

**ENGINEERING EXHIBIT FOR A SECOND  
ADJACENT CHANNEL WAIVER REQUEST FOR  
A NEW LPFM BROADCAST STATION  
CHANNEL 292 – LEESBURG, FL  
FACILITY ID: 788076  
FCC FILE NO.: 0000232217**

**1.0 EXECUTIVE SUMMARY**

This engineering statement has been prepared as a request for waiver of the spacing requirements of 47 CFR Section 73.807 with respect to short spaced second adjacent channel stations in the vicinity of the proposed LPFM facility. The technical data and narration below will demonstrate that the proposed LPFM facility would not cause prohibited interference using the “ratio” undesired-to-desired (“U/D”) signal method of interference determination as described in 47 CFR Section 73.807(e)(1) and FCC 12-144<sup>1</sup> to any short spaced incumbent second adjacent channel facility.

**2.0 ALLOCATION ANALYSIS**

Appendix A is a channel spacing study which demonstrates the distance separation requirements pursuant to 47 C.F.R. Section 73.807 with respect to surrounding FM stations. As demonstrated, the proposed facility is short spaced with WOCL and WXXL which is subject to the instant waiver request.

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<sup>1</sup> *Creation of a Low Power Radio Service*, Fifth Order on Reconsideration and Sith Report and Order, released December 4, 2012, FCC 12-144, paragraph 78.

### 3.0 LPFM HAAT AND EFFECTIVE RADIATED POWER DETERMINATION

The FCC's LPFM Form 2100 Schedule 318 application does not ask for the antenna Height Above Average Terrain ("HAAT") or Effective Radiated Power ("ERP") which are essential figures needed to formulate the U/D study and are hereby derived below.

The proposed LPFM antenna HAAT was determined using the FCC Media Bureau Audio Service's website "[Antenna Height Above Average Terrain \(HAAT\) Calculator](#)"<sup>2</sup>. Appendix B demonstrates the HAAT to be 60 meters based upon Section 73.313(d) methodology using NAD83 coordinates, eight radials, and standard FCC 30 arc second terrain data.

The proposed LPFM ERP was determined using the FCC Media Bureau Audio Services website "[FMpower - Find ERP for an FM Station Class](#)".<sup>3</sup> Appendix C demonstrates that based upon the HAAT determined above, the corresponding ERP is 0.024 kW (24 Watts) to achieve a 60 dB $\mu$ V/m contour distance of 5.6 km pursuant to Section 73.811(a).

### 4.0 ANALYSIS AND REQUEST FOR WAIVER

As demonstrated in Appendix A, the proposed LPFM site location meets the Section 73.807 minimum distance separation requirements for all FM full power, LPFM, and FM translator stations except for WOCL and WXXL. As permitted by Section 73.807(e)(1), the instant applicant seeks a waiver of the second-adjacent minimum separation requirement with respect to the short spaced stations.

As described in Section 73.807(e)(1) the ratio of undesired-to-desired signal method of interference determination may be used by an LPFM applicant to demonstrate that its proposed operations will not result in interference to a station on a second-

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<sup>2</sup> <https://www.fcc.gov/media/radio/haat-calculator>

<sup>3</sup> <https://www.fcc.gov/media/radio/fmpower>

adjacent channel. WOCL and WXXL are on channels second adjacent to the proposed LPFM facility and are located 46.68 km and 35.3 km respectively from the proposed LPFM transmitter site. The WOCL signal level at the proposed LPFM site is 76.5 dB $\mu$ V/m based upon standard FCC F(50,50) propagation curves as demonstrated in Appendix D. The corresponding undesired interfering signal level is 116.5 dB $\mu$ V/m. The WXXL signal level at the proposed LPFM site is 76.56 dB $\mu$ V/m based upon standard FCC F(50,50) propagation curves as demonstrated in Appendix D. The corresponding undesired interfering signal level is 116.56 dB $\mu$ V/m.

It is only necessary to evaluate the lowest of the potential interfering signal levels for compliance since the higher interfering levels will be 100% subsumed by the lowest level. In this case the lowest interfering signal level is 116.5 dB $\mu$ V/m produced by WOCL. Using an isotropic antenna pattern and free space loss calculations, the maximum horizontal distance to the proposed LPFM's 121.76 dB $\mu$ V/m interfering contour would be 51.3 meters and is the radius used around the transmitter site for considering structures and roadways potentially impacted by the U/D interference zone. An aerial view of the proposed LPFM site and vicinity is provided in Appendix E along with the 116.5 dB $\mu$ V/m free space loss interfering contour. As demonstrated this area contains no buildings; however, for the sake of further discussion it shall be assumed that a two story building was within the interference area.

Substituting the isotropic antenna discussed above with a real antenna having vertical plane suppression further reduces the interference towards occupied structures and roads within the 51.3 meter interference zone. The applicant is proposing to use an Nicom model BKG77 having one element. Appendix F provides a plot of the antenna elevation pattern. Appendix G provides a plot and tabulation of the 116.5 dB $\mu$ V/m interfering contour with respect to ground level from the base of the tower out to 51.3 meters from the base of the tower with the antenna elevation pattern applied. Appendix G demonstrates that the 116.5 dB $\mu$ V/m contour never falls below an elevation of 38.2 meters above ground level and is thus well clear of any occupied two story building. These exhibits demonstrate higher signal levels

that would exceed the 40 dB $\mu$ V/m undesired-to-desired ratio with respect to WOCL are at locations which are well elevated, inaccessible, and unpopulated. As demonstrated, the proposal complies with Section 73.807(e)(1) with respect to WOCL. Since the interfering contour corresponding to protection of WXXL is completely subsumed by that for WXXL, the proposal also complies with Section 73.807(e)(1). It is herein demonstrated that zero population will be impacted by the proposed LPFM facility and thus a waiver of Section 73.807 of the Commission's Rules is respectfully requested.

## **5.0 CERTIFICATION**

The foregoing statement and the report regarding the aforementioned engineering work are true and correct to the best of my knowledge. Executed on March 8, 2024

Ryan Wilhour



Consulting Engineer

## Second Adjacent Channel Waiver Request

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### APPENDIX A – ALLOCATION ANALYSIS

Cpc Of The Wmm - Leesburg, Fl

REFERENCE  
28 49 43.00 N. CLASS = L1 DISPLAY DATES  
81 47 09.00 W. Current Spacings to 2nd Adj. DATA 03-07-24  
SEARCH 03-08-24

----- Channel 292 - 106.3 MHz -----

Call	Channel	Location	Azi	Dist	FCC	Margin	
<b>WOCL</b>	<b>LIC 290C</b>	<b>Deland</b>	<b>FL</b>	<b>77.3</b>	<b>46.68</b>	<b>92.5</b>	<b>-45.8</b>
<b>WXXL</b>	<b>LIC 294C1</b>	<b>Tavares</b>	<b>FL</b>	<b>148.0</b>	<b>35.30</b>	<b>72.5</b>	<b>-37.2</b>
WGHR	LIC-N 292C3	Spring Hill	FL	245.9	81.38	77.5	3.9
W292DZ	LIC 292D	Orlando	FL	124.5	43.61	38.5	5.1

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Reference station has protected zone issue: AM tower  
All separation margins include rounding

## APPENDIX B – HEIGHT ABOVE AVERAGE TERRAIN CALCULATION

The Height above Average Terrain (HAAT) was calculated from the FCC's HAAT Calculator tool:

<https://www.fcc.gov/media/radio/haat-calculator>

Results are as follows:

**Antenna Height Above Average Terrain Calculations -- Results**

**Input Data**

Latitude **28° 49' 43" North**  
Longitude **81° 47' 9" West (NAD 83)**

These coordinates convert to NAD 27 coordinates of  
28° 49' 42.04", North, 81° 47' 09.72" West (NAD 27).

Height of antenna radiation center above mean sea level: **82.3 meters AMSL**

Number of Evenly Spaced Radials = **8**      0° is referenced to True North

**Results**

Calculated HAAT = **60 meters**

Antenna Height Above Average Terrain calculated  
using FCC 30 second terrain database (continental USA only)

**Individual "Radial HAAT" Values, in meters**

0°	61.1 m
45°	62.0 m
90°	52.7 m
135°	61.3 m
180°	60.5 m
225°	57.7 m
270°	60.6 m
315°	61.4 m

## APPENDIX C – ERP CALCULATION

The operating ERP was calculated from the FCC's FM power calculation tool:

<https://www.fcc.gov/media/radio/fmpower>

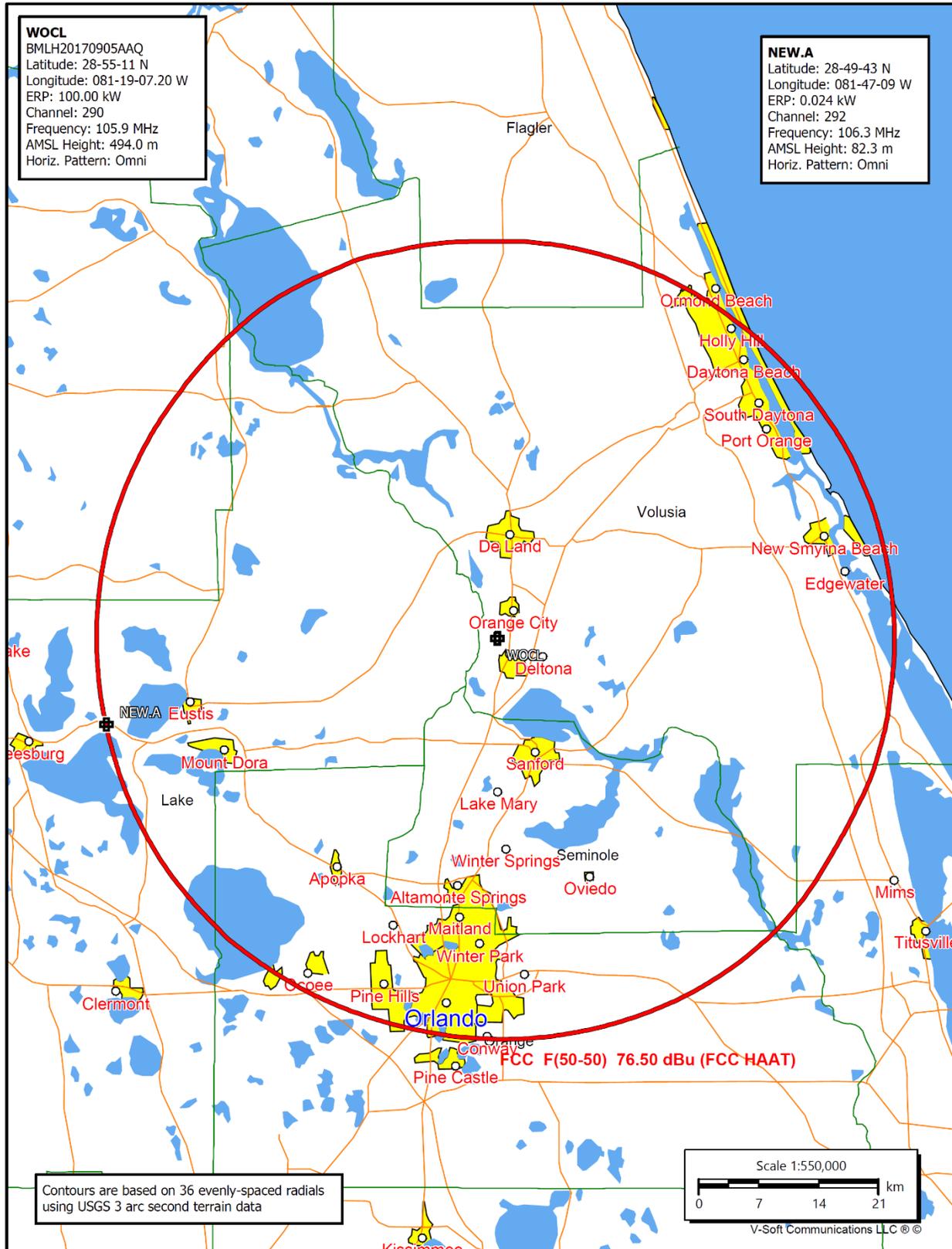
Results are as follows:

Choose a U.S. State or Possession:	FL - Florida	▼
Station Class:	100 watt LPFM	▼
60	meters Antenna Height Above Average Terrain (HAAT)	
Find Result	Print	Clear Data

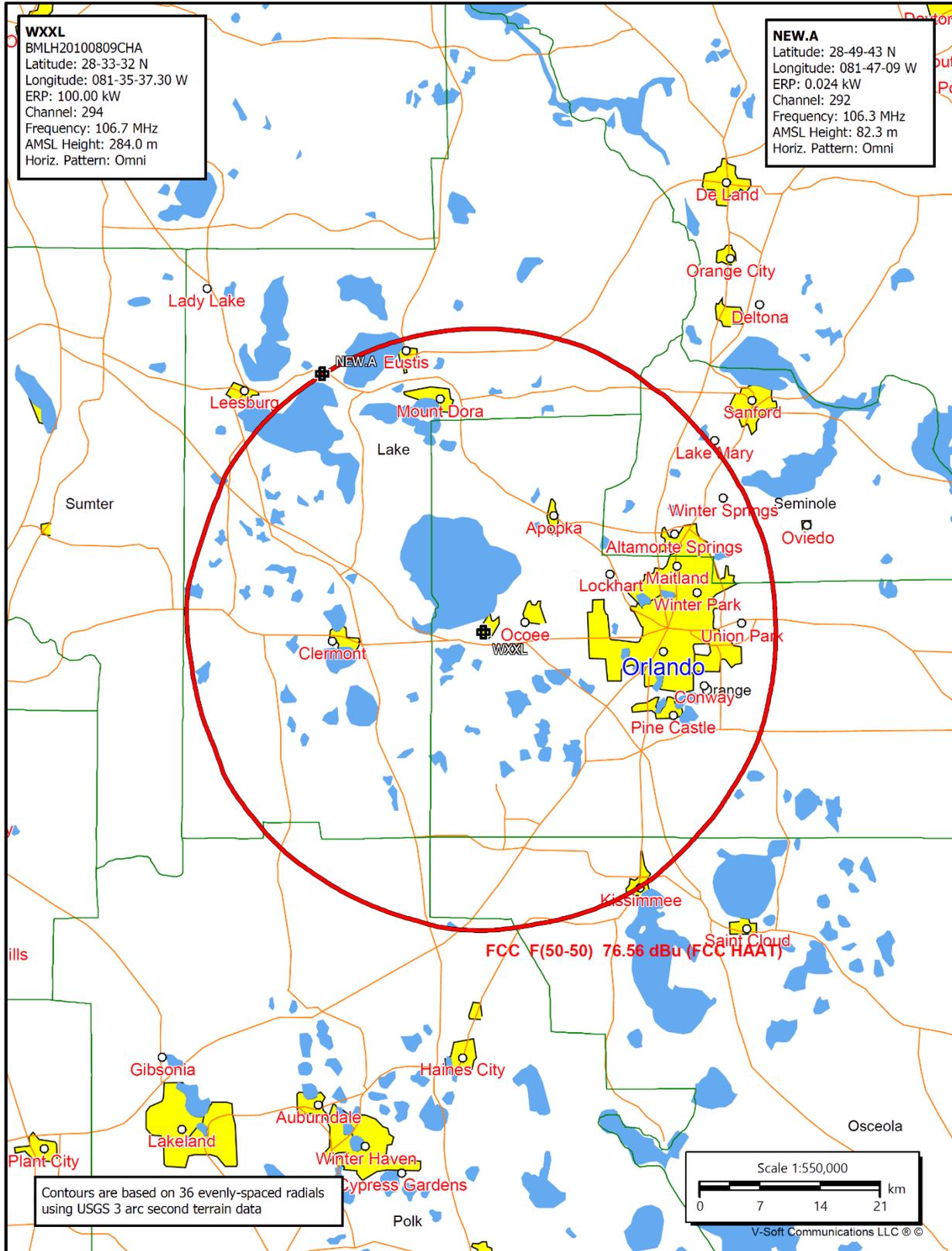
Results:

<b>Calculated ERP (rounded per Section 73.212) = 0.024 kW</b>
Unrounded ERP = 0.023776 kW
Comments:
Low Power FM (LPFM) stations are authorized throughout the United States.
Maximum class limit determined from: Class: L1 Reference ERP: 0.1 kW Reference HAAT: 30 meters Distance to 60 dBu F(50,50) contour: 5.6 km

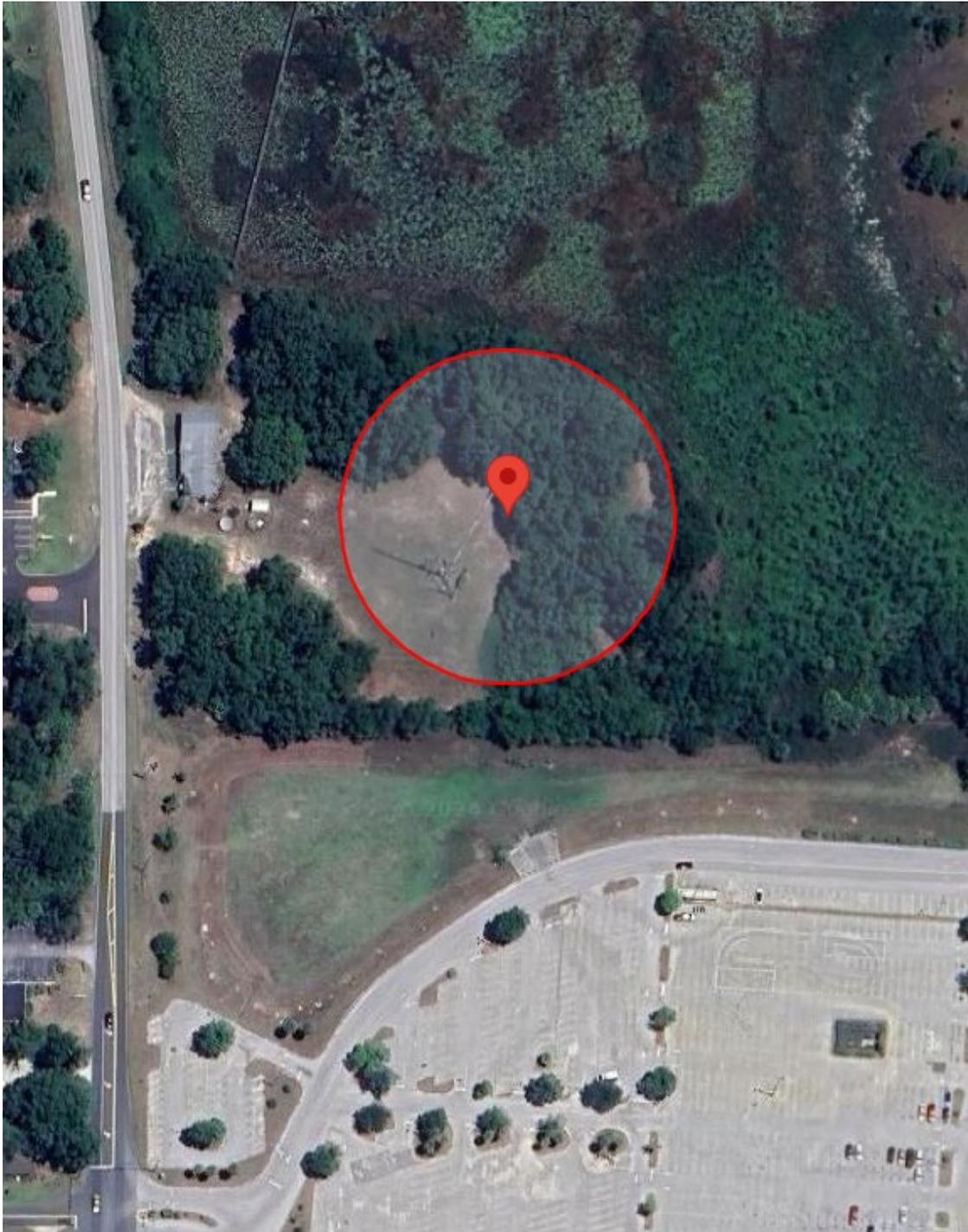
APPENDIX D – PROTECTED FIELD STRENGTH AT LPFM TRANSMITTER SITE



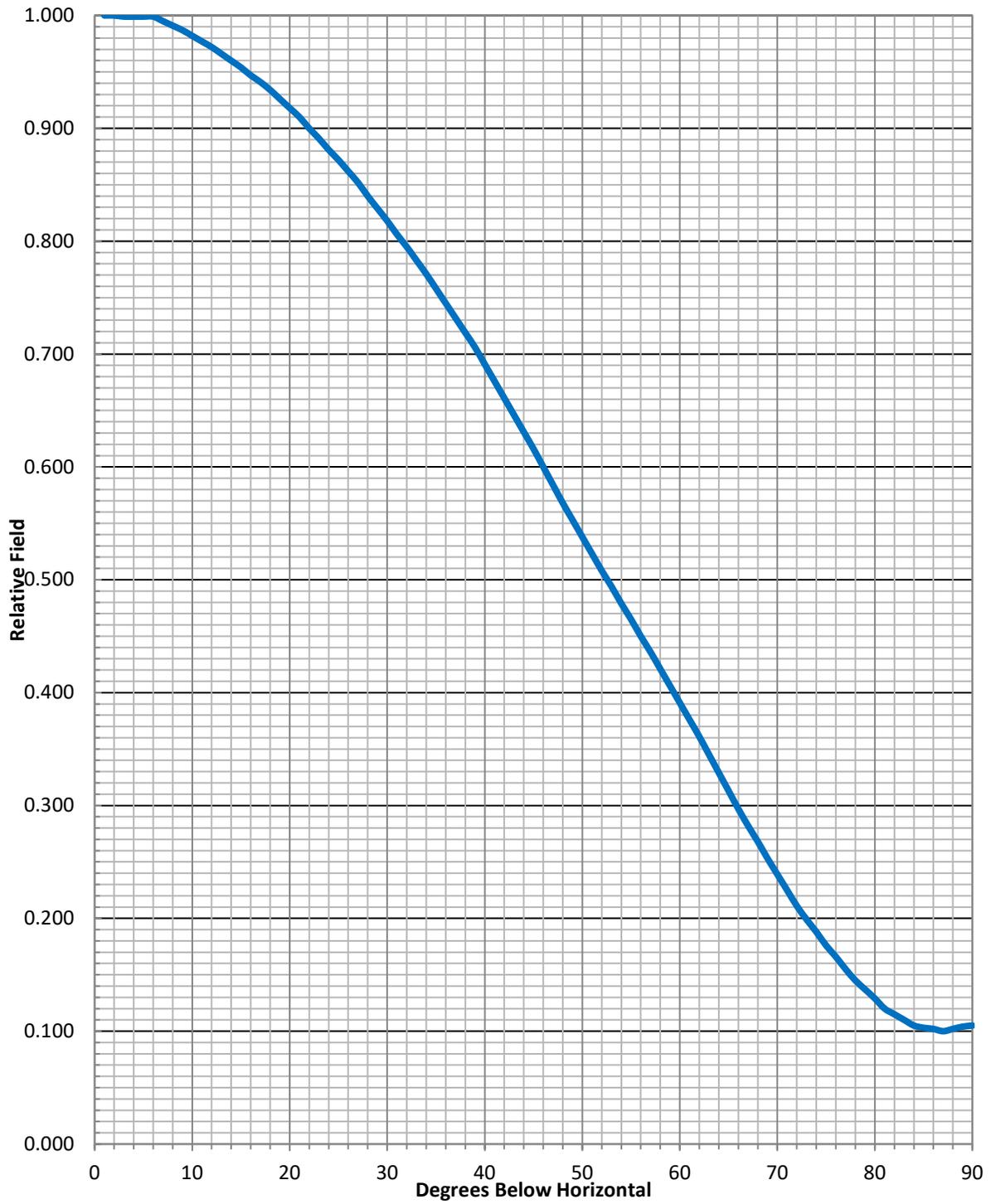
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APPENDIX E – ARIAL VIEW OF INTERFERENCE CONTOUR



APPENDIX F – Antenna Relative Field Elevation Pattern



**APPENDIX G – U/D Interference Calculation**

Antenna: Nicom BKG77 1 bay  
 C/R Elevation: 61 m AGL  
 Vertical Clearance: 9 m AGL - Occupied Elevation for a 2 Story Building  
 ERP: 0.024 kW  
 IX Signal Level: 116.5 dBμV/m

Deg Below Hor	Relative Field	ERP (kW)	Distance to IX Contour From Antenna (m)	Horizontal Distance of IX Contour From Tower (m)	Vertical Clearance of IX Contour AGL (m)	Occupied Elevation (m)	Margin (m)
1	1	0.024	51.3	51.3	60.1	9	51.1
2	1	0.024	51.3	51.3	59.2	9	50.2
3	0.999	0.024	51.3	51.2	58.3	9	49.3
4	0.999	0.024	51.3	51.2	57.4	9	48.4
5	0.999	0.024	51.3	51.1	56.5	9	47.5
6	0.999	0.024	51.3	51.0	55.6	9	46.6
7	0.995	0.024	51.1	50.7	54.8	9	45.8
8	0.991	0.024	50.9	50.4	53.9	9	44.9
9	0.987	0.023	50.7	50.0	53.1	9	44.1
10	0.982	0.023	50.4	49.6	52.2	9	43.2
11	0.977	0.023	50.1	49.2	51.4	9	42.4
12	0.972	0.023	49.9	48.8	50.6	9	41.6
13	0.966	0.022	49.6	48.3	49.8	9	40.8
14	0.96	0.022	49.3	47.8	49.1	9	40.1
15	0.954	0.022	49.0	47.3	48.3	9	39.3
16	0.947	0.022	48.6	46.7	47.6	9	38.6
17	0.941	0.021	48.3	46.2	46.9	9	37.9
18	0.934	0.021	47.9	45.6	46.2	9	37.2
19	0.926	0.021	47.5	44.9	45.5	9	36.5
20	0.918	0.020	47.1	44.3	44.9	9	35.9
21	0.91	0.020	46.7	43.6	44.3	9	35.3
22	0.9	0.019	46.2	42.8	43.7	9	34.7
23	0.891	0.019	45.7	42.1	43.1	9	34.1
24	0.881	0.019	45.2	41.3	42.6	9	33.6
25	0.872	0.018	44.8	40.6	42.1	9	33.1

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Deg Below Hor	Relative Field	ERP (kW)	Distance to IX Contour From Antenna (m)	Horizontal Distance of IX Contour From Tower (m)	Vertical Clearance of IX Contour AGL (m)	Occupied Elevation (m)	Margin (m)
26	0.862	0.018	44.2	39.8	41.6	9	32.6
27	0.852	0.017	43.7	39.0	41.1	9	32.1
28	0.84	0.017	43.1	38.1	40.8	9	31.8
29	0.829	0.016	42.6	37.2	40.4	9	31.4
30	0.818	0.016	42.0	36.4	40.0	9	31.0
31	0.806	0.016	41.4	35.5	39.7	9	30.7
32	0.795	0.015	40.8	34.6	39.4	9	30.4
33	0.783	0.015	40.2	33.7	39.1	9	30.1
34	0.771	0.014	39.6	32.8	38.9	9	29.9
35	0.758	0.014	38.9	31.9	38.7	9	29.7
36	0.745	0.013	38.2	30.9	38.5	9	29.5
37	0.732	0.013	37.6	30.0	38.4	9	29.4
38	0.719	0.012	36.9	29.1	38.3	9	29.3
39	0.706	0.012	36.2	28.2	38.2	9	29.2
40	0.691	0.011	35.5	27.2	38.2	9	29.2
41	0.676	0.011	34.7	26.2	38.2	9	29.2
42	0.661	0.010	33.9	25.2	38.3	9	29.3
43	0.646	0.010	33.2	24.2	38.4	9	29.4
44	0.631	0.010	32.4	23.3	38.5	9	29.5
45	0.616	0.009	31.6	22.4	38.6	9	29.6
46	0.6	0.009	30.8	21.4	38.8	9	29.8
47	0.584	0.008	30.0	20.4	39.1	9	30.1
48	0.568	0.008	29.2	19.5	39.3	9	30.3
49	0.553	0.007	28.4	18.6	39.6	9	30.6
50	0.538	0.007	27.6	17.8	39.8	9	30.8
51	0.523	0.007	26.8	16.9	40.1	9	31.1
52	0.508	0.006	26.1	16.1	40.5	9	31.5
53	0.494	0.006	25.4	15.3	40.7	9	31.7
54	0.479	0.006	24.6	14.5	41.1	9	32.1
55	0.465	0.005	23.9	13.7	41.4	9	32.4
56	0.45	0.005	23.1	12.9	41.9	9	32.9
57	0.436	0.005	22.4	12.2	42.2	9	33.2
58	0.421	0.004	21.6	11.5	42.7	9	33.7
59	0.406	0.004	20.8	10.7	43.1	9	34.1
60	0.391	0.004	20.1	10.0	43.6	9	34.6

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Deg Below Hor	Relative Field	ERP (kW)	Distance to IX Contour From Antenna (m)	Horizontal Distance of IX Contour From Tower (m)	Vertical Clearance of IX Contour AGL (m)	Occupied Elevation (m)	Margin (m)
61	0.376	0.003	19.3	9.4	44.1	9	35.1
62	0.361	0.003	18.5	8.7	44.6	9	35.6
63	0.345	0.003	17.7	8.0	45.2	9	36.2
64	0.329	0.003	16.9	7.4	45.8	9	36.8
65	0.313	0.002	16.1	6.8	46.4	9	37.4
66	0.297	0.002	15.2	6.2	47.1	9	38.1
67	0.282	0.002	14.5	5.7	47.7	9	38.7
68	0.268	0.002	13.8	5.2	48.2	9	39.2
69	0.253	0.002	13.0	4.7	48.9	9	39.9
70	0.239	0.001	12.3	4.2	49.5	9	40.5
71	0.225	0.001	11.5	3.8	50.1	9	41.1
72	0.211	0.001	10.8	3.3	50.7	9	41.7
73	0.199	0.001	10.2	3.0	51.2	9	42.2
74	0.188	0.001	9.6	2.7	51.7	9	42.7
75	0.176	0.001	9.0	2.3	52.3	9	43.3
76	0.166	0.001	8.5	2.1	52.7	9	43.7
77	0.155	0.001	8.0	1.8	53.2	9	44.2
78	0.145	0.001	7.4	1.5	53.7	9	44.7
79	0.137	0.000	7.0	1.3	54.1	9	45.1
80	0.129	0.000	6.6	1.1	54.5	9	45.5
81	0.12	0.000	6.2	1.0	54.9	9	45.9
82	0.115	0.000	5.9	0.8	55.2	9	46.2
83	0.11	0.000	5.6	0.7	55.4	9	46.4
84	0.105	0.000	5.4	0.6	55.6	9	46.6
85	0.103	0.000	5.3	0.5	55.7	9	46.7
86	0.102	0.000	5.2	0.4	55.8	9	46.8
87	0.1	0.000	5.1	0.3	55.9	9	46.9
88	0.102	0.000	5.2	0.2	55.8	9	46.8
89	0.104	0.000	5.3	0.1	55.7	9	46.7
90	0.105	0.000	5.4	0.0	55.6	9	46.6

### Interfering Contour Above Ground Level Elevation Profile

