

Engineering Statement

prepared for

Gray Television Licensee, LLC

KOSA-TV Odessa, TX

Facility ID 6865

Ch. 31 500 kW 226 m

This engineering statement has been prepared on behalf of *Gray Television Licensee, LLC* (“*Gray*”), licensee of KOSA-TV (Facility ID 6865, Odessa TX) in support of a *Petition for Rulemaking* to amend §73.622(j) by changing KOSA-TV’s digital television channel assignment. KOSA-TV is licensed to operate on Channel 7 (file# BLCDDT-20090622ACL). As described herein, *Gray* requests substitution of Channel 31 in lieu of Channel 7 for KOSA-TV.

The KOSA-TV Channel 7 facility is in the VHF spectrum and has proven to be ineffective for satisfactory viewer reception as discussed herein and elsewhere in the petition. The use of Channel 31 would place KOSA-TV in the UHF spectrum which is known to provide robust signal levels for home reception.

Gray has determined that many viewers experience significant difficulty in receiving KOSA-TV’s signal. Problems with digital VHF reception by stations in many markets were widely publicized since the 2009 digital transition date. It has been established that indoor reception is difficult for digital VHF stations such as KOSA-TV due to the longer wavelength signal’s inability to readily pass through buildings (the windows are smaller than the wavelength size), the ineffectiveness of many indoor antennas many of which were designed to emphasize the shorter wavelengths for UHF reception, and high levels of manmade and environmental noise.

No change in transmitting location is proposed. The KOSA-TV tower structure corresponds to FCC Antenna Structure Registration (“ASR”) number 1233693. *Gray* proposes to implement the Channel 31 substitution with a top-mounted transmitting antenna on the existing tower structure which would replace the existing top-mounted Channel 7 antenna.

The licensed Channel 7 facility operates with 48 kW effective radiated power (“ERP”) nondirectional at 226 meters antenna height above average terrain (“HAAT”). *Gray* proposes herein to utilize 500 kW ERP directional on Channel 31 at 226 meters antenna HAAT.

A summary of the licensed Channel 7 and proposed Channel 31 technical parameters is provided in the following.

Licensed Channel 7 Parameters (file# BLCDT-20090622ACL)

FacID	Call	Ch	City	St	Lat	Lon	RCAMSL	HAAT	ERP	DA
6865	KOSA-TV	7	ODESSA	TX	315150.8	1023442.5	1164.4	226	48	ND

Proposed Channel 31 Parameters

FacID	Call	Ch	City	St	Lat	Lon	RCAMSL	HAAT	ERP	DA
6865	KOSA-TV	31	ODESSA	TX	315150.8	1023442.5	1164.4	226	500	DA

The proposed directional antenna azimuthal pattern is plotted in Figure 1. The proposed directional antenna, a wide cardioid pattern oriented at 70°T, will be shared with *Gray’s* station KWWT (Ch. 30, Fac ID 84410, Odessa TX).¹

A map is supplied as Figure 2 which depicts the standard predicted coverage contours. As demonstrated thereon, the proposed facility complies with §73.625(a)(1) as the entire community of Odessa will be encompassed by the 48 dBμ contour.

Interference study per FCC OET Bulletin 69² shows that the proposal complies with the 0.5 percent limit of new interference caused to pertinent nearby full service and Class A television stations as required by §73.616. The interference study output report is provided as Table 1.

¹A Construction Permit (“CP” file# 0000127640) authorizes KWWT to relocate to the KOSA-TV tower and utilize a directional antenna at 500 kW ERP having a similar pattern to that proposed herein for KOSA-TV. The KWWT CP currently specifies 204 meters antenna HAAT at a side-mounted position on the KOSA-TV tower. Upon approval of the proposed KOSA-TV channel substitution, *Gray* intends to modify the KWWT CP to specify the top-mount location for use of a shared antenna with KOSA-TV.

²FCC Office of Engineering and Technology Bulletin number 69, *Longley-Rice Methodology for Evaluating TV Coverage and Interference*, February 6, 2004 (“OET-69”). This analysis employed the FCC’s current “TVStudy” software with the default application processing template settings, 2 km cell size, and 1 km terrain increment. Comparisons of various results of this computer program (run on a Mac processor) to the FCC’s implementation of

A coverage contour comparison map is provided in Figure 3, showing that the proposed Channel 31 noise limited service contour (“NLSC”) will fall short of matching that of the licensed Channel 7 facility. The gap between the proposed Channel 31 NLSC and the licensed Channel 7 NLSC is approximately 21 kilometers. *Gray* has determined that constructing a Channel 31 facility having an ERP of 500 kW directional would be complementary to KOSA-TV’s market size while minimizing service loss. The population density is fairly low along the edges of the licensed KOSA-TV NLSC. Even at the maximum allowed UHF ERP of 1000 kW nondirectional there would be a gap of approximately 12 km.

The proposed KOSA-TV Channel 31 NLSC loss area is depicted in Figure 3. A population summary of the NLSC loss is provided on the map and in the following table.

Loss Area Analysis – Standard FCC Contours

KOSA-TV Population Within NLSC	(2010 census)
Licensed Ch. 7 Total:	339,811
Proposed Ch. 31 Total:	317,350
Loss Area Population:	22,461
(percentage)	6.6%

The licensed Channel 7 facility’s NLSC encompasses 339,811 persons and the proposed Channel 31 facility’s NLSC would encompass 317,350 persons. The resulting NLSC loss population is 22,461 persons, representing 6.6 percent of the total population within the licensed KOSA-TV Channel 7 NLSC.

The results of additional loss area analysis are also provided in Figure 3, now to consider terrain-limited coverage predictions of the KOSA-TV licensed Channel 7 facility and the proposed Channel 31 operation. Here, the FCC’s TVStudy computer program was used to determine terrain-limited coverage predictions at locations beyond the proposed Channel 31 NLSC. The study area was set using the “fixed geography” option to match the KOSA-TV licensed Channel 7 NLSC. Default cell size and profile step settings were employed. The analysis included examination of each cell that is located beyond the Channel 31 NLSC and within the existing

TVStudy show excellent correlation.

Channel 7 facility’s NLSC. The results regarding the population within the NLSC loss area are provided on Figure 3 and in the following table.

KOSA-TV Terrain-Limited Population TVStudy at Fixed Geography Area (2010 census)	
Licensed Ch. 7 Total	338,070
Proposed Ch. 31 Total	338,034
Loss Total	36
Loss beyond Licensed NLSC (percentage)	36 0.01%

The licensed Channel 7 facility provides terrain-limited service to 338,070 persons within its NLSC. Within the same Channel 7 NLSC area, the proposed Channel 31 facility would provide terrain-limited service to 338,034 persons, a total loss of only 36 persons. Examination of terrain-limited service loss also considered each cell that is located within the existing Channel 7 facility’s NLSC and beyond the Channel 31 NLSC. Analysis within the NLSC loss area shows that the terrain-limited loss population is also only 36 persons in this region. The FCC has previously found that population loss of less than 500 persons is *de minimis*.³

Conclusion

The proposed channel substitution complies with the FCC’s principal community coverage requirements of §73.625 and the interference protection requirements of §73.616. The area of service loss can be considered as *de minimis*.

List of Attachments

Figure 1	Antenna Azimuthal Pattern
Figure 2	Proposed Coverage Contours
Figure 3	Loss Area Analysis – Terrain-Limited Method
Table 1	TVStudy Analysis of Proposal

Chesapeake RF Consultants, LLC

Joseph M. Davis, P.E. November 11, 2021
207 Old Dominion Road Yorktown, VA 23692 703-650-9600

³See *WSET, Inc.*, 80 FCC 2d 233, 246 (1980).



Azimuth Pattern

Type:	ATW-WC	Polarization:	Horizontal
Directivity:	1.40 numeric (1.46 dB)	Frequency:	31 (ATSC)
Peak(s) at:		Location:	Odessa, TX
		NOTE: Pattern shape and directivity may vary with channel and mounting configuration.	

Relative Field

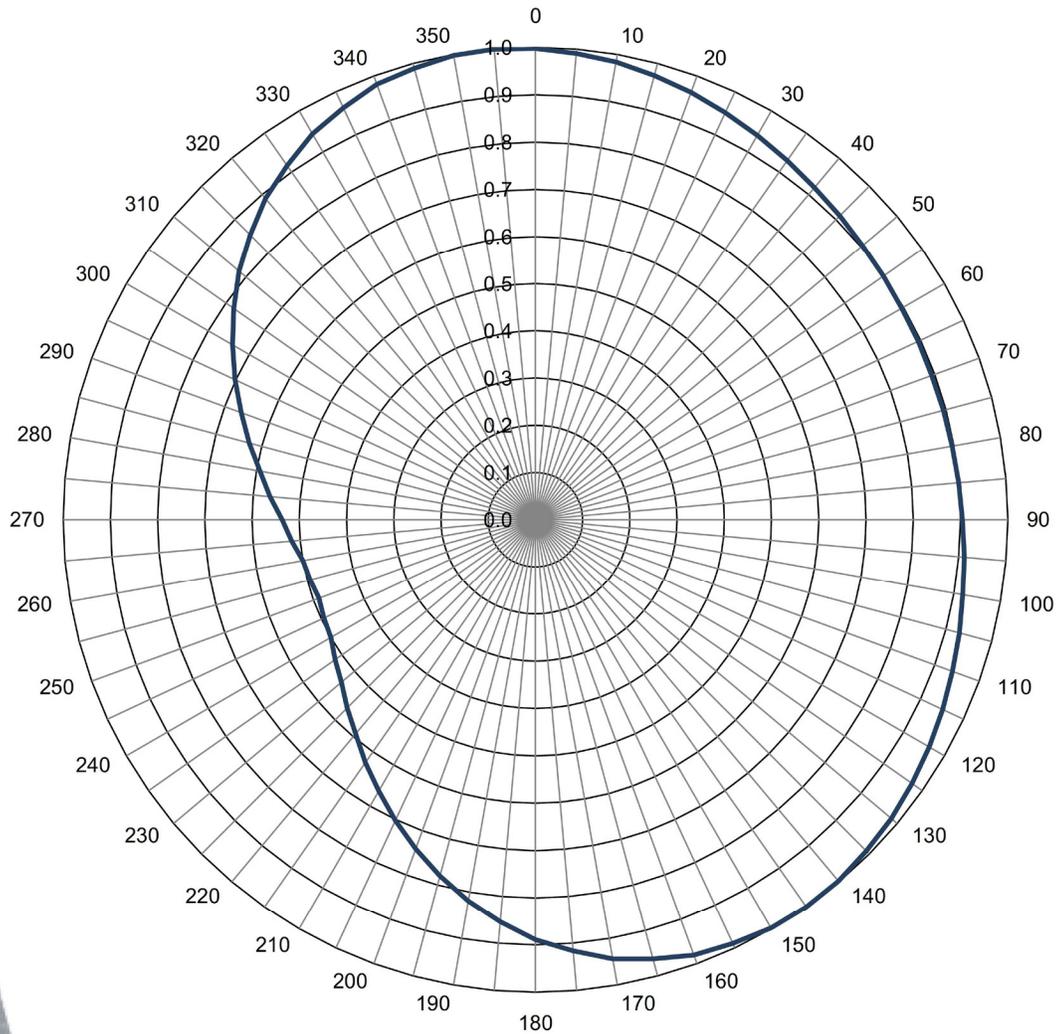


Figure 1
Antenna Azimuthal Pattern
KOSA-TV Odessa, TX
Facility ID 6865
Ch. 31 500 kW 226 m

prepared for
Gray Television Licensee, LLC

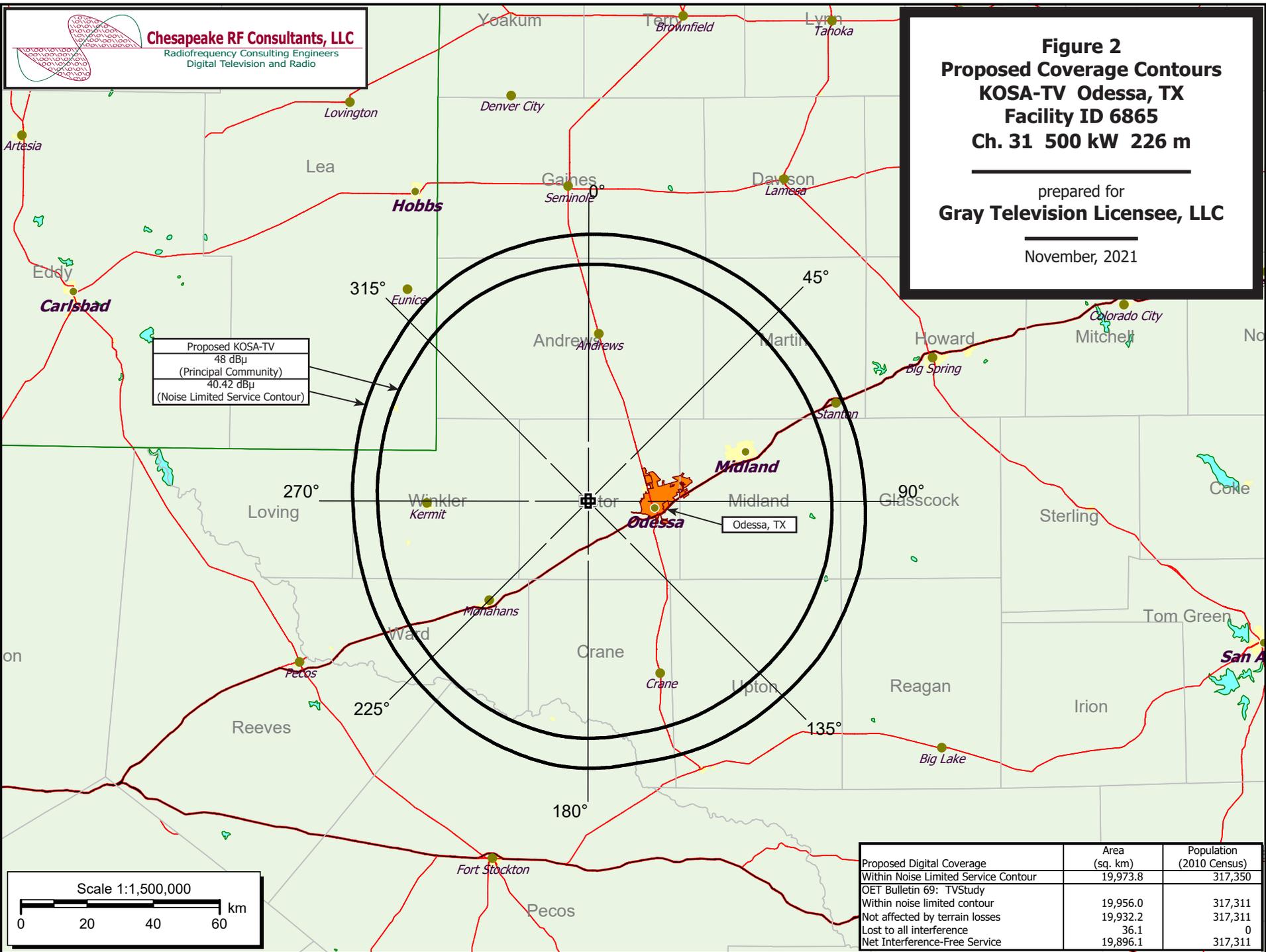
November, 2021

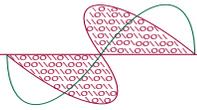


Figure 2
Proposed Coverage Contours
KOSA-TV Odessa, TX
Facility ID 6865
Ch. 31 500 kW 226 m

prepared for
Gray Television Licensee, LLC

November, 2021



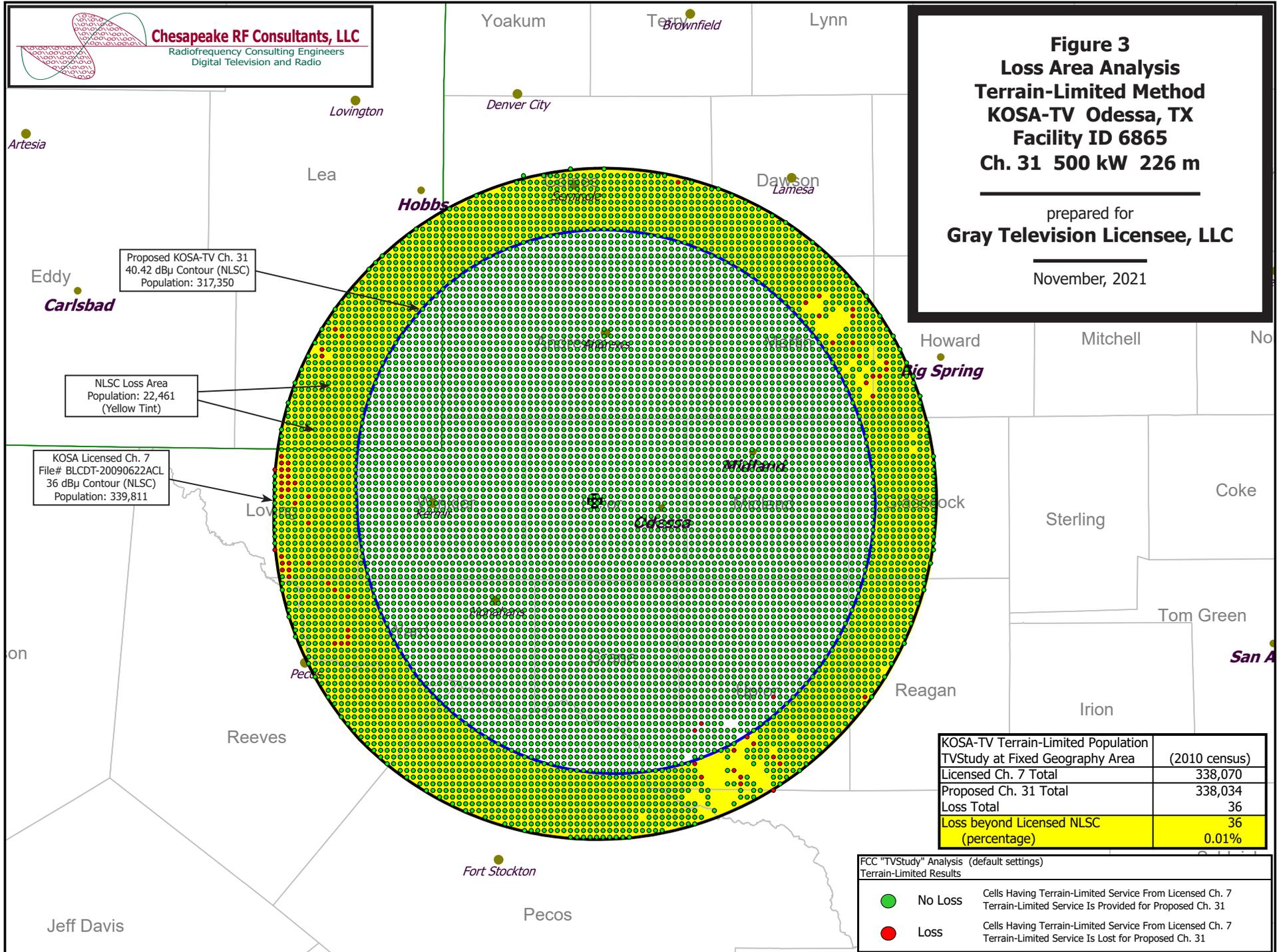


Chesapeake RF Consultants, LLC
 Radiofrequency Consulting Engineers
 Digital Television and Radio

Figure 3
Loss Area Analysis
Terrain-Limited Method
KOSA-TV Odessa, TX
Facility ID 6865
Ch. 31 500 kW 226 m

prepared for
Gray Television Licensee, LLC

November, 2021



Proposed KOSA-TV Ch. 31
 40.42 dBu Contour (NLSC)
 Population: 317,350

NLSC Loss Area
 Population: 22,461
 (Yellow Tint)

KOSA Licensed Ch. 7
 File# BLCDT-20090622ACL
 36 dBu Contour (NLSC)
 Population: 339,811

KOSA-TV Terrain-Limited Population TVStudy at Fixed Geography Area (2010 census)	
Licensed Ch. 7 Total	338,070
Proposed Ch. 31 Total	338,034
Loss Total	36
Loss beyond Licensed NLSC (percentage)	0.01%

FCC "TVStudy" Analysis (default settings) Terrain-Limited Results	
● No Loss	Cells Having Terrain-Limited Service From Licensed Ch. 7 Terrain-Limited Service Is Provided for Proposed Ch. 31
● Loss	Cells Having Terrain-Limited Service From Licensed Ch. 7 Terrain-Limited Service Is Lost for Proposed Ch. 31

Table 1 KOSA-TV TVStudy Analysis of Proposal
 (page 1 of 2)



tvstudy v2.2.5 (4uoc83)
 Database: localhost, Study: KOSA-TV 500kW Ch31 WC, Model: Longley-Rice
 Start: 2021.11.10 10:53:51

Study created: 2021.11.10 10:53:51

Study build station data: LMS TV 2021-11-10

Proposal: KOSA-TV D31 DT APP ODESSA, TX
 File number: KOSA-TV 500kW Ch31 WC
 Facility ID: 6865
 Station data: User record
 Record ID: 3953
 Country: U.S.
 Zone: II

Search options:
 Baseline record excluded if station has CP

Stations potentially affected by proposal:

IX	Call	Chan	Svc	Status	City, State	File Number	Distance
Yes	KWWT	D30	DT	CP	ODESSA, TX	BLANK0000127640	0.0 km
Yes	KWWT	D30	DT	LIC	ODESSA, TX	BLCDT20090612AJT	33.6
No	KEYU	D31	DT	LIC	BORGER, TX	BLCDT20130815AAW	392.9
Yes	KLBK-TV	D31	DT	LIC	LUBBOCK, TX	BLANK0000078650	196.3
No	KENW	D32	DT	LIC	PORTALES, NM	BLEDT20030219ADP	272.5

No non-directional AM stations found within 0.8 km

No directional AM stations found within 3.2 km

Record parameters as studied:

Channel: D31
 Latitude: 31 51 50.80 N (NAD83)
 Longitude: 102 34 42.50 W
 Height AMSL: 1164.4 m
 HAAT: 225.5 m
 Peak ERP: 500 kW
 Antenna: ERI ATW-WC_2021 70.0 deg
 Elev Pattn: Generic
 Elec Tilt: 0.50

40.4 dBu contour:

Azimuth	ERP	HAAT	Distance
0.0 deg	498 kW	217.4 m	81.2 km
45.0	415	240.9	81.9
90.0	409	260.1	83.8
135.0	491	243.4	83.2
180.0	395	235.3	81.2
225.0	159	228.7	75.8
270.0	144	186.2	72.1
315.0	365	191.6	77.4

Database HAAT does not agree with computed HAAT
 Database HAAT: 226 m Computed HAAT: 225 m

Distance to Canadian border: 1904.5 km

**Proposal is within coordination distance of Mexican border
 Distance to Mexican border: 222.0 km

Conditions at FCC monitoring station: Kingsville TX
 Bearing: 136.1 degrees Distance: 668.6 km

Proposal is not within the West Virginia quiet zone area

Conditions at Table Mountain receiving zone:
 Bearing: 346.2 degrees Distance: 947.7 km

Study cell size: 2.00 km

Table 1 KOSA-TV TVStudy Analysis of Proposal
(page 2 of 2)



Profile point spacing: 1.00 km

Maximum new IX to full-service and Class A: 0.50%
Maximum new IX to LPTV: 2.00%

Interference to BLANK0000127640 CP scenario 1

Call	Chan	Svc	Status	City, State	File Number	Distance			
Desired: KWWT	D30	DT	CP	ODESSA, TX	BLANK0000127640				
Undesireds: KOSA-TV	D31	DT	APP	ODESSA, TX	KOSA-TV 500kW Ch31 WC	0.0 km			
KTAB-TV	D30	DT	LIC	ABILENE, TX	BLANK0000145912	284.5			
Service area	Terrain-limited	IX-free, before	IX-free, after	Percent New IX					
19150.6	317,078	19130.7	317,078	19122.8	317,078	19102.6	317,075	0.11	0.00
Undesired		Total IX	Unique IX, before	Unique IX, after					
KOSA-TV D31 DT APP		20.2	3	20.2	3				
KTAB-TV D30 DT LIC		7.9	0	7.9	0				

Interference to BLCDT20090612AJT LIC scenario 1

Call	Chan	Svc	Status	City, State	File Number	Distance			
Desired: KWWT	D30	DT	LIC	ODESSA, TX	BLCDT20090612AJT				
Undesireds: KOSA-TV	D31	DT	APP	ODESSA, TX	KOSA-TV 500kW Ch31 WC	33.6 km			
KTAB-TV	D30	DT	LIC	ABILENE, TX	BLANK0000145912	255.1			
Service area	Terrain-limited	IX-free, before	IX-free, after	Percent New IX					
10125.1	293,291	10101.1	293,291	9947.9	293,266	8519.3	293,180	14.36	0.03
Undesired		Total IX	Unique IX, before	Unique IX, after					
KOSA-TV D31 DT APP		1436.5	86	1428.6	86				
KTAB-TV D30 DT LIC		153.2	25	145.3	25				

Interference to BLANK0000078650 LIC scenario 1

Call	Chan	Svc	Status	City, State	File Number	Distance			
Desired: KLBK-TV	D31	DT	LIC	LUBBOCK, TX	BLANK0000078650				
Undesireds: KOSA-TV	D31	DT	APP	ODESSA, TX	KOSA-TV 500kW Ch31 WC	196.3 km			
KEYU	D31	DT	LIC	BORGER, TX	BLCDT20130815AAW	201.9			
Service area	Terrain-limited	IX-free, before	IX-free, after	Percent New IX					
22482.0	387,783	22322.1	387,743	22217.9	387,726	22073.6	387,679	0.65	0.01
Undesired		Total IX	Unique IX, before	Unique IX, after					
KOSA-TV D31 DT APP		184.3	51	144.3	47				
KEYU D31 DT LIC		104.1	17	64.1	13				

Interference to proposal scenario 1

Call	Chan	Svc	Status	City, State	File Number	Distance	
Desired: KOSA-TV	D31	DT	APP	ODESSA, TX	KOSA-TV 500kW Ch31 WC		
Undesireds: KWWT	D30	DT	CP	ODESSA, TX	BLANK0000127640	0.0 km	
KLBK-TV	D31	DT	LIC	LUBBOCK, TX	BLANK0000078650	196.3	
Service area	Terrain-limited	IX-free	Percent IX				
19956.0	317,311	19932.2	317,311	19896.1	317,311	0.18	0.00
Undesired		Total IX	Unique IX	Prcnt Unique IX			
KLBK-TV D31 DT LIC		36.1	0	0.18	0.00		