



County of Fairfax, Virginia

To protect and enrich the quality of life for the people, neighborhoods and diverse communities of Fairfax County

February 17, 2023

ZONING ORDINANCE AMENDMENT – OUTDOOR LIGHTING Dark Skies Around Turner Farm Park Observatory Staff Summary

BACKGROUND

On February 11, 2020, as part of the adoption of a Zoning Ordinance amendment updating certain outdoor lighting provisions, the Board of Supervisors (Board) approved a follow-on motion directing staff to consider additional zoning provisions to protect dark skies around astronomical facilities. This motion was in response to comments received from the community and supported by the Planning Commission.

Background information and draft text for discussion purposes was posted on August 31, 2022, and can be found here: [Zoning Ordinance Amendment - Outdoor Lighting Dark Skies around Turner Farm Park Observatory Preliminary Concepts \(fairfaxcounty.gov\)](https://www.fairfaxcounty.gov/planning-development/zoning-ordinance-amendment-outdoor-lighting-dark-skies-around-turner-farm-park-observatory-preliminary-concepts). Since that time, a town hall was held on September 19, 2022, and additional feedback has been received from the community. This document provides an updated overview of potential options for consideration and revised draft text.

TURNER FARM PARK OBSERVATORY

The Board's follow-on motion was based on Va. Code §15.2-920 which says:

“In addition to any other authority granted to localities by law, any locality may by ordinance regulate outdoor lighting within an area one-half mile around planetariums, astronomical observatories and meteorological laboratories. ...”

The only facility within the County that could be subject to such regulations is the Turner Farm Park Observatory, located at the intersection of Georgetown Pike and Springvale Road within the Dranesville District. There is an additional observatory located at the Fairfax campus of George Mason University; however, the Zoning Ordinance does not apply on properties owned by the State.



Can the amendment apply to other areas of the County? No, any regulations adopted for the purpose of protecting dark skies around an astronomical facility are limited by Va. Code §15.2-920.



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The Turner Farm Park Observatory contains a roll-top observatory with multiple telescopes and a former National Defense Mapping Agency observation tower that will be converted to a remote access telescope observatory. The observatory is part of a larger park complex that contains equestrian facilities, a playground, and a picnic area. The observatory offers classes, summer camps, scout badges, and holds an astronomy festival. It has served over 7,891 people

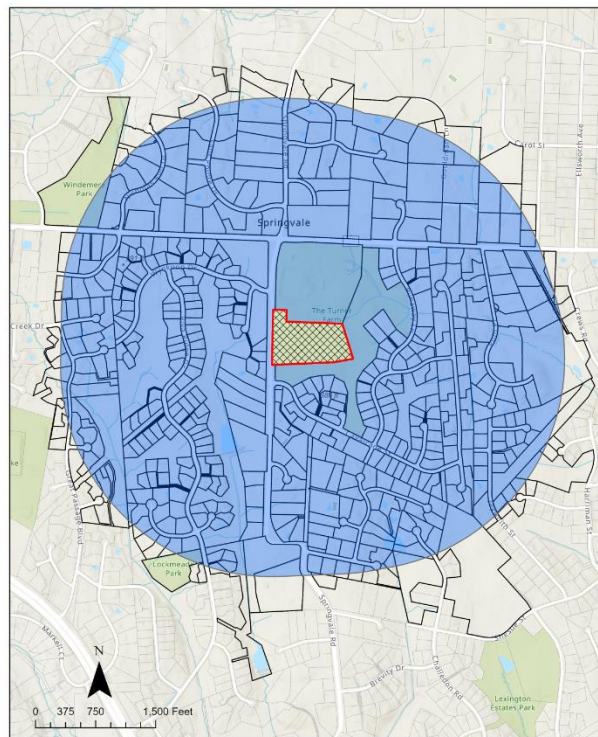
in educational programs since the spring of 2018. In addition to the for-fee activities, the observatory is open for free to the public for viewing Friday nights, weather permitting. The Analemma Society also provides volunteers to open the park for free viewing during astronomical events like eclipses and comets. Currently, the observatory is working toward becoming an official Urban Night Sky Place from the International Dark Sky Association and hopes to become an education leader in dark sky preservation and value-centered lighting.

CURRENT COUNTYWIDE REGULATIONS

The Zoning Ordinance contains standards for outdoor lighting that apply countywide and are intended to reduce the impacts of glare, light trespass, and light pollution; promote safety and security; and encourage energy conservation. These are found in [Section 5109](#) and are summarized on the County's [website](#) and in informational flyers about [residential](#) and [nonresidential](#) lighting. The [Preliminary Concepts](#) document posted previously for this amendment included an overview of the current regulations.

POTENTIAL ZONING ORDINANCE REVISIONS

In accordance with State Code, new regulations could apply within one-half mile of the observatory. These properties are zoned residential and developed with single-family detached dwellings or recreation facilities. The area includes 525 lots and is shown below:



Single Parcel for Observatory Park
1/2 Mile Buffer of Parcels from the subject property boundary
Source: Fairfax County Geographic Information System



Current countywide regulations support dark skies by requiring most lights to be dark sky compliant (full cut-off and mounted horizontal to the ground), but the Zoning Ordinance allows exemptions for certain lights. To maintain dark skies around the observatory it is recommended that these exemptions be limited within the one-half mile area around the observatory. However, to allow flexibility to install lighting for safety, security, and nighttime visibility, limits on (a) the number of lights per lot; and (b) the lumens for full cut-off lights, are not recommended.¹ The Fairfax County Police Department has advised that proper lighting can be a deterrent for criminal activity, but overlighting is not needed to facilitate a safe environment.

Community input on the proposed amendment has been mixed, with some in favor of additional regulations, and some against. Based on the feedback, the proposed regulations have been revised. In general, the proposed revisions allow for additional flexibility for outdoor lighting while still reducing the exemptions from dark sky compliant lighting. The proposed regulations are summarized in the table below as compared to current countywide standards and the previous staff draft of August 31, 2022, and are further discussed below.

¹ Watts to lumens in the text box on page 5 are based on: <https://www.thecalculatorsite.com/energy/watts-lumens.php>.

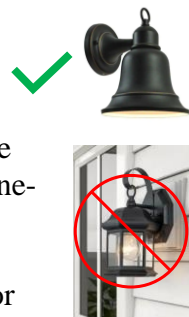
Current Zoning Ordinance standards (countywide)	Staff draft for observatory area – August 31, 2022	Staff draft for observatory area – revised February 2023
“Grandfathering” provisions with previous amendments have allowed legally existing lights to remain until replaced	Two options were included: - legally existing lights may remain until replaced, or - existing lights must comply within 5 years	Legally existing lights may remain until replaced
Motion-activated lights on single-family lots: do not need to be full cut-off or meet the setback/shielding requirements if 4,000 lumens, turn off within 5 minutes, and are directed within the property	Same, but reduce lumens to 1,500	Same as previous draft
Other lights on single-family lots: do not need to be full cut-off or meet the setback/shielding requirements if 1,500 lumens or less	All lights need to be full cut-off and comply with the setback/shielding requirements, except for: - driveway or walkway lighting of 10 lumens or less, and - 1 light at each exterior door or garage, up to 1,500 lumens/fixture	All lights need to be full cut-off and comply with the setback/shielding requirements, except for: - any lights 20 lumens or less, and - any number of lights at a door or garage, up to 1,500 lumens/fixture
Uplights or spotlights (architectural features, flags, landscaping): any number allowed, but must be full cut-off or shielded to confine the light to the object	Same, but limit to 15 light fixtures per lot	Any number of fixtures allowed, with a maximum of 300 lumens/fixture
Color temperature: Up to 3,000K	No change	No change
Light trespass on a street or trail: No specific standard in the Zoning Ordinance, but there are standards for full cut-off fixtures, and a prohibition on disability glare	No change	No change (the requirements above would reduce potential light trespass)



What are lumens? Lumens measure light output. This is different from watts which measure electrical power consumption. Lumens can be converted from watts, but it depends on the efficiency of the bulb. The lumens are listed on light bulb packaging and sometimes on the bulb itself. Below are examples for comparing some typical light bulbs:

<u>Incandescent Bulb Watts</u>	<u>Lumens</u>
250	3,000 – 4,500
100	1,200 – 1,800
60	720 – 1,080
25	300 – 450
1	12 – 18

- **Previously existing lights:** As the outdoor lighting regulations have changed over time, lawfully existing lights in place prior to the effective date of the new regulations have been allowed to remain. The existing applicability provisions are found in subsection 5109.1. The previous draft included two options for consideration – option 1 would allow lighting that was lawful when installed to remain until replaced, and option 2 would require all lights to conform within five years. Based on community feedback, the revised draft would allow lawfully existing lights to remain and removes the option for all lights to conform within five years. The new regulations would only apply to new or replaced lighting fixtures. In accordance with subsection 5109.2.C, routine fixture maintenance, such as changing a light bulb or other components does not constitute replacement if the changes do not result in a higher lumen output or a color temperature above 3,000K.
- **Residential lighting:** Currently, lights, such as porch lights, lamp posts, and landscape lighting, are not required to be full cut-off² or meet the setback/shielding requirement³ if they are 1,500 lumens or less. This exemption recognizes that full cut-off lighting is less available for purchase by homeowners; however, over time, dark sky compliant lighting has become more available and can now be purchased in stores and online.⁴ Within the one-half mile area around the observatory, consideration should be given to requiring all lights to be full cut-off and meet the setback/shielding requirement, except for: (a) any number of lighting fixtures located at exterior doors or garages with a maximum of 1,500 lumens; (b) other lights, such as



² See subsection [5109.3.A\(1\)](#) which requires lights to be full cut-off and mounted horizontal to the ground.

³ See subsection 5109.3.C(3) which requires lights abutting residentially zoned properties to be mounted at a height equal to or less than, $\text{Height} = 3 + (\text{Distance from lot line})/3$, or have opaque shielding to reduce glare on the abutting property. For example, a light located 20 feet from the lot line could be mounted no higher than 9.67 feet, unless it had shielding.

⁴ Images from homedepot.com

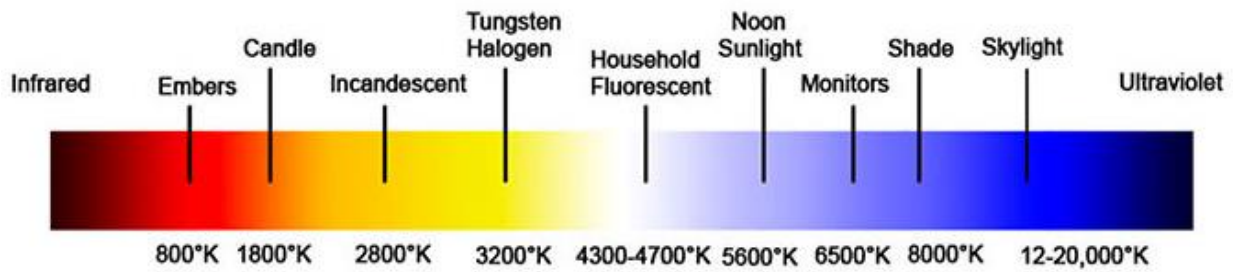
string lights, with up to 20 lumens; (c) motion-activated lights as discussed below; and (d) uplights or spotlights as discussed below.

Instead of limiting the exemption for lights located at doors or garages to one light fixture as recommended in the previous draft, the revised standards would allow any number of lighting fixtures, recognizing that it is not unusual for homes to have at least two lights at each entrance. The exemption for driveway or walkway lighting of 10 lumens or less as included in the previous draft is recommended to be expanded to any type of lighting up to 20 lumens. This would allow for string lights and other common landscaping lighting.

- **Motion-activated:** Motion-activated lights are not currently required to be full cut-off or meet the setback/shielding requirement if they are 4,000 lumens or less, turn off within five minutes of the motion ceasing, and are aimed so that illumination is directed within the property. Within the one-half mile area around the observatory, the exemption could be reduced from the current maximum of 4,000 lumens (approximately a 250-watt incandescent bulb). A maximum of 1,500 lumens is recommended, consistent with the current exemption for other types of residential lighting.
- **Uplighting and Spotlighting:** Currently, uplights and spotlights are allowed for flags, landscaping, signs, statues, architectural and other features if the light is aimed and shielded to be confined to the object. Given the potential impacts on dark skies, consideration could be given to establishing a maximum number of lumens for such lights within the one-half mile area. The previous draft did not include a maximum number of lumens, but instead limited the number of uplights or spotlights to fifteen. Replacing the maximum number of fixtures with a limit on the lumens per fixture would allow flexibility in lighting design while still reducing impacts on the night sky.

All other requirements of the Zoning Ordinance would continue to apply, including the maximum color temperature. Questions have been raised regarding whether the maximum allowed color temperature should be reduced within the one-half mile area. The countywide standard of 3,000K was adopted for streetlights in the Public Facilities Manual in 2019 and for private properties in the Zoning Ordinance in 2020. For reference, a typical incandescent bulb has a color temperature of approximately 2,600K to 3,000K. Color temperature impacts glare and bulbs with a lower color temperature, such as 2,700K, are now typically available. However, given the relatively recent adoption of the 3,000K standard and the limited difference between 2,700K and 3,000K, staff does not recommend revising the color temperature standard with this amendment.⁵

⁵ Image from <https://www.ledwatcher.com/what-is-light-bulb-color-temperature-and-how-it-is-measured/>



Overall, the proposed revisions would support dark skies around the observatory while allowing for flexibility in lighting design for individual properties. Revised draft text for discussion purposes is included in Attachment 1.

NEXT STEPS

Another community meeting is scheduled for February 27, 2023, at 7:00 p.m. Information about that meeting is posted on this website: <https://www.fairfaxcounty.gov/planning-development/zoning-ordinance/amendments>. In addition, questions and comments can be directed to Carmen Bishop, Deputy Zoning Administrator, at carmen.bishop@fairfaxcounty.gov or 703-324-1314.

ATTACHMENT

1. Draft Zoning Ordinance Text

DRAFT TEXT FOR DISCUSSION

Revised February 2023

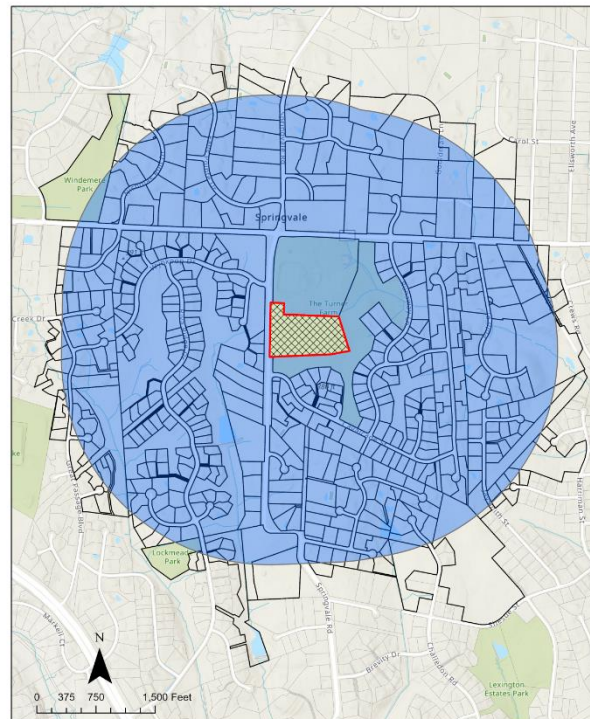
Proposed new subsection 5109.5 is shown below.

5. Lighting Standards Surrounding the Turner Farm Park Observatory

A. Applicability

Properties located within one-half mile around the Turner Farm Park Observatory, as shown in Figure 5109.5 below, are subject to the additional standards of this subsection 5. The one-half mile area is measured from the lot lines established by Tax Map 12-1 ((1)) 24 as of (*insert effective date of this amendment*). If a lot is partially within the one-half mile area, these standards apply to the entire lot. Additional applicability provisions are included in subsection 5109.1.

Figure 5109.5



B. Lighting Fixtures and Mounting

(1) On lots developed with single-family dwellings, instead of the exemptions in subsections 5109.2.F and 2.G, the following lighting fixtures do not need to be full cut-off and mounted horizontal to the ground as required by subsection 5109.3.A(1), or comply with the setback or shielding requirement in subsection 5109.3.C(3):

(a) Motion activated lighting fixtures that:

1. Emit initial lighting levels of 1,500 lumens or less;

- 2. Are extinguished within five minutes upon cessation of motion; and
 - 3. Are aimed to direct the illumination within the property boundary.
- (b) Lighting fixtures located at an exterior door or garage with initial lighting levels of 1,500 lumens or less per fixture. These fixtures must be located within three feet of and intended to illuminate the immediate area of the door or garage.
- (c) Lighting fixtures of 20 lumens or less.
- (2) Uplights or spotlights in accordance with subsection 5109.3.A(4) are allowed with initial lighting levels of 300 lumens. The lights must be full cut-off and mounted horizontal to the ground or directionally shielded, aimed, and controlled to confine the light to the object intended to be illuminated. These lights are not exempt from the setback or shielding requirement of subsection 5109.3.C(3).

Proposed revisions to the applicability provisions of subsection 5109.1.B are shown below in strike-through and underline.

5109. Outdoor Lighting

The purpose of this section is to establish outdoor lighting standards to reduce the impacts of glare, light trespass, and light pollution; promote safety and security; and encourage energy conservation.

1. Applicability

- A. These outdoor lighting standards apply to the installation of new outdoor lighting fixtures or the replacement of existing outdoor fixtures, except as provided in subsection 2 below.
- B. Previously existing lighting fixtures:
- (1) Outdoor lighting fixtures lawfully existing before June 17, 2003, that do not conform to the provisions of this section ~~are deemed to be a lawful nonconforming use and~~ may remain.
 - (2) For the purpose of the provisions in subsections ~~5109.3.A(2) (correlated color temperature), 5109.2.F (exemptions for motion activated light fixtures), and 5109.2.G (exemptions for lots developed with single-family dwellings), and 5109.3.A(2) (correlated color temperature),~~ outdoor lighting fixtures lawfully existing before February 12, 2020, ~~are deemed to be a lawful nonconforming use and~~ may remain. A nonconforming lighting fixture that is changed to or replaced by a conforming lighting fixture is no longer deemed nonconforming and must be in accordance with the provisions of this section.
 - (3) For properties subject to subsection 5109.5, outdoor lighting fixtures lawfully existing before (insert effective date of this amendment), that do not conform to the provisions of subsection 5109.5 may remain.