

TESTIMONY
PUBLIC SAFETY AND TRANSPORTATION COMMITTEE
SEPTEMBER 22, 2010
BY MIKE LYNK
DIRECTOR, DIVISION OF STATE RADIO
NORTH DAKOTA DEPARTMENT OF EMERGENCY SERVICES

Mr. Chairman and members of the committee, my name is Mike Lynk. I am the Director of the Division of State Radio, North Dakota Department of Emergency Services (NDDDES). I am here to provide testimony relating status reports concerning the study related to the effects of Next Generation 911, an overview of funding designed for alternatives for constructing new State Radio tower sites, and an update about construction of the State Radio tower site near Wales; all funded through House Bill No. 1016 passed during the 2009 session.

The Emergency Services Communications Coordinating Committee (ESCCC) has been examining the process of Next Generation 911 implementation but because federal rules have not been determined, it is very difficult to develop state standards. Consequently, no money has been expended to study effects of Next Generation 911.

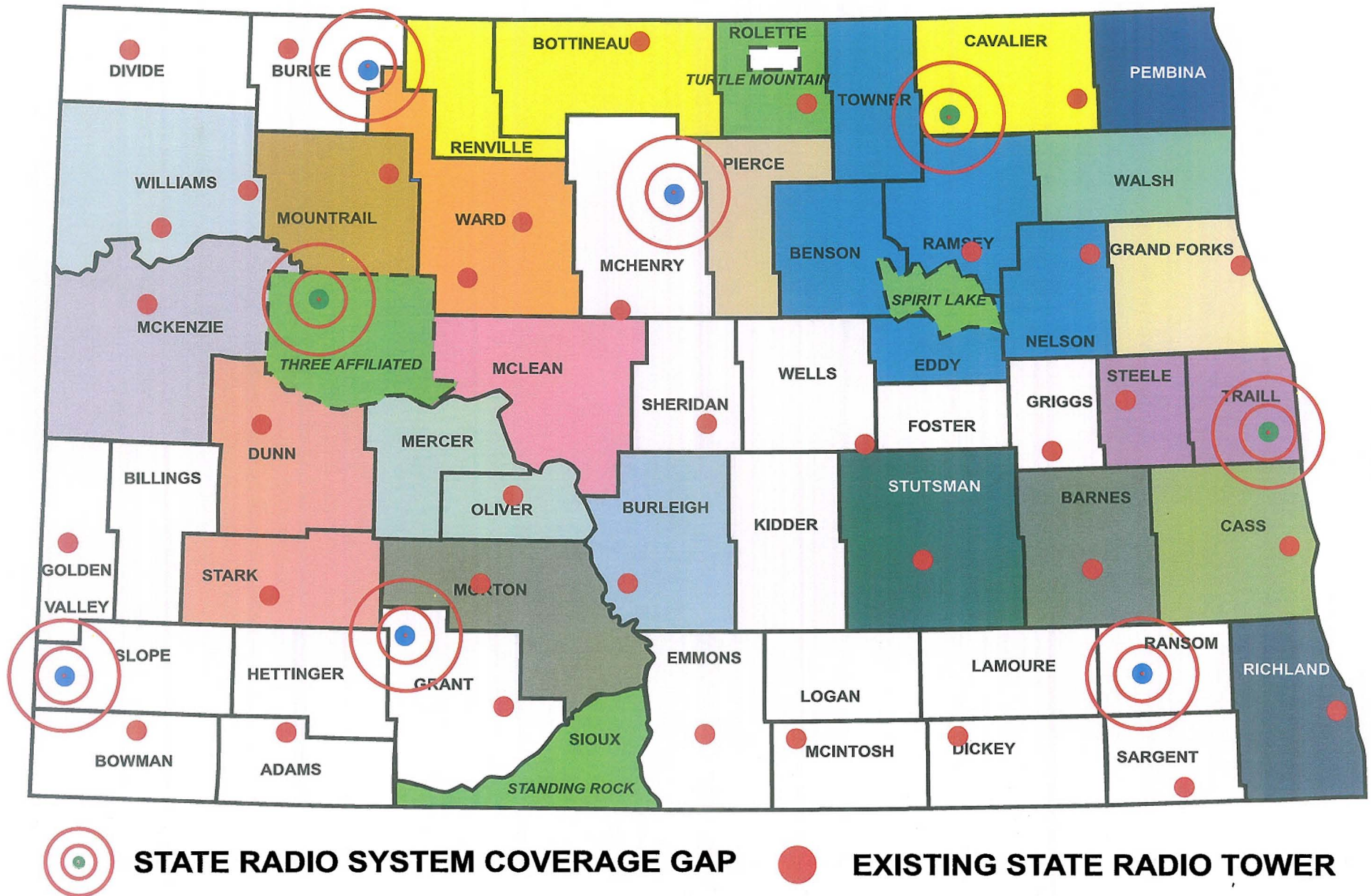
In the fall of 2009, the Office of Emergency Communications (OEC) provided engineering assistance for a Land Mobile Radio (LMR) systems study. State Radio applied and received technical assistance for the western half of North Dakota at no cost. The study began February 1, 2010, and was completed in June 2010. The final report will identify State Radio system gaps (mobile and portable), current wideband analog and narrowband equipment (2013), the existence of alternative infrastructure in gap areas, and alternative location analysis. The study was conducted by computer engineering modeling and on-location verification by a drive test. OEC provided State Radio a report that will include action plans (See the Draft North Dakota Mobile Coverage Study.) In July 2010, State Radio was awarded a second study for eastern half of North Dakota. Upon receipt of the final report, State Radio will then evaluate if further study needs to be conducted utilizing 2009 House Bill No. 1016 funding.

The 2007 Interim Public Safety Committee asked that a task force be established to request improvements to emergency services by adding organizational changes, system upgrades, process or protocol changes, and statutory changes to ensure the future viability and capability of emergency services in North Dakota. The 2009 HB 1050 was drafted to advance the propagation of the State Radio System by dramatically improving radio signal coverage through the addition of eight towers. Studies conducted combined with reports from local and state law enforcement officers and responders indicate current mobile and handheld coverage equates to approximately 90-95 percent and 55 percent, respectively over and around state highway networks. Because of the dramatic increase in communications activity achieved in part through more industrial and recreational use, coverage gaps pose real life safety issues for law enforcement officers and citizens. The envisioned goal is to reach 95 percent mobile radio coverage. HB 1050 developed into the \$75,000 allocation for the tower study.

State Radio pooled resources with the Department of Transportation (DOT) to construct the new tower site in Wales. With funding provided by House Bill No.1016 and from DOT, tower construction including new radio infrastructure is scheduled for completion in October or November 2010. The project is currently waiting for the delivery of the shelter used to house the radio electronics.

Mr. Chairman, I will answer any questions you and other members may have.

COVERAGE GAPS



The Estimated cost per tower: \$325, 000 with out tower - \$1,200,000 with tower.



Homeland Security

Office of Emergency Communications

North Dakota Mobile Coverage Study

ICTAP Engineering
September 2010

Purpose

- The State of North Dakota is looking to increase their coverage area for the statewide radio system. The Statewide Interoperability Coordinator (SWIC) will include these results in a budget report he must submit to the State legislature.
- WO10-123 requested OEC-ICTAP to concentrate on the western portion of the state however, WO10-162 requested an expansion into the eastern portion of the state.
- OEC-ICTAP goals are to:
 - Determine communications problem areas through coverage study analysis
 - Suggest possible new site locations for a three phase build-out
 - Phase 1 – Statewide mobile coverage
 - Phase 2 – Portable coverage in high communication traffic areas (areas were defined by North Dakota State Radio – Mike Lynk)
 - Phase 3 – Statewide portable coverage

Overview

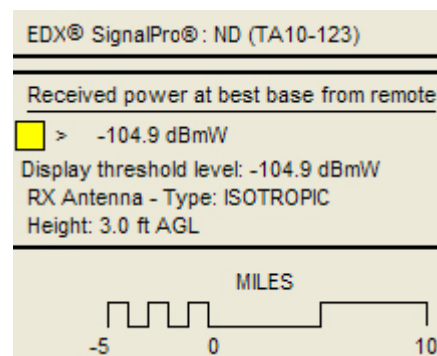
- **Mobile talkback coverage was run on the statewide radio system's 36 existing sites to establish the base line coverage and identify coverage gap**
- **Coverage listed provides a Delivered Audio Quality (DAQ) level of 3.4**
 - Each potential site will need to be physically surveyed to ensure adequate support (i.e. tower loading, floor space, power, heating/air-conditioning...)
 - Each site will contribute to the total coverage however gaps at a single site should be considered when evaluating system operability.

Coverage Plots

- The coverage maps provided in this document are only the estimated coverage for each site based on the parameters provided by North Dakota DOT.
- The coverage study is provided to help North Dakota with their system planning and to make tradeoff decisions.
- This coverage study uses two methods to display RF coverage:
 - Static images included in this presentation
 - Dynamic viewing using a Google Earth .kmz file
 - Allows for greater detail and view capabilities (zoom, pan, rotate) for areas of interest
 - You can download Google Earth for free at: <http://earth.google.com/>

Delivered Audio Quality (DAQ)

- **DAQ**
 - A way to relate the perceived audio quality to a specific signal power
- **Color on the coverage maps indicate DAQ 3.4 Handheld Radio Talk Back coverage:**
 - DAQ 3.4 = Speech understandable with repetition only rarely needed. Some Noise/Distortion
 - No color indicates = Less than DAQ 3.4 or that the signal is too low for reliable public safety use
- **The numeric values for the color bin represent the received signal power in dBm. For example:**



Global Coverage Parameters

Coverage Parameters (All Sites)	
Audio Quality	DAQ 3.4
Reliability	95% (10.2 dB margin)
Frequency Band (MHz)	VHF
Modulation Type	Analog Narrowband (12.5 kHz)
Propagation Model	Anderson-2D V1.00
Effective Antenna Model	Profile
Environmental Parameters	Environment – Open
Land Clutter Attenuation	NLCD 2001 data mapped to TSB-88-B recommended values

Mountain Top Station Parameters	
Radio Type	Base / Repeater
Effective Radiated Power	As Listed
Receiver Sensitivity (dBm)	VHF -116
Antenna Type	As Listed
Tx Antenna Height (ft.)	As Listed
Rx Antenna Height (ft.)	As Listed
Rx Radio Location	As Listed

Subscriber Unit Parameters	
Subscriber Radio Type	Mobile
Radio Transmit Power (W)	45
Receiver Sensitivity (dBm)	-119
Antenna Type	Isotopic
Tx Antenna Height (ft.)	5
Rx Antenna Height (ft.)	5
Antenna Location	Roof Mount

Fixed Site Locations

Site Name	Latitude	Longitude	County, State	Antenna Azimuth (Degrees)	Effective Radiated Power ERP (W)	Antenna Height (Meters / Feet)
ARNEGARD	47:54:42.0:N	103:27:12.0:W	MCKENZIE, ND	Omni	110.0	63.9 / 209.65
BELCOURT	48:40:34.0:N	99:39:2.0:W	ROLETTE, ND	Omni	110.0	92.9 / 304.79
BISMARCK	46:49:15.0:N	100:46:57.0:W	BURLEIGH, ND	Omni	110.0	76.9 / 252.3
BLAISDELL	48:24:47.0:N	102:0:56.0:W	MOUNTRAIL, ND	Omni	110.0	94.9 / 311.35
BOTTINEAU	48:57:9.0:N	100:28:9.0:W	BOTTINEAU, ND	Omni	110.0	63.9 / 209.65
BOWMAN	46:16:25.0:N	103:21:4.0:W	BOWMAN, ND	Omni	110.0	94.9 / 311.35
CARRINGTON	47:20:37.0:N	99:17:29.0:W	WELLS, ND	Omni	110.0	63.9 / 209.65
CAYUGA	45:56:14.0:N	97:28:43.0:W	SARGENT, ND	Omni	110.0	94.9 / 311.35
CLEVELAND	46:56:54.0:N	99:6:40.0:W	STUTSMAN, ND	Omni	110.0	63.9 / 209.65
COLUMBUS	48:43:2.0:N	102:45:1.0:W	BURKE, ND	Omni	110.0	94.9 / 311.35
DENHOFF	47:27:39.0:N	100:15:1.0:W	SHERIDAN, ND	Omni	110.0	63.9 / 209.65
DEVILS LAKE	47:59:4.0:N	98:55:55.0:W	RAMSEY, ND	Omni	110.0	94.9 / 311.35
DICKENSON	46:43:29.0:N	102:54:51.0:W	STARK, ND	Omni	110.0	94.9 / 311.35

Fixed Site Locations

Site Name	Latitude	Longitude	County, State	Antenna Azimuth (Degrees)	Effective Radiated Power ERP (W)	Antenna Height (Meters / Feet)
DOGDEN	47:49:12.0:N	100:45:33.0:W	MCLEAN, ND	Omni	110.0	63.9 / 209.65
DRISCOLL	46:59:52.0:N	100:5:57.0:W	KIDDER, ND	Omni	110.0	63.9 / 209.65
FARGO	46:52:30.6:N	96:56:19.3:W	CASS, ND	Omni	110.0	121.9 / 399.93
FINLEY	47:33:38.0:N	97:52:51.0:W	STEELE, ND	Omni	110.0	63.9 / 209.65
FORTUNA,	48:49:3.0:N	103:46:35.0:W	DIVIDE, ND	Omni	110.0	63.9 / 209.65
GRAND FORKS	48:0:17.0:N	97:6:31.0:W	GRAND FORKS, ND	Omni	110.0	63.9 / 209.65
HANOVER	47:11:9.0:N	101:25:43.0:W	OLIVER, ND	Omni	110.0	94.9 / 311.35
KILLDEER	47:30:24.0:N	102:53:25.0:W	DUNN, ND	Omni	74.6	63.9 / 209.65
LINTON	46:19:37.0:N	100:16:40.0:W	EMMONS, ND	Omni	110.0	48.9 / 160.43
MERRICOURT	46:12:50.0:N	98:51:10.0:W	DICKEY, ND	Omni	110.0	94.9 / 311.35
MILTON	48:37:43.0:N	97:59:19.0:W	CAVALIER, ND	Omni	110.0	94.9 / 311.35
MINOT	48:10:51.0:N	101:18:58.0:W	WARD, ND	Omni	110.0	94.9 / 311.35
MOTT	46:14:48.0:N	102:33:23.0:W	ADAMS, ND	Omni	110.0	63.9 / 209.65

Fixed Site Locations

Site Name	Latitude	Longitude	County, State	Antenna Azimuth (Degrees)	Effective Radiated Power ERP (W)	Antenna Height (Meters / Feet)
NEW SALEM	46:47:6.0:N	101:24:32.0:W	MORTON, ND	Omni	110.0	70.1 / 229.99
PETERSBURG	48:0:13.0:N	97:56:7.0:W	NELSON, ND	Omni	110.0	63.9 / 209.65
RALIEGH	46:18:51.0:N	101:17:52.0:W	GRANT, ND	Omni	110.0	63.9 / 209.65
RYDER	47:56:28.0:N	101:34:15.0:W	WARD, ND	Omni	110.0	94.9 / 311.35
SENTINEL BUTTE	46:52:35.0:N	103:50:51.0:W	GOLDEN VALLEY, ND	Omni	95.7	63.9 / 209.65
TIOGA	48:18:16.0:N	102:54:58.0:W	WILLIAMS, ND	Omni	110.0	94.9 / 311.35
VALLEY CITY	46:54:33.0:N	97:53:37.0:W	BARNES, ND	Omni	110.0	94.9 / 311.35
WAHPETON	46:15:54.0:N	96:38:9.0:W	RICHLAND, ND	Omni	110.0	33.9 / 111.22
WILLISTON	48:6:50.0:N	103:26:26.0:W	WILLIAMS, ND	Omni	110.0	94.9 / 311.35
WISHEK	46:15:18.0:N	99:44:21.0:W	MCINTOSH, ND	Omni	110.0	63.9 / 209.65

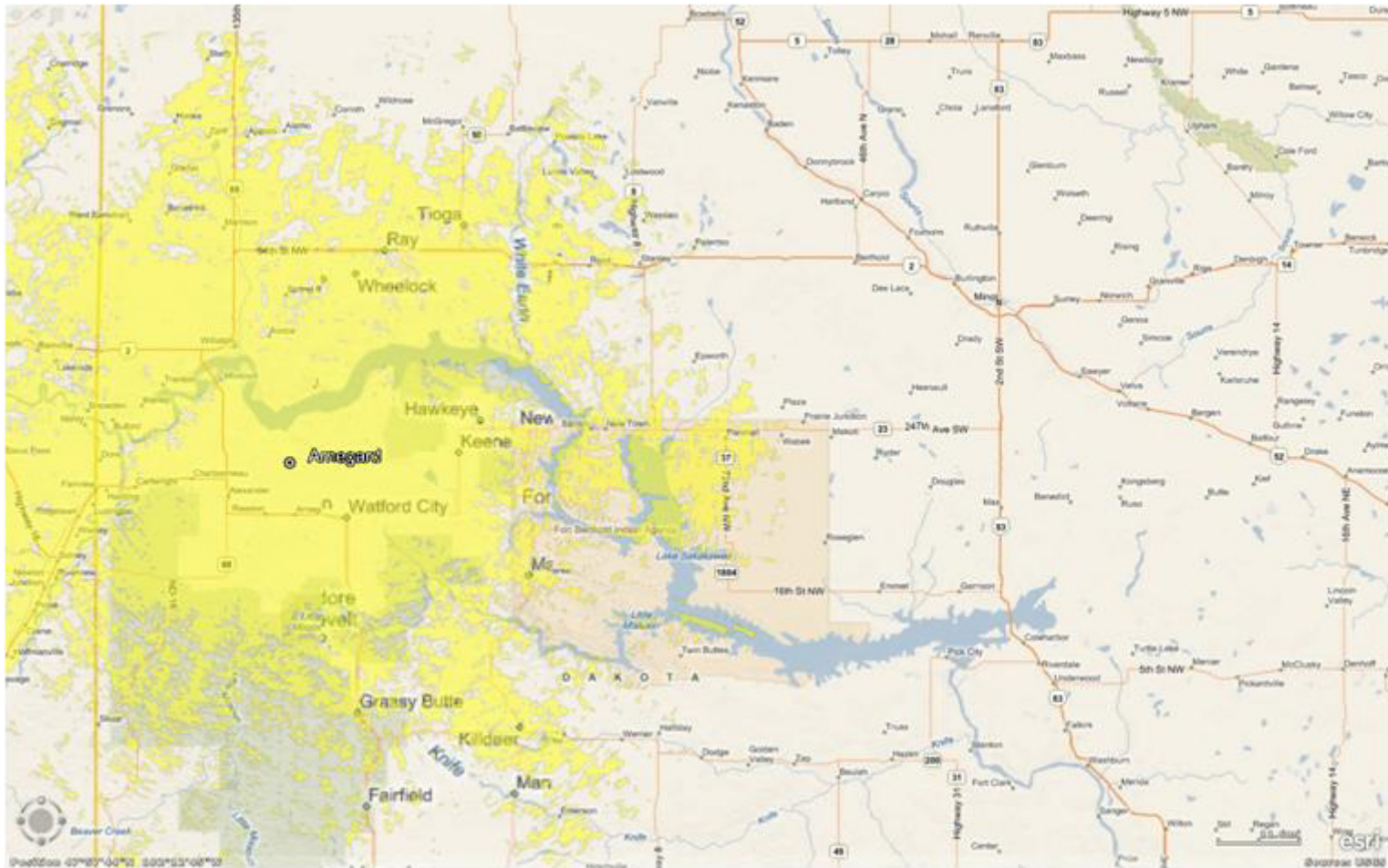
Note: Fixed site ERP is provided for future reference all coverage depicted is talk back with a 50 watt mobile radio

Existing State Radio Sites



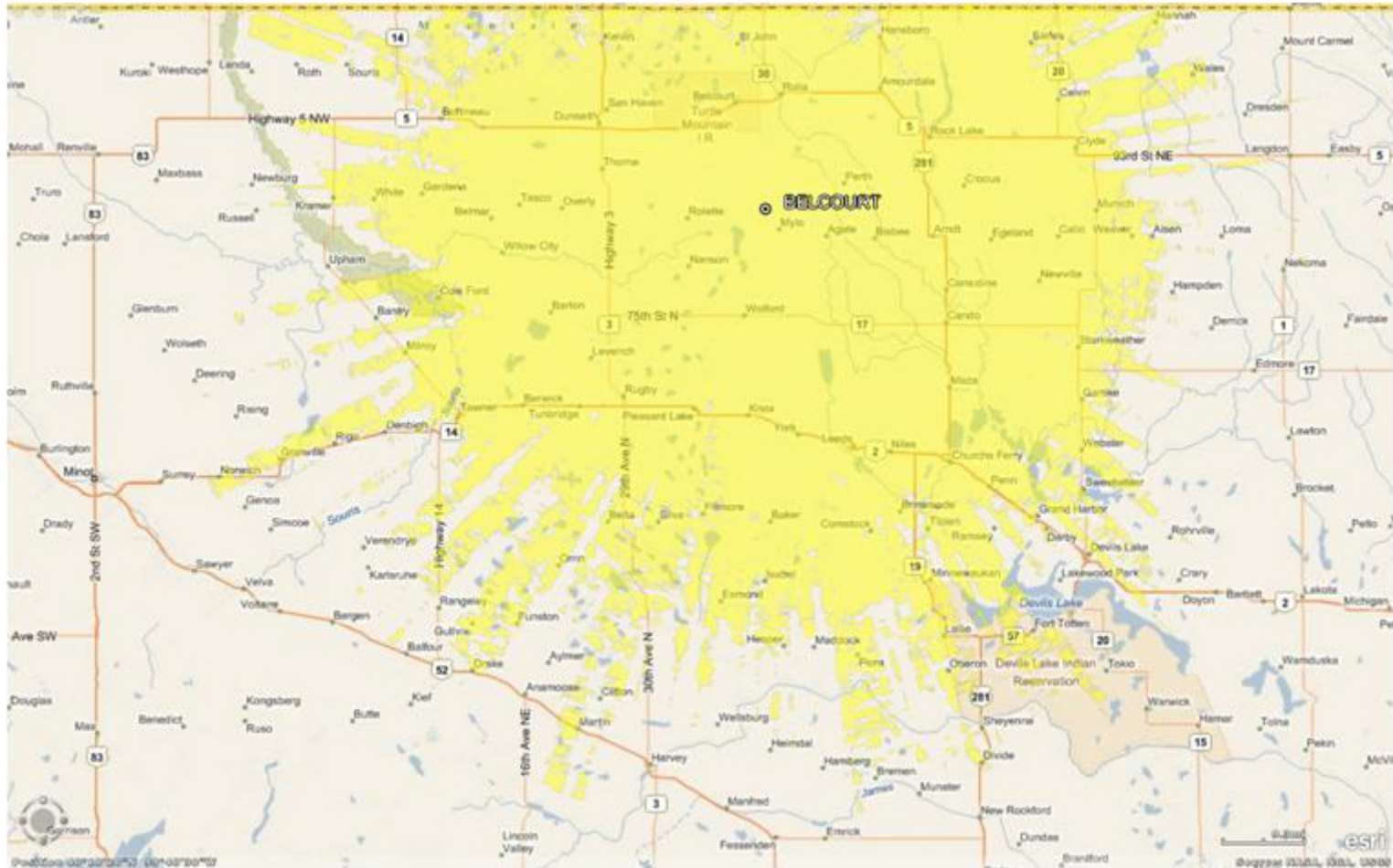
Homeland
Security

Arnegard



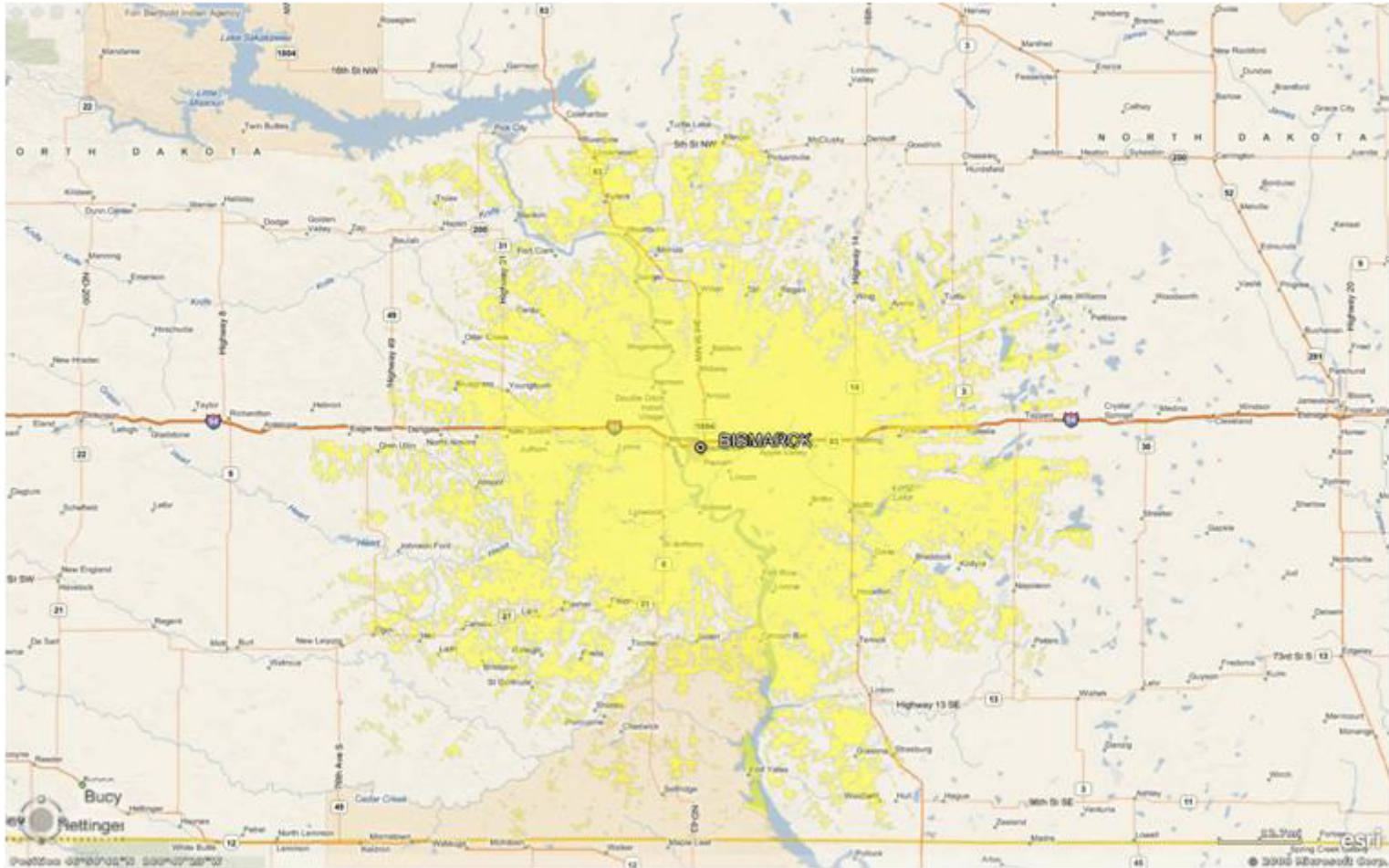
Homeland
Security

Belcourt



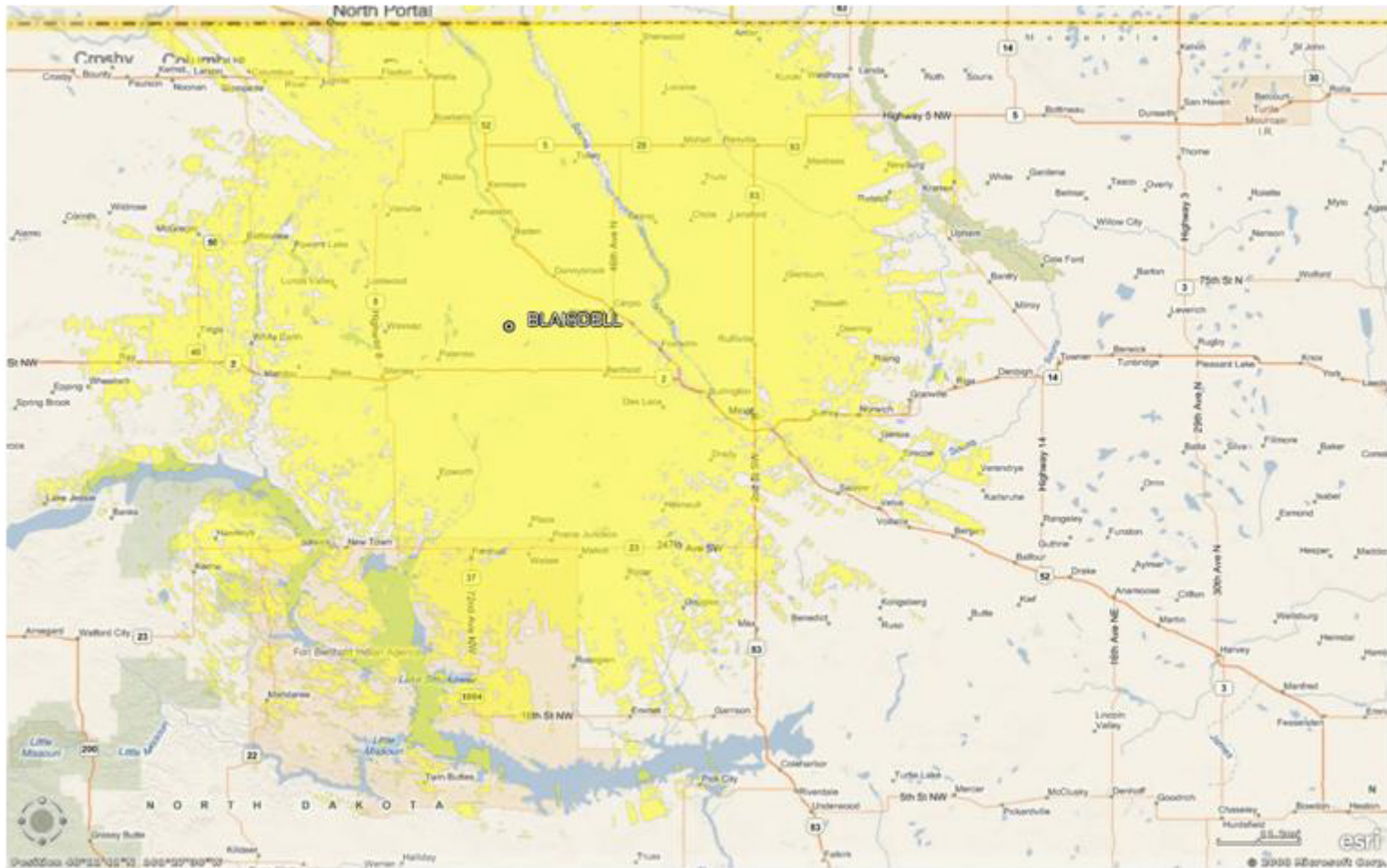
Homeland
Security

Bismarck



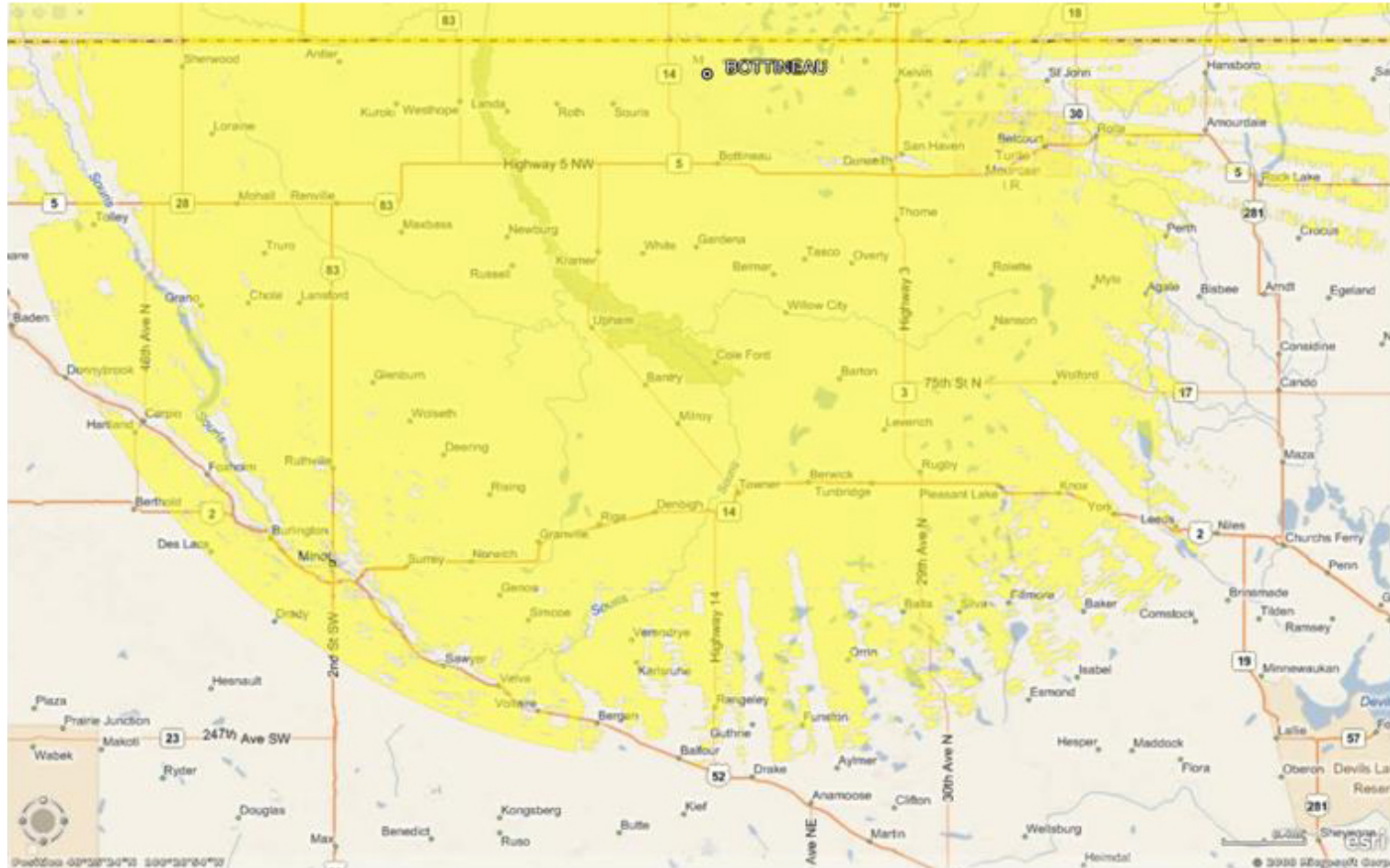
Homeland
Security

Blaisdell



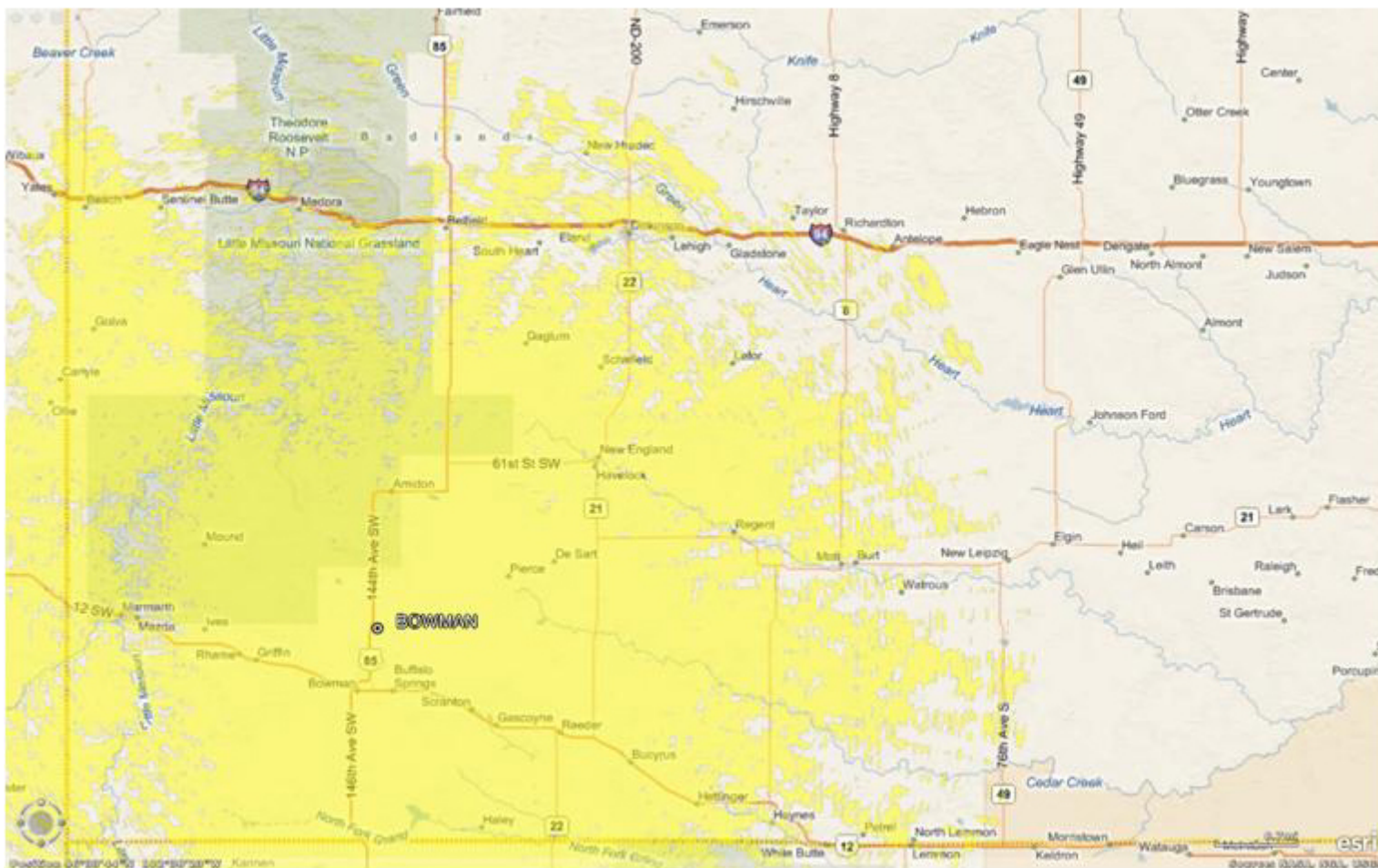
Homeland
Security

Bottineau

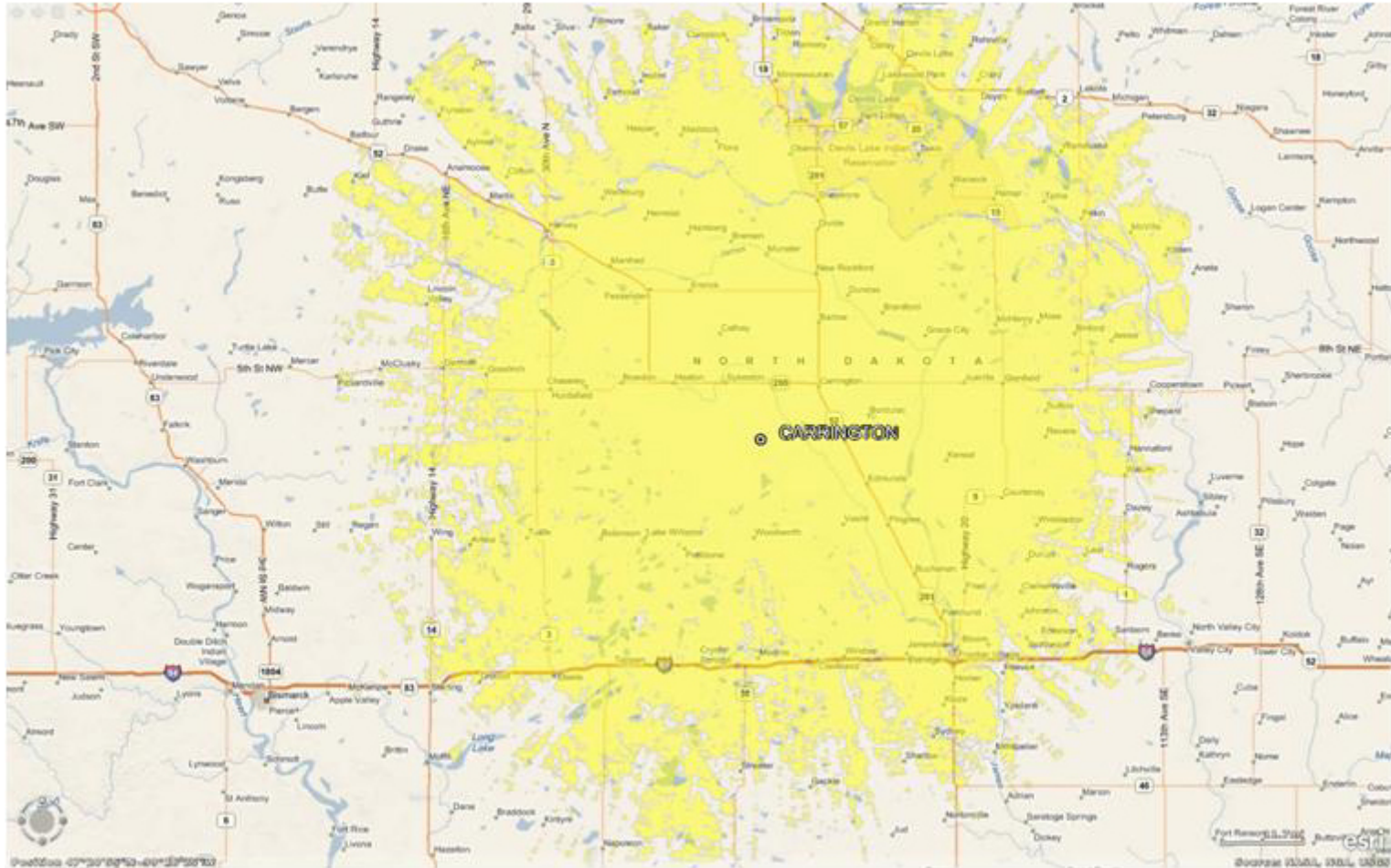


Homeland
Security

Bowman

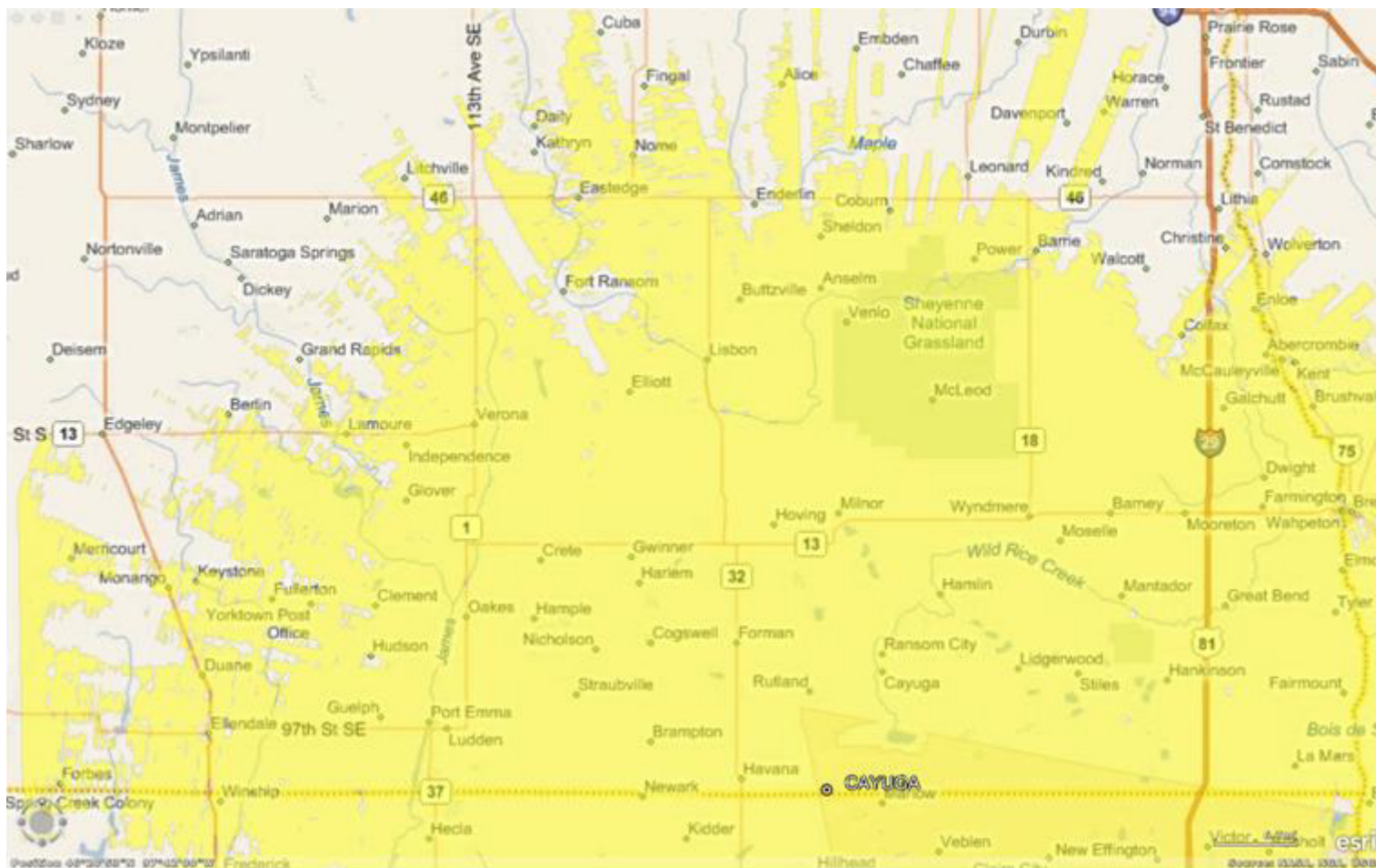


Carrington

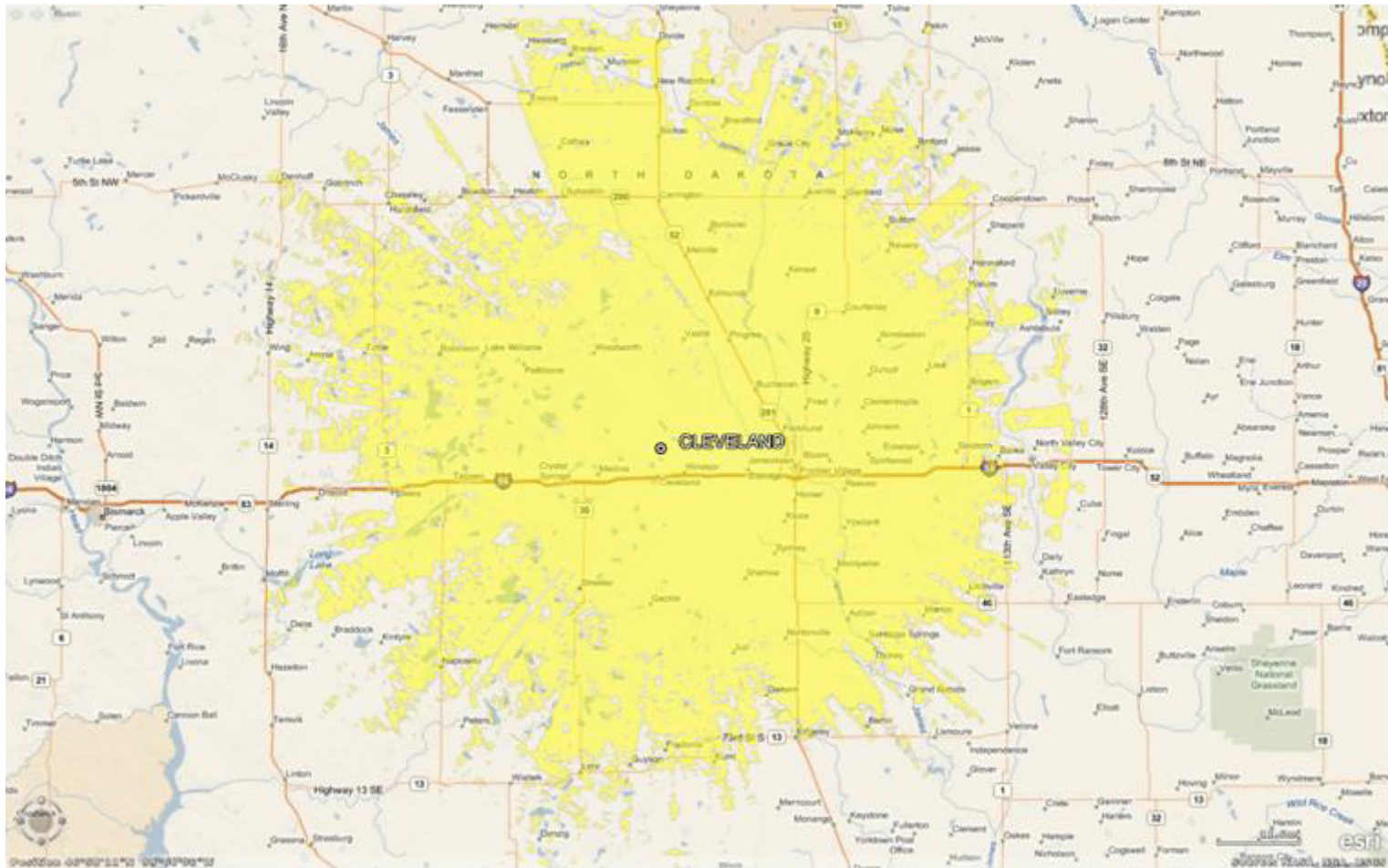


Homeland
Security

Cayuga

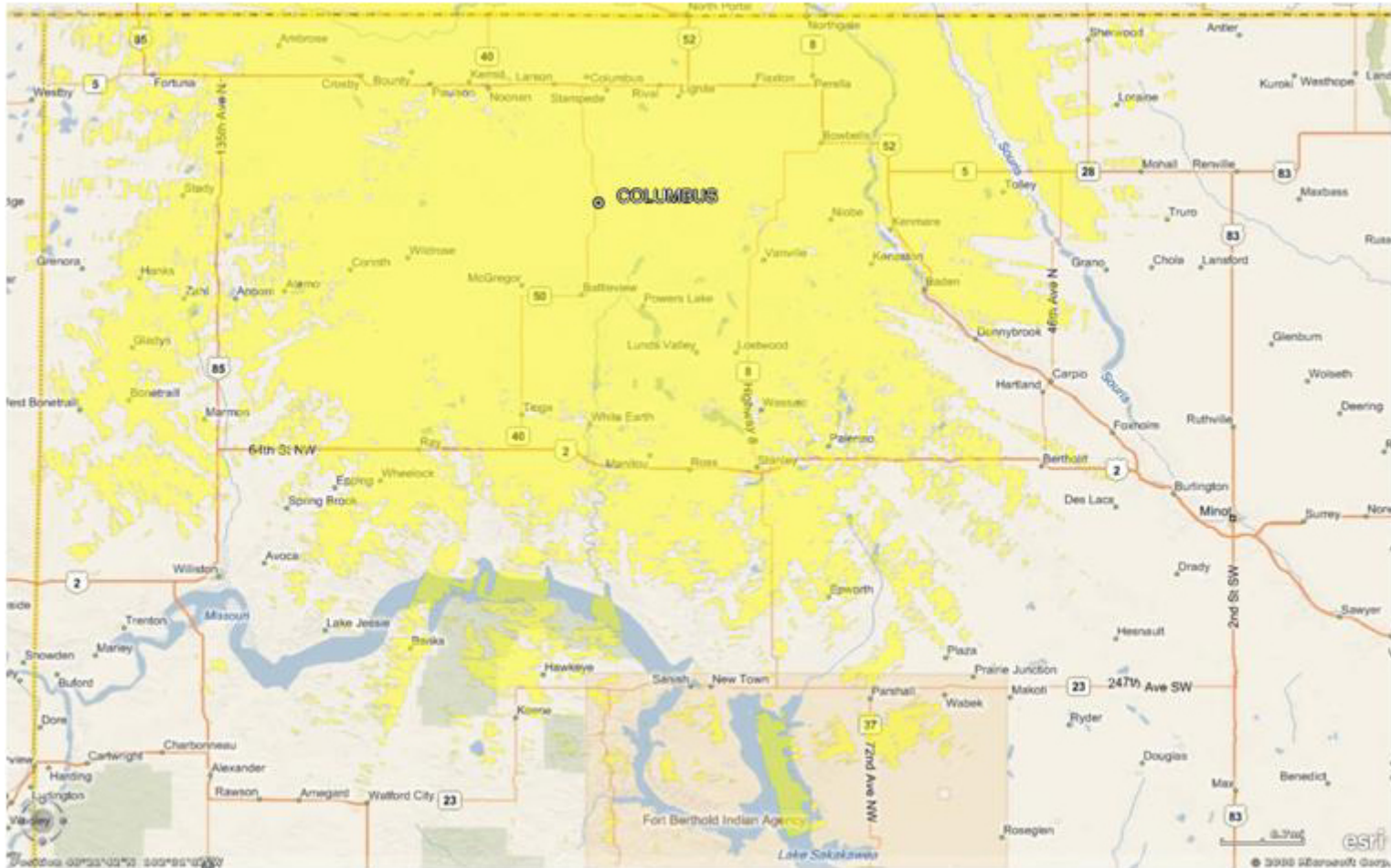


Cleveland



Homeland
Security

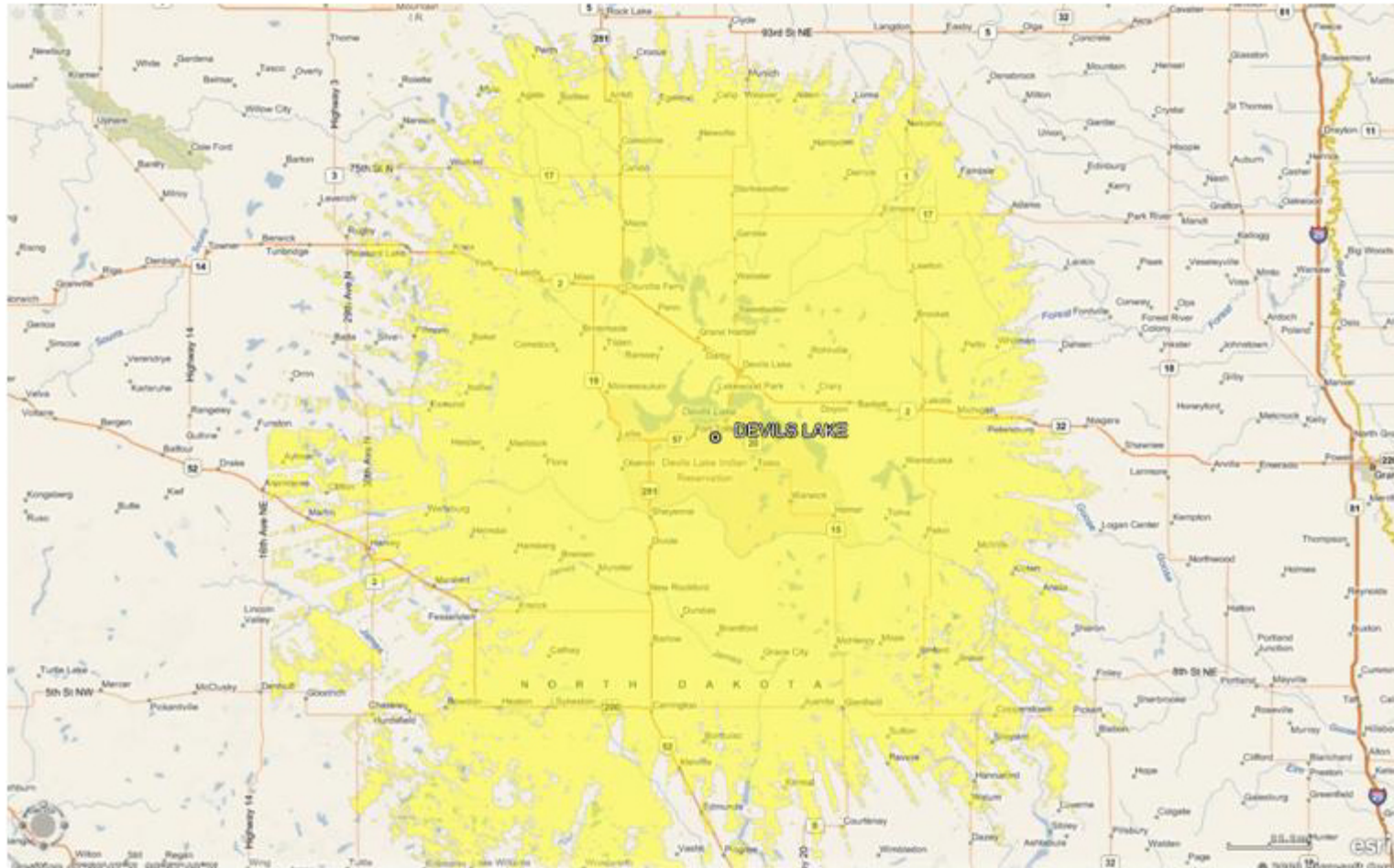
Columbus



Homeland
Security

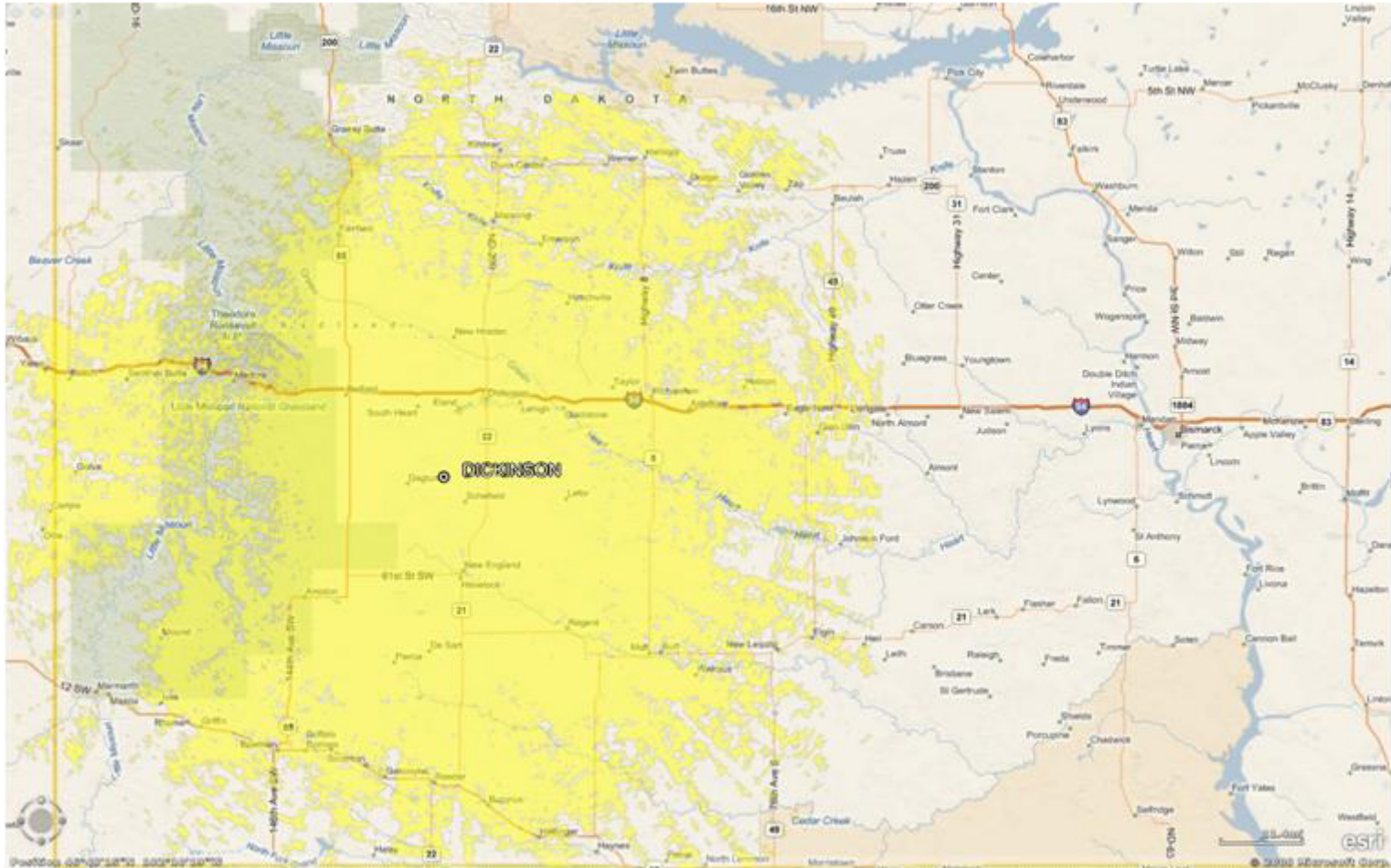


Devils Lake



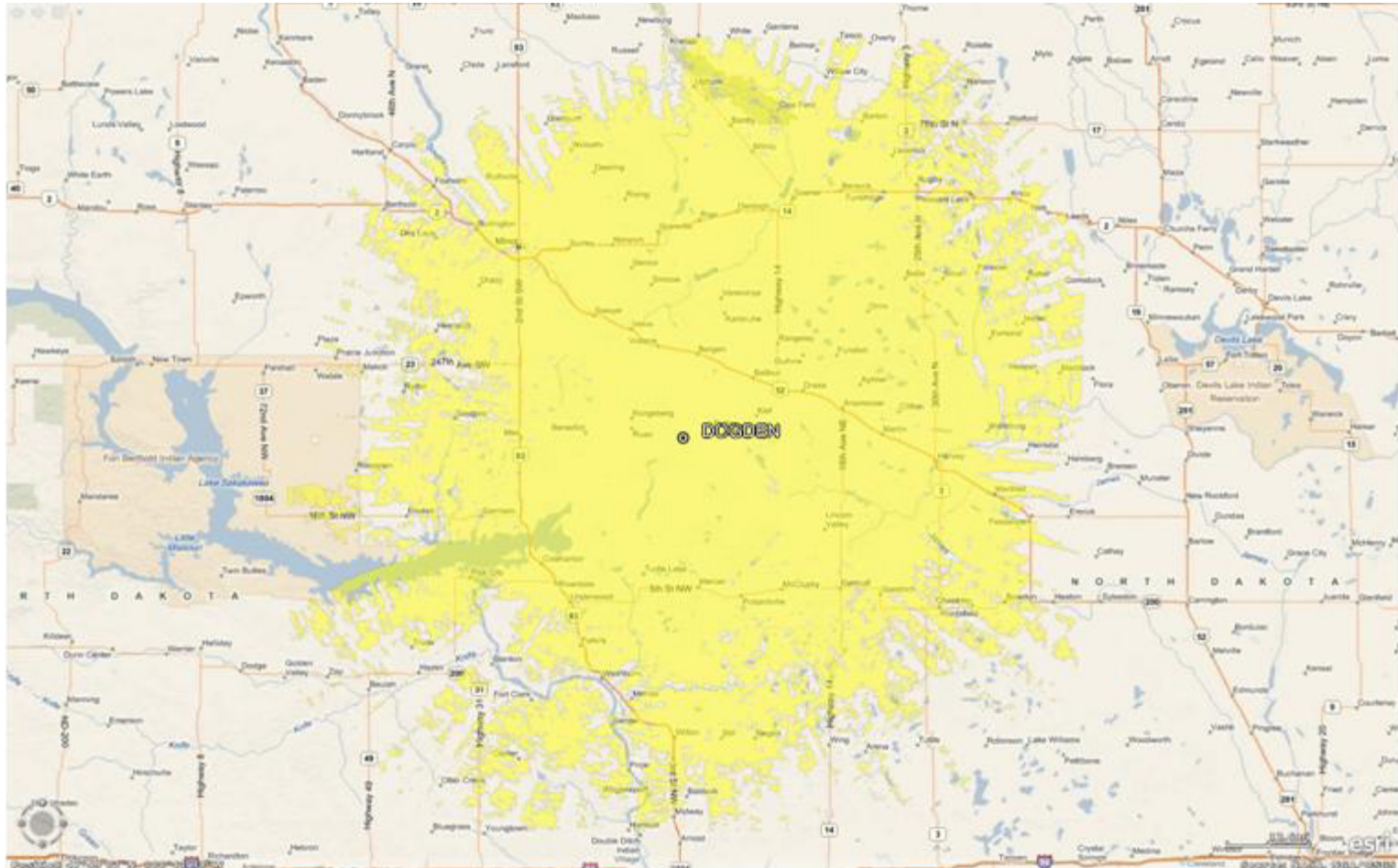
Homeland
Security

Dickinson



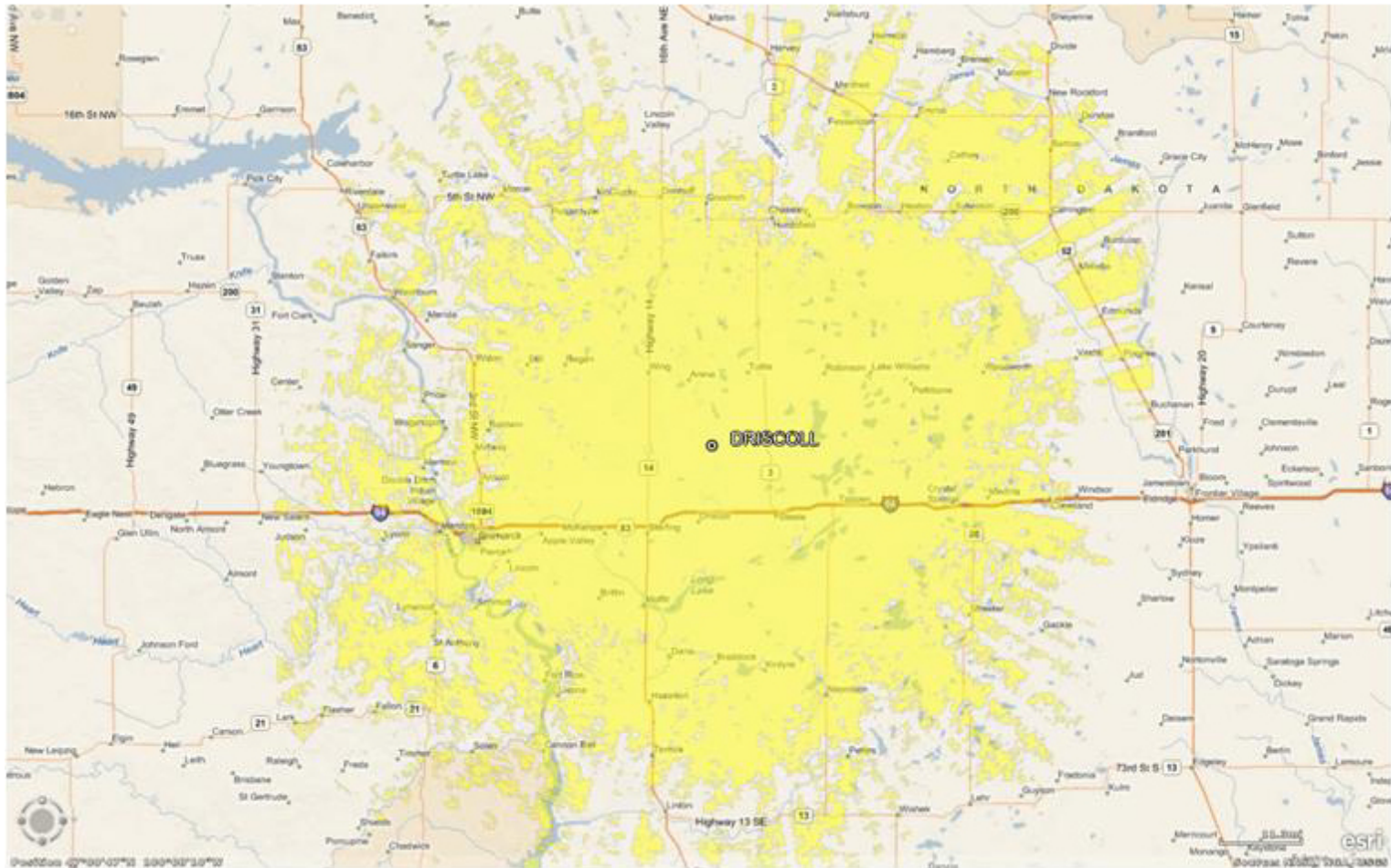
Homeland
Security

Dogden



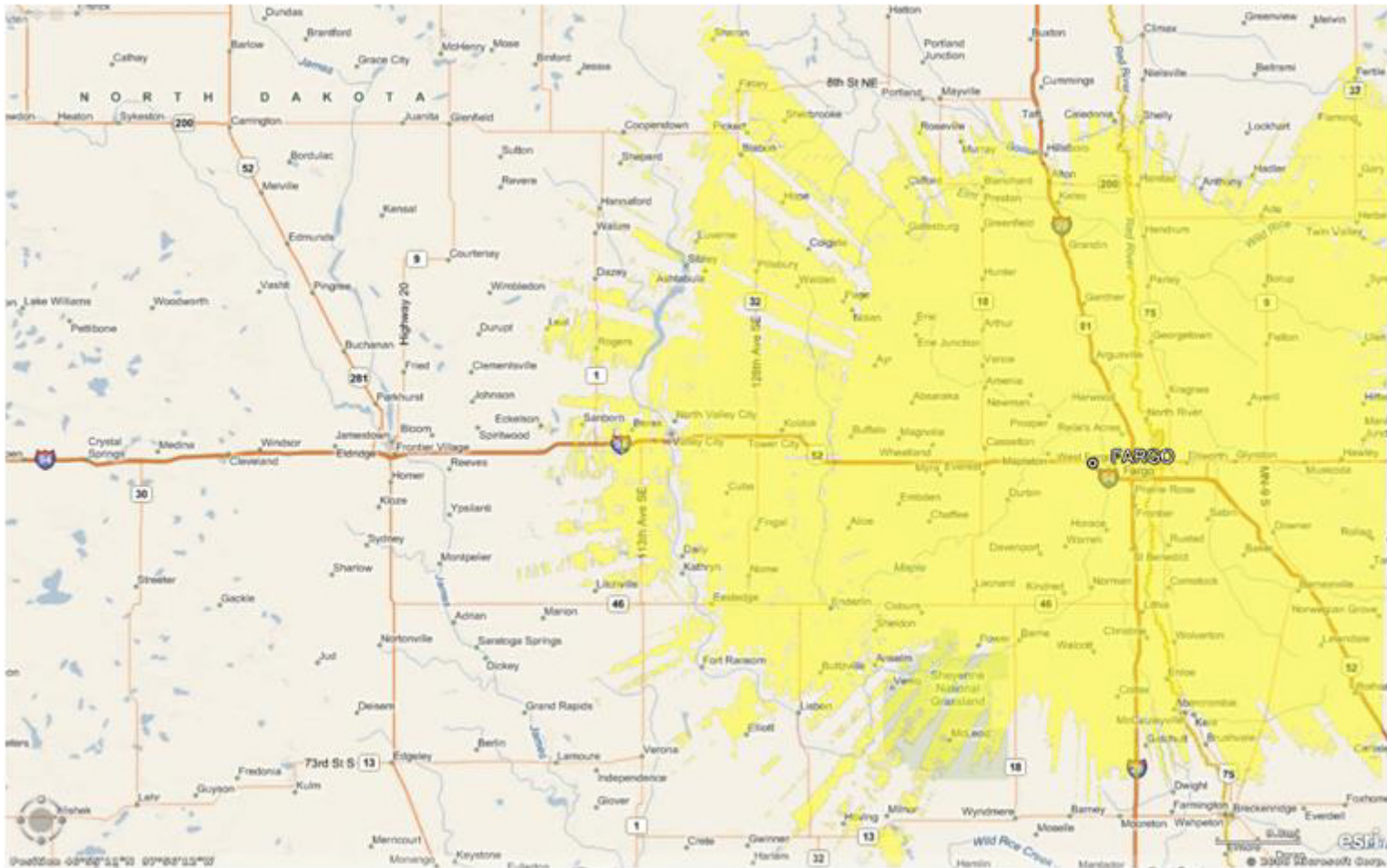
Homeland
Security

Driscoll



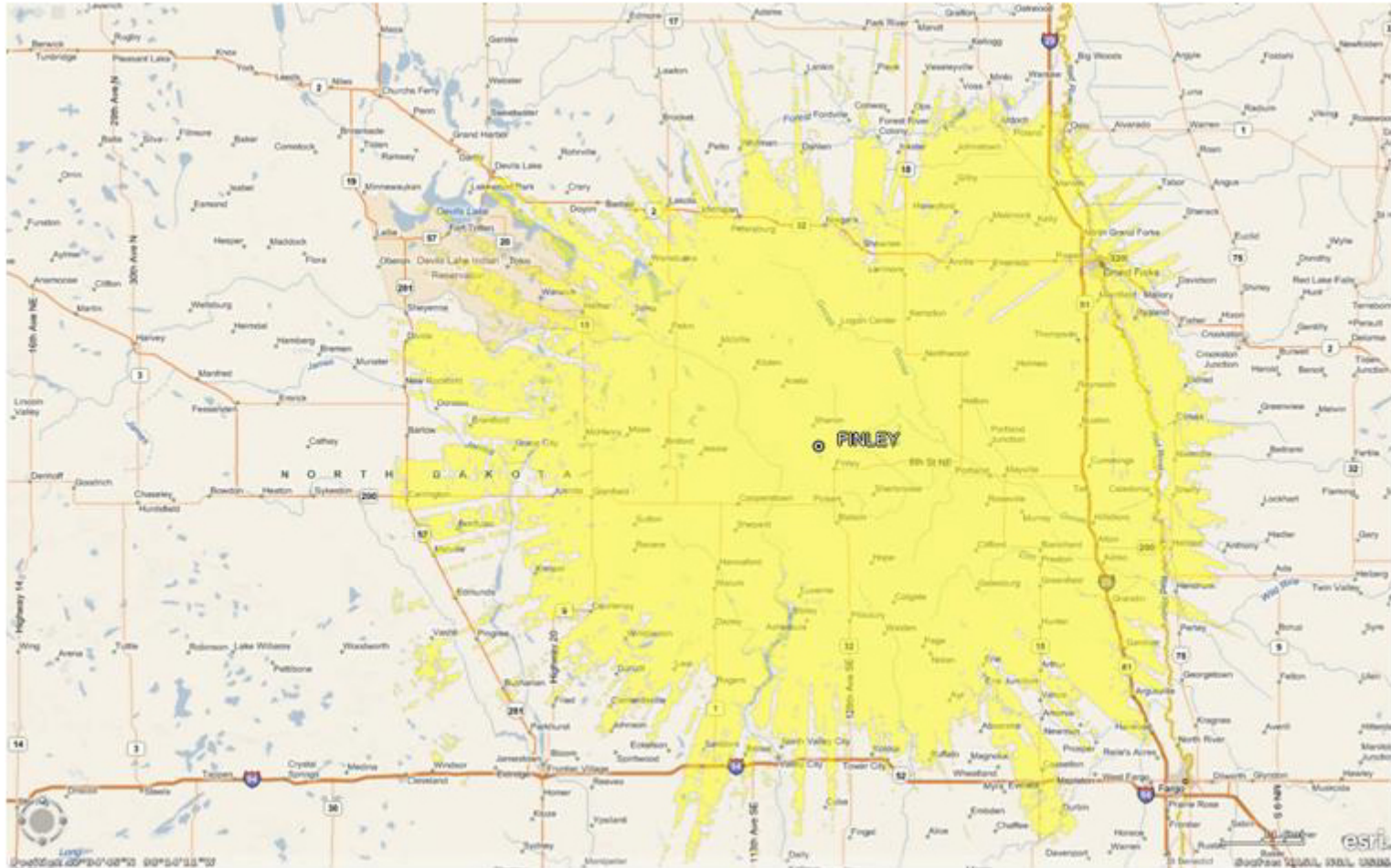
Homeland
Security

Fargo



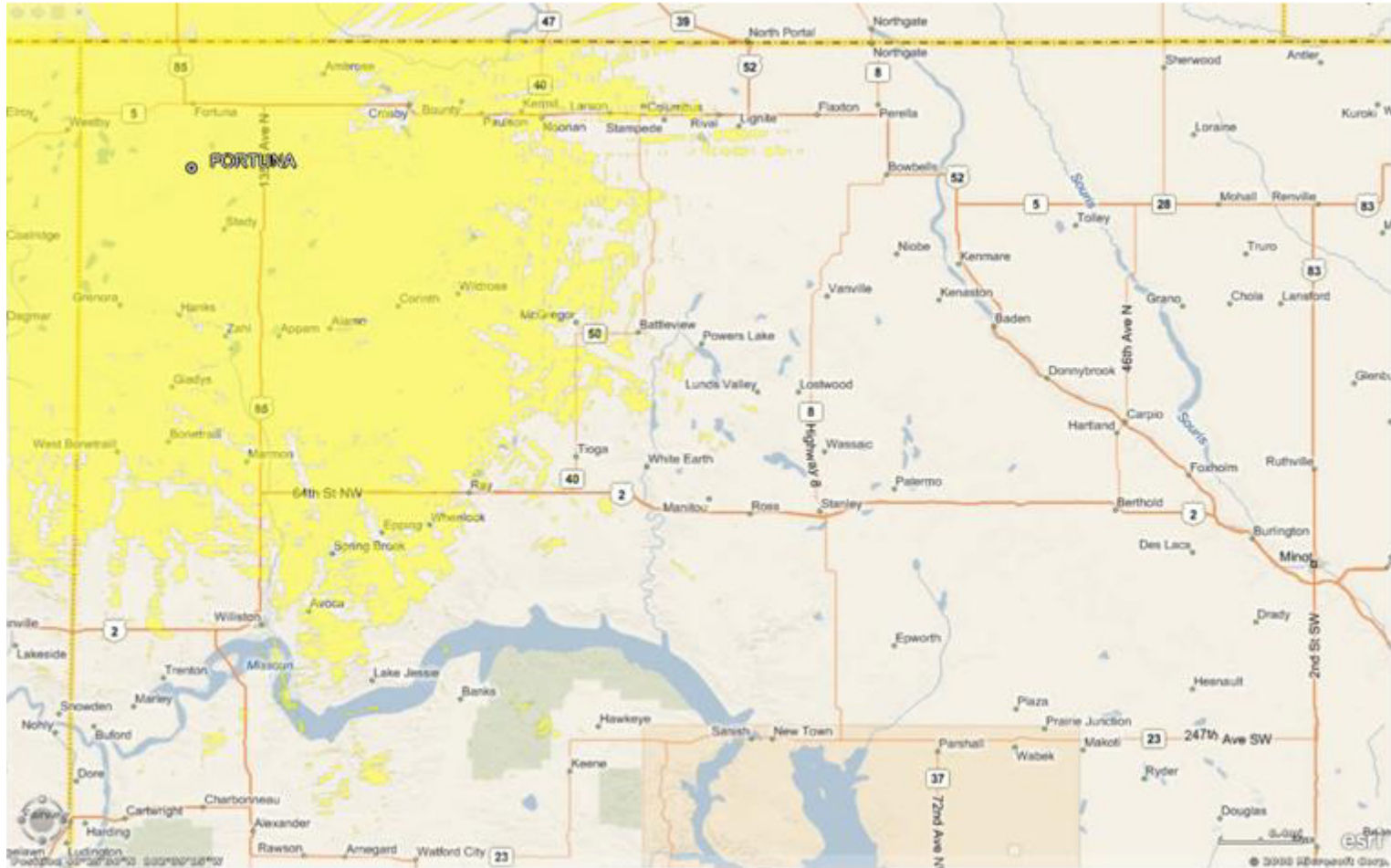
Homeland
Security

Finley



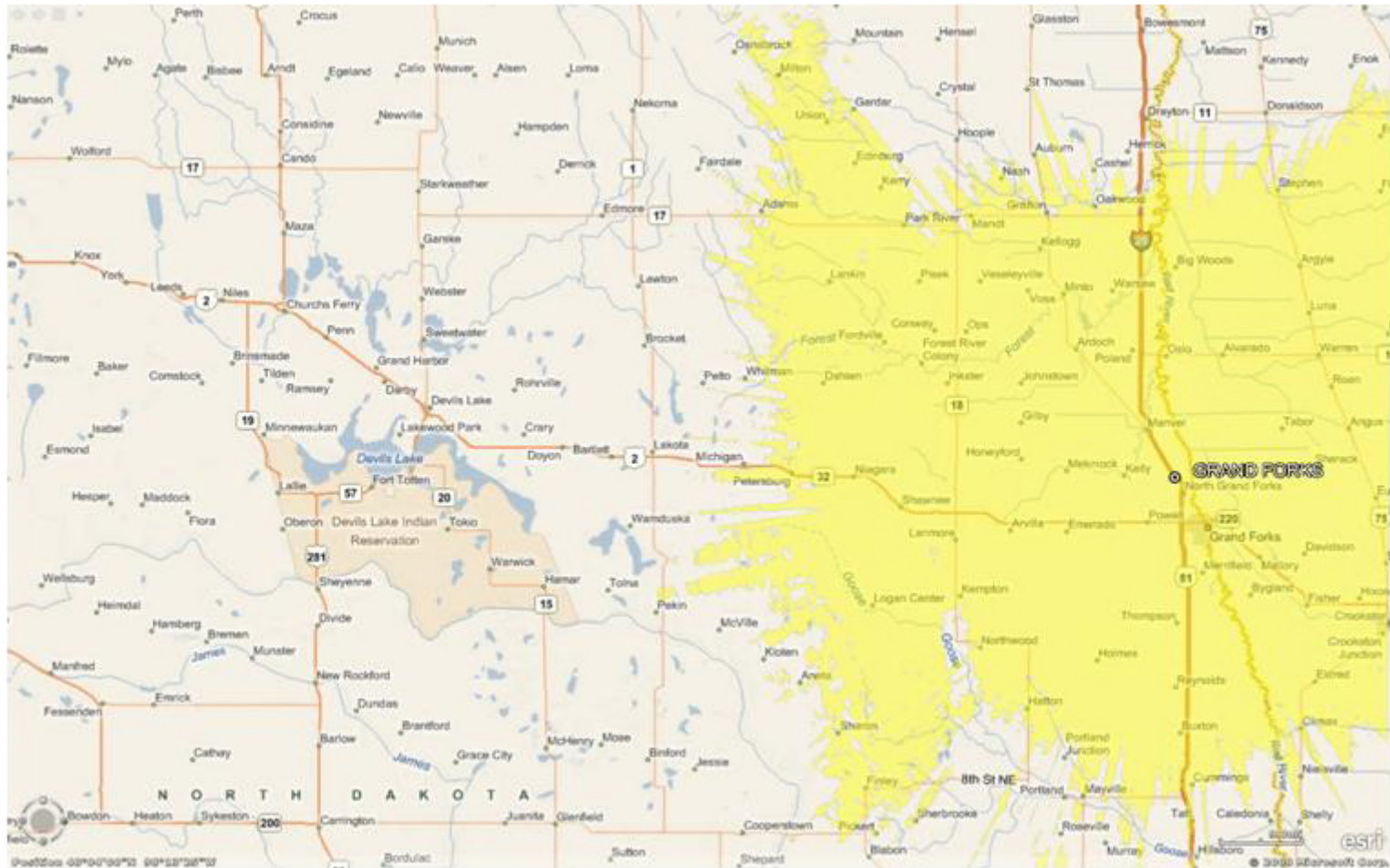
Homeland
Security

Fortuna



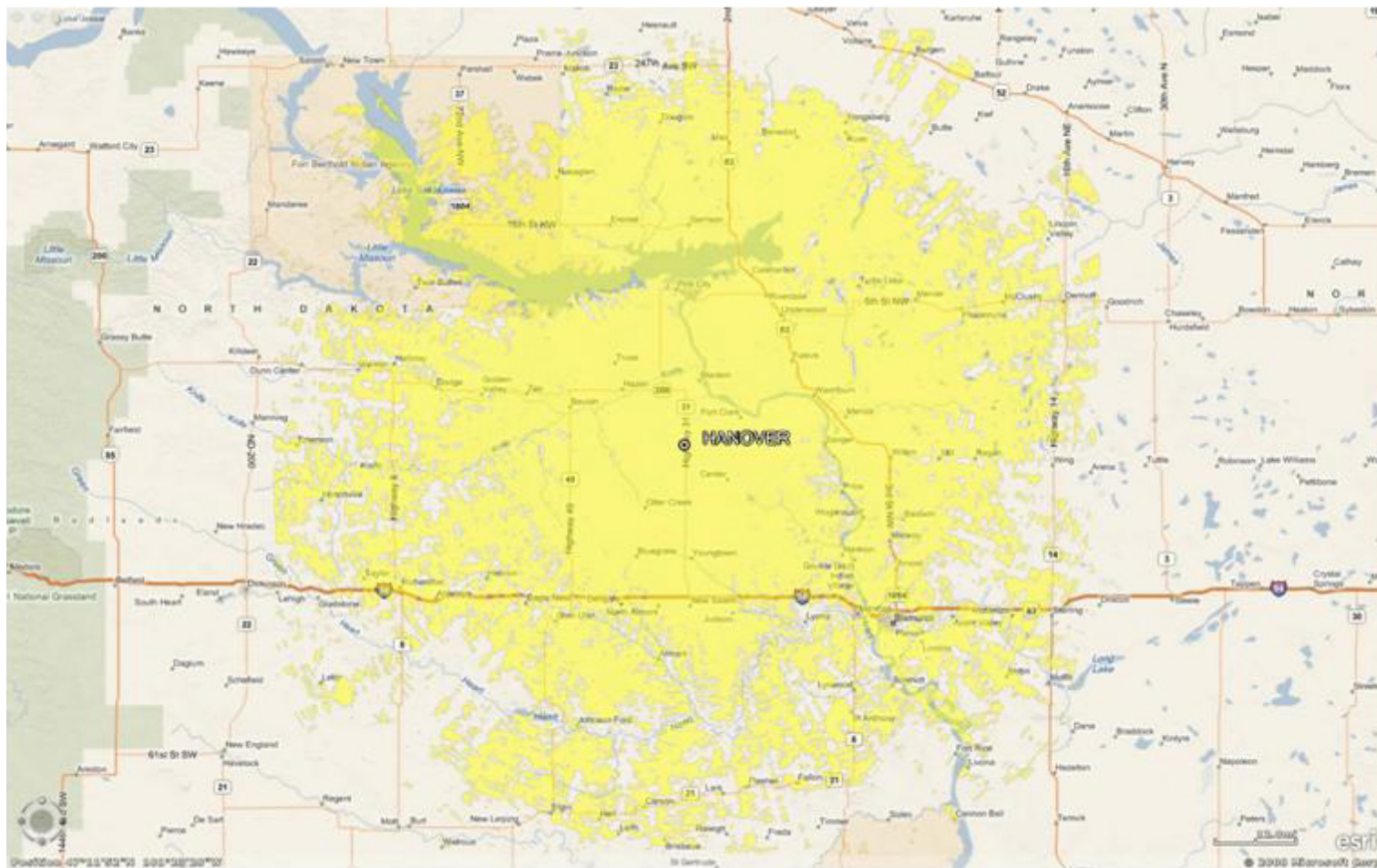
Homeland
Security

Grand Forks



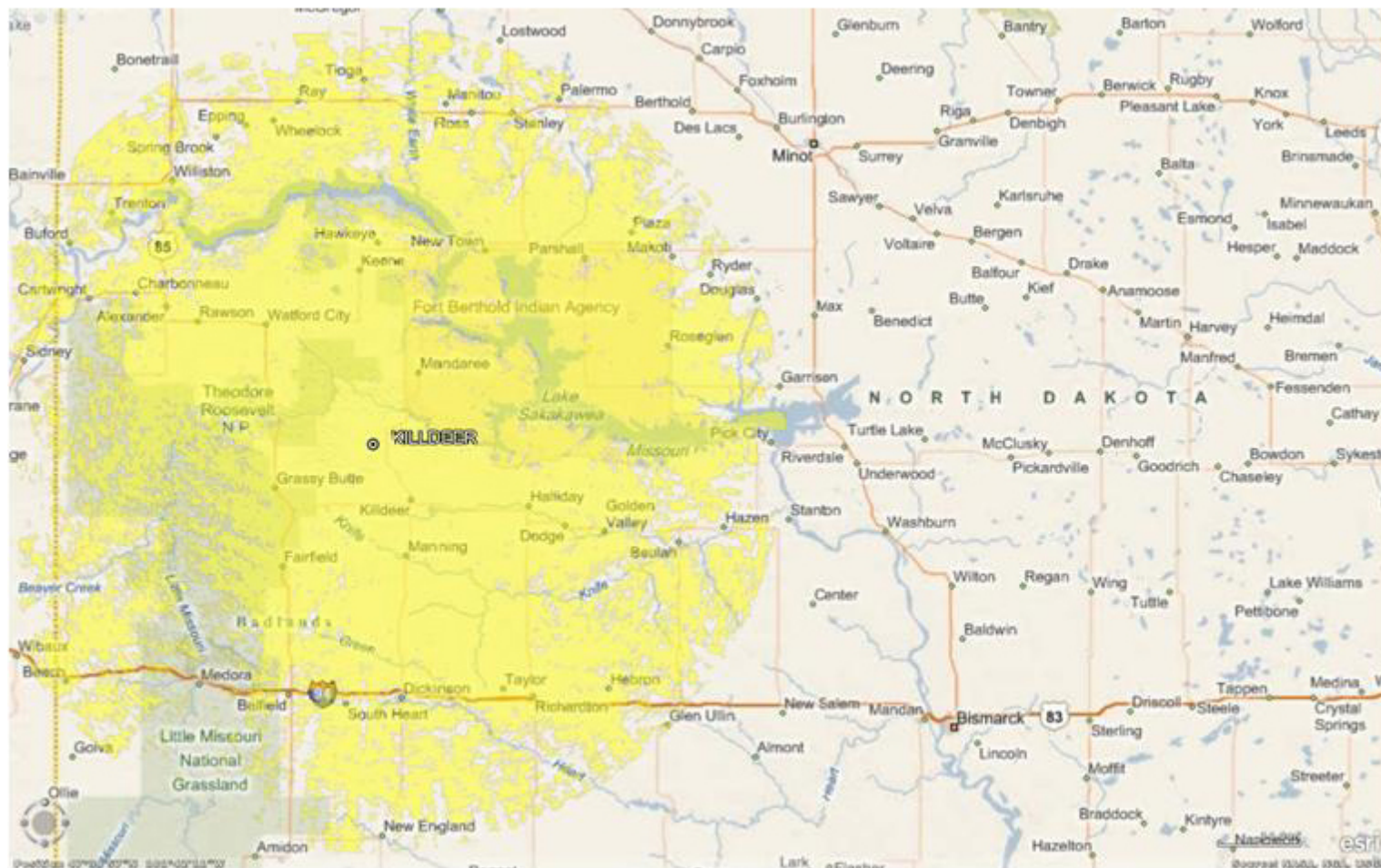
Homeland
Security

Hanover



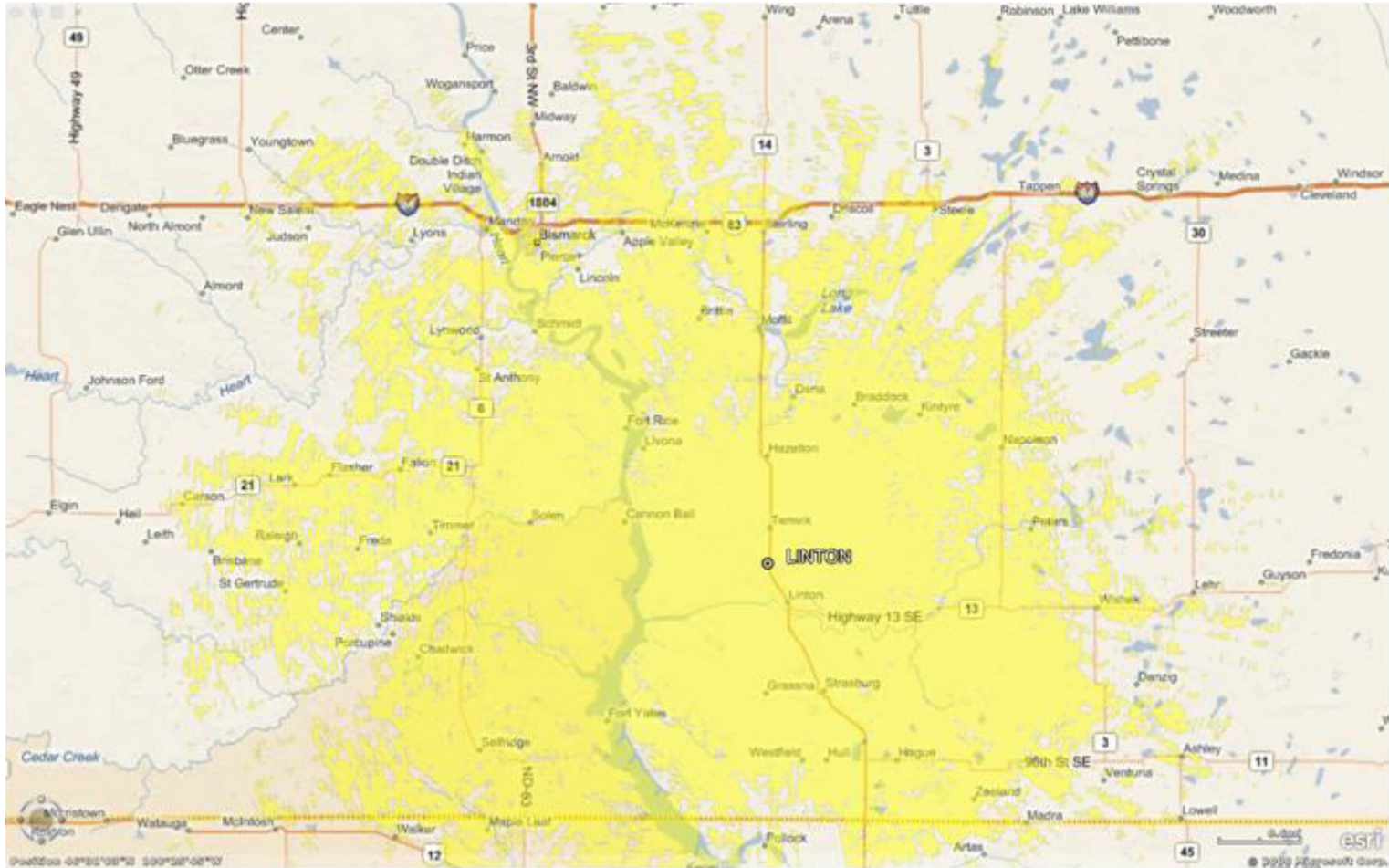
Homeland
Security

Killdeer



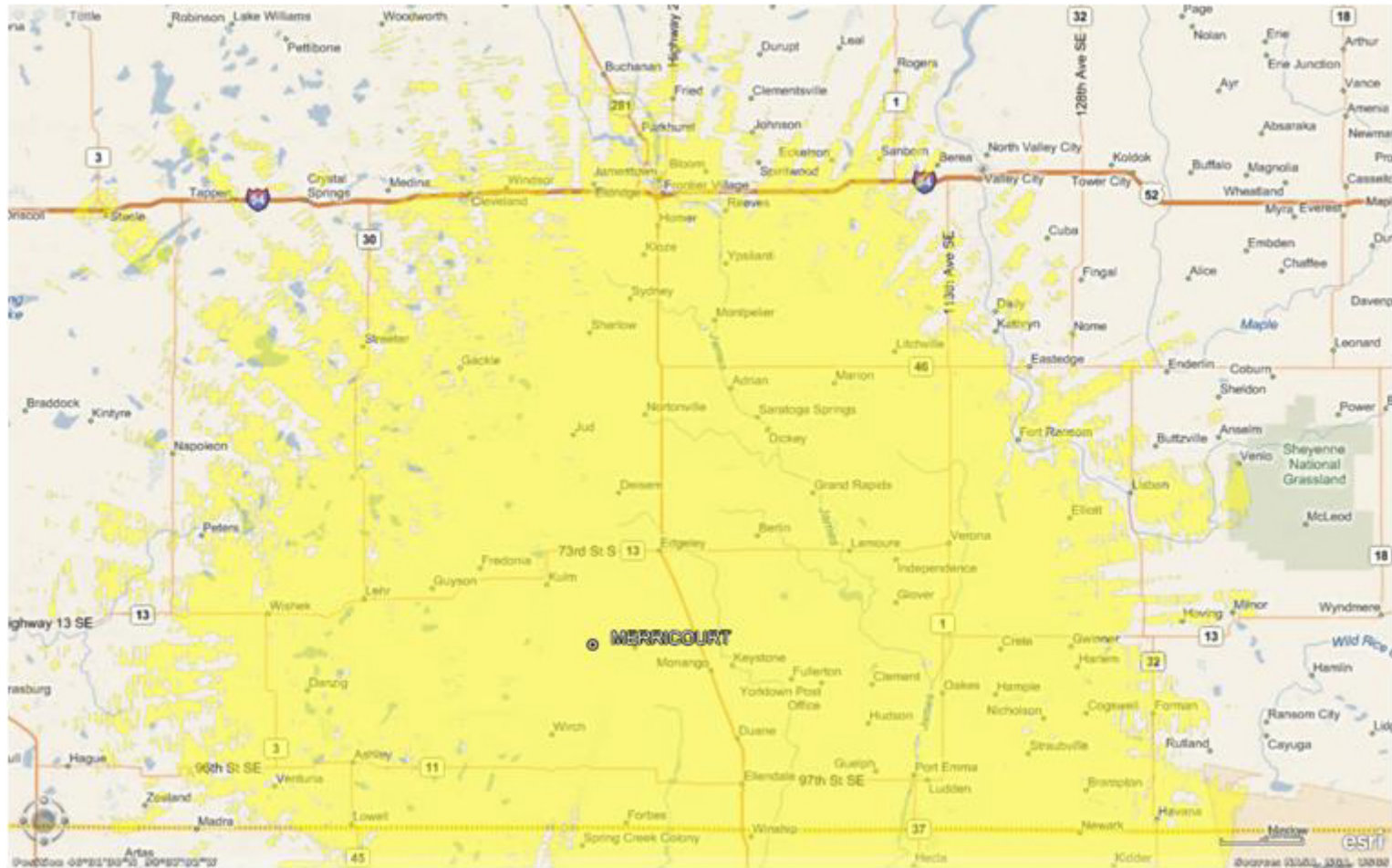
Homeland
Security

Linton

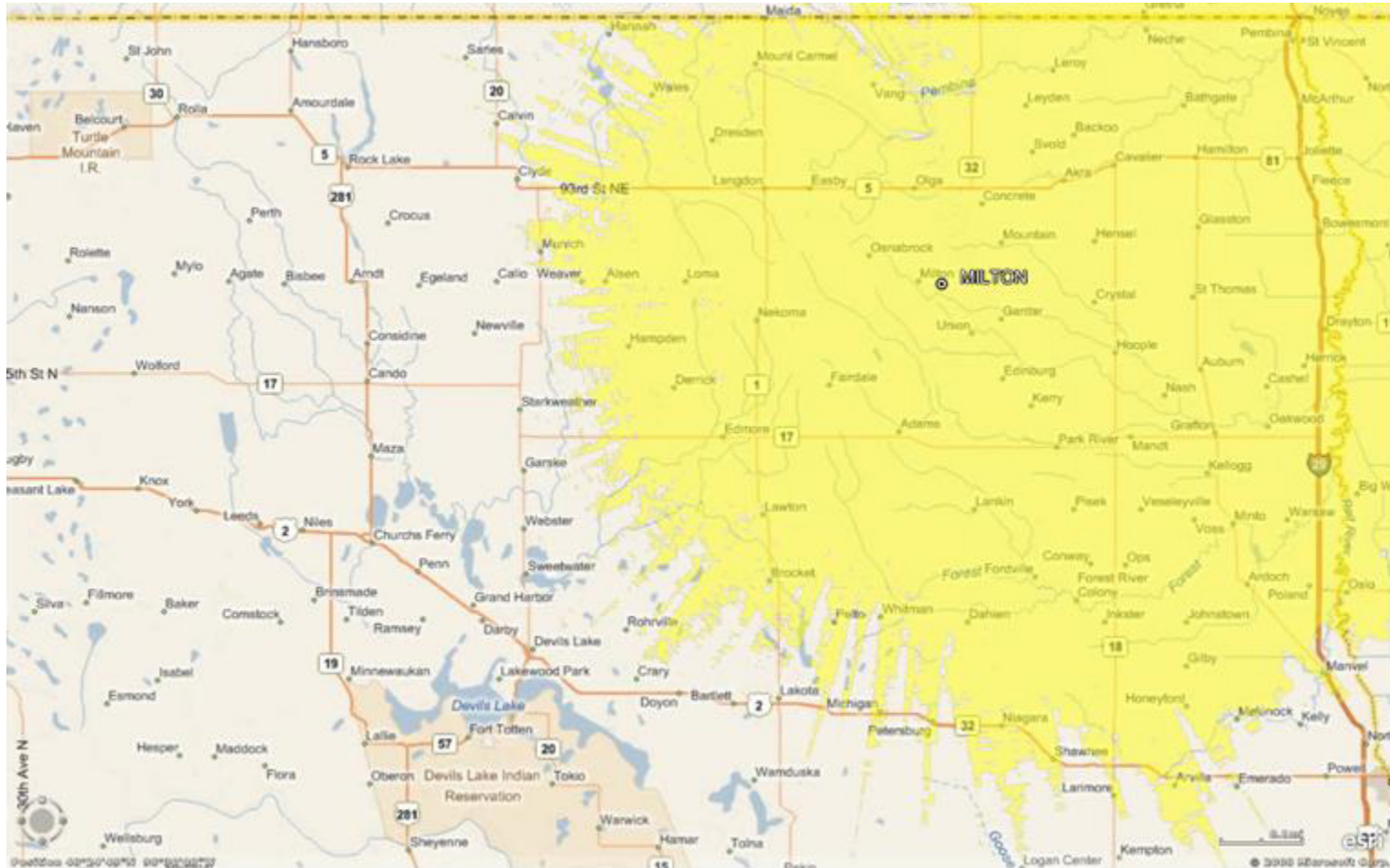


Homeland
Security

Merricourt

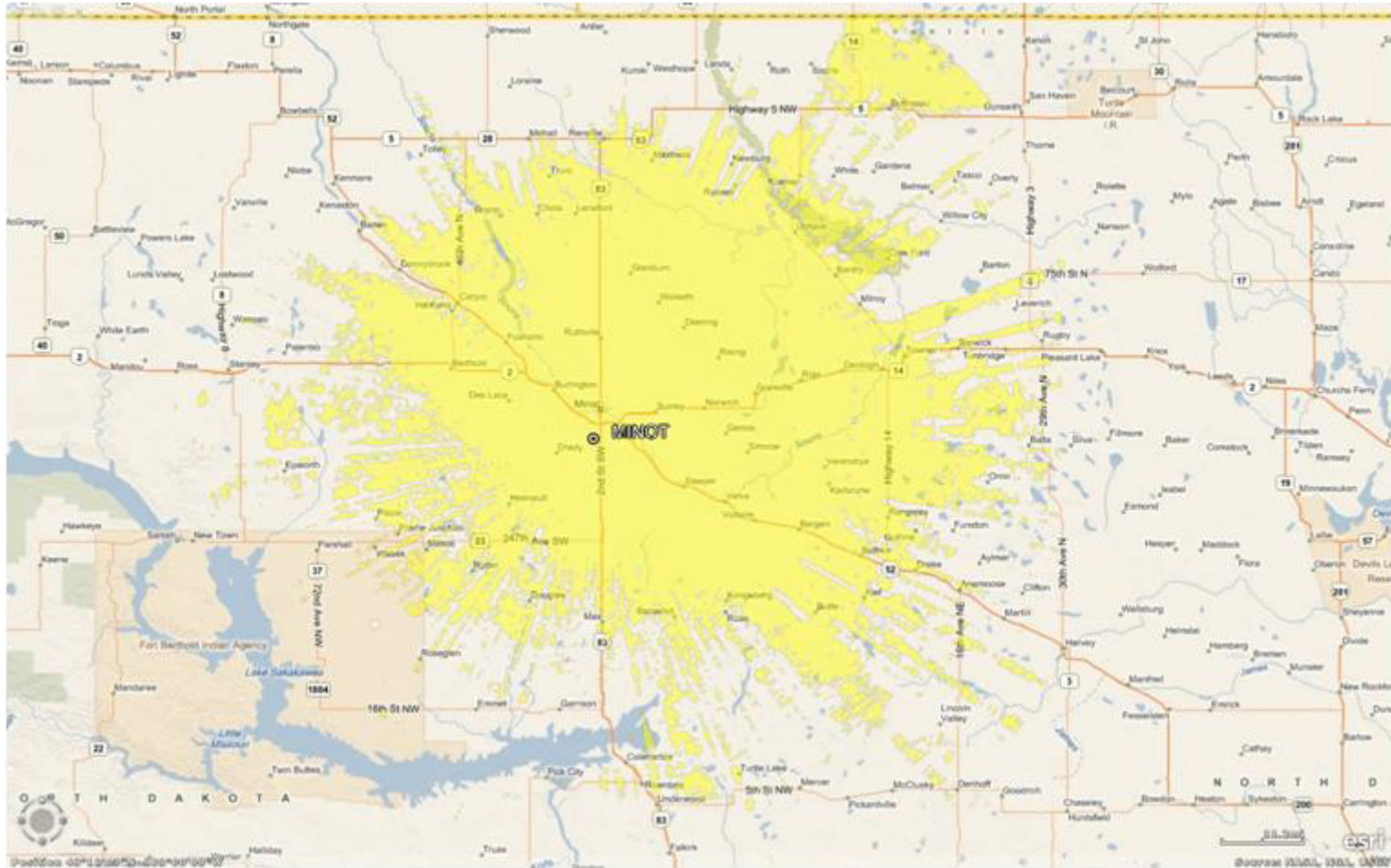


Homeland
Security



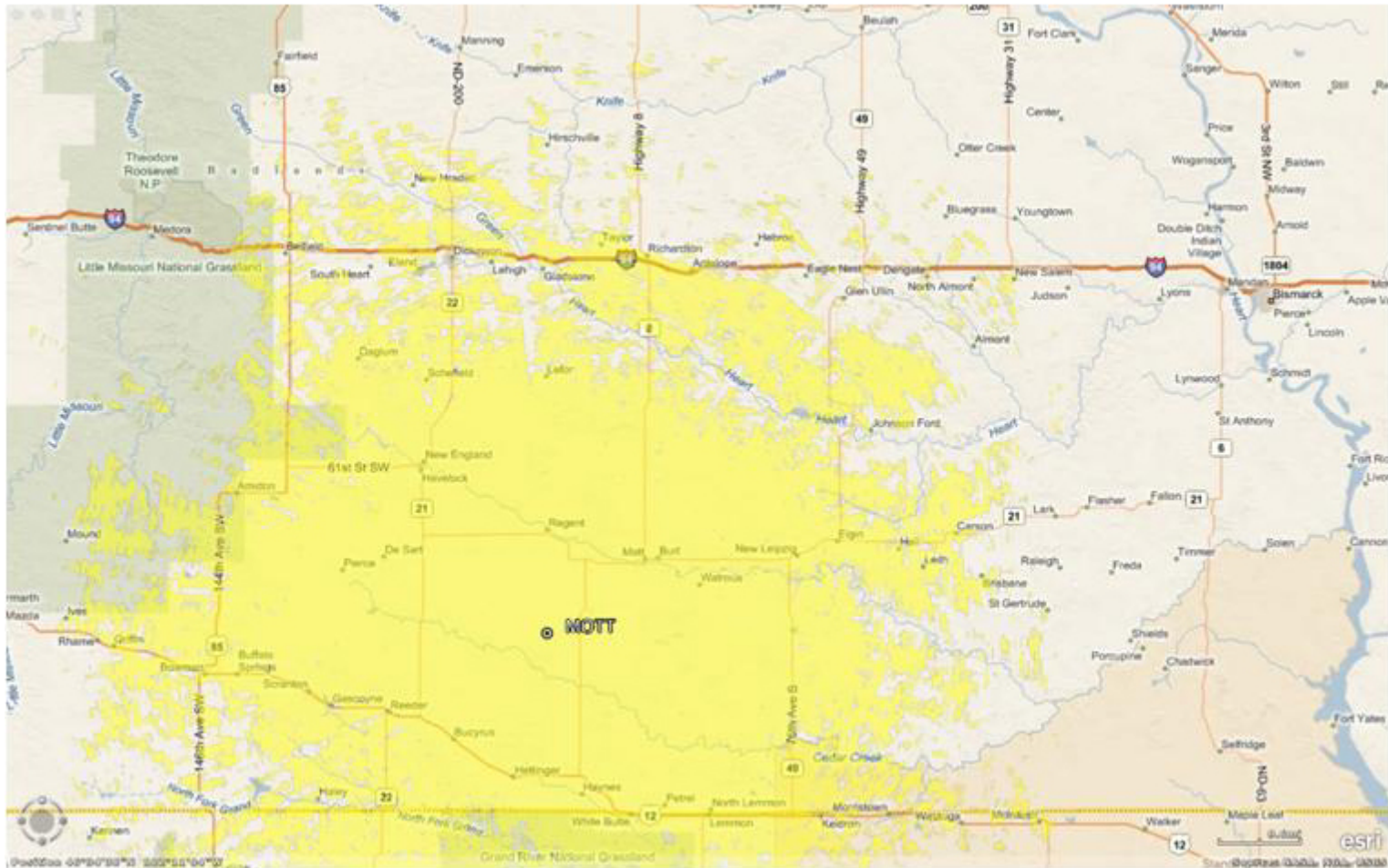
Homeland
Security

Minot



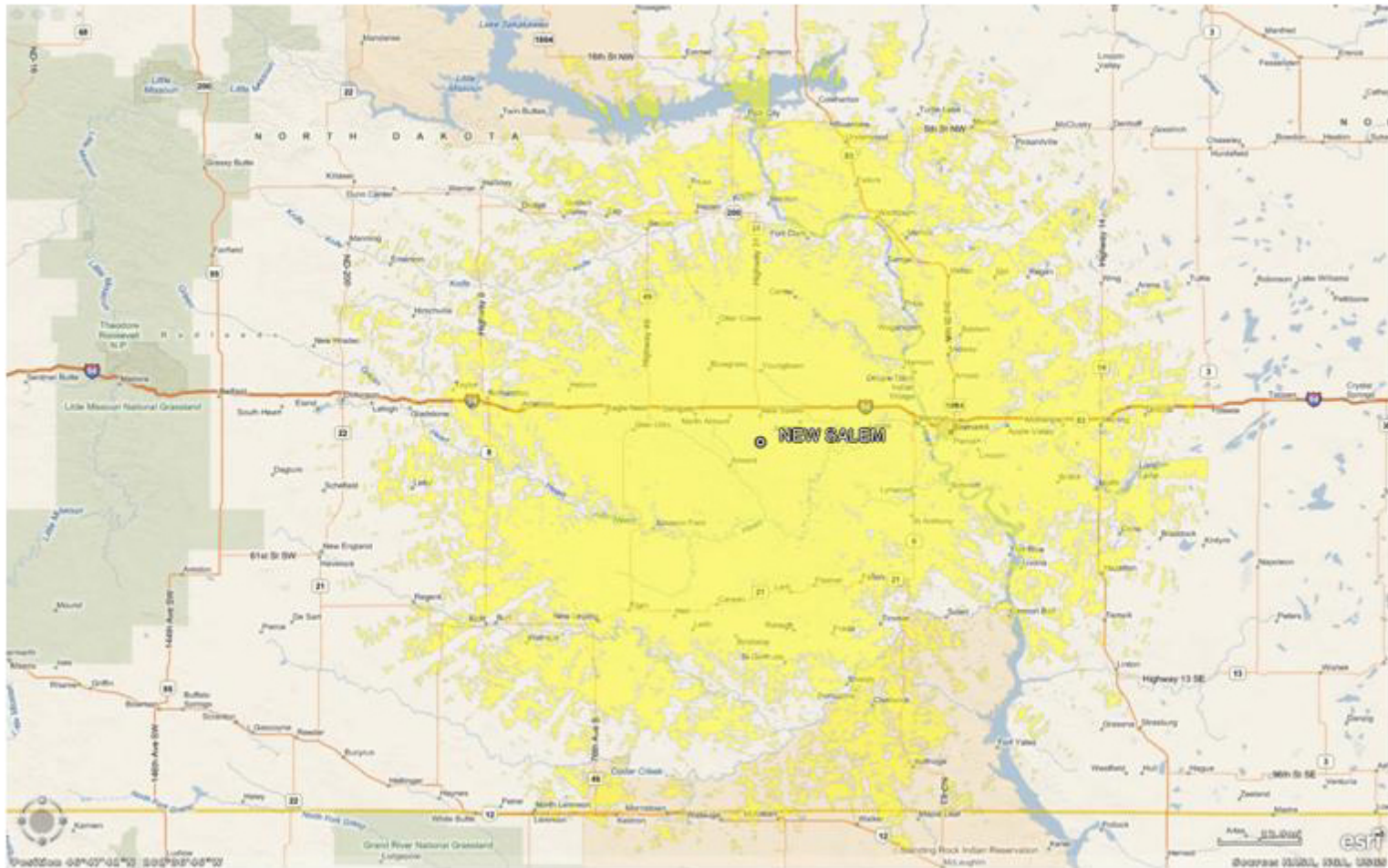
Homeland
Security

Mott



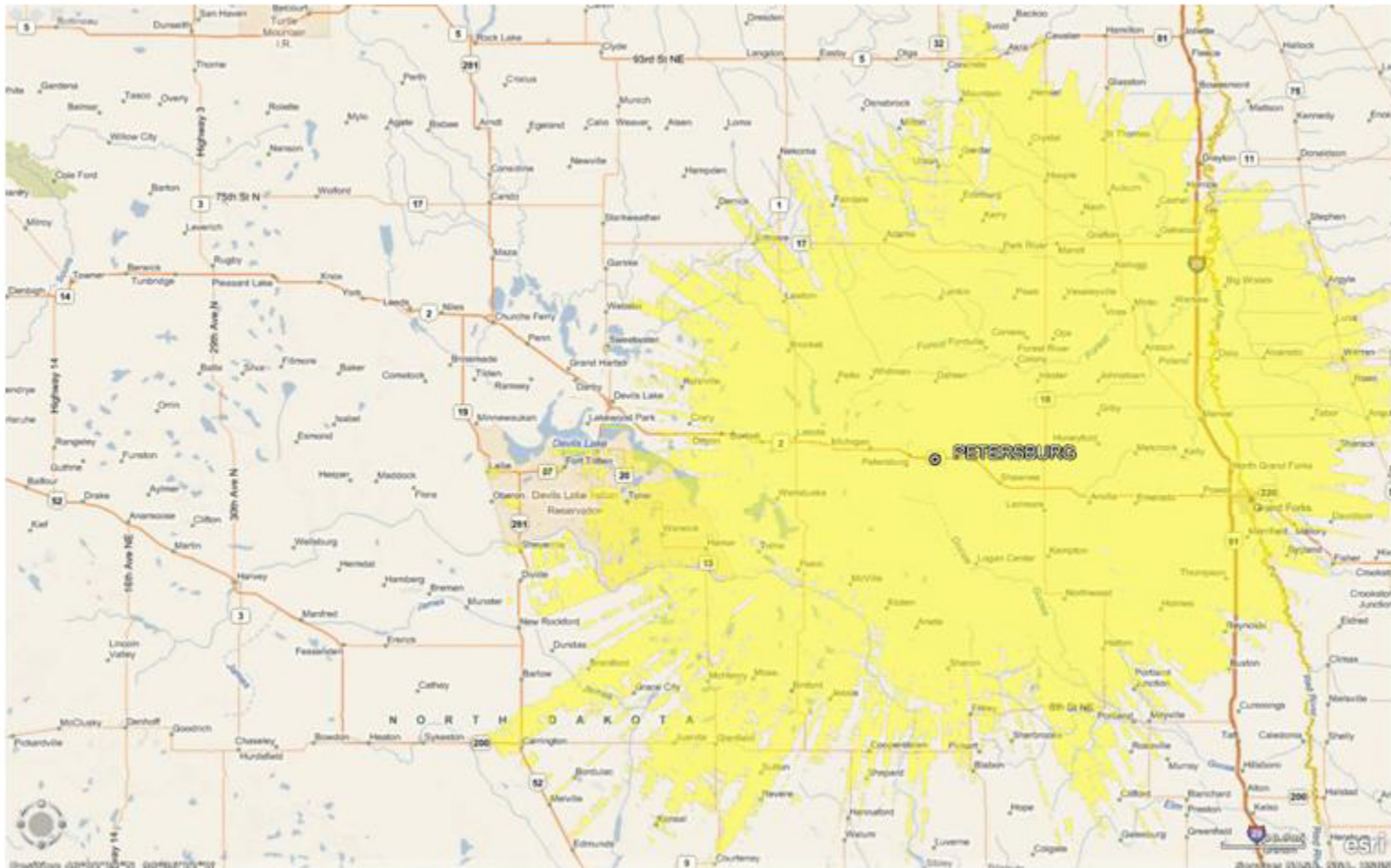
Homeland
Security

New Salem



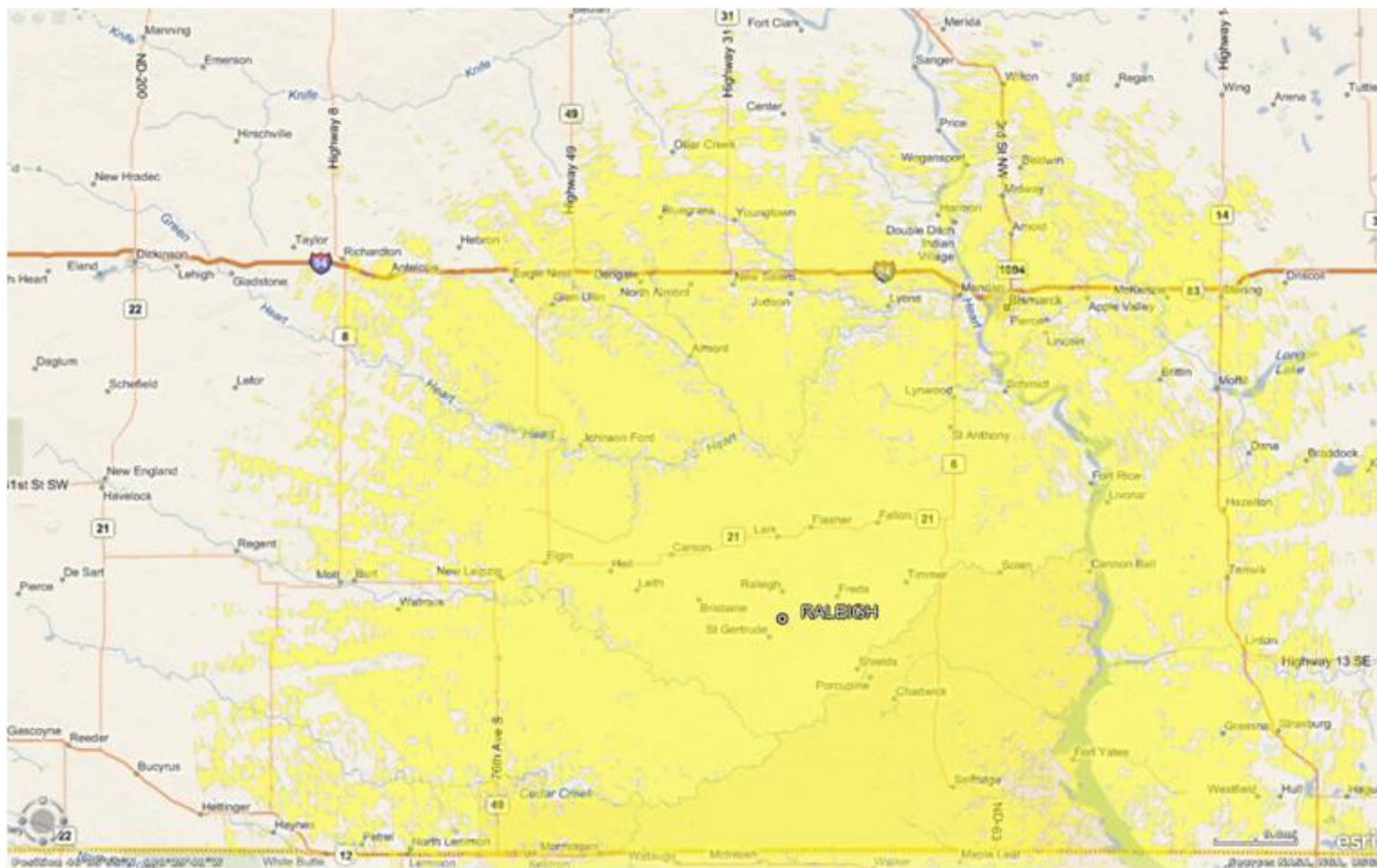
Homeland
Security

Petersburg



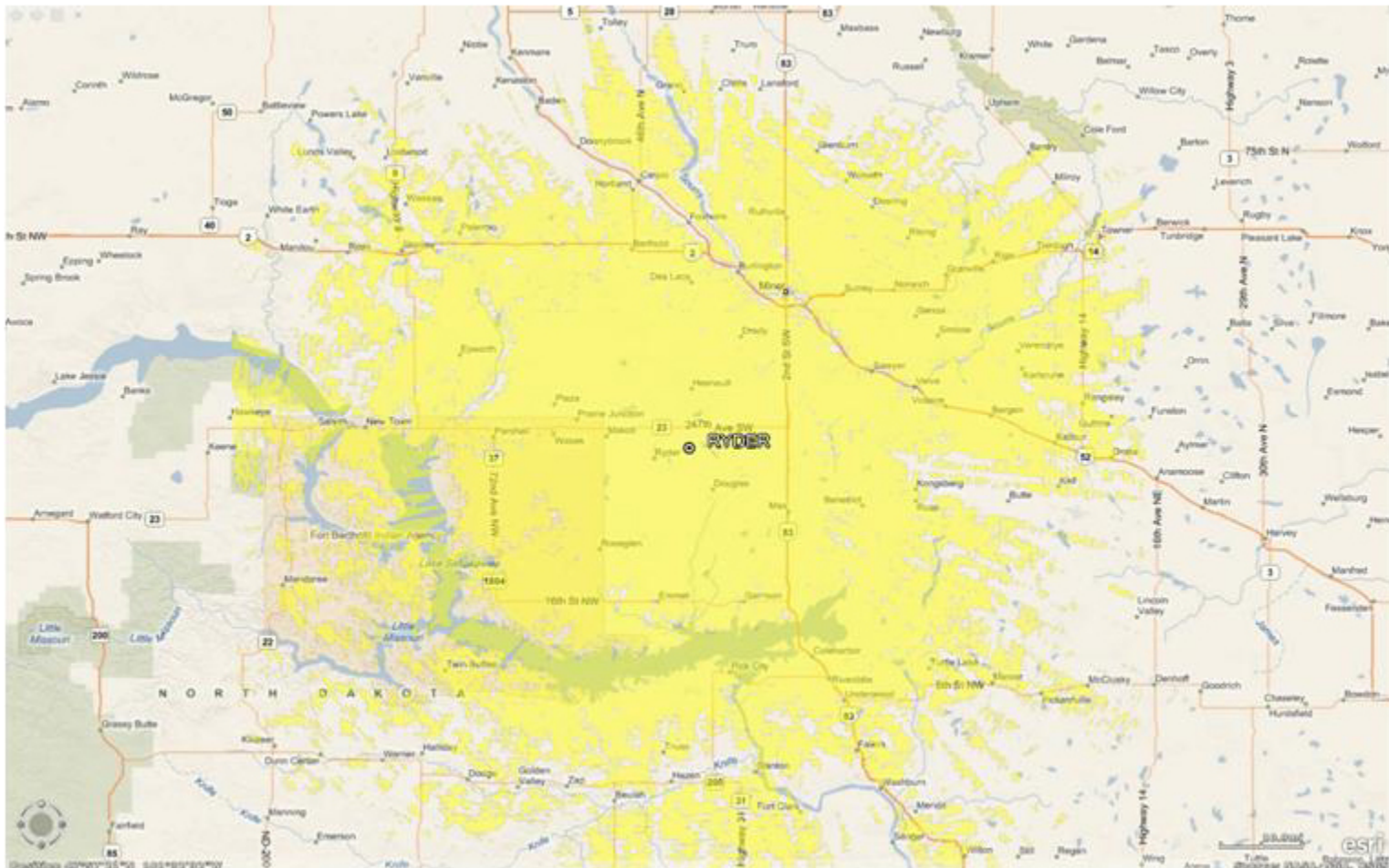
Homeland
Security

Raleigh



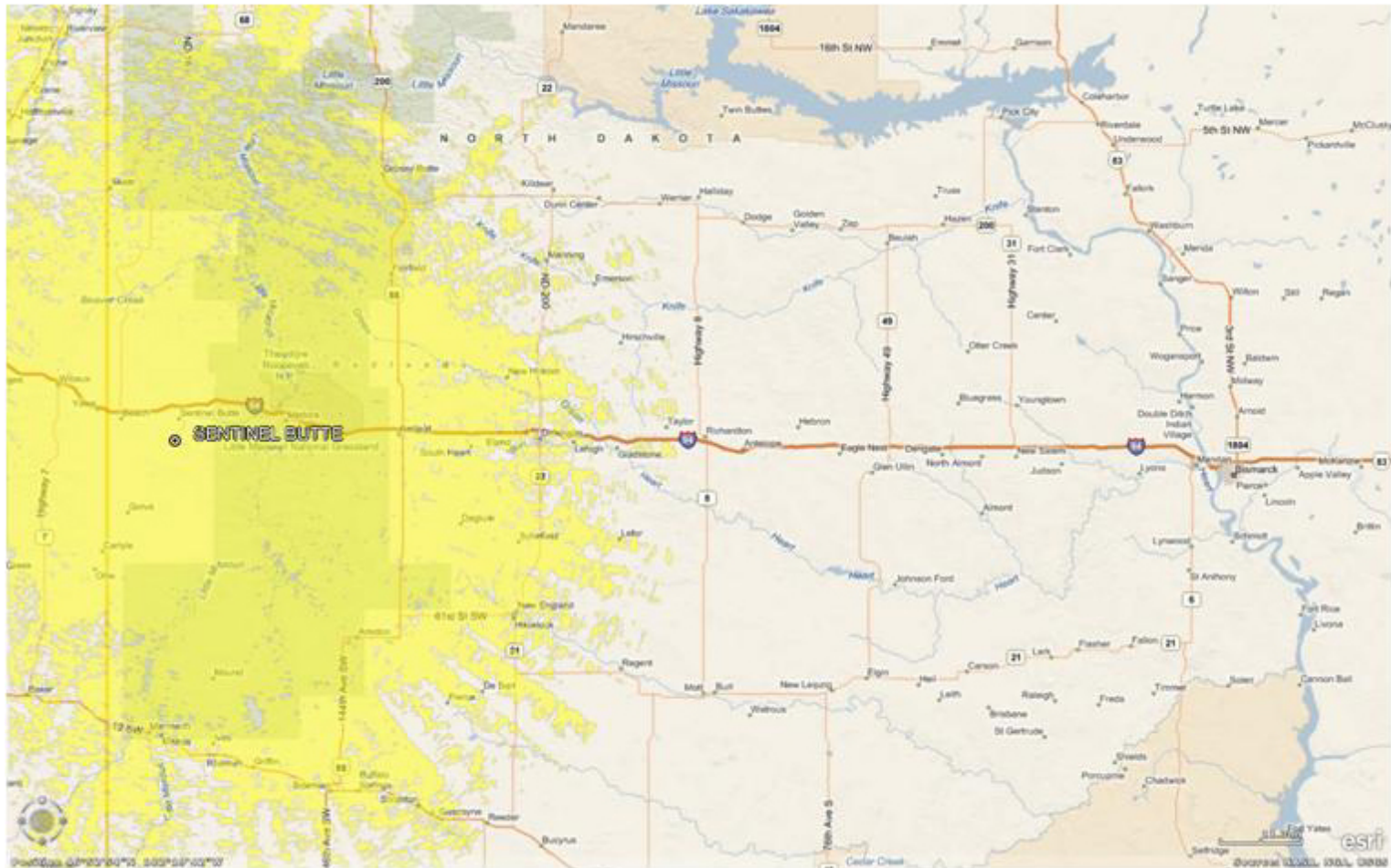
Homeland
Security

Ryder



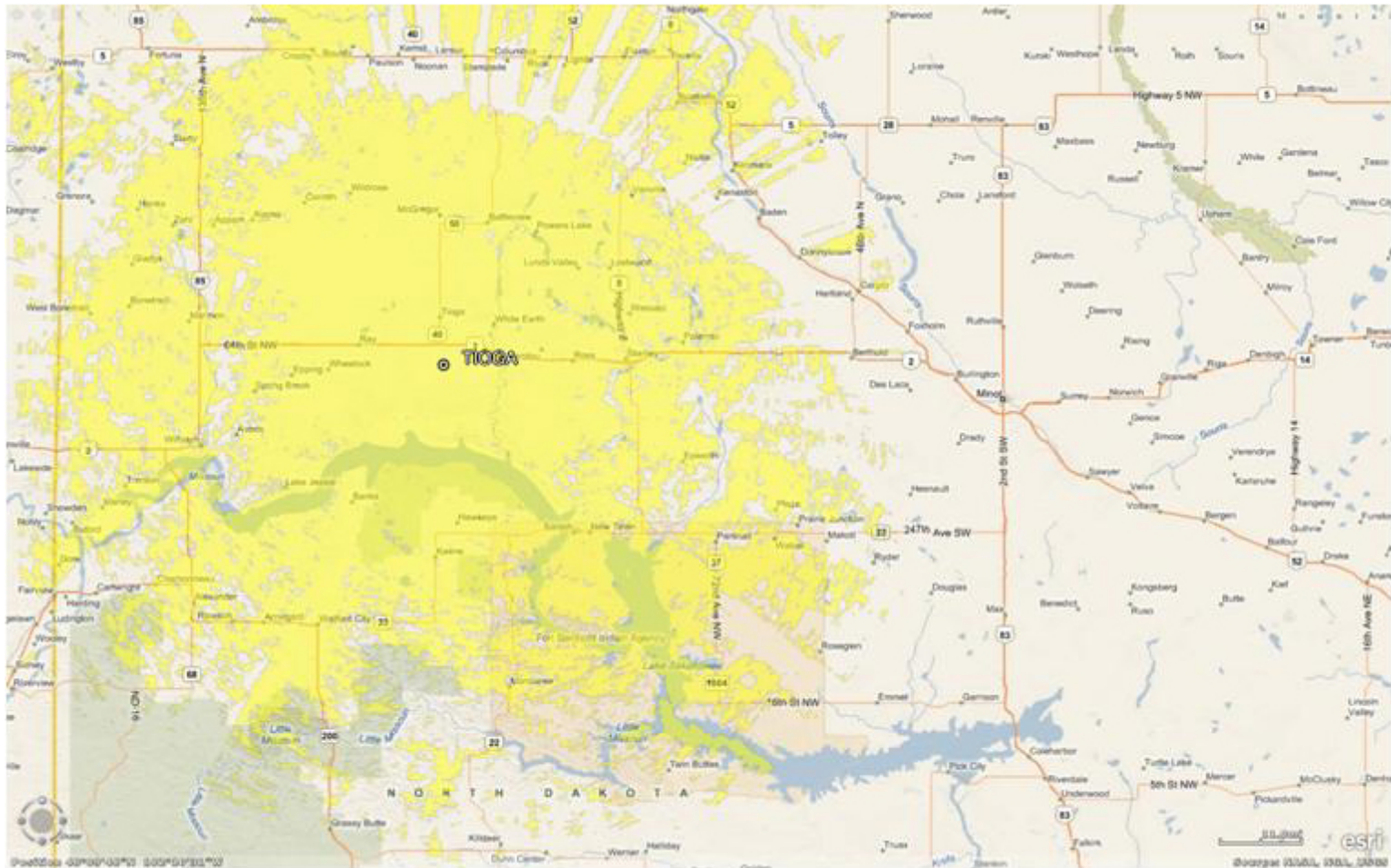
Homeland
Security

Sentinel Butte



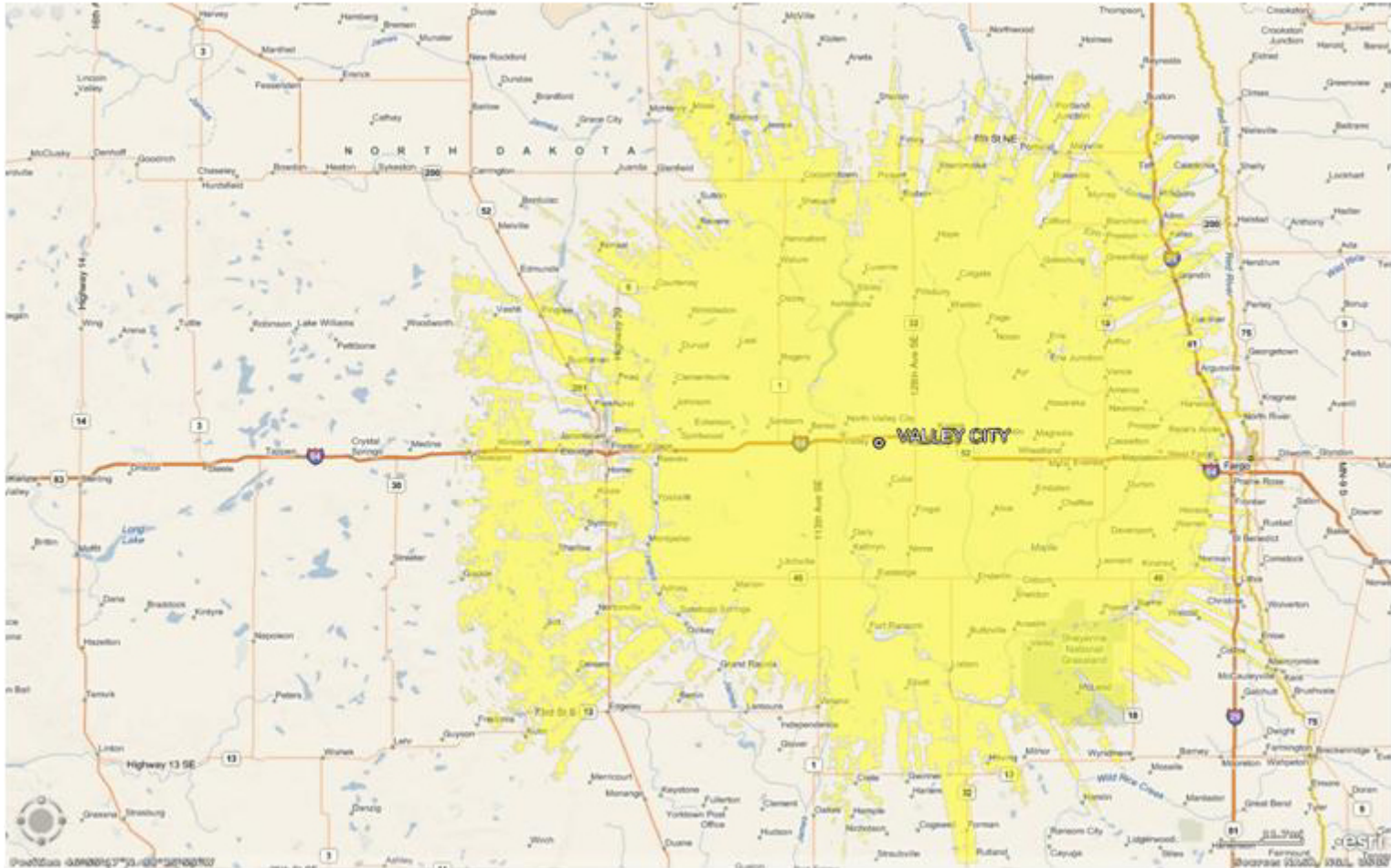
Homeland
Security

Tioga



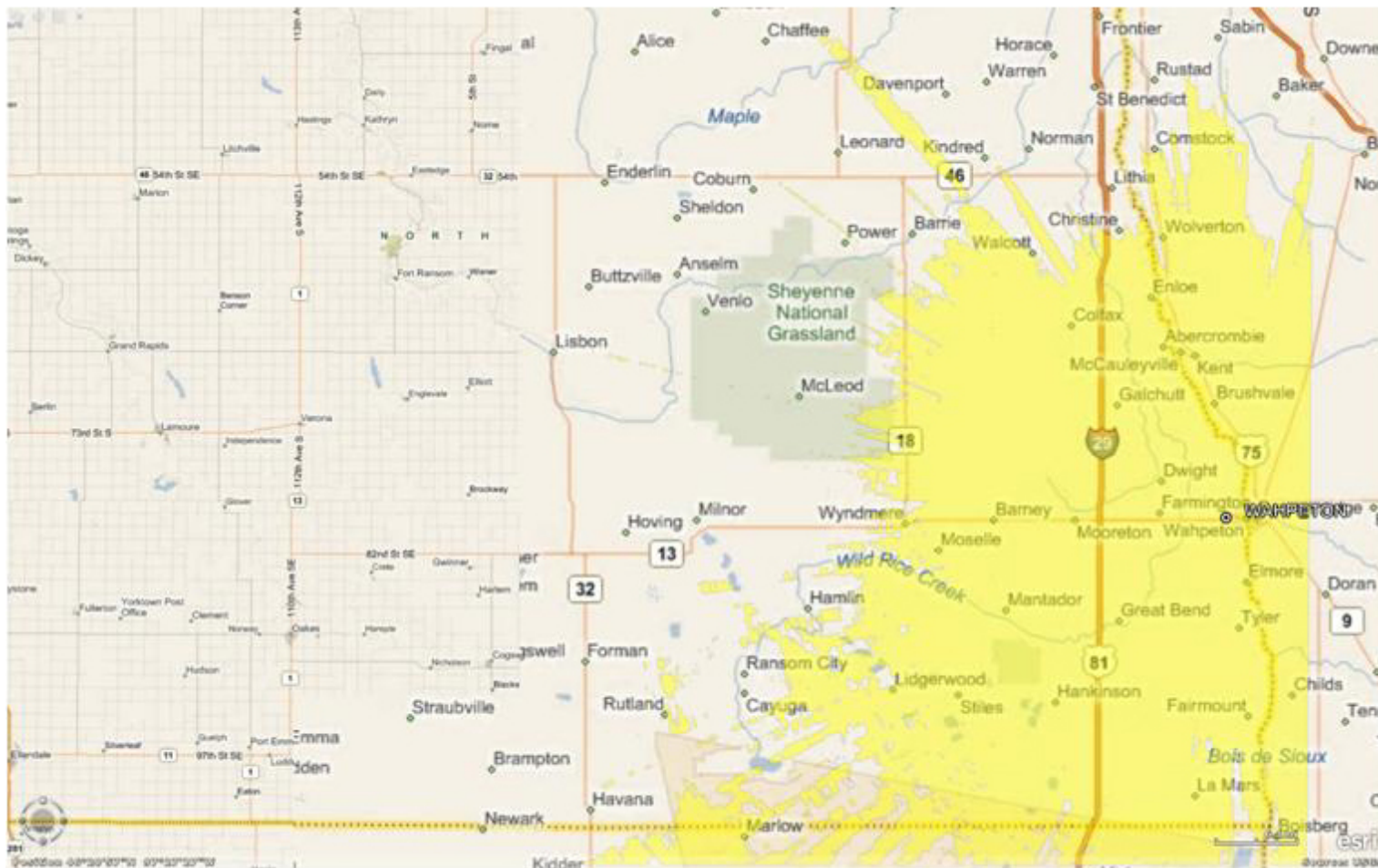
Homeland
Security

Valley City



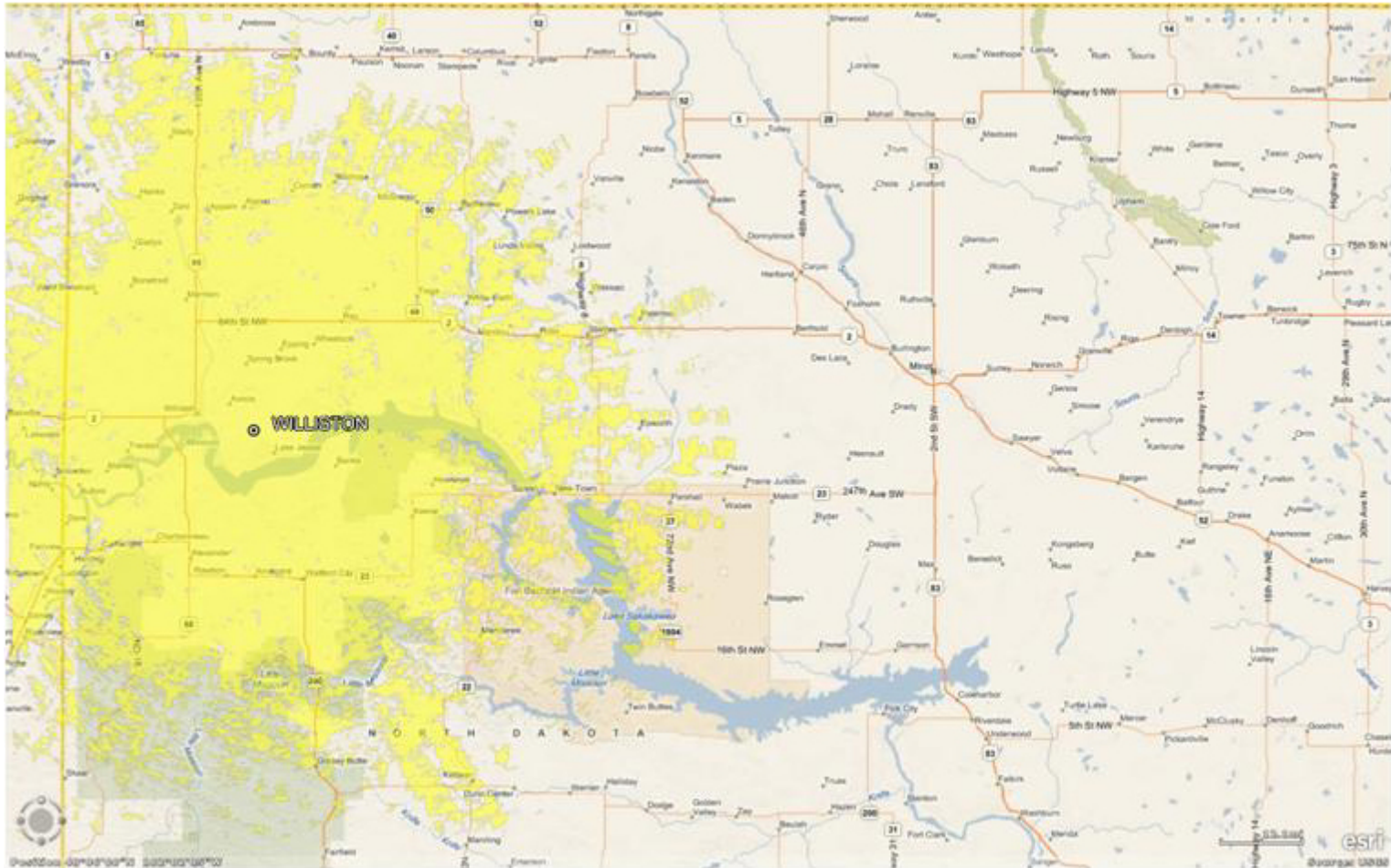
Homeland
Security

Wahpeton



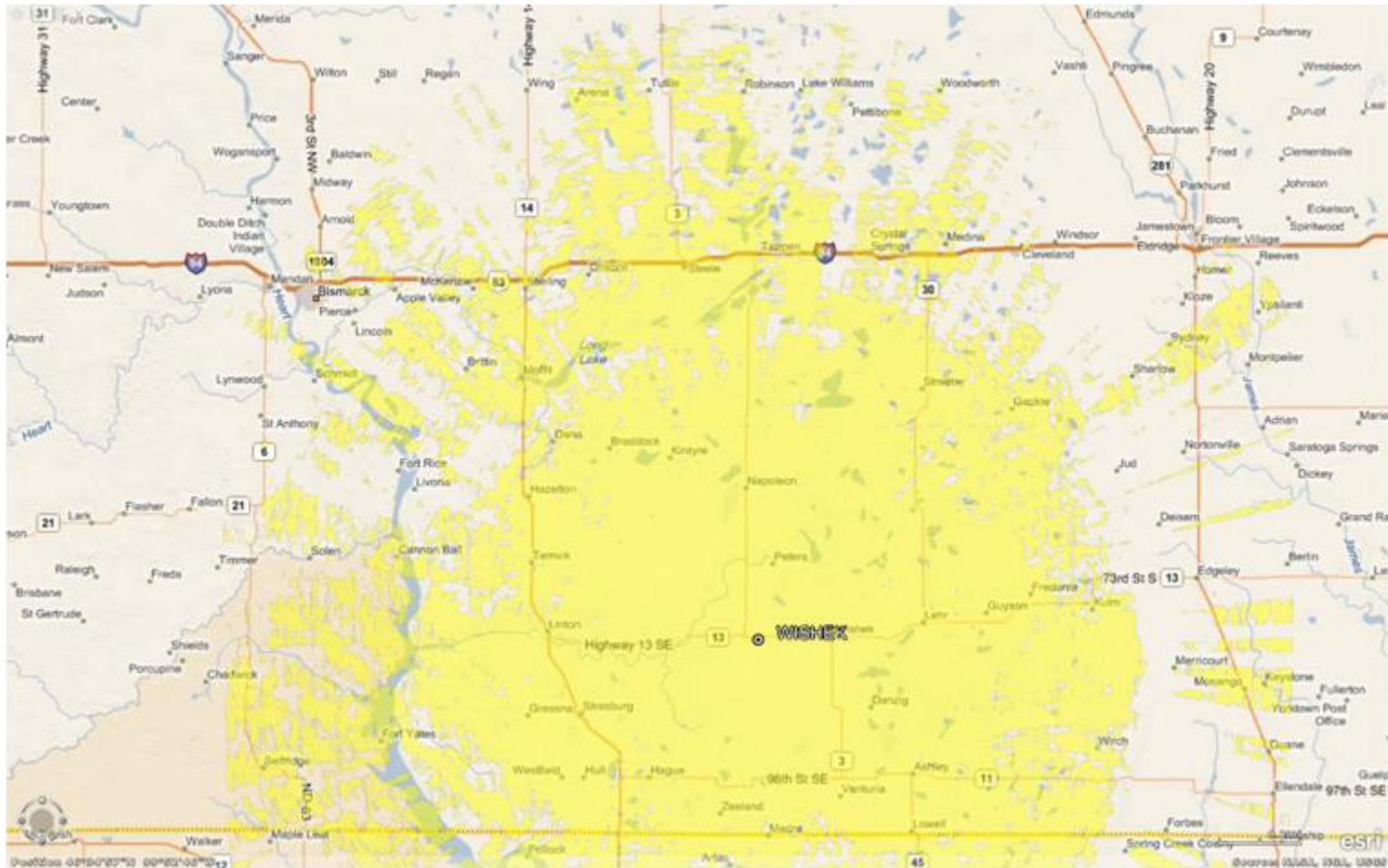
Homeland
Security

Williston



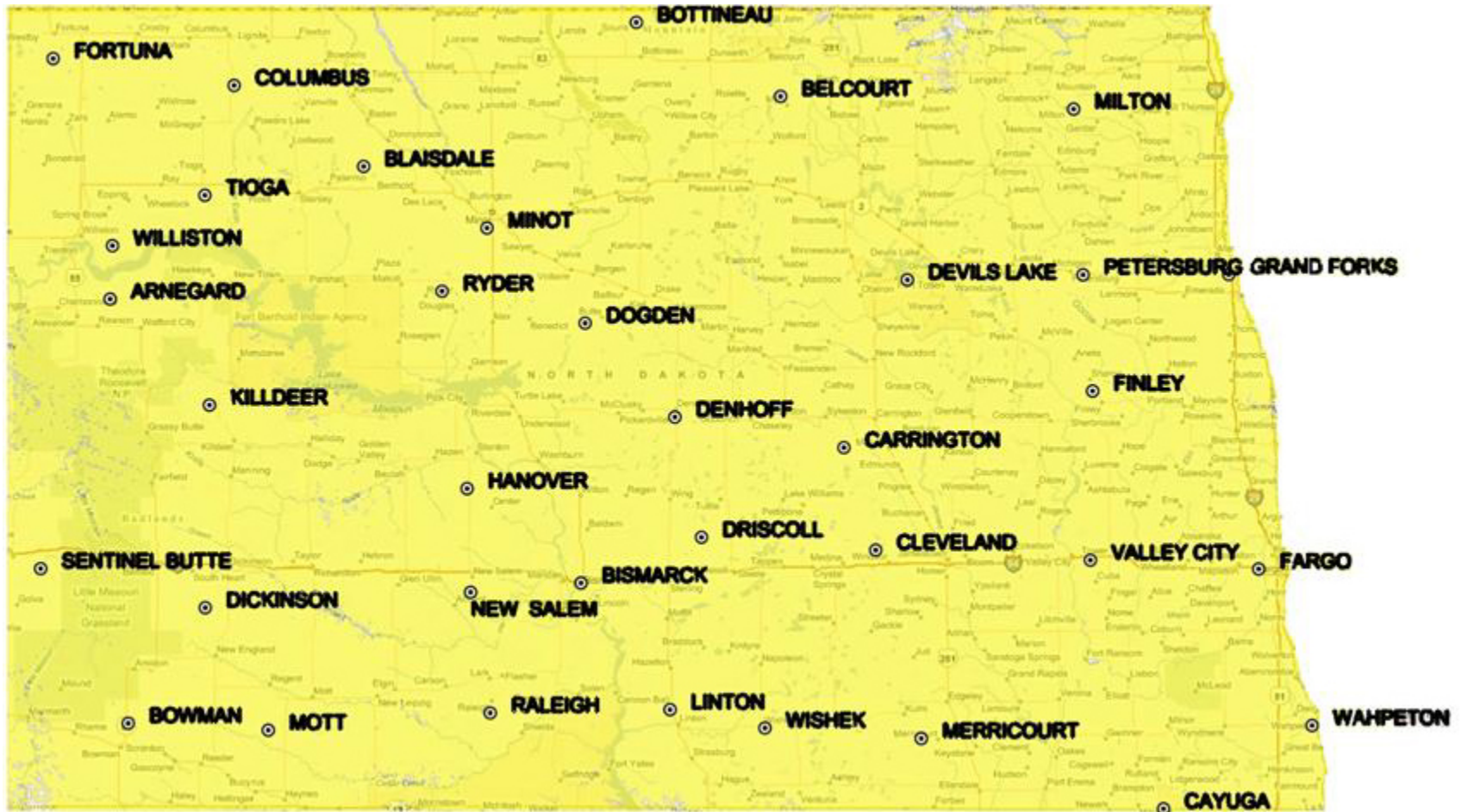
Homeland
Security

Wishek



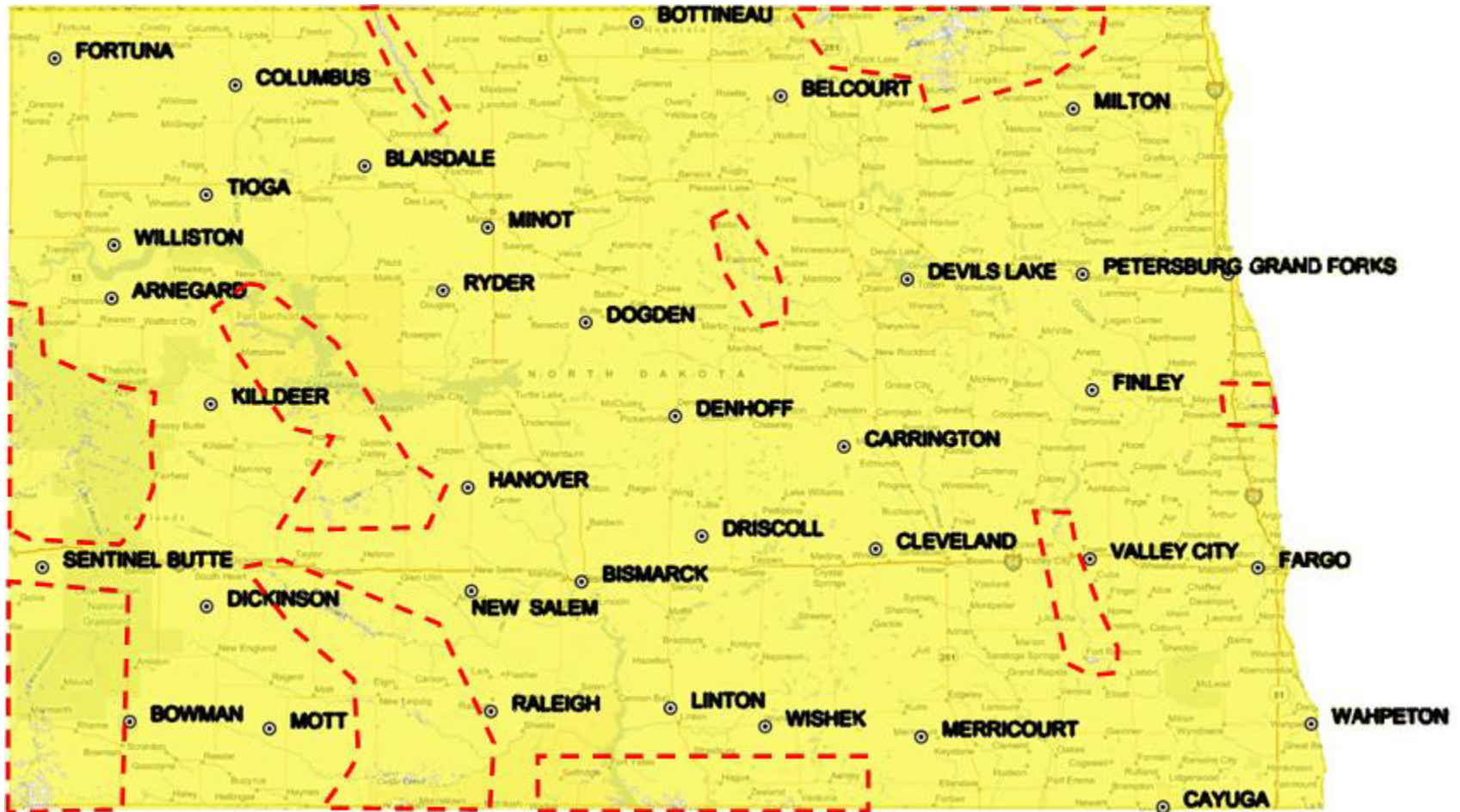
Homeland
Security

State Radio Mobile Coverage



Homeland
Security

Possible Communications Problem Areas



Additional Site Information

- **OEC- ICTAP searched the FCC database for all assignments in the convention public safety radio service for possible new site locations**
 - Over 900 assignments in database
 - New site locations were overlaid on the base line coverage and redundant sites deleted and the best possible sites selected
- **Mobile talkback coverage was conducted on 14 possible sites**
 - Four DOT only sites - parameters provided by DOT
 - 10 new sites - parameters provided by the FCC database
- **New site coverage study parameters**
 - 50 Watt mobile talk back coverage with the radio antenna mounted on the roof of the vehicle
 - The fixed site antenna was placed 5 meters below the existing antenna in the FCC database

Possible New Site Locations – Mobile Coverage

Site Name	Latitude Decimal Degrees	Longitude Decimal Degrees	County, State	Antenna Azimuth (Degrees)	Effective Radiated Power (ERP)	Antenn a Height
HANNAFORD	47:19:40.0:N	98:12:35.3:W	GRIGGS, ND	OMNI	100	60
MAYVILLE	47:29:1.9:N	97:19:28.3:W	TRAILL, ND	OMNI	100	26
PEER CREEK	47:31:51.1:N	103:51:31.7:W	MCKENZIE, ND	OMNI	100	21
WALES	48:53:50.0:N	98:36:9.4:W	CAVALIER, ND	OMNI	100	25
KDR780	46:02:21.1:N	98:54:37.2:W		OMNI	100	55.9
KDU569	48:56:12:N	99:56:42.5:W		OMNI	100	80
WPEC581	46:26:13.9:N	97:40:02.4:W		OMNI	100	50
WPFK637	48:45:55.1:N	101:41:46.6:W	RENVILLE, ND	OMNI	100	102
WPKC870	46:16:52.0:N	103:57:43.0:W	SLOPE, ND	OMNI	100	24.4
WPKW702	46:01:06:N	99:28:00.5:W		OMNI	100	56
WPNV674	48:54:53:N	97:55:33.3:W		OMNI	100	19
WQEB919	47:40:9.0:N	102:25:25.0:W	MOUNTRAIL, ND	OMNI	100	50
WQGJ209	46:24:12.0:N	101:50:57.0:W	GRANT, ND	OMNI	100	10
WQIR328	446:05:58.7:N	100:38:07.2:W		OMNI	100	25.5

**Note: Fixed site ERP is provided for future reference
all coverage depicted is talk back with a 50 watt
mobile radio**



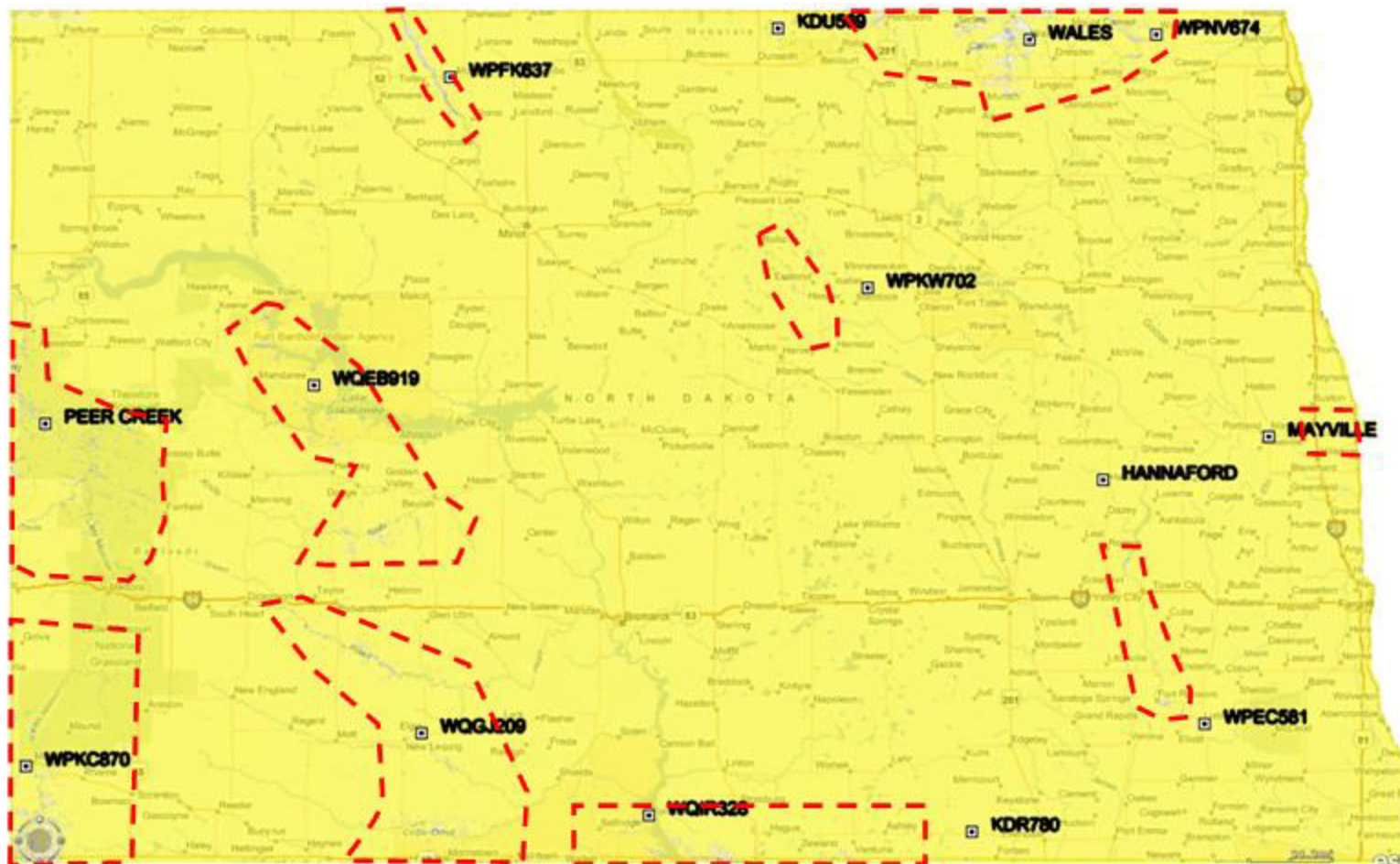
**Homeland
Security**

Possible New Sites – Mobile Coverage



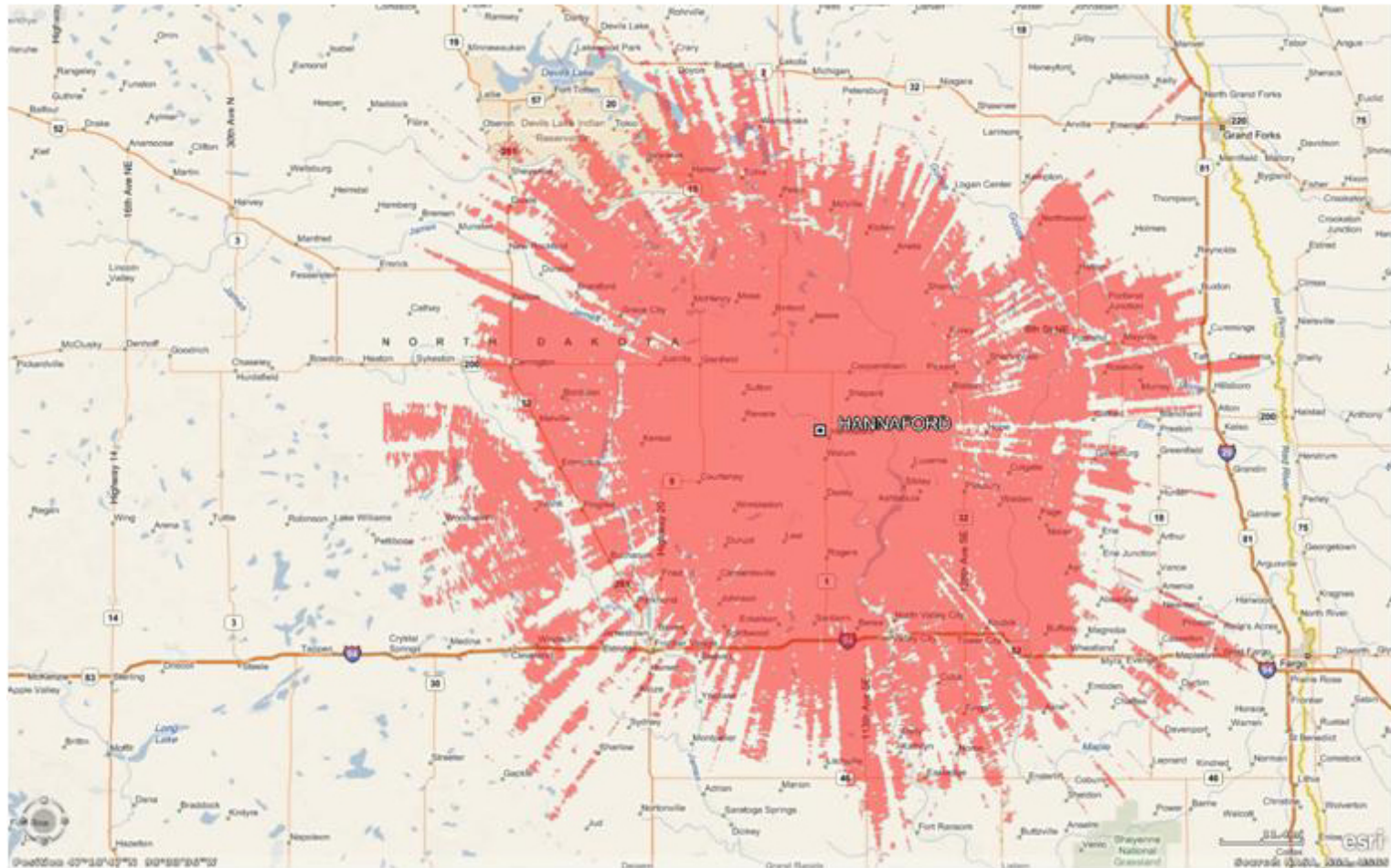
Homeland
Security

Possible New Sites – Mobile Coverage



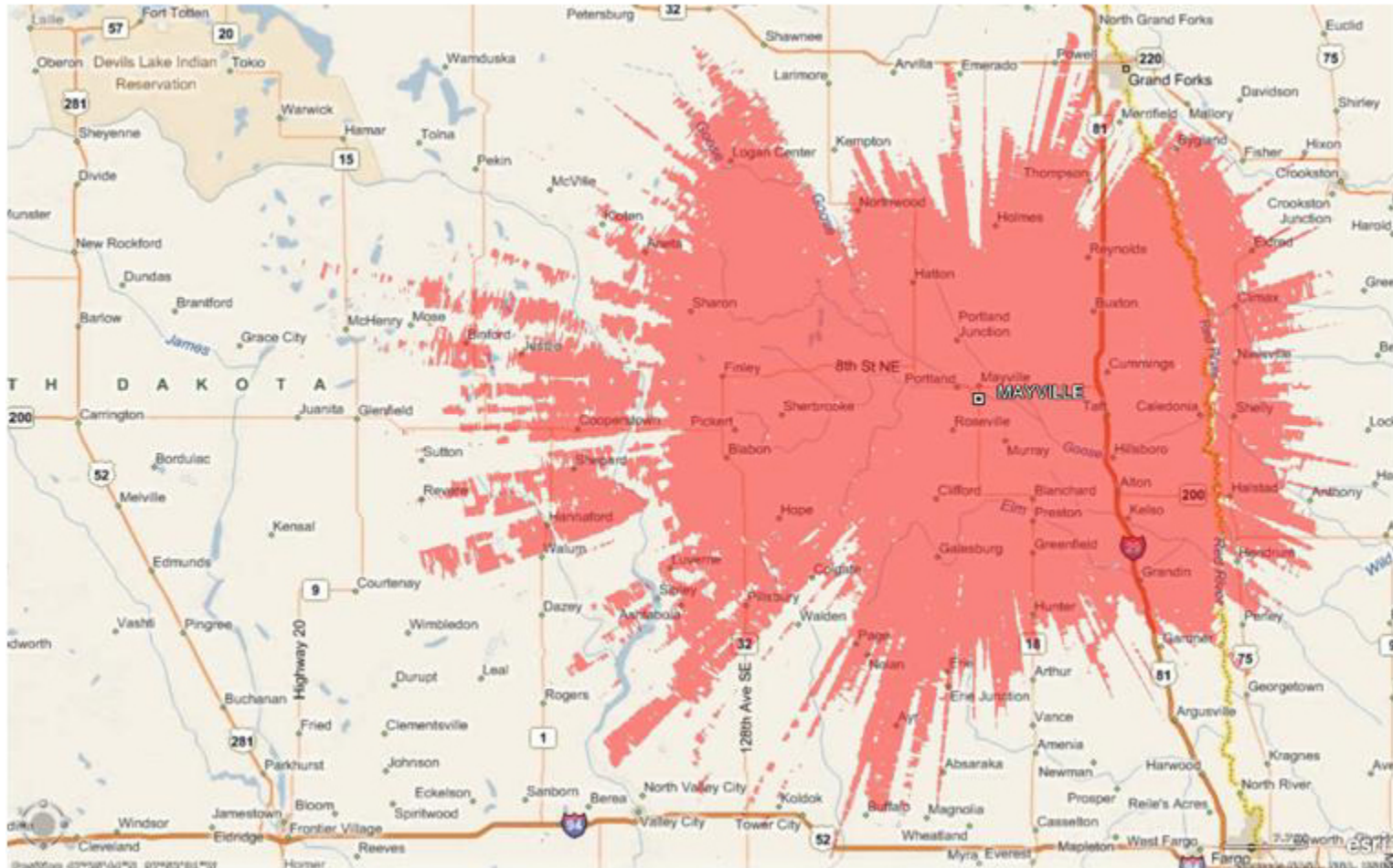
Homeland
Security

DOT - Hannaford



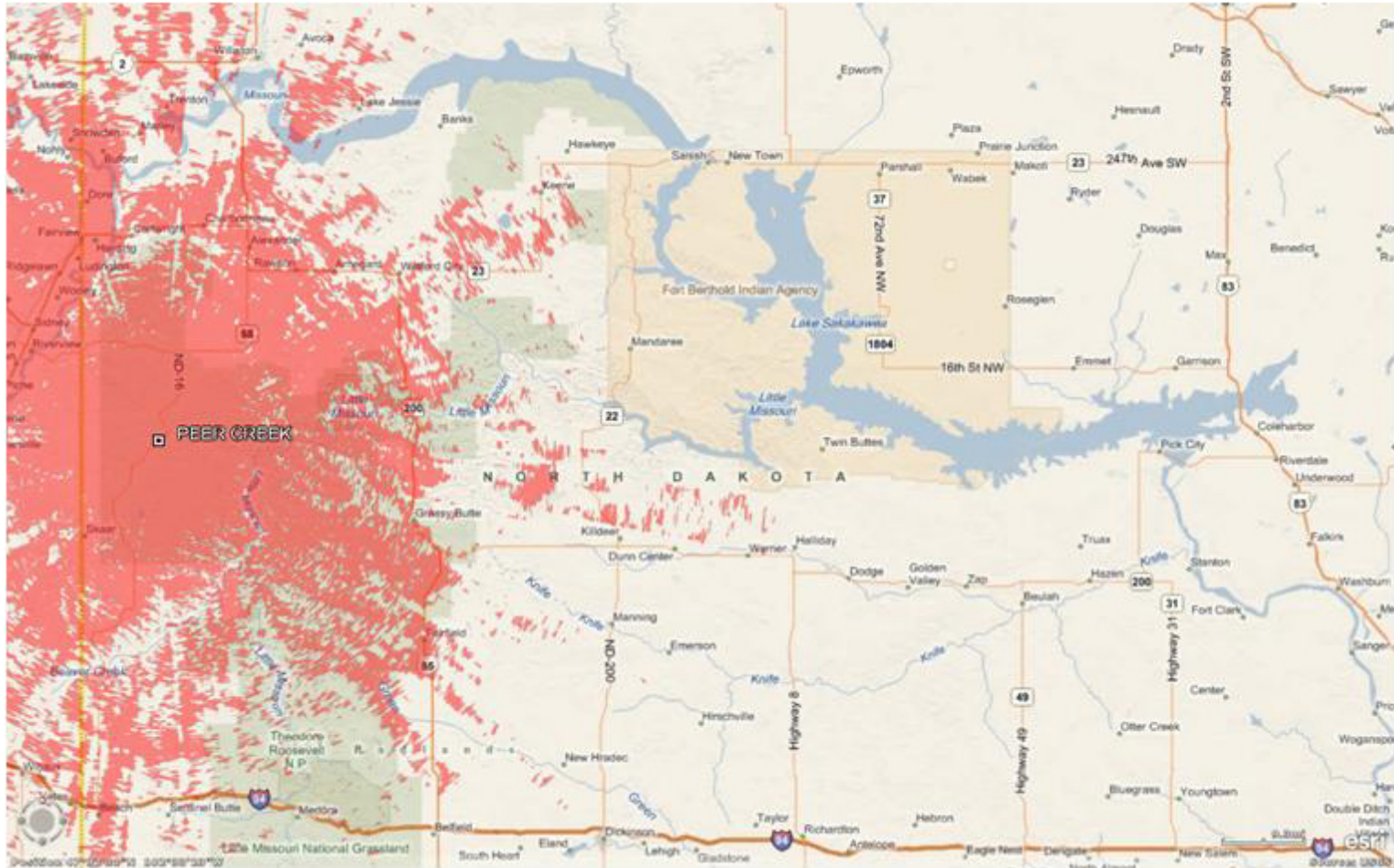
Homeland
Security

DOT - Mayville



Homeland
Security

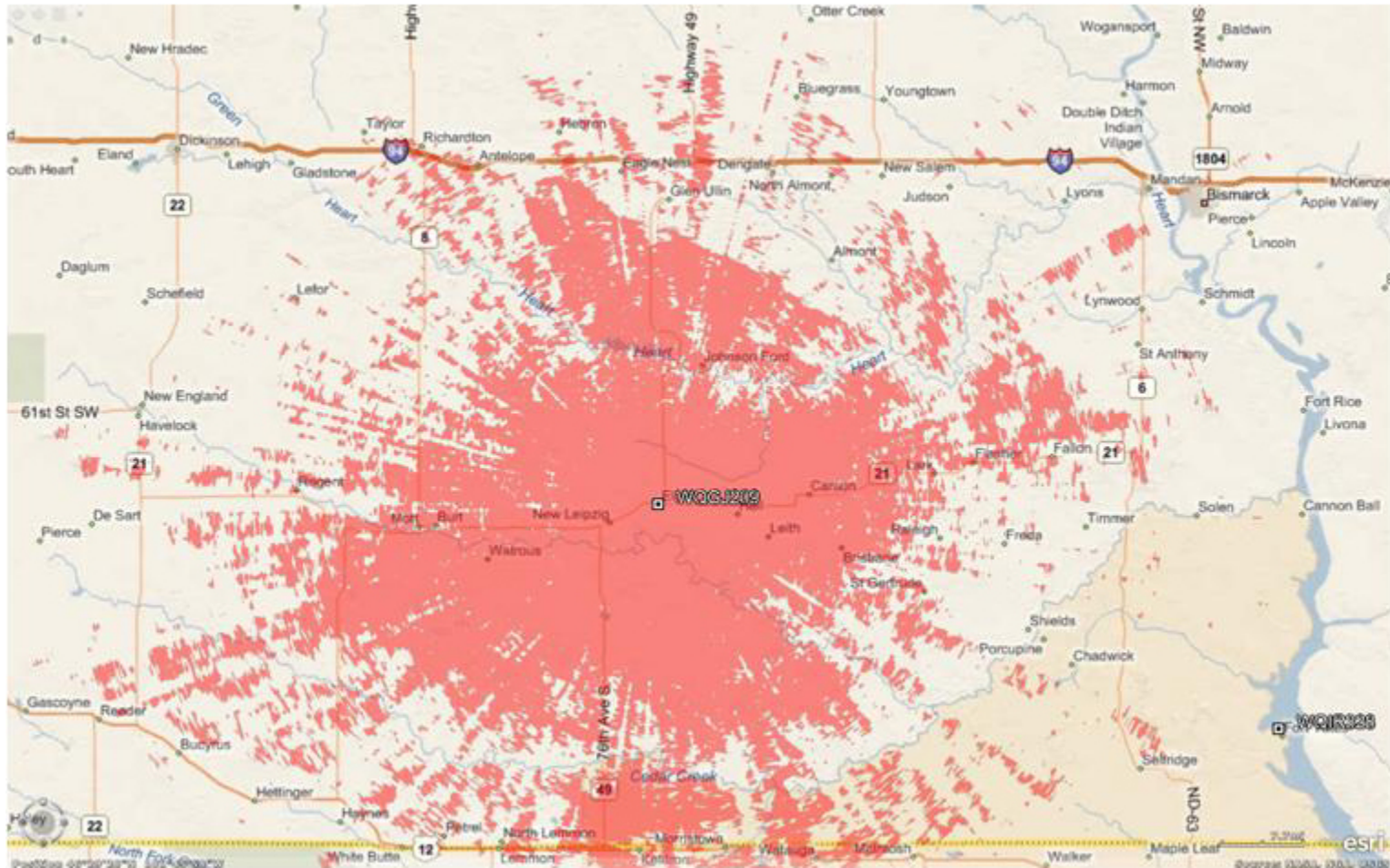
DOT-Peer Creek



Homeland
Security

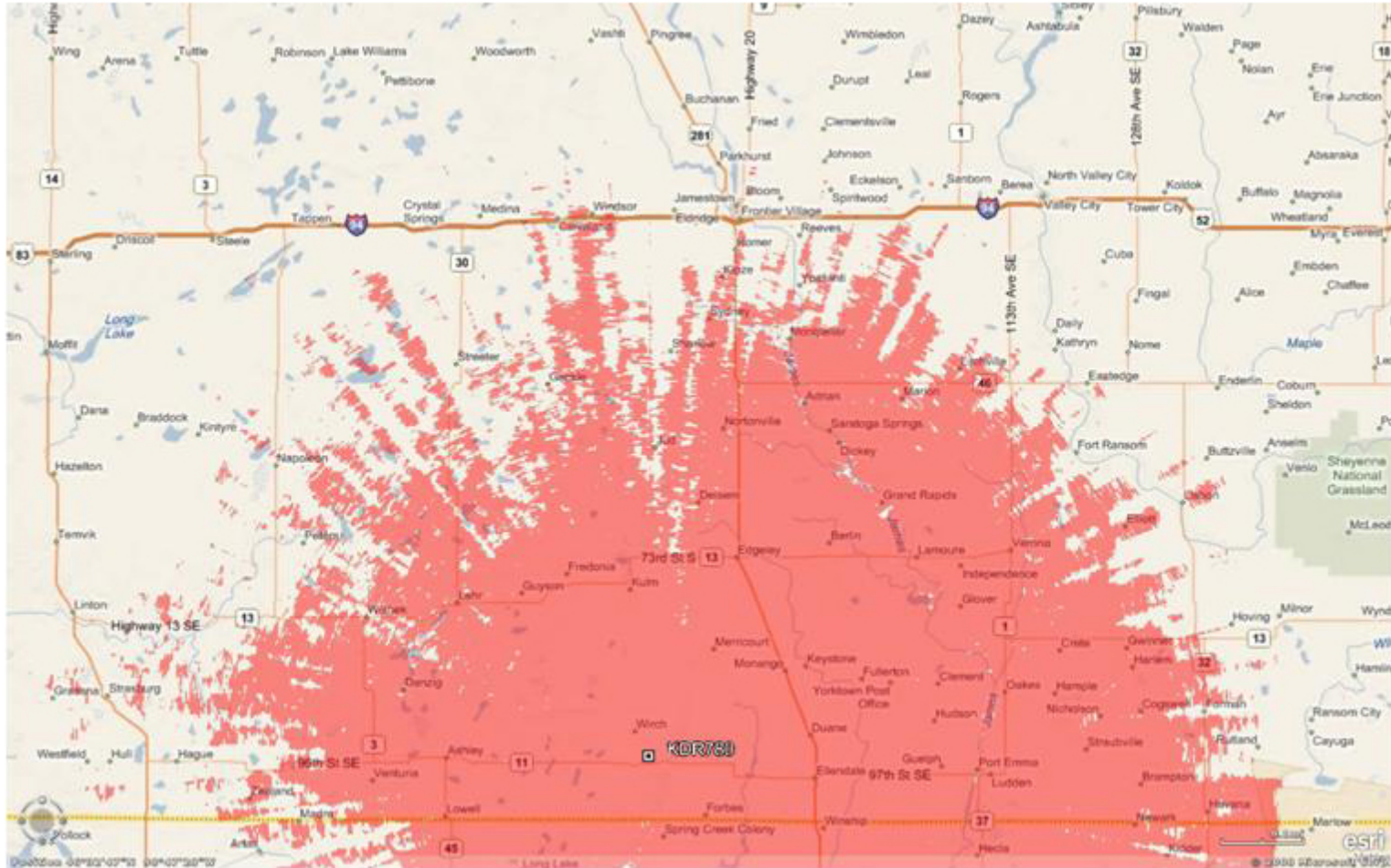


Call Sign WQGJ209



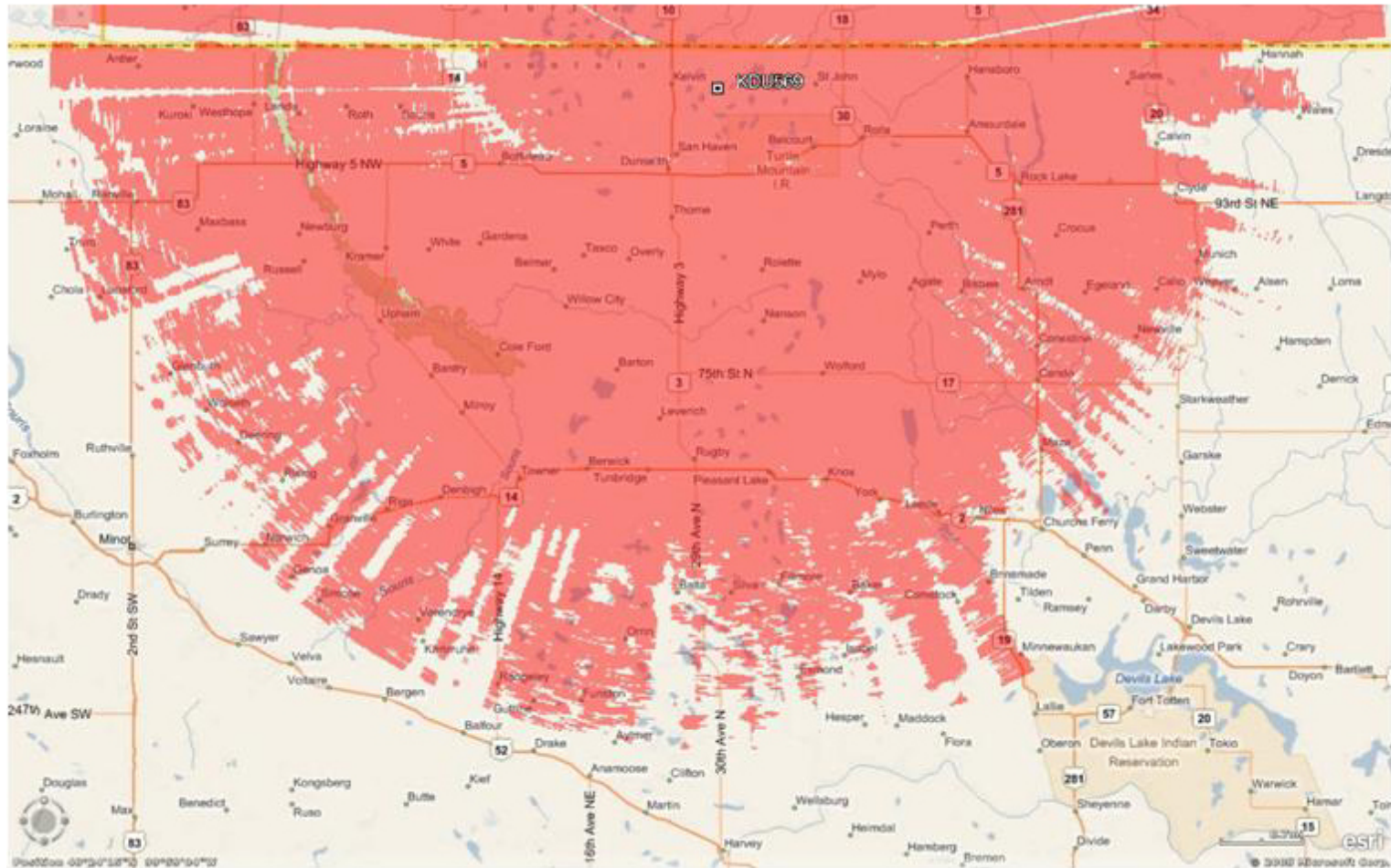
Homeland
Security

Call Sign KDR780



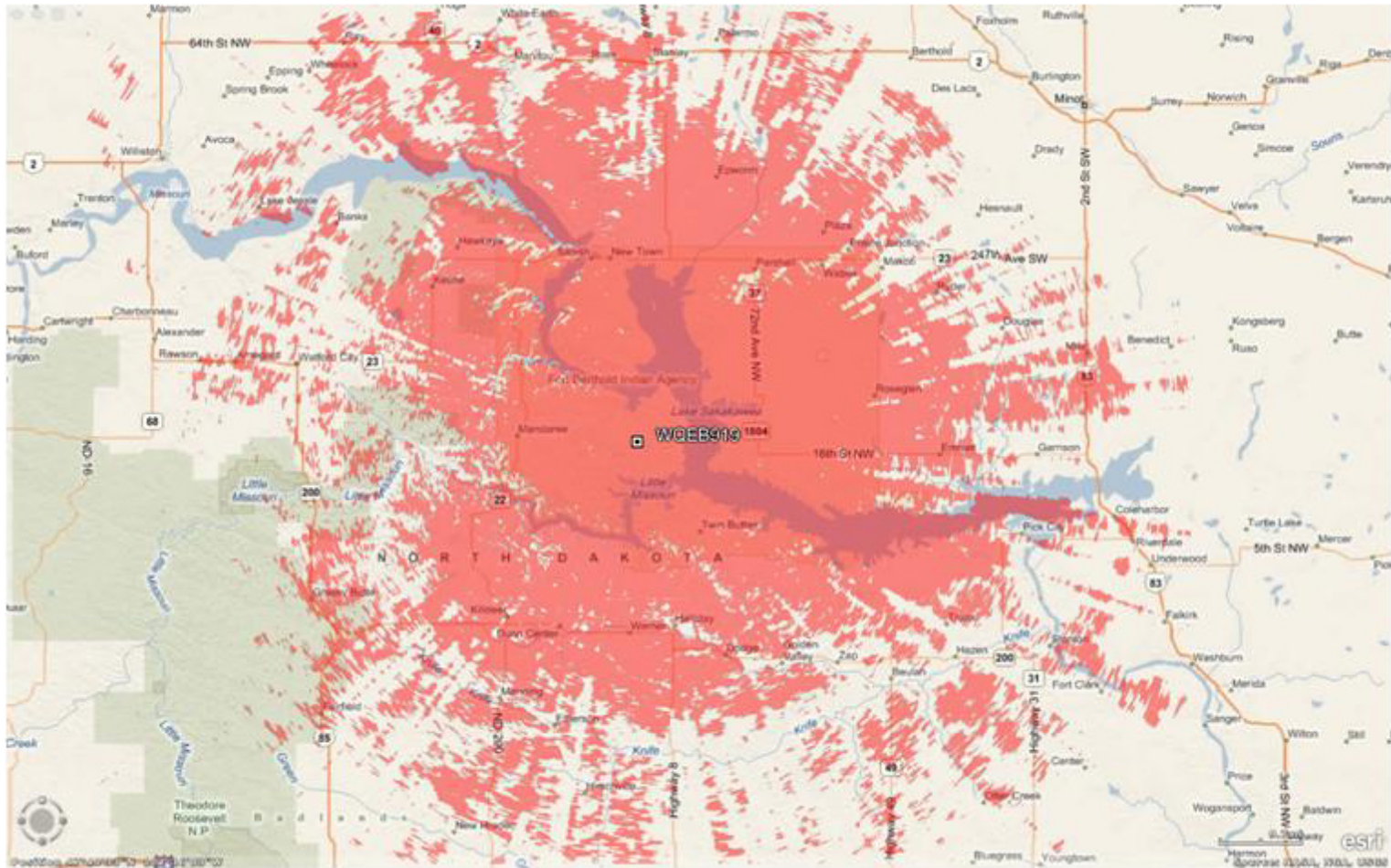
Homeland
Security

Call Sign KDU569



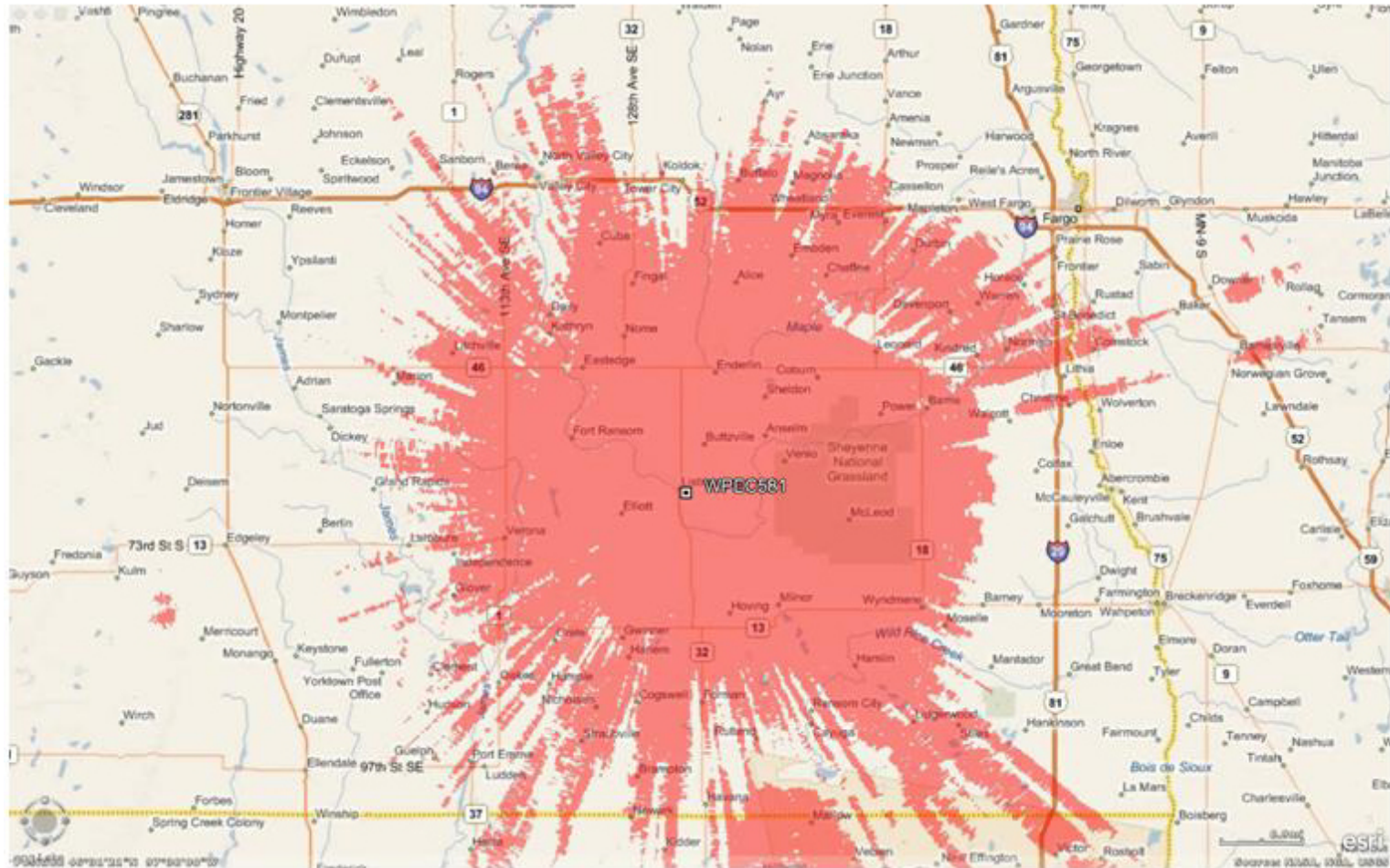
Homeland
Security

Call Sign WQEB919



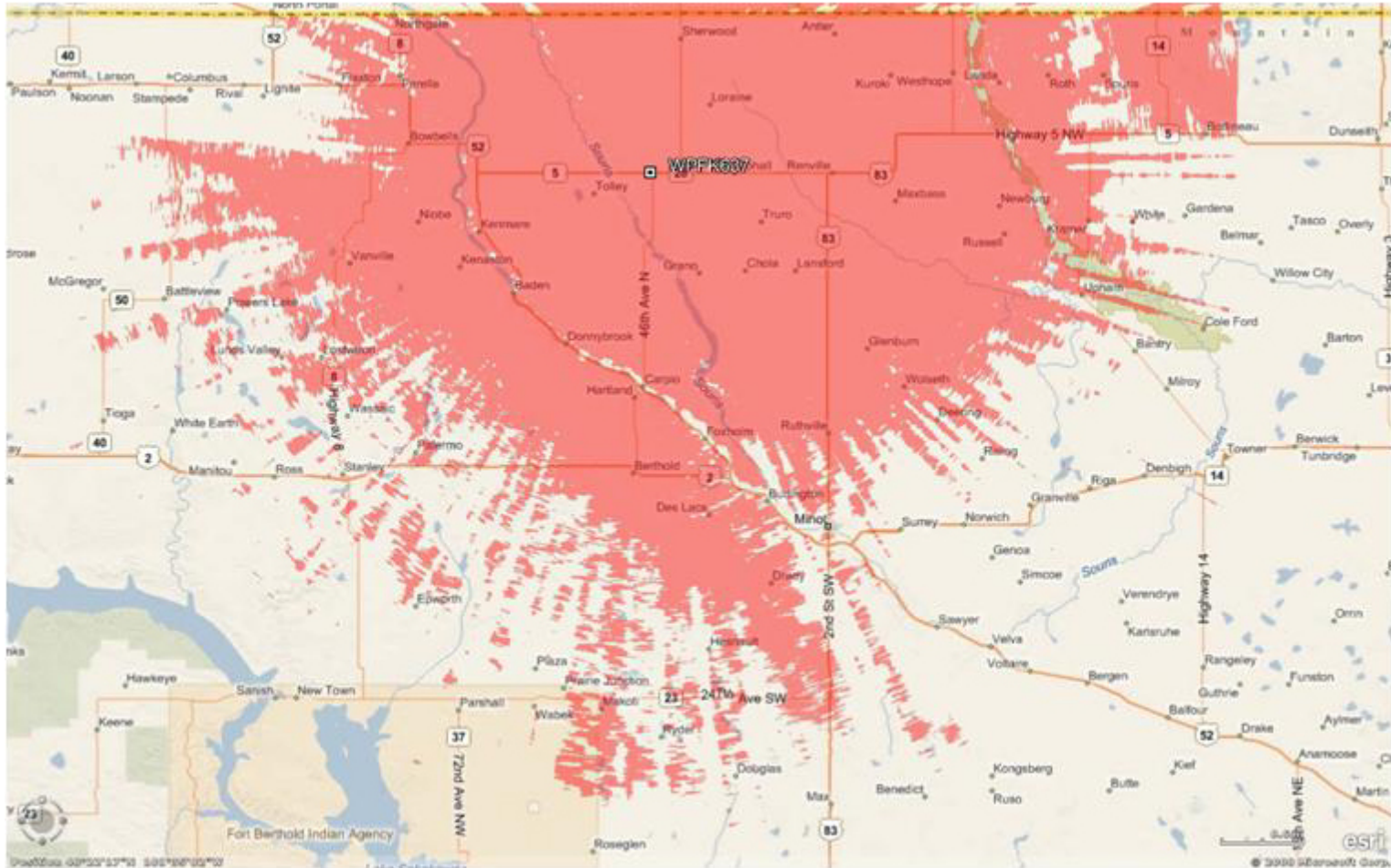
Homeland
Security

Call Sign WPEC581



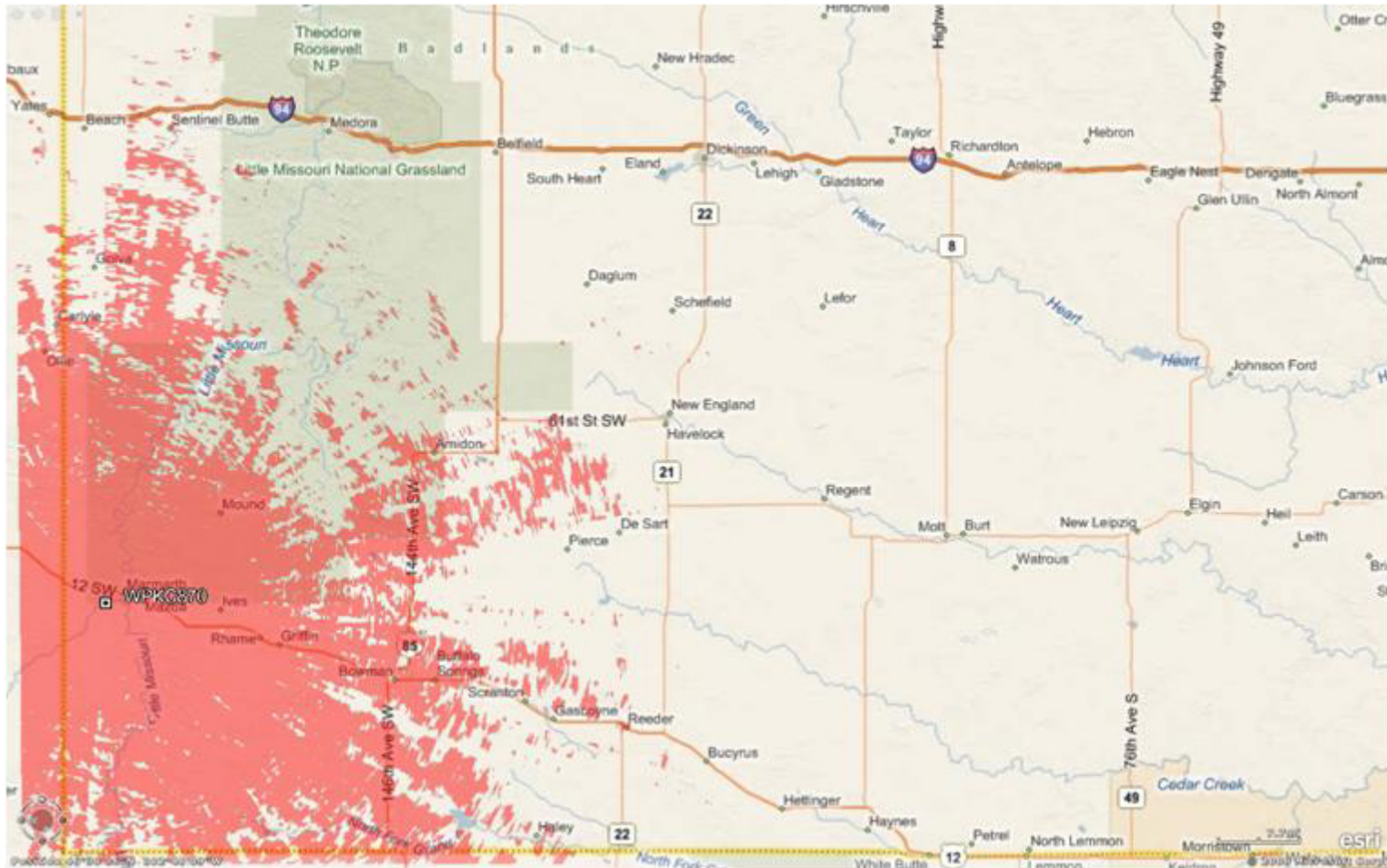
Homeland
Security

Call Sign WPFK637



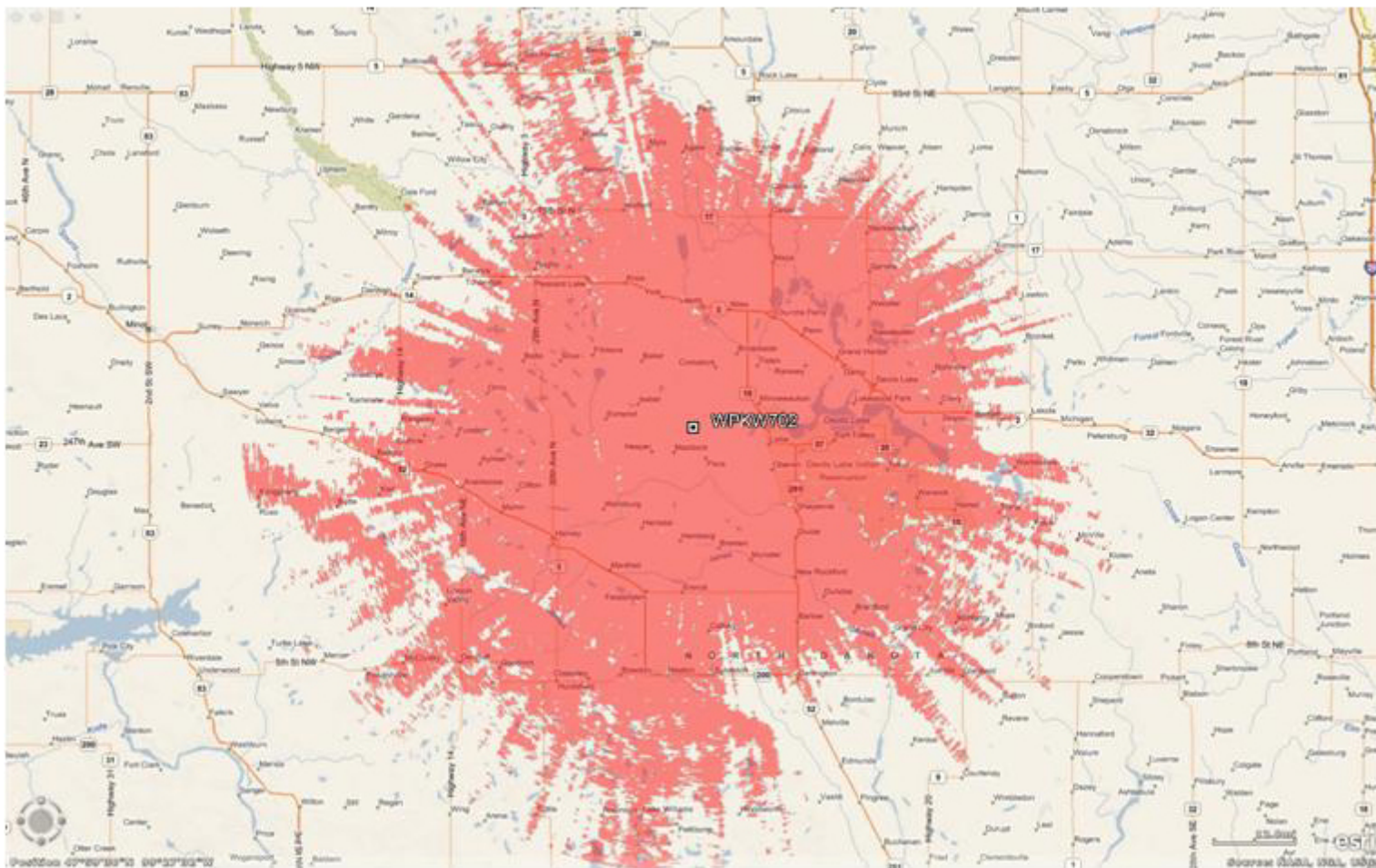
Homeland
Security

Call Sign WPKC870



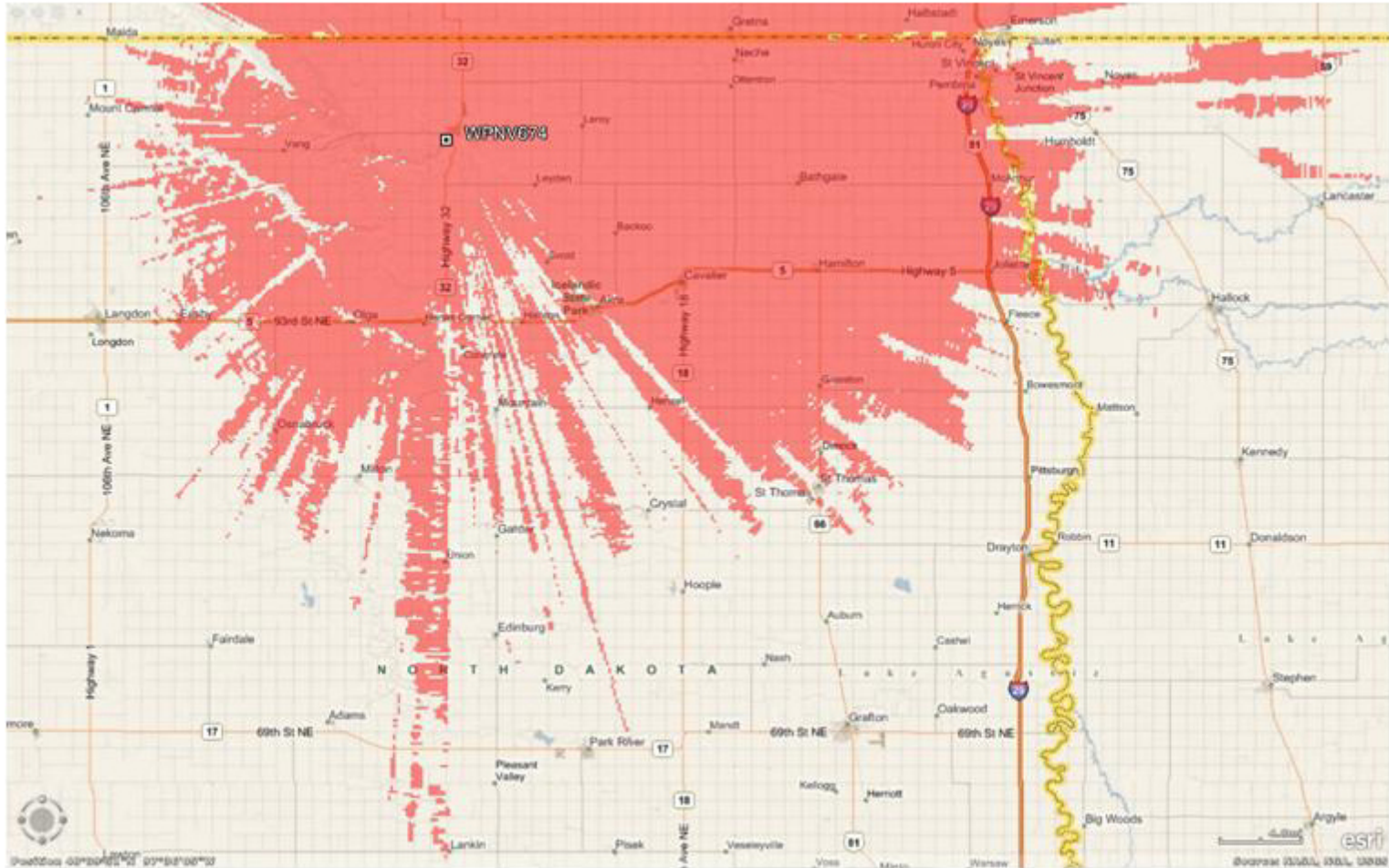
Homeland
Security

Call Sign WPKW702



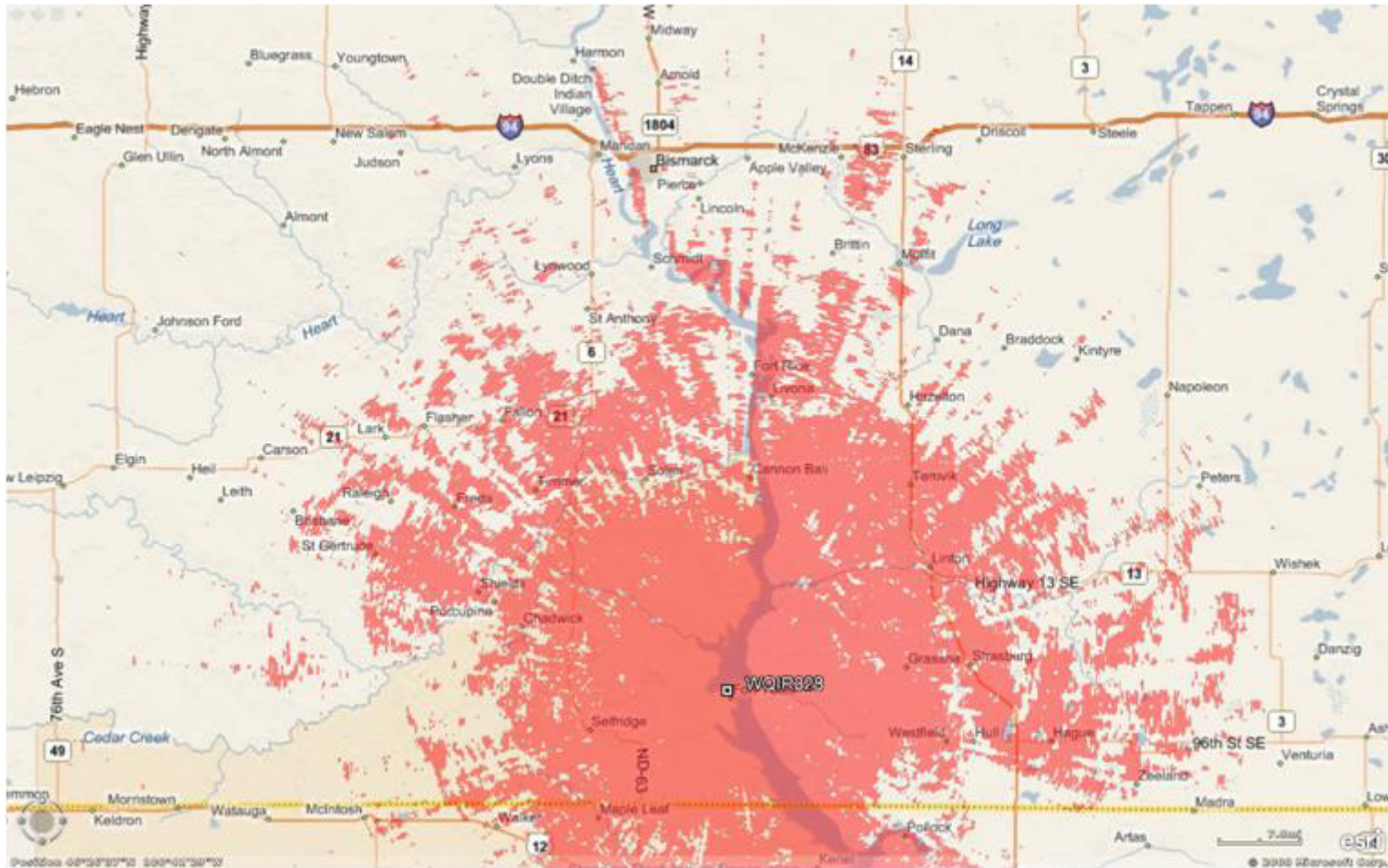
Homeland
Security

Call Sign WPNV674



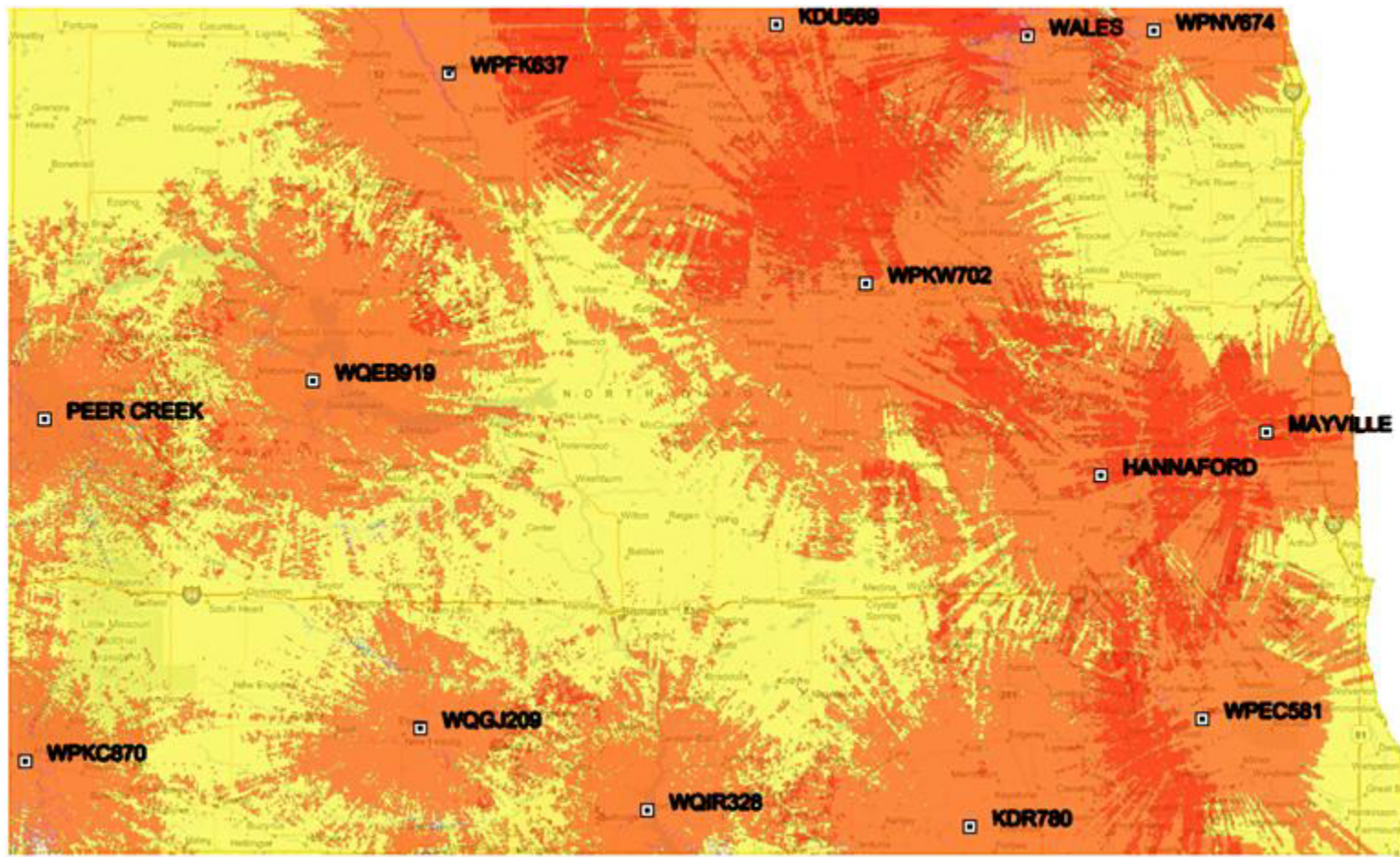
Homeland
Security

Call Sign WQIR328



Homeland
Security

New Sites' Mobile Coverage



Summary

- **Coverage was run on 14 possible sites with the parameters provided by DOT and the FCC database**
- **Utilizing the sites listed and providing a Delivered Audio Quality (DAQ) level of 3.4 or better several conclusions were drawn:**
 - Each potential site will need to be physically surveyed to ensure adequate support (i.e. tower loading, floor space, power, heating/air-conditioning...)
 - Each site will contribute to the total coverage however gaps at a single site should be considered when evaluating system operability.
- **The coverage maps provided in this document are only the estimated coverage**



Homeland
Security