WWKY(AM) - FACILITY ID #24221
MINOR CHANGE TO 990 KHZ AT 300 WATTS DAY
AT WINCHESTER, KY

This technical report is provided in support of an application for minor modifications to the WGWM licensed facility on 980 kHz Day at London, KY. A mutually exclusive change to first adjacent channel 990 kHz and a city of license change to Winchester, KY are proposed. Mutual exclusivity is demonstrated in exhibit E15A2. Section 307(b) analysis is provided in a separate exhibit.

Site	**N 38-00-46 W 84-09-40 (NAD27)**
Day Power	**0.300 kW non-directional**
Night power	**0.017 kW non directional**
Radiator Height	**61 meters overall – 59.7 m radiator = 71 degrees**
Efficiency	**270.85 mV/m/km/kW at one km (see E12F)**

The efficiency of the WGWM radiator at 990 kHz was determined to be 270.85 mV/m/km/kW using the FCC Figure 8 utility based on a 59.7 meter radiator using an existing 120 radial 54.3 meter copper ground system which was previously used for AM station WWKY on 1380 kHz (E12F).

A vertical sketch is provided as E12A, a site plat as E12B, a topographic map as E12C, an aerial photograph as E12E with the 1000 mV/m contour marked and E12D and E12D1 showing the 25 mV/m and 1000 mV/m contours. The proposed facility complies with 73.24(g) based on a population of 0 within the 1 V/m contour.

Required 5 mV/m day coverage of Winchester, KY is demonstrated by E13A.

Daytime allocation analysis:

E15A	M-3 allocation plot
E15A1	M-3 detailed analysis plot
E-15A2	M-3 overlap of licensed and proposed facility
E15B	Proposed 5, 2, 1 and .5 mV/m contours plot
E15C	Tabulation of day allocation factors
E15FS	Field intensity measurements on WNML, WITZ and WONE

Field intensity measurements were conducted on the co-channel WNML 990 kHz facility at Knoxville, TN and WITZ at Jasper, IN and adjacent channel station WONE on 980 kHz at Dayton, OH. These measurements are summarized in exhibit E15FS which included analyzed conductivities, measurement tabulations and certifications.

Exhibits E15Aand E15A1 demonstrate required clearances to all facilities based on the use of measured conductivities. All analyses were conducted using V-Soft's AMRPO 2 software which utilizes M3 data where measured data are not specified.

Night Allocation Analysis:

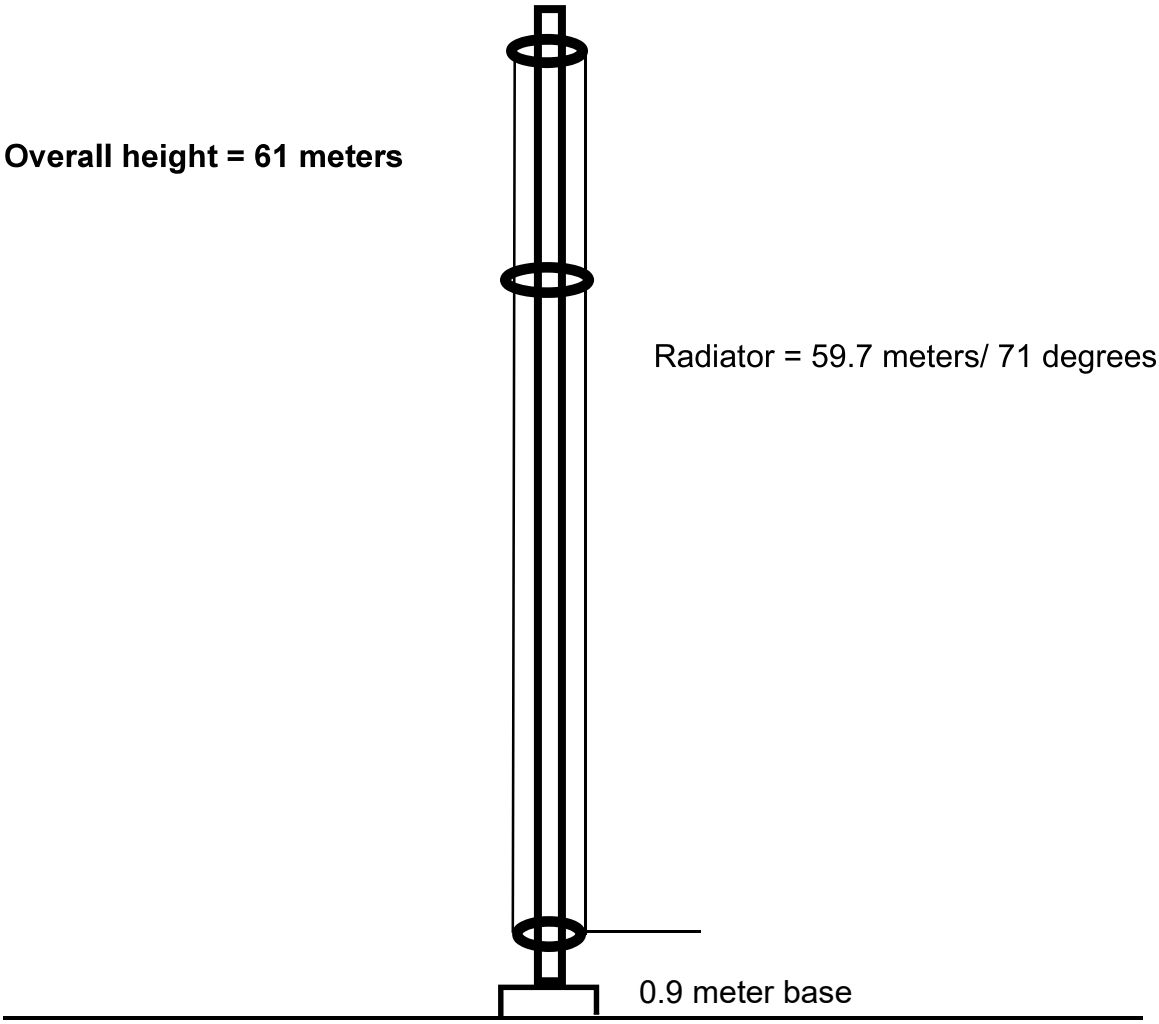
A night operating power of 0.017 kW non-directional is proposed. Again, AMPRO 2 was utilized to establish the required clearances as demonstrated in exhibit 16A.

RF analysis:

The proposed 990 kHz kHz facility will utilize a 71 degree folded unipole feed radiator. It will meet RF requirements using a fence extending at least two (2) meters from the tower base based on the Commission's AM RF worksheet.

Charles M. Anderson 02-01-2017
1519 Euclid Avenue
Bowling Green, KY 42103
270-782-0246

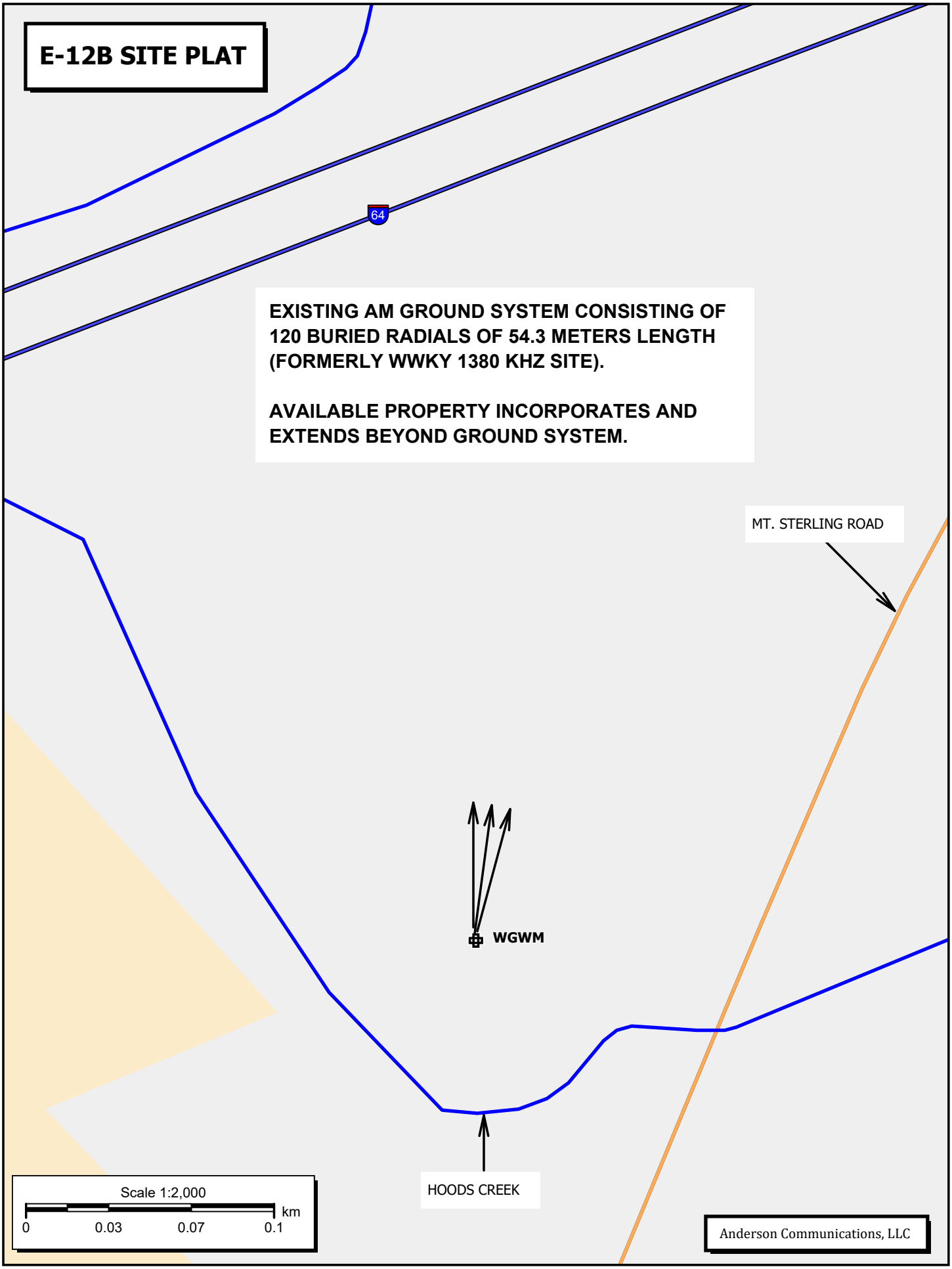
E12A VERTICAL SKETCH

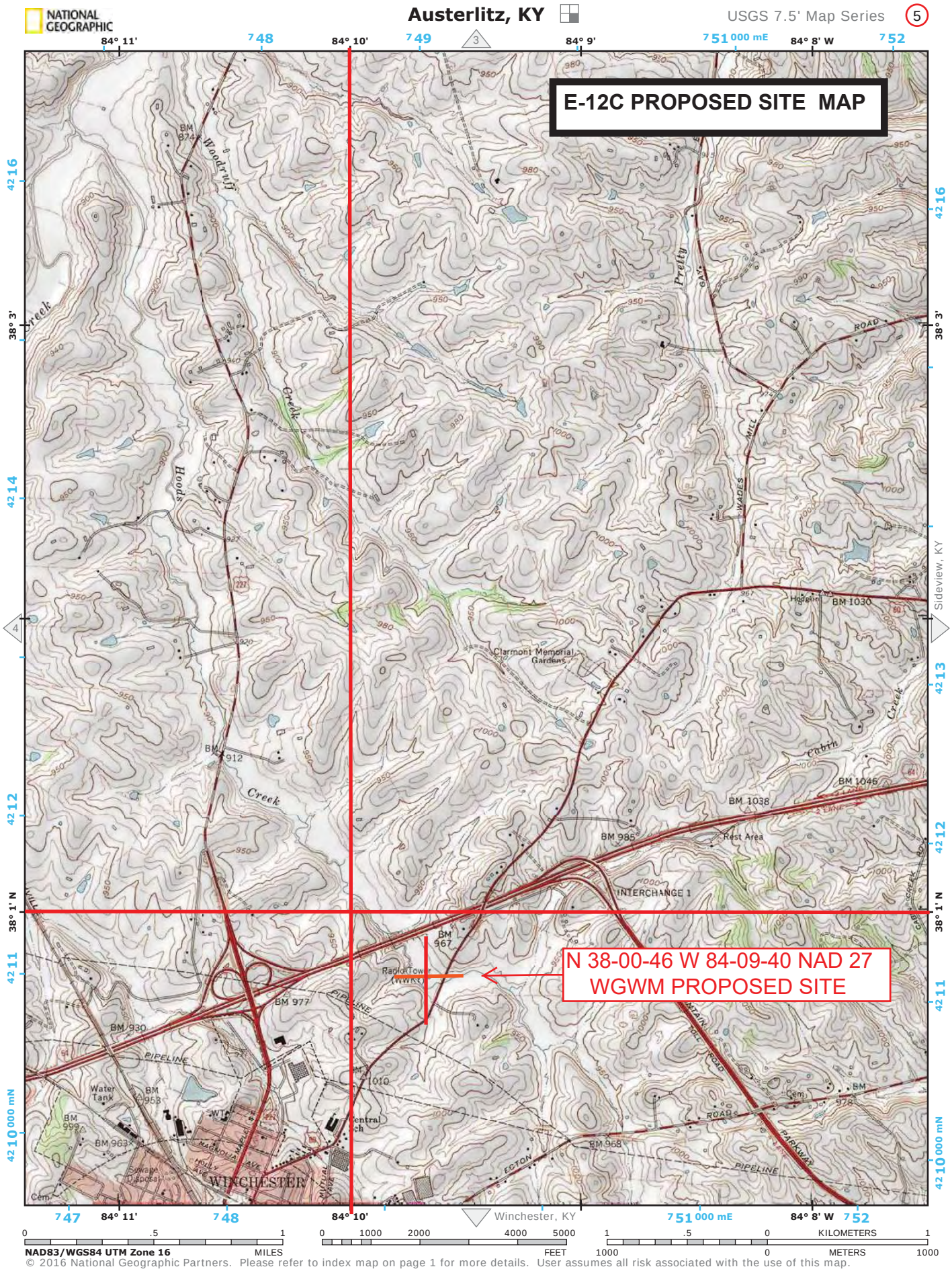


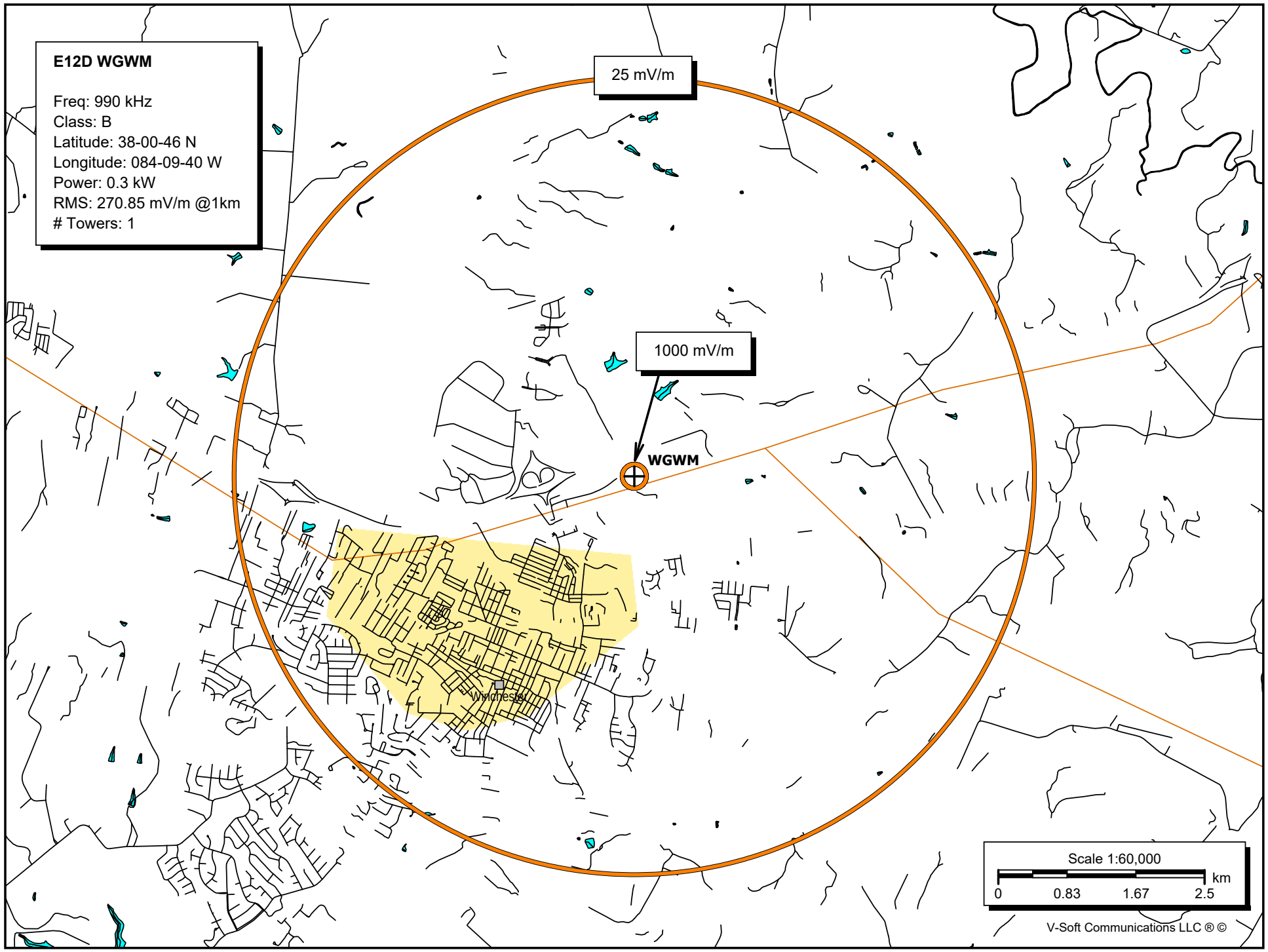
61 Meter guyed and grounded tower (59.7 m radiator) excited via a three wire folded unipole. The ground system consists of 120 buried copper radials 54.3 meters in length.

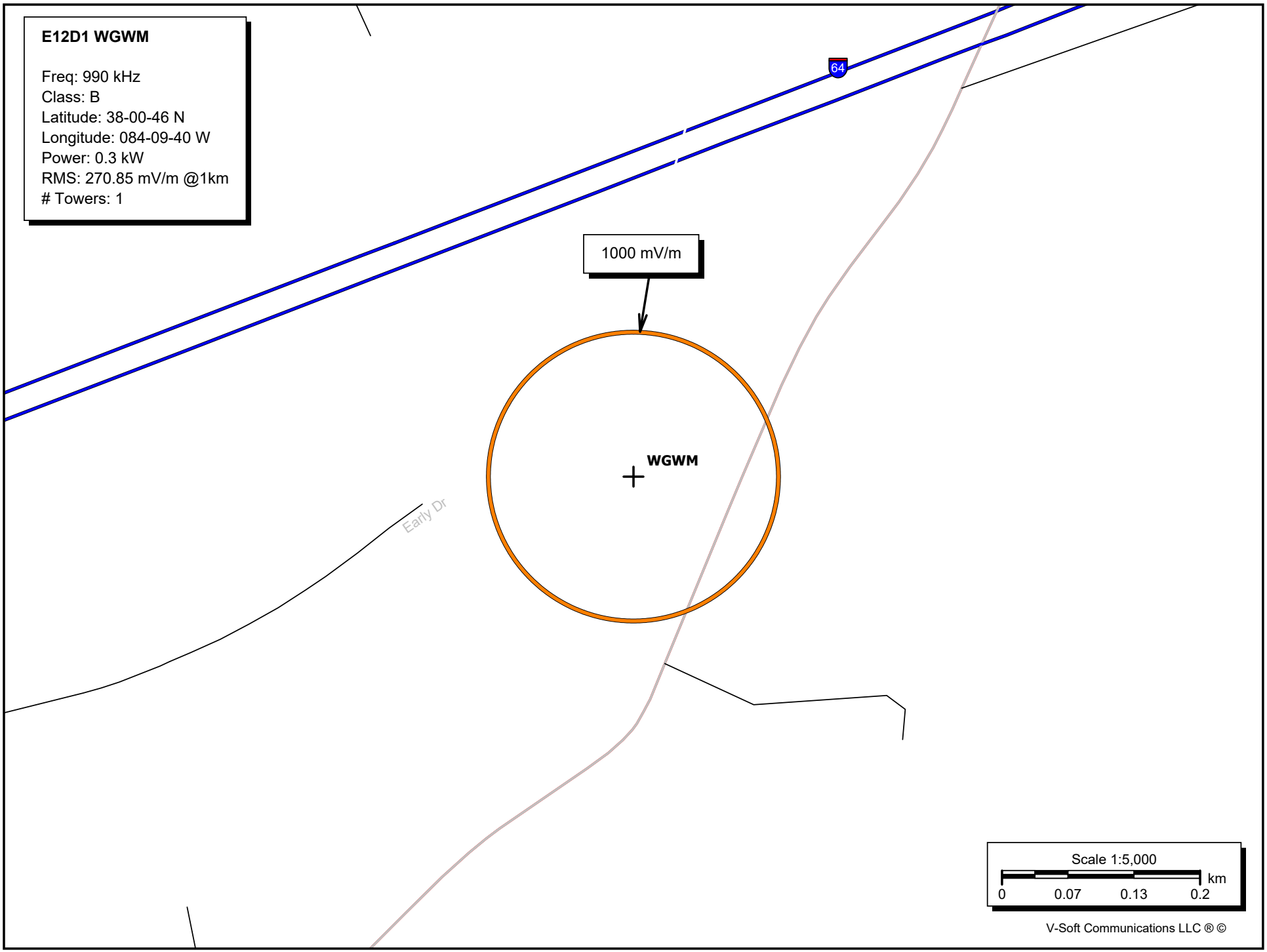
NOT TO SCALE

E-12B SITE PLAT






E12D WGWM
Freq: 990 kHz
Class: B
Latitude: 38-00-46 N
Longitude: 084-09-40 W
Power: 0.3 kW
RMS: 270.85 mV/m @1km
Towers: 1
25 mV/m
1000 mV/m
WGWM
Winchester
Scale 1:60,000
km
0
0.83
1.67
2.5
V-Soft Communications LLC ® ©


E12D1 WGWM
Freq: 990 kHz
Class: B
Latitude: 38-00-46 N
Longitude: 084-09-40 W
Power: 0.3 kW
RMS: 270.85 mV/m @1km
Towers: 1
64
1000 mV/m
WGWM
Early Dr
Scale 1:5,000
km
0
0.07
0.13
0.2
V-Soft Communications LLC ® ©

E12E 1000 MV/M AERIAL PHOTOGRAPH

E-12F ANTENNA EFFICIENCY

FIGURE 8 calculates the Inverse Distance Field for AM broadcast stations with frequencies between **530** and **1700 kHz.** This calculator is a computer version of Figure 8 of Section 73.190 of the FCC Rules.

The Inverse Distance Fields calculated here are in **mV/m at 1 kilometer.**

Ground system correction factors may be incorporated into the following results.

Input Parameters

Frequency:	990 kHz
Number of Ground Radials:	120
Correction for number of radials:	0.0000 mV/m @ 1 kilometer
Average Length of Ground Radials:	54.300 meters 178.150 feet 64.553 degrees 0.1793 wavelengths
Correction factor for length:	-22.5308 mV/m @ 1 kilometer
One Wavelength at 990 kHz is:	302.821 meters 993.506 feet
Tower Height:	59.700 meters 195.866 feet 70.97 degrees 0.1971 wavelengths

Predicted Field Strength from Figure 8, Section 73.190

(Metric units)

	Theoretical Field	Corrected Field	
At **1.00 kW**:	293.384	270.853	mV/m @ 1 KM
At **0.300 kW**:	160.693	148.353	mV/m @ 1 KM

TOWAIR Determination Results E-12G

*** NOTICE ***

TOWAIR's findings are not definitive or binding, and we cannot guarantee that the data in TOWAIR are fully current and accurate. In some instances, TOWAIR may yield results that differ from application of the criteria set out in 47 C.F.R. Section 17.7 and 14 C.F.R. Section 77.13. A positive finding by TOWAIR recommending notification should be given considerable weight. On the other hand, a finding by TOWAIR recommending either for or against notification is not conclusive. It is the responsibility of each ASR participant to exercise due diligence to determine if it must coordinate its structure with the FAA. TOWAIR is only one tool designed to assist ASR participants in exercising this due diligence, and further investigation may be necessary to determine if FAA coordination is appropriate.

DETERMINATION Results

Structure does not require registration. There are no airports within 8 kilometers (5 miles) of the coordinates you provided.

Your Specifications

NAD83 Coordinates

Latitude	38-00-46.3 north
Longitude	084-09-39.7 west

Measurements (Meters)

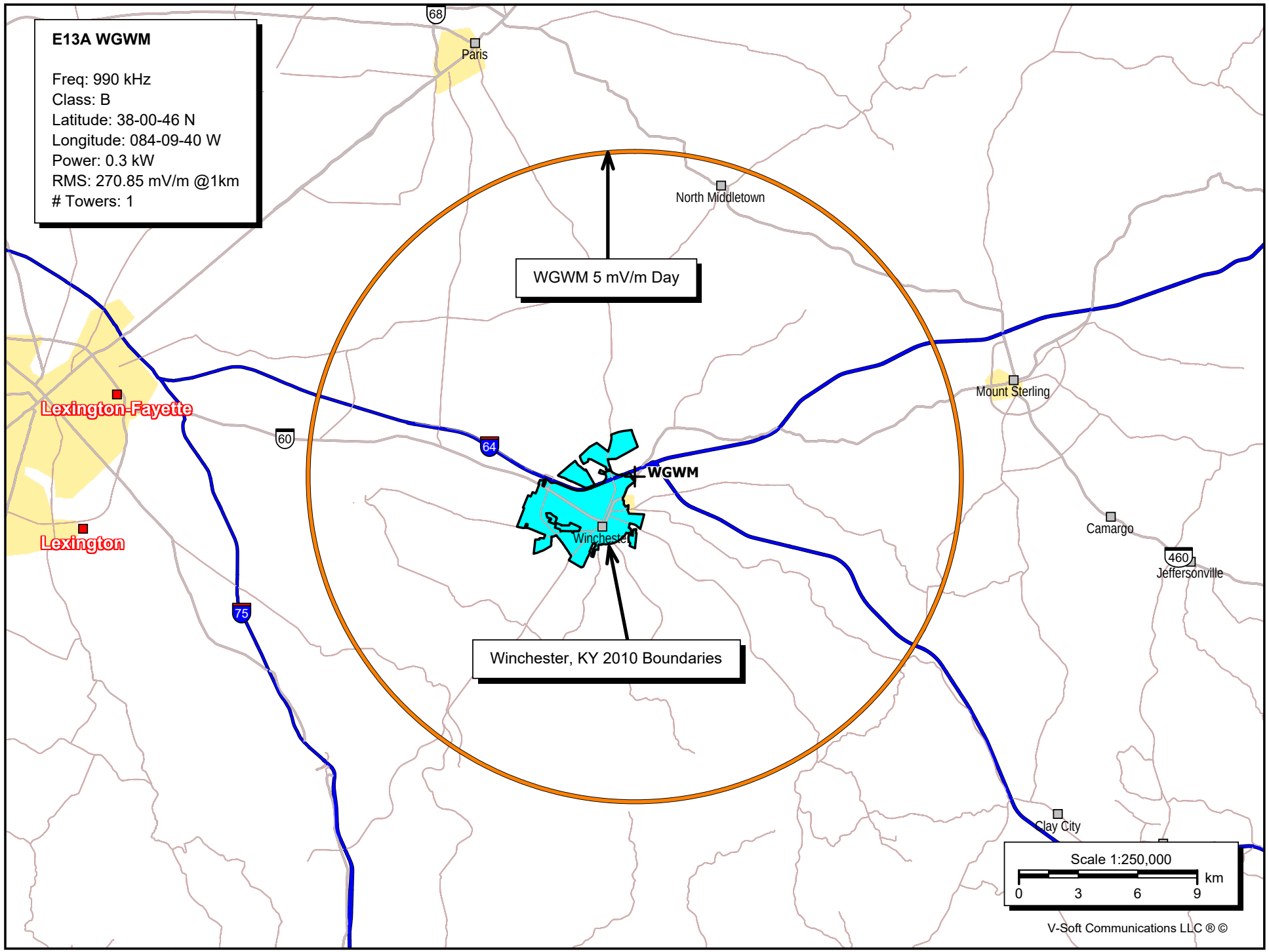
Overall Structure Height (AGL)	61
Support Structure Height (AGL)	0
Site Elevation (AMSL)	296

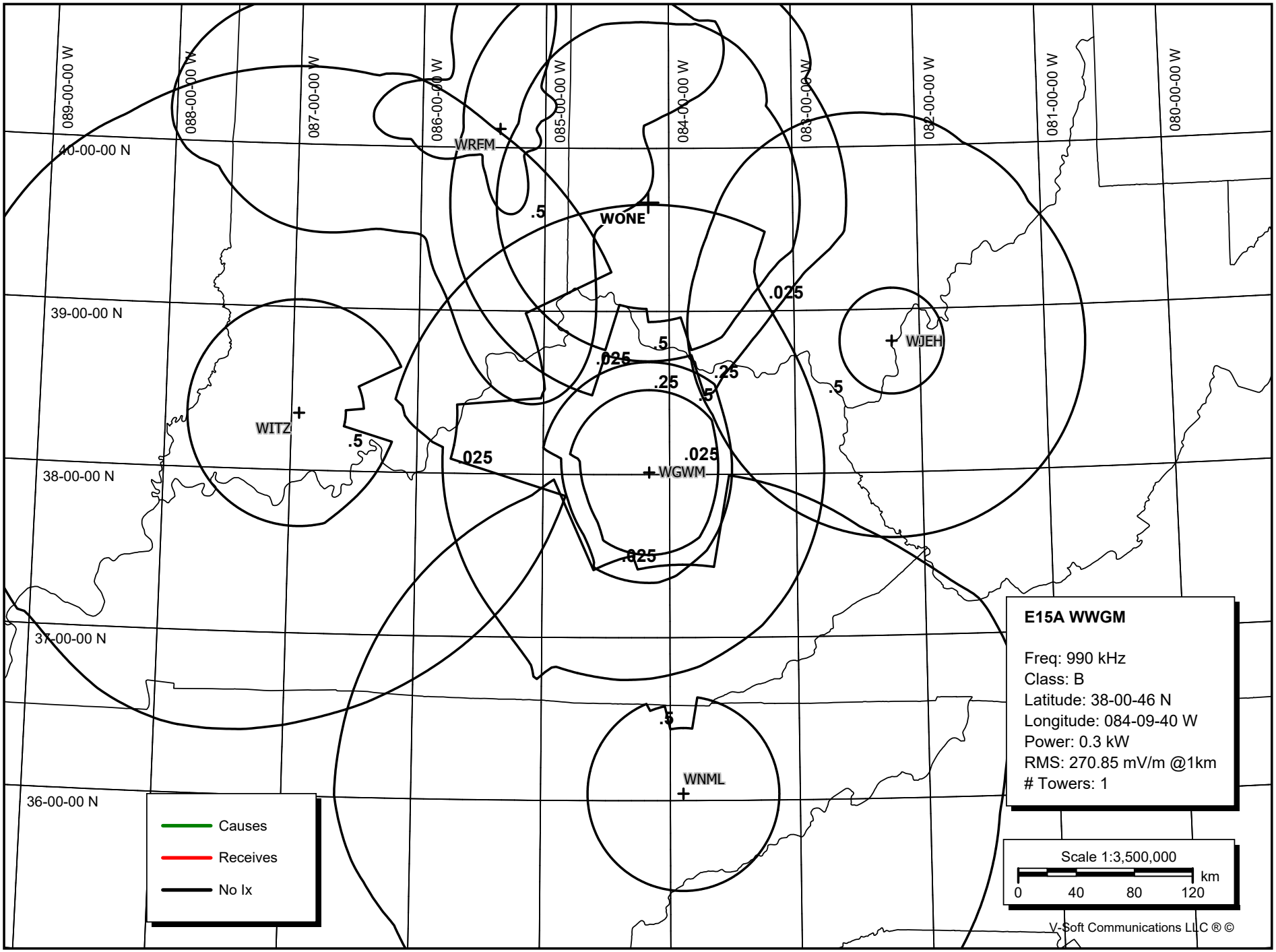
Structure Type

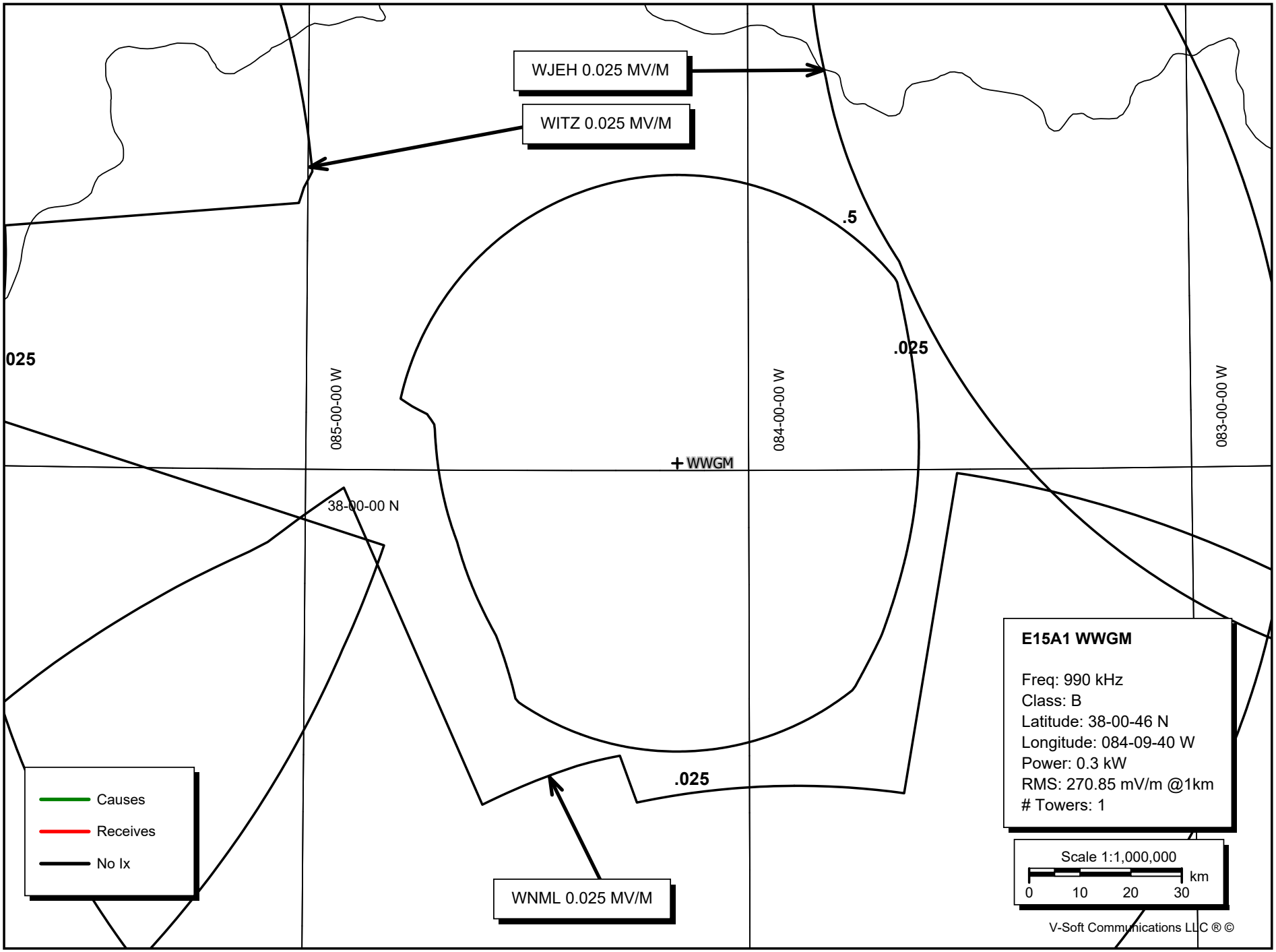
GTOWER - Guyed Structure Used for Communication Purposes

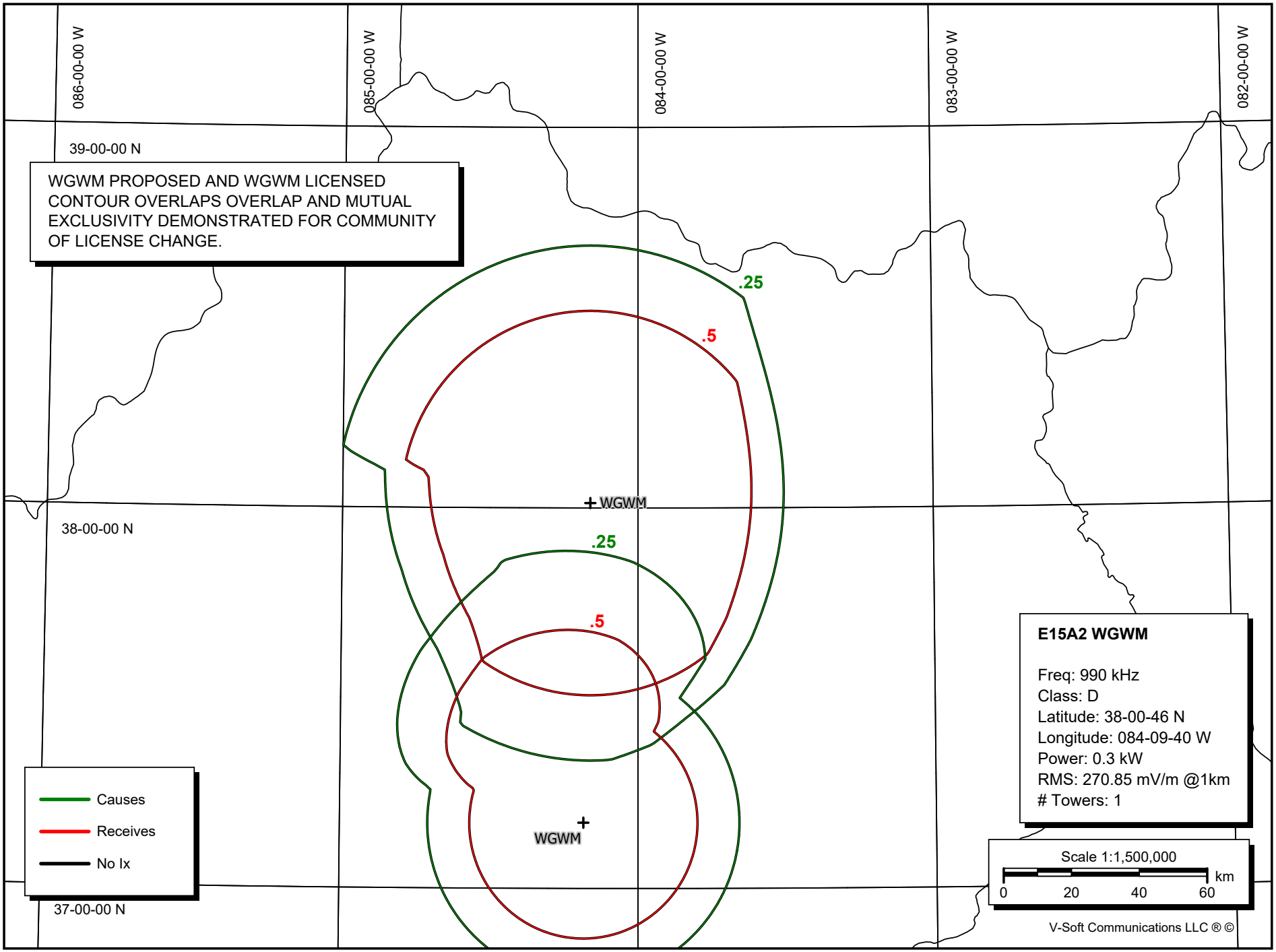
Tower Construction Notifications
Notify Tribes and Historic Preservation Officers of your plans to build a tower.

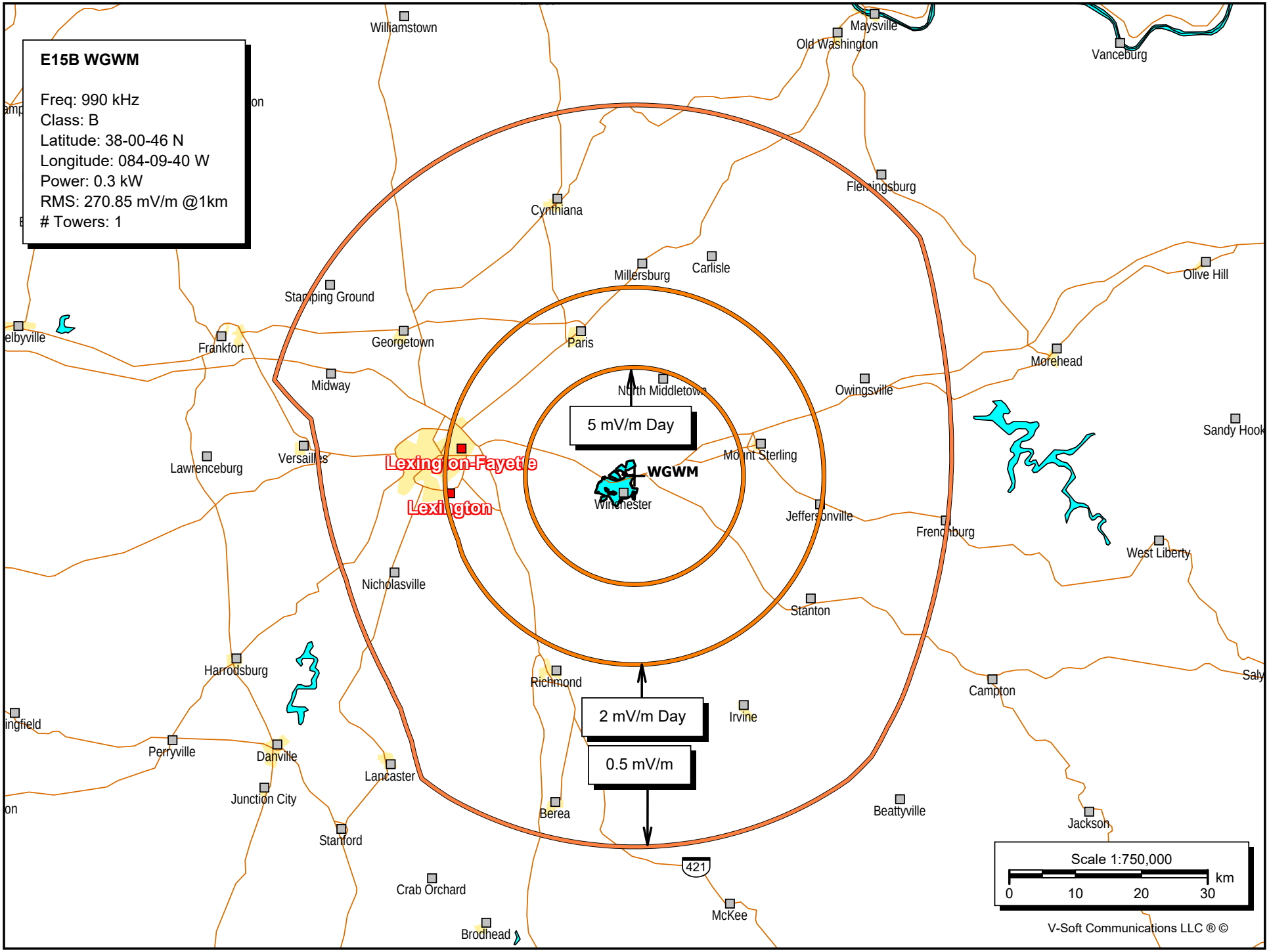
CLOSE WINDOW


E13A WGWM
Freq: 990 kHz
Class: B
Latitude: 38-00-46 N
Longitude: 084-09-40 W
Power: 0.3 kW
RMS: 270.85 mV/m @1km
Towers: 1
WGWM 5 mV/m Day
Winchester, KY 2010 Boundaries
WGWM
Paris
North Middletown
Mount Sterling
Lexington-Fayette
Lexington
Winchester
Camargo
Jeffersonville
Clay City
68
60
64
75
460
Scale 1:250,000
km
0
3
6
9
V-Soft Communications LLC ® ©


089-00-00 W
088-00-00 W
087-00-00 W
086-00-00 W
085-00-00 W
084-00-00 W
083-00-00 W
082-00-00 W
081-00-00 W
080-00-00 W
40-00-00 N
39-00-00 N
38-00-00 N
37-00-00 N
36-00-00 N
WREM
WONE
WJEH
WITZ
WGWM
WNML
.5
.025
.25
025
Causes
Receives
No Ix
E15A WWGM
Freq: 990 kHz
Class: B
Latitude: 38-00-46 N
Longitude: 084-09-40 W
Power: 0.3 kW
RMS: 270.85 mV/m @1km
Towers: 1
Scale 1:3,500,000
km
0
40
80
120
V-Soft Communications LLC ® ©


WJEH 0.025 MV/M
WITZ 0.025 MV/M
.5
.025
025
085-00-00 W
084-00-00 W
083-00-00 W
WWGM
38-00-00 N
.025
Causes
Receives
No Ix
WNML 0.025 MV/M
E15A1 WWGM
Freq: 990 kHz
Class: B
Latitude: 38-00-46 N
Longitude: 084-09-40 W
Power: 0.3 kW
RMS: 270.85 mV/m @1km
Towers: 1
Scale 1:1,000,000
km
0 10 20 30
V-Soft Communications LLC ® ©


086-00-00 W
085-00-00 W
084-00-00 W
083-00-00 W
082-00-00 W
39-00-00 N
38-00-00 N
37-00-00 N
WGWM PROPOSED AND WGWM LICENSED CONTOUR OVERLAPS OVERLAP AND MUTUAL EXCLUSIVITY DEMONSTRATED FOR COMMUNITY OF LICENSE CHANGE.
.25
.5
WGWM
.25
.5
WGWM
Causes
Receives
No Ix
E15A2 WGWM
Freq: 990 kHz
Class: D
Latitude: 38-00-46 N
Longitude: 084-09-40 W
Power: 0.3 kW
RMS: 270.85 mV/m @1km
Towers: 1
Scale 1:1,500,000
0
20
40
60
km
V-Soft Communications LLC ® ©


E15B WGWM
Freq: 990 kHz
Class: B
Latitude: 38-00-46 N
Longitude: 084-09-40 W
Power: 0.3 kW
RMS: 270.85 mV/m @1km
Towers: 1
5 mV/m Day
2 mV/m Day
0.5 mV/m
WGWM
Lexington-Fayette
Lexington
Williamstown
Maysville
Old Washington
Vanceburg
Flemingsburg
Cynthiana
Millersburg
Carlisle
Olive Hill
Stamping Ground
Frankfort
Georgetown
Paris
Morehead
Midway
North Middletown
Owingsville
Sandy Hook
Lawrenceburg
Versailles
Mount Sterling
Winchester
Jeffersonville
Frenchburg
West Liberty
Nicholasville
Stanton
Harrodsburg
Richmond
Irvine
Campton
Perryville
Danville
Lancaster
Junction City
Berea
Beattyville
Jackson
Stanford
Crab Orchard
McKee
Brodhead
421
Scale 1:750,000
km
0
10
20
30
V-Soft Communications LLC ® ©

E15C RELEVANT DAY ALLOCATION FACTORS

Reference Station: WGWM, 990 kHz
Location: 38-00-46 N, 084-09-40 W

***** 960 kHz (-3) *****

126.9 km	WPRT	L	37-38-46 N	082-47-46 W	3.8 kW	ND2 - 283.0 mV/m@1km
78.8 mi			Azi: 109.1	Class: D	Sched: U	File #: BL20030428AFT
			Location: PRESTONSBURG, KY, US			

***** 970 kHz (-2) *****

142.8 km	WGTK	L	38-19-05 N	085-44-39 W	5.0 kW	DA2 - 706.5 mV/m@1km
88.7 mi			Azi: 283.2	Class: B	Sched: U	File #: BL
			Location: LOUISVILLE, KY, US			
147.0 km	WFSR	L	36-52-02 N	083-19-36 W	5.0 kW	ND1 - 286.5 mV/m@1km
91.4 mi			Azi: 150.1	Class: D	Sched: U	File #: BL19900802AE
			Location: HARLAN, KY, US			

***** 980 kHz (-1) *****

93.2 km	WGWM	L	37-10-22 N	084-10-58 W	0.85 kW	ND2 - 286.7 mV/m@1km
57.9 mi			Azi: 181.2	Class: D	Sched: U	File #: BL20010620ABC
			Location: LONDON, KY, US			
183.7 km	WONE	L	39-40-03 N	084-10-01 W	5.0 kW	DAN - 304.2 mV/m@1km
114.1 mi			Azi: 359.8	Class: B	Sched: U	File #: BL19830105AE
			Location: DAYTON, OH, US			

***** 990 kHz (CO) *****

190.8 km	WJEH	L	38-48-20 N	082-13-23 W	1.0 kW	ND3 - 304.2 mV/m@1km
118.5 mi			Azi: 63.1	Class: D	Sched: U	File #: BL20041012AKQ
			Location: GALLIPOLIS, OH, US			
219.9 km	WNML	L	36-02-33 N	083-53-59 W	10.0 kW	DAN - 371.8 mV/m@1km
136.6 mi			Azi: 174.0	Class: B	Sched: U	File #: BL20031112AJC
			Location: KNOXVILLE, TN, US			
246.4 km	WITZ	L	38-21-02 N	086-56-26 W	1.0 kW	ND1 - 317.0 mV/m@1km
153.1 mi			Azi: 277.9	Class: D	Sched: U	File #: BL
			Location: JASPER, IN, US			
255.7 km	WRFM	L	40-06-54 N	085-22-02 W	0.25 kW	DA2 - 152.9 mV/m@1km
158.9 mi			Azi: 335.5	Class: D	Sched: U	File #: BL10879
			Location: MUNCIE, IN, US			

***** 1000 kHz (+1) *****

165.4 km	WKVG	L	37-09-59 N	082-37-13 W	1.0 kW	NDD - 291.3 mV/m@1km
102.7 mi			Azi: 125.1	Class: D	Sched: D	File #: BL
			Location: JENKINS, KY, US			

***** 1010 kHz (+2) *****

132.2 km	WIOI	L	38-43-48 N	082-57-10 W	1.0 kW	ND1 - 286.5 mV/m@1km
82.2 mi			Azi: 53.4	Class: D	Sched: U	File #: BL
			Location: NEW BOSTON, OH, US			

EXHIBIT E15FS

MEASURED CONDUCTIVITIES TABULATION

WNML 990 KHZ 10 KW-DAY ND (1234 mV/m/km inverse field - € = 20)

348 degree stub - 2 to 61 km (M3), 0.1 to 135,1 km

358 degree - 4 to 2.4 km, 1.5 to 10 km, 0.5 to 120 km, 0.1 to 162 km

WITZ 990 KHZ 1 KW-DAY ND (inverse field 307 mV/m/km/kW - € = 15)

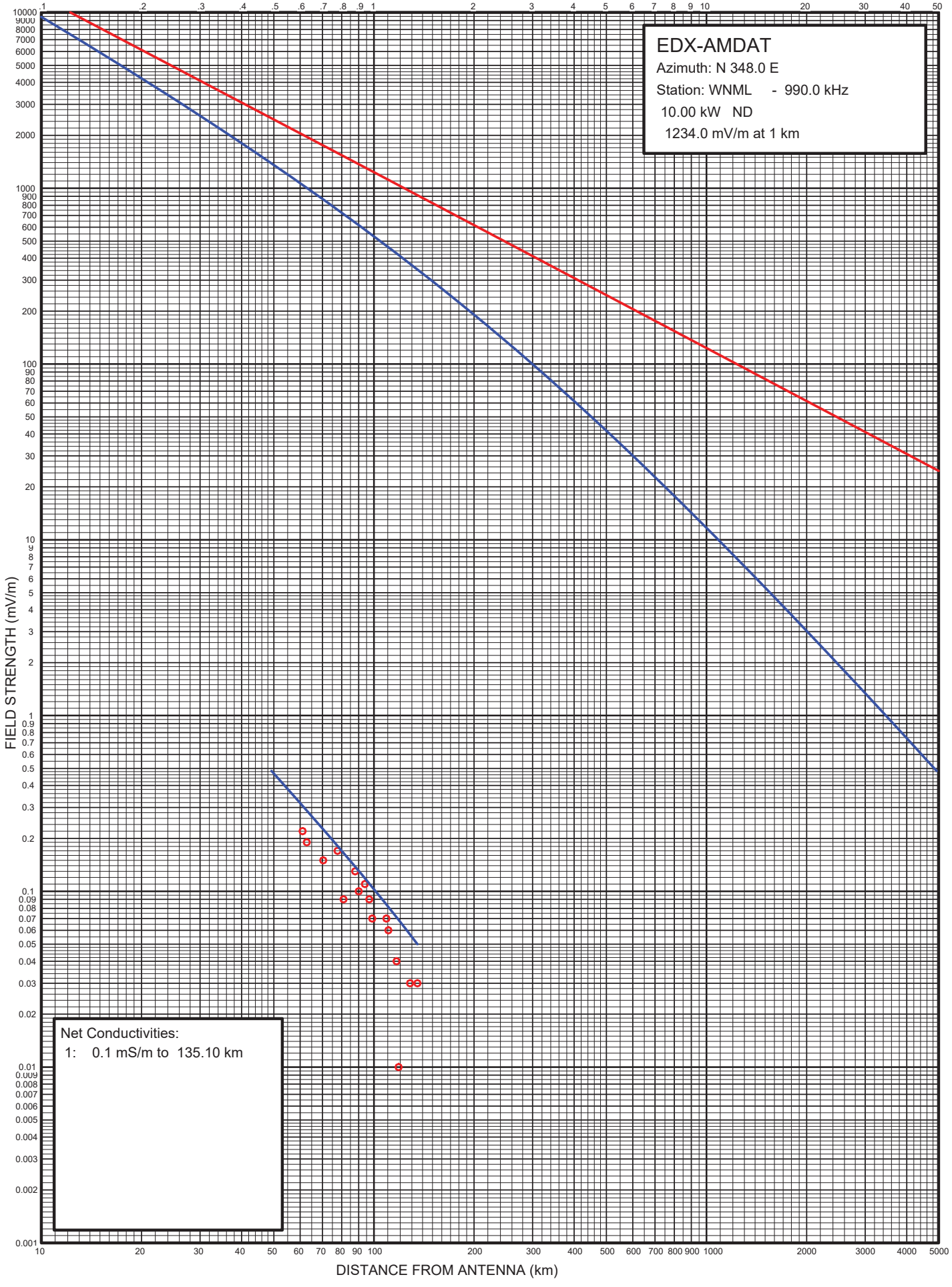
75 degree stub - 8 to 30 km (M3), 3 to 56.8 km, 2 to 69.8 km

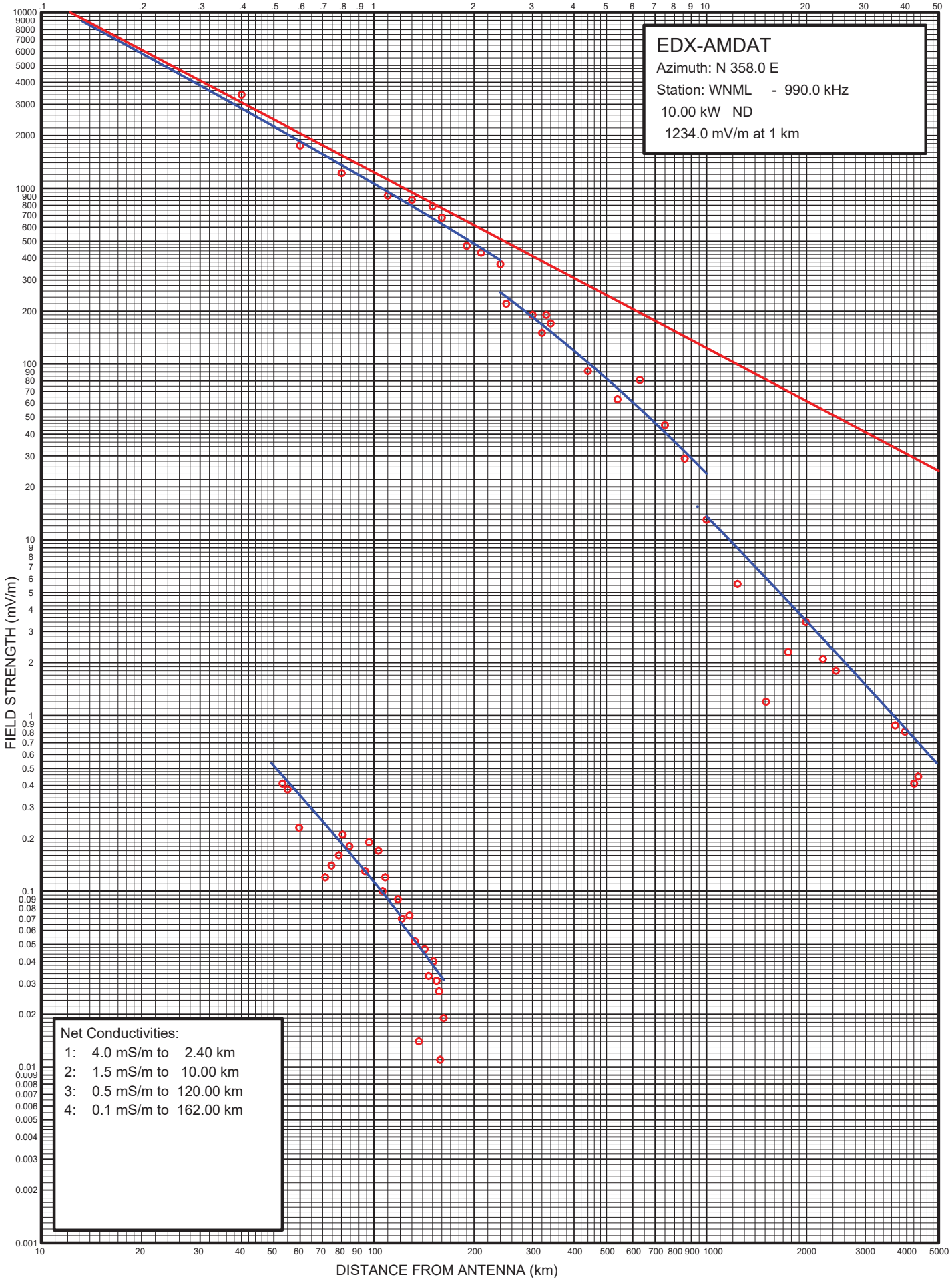
95 degree - 4 to 8.9 km, 3 to 23.2 km, 1.5 to 65.9 km, 3 to 101.8 km, 1 to 140.8 km

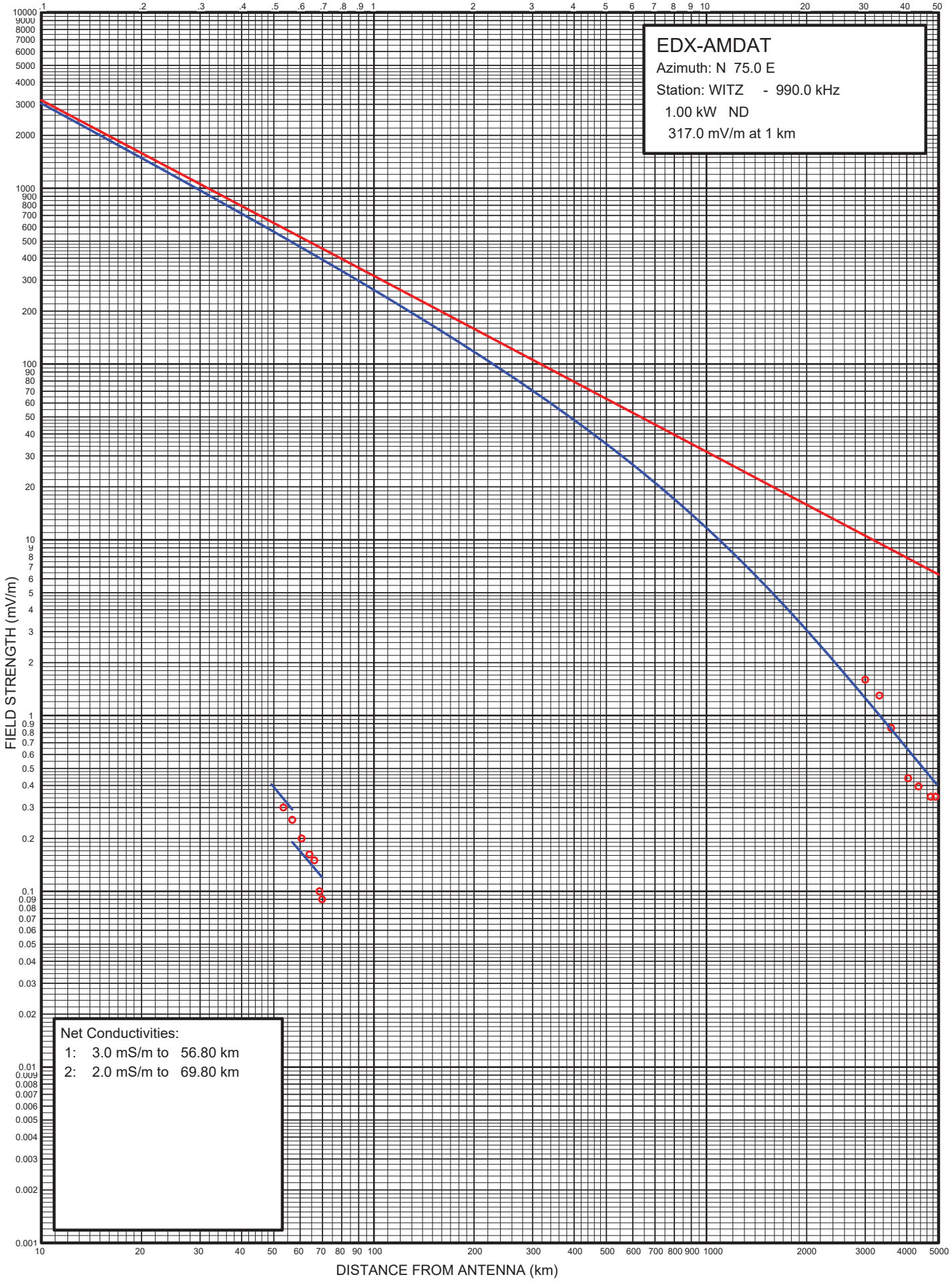
WONE 980 KHZ 5 KW-DAY ND (inverse field = 304.17 mV/m/km/kW - € = 15)

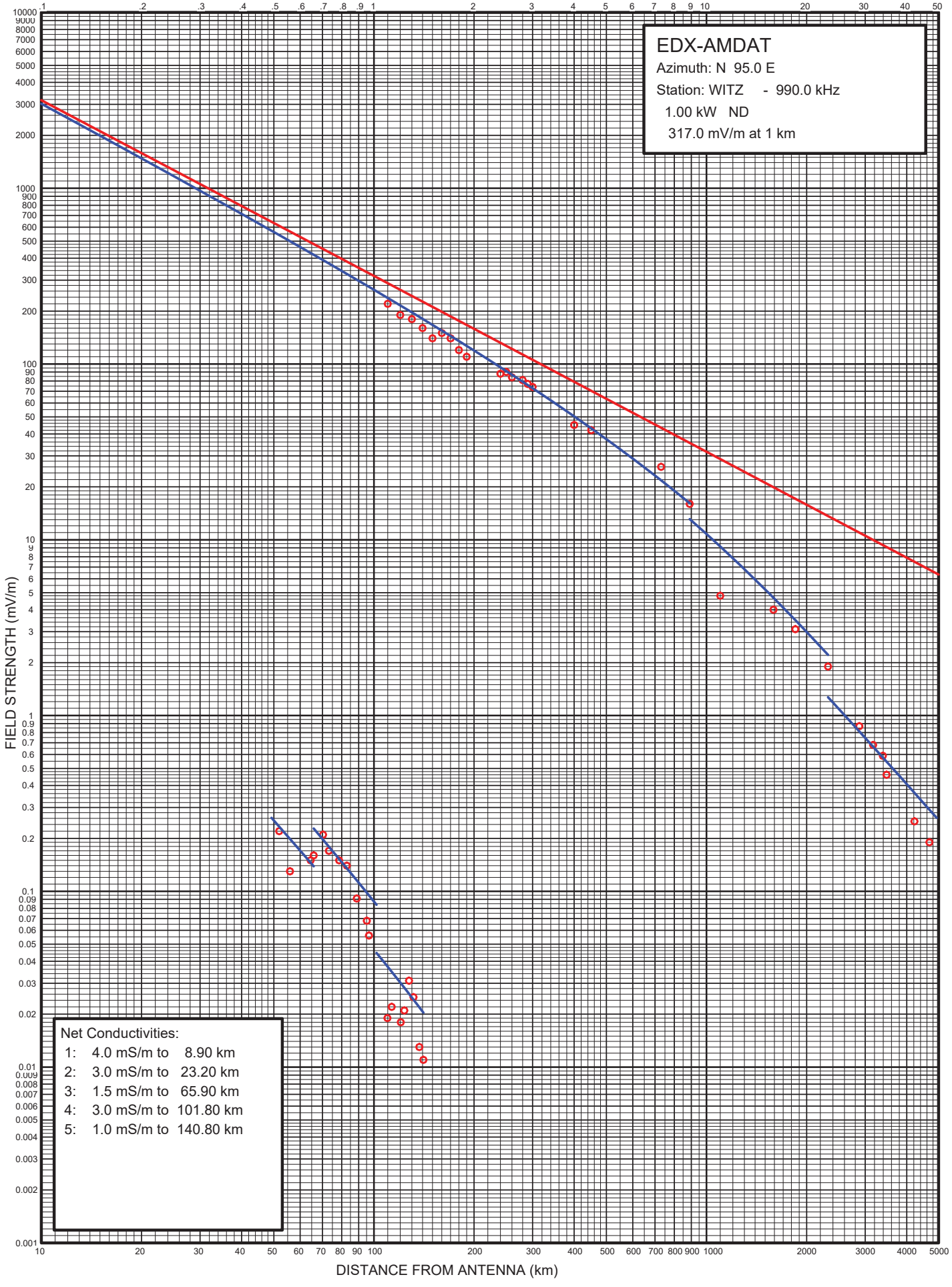
174 degree stub - 8 to 60 km (M3), 8 to 72.1 km, 5 to 121.3 km

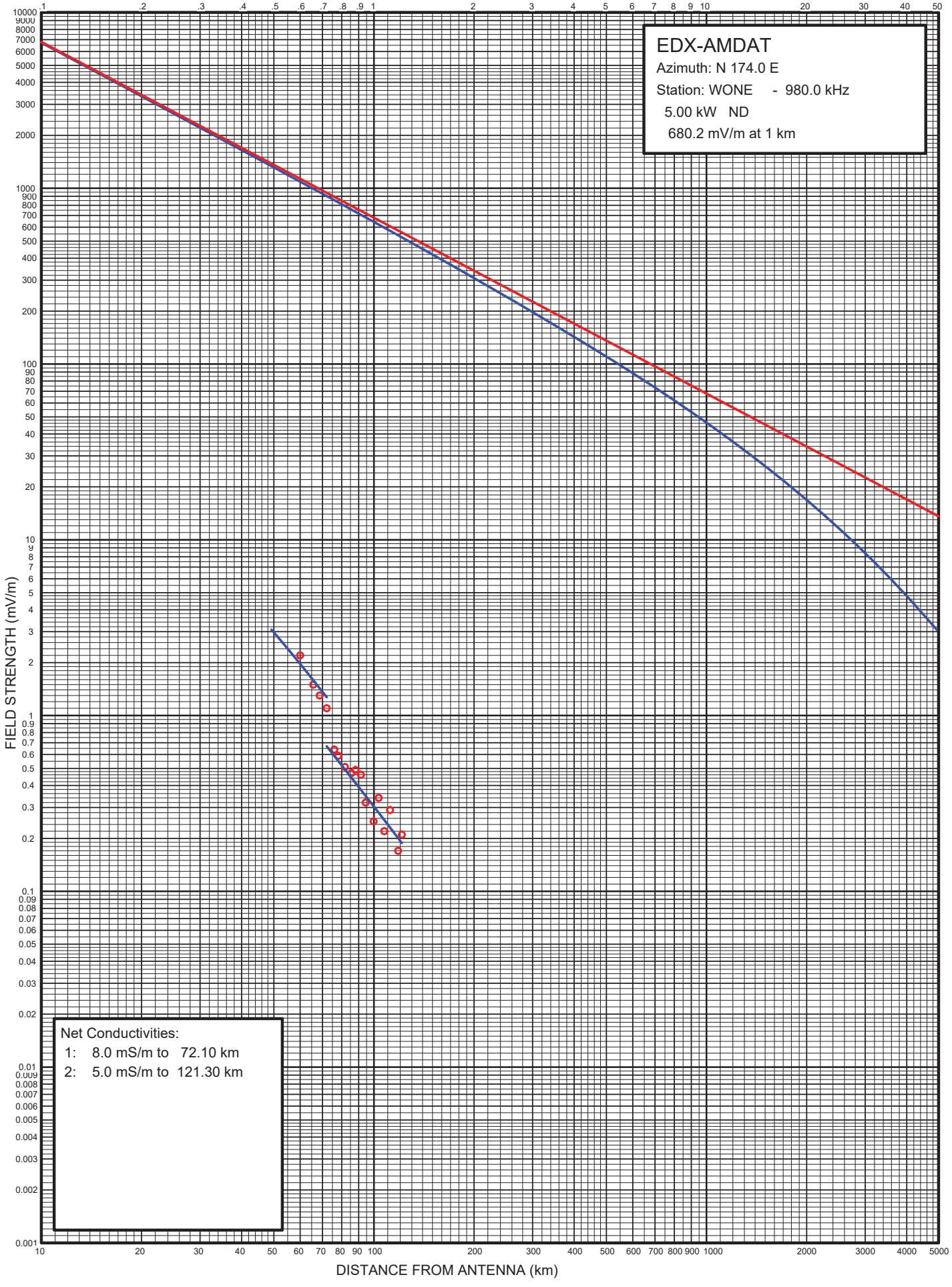
186 degree - 8 to 8.6 km, 7 to 27.8 km, 6 to 55.1 km, 4 to 86.7 km, 5 to 127.8 km

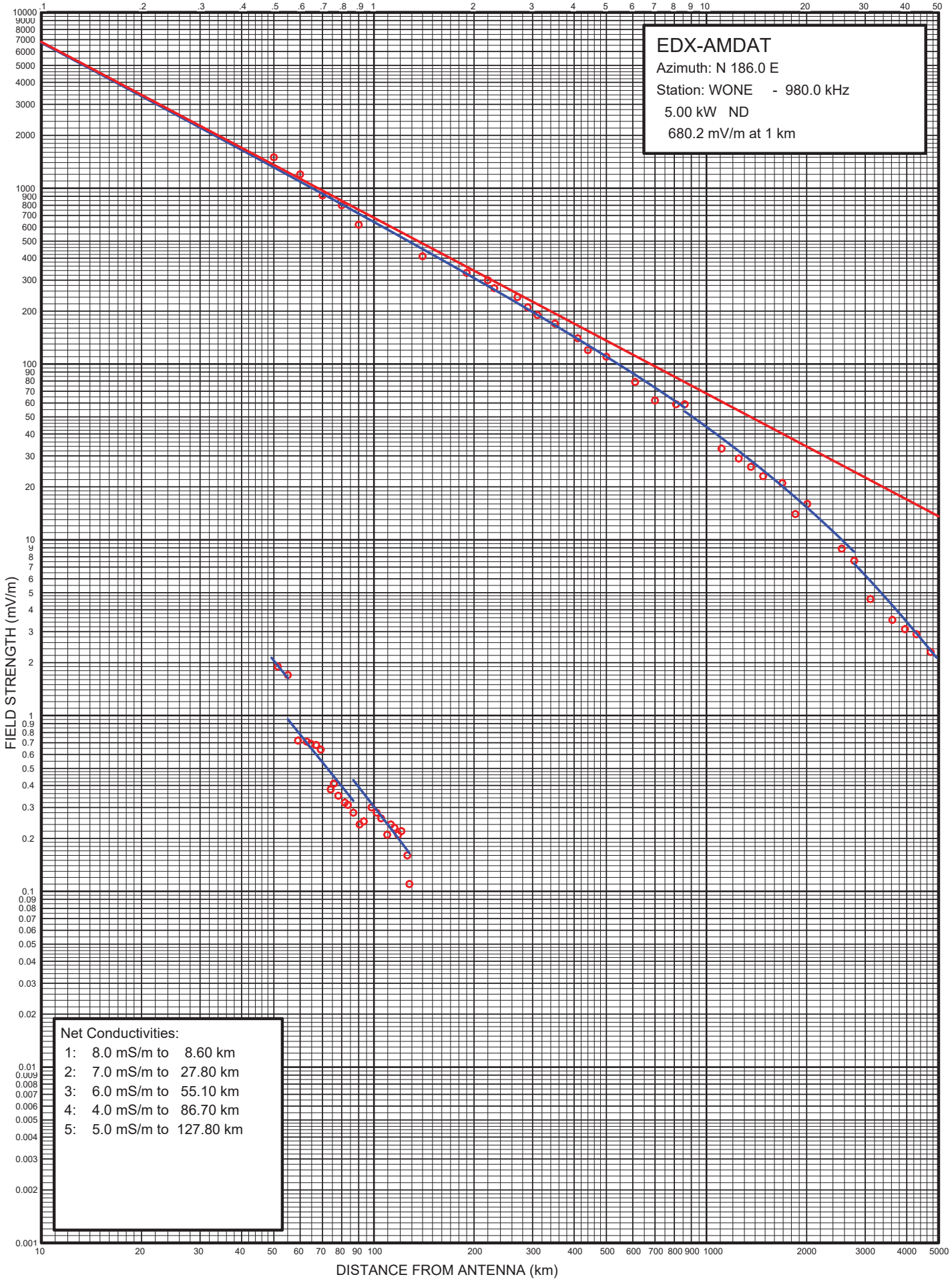

EDX-AMDAT
Azimuth: N 348.0 E
Station: WNML - 990.0 kHz
10.00 kW ND
1234.0 mV/m at 1 km
Net Conductivities:
1: 0.1 mS/m to 135.10 km
FIELD STRENGTH (mV/m)
DISTANCE FROM ANTENNA (km)

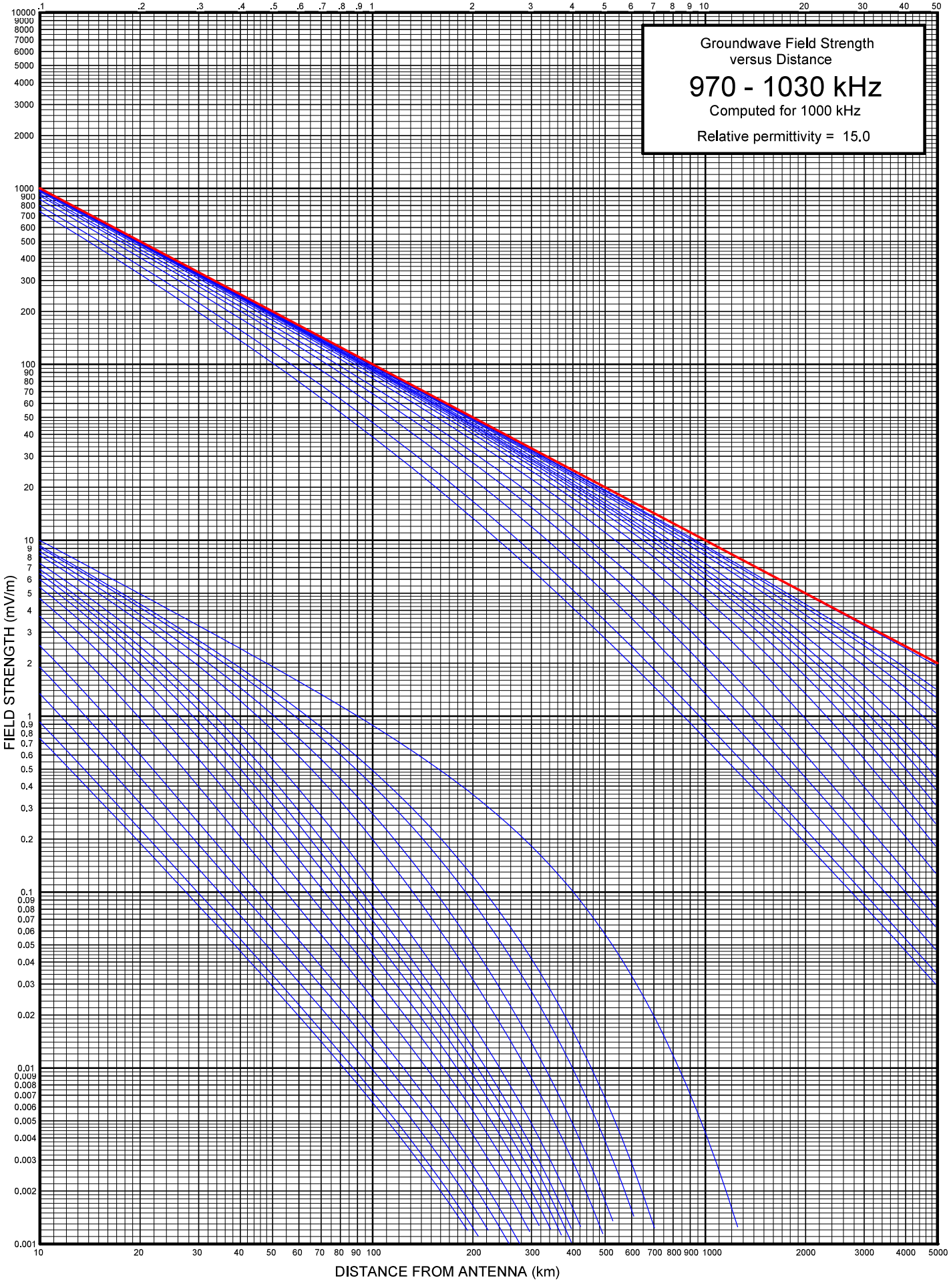

EDX-AMDAT
Azimuth: N 358.0 E
Station: WNML - 990.0 kHz
10.00 kW ND
1234.0 mV/m at 1 km
Net Conductivities:
1: 4.0 mS/m to 2.40 km
2: 1.5 mS/m to 10.00 km
3: 0.5 mS/m to 120.00 km
4: 0.1 mS/m to 162.00 km
FIELD STRENGTH (mV/m)
DISTANCE FROM ANTENNA (km)


EDX-AMDAT
Azimuth: N 75.0 E
Station: WITZ - 990.0 kHz
1.00 kW ND
317.0 mV/m at 1 km
Net Conductivities:
1: 3.0 mS/m to 56.80 km
2: 2.0 mS/m to 69.80 km
FIELD STRENGTH (mV/m)
DISTANCE FROM ANTENNA (km)


EDX-AMDAT
Azimuth: N 95.0 E
Station: WITZ - 990.0 kHz
1.00 kW ND
317.0 mV/m at 1 km
Net Conductivities:
1: 4.0 mS/m to 8.90 km
2: 3.0 mS/m to 23.20 km
3: 1.5 mS/m to 65.90 km
4: 3.0 mS/m to 101.80 km
5: 1.0 mS/m to 140.80 km
FIELD STRENGTH (mV/m)
DISTANCE FROM ANTENNA (km)


EDX-AMDAT
Azimuth: N 174.0 E
Station: WONE - 980.0 kHz
5.00 kW ND
680.2 mV/m at 1 km
Net Conductivities:
1: 8.0 mS/m to 72.10 km
2: 5.0 mS/m to 121.30 km
FIELD STRENGTH (mV/m)
DISTANCE FROM ANTENNA (km)


EDX-AMDAT
Azimuth: N 186.0 E
Station: WONE - 980.0 kHz
5.00 kW ND
680.2 mV/m at 1 km
Net Conductivities:
1: 8.0 mS/m to 8.60 km
2: 7.0 mS/m to 27.80 km
3: 6.0 mS/m to 55.10 km
4: 4.0 mS/m to 86.70 km
5: 5.0 mS/m to 127.80 km
FIELD STRENGTH (mV/m)
DISTANCE FROM ANTENNA (km)


Groundwave Field Strength
versus Distance
970 - 1030 kHz
Computed for 1000 kHz
Relative permittivity = 15.0
FIELD STRENGTH (mV/m)
DISTANCE FROM ANTENNA (km)

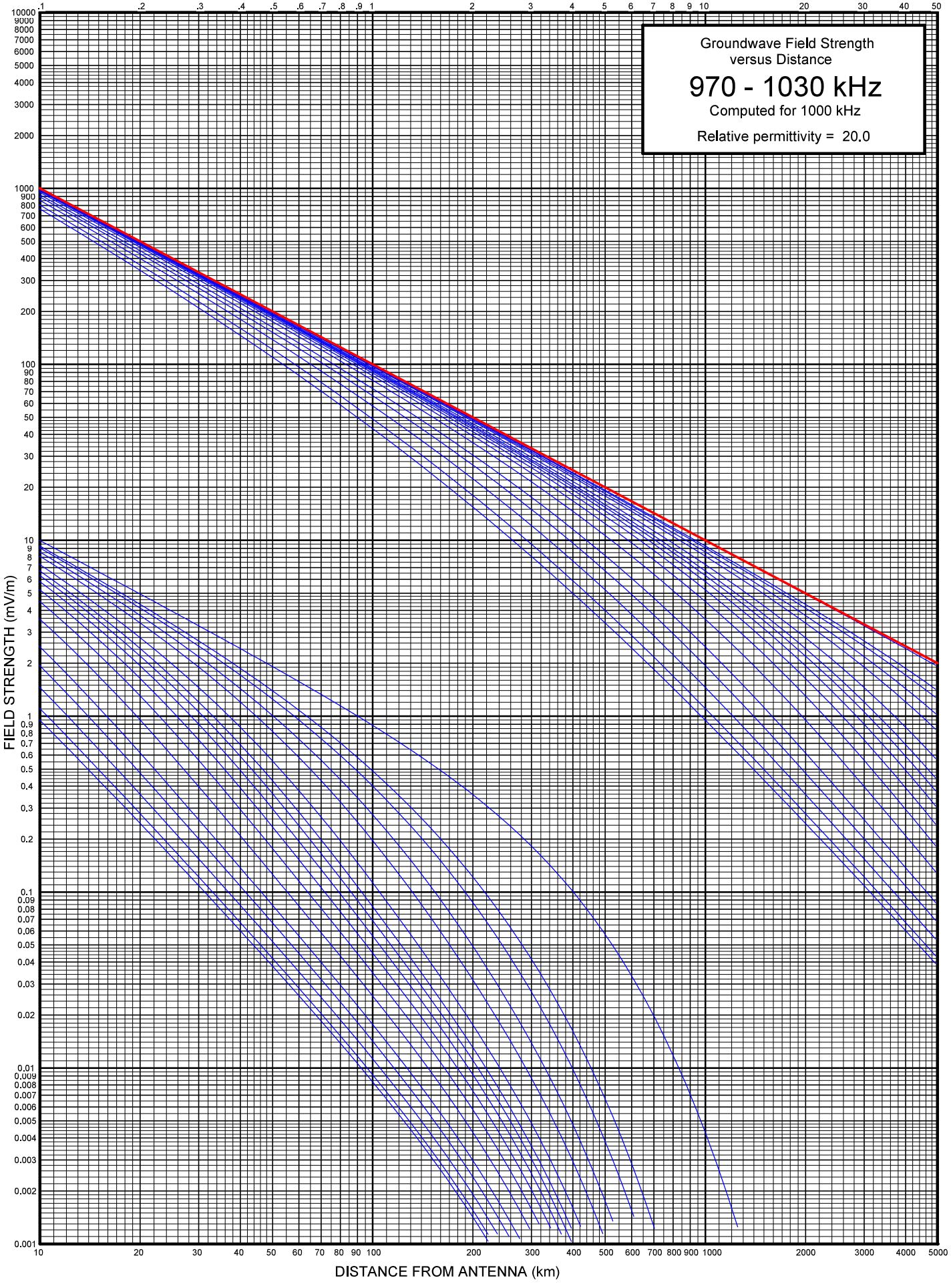

Groundwave Field Strength
versus Distance
970 - 1030 kHz
Computed for 1000 kHz
Relative permittivity = 20.0
FIELD STRENGTH (mV/m)
DISTANCE FROM ANTENNA (km)

EXHIBIT E-15FS
MEASUREMENT DATA

WNML

	990	**348**	**DEGREE**	
	16	**1**		
ND				
1	**61**	**0.22**	**11:20**	**10/28/2016**
2	**62.8**	**0.19**	**11:40**	
3	**70.4**	**0.15**	**12:25**	
4	**77.7**	**0.17**	**12:45**	
5	**81**	**0.09**	**13:10**	
6	**87.8**	**0.13**	**13:55**	
7	**90**	**0.1**	**14:10**	
8	**93.9**	**0.11**	**14:25**	
9	**96.8**	**0.09**	**14:45**	
10	**98.8**	**0.07**	**15:05**	
11	**109**	**0.07**	**12:35**	**10/30/2016**
12	**110.5**	**0.06**	**12:50**	
13	**116.9**	**0.04**	**13:35**	
14	**118.6**	**0.01**	**13:50**	
15	**128.4**	**0.03**	**14:40**	
16	**135.1**	**0.03**	**15:35**	

All measurements conducted by Hays McMakin using WX-2D #1344 last calibrated across the band by Mooretronix on October 11, 2016. Calibration certificate included.

EXHIBIT E-15FS
MEASUREMENT DATA

WNML

	990	358	DEGREE	
	56	1		
ND				
1	0.4	3400	9:05	11/1/2016
2	0.6	1750	9:15	
3	0.8	1220	9:25	
4	1.1	910	9:35	
5	1.3	860	9:50	
6	1.5	790	10:20	
7	1.6	680	10:30	
8	1.9	470	10:45	
9	2.1	430	11:00	
10	2.4	370	11:15	
11	2.5	220	11:25	
12	3	190	12:40	
13	3.2	150	12:50	
14	3.3	190	13:00	
15	3.4	170	13:10	
16	4.4	91	14:05	
17	5.4	63	14:20	
18	6.3	81	14:35	
19	7.5	45	14:55	
20	8.6	29	15:10	
21	10	13	15:35	
22	12.4	5.6	15:45	
23	15.1	1.2	15:55	
24	17.6	2.3	16:10	
25	19.9	3.4	9:05	11/02/16
26	22.4	2.1	9:20	
27	24.5	1.8	9:35	
28	36.9	0.88	12:05	
29	39.5	0.81	12:20	
30	42.1	0.41	12:45	
31	43.3	0.45	12:55	
32	53.1	0.41	14:10	
33	55	0.38	14:25	
34	59.6	0.23	15:05	
35	71.4	0.12	15:40	11/03/16
36	74.5	0.14	14:55	
37	78.4	0.16	14:30	
38	80.5	0.21	14:20	
39	84.4	0.18	13:55	
40	94	0.13	12:40	
41	96.6	0.19	12:15	
42	103.1	0.17	12:25	10/26/2016

WNML 358 degree tabulation continued.

43	**106.2**	**0.1**	**11:55**	
44	**108**	**0.12**	**11:40**	
45	**118**	**0.09**	**11:05**	
46	**121.2**	**0.07**	**10:45**	**10/30/16**
47	**127.8**	**0.073**	**14:45**	**11/12/16**
48	**132.8**	**0.052**	**13:55**	
49	**136.4**	**0.014**	**13:15**	
50	**142**	**0.047**	**12:35**	
51	**145.9**	**0.033**	**12:15**	
52	**150.9**	**0.04**	**15:15**	**10/25/16**
53	**154.2**	**0.031**	**14:35**	
54	**156.9**	**0.027**	**14:15**	
55	**158.1**	**0.011**	**11:40**	**11/12/16**
56	**162**	**0.019**	**13:35**	**10/25/16**

All measurements conducted by Hays McMakin using WX-2D #1344 last calibrated across the band by Mooretronix on October 11, 2016. Calibration certificate included.

EXHIBIT E-15FS
MEASUREMENT DATA

WITZ

	990	**75**	**DEGREE**	
	14	**1**		
ND				
1	**30**	**1.6**	**10:00AM**	**1/16/2017**
2	**33.1**	**1.3**	**10:05**	
3	**35.9**	**0.85**	**10:12**	
4	**40.4**	**0.44**	**10:25**	
5	**43.4**	**0.395**	**10:39**	
6	**47.2**	**0.345**	**10:49**	
7	**48.8**	**0.345**	**10:58**	
8	**53.4**	**0.3**	**11:15**	
9	**56.8**	**0.255**	**11:28**	
10	**60.6**	**0.2**	**11:37**	
11	**64**	**0.162**	**11:48**	
12	**66.2**	**0.15**	**11:55**	
13	**68.6**	**0.1**	**12:07**	
14	**69.8**	**0.09**	**12:19**	

All measurements conducted by James B. Williams using FIM-21 #1220 compared to WX-2C #952 and found to agree within 1-2%. WX-2C #952 was refurbished and calibrated across the AM band by Mooretronix, and found to agree with 2%. Mooretronix on October 12, 2016.

EXHIBIT E-15FS
MEASUREMENT DATA

WITZ

	990	95 DEGREE		
	48	1		
ND				
1	1.1	220	10:25	11/19/2016
2	1.2	190	10:20	
3	1.3	180	10:10	
4	1.4	160	10:05	
5	1.5	140	9:30	
6	1.6	150	10:50	
7	1.7	140	10:55	
8	1.8	120	11:00	
9	1.9	110	11:05	
10	2.4	88	11:35	
11	2.5	90	11:30	
12	2.6	84	11:25	
13	2.8	81	11:50	
14	2.9	77	11:55	
15	3	74	12:00	
16	4	45	12:25	
17	4.5	42	12:35	
18	7.3	26	12:50	
19	8.9	16	13:05	
20	11	4.8	16:05	11/18/2016
21	15.9	4	15:55	
22	18.5	3.1	15:40	
23	23.2	1.9	15:30	
24	28.8	0.87	15:05	
25	31.7	0.68	14:50	
26	33.9	0.59	14:35	
27	34.8	0.46	14:20	
28	42.2	0.25	14:00	
29	46.8	0.19	13:20	
30	51.9	0.22	11:15	
31	55.9	0.13	10:40	
32	64.5	0.15	10:20	
33	65.9	0.16	10:05	
34	70.3	0.21	9:45	
35	73.2	0.17	9:25	
36	78.6	0.15	9:00	
37	82.9	0.14	15:15	11/17/2016
38	88.8	0.091	14:25	
39	95.2	0.068	13:30	
40	96.6	0.056	13:10	
41	109.8	0.019	11:45	
42	113.1	0.022	11:25	

WITZ 95 degree tabulation continued.

43	**120.4**	**0.018**	**10:55**
44	**123.4**	**0.021**	**10:35**
45	**127.5**	**0.031**	**9:55**
46	**131.5**	**0.025**	**9:40**
47	**136.9**	**0.013**	**9:25**
48	**140.8**	**0.011**	**9:10**

All measurements conducted by Hays McMakin using WX-2D #1344 last calibrated across the band by Mooretronix on October 11, 2016. Calibration certificate included.

EXHIBIT E-15FS
MEASUREMENT DATA

WONE

	980	**174 DEGREE**		
	17	**1**		
ND				
1	**60**	**2.2**	**3:10**	**1/18/2017**
2	**65.7**	**1.5**	**2:40**	
3	**68.7**	**1.3**	**2:20**	
4	**72.1**	**1.1**	**1:50**	
5	**76**	**0.64**	**1:25**	
6	**78.1**	**0.59**	**1:10**	
7	**81.8**	**0.51**	**12:50**	
8	**85.5**	**0.47**	**12:35**	
9	**88**	**0.49**	**12:15**	
10	**91.4**	**0.46**	**11:55**	
11	**94.4**	**0.32**	**11:20**	
12	**99.8**	**0.25**	**10:45**	
13	**103.3**	**0.34**	**3:15**	**1/17/2017**
14	**107.4**	**0.22**	**2:50**	
15	**111.8**	**0.29**	**2:35**	
16	**118.2**	**0.17**	**1:50**	
17	**121.3**	**0.21**	**1:30**	

All mesurements conducted by Hays McMakin using RCA WX-2B Nems Clarke field intensity meter #1344 refurbished and calibrated across the AM band by Mooretronix on October 11, 2016. Calibration certificate included in this report. Mooretronix is a recognized calibration form recommended by Potomac Instruments.

EXHIBIT E-15FS
MEASUREMENT DATA

WONE

	980	186	DEGREE	
	59	1		
ND				
1	0.5	1500	9:40	1/22/2017
2	0.6	1200	9:50	
3	0.7	910	10:00	
4	0.8	800	9:35	
5	0.9	620	10:20	
6	1.4	410	10:40	
7	1.9	330	10:55	
8	2.2	300	11:10	
9	2.3	270	11:35	
10	2.7	240	11:35	
11	2.9	210	11:50	
12	3.1	190	12:00	
13	3.5	170	12:20	
14	4.1	140	12:40	
15	4.4	120	12:55	
16	5	110	1:10	
17	6.1	79	1:25	
18	7	62	1:40	
19	8.1	59	2:05	
20	8.6	59	2:05	
21	11.1	33	2:25	
22	12.5	29	2:40	
23	13.6	26	2:55	
24	14.8	23	3:15	
25	16.9	21	3:30	
26	18.5	14	3:40	
27	20.1	16	3:35	
28	25.5	8.9	3:10	1/21/2017
29	27.8	7.6	2:45	
30	31.1	4.6	2:30	
31	36.2	3.5	2:10	
32	39.5	3.1	1:55	
33	42.8	2.9	1:35	
34	47.2	2.3	1:10	
35	51.4	1.9	12:40	
36	55.1	1.7	12:20	
37	59.1	0.72	11:55	
38	62.8	0.71	11:40	
39	64.6	0.69	11:30	
40	67	0.68	11:15	
41	69.2	0.64	11:05	
42	74.1	0.38	10:40	

WONE 186 degree tabulation continued.

43	**75.8**	**0.41**	**10:20**	
44	**78.1**	**0.35**	**10:00**	
45	**81.7**	**0.32**	**9:35**	
46	**83.5**	**0.31**	**3:15**	**1/12/2017**
47	**86.7**	**0.28**	**2:55**	
48	**90.5**	**0.24**	**2:25**	
49	**93.2**	**0.25**	**2:05**	
50	**98.3**	**0.3**	**1:35**	
51	**101.9**	**0.28**	**1:15**	
52	**105.1**	**0.26**	**12:50**	
53	**109.6**	**0.21**	**12:25**	
54	**112.4**	**0.24**	**12:05**	
55	**115.2**	**0.23**	**11:45**	
56	**118.2**	**0.21**	**11:25**	
57	**120.9**	**0.22**	**11:10**	
58	**126**	**0.16**	**10:50**	
59	**127.8**	**0.11**	**10:35**	

All measurements conducted by Hays McMakin using WX-2D #1344 last calibrated across the band by Mooretronix on October 11, 2016. Calibration certificate included. All times local.

FIELD INTENSITY MEASUREMENT CERTIFICATION

I, Hays McMakin, hereby certify that I conducted the measurements attributed to me on stations WNML Knoxville, TN, WITZ Jasper, IN, and WONE Dayton, OH using FIM Meter "RCA/Nems Clarke" WX-2D S/N # 1344. This instrument was last calibrated and certified across the band by Mooretronix Broadcast & Industrial Electronics on October 11, 2016. Furthermore, all of the measurements were conducted according to the manufacturer's instruction and in accordance with good engineering practices and are true and correct to the best of my knowledge and belief.

My qualifications are a matter of record having served in the broadcasting industry forty plus years and holding First Class Operators License #P1-6-31332 and General Radiotelephone Certificate #PG-6-7952.

Respectfully Submitted,

Hays McMakin

CERTIFICATE OF CALIBRATION

Nems Clarke/RCA Model WX-2D, serial 1344

This instrument was calibrated by placing it in an induction field of 225mV/M and making the necessary adjustments to give a correct indication of at 1.000 MHz. Measurements were then with the same value of field at the frequencies tabulated below. Deviation is expressed as a correction factor (K) by which the indicated field should be multiplied.

Frequency	(K)	Frequency	(K)
1.600 MHz	1.023	1.000 MHz	1.000
1.500 MHz	1.014	.900 MHz	1.000
1.400 MHz	1.000	.800 MHz	1.000
1.300 MHz	1.000	.700 MHz	1.000
1.200 MHz	1.000	.600 MHz	1.000
1.100 MHz	1.000	.540 MHz	1.000

An overall check of the linearity of the instrument showed no deviation greater than 3.0% using mid scale as reference. The attenuator ratios were adjusted to be correct within 2.0%. The above statements hold true over the range of the A & B battery voltages specified as usable in the instruction book for this model.

Calibration measurements were conducted by Robert R. Moore Jr. on the 11th day of October, 2016.

A special screened room was used for all measurement data collected. Room temperature was 72 degrees F.

Robert R. Moore Jr

STATE OF KENTUCKY
COUNTY OF WARREN

J. Barry Williams, being first duly sworn upon oath, deposes and says:

That he is familiar with the generally accepted standards applicable to field strength measurements in the AM broadcast service, and the Rules of the Federal Communications Commission pertaining to such measurements;

That he conducted certain field strength measurements at the direction of the firm of ANDERSON & ASSOCIATES, for use in analysis and allocation studies performed by that firm to the following measured station(s):

WITZ, JASPER, IN

That the measurements reported by him were conducted by him personally, with particular care given to the accurate location of measurement points using topographic maps; the avoidance of obstructed measurement locations; and the proper calibration of the field strength meter by the manufacturer's recommended procedure prior to every reading;

That his qualifications in telecommunications matters are of record before the Federal Communications Commission and that the information reported by him in connection with this matter is true and correct to the best of his knowledge and belief.

/s/ J. Barry Williams

CERTIFICATION

I, Charles M. Anderson certify that I prepared the topographic maps identifying the radials and points on which measurements were conducted for WNML (990), WONE (980) and WITZ (990); that the measurements were conducted under my supervision; and that meters used are of current calibration or have been compared to a meter(s) of current calibration and found to be within manufacturer's specified accuracy.

These measurements were conducted and analyzed in accordance with accepted Federal Communications Commission engineering practices.

Charles M. Anderson 02-01-2017
1519 Euclid Avenue
Bowling Green, KY 42103
270-782-0246