Cedar County

Radio Communications
Needs Assessment and Strategic Plan

MCM Consulting Group, Inc.
March 3, 2020

Project Team

- Cedar County
  - Tim Malott, Cedar County Emergency Management Agency Director
  - Jodi Freet, Cedar County Emergency Management Agency, Office Coordinator
  - Jon Bell, Cedar County Supervisor
  - Warren Wethington, Cedar County Sheriff
  - Brenda Johnson, Cedar County Sheriff's Office

- MCM Consulting Group, Inc.
  - Michael C. McGrady, Chief Executive Office
  - Jason Roblin, Project Manager/Staff Supervisor
  - Mike Crago, Senior Consultant
  - Ron Godava, Senior Consultant
  - Andrew Gilbert, Engineer

Needs Assessment

- Analyze current communications network
  - Radio system review
    - Licensing
    - Coverage area maps
  - Tower site surveys
    - Physical site issues
    - Equipment review
- Gather network user feedback
  - Online survey option (27 responses)
  - Interviews (6 in person interviews)

Strategic Plan

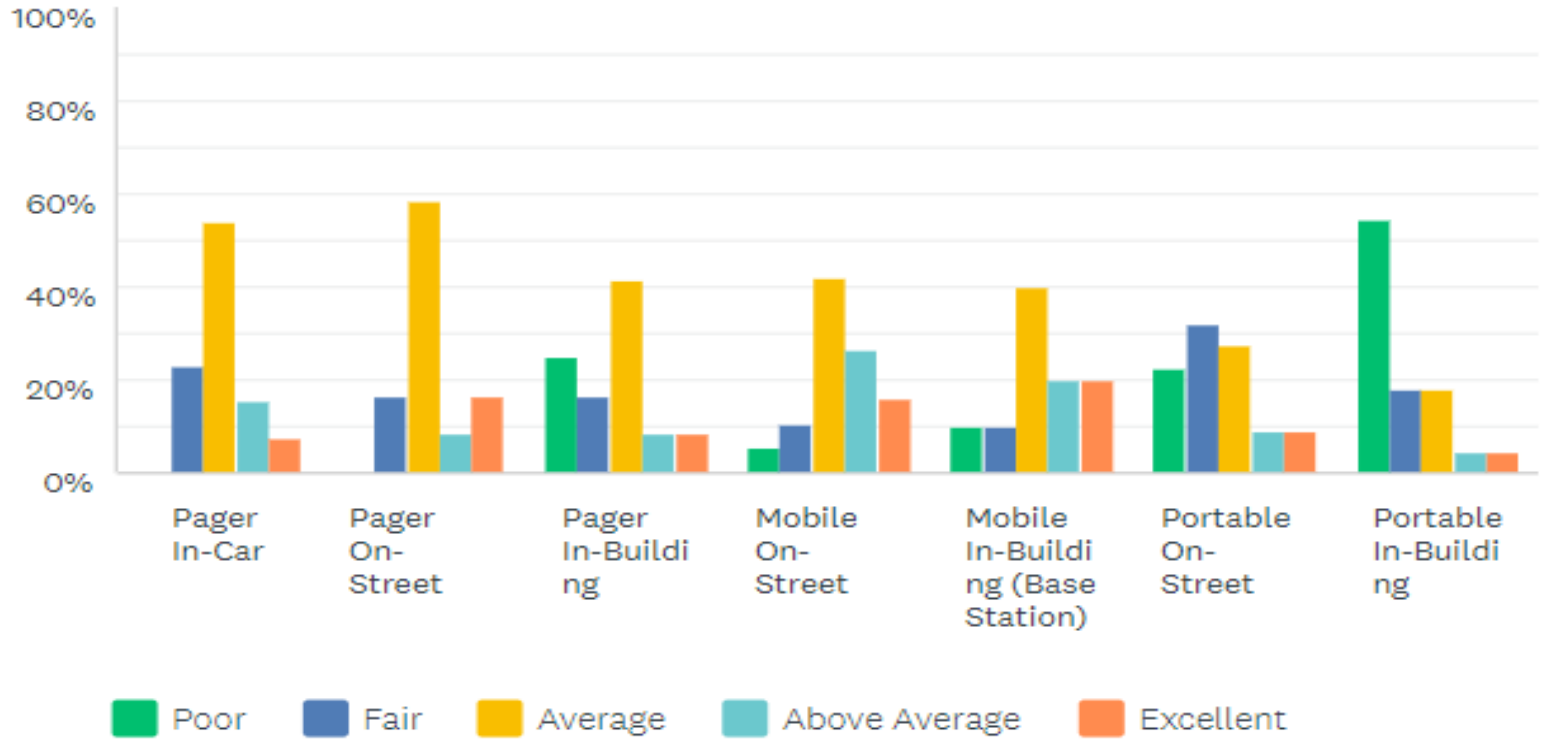
- Compare feedback to the analysis
  - Identify source of issues the users shared
- Recommend System Enhancements
  - Correct existing issues
  - Increase/enhance system coverage
  - Upgrade/maintenance planning
  - Increase system resilience

Communications Network Design

- VHF conventional P25
  - All sites listen for field users and one site transmits
    - Cedar County Sheriff site is the main transmit site at 200’
- Six (6) Tower Sites
  - EF Johnson Atlas 4100 equipment
- Inter-Connection
  - 11GHz Microwave connections
    - Ring configuration

Survey Results

- Survey highlights
  - 70% rated channel capacity as average or better during normal incidents
  - 50% rated channel capacity as average or better during disaster situations
  - 50% noted difficulty using the system during times of high call volume



Survey Results

- Respondents reported difficulty using the system caused by:
  - Signal reliability
  - Signal quality
  - Channel availability
- Maintenance Plans
  - Most agencies have no formal agreement with radio vendors

Survey Results

- Items working well
  - Local/talk around channels
  - Radio transmissions near the center of the county
  - Statewide mutual aid channels
- Most needed improvements
  - Signal coverage, especially on portable radios
  - Interoperability with surrounding systems
  - Signal reliability
  - More channel options
  - Common usage policies and training

Survey and Interview Comments

- Ongoing issues since the federally mandated narrow banding
- Communicating with dispatch via a portable radio is a major problem
- Funding a new system needs to become a priority
- Poor reliability and coverage of our portable radios puts officers *(all responders)* at risk

Current VHF System Coverage Propagation Maps

- For both indoor studies, a 37dB loss represents a portable radio on the hip used inside a thick-walled building or industrial business.
- System talkout coverage outdoors to a portable radio on the hip using a standard 19dB loss model.
- System talkout coverage indoors to a portable radio on the hip using a standard 37dB loss model.
- Portable radio on the hip talkback coverage, outdoors. This also used a standard 19dB loss model at the lower wattage of the portable radio.
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Radio system coverage study results

Coverage Type		Current VHF System
Talkout	Outdoor	97.47%
	Indoor -6dB	92.02%
	Indoor -10dB	83.42%
	Indoor -16dB	61.57%
	Indoor -25dB	36.35%
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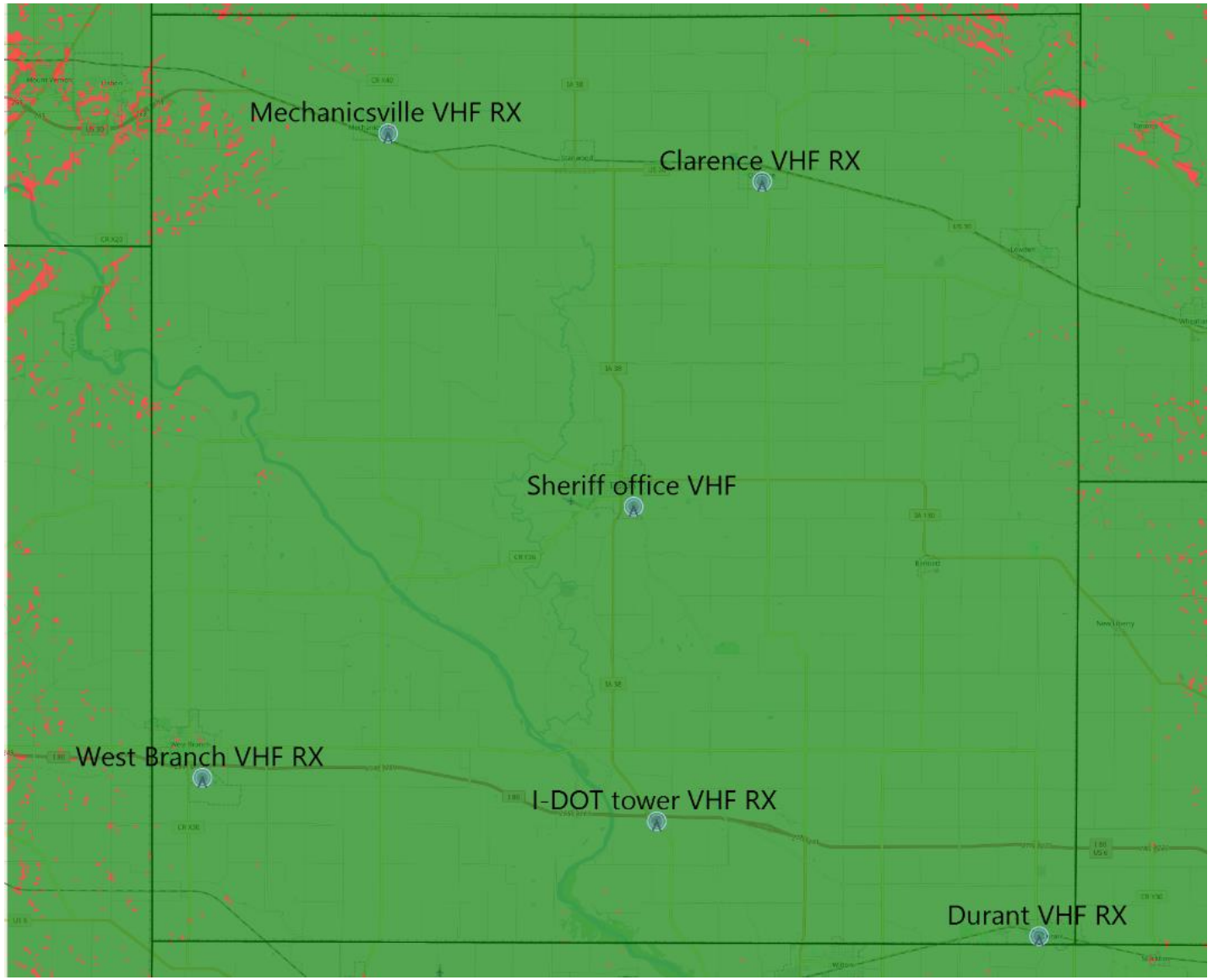
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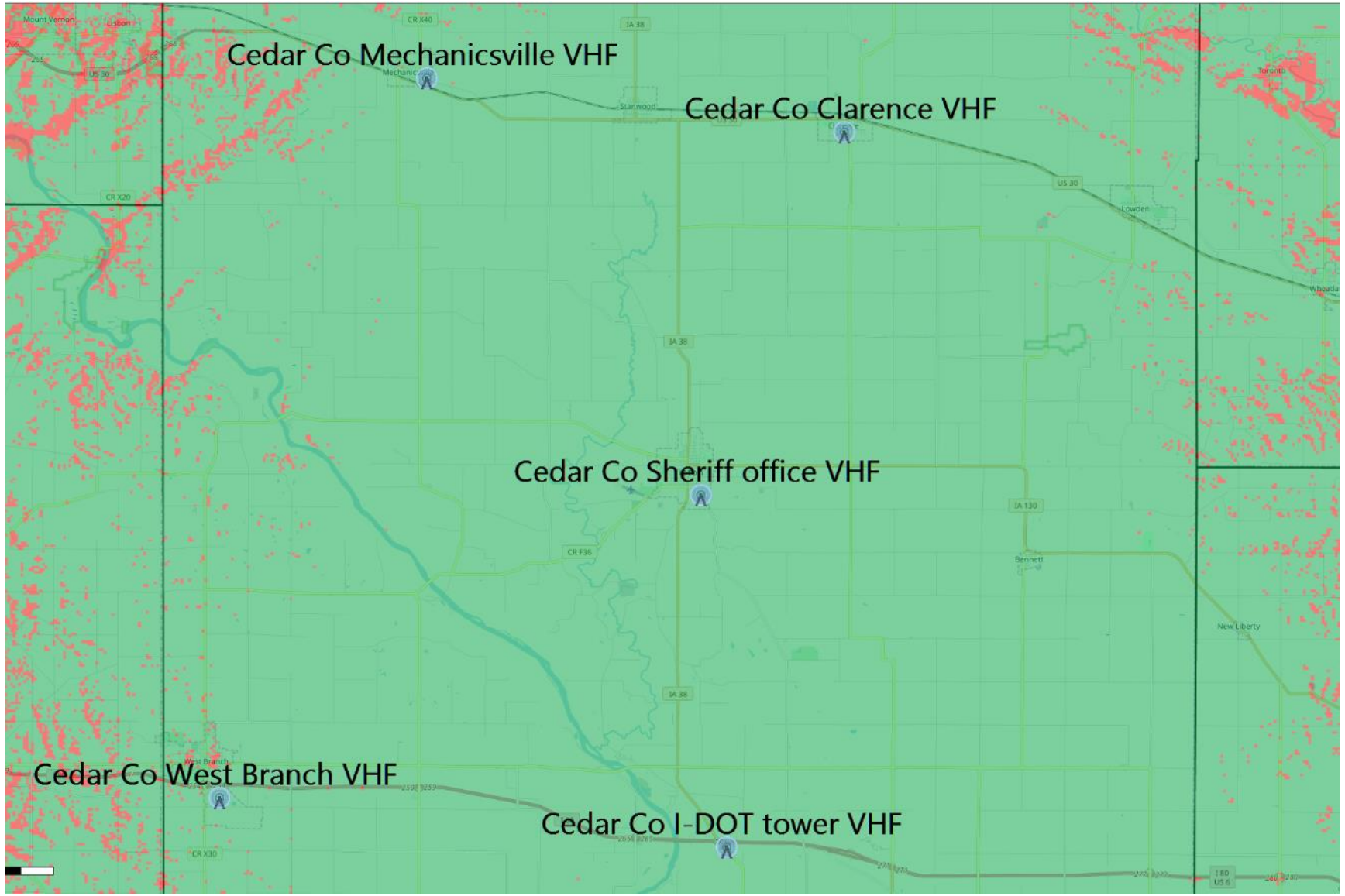
Clarence VHF RX
Sheriff office VHF
West Branch VHF RX
I-DOT tower VHF RX
Durant VHF RX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US 30
Mechanicsville
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I 80
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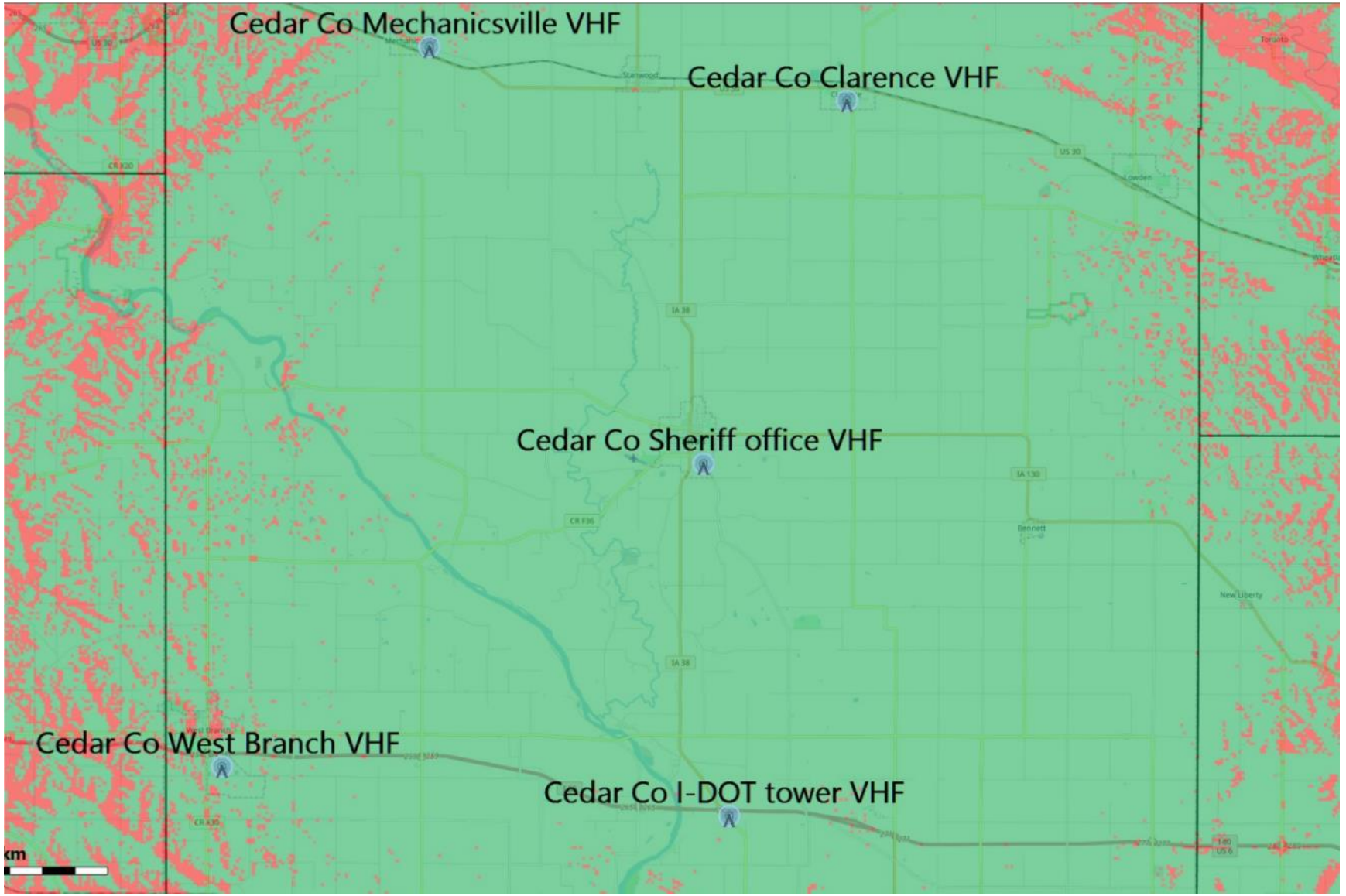
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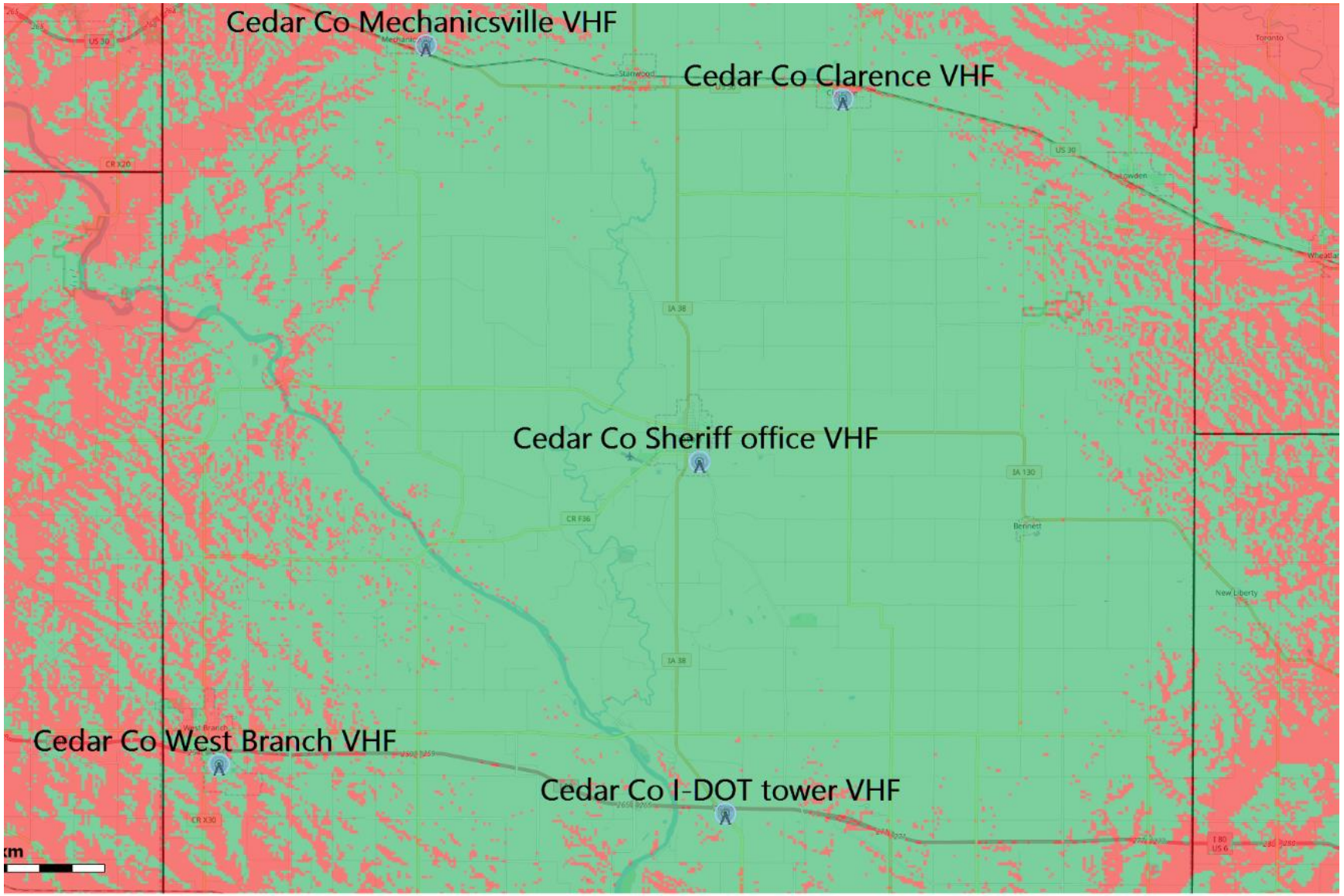
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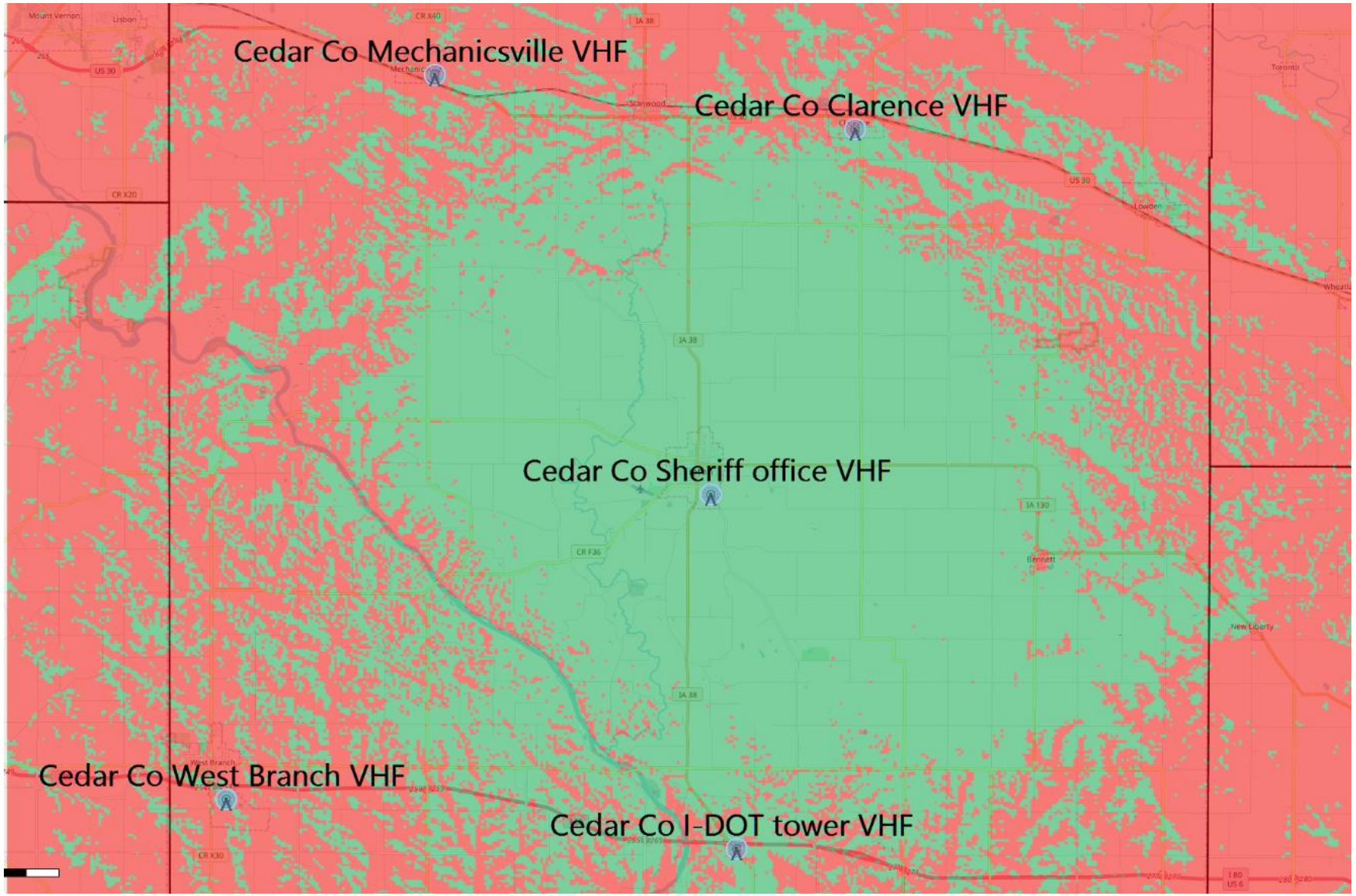
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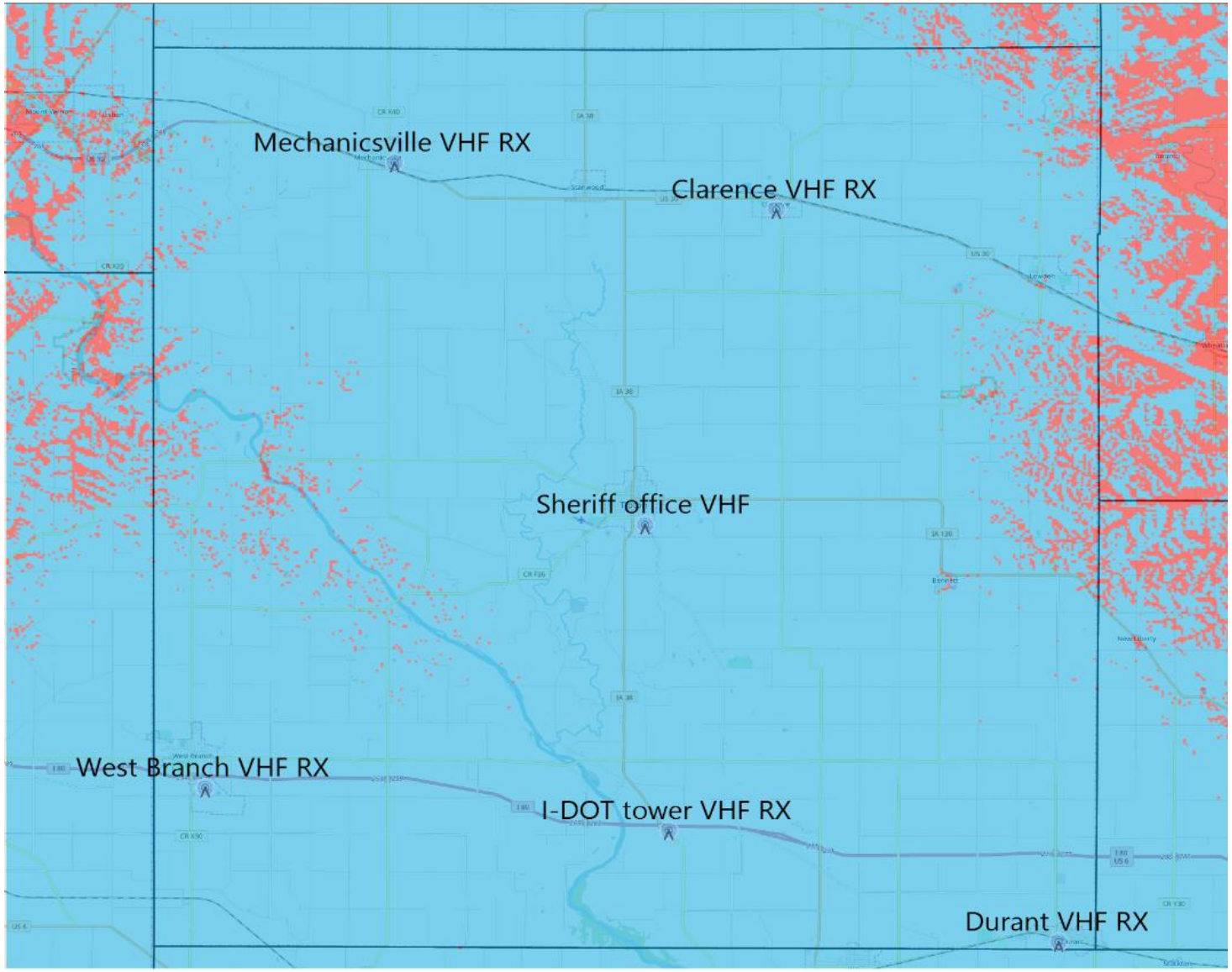
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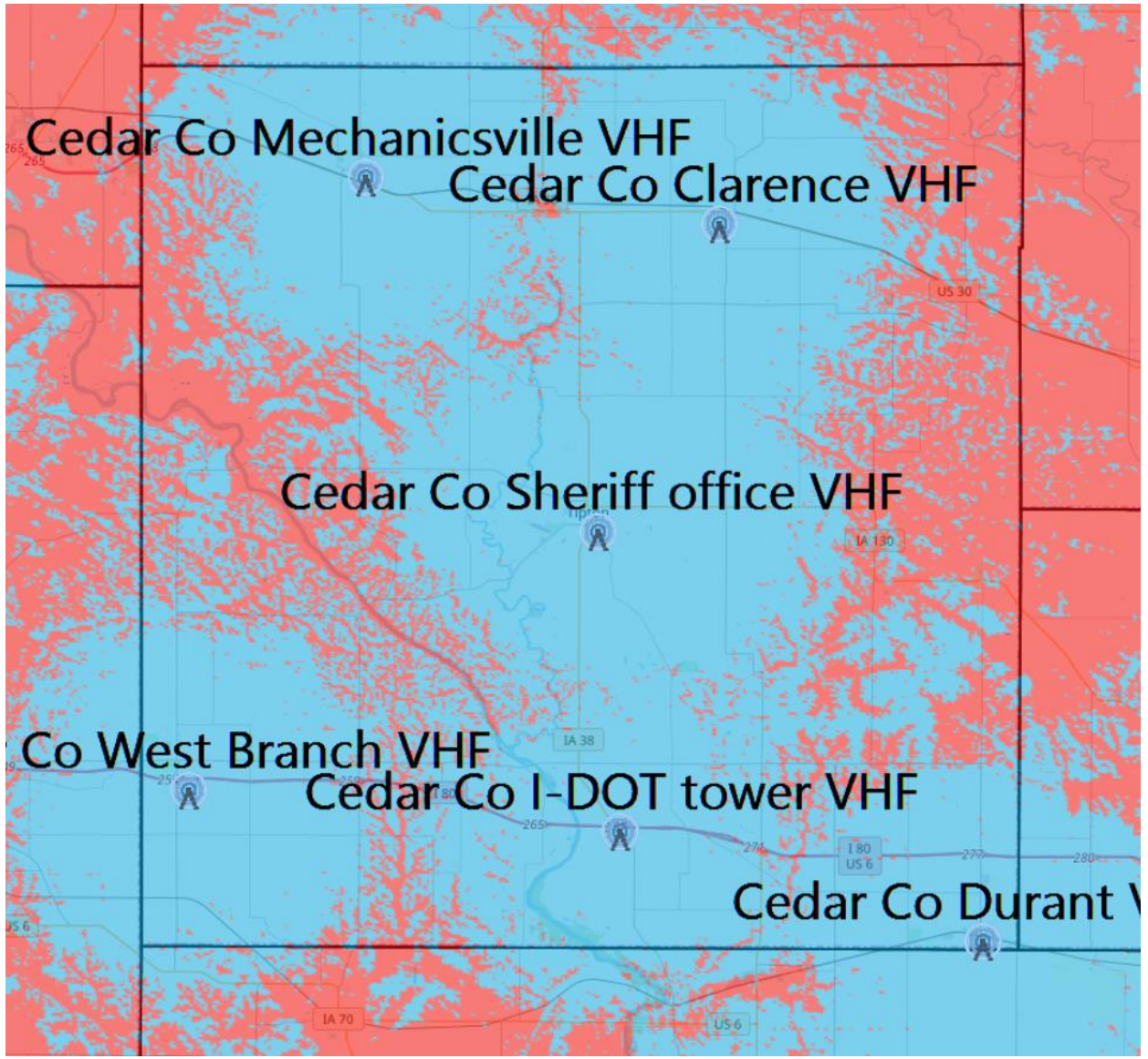
Durant VHF RX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US 30
Cedar Co Sheriff office VHF
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Cedar Co I-DOT tower VHF
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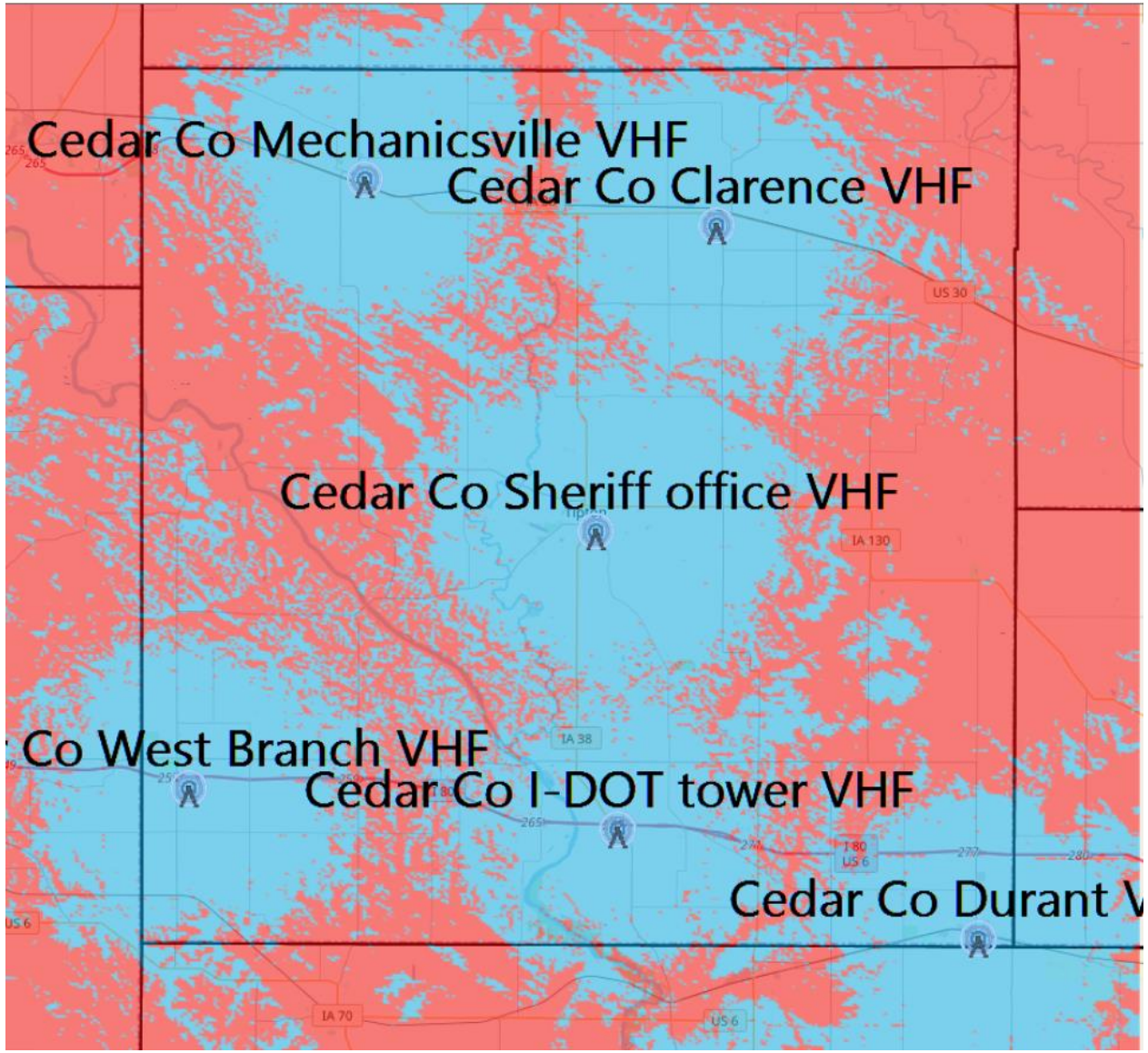
US 6
Cedar Co Durant
IA 70
US 6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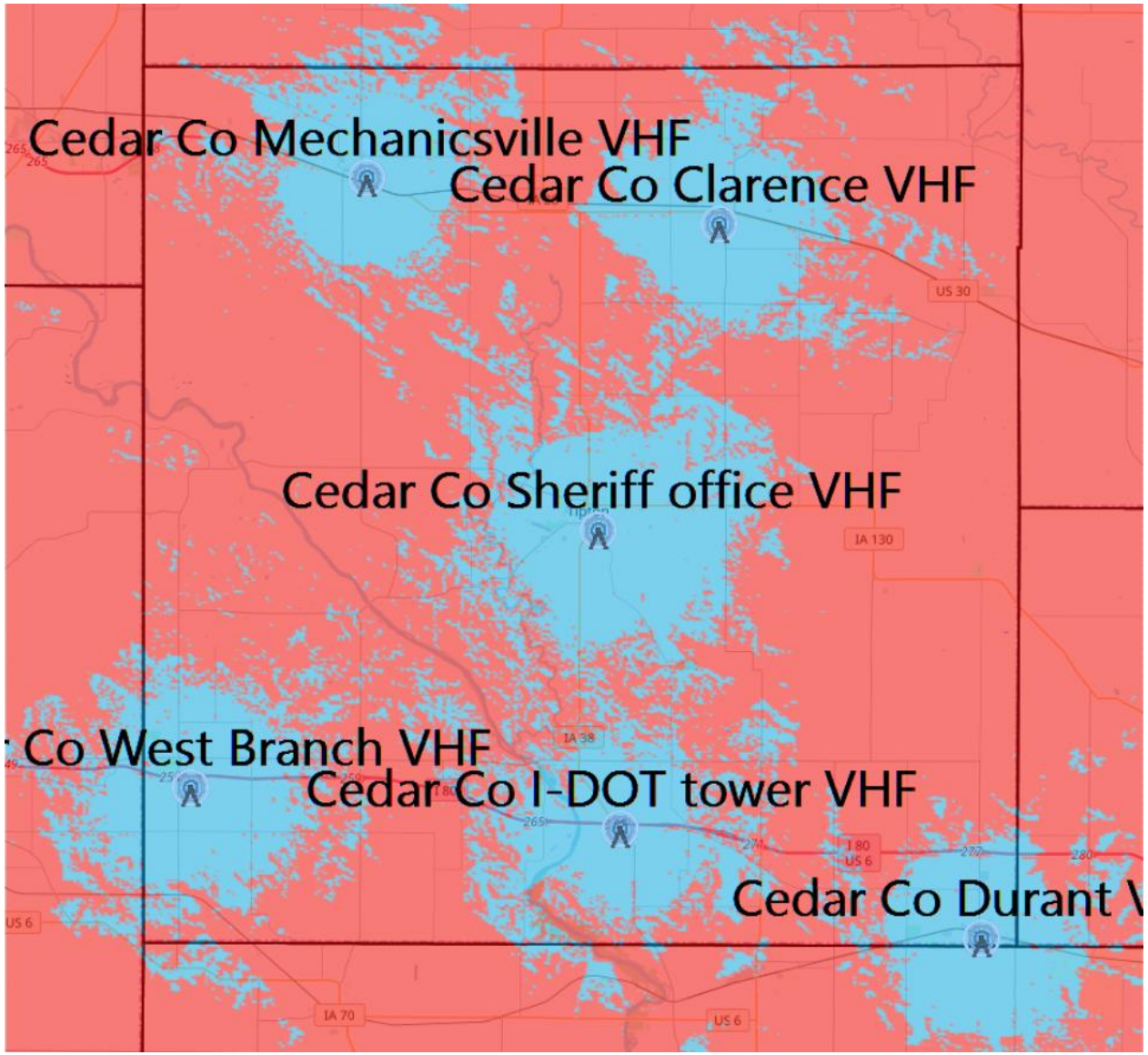
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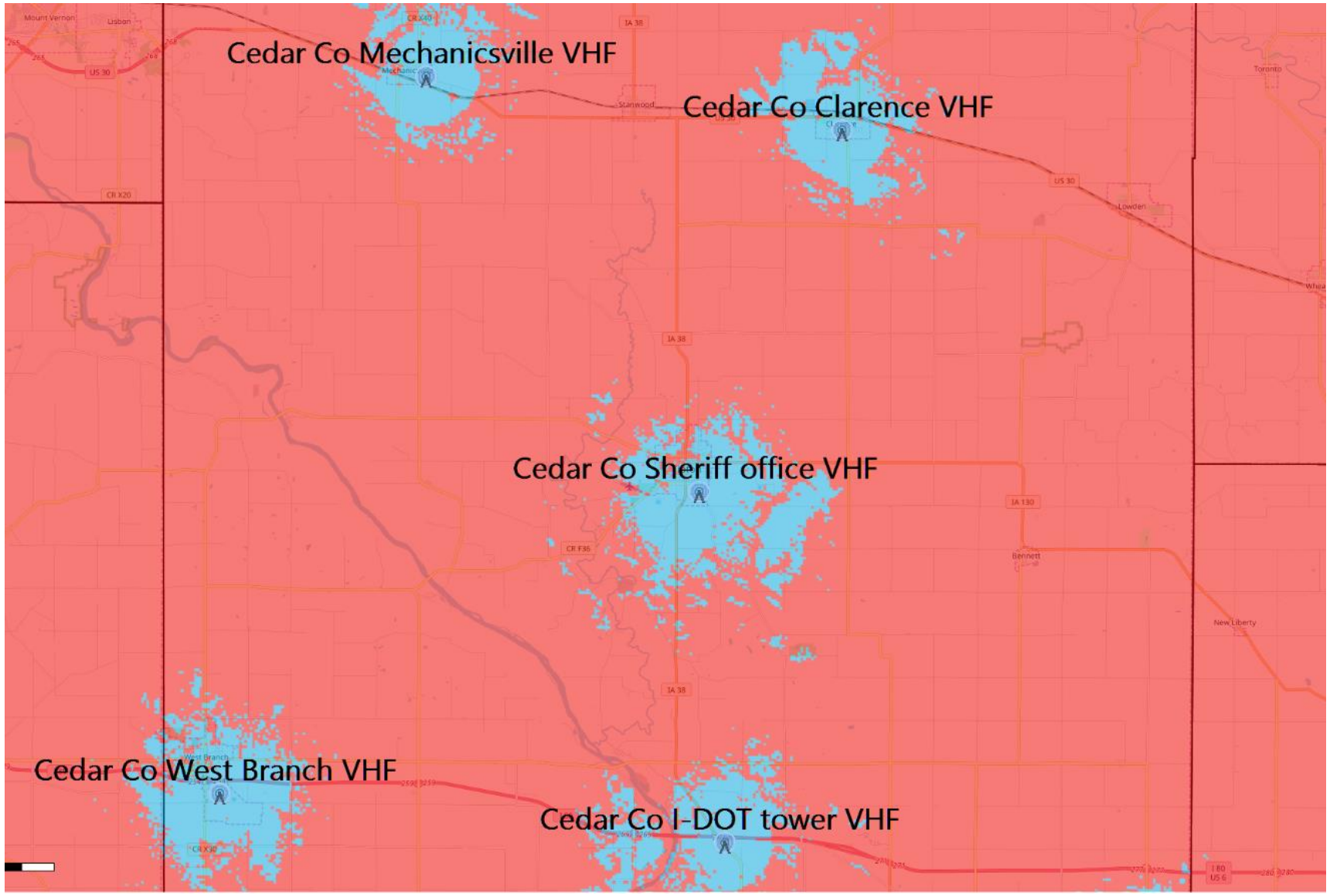
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Strategic Plan
Recommendations

- Build a new simulcast trunked P25 Phase II system
  - Simulcast allows the broadcasted signal to be transmitted over the entire county at one time or simultaneously.
  - Trunking increases the efficiency of the system by making use of idle channels.
  - Phase II allows two conversations at the same time on one frequency which increases the capacity of the system.
- Migrate paging to simulcast 800MHz digital
- Add two additional sites to improve coverage
  - Bennett
  - Cedar Bluff
  - Move Clarence site further east

Proposed 700/800MHz System Coverage Propagation Maps

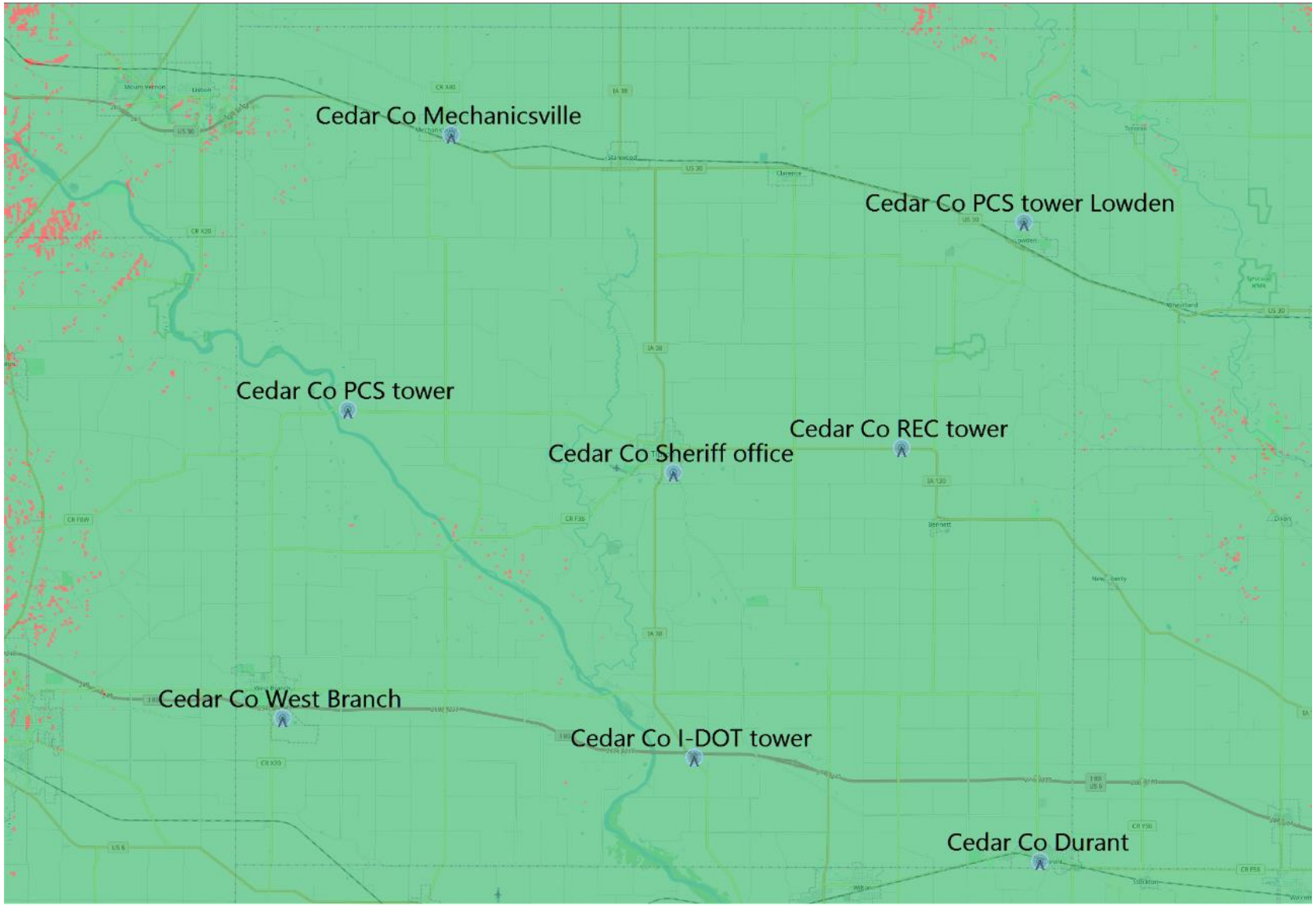
- For both indoor studies, a 37dB loss represents a portable radio on the hip used inside a thick-walled building or industrial business.

- The proposed system received the same exact analysis consisting of:

  - System talkout coverage outdoors to a portable radio on the hip using a standard 19dB loss model.
  - System talkout coverage indoors to a portable radio on the hip using a standard 37dB loss model.
  - Portable radio on the hip talkback coverage, outdoors. This also used a standard 19dB loss model at the lower wattage of the portable radio.
  - Portable radio on the hip talkback coverage, indoors. This also used a standard 37dB loss model at the lower wattage of the portable radio.

Radio system coverage study results

Coverage Type		Proposed 700/800Mhz System
Talkout	Outdoor	98.73%
	Indoor -6dB	96.67%
	Indoor -10dB	94.17%
	Indoor -16dB	86.70%
	Indoor -25B	71.93%
Talkback	Outdoor	92.38%
	Indoor -6dB	85.09%
	Indoor -10dB	77.70%
	Indoor -16dB	57.53%
	Indoor -25dB	40.49%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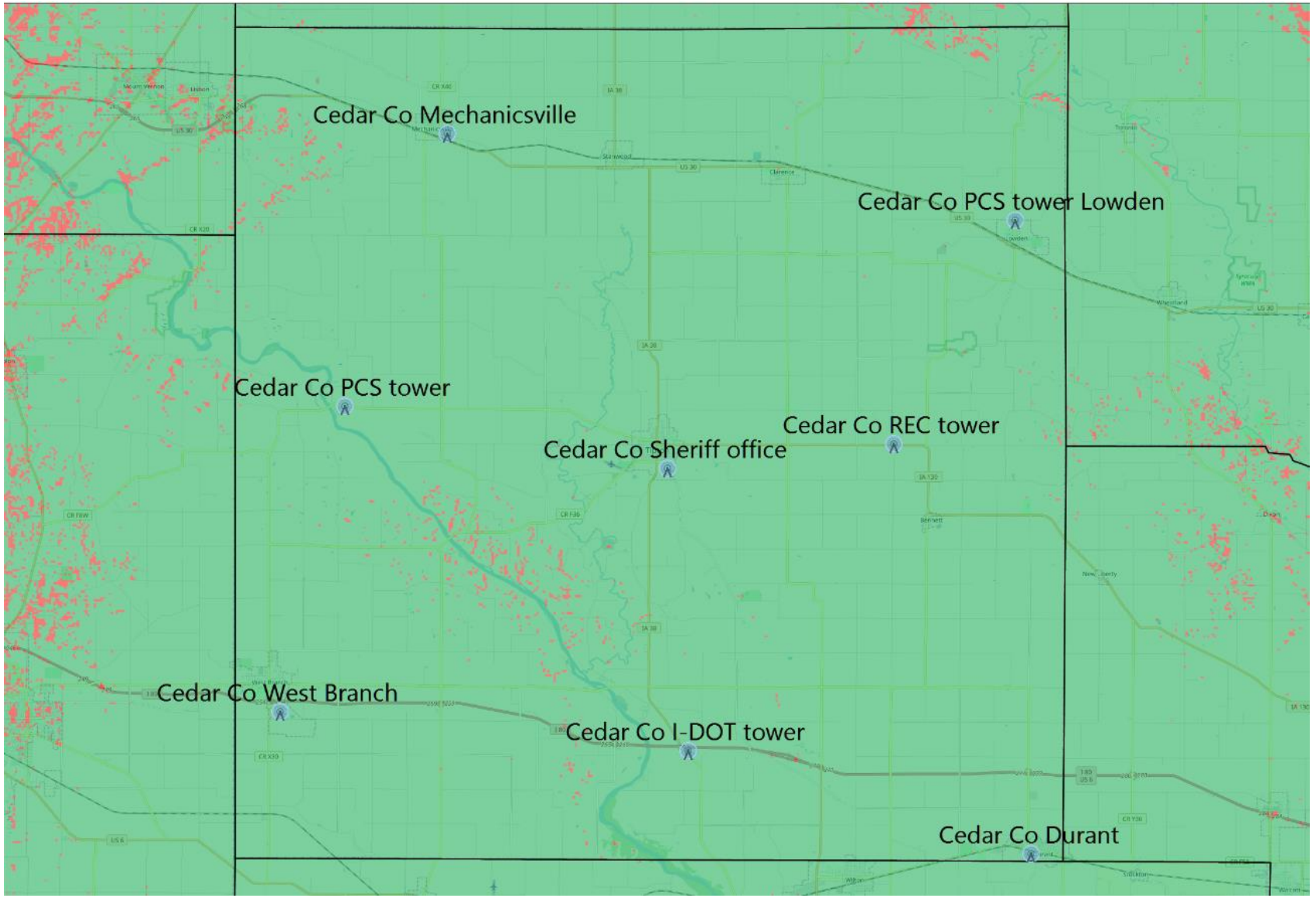
Cedar Co Durant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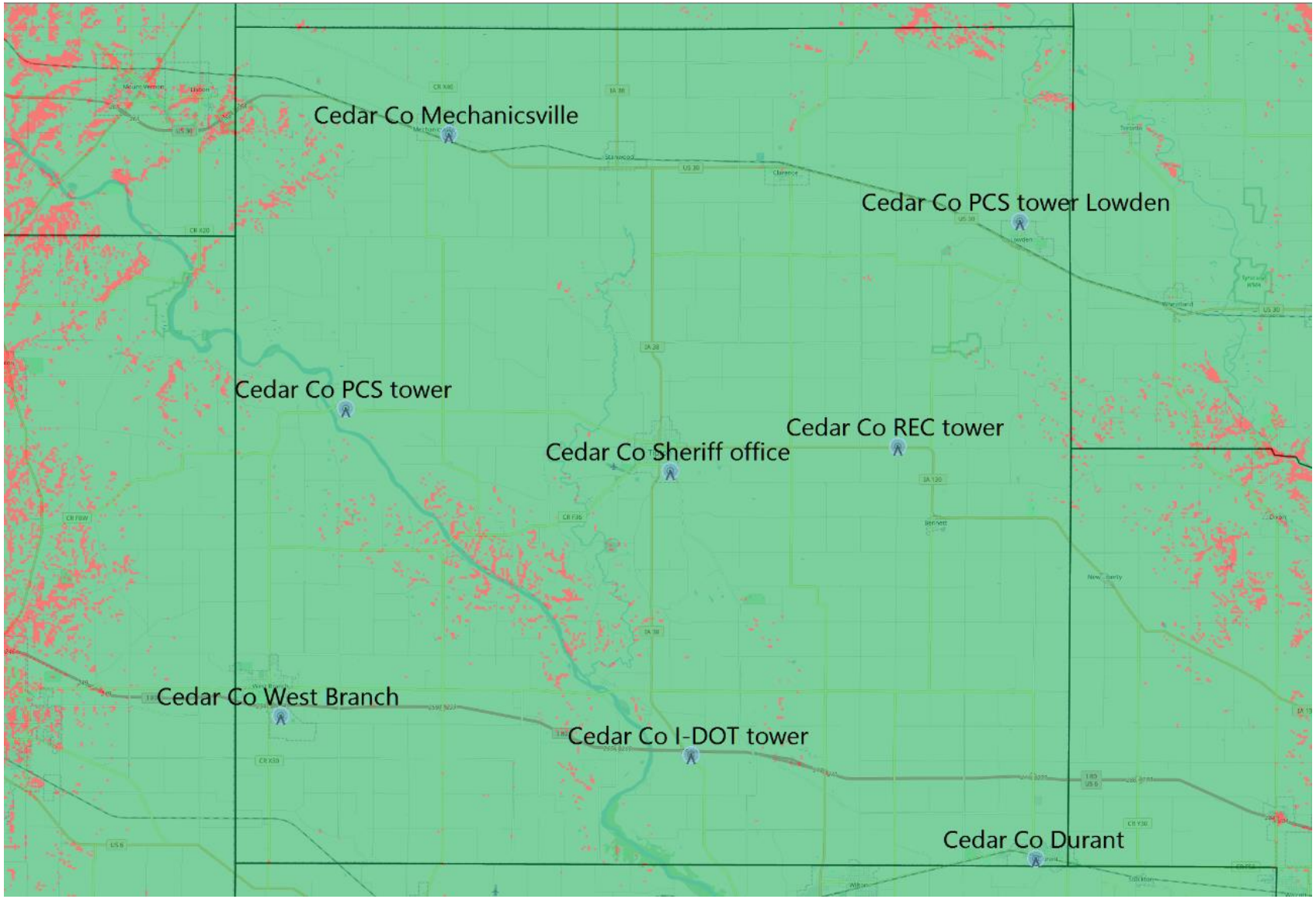
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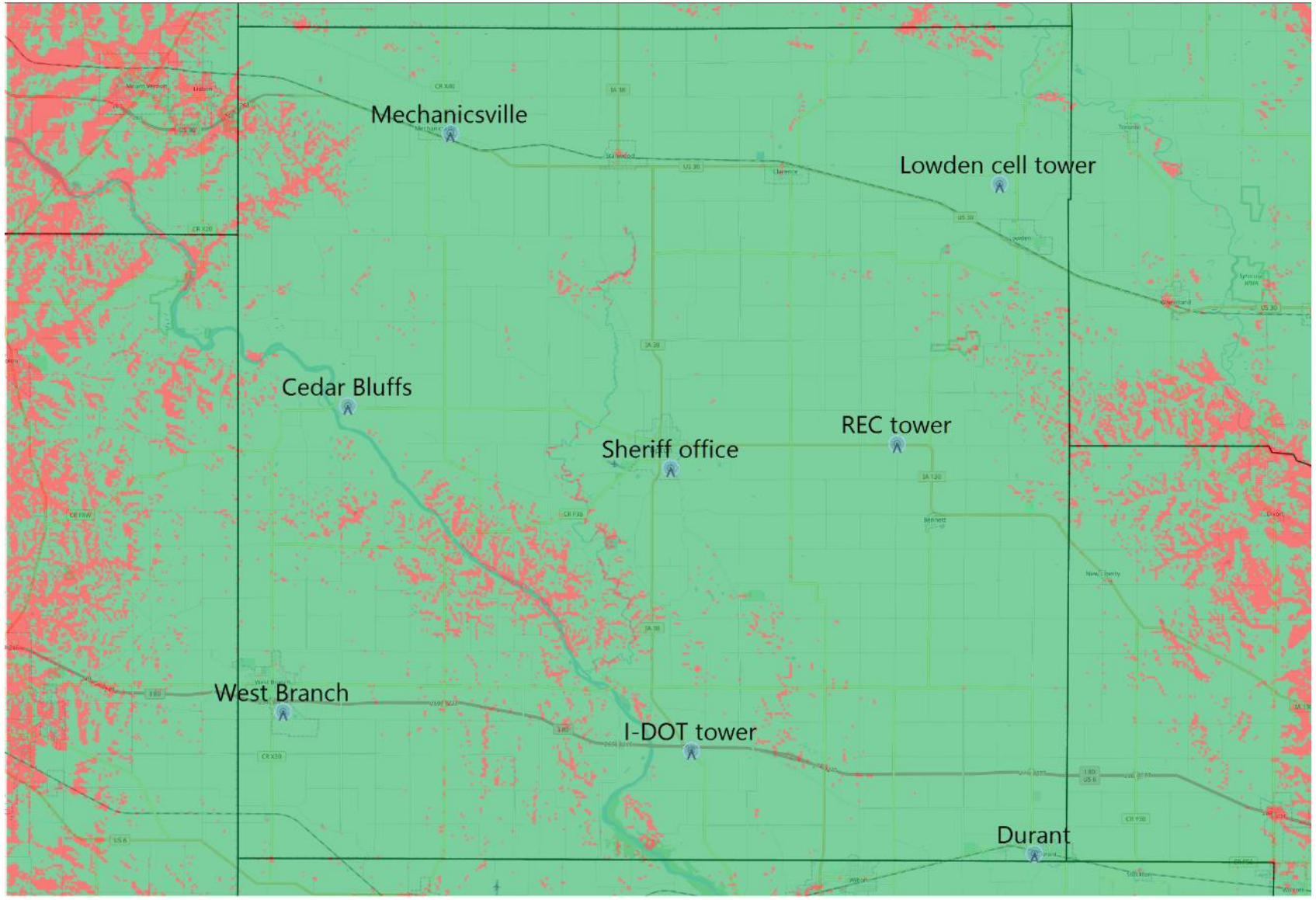
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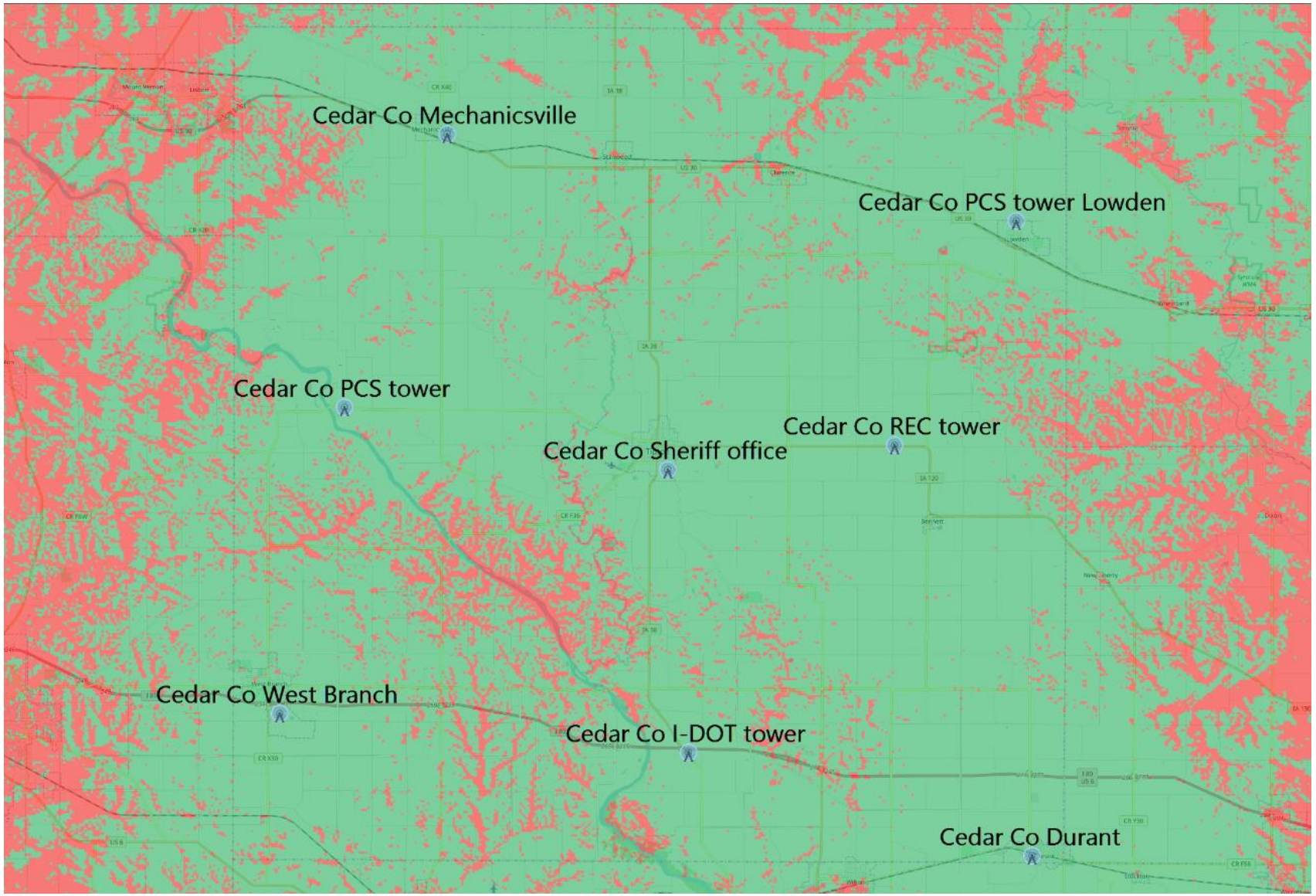
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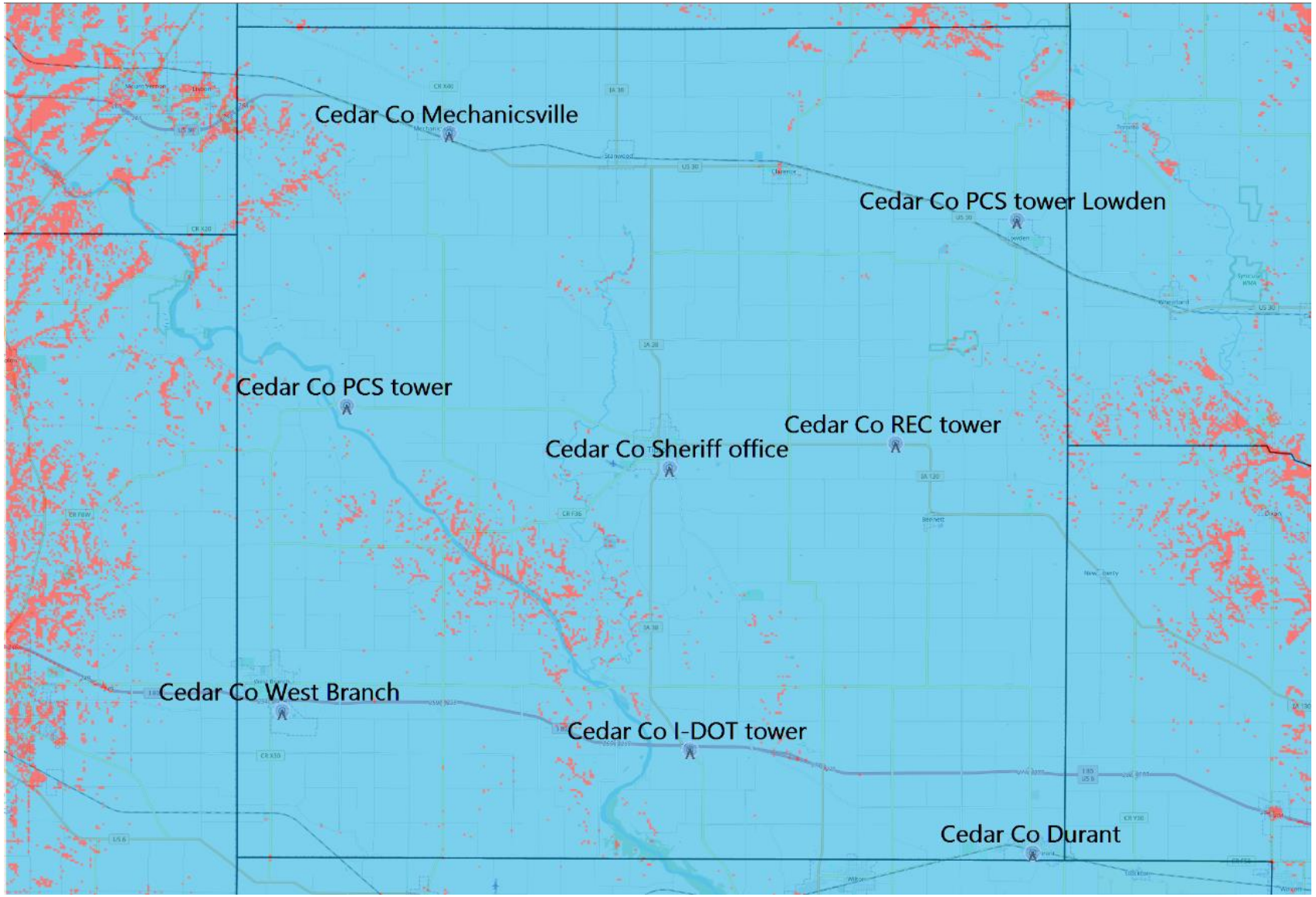
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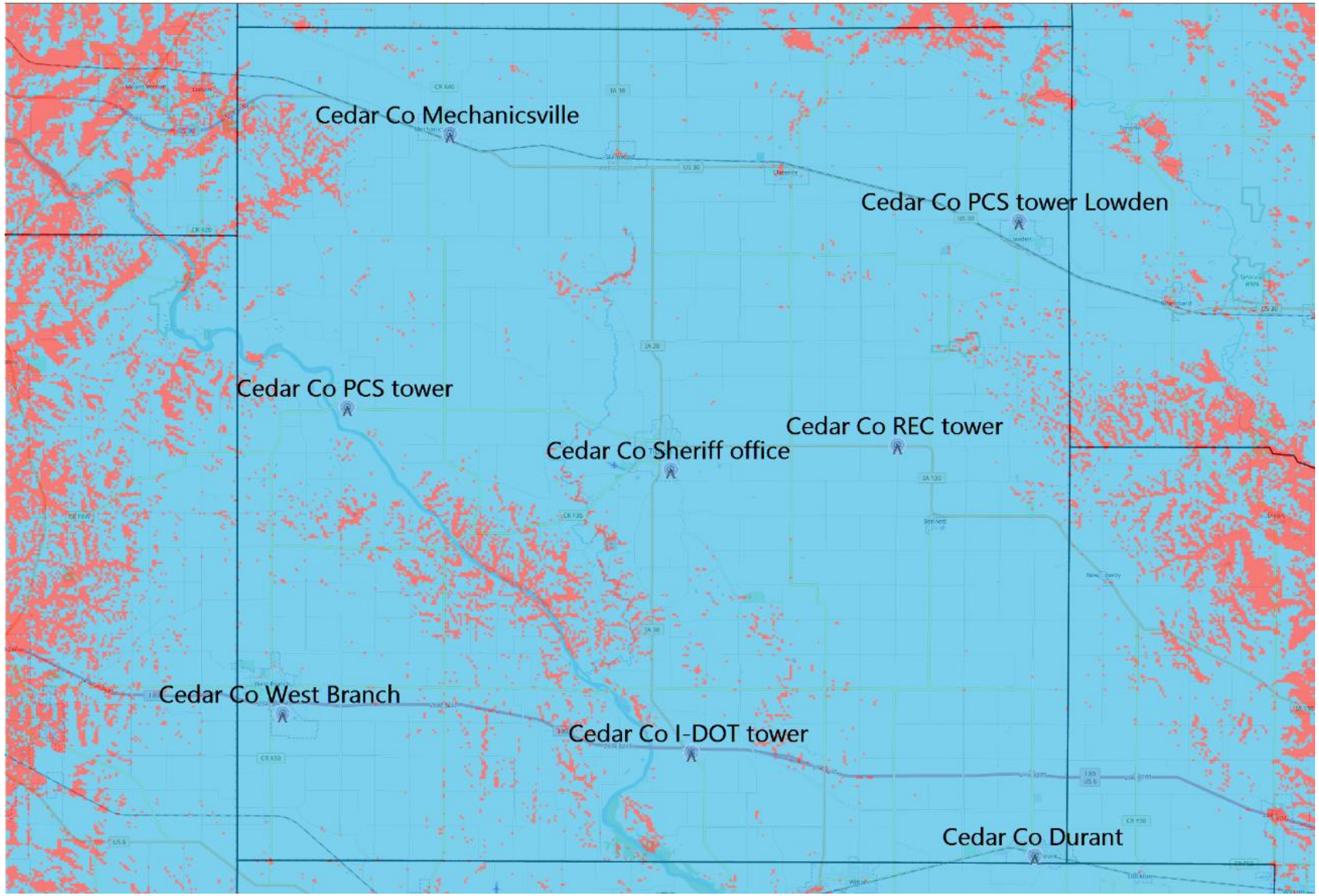
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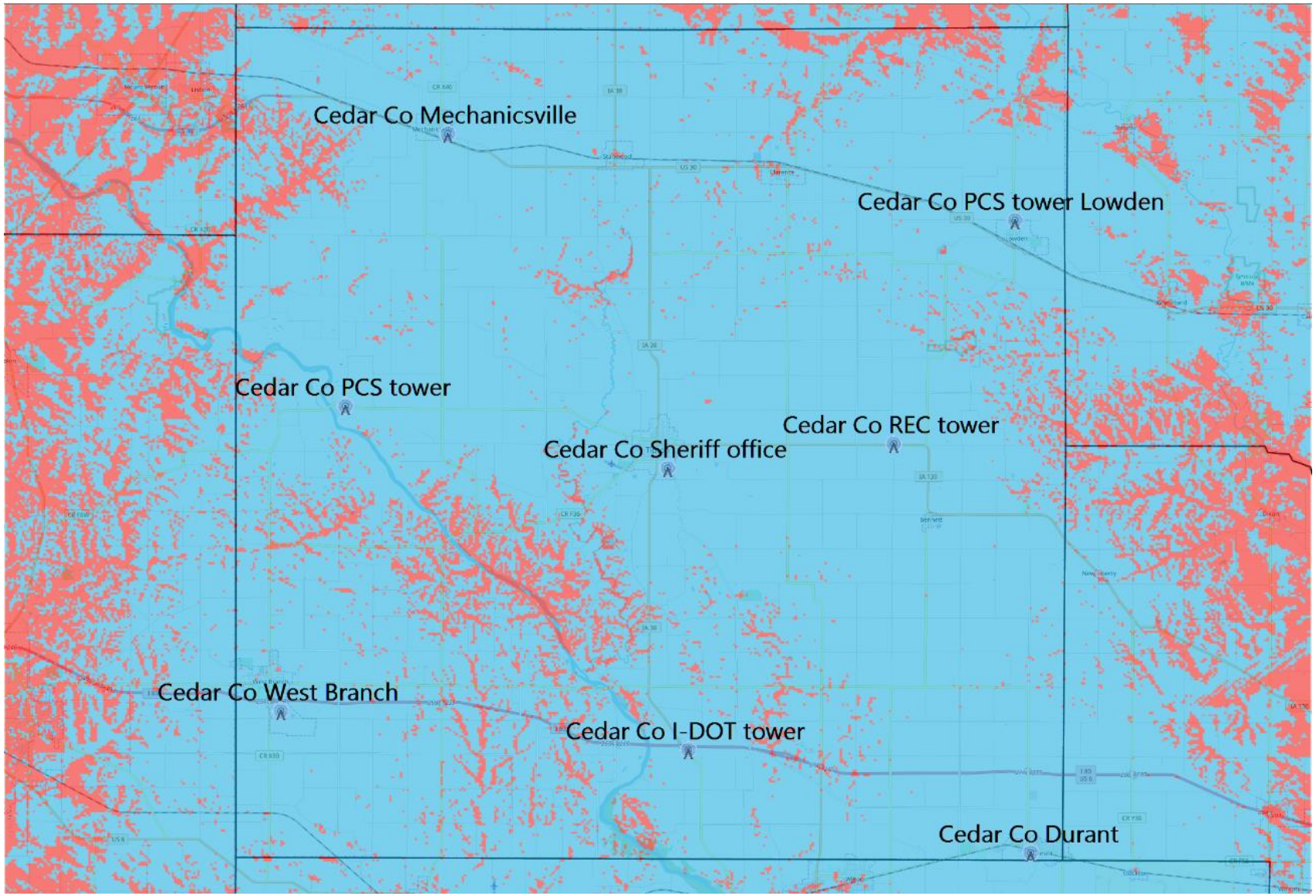
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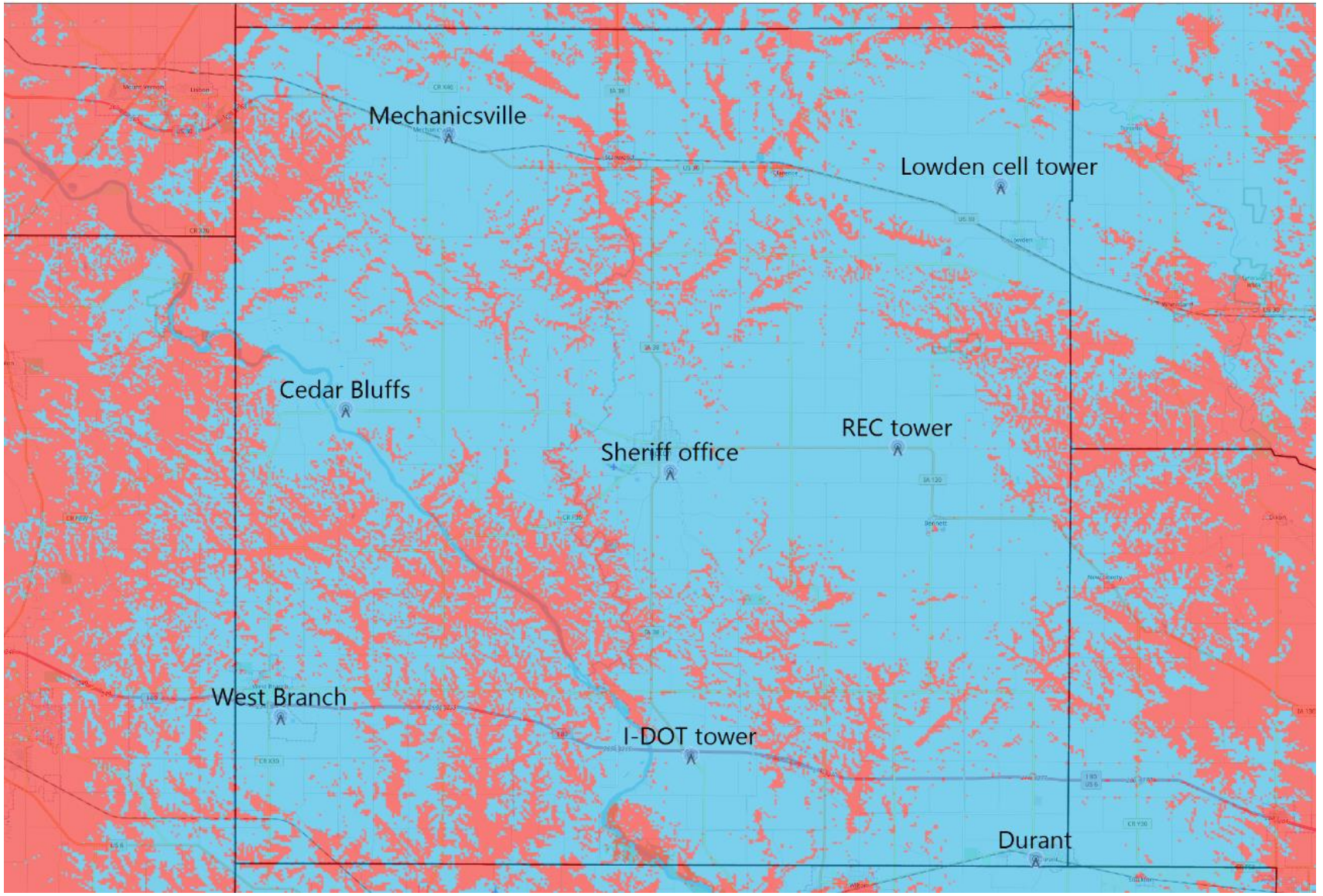
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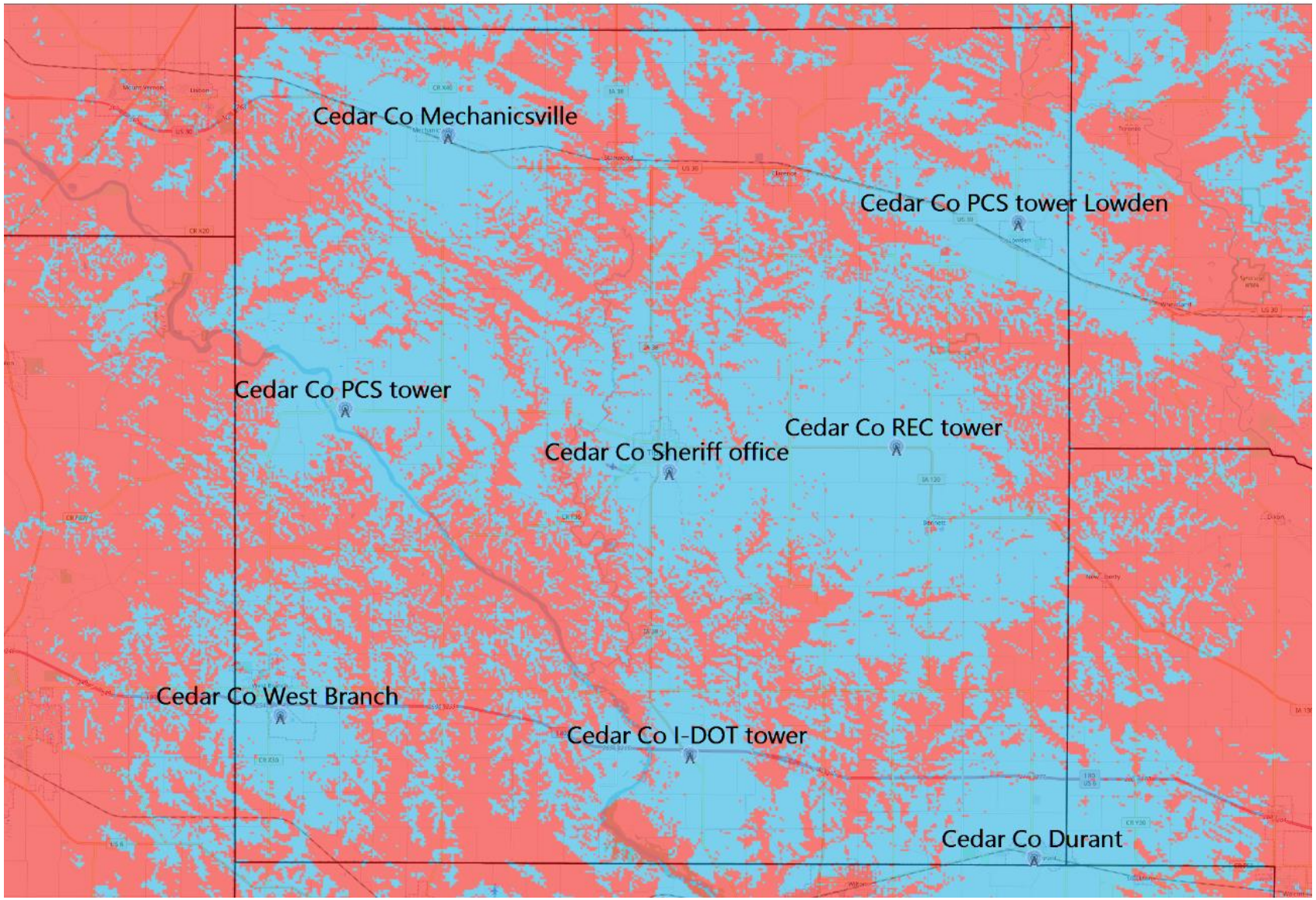
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Strategic Plan
Recommendations- Benefits

- True countywide coverage, both talkout and talkback
- Additional talkpaths
  - Multiple on scene mutual aid and tactical channels
  - A dedicated paging channel
  - All channels are repeated countywide and therefore heard by dispatch and recorded in the audio logger
- Significantly greater building penetration for **portable radio** and pager use **indoors**.
- Simulcasting requires vertical separation between transmit and receive antennas, more so on VHF than other bands
- Simulcasting on the 700/800MHz spectrum can employ horizontal separation
  - Water tower installations are difficult to achieve vertical separation at usable heights.

Strategic Plan Recommendations

- **Correct existing issues (Immediate, 0-6 months)**
  - Lightning protection at Sheriff's tower site $5,000
  - HALO grounding, welding tower legs $2,500
  - Improve grounding at three sites $2,000-$32,000
- **Planning of upgrades/maintenance (Intermediate, 6-18 months)**
  - Durant site fencing $18,000
  - Durant shelter replacement $5,000-$55,000

Strategic Plan Recommendations

- **Increase/Enhance system coverage (Long-term, 18-36 months)**
  - Radio infrastructure replacement (eight sites) $5,280,000
  - Consulting and project management $240,000
  - Install generators at current receive sites $112,000

  - 2 New tower sites- Bennett REC, Cedar Bluff PSC
    - Shelters, generators, fuel tanks, utility hookup $530,000
    - Monthly rent (utilities not included) $2,000/month
  - Move Clarence tower site to nearby Crown Caste $130,000
  - Monthly Rent (utilities not included) $2,000/month

  - Total of budgetary quotes $6,324,500-$6,404,500

Subscriber Equipment Cost Estimates

		Totals
Law Enforcement		
68	Portable radios $4,915 each (encryption)	$334,220
42	Mobile radios $4,679 each	$196,518
42	Mobile radio installs $460 each	$ 19,320
Fire Departments		
196	800MHz pagers $650 each	$127,400
160	Portable radios 3,943 each	$630,880
51	Mobile radios $3,830 each	$195,347
51	Mobile radio installs $467 each	$ 24,310
EMS Agencies		
50	Portable radios $3,943 each	$197,150
13	Mobile radios $3,627 each	$ 47,151
13	Mobile radio installs $460 each	$ 5,980
Other Agencies		
26 Portables, 5 Mobiles		$ 99,319
Total cost estimate		**$1,877,595**

System Partnership

- The infrastructure costs are over $6,000,000.
- Subscriber equipment replacement will be needed at the same time as the switchover to the new system. Subscriber equipment replacement cost will be up to the agencies to fund
- MCM recommends the planning of a regional:
  - FEMA Assistance to Firefighters (AFG) grant application
  - Community Oriented Policing Services (COPS) grant application

AFG/COPS Grants

- The NA&SP report is a strong supporting document for a countywide (regional) grant application
- One department will need to sponsor each application
- Exact subscriber counts will be needed. Please work with the 911 Service Board to verify your subscriber needs.

Questions?