INFORMATION GUIDE:
WIND ENERGY ORDINANCES

Wind turbines are multiplying across the U.S., and most are installed in rural areas overlooking crops, cattle, timber, and lakes. Rural communities have experienced several benefits from the development of wind energy, but the growth of the industry has also presented a challenge in the form of local regulations that may be insufficient or out-of-date.

Wind ordinances on the city, county, and state levels may be hard to understand, whether you are an expert or just becoming familiar with the industry. The Center for Rural Affairs has gathered some helpful items to note when reviewing ordinances.

New ordinance application and project requirements, helpful recommendations, and key definitions found inside.

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DEFINITIONS

Common terms found in wind ordinances include:

Wind Energy Conversion System (WECS) — a machine or mechanism that utilizes wind to generate electricity or mechanical energy. A WECS can be a single turbine or an entire wind farm.

Commercial/utility-scale WECS — wind systems with a total capacity of 100 kilowatts (kW) or greater.

Decibel (dB) — a unit of measurement used for the intensity of a sound.

Decibel A-weighting (dBA) — a measurement of sound using decibels that have been A-weighted. A-weighting is a frequency-dependent curve (or filter) which is applied to a sound pressure microphone to mimic the effects of human hearing. Given the same sound pressure levels, microphone recordings can be different than the levels perceived by the human ear.[1]

Feeder circuits/lines — a power line or network of power lines used as a collection system to carry energy generated by a WECS to a substation or other interconnection point. These lines may be underground or overhead.

System height — refers to the height of a WECS, either the total height or the height to a specific part of the system. Total height is most often defined as the height of a WECS from the ground to the tallest point, usually the tip of a rotor blade.

Meteorological tower — a tower placed near a proposed project site which is used to measure the wind energy resource of the area.

Non-participating landowner — any landowner that has not signed a lease agreement with the project owner or developer, often adjacent to or near the project.

Occupied building — a residence or other building used for public gatherings or that contains human occupants. This definition excludes buildings used for storage, machine shops, and other structures that do not have human occupants for a prescribed length of time.

Operator — the entity or individual that operates a WECS facility.

Owner — the entity or individual that has ownership over a WECS facility.

Participating landowner — a landowner who has signed a lease agreement with a project owner.

Rotor — the hub and blade assembly of a WECS, which is responsible for converting the kinetic energy of wind. The blades of the rotor are pushed by the wind causing this assembly to rotate on its axis.

Residential/small-scale WECS — a system that often has a capacity of less than 10 kW or up to 100 kW. Residential and small-scale WECS may be in separate locations.

Shadow flicker — flickering shadows caused by the rotation of WECS rotor blades in front of a light source, such as the sun.

Substation — a facility used to convert electricity produced by a WECS to a higher voltage allowing for interconnection to high voltage transmission lines.

Transmission line — a power line used to carry electricity from collection systems or substations over long distances.

1 Siemens Experimenter. "What is A-weighting?" July 28, 2016. https://community.plm.automation.siemens.com/t5/Testing-Knowledge-Base/What-is-A-weighting/ta-p/357894. Accessed November 2017.

APPLICATION REQUIREMENTS

County boards require applicants to submit information before they will consider a project. Boards may allow applicants to provide select information at a later date.

COMMONLY REQUIRED ITEMS	
1	Name of applicant.
2	Name of the project owner.
3	Description of the project — this should include the number of turbines, specifications for the turbines (such as height, capacity, manufacturer, model, etc.), locations for turbines and the substation, and proximity to homes and other structures.
4	Map of the project location and the surrounding area.
5	A decommissioning plan outlining the process for turbine removal and property restoration before an easement is returned to the landowner.
6	A power purchase agreement or other agreement for the sale of power generated from the facility.
7	Evidence of a transmission plan or agreement for the project.
8	Acoustical analysis of the project site. This measures sound/noise already present on the land, and provides a baseline for noise level limits that may be outlined in the ordinance.
9	A road use plan that outlines routes that will be used to transport equipment and workers. This plan should include an assessment by a county engineer of the selected roads, and a plan for repairing any potential damage caused to roads by heavy machinery or equipment. The county may also require a bond from the applicant to fix any damage that may occur.
10	Notices from relevant agencies showing the project will not be a hazard to electronic communications or air traffic.
11	Documentation of easement agreements for WECS and associated facilities, if necessary.

PROJECT REQUIREMENTS

Below are several requirements for siting, construction, and operation that are commonly found in ordinances:

1. **Setback requirement** — distance of a WECS from occupied dwellings, and in some cases, property lines. The requirement most often used is 1,000 feet. Turbine height is also commonly used to determine the setback distance, such as a formula of three times the height of a turbine for a setback. County officials may choose to allow some setback requirements to be waived if residents affected by the setback voluntarily agree.

2. **Noise limits** — county officials may create requirements for limits on noise generated by WECS, sometimes dependent on the location that would experience the noise, such as an occupied residence, a nonresidential structure like a school, etc. As previously mentioned, if county officials intend to place limits on noise, the baseline noise level at a project site should be established prior to construction. Limits should be similar to noise standards for other forms of development in the county. Typically, noise standards for WECS are 50 or 45 dBA.

3. **Shadow flicker** — a limit on shadows caused by a WECS at occupied structures. Most ordinances require projects to comply with an annual limit, typically no more than 30 hours annually for each structure. Roadways may also be included as areas with shadow flicker limits.

4. **Lighting** — lights are placed on individual turbines to alert aircrafts of their presence. County officials often require that projects at least adhere to Federal Aviation Administration (FAA) regulations regarding lights on turbines. Some officials choose to prescribe lighting that is in compliance with FAA guidelines but has less visual impact by requiring the use of special lighting systems that avoid continuous lighting. Operators would instead employ tools such as radar to turn on external lighting only when aircrafts are approaching.

5. **Site restoration** — requirement that a project site is sufficiently restored post-construction and prior to any property being made available again to the landowner. This includes removal of equipment and any waste generated by the project, as well as requirements that ensure there has not been significant soil compaction or other damages affecting normal operations on the property.

6. **Signage** — requirements for signs on WECS and associated facilities providing the project name, address, emergency contact information for operator/technicians, and warnings.

7. **WECS appearance** — county officials may make certain requirements for the appearances of a WECS. These standards often require that WECS are a uniform color(s), and limit the addition of logos or signage beyond the name and logo of the project or manufacturer.

RECOMMENDATIONS

We suggest residents and local officials take the following steps when drafting new zoning regulations or ordinances, and when they are approached about a wind farm near their community.

1

Consult experts on key issue areas in a proposed ordinance. For example, specialized equipment and training are required to effectively measure the potential impacts of a wind energy system on sound/noise, frequency, etc. Anecdotal evidence should not be substituted for expert guidance, as it does not provide a sound foundation for zoning standards.

2

Communicate with officials from neighboring or similar counties who have wind development experience. Officials can provide valuable insight and give examples of what has worked in the past, as well as assist in identifying useful items to include in an ordinance.

3

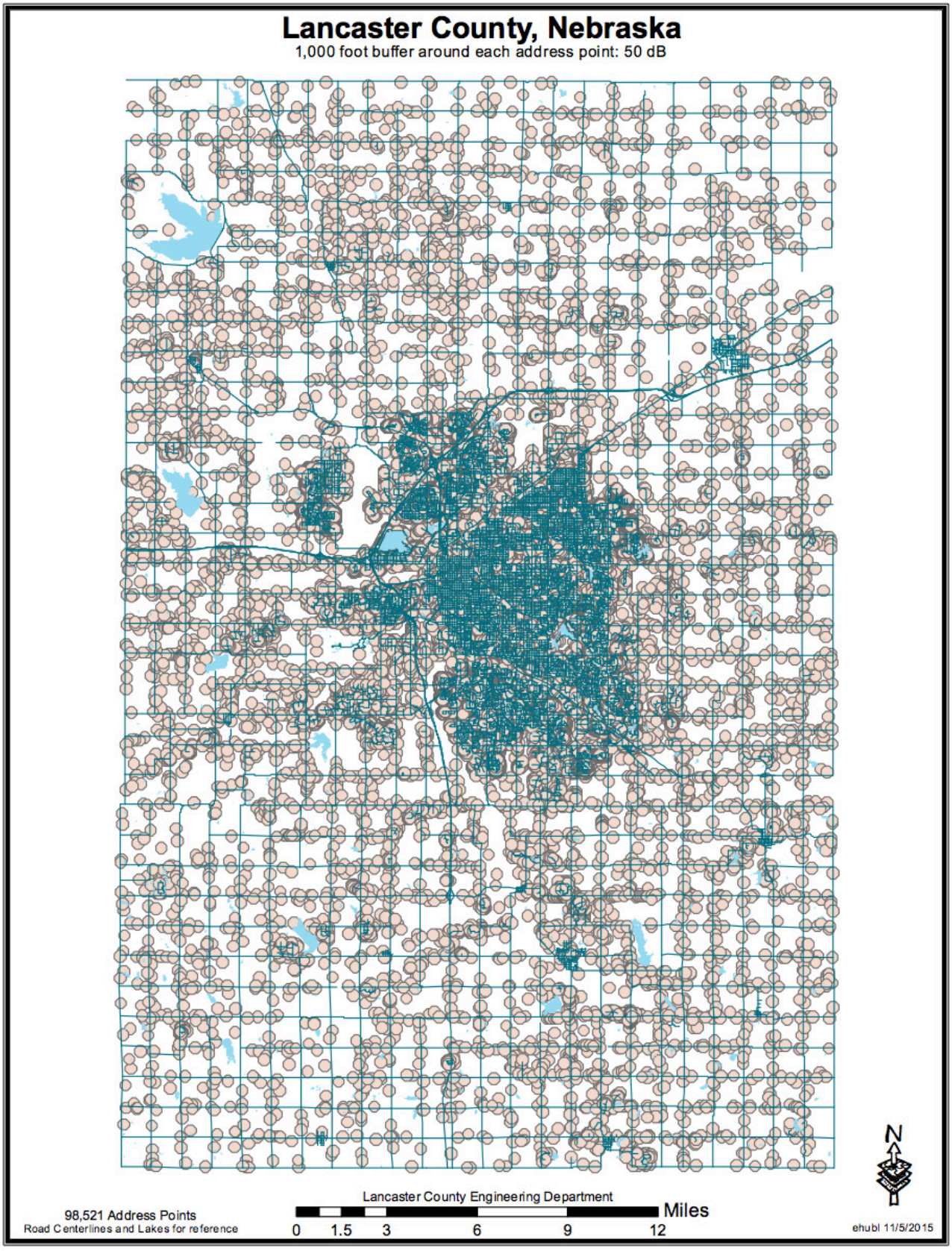
Encourage developers to hold community meetings to engage with members of the public early in the process of project development. The meetings should be an opportunity for developers to provide education on wind energy development, offer specific details about the project, and answer questions from local residents. Community members should also use the opportunity to share specific concerns.

4

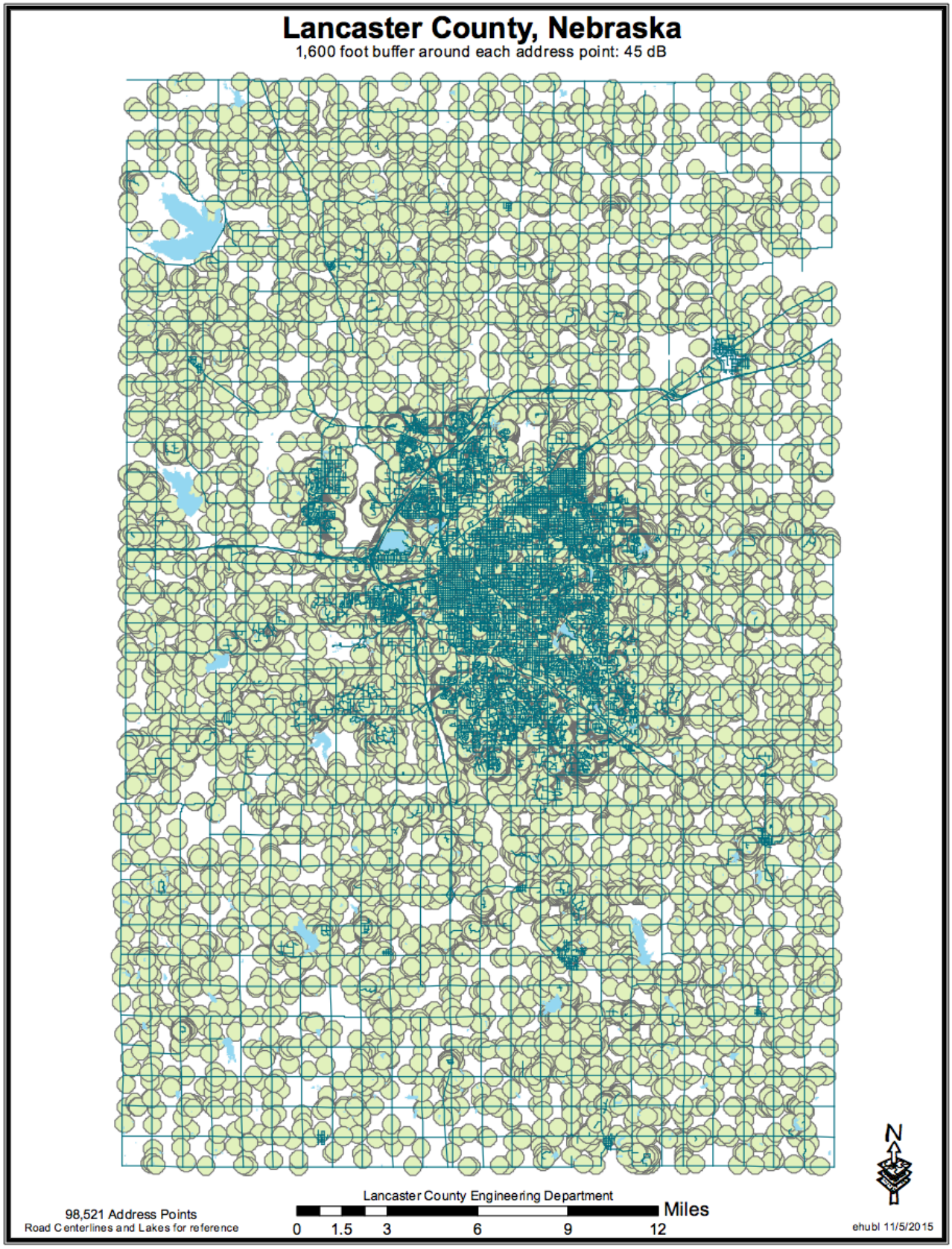
Consider potential unintended consequences of ordinances and zoning standards. Items such as setbacks and noise limits can significantly limit the ability of project developers to site projects in a county if made too restrictive. The Nebraska Farmer's Union has prepared maps showing the effects of increasingly restrictive noise standards on wind development (on the next pages). Each map marks the location of homes and examples of the buffer area that would be required with each noise limit. These maps show how low acceptable noise standards make wind energy development increasingly difficult or impossible.

5

Counties should seek out ways to ensure developers address local concerns. For instance, a common requirement is that developers submit road use plans that include two items: clear measures for mitigating impacts to the local area and steps to repair any damage incurred during the construction of a project. Officials also sometimes require bonds for infrastructure, like roads, setting aside money from a developer to repair any damages caused by construction. Forming additional agreements like these will provide county officials and developers with clear expectations for the use of local land and infrastructure, as well as outline steps a developer or operator will undertake when repairing damages that may occur.



Source: Nebraska Farmer's Union



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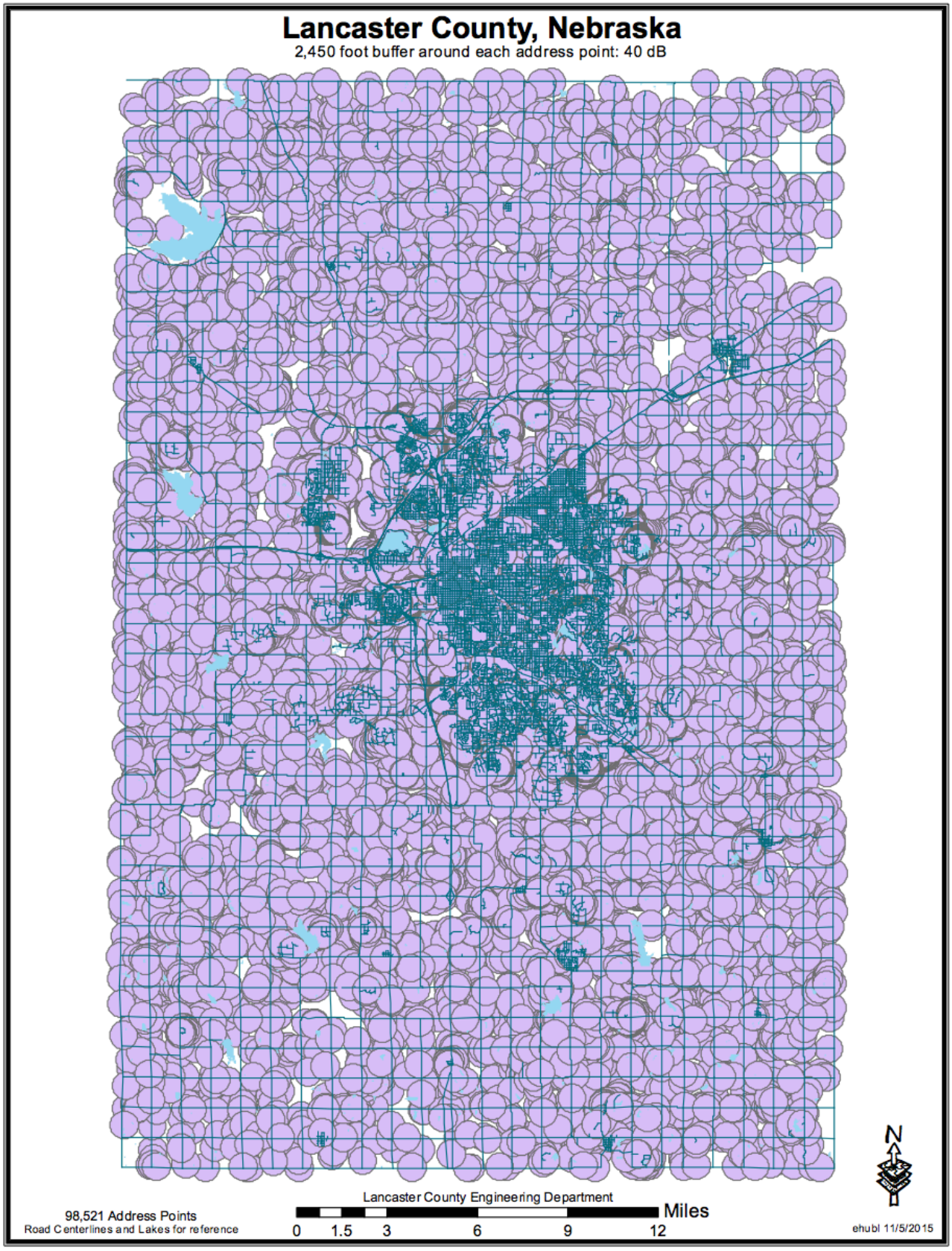
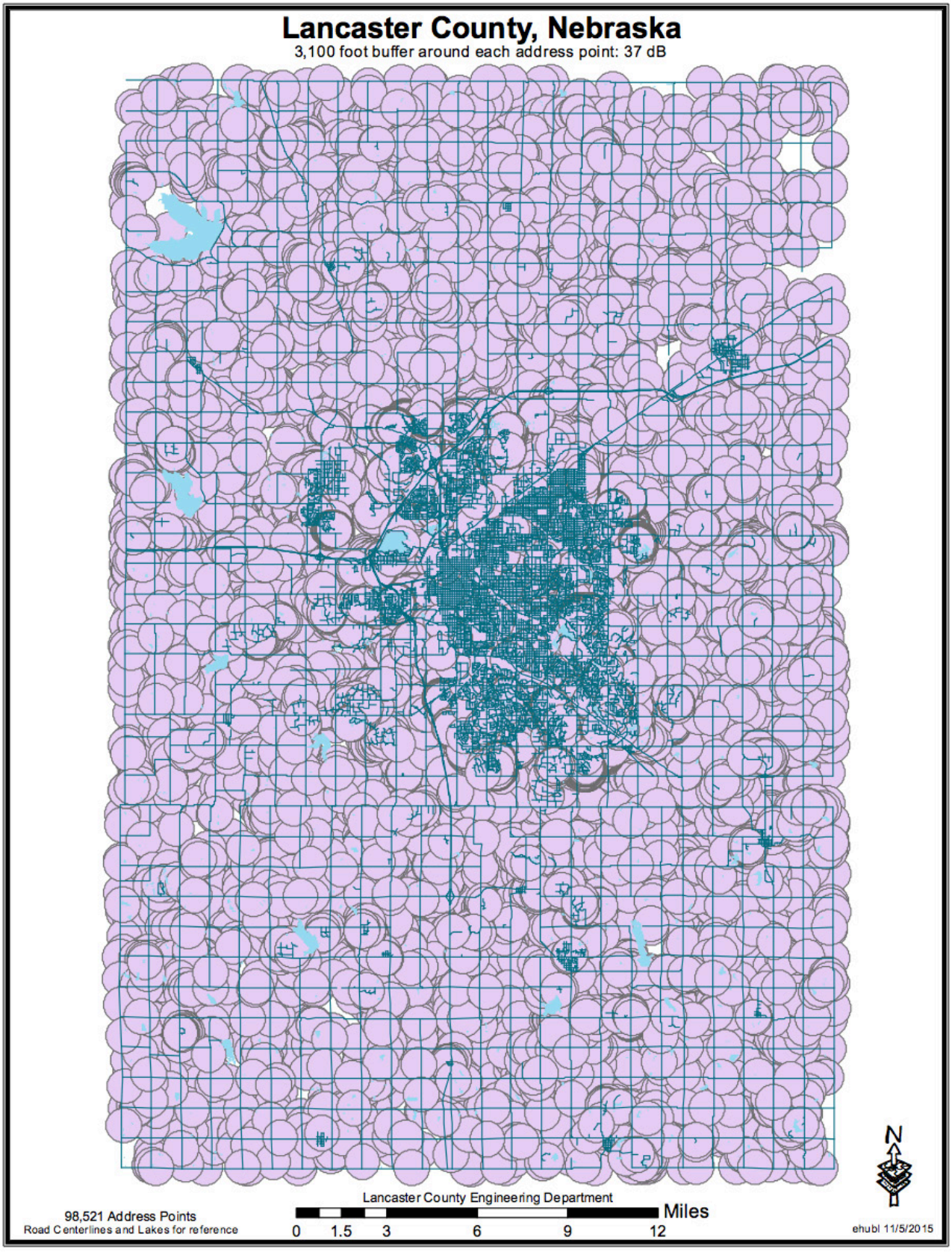


Source: Nebraska Farmer's Union



Source: Nebraska Farmer's Union