



**OhioFirst.Net**



**STATE OF OHIO  
COVERAGE NEEDS  
REPORT**

OHIOFIRST.NET IMPLEMENTATION PROJECT  
September 30, 2016

  
**OhioDAS**  
Service · Support · Solutions

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# INTRODUCTION

## DOCUMENT PURPOSE

Ohio began performing a comprehensive, county-by-county coverage review process beginning in October 2015 and concluding by September 2016. These coverage reviews allowed each stakeholder in the state to articulate their coverage needs in a manner that they can take ownership of, and stand behind when evaluating whether to adopt FirstNet's service.

This document provides Ohio's coverage needs in five phases for the purposes of Ohio and FirstNet State Planning, and provides background on our individual coverage reviews with each county in the state of Ohio. This document supersedes coverage requirements submitted by the state of Ohio in our submission *State of Ohio Phase 2 Data Collection Response to FirstNet* dated September 30, 2015.<sup>1</sup>

## ABOUT THE OHIOFIRST.NET IMPLEMENTATION PROJECT

The *OhioFirst.Net Implementation Project (OFIP)* is a structured project to prepare the state of Ohio to develop a State Plan with FirstNet and to ensure implementation of a public safety wireless broadband network in the State of Ohio.

The project will fulfill the State's public safety broadband planning objectives, and will support the overall FirstNet consultation process. Additional information about our program and FirstNet is available at the following websites:

<http://firstnet.ohio.gov>

<http://firstnet.gov>

<http://siec.ohio.gov>

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<sup>1</sup> Available at <http://firstnet.ohio.gov/publications>

# METHODOLOGY

## COVERAGE REVIEW PROCESS

The purpose of our coverage reviews was to determine each Ohio public safety agency's coverage needs and to provide FirstNet with objective, factual data, as well as subjective inputs from subject-matter experts to deliver comprehensive information to guide the implementation.

The outputs from these coverage reviews were used to collaboratively develop FirstNet's State Plan and were provided to stakeholder entities to support their migration planning to the service. The reviews were held from October 2015 – September 2016. We were able to successfully conduct a coverage review with every county and major city in the state.

## Summary

We conducted an individual coverage and needs review with each county, each major city, and major state agencies<sup>2</sup> to determine coverage needs throughout the state for all first response and supporting organizations. These coverage reviews provided each stakeholder with the opportunity to review FirstNet's coverage baseline, articulate their own needs, ask questions about the program and, most importantly, take ownership over their own requirements.

Each coverage review included the following steps:

- Contact via Email and Send Read-Ahead Material
- Process Computer Aided Dispatch (CAD data)
- Execute Coverage Review
- Follow up and Verify Data

## Contact via Email and Send Read-Ahead Material

Program staff first made email contact with the individual identified in our point of contact (POC) survey to schedule the meeting. If a POC had not yet been identified for a particular stakeholder group, we made a best-effort attempt to locate one. We sent read-ahead materials describing the overall program and the coverage review process.

Program staff utilized email marketing software and site analytics to provide detail on stakeholder engagement with read-ahead materials.

Eventually, we were able to make contact with every single county and every major metropolitan area in the state of Ohio and successfully executed a coverage review with each stakeholder. These reviews consisted of webinars with 82 counties, and face-to-face meetings with six (6)<sup>3</sup> urban counties,<sup>3</sup> and six (6)<sup>4</sup> metropolitan areas.

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<sup>2</sup> Ohio State Highway Patrol, Ohio Department of Natural Resources, Ohio Department of Rehabilitation and Correction and Ohio Department of Transportation

<sup>3</sup> Cuyahoga, Franklin, Hamilton, Summit, Montgomery and Lucas Counties

<sup>4</sup> Cities of Columbus, Cleveland, Toledo, Cincinnati, Akron and Dayton

Process CAD Data

Program Staff requested CAD data incident data from the years 2013-2015 to provide three full years of incident records. Staff used the rendered CAD data heatmap to guide the coverage review process, aiding program staff in identifying hot spots and areas of interest with the participating agency. The heatmap is generated on a statewide basis by binning all incident records into a ½-square mile area.

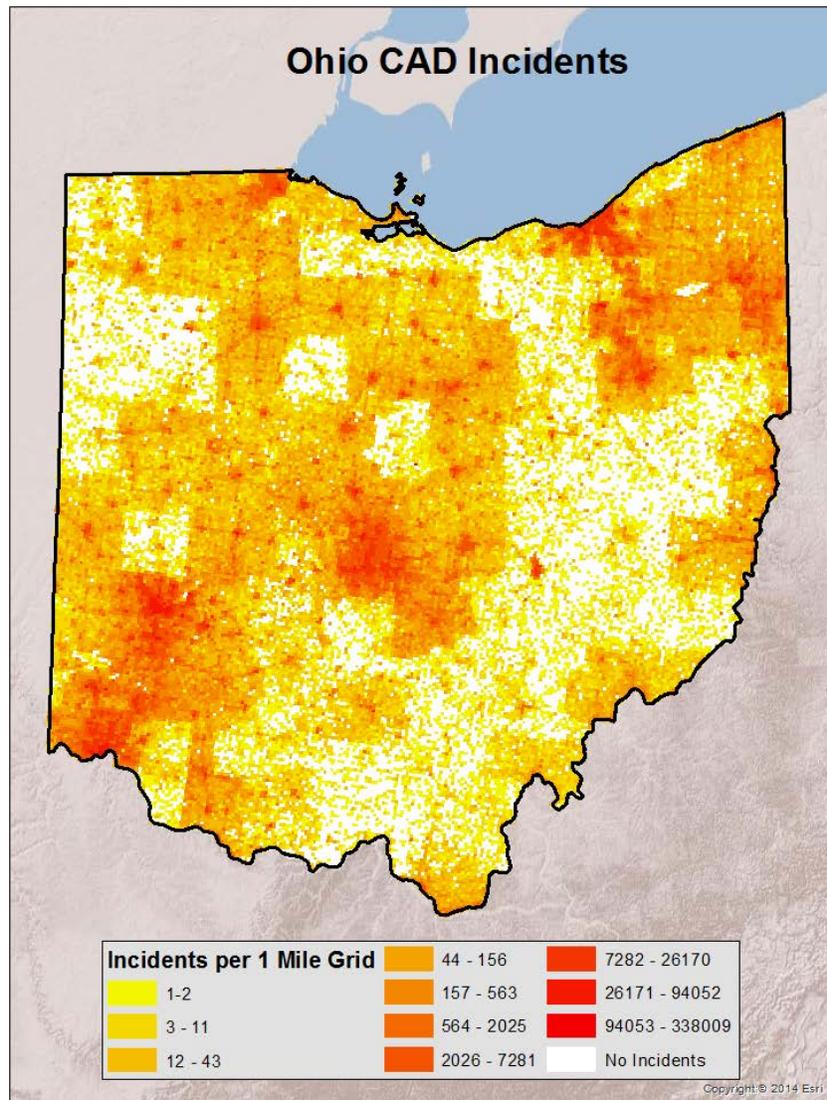


Figure 1: Statewide Incident Heatmap

The heatmap depicts the density of incidents throughout the state. Our research has shown that while incidents *tend* to cluster around populated areas, and that incident data *tends* to correspond to population, these trends are not universal. For example, recreational areas, special event venues, and seasonal tourist attractions are high-risk response areas that may have a very low resident population.

Therefore as a guide in performing our coverage reviews, we produced an incident heatmap for all stakeholder agencies where CAD data was available prior to performing the coverage review and reviewed the results with the agency. This served as a guide in determining which service areas should be determined as Critical Service Areas.

While we were able to collect CAD data from *most* agencies, a small number of counties either could not, or did not, provide CAD data, or provided partial CAD data not representative of the entire geography of the county. In total, 74 counties provided complete CAD data, one (1) provided partial CAD data and 13 provided no CAD data at all. A breakdown of participating counties is in the figure below.

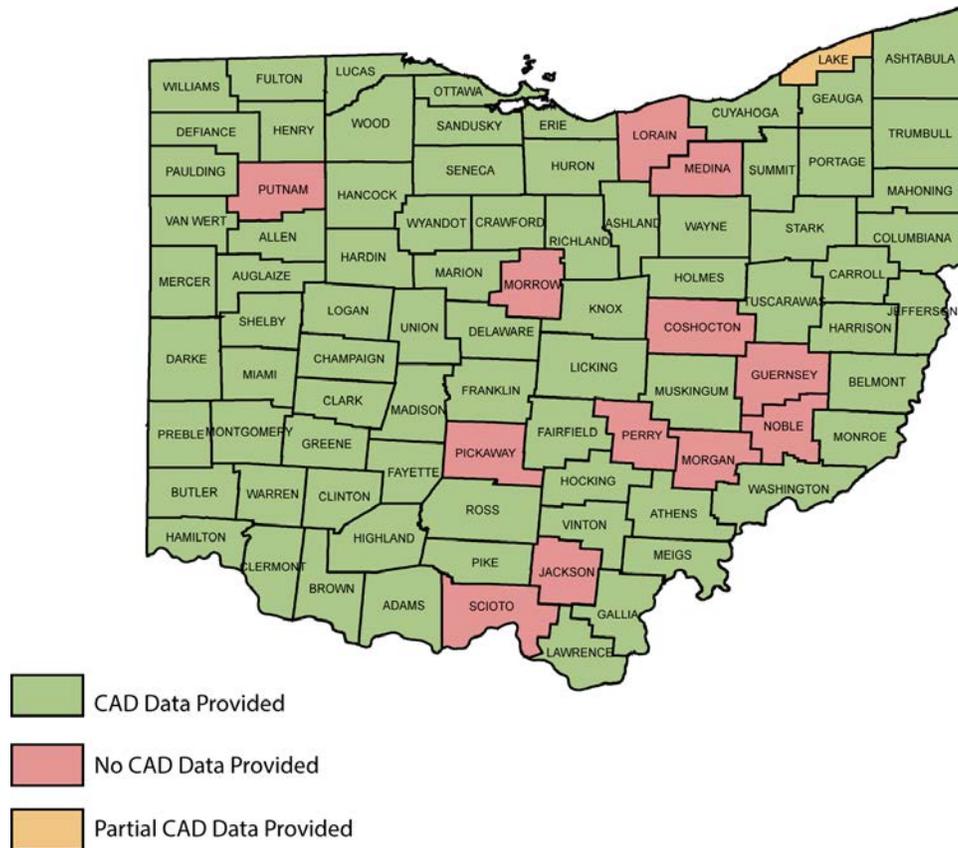


Figure 2: Counties Providing CAD Data

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## Execute Coverage Review

Project staff performed a coverage review via WebEx and, in about 1/3 of markets, complemented the WebEx with a face-to-face resource. The coverage review included:

- An introduction to the project
- A review of FirstNet baseline coverage data
- A review of commercial carrier services in their area (marketed vs. actual end-user experience)
- A review of incident data (heatmaps)
- Program Q&A

The deliverable for each of these coverage reviews is a set of Geographic Information System (GIS) polygons depicting priority coverage areas and areas of poor service. In some cases, these areas were collected in-person through anecdotal information from participants, while in others personnel elected to collect the data “offline” after the coverage review and to email their submission to program staff later. Coverage areas collected reflect both critical service areas (high-priority areas) and extended service areas (areas with inadequate coverage), and form the basis for the development of Ohio’s phased buildout process.

## Follow up and Verify Data

Project staff performed follow-ups with the agency to verify results of the coverage review, including reviewing coverage priority polygons and evaluating customer satisfaction.

## Final Results: Phased Coverage

The final output for all 5 phases of Ohio’s coverage rollout strategy is depicted below. For additional detail on how these phases are determined, see Section *Findings: Buildout Phases* below.

It is important to note that Extended Service Areas are self-reported, and in almost all cases, completely anecdotal based on our interviews. They may not accurately reflect carrier coverage in that jurisdiction and may not account for external factors, such as technical issues with the user’s device. However, Extended Service Areas *do* accurately reflect user perception, and as a result, the specific areas where Ohio agencies would seek for FirstNet to provide coverage.

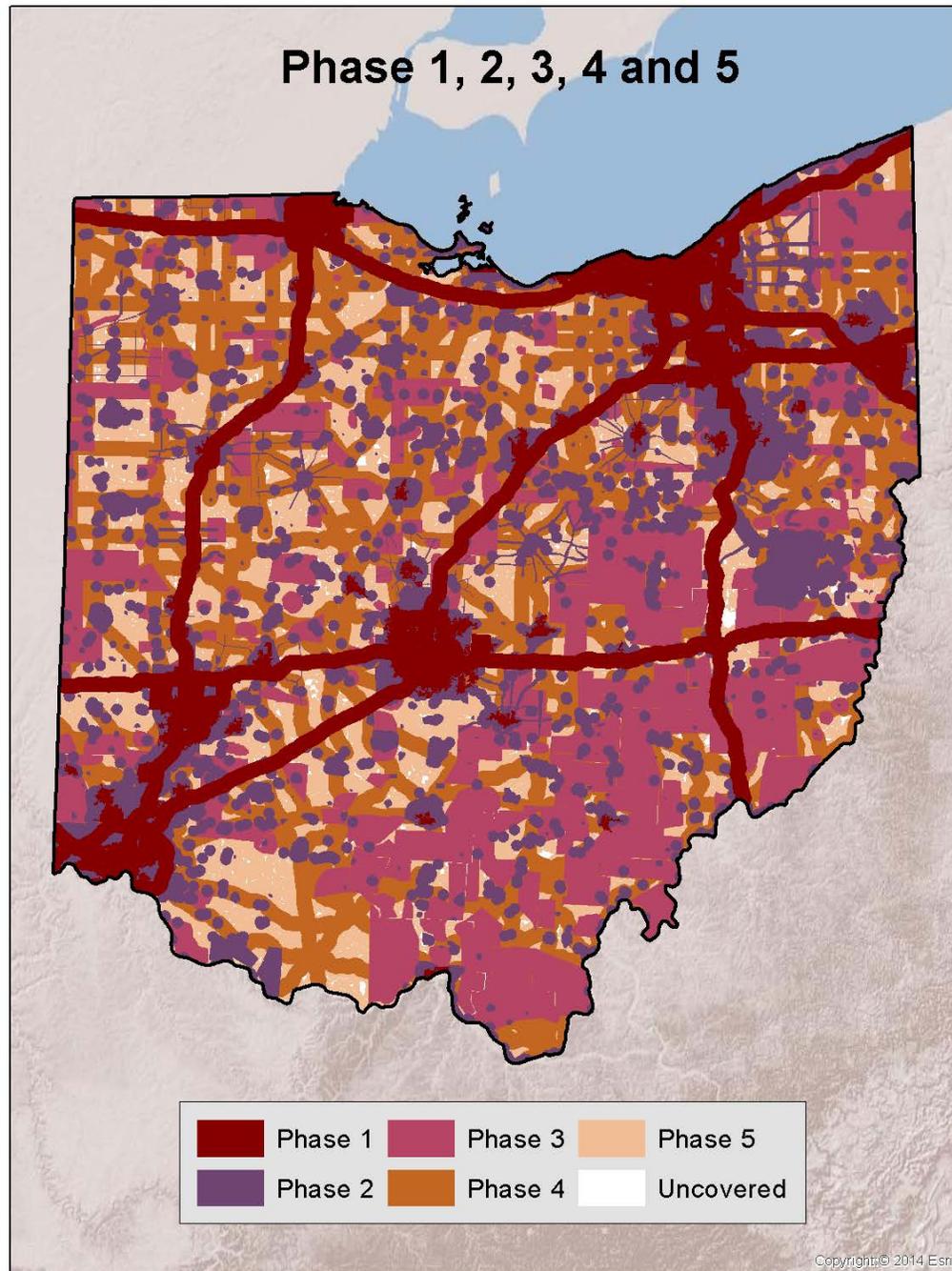


Figure 3: State of Ohio Coverage Phases

The stakeholder-identified Critical and Extended Service Areas are of critical interest for the purposes of this study as they reflect what each stakeholder agency specifically stated as its coverage need. These areas are depicted below. For more detail on how these areas fit into specific coverage phases, see Section *Findings: Buildout Phases* below.

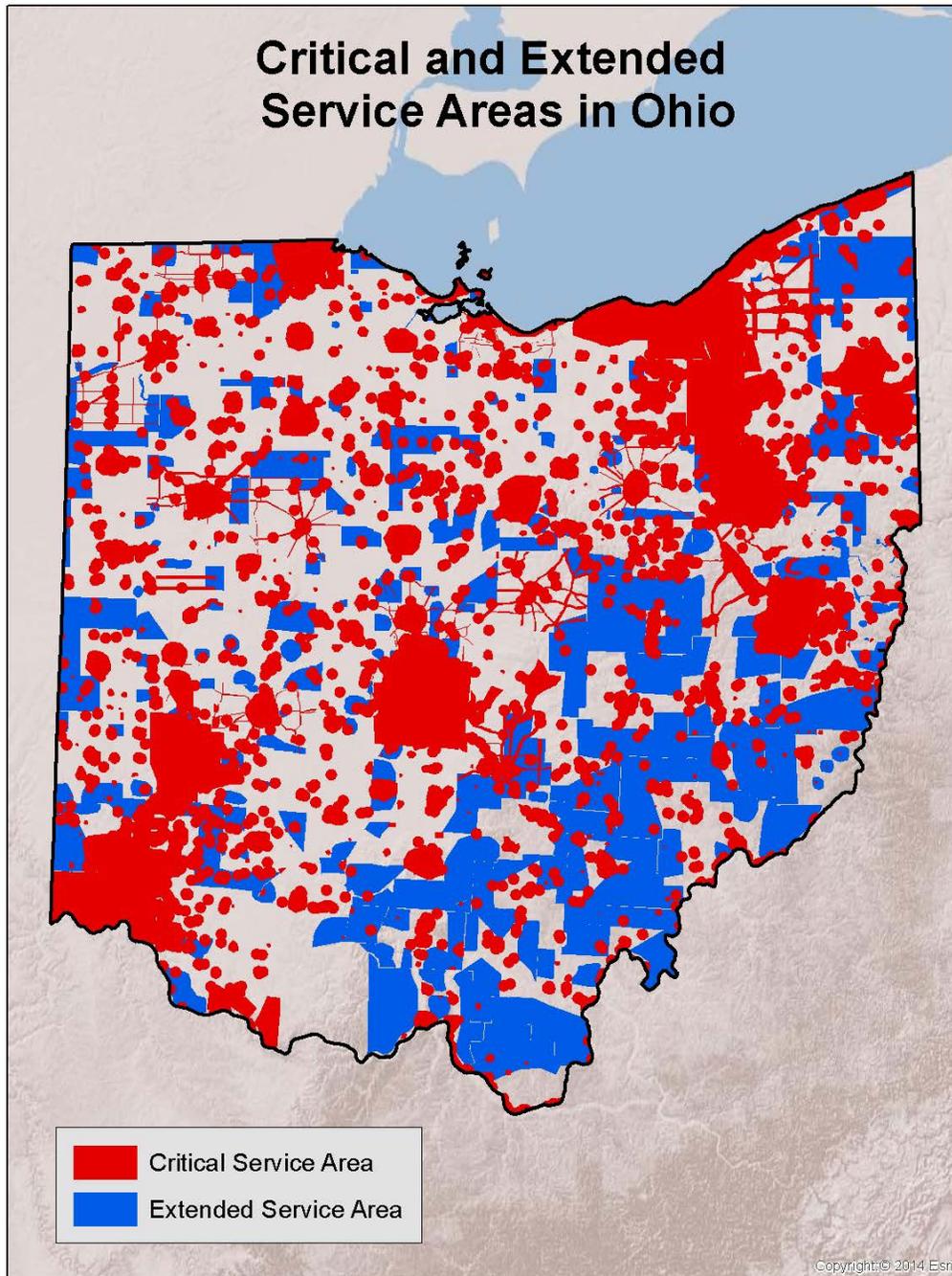


Figure 4: State of Ohio Critical Service Areas and Extended Service Areas

### Coverage Comparisons

As part of each coverage review, we reviewed the incumbent commercial carrier coverage according to the US Broadband Map and the ConnectOhio program in that stakeholder's particular jurisdiction.



Figure 5: Aggregate Commercial Carrier Coverage in Ohio

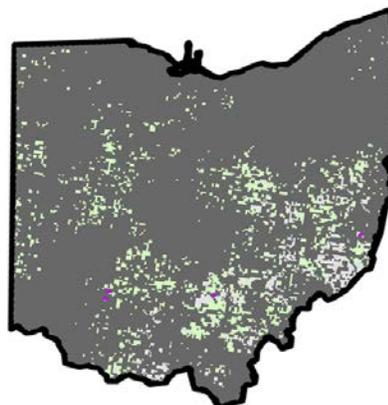


Figure 6: FirstNet Coverage Objective for Ohio



Figure 7: Verizon Reported Coverage



Figure 8: AT&T Reported Coverage

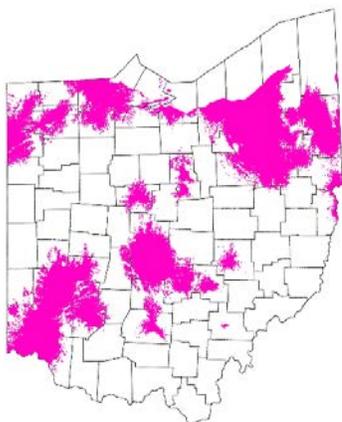


Figure 9: T-Mobile Reported Coverage

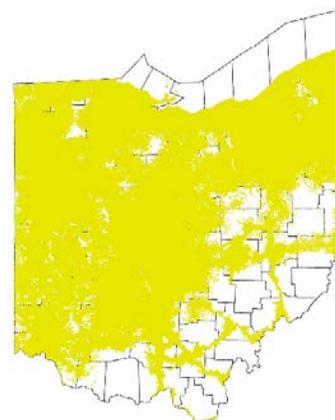


Figure 10: Sprint Reported Coverage

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Depending on the agency's location and choice of carrier,<sup>5</sup> the effective reported coverage in most cases was the entirety or nearly the entirety of the agency's jurisdiction. Any service issues relative to the reported service area of incumbent carriers were documented as an Extended Service Area.

Data for these coverage maps is from July 2015 ConnectOhio Broadband Mapping Data. The data was retrieved October 1, 2015 by direct request to ConnectOhio. Note that the most current broadband data available through the US broadband map (<http://broadbandmap.gov>) is dated June 2014.

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<sup>5</sup> In most cases, Verizon. See *State of Ohio FirstNet Phase 2 Data Collection Response*, September 30, 2015. Available at <http://firstnet.ohio.gov/publications/reports>.

# FINDINGS: BUILDOUT PHASES

We based our buildout phases on first prioritizing the urban areas and interstates and then prioritizing Critical and Extended Service Areas identified by stakeholders during our coverage reviews. We filled in the remaining areas of the coverage requirement with Major Road Areas and finally the remaining populated geography of the state.

A breakdown of each phase is presented below:

Table 1: Ohio Buildout Phases

Phase	Inputs	% of State Covered	% Population Covered	% Incidents Covered
Phase 1	Metropolitan Areas Interstate Areas	15.77%	63.39%	72.08%
Phase 2	Critical Service Areas	39.15%	67.25%	92.09%
Phase 3	Extended Service Areas	61.83%	79.25%	95.59%
Phase 4	Major Road Areas	84.49%	92.49%	98.10%
Phase 5	Populated Areas	99.28%	100%	99.31%

## URBAN AND RURAL AREAS

Our first phase covers the entirety of the urban area included in FirstNet’s RFP. For the purposes of this report, we evaluated “urban” and “rural” area and population covered by each phase according to the US Office of Management and Budget (OMB) classification for urban and rural counties:

*A metro area includes one or more counties containing a core urban area of 50,000 or more people, together with any adjacent counties that have a high degree of social and economic integration (as measured by commuting to work) with the urban core.<sup>6</sup>*

This approach allows us to evaluate the impact of our approach on suburban and urban communities. A breakdown of urban and rural counties is in the table and figure below:

Table 2: Urban and Rural Counties in Ohio, According to US OMB

Urban		Rural	
Allen	Lorain	Adams	Knox
Belmont	Lucas	Ashland	Logan
Brown	Madison	Ashtabula	Marion
Butler	Mahoning	Athens	Meigs

<sup>6</sup> More information available at [http://www.ers.usda.gov/datafiles/Rural\\_Definitions/StateLevel\\_Maps/OH.pdf](http://www.ers.usda.gov/datafiles/Rural_Definitions/StateLevel_Maps/OH.pdf).

Carroll	Medina	Auglaize	Mercer
Clark	Miami	Champaign	Monroe
Clermont	Montgomery	Clinton	Morgan
Cuyahoga	Morrow	Columbiana	Muskingum
Delaware	Ottawa	Coshocton	Noble
Eerie	Pickaway	Crawford	Paulding
Fairfield	Portage	Darke	Perry
Franklin	Preble	Defiance	Pike
Fulton	Richland	Fayette	Putnam
Geauga	Stark	Gallia	Ross
Greene	Summit	Guernsey	Sandusky
Hamilton	Trumbull	Hancock	Scioto
Jefferson	Union	Hardin	Seneca
Lake	Warren	Harrison	Shelby
Lawrence	Washington	Henry	Tuscarawas
Licking	Wood	Highland	Van Wert
		Hocking	Vinton
		Holmes	Wayne
		Huron	Williams
		Jackson	Wyandot

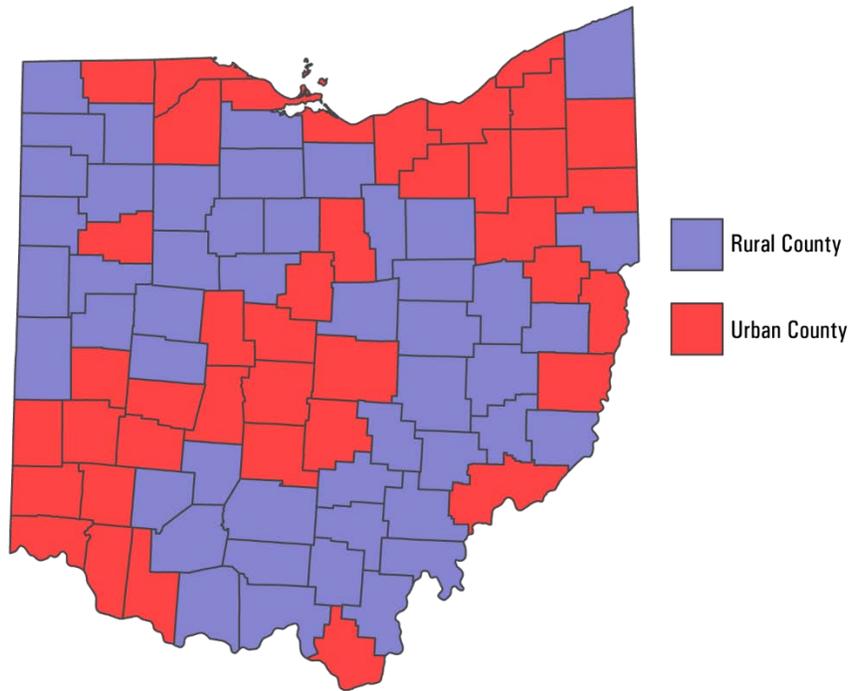


Figure 11: Urban and Rural Counties in Ohio, according to US OMB

## PHASE 1

The Phase 1 coverage objective includes all metropolitan areas and interstates in Ohio. While only 15.77% of the state is covered with this phase (15.77%), this area includes more than 63.39% of the state’s population. Building the first phase along the interstates also provides the network with a robust backbone from which the network can extend in future phases. However, over 72% of incidents recorded within the past three years in the state are included in this area.

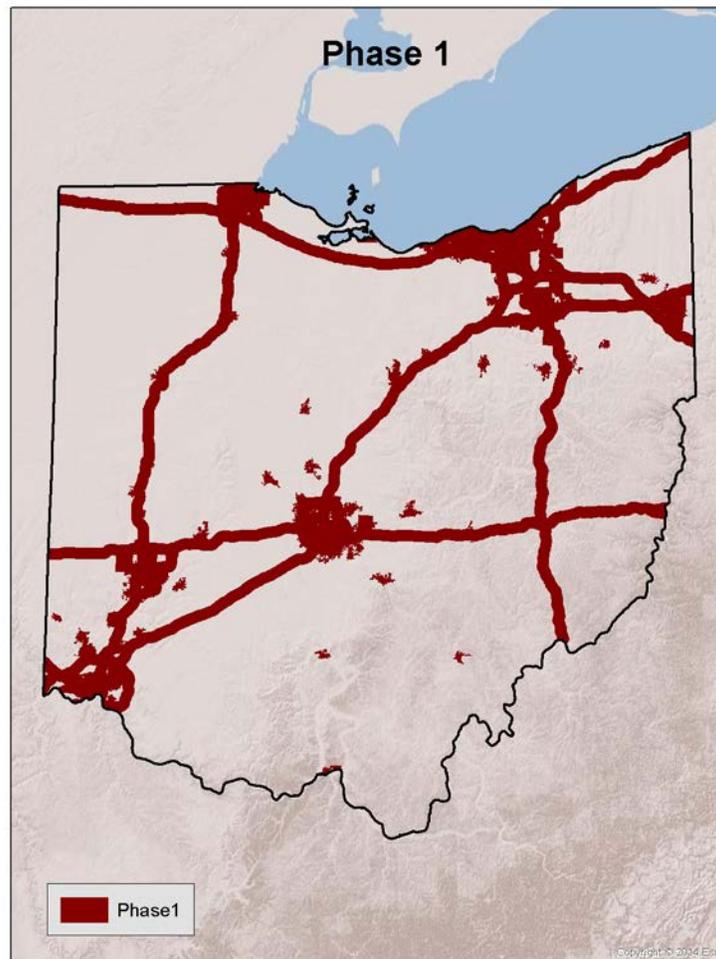


Table 3: Phase 1 Statistics

	Urban	Rural	Total
Percent of Area Covered	28.22%	5.94%	15.77%
Population Covered	74.16%	18.60%	63.39%

## PHASE 2

Phase 2 includes all Critical Service Areas as well as the area covered in Phase 1. Since critical service areas include most populated places in the state, phase 2 serves most of the state’s population already: 87.59% of the state’s total and more than half of the rural population. This phase also covers over 92% of the total incidents recorded in our CAD data.

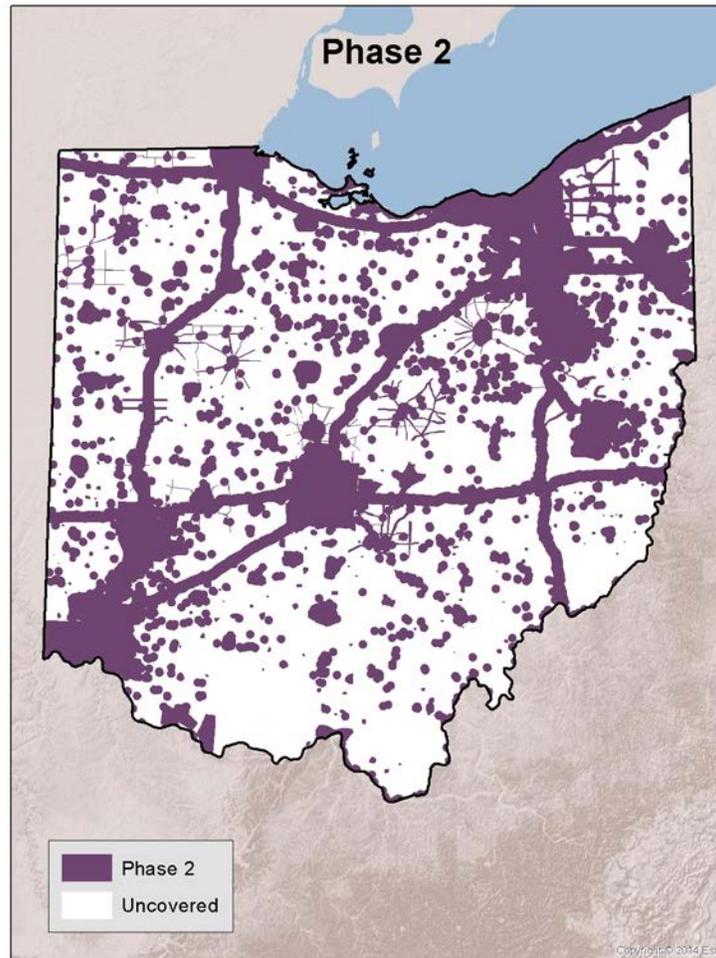


Table 4: Phase 2 Statistics

	Urban	Rural	Total
Percent of Area Covered	52.89%	28.29%	39.15%
Population Covered	92.49%	67.25%	87.59%

### PHASE 3

Phase includes all Extended Service Areas as well as the area covered in Phases 1 and 2 and provides service to nearly every resident in the state as well as over 95% of incidents.

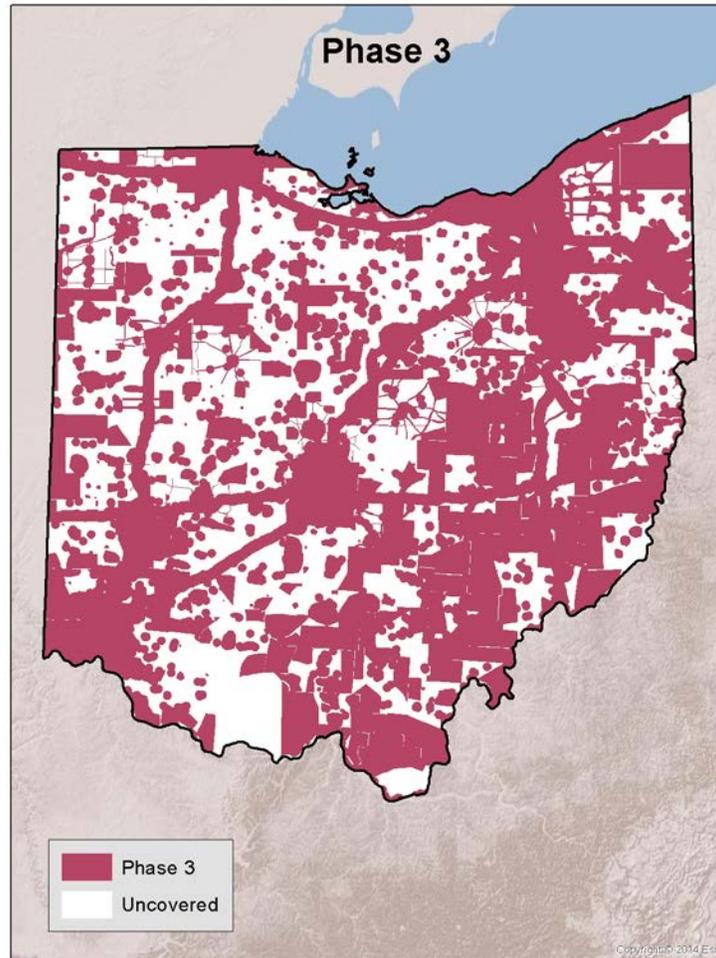


Table 5: Phase 3 Statistics

	Urban	Rural	Total
Percent of Area Covered	67.23%	57.55%	61.83%
Population Covered	94.52%	79.25%	91.56%

## PHASE 4

Phase 4 includes Major Road Areas other than Interstate Areas, which includes a 2-mile area surrounding any highway with a Roadway Functional Class of 2, 3 or 4 as well as the area covered in Phases 1, 2 and 3. This phase covers over 98% of the population of the state and over 98% of incidents that have occurred over the past three years.



Table 6: Phase 4 Statistics

	Urban	Rural	Total
Percent of Area Covered	87.29%	82.27%	84.49%
Population Covered	98.22%	92.49%	97.11%

**PHASE 5**

Phase 5 includes the remaining populated geography of the state as well as the areas covered in Phases 1, 2, 3 and 4. A Populated area, for the purposes of this study, is any area with a non-zero population by census block. Phase 5 brings the final coverage need for the state of Ohio to 99.28% of the state, or roughly the equivalent footprint of the Ohio-MARCS (Multi-Agency Radio Communications System) incumbent land-mobile-radio service area of 99.71% of the state.<sup>7</sup>



Table 7: Phase 5 Statistics

	Urban	Rural	Total
Percent of Area Covered	99.51%	99.09%	99.28%
Population Covered	100%	100%	100%

<sup>7</sup> See <http://das.ohio.gov/divisions/informationtechnology/marcsservices.aspx>

# CONCLUSION

## LESSONS LEARNED

Our team identified a number of lessons learned upon the closing of this project. These include the following:

### Outreach is Key

The fundamental mission of FirstNet—that the Federal government will build a dedicated mission-critical public safety broadband network specifically for public safety—came across to a number of stakeholders as literally unbelievable. In many cases, our program staff had to invest substantial effort in establishing a basic level of credibility before stakeholders were even willing to meet with us. This provided a valuable outreach opportunity with stakeholder agencies throughout the state to improve understanding about FirstNet. Our interaction with these stakeholders will be critical to advancing the program's success in 2017 and beyond as we encourage adoption of the Nationwide Public Safety Broadband Network.

### Collecting CAD Incident Records from Agencies is Extremely Challenging

While we intended to heavily leverage CAD data for all of our coverage reviews, we were unable to secure CAD data from every agency in the state. Some agencies simply did not have CAD systems. A few agencies had recently migrated to a new system and were not able to produce a report, and in one case, the agency reported their vendor's quoted rate for producing a report was prohibitively expensive. In almost all cases, preparing data for our program was the first time stakeholder agencies had prepared such a report.

### Relationships Help

Key members of our program staff had extensive personal relationships through long careers working in Ohio public safety. Throughout the program, we were able to leverage these relationships to encourage stakeholder feedback; people are much more likely to respond to an inquiry from somebody they already know. Our program's ability to schedule a session with every county in the state was successful in no small part due to these built-in personal relationships.

### Incident Occurrence is Strongly Directly Correlated with Population Density

Incident occurrence in the state is very closely correlated with population density; in each coverage phase, incidents covered were within 1-2% of the population covered. However, it's important to note that comprehensive coverage is still required—even though phase 1 and 2 cover most concentrated areas, they do not cover the spaces in-between. This means that responders on patrol or in transit would drop in and out of service if coverage is not provided everywhere.

## CLOSING

These coverage requirements represent the combined efforts of over 482 individual public safety officials at 99 individual coverage reviews conducted over the course of an entire year of study in every county in the state. Interview subjects included line-level, uniformed first responders, elected officials including sheriffs, technical and information technology experts, communications managers, emergency managers, and others. Based on the input of this wide array of stakeholders, our program feels confident that these coverage phases comprehensively represent the critical NPSBN service needs of public safety throughout the state.

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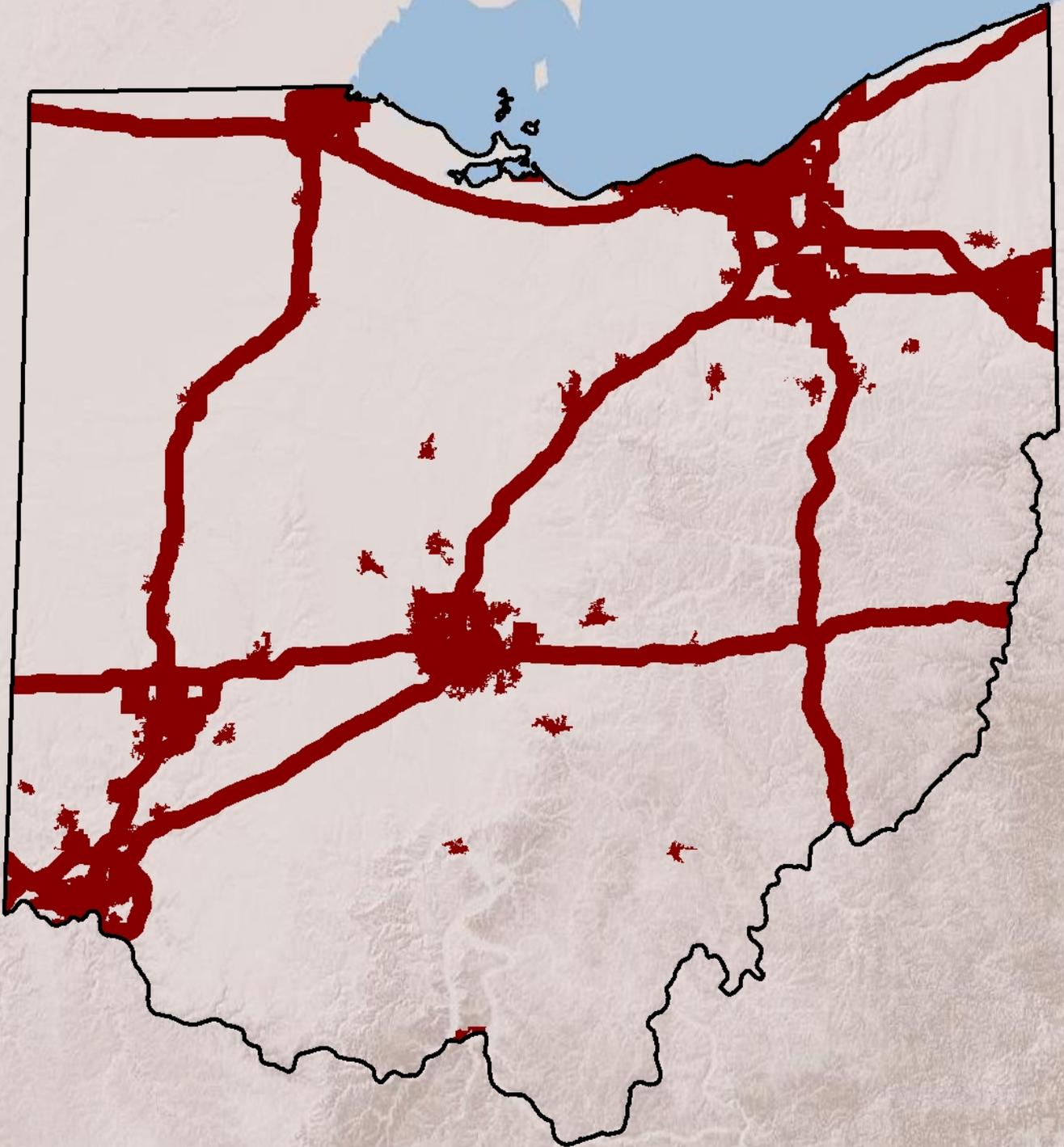
# APPENDICES

**APPENDIX I: COVERAGE PHASES**

**APPENDIX II: CSAs AND ESAs**

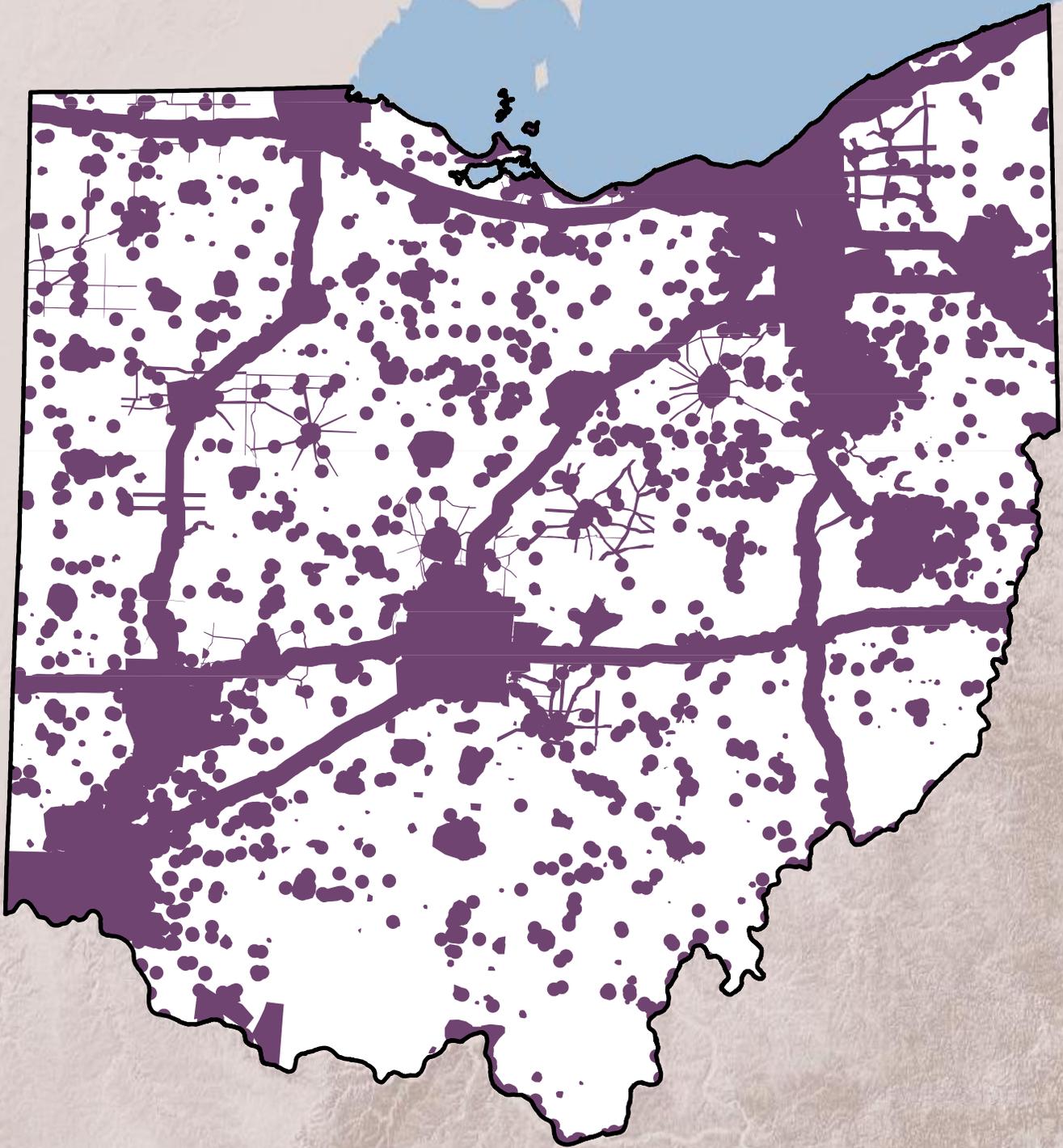
**APPENDIX III: INCIDENT HEATMAP**

# Phase 1

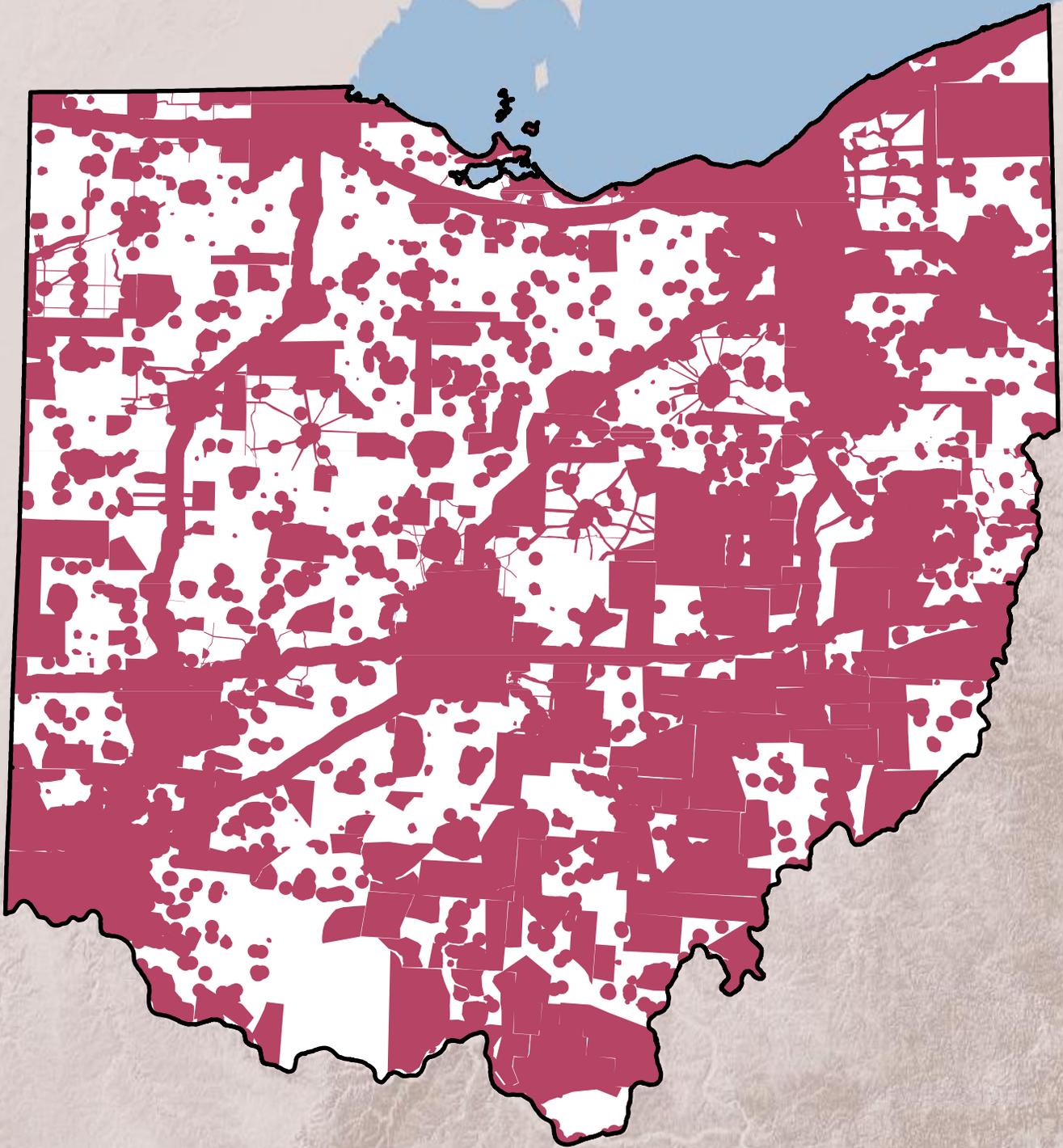


 Phase1

# Phase 2



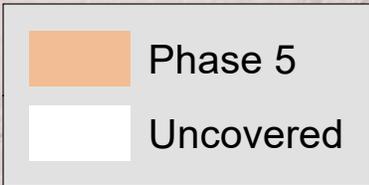
# Phase 3



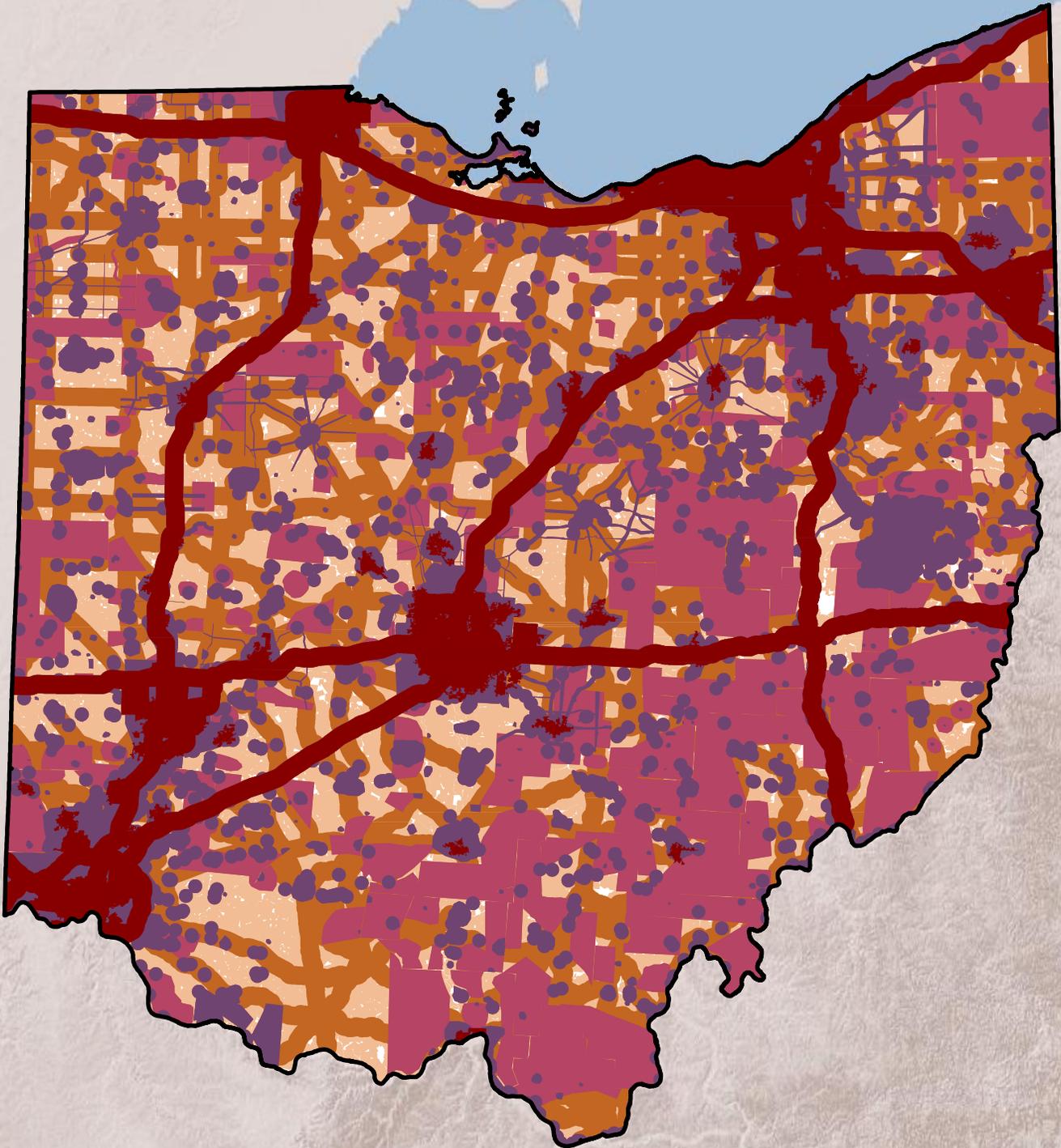
# Phase 4



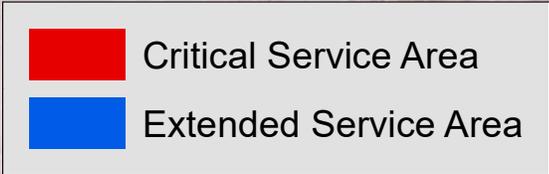
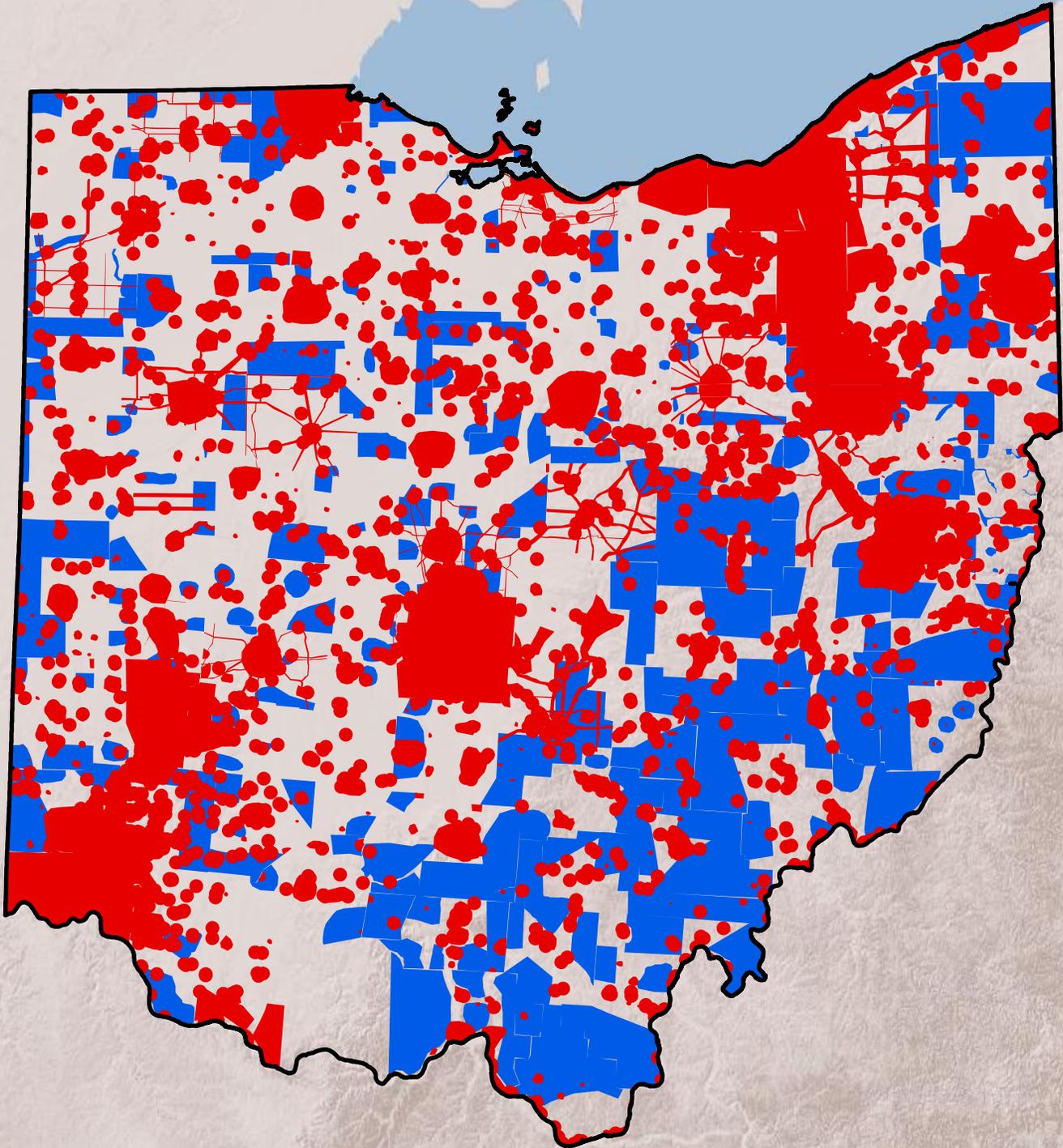
# Phase 5



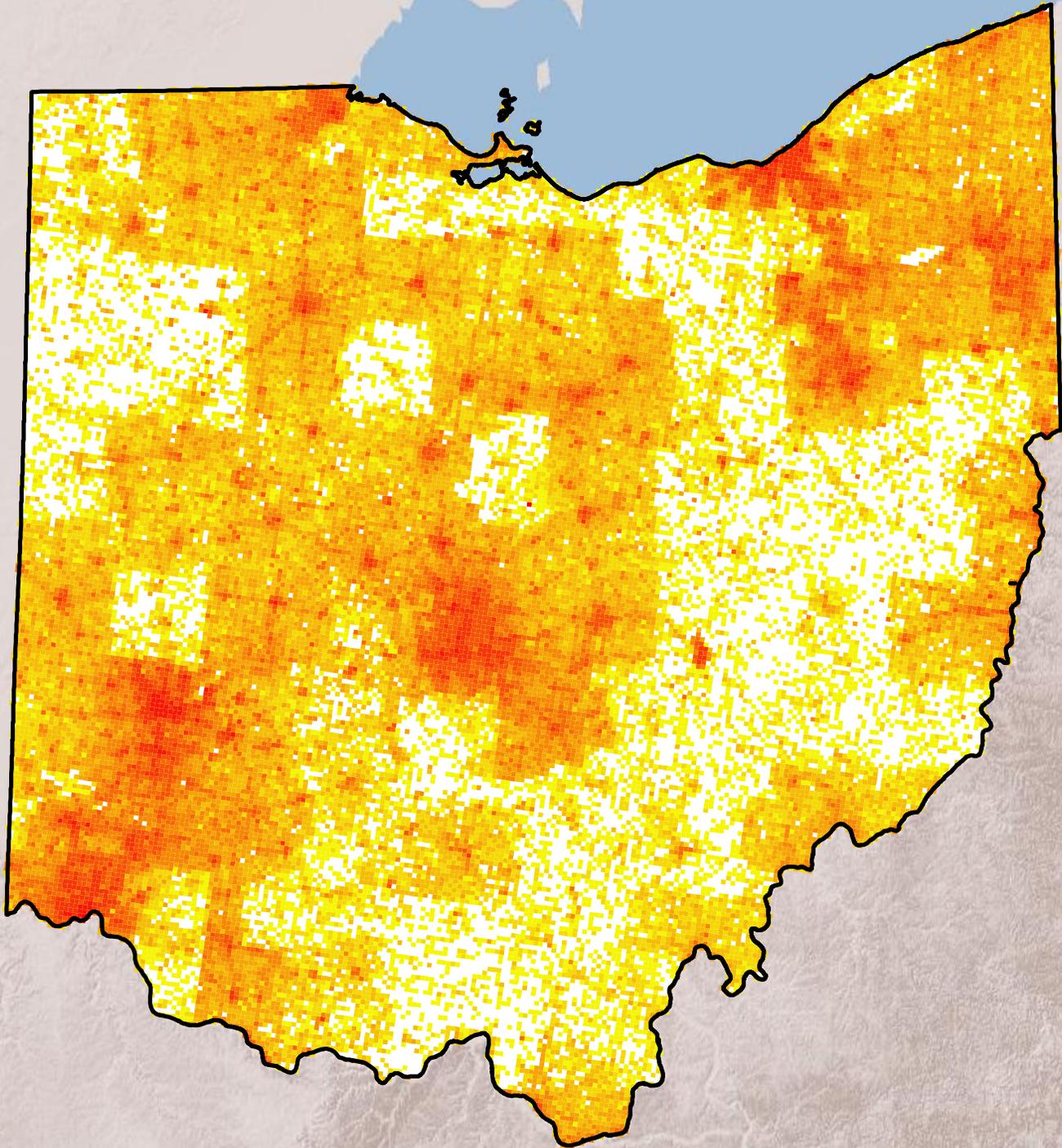
# Phase 1, 2, 3, 4 and 5



# Critical and Extended Service Areas in Ohio



# Ohio CAD Incidents



Incidents per 1 Mile Grid		
 1-2	 44 - 156	 7282 - 26170
 3 - 11	 157 - 563	 26171 - 94052
 12 - 43	 564 - 2025	 94053 - 338009
	 2026 - 7281	 No Incidents