

Information Guide: Wind Energy Ordinances



A resource guide by Alex Delworth,
Center for Rural Affairs



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Information Guide: Wind Energy Ordinances

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Wind energy tax revenue offers significant benefits to rural communities. Counties can use the revenue to fund special infrastructure projects, increase funds for county services, or reduce the tax levy on residents.

I. Introduction

A. Wind development and the importance of ordinances

Wind turbines are multiplying across the U.S., with most installed in rural areas. In the past decade, wind power has accounted for 27% of new energy generation. A majority of the penetration has been in the central U.S., with regional grid networks Southwest Power Pool (SPP) and Midcontinent Independent System Operators (MISO) reporting that wind represented 87% and 47% of new generation sources.

Historic federal investments in clean energy have rapidly spurred \$488 billion in private investments since August 2022, or 320,090 megawatts (MW) of clean energy capacity.¹ This is equivalent to the amount of clean energy investment from 1981 to 2022.

Wind energy development offers numerous benefits to rural communities in the form of tax revenue, diversified income for landowners, and job creation.

1 “Clean Energy Investing in America.” American Clean Power, July 31, 2023, cleanpower.org/investing-in-america. Accessed July 2024.

For example, in 2022, Iowa wind turbines had a nameplate capacity of more than 13,000 MW, which generated approximately \$62.5 million in tax revenue for state and local taxing bodies, and wind companies paid \$74.6 million in lease payments to landowners.² Counties can use this money to support education, law enforcement, emergency services, infrastructure projects, or reduce burden on taxpayers. The Midwest’s wind industry also employs more than 39,000 people. The clean energy sector as a whole employed 735,000 people in 2022, with 147,000 working in rural areas.³

Wind ordinances on the city, county, and state levels may be difficult to understand, whether you are an expert or just becoming familiar with the industry. This guide is meant to assist policymakers in discussing wind energy ordinances and designing well-balanced regulations. It is an update to the 2018 wind resource guide from the Center for Rural Affairs to incorporate new information from our expanded siting resources and technological advances in the wind industry.

2 “Clean Power Iowa.” American Clean Power, 2024, cleanpower.org/wp-content/uploads/2024/05/Iowa_clean_energy_factsheet.pdf. Accessed July 2024.

3 “Midwest Clean Energy & Transportation Jobs are Growing.” Clean Jobs Midwest, 2023, cleanjobsmidwest.com/state/midwest. Accessed July 2024.

II. Major provisions in wind ordinances

A. Definitions

The following are common terms found in wind ordinances.

Applicant: An applicant is any person, firm, corporation, partnership, association, trust, or other entity who has, directly or through an agent, submitted an application for a use that requires compliance with the regulations herein.

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

Commercial/utility-scale WECS: A commercial/utility-scale WECS is a wind system with a total capacity of 100 kilowatts (kW) or greater.

Decibel (dB): A decibel is a unit of measurement used for the intensity of a sound.

Decibel A-weighting (dBA): A dBA is a measurement of sound using decibels that have been A-weighted. A-weighting is a frequency-dependent curve (or filter) that 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 from the levels perceived by the human ear.⁴

Fall zone: A fall zone is the area of the land surrounding a wind turbine that may be affected by debris should the supporting structure collapse or any component of the wind turbine or anything attached to it fall to the ground.

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

Turbine height: Turbine height refers to the height of a WECS, either the total height or the height of 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 meteorological tower is placed near a proposed project site and is used to measure the wind energy resource of the area.

Non-participating landowner: A non-participating landowner is someone who has not signed a lease agreement with the project owner or developer. They are often adjacent to or near the project.

Occupied building: An occupied building is a residence or structure used for public gatherings or one 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: An operator is an individual or entity that operates a WECS facility.

Owner: An owner is an individual or entity that has ownership over a WECS facility.

Participating landowner: A participating landowner is someone who has signed a lease agreement with a project owner.

Rotor: A rotor is 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 the assembly to rotate on its axis.

Right-of-way: A right-of-way is a type of easement granted on private property that can be used for public transportation purposes, such as roads, railroads, and electric transmission lines. The right-of-way includes the physical structure and a defined distance on both sides. For example, the right-of-way for a two-lane highway is 50 feet on both sides.

Residential/small-scale WECS: A residential/small-scale WECS 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: Shadow flicker is caused by the rotation of the rotor blades in front of a light source, such as the sun.

Substation: A substation is a facility used to convert the electricity produced by a WECS to a higher voltage, allowing for interconnection to high-voltage transmission lines.

Transmission line: A transmission line carries electricity from collection systems or substations over long distances.

4 “What is A-weighting?” Siemens, Aug. 29, 2019, community.sw.siemens.com/s/article/what-is-a-weighting. Accessed July 2024.

B. Application requirements

Project applications should provide essential information, seen in Table 1, to county boards and zoning officials. County officials should prioritize creating a clear application and review process with well-defined steps and conditions for approval. This allows developers to clearly identify all application requirements for a proposed wind project. Other information regarding items like decommissioning can be provided in updates as the project progresses.

Table 1: Commonly required information for county applications

1	The name of the applicant.
2	The 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, air traffic, and biodiverse areas.
11	Documentation of easement agreements for WECS and associated facilities, if necessary.

C. Setbacks^{5,6}

A setback is the distance from a WECS to certain points of interest like occupied dwellings, property lines, and rights-of-way. These distances are often one of the main topics of discussion as local governments draft wind ordinances. The goal of setbacks should not be to prohibit development but rather to reduce the impact on local stakeholders while allowing it. Every community, county, and state has unique features that policymakers need to consider when thinking about setbacks from different points of interest. The following sections explore in detail the features often included in county setback standards.

1. Occupied buildings

The requirement most often used for setbacks from occupied dwellings or other buildings is a fixed distance between 1,000 and 1,250 feet, which equates to a variable setback of two to three times the height of the turbine. Variable setbacks allow for a more fluid metric that adjusts with changes in turbine technology and heights. Variable setback distances can also save local policymakers time in the future by not having to update their ordinance with new technology. However, some counties use a combination of fixed distance and variable setbacks so they can display a minimum that is easier for residents to conceptualize without having to know the specifications of the turbines.

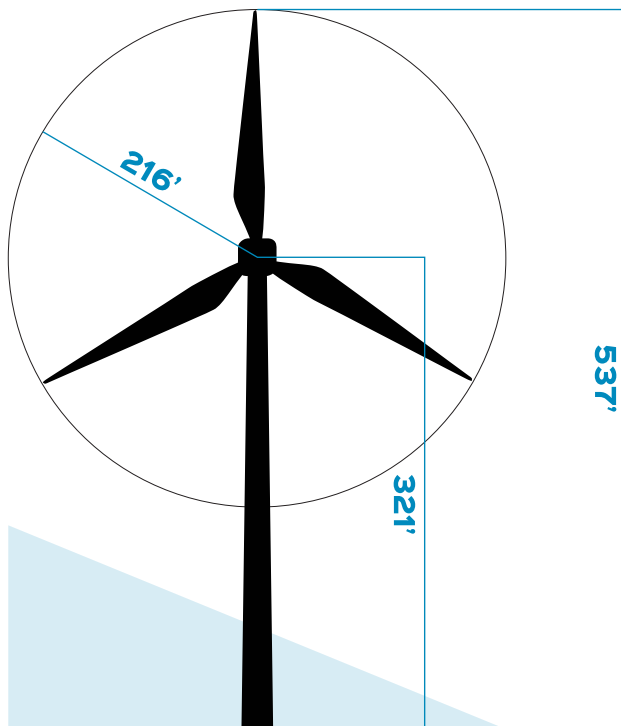
2. Property lines

Two metrics have been found to be the most common for property line setbacks: 1.1 times the height of the turbine, or the length of the turbine blade. See Figure 1 on page 4 for average turbine measurements. The main objective for using the height is to ensure neighboring property is out of the fall zone. Using the blade length ensures there is no overhang of the turbine on the adjoining property. Some ordinances will instead explicitly say that the turbine must be far enough not to have any overhang.

5 Nelsen, Lu, and Lauren Taylor. “Review of Wind Energy Setbacks: Commonalities and Differences Among Three States.” Center for Rural Affairs, March 31, 2020, cfra.org/publications/review-wind-energy-setbacks-commonalities-and-differences-among-three-states. Accessed July 2024.

6 Ibid.

Figure 1: 2022 Average turbine measurements



Turbine height is often defined as from base to blade tip at its highest point. In 2022, the average height of a turbine under that definition was 537 ft. (Hub height [321 ft.] + blade length [216 ft.]

3. Wildlife and public conservation lands

For projects in elevated biodiverse areas such as national and state parks, public forests, or other public conservation lands, additional consideration for creating a unique setback distance can be given. As with any industrial development, wind projects can negatively impact avian wildlife through occasional collisions. Developers are already required to file an incidental take permit per the Endangered Species Act, which requires a Habitat Conservation Plan for protecting vulnerable species. However, policymakers may also want to include special considerations for protected lands with vulnerable species present. Some Iowa counties have ordinances that require developers to have a preliminary review with the Iowa Department of Natural Resources (DNR) and local conservation boards on the planned locations of turbines. Additionally, they require permit applications be sent to agencies mentioned above like the DNR for comment before official approval.

4. Waivers

Officials may choose to allow some setback requirements to be waived if affected residents voluntarily agree. Especially long setbacks may lead to limitations in development as seen in Appendixes one through four.⁷ Granting a waiver gives affected residents and developers more flexibility regarding where the turbines can be placed. When an agreement between the landowner and developer is reached, written proof should be submitted to the siting authority responsible for issuing a setback waiver.

Setback recommendations and resources

Recommendation

- Occupied dwellings or community buildings: two to three times the turbine height or 1,000 to 1,250 feet, whichever is greater
- Property Line: 1.1 times the turbine height or the turbine blade length to have no overhang from abutting systems
- Right of way: 1.1 times the turbine height
- Communication and electrical lines: 1.1 times the turbine height
- Consultation with the local conservation board and state-specific DNR on any need for specific setbacks from elevated biodiverse areas
- Airport setbacks should not be greater than the Federal Aviation Administration (FAA) requirement

Center resources

- Review of Wind Energy Setbacks⁸
- Report Recap: Review of Wind Energy Setbacks⁹
- Environmental Impacts of Renewable Energy¹⁰

7 Graphics provided by Nebraska Farmers Union.

8 Nelsen, Lu, and Lauren Taylor. "Review of Wind Energy Setbacks: Commonalities and Differences Among Three States." Center for Rural Affairs, March 31, 2020, cfra.org/publications/review-wind-energy-setbacks-commonalities-and-differences-among-three-states. Accessed July 2024.

9 "Report Recap: Review of Wind Energy Setbacks." Center for Rural Affairs, June 20, 2020, cfra.org/publications/report-recap-review-wind-energy-setbacks. Accessed July 2024.

10 "Environmental Impacts of Renewable Energy—Wind and Solar." Center for Rural Affairs, June 24, 2019, cfra.org/publications/environmental-impacts-renewable-energy-wind-and-solar. Accessed July 2024.

D. Decommissioning and site restoration¹¹

A decommissioning plan requires a project site to be sufficiently restored post-construction and before any property is returned to the landowner. The plan can include requirements that the turbines be dismantled and all of the equipment removed, as well as defined conditions upon which the process is initiated. The plan should also consider the removal of turbine foundations down to a certain depth, often measured below tillable ground so the land can be returned to agricultural use. Before drafting a decommissioning plan, officials should determine if existing requirements are outlined in the state code.

1. Site restoration

After the WECS infrastructure is removed, consideration should be given to restoring the land to pre-construction conditions. Examples of considerations could include de-compacting the land or reseeded vegetation. Ordinances could also address potential crop loss from the deconstructed turbines. The plan should incorporate any restoration agreements made with landowners.

2. Financial surety

A guarantee that developers bear the cost of decommissioning is often included. This ensures a financial guarantee that the funds will be available upon discontinuation of the systems and that the estimated cost is accurate. Rather than relying on average cost estimates, counties should work with a third-party professional and the developer to determine an accurate cost of decommissioning. This estimate should be updated every five to 10 years. The surety can be established through different financial instruments, such as trusts or escrow accounts, bonds, letters of credit, or other types of agreements.

3. Equipment disposal

Counties may choose to limit the number of turbine blades a local landfill may accept or ban them entirely. Landfill disposal is generally the most accessible and least expensive method of decommissioning wind turbine blades, but there are environmental drawbacks and disposal may not be allowed or available in certain places.

A county should not place additional disposal requirements. Instead, an ordinance should focus on removal or disposal within a county's jurisdiction. To reduce the amount of materials sent to landfills, developers should consider finding companies or organizations that may be able to recycle or repurpose blades.

Decommissioning recommendations and resources

Recommendation

Counties should craft decommissioning plans that include the following items:

- Defined conditions of when the decommissioning of a project will commence and the timeline of activities
- Specific requirements for:
 - » Removal of equipment to not interfere with pre-construction operations
 - » Transportation and disposal or salvage of decommissioned materials
 - » Restoration of land and roadways before removal of the parts and equipment
- A financial guarantee through an approved financial instrument on projected cost for decommissioning with a third-party estimate and periodic updates

Center resource

- Decommissioning Wind Energy Systems¹²

E. Noise

In drafting an ordinance, county officials may place limits on the noise generated by WECS. Limits should be measured at the applicable setback distance from an occupied dwelling or building. If county officials intend to place limits, the baseline noise level at a project site should be established before construction begins and should be similar to standards for other forms of development in the county.

Since sound decreases as it travels from the source, the noise will be louder at the base of the system. The noise from turbines produces a sound pressure of 100 dBA. At 1,300 feet, the sound pressure typically falls at or below 40 dBA,¹³ the noise level

11 Hoffer, Cora. "Decommissioning Wind Energy Systems Resource Guide." Center for Rural Affairs, June 6, 2024, cfra.org/decommissioning-wind-energy-systems. Accessed July 2024.

12 Ibid.

13 "Fact Sheet: Wind Energy and Noise." Center for Rural Affairs, Sept. 18, 2019, cfra.org/publications/wind-energy-and-noise. Accessed July 2024.

similar to that of a library, while 50 dBA is similar to a quiet suburb or conversation at home.¹⁴

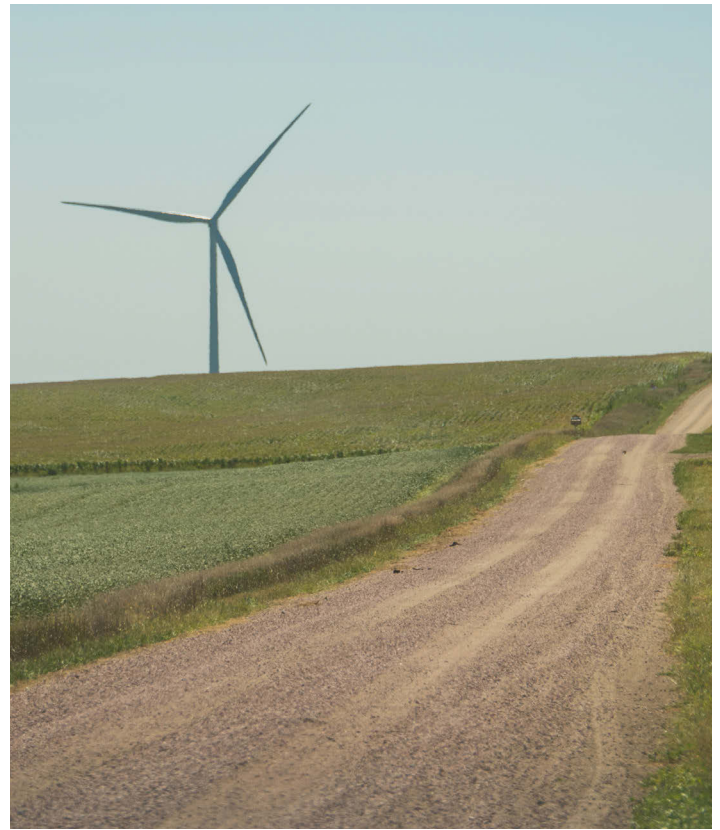
Noise recommendation and resource

Recommendation

- Noise requirements should be no less than 45 to 50 decibels measured from the setback distance of occupied buildings.

Center resource

- Wind Energy and Noise¹⁵



F. Shadow flicker¹⁶

Shadow flicker is the effect of repetitive “shadows” being cast due to the turning of the blades. Officials may consider setting a limit on shadows caused by a WECS at occupied structures. Most ordinances require projects to comply with an annual limit based on the number of hours shadow flicker will occur. Shadow flicker limits may also be established for roadways. Developers can map areas that could be affected by shadow flicker during the planning phase. The goal of setting regulations is to limit annoyance caused by the flicker.

Shadow flicker is unlikely to contribute to any health conditions like photosensitive epilepsy, as those are typically triggered at 5 to 30 hertz. Flickers caused by turbines generally fall between 0.6 and 1 hertz.

Shadow flicker recommendation and resource

Recommendation

- Shadow flicker provisions should not exceed more than 30 hours annually for each structure.

Center resource

- Wind Energy and Shadow Flicker¹⁷

An ordinance should require developers to identify which roads will be used for transportation and submit a pre-construction review of the current road conditions. The ordinance should then require the developer to restore or pay for any damage to public infrastructure like roads, bridges, and drainage systems.

G. Road-use agreement and construction remediation

(Also referred to as Avoidance and Mitigation of Damages to Public Infrastructure)

During the installation of a wind energy project, crews will haul large and heavy equipment to and from job sites. An ordinance should require developers to identify which roads will be used for transportation and submit a pre-construction review of the current road conditions. The ordinance should then require the developer to restore or pay for any damage to public infrastructure like roads, bridges, and drainage systems.

Road-use agreement and construction remediation recommendation

Recommendation

- County officials should put a process in place for assessing and repairing infrastructure before construction commences.

14 “Comparative Examples of Noise Levels.” iac acoustics, iacacoustics.com/blog-full/comparative-examples-of-noise-levels. Accessed July 2024.

15 “Fact Sheet: Wind Energy and Noise.” Center for Rural Affairs, Sept. 18, 2019, cfra.org/publications/wind-energy-and-noise. Accessed July 2024.

16 “Fact Sheet: Wind Energy and Shadow Flicker.” Center for Rural Affairs, Sept. 18, 2019, cfra.org/publications/wind-energy-and-shadow-flicker. Accessed July 2024.

17 Ibid.

H. Additional siting standards

1. Lighting¹⁸

Wind turbines are required to have lights placed on individual turbines to alert aircraft of their presence. Developers already have to abide by FAA regulations regarding lights on turbines, but ordinances commonly include this measure. Officials can also 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. Developers can employ tools such as radar to turn on lighting only when approaching aircraft are detected.

Lighting recommendation and resource

Recommendation

- Officials should first refer to official FAA guidelines when crafting an ordinance. When a project is proposed, officials can consult with the developer about alternative lighting for individual projects.

Center resource

- Wind Energy and Lighting¹⁹

2. Signage

Signage recommendation

Recommendation

- Officials should require signs on WECS and associated facilities with the project developer's name, address, emergency contact information for operators, and warnings. Other signage information may be considered if warnings about icing under certain conditions or other pertinent information is needed for safety.

18 "Fact Sheet: Wind Energy and Lighting." Center for Rural Affairs, Sept. 18, 2019, cfra.org/publications/wind-energy-and-lighting. Accessed July 2024.

19 Ibid.

3. Icing²⁰

While the overall risk of ice may be small, local officials may want to consider including language regarding icing in their ordinance if accumulation in a project area is likely. Officials can request information about the developer's procedures during periods of icing and methods to detect ice formation on systems.

Minimum setbacks recommended in this guide should be adequate to eliminate the risk of ice throws in regions where formation is likely. Officials can require signage to warn people about the risk of ice throws in certain weather conditions.

Icing recommendation and resource

Recommendation

- Only add language for ordinances affecting geographical areas where ice formation is likely. Officials may require developers to share their procedures to identify ice formations and mitigate potential ice throws.

Center resource

- Icing and Wind Energy Systems²¹

4. Vegetation management²²

The increasing development of wind energy systems requires land for both the placement of turbines and to access roads, often on agricultural lands. While solar farms offer great opportunities to create pastureland in singular blocks, wind farms can contribute in a more dispersed manner. Officials may require developers to plant prairie strips, which are diverse native vegetation mixes, along access roads and around turbines. Prairie strips have been shown to increase pollinator and native bird species' habitats and reduce water runoff at peak streamflow during flooding events.

20 "Fact Sheet: Icing and Wind Energy Systems." Center for Rural Affairs, Sept. 18, 2019, cfra.org/publications/icing-and-wind-energy-systems. Accessed July 2024.

21 Ibid.

22 Smith, Cody. "Amplifying Clean Energy with Conservation Part Three: Exploring Wind Energy and Stewardship." Center for Rural Affairs, Dec. 1, 2020, cfra.org/publications/amplifying-clean-energy-conservation-part-three-exploring-wind-energy-and-stewardship. Accessed July 2024.

Vegetation management recommendation and resource

Recommendation

- Include language for prairie strips along access roads and around turbines.

Center resource

- Amplifying Clean Energy with Conservation Part Three: Exploring Wind Energy and Stewardship²³

5. Wind Energy Conversion System (WECS) appearance

County officials may make certain requirements for the appearance 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.

WECS recommendation

Recommendation

- Ordinances should require WECS to be a uniform color(s) and limit the addition of logos or signage beyond the project or manufacturer's name and logo.

III. Other considerations

A. Prime farmland and WECS

The increased development of renewable energy systems has raised concerns about prime farmland being taken out of production. These concerns have mostly been with solar energy, but have also included wind energy systems.

A 2009 study by the National Renewable Energy Laboratory examined 93 wind projects to determine their permanent land impact. This includes the land needed for the base of turbines, the land surrounding them, and any complementary access roads. They found an average of .74 acres per megawatt of capacity was directly impacted. For example, a 4 MW capacity wind turbine would need about 3 acres of land.

In 2021, Iowa had a capacity of 11,804 MW of wind production and a total of 30.5 million acres of

farmland.^{24,25} Applying National Renewable Energy Laboratory's average acre-to-megawatt ratio, this would equate to 8,734 acres of land being used for wind production, or 0.02% of the state's farmland. Even with the continued buildout of wind energy in Iowa, the development will have a negligible effect on farmland overall.

Additionally, construction restrictions on farmland tied to higher quality land ratings like Corn Suitability Rating are not recommended. These restrictions infringe on the rights of private property landowners to decide how best to use their land.

Prime farmland resource

Center resource

- Sifting through Solar: Land-Use Concerns on Prime Farmland²⁶

B. Community Benefit Agreements²⁷

A Community Benefit Agreement is a project-specific agreement made between developers and communities to gain support for a wind project.²⁸ While communities will see benefits from wind projects, such as increased tax revenue and a diversified income source for landowners, this type of agreement provides additional measurable benefits. Through a Community Benefit Agreement, local leaders, community groups, and developers can agree to terms, such as local hiring commitment, a living

24 "Iowa's Electric Profile." Iowa Utilities Commission, iub.iowa.gov/iowas-electric-profile. Accessed July 2024.

25 "Iowa Ag News—Farms and Land in Farms." U.S. Department of Agriculture, National Agricultural Statistics Service, Feb. 18, 2022, nass.usda.gov/Statistics_by_State/Iowa/Publications/Other_Surveys/2022/IA-Farms-02-22.pdf. Accessed July 2024.

26 Delworth, Alex. "Sifting through Solar: Land-Use Concerns on Prime Farmland." Center for Rural Affairs, May 21, 2024, cfra.org/sifting-through-solar. Accessed July 2024.

27 Tope, Mallory. "Empowering Rural Development through Community Benefit Agreements." Center for Rural Affairs, July 3, 2024, cfra.org/CommunityBenefitAgreements. Accessed July 2024.

28 "Guide to Advancing Opportunities for Community Benefits through Energy Project Development." U.S. Department of Energy, Office of Minority Business & Economic Development, Aug. 1, 2017, energy.gov/diversity/articles/community-benefit-agreement-cba-resource-guide. Accessed July 2024.

23 Ibid.

wage requirement, allocation of resources to community funds, and direct donations to local emergency services and schools.

In Rock County, Minnesota, a local developer agreed to donate \$2,000 per megawatt produced annually to a newly established community fund, in addition to its production tax payments. The community has used the fund for scholarships, playground equipment, and grants for communities in the project's footprint. Other Minnesota counties have similar agreements in place and have funded community festivals and other small projects.

Community Benefit Agreement resource

Center resource

- Empowering Rural Development through Community Benefit Agreements²⁹

C. Taxation of wind energy systems

Wind energy tax revenue offers significant benefits to rural communities. For example, Lincoln County, Minnesota, collected more than \$20 million in tax revenue from wind energy between 2004 and 2021. The current development will account for \$3,695 in taxes per county resident over the project's lifetime.³⁰ Counties can use the revenue to fund special infrastructure projects, increase funds for county services, or reduce the tax levy on residents.

In some states, local officials must pass an ordinance to collect the maximum amount available. For example, in Iowa, state code Section 427B.26 gives counties the ability to establish ordinances for a special valuation of wind energy conversion systems that allows them to collect more taxes than they otherwise would.³¹

29 Tope, Mallory. "Empowering Rural Development through Community Benefit Agreements." Center for Rural Affairs, July 3, 2024, cfra.org/CommunityBenefitAgreements. Accessed July 2024.

30 Malone, Molly. "Industry on the Prairie: Minnesota Wind Energy Production Tax Impact Studies." Center for Rural Affairs, Nov. 29, 2022, cfra.org/publications/industry-prairie-minnesota-wind-energy-production-tax-impact-studies. Accessed July 2024.

31 "Iowa Code 2023, Section 427B.26. Special valuation of wind energy conversion property." Iowa Legislature, Dec. 30, 2022, legis.iowa.gov/docs/code/427b.26.pdf. Accessed July 2024.

Taxation recommendation and resources

Recommendation

- Officials should conduct additional research within their state to be sure they are not missing out on the full impact of wind tax revenues.

Center resources

- State-specific fact sheets on wind energy tax revenue: Iowa,³² Minnesota,³³ Nebraska,³⁴ North Dakota,³⁵ South Dakota³⁶

IV. Lancaster County, Nebraska, noise and setback maps

The Nebraska Farmers Union has prepared maps showing the effects of increasingly restrictive noise standards on wind development. Each map marks the location of homes and examples of the required buffer area for each noise limit. The maps show how low acceptable noise standards can make wind energy development increasingly difficult or impossible. The maps also show how increasingly long setbacks from dwellings can make wind energy development difficult. See appendix.

32 "Fact Sheet: Iowa Wind Energy Tax Revenue." Center for Rural Affairs, May 1, 2019, cfra.org/publications/iowa-wind-energy-tax-revenue. Accessed July 2024.

33 "Fact Sheet: Minnesota Wind Energy Tax Revenue." Center for Rural Affairs, July 21, 2022, cfra.org/publications/fact-sheet-minnesota-wind-energy-tax-revenue. Accessed July 2024.

34 "Fact Sheet: Nebraska Wind Energy Tax Revenue." Center for Rural Affairs, Dec. 11, 2018, cfra.org/publications/nebraska-wind-energy-tax-revenue. Accessed July 2024.

35 "Fact Sheet: North Dakota Wind Energy Tax Revenue." Center for Rural Affairs, Dec. 11, 2018, cfra.org/publications/north-dakota-wind-energy-tax-revenue. Accessed July 2024.

36 "Fact Sheet: South Dakota Wind Energy Tax Revenue." Center for Rural Affairs, Dec. 11, 2018, cfra.org/publications/south-dakota-wind-energy-tax-revenue. Accessed July 2024.



Community engagement is crucial to the successful development of regulations for wind energy systems. Local officials and developers need to seek input from all affected stakeholders and ensure their interests are taken into consideration.

V. Summary of best practices recommendations

Application requirements

- Establish a clear and well-defined application process with essential information such as geographical locations of the planned project sites, construction and road-use plans, and purchase power agreements, among other information.

Setbacks

- Occupied dwellings or community buildings: two to three times the turbine height or 1,000 to 1,250 feet, whichever is greater
- Property Line: 1.1 times the turbine height or the turbine blade length to have no overhang from abutting systems
- Right of way: 1.1 times the turbine height
- Communication and electrical lines: 1.1 times the turbine height
- Consultation with the local conservation board and state-specific DNR on any need for specific setbacks from elevated biodiverse areas
- Airport setbacks should not be greater than the FAA requirement

Decommissioning and site restoration

A decommissioning plan that includes these items:

- Defined conditions of when the decommissioning of a project will commence and the timeline of activities.
- Specific requirements for:
 - » Removal of equipment to not interfere with pre-construction operations
 - » Transportation and disposal or salvage of decommissioned materials
 - » Restoration of land and roadways before removal of the parts and equipment
- A financial guarantee through an approved financial instrument on projected cost for decommissioning with a third-party estimate and periodic updates.

Noise: Noise requirements should be no less than 45 to 50 decibels measured from the setback distance of occupied buildings.

Shadow flicker: Shadow flicker provisions should not exceed more than 30 hours annually for each structure.

Road use and construction remediation: A process is in place for assessing and repairing infrastructure before construction commences.

Lighting: Officials should first defer to FAA regulations; however, officials can consult with developers about alternative lighting for individual projects.

Signage: Signage posted that provides the project name, address, emergency contact information for operators or technicians, and warnings.

Icing: Only adding language for deicing and other measures for ordinances affecting areas where ice formation is likely. Officials may require developers to share their procedures to identify ice formations and mitigate potential ice throws.

Vegetation management: Officials could include language for prairie strips along access roads and around turbines.

WECS appearance: Language stating 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.

VI. Community engagement and recommendations of process

Community engagement is crucial to the successful development of regulations for wind energy systems. Local officials and developers need to seek input from all affected stakeholders and ensure their interests are taken into consideration. Hosting community meetings and public input sessions where residents can ask questions and share their concerns with developers and local officials provides transparency and can build trust with local residents.

Community engagement recommendations and resource

Recommendation

- When local officials are approached about a wind development project near their community or are drafting new zoning regulations, they should follow these steps:
 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. Engage with the community as early as possible in the planning stages of the project. Hold public meetings and provide other opportunities for community members to become engaged and share feedback during the zoning regulations development process. If a wind project is being proposed, meetings should be an opportunity for developers to provide education on wind energy development, offer specific details about the project, and answer questions from residents. Developers should also be encouraged to hold their own public meetings for fur-

ther community engagement opportunities. This helps build trust and allows for feedback and concerns to be shared and addressed.

4. Provide clear and concise information about the ordinance or project and its potential benefits and impacts to the community. 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, as seen in the Lancaster County setback maps.
5. Counties should seek out ways to ensure developers address local concerns that may have arisen during the public meetings. Counties should look to address those through requirements within their ordinance and be clear with the public on how it will alleviate the 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 construction of a project. Forming additional agreements like these will provide county officials, developers, and communities 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.

Center resource

- Best Practices for Community Engagement³⁷

37 “Best Practices for Community Engagement.” Center for Rural Affairs, July 8, 2024, cfra.org/publications/best-practices-community-engagement. Accessed July 2024.

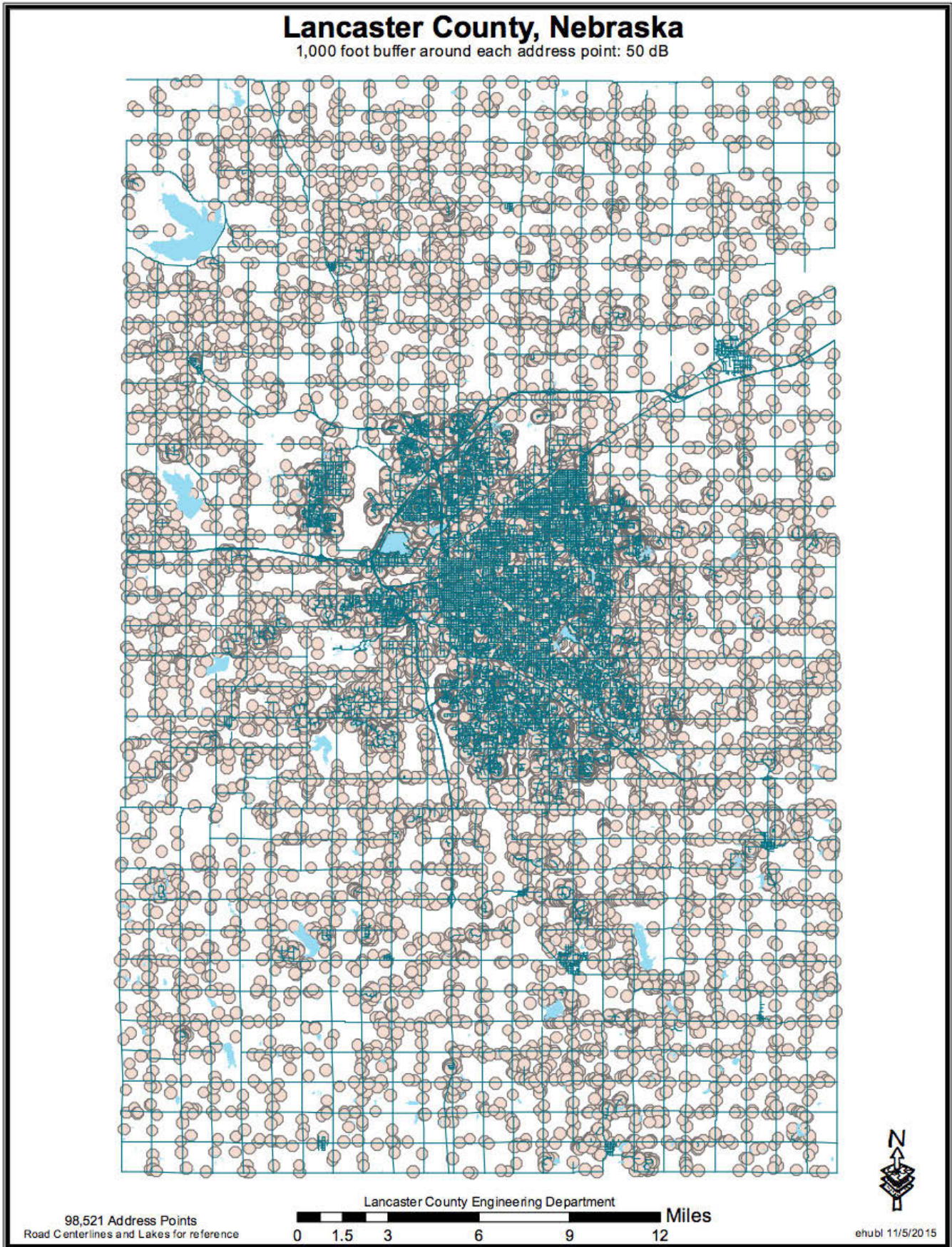
VII. Conclusion

In setting regulations for wind energy development, county officials should strive for well-crafted and balanced ordinances that promote the safety and well-being of residents, not target certain projects or restrict development overall. Regulations should take local concerns and issues into consideration but also allow residents to take advantage of the emerging development without harming existing operations. A review of numerous county ordinances and available data shows balanced ordinances that consider both development and community concerns are possible.

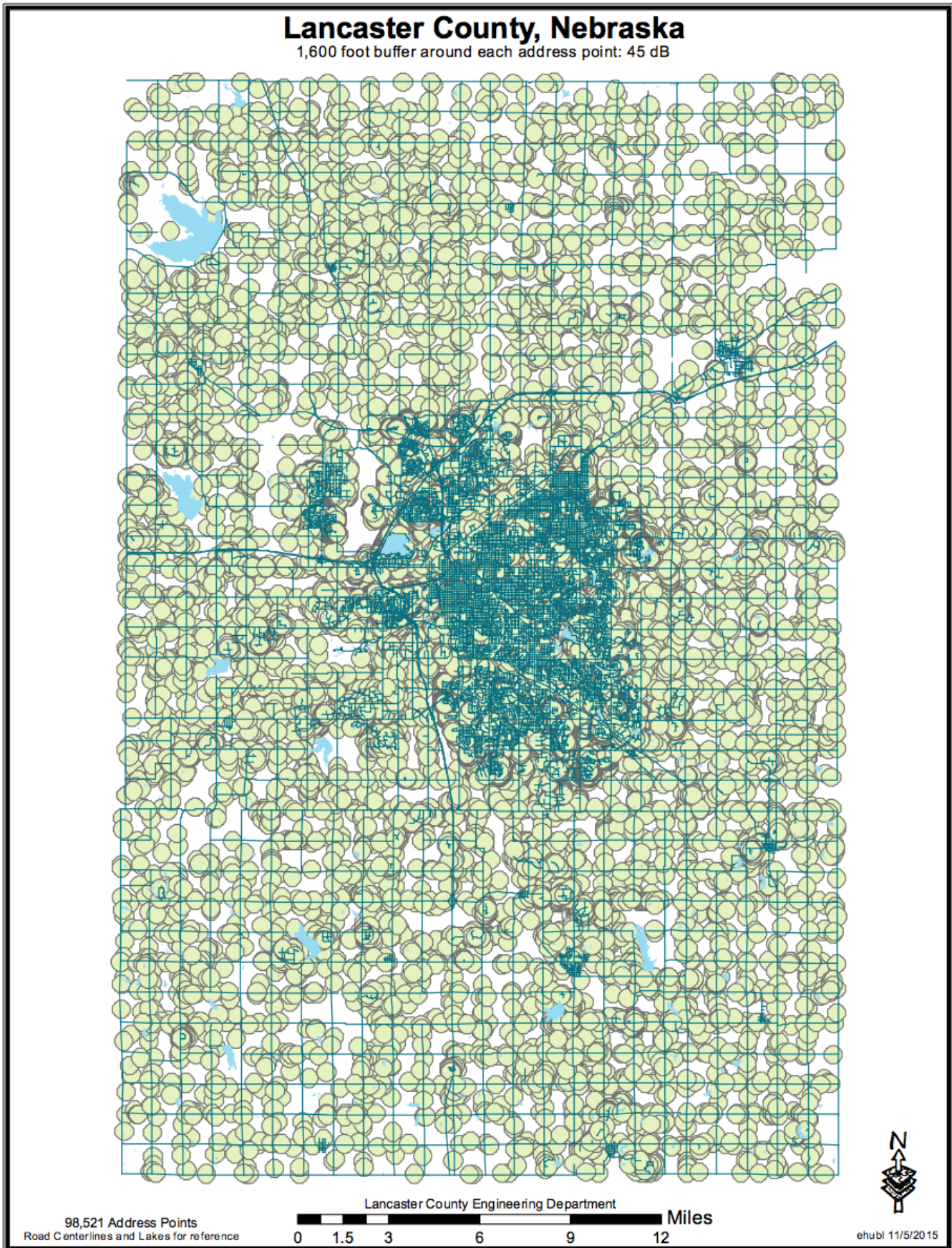
About the Center for Rural Affairs

Established in 1973, the Center for Rural Affairs is a private, nonprofit organization with a mission to establish strong rural communities, social and economic justice, environmental stewardship, and genuine opportunity for all while engaging people in decisions that affect the quality of their lives and the future of their communities.

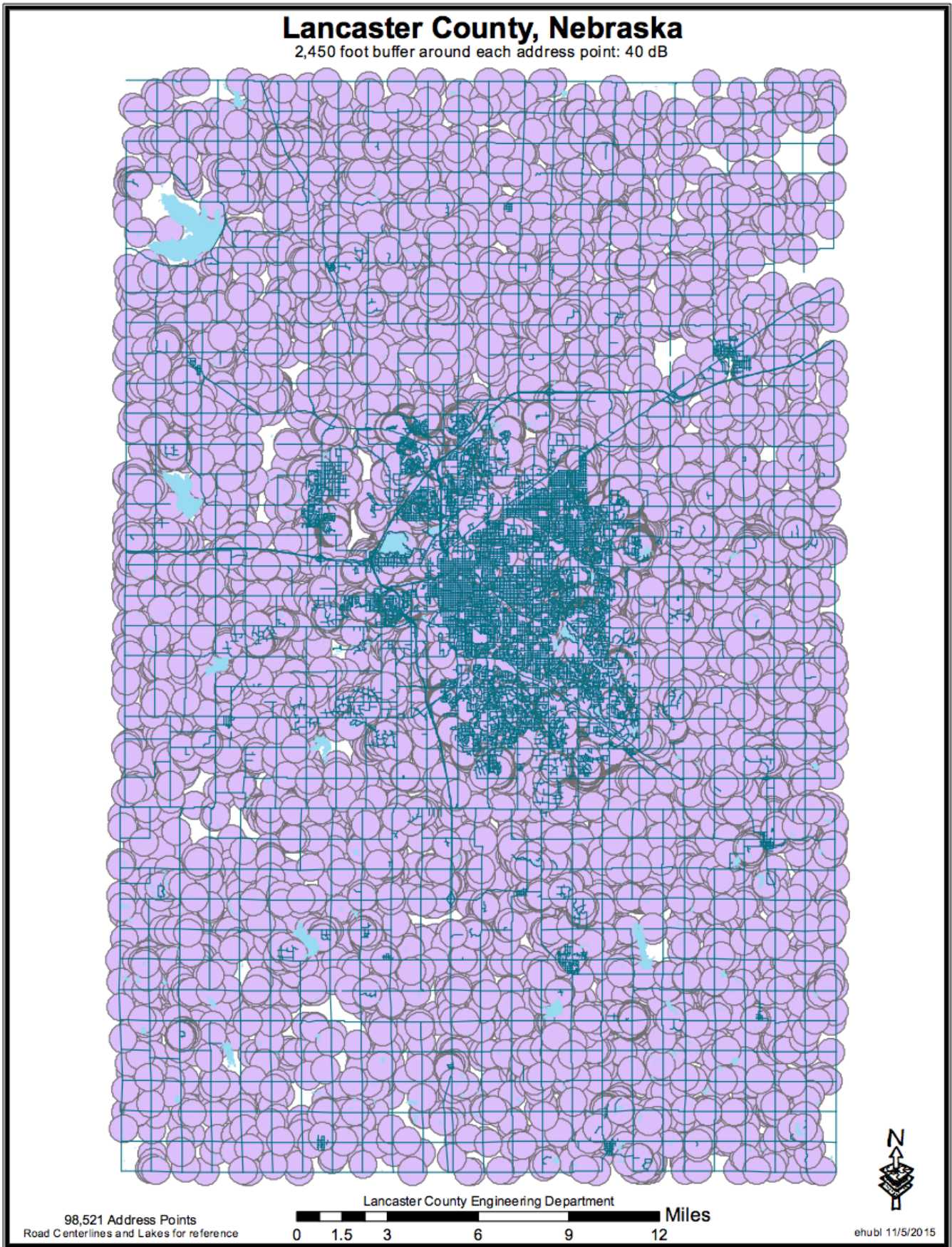
Appendix 1: Lancaster County setback map: 1,000 foot buffer from residences



Appendix 2: Lancaster County setback map: 1,600 foot buffer from residences



Appendix 3: Lancaster County setback map: 2,450 foot buffer from residences



Appendix 4: Lancaster County setback map: 3,100 foot buffer from residences

