ENGINEERING EXHIBIT

Application for Digital Television Station
Modification of Auxiliary Antenna Construction Permit

prepared for

Gray Television Licensee, LLC
WECT(DT) Wilmington, NC
Facility ID 48666
Ch. 23 37 kW 212 m

Gray Television Licensee, LLC ("Gray") is the licensee of digital television station WECT(DT), Facility ID 48666, Channel 23, Wilmington NC. WECT is licensed (file# 0000111584) to operate with a top-mounted directional antenna at 510 kW effective radiated power ("ERP") and 590 meters height above average terrain ("HAAT"). A Construction Permit ("CP" file# 0000207207) authorizes WECT to implement a replacement top-mounted directional antenna at 550 kW ERP and 592 meters HAAT. A separate CP (file# 0000207212) authorizes an auxiliary antenna for WECT. *Gray* herein seeks to modify the WECT auxiliary antenna CP to specify reduced power and height.

The auxiliary antenna CP authorizes a side-mounted antenna on the same tower structure as the licensed main antenna, to operate at 70.3 kW ERP (directional) and an antenna HAAT of 452 meters. Due to manufacturer and supplier shortages of flexible coaxial transmission line, the auxiliary antenna has been installed at a lower elevation on the tower and will operate at a lower ERP. As proposed herein, the WECT auxiliary antenna will operate with 37 kW ERP at 212 meters HAAT. As with the main antenna, the proposed auxiliary antenna will be shared with stations WSFX-TV Channel 29 and WWAY Channel 24, both Wilmington NC.

The WECT tower structure is associated with FCC Antenna Structure Registration number 1008242. No change to the overall structure height will result from this proposal.

The auxiliary antenna is an elliptically horizontally polarized directional Dielectric model TFU-16WB/VP-R C160 (63.6 percent vertical polarization). The maximum horizontally polarized ERP is 37 kW and the maximum vertically polarized ERP is 23.5 kW. The vertically

polarized component will not exceed the horizontally polarized component at any azimuth. The directional antenna's azimuthal patterns are supplied in Figures 1 and 1A for horizontal and vertical polarization, respectively. The antenna's elevation pattern is depicted in Figure 2.

Figure 3 shows that the 41 dBµ noise limited service contour ("NLSC") of the proposed auxiliary facility does not extend beyond those of the licensed main and authorized replacement main antenna facilities. Thus, the proposal complies with §73.1675(a).

Human Exposure to Radiofrequency Electromagnetic Field (Environmental)

The proposed facility was evaluated for human exposure to RF energy using the procedures outlined in the FCC's OET Bulletin Number 65. Based on OET-65 equation (10) and 15 percent antenna relative field in downward elevations (pattern data shows 15 percent or less relative field at angles 25 to 90 degrees below the antenna), the calculated power density attributable to the proposed facility at locations near the transmitter site at a height of two meters above ground level is 1.1 µW/cm^2, which is 0.3 percent of the general population / uncontrolled maximum permissible exposure limit. This is well below the five percent threshold limit described in §1.1307(b) regarding sites with multiple emitters, categorically excluding the applicant from responsibility for taking any corrective action in the areas where the proposal's contribution is less than five percent.

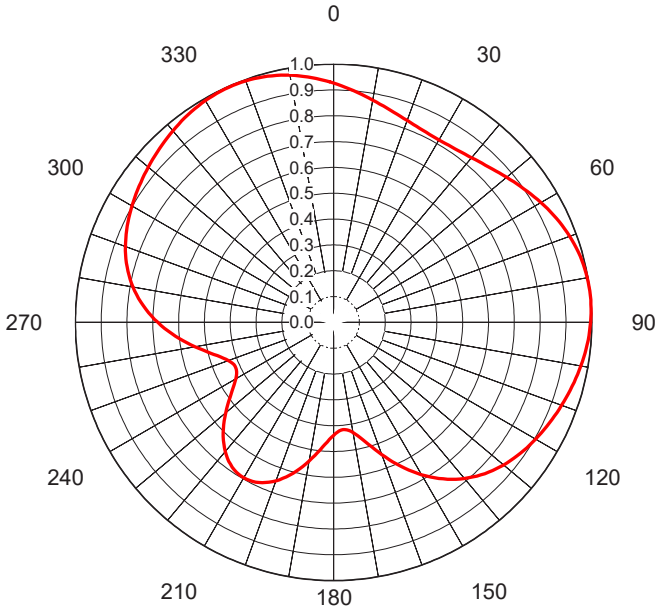
The general public will not be exposed to RF levels attributable to the proposal in excess of the FCC's guidelines. RF exposure warning signs will continue to be posted. With respect to worker safety, the applicant will coordinate exposure procedures with all pertinent stations and will reduce power or cease operation as necessary to protect persons having access to the site, tower, or antenna from RF electromagnetic field exposure in excess of FCC guidelines. This exhibit is limited to the evaluation of exposure to RF electromagnetic field. No increase in structure height is proposed.

List of Attachments

Figure 1, 1A	Antenna Azimuthal Pattern
Figure 2	Antenna Elevation Pattern
Figure 3	Proposed Auxiliary Contours
Form 2100	Saved Version of Engineering Sections of FCC Form at Time of Upload

Chesapeake RF Consultants, LLC
Joseph M. Davis, P.E. July 11, 2023
207 Old Dominion Road Yorktown, VA 23692 703-650-9600

Dielectric®



AZIMUTH PATTERN
Horizontal Polarization

Proposal No.	**20230111jmd**
Date	**11-Jan-23**
Call Letters	**WECT**
Channel	**23**
Frequency	**527 MHz**
Antenna Type	**TFU-16WB/VP-R C160**
Gain	**1.54 (1.88dB)**
	Calculated
Pattern Number	**WB-C160-23 Hpol**

Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value
0	0.927	36	0.822	72	0.981	108	0.947	144	0.751	180	0.437	216	0.680	252	0.448	288	0.847	324	0.980
1	0.922	37	0.824	73	0.984	109	0.943	145	0.740	181	0.445	217	0.674	253	0.458	289	0.852	325	0.982
2	0.916	38	0.827	74	0.986	110	0.940	146	0.729	182	0.454	218	0.668	254	0.468	290	0.858	326	0.984
3	0.911	39	0.829	75	0.989	111	0.937	147	0.718	183	0.464	219	0.661	255	0.480	291	0.863	327	0.986
4	0.906	40	0.832	76	0.991	112	0.933	148	0.706	184	0.474	220	0.653	256	0.491	292	0.868	328	0.988
5	0.900	41	0.836	77	0.993	113	0.930	149	0.694	185	0.485	221	0.644	257	0.504	293	0.873	329	0.990
6	0.895	42	0.839	78	0.995	114	0.926	150	0.681	186	0.496	222	0.635	258	0.517	294	0.877	330	0.992
7	0.890	43	0.843	79	0.997	115	0.923	151	0.668	187	0.508	223	0.625	259	0.530	295	0.882	331	0.993
8	0.884	44	0.847	80	0.998	116	0.919	152	0.655	188	0.520	224	0.615	260	0.544	296	0.886	332	0.994
9	0.879	45	0.851	81	0.999	117	0.915	153	0.642	189	0.533	225	0.604	261	0.558	297	0.890	333	0.995
10	0.874	46	0.855	82	0.999	118	0.912	154	0.628	190	0.545	226	0.593	262	0.572	298	0.894	334	0.996
11	0.869	47	0.860	83	1.000	119	0.908	155	0.614	191	0.557	227	0.581	263	0.586	299	0.898	335	0.997
12	0.864	48	0.864	84	1.000	120	0.904	156	0.600	192	0.570	228	0.569	264	0.600	300	0.901	336	0.997
13	0.860	49	0.869	85	1.000	121	0.900	157	0.586	193	0.582	229	0.557	265	0.614	301	0.905	337	0.997
14	0.855	50	0.874	86	0.999	122	0.896	158	0.572	194	0.593	230	0.545	266	0.628	302	0.909	338	0.997
15	0.851	51	0.879	87	0.999	123	0.892	159	0.558	195	0.604	231	0.532	267	0.642	303	0.912	339	0.996
16	0.847	52	0.885	88	0.998	124	0.888	160	0.544	196	0.615	232	0.520	268	0.655	304	0.916	340	0.995
17	0.843	53	0.890	89	0.997	125	0.884	161	0.531	197	0.626	233	0.508	269	0.668	305	0.919	341	0.994
18	0.839	54	0.895	90	0.996	126	0.879	162	0.517	198	0.635	234	0.496	270	0.681	306	0.923	342	0.993
19	0.836	55	0.901	91	0.994	127	0.875	163	0.504	199	0.644	235	0.485	271	0.693	307	0.926	343	0.991
20	0.832	56	0.906	92	0.992	128	0.870	164	0.492	200	0.653	236	0.474	272	0.706	308	0.929	344	0.989
21	0.829	57	0.912	93	0.990	129	0.865	165	0.480	201	0.661	237	0.463	273	0.717	309	0.933	345	0.987
22	0.827	58	0.917	94	0.988	130	0.859	166	0.469	202	0.668	238	0.454	274	0.729	310	0.936	346	0.984
23	0.824	59	0.922	95	0.986	131	0.854	167	0.458	203	0.674	239	0.445	275	0.740	311	0.940	347	0.982
24	0.822	60	0.928	96	0.984	132	0.848	168	0.449	204	0.680	240	0.437	276	0.750	312	0.943	348	0.979
25	0.821	61	0.933	97	0.981	133	0.842	169	0.440	205	0.684	241	0.430	277	0.761	313	0.946	349	0.975
26	0.819	62	0.938	98	0.978	134	0.835	170	0.433	206	0.688	242	0.425	278	0.770	314	0.950	350	0.972
27	0.818	63	0.943	99	0.975	135	0.828	171	0.427	207	0.691	243	0.421	279	0.780	315	0.953	351	0.968
28	0.817	64	0.948	100	0.973	136	0.821	172	0.423	208	0.693	244	0.418	280	0.789	316	0.956	352	0.964
29	0.817	65	0.953	101	0.970	137	0.814	173	0.419	209	0.695	245	0.417	281	0.797	317	0.959	353	0.960
30	0.817	66	0.957	102	0.966	138	0.806	174	0.418	210	0.695	246	0.417	282	0.805	318	0.962	354	0.956
31	0.817	67	0.962	103	0.963	139	0.798	175	0.417	211	0.695	247	0.419	283	0.813	319	0.965	355	0.951
32	0.817	68	0.966	104	0.960	140	0.789	176	0.419	212	0.693	248	0.422	284	0.821	320	0.968	356	0.947
33	0.818	69	0.970	105	0.957	141	0.780	177	0.421	213	0.691	249	0.427	285	0.828	321	0.971	357	0.942
34	0.819	70	0.974	106	0.954	142	0.771	178	0.425	214	0.688	250	0.433	286	0.834	322	0.974	358	0.937
35	0.821	71	0.977	107	0.950	143	0.761	179	0.431	215	0.684	251	0.440	287	0.841	323	0.977	359	0.932

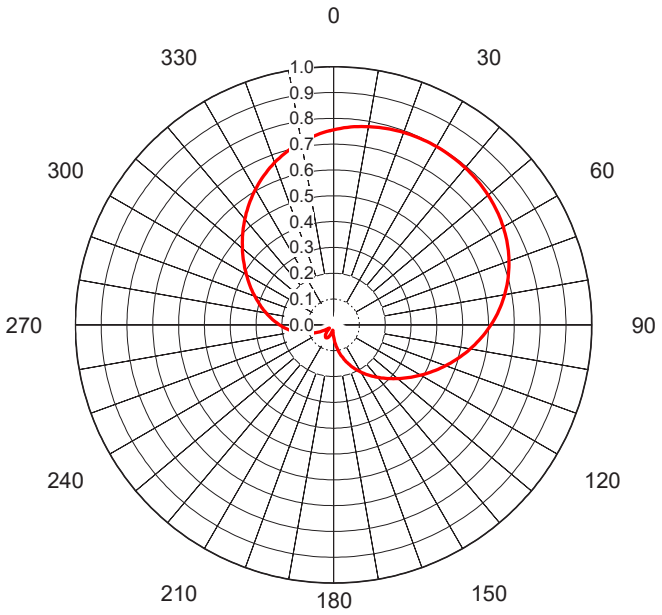
Chesapeake RF Consultants, LLC
Radiofrequency Consulting Engineers
Digital Television and Radio

Figure 1
Auxiliary Antenna Azimuthal Pattern
Horizontal Polarization
WECT(DT) Wilmington, NC
Facility ID 48666
Ch. 23 37 kW 212 m

prepared for
Gray Television Licensee, LLC

July, 2023

Dielectric®



AZIMUTH PATTERN
Verttical Polarization

Proposal No.	**20230111jmd**
Date	**11-Jan-23**
Call Letters	**WECT**
Channel	**23**
Frequency	**527 MHz**
Antenna Type	**TFU-16WB/VP-R C160**
Gain	**2.61 (4.17dB)**
	Calculated
Pattern Number	**WB-C160-23 Vpol**

Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value
0	0.756	36	0.796	72	0.714	108	0.477	144	0.243	180	0.046	216	0.054	252	0.108	288	0.312	324	0.564
1	0.759	37	0.796	73	0.710	109	0.469	145	0.238	181	0.041	217	0.053	253	0.113	289	0.318	325	0.571
2	0.762	38	0.795	74	0.705	110	0.462	146	0.232	182	0.037	218	0.051	254	0.119	290	0.325	326	0.578
3	0.764	39	0.795	75	0.700	111	0.454	147	0.227	183	0.033	219	0.049	255	0.125	291	0.331	327	0.585
4	0.767	40	0.794	76	0.695	112	0.447	148	0.221	184	0.029	220	0.047	256	0.130	292	0.337	328	0.592
5	0.769	41	0.793	77	0.689	113	0.440	149	0.216	185	0.026	221	0.045	257	0.136	293	0.343	329	0.599
6	0.772	42	0.792	78	0.684	114	0.432	150	0.211	186	0.023	222	0.043	258	0.142	294	0.350	330	0.606
7	0.774	43	0.791	79	0.679	115	0.425	151	0.205	187	0.021	223	0.040	259	0.147	295	0.356	331	0.612
8	0.776	44	0.790	80	0.673	116	0.418	152	0.200	188	0.021	224	0.038	260	0.153	296	0.363	332	0.619
9	0.778	45	0.789	81	0.667	117	0.411	153	0.194	189	0.021	225	0.035	261	0.159	297	0.370	333	0.626
10	0.780	46	0.788	82	0.661	118	0.404	154	0.189	190	0.022	226	0.032	262	0.164	298	0.376	334	0.632
11	0.781	47	0.786	83	0.655	119	0.397	155	0.183	191	0.024	227	0.030	263	0.170	299	0.383	335	0.638
12	0.783	48	0.785	84	0.649	120	0.390	156	0.178	192	0.026	228	0.027	264	0.176	300	0.390	336	0.645
13	0.785	49	0.783	85	0.643	121	0.383	157	0.172	193	0.029	229	0.025	265	0.181	301	0.397	337	0.651
14	0.786	50	0.782	86	0.636	122	0.376	158	0.167	194	0.031	230	0.022	266	0.187	302	0.404	338	0.657
15	0.788	51	0.780	87	0.630	123	0.369	159	0.161	195	0.034	231	0.021	267	0.192	303	0.411	339	0.663
16	0.789	52	0.778	88	0.623	124	0.362	160	0.156	196	0.037	232	0.020	268	0.198	304	0.418	340	0.668
17	0.790	53	0.776	89	0.616	125	0.356	161	0.150	197	0.039	233	0.020	269	0.204	305	0.425	341	0.674
18	0.791	54	0.774	90	0.610	126	0.349	162	0.145	198	0.042	234	0.021	270	0.209	306	0.432	342	0.680
19	0.792	55	0.772	91	0.603	127	0.343	163	0.139	199	0.044	235	0.023	271	0.215	307	0.439	343	0.685
20	0.793	56	0.769	92	0.596	128	0.336	164	0.133	200	0.046	236	0.026	272	0.220	308	0.446	344	0.690
21	0.794	57	0.767	93	0.589	129	0.330	165	0.128	201	0.048	237	0.030	273	0.226	309	0.453	345	0.695
22	0.794	58	0.764	94	0.581	130	0.324	166	0.122	202	0.050	238	0.034	274	0.231	310	0.461	346	0.700
23	0.795	59	0.762	95	0.574	131	0.318	167	0.116	203	0.052	239	0.038	275	0.237	311	0.468	347	0.705
24	0.796	60	0.759	96	0.567	132	0.312	168	0.111	204	0.053	240	0.043	276	0.243	312	0.475	348	0.710
25	0.796	61	0.756	97	0.560	133	0.306	169	0.105	205	0.055	241	0.048	277	0.248	313	0.483	349	0.715
26	0.797	62	0.753	98	0.552	134	0.300	170	0.099	206	0.056	242	0.053	278	0.254	314	0.490	350	0.719
27	0.797	63	0.750	99	0.545	135	0.294	171	0.094	207	0.057	243	0.058	279	0.259	315	0.498	351	0.723
28	0.797	64	0.746	100	0.537	136	0.288	172	0.088	208	0.057	244	0.063	280	0.265	316	0.505	352	0.727
29	0.797	65	0.743	101	0.530	137	0.282	173	0.083	209	0.058	245	0.068	281	0.271	317	0.512	353	0.731
30	0.797	66	0.739	102	0.522	138	0.276	174	0.077	210	0.058	246	0.074	282	0.277	318	0.520	354	0.735
31	0.797	67	0.735	103	0.515	139	0.271	175	0.072	211	0.058	247	0.079	283	0.283	319	0.527	355	0.739
32	0.797	68	0.731	104	0.507	140	0.265	176	0.066	212	0.057	248	0.085	284	0.288	320	0.534	356	0.743
33	0.797	69	0.727	105	0.500	141	0.260	177	0.061	213	0.057	249	0.091	285	0.294	321	0.542	357	0.746
34	0.797	70	0.723	106	0.492	142	0.254	178	0.056	214	0.056	250	0.096	286	0.300	322	0.549	358	0.750
35	0.797	71	0.719	107	0.484	143	0.249	179	0.051	215	0.055	251	0.102	287	0.306	323	0.556	359	0.753

Chesapeake RF Consultants, LLC
Radiofrequency Consulting Engineers
Digital Television and Radio

Figure 1A
Auxiliary Antenna Azimuthal Pattern
Vertical Polarization
WECT(DT) Wilmington, NC
Facility ID 48666
Ch. 23 37 kW 212 m

prepared for
Gray Television Licensee, LLC

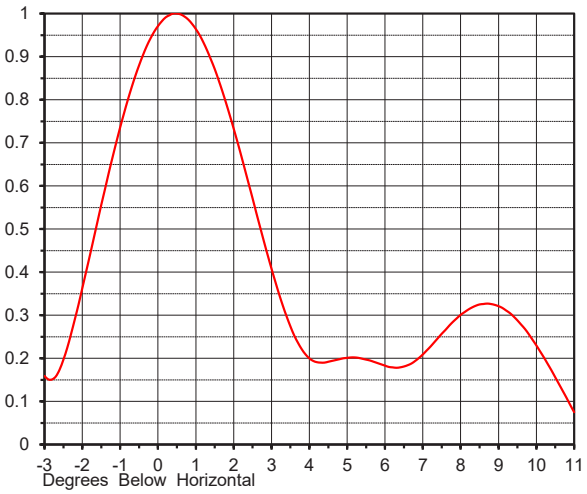
July, 2023

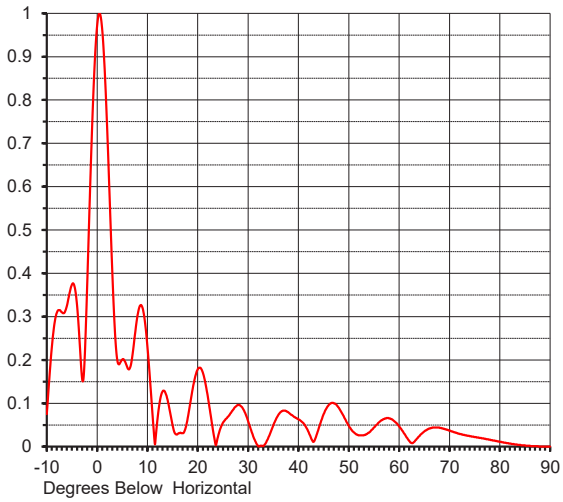
Dielectric®

ELEVATION PATTERN

Proposal No.	**20230111jmd**
Date	**11-Jan-23**
Call Letters	**WECT**
Channel	**23**
Frequency	**527 MHz**
Antenna Type	**TFU-16WB/VP-R C160**

RMS Directivity at Main Lobe	**14.3 (11.57 dB)**	Beam Tilt	**0.55 deg**
RMS Directivity at Horizontal	**13.5 (11.30 dB)**	Pattern Number	**16W143055-23**
	Calculated		





Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10.0	0.075	10.0	0.230	30.0	0.059	50.0	0.048	70.0	0.037
-9.0	0.229	11.0	0.075	31.0	0.024	51.0	0.033	71.0	0.033
-8.0	0.309	12.0	0.064	32.0	0.001	52.0	0.026	72.0	0.029
-7.0	0.310	13.0	0.127	33.0	0.001	53.0	0.026	73.0	0.027
-6.0	0.325	14.0	0.108	34.0	0.020	54.0	0.032	74.0	0.024
-5.0	0.374	15.0	0.049	35.0	0.049	55.0	0.044	75.0	0.022
-4.0	0.328	16.0	0.029	36.0	0.073	56.0	0.056	76.0	0.020
-3.0	0.159	17.0	0.031	37.0	0.083	57.0	0.064	77.0	0.018
-2.0	0.363	18.0	0.066	38.0	0.079	58.0	0.065	78.0	0.016
-1.0	0.736	19.0	0.134	39.0	0.070	59.0	0.059	79.0	0.014
0.0	0.971	20.0	0.179	40.0	0.063	60.0	0.047	80.0	0.011
1.0	0.964	21.0	0.171	41.0	0.054	61.0	0.030	81.0	0.009
2.0	0.733	22.0	0.115	42.0	0.034	62.0	0.013	82.0	0.007
3.0	0.408	23.0	0.039	43.0	0.011	63.0	0.011	83.0	0.005
4.0	0.200	24.0	0.022	44.0	0.041	64.0	0.024	84.0	0.004
5.0	0.201	25.0	0.055	45.0	0.075	65.0	0.035	85.0	0.003
6.0	0.183	26.0	0.069	46.0	0.096	66.0	0.042	86.0	0.002
7.0	0.209	27.0	0.085	47.0	0.100	67.0	0.044	87.0	0.001
8.0	0.301	28.0	0.096	48.0	0.090	68.0	0.044	88.0	0.000
9.0	0.321	29.0	0.087	49.0	0.070	69.0	0.041	89.0	0.000
								90.0	0.000

Chesapeake RF Consultants, LLC
Radiofrequency Consulting Engineers
Digital Television and Radio

Figure 2
Auxiliary Antenna Elevation Pattern
WECT(DT) Wilmington, NC
Facility ID 48666
Ch. 23 37 kW 212 m

prepared for
Gray Television Licensee, LLC

July, 2023

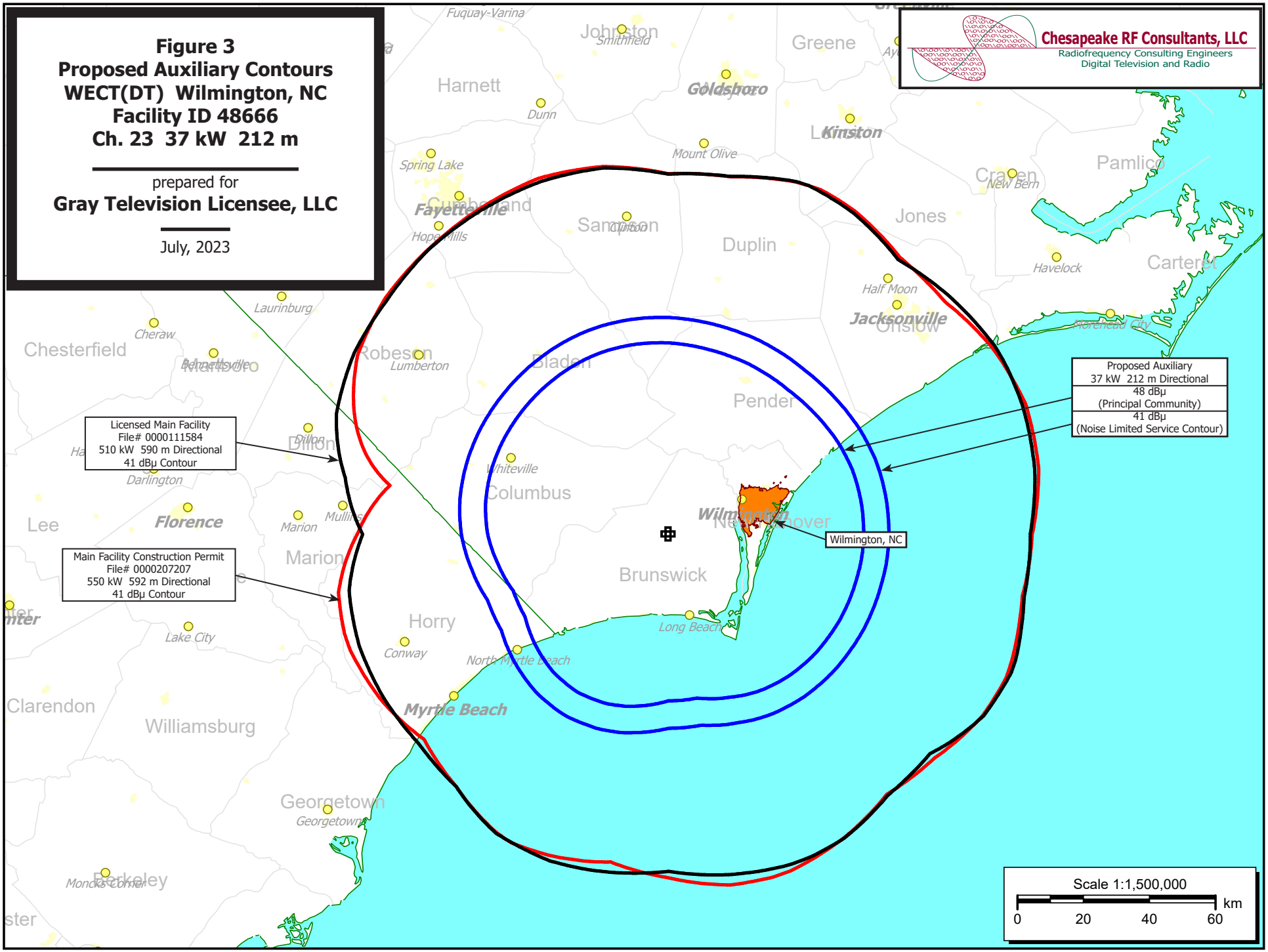


Figure 3
Proposed Auxiliary Contours
WECT(DT) Wilmington, NC
Facility ID 48666
Ch. 23 37 kW 212 m
prepared for
Gray Television Licensee, LLC
July, 2023
Chesapeake RF Consultants, LLC
Radiofrequency Consulting Engineers
Digital Television and Radio
Licensed Main Facility
File# 0000111584
510 kW 590 m Directional
41 dBµ Contour
Main Facility Construction Permit
File# 0000207207
550 kW 592 m Directional
41 dBµ Contour
Proposed Auxiliary
37 kW 212 m Directional
48 dBµ
(Principal Community)
41 dBµ
(Noise Limited Service Contour)
Wilmington, NC
Scale 1:1,500,000
km
0
20
40
60

Channel and Facility Information

Section	Question	Response
Proposed Community of License	Facility ID	48666
	State	North Carolina
	City	WILMINGTON
	DTX Channel	23
	Designated Market Area	Wilmington
Facility Type	Facility Type	Commercial
	Station Type	Auxiliary
Zone	Zone	2

Antenna Location Data

Section	Question	Response
Antenna Structure Registration	Do you have an FCC Antenna Structure Registration (ASR) Number?	Yes
	ASR Number	1008242
Coordinates (NAD83)	Latitude	34° 07' 54.0" N+
	Longitude	078° 11' 16.0" W-
	Structure Type	GTOWER-Guyed Structure Used for Communication Purposes
	Overall Structure Height	595.6 meters
	Support Structure Height	548.0 meters
	Ground Elevation (AMSL)	19.2 meters
Antenna Data	Height of Radiation Center Above Ground Level	207.9 meters
	Height of Radiation Center Above Average Terrain	211.9 meters
	Height of Radiation Center Above Mean Sea Level	227.1 meters
	Effective Radiated Power	37 kW

Antenna Technical Data

Section	Question	Response
Antenna Type	Antenna Type	Directional Custom
	Do you have an Antenna ID?	No
	Antenna ID	
Antenna Manufacturer and Model	Manufacturer:	Dielectric
	Model	TFU-16WB/VP-R C160
	Rotation	30 degrees
	Electrical Beam Tilt	0.55
	Mechanical Beam Tilt	Not Applicable
	toward azimuth	
	Polarization	Elliptical
DTV and DTS: Elevation Pattern	Does the proposed antenna propose elevation radiation patterns that vary with azimuth for reasons other than the use of mechanical beam tilt?	No
	Uploaded file for elevation antenna (or radiation) pattern data	

Directional Antenna Relative Field Values (Pre-rotated Pattern)

Degree	Value	Degree	Value	Degree	Value	Degree	Value
0	0.817	**90**	0.904	**180**	0.695	**270**	0.902
10	0.832	**100**	0.859	**190**	0.653	**280**	0.936
20	0.874	**110**	0.789	**200**	0.545	**290**	0.969
30	0.928	**120**	0.681	**210**	0.437	**300**	0.992
40	0.974	**130**	0.544	**220**	0.433	**310**	0.995
50	0.998	**140**	0.433	**230**	0.544	**320**	0.972
60	0.996	**150**	0.437	**240**	0.681	**330**	0.927
70	0.973	**160**	0.545	**250**	0.789	**340**	0.874
80	0.940	**170**	0.653	**260**	0.858	**350**	0.832

Additional Azimuths

Degree	V_A
54	1.000
306	0.997