

Proposed Outdoor Lighting General Bylaw

SECTION 1 - Purpose

The purpose of this By-law is to regulate the use of new and replacement outdoor lighting fixtures so as to:

- (1) provide adequate, well-designed lighting for the safety and security for all Bedford residents and for the safe performance of outdoor tasks at night;
- (2) control glare to ensure safe navigation for motorists, bicyclists, and pedestrians at night;
- (3) protect residents from light trespass, which negatively affects the enjoyment of property;
- (4) minimize light pollution to the greatest extent possible, especially blue light, which can cause negative effects on human health and nocturnal organisms;
- (5) preserve the night sky as a natural resource to enhance nighttime enjoyment of property within Bedford.
- (6) promote efficient lighting to conserve energy and thus reduce atmospheric carbon emissions, and decrease lighting cost without decreasing nighttime safety, security, and productivity.

SECTION 2 - Applicability.

All new or replacement outdoor lighting fixtures installed on any property within the Town after this Bylaw becomes effective shall comply with the requirements established by this By-law. This Bylaw is applicable to all residential, commercial, and municipal outdoor luminaires and in all zones.

Unless exempted elsewhere in this Bylaw, all new and replacement exterior luminaires with an output of greater than 600 lumens shall be fully shielded.

Outdoor lighting shall be designed for safety and for personal security. Glare and light spillover, as defined below, shall be controlled to protect inhabitants from the consequences of stray light shining into inhabitant's eyes or onto adjoining properties. Control of light pollution, as defined below, shall be required to minimize the negative effect of misdirected upward light. All exterior lighting shall be aimed, located, designed, fitted and maintained so that it illuminates the task intended and does not shine directly onto neighboring properties or roadways or distribute excessive light skyward.

SECTION 3 - Definitions

BUG rating system: A lighting classification system (IES TM-15-20 standard or its successor) by the Illuminating Engineering Society (IES) and DarkSky International to describe the light-pollution contributions from outdoor luminaires, including for street and parking-lot lighting. Each letter is attached to a number ranging from 0 (ideal) to 5 (unacceptable). B describes backlight that often contributes to light trespass. U describes uplight, which contributes to skyglow, which limits a person's

ability to see the stars. G describes glare, which makes it difficult for people to see and thus makes roadways more dangerous and security lighting less effective.

Café lighting: A string of multiple lights hung between two points and used to decorate outdoor spaces in ways and at times not associated with holidays. Also known as party lighting or festoon lighting.

Correlated color temperature (CCT): A specification of the color appearance of the light emitted by a light source, measured in Kelvin (K). CCT values are typically provided in lighting-manufacturer data sheets. For example, high-pressure-sodium (HPS) streetlights are approximately 2000 K and “warm-white” lamps are typically 2700 K.

Environmentally sensitive area: Light-sensitive areas that include: any land subject to a conservation restriction, legally recognized wetlands, agricultural land, or any land that contains threatened or endangered-species habitats.

Foot-candle: A measurement of illuminance, which is the intensity of light incident on a surface. One (1) foot-candle (fc) is defined as enough light to uniformly illuminate one square foot (1 ft²) with one (1) lumen. One foot-candle corresponds to 10.764 lux (lx), which is the SI (International System of Units) unit of illuminance.

Fully shielded: An outdoor luminaire constructed so that, in its installed position, all of the light emitted by the luminaire is projected below the horizontal plane that passes through the lowest light emitting part of the luminaire. See Figure 1.

Glare: Intense and harsh light emitted by a luminaire that reduces visibility and creates visual discomfort and/or momentary visual impairment. Discomfort Glare causes a nuisance due to overly bright light sources in the field of view. Disability Glare causes interference in the visual process and impairs the viewer’s vision. *OR - Glare shall mean the sensation produced by luminance within the visual field that is sufficiently greater than the luminance to which the eyes are adapted so as to cause annoyance, discomfort or loss in visual performance and visibility. The magnitude of the sensation of glare depends upon factors such as the size, position, and luminance of the source, the number of sources, and the luminance to which the eyes are adapted.*

Holiday lighting: Decorative lighting temporarily installed on or near homes, businesses, and public spaces to celebrate holidays and seasonal events.

Illuminance: The intensity of light incident on a surface, often measured on horizontal or vertical surfaces in foot-candles (fc or lumens/ft²). Example: the full Moon illuminates the ground with an illuminance of 0.01 fc.

IES: Illuminating Engineering Society, the recognized authoritative body on the science and application of lighting, which publishes and promotes recommended practices for a variety of specific lighting applications.

Lamp: The bulb or other light-emitting portion of a luminaire, not inclusive of any reflective or refractive optics used to direct light.

Light pollution: An adverse and/or obtrusive effect of the use of outdoor light at night. OR Light pollution shall mean illumination which extends beyond an object, structure or area, which the light

fixture is designed to serve, so as to produce glare, or otherwise interfere with viewing of natural vistas such as the night sky.

Light trespass: Light emitted by a luminaire or from an adjacent reflective surface that shines beyond the property boundary on which the luminaire is installed.

Lumen: A unit of luminous flux; the flux emitted within a unit solid angle by a point source with a uniform luminous intensity of one candela (the SI unit of luminous intensity).

Luminaire: A complete lighting assembly, consisting of a lamp or lamps, housing, optic(s), and other structural elements, but not including any mounting pole or surface.

Luminance: The amount of light that passes through, is emitted by, or reflected from a particular area, and falls within a specified solid angle. The SI unit of luminance is candela per square meter (cd/m²), also known as a nit.

Nuisance: The unreasonable, unwarranted and/or unlawful use of outdoor lighting, which causes inconvenience, disruption of enjoyment, or damage to others, either to individuals and/or to the general public.

Skyglow: A measurable glow in the night sky deriving from an artificial source.

Wall sconce: A decorative luminaire affixed to a vertical exterior wall.

Walkway lighting: One or more outdoor luminaires installed adjacent to a walkway to provide wayfinding and safe movement for pedestrians and/or personal-mobility devices.

SECTION 4 - STANDARDS FOR COMMERCIAL and INDUSTRIAL Properties & Multifamily Properties

- (1) Scope and Applicability. This section applies to commercial and industrial properties, the common areas of condominium complexes and homeowner associations, and other properties with dwellings for more than three families.
- (2) Priority of Bylaw Provisions. In case of conflict between any of the provisions of this Bylaw or any other state or federal regulation, and if such state or federal regulation allows for more restrictive local regulation, the most restrictive shall apply.
- (3) New Lighting. All outdoor luminaires installed after the effective date of this Bylaw shall comply with the requirements established by this Bylaw.
- (4) Existing Lighting. All outdoor luminaires installed prior to the effective date of this Bylaw that do not comply with the requirements of this Bylaw are declared to be non-conforming. All non-conforming luminaires may continue to be used and maintained after the effective date of this Bylaw but shall be brought into compliance with the requirements herein within ten (10) years of the effective date of this Bylaw or upon the first to occur of any of the following:
 - A) A determination by the Inspector of Buildings that the luminaire or its installation constitutes a hazard to public safety or otherwise constitutes a nuisance.

- B) The replacement of more than twenty-five percent (25%) of the existing system of luminaires intended to illuminate a specific area.
- C) Expansions exceeding twenty-five percent (25%) of the gross floor area, the number of dwelling units, or the number of parking spaces. This requirement may be reduced by permit issued by the Planning Board upon a simple majority finding that such reduction will not detract from the objectives of this bylaw.

(5) Shielding.

- A) Unless exempted elsewhere in this Bylaw, all single-lamp outdoor luminaires shall be fully shielded.
- B) Lighting of building façades, landscaping, monuments, plaques, flagpoles, and similar installations are exempted from the shielding requirements of this bylaw, but shall be focused directly at the target so that the light does not create a nuisance. It is the Town's preference that such lighting be turned off or dimmed between 12 a.m. and 6 a.m. or within one (1) hour of the posted closing time for that facility, whichever occurs later.

(6) Light Output.

- A) The output of any outdoor luminaire installed at a height below twenty (20) feet shall not exceed five thousand (5,000) lumens, except as permitted in Section 3.6.2.
- B) An outdoor luminaire may exceed five thousand (5,000) lumens if its output does not exceed the ground-level luminance values recommended by the Illuminating Engineering Society (IES) for the specific application by more than fifty percent (50%).
- C) An outdoor luminaire exceeding the lumen values in Sections 3.6.1 and 3.6.2 may be installed by permit issued by the Planning Board upon a simple majority finding that extenuating circumstances related to safety and security justify an exception.

- (7) Correlated color temperature. The correlated color temperature (CCT) of the light emitted by an outdoor luminaire shall not exceed 2700 K. An outdoor luminaire may exceed this CCT value by permit issued by the Planning Board upon a simple majority finding that extenuating circumstances related to safety and security justify an exception.

(8) Height.

- A) Scope and Applicability. This subsection applies only to luminaires used for illuminating outdoor areas such as parking lots, driveways, walkways, yards, or other ground surfaces, whether mounted on freestanding poles or on buildings, but it shall not apply to building mounted luminaires intended primarily for entrance, porch, architectural, or decorative lighting.
- B) The maximum mounting height of such luminaires shall not exceed twenty-five (25) feet. A maximum mounting height of thirty-five (35) feet may be allowed by permit issued by the Planning Board upon a simple majority finding that the increased height will not negatively impact abutting properties, particularly property used or zoned for residential purposes.

(9) Hours of Operation.

- A) Outdoor lighting shall not be illuminated between 11 p.m. and 6 a.m with the following exceptions:
1. If the use is being operated, such as a business open to customers, or where employees are working or where an institution or place of public assembly is conducting an activity, normal illumination shall be allowed during the activity and for not more than one half hour after the activity ceases.
 2. Low level lighting sufficient for the security of persons or property on the lot may be in operation between 11 p.m. and 6 a.m., provided the average illumination on the ground or on any vertical surface is not greater than 0.5-foot candles.

SECTION 5 - Standards for Residential Properties

- (1) This section applies to properties with single- and two-family residential dwellings, accessory dwelling units (ADUs), and individually-owned dwellings that are part of a condominium complex or homeowner association.
- (2) Residential outdoor lighting, including but not limited to, security, floodlighting, walkway illumination, driveway illumination, flagpoles, outdoor living areas, and outdoor recreational facilities, shall not unduly inconvenience abutters by having outdoor lighting shining directly into their windows or onto their properties.
- (3) In all residential neighborhoods, all outdoor lighting, shall be continuous (not flashing), indirect, and installed and/or shielded in a manner that shall prevent direct light from shining onto or upon any street and/or adjacent or abutting property.
- (4) Temporary holiday lighting shall be exempt from these requirements.

SECTION 6 - Nuisance.

No outdoor luminaire shall create a lighting nuisance in the form of excessive light trespass or glare, as defined below. No new or replacement exterior fixture installed within the Town shall create a lighting nuisance in the form of light trespass or glare.

(1) Light trespass.

- A) The maximum vertical illuminance created by one or more outdoor luminaires shall not exceed 0.1 foot-candle when measured fifteen (15) feet inside the property line of an adjacent residential property or at the exterior wall of a dwelling on the adjacent property, whichever is closer to the outdoor luminaire(s), at a point five (5) feet above grade.

- B) The maximum vertical illuminance shall not exceed 0.05 foot-candle when measured at the property line of an environmentally sensitive area.
 - C) The Inspector of Buildings may grant exceptions due to extenuating circumstances related to safety and security.
- (2) Glare. Glare is declared to be a lighting nuisance when it constitutes a hazard to public safety along a public way or exceeds the standards listed in 6.1.A.
 - (3) A motion-activated luminaire that causes a nuisance but otherwise complies with this Bylaw is permitted as long as its output remains on for no more than 10 minutes, does not flicker intermittently, and is not triggered by right-of-way traffic in any form.
 - (4) The determination of light trespass and/or glare will be made by the Inspector of Buildings or their designee after a site visit and a visual inspection.
- A) Light trespass. The maximum vertical illuminance at a property line shall not exceed 0.1 foot-candle. The determination as to compliance shall be made by the Inspector of Buildings or their designee and vertical illuminance shall be measured at the property line measured five (5) feet above grade with the meter aimed toward the subject property and perpendicular to the property line. The Town Administrator in coordination with DPW, the Police Department, and Public Health Department may grant exceptions due to extenuating circumstances related to safety and security.
 - B) Glare is declared to be a lighting nuisance when it constitutes a hazard to public safety along a public way or causes intense discomfort to occupants of adjacent properties. This determination will be made by the Inspector of Buildings or designee through a site visit and a visual inspection.

SECTION 7 - Prohibitions

The use of searchlights, sky beams, or any outdoor luminaire that dynamically varies its output by intermittently fading, flashing, blinking, or rotating is prohibited, except for holiday lighting or as required by public-safety and public works personnel in temporary situations.

SECTION 8 - Exemptions

The following are exempt from compliance with all provisions of this Bylaw, except as noted:

- (1) Temporary emergency lighting needed by the Police, Fire, and Public Works departments; or other law-enforcement and emergency services, as well as all vehicle-mounted luminaires.
- (2) Lighting employed during repairs of roads, utilities, and similar infrastructure, including unshielded lighting, provided that such lighting is deployed, positioned, and aimed such that to the extent possible the resulting glare and light trespass do not extend beyond the work area.
- (3) Any form of lighting whose use is mandated or otherwise governed by any legal jurisdiction with broader authority than that of the Town of Bedford.

- (4) Temporary lighting for events sponsored by the Town of Bedford or for which a license or other approval has been issued, such as concerts, fairs, and festivals.
- (5) Holiday lighting, walkway lighting, and café lighting. However, it is the Town's preference that the outdoor luminaires used for these purposes be aimed so as to minimize light trespass on adjacent properties and be turned off between 12 a.m. and 6 a.m.
- (6) Luminaires used to illuminate athletic fields or recreational facilities shall, to the greatest extent possible, satisfy the on-field illuminance values in the latest version of ANSI/IES RP-6, Recommended Practice: Lighting Sports and Recreational Areas. Further, such luminaires must be aimed so as to minimize light trespass on adjacent properties and must be turned off within one (1) hour after the end of play or by 10 p.m., whichever occurs later.

SECTION 9 - Enforcement

- (1) The requirements of this bylaw shall be enforced by the Inspector of Buildings or by another person appointed or engaged by the Town for this purpose.
- (2) In the event an enforcement action is initiated, the owner of any lot, dwelling, commercial, or industrial property on which an outdoor luminaire subject to this Bylaw is located or proposed to be located shall have the burden of demonstrating that the existing or proposed outdoor luminaire complies with the requirements of this Bylaw.
- (3) The applicant for any permit or exception under this Bylaw shall submit evidence that the proposed work will comply with this Bylaw. Any costs associated with such proof of compliance will be paid by the applicant. The submission shall contain, but shall not necessarily be limited to, the following:
 - A) Plans indicating the location on the premises of each outdoor luminaire, both existing and proposed.
 - B) Description of all luminaires, fixtures, lamps, supports, reflectors, both existing and proposed. The description may include, but is not limited to, specification data and illustrations by manufacturers (including sections where required).
 - C) Photometric data, such as that supplied by manufacturers, photometric site drawings, and/or on-site calibrated light meter light level readings.
- (4) Violations and Penalties. The Inspector of Buildings may issue orders to enforce the terms of this bylaw, and may seek injunctive relief and utilize any other appropriate remedy to compel compliance, including the issuance of fines and penalties and the use of non-criminal disposition as provided in M.G.L. c. 40D, § 21D.