

CITY OF SANTA CRUZ
OUTDOOR LIGHTING ORDINANCE

DEVELOPED BY THE SANTA CRUZ
CHAPTER OF
DARK SKY INTERNATIONAL

PRESENTED TO
THE CITY OF SANTA CRUZ
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SantaCruzDarkSky.Org

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CITY OF SANTA CRUZ OUTDOOR
LIGHTING ORDINANCE

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1 PREFACE

1.1 RECITALS

- 1.1.1 WHEREAS, the City of Santa Cruz included in its 2030 General Plan the objective to “adopt or adapt the Model Light Ordinance and Design Guidelines jointly developed by the International Dark Sky Association [now *DarkSky International*] and the Illuminating Engineering Society of North America” as established Goal NRC7.1.2; and
- 1.1.2 WHEREAS, the American Medical Association (AMA) recognizes that *light pollution* and the misuse of blue-rich lighting can cause biological disruption in humans and other living organisms and can damage nocturnal ecosystems; and
- 1.1.3 WHEREAS, the City unanimously adopted a Health In All Policies Ordinance to take into account community well-being and outdoor lighting is an important component of this consideration; and
- 1.1.4 WHEREAS, outdoor uses of Artificial Light At Night (*ALAN*) can cause an unsafe reduction in visual performance, especially for the aged and those with low vision; and
- 1.1.5 WHEREAS, the natural night sky is an important cultural resource, and the increased misuse of *ALAN* has caused the proliferation of *light pollution* on a global scale and has recently been increasing the brightness of the night sky by 10 % annually, rendering the current night sky orders of magnitude brighter than the natural sky background; and
- 1.1.6 WHEREAS, Santa Cruz is host to several threatened and endangered species, and *ALAN* is known to negatively impact the viability of many plants, insects, terrestrial and marine animals, and their related ecosystems; and
- 1.1.7 WHEREAS, the increasing misuse of *ALAN* contributes to *light pollution* and wasted energy that could, if corrected, represent significant cost savings; and
- 1.1.8 WHEREAS, outdoor lighting that flickers or pulsates is associated with adverse health impacts on humans and animals; and
- 1.1.9 WHEREAS, local governments have the authority to protect natural and cultural resources and maintain a healthy environment for present and future generations; and

1.1.10 WHEREAS, *DarkSky International (DarkSky)* and the *Illuminating Engineering Society (IES)* have jointly authored the Five Principles for Responsible Outdoor Lighting to reduce *light pollution* and the misuses of *ALAN*:

1. Use light only when it has a necessary purpose.
2. Distribute lighting so it falls only where needed.
3. Use light levels no brighter than necessary.
4. Control light so it is used only when needed.
5. Use warmer color lighting where possible.

1.1.11 Now, therefore, let it be resolved that the City Council of the City of Santa Cruz hereby enacts this outdoor lighting ordinance to minimize *light pollution* and to promote responsible lighting at night, thereby supporting human visual performance and safety at night, limiting biological disruptions and damage to local ecosystems and cultural resources, as well as reducing wasteful use of energy and taxpayer funds.

1.2 PURPOSE

This municipal outdoor lighting ordinance, based on the *DarkSky* Municipal Ordinance Template version 1.0, addresses the negative impacts of artificial light at night, including *light pollution*, in our community. Implementation of appropriate and responsible lighting will enhance the safety and health of residents and visitors, protect local ecosystems and wildlife, address the impact of *light trespass*, minimize *skyglow* to preserve the night sky as a cultural resource, and help improve the City's reputation as a leader in environmental stewardship.

1.3 APPLICABILITY

1.3.1 This lighting ordinance applies to all outdoor lighting within the City, including street lighting and the regulation of *light trespass* within City boundaries.

1.3.2 All existing outdoor lighting that was lawfully installed prior to the enactment of this ordinance that does not meet the provisions of this outdoor lighting ordinance shall be considered legal but nonconforming until the time frame listed in Applicability Table 1, at which time they become subject to regulation.

- 1.3.3 All existing outdoor *luminaires* that may jeopardize public safety to drivers, pedestrians, or cyclists or are deemed a nuisance to residents, neighbors, or businesses can be addressed using the City’s existing Code Compliance process.

Applicability Table 1

Time frame in years from the date of ordinance adoption until the regulations take effect:

Residential

New Construction 0 years

Existing 2 years

Nonresidential

New Construction 0 years

Existing 2 years

Public Street and Parking Lot Lighting

New Construction 0 years

Existing 5 years

1.4 EXEMPTIONS

- 1.4.1 Any form of lighting mandated by a legal jurisdiction with broader authority than the City is exempt from this outdoor lighting ordinance.

- 1.4.1.1 Government-mandated navigational lighting systems necessary for nautical safety.

- 1.4.1.2 Occupational Safety and Health Administration (OSHA) mandated lighting.

- 1.4.1.3 Temporary lighting used for road construction/repair and worker safety on roadway projects.

- 1.4.2 Temporary lighting used by law enforcement and authorized first responders during emergency procedures.

- 1.4.3 Permit-approved *luminaires* replicating time-period historical character for registered historic places of local landmarks.

1.4.4 Temporary lighting used during permit-approved special events and festivals.

1.4.5 Temporary holiday lighting.

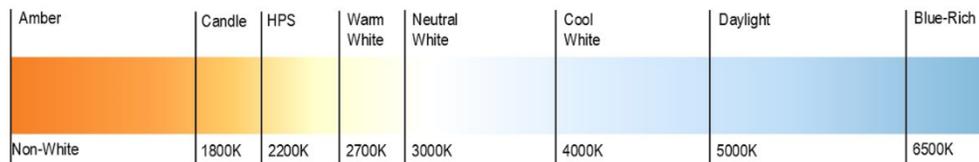
1.5 DEFINITIONS

As used in this ordinance, the following terms shall have the meaning set forth below unless the context clearly dictates a different meaning.

American National Standards Institute (ANSI): A private non-profit organization that oversees the publication of standards for products, services, and systems.

ALAN (Artificial Light at Night): Light that is created from human technology rather than from a naturally occurring process.

Correlated Color Temperature (CCT): The measured color appearance (not brightness) of light emitted by a **luminaire**, lamp, or light source described using a nominal value in *kelvins* (K).



Light sources with lower CCTs (1800 K to 2200 K) appear “warm” or “amber”; medium CCTs (2700 K to 3000 K) appear “warm white; high CCTs (4000 K and higher) appear “cool white” or “blue.” The CCT is usually printed on the lighting packaging.

DarkSky International (DarkSky): A private non-profit advocacy organization that works to restore the nighttime environment and protect communities from the harmful effects of *light pollution*. *DarkSky* was formerly known as the *International Dark-Sky Association (IDA)*.

DarkSky Approved Outdoor Sports Lighting: A standalone program put forth by *DarkSky International* to guide and/or certify sports lighting that meets stringent *glare* and *light trespass* requirements.

Five Principles for Responsible Outdoor Lighting:

1. Use light only if it is needed. All light should have a clear purpose. Consider how the use of the light will impact the area, including wildlife and their habitats.

2. Direct light so it falls only where it is needed. Use shielding and careful aiming to target the direction of the light beam so that it points downward and does not spill beyond where it is needed.
3. Light should be no brighter than necessary. Use the lowest light level required. Be mindful of surface conditions, as some surfaces may reflect more light into the night sky than intended.
4. Use light only when it is needed. Use controls such as timers or motion detectors to ensure that light is available when it is needed, dimmed when possible, and turned off when not needed.
5. Use warmer color lights where possible. Limit the amount of shorter wavelength (blue-violet) light to the least amount needed.

Glare: Excessive brightness from artificial lighting in a dark environment that causes visual discomfort, reduces visibility, or interferes with the natural viewing environment

HPS: Acronym for High Pressure Sodium.

Illuminance: The amount of light falling onto a surface measured in *lux*.

Illuminating Engineering Society (IES): A private learned society that researches and publishes standards for lighting.

International Dark-Sky Association (IDA): The private non-profit advocacy organization now doing business as *DarkSky International* or *DarkSky*.

Kelvin (K): The unit of thermodynamic temperature.

Light Pollution: *ALAN* traveling into areas where it's not needed or wanted. This can be in the form of *light trespass*, *glare*, or *skyglow*.

Light Trespass: Light emitted by a *luminaire* that shines beyond the property on which it is located and exceeds the *lux* level limits specified in this ordinance in the Light Distribution section for the relevant property type (i.e., residential or nonresidential).

Lumen (lm): A unit of measure for the quantity of light provided by a source or *luminaire*. *A conventional 60-watt incandescent bulb typically emits 800 lumens.*

Luminaire: A complete lighting unit, including the light source, housing, optics, electronics, and other necessary components to provide outdoor illumination.

Lux (lx): A unit of measure for *illuminance*.

Lux can be measured using a light meter. 1 lux is approximately the illuminance at 3 feet from a candle. 1 lux is approximately the illuminance 38 feet away from a 60-watt incandescent light. 10 lux is approximately the illuminance at one foot from a candle. The full Moon at its brightest is less than 1/2 lux.

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* begin one hour after closing.

Nonresidential Properties: Properties belonging to or operated by private businesses, the City, or other government entities, excluding *public street and parking lot lighting*.

Public Street and Parking Lot Lighting: Street and parking lot lighting utilized in and managed by the City that illuminates public streets, public alleys, public parking lots, etc.

Shielded Lighting: Luminaires constructed so that all light is emitted directly or indirectly below a horizontal plane running through the lowest light-emitting part of the *luminaire*.

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.

Skyglow: The brightening of the night sky caused by *ALAN* scattering in the atmosphere and returning to Earth, thus decreasing the ability to see stars and other celestial objects.

2 OUTDOOR LIGHTING REQUIREMENTS FOR RESIDENTIAL PROPERTIES

2.1 LIGHT QUANTITY

2.1.1 The total sum of outdoor *lumens* at each residence in a single or multi-family residential property shall not exceed the limits in the table below expressed as the size of the property and maximum *lumens*. For reference, a 60-watt incandescent bulb outputs approximately 800 *lumens*.

Per Dwelling	Lumen	Allowance	
Property	Size		Max
	(acre)	(sf)	Lumens
less than	0.05	2178	850
greater than	0.05	2178	850
greater than	0.13	5662	1500
greater than	0.20	8712	2000
greater than	0.25	10890	2400
greater than	0.33	14375	2800
greater than	0.50	21780	3500
greater than	0.75	32680	4100
greater than	1.00	43560	4600
greater than	1.33	57935	5200

Single-Family Example: A typical 5,000 square foot lot is 0.11 acres. Therefore, the residence is allowed to have a total of 850 *lumens* of outdoor lighting.

Multi-Family Example: 32 townhome units on a 3.2-acre development equals .10 acres per dwelling. Therefore, each dwelling is allowed to have a total of 850 *lumens* of outdoor lighting.

2.1.2 No single *luminaire* shall exceed a light output of 1,000 *lumens*.

2.2 LIGHT DISTRIBUTION

2.2.1 Outdoor lighting shall not create *light trespass* above the following levels:

2.2.1.1 *Light trespass* onto waterways or land designated as wilderness, natural area, habitat, or reserves shall be no greater than one-tenth (0.1) *lux*.

2.2.1.2 *Light trespass* from a residential property shall be no greater than one (1) *lux* at the boundary of the property on which the *luminaire* is located.

2.2.2 All exterior lighting greater than 50 *lumens* shall be *shielded lighting*. Additional *shielding* may be required to meet the *light trespass* requirements above.

2.2.3 Outdoor lighting must not interfere with the safe movement of pedestrians, bicyclists, or motor vehicle operators. Any lighting that distracts or disables the vision of a vehicle operator (e.g., excessively bright, rapid blinking, flashing, and/or motion video), contributors to traffic confusion (e.g., resembles a traffic, railroad, or other warning signal), or interferes with the effectiveness of any traffic control device is prohibited.

2.3 LIGHTING CONTROL

2.3.1 Outdoor *luminaires* shall be turned off or controlled by motion detection during *nighttime hours*. Motion detectors shall be set such that they:

- Turn off all activated lights within 5 minutes of inactivity or lack of motion.
- Are not activated by motion beyond the property boundaries.
- Are not activated by wind-blown flags or vegetation on the property.

2.4 LIGHT COLOR AND FLICKER

2.4.1 The maximum allowable Correlated Color Temperature (CCT) for outdoor lighting on residential properties is 2400 K. *Lower CCTs typically have less blue wavelength content and are generally less harmful to humans and other species. Use warmer color lights when possible. Lighting under 2400 K is encouraged for properties near natural areas including riparian zones, rivers, streams, and the marine environment.*

2.4.2 Outdoor lighting may not flash, flicker, rotate, or pulsate.

3 OUTDOOR LIGHTING REQUIREMENTS FOR NONRESIDENTIAL PROPERTIES

3.1 LIGHT DISTRIBUTION

- 3.1.1 No outdoor lighting shall create *light trespass* above the following levels:
- 3.1.2 *Light trespass* onto waterways or land designated as wilderness, natural area, habitat, or reserves shall be no greater than one-tenth (0.1) *lux*.
- 3.1.3 *Light trespass* limits are a maximum of three (3) *lux* measured 20 feet away from the property boundary.
- 3.1.4 All exterior lighting greater than 50 *lumens* shall be *shielded lighting*. Additional *shielding* may be required to meet the *light trespass* requirements above.
- 3.1.5 Outdoor lighting must not interfere with the safe movement of pedestrians, bicyclists, or motor vehicle operators. Any lighting that contributes to traffic control confusion (e.g., source resembling or imitating traffic control lighting, railroad signal, blinking, flashing, moving, and revolving) or hides or interferes with the effectiveness of any official traffic control devices is prohibited.

3.2 LIGHTING CONTROL

- 3.2.1 Outdoor *luminaires* shall be turned off or controlled by motion detection during *nighttime hours*. Motion detectors shall be set such that they:
- Turn off all activated lights within 5 minutes of inactivity or lack of motion.
 - Are not activated by motion beyond the property boundaries.
 - Are not activated by wind-blown flags or vegetation on the property.

3.3 LIGHT COLOR AND FLICKER

- 3.3.1 The maximum allowable *CCT* is 3000 K. *Lower CCTs typically have less blue wavelength content and are generally less harmful to humans and other species. Lighting under 2400 K is encouraged for properties near natural areas including riparian zones, rivers, streams, and the marine environment.*
- 3.3.2 Outdoor lighting may not flash, flicker, rotate, or pulsate.

4 OUTDOOR LIGHTING REQUIREMENTS FOR PUBLIC STREET AND PARKING LOT LIGHTING

4.1 LIGHT QUANTITY

- 4.1.1 Outdoor lighting shall not exceed *illuminance* levels recommended by *ANSI/IES* Lighting Standards or any State alternative for the intended application by more than 25%.

4.2 LIGHT DISTRIBUTION

- 4.2.1 All outdoor lighting shall be *shielded lighting*.
- 4.2.2 All *luminaires* shall emit 95% of their total lumen output at or below 80 degrees from a downward vector directly below the *luminaire*.



- 4.2.3 No outdoor lighting shall create *light trespass* above the following levels:
- 4.2.3.1 *Light trespass* onto waterways or land designated as wilderness, natural area, habitat, or reserves shall be no greater than one-tenth (0.1) *lux*.

4.3 LIGHTING CONTROL

- 4.3.1 All new and replacement outdoor *luminaires* shall be managed by automatic (e.g., clock, calendar, motion) or manual controls capable of turning lights on, off, and dimming to 25% of full light output.

- 4.3.2 Unless specified otherwise, new and replacement outdoor lighting shall be dimmed by at least 30% during *nighttime hours*.

4.4 LIGHT COLOR

- 4.4.1 The maximum allowable *CCT* for *luminaires* is 3000 K. *Lower CCTs typically have less blue wavelength content and are generally less harmful to humans and other species. Use warmer color lights when possible. Lighting under 2400 K is encouraged for properties near natural areas, including riparian zones, rivers, streams, and the marine environment.*

5 OUTDOOR LIGHTING REQUIREMENTS SPORTS LIGHTING

Newly installed or renovated sports lighting shall meet the *DarkSky Approved Outdoor Sports Lighting* Program requirements in effect at the time of design approval.

6 LIGHT ORDINANCE EDUCATION

The City will establish an informational resource along with seminars and in-person meetings to support and educate residents and business owners about compliance with this ordinance.

7 ADMINISTRATIVE REQUIREMENTS

7.1 PERMIT APPLICATION

7.1.1 Submittal: Whenever a building, subdivision, site plan, or outdoor lighting permit is applied for, an outdoor lighting plan must be submitted along with a compliance statement that the proposed work will comply with all City Outdoor Lighting Ordinance requirements. The outdoor lighting plan must follow one of the following:

7.1.1.1 “Schedule Method”: Available for residential projects up to four units per property to be documented using a spreadsheet format by listing the *luminaire* identifications (i.e., manufacturer, model number, type), *luminaire* quantities, and *lumen* outputs for each to assure that the total *lumens* output per dwelling do not exceed the limits in section 2.1.1; or

7.1.1.2 “Lighting Plan Method”: Available for all project types and required when specifically requested by the Planning Commission and for all sports lighting, an outdoor lighting design shall be prepared and analyzed by a certified or licensed professional designer or engineer using industry-standard lighting software. This outdoor lighting plan shall include the following:

1. *Luminaire identification (model number), locations, mounting heights, targeted directions, buildings, and other physical objects within the site.*

2. *Site plan and illuminance calculation plots demonstrating conformance with this ordinance.*

7.1.2 Review: Site lighting plans and compliance statements shall be subject to review and approval by the Planning Commission or designee. The Planning Commission shall have the authority to refer an application to the Zoning Administrator or the Historic Preservation Commission if deemed appropriate.

7.1.3 Appeals: Any appeals related to decisions regarding outdoor lighting shall be made to the Planning Commission or designee.

7.2 ENFORCEMENT AND PENALTY

- 7.2.1 Any City resident who is negatively affected by outdoor lighting can submit a code compliance complaint using the City's standard code compliance reporting process. Code compliance officers will respond to the complaint within 30 days. If the issue is found to be a violation, the issue must be resolved within ninety (90) days of being cited.
- 7.2.2 Enforcement: Unless otherwise noted in this outdoor lighting ordinance, the Planning Commission shall be responsible for compliance for new residential and non-residential construction. City Code Compliance shall be responsible for enforcement of existing residential and non-residential lighting triggered by nuisance complaints. The Public Works department shall be responsible for the enforcement of new and existing *public street and parking lot lighting*.
- 7.2.3 Penalty: Any lighting that does not meet the requirements of this ordinance shall be considered a violation. A person, firm, or corporation that violates, disobeys, omits, neglects, or refuses to comply with any provisions of this ordinance shall receive an administrative citation as provided by the municipal code. Violation citations shall be corrected within ninety (90) days of being cited. If the property owner remains unresponsive, additional fees apply until compliance is reached.