

# Light pollution reduction

Possible 1 point

## Intent

To increase night sky access, improve nighttime visibility, and reduce the consequences of development for wildlife and people.

## Requirements

Meet the Light Pollution Reduction requirements for the following:

1. One option in Exterior Lighting for Residential Areas
2. Exterior Lighting for Circulation Network
3. Uplight and light trespass requirements in Exterior Lighting for All Other Areas
4. Covenants, Conditions, and Restrictions.

Divide the project into model lighting ordinance (MLO) lighting zones LZ0 to LZ4 based on site-specific characteristics using the definitions of lighting zones provided in the Illuminating Engineering Society and International Dark Sky Association (IES/IDA) MLO User Guide.

Meet the requirements below for each lighting zone within the project.

### Exterior lighting for residential areas

Meet either Option 1 or Option 2 for all exterior lighting in new residential construction and residential buildings undergoing major renovations. Existing residential construction is exempt. Projects may use different options for uplight and light trespass.

#### Option 1. BUG rating method

Each fixture must have a backlight-uplight-glare (BUG) rating (as defined in IES TM-15-11, Addendum A) of no more than B2-U2-G2.

#### **OR**

#### Option 2. Calculation method

Meet the requirements of Option 2 in Exterior Lighting for All Other Areas, below.

### Exterior lighting for circulation network

For any portions of the circulation network not governed by national, state, or other superseding regulations, do not install street lighting unless conditions warrant the need for street lighting.

New and existing street lighting luminaires must not emit any light above 90 degrees (horizontal), based on the photometric characteristics of each luminaire when mounted in the same orientation and tilt as specified in the project design or as currently installed.

Exception for ornamental luminaires: Using the lowest MLO lighting zone for immediately adjacent properties, meet the requirements of the IES/IDA MLO, Table H.

#### **AND**

### Exterior lighting for all other areas

Use either the BUG method (Option 1) or the calculation method (Option 2) to meet uplight and light trespass requirements. Projects may use different options for uplight and light trespass.

### Uplight

#### Option 1. BUG rating method

Do not exceed the following luminaire uplight ratings, based on the specific light source installed in the luminaire, as defined in IES TM-15-11, Addendum A.

**Table 1. maximum uplight ratings for luminaires, by lighting zone**

MLO lighting zone	Luminaire uplight rating
LZ0	U0
LZ1	U1
LZ2	U2
LZ3	U3
LZ4	U4

OR

**Option 2. calculation method**

Do not exceed the following maximum percentages of total lumens emitted above horizontal.

**Table 2. Maximum percentage of lumens above horizontal, by lighting zone**

MLO lighting zone	Maximum allowed percentage of total luminaire lumens emitted above horizontal
LZ0	0%
LZ1	0%
LZ2	1.5%
LZ3	3%
LZ4	6%

**Light trespass**

**Option 1. BUG Rating Method**

Do not exceed the following luminaire backlight and glare ratings (based on the specific light source installed in the luminaire) as defined in IES TM-15-11, Addendum A, based on the mounting location and distance from the lighting boundary.

**Table 3. Maximum backlight and glare ratings**

Luminaire mounting	MLO lighting zone				
	LZ0	LZ1	LZ2	LZ3	LZ4
<b>Allowed backlight ratings</b>					
> 2 mounting heights from lighting boundary	B1	B3	B4	B5	B5
1 to 2 mounting heights from lighting boundary and properly oriented	B1	B2	B3	B4	B4
0.5 to 1 mounting height to lighting boundary and properly oriented	B0	B1	B2	B3	B3
< 0.5 mounting height to lighting boundary and properly oriented	B0	B0	B0	B1	B2
<b>Allowed glare ratings</b>					
Building-mounted > 2 mounting heights from any lighting boundary	G0	G1	G2	G3	G4
Building-mounted 1–2 mounting heights from any lighting boundary	G0	G0	G1	G1	G2
Building-mounted 0.5 to 1 mounting heights from any lighting boundary	G0	G0	G0	G1	G1
Building-mounted < 0.5 mounting heights from any lighting boundary	G0	G0	G0	G0	G1
All other luminaires	G0	G1	G2	G3	G4

A lighting boundary (or boundaries) is defined as the perimeter of each lighting zone within the project boundary. A lighting boundary can be modified under the following conditions:

- When the property line is adjacent to a public area that is a walkway, bikeway, plaza, or parking lot, the lighting boundary may be moved to 5 feet (1.5 meters) beyond the property line;
- When the property line is adjacent to a public street, alley, or transit corridor, the lighting boundary may be moved to the center line of that street, alley, or corridor;
- When there are additional properties owned by the same entity that are contiguous to the property, or properties, that the LEED project is within and have the same or higher MLO lighting zone designation as the LEED project, the lighting boundary may be expanded to include those properties.

Orient all luminaires less than two mounting heights from the lighting boundary such that the backlight points toward the nearest lighting boundary line. Building-mounted luminaires with the backlight oriented toward the building are exempt from the backlight rating requirement

**Option 2. calculation method**

Do not exceed the following vertical illuminances at the lighting boundary of each lighting zone in the project (use the definition of lighting boundary in Option 1). Calculation points may be no more than 5 feet (1.5 meters) apart. Vertical illuminances must be calculated on vertical planes running parallel to the lighting boundary, with the normal to each plane oriented toward the property and perpendicular to the lighting boundary, extending from grade level to 33 feet (10 meters) above the height of the highest luminaire.

**Table 4. maximum vertical illuminance at lighting boundary, by lighting zone**

MLO lighting zone	Vertical illuminance
LZ0	0.05 fc (0.5 lux)
LZ1	0.05 fc (0.5 lux)
LZ2	0.10 fc (1 lux)
LZ3	0.20 fc (2 lux)
LZ4	0.60 fc (6 lux)

FC = footcandle

**Exemptions from uplight and light trespass requirements**

The following exterior lighting is exempt from the requirements, provided it is controlled separately from the nonexempt lighting:

- specialized signal, directional, and marker lighting for transportation;
- internally illuminated signage;
- lighting that is used solely for façade and landscape lighting in MLO lighting zones 3 and 4 and is automatically turned off from midnight until 6 a.m.;
- lighting that is integral to other equipment or instrumentation that has been installed by the equipment or instrumentation manufacturer;
- lighting for theatrical purposes for stage, film, and video performances;
- street lighting;
- hospital emergency departments, including associated helipads; and
- lighting for the national flag in MLO lighting zones 2, 3, or 4

**Covenants, conditions, and restrictions**

Establish covenants, conditions, and restrictions (CC&R) or other binding documents that require continued adherence to the above requirements.