

# **EXHIBIT 2**

## **TECHNICAL CERTIFICATIONS & EXHIBITS**

### **BROADCAST FACILITY**

**KHUU-LP, Seattle WA**

**Hollow Earth Radio**

August 30, 2023

#### **OVERVIEW**

Hollow Earth Radio (HER) hereby proposes a minor modification to licensed LPFM station KHUU-LP, specifying a new location, ERP, and antenna pattern. HER wishes to co-locate the station at the main studio building, at 429 Eastlake Avenue East, 2.14km from the current licensed location.

A 2-bay antenna will be mounted on a tower supported by a Rohn 25GBRM flat-roof non-penetrating tripod. The overall height of the tower assembly will extend 8 meters above the roof, with an antenna center of radiation of 5.5 meters above the roof (55.5m AMSL).

**Exhibit 2A** shows compliance with spacing requirements for co- and first-adjacent stations, and contour protection to second-adjacent stations. Most populated areas (buildings) are outside the interfering contour towards the horizon (based on the ratio method), while three remaining buildings are shown to be interference-free when the antenna elevation pattern is taken into account.

**Exhibit 2B** shows environmental compliance.

#### **METHODOLOGY**

All contour calculations were made using the methods and procedures described in 47 CFR §73.313(c). Contours were plotted using linear interpolation in one-degree increments, using “HAAT method 0 (zero)”, 51 data points per radial, and the FCC 30-second terrain database.

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INCORPORATED

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# EXHIBIT 2A

## TECHNICAL CERTIFICATIONS

### INTERFERENCE PROTECTION

This proposal is fully spaced to all co- and first-adjacent stations. There are no Canadian stations within range, and the 34dBu interfering contour does not cross into Canada.

#### CHANNEL STUDY

REFERENCE  
47 37 22.70 N.  
122 19 46.80 W.

KHUH at Eastlake Ave  
Hollow Earth Radio

CLASS = L1  
Current Spacings to 3rd Adj.

DISPLAY DATES  
DATA 08-27-23  
SEARCH 08-29-23

----- Channel 285 - 104.9 MHz -----

Call	Channel	Location	Azi	Dist	FCC	Margin
KCMS	LIC 287C1	Edmonds	WA 117.7	18.75	73.0	-54.3
KLSW	LIC 283C2	Covington	WA 118.1	18.84	53.0	-34.2
KHUH-LP	STA 285L1	Seattle	WA 120.7	2.14	24.0	-21.9
KHUH-LP	LIC 285L1	Seattle	WA 120.7	2.14	24.0	-21.9
KTDD	LIC-Z 285C3	Eatonville	WA 176.5	87.23	78.0	9.2
KAPY-LP	LIC 285L1	Duval	WA 64.7	35.03	24.0	11.0
KZQM	LIC-D 285A	Sequim	WA 313.9	81.08	67.0	14.1

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Reference station has protected zone issue: Canada

#### SECOND-ADJACENT CONTOUR PROTECTION:

Contour protection to 2<sup>nd</sup>-adjacent stations is provided using the ratio method. A waiver of 2<sup>nd</sup>-adjacent spacing to KCMS, Edmonds, and KLSW, Covington, is hereby requested, using the provisions of §73.807(e)(1). At the proposed LPFM tower site, the 60dBu F(50,50) contour of KCMS, is 90.3dBu, and the 60dBu contour of KLSW is 81.4dBu. Using the appropriate U/D ratio of 40dB, the “worst-case” interfering contour of the proposed LPFM is therefore 121.4dBu.

#### REDUCED POWER REQUESTED:

The applicant proposes to use the minimum ERP allowed by §73.811(b) (50 watts) for the sole purpose of providing 2<sup>nd</sup>-adjacent contour protection. Protection of the 2<sup>nd</sup>-adjacent stations cannot be met without this ERP reduction.

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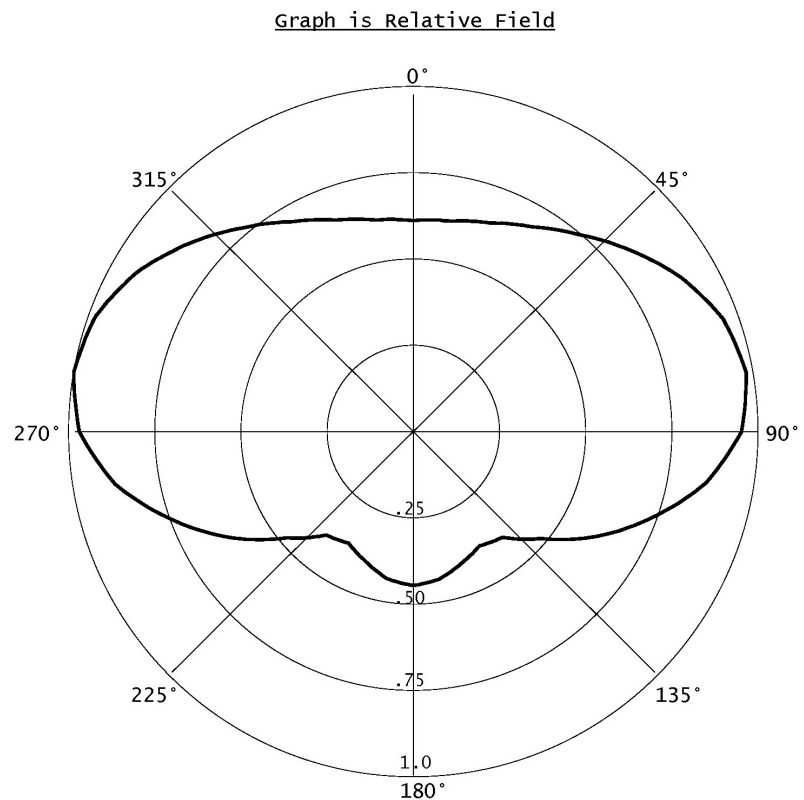
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**DIRECTIONAL ANTENNA:**

The applicant proposes usage of an off-the-shelf directional antenna, a 2-bay 0.75 wave-spaced Bext TFC2K-D, for the sole purpose of enabling contour protection to incumbent 2<sup>nd</sup>-adjacent stations. Therefore, the provisions of §73.816(d)(3)(ii) are applicable. No formal antenna proof of performance is required. The manufacturer did, however, supply a computer-generated azimuth and elevation pattern for the specific frequency employed. The data is employed in this application.

KHUH-LP			
08-29-2023			
RMS(V)= .711			
Azi	Field	dBk	kw
000	0.614	-17.247	0.019
010	0.622	-17.134	0.019
020	0.646	-16.806	0.021
030	0.688	-16.259	0.024
040	0.748	-15.532	0.028
050	0.821	-14.723	0.034
060	0.897	-13.954	0.040
070	0.957	-13.392	0.046
080	0.981	-13.177	0.048
090	0.952	-13.438	0.045
100	0.862	-14.300	0.037
110	0.735	-15.685	0.027
120	0.611	-17.289	0.019
130	0.484	-19.313	0.012
140	0.402	-20.926	0.008
150	0.384	-21.324	0.007
160	0.408	-20.797	0.008
170	0.436	-20.221	0.010
180	0.448	-19.985	0.010
190	0.435	-20.241	0.009
200	0.403	-20.904	0.008
210	0.375	-21.530	0.007
220	0.393	-21.122	0.008
230	0.481	-19.367	0.012
240	0.616	-17.219	0.019
250	0.747	-15.544	0.028
260	0.879	-14.131	0.039
270	0.969	-13.284	0.047
280	1.000	-13.010	0.050
290	0.981	-13.177	0.048
300	0.926	-13.678	0.043
310	0.851	-14.412	0.036
320	0.773	-15.247	0.030
330	0.705	-16.047	0.025
340	0.655	-16.685	0.021
350	0.625	-17.093	0.020



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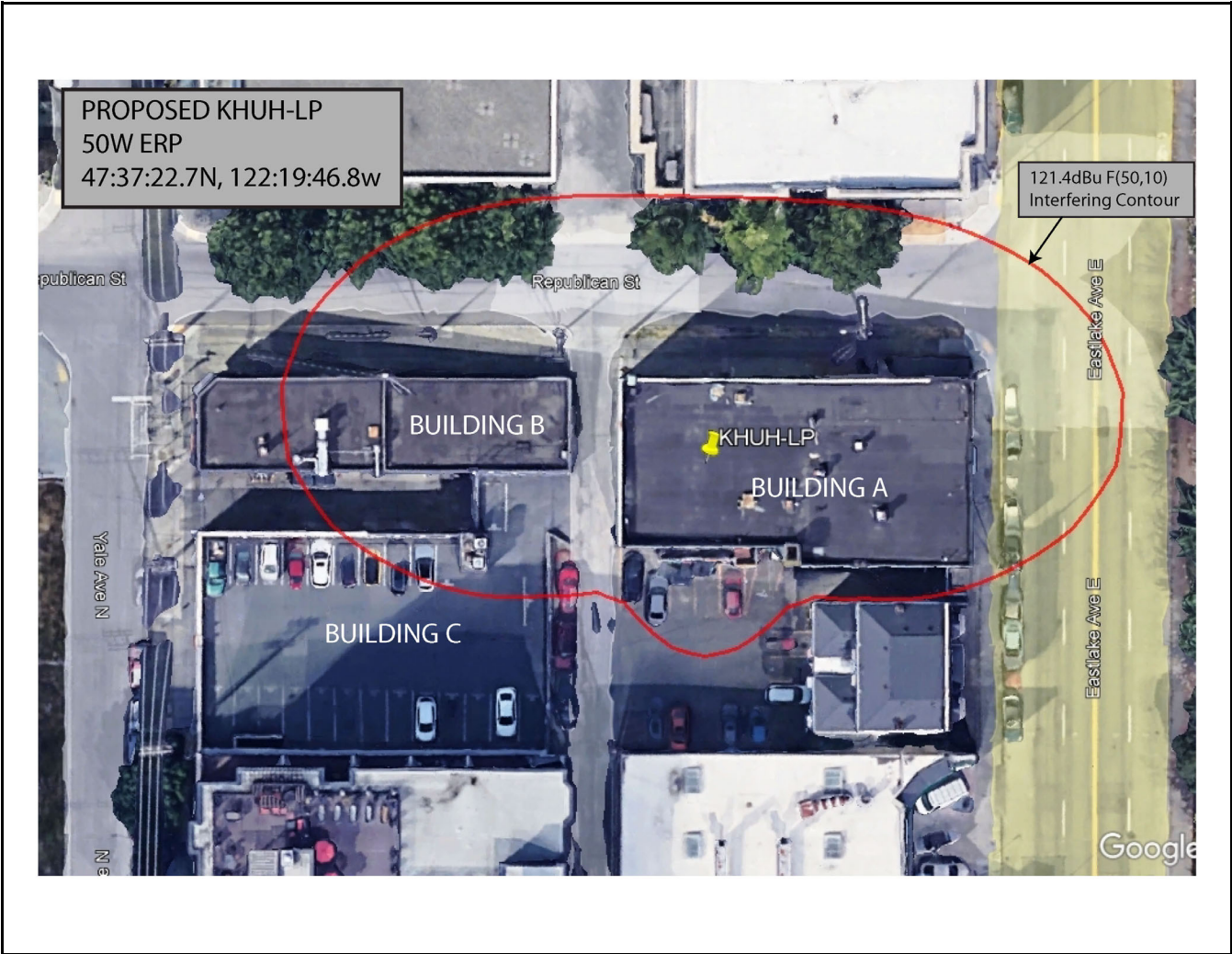
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**MAP OF AREA:**



All populated areas (buildings) are outside the red interfering contour, except for the three buildings, above. The proposed antenna is 55.5m AMSL; 5.5m above the roof of Building A.

BLDG	ELEVATION OF UPPERMOST POPULATED SURFACE	DISTANCE BELOW ANTENNA RAD CNTR	COMMENT
A	45m AMSL	10.5m	
B	39m AMSL	16.5m	
C	35m AMSL	20.5m	rooftop parking is 15.5m below antenna

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**ANTENNA ELEVATION PATTERN EMPLOYED**  
**TO SHOW LACK OF INTERFERENCE INSIDE BUILDING A:**

<b>2nd ADJACENT INTERFERENCE PROTECTION TO POPULATED AREAS</b>							
CALL LETTERS OR FILE NUMBER				KHUH-LP			
PROPOSED COMMUNITY OF LICENSE				SEATTLE			
INTERFERING CONTOUR OF PROPOSAL - dBu				121.40			
INTERFERING CONTOUR OF PROPOSAL - <V/m				1.1749			
2nd-ADJ STN REQUIRING INTERFERENCE PROT. (worst case)				KLSW, Covington, WA			
PROP. ERP (W)				50			
ANTENNA MODEL				BEXT TFC2K-D			
NOTES				2 BAY 0.75 SPACING 104.9MHz			
Depression Angle Below Horizon (dg)	Relative Field	ERP (W)	Angular Dist. to IX Contour (m)	Vertical Dist. to IX (below antenna)(m)	Horiz Dist. to IX Contour (m)	Vertical Dist Below Antenna to Uppermost Populated Area (m)	Clearance of IX Above Populated Areas (m)
0	0.963	49.07	41.79	0.0	41.8	10.5	10.5
5	1	50.00	42.19	3.7	42.0	10.5	6.8
10	0.948	44.94	40.00	6.9	39.4	10.5	3.6
15	0.81	32.81	34.17	8.8	33.0	10.5	1.7
20	0.635	20.16	26.79	9.2	25.2	10.5	1.3
25	0.477	11.38	20.12	8.5	18.2	10.5	2.0
30	0.347	6.02	14.64	7.3	12.7	10.5	3.2
35	0.214	2.29	9.03	5.2	7.4	10.5	5.3
40	0.061	0.19	2.57	1.7	2.0	10.5	8.8
45	0.091	0.41	3.84	2.7	2.7	10.5	7.8
50	0.205	2.10	8.65	6.6	5.6	10.5	3.9
55	0.26	3.38	10.97	9.0	6.3	10.5	1.5
60	0.258	3.33	10.88	9.4	5.4	10.5	1.1
65	0.219	2.40	9.24	8.4	3.9	10.5	2.1
70	0.17	1.45	7.17	6.7	2.5	10.5	3.8
75	0.138	0.95	5.82	5.6	1.5	10.5	4.9
80	0.14	0.98	5.91	5.8	1.0	10.5	4.7
85	0.163	1.33	6.88	6.9	0.6	10.5	3.6
89.8	0.188	1.77	7.93	7.9	0.0	10.5	2.6

Therefore, the “worst-case” 121.4dBu interfering contour will not reach any populated areas.

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**PROTECTED ZONES**

Distance to Canadian border = 100.1 km. There are no Canadian stations within spacing range, and the proposed 34dBu contour does not cross onto Canadian soil

Facility is okay with respect to AM station towers.

Closest AM Facility is KKDZ, SEATTLE, WA, L, DAN at 198.9° at a distance of 7.0 km

Facility is okay with respect to FCC monitoring stations.

Closest FCC Monitoring Station is 149.1 km - Ferndale, WA

## **EXHIBIT 2B**

### **TECHNICAL CERTIFICATIONS**

### **ENVIRONMENTAL EFFECTS**

This proposal would not have a significant environmental impact, under 47 CFR §1.1307. None of the provisions in this part apply in this case. The applicant proposes a new two-bay Bext TFC2K-D directional antenna, on a rooftop tower. The proposed antenna height is 15.5m AGL, with an ERP of 50W.

This proposal is categorically excluded from environmental processing per Table 1 of §1.1307(b), in that the ERP is less than 100 watts.

The applicant will ensure that public access to the tower is restricted by locking of access points to the roof. The site will be posted with appropriate RF exposure warning signs. If tower climbing or roof work by authorized personnel becomes necessary, transmitter power will be reduced or operation will cease, as necessary, so as to not exceed the RF exposure limits.

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