**November 2022**
**WGHN-FM Channel 221A**
**Grand Haven, Michigan**
**Allocation Study**

The attached spacing study shows that the proposed operation meets the co-channel and adjacent channel spacing requirements for Class A stations as prescribed in §73.207 of the Commission's Rules, with the exception of a short-spacing to the licensed operation of WDPW on Channel 220A at Greenville. Processing pursuant to §73.215 of the Commission's Rules is requested with respect to WDPW, and the attached allocation study map is included to demonstrate the lack of prohibited contour overlap with that facility.

FMSTUDY.EXE Copyright 2021, Hatfield & Dawson, LLC Version 5.10

SEARCH PARAMETERS FM Database Date: 20221114

Channel: 221A 92.1 MHz 

Latitude: 43 4 7.0 (NAD83)

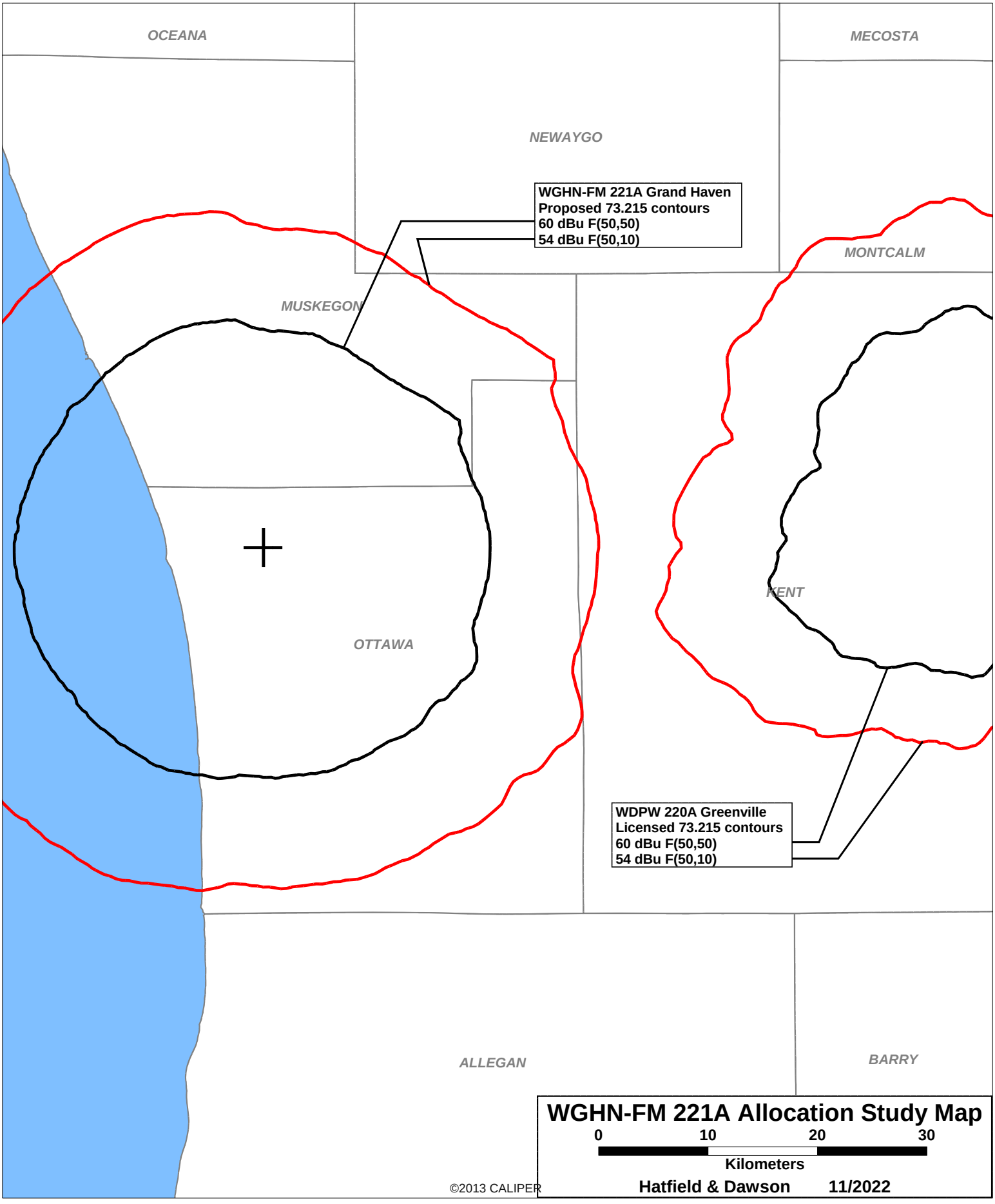
Longitude: 86 8 32.0

Safety Zone: 32 km

Job Title: WGHN-FM 221A MOD

| Call | City | Channel | ERP(kW) | | Latitude | Bearing | Dist | Req |
|---|---|---|---|---|---|---|---|---|
| Status | St FCC File No. | Freq. | HAAT(m) | | Longitude | deg-True | (km) | (km) |
| WMCQ | MUSKEGON | 219A | 6.000 | DA | 43 18 37.1 | 34.7 | 32.72 | 31 |
| LIC | MI BLED-20050401AOE | 91.7 | 100.0 | | 85 54 44.2 | | 1.72 | CLOSE |
| WDPW | GREENVILLE | 220A | 4.000 | DA | 43 5 12.1 | 88.0 | 67.29 | 72 |
| LIC | MI BLED-20080818ABB | 91.9 | 63.0 | | 85 18 59.0 | SS | -4.71 | SHORT |
| WMJC | RICHLAND | 220A | 6.000 | DA | 42 27 13.1 | 136.1 | 94.52 | 72 |
| LIC | MI BLED-20080815AAC | 91.9 | 67.4 | | 85 20 39.0 | | 22.52 | CLEAR |
| WVTY | RACINE | 221A | 0.000 | | 42 40 55.1 | 253.4 | 145.98 | 115 |
| ALC | WI | 92.1 | 0.0 | | 87 50 59.3 | | 30.98 | CLEAR |
| WQTX | ST. JOHNS | 221A | 0.000 | | 42 53 29.1 | 98.2 | 129.41 | 115 |
| ALC | MI | 92.1 | 0.0 | | 84 34 26.9 | | 14.41 | CLEAR |
| WQTX | ST. JOHNS | 221A | 4.000 | | 42 53 30.1 | 98.2 | 129.32 | 115 |
| LIC | MI BLH-20120119ACV | 92.1 | 122.0 | | 84 34 30.9 | | 14.32 | CLEAR |
| WGHN-FM | GRAND HAVEN | 221A | 6.000 | | 43 3 25.1 | 260.9 | 8.16 | 115 |
| LIC | MI BLH-20110518ACV | 92.1 | 65.0 | | 86 14 28.2 | | -106.84 | SHORT |
| WHPD | DOWAGIAC | 221A | 3.300 | | 41 59 52.1 | 176.5 | 119.17 | 115 |
| LIC | MI BMLH-19911112KA | 92.1 | 91.0 | | 86 3 14.0 | | 4.17 | CLOSE |
| WRWW-LP | LOWELL | 222L1 | 0.100 | | 42 56 30.1 | 101.8 | 67.38 | 0 |
| LIC | MI BLL-20190320AAO | 92.3 | 30.0 | | 85 20 3.1 | | 0.00 | LPFM |
| WRVU-LP | GRAND RAPIDS | 222L1 | 0.100 | | 42 51 3.1 | 118.9 | 49.91 | 0 |
| LIC | MI BLL-20160202ABV | 92.3 | 26.3 | | 85 36 26.1 | | 0.00 | LPFM |
| WWSN | NEWAYGO | 223A | 2.250 | | 43 18 35.1 | 34.7 | 32.65 | 31 |
| LIC | MI BLH-20050805AAN | 92.5 | 165.0 | | 85 54 45.2 | | 1.65 | CLOSE |
| WYVN | SAUGATUCK | 224A | 3.300 | | 42 41 10.1 | 182.8 | 42.54 | 31 |
| LIC | MI BLH-20021002ABE | 92.7 | 114.0 | | 86 10 5.1 | SS | 11.54 | CLEAR |
| WYHA | GRAND RAPIDS | 275B | 50.000 | | 42 57 13.0 | 109.4 | 38.36 | 15 |
| LIC | MI 0000191029 | 102.9 | 150.0 | | 85 41 55.0 | | 23.36 | CLEAR |

==== END OF FM SPACING STUDY FOR CHANNEL 221 ====



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**November 2022**
**WGHN-FM Channel 221A**
**Grand Haven, Michigan**
**RF Exposure Study**

## Facilities Proposed

The proposed operation will be on Channel 221A (92.1 MHz) with an effective radiated power of 6 kilowatts. Operation is proposed with a 3-element circularly-polarized omni-directional antenna. The FCC Antenna Structure Registration Number for the proposed tower is 1000810. Diplexed operation of WGHN-FM 221A and WMPA 226A is proposed.

## RF Exposure Calculations

The power density calculations shown below were made using the techniques outlined in OET Bulletin No. 65. "Ground level" calculations in this report have been made at a reference height of 2 meters above ground to provide a worst-case estimate of exposure for persons standing on the ground in the vicinity of the tower. The equation shown below was used to calculate the ground level power density figures from each antenna.

$$S(\mu W / cm^2) = \frac{33.4 \times AdjERP(Watts)}{D^2}$$

Where: *AdjERP(Watts)* is the maximum lobe effective radiated power times the element pattern factor times the array pattern factor.

*D* is the distance in meters from the center of radiation to the calculation point.

Ground level power densities have been calculated for locations extending from the base of the tower to a distance of 500 meters. Values past this point are increasingly negligible.

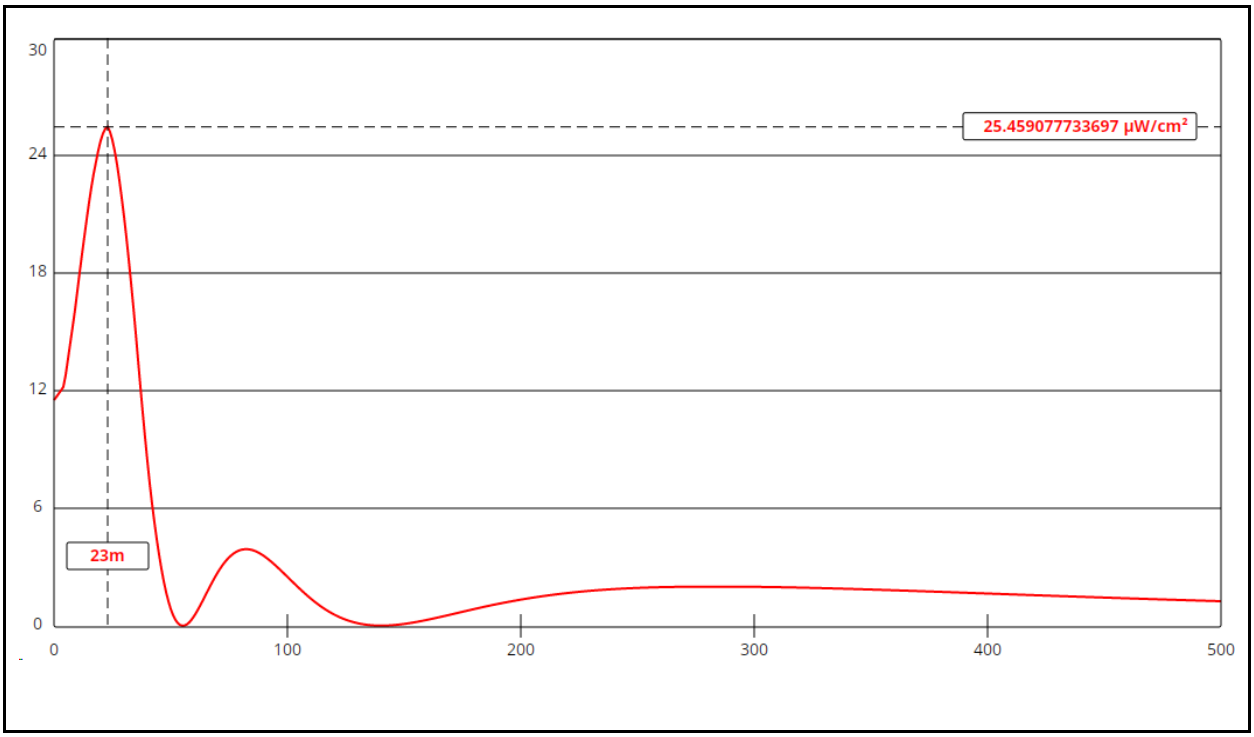
Calculations of the power density produced by the proposed WGHN-FM antenna system assume a Type 2 element pattern, which is the element pattern for the SWR model FM3-3 antenna proposed for use. The highest calculated ground level power density occurs at a distance of 23 meters from the base of the antenna support structure. At this point the power density is calculated to be 25.5 μW/cm².

Calculations of the power density produced by the proposed WMPA antenna system assume a

Type 2 element pattern, which is the element pattern for the SWR model FM3-3 antenna proposed for use. The highest calculated ground level power density occurs at a distance of 23 meters from the base of the antenna support structure. At this point the power density is calculated to be 25.5 $\mu W/cm^2$.

These calculations show that the maximum calculated power density produced at two meters above ground level by the proposed operations of WGHN-FM and WMPA is 51 $\mu W/cm^2$, which is 25.5% of 200 $\mu W/cm^2$ (the FCC standard for uncontrolled environments).

The permittee/licensee in coordination with other users of the site must reduce power or cease operation as necessary to protect persons having access to the site, tower or antenna from radiofrequency exposure in excess of FCC guidelines.

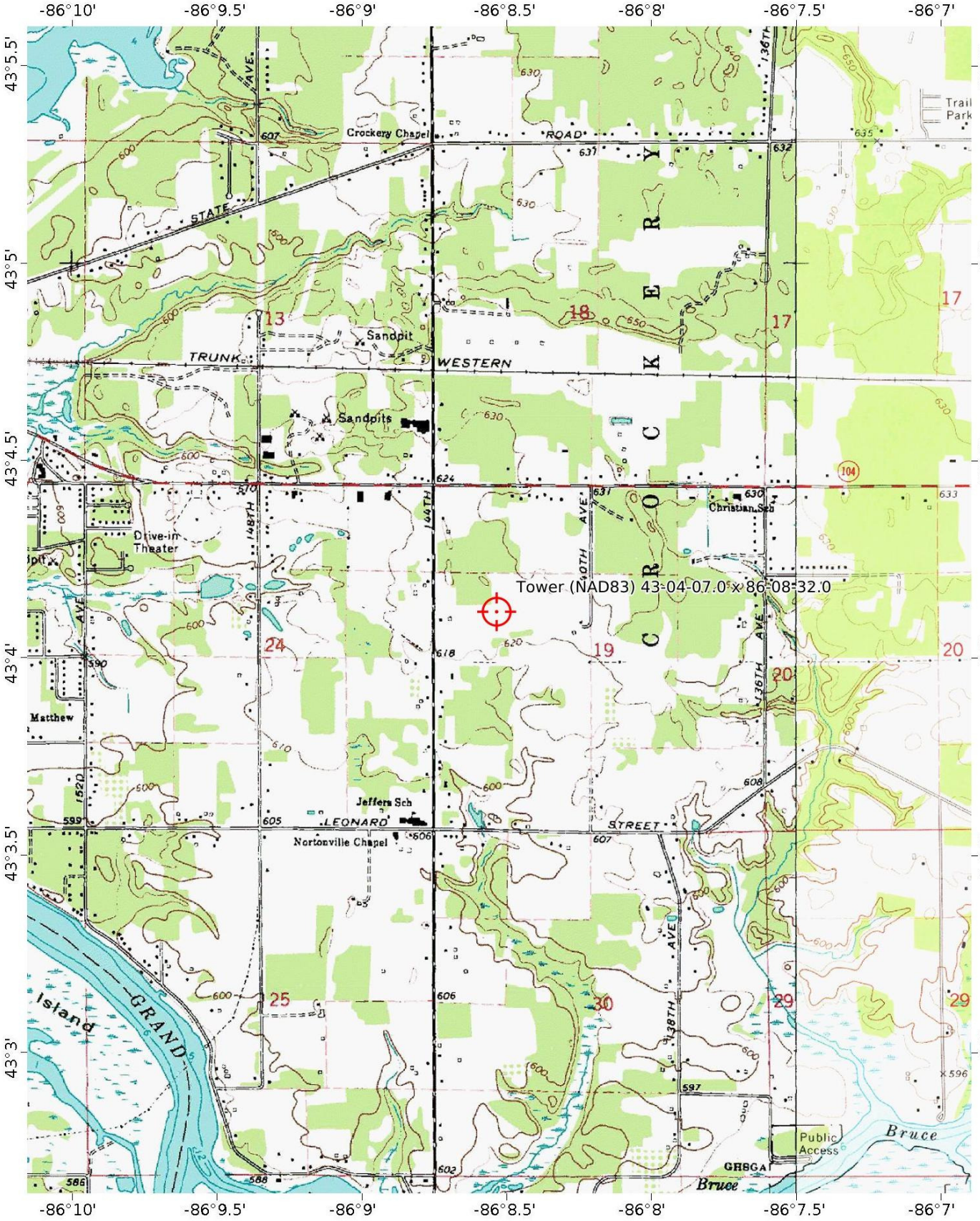



**Ground-Level RF Exposure** **OET FMModel**

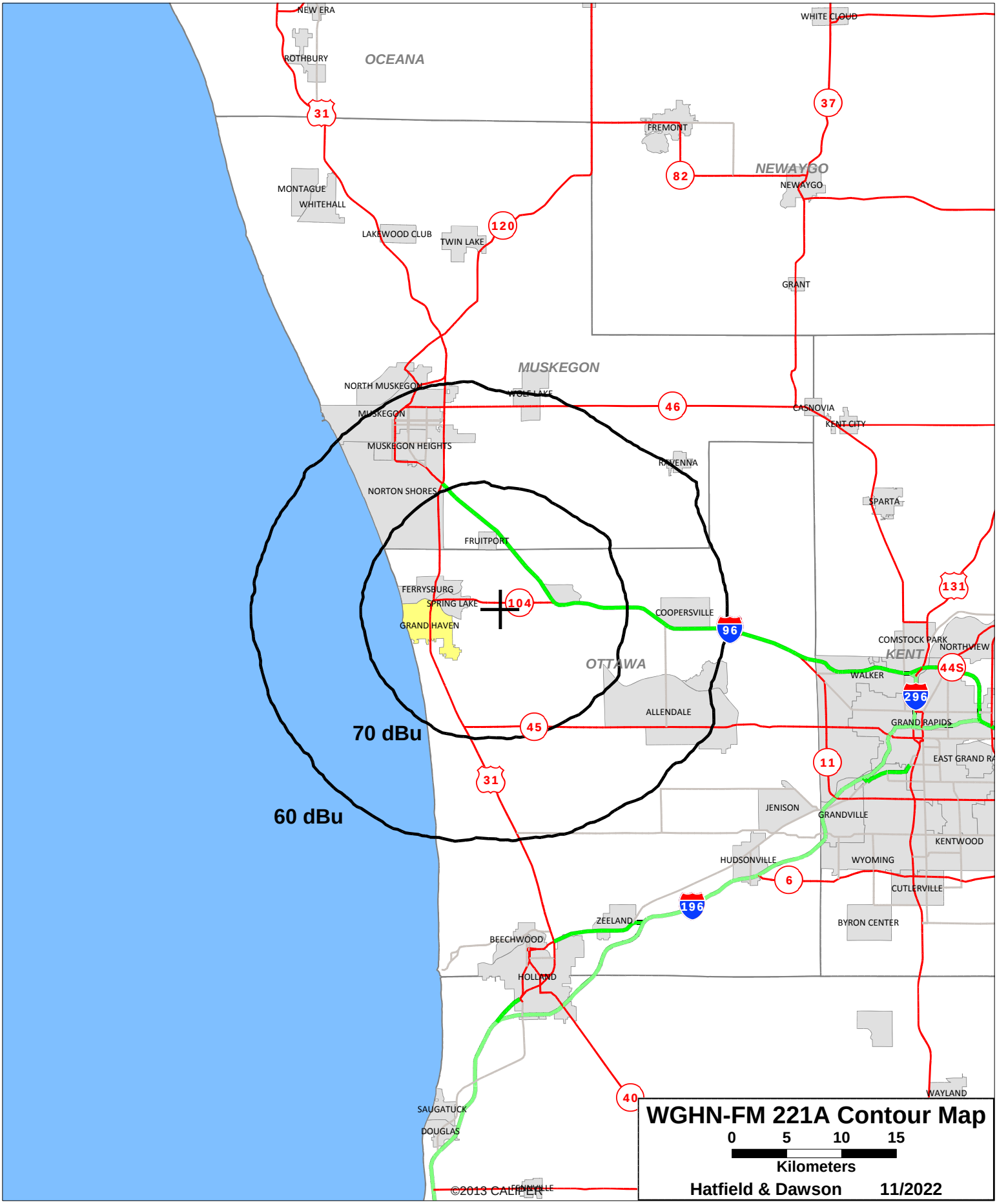
**WGHN-FM 221A Grand Haven**

| | |
|---|---|
| Antenna Type: | SWR FM3-3 (Type 2) |
| No. of Elements: | 3 |
| Element Spacing: | 1.0 wavelength |
| | |
| Distance: | 500 meters |
| Horizontal ERP: | 6 kW |
| Vertical ERP: | 6 kW |
| | |
| Antenna Height: | 51.5 meters AGL |

Maximum Calculated Power Density is 25.5 µW/cm$^2$ at 23 meters from the antenna structure.




Hatfield & Dawson Consulting Engineers


NEW ERA
ROTHBURY
OCEANA
WHITE CLOUD
31
37
FREMONT
82
NEWAYGO
NEWAYGO
MONTAGUE
WHITEHALL
LAKEWOOD CLUB
TWIN LAKE
120
GRANT
MUSKEGON
NORTH MUSKEGON
WOLF LAKE
46
CASNOVIA
KENT CITY
MUSKEGON
MUSKEGON HEIGHTS
RAVENNA
NORTON SHORES
SPARTA
FRUITPORT
131
FERRYSBURG
SPRING LAKE
104
COOPERSVILLE
GRAND HAVEN
96
COMSTOCK PARK
NORTHVIEW
KENT
OTTAWA
WALKER
44S
296
ALLENDALE
GRAND RAPIDS
70 dBu
45
EAST GRAND RA
11
31
JENISON
GRANDVILLE
60 dBu
KENTWOOD
HUDSONVILLE
WYOMING
6
CUTLERVILLE
196
ZEELAND
BYRON CENTER
BEECHWOOD
HOLLAND
WAYLAND
40
SAUGATUCK
DOUGLAS
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WGHN-FM 221A Contour Map
0 5 10 15
Kilometers
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