# Land Use and Siting Criteria Executive Summary

The Henderson County Wind Energy Public Hearing Plan identifies Land Use and Siting Criteria as the first topic for review during the moratorium process, with the March 18, 2026 public hearing intended to address if and/or where Wind Energy Conversion Systems (WECS) should be permitted and under what conditions; including, among possibly other things: zoning suitability, minimum parcel size, turbine density, setbacks, height limits, and compatibility with surrounding land uses, etc. Staff has reviewed Wind Energy Conversion System (WECS) ordinance standards from other jurisdictions, and Staff preliminarily recommends that, if the County elects to allow this use, it do so within the existing zoning ordinance framework. Therefore:

**Section 1. Staff recommends, as follows:**

1.1. That the current zoning maximum height of 200 feet remain in place and not be exceeded for wind turbines (WECS). (Currently, no structure in Henderson County can exceed 200 feet in height according to current zoning regulations.) (There is a variance procedure to reasonably exceed the 200 feet in limited circumstances.) See airport height restrictions and cellular tower regulations. This 200-foot height regulation would be to the highest point on the WEC structure, which presumably would be to the tip of the propeller blade;

1.2. Only allow commercial WECS as a conditional use in the M-2 Heavy Industrial district

1.3. Require a conditional use public notice as required under KRS 100.237(6) to be provided to adjoining property owners as well as every property owner within a one-mile radius of the proposed location of the system. Applicant shall be responsible for all postage costs for mailed notices;

1.4. Require site plan approval by the Henderson City-County Planning Commission;

1.5. It is the staff's understanding that the currently existing Surface Mining District regulations cannot be amended. Staff suggests we will look to the County Attorney for guidance;

1.6. A minimum of a one-mile setback from; 1) occupied structures, 2) rivers, 3) wildlife refuges, 3) publicly owned nature reserves, 4) dedicated natural areas, 5) similar protected conservation lands, and 6) possibly others which may be identified during the public hearing process. The one-mile setback would be measured from the center of the WECS Tower to the nearest comer of the structure or other enumerated item. The one-mile setback from occupied structures, but not the following Paragraph 6 setbacks, could be waived in writing by the adjacent property owner to whom the residence setback is applicable. Notice of this waiver would be placed of public record.

1.7. A setback of at least 1,640 feet or 1.5 times the turbine height or the ice throw distance plus 250 feet, whichever is greater, from; 1) property lines, 2) public roads, 3) above-ground utilities, 4) transmission facilities, 5) private access easements or driveways serving non-participating properties, 6) occupied structures that have entered into waiver agreements – waiving the one-mile setback;

1.8. The Applicant would be required to submit an ice-throw hazard analysis certification prepared by a qualified engineer or professional, acceptable to the Planning Commission.

## These Staff Recommendations Are Only A Beginning Point, As Additional Information Is Anticipated Over the Course Of The Various Scheduled Public Hearings.

### Section 2. Reference to current Henderson County Zoning Ordinances and Discussion:

**2.1. Maximum Height:**

Article XXVIII, Henderson City-County Airport Height Restriction Regulations [Amended 10-7-2014 by Ord. No. 14-03(a]No. 14-03(a]; and, Article XXIX, Regulation of Cellular Antenna Towers [Added 7-22-2014 by Ord. No. 14-03], both have a maximum height of two hundred feet (200 feet). The county has an established, long-standing legislative pattern of regulating structure height, with variance provisions.

In the WECS context, structures above 200 feet may raise additional aviation review, visual impact ramifications, siting, and land-use compatibility concerns in Henderson County. Accordingly, a 200-foot height to the highest point (presumably to the tip of the blade), with up to a 10% variance provision, and height limit, is recommended as a clear and administratively enforceable standard that is consistent with existing local regulation of tall structures.

a. **Section 28.03 (M) - Navigable airspace zone:** That airspace which begins at ground level and overlies all of Henderson City and the County.
b. **Section 28.04 (L) - Navigable airspace zone**: established at 200 feet above ground level (AGL) at all points in the County except those encompassed by other airport zones defined herein.
c. **Section 28.07 (D) - Variances.** Any person desiring to erect or increase the height of any structure, or permit the growth of any street, or use property, not in accordance with the regulations prescribed in this article, may apply to the Board of Zoning Adjustment for a variance from such regulations. The application for variance shall be accompanied by a determination from the Federal Aviation Administration and Kentucky Airport Zoning Commission as to the effect of the proposal on the operation of air navigation facilities and the safe, efficient use of navigable airspace. Such variances shall be allowed where it is duly found that a literal application or enforcement of the regulations will result in unnecessary hardship and relief granted, will not be contrary to the public interest, will not create a hazard to air navigation, will do substantial justice, and will be in accordance with the spirit of this article. Additionally, no application for variance to the requirements of this article may be considered by the Board of Adjustment unless a copy of the application has been furnished to the Henderson City-County Air Board for advice as to the aeronautical effects of the variance. If the Henderson City-County Air Board does not respond to the application within 15 days after receipt, the Board of Zoning Adjustment may act on its own to grant or deny said application.
d. **Section 29.02 Definitions –** Cellular Antenna Tower Height: The distance from the anchored base of the tower, whether on the top of another building or at grade, to the highest point of the antenna structure.
e. **29.05. Design standards (D) -** Height. A cellular antenna tower, or alternative antenna tower structure, may be constructed to a maximum height of 200 feet, regardless of the maximum height requirements listed in the specific zoning district. This also applies to any tower taller than 15 feet constructed on the top of another building or structure, with the height being the overall height of building/structure and tower together, measured from the grade to the highest point. The Planning Commission may allow antennas greater than 200 feet in height

upon review of the applicant's justification that the additional height meets the criteria identified herein

**2.2.** **<u>Land Use Compatibility and Zoning Classification based on current regulations regulating "Green Energy.</u>"**

Staff recommends that Wind Energy Collection Systems be a conditional use in the M-2 (Heavy Industrial) zoning district, similar to Article XXX, Solar Energy Systems (SES) [Added 12-23-2019 by Ord. No. 19-07; amended 7-25-2023 by Ord. No. 23-07] and Article XXXII Battery Energy Storage Systems (BESS) [Added 8-27-2024 by Ord. No. 24-06] and require a site plan to be approved by the Henderson City-County Planning Commission.

2.3. **30.03. Additional standards (B) (1) -** Level 2 solar energy systems are only allowed in Light Industrial (M-1) and Heavy Industrial (M-2) Zones.

2.4. **32.03. Zoning (B) -** Tier 2 Battery Energy Storage Systems are a conditional use in Zone M-2, Heavy Industrial, described in Appendix A, Article XXI of the Henderson County Code of Ordinances.

**2.5.** **32.03. Zoning (C) -** All Tier 2 Battery Energy Storage Systems' conditional use public notice as required under KRS 100.237(6) will be provided to adjoining property owners, as well as every property owner within a one-mile radius of the proposed location of the system. Applicant shall be responsible for all postage costs for mailed notices.

**2.6.** **32.04. Zoning (C) - Site plan.** Staff recommends a requirement that a site plan must be submitted to the Henderson City-County Planning Commission for approval. The submittal shall include: (1) An engineered site plan with related construction drawings. (2) Site plan checklist, application, and applicable fees. (3) Commissioning plan. (4) Fire safety compliance plan. (5) System and property operations and maintenance manual. (6) Decommissioning plan. A decommissioning bond set by, and administered through, the Henderson City-County Planning Commission will be required before any permits are issued for this project, and this bond will be reviewed and updated periodically.

3. **<u>Land Use Compatibility and Zoning Classification based on current regulations regulating "Surface Mining."</u>**

The current Surface Mining District cannot be amended to accommodate WECS. The Surface Mining District is a limited-purpose district established for surface mining operations and closely related agricultural uses, with reclamation and post-mining land-use requirements that are already addressed elsewhere in the ordinance framework. Disturbed land in the district must ultimately be

reclaimed and returned either to its original zoning classification or to an alternative post-mining land use that is separately justified, reviewed, and approved. For that reason, the existing Surface Mining District should remain unchanged, and any WECS proposal on former mining land should instead be evaluated through the applicable post-mining land-use and zoning processes.

3.1. **26.01. Statement of purpose.** The Surface Mining District is established as a district in which the only permitted uses are surface mining and agricultural and those accessory uses as are necessary to the operation of surface mining activities. Due to the potentially adverse impact of surface mining operations, such activity must be restricted to an exclusive district in order to protect the public health and safety, ensure compatibility with adjacent land uses, protect and preserve natural resources such as prime farmland, and promote public welfare**.**

3.2. **26.04. Termination of use.** Surface mining of land is a limited-duration use, and once such use is terminated, the site shall revert to its original zoning classification.

A. The use of land for surface mining shall be considered terminated when all requirements of the surface mining regulations have been fulfilled and the bond has been released in full by the County. B. Alternative post-mining land use. In the case where an alternative post-mining land use is approved in accordance with § 27.06D, the tract shall be rezoned to an appropriate classification upon termination of surface mining operations. The procedures for amendments to the Zoning Ordinance established in Article VII shall apply.

**3.3. 27.06. Post-mining land use (A).** General. All disturbed areas shall be restored in a timely manner to conditions that are capable of supporting the uses which they were capable of supporting before any mining, or to higher or better uses achievable under criteria and procedures of this regulation.

3.4. **Post-mining land use (D).** Criteria for approving alternative post-mining land uses. Change from one to another land use category or subcategory in pre-mining to post-mining constitutes an alternate land use and the applicant shall meet the requirements of this regulation and all other applicable provisions of this article. An alternative post-mining land use shall be approved by the Henderson City-County Planning Commission after consultation with the landowner if the criteria of this regulation are met.

## Section 4. Reference To Ordinances from Other Kentucky Jurisdictions

### 4.1. Minimum Setbacks from Occupied Buildings (Mason County, KY Ordinance).

Mason County, KY, is the first county in the Commonwealth of Kentucky we are aware of to pass an ordinance regulating WECS. The primary ordinance regulating industrial wind energy in Mason County was given final approval on April 15, 2014, during a regular meeting of the Mason County Fiscal Court. The Mason County Ordinance requires a minimum one-mile setback from residential dwellings, regularly occupied industrial or institutional buildings, measured from the center of the WECS Tower to the nearest corner of the structure.

https://docs.wind-watch.org/KY-Mason-Cty.pdf

### 4.2. Cross Point Arkansas:

**Minimum Setbacks from Occupied Buildings (Vestas Documentation).**

The Crossover Wind Project in Cross County, Arkansas, a 135-megawatt wind energy facility using 32 Vestas V163-4.5 MW turbines, is an example of a modern utility-scale wind project employing turbine dimensions and generating capacity comparable to those that may be proposed in this jurisdiction. When evaluating setbacks from occupied structures, the Planning Commission may consider manufacturer guidance indicating that shadow flicker is generally limited to areas within approximately 1 to 1.5 kilometers (0.62 to 0.93 miles, or 3,281 to 4,921 feet) of a turbine.

### 4.3. Other References:

**Shadow flicker** is typically only an issue at close distances, generally no more than 1 to 1.5 km, and it only occurs in limited locations and for a few hours per year. [1].

https://www.vestas.com/en/energy-solutions/development/turnwindshadow#:~:text=How%20does%20shadow%20flicker%20occur,work%20to%20minimise%20shadow%20flicker

https://www.vestas.com/en/energy-solutions/onshore-wind-turbines/4-mw-platform/V163-4-5-MW

https://cordeliopower.com/project/crossoverwind/

### 4.4. Minimum Setbacks from Residences and Property Values.

Recent research concerning wind turbines and residential property values reflects mixed results, but several studies indicate that any measurable sale-price or marketability effects are most likely to occur closest to turbines, particularly during the announcement and construction period, with the strongest effects often observed within one mile and smaller or less consistent effects at greater

distances. In combination with concerns relating to shadow flicker, nighttime rural conditions, visual dominance, and general land-use compatibility, the county may reasonably recommend a one-mile setback from occupied structures as a conservative and administrable protective buffer. This recommendation is intended as a policy judgment based on the combined effect of those considerations rather than on any single study or impact category alone.

https://emp.lbl.gov/publications/commercial-wind-turbines-and

https://digitalcommons.uri.edu/cgi/viewcontent.cgi?article=1194&context=enre_facpubs

https://www.sciencedirect.com/science/article/pii/S0301421523004226?via%3Dihub

https://agrilife.org/westtexasrangelands/files/2025/01/Values-in-the-Wind-A-Hedonic-Analysis-of-Wind-Power-Facilities.pdf

https://trerc.tamu.edu/blog/wind-and-solar-power-and-their-impact-on-the-value-of-nearby-properties/

https://www.researchgate.net/publication/361261371_The_Effect_of_Wind_Power_Projects_on_Property_Values_A_Decade_2011-2021_of_Hedonic_Price_Analysis

https://extension.purdue.edu/cdext/thematic-areas/community-planning/collaborative-projects/rstep/_media/cber-rstep-prop-values-2025-aug-12-2025-smaller.pdf

**Section 5. Setbacks.**

**5.1. Minimum Setbacks from Rivers and Wildlife Refuges.**

No WECS turbine shall be located within one mile of the boundary of any publicly owned nature reserve, wildlife refuge, dedicated natural area, or similar protected conservation land. This is consistent with the ordinance that Mason County, KY, passed. Because the Ohio River and Green River corridor in Henderson County supports migratory waterfowl, songbirds, and other wildlife associated with bottomland hardwood forest, wetlands, and riparian habitat, any application for a WECS proposed near the Ohio River, the Green River, wetlands, riparian corridors, rookeries, roosts, staging areas, leks, refuges, or other known bird-concentration or wildlife-sensitive areas shall include a site-specific environmental analysis addressing potential impacts on habitat use, migration pathways, species concentration, and related ecological resources For wetlands and bird-concentration areas, turbines should avoid known migration pathways and in areas where birds are highly concentrated, including wetlands and wildlife refuges. Turbines should not be built in wetlands and should avoid documented migratory bird corridors and flight paths.

https://docs.wind-watch.org/KY-Mason-Cty.pdf

https://www.fws.gov/sites/default/files/documents/land-based-wind-energy-guidelines.pdf

https://tethys.pnnl.gov/sites/default/files/publications/US-FWS-2003.pdf

https://gf.nd.gov/node/4800

5.2. **Minimum Setbacks from Property Lines, Roads, and Utilities.**

To protect adjacent property, public infrastructure, and utility facilities from blade throw, tower collapse, maintenance incidents, and other reasonably foreseeable hazards, each Wind Energy Conversion System (WECS) shall comply with the following minimum setback requirements.

https://apps.legislature.ky.gov/law/acts/14RS/documents/0088.pdf

https://docs.nlr.gov/docs/fy09osti/44439.pdf

https://northeastwindmills.com/wp-content/uploads/2013/07/vestas-nordex.pdf

https://puc.sd.gov/commission/dockets/Civil/2018/civ18-70/batenumber/Internet/7802-7827.pdf

https://www.igwaldviertel.at/wp-content/uploads/2020/07/336_Safety-regulations.pdf

**5.3. Property Lines.** No turbine shall be located closer than 1,640 feet or one and one-half times (1.5) the total turbine height, whichever is larger, measured from the center of the turbine base to the nearest property line of any property.

**5.4. Public Roads.** No turbine shall be located closer than 1,640 feet or one and one-half times (1.5) the total turbine height, whichever is larger, measured from the center of the turbine base to the nearest edge of the public road right-of-way.

**5.5. Utilities and Transmission Facilities.** No turbine shall be located closer than 1,640 feet or one and one-half times (1.5) the total turbine height, whichever is larger, measured from the center of the turbine base to the nearest above-ground utility line, transmission line, substation, communication tower, or similar utility facility, unless the affected utility owner provides written consent to a lesser setback.

**5.6. Private Access Easements and Driveways.** No turbine shall be located closer than 1,640 feet or one and one-half times (1.5) the total turbine height, whichever is larger, measured from the center of the turbine base to the nearest recorded access easement or private driveway serving a non-participating property, unless waived in writing by the easement holder or affected property owner.

**5.7. Minimum Setbacks for Debris and Ice Throw.** To protect persons, property, and infrastructure from hazards associated with ice accumulation and ice throw, each Wind Energy Conversion System (WECS) shall be designed, sited, and operated to minimize the risk of ice shedding and ice throw beyond the project boundary and onto non-participating property, public roads, railroads, utilities, and occupied structures. The application should include an ice-throw hazard analysis prepared by a qualified professional identifying the expected risk area under normal operating conditions, start-up, shutdown, emergency braking, and foreseeable winter weather conditions.

**5.7.1.** As a conservative screening boundary: a 1.5 turbine height rule is what the report uses to define the outer limit of the hazard zone. https://patternenergy.com/wp-content/uploads/2024/07/Appendix-L-Ice-Throw-FINAL.pdf

**5.7.2.** One study suggests that a buffer zone of 1.5 (hub height + rotor diameter) may be sufficient to reduce risk to the nearby area in locations with a high probability for ice formation. https://www.cfra.org/sites/default/files/publications/icing-and-wind-energy-systems.pdf

**5.7.3.** This Professor of Physics and Astronomy argues a maximum-distance estimate for wind-turbine ice throw and then criticizes industry drag-model assumptions. https://www.physics.rutgers.edu/~matilsky/windmills/throw.html

**5.7.4.** This study models how far detached wind-turbine debris can travel, including whole blades, blade-shell fragments, and ice, for turbines scaled from 2.3 to 20 MW. Using six-degree-of-freedom motion equations plus aerodynamic loading, the authors find that tip speed is the dominant driver of throw distance: under normal operation, blade pieces are generally thrown less than 700 m (2,296.59 feet), but at extreme tip speeds, throws can approach 2 km (6561.68). https://onlinelibrary.wiley.com/doi/abs/10.1002/we.1828