Nebraska Game and Parks Commission Guidance
Utility-Scale Photovoltaic Solar Energy Projects

This guidance contains non-regulatory statewide recommendations designed to help developers minimize potential environmental impacts that could result from development and operation of utility-scale photovoltaic (PV) solar energy projects. **Following the guidelines in this document does not replace consultation or coordination with the Nebraska Game and Parks Commission (NGPC) or the U.S. Fish and Wildlife Service (USFWS). Site-specific recommendations may be made by NGPC or USFWS that are not included in this document.**

Project developers and operators are strongly encouraged to submit their project via the Nebraska Conservation and Environmental Review Tool (CERT), which can help provide information on the following recommendations. These recommendations should be incorporated into project planning, siting, design, construction, and operation. When initially planning and siting a PV solar development, reference the attached *Nebraska Biodiversity and Wind Energy Siting and Mitigation Map*. The map depicts areas of high and low sensitivity with regards to wind energy development; however, it is useful in siting other renewable projects to avoid areas of sensitive environmental significance.

1. **Avoid Impacts to Protected Species**: Avoid placing solar arrays, associated infrastructure, and roads at locations where they would have a direct or indirect impact on species protected under the Nebraska Nongame and Endangered Species Conservation Act (NESCA)(Neb. Stat. Rev. 37-801-811), the federal Endangered Species Act (ESA)(16 U.S.C. 1531-1544, 87 Stat. 884), and the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c). Site solar arrays in areas where impacts to migratory birds would be avoided or minimized in accordance with the Nebraska Game Law – Protected Birds (Neb. Stat. Rev. 37-540) and Migratory Bird Treaty Act (16 U.S.C. 703-712: Ch. 128 *as amended*). Early consultation with NGPC and USFWS is highly recommended to determine if protected species may be impacted by the proposed project and/or if focused surveys for protected species are needed.

2. **Avoid Rare Plant Communities, Natural Legacy Tier 1 At-Risk Species, and Areas of Wildlife Concentration**: Site solar arrays, and other infrastructure away from occurrences of at risk (rare) plant communities (Rolfsmeier and Steinauer 2010), occurrences of Natural Legacy Tier 1 At-Risk Species as identified in the state wildlife action plan, *Nebraska Natural Legacy Project* (Schneider et al. 2011), and areas where wildlife concentrate (e.g., high quality prairie, Rainwater Basin wetlands and other identified playa wetlands, riparian areas, wet meadows, Sandhills wetlands, bird wintering areas).

3. **Minimize Fragmentation and Impacts to Streams and Wetlands**: Existing roads and utility corridors should be utilized to the maximum extent possible. New access roads and utility corridors, as well as solar array sites, should be configured to avoid high quality habitats and minimize habitat fragmentation. Access roads and utility corridors should have alignments that minimize stream crossing and wetland impacts. If stream crossings are needed, culverts or bridges should be adequately sized to account for aquatic species movement. Bottomless or buried bottom culverts are recommended, depending on type of streambed substrate. Buried infrastructure should be directionally bored under wetlands and streams to avoid construction and water quality impacts to these resources.

4. **Develop Away from Protected Lands**: State and Federally owned and/or managed wildlife or recreation properties (e.g., State Parks, Wildlife Management Areas, State Recreation Areas, Waterfowl Production Areas, National Wildlife Refuges, etc.) should be avoided entirely both for biological (e.g., rare landscapes, extensive wildlife breeding, and migrating activities, etc.) and aesthetic reasons. A one-mile buffer is recommended around all state-owned and/or managed wildlife and recreation properties. In some cases, a larger buffer may be recommended depending on the location and wildlife use of the area, particularly with regards to identified use by endangered or threatened species.

5. **Develop on Previously Disturbed Lands**: Siting solar energy facilities on previously altered landscapes, such as areas of cultivation, near towns, or urban and industrial areas is highly recommended in most circumstances. Avoid siting facilities in areas of contiguous intact native habitat and areas of concentrated wildlife use. If the site selected is not previously disturbed, mow or graze the area around the installation site prior to construction and do not grade the footprint unless required by the topography. Avoid siting facilities on highly erodible lands as the shading from arrays may reduce or eliminate vegetation and result in soil erosion. Areas of land overgrown with invasive species, such as eastern red cedar (*Juniperus virginiana*), should be targeted for development, as these offer an opportunity for clearing of nuisance species and improvement of grassland and pollinator habitat under and surrounding solar arrays.

6. **Restore Disturbed Areas**: Minimize ground disturbance during construction and decommissioning. After construction is complete, restore disturbed areas which are not needed for facility operations (e.g., roads, staging sites, laydown yards, etc.) with native vegetation. After a project is decommissioned, restore the site such that the habitat is better-than or equal-to the original habitat conditions present at the site. Use site-appropriate native species when replanting or seeding areas that have been disturbed.

7. **Reduce the Risk of Bird Electrocution**: Bury electric power lines (collection lines) from solar arrays. Any above ground power lines (i.e., from the solar array to the power grid), riser poles, transformers, and conductors should comply with the document *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* by Avian Power Line Interactive Committee (http://www.aplic.org/uploads/files/2643/SuggestedPractices2006(LR-2).pdf). This includes marking all above ground power lines with bird flight diverters. Above ground lines should avoid crossing/bisecting sensitive habitats, such as rivers, wetlands, and native grasslands.

8. **Minimize Attractants and Disturbances**: Minimize the number and intensity of lights associated with the solar project, including operation and maintenance facilities and substations. Use lights that are hooded downward (i.e., down-shielded). Promptly remove all large wildlife and livestock carcasses from roads, fields, and all other areas in and around the solar energy site. Advise personnel to be aware of wildlife in the area, reduce vehicle speed, and avoid disturbing wildlife.

9. **Fencing**: Use a fence design that will allow for wildlife passage and will not impede migratory movements. Larger openings along the bottom will allow foxes and other small animals to pass through the solar facility and may provide some protection from larger predators. Use C-Style pipe or cap open pipes to minimize bird deaths during construction.

Contacts

For initial inquiries regarding solar projects, questions about the environmental review process, requests for environmental reviews, and for recommendations regarding ways to avoid or minimize project effects, please contact:

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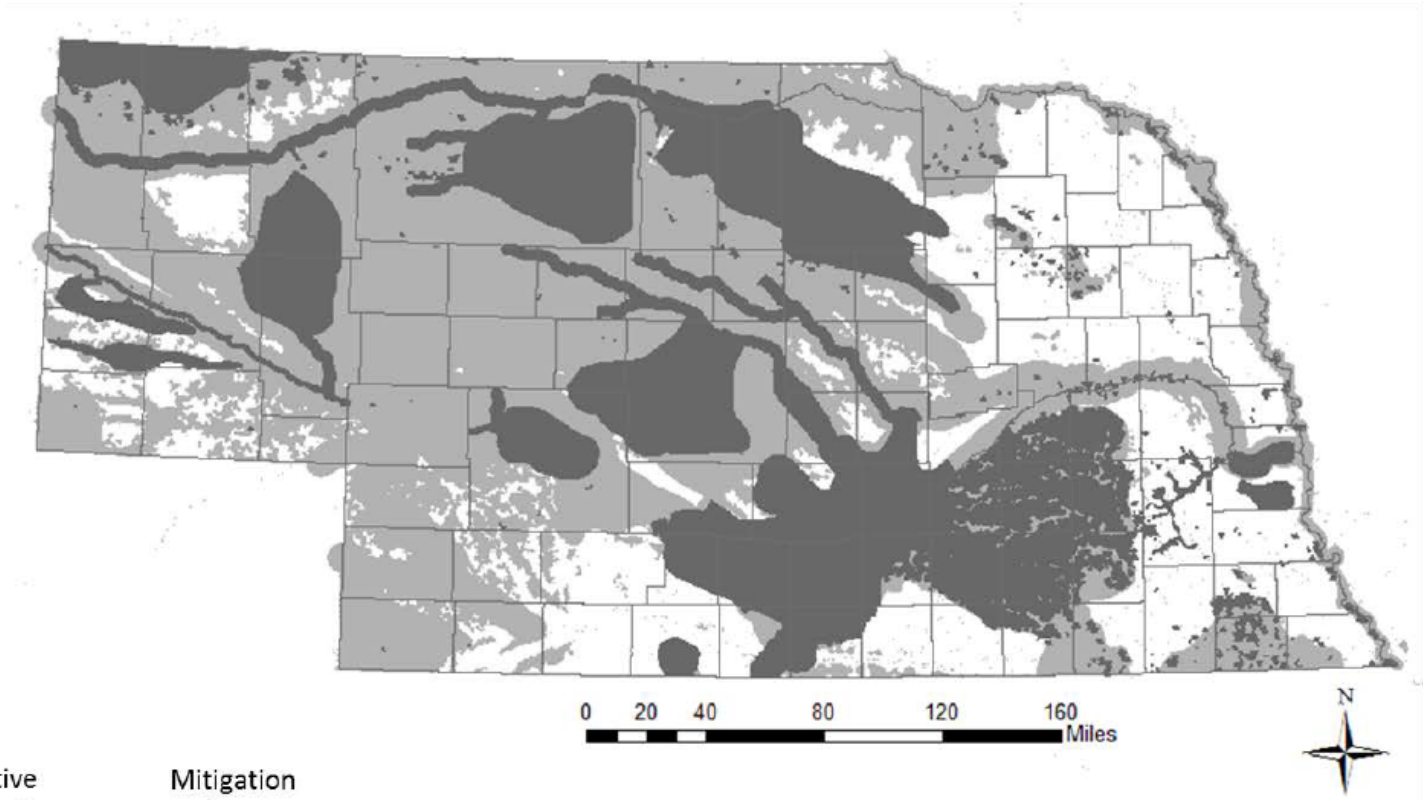
Nebraska's Biodiversity and Wind Energy Siting and Mitigation Map



Relative Sensitivity	Mitigation Area
Low	Minimum
Medium	Moderate
High	Maximum

This map is part of the voluntary guidance for wind energy development in Nebraska.

Projects will be reviewed site-by-site.

This map was developed to accompany the document *Guidelines for Avoiding, Minimizing, and Mitigating Impacts of Wind Energy on Biodiversity in Nebraska* (http://snr.unl.edu/renewableenergy/wind/tools.asp#stateguidelines).