

# **Comprehensive Engineering Exhibit**

## **Minor Change Application**

### **Facility ID No. 15397, W250AA**

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This exhibit is for the minor change application of Translator W250AA which is seeking to change to a non-adjacent channel, with power increased to 99 watts, with no change of location.

#### **Antenna Location**

The proposed operation on channel 221 (92.1 MHz) will employ a non-directional, circular-polarized antenna located 19.8 meters above ground level with 99 watts power.

Below as Figure 1 is a channel study from which it can be determined that this proposal requires further study with regards to second adjacent facility WWYZ(FM).

Section 74.1204(d) of the Commission's Rules states that "The provisions of this section concerning prohibited overlap will not apply where the area of such overlap lies entirely over water. In addition, an application otherwise precluded by this section will be accepted if it can be demonstrated that no actual interference will occur due to intervening terrain, lack of population or such other factors as may be applicable."

This exhibit demonstrates that a lack of population and/or other factors allow this proposal to be compliant with Section 74.1204. The process commonly called "Living Way," allows for an Undesired/Desired analysis, also known as "signal strength ratio methodology" to be utilized. In this case, the station to be protected (WWYZ) is second adjacent channel, and thus is to be afforded protection from signals 40 dB stronger at the translator antenna location.

Figure 2 is a map showing the predicted signal contour of WWYZ at the translator antenna location utilizing the FCC F50:50 curve. WWYZ is located on a support tower 20.7 km distant from this proposed translator facility, and will present a signal of 77.6 dBu at ground level at the translator antenna site. Thus a signal produced by this translator proposal exceeding 117.6 dBu is the only area predicted to cause interference.

Utilizing the line of sight equation and the manufacturer provided elevation pattern data, it has been determined that a 117.6 dBu signal developed by 99 watts power will not reach any habitable space. Attached as Figure 3 is a table depicting distance to contour at various elevations and distances from the translator support tower. Figure 4 is a photographic image of the translator support tower demonstrating that no habitable space exists close to the translator's antenna.

Thus the provisions of the Commission's rules concerning prohibited overlap will not apply as it has been demonstrated that no actual interference will occur due to a lack of population and other factors as applied in this instant proposal.

## Channel Selection

Attached as Figure 5 is a preclusion study demonstrating that no “fully spaced” adjacent exclusive channel at the current translator location is available. Each adjacent channel was investigated for possible application of the “Living Way” process and channel 253 would normally benefit from “Living Way”, however it has been determined that use of channel 253 would result in predicted real interference to first-adjacent (channel 252) station WDAQ.

Using the microcomputer program “Probe 4” the location of the WDAQ 60 dBu F50:50 contour was calculated, and the Longley Rice algorithm was used to predict the mean distance from the W250AA location that where a 54 dBu signal will occur for a receive antenna located 2 meters above ground level, and this location data set was drawn as a contour for W250AA. Figure 6 is a map representation showing that the contours thus predicted have an area of overlap. Figure 7 is a report of the population inside that area of overlap; based upon 2010 US Census data, 10,260 persons reside within the predicted interference area.

It is thought that using the very “conservative” comparison of the protected contour of WDAQ and the 2 meter Longley Rice location for W250AA, a strong indication exists that should W250AA change to channel 253 using the “Living Way” process, it would cause real predicted interference to WDAQ. Because of this channel 253 is not considered usable, and a displacement to a non-adjacent channel is warranted.

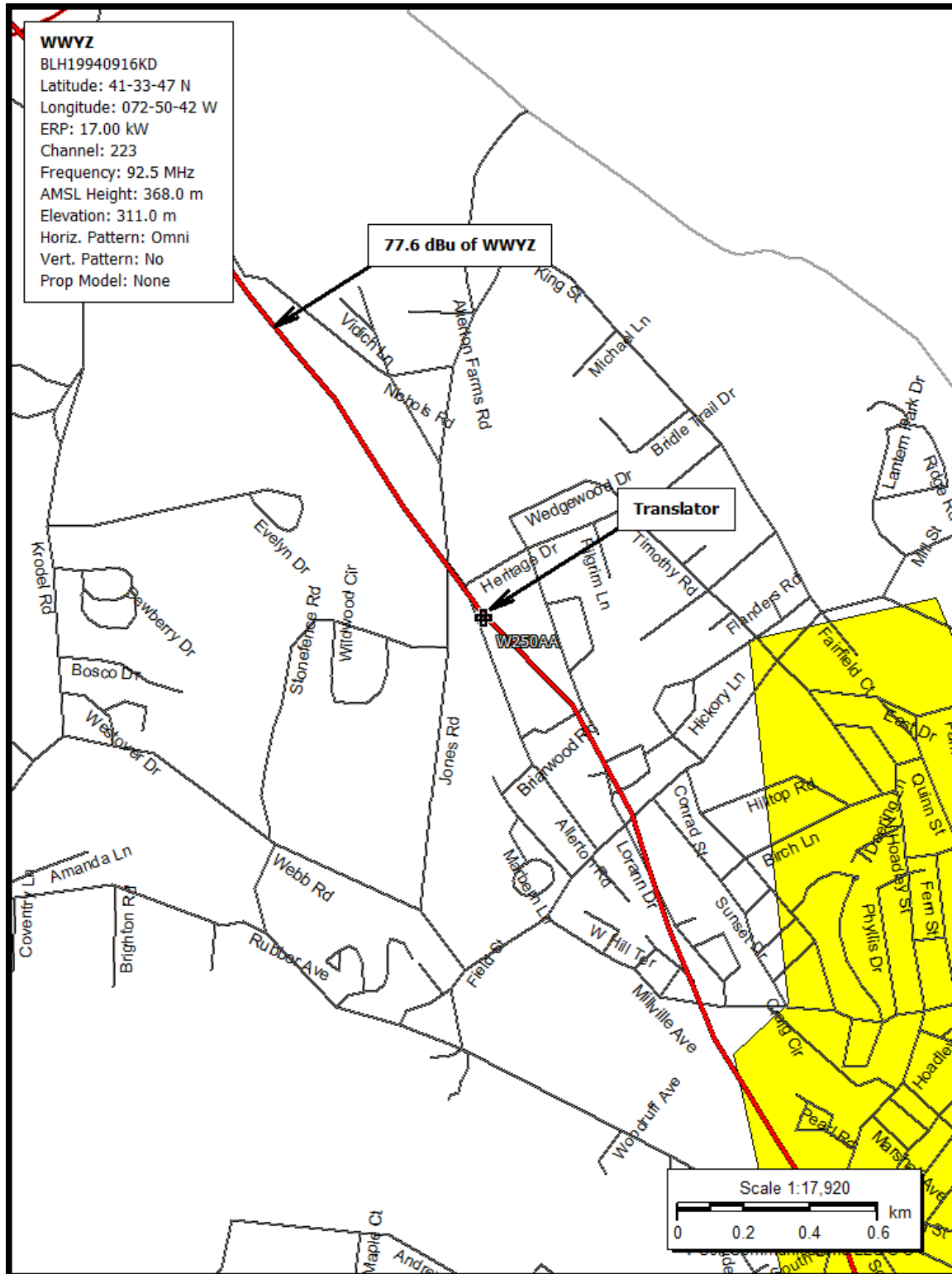
No intermediate channel exists for channel 250.

## RF Radiation Statement

In accordance with Section 1.1307(b)(1), Table 1 of the Commission’s Rules, only a “Part 74 – Subpart L” facility with an ERP greater than 100 watts is subject to routine environmental evaluation. Since the facility proposed in this application will operate with an ERP of less than 100 watts, it is “categorically excluded from making such studies or preparing an EA,” see Section 1.1307(b)(1). The licensee will fully cooperate with other site users to temporarily reduce power or cease broadcasting, as necessary, to protect workers and others having access to the site from excessive levels of RF Radiation.

w250AA Moved to Channel 221 (92.1) Preclusion Study											
Danbury Community Radio, Inc.											
CH# 221D - 92.1 MHz, Pwr= 0.099 kw, HAAT= 21.0 M, COR= 181 M											
Average Protected F(50-50)= 5.62 km											
Omni-directional											
REFERENCE	CH#	CALL	TYPE	ANT STATE	AZI	DIST	LAT	Pwr(kw)	INT(km)	PRO(km)	DISPLAY DATES
41 30 18.0 N.	221D					FILE #	LNG	HAAT(M)	COR(M)	LICENSEE	DATA 01-08-13
73 04 50.0 W.											SEARCH 01-09-13
CH	CALL	TYPE	ANT STATE	AZI	DIST	LAT	Pwr(kw)	INT(km)	PRO(km)	*IN*	*OUT*
CITY				<--	FILE #	LNG	HAAT(M)	COR(M)	LICENSEE	(Overlap in km)	(Overlap in km)
223B WWVZ		LIC _CN		71.7	20.68	41 33 47.0	17.000	5.3	62.5	9.6	-43.2*
waterbury		CT		251.9	BLH19940916KD	72 50 42.0	268	368	Capstar Tx Llc		
221A WLNG		LIC _CX		133.8	85.28	40 58 19.0	5.300	87.0	29.2	-7.4*	37.2
Sag Harbor		NY		314.3	BMLH20100917ABZ	72 20 54.0	106	114	Main Street Broadcasting C		
221A WRNQ		LIC _ZC		287.7	79.95	41 43 09.0	0.520	81.4	28.7	-7.1*	32.8
Poughkeepsie		NY		107.1	BLH20000501AAA	73 59 47.0	314	424	Cc Licenses, Llc		
220D W220CE		LIC _C		72.1	20.66	41 33 42.2	0.001	6.0	4.0	8.9	8.5
Southington		CT		252.3	BLFT20110725AEX	72 50 41.1		311	Town of Monroe, Connecticut		
219A WXCJ		LIC DCN		250.3	36.11	41 23 42.0	3.000	2.4	26.1	27.6	9.3
Danbury		CT		70.0	BLED19970702KB	73 29 14.0	67	241	western Connecticut State		
220D W220CF		LIC DVN		189.1	25.77	41 16 33.0	0.007	4.1	2.9	16.1	14.9
Huntington		CT		9.1	BLFT19990225TD	73 07 46.0	73	144	Town of Monroe, Connecticut		
Translator for WGRS, Guilford, CT vertical Polarization Only											
218D W218AV		LIC DCN		318.6	34.37	41 44 11.0	0.250	0.5	11.6	28.3	22.1
warren		CT		138.4	BLFT19981203TE	73 21 16.0	163	452	Town of Monroe, Connecticut		
Translator for WMNR, Monroe, CT											
220D W220CH		LIC _C		35.8	40.05	41 47 48.0	0.008	10.4	7.3	24.0	24.8
west Hartford		CT		216.0	BLFT20011002ACH	72 47 52.0	170	253	Town of Monroe, Connecticut		
Translator for WMNR(FM), Monroe, CT.											
218A WGRS		LIC _CN		124.2	42.67	41 17 19.0	3.100	1.6	13.3	35.4	28.7
Guilford		CT		304.5	BLED19951214KB	72 39 32.0	25	59	Town of Monroe, Connecticut		
218A WGRS		CP _CX		124.2	42.69	41 17 18.6	2.800	1.6	13.0	35.5	29.0
Guilford		CT		304.5	BMPED20121212AAN	72 39 31.5	30	65	Town of Monroe, Connecticut		
222B WNOW-FM		LIC _CN		222.3	113.33	40 44 54.0	6.000	78.6	66.0	29.2	36.0
New York		NY		41.7	BLH19940204KF	73 59 10.0	415	429	Cbs Radio East Inc.		
220D W220AC		LIC _CN		199.8	42.14	41 08 53.0	0.019	5.3	3.7	31.3	30.5
Fairfield		CT		19.7	BLFT19950814TB	73 15 05.0	1	30	Town of Monroe, Connecticut		
Translator for WMNR, Monroe, CT											
220A WSHR		LIC _NC		181.2	74.30	40 50 10.0	6.000	30.4	20.6	35.7	42.1
Lake Ronkonkoma		NY		1.2	BLED19990413KC	73 05 59.0	54				

**Figure 2. Contour Map**



**Figure 3. Distance to Signal Table**

<p><b>Proposed Antenna:</b> RFS CPF500-1</p> <p><b>Proposed Power:</b> 0.099 kW</p> <p><b>Antenna Height AGL:</b> 19.8 meters</p> <p><b>Interference Contour:</b> 117.6 dBu</p> <p><b>Artificial Rcv Antenna Height:</b> 2 meters</p> <p><b>Distance (Free Space) Equation:</b> <math>= (10^{\frac{106.92 - [\text{desired dBu}] + [\text{ERP in dBk}]}{20}}) * 1000</math></p> <p><b>Field Strength (dBu) Equation:</b> <math>= 106.92 - (20 * (\text{LOG10}[\text{DistMeters}/1000])) + [\text{ERP in dBk}]</math></p>								
<b>Depression</b>				<b>Distance</b>				
<b>Angle</b>	<b>Antenna</b>			<b>from Ant.</b>	<b>Distance</b>	<b>Field Stren</b>	<b>Distance</b>	<b>eld Strengt</b>
<b>Below</b>	<b>Relative</b>	<b>ERP</b>	<b>ERP</b>	<b>to Interf</b>	<b>from Ant. to</b>	<b>in dBu @</b>	<b>from Ant.</b>	<b>in dBu @</b>
<b>Horizon</b>	<b>Field</b>	<b>in kW</b>	<b>in dBk</b>	<b>Contour</b>	<b>Artificial Plane</b>	<b>Artificial Plane</b>	<b>to Ground Level</b>	<b>Ground Level</b>
0°	1.000	0.099	-10.04	92.01 m	infinite	---	infinite	---
-5°	0.949	0.089	-10.50	87.30 m	204.23 m	110.22 dBu	227.18 m	109.29 dBu
-10°	0.805	0.064	-11.93	74.05 m	102.51 m	114.78 dBu	114.02 m	113.85 dBu
-15°	0.594	0.035	-14.57	54.63 m	68.77 m	115.60 dBu	76.50 m	114.68 dBu
-20°	0.353	0.012	-19.09	32.49 m	52.04 m	113.51 dBu	57.89 m	112.58 dBu
-25°	0.123	0.001	-28.26	11.30 m	42.12 m	106.17 dBu	46.85 m	105.25 dBu
-30°	0.062	0.000	-34.24	5.68 m	35.60 m	101.65 dBu	39.60 m	100.73 dBu
-35°	0.178	0.003	-25.06	16.33 m	31.03 m	112.02 dBu	34.52 m	111.10 dBu
-40°	0.217	0.005	-23.31	19.98 m	27.69 m	114.77 dBu	30.80 m	113.84 dBu
-45°	0.189	0.004	-24.50	17.43 m	25.17 m	114.41 dBu	28.00 m	113.48 dBu
-50°	0.115	0.001	-28.80	10.62 m	23.24 m	110.80 dBu	25.85 m	109.87 dBu
-55°	0.023	0.000	-42.81	2.12 m	21.73 m	97.37 dBu	24.17 m	96.44 dBu
-60°	0.060	0.000	-34.42	5.56 m	20.55 m	106.24 dBu	22.86 m	105.31 dBu
-65°	0.114	0.001	-28.91	10.49 m	19.64 m	112.15 dBu	21.85 m	111.23 dBu
-70°	0.128	0.002	-27.91	11.76 m	18.94 m	113.46 dBu	21.07 m	112.53 dBu
-75°	0.104	0.001	-29.74	9.53 m	18.43 m	111.87 dBu	20.50 m	110.95 dBu
-80°	0.012	0.000	-48.46	1.10 m	18.07 m	93.32 dBu	20.11 m	92.39 dBu
-85°	0.007	0.000	-53.14	0.64 m	17.87 m	88.74 dBu	19.88 m	87.81 dBu
-90°	0.058	0.000	-34.75	5.35 m	17.80 m	107.17 dBu	19.80 m	106.24 dBu

**Figure 4. Site Photograph**





**Figure 5. Adjacent Channel Preclusion Study**

CHANNEL PRECLUSION STUDY											
w250AA Moved to Channel 221 (92.1) Preclusion Study											
Danbury Community Radio, Inc.											
Class= D , Pwr=0.055 kw, HAAT= 21 M, COR= 181 M											
Average Protected F(50-50)= 4.83 km											
Omni-directional											
DISPLAY DATES											
DATA 01-08-13											
SEARCH 01-08-13											
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)	
--- Channel 247 97.3 MHz. ---											
247A	WZBG	LIC _CN	348.2	33.73	41 48 08.0	3.000	80.3	26.8	-51.4*	-8.5	
Litchfield		CT	168.1	BLH19920813KA	73 09 50.0	100	411	Local Girls And Boys Broad			
248B	WALK-FM	LIC DCN	176.9	73.43	40 50 41.0	39.000	75.5	63.5	-10.1*	-6.4	
Patchogue		NY	357.0	BLH19910524KA	73 02 01.0	169	192	Aloha Station Trust, Llc			
250D	W250AA	LIC _HN	0.0	0.00	41 30 18.0	0.055	0.5	4.8	-5.3*	-5.3*	
Naugatuck, Etc.		CT	0.0	BLFT19920729TA	73 04 50.0	21	181	Danbury Community Radio, I			
--- Channel 248 97.5 MHz. ---											
248B	WALK-FM	LIC DCN	176.9	73.43	40 50 41.0	39.000	132.1	63.5	-66.7*	-28.8	
Patchogue		NY	357.0	BLH19910524KA	73 02 01.0	169	192	Aloha Station Trust, Llc			
247A	WZBG	LIC _CN	348.2	33.73	41 48 08.0	3.000	40.8	26.8	-11.9*	0.1	
Litchfield		CT	168.1	BLH19920813KA	73 09 50.0	100	411	Local Girls And Boys Broad			
250D	W250AA	LIC _HN	0.0	0.00	41 30 18.0	0.055	0.5	4.8	-5.3*	-5.3*	
Naugatuck, Etc.		CT	0.0	BLFT19920729TA	73 04 50.0	21	181	Danbury Community Radio, I			
--- Channel 249 97.7 MHz. ---											
250D	W250AA	LIC _HN	0.0	0.00	41 30 18.0	0.055	6.9	4.8	-11.7*	-11.7*	
Naugatuck, Etc.		CT	0.0	BLFT19920729TA	73 04 50.0	21	181	Danbury Community Radio, I			
248B	WALK-FM	LIC DCN	176.9	73.43	40 50 41.0	39.000	75.5	63.5	-10.1*	-6.4	
Patchogue		NY	357.0	BLH19910524KA	73 02 01.0	169	192	Aloha Station Trust, Llc			
--- Channel 250 97.9 MHz. ---											
250D	W250AA	LIC _HN	0.0	0.00	41 30 18.0	0.055	15.5	4.8	-20.3*	-20.3*	
Naugatuck, Etc.		CT	0.0	BLFT19920729TA	73 04 50.0	21	181	Danbury Community Radio, I			
250B	WSKQ-FM	LIC _CN	222.3	113.33	40 44 54.0	6.000	127.5	66.0	-19.0*	24.4	
New York		NY	41.7	BLH19940204KA	73 59 10.0	415	429	wskq Licensing, Inc.			
250A	WUCS	LIC ZCX	48.9	44.43	41 46 00.0	3.400	58.3	18.3	-18.7*	10.7	
Windsor Locks		CT	229.2	BLH20120123AEO	72 40 38.0	135	183	Capstar Tx Llc			
--- Channel 251 98.1 MHz. ---											
250D	W250AA	LIC _HN	0.0	0.00	41 30 18.0	0.055	6.9	4.8	-11.7*	-11.7*	
Naugatuck, Etc.		CT	0.0	BLFT19920729TA	73 04 50.0	21	181	Danbury Community Radio, I			
252A	WDAQ	LIC _CX	244.6	33.85	41 22 27.0	1.300	36.0	24.0	-7.0*	3.0	
Danbury		CT	64.4	BMLH20060420ACO	73 26 47.0	140	301	The Berkshire Broadcasting			
251D	WQAQ	LIC _CX	123.1	17.37	41 25 10.6	0.018	11.7	3.6	0.8	-1.8	
Hamden		CT	303.2	BLED20080714ABZ	72 54 22.6	-24	59	Quinnipiac University			
--- Channel 252 98.3 MHz. ---											
252A	WDAQ	LIC _CX	244.6	33.85	41 22 27.0	1.300	72.3	24.0	-43.3*	-5.7	
Danbury		CT	64.4	BMLH20060420ACO	73 26 47.0	140	301	The Berkshire Broadcasting			
250D	W250AA	LIC _HN	0.0	0.00	41 30 18.0	0.055	0.5	4.8	-5.3*	-5.3*	
Naugatuck, Etc.		CT	0.0	BLFT19920729TA	73 04 50.0	21	181	Danbury Community Radio, I			
252D	W252AV	CP _C_	79.7	23.92	41 32 34.7	0.250	23.8	7.1	-4.7	1.3	
Meriden		CT	259.9	BPFT20110815AAJ	72 47 54.2		60	Revival Christian Ministri			
252D	W252AV	LIC _C_	79.3	23.06	41 32 35.0	0.120	19.6	5.9	-1.3	1.7	
Meriden		CT	259.5	BLFT20040525ACA	72 48 32.0	-24	62	Revival Christian Ministri			
--- Channel 253 98.5 MHz. ---											
256B	WPLR	LIC _C_	130.4	14.11	41 25 22.0	15.000	5.1	61.5	4.1	-48.4*	
New Haven		CT	310.4	BLH20010628ABF	72 57 06.0	276	375	Cox Radio, Inc.			

**Figure 5 Continued. Adjacent Channel Preclusion Study**

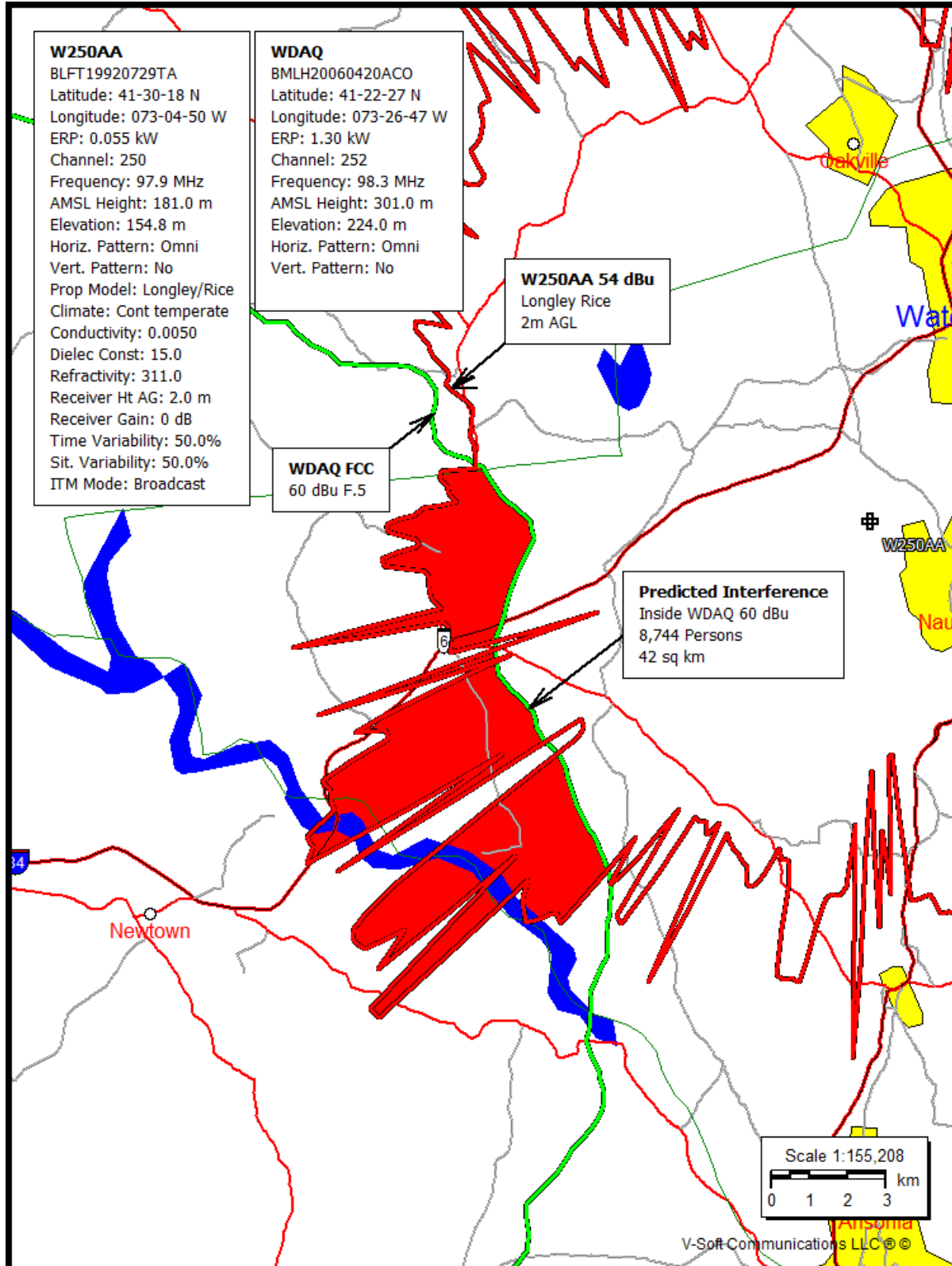
CH CITY	CALL	TYPE STATE	ANT STATE	AZI <--	DIST FILE #	LAT LNG	PWR(kw) HAAT(M)	INT(km) COR(M)	PRO(km) LICENSEE	Page # 2 *IN* *OUT* (Overlap in km)	
252A Danbury	WDAQ	LIC _CX CT		244.6 64.4	33.85 BMLH20060420ACO	41 22 27.0 73 26 47.0	1.300 140	36.0 301	24.0 The Berkshire Broadcasting	-7.0*	3.0
250D Naugatuck, Etc.	W250AA	LIC _HN CT		0.0 0.0	0.00 BLFT19920729TA	41 30 18.0 73 04 50.0	0.055 21	0.5 181	4.8 Danbury Community Radio, I	-5.3*	-5.3*

Terrain database is NGDC 30 SEC, R= 73.215 qualifying spacings or FCC minimum spacings in KM, M= Margin KM  
Contour distances are on direct line to and from reference station. Reference Zone=  
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 protected contour.

All separation margins include rounding



**Figure 6. Map of Predicted Interference to WDAQ**



**Figure 7. Report of Predicted Interference to WDAQ**

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Population Database: 2010 US Census (PL)

V-Soft Communications Population Report

WDAQ (252) Danbury, CT - BMLH20060420ACO
Lat: 41-22-27 N Lng: 073-26-47 W ERP: 1.30 kW AMSL: 301.0 m
FM Interference Study
Protected: FCC F(50-50): 60 dBu
Interference considered within distance based on interfering
station's power and channel relationship.
Signal Resolution: 0.5 km

Study Date: 1/9/2013
FM Database Date: 1/8/2013

D/U Ratios Used:
    Co: 20.0 dB
    First Adj: 6.0 dB
    Second Adj: -40.0 dB
    Third Adj: -40.0 dB

Threshold for reception: 45.0 dBu.

Primary Terrain: NED 3 Second US Terrain
Secondary Terrain: NED 30 Meter Terrain

Population Database: 2010 US Census (PL)

Percentages calculated using a baseline population of 372,018.

Stations which cause interference:

Call Letters      H Units  Population    %      Area (sq. km)
W250AA (253)      5,508    10,260        2.758   42.84

Masking Summary:

Call Letters      Total Interference    Unique Interference
W250AA (253)      Population    %      Population    %
                  10,260        2.758    10,260        2.758

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Call Letters      City          State  Dist  Azi
-----
W250AA (253)      Naugatuck, Etc.  CT     33.9   64.5
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Totals for WDAQ (252)

                Population      Area
Calculation Area Population:  375,369  [ 1608.3 sq. km ]
Not Affected by Terrain Loss:  372,018  [ 1582.8 sq. km ]
Interfered Population:         10,260  [   42.8 sq. km ]
Interference Free:            361,758  [ 1540.0 sq. km ]

Percent Interference:          2.76 %

Terrain Blocked Population:     3,351  [   25.5 sq. km ]

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