Bird Safe Building and Lighting Design:

Creating a bird safe building with bird safe lighting is especially important in the proposed location of this development near the Sandy Creek Environmental Park and wetlands corridor area.

Many of the 185 species of birds that citizens have identified at the park are rare or endangered because of habitat loss. The park is one of very few nesting areas in the City of Durham for these species including Wood Thrush and Prothonotary Warblers. And because the park's forests and wetlands provide such a unique habitat in the City of Durham, it is also a critical resting and refueling area for birds that pass through the city while migrating thousands of miles between winter and summer habitats.

Window collisions because of faulty design kill over a billion birds a year across the country. Lighting at night both exacerbates window collisions and disrupts breeding, nesting, and feeding. Therefore, bird safe building and lighting design must be incorporated up front to reduce the potential for bird collisions and nesting and foraging disruptions at the critical habitat of Sandy Creek Environmental Park and Sandy Creek wetlands.

Windows: A bird friendly building would not be all glass or have an excessive amount of glass. Limiting glass also increases energy efficiency and can help meet green building practices.

Most bird strikes occur within the first 100 feet from the ground. Therefore, bird friendly design requires a mix of building design elements. At least 90% of the exposed façade material from ground level to 40 feet should not composed of glass, or if composed of glass, should contain elements that preclude bird collisions. These features would not completely obscure vision. They would include such elements as secondary facades, netting, screens, shutters, and exterior shades.

All exterior glass should meet the glass requirement in Appendix A. There should not be transparent passageways or corners in the building that birds could see through. Additional Information about bird friendly design may be found here: <u>https://abcbirds.org/glass-collisions/architecture-planning/</u>

Lighting: Plants and animals depend on natural light cycles to govern life sustaining behaviors such as reproduction, nourishment, sleep, and protection from predators. Excessive lights at night has been shown to impact insect populations <u>https://blog.entomologist.net/what-effects-does-light-pollution-have-on-insects.html</u> Insects are critical food for birds, especially nestlings. Also, exterior lighting has been shown to distract and confuse migrating birds, again a concern because of the species that use the park as a migration stop.

New Hope Bird Alliance therefore recommends the following requirements for exterior glass and also exterior lighting:

APPENDIX A

Glass Requirements:

Definitions:

- i. Glass: All glass, including spandrel glass.
- ii. Reflective and/or Transparent Non-Glass Materials: Any non-glass materials that are transparent or highly reflective, including but not limited to plexiglass and polished metal.

Requirement: 100% of the glazing for all building types must be Bird-Friendly Glass_

- 1. <u>Bird-Friendly Glass</u>: Glass or materials that meet any of the following conditions:
 - a. Any product with an American Bird Conservancy Material Threat Factor Rating ≤ 30. Visit <u>birdsmartglass.org</u> to view the continuously-updated database
 - b. Any product that follows American Bird Conservancy's <u>Prescriptive Rating Criteria</u> (abcthreatfactor.org)
 - c. Continuous-surface materials, including spandrel glass and polished or brushed metals, whose surface 1 gloss reading follows the <u>ABC Prescriptive Rating Criteria</u> (<u>abcthreatfactor.org</u>) to ensure that they do not produce strong reflections).

Lighting Requirements:

- **A.** Light Level: lighting installed for an outdoor use shall not exceed 25% more than the *Light Level* recommended by the applicable *ANSI/IES Lighting Standard*, or a state approved alternate.
- **B.** Distribution: Unless otherwise specified in this ordinance, *Luminaires* emitting more than 1,000 *Lumens* shall be *Fully Shielded* and shall emit no more than 5% of their total *Lumen* output above 80 degrees from *Nadir*.
 - 1. Exception: Directional Luminaires used for façade illumination which are shielded and aimed to hit their target such that the light is contained by architectural elements.
- C. Trespass: Light Trespass shall meet the following:
 - 1. Luminaire light sources shall not be visible from Sandy Creek Park, and Light Trespass shall measure no greater than 0.1 Lux.

- 2. Light Trespass onto Residential Use property shall measure no greater than 1 Lux.
- **D.** Curfew: Non-essential outdoor lighting, including but not limited to landscape and decorative lighting elements, shall be extinguished during Nighttime Hours.
- **E.** Controls: Luminaires activated by motion detection shall automatically turn off or return to their dimmed state no more than [5] minutes after activity is no longer detected.
- **F.** Spectrum: The maximum allowable correlated color temperature (CCT) for outdoor Luminaires is 3000 K.

Definitions: The following definitions apply to terms used:

ANSI: American National Standards Institute.

ANSI/IES Lighting Standards: Applicable outdoor lighting standards and metrics include but are not limited to:

RP-2: outdoor retail spaces RP-6: outdoor sports and recreational areas RP-7: outdoor industrial areas RP-8: roadway and parking facilities RP-40: port terminals RP-43: outdoor pedestrian areas

ALAN (artificial light at night): Light that is created from human technology, rather than a naturally occurring process. Also known as anthropogenic lighting.

Candela (cd): The unit of measure for luminous intensity.

CCT (correlated color temperature): The measured color appearance of light emitted by a light source described using a <u>nominal</u> value stated in kelvins (K). Lower CCTs (1800 K to 2200 K) appear very warm or amber. Medium CCTs (2700 K to 3000 K) appear "warm white," similar to standard incandescent bulbs. High CCTs (4000 K and higher) appear "cool white" or "blue."



- **H. Five Principles for Responsible Outdoor Lighting:** Co-authored and published by DarkSky International and the Illuminating Engineering Society: 1) Use light only if needed; 2) distribute light only where it is needed; 3) use light that is no brighter than needed; 4) control light so it is on only when needed; and 5) use warmer color light when possible.
- I. **Fully Shielded:** A *Luminaire* designed or shielded in such a manner that no light is emitted, either directly or indirectly, at or above a horizontal plane running through the lowest light-emitting part of the luminaire.

- J. IES (Illuminating Engineering Society): An ANSI-recognized Standards Development Organization. ANSI/IES Recommended Practices are universally recognized as authoritative references for lighting applications.
- **K. Illuminance:** Measured in *Lux* or footcandles, the total luminous flux incident at a point on a surface.
- L. Light Level: The maintained *Luminance* or *Illuminance* value.
- **M.** Light Pollution: ALAN traveling into areas where it is not needed or wanted. This can be in the form of *Light Trespass*, glare, or atmospheric sky glow.
- **N.** Light Trespass: ALAN illuminating past property lines without permission. Unless specified otherwise, light trespass limits are measured at any location along a property line both horizontally at the ground plane facing upward and vertically at 1.5 meters (5ft) above grade with the meter aimed toward the light source in question.
- **O.** Lighting Zones: An ANSI/IES/DarkSky system describing the luminous environment and related lighting conditions based on land uses and expected tasks. These range from natural and intrinsically dark zones to very bright zones.
- **P.** Lumen (Im): A unit of measure of the *luminous flux* of a light source.
- **Q.** Luminaire: A complete lighting unit, including the light source, housing, optics, electronics, and other necessary components for the purpose of providing outdoor illumination.
- **R.** Luminance: The intensity of light emitted from a surface per unit area in a given direction.
- S. Lux (lx): The SI metric system unit of measure for Illuminance.
- **T. Nadir:** A downward vertical vector directly beneath a luminaire, opposite to zenith.



- **U.** Nighttime Hours: The time between 10 PM and sunrise, or 7 AM (whichever comes earlier). For businesses and events with operating hours later than 10 PM, nighttime hours will begin one hour after closing.
- V. Non-essential: Lighting that is not directly associated with the physical safety of motor vehicle and pedestrian threats, including but not limited to: landscape lighting, illuminated signage or advertising after business hours, façade lighting, vacant sports fields, and seasonal lighting.
- **W. Residential Use:** Municipal zoning districts dedicated exclusively to places of low-rise (i.e., 3 stories or less) human residence and dwelling. Examples include single family, duplex, dual

family, multi-family, apartment, townhouse, and mobile home. This does not include mixed-use or commercial districts with combined dwellings.

- **X. Security Lighting:** Illumination used specifically to protect people, property, and infrastructure from criminal threat.
- **Y. Shielding:** A *Luminaire* design, optical intervention, or physical accessory (such as a louver) preventing light emission from traveling into a particular area, angle, or region.