

APPLICATION FOR CONSTRUCTION PERMIT

NEW - MUNCIE, INDIANA
BNPFT-2070801AIE
FACILITY ID: 201636
92.5 MHz / 250 W ERP ND

WOOF BOOM RADIO MUNCIE LICENSE LLC

DECEMBER, 2017

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12.5.2017

APPLICATION FOR CONSTRUCTION PERMIT

The following engineering statement and attached exhibits have been prepared for **Woof Boom Radio Muncie License LLC** ("Woof Boom"), applicant for a new FM translator station to serve Muncie, Indiana, and are in support of their application for construction permit.¹ This application is being filed as the initial long-form application for the facility following its singleton determination by the Staff. The short-form engineering proposal was assigned FCC File No. BNPFT-20170801AIE, and was filed during the Commission's July 2017 new translator filing window as part of the *Revitalization of the AM Radio Service*.

The proposed facility would operate on FM channel 223 with a maximum effective radiated power of 240 Watts at a center of radiation of 393 meters above mean sea level, which corresponds to a height of 100 meters above ground level. No change in the technical parameters specified under the short-form engineering is proposed for this long-form application.

The primary facility for the proposed translator is AM broadcast station WXFN at Muncie, Indiana.² Exhibit E-1 provides a comparison between the proposed 60 dBu service contour, the WXFN 2 mV/m groundwave contour, and a twenty-five mile radius centered on the WSCFN transmitter site. This map demonstrates that at all azimuths, the proposed 60 dBu service contour would be wholly contained within both the WXFN 2 mV/m service contour and a twenty-five mile radius centered on the WXFN transmitter site.³

¹ The Facility ID for the proposed translator at Muncie, Indiana is 201636.

² The Facility ID for WXFN at Muncie, Indiana is 17601.

³ WXFN is a class C AM station with identical daytime and nighttime parameters.

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The proposed facility complies with the provisions of Section 74.1204 of the Commission's Rules. Due to the channel of operation, Section 74.1205 is not applicable. Exhibit E-2 is a tabular interference study for the proposed facility. This study demonstrates that the Section 74.1204 contour overlap provisions would be met to all relevant authorizations with the exception of WBST at Muncie, Indiana.⁴ The provisions of Section 74.1204(d) will be utilized in relation to that facility. This tabular interference study is graphically depicted in the contour map that is Exhibit E-3.

Although normally prohibited contour overlap would exist between the proposed facility, and WBST, no interference to any populated region is predicted to occur. Exhibit E-4 illustrates the proposed translator site along with the WBST 75.1 dBu F(50,50) service contour. As this map demonstrates, the WBST contour intersects the site for the proposed translator. WBST operates second adjacent to the proposed translator. As a result of this relationship, interference to WBST would potentially occur when the translator field strength is at least 40 dB above that of WBST. Specifically this would be in regions where the translator field strength is at least 115.1 dBu.

The power density for the interfering field strength is given by the following equation:

$$S = \frac{E^2}{Z_0}$$

In this equation, S represents the calculated power density in Watts per square meter, E is the electric field intensity, and Z_0 is the characteristic impedance of free space of 377 ohms.

⁴ The Facility ID for WBST at Muncie, Indiana is 3645.

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The power density is also given by:

$$S = \frac{P}{4\pi R^2}$$

Where S is the same units, P is the total power in Watts and R is the distance from the antenna. Rearranging the terms in the equation, it can be solved for the distance to the desired power density as follows:

$$R^2 = \frac{P}{4\pi S}$$

The results of these calculations for depression angles of 0 degrees to 90 degrees are tabulated in Exhibit E-5. The values listed for the relative field at the various depression angles were obtained from published manufacturer data for the proposed antenna. The listed radii values on this tabulation indicate the boundary of the potential interference region, and as is indicated, the potential interference region is confined to a horizontal radius of 191.0 meters from the antenna. The following satellite image illustrates this radius along with the tower location.

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As Exhibit E-5 demonstrates, the closest approach to ground level of the predicted interference region is approximately 15 meters, or 49 feet. The above satellite image demonstrates that the structures within the maximum interference region are typically low density single story residences. The exceptions to this are single story commercial buildings to the south of the site, and the motel to the west northwest of the site. The motel to the west northwest is a two story motel, and as such, has a height that would not penetrate the interference region. From this, it can be reasonably inferred that the interference region would not affect any populated regions.

The proposed facility would not constitute a significant environmental impact, and is exempt from environmental processing. The translator antenna would utilize an existing tower that is

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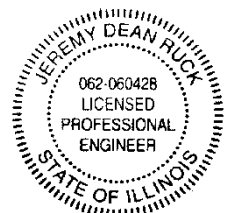
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registered with the Commission. The addition of the translator antenna to this structure would not increase the existing environmental impact already present from the tower.

Additionally, the proposed facility would not constitute a radiofrequency radiation hazard to persons at the site. The Commission's online *FM Model* utility returns a calculated maximum power density of $0.240 \mu\text{W}/\text{cm}^2$ at a distance of 66 meters from the tower. This value complies with the uncontrolled environment of the Commission's safety standard, and is sufficiently low to categorically exclude the facility. The ERI LPX-2E type antenna is considered a "type-3" antenna, and was analyzed as such.

CFEF certifies that it will coordinate with all other users of the site to ensure that workers and other personnel are not exposed to levels of radiofrequency radiation in excess of the applicable safety standards. Coordination activities will include, but are not necessarily limited to, a reduction in transmitter power or cessation of operation.

The preceding statement and attached exhibits have been prepared by me, or under my direction, and are true and accurate to the best of my belief and knowledge.



Above signature is digitized copy of actual signature
License Expires November 30, 2019

Jeremy D. Ruck, PE
December 5, 2017

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12.5.2017

1763640.A

BNPFT20170801AIE

Latitude: 40-09-40 N

Longitude: 085-22-44 W

ERP: 0.24 kW

Channel: 223

Frequency: 92.5 MHz

AMSL Height: 393.0 m

Horiz. Pattern: Omni

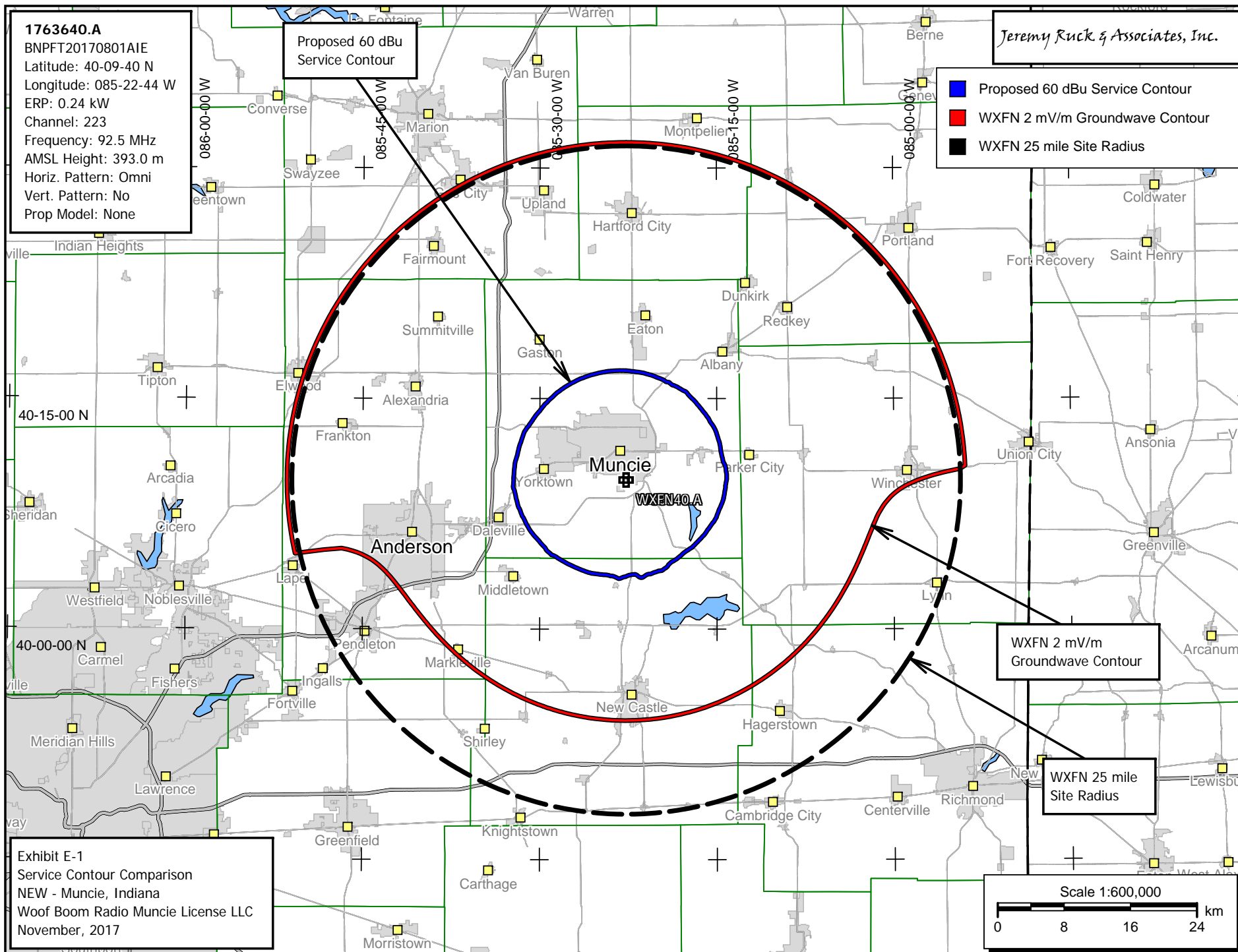
Vert. Pattern: No

Prop Model: None

Proposed 60 dBu
Service Contour

Jeremy Ruck & Associates, Inc.

- Proposed 60 dBu Service Contour
- WXFN 2 mV/m Groundwave Contour
- WXFN 25 mile Site Radius



Jeremy Ruck & Associates, Inc.
Consulting Engineers - Canton, Illinois

Exhibit E-2 - Tabular Interference Study

NEW - Muncie, Indiana

REFERENCE
40 09 40.0 N.
85 22 44.0 W.

CH# 223D - 92.5 MHz, Pwr= 0.24 kW, HAAT= 0.0 M, COR= 393 M
Average Protected F(50-50)= 7.02 km
Omni-directional

DISPLAY DATES
DATA 12-05-17
SEARCH 12-05-17

CH CITY	CALL	TYPE STATE	ANT AZI <--	DI ST FILE #	LAT LNG	PWR(kW) HAAT(M)	INT(km) COR(M)	PRO(km) LICENSEE	*IN* (Overlap in km)	*OUT*
223D Muncie	1763640	APP _C_ IN	0.0 0.0	0.00 BNPFT20170801AIE	40 09 40.0 85 22 44.0	0.240	45.3 393	13.2 Woof Boom Radio Muncie Li c	-58.6*	-58.6*
223A Kokomo	WZVZ	LIC _CN IN	297.7 117.2	75.01 BLH19950120KB	40 28 18.0 86 09 52.0	6.000 99	85.1 348	27.0 Hoosier Am/fm, Li c	-23.6*	1.9
221A Muncie	WBST	LIC _CN IN	310.2 130.1	9.00 BLED19781211AR	40 12 48.0 85 27 36.0	3.000 91	2.1 374	21.6 Ball State University	-6.4*	-13.7*
222B Bl oomi ngton	WTTS	LIC _CN IN	218.3 37.9	106.46 BMLH19880426KB	39 24 27.0 86 08 52.0	37.000 332	95.5 574	79.6 Sarkes Tarzian, Inc.	-1.6	0.6
222B Bl oomi ngton	WTTS	LIC _CX IN	218.3 37.9	106.46 BMLH20160429ABG	39 24 27.0 86 08 52.0	37.000 332	95.5 574	79.6 Sarkes Tarzian, Inc.	-1.6	0.6
223B Cincinnati	WOFX-FM	LIC DCN OH	146.8 327.4	138.30 BLH19981209KB	39 06 59.0 84 30 07.0	16.000 264	125.5 483	64.3 Cumulus Licensing Li c	1.4	19.1
226B Indianapolis	WIBC	LIC _CX IN	230.8 50.4	68.89 BLH20031121APA	39 46 03.0 86 00 12.0	13.500 302	5.5 551	65.3 Emmis Radio License, Li c	50.7	2.1
224D Anderson	W224CL	LIC _C_ IN	255.4 75.2	29.55 BLFT20160415ABA	40 05 36.9 85 42 54.7	0.019	9.0 357	6.3 Educational Media Foundati	7.3	3.3
224A Berne	WZBD	LIC _CN IN	28.9 209.1	77.50 BLH19950327KC	40 46 15.0 84 56 05.0	4.100 120	41.5 366	27.0 Adams County Radio, Inc	23.1	31.2
225B Eaton	WGTZ	LIC _CN OH	113.2 293.8	90.51 BLH19850204KW	39 50 10.0 84 24 16.0	40.000 168	5.6 463	62.4 Alpha Media Licensee Li c	73.2	26.6
224D Indianapolis	W224DI	CP DC_ IN	230.4 50.0	69.61 BMPFT20171006ACS	39 45 36.0 86 00 22.0	0.250	23.1 442	14.0 Charles M. Anderson	34.9	33.5
224D Indianapolis	W224DI	LIC DV_ IN	230.4 50.0	69.61 BLFT20170707ABC	39 45 36.0 86 00 22.0	0.140	9.8 320	6.6 Charles M. Anderson	47.2	43.3
220A Rushville	WRLN«	LIC NCX IN	176.5 356.5	59.66 BLED20110812AAZ	39 37 29.0 85 20 10.0	0.600 92	1.6 396	14.9 Rush County Schools	25.5R	34.2M

Terrain database is FCC 30 meter , 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 adjacent.
All separation margins (if shown) include rounding.
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.
Reference station has protected zone issue: AM tower

1763640.A

BNPFT20170801AIE

Latitude: 40-09-40 N

Longitude: 085-22-44 W

ERP: 0.24 kW

Channel: 223

Frequency: 92.5 MHz

AMSL Height: 393.0 m

Horiz. Pattern: Omni

Vert. Pattern: No

Prop Model: None

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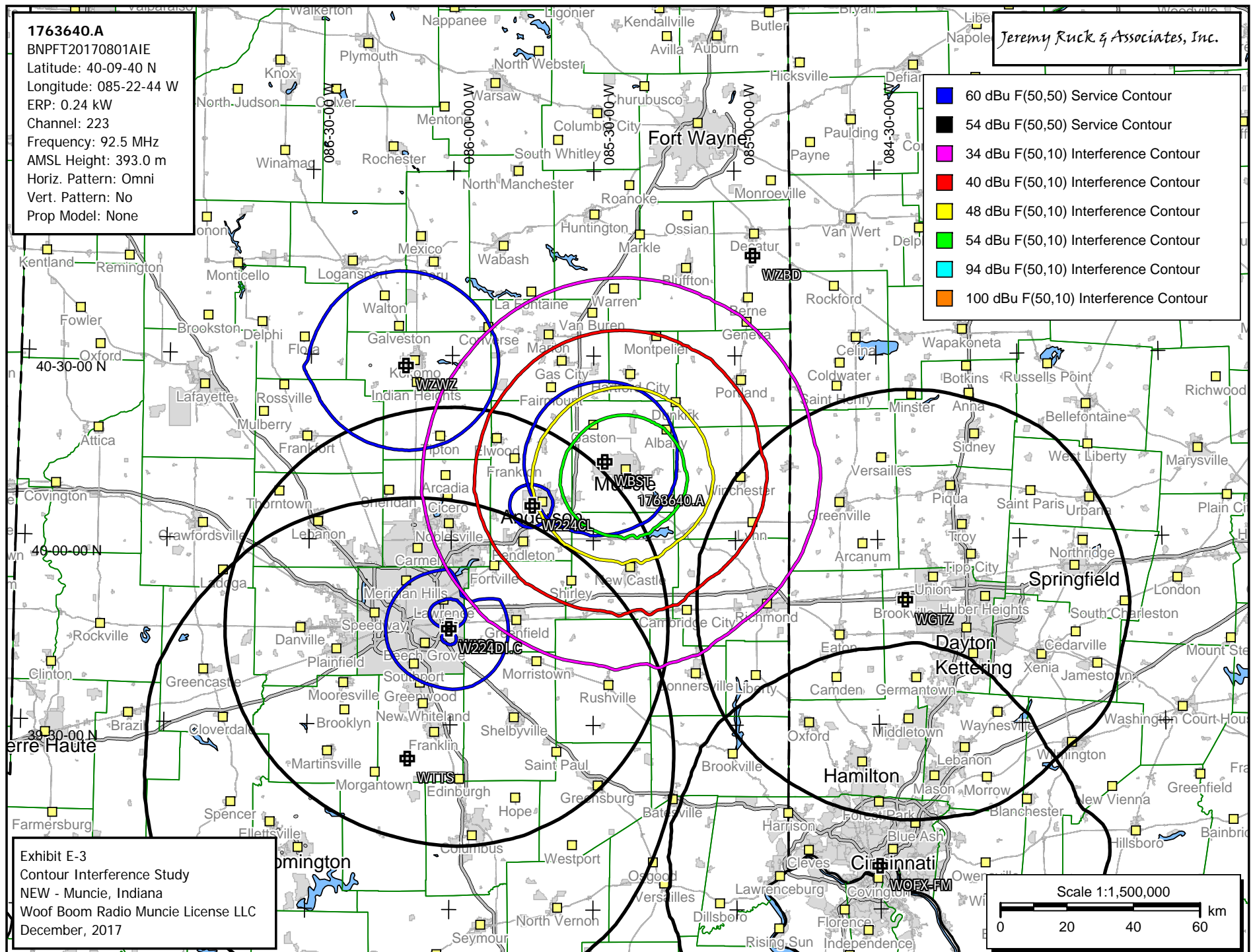


Exhibit E-3

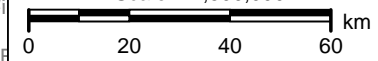
Contour Interference Study

NEW - Muncie, Indiana

Woof Boom Radio Muncie License LLC

December, 2017

Scale 1:1,500,000



1763640.A

BNPFT20170801AIE
Latitude: 40-09-40 N
Longitude: 085-22-44 W
ERP: 0.24 kW
Channel: 223
Frequency: 92.5 MHz
AMSL Height: 393.0 m
Horiz. Pattern: Omni
Vert. Pattern: No
Prop Model: None

WBST

BLED19781211AR
Latitude: 40-12-48 N
Longitude: 085-27-36 W
ERP: 3.00 kW
Channel: 221
Frequency: 92.1 MHz
AMSL Height: 374.0 m
Horiz. Pattern: Omni
Vert. Pattern: No
Prop Model: None

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WBST Transmitter
Site Location

WBST

WBST 75.1 dBu
Service Contour

Proposed Transmitter
Site Location

Muncie

Yorktown

FCC F(50-50) 75.10 dBu

1763640.A

Exhibit E-4

Interference Study
NEW - Muncie, Indiana
Woof Boom Radio Muncie License LLC
December, 2017

Scale 1:75,000

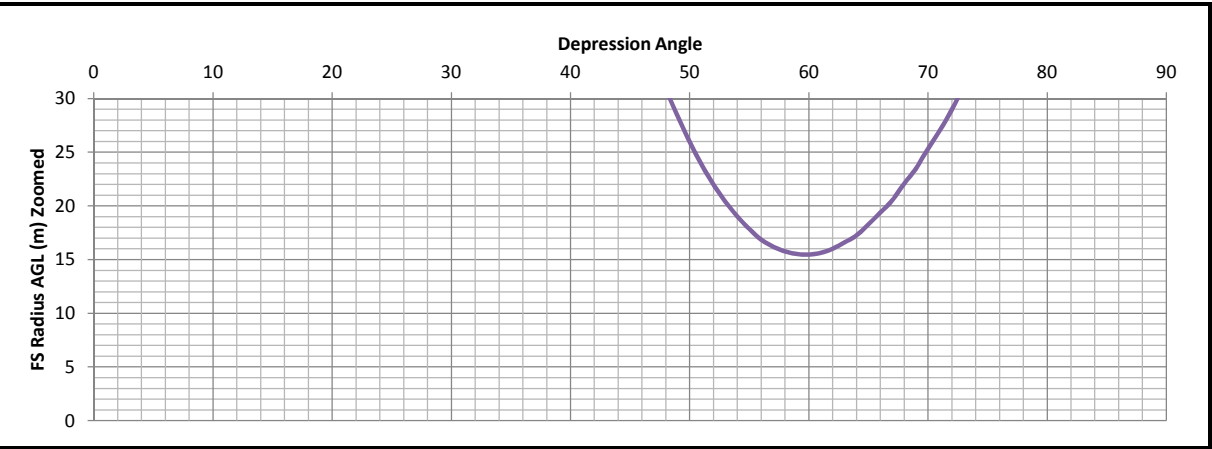
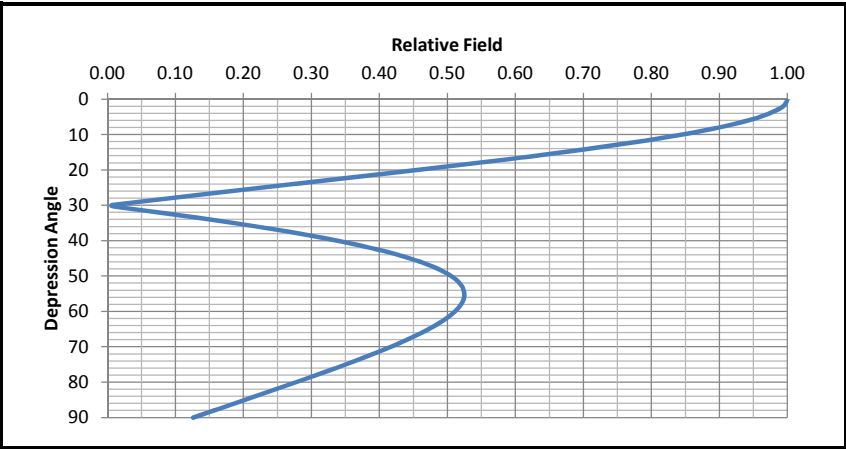
0 1 2 3 km

Exhibit E-5

Proximity Interference Analysis

NEW - Muncie, Indiana

Antenna No:	46	<div><div></div><div></div><div></div><div></div></div>	Center of Radiation:	100 m AGL
Manufacturer:	ERI	<div><div></div><div></div><div></div><div></div></div>	Effective Radiated Power:	240 Watts
Model:	LPX-2E		FS Contour:	115.1 dBu
Number of Bays:	2		E Field Strength:	0.56885 V/m
Bay Spacing:	Lambda		Z0:	377 Ohms
			Power Density:	0.000858339 W/m^2



Depression Angle	Relative Field	Relative Power	ERP Watts	Radii in meters			
				Field Strength	Horizontal	Vertical	AGL
0	1.0000	1.0000	240.00	191.03	191.03	0.00	100.00
1	0.9980	0.9960	239.04	190.64	190.62	3.33	96.67
2	0.9940	0.9880	237.13	189.88	189.76	6.63	93.37
3	0.9850	0.9702	232.85	188.16	187.90	9.85	90.15
4	0.9740	0.9487	227.68	186.06	185.61	12.98	87.02
5	0.9600	0.9216	221.18	183.39	182.69	15.98	84.02
6	0.9420	0.8874	212.97	179.95	178.96	18.81	81.19
7	0.9220	0.8501	204.02	176.13	174.81	21.46	78.54
8	0.8990	0.8082	193.97	171.73	170.06	23.90	76.10
9	0.8730	0.7621	182.91	166.77	164.71	26.09	73.91
10	0.8450	0.7140	171.37	161.42	158.96	28.03	71.97
11	0.8140	0.6626	159.02	155.50	152.64	29.67	70.33
12	0.7810	0.6100	146.39	149.19	145.93	31.02	68.98
13	0.7450	0.5550	133.21	142.31	138.67	32.01	67.99
14	0.7080	0.5013	120.30	135.25	131.23	32.72	67.28
15	0.6690	0.4476	107.41	127.80	123.44	33.08	66.92
16	0.6290	0.3956	94.95	120.16	115.50	33.12	66.88
17	0.5870	0.3446	82.70	112.13	107.23	32.78	67.22
18	0.5440	0.2959	71.02	103.92	98.83	32.11	67.89
19	0.4990	0.2490	59.76	95.32	90.13	31.03	68.97
20	0.4550	0.2070	49.69	86.92	81.68	29.73	70.27
21	0.4090	0.1673	40.15	78.13	72.94	28.00	72.00
22	0.3630	0.1318	31.62	69.34	64.29	25.98	74.02
23	0.3170	0.1005	24.12	60.56	55.74	23.66	76.34
24	0.2720	0.0740	17.76	51.96	47.47	21.13	78.87
25	0.2260	0.0511	12.26	43.17	39.13	18.25	81.75
26	0.1800	0.0324	7.78	34.38	30.90	15.07	84.93
27	0.1350	0.0182	4.37	25.79	22.98	11.71	88.29
28	0.0910	0.0083	1.99	17.38	15.35	8.16	91.84
29	0.0480	0.0023	0.55	9.17	8.02	4.45	95.55
30	0.0060	0.0000	0.01	1.15	0.99	0.57	99.43
31	0.0360	0.0013	0.31	6.88	5.89	3.54	96.46
32	0.0760	0.0058	1.39	14.52	12.31	7.69	92.31
33	0.1140	0.0130	3.12	21.78	18.26	11.86	88.14
34	0.1510	0.0228	5.47	28.84	23.91	16.13	83.87
35	0.1870	0.0350	8.39	35.72	29.26	20.49	79.51
36	0.2210	0.0488	11.72	42.22	34.15	24.81	75.19
37	0.2530	0.0640	15.36	48.33	38.60	29.09	70.91
38	0.2840	0.0807	19.36	54.25	42.75	33.40	66.60
39	0.3120	0.0973	23.36	59.60	46.32	37.51	62.49
40	0.3390	0.1149	27.58	64.76	49.61	41.63	58.37
41	0.3640	0.1325	31.80	69.53	52.48	45.62	54.38
42	0.3870	0.1498	35.94	73.93	54.94	49.47	50.53
43	0.4090	0.1673	40.15	78.13	57.14	53.28	46.72
44	0.4280	0.1832	43.96	81.76	58.81	56.79	43.21
45	0.4450	0.1980	47.53	85.01	60.11	60.11	39.89

Depression Angle	Relative Field	Relative Power	ERP Watts	Radii in meters			
				Field Strength	Horizontal	Vertical	AGL
45	0.4450	0.1980	47.53	85.01	60.11	60.11	39.89
46	0.4610	0.2125	51.01	88.06	61.17	63.35	36.65
47	0.4750	0.2256	54.15	90.74	61.88	66.36	33.64
48	0.4870	0.2372	56.92	93.03	62.25	69.13	30.87
49	0.4970	0.2470	59.28	94.94	62.29	71.65	28.35
50	0.5060	0.2560	61.45	96.66	62.13	74.05	25.95
51	0.5130	0.2632	63.16	98.00	61.67	76.16	23.84
52	0.5180	0.2683	64.40	98.95	60.92	77.97	22.03
53	0.5220	0.2725	65.40	99.72	60.01	79.64	20.36
54	0.5240	0.2746	65.90	100.10	58.84	80.98	19.02
55	0.5250	0.2756	66.15	100.29	57.52	82.15	17.85
56	0.5250	0.2756	66.15	100.29	56.08	83.14	16.86
57	0.5230	0.2735	65.65	99.91	54.41	83.79	16.21
58	0.5200	0.2704	64.90	99.33	52.64	84.24	15.76
59	0.5160	0.2663	63.90	98.57	50.77	84.49	15.51
60	0.5110	0.2611	62.67	97.61	48.81	84.54	15.46
61	0.5050	0.2550	61.21	96.47	46.77	84.37	15.63
62	0.4980	0.2480	59.52	95.13	44.66	84.00	16.00
63	0.4900	0.2401	57.62	93.60	42.49	83.40	16.60
64	0.4820	0.2323	55.76	92.07	40.36	82.76	17.24
65	0.4720	0.2228	53.47	90.16	38.11	81.72	18.28
66	0.4620	0.2134	51.23	88.25	35.90	80.62	19.38
67	0.4520	0.2043	49.03	86.34	33.74	79.48	20.52
68	0.4400	0.1936	46.46	84.05	31.49	77.93	22.07
69	0.4290	0.1840	44.17	81.95	29.37	76.51	23.49
70	0.4160	0.1731	41.53	79.47	27.18	74.67	25.33
71	0.4040	0.1632	39.17	77.17	25.13	72.97	27.03
72	0.3910	0.1529	36.69	74.69	23.08	71.04	28.96
73	0.3770	0.1421	34.11	72.02	21.06	68.87	31.13
74	0.3640	0.1325	31.80	69.53	19.17	66.84	33.16
75	0.3500	0.1225	29.40	66.86	17.30	64.58	35.42
76	0.3360	0.1129	27.10	64.18	15.53	62.28	37.72
77	0.3210	0.1030	24.73	61.32	13.79	59.75	40.25
78	0.3070	0.0942	22.62	58.65	12.19	57.36	42.64
79	0.2920	0.0853	20.46	55.78	10.64	54.75	45.25
80	0.2770	0.0767	18.41	52.91	9.19	52.11	47.89
81	0.2620	0.0686	16.47	50.05	7.83	49.43	50.57
82	0.2470	0.0610	14.64	47.18	6.57	46.72	53.28
83	0.2320	0.0538	12.92	44.32	5.40	43.99	56.01
84	0.2170	0.0471	11.30	41.45	4.33	41.23	58.77
85	0.2020	0.0408	9.79	38.59	3.36	38.44	61.56
86	0.1870	0.0350	8.39	35.72	2.49	35.63	64.37
87	0.1720	0.0296	7.10	32.86	1.72	32.81	67.19
88	0.1560	0.0243	5.84	29.80	1.04	29.78	70.22
89	0.1410	0.0199	4.77	26.93	0.47	26.93	73.07
90	0.1260	0.0159	3.81	24.07	0.00	24.07	75.93

