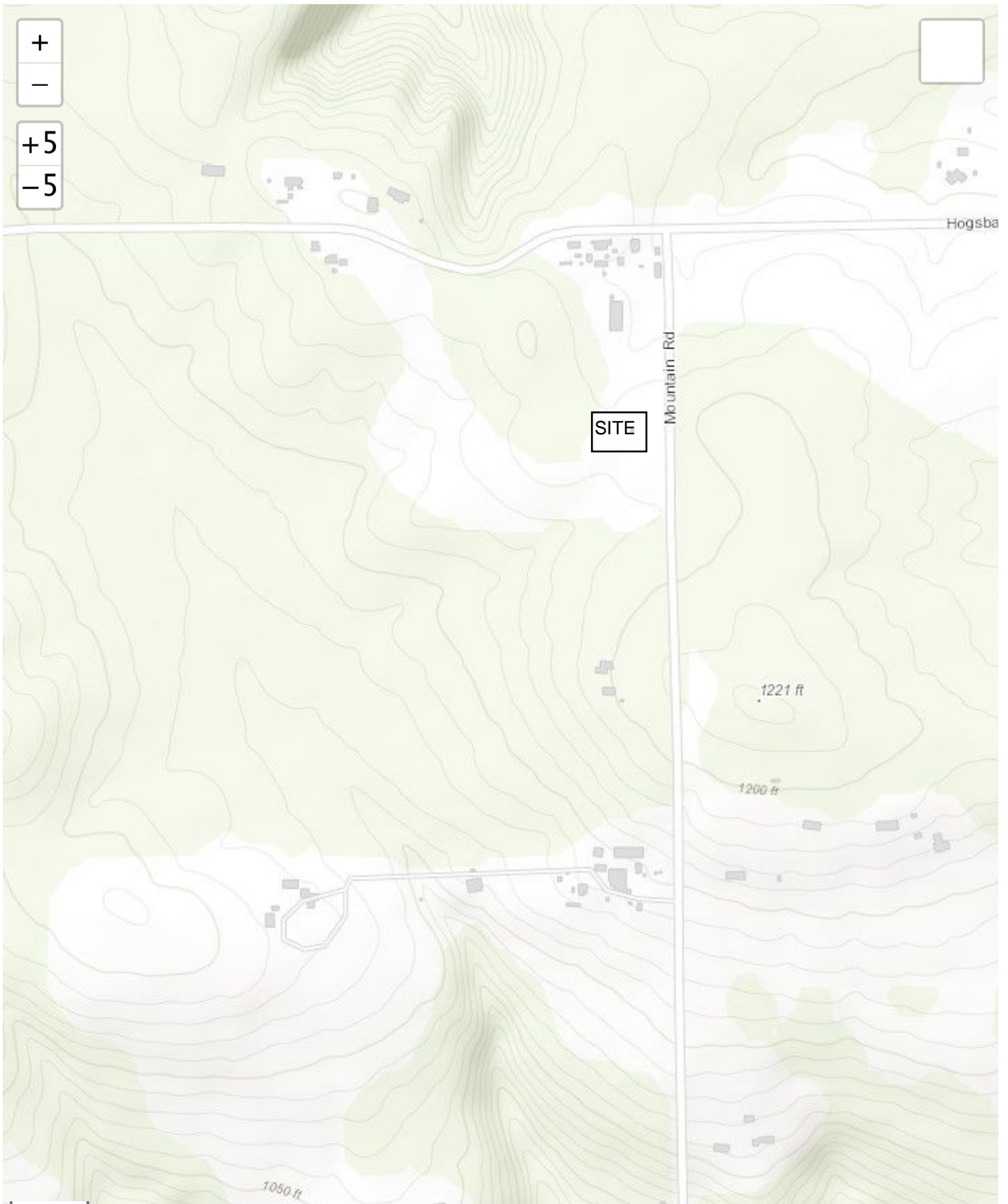
W247CY.C CH 247 D
Lat= 43 30 32.0, Lng= 89 51 10.0
0.25 kW 136.2 m HAAT, 436 m COR
Prot.= 60 dBu, Intef.= 40 dBu

W247CI CH 247 D BLFT20161102ABJ
Lat= 43 05 21.8, Lng= 89 31 44.1
0.04 kW 0 m HAAT, 340 m COR
Prot.= 60 dBu, Intef.= 40 dBu











Leaflet | Tiles © Esri — Esri, DeLorme, NAVTEQ, TomTom, Intermap, IPC, USGS, FAO, NPS, NRCAN, GeoBase, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), and the GIS User Community

W247CYm

Aerial Photograph
With Interference Contour
April 2019
Figure 7

Legend

-  W247CYm (247)
-  W247CYm (247) - 50 10 Field Strength: 176.99 dBu FCC [GLOBE 30]