



# MEETING 2 TOPICS

Presentation to the Wind Energy Working Group

March 26, 2015

# AGENDA

- Economic Implications
- Environmental Implications
- Shadow Flicker
- Ice Throw
- Lancaster and Gage Regulations
- Sample Regulations from Other Jurisdictions
- Wind Energy Associations of Property Owners
- Comments from the Public



# ECONOMIC IMPLICATIONS

## ○ County Tax Base

- Nameplate Capacity Tax – LB1048 established this to replace taxation of depreciable tangible personal property. \$3,518 per MW per year
- Property tax – Wind turbines and their supporting structures (towers) are exempt from depreciable tangible personal property tax. Land continues to be taxed as it was before tower construction. Real property (concrete pads, foundations, operation and maintenance buildings, roads, leaseholder value, and lease payments) is not exempt from property tax.



# ECONOMIC IMPLICATIONS

## ○ Land Owners

- Fixed rent/Royalties – property owners who lease their property for wind development are generally compensated with annual lease payments. They may also receive royalties directly tied to the actual turbines on their property.
- Construction/Installation fees – additional compensation during construction phase to compensate for disturbance.
- Neighbor Agreement Compensation – payments may be made to landowners who are impacted but do not have leases.
- Easements – easements can be purchased for transmission lines, fall zones, noise impacts



# ECONOMIC IMPLICATIONS

## ○ Jobs and Contracting

- Construction and Development – temporary positions may be filled by local or out of town workers. Boost to economy during construction in the form of lodging, services, food, etc...
- Ongoing Operations and Maintenance – Operation and maintenance crew. Local training programs may mean opportunity for local hires. My live in local communities.

## ○ Handout



# ENVIRONMENTAL IMPLICATIONS

## ○ Air

- No emissions during operation
- No emissions or other impacts from transport of fuels
- Manufacture and maintenance may produce some emissions

## ○ Water

- No water used in operations
- Foundations typically about the depth of a residential basement – no impact on water table
- No pollution of water from emissions or heavy metals



# ENVIRONMENTAL IMPACTS

## ○ Land

- Relatively small footprint, may still use surrounding area for agriculture
- Erosion is primary impact, must provide erosion control plan as part of building permit
- Topsoil should be sequestered and replaced after construction – this would have to be part of the agreement with land owner



# ENVIRONMENTAL IMPACTS

## ○ Direct

- Refers to collision of birds and bats with towers, blades or transmission lines
- Increased when wind farm is located along migratory paths

## ○ Indirect

- Habitat fragmentation or loss
- Some species may avoid areas near turbines
- Particularly high impact to intact grasslands



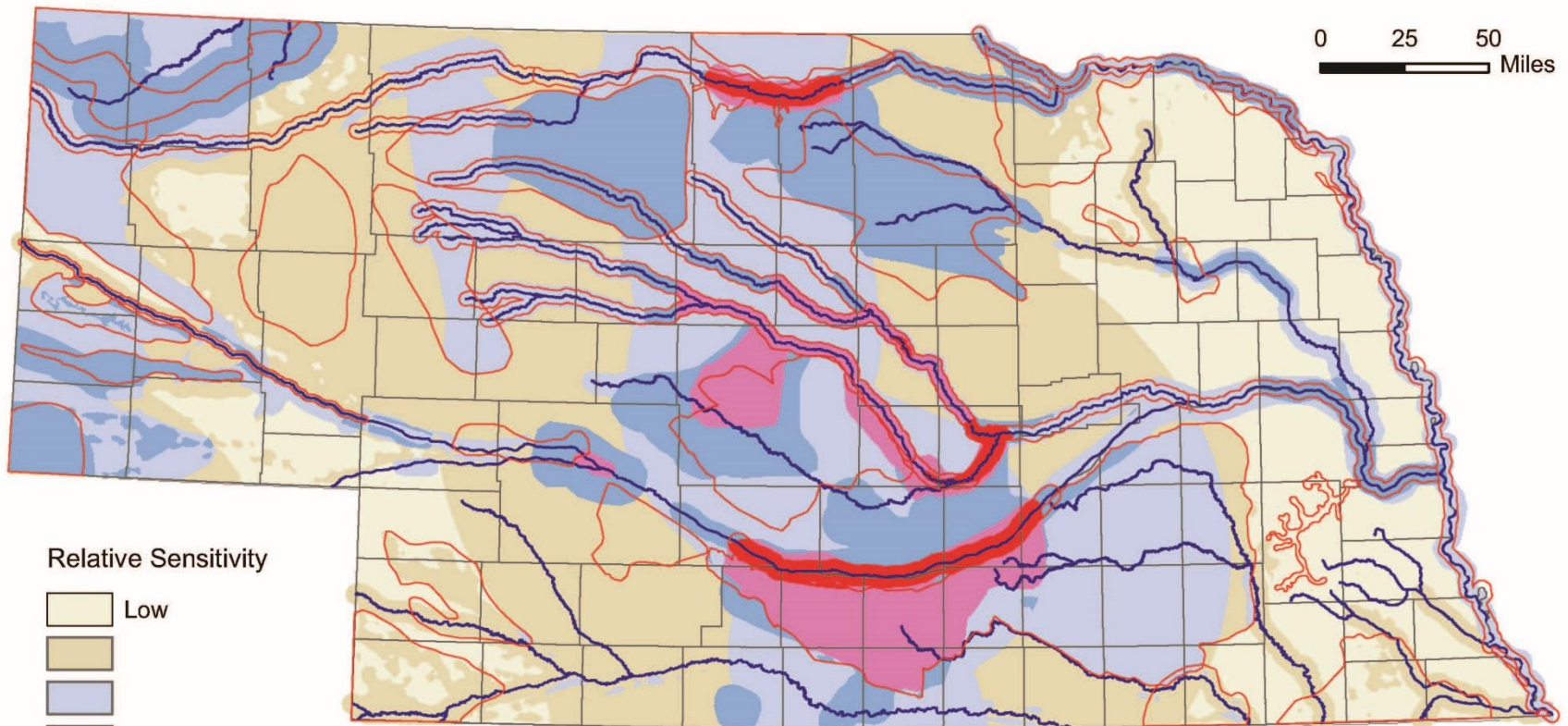


# ENVIRONMENTAL IMPACTS

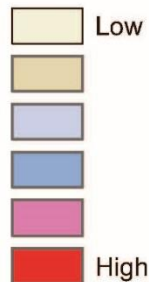
- Nebraska Wind and Wildlife Map
  - identifies sensitive areas
  - Specific locations must still be evaluated
- Guidelines for Wind Energy and Wildlife Resource Management
  - Non-regulatory recommendations
  - May mitigate identified impacts
- Avian Assessment Guidance for Wind Energy Facilities in Nebraska
  - Specifically addresses impacts to birds



# Wind Energy and Nebraska's Wildlife: An index of the sensitivity of wildlife habitats to wind energy development, based on selected at-risk species



## Relative Sensitivity



## Biologically Unique Landscapes

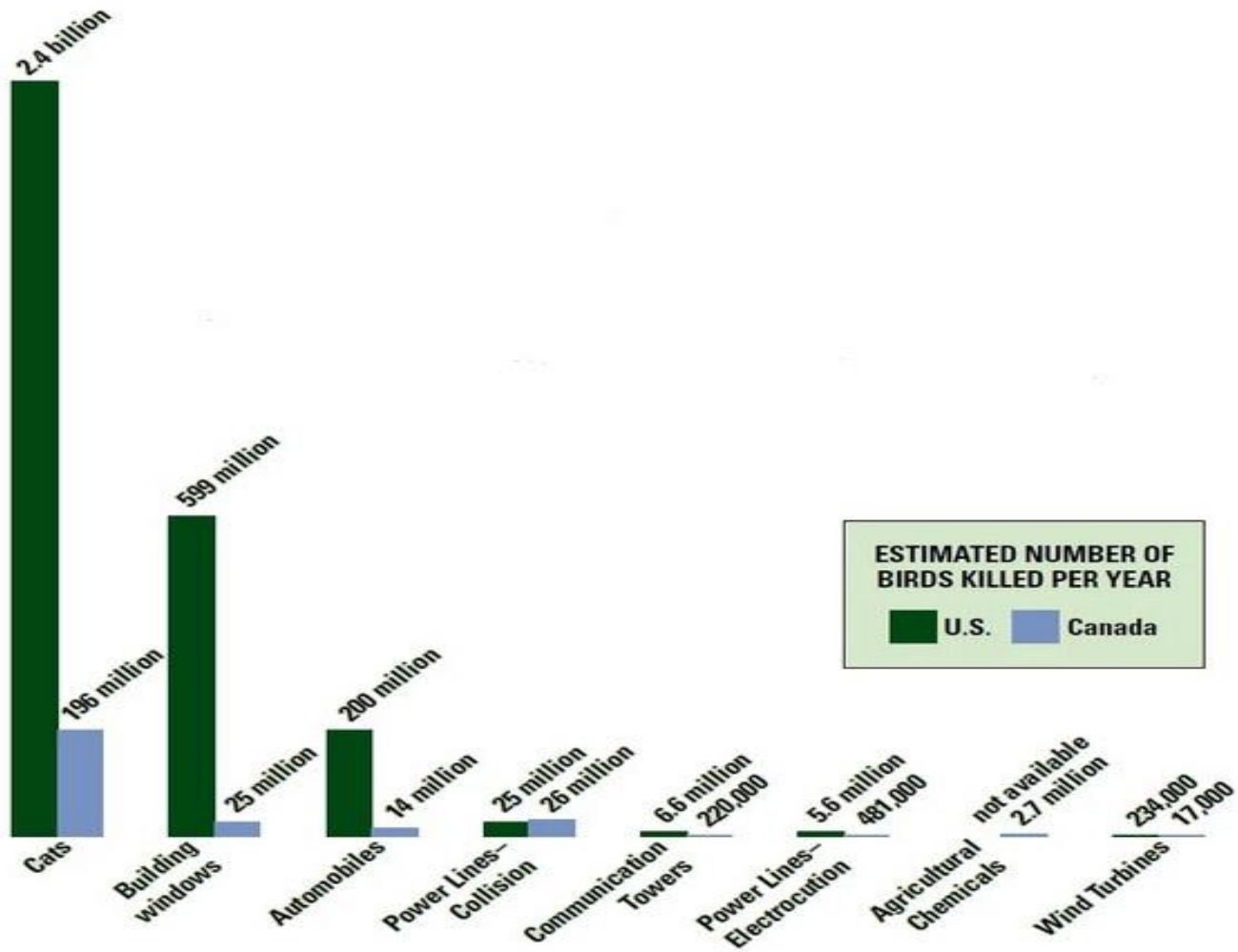


This map was designed to aid in planning for wind energy development by identifying areas that are considered relatively more sensitive or less sensitive to such development, with respect to species of concern. This map is not designed to evaluate wind farm siting at specific locations. Even in "low sensitivity" areas shown, there will be specific locations where siting of wind power infrastructure can negatively impact significant biological resources (e.g. remnant tallgrass prairie, listed plant species, etc.). Contact the Nebraska Game and Parks Commission and the U.S. Fish and Wildlife Service for potential site-specific impacts and potential conservation measures to avoid "take" under the state Nongame and Endangered Species Conservation Act and the federal Endangered Species Act.

See attached document for a description of the information used to develop this map.

Map version date: October 1, 2011

# ESTIMATED NUMBER OF BIRDS KILLED/YR



# SHADOW FLICKER

- Caused by the moving shadow of the wind turbine blades as they rotate in front of the sun
- Area of shadow changes throughout the day and season to season.
- Area of shadow is larger, but moves over an area faster, in the morning and evening, smaller and slower in the middle of the day
- Commercial turbines typically rotate at one cycle per 3 seconds, or one “flicker” per second. (note: flashes of one every 5 to 20 seconds are found to induce seizure in epileptic patients)



# SHADOW FLICKER

- Can be modeled with computer software
- Models can predict the number of hours per year that flicker can be expected to occur
- Factors:
  - Distance
  - Wind direction
  - Solar angle
  - Topography
  - Vegetation

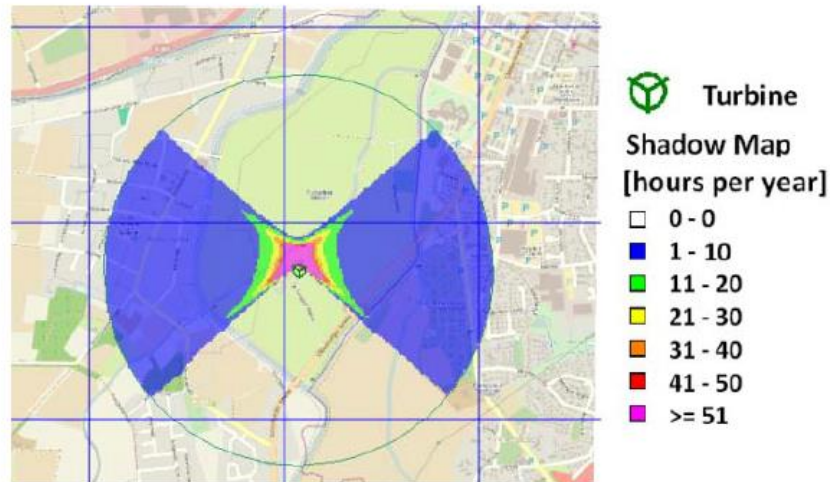


Figure 1: Shadow flicker map for hours per year, calculated with WindFarmer



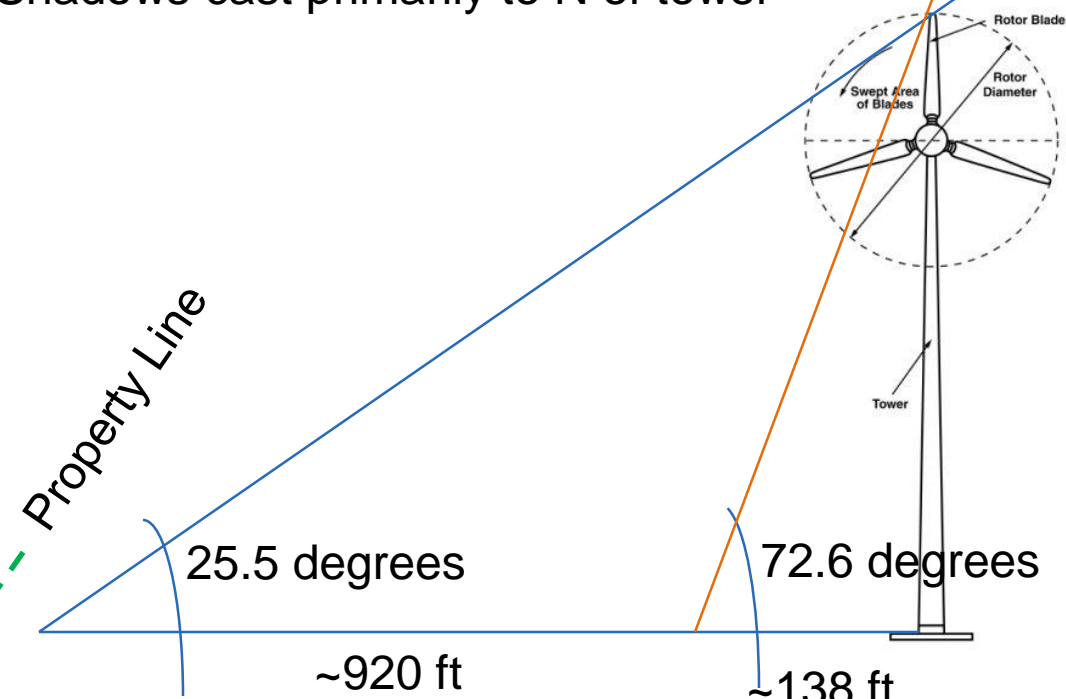
# SOLAR ANGLE – ANGLE OF THE SUN AS ITS RAYS HIT THE EARTH ON A PARTICULAR DATE AND TIME



Wind direction in Lancaster County is primarily N and S  
Face of blades will most often face N or S  
Shadows cast primarily to N of tower



Property Line



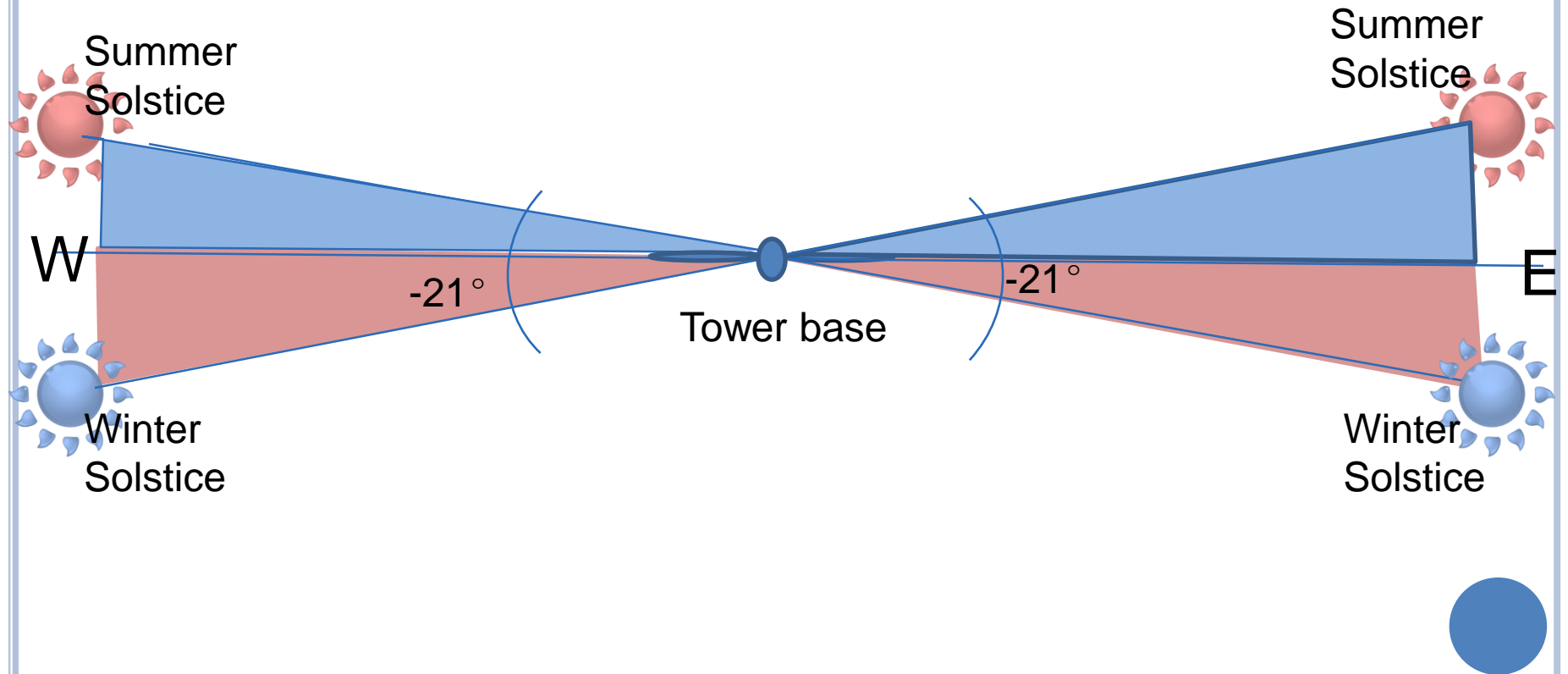
Total Height: 439 ft

Extent of shadow at noon on Winter and Summer Solstices

Current setback – 1000 ft to property line of dwelling unit



# SHADOW FLICKER – AERIAL ASPECT



# SHADOW FLICKER

- Not currently regulated in Lancaster County regulations
- Common regulations identify a maximum number of hours allowed at a point in one year or minutes in one day – typically 30 hours per year and 30 minutes per day
- Mitigation can include proper siting to avoid impacts, shutting down turbines so as not to exceed limits, and screening, which is not always desirable





# ICE THROW

- Ice can build up on turbine blades and other structures, moving blades can shed ice while turning and melting ice can fall
- Distance ice is thrown appears to be most closely related to tower height and rotor speed
  - Maximum distance ice has been found is 494' from base
- Can be mitigated with setbacks, through sensors which can shut down turbines, manual shut down



# CURRENT REGULATIONS IN LINCOLN AND LANCASTER COUNTY

- Wind Energy Conversion Systems (WECS) are allowed by right in all City and County
  - Use on an individual property, not for commercial production of energy
  - Special permit when over district height
- Commercial Wind Energy Conversion Systems (CWECS) are allowed by Special Permit in the City and County AG districts

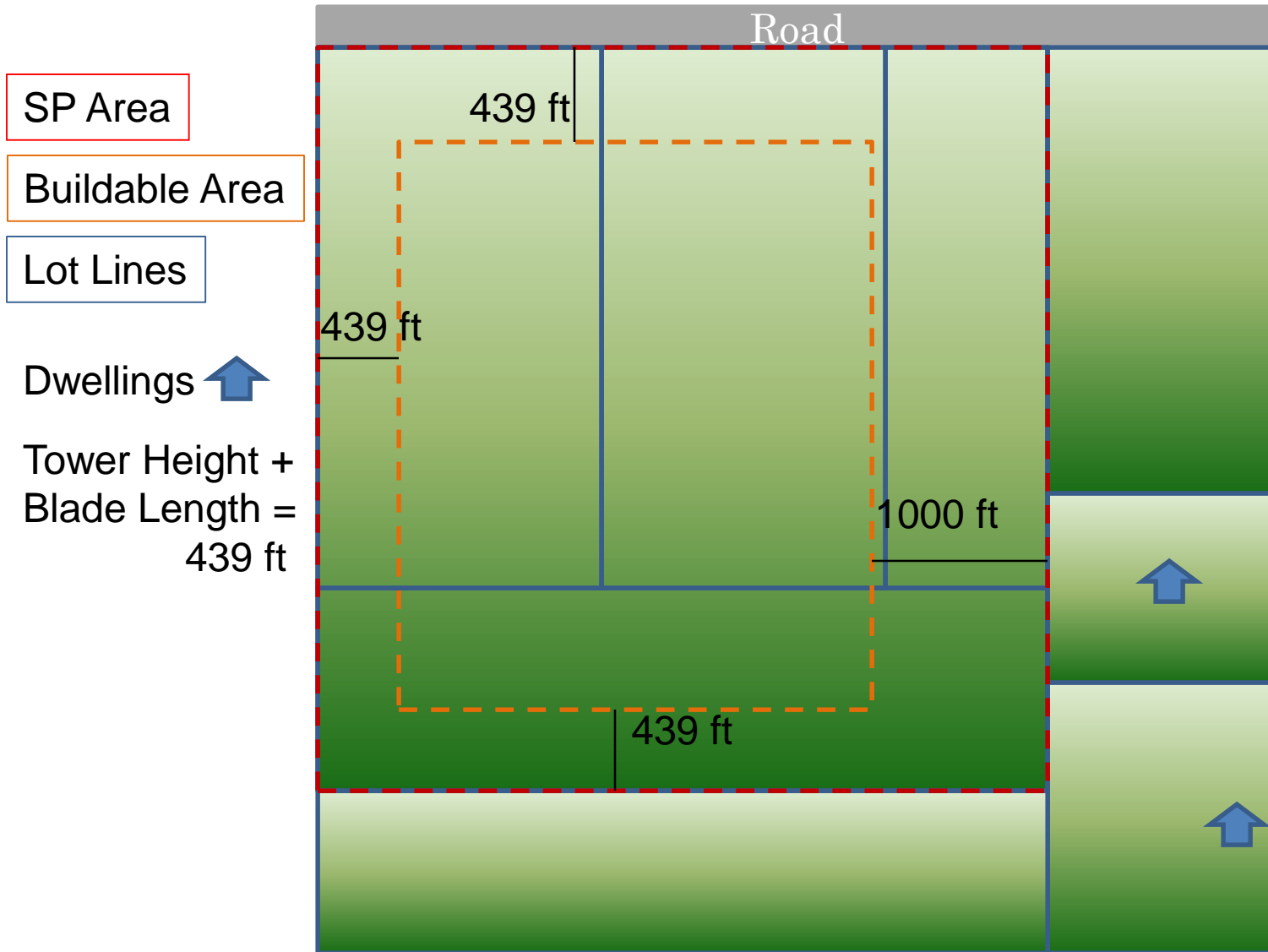


# COUNTY SPECIAL PERMIT – CWECS (SUMMARIZED)

- No less than 1000 feet from any property line of a dwelling unit not associated with the project
- Distance to boundary of SP area must be equal to height of tower plus rotor radius (blade length)
- Noise standard of 35 dBA at property line of any dwelling unit within one mile. Noise study may be required
- Shall meet FAA requirements
- Must follow all codes and regulations
- Unrelated towers must be separated by 5 rotor diameters
- Decommissioning plan and bond for removal required
- Meet all Federal State and local requirements



# COUNTY SPECIAL PERMIT



# PROCESS

- Special permit
  - Multiple towers may be in single special permit area
  - Special permit area must be made of contiguous parcels, not separated by section lines
  - Application must include site plan and any other necessary supporting documentation
- Planning Commission final action
- Appeal to County Board
- County Board has authority to waive conditions or impose additional conditions
- County Board has authority to revoke special permit



# PROCESS

- Building permit
  - Addresses structural requirements, erosion and sediment control
- County Contracts
  - Work in the right of way
  - Roadway maintenance agreements
- Environmental
  - USFWS, NGPC
- Aeronautic
  - FAA, NE Dept. of Aeronautics



# SUMMARY OF REGULATION TOPICS

Location	Setbacks to various uses	Maximum Noise Level	Shadow Flicker mitigation	Color and finish unobtrusive	Lighting to FAA standard	No Advertising	Vibration undetectable	Underground wiring	Signal interference minimized	Minimum Ground Clearance	Separation between Turbines	Access doors protected	Scenic view impacts minimized	Decommissioning plan and bond	Proof of Liability Insurance	Notification of ownership change	Complaint process outlined
Lancaster	X	X		X	X						X			X			
North Carolina	x	x	x	x	x	x						x		x			
Lake Township MI	x	x	x	x	x	x	x	x	x	x	x			x			
Ottawa Co. MI	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x
Plymouth Co. IA	x			x	x	x			x		x			x			
Minnesota	x	x		x	x	x		x	x	x		x		x			
Pennsylvania	x	x	x	x	x	x		x	x			x		x			x
Tennessee and Kentucky	x	x	x		x	x			x			x		x	x		
South Dakota	x	x			x			x	x	x	x			x			
Columbia University	x	x		x	x	x			x	x		x		x	x	x	
Better Plan Wisconsin	x	x		x	x	x		x		x		x					
New York	x	x		x	x	x		x	x	x		x	x		x		



# EXAMPLES OF WIND ASSOCIATIONS OF PROPERTY OWNERS

- Privately organized
- May be initiated by land owners or others
- When well organized can provide continuity and fairness and provide a single voice
- Saline County Wind Association
  - Online presentation  
<http://www.neo.ne.gov/renew/wind-working-group/pdf/Vavra.pdf>
- Other local examples?

