



**CONSULTING ENGINEERING REPORT  
CONCERNING THE EFFECTS UPON  
LICENSED POINT-TO-POINT MICROWAVE PATHS  
and  
AIRPORT, CELLULAR, NTIA, TV, FM and AM FACILITIES  
DUE TO THE CONSTRUCTION OF A  
WIND TURBINE FARM  
In  
Your County**

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**Evans Associates  
Energy Project  
Microwave, Cellular, Airport,  
& NTIA Notification Study**

## **I. INTRODUCTION**

This Consulting Engineering Report describes the results of a study and analysis to determine the locations of federally-licensed (FCC) microwave, cellular, airport, and NTIA facilities that could be adversely impacted as a result of the construction of the Main Wind turbine farm near YourTown, YourState. This document describes impact zones and necessary mitigation procedures, along with recommendations concerning wind turbine siting. All illustrations, calculations and conclusions contained in this document are subject to on-site verification.

Where feasible, coordinates of towers supporting requested microwave paths have been independently verified. The purposes of this study is to facilitate the siting of turbines to avoid unacceptable impact to FCC licensed RF facilities and, to the maximum extent possible, identify available alternatives to individual licensees in intractable cases.

The wind turbines to be used have a hub height of 100 meters above ground and a blade diameter of 90 meters. Thus, the total height will be 145 meters above ground level to the tip of one blade at the 12:00 position. The turbine project comprises 250 turbines within the project boundary shown in Figure 1.

Using industry standard procedures and FCC databases, a search was conducted to determine the presence of existing microwave paths crossing the subject property. Other fixed RF facilities within or adjacent to the identified area are also shown in cases where they may also result in a blackout area. A GIS database and map were then prepared showing the results of this research. The turbine layout plan was then prepared as an overlay, showing microwave blackout areas, and nearby cellular, airport, and NTIA facilities. The resulting maps are shown in Figures 1 through 6 attached.

The following analysis consists of three sections:

1. Microwave path analysis (Section II)
2. Cellular, Airport, NTIA, TV, FM and AM facilities (Section III)
3. Conclusions (Section IV)

The database search revealed 10 unique microwave paths that impact the turbine site, as well as several land-mobile facilities located within the subject property. These have been plotted for reference. The locations of the microwave paths with respect to the turbine locations are shown in Figure 1. The turbines and the land-mobile facilities are shown on the map of Figure 2. In this consultant's opinion, the instant study, coupled with on-site verification, represents due diligence with respect to these services and facilities.

Each of the RF analyses is described separately in the sections that follow.



## II. ANALYSIS OF MICROWAVE LINKS

An extensive analysis was undertaken to determine the likely effect of the new wind turbine farm upon the existing microwave paths, consisting of a Fresnel x/y axis study and a z-axis (height) evaluation. The microwave path is overlaid on the USGS topographic base maps attached, and is also available as overlays for the Google Earth™ program files.

For this study, *Worse Case Fresnel Zones* (WCFZ) were calculated for each microwave path. The mid-point of a microwave path is the location where the widest (or worst case) Fresnel zone occurs. Possible geographic coordinate errors must be added to the Fresnel zone clearance numbers<sup>1</sup>. The radius  $R$  of the Worst Case Fresnel Zone, in meters, is calculated for each path using the following formula:

$$Rn \cong 17.3 \sqrt{\frac{n}{F_{GHz}} \left( \frac{d_1 d_2}{d_1 + d_2} \right)}$$

$Rn$  = First Fresnel Zone Radius, meters

$n$  = The Number 1

$F_{GHz}$  = Frequency of Microwave Link in GHz

$d_1$  = Distance to Wind Turbine from Microwave Transmitter in km

$d_2$  = Distance to Wind Turbine from Microwave Receiver in km

$d_1 + d_2$  = Total Microwave Path Length in km

*Note: For Worst Case Fresnel Zone calculation,  $d_1 = d_2$*

The WCFZ is defined by the cylindrical area (catenary) with its axis as the direct line between the microwave link endpoints and whose radius is  $R$  as calculated above. This is the zone where the siting of obstructions should be avoided.

As shown in Tables 1-3 below, Evans Associates has identified 10 active microwave links that intersect, or come close to, the project area<sup>2</sup>:

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<sup>1</sup> Many microwave and earth station facilities were built before accurate methods were available to establish exact geographic coordinates (such as GPS). It is not unusual for database errors of up to 4 or 5 seconds to occur, which can effect the positioning of critical turbines located near Fresnel paths.

<sup>2</sup> There are numerous other links that are inactive, cancelled and terminated.



**Table 1 – Microwave Links Crossing Turbine Area**

Path	Frequency	Distance from Transmitter to Receiver	Bearing	Fresnel Zone Radius	Name
1	955.55	69.6046	11.85445	73.82584	Cooperative, Inc.
2	6650	32.82664	182.9496	19.21846	Cooperative, Inc.
3	951	35.14817	15.86317	52.58685	Four, Inc.
4	948.875	35.1471	15.86368	52.64491	K---
5	944.875	29.24975	345.2081	48.12714	Four, Inc.
6	6083.57	36.29512	114.0952	21.12812	Wireless
7	6226.89	36.61113	348.0447	20.97428	Wireless
8	6286.19	26.68046	166.5832	17.82046	Wireless
9	6197.24	30.0279	17.09109	19.04055	Wireless
10	959.15	69.61209	191.9882	73.69112	Cooperative, Inc.

**Table 2 – Microwave Links Crossing Turbine Area: Transmitter & Receiver Information**

Path	Call Sign	Transmitter Location	Transmitter Latitude	Transmitter Longitude	Transmitter Elevation
1	W-----	City	45° 10' 43.7874"	97° 0' 58.212"	605
2	W-----	City	45° 10' 43.7874"	97° 0' 58.212"	699.5
3	W-----	K---- Aux Site	44° 52' 15.996"	97° 6' 34.9914"	688.8
4	W-----	City	44° 52' 15.8154"	97° 6' 36.18"	608
5	W-----	City	44° 55' 14.808"	96° 53' 34.188"	556.3
6	W-----	City	45° 20' 22.4874"	97° 4' 18.084"	553.2
7	W-----	City	45° 20' 22.4874"	97° 4' 18.084"	646.2
8	W-----	City	45° 20' 22.4874"	97° 4' 18.084"	682.1
9	W-----	City	44° 50' 52.116"	97° 6' 18.5754"	737
10	W-----	City	45° 47' 30.012"	96° 49' 55.992"	672.4
Path	Call Sign	Receiver Location Name	Receiver Latitude	Receiver Longitude	Receiver Elevation
1	W-----	#	45° 47' 29.7954"	96° 49' 56.2074"	419.1
2	W-----	City	44° 53' 1.788"	97° 2' 15.1794"	623.9
3	W-----	K--- Main Xmtr Site	45° 10' 31.008"	96° 59' 14.9994"	712.8
4	W-----	City	45° 10' 30.792"	96° 59' 16.188"	682.8
5	W-----	City	45° 10' 30.792"	96° 59' 16.188"	652.8771
6	W-----	City	45° 12' 19.6914"	96° 38' 59.8914"	403.8
7	W-----	City	45° 39' 42.516"	97° 10' 8.3994"	646.2
8	W-----	City	45° 6' 21.7074"	96° 59' 34.908"	655.6
9	W-----	City	45° 6' 21.7074"	96° 59' 34.908"	657.5
10	W-----	#	45° 10' 43.7874"	97° 0' 58.212"	699.5

The most pertinent paths are those that create blackout zones across the turbine area (Figure 1).

As turbine locations are added or re-sited, the tabulated clearances must be maintained with due consideration given to coordinate accuracy.



Mitigation of microwave path encroachment can involve one or more of the following possibilities:

1. Configuring the turbines to avoid the blackout zone (recommended).
2. Shifting the microwave path to by moving one endpoint to another location.
3. Increasing the height of the microwave tower above the turbines.
4. Increasing microwave transmitter power, receiver sensitivity, or type of antenna.

Figure 1, attached, shows the pertinent microwave paths with respect to the property boundaries.

### **III. ANALYSIS OF FIXED RADIO FACILITIES**

#### **3.1 Land Mobile Facilities**

Analysis of fixed mobile facilities was not requested, but pertinent tower locations are provided for purposes of identification:

**Table 3 – Land Mobile Facility Locations and Information**

Call Sign	Frequency	Height (Meters)	Latitude	Longitude	Company
W-----	153.74	16	45° 18' 18.39"	97° 2' 13.59"	County
W-----	451.675	91	45° 22' 28.88"	97° 2' 21.30"	Southern Energy
K-----	160.71	26	45° 18' 23.90"	97° 2' 29.29"	Railway Co.
K-----	153.02	23	45° 21' 18.90"	97° 1' 50.30"	Private
K-----	463.225	43	45° 18' 34.88"	97° 1' 41.30"	County Rural Water
K-----	158.76	24.4	45° 6' 21.49"	96° 55' 40.69"	County
K-----	463.5	23	45° 3' 54.90"	97° 7' 14.30"	Communications
W-----	158.775	37	45° 10' 44.00"	97° 0' 57.99"	County
K-----	152.93	30	45° 17' 34.90"	97° 3' 16.31"	Appalachia Inc.
W-----	463.45	23.8	45° 18' 2.88"	97° 2' 23.28"	KD Inc.

10 LMR sites impinge upon the property boundary area. These sites are assigned to the County District, representing a SCADA system. This application can be high liability if interference is caused; Evans is therefore tabulating them (see Figure 2).

#### **3.2 Cellular Facilities**

Figure 3 shows the cellular facilities that are registered in the pertinent area. Because of the manner in which cellular facilities are licensed, it is possible that some cellular antennas could be located in the area and not be registered in the FCC's database. However, even if one or more cell phone antennas are co-located on the existing towers or on unregistered towers, impact to these services is insignificant to non-existent<sup>3</sup> as long as all tower structures are located farther away than 0.50 miles (0.8 kilometer). If an on-site survey

<sup>3</sup> These services operate on high UHF and SHF frequencies that are less sensitive to nearby turbines.



identifies any cellular antennas within this distance, they should be analyzed as per the techniques used in this study, as recommended previously in this document<sup>4</sup>.

**Table 4 – Cellular Towers Near Summit Wind Project Area**

Licensee	Call Sign	Location Number	Latitude	Longitude	City
RRR, Inc	K-----	11	44° 53' 33"	97° 7' 45"	City
RRR, Inc	K-----	14	45° 12' 26"	96° 39' 0"	City
RRR, Inc	K-----	15	45° 21' 17"	97° 32' 29"	City
RRR, Inc	K-----	16	45° 6' 58"	97° 2' 47"	City
RRR, Inc	K-----	17	44° 54' 24"	96° 42' 2"	City
RRR, Inc	K-----	18	44° 53' 32"	97° 6' 11"	City
RRR, Inc	K-----	19	44° 44' 0"	96° 41' 1"	City
RRR, Inc	K-----	20	45° 19' 25"	97° 45' 24"	City
Pear, LLC	K-----	1	44° 55' 15"	96° 53' 34"	City
Pear, LLC	K-----	2	44° 37' 1"	96° 42' 51"	City
Pear, LLC	K-----	3	45° 20' 24"	97° 4' 17"	City

**Red shading:** facilities within the project area.

### 3.3 FAA and DOD Concerns

The FAA and DoD wind farm interference report was released to the public on September 27, 2006. Subsequently, a tool has been developed to determine the level of interference to be caused to radar facilities operated by these services. The Department of Defense and the Department of Homeland Security *Long Range Radar Joint Program Office* “JPO” subscribes to this tool; however, FAA forms 7460-1 must still be submitted to the FAA detailing all turbine positions and heights. The following airport information should be submitted on these forms:

**Table 5 – Public Airport Information**

Airports within 25 Nautical Miles (NM) of Center of Turbine Area: 45° 11' 32.4" N, 97° 3' 27.68" W						
Locator Id	Name	City	Latitude	Longitude	Distance (NM)	Azimuth
A--	Town Regional	City	44° 54' 50.30" N	97° 9' 17.00" W	17.2	13.8°
---	General	City	45° 17' 33.30" N	97° 30' 49.66" W	20.25	107.17°
1--	County Municipal	City	45° 13' 49.80" N	96° 33' 57.90" W	20.97	96.11°

<sup>4</sup> Cellular antennas employ diversity and multiple receivers to compensate for any disruptions at any one location.



**3.4 Other Government RF Facilities**

Operation of RF frequencies for federal government use is managed by the National Telecommunication Information Agency (NTIA), which is part of the U.S. Department of Commerce. In almost all cases, no adverse impact is found, and IRAC usually issues a determination within 30 days. However, notification to NTIA should not be regarded as an alternative to notifying JPO concerning military radar impact, or the FAA concerning airspace navigation impact. All three agencies should be notified.

**3.5 T.V. Facilities**

The following full service analog and digital TV facilities have been identified as placing a predicted FCC primary service signal over at least part of the turbine area, based on calculations using both the FCC method and the Longley-Rice propagation prediction method. The distances given are to the center of the wind farm:

**Table 6– TV Tabulation**

Reference Search Radius of TV Facilities Centered on Wind Turbine 33									
Call Letter	Channel	City	Latitude	Longitude	Distance (KM)	Distance (MI)	Bearing (Azimuth)	Power (kW)	HAAT (M)
W----	5	City	41° 44' 41"	84° 1' 6"	5.39	3.35	264.68°	10	155
W---	11	City	41° 40' 22"	83° 22' 47"	48.53	30.15	99.92	16.9	305
W---	13	City	41° 41' 0"	83° 24' 49"	45.54	28.3	99.10°	14.6	305.4
W---	13	City	41° 41' 0"	83° 24' 49"	45.54	28.3	99.10°	16.7	305.4
W-----	18	City	41° 39' 12"	83° 32' 53"	35.41	22	107.43°	4	0
W----	23	City	41° 38' 49"	83° 36' 18"	31.18	19.37	111.33°	8	0

Based on this consultant’s analysis, the local facilities serving the city will be the primary subjects of study because they are most likely to experience multipath distortion from nearby metallic objects. These effects will most likely be localized, however, and the relatively small number of cases that occur can be easily mitigated at the viewer’s receiver. The single exception to this mitigation category is W---, channel 5. This station is very close to several of the turbines in the County Wind Project, and requires a more detailed analysis (see below):

**Table 7 – TV to Turbine Tabulation<sup>5</sup>**

<b>Number</b>	<b>TV to Turbines (Miles)</b>	<b>Kilometers</b>	<b>Bearing N deg E</b>
<b>1</b>	<b>3.96</b>	<b>6.38</b>	<b>24.21</b>
<b>2</b>	<b>3.78</b>	<b>6.08</b>	<b>26.67</b>
<b>3</b>	<b>3.53</b>	<b>5.68</b>	<b>28.57</b>
<b>4</b>	<b>4.30</b>	<b>6.92</b>	<b>32.18</b>
<b>5</b>	<b>4.20</b>	<b>6.76</b>	<b>34.71</b>
<b>6</b>	<b>4.10</b>	<b>6.60</b>	<b>37.35</b>
<b>7</b>	<b>4.02</b>	<b>6.47</b>	<b>40.15</b>
<b>8</b>	<b>3.19</b>	<b>5.13</b>	<b>20.57</b>
<b>9</b>	<b>1.47</b>	<b>2.37</b>	<b>70.47</b>
<b>10</b>	<b>1.41</b>	<b>2.28</b>	<b>80.70</b>

The closest W---to-turbine spacing is 1.41 miles. It is also noted that the turbine fan turns through the center of radiation of the channel 5 transmitting antenna.

The proximity of the wind farm to W--- will unavoidably cause multipath distortion over an area primarily to the east of the TV station. W--- employs a cardioid directional antenna to increase its signal toward the city at the expense of radiation to the west. Based upon 50% propagation 50% of the time, the multipath will be primarily confined.

Interference is especially likely for residential viewers in and around the project area that have to point their outdoor antennas through the turbines toward W---, that utilize “rabbit ears” type antennas, or who own TV sets more than approximately 5 years old. W---’s signal may periodically exhibit some “pixelization” and “freezing” within the designated area due to multipath reception. Mitigation measures, as described in this report, could reduce the incidence of TV signal anomalies, but would most likely involve the fabrication of a “stealth” blade, an unproven technology.

### **Mitigation Measures**

Most of the multipath effect should be dissipated for locations farther than approximately 30 to 35 miles of the TV station. This estimate is based upon Evans’ experience with similar turbine farms<sup>6</sup> and a TV interference “tool” that tabulates the re-radiation contribution from each turbine, obtains the root-sum-square total, and compares it to the direct signal. Overlaying the tool predictions with a map of minor civil divisions, the result is approximately 310,000 households that would be potentially affected by interference from 10% to 50% of the time. Of this number, approximately 70% of the residences in the city’s market utilize cable or satellite services, leaving a net of 93,000 households that will most likely require mitigation.

<sup>5</sup> Note: This is the latest turbine arrangement as of the date of this report.

<sup>6</sup> Especially Mars Hill in Maine, TVA on Buffalo Mountain, and Fond du Lac Wisconsin.



On this scale, mitigation at the viewer’s location is probably not feasible. Based upon this consultant’s experience, it is the rotating blades (with their internal metal support structure and lightning suppression) that cause the major portion of the multipath interference<sup>7</sup>. It may be possible to fabricate “stealth” blades that would have the following characteristics:

1. GRP Glass with carbon reinforced supporting structure (or other non-metallic).
2. Lightning protection wire “detuned” for channel 5 using coaxial capacitive sleeves.

If desired, Evans is capable of pursuing this solution.

With regard to the other TV stations, the majority of modern TV sets with good outdoor antennas should successfully handle the described anomalies. The most likely necessary mitigation measure would be to install a directional high(er)-gain outside antenna to increase the strength of the direct wave and reduce reflections.

### **3.6 FM Facilities**

The following full-service FM stations each place a predicted primary signal over at least a portion of the turbine property (according to the FCC, *only* stations providing predicted service are entitled to protection):

**Table 8 – FM Tabulation**

Reference Search Radius of 30 KM of Wind Turbine 5									
Call Letter	Channel	City	Latitude	Longitude	Distance (KM)	Distance (MI)	Bearing (Azimuth)	Power (kW)	HAAT (M)
W----	202	City	41° 39' 26"	83° 36' 57"	29.93	18.6	109.93°	0.1	58
W----	203	City	41° 33' 29"	84° 11' 8"	28.7	17.83	222.25°	10	89
W-----	205	City	41° 53' 55"	84° 3' 40"	18.83	11.7	331.87°	0.01	22.8
W----	207	City	41° 38' 55"	83° 42' 22"	23.45	14.57	118.47°	2.45	93
W-----	211	City	41° 53' 55"	84° 3' 40"	18.83	11.7	331.87°	0.01	23.8
NEW	221	City	41° 41' 13"	83° 43' 40"	20.04	12.45	110.2°	0.019	94
W-----	225	City	41° 52' 30"	83° 58' 0"	14.01	8.7	355.64°	0.025	48.5
NEW	232	City	41° 36' 0"	84° 12' 26"	26.84	16.68	231.83°	0.025	22
W----	237	City	41° 48' 15"	84° 5' 25"	12.88	8.01	298.39°	-	-
W----	237	City	41° 48' 15"	84° 5' 25"	12.88	8.01	298.39°	3	91

Because of the “capture effect” supported by the “discriminator” in FM receivers, significant disruptions to the above-listed primary FM facilities is not expected. There do not appear to be any “unique” services that could be lost as a result of construction of the wind farm. Although the received signal may vary with the blade rotation at some receive locations in the immediate area, good quality FM radios will most likely factor out such time-varying signals. In those relatively few cases where significant impact is caused (e.g. when a listener is located within

<sup>7</sup> At Mars Hill, extensive tests were conducted with the rotors on and then off, verifying this statement.



0.50 mile of a turbine), home FM radios could be connected to rooftop TV receive antennas to pull in a stronger direct signal. Mobile or portable receivers would only need to be moved slightly to pick up a stronger signal (for instance, radios using line cords for antennas).

### **3.7 AM FACILITIES**

A search of the FCC's database revealed no AM facilities within the required notification distance of 3 kilometers beyond the nearest turbine.

There should therefore be no reasonable expectations of disruptions in transmitted radiations on the AM band due to the presence of the turbines. Occasionally, depending upon ground and atmospheric conditions, local AM receivers tuned to distant stations and located within approximately one mile of the turbines may experience slight signal variations, but such anomalies are not recognized by the FCC or the standards of good engineering practice as a significant disruption. Usually, the receiver's automatic gain control can keep the audio reasonably uniform.

## **IV. CONCLUSIONS**

The following conclusions have been reached as a result of the analysis undertaken with respect to the Wind project:

1. Two microwave paths create blackout areas in which turbine siting should be avoided. In addition, if turbines are relocated within the WCFZ of any other identified path as shown in Figure 1, those paths should be re-studied. Currently, only one planned turbine appears to require re-siting, pending coordinates verification.
2. It is strongly recommended that the ten microwave paths crossing the turbine area be field-verified by land survey.
3. Based upon reasonable assumptions, there are no serious instances of impact potential to land mobile facilities. If feasible, concurrence should be obtained from the licensees whose antenna sites are within 3 kilometers of any planned turbine. All re-sited turbines should be sited at least 0.50 mile from all the listed land mobile facilities. In cases where this is not feasible, mitigation could involve equipment changes at the transmitter sites or antenna height increases to affected antennas. Costs could range from zero to \$50,000 for each station, depending upon the outcome of negotiating a MOU with each licensee.
4. Based upon FCC database information, no significant impact is expected to the reception of FM broadcast facilities. A few receive locations may experience signal fluctuations in time with the blade rotors, but the receiver AGC should be able to manage these variations. In a few cases, it might be necessary to utilize outside antennas within nearby homes.
5. Some moderate impact to local over-the-air TV receivers tuned to a full-power broadcast TV or Digital TV station may occur in and near the project area, especially if viewers are

not using high-gain outside antennas. The most likely scenario is that perhaps 10% of sites may have to be mitigated (rough estimate). According to the U.S. Census, approximately 1600 households are in the area likely to be affected. Assuming that 20% of these households rely on over-the-air TV broadcast, some level of mitigation could be required for about 32 of these residences. Mitigation measures are expected to be available for all expected anomalies, with satellite or cable TV service providing the worst-case resolution.

6. A significant impact is expected to earth station facilities, requiring either the re-siting of some turbines or, in cases where sufficient land is not available, re-siting and/or upgrading the uplinks.
7. It is suggested that an on-site survey be undertaken to look for unregistered transmit antennas, inventory outdoor receive antennas, and verify microwave antenna site coordinates.

It is the opinion of the consultant that a significant impact one of the microwave paths is likely, but these effects should be manageable and amenable to mitigation subject to an exact on-site survey and the availability of land farther to the east.

Respectfully Submitted,

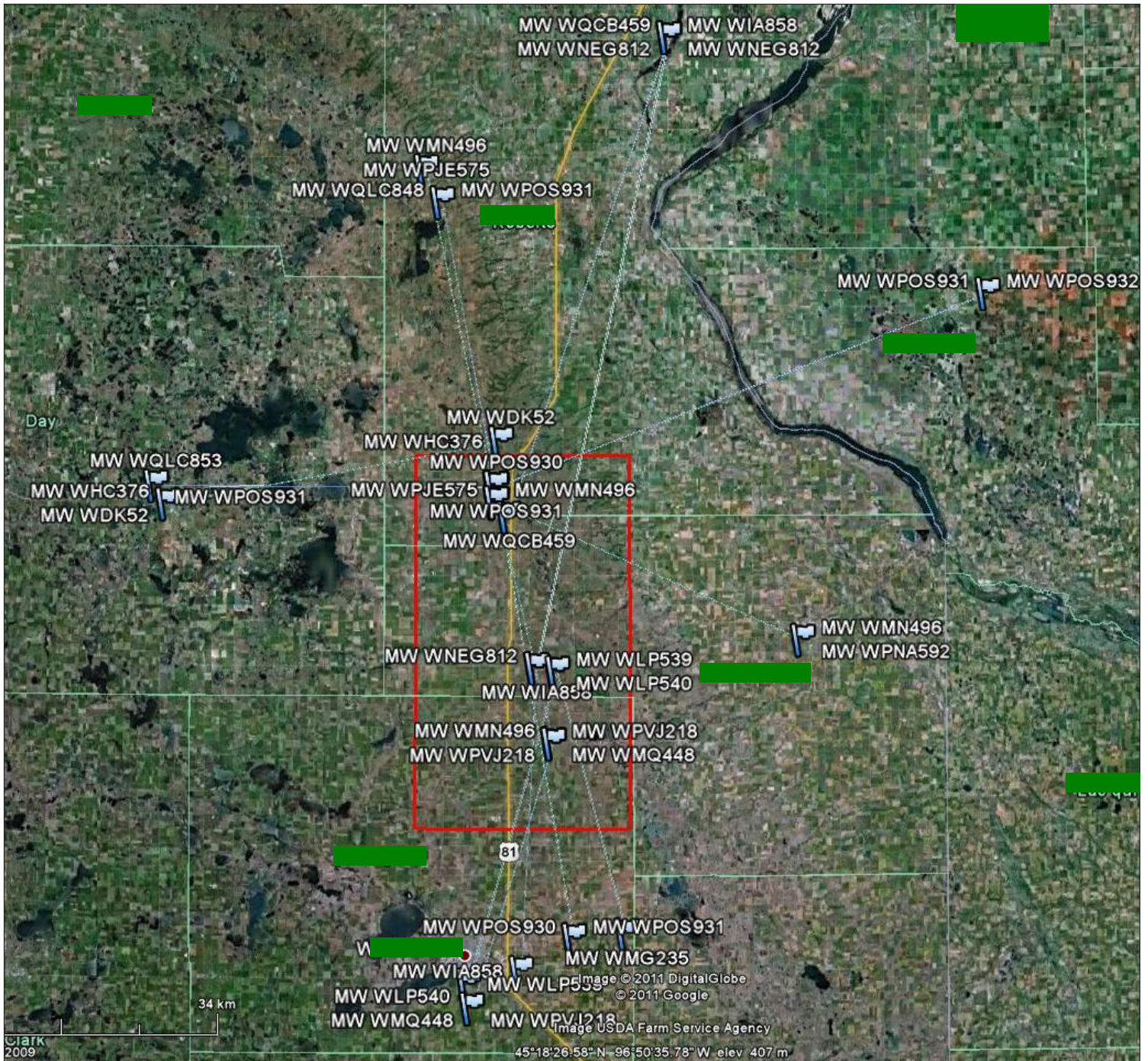
A handwritten signature in blue ink, appearing to read "Ralph E. Evans".

Ralph E. Evans, Consultant

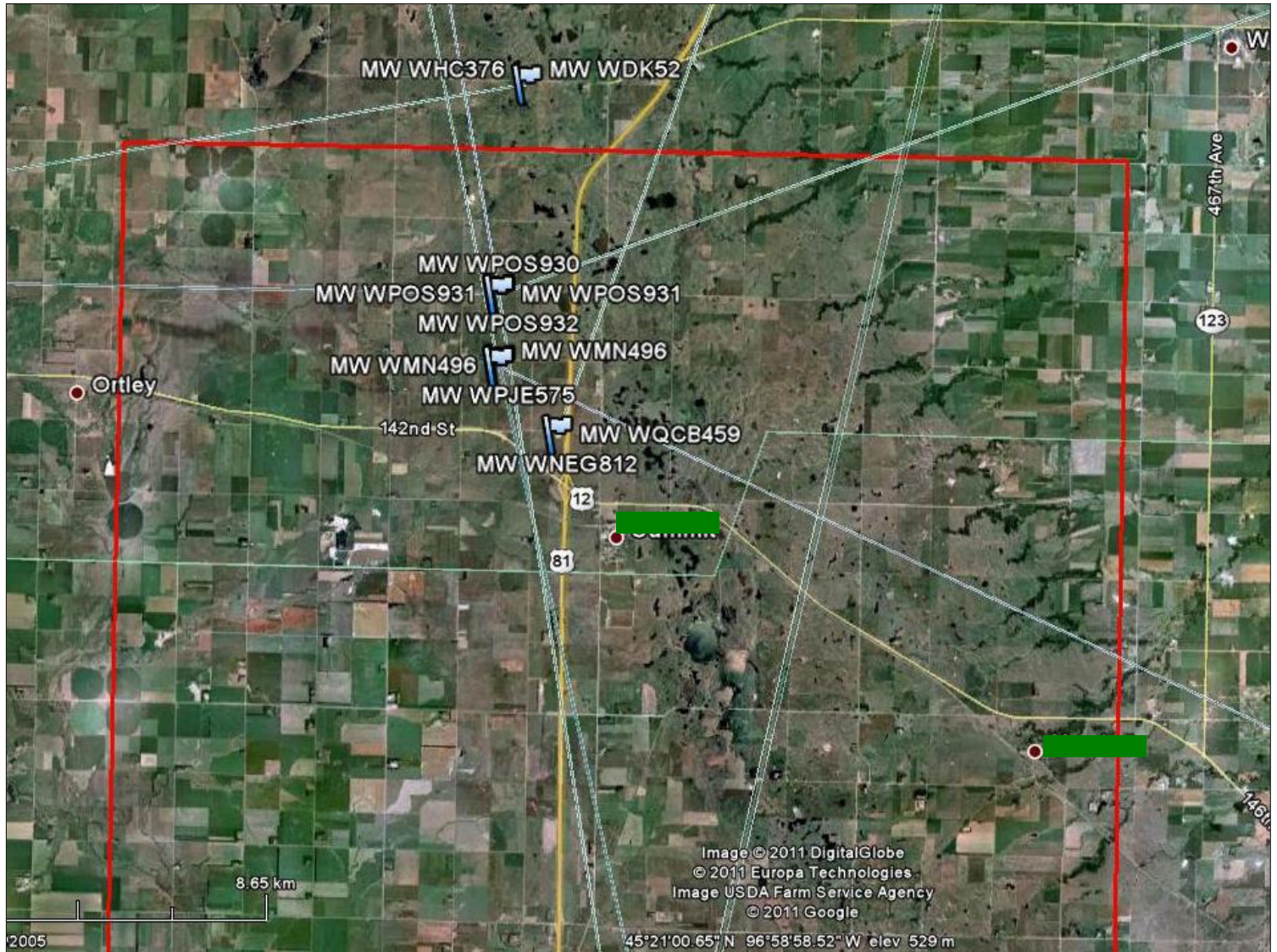
**ATTACHED FIGURES:**

- Figure 1 --- Microwave Paths Overview
- Figure 1.1 - Microwave Paths Crossing Northern Half of Turbine Area
- Figure 1.2 - Microwave Paths Crossing Southern Half of Turbine Area
- Figure 2 --- Land Mobile Sites in Wind Turbine Area
- Figure 3 --- Location of Cellular Towers in Turbine Area
- Figure 4 --- DoD Screen
- Figure 5 --- Military Operations Screen
- Figure 5.1 - Military Operations Screen Assessment
- Figure 6 --- Wx Radar Screen

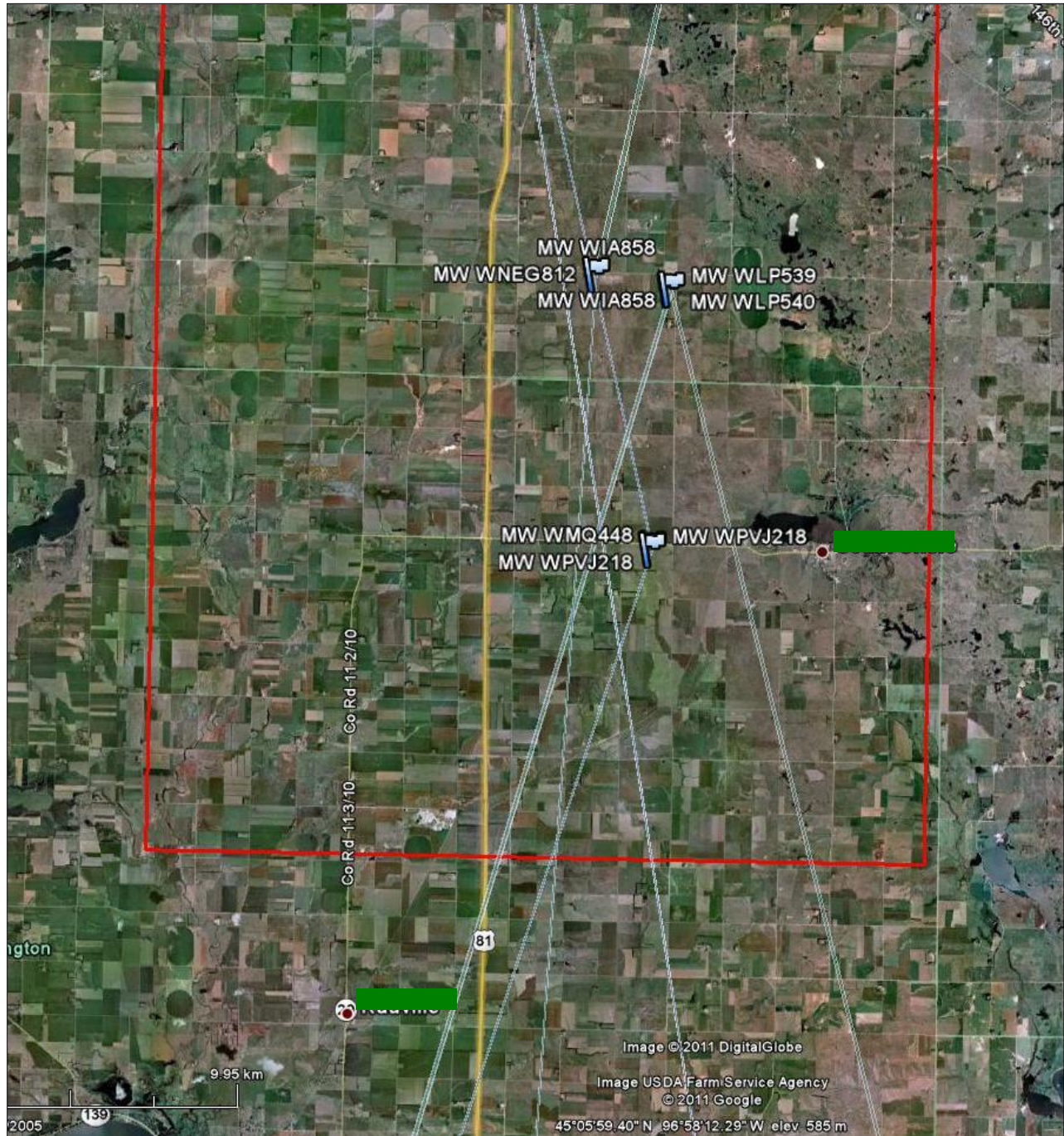
**Figure 1 - Microwave Paths Overview**



**Figure 1.1 – Microwave Paths Crossing Northern Half of Turbine Area**



**Figure 1.2 – Microwave Paths Crossing Southern Half of Turbine Area**



**Figure 2 – Land Mobile Sites in Wind Turbine Area**

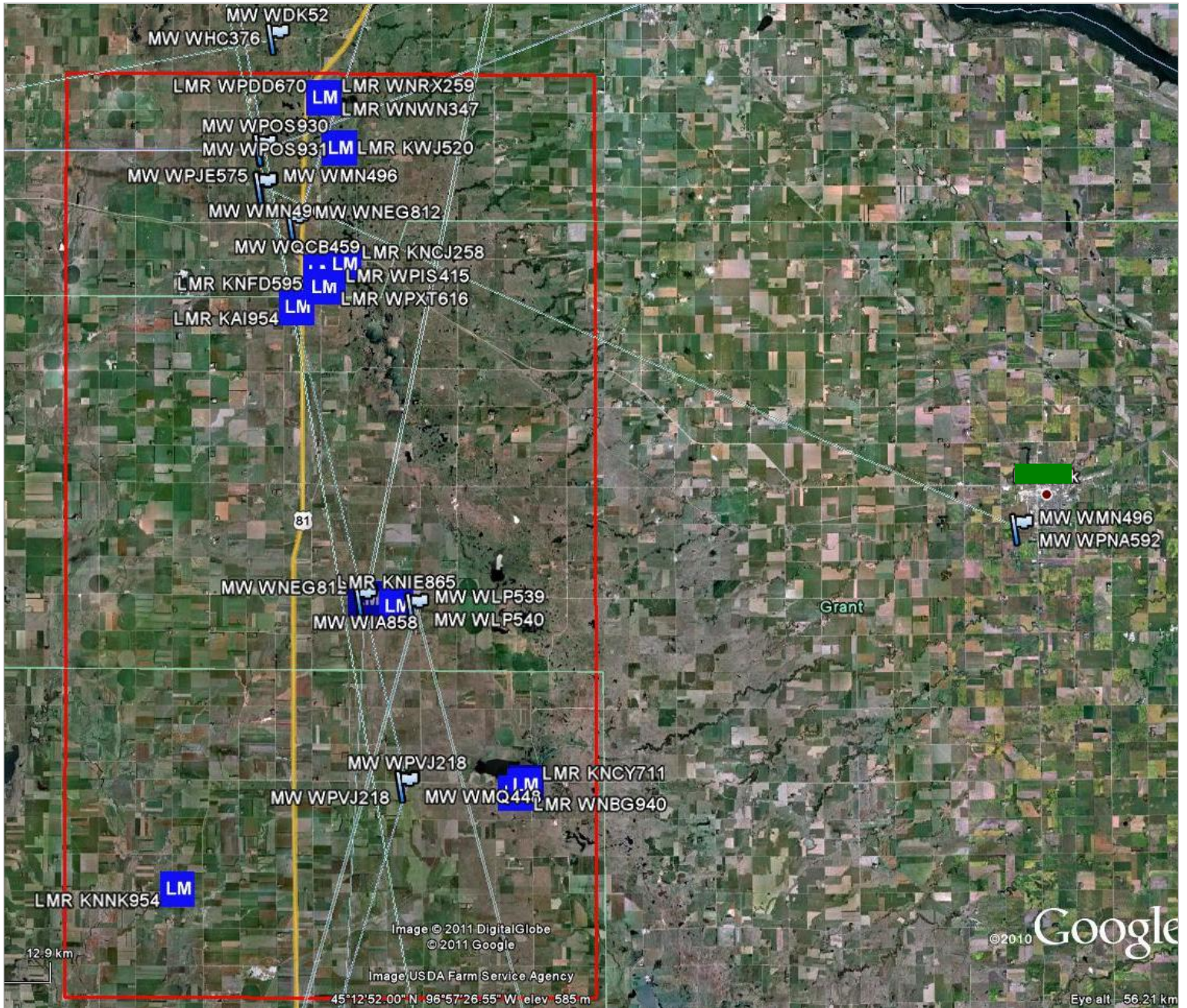


Figure 3 – Registered Cellular Towers in Turbine Area



Figure 4 – DoD Screen

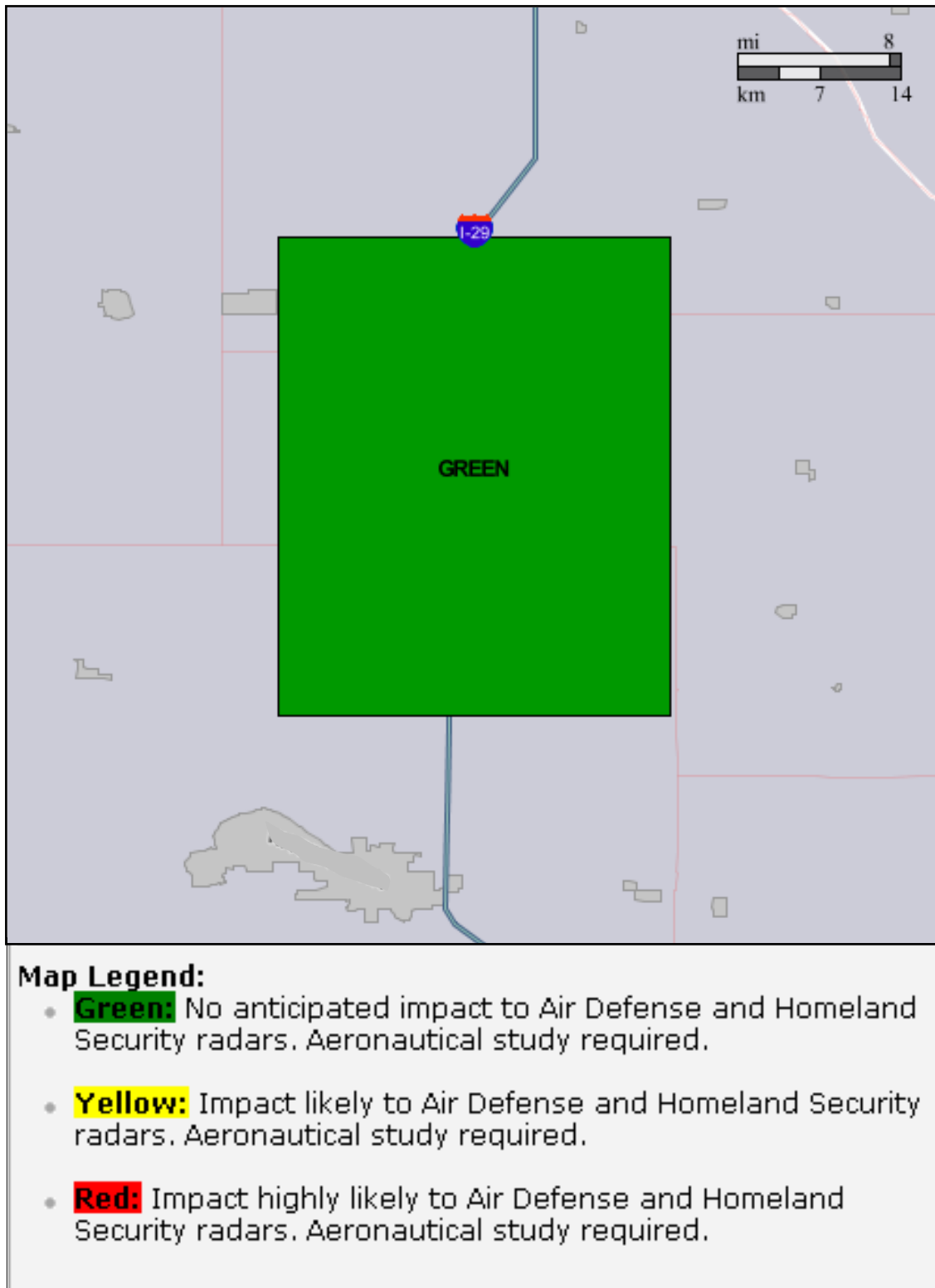




Figure 5.1 – Military Operations Assessment

Screening Type:  Geometry Type:

Point	Latitude				Longitude			
	Deg	Min	Sec	Dir	Deg	Min	Sec	Dir
1	<input type="text" value="45"/>	<input type="text" value="1"/>	<input type="text" value="21.12"/>	<input type="text" value="N"/>	<input type="text" value="96"/>	<input type="text" value="53"/>	<input type="text" value="17.21"/>	<input type="text" value="W"/>

Horizontal Datum:

The preliminary review of your proposal does not return any likely impacts to military airspace. Please contact Dr. Thomas (Thom) H. Rennie at the USAF Regional Environmental Coordinator at (214)767-4678 for confirmation and documentation.

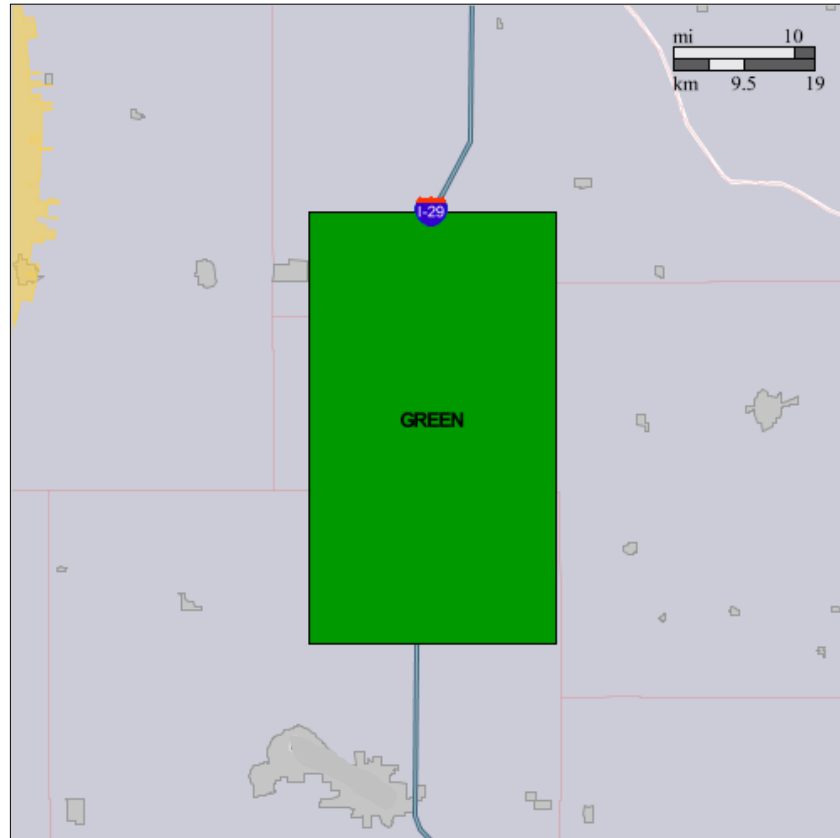
The preliminary review of your proposal does not return any likely impacts to military airspace. Please contact the US Navy Representative, FAA Central Service Area at the USN Regional Environmental Coordinator at (817) 222-5930 for confirmation and documentation.

The preliminary review of your proposal does not return any likely impacts to military airspace. Please contact LTC Pete Kowal at the USA Regional Environmental Coordinator at (425)227-2955 for confirmation and documentation.

The preliminary review of your proposal does not return any likely impacts to military airspace. Please contact the US Navy Representative, FAA Central Service Area at the USMC Regional Environmental Coordinator at (817) 222-5930 for confirmation and documentation.

**This is a preliminary review of your proposal and does not preclude official FAA processes.**  
Your search data is not retained and the privacy of all your searches is assured.

Figure 6 – Wx Radar Screen



**Map Legend:**

- **Green:** Minimal to no impact to Weather Surveillance Radar-1988 Doppler (WSR-88D) weather radar operations. National Telecommunications & Information Administration (NTIA) notification advised.
- **Yellow:** RLOS Coverage At or Below 130m AGL. Impact likely to WSR-88D weather radar operations. Turbines likely in radar line of sight. Impact study required. NTIA notification advised.
- **Blue:** RLOS Coverage At or Below 160m AGL. Impact likely to WSR-88D weather radar operations. Turbines likely in radar line of sight. Impact study required. NTIA notification advised.
- **Gold:** RLOS Coverage At or Below 200m AGL. Impact likely to WSR-88D weather radar operations. Turbines likely in radar line of sight. Impact study required. NTIA notification advised.
- **Red:** Impact highly likely to WSR-88D weather radar operations and wind turbine electronics. Turbines likely in radar line of sight. Aeronautical study required. NTIA notification strongly advised.

