

# Technical Report Supporting a Form 349 Minor Change in Licensed Facility Construction Permit Application

Pursuant to 47 C.F.R. Section 74:

*for*

*W222CH.L - Greenfield, MA  
(Facility ID: 140079)*

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*New Directional Antenna,  
Increase in Power &  
Correction of Coordinates  
and Ground Elevation*

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*as a*

*Commercial, Fill-In  
AM Translator for  
WFAT(AM) - Orange-Athol, MA*

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January, 2019

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## **Supplemental Appendix(s):**

RF Appendix 1 - Radio Frequency Radiation Compliance Showing

**EXPLANATION OF PROPOSAL:** This Form 349 Filing and accompanying technical report supports a Minor Change in Licensed Facility Construction Permit Application for FM Translator W222CH.L - Greenfield, MA (Facility ID: 140079). This FCC Form 349 Filing requests a new directional antenna pattern, increase in power and minor corrections of ground elevation and site coordinates. Continued operation on CH222D (92.3 MHz) with a power of 0.250 kW ERP circular polarization (H&V) is requested. The FM Translator will operate from a corrected COR of 274 meters AMSL at the same site location (corrected for coordinates). This Form 349 Filing will continue to specify rebroadcast of Class D, AM Primary Station WFAT(AM) - Orange-Athol, MA (700 kHz); Facility ID No. 51118. The Translator will remain licensed to the current community of Greenfield, MA.

**FACILITY COMPLIANCE SHOWINGS:** A map of the proposed 60 dB $\mu$  service contour in relation to the present 60 dB $\mu$  service contour has been included in ***Exhibit 1***. The minor change proposed service area will overlap a portion of the present service area as noted in the exhibit. The proposed 60 dB $\mu$  contour of the Translator lies wholly inside the larger of the AM primary daytime 2.0 mV/m contour or a 25 mile radius around the AM site. The primary station service contour relationship has been plotted in ***Exhibit 2***.

The proposed facility will be located on an existing 40.0 meter tower which does not require Antenna Structure Registration. In support of this filing, a copy of USGS Topographic Aerial Photomapping of the existing tower site has been included in ***Exhibit 3***. A depiction of the tower and antenna configuration has been included in ***Exhibit 4***. Further notification to the FAA or ASR governing authorities is not required as this proposal will not increase the overall tower height.

The applicant would like to note use of the NED 03 second terrain database for all allocation, contour and HAAT showings contained herein. A copy of the proposed HAAT calculation has been included in ***Exhibit 5***.

**ALLOCATION COMPLIANCE SHOWINGS:** The proposed Translator remains in compliance with 47 C.F.R. Section 74.1204 toward all allocation protection concerns with the exception of WNNZ-FM - Deerfield, MA (CH219A). A general allocation study for this proposal is found in ***Exhibit 6***.

The applicant would like to note the existence of a 47 C.F.R. Section 74.1204(d) Second/Third Adjacent Channel Given Interference Waiver Requests toward WNNZ-FM - Deerfield, MA (CH219A) as noted in ***Exhibit 8***. Protection of the worst case calculated 152.2 dBμ F(50:10) Interference Contour, corresponding to the 112.2 dBμ F(50:50) Protected Contour, has been demonstrated through a downward radiation study. The worst case calculated Interference Contour will not reach the ground nor a seven meter artificial plane representing a standard two story home when taking into account the downward radiation characteristics of the antenna as supplied by the antenna manufacturer. A copy of the antenna manufacturer specifications has been included in ***Exhibit 9***.

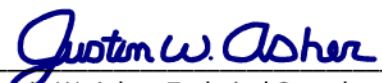
There are three additional facilities, existing or proposed, close enough to merit further study. Therefore, a supplemental contour protection study has been provided toward each facility as included in ***Exhibit(s) 7(a-c)***.

Regarding protection of international concerns, the facility is and will remain within 320 km from the common border between the United States and Canada. However full protection will be afforded all Canadian concerns as noted in ***Exhibit 6***.

**ENVIRONMENTAL COMPLIANCE SHOWINGS:** The proposed facility complies with the maximum permissible radiofrequency electromagnetic exposure limits for restricted access (mountain top) controlled environments as set forth under §1.1310 and/or §1.1307(b)(3) of the Commission's rules and the guidelines for RF radiation protection guidelines as set forth in OET Bulletin No. 65 (Edition 97-01), and the accompanying Supplement A, (Edition 97-01). Compliance has been demonstrated in the attached ***RF Appendix 1*** of this filing. The facility is, or will be, properly marked with signs. Entry is, or will be, restricted by means of fencing, locked doors or gates. In addition, coordination with other users of the site will be secured to reduce power or cease operation as necessary to protect persons having access to the site, tower or antenna from radiofrequency electromagnetic fields in excess of FCC guidelines.

Regarding compliance with the NEPA, Nationwide Programmatic Agreement and NHPA Section 106 for tower co-location, compliance with the Agreement is not required where no new tower construction is being proposed and the tower is not being substantially altered. Specifically, compliance is not necessary where only an antenna and feed-line are being replaced on an existing structure, as here. However, should the Commission determine compliance is necessary, upon notification to the applicant, the applicant will file FCC Form 621.

**CERTIFICATION OF TECHNICAL CONSULTANT:** *I declare, under penalty of perjury, that the contents of this report are true and accurate to the best of my knowledge and belief. I further certify I have over nineteen years of experience as a broadcast technical consultant before the Federal Communications Commission ("the FCC"); and am familiar with the Code of Federal Regulations Title 47 ("the Rules") as pertaining to this report and its contents herein. The underlying data utilized in this report was taken directly from FCC databases or indirectly through third party software vendors securing data directly from FCC databases. This firm cannot be held liable for errors or omissions resulting from the underlying data. The information contained herein is believed accurate to the date reported below.*



Justin W. Asher, Technical Consultant  
January 24, 2019

# Exhibit 1

## Service Contour Study: Present vs Proposed Operations

*Proposed 60 dBμ F(50:50) Contour*

*Present 60 dBμ F(50:50) Contour*

**W222CH.P**  
Greenfield, MA  
Proposed Operation  
Facility ID: 140079  
Latitude: 42-31-59 N  
Longitude: 072-35-33 W  
ERP: 0.25 kW  
Channel: 222D (92.3 MHz)  
AMSL Height: 274.0 m  
Horiz. Pattern: Directional

60 dBμ F(50:50) Contour  
Total Population: 68,614  
Total Area: 561.1 sq. km

**W222CH.L**  
Greenfield, MA  
BLFT20180403AAM  
Facility ID: 140079  
Latitude: 42-32-01 N  
Longitude: 072-35-32 W  
ERP: 0.099 kW  
Channel: 222D (92.3 MHz)  
AMSL Height: 275.0 m  
Horiz. Pattern: Directional

60 dBμ F(50:50) Contour  
Total Population: 39,429  
Total Area: 340.6 sq. km

Terrain  
26 678 m

Scale 1:250,000  
0 4 8 12 km

Windham

**25 mile Radius from AM Site**

Cheshire

**Primary 2 mV/m Daytime Contour**

**Proposed 60 dBμ F(50:50) Contour**

Franklin

**W222CH.P**

**WFAT(AM)**

Hampshire

Worcester

## **Exhibit 2**

### **Service Contour Study: Proposed vs Primary Operations**

WFAT(AM) 700 kHz  
Orange-Athol, Massachusetts  
Station Class: D  
Region 2 Class: B  
Facility ID: 51118  
File Number: BL-19841113AE  
42-35-06.0 N 72-16-56.0 W (NAD 27)  
42-35-06.3 N 72-16-54.3 W (NAD 83)  
Power: 2.5 kW, Non-Directional  
Hours: Daytime  
Pattern Type: Theoretical  
Towers: 1 Augmentations: 0  
Tower Elec Height: 51.1 Deg; 60.79 m  
RMS Theoretical: 282 mV/meter (per kW)  
or 445.88 mV/meter at 2.5 kW

W222CH.P  
Greenfield, MA  
Proposed Operation  
Facility ID: 140079  
Latitude: 42-31-59 N  
Longitude: 072-35-33 W  
ERP: 0.25 kW  
Channel: 222D (92.3 MHz)  
AMSL Height: 274.0 m  
Horiz. Pattern: Directional

NED 03 SEC Terrain Database  
US Census 2010 PL Database

Scale 1:475,000

0 6 12 18 km

Asher Broadcast Consulting LLC  
justinasher@consultant.com  
1 (202) 875-2986

V-Soft Communications LLC ©

# The National Map Advanced Viewer

## *Exhibit 3* *USGS Topographic Photomapping* *of Existing Site*

#1: 848.18 ft 258.53 m

### Site Coordinates

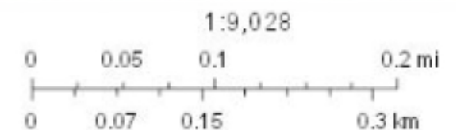
(NGS NADCON)

	<u>Latitude</u>	<u>Longitude</u>
NAD 27 datum:	42 31 59.28787	72 35 32.58001
NAD 83 datum:	42 31 59.60000	72 35 30.90000

Asher Broadcast Consulting LLC  
justinasher@consultant.com  
1 (202) 875-2986

1/22/2019, 12:27:24 PM

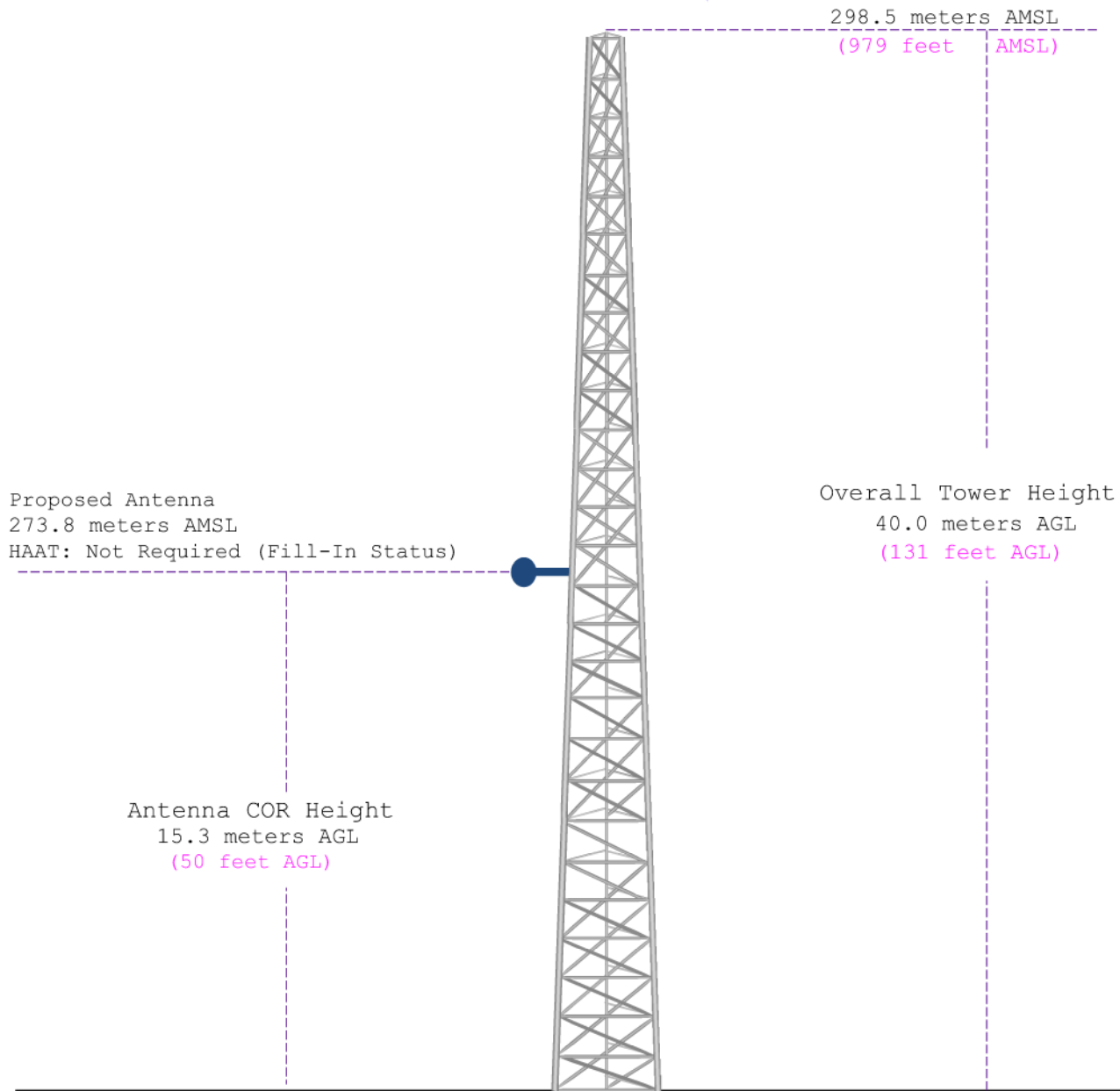
- Normal Intermediate Contours
- Normal Index Contours



USGS The National Map: Orthimagery. Data refreshed October, 2017.

# Exhibit 4

## Vertical Plan of Antenna System



Ground Elevation: 258.5 meters AMSL (848 feet AMSL)		
Address: On Pocumtuck Rock		
City: Deerfield	Latitude (D M S) Longitude (D M S)	
County: Franklin	NAD 27 datum values: 42 31 59.28787 72 35 32.58001	
State: Massachusetts	NAD 83 datum values: 42 31 59.60000 72 35 30.90000	
Antenna Structure Registration	Drawing	Asher Broadcast Consulting, LLC
Not Required	Is Not	justinasher@consultant.com
	To Scale	1(202)875-2986

## ***Exhibit 5***

### **HAAT and Miscellaneous Coordinate Information**

#### **HAAT Calculation (1927):**

N. Lat. = 423159.0    W. Lng. = 723533.0  
 HAAT and Distance to Contour,  
 FCC, FM 2-10 Mi, 51 pts Method - NED 03 SEC

Azi.	AV EL	HAAT	ERP kW	dBk	Field	60-F5
000	125.1	148.9	0.2500	-6.02	1.000	15.82
030	99.1	174.9	0.2500	-6.02	1.000	17.37
060	133.3	140.7	0.2500	-6.02	1.000	15.30
090	247.2	26.8	0.2500	-6.02	1.000	7.09
120	231.3	42.7	0.2500	-6.02	1.000	8.47
150	123.2	150.8	0.2500	-6.02	1.000	15.95
180	70.9	203.1	0.2500	-6.02	1.000	18.67
210	131.9	142.1	0.2500	-6.02	1.000	15.39
240	264.4	9.6	0.2500	-6.02	1.000	7.09
270	222.4	51.6	0.0756	-11.21	0.550	6.86
300	170.6	103.4	0.0400	-13.98	0.400	8.35
330	203.8	70.2	0.2500	-6.02	1.000	10.91

Ave El= 168.60 M    HAAT= 105.40 M    AMSL= 274.0

#### **NAD 1983 to NAD 1927 Conversion:**

	<u>Latitude</u>	<u>Longitude</u>
NAD 27 datum values:	42 31 59.28787	72 35 32.58001
NAD 83 datum values:	42 31 59.60000	72 35 30.90000

#### **Various Coordinate Conversion Calculations (NAD 1983):**

Position Type	Lat Lon
<b>Degrees Lat Long</b>	42.5332222°, -072.5919167°
<b>Degrees Minutes</b>	42°31.99333', -072°35.51500'
<b>Degrees Minutes Seconds</b>	42°31'59.6000", -072°35'30.9000"
<b>UTM</b>	18T 697763mE 4711792mN
<b>UTM centimeter</b>	18T 697763.22mE 4711792.36mN
<b>MGRS</b>	18TXN9776311792
<b>Grid North</b>	1.6°
<b>GARS</b>	215MB48
<b>Maidenhead</b>	FN32QM87XX23
<b>GEOREF</b>	HJCN24483199

# Exhibit 6

## Tabulation of Proposed Allocation

Blue Text indicates contour protection studies toward select stations as included in **Exhibit(s) 7(a-c)**.

Yellow Highlighted Text denotes the existence of a 47 C.F.R. Section 74.1204(d) Second/Third Adjacent Channel Given Interference Waiver Requests as included in **Exhibit 8**.

REFERENCE		CH# 222D - 92.3 MHz, Pwr= 0.25 kW DA, HAAT= 105.4 M, COR= 274 M							DISPLAY DATES	
42 31 59.0 N.		Average Protected F(50-50)= 13.2 km							DATA 01-22-19	
72 35 33.0 W.		Standard Directional							SEARCH 01-22-19	
CH	CALL	TYPE ANT	AZI	DIST	LAT	PWR (kW)	INT (km)	PRO (km)	*IN*	*OUT*
CITY		STATE	<--	FILE #	LNG	HAAT (M)	COR (M)	LICENSEE	(Overlap in km)	
222D	W222CH	LIC DC	20.0	0.06	42 32 01.0	0.099		---Reference---		
Greenfield		MA	200.0	BLFT20180403AAM	72 35 32.0		275	County Broadcasting Compan		
222B	WFLY	LIC CN	276.3	115.68	42 38 16.0	17.000	146.0	76.9	-38.1*<	0.9
Troy		NY	95.3	BLH19871015KA	73 59 55.0	259	500	6 Johnson Road Licenses, I		
222B	WPRO-FM	LIC CN	130.9	122.70	41 48 18.0	39.000	128.9	59.2	-18.3*<	5.9
Providence		RI	311.6	BMLH19920605KA	71 28 24.0	168	230	Radio License Holding Cbc,		
219A	WNNZ-FM	LIC DCX	10.3	0.12	42 32 03.0	0.100	0.5	13.0	-18.1*<	-14.0*<
Deerfield		MA	190.3	BMLEDD20100908ACV	72 35 32.0	95	276	New England Public Radio F		
220A	WOZQ«	LIC DEN	188.8	23.92	42 19 13.0	0.200	0.9	6.5	7.5R	16.4M
Northampton		MA	8.8	BLED19820924AH	72 38 14.0	-35	76	Trustees Of The Smith Coll		
223B	WWYZ	LIC CN	191.0	109.84	41 33 47.0	17.000	75.9	64.5	14.6	5.0
Waterbury		CT	10.9	BLH19940916KD	72 50 42.0	268	368	Capstar Tx, Llc, As Debtor		
224A	WKVT-FM	LIC CN	351.8	40.74	42 53 45.0	1.800	2.4	28.5	21.1	11.1
Brattleboro		VT	171.8	BMLH19900627KB	72 39 49.0	186	507	Saga Communications Of New		
Class B1 with respect to Canada										
222A	WGXL	LIC CN	10.9	127.02	43 39 17.0	6.000	93.2	33.2	16.1	37.8
Hanover		NH	191.1	BMLH19930604KD	72 17 41.0	99	376	Great Eastern Radio, Llc		
Class B1 with respect to Canada										
221A	WDER-FM	LIC NC	57.7	68.77	42 51 41.0	0.170	36.9	24.0	17.5	23.1
Peterborough		NH	238.2	BLH20010828AAS	71 52 45.0	423	734	Blount Communications, Inc		
220A	WAIC«	LIC CX	176.4	46.80	42 06 45.0	0.200	1.0	6.7	7.5R	39.3M
Springfield		MA	356.4	BLED20170710ACD	72 33 24.0	22	95	American International Col		
219A	WJNF«	LIC DCX	254.3	39.42	42 26 11.0	0.160	0.2	8.6	7.5R	31.9M
Dalton		MA	74.0	BLED20120514AAQ	73 03 14.0	298	776	Horizon Christian Fellowsh		
220A	WCMK«	LIC NCX	359.0	49.04	42 58 28.0	0.080	0.6	17.6	7.5R	41.5M
Putney		VT	179.0	BMLEDD20061115ABH	72 36 12.0	231	507	Christian Ministries, Inc.		
219A	WJWT«	LIC DCX	86.2	44.51	42 33 29.0	0.850	0.9	10.9	7.5R	37.0M
Gardner		MA	266.6	BLED20060623ABM	72 03 06.0	84	391	Horizon Christian Fellowsh		
223B	AL1875	RSV-A	77.2	124.89	42 46 23.0	50.000	77.4	64.4	38.0	40.8
Andover		MA	258.2	RM11178	71 06 01.0	150	194			
223B	WXRV	LIC CX	77.2	124.89	42 46 23.0	25.000	77.0	65.0	38.3	40.2
Andover		MA	258.2	BLH20061121ACI	71 06 01.0	217	262	Beanpot License Corp.		

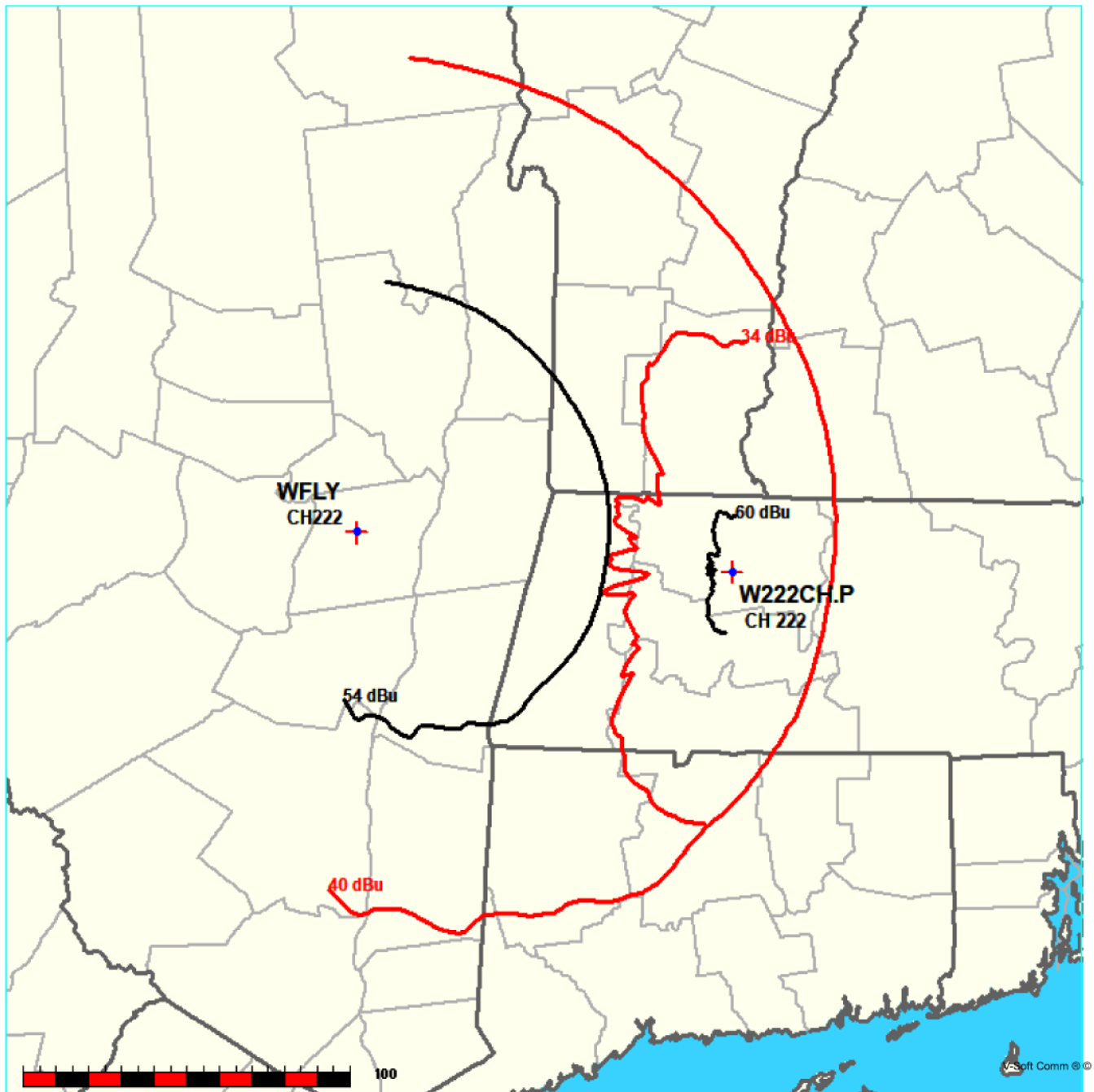
Terrain database is NED 03 SEC , R= 73.215 qualifying spacings or FCC minimum Spacings in KM, M= Margin in KM  
 Contour distances are on direct line to and from reference station. Reference zone= East Zone, Co to 3rd adjacent.  
 All separation margins (if shown) include rounding.  
 Ant Column: (D= 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.  
 < = Contour Overlap

***Exhibit 7a***  
***Contour Protection Studies Toward Select Allocation Concern(s)***

FMCommander Single Allocation Study - 01-22-2019 - NED 03 SEC  
W222CH.P's Overlaps (In= -38.08 km, Out= 0.89 km)

W222CH.P CH 222 D DA  
Lat= 42 31 59.0, Lng= 72 35 33.0  
0.25 kW 105.4 m HAAT, 274 m COR  
Prot.= 60 dBu, Intef.= 34 dBu

WFLY CH 222 B BLH19871015KA  
Lat= 42 38 16.0, Lng= 73 59 55.0  
17.0 kW 259 m HAAT, 500 m COR  
Prot.= 54 dBu, Intef.= 40 dBu



## Exhibit 7a

### Contour Protection Studies Toward Select Allocation Concern(s)

01-22-2019

Terrain Data: NED 03 SEC

FMOver Analysis

W222CH.P

WFLY BLH19871015KA

Channel = 222D

Max ERP = 0.25 kW

RCAMSL = 274 m

N. Lat. 42 31 59.0

W. Lng. 72 35 33.0

Protected  
60 dBu

Channel = 222B

Max ERP = 17 kW

RCAMSL = 500 m

N. Lat. 42 38 16.0

W. Lng. 73 59 55.0

Interfering  
40 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
234.0	000.2500	0034.5	007.5	097.9	017.0000	0414.9	110.2	48.83*	35.58
235.0	000.2500	0032.7	007.4	097.8	017.0000	0414.8	110.3	48.82*	35.53
236.0	000.2500	0028.4	007.1	097.7	017.0000	0414.8	110.4	48.79*	35.41
237.0	000.2500	0024.8	007.1	097.6	017.0000	0414.8	110.3	48.81*	35.49
238.0	000.2500	0020.1	007.1	097.6	017.0000	0414.8	110.2	48.83*	35.58
239.0	000.2500	0011.9	007.1	097.5	017.0000	0414.8	110.1	48.85*	35.66
240.0	000.2500	0009.6	007.1	097.5	017.0000	0414.9	110.1	48.87*	35.74
241.0	000.2500	0008.4	007.1	097.4	017.0000	0414.9	110.0	48.89*	35.82
242.0	000.2500	0003.3	007.1	097.4	017.0000	0414.9	109.9	48.91*	35.90
243.0	000.2500	0001.2	007.1	097.3	017.0000	0414.9	109.8	48.93*	35.97
244.0	000.2500	0003.7	007.1	097.3	017.0000	0414.9	109.8	48.95*	36.05
245.0	000.2500	0012.2	007.1	097.2	017.0000	0415.0	109.7	48.97*	36.12
246.0	000.2500	0019.2	007.1	097.2	017.0000	0415.0	109.6	48.99*	36.18
247.0	000.2500	0025.2	007.1	097.1	017.0000	0415.0	109.6	49.01*	36.25
248.0	000.2500	0028.8	007.1	097.1	017.0000	0415.0	109.5	49.02*	36.31
249.0	000.2500	0025.5	007.1	097.0	017.0000	0415.0	109.4	49.04*	36.38
250.0	000.2500	0024.8	007.1	096.9	017.0000	0415.0	109.4	49.06*	36.44
251.0	000.2352	0024.4	007.0	096.9	017.0000	0415.1	109.4	49.05*	36.41
252.0	000.2209	0026.6	006.9	096.8	017.0000	0415.1	109.5	49.04*	36.37
253.0	000.2070	0027.6	006.8	096.7	017.0000	0415.2	109.5	49.02*	36.32
254.0	000.1936	0028.7	006.7	096.6	017.0000	0415.2	109.6	49.01*	36.27
255.0	000.1806	0026.4	006.5	096.5	017.0000	0415.2	109.6	49.00*	36.22
256.0	000.1681	0027.2	006.4	096.5	017.0000	0415.3	109.7	48.98*	36.16
257.0	000.1560	0032.0	006.5	096.4	017.0000	0415.4	109.6	49.01*	36.26
258.0	000.1444	0039.8	007.0	096.5	017.0000	0415.3	109.0	49.16*	36.83
259.0	000.1332	0050.3	007.8	096.5	017.0000	0415.2	108.2	49.36*	37.62
260.0	000.1225	0056.7	008.2	096.5	017.0000	0415.2	107.8	49.47*	38.00
261.0	000.1173	0057.6	008.2	096.4	017.0000	0415.3	107.8	49.47*	38.03
262.0	000.1122	0052.3	007.7	096.3	017.0000	0415.6	108.3	49.36*	37.60
263.0	000.1073	0046.8	007.1	096.2	017.0000	0415.8	108.8	49.24*	37.14
264.0	000.1024	0039.9	006.5	096.0	017.0000	0416.1	109.4	49.09*	36.58
265.0	000.0977	0033.9	005.9	095.9	017.0000	0416.2	109.9	48.95*	36.07
266.0	000.0930	0027.3	005.5	095.8	017.0000	0416.3	110.2	48.86*	35.72

## Exhibit 7a

### Contour Protection Studies Toward Select Allocation Concern(s)

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)
267.0	000.0885	0023.7	005.5	095.8	017.0000	0416.3	110.3	48.85*
268.0	000.0841	0031.9	005.5	095.7	017.0000	0416.3	110.2	48.88*
269.0	000.0798	0041.7	006.2	095.7	017.0000	0416.3	109.5	49.06*
270.0	000.0756	0051.6	006.9	095.7	017.0000	0416.3	108.9	49.23*
271.0	000.0756	0060.6	007.4	095.7	017.0000	0416.3	108.3	49.38*
272.0	000.0756	0065.5	007.7	095.6	017.0000	0416.3	108.0	49.46*
273.0	000.0756	0068.1	007.9	095.5	017.0000	0416.3	107.8	49.50*
274.0	000.0756	0066.2	007.8	095.5	017.0000	0416.4	107.9	49.48*
275.0	000.0756	0063.9	007.6	095.4	017.0000	0416.4	108.1	49.44*
276.0	000.0756	0065.0	007.7	095.3	017.0000	0416.4	108.0	49.46*
277.0	000.0756	0066.4	007.8	095.2	017.0000	0416.5	107.9	49.49*
278.0	000.0756	0061.9	007.5	095.2	017.0000	0416.7	108.2	49.42*
279.0	000.0756	0055.1	007.1	095.1	017.0000	0416.8	108.6	49.31*
280.0	000.0756	0051.5	006.9	095.1	017.0000	0416.9	108.8	49.25*
281.0	000.0756	0048.4	006.6	095.0	017.0000	0417.0	109.1	49.19*
282.0	000.0756	0044.9	006.4	095.0	017.0000	0417.0	109.3	49.12*
283.0	000.0756	0043.9	006.3	094.9	017.0000	0417.1	109.4	49.10*
284.0	000.0756	0047.5	006.6	094.8	017.0000	0417.2	109.2	49.17*
285.0	000.0756	0048.9	006.7	094.8	017.0000	0417.2	109.1	49.19*
286.0	000.0756	0050.2	006.8	094.7	017.0000	0417.3	109.0	49.21*
287.0	000.0756	0051.9	006.9	094.6	017.0000	0417.5	108.9	49.24*
288.0	000.0756	0047.0	006.5	094.6	017.0000	0417.5	109.3	49.15*
289.0	000.0756	0046.6	006.5	094.5	017.0000	0417.6	109.4	49.13*
290.0	000.0756	0054.3	007.0	094.4	017.0000	0417.6	108.9	49.27*
291.0	000.0716	0066.3	007.7	094.3	017.0000	0417.6	108.3	49.42*
292.0	000.0676	0073.6	008.0	094.2	017.0000	0417.6	108.0	49.48*
293.0	000.0638	0078.6	008.1	094.1	017.0000	0417.5	107.9	49.51*
294.0	000.0600	0079.4	008.0	094.0	017.0000	0417.5	108.1	49.47*
295.0	000.0564	0079.9	007.9	093.9	017.0000	0417.4	108.2	49.43*
296.0	000.0529	0083.4	008.0	093.9	017.0000	0417.3	108.2	49.43*
297.0	000.0495	0089.8	008.2	093.8	017.0000	0417.2	108.1	49.46*
298.0	000.0462	0095.5	008.3	093.7	017.0000	0417.2	108.0	49.47*
299.0	000.0431	0101.5	008.4	093.6	017.0000	0417.2	108.0	49.49*
300.0	000.0400	0103.4	008.3	093.5	017.0000	0417.3	108.1	49.46*
301.0	000.0462	0101.9	008.6	093.4	017.0000	0417.5	107.9	49.50*
302.0	000.0529	0095.9	008.6	093.3	017.0000	0417.5	108.0	49.49*
303.0	000.0600	0086.3	008.4	093.3	017.0000	0417.5	108.2	49.43*
304.0	000.0676	0077.7	008.2	093.3	017.0000	0417.5	108.5	49.36*
305.0	000.0756	0069.7	008.0	093.3	017.0000	0417.5	108.8	49.29*
306.0	000.0841	0061.6	007.7	093.3	017.0000	0417.5	109.1	49.21*
307.0	000.0930	0051.7	007.2	093.4	017.0000	0417.5	109.5	49.09*
308.0	000.1024	0046.1	007.0	093.4	017.0000	0417.5	109.8	49.01*
309.0	000.1122	0044.2	007.0	093.3	017.0000	0417.5	109.9	49.00*
310.0	000.1225	0042.0	007.0	093.3	017.0000	0417.5	110.0	48.97*
311.0	000.1332	0034.8	006.5	093.4	017.0000	0417.5	110.4	48.85*
312.0	000.1444	0025.4	006.2	093.4	017.0000	0417.4	110.7	48.77*

# ***Exhibit 7a***

## **Contour Protection Studies Toward Select Allocation Concern(s)**

01-22-2019      Terrain Data: NED 03 SEC      FMOver Analysis

WFLY    BLH19871015KA

W222CH.P

Channel = 222B  
 Max ERP = 17 kW  
 RCAMSL = 500 m  
 N. Lat. 42 38 16.0  
 W. Lng. 73 59 55.0  
 Protected  
     54   dBu

Channel = 222D  
 Max ERP = 0.25 kW  
 RCAMSL = 274 m  
 N. Lat. 42 31 59.0  
 W. Lng. 72 35 33.0  
 Interfering  
     34   dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
050.0	017.0000	0406.5	076.2	317.3	000.2117	0022.0	082.4	22.84	
051.0	017.0000	0407.6	076.3	317.3	000.2116	0021.9	081.1	23.10	
052.0	017.0000	0408.3	076.3	317.3	000.2109	0021.7	079.7	23.35	
053.0	017.0000	0408.1	076.3	317.2	000.2093	0021.2	078.4	23.58	
054.0	017.0000	0408.3	076.3	317.1	000.2078	0020.7	077.1	23.80	
055.0	017.0000	0407.5	076.3	316.9	000.2052	0019.8	075.8	23.99	
056.0	017.0000	0407.7	076.3	316.7	000.2030	0019.0	074.5	24.18	
057.0	017.0000	0408.0	076.3	316.5	000.2006	0018.1	073.2	24.37	
058.0	017.0000	0409.0	076.4	316.4	000.1984	0017.4	071.8	24.56	
059.0	017.0000	0409.8	076.4	316.2	000.1957	0017.0	070.5	24.74	
060.0	017.0000	0410.8	076.5	316.0	000.1929	0016.8	069.2	24.91	
061.0	017.0000	0411.1	076.5	315.7	000.1892	0017.1	067.9	25.06	
062.0	017.0000	0412.1	076.6	315.4	000.1857	0017.4	066.6	25.21	
063.0	017.0000	0412.6	076.6	315.1	000.1814	0017.0	065.3	25.35	
064.0	017.0000	0412.7	076.6	314.7	000.1764	0016.1	064.1	25.47	
065.0	017.0000	0414.2	076.8	314.3	000.1722	0015.4	062.8	25.61	
066.0	017.0000	0416.3	076.9	314.0	000.1681	0016.1	061.5	25.76	
067.0	017.0000	0417.9	077.0	313.6	000.1632	0017.8	060.2	25.89	
068.0	017.0000	0419.2	077.1	313.1	000.1575	0020.1	058.9	26.00	
069.0	017.0000	0420.8	077.2	312.6	000.1518	0022.5	057.7	26.10	
070.0	017.0000	0421.6	077.3	312.1	000.1450	0025.0	056.5	26.16	
071.0	017.0000	0422.4	077.4	311.4	000.1379	0031.5	055.3	26.42	
072.0	017.0000	0422.8	077.4	310.7	000.1301	0037.2	054.1	27.29	
073.0	017.0000	0422.3	077.4	309.9	000.1214	0042.3	053.0	28.01	
074.0	017.0000	0421.0	077.3	309.0	000.1118	0044.3	051.9	28.21	
075.0	017.0000	0419.7	077.2	308.0	000.1021	0046.2	050.9	28.37	
076.0	017.0000	0420.4	077.2	307.1	000.0935	0051.2	049.8	28.98	
077.0	017.0000	0421.6	077.3	306.1	000.0850	0060.7	048.8	30.02	
078.0	017.0000	0423.1	077.4	305.1	000.0766	0068.7	047.7	30.72	

## Exhibit 7a

### Contour Protection Studies Toward Select Allocation Concern(s)

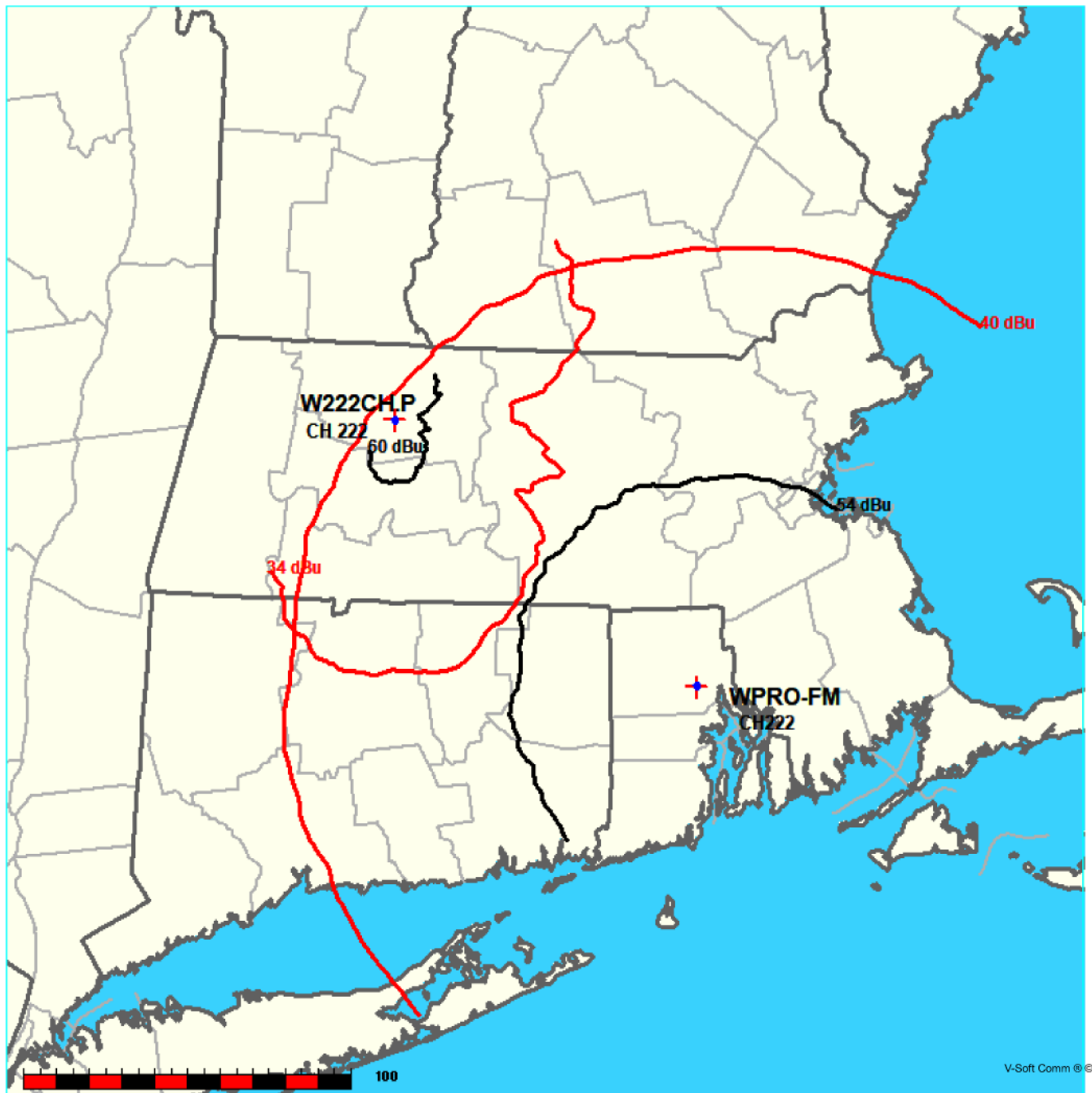
Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)
079.0	017.0000	0423.1	077.4	304.0	000.0672	0078.0	046.7	31.39
080.0	017.0000	0422.2	077.3	302.7	000.0576	0089.5	045.9	32.11
081.0	017.0000	0423.4	077.4	301.5	000.0492	0100.1	044.9	32.68
082.0	017.0000	0422.3	077.4	300.0	000.0401	0103.4	044.1	32.36
083.0	017.0000	0422.9	077.4	298.6	000.0442	0099.0	043.3	32.76
084.0	017.0000	0421.8	077.3	297.1	000.0493	0090.1	042.6	32.73
085.0	017.0000	0420.1	077.2	295.4	000.0550	0081.2	042.1	32.58
086.0	017.0000	0419.2	077.1	293.7	000.0610	0080.1	041.5	33.15
087.0	017.0000	0420.5	077.2	292.1	000.0672	0074.3	040.8	33.23
088.0	017.0000	0422.3	077.4	290.4	000.0739	0059.8	040.2	32.27
089.0	017.0000	0421.2	077.3	288.6	000.0756	0046.5	039.8	30.56
090.0	017.0000	0419.8	077.2	286.6	000.0756	0052.4	039.5	31.61
091.0	017.0000	0420.4	077.2	284.8	000.0756	0048.7	039.1	31.17
092.0	017.0000	0419.3	077.1	282.8	000.0756	0043.4	038.9	30.31
093.0	017.0000	0417.8	077.0	280.8	000.0756	0049.2	038.9	31.35
094.0	017.0000	0417.5	077.0	278.8	000.0756	0056.0	038.8	32.42
095.0	017.0000	0417.0	077.0	276.8	000.0756	0066.9	038.7	33.75
096.0	017.0000	0416.1	076.9	274.9	000.0756	0064.3	038.8	33.42
097.0	017.0000	0415.0	076.8	272.9	000.0756	0068.0	039.0	33.78
098.0	017.0000	0414.9	076.8	270.9	000.0756	0060.2	039.1	32.81
099.0	017.0000	0415.2	076.8	269.0	000.0798	0041.8	039.3	30.10
100.0	017.0000	0415.0	076.8	267.1	000.0880	0024.0	039.6	28.09
101.0	017.0000	0415.1	076.8	265.3	000.0965	0032.4	040.0	28.88
102.0	017.0000	0414.9	076.8	263.4	000.1051	0043.6	040.4	31.24
103.0	017.0000	0414.3	076.8	261.7	000.1137	0054.1	040.9	33.11
104.0	017.0000	0414.3	076.8	260.0	000.1226	0056.6	041.5	33.59
105.0	017.0000	0414.5	076.8	258.3	000.1406	0042.6	042.1	31.79
106.0	017.0000	0413.8	076.7	256.8	000.1586	0030.6	042.7	29.83
107.0	017.0000	0413.8	076.7	255.3	000.1773	0026.2	043.4	30.00
108.0	017.0000	0413.8	076.7	253.8	000.1961	0028.8	044.2	30.23
109.0	017.0000	0414.5	076.8	252.4	000.2155	0026.8	044.9	30.44
110.0	017.0000	0413.4	076.7	251.1	000.2333	0024.8	045.8	30.56
111.0	017.0000	0411.8	076.6	250.0	000.2500	0024.8	046.8	30.63
112.0	017.0000	0412.6	076.6	248.7	000.2500	0025.7	047.7	30.43
113.0	017.0000	0409.9	076.4	247.8	000.2500	0028.9	048.8	30.19
114.0	017.0000	0407.2	076.2	246.9	000.2500	0024.5	049.9	29.95
115.0	017.0000	0405.6	076.1	246.0	000.2500	0019.2	051.0	29.71
116.0	017.0000	0403.9	076.0	245.2	000.2500	0014.2	052.1	29.47
117.0	017.0000	0401.4	075.8	244.5	000.2500	0007.5	053.2	29.22
118.0	017.0000	0399.0	075.6	243.8	000.2500	0002.4	054.4	28.97
119.0	017.0000	0397.1	075.5	243.2	000.2500	0001.3	055.6	28.72
120.0	017.0000	0394.8	075.3	242.6	000.2500	0001.5	056.8	28.46
121.0	017.0000	0392.0	075.1	242.1	000.2500	0002.9	058.0	28.20
122.0	017.0000	0390.1	075.0	241.6	000.2500	0005.8	059.2	27.95
123.0	017.0000	0388.5	074.9	241.1	000.2500	0008.0	060.4	27.70
124.0	017.0000	0386.8	074.8	240.6	000.2500	0009.4	061.6	27.45

***Exhibit 7b***  
**Contour Protection Studies Toward Select Allocation Concern(s)**

FMCommander Single Allocation Study - 01-22-2019 - NED 03 SEC  
W222CH.P's Overlaps (In= -18.25 km, Out= 5.88 km)

W222CH.P CH 222 D DA  
Lat= 42 31 59.0, Lng= 72 35 33.0  
0.25 kW 105.4 m HAAT, 274 m COR  
Prot.= 60 dBu, Intef.= 34 dBu

WPRO-FM CH 222 B BMLH19920605KA  
Lat= 41 48 18.0, Lng= 71 28 24.0  
39.0 kW 168 m HAAT, 230 m COR  
Prot.= 54 dBu, Intef.= 40 dBu



# ***Exhibit 7b***

## **Contour Protection Studies Toward Select Allocation Concern(s)**

01-22-2019

Terrain Data: NED 03 SEC

FMOver Analysis

W222CH.P

WPRO-FM BMLH19920605KA

Channel = 222D  
 Max ERP = 0.25 kW  
 RCAMSL = 274 m  
 N. Lat. 42 31 59.0  
 W. Lng. 72 35 33.0  
 Protected  
 60 dBu

Channel = 222B  
 Max ERP = 39 kW  
 RCAMSL = 230 m  
 N. Lat. 41 48 18.0  
 W. Lng. 71 28 24.0  
 Interfering  
 40 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
090.0	000.2500	0026.8	007.1	313.9	039.0000	0122.2	117.4	41.95*	10.88
091.0	000.2500	0030.1	007.1	313.9	039.0000	0122.3	117.3	41.97*	10.98
092.0	000.2500	0034.8	007.6	314.0	039.0000	0122.1	116.9	42.04*	11.40
093.0	000.2500	0037.4	007.9	314.0	039.0000	0122.0	116.6	42.09*	11.68
094.0	000.2500	0038.4	008.0	314.0	039.0000	0122.0	116.4	42.12*	11.86
095.0	000.2500	0039.0	008.0	314.0	039.0000	0122.1	116.3	42.15*	12.01
096.0	000.2500	0039.0	008.0	313.9	039.0000	0122.2	116.2	42.17*	12.12
097.0	000.2500	0041.9	008.4	314.0	039.0000	0122.1	115.8	42.23*	12.46
098.0	000.2500	0044.2	008.6	314.0	039.0000	0122.1	115.5	42.28*	12.75
099.0	000.2500	0047.9	009.0	314.0	039.0000	0122.0	115.1	42.36*	13.15
100.0	000.2500	0050.2	009.3	314.0	039.0000	0122.0	114.8	42.41*	13.44
101.0	000.2500	0051.2	009.4	314.0	039.0000	0122.1	114.7	42.44*	13.64
102.0	000.2500	0050.1	009.3	313.9	039.0000	0122.3	114.7	42.45*	13.66
103.0	000.2500	0049.0	009.2	313.8	039.0000	0122.3	114.7	42.45*	13.65
104.0	000.2500	0051.7	009.4	313.8	039.0000	0122.3	114.4	42.51*	13.96
105.0	000.2500	0057.6	010.0	313.8	039.0000	0122.3	113.8	42.61*	14.52
106.0	000.2500	0064.6	010.5	313.9	039.0000	0122.3	113.3	42.71*	15.07
107.0	000.2500	0070.2	010.9	313.9	039.0000	0122.3	112.8	42.79*	15.50
108.0	000.2500	0070.4	010.9	313.8	039.0000	0122.3	112.7	42.81*	15.61
109.0	000.2500	0066.6	010.7	313.7	039.0000	0122.3	112.9	42.78*	15.44
110.0	000.2500	0059.7	010.2	313.5	039.0000	0122.5	113.3	42.71*	15.09
111.0	000.2500	0055.3	009.8	313.3	039.0000	0122.7	113.6	42.67*	14.83
112.0	000.2500	0053.6	009.6	313.2	039.0000	0122.8	113.6	42.65*	14.76
113.0	000.2500	0051.3	009.4	313.1	039.0000	0122.9	113.8	42.63*	14.61
114.0	000.2500	0051.2	009.4	313.0	039.0000	0123.0	113.7	42.64*	14.67
115.0	000.2500	0049.2	009.2	312.9	039.0000	0123.2	113.9	42.62*	14.56
116.0	000.2500	0049.1	009.2	312.8	039.0000	0123.4	113.9	42.63*	14.62
117.0	000.2500	0050.1	009.3	312.8	039.0000	0123.6	113.7	42.66*	14.79
118.0	000.2500	0049.2	009.2	312.7	039.0000	0123.8	113.8	42.66*	14.77
119.0	000.2500	0045.5	008.8	312.6	039.0000	0124.1	114.1	42.61*	14.47
120.0	000.2500	0042.7	008.5	312.5	039.0000	0124.3	114.4	42.56*	14.23
121.0	000.2500	0043.3	008.5	312.4	039.0000	0124.5	114.3	42.59*	14.35

# ***Exhibit 7b***

## **Contour Protection Studies Toward Select Allocation Concern(s)**

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)
122.0	000.2500	0046.8	008.9	312.3	039.0000	0124.6	113.9	42.67*
123.0	000.2500	0052.7	009.5	312.3	039.0000	0124.7	113.3	42.78*
124.0	000.2500	0059.8	010.2	312.3	039.0000	0124.8	112.6	42.91*
125.0	000.2500	0065.7	010.6	312.2	039.0000	0124.9	112.2	43.00*
126.0	000.2500	0072.6	011.1	312.1	039.0000	0125.2	111.7	43.10*
127.0	000.2500	0081.3	011.7	312.1	039.0000	0125.4	111.1	43.22*
128.0	000.2500	0087.5	012.1	312.0	039.0000	0125.6	110.7	43.32*
129.0	000.2500	0090.6	012.3	311.9	039.0000	0125.9	110.4	43.37*
130.0	000.2500	0088.7	012.1	311.7	039.0000	0126.2	110.6	43.35*
131.0	000.2500	0086.9	012.0	311.6	039.0000	0126.6	110.7	43.34*
132.0	000.2500	0090.6	012.3	311.5	039.0000	0126.9	110.4	43.40*
133.0	000.2500	0096.6	012.6	311.4	039.0000	0127.3	110.1	43.49*
134.0	000.2500	0101.4	012.9	311.3	039.0000	0127.7	109.8	43.56*
135.0	000.2500	0105.9	013.2	311.2	039.0000	0128.2	109.5	43.63*
136.0	000.2500	0108.4	013.4	311.0	039.0000	0128.7	109.4	43.67*
137.0	000.2500	0108.7	013.4	310.9	039.0000	0129.0	109.4	43.68*
138.0	000.2500	0108.7	013.4	310.8	039.0000	0129.2	109.4	43.68*
139.0	000.2500	0108.2	013.4	310.7	039.0000	0129.5	109.5	43.68*
140.0	000.2500	0109.2	013.4	310.5	039.0000	0129.8	109.5	43.69*
141.0	000.2500	0114.3	013.7	310.4	039.0000	0129.9	109.2	43.75*
142.0	000.2500	0121.0	014.1	310.2	039.0000	0129.9	108.9	43.82*
143.0	000.2500	0128.1	014.5	310.0	039.0000	0130.0	108.5	43.89*
144.0	000.2500	0134.0	014.9	309.9	039.0000	0130.0	108.3	43.95*
145.0	000.2500	0135.7	015.0	309.7	039.0000	0129.9	108.2	43.95*
146.0	000.2500	0136.4	015.0	309.6	039.0000	0129.8	108.3	43.94*
147.0	000.2500	0141.6	015.4	309.4	039.0000	0129.6	108.0	43.98*
148.0	000.2500	0145.4	015.6	309.2	039.0000	0129.3	107.9	44.00*
149.0	000.2500	0148.3	015.8	309.0	039.0000	0128.8	107.8	44.01*
150.0	000.2500	0150.8	015.9	308.9	039.0000	0128.1	107.8	43.99*
151.0	000.2500	0155.5	016.2	308.7	039.0000	0127.2	107.6	44.00*
152.0	000.2500	0158.0	016.4	308.5	039.0000	0126.6	107.6	43.99*
153.0	000.2500	0155.9	016.3	308.4	039.0000	0126.3	107.8	43.92*
154.0	000.2500	0155.8	016.3	308.3	039.0000	0125.9	107.9	43.88*
155.0	000.2500	0155.6	016.3	308.1	039.0000	0125.5	108.1	43.84*
156.0	000.2500	0158.9	016.5	307.9	039.0000	0124.9	108.0	43.83*
157.0	000.2500	0162.5	016.7	307.7	039.0000	0123.6	108.0	43.80*
158.0	000.2500	0170.8	017.2	307.5	039.0000	0122.0	107.7	43.80*
159.0	000.2500	0180.3	017.6	307.2	039.0000	0120.8	107.5	43.81*
160.0	000.2500	0186.0	017.9	307.0	039.0000	0120.4	107.4	43.80*
161.0	000.2500	0192.2	018.2	306.8	039.0000	0119.8	107.4	43.80*
162.0	000.2500	0200.6	018.6	306.5	039.0000	0118.8	107.2	43.79*
163.0	000.2500	0205.8	018.8	306.3	039.0000	0118.1	107.3	43.76*
164.0	000.2500	0209.6	019.0	306.1	039.0000	0117.8	107.3	43.74*
165.0	000.2500	0215.6	019.2	305.9	039.0000	0117.8	107.3	43.74*
166.0	000.2500	0216.8	019.3	305.7	039.0000	0118.0	107.5	43.71*

# ***Exhibit 7b***

## **Contour Protection Studies Toward Select Allocation Concern(s)**

01-22-2019

Terrain Data: NED 03 SEC

FMOver Analysis

WPRO-FM BMLH19920605KA

W222CH.P

Channel = 222B  
 Max ERP = 39 kW  
 RCAMSL = 230 m  
 N. Lat. 41 48 18.0  
 W. Lng. 71 28 24.0  
 Protected  
 54 dBu

Channel = 222D  
 Max ERP = 0.25 kW  
 RCAMSL = 274 m  
 N. Lat. 42 31 59.0  
 W. Lng. 72 35 33.0  
 Interfering  
 34 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
267.0	039.0000	0110.5	056.7	156.7	000.2500	0161.4	091.5	27.44	
268.0	039.0000	0107.4	056.2	156.2	000.2500	0159.7	090.8	27.59	
269.0	039.0000	0103.5	055.5	155.5	000.2500	0156.8	090.1	27.66	
270.0	039.0000	0101.5	055.1	155.1	000.2500	0155.7	089.4	27.83	
271.0	039.0000	0099.9	054.8	154.6	000.2500	0155.3	088.6	28.03	
272.0	039.0000	0099.2	054.7	154.3	000.2500	0155.5	087.8	28.27	
273.0	039.0000	0098.6	054.5	153.9	000.2500	0155.7	087.1	28.52	
274.0	039.0000	0097.8	054.4	153.5	000.2500	0155.4	086.3	28.73	
275.0	039.0000	0097.2	054.3	153.2	000.2500	0155.6	085.5	28.97	
276.0	039.0000	0096.8	054.2	152.8	000.2500	0156.6	084.8	29.24	
277.0	039.0000	0097.7	054.4	152.5	000.2500	0157.5	083.9	29.55	
278.0	039.0000	0098.7	054.6	152.3	000.2500	0158.0	083.0	29.85	
279.0	039.0000	0099.0	054.6	151.9	000.2500	0157.9	082.2	30.09	
280.0	039.0000	0099.4	054.7	151.6	000.2500	0157.5	081.4	30.32	
281.0	039.0000	0101.0	055.0	151.3	000.2500	0156.4	080.4	30.56	
282.0	039.0000	0103.3	055.4	151.1	000.2500	0155.7	079.4	30.84	
283.0	039.0000	0105.1	055.8	150.8	000.2500	0154.7	078.5	31.09	
284.0	039.0000	0105.4	055.8	150.4	000.2500	0151.9	077.7	31.20	
285.0	039.0000	0104.7	055.7	149.8	000.2500	0150.4	077.1	31.32	
286.0	039.0000	0104.9	055.7	149.3	000.2500	0149.5	076.4	31.50	
287.0	039.0000	0105.1	055.8	148.8	000.2500	0147.4	075.7	31.62	
288.0	039.0000	0107.2	056.1	148.4	000.2500	0146.3	074.7	31.86	
289.0	039.0000	0109.2	056.5	148.0	000.2500	0145.5	073.9	32.10	
290.0	039.0000	0114.9	057.5	147.9	000.2500	0145.2	072.5	32.52	
291.0	039.0000	0120.7	058.4	147.7	000.2500	0144.7	071.1	32.93	
292.0	039.0000	0120.9	058.4	147.1	000.2500	0142.0	070.5	32.99	
293.0	039.0000	0117.0	057.8	146.1	000.2500	0136.9	070.4	32.75	
294.0	039.0000	0116.5	057.7	145.4	000.2500	0135.3	069.9	32.82	
295.0	039.0000	0117.5	057.9	144.7	000.2500	0135.7	069.3	33.05	

## ***Exhibit 7b***

### ***Contour Protection Studies Toward Select Allocation Concern(s)***

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)
296.0	039.0000	0117.9	057.9	144.0	000.2500	0134.2	068.7	33.15
297.0	039.0000	0116.0	057.6	143.2	000.2500	0129.6	068.5	32.97
298.0	039.0000	0113.1	057.2	142.3	000.2500	0122.3	068.5	32.59
299.0	039.0000	0111.9	057.0	141.4	000.2500	0117.9	068.3	32.43
300.0	039.0000	0114.4	057.4	140.8	000.2500	0112.2	067.5	32.35
301.0	039.0000	0116.6	057.7	140.1	000.2500	0109.6	066.8	32.42
302.0	039.0000	0119.3	058.2	139.4	000.2500	0108.3	066.1	32.57
303.0	039.0000	0120.3	058.3	138.6	000.2500	0107.6	065.6	32.67
304.0	039.0000	0120.6	058.4	137.7	000.2500	0108.8	065.3	32.84
305.0	039.0000	0118.9	058.1	136.8	000.2500	0108.9	065.3	32.84
306.0	039.0000	0117.8	057.9	135.9	000.2500	0108.0	065.3	32.80
307.0	039.0000	0120.4	058.3	135.1	000.2500	0106.1	064.7	32.87
308.0	039.0000	0125.2	059.0	134.3	000.2500	0102.4	063.9	32.91
309.0	039.0000	0128.6	059.6	133.4	000.2500	0098.4	063.3	32.86
310.0	039.0000	0130.0	059.8	132.5	000.2500	0093.1	063.0	32.61
311.0	039.0000	0128.7	059.6	131.5	000.2500	0088.1	063.1	32.24
312.0	039.0000	0125.5	059.1	130.6	000.2500	0086.8	063.6	32.01
313.0	039.0000	0123.0	058.7	129.7	000.2500	0090.7	064.0	32.14
314.0	039.0000	0122.1	058.6	128.8	000.2500	0089.9	064.2	32.02
315.0	039.0000	0119.9	058.2	127.9	000.2500	0086.8	064.6	31.70
316.0	039.0000	0121.3	058.5	127.0	000.2500	0081.0	064.6	31.33
317.0	039.0000	0123.2	058.7	126.0	000.2500	0072.8	064.4	30.81
318.0	039.0000	0122.1	058.6	125.2	000.2500	0066.6	064.8	30.27
319.0	039.0000	0121.7	058.5	124.3	000.2500	0061.9	065.1	29.86
320.0	039.0000	0122.5	058.6	123.4	000.2500	0055.3	065.2	29.31
321.0	039.0000	0125.2	059.0	122.4	000.2500	0049.3	065.2	28.80
322.0	039.0000	0131.2	059.9	121.3	000.2500	0044.1	064.6	28.41
323.0	039.0000	0131.7	060.0	120.4	000.2500	0042.7	064.9	28.20
324.0	039.0000	0128.6	059.6	119.7	000.2500	0043.1	065.8	28.06
325.0	039.0000	0127.1	059.3	119.0	000.2500	0045.6	066.4	28.16
326.0	039.0000	0127.9	059.5	118.1	000.2500	0048.7	066.8	28.36
327.0	039.0000	0130.3	059.8	117.2	000.2500	0050.2	066.9	28.46
328.0	039.0000	0135.5	060.6	116.1	000.2500	0049.0	066.8	28.39
329.0	039.0000	0139.2	061.1	115.1	000.2500	0049.1	066.9	28.36
330.0	039.0000	0145.1	062.0	113.9	000.2500	0051.1	066.8	28.57
331.0	039.0000	0146.0	062.1	113.1	000.2500	0051.2	067.4	28.44
332.0	039.0000	0140.3	061.3	112.8	000.2500	0051.6	068.6	28.16
333.0	039.0000	0136.7	060.8	112.4	000.2500	0052.8	069.7	28.00
334.0	039.0000	0137.8	060.9	111.7	000.2500	0054.0	070.3	27.95
335.0	039.0000	0138.1	061.0	111.0	000.2500	0055.4	071.0	27.88
336.0	039.0000	0135.8	060.6	110.6	000.2500	0056.9	072.0	27.75
337.0	039.0000	0137.9	060.9	109.8	000.2500	0060.8	072.5	27.87
338.0	039.0000	0145.7	062.0	108.6	000.2500	0068.5	072.5	28.35
339.0	039.0000	0152.6	063.0	107.5	000.2500	0071.2	072.8	28.45
340.0	039.0000	0154.2	063.2	106.8	000.2500	0069.5	073.5	28.15

## Exhibit 7c

### Contour Protection Studies Toward Select Allocation Concern(s)

FMCommander Single Allocation Study - 01-22-2019 - NED 03 SEC

W222CH.P's Overlaps (In= 14.58 km, Out= 5.01 km)

W222CH.P CH 222 D DA

Lat= 42 31 59.0, Lng= 72 35 33.0

0.25 kW 105.4 m HAAT, 274 m COR

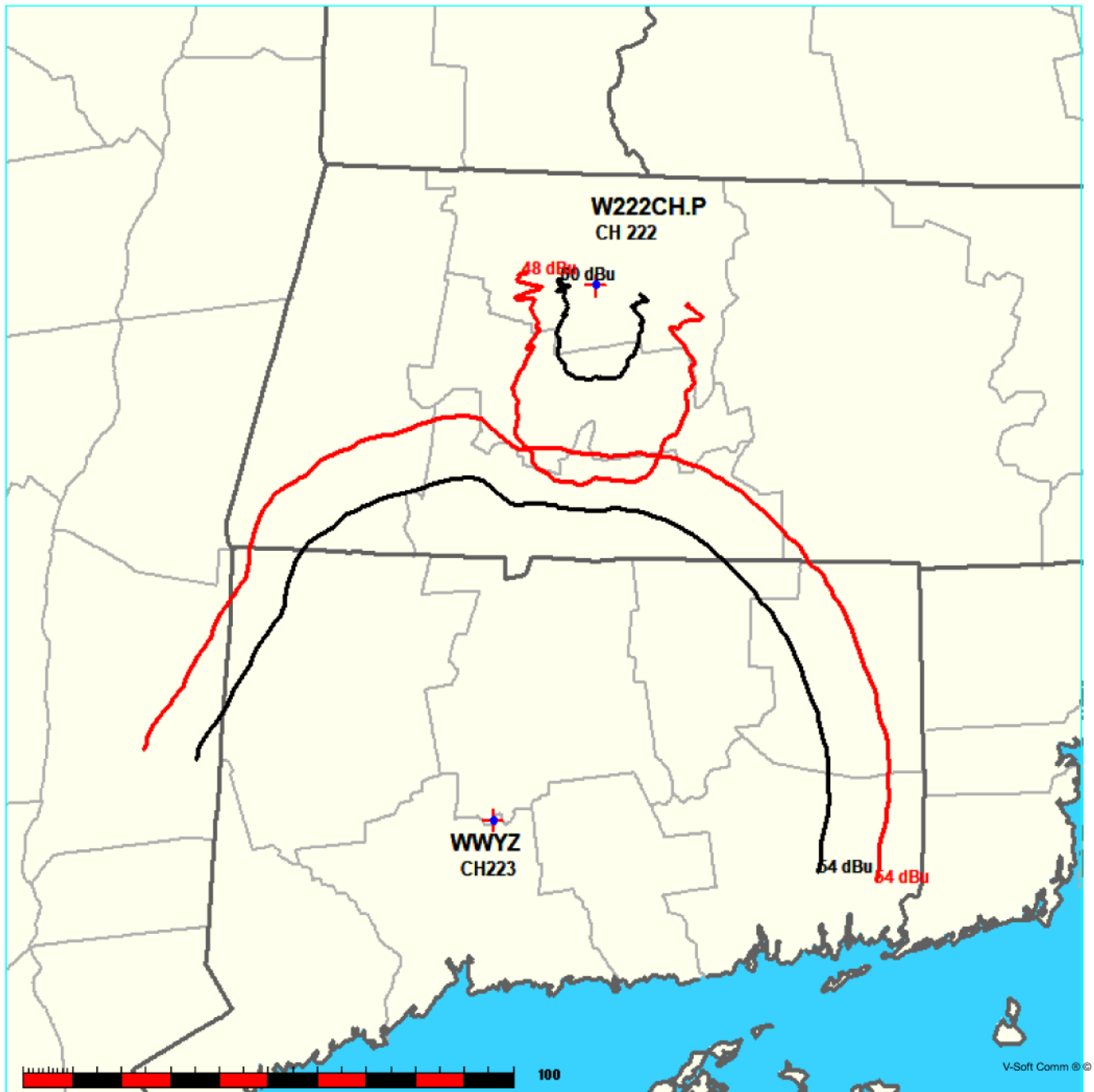
Prot.= 60 dBu, Intef.= 48 dBu

WWYZ CH 223 B BLH19940916KD

Lat= 41 33 47.0, Lng= 72 50 42.0

17.0 kW 268 m HAAT, 368 m COR

Prot.= 54 dBu, Intef.= 54 dBu



## Exhibit 7c

### Contour Protection Studies Toward Select Allocation Concern(s)

01-22-2019

Terrain Data: NED 03 SEC

FMOver Analysis

W222CH.P

WWYZ BLH19940916KD

Channel = 222D  
Max ERP = 0.25 kW  
RCAMSL = 274 m  
N. Lat. 42 31 59.0  
W. Lng. 72 35 33.0  
Protected  
60 dBu

Channel = 223B  
Max ERP = 17 kW  
RCAMSL = 368 m  
N. Lat. 41 33 47.0  
W. Lng. 72 50 42.0  
Interfering  
54 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
150.0	000.2500	0150.8	015.9	017.0	017.0000	0258.6	098.4	47.11	
151.0	000.2500	0155.5	016.2	017.0	017.0000	0258.6	098.0	47.23	
152.0	000.2500	0158.0	016.4	016.9	017.0000	0258.6	097.6	47.33	
153.0	000.2500	0155.9	016.3	016.8	017.0000	0258.2	097.5	47.35	
154.0	000.2500	0155.8	016.3	016.6	017.0000	0258.1	097.3	47.41	
155.0	000.2500	0155.6	016.3	016.5	017.0000	0257.8	097.2	47.45	
156.0	000.2500	0158.9	016.5	016.5	017.0000	0257.7	096.8	47.56	
157.0	000.2500	0162.5	016.7	016.4	017.0000	0257.5	096.5	47.66	
158.0	000.2500	0170.8	017.2	016.5	017.0000	0257.6	095.9	47.84	
159.0	000.2500	0180.3	017.6	016.5	017.0000	0257.7	095.3	48.02	
160.0	000.2500	0186.0	017.9	016.4	017.0000	0257.6	094.9	48.14	
161.0	000.2500	0192.2	018.2	016.4	017.0000	0257.4	094.5	48.26	
162.0	000.2500	0200.6	018.6	016.4	017.0000	0257.4	094.0	48.41	
163.0	000.2500	0205.8	018.8	016.3	017.0000	0257.2	093.7	48.52	
164.0	000.2500	0209.6	019.0	016.2	017.0000	0256.9	093.3	48.61	
165.0	000.2500	0215.6	019.2	016.1	017.0000	0256.7	092.9	48.73	
166.0	000.2500	0216.8	019.3	015.9	017.0000	0256.2	092.7	48.78	
167.0	000.2500	0217.9	019.3	015.7	017.0000	0255.7	092.5	48.83	
168.0	000.2500	0219.6	019.4	015.6	017.0000	0255.3	092.3	48.89	
169.0	000.2500	0219.5	019.4	015.4	017.0000	0255.0	092.2	48.93	
170.0	000.2500	0218.4	019.3	015.2	017.0000	0254.7	092.0	48.95	
171.0	000.2500	0217.3	019.3	015.0	017.0000	0254.4	091.9	48.97	
172.0	000.2500	0214.7	019.2	014.8	017.0000	0253.7	091.9	48.96	
173.0	000.2500	0212.5	019.1	014.5	017.0000	0253.0	091.9	48.95	
174.0	000.2500	0212.4	019.1	014.3	017.0000	0252.0	091.8	48.96	
175.0	000.2500	0211.5	019.0	014.1	017.0000	0251.0	091.7	48.95	
176.0	000.2500	0208.7	018.9	013.9	017.0000	0250.0	091.7	48.92	
177.0	000.2500	0207.4	018.9	013.7	017.0000	0249.4	091.7	48.91	
178.0	000.2500	0207.4	018.9	013.5	017.0000	0249.0	091.6	48.92	
179.0	000.2500	0205.7	018.8	013.3	017.0000	0248.5	091.5	48.91	
180.0	000.2500	0203.1	018.7	013.1	017.0000	0248.3	091.6	48.89	
181.0	000.2500	0205.9	018.8	012.9	017.0000	0248.0	091.4	48.95	

***Exhibit 7c***  
**Contour Protection Studies Toward Select Allocation Concern(s)**

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)
182.0	000.2500	0211.7	019.1	012.7	017.0000	0247.7	091.1	49.04
183.0	000.2500	0216.5	019.3	012.6	017.0000	0247.6	090.8	49.12
184.0	000.2500	0219.2	019.4	012.4	017.0000	0247.6	090.6	49.17
185.0	000.2500	0218.8	019.4	012.1	017.0000	0247.7	090.6	49.19
186.0	000.2500	0218.4	019.3	011.9	017.0000	0248.1	090.6	49.21
187.0	000.2500	0216.7	019.3	011.7	017.0000	0248.8	090.6	49.21
188.0	000.2500	0216.2	019.3	011.5	017.0000	0249.6	090.6	49.24
189.0	000.2500	0216.5	019.3	011.3	017.0000	0250.2	090.6	49.27
190.0	000.2500	0217.0	019.3	011.1	017.0000	0250.5	090.6	49.29
191.0	000.2500	0217.6	019.3	010.9	017.0000	0250.5	090.5	49.30
192.0	000.2500	0218.1	019.3	010.6	017.0000	0250.3	090.5	49.30
193.0	000.2500	0214.9	019.2	010.4	017.0000	0250.1	090.7	49.25
194.0	000.2500	0209.5	019.0	010.2	017.0000	0250.0	090.9	49.16
195.0	000.2500	0209.1	018.9	010.0	017.0000	0249.9	091.0	49.14
196.0	000.2500	0207.4	018.9	009.8	017.0000	0249.7	091.1	49.10
197.0	000.2500	0205.6	018.8	009.6	017.0000	0249.4	091.2	49.06
198.0	000.2500	0203.9	018.7	009.4	017.0000	0248.9	091.3	49.00
199.0	000.2500	0200.3	018.5	009.2	017.0000	0248.6	091.5	48.93
200.0	000.2500	0193.3	018.2	009.1	017.0000	0248.4	091.9	48.81
201.0	000.2500	0180.9	017.7	009.0	017.0000	0248.3	092.5	48.61
202.0	000.2500	0171.2	017.2	008.8	017.0000	0248.0	093.0	48.43
203.0	000.2500	0171.3	017.2	008.7	017.0000	0247.5	093.1	48.40
204.0	000.2500	0170.5	017.1	008.5	017.0000	0247.1	093.2	48.35
205.0	000.2500	0166.9	016.9	008.3	017.0000	0246.9	093.5	48.25
206.0	000.2500	0163.7	016.8	008.2	017.0000	0246.6	093.8	48.16
207.0	000.2500	0164.5	016.8	008.0	017.0000	0246.3	093.8	48.14
208.0	000.2500	0160.4	016.6	007.9	017.0000	0246.3	094.1	48.04
209.0	000.2500	0153.5	016.1	007.8	017.0000	0246.3	094.6	47.88
210.0	000.2500	0142.1	015.4	007.8	017.0000	0246.3	095.4	47.64
211.0	000.2500	0129.5	014.6	007.9	017.0000	0246.3	096.2	47.38
212.0	000.2500	0126.4	014.4	007.8	017.0000	0246.2	096.5	47.30
213.0	000.2500	0118.7	014.0	007.8	017.0000	0246.2	097.0	47.14
214.0	000.2500	0107.0	013.3	007.8	017.0000	0246.3	097.7	46.92
215.0	000.2500	0105.1	013.2	007.7	017.0000	0246.1	097.9	46.85
216.0	000.2500	0105.8	013.2	007.6	017.0000	0245.8	098.0	46.82
217.0	000.2500	0102.8	013.0	007.5	017.0000	0245.7	098.3	46.73
218.0	000.2500	0101.3	012.9	007.4	017.0000	0245.4	098.5	46.66
219.0	000.2500	0098.5	012.8	007.4	017.0000	0245.2	098.7	46.58
220.0	000.2500	0090.3	012.2	007.4	017.0000	0245.4	099.3	46.41
221.0	000.2500	0076.0	011.3	007.6	017.0000	0245.9	100.2	46.15
222.0	000.2500	0066.9	010.7	007.7	017.0000	0246.1	100.8	45.97
223.0	000.2500	0057.4	010.0	007.9	017.0000	0246.3	101.5	45.77
224.0	000.2500	0049.2	009.2	008.1	017.0000	0246.4	102.3	45.56
225.0	000.2500	0044.3	008.7	008.2	017.0000	0246.5	102.8	45.41
226.0	000.2500	0047.4	009.0	008.0	017.0000	0246.3	102.6	45.46
227.0	000.2500	0050.2	009.3	007.8	017.0000	0246.3	102.5	45.49

# ***Exhibit 7c***

## **Contour Protection Studies Toward Select Allocation Concern(s)**

01-22-2019      Terrain Data: NED 03 SEC      FMOver Analysis

WWYZ    BLH19940916KD

W222CH.P

Channel = 223B  
 Max ERP = 17 kW  
 RCAMSL = 368 m  
 N. Lat. 41 33 47.0  
 W. Lng. 72 50 42.0  
 Protected  
     54   dBu

Channel = 222D  
 Max ERP = 0.25 kW  
 RCAMSL = 274 m  
 N. Lat. 42 31 59.0  
 W. Lng. 72 35 33.0  
 Interfering  
     48   dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
326.0	017.0000	0286.3	067.4	228.5	000.2500	0046.0	078.2	25.52	
327.0	017.0000	0287.5	067.5	228.4	000.2500	0046.2	077.0	25.80	
328.0	017.0000	0287.1	067.4	228.2	000.2500	0046.9	075.8	26.11	
329.0	017.0000	0287.3	067.4	228.1	000.2500	0047.4	074.7	26.41	
330.0	017.0000	0287.5	067.5	227.9	000.2500	0048.0	073.5	26.72	
331.0	017.0000	0284.7	067.2	227.5	000.2500	0048.9	072.4	27.04	
332.0	017.0000	0288.4	067.5	227.5	000.2500	0048.9	071.2	27.33	
333.0	017.0000	0295.7	068.1	227.7	000.2500	0048.4	069.9	27.59	
334.0	017.0000	0298.2	068.3	227.6	000.2500	0048.7	068.7	27.90	
335.0	017.0000	0298.2	068.3	227.3	000.2500	0049.7	067.6	28.25	
336.0	017.0000	0298.2	068.3	227.0	000.2500	0050.2	066.5	28.57	
337.0	017.0000	0298.4	068.3	226.7	000.2500	0050.0	065.3	28.82	
338.0	017.0000	0297.8	068.3	226.2	000.2500	0049.1	064.2	29.00	
339.0	017.0000	0297.9	068.3	225.8	000.2500	0046.1	063.1	28.97	
340.0	017.0000	0300.0	068.4	225.5	000.2500	0044.5	062.0	29.09	
341.0	017.0000	0301.2	068.5	225.1	000.2500	0044.1	060.9	29.32	
342.0	017.0000	0300.7	068.5	224.6	000.2500	0045.8	059.8	29.77	
343.0	017.0000	0299.5	068.4	223.9	000.2500	0049.6	058.8	30.46	
344.0	017.0000	0297.7	068.3	223.2	000.2500	0054.6	057.8	31.27	
345.0	017.0000	0296.1	068.1	222.5	000.2500	0062.5	056.9	32.27	
346.0	017.0000	0295.7	068.1	221.8	000.2500	0068.7	055.9	33.12	
347.0	017.0000	0297.7	068.3	221.2	000.2500	0073.6	054.9	33.89	
348.0	017.0000	0299.9	068.4	220.6	000.2500	0080.8	053.8	34.86	
349.0	017.0000	0302.7	068.6	220.0	000.2500	0090.1	052.7	36.01	
350.0	017.0000	0304.6	068.8	219.3	000.2500	0096.5	051.7	36.88	
351.0	017.0000	0306.4	068.9	218.5	000.2500	0100.6	050.7	37.56	
352.0	017.0000	0307.6	069.0	217.6	000.2500	0100.7	049.8	37.92	
353.0	017.0000	0309.1	069.1	216.7	000.2500	0103.6	048.9	38.49	
354.0	017.0000	0308.8	069.1	215.6	000.2500	0106.0	048.1	38.96	
355.0	017.0000	0307.9	069.0	214.5	000.2500	0104.9	047.4	39.16	
356.0	017.0000	0306.7	068.9	213.3	000.2500	0115.1	046.7	40.11	
357.0	017.0000	0304.5	068.8	212.0	000.2500	0126.4	046.1	40.98	
358.0	017.0000	0300.5	068.5	210.5	000.2500	0134.4	045.7	41.57	

## Exhibit 7c

### Contour Protection Studies Toward Select Allocation Concern(s)

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)
359.0	017.0000	0287.5	067.5	208.6	000.2500	0156.5	046.0	42.62
000.0	017.0000	0275.9	066.5	206.7	000.2500	0164.1	046.2	42.89
001.0	017.0000	0261.4	065.3	204.8	000.2500	0167.9	046.8	42.84
002.0	017.0000	0252.2	064.6	203.2	000.2500	0171.7	047.1	42.93
003.0	017.0000	0241.5	063.7	201.6	000.2500	0174.0	047.5	42.87
004.0	017.0000	0238.8	063.5	200.2	000.2500	0191.1	047.4	43.72
005.0	017.0000	0240.0	063.6	199.0	000.2500	0200.3	047.0	44.31
006.0	017.0000	0244.0	063.9	197.7	000.2500	0204.8	046.4	44.75
007.0	017.0000	0244.4	064.0	196.4	000.2500	0206.6	046.2	44.93
008.0	017.0000	0246.3	064.1	195.0	000.2500	0209.1	045.9	45.17
009.0	017.0000	0248.3	064.3	193.6	000.2500	0210.9	045.6	45.37
010.0	017.0000	0249.9	064.4	192.2	000.2500	0218.2	045.4	45.79
011.0	017.0000	0250.5	064.5	190.8	000.2500	0217.5	045.4	45.78
012.0	017.0000	0247.9	064.3	189.4	000.2500	0216.7	045.6	45.65
013.0	017.0000	0248.1	064.3	188.0	000.2500	0216.2	045.7	45.60
014.0	017.0000	0250.3	064.5	186.6	000.2500	0217.4	045.6	45.68
015.0	017.0000	0254.4	064.8	185.1	000.2500	0218.7	045.5	45.80
016.0	017.0000	0256.5	064.9	183.7	000.2500	0218.4	045.5	45.76
017.0	017.0000	0258.7	065.1	182.2	000.2500	0213.0	045.6	45.47
018.0	017.0000	0260.3	065.3	180.8	000.2500	0205.1	045.8	45.02
019.0	017.0000	0266.2	065.7	179.3	000.2500	0205.1	045.7	45.05
020.0	017.0000	0271.4	066.2	177.7	000.2500	0207.3	045.8	45.15
021.0	017.0000	0282.7	067.1	175.9	000.2500	0208.8	045.4	45.38
022.0	017.0000	0289.5	067.6	174.3	000.2500	0212.6	045.4	45.54
023.0	017.0000	0291.3	067.8	172.9	000.2500	0212.6	045.9	45.35
024.0	017.0000	0297.1	068.2	171.4	000.2500	0216.7	046.1	45.44
025.0	017.0000	0301.0	068.5	169.9	000.2500	0218.5	046.5	45.35
026.0	017.0000	0307.4	069.0	168.4	000.2500	0219.7	046.9	45.27
027.0	017.0000	0310.0	069.2	167.1	000.2500	0218.2	047.5	44.95
028.0	017.0000	0310.3	069.2	166.0	000.2500	0216.8	048.2	44.58
029.0	017.0000	0311.7	069.3	164.9	000.2500	0215.1	049.0	44.21
030.0	017.0000	0315.9	069.6	163.6	000.2500	0207.4	049.6	43.60
031.0	017.0000	0318.7	069.8	162.5	000.2500	0204.1	050.4	43.14
032.0	017.0000	0320.3	069.9	161.5	000.2500	0196.3	051.2	42.45
033.0	017.0000	0320.4	070.0	160.7	000.2500	0190.4	052.2	41.81
034.0	017.0000	0321.5	070.0	159.8	000.2500	0184.8	053.1	41.19
035.0	017.0000	0322.6	070.1	159.0	000.2500	0180.4	054.1	40.62
036.0	017.0000	0323.4	070.2	158.3	000.2500	0173.3	055.1	39.91
037.0	017.0000	0324.9	070.3	157.5	000.2500	0165.8	056.1	39.17
038.0	017.0000	0325.0	070.3	156.9	000.2500	0162.0	057.1	38.58
039.0	017.0000	0324.3	070.2	156.4	000.2500	0160.2	058.2	38.08
040.0	017.0000	0322.8	070.1	155.9	000.2500	0158.5	059.4	37.58
041.0	017.0000	0323.1	070.2	155.4	000.2500	0156.2	060.5	37.06
042.0	017.0000	0324.9	070.3	154.8	000.2500	0155.3	061.6	36.63
043.0	017.0000	0324.6	070.3	154.4	000.2500	0155.3	062.7	36.24

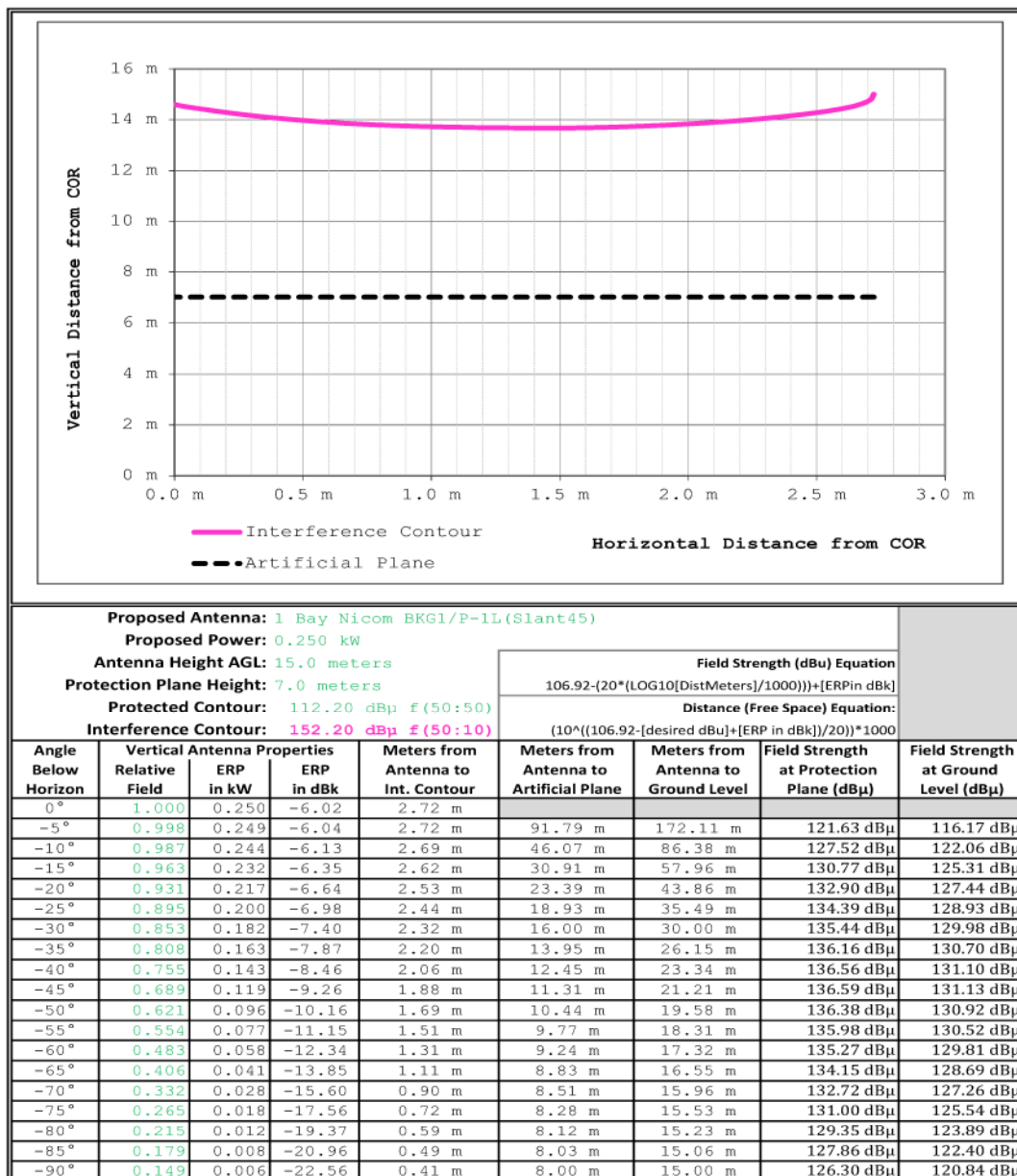
## Exhibit 8

### 47 C.F.R. Section 74.1204(d) Second / Third Adjacent Given Interference Waiver Request

Yellow Highlighted Text denotes the existence of a 47 C.F.R. Section 74.1204(d) Second/Third Adjacent Channel Given Interference Waiver Request toward WNNZ-FM - Deerfield, MA (CH219A) as included in **Exhibit 8**. Protection of the worst case calculated 152.2 dBμ F(50:10) Interference Contour, corresponding to the 112.2 dBμ F(50:50) Protected Contour, has been demonstrated through a downward radiation study. Full protection will be afforded the facility as this interference area will not reach the ground nor a seven meter artificial plane representing a standard two story building when taking into account the downward radiation characteristics of the antenna as supplied by the antenna manufacturer. A copy of the antenna manufacturer specifications has been included in **Exhibit 9**.

Signal Report ✕

WNNZ-FM Signal value at Reference site = 112.2 dBu. Distance to W222CH.P interference signal contour = 2.7 m

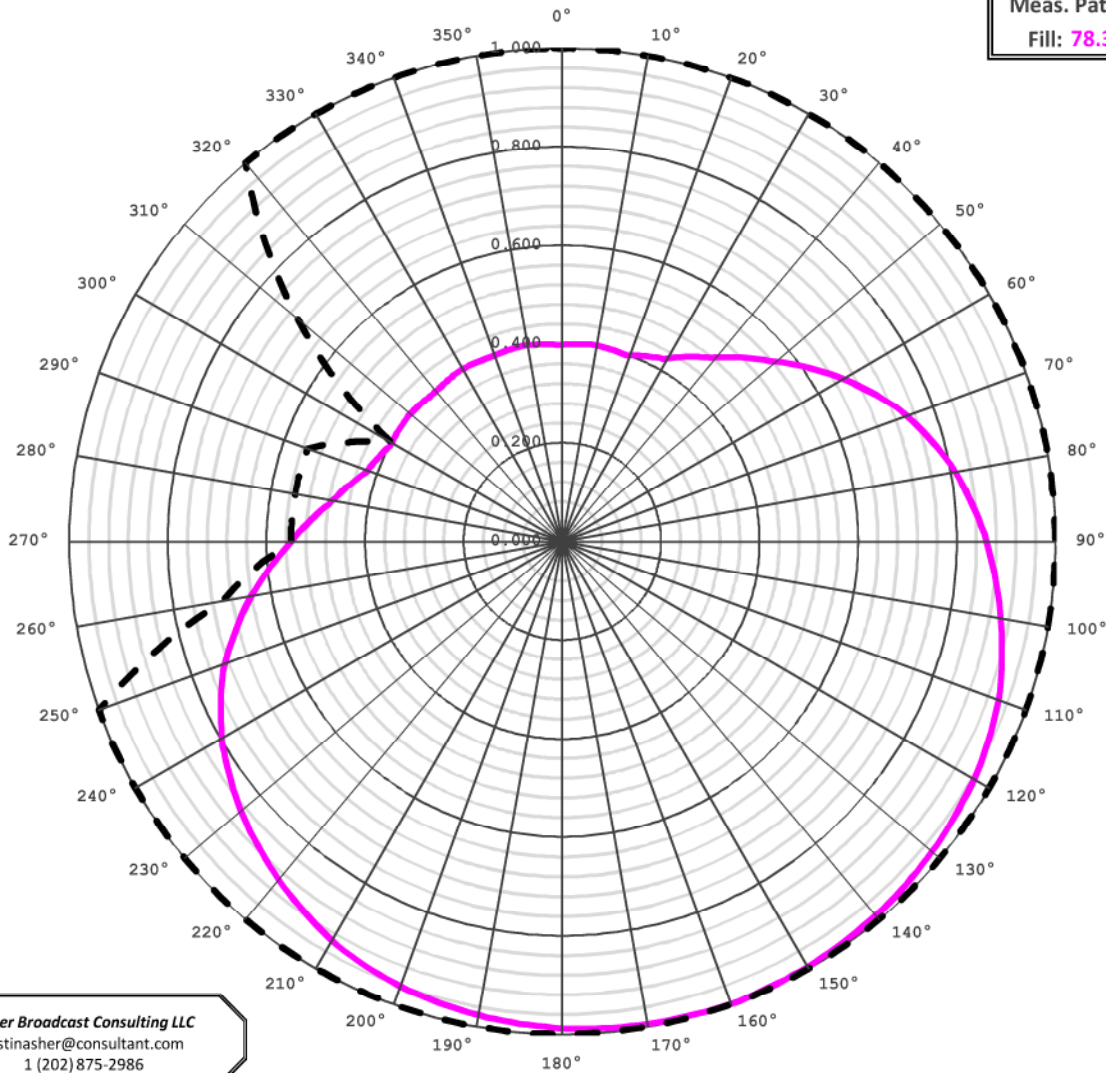


Manufacturer's	Make/Model	Orientation	Power
Element 1:	BKG1/P(Slant45)	159° True	100.0%
Element 2:			
Element 3:			
Element 4:			

Composite Power: 100%

## Exhibit 9 - Copy of Manufacturer's Directional Antenna Pattern Data

Meas. Pattern  
Fill: 78.3%



Azimuth ° True	FCC Pattern	Manufacturer's Pattern
0°	1.000	0.399
10°	1.000	0.403
20°	1.000	0.401
30°	1.000	0.429
40°	1.000	0.487
50°	1.000	0.566
60°	1.000	0.659
70°	1.000	0.744
80°	1.000	0.809
90°	1.000	0.860
100°	1.000	0.903
110°	1.000	0.941
120°	1.000	0.965
130°	1.000	0.979
140°	1.000	0.990
150°	1.000	0.996
160°	1.000	1.000
170°	1.000	0.994
180°	1.000	0.988
190°	1.000	0.977
200°	1.000	0.961
210°	1.000	0.935
220°	1.000	0.895
230°	1.000	0.851
240°	1.000	0.797
250°	1.000	0.728
260°	0.700	0.641
270°	0.550	0.549
280°	0.550	0.473
290°	0.550	0.421
300°	0.400	0.399
310°	0.700	0.403
320°	1.000	0.399
330°	1.000	0.404
340°	1.000	0.401
350°	1.000	0.403

Asher Broadcast Consulting LLC  
justinasher@consultant.com  
1 (202) 875-2986

FCC Pattern: ---  
Manufacturer's Pattern: ———

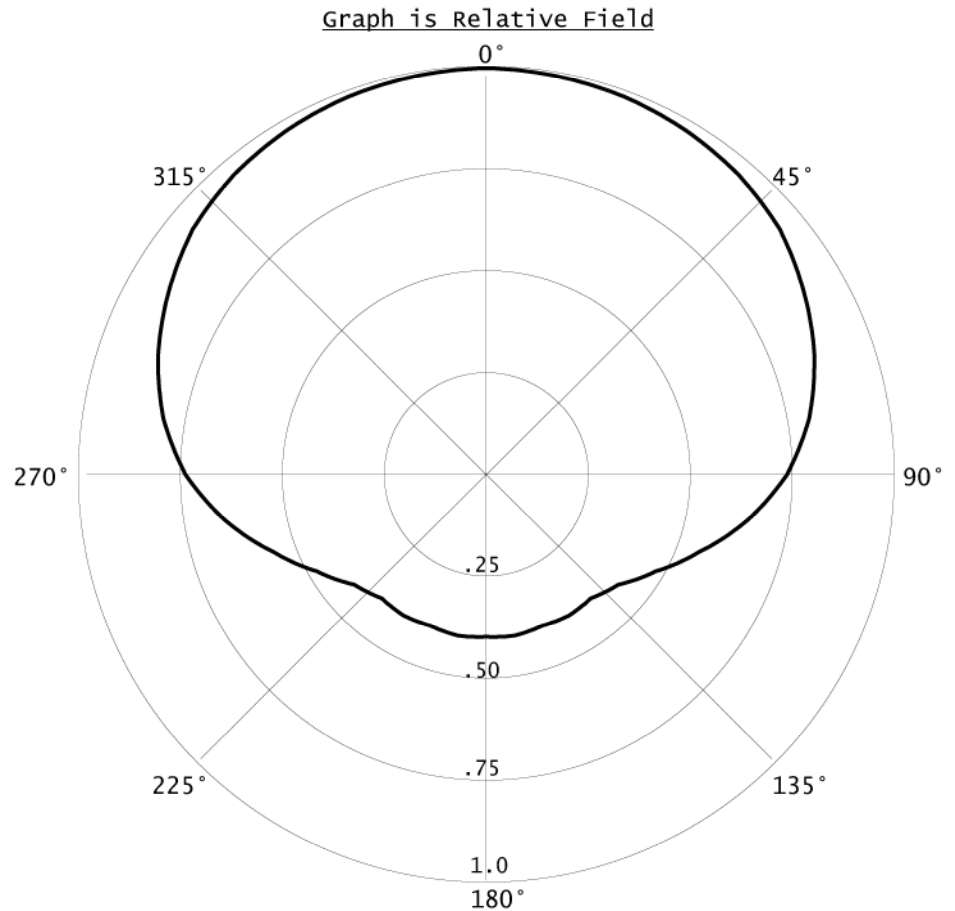
## Exhibit 9

### Copy of Manufacturer's Directional Antenna Documentation (Actual Antenna Elements rotated to 159°T) (public record copy)

#### BKG1/P-1DA(Slant45) COMPOSITE PATTERN

Azi	Field	dBk
000	1.000	-10.000
010	0.995	-10.044
020	0.989	-10.096
030	0.978	-10.193
040	0.963	-10.327
050	0.939	-10.547
060	0.899	-10.925
070	0.856	-11.351
080	0.804	-11.895
090	0.737	-12.651
100	0.650	-13.742
110	0.557	-15.083
120	0.479	-16.393
130	0.423	-17.473
140	0.399	-17.981
150	0.403	-17.894
160	0.398	-18.002
170	0.404	-17.872
180	0.401	-17.937
190	0.404	-17.872
200	0.398	-18.002
210	0.403	-17.894
220	0.399	-17.981
230	0.423	-17.473
240	0.479	-16.393
250	0.557	-15.083
260	0.650	-13.742
270	0.737	-12.651
280	0.804	-11.895
290	0.856	-11.351
300	0.899	-10.925
310	0.939	-10.547
320	0.963	-10.327
330	0.978	-10.193
340	0.989	-10.096
350	0.995	-10.044

RMS(V)= .739



The directional antenna pattern will be produced by means of a Nicom Dipole BKG1/P broadcast element mounted at a 45° (degree) slant orientation to achieve horizontal and vertical polarization. The BKG1/P-1DA(Slant45) Directional Pattern is therefore a maximum composite pattern of the current horizontal and vertical broadcast patterns as notified by Nicom USA, Inc.

The maximum antenna gain for a single BKG1/P-1DA(Slant45) element will be -3.0 dBd or the common horizontal or vertical maximum antenna gain of 0.0 dBd adjusted by 3 dBd for dual broadcast in the Horizontal and Vertical planes (-3.0 dBd = 0.0 dBd - 3.0 dBd). The maximum gain for multiple bay options of the Nicom BKG1/P-1DA(Slant45) antenna would therefore also be adjusted by -3 dBd to account for operation in the horizontal and vertical planes.

The antenna proposed in this application will be mounted in accordance with specific instructions provided by the antenna manufacturer. The directional antenna will be mounted on the tower which is of uniform cross section. No other antennas of any type are or will be mounted on the same tower level as the directional antenna.

No antenna is or will be mounted within any vertical or horizontal distance specified by the antenna manufacturer as being necessary for proper operation of the directional antenna. In addition, the antenna will be assembled under the supervision of a qualified engineer and installed pursuant to the manufacturer's instructions and manufacturer specified antenna orientation.

## Exhibit 9

# Copy of Manufacturer's Directional Antenna Documentation (Actual Antenna Elements rotated to 159°T) (public record copy)



### BKG1/P

Medium Power Portable Broadband FM Dipole

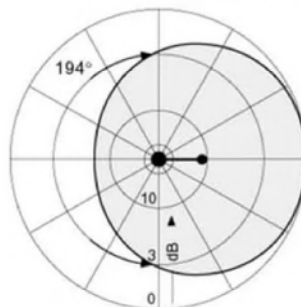
This broadband dipole antenna is constructed of stainless steel and is designed to last a long time in any weather condition. Because of its sturdy construction, it can support up to 2.5 KW of input power with the appropriate connector. Since it has a wide angle of radiation, it is strongly recommended for omni-directional arrays. Due to the fact that it is easily disassembled and reassembled, it can be placed in a compact container making it very portable and inexpensive to ship.

#### TECHNICAL SPECIFICATIONS

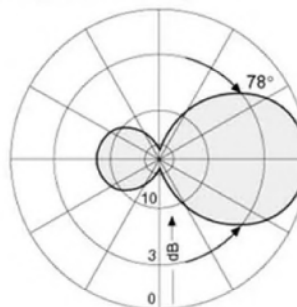
**Antenna Type:** dipole  
**Front-to-Back Ratio:** 7 dB  
**Frequency Range:** 87.5 - 108 MHz  
**Polarization:** vertical  
**Gain:** 0 dBd (unity gain)  
**Bandwidth:** 20 MHz Max  
**VSWR:** < 1.3  
**H Plane:** 194 degrees  
**V Plane:** 78 degrees  
**Impedance:** 50 Ohms  
**Connectors:** N type (1 kw) - 7/8 type (2 kw)  
**Power Rating:** 2000 Watts max.  
**Wind Load:** 39.6 Lbs (18 kg)  
**Wind Velocity:** 119 mph (190 km/h)  
**Wind Surface:** 1.2 ft<sup>2</sup> (0.11 m<sup>2</sup>)  
**Lightning Protection:** all parts grounded  
**Material:** (external) stainless steel  
**Mounting:** from 2" to 4"  
**Weight:** 18 Lbs (8.1 kg)  
**Average Dimensions:** 50"×30"×2"  
**Packing:** 46"×22"×4"



#### Radiation Patterns (at mid-band)



in H-plane  
Horizontal Radiation Pattern



in E-plane  
Vertical Radiation Pattern

## Exhibit 9

# Copy of Manufacturer's Directional Antenna Documentation (Actual Antenna Elements rotated to 159°T) (public record copy)

TX station: BKG1/P

Site name:

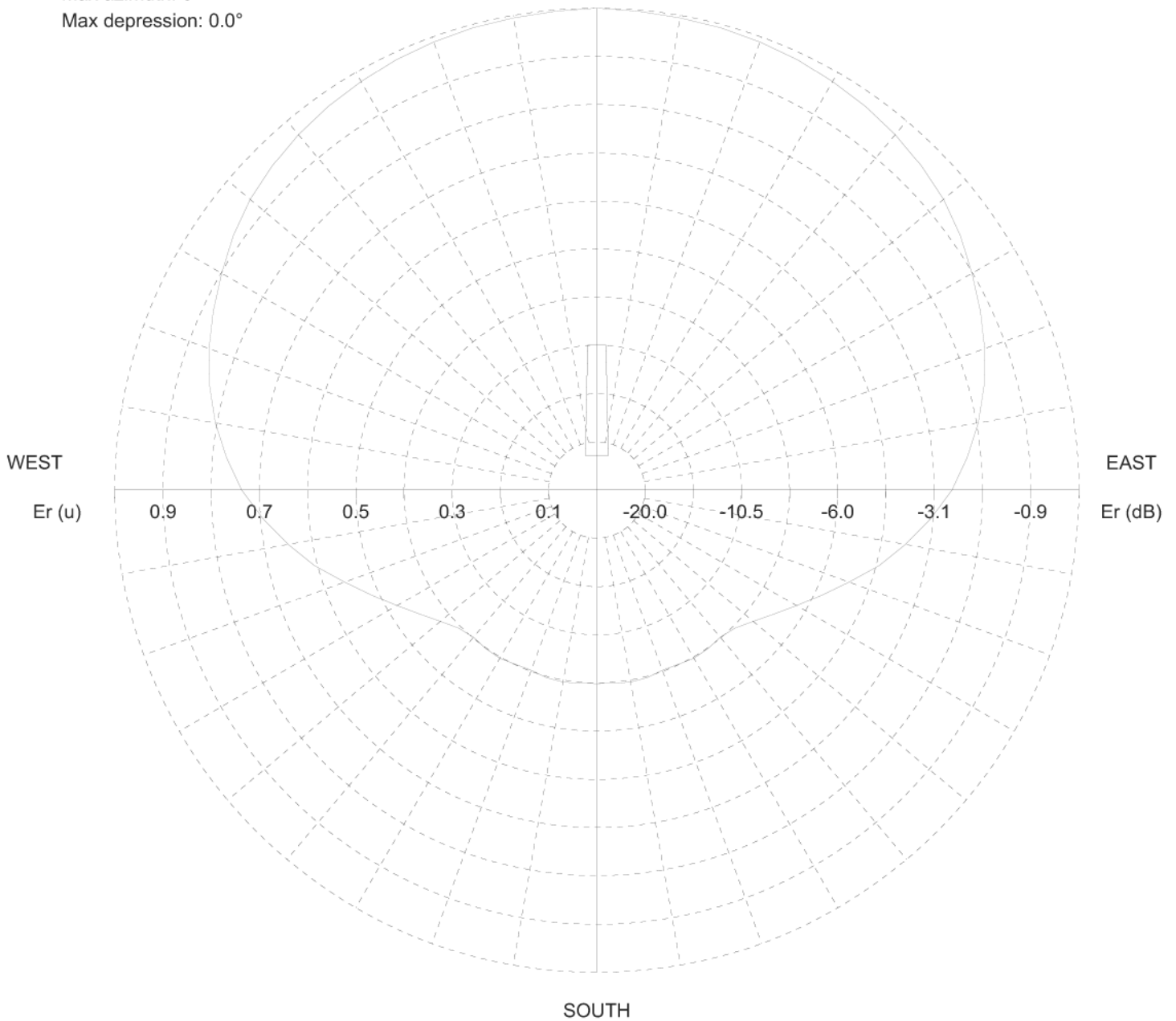
Frequency: 100.00 MHz

### Horizontal diagram of Maxima

NORTH

Max azimuth: 0°

Max depression: 0.0°



—— 0.0° depres. (Total antenna), Gain (dBd): 0.00 ERP T.max (KW): 1.

ERP E.max (KW): 0.776

# Exhibit 9

## Copy of Manufacturer's Directional Antenna Documentation

(Actual Antenna Elements rotated to 159°T) (public record copy)

TX station: BKG1/P

Site name:

Frequency: 100.00 MHz

### Horizontal diagram of Maxima

Az (°)	Dep (°)	Er (%)	ERP (W)	Az (°)	Dep (°)	Er (%)	ERP (W)	Az (°)	Dep (°)	Er (%)	ERP (W)
0.0	0.0	100.0	776.2	120.0	0.0	47.9	178.0	240.0	0.0	47.9	178.0
5.0	0.0	99.7	772.1	125.0	0.0	44.8	156.0	245.0	0.0	51.5	205.9
10.0	0.0	99.5	768.1	130.0	0.0	42.3	139.1	250.0	0.0	55.7	240.8
15.0	0.0	99.3	765.7	135.0	0.0	40.5	127.4	255.0	0.0	60.6	285.0
20.0	0.0	98.9	759.7	140.0	0.0	39.9	123.3	260.0	0.0	65.0	328.3
25.0	0.0	98.5	753.4	145.0	0.0	40.1	125.1	265.0	0.0	69.5	374.7
30.0	0.0	97.8	743.2	150.0	0.0	40.3	126.0	270.0	0.0	73.7	421.3
35.0	0.0	97.2	733.2	155.0	0.0	39.9	123.5	275.0	0.0	77.1	461.6
40.0	0.0	96.3	720.1	160.0	0.0	39.8	122.8	280.0	0.0	80.4	501.4
45.0	0.0	95.2	703.9	165.0	0.0	40.3	126.1	285.0	0.0	83.2	536.8
50.0	0.0	93.9	684.4	170.0	0.0	40.4	126.9	290.0	0.0	85.6	569.2
55.0	0.0	92.1	658.3	175.0	0.0	40.3	125.8	295.0	0.0	87.8	598.3
60.0	0.0	89.9	627.1	180.0	0.0	40.1	125.0	300.0	0.0	89.9	627.1
65.0	0.0	87.8	598.3	185.0	0.0	40.3	125.8	305.0	0.0	92.1	658.3
70.0	0.0	85.6	569.2	190.0	0.0	40.4	126.9	310.0	0.0	93.9	684.4
75.0	0.0	83.2	536.8	195.0	0.0	40.3	126.1	315.0	0.0	95.2	703.9
80.0	0.0	80.4	501.4	200.0	0.0	39.8	122.8	320.0	0.0	96.3	720.1
85.0	0.0	77.1	461.6	205.0	0.0	39.9	123.5	325.0	0.0	97.2	733.2
90.0	0.0	73.7	421.3	210.0	0.0	40.3	126.0	330.0	0.0	97.8	743.2
95.0	0.0	69.5	374.7	215.0	0.0	40.1	125.1	335.0	0.0	98.5	753.4
100.0	0.0	65.0	328.3	220.0	0.0	39.9	123.3	340.0	0.0	98.9	759.7
105.0	0.0	60.6	285.0	225.0	0.0	40.5	127.4	345.0	0.0	99.3	765.7
110.0	0.0	55.7	240.8	230.0	0.0	42.3	139.1	350.0	0.0	99.5	768.1
115.0	0.0	51.5	205.9	235.0	0.0	44.8	156.0	355.0	0.0	99.7	772.1

## Exhibit 9

### Copy of Manufacturer's Directional Antenna Documentation (Actual Antenna Elements rotated to 159°T) (public record copy)

TX station: BKG1/P

Site name:

Frequency: 100.00 MHz

Vertical diagram



# Exhibit 9

## Copy of Manufacturer's Directional Antenna Documentation

(Actual Antenna Elements rotated to 159°T) (public record copy)

TX station: BKG1/P

Site name:

Frequency: 100.00 MHz

### Vertical diagram at an azimuth of 0° degrees

Dep (°)	Er (%)	ERP (W)	Dep (°)	Er (%)	ERP (W)	Dep (°)	Er (%)	ERP (W)
0.0	100.0	776.2	60.0	48.3	180.9	120.0	32.8	83.6
1.0	100.0	776.1	61.0	46.8	169.7	121.0	33.2	85.8
2.0	100.0	775.9	62.0	45.2	158.9	122.0	33.7	88.0
3.0	100.0	775.7	63.0	43.7	148.5	123.0	34.1	90.2
4.0	99.9	774.8	64.0	42.2	138.1	124.0	34.4	91.9
5.0	99.8	773.8	65.0	40.6	128.0	125.0	34.7	93.6
6.0	99.8	772.9	66.0	39.1	118.4	126.0	35.0	95.3
7.0	99.5	769.2	67.0	37.6	109.6	127.0	35.3	96.8
8.0	99.3	765.6	68.0	36.1	101.1	128.0	35.6	98.2
9.0	99.1	762.0	69.0	34.6	92.9	129.0	35.8	99.6
10.0	98.7	755.7	70.0	33.2	85.4	130.0	36.0	100.4
11.0	98.3	749.5	71.0	31.7	78.1	131.0	36.1	101.3
12.0	97.9	743.2	72.0	30.3	71.2	132.0	36.3	102.1
13.0	97.3	735.2	73.0	29.0	65.4	133.0	36.4	103.0
14.0	96.8	727.2	74.0	27.8	59.9	134.0	36.6	103.8
15.0	96.3	719.2	75.0	26.5	54.6	135.0	36.7	104.7
16.0	95.7	710.3	76.0	25.4	50.1	136.0	36.8	105.3
17.0	95.1	701.4	77.0	24.3	45.8	137.0	36.9	105.9
18.0	94.5	692.6	78.0	23.2	41.7	138.0	37.0	106.5
19.0	93.8	683.0	79.0	22.3	38.7	139.0	37.1	107.1
20.0	93.1	673.5	80.0	21.5	35.8	140.0	37.2	107.7
21.0	92.5	664.1	81.0	20.6	33.1	141.0	37.3	108.2
22.0	91.8	653.7	82.0	19.9	30.9	142.0	37.4	108.8
23.0	91.0	643.4	83.0	19.2	28.8	143.0	37.5	109.3
24.0	90.3	633.1	84.0	18.6	26.7	144.0	37.6	109.8
25.0	89.5	621.6	85.0	17.9	25.0	145.0	37.7	110.4
26.0	88.7	610.3	86.0	17.3	23.4	146.0	37.8	111.0
27.0	87.8	599.0	87.0	16.7	21.8	147.0	37.9	111.6
28.0	87.0	587.3	88.0	16.1	20.2	148.0	38.1	112.5
29.0	86.1	575.7	89.0	15.5	18.7	149.0	38.2	113.4
30.0	85.3	564.3	90.0	14.9	17.3	150.0	38.4	114.2
31.0	84.4	552.9	91.0	14.6	16.5	151.0	38.5	115.2
32.0	83.5	541.7	92.0	14.3	15.8	152.0	38.7	116.1
33.0	82.7	530.6	93.0	14.0	15.2	153.0	38.8	117.1
34.0	81.7	518.8	94.0	13.9	15.0	154.0	39.0	117.9
35.0	80.8	507.1	95.0	13.9	14.9	155.0	39.1	118.6
36.0	79.9	495.6	96.0	13.8	14.8	156.0	39.2	119.4
37.0	78.9	482.9	97.0	14.3	15.9	157.0	39.3	119.9
38.0	77.8	470.4	98.0	14.8	17.0	158.0	39.4	120.4
39.0	76.8	458.0	99.0	15.3	18.1	159.0	39.5	120.9
40.0	75.5	442.7	100.0	16.2	20.5	160.0	39.5	121.1
41.0	74.2	427.7	101.0	17.2	23.0	161.0	39.5	121.3
42.0	72.9	412.9	102.0	18.1	25.5	162.0	39.5	121.4
43.0	71.6	398.0	103.0	19.3	28.8	163.0	39.6	121.6
44.0	70.3	383.3	104.0	20.4	32.3	164.0	39.6	121.7
45.0	68.9	368.9	105.0	21.5	35.9	165.0	39.6	121.9
46.0	67.5	354.2	106.0	22.4	39.1	166.0	39.6	122.0
47.0	66.2	339.7	107.0	23.4	42.4	167.0	39.6	122.0
48.0	64.8	325.5	108.0	24.3	45.8	168.0	39.7	122.1
49.0	63.4	312.3	109.0	25.0	48.5	169.0	39.7	122.1
50.0	62.1	299.4	110.0	25.7	51.3	170.0	39.7	122.2
51.0	60.8	286.8	111.0	26.4	54.2	171.0	39.7	122.2
52.0	59.5	274.4	112.0	27.2	57.6	172.0	39.7	122.4
53.0	58.1	262.3	113.0	28.1	61.1	173.0	39.7	122.5
54.0	56.8	250.4	114.0	28.9	64.6	174.0	39.8	122.7
55.0	55.4	238.3	115.0	29.6	67.9	175.0	39.8	123.2
56.0	54.0	226.6	116.0	30.3	71.1	176.0	39.9	123.7
57.0	52.6	215.1	117.0	31.0	74.4	177.0	40.0	124.2
58.0	51.2	203.3	118.0	31.6	77.5	178.0	40.0	124.5
59.0	49.7	191.9	119.0	32.2	80.5	179.0	40.1	124.7