



# County of Fairfax, Virginia

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

August 31, 2022

## ZONING ORDINANCE AMENDMENT – OUTDOOR LIGHTING Dark Skies Around Turner Farm Park Observatory Preliminary Concepts

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### 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.

This document provides an overview of this Zoning Ordinance amendment topic, the timeline, and potential options for consideration.

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### 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.



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 3,700 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



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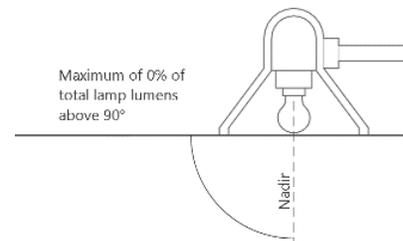
becoming an official Urban Night Sky Place from the International Dark Sky Association and hopes to become an education leader in dark sky preservation and value-centered lighting.

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## 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 properties located within ½ mile of the observatory are zoned residential and developed with single-family detached dwellings or recreation facilities. Some of the lighting requirements applicable to residential properties include:

- Outdoor lighting fixtures are required to be full cut-off and mounted horizontal to the ground (dark sky compliant). Full cut-off means that light is not emitted above the bottom of the fixture. Exemptions:
  - On lots with single-family dwellings, lights do not need to be full cut-off or meet the setback/shielding requirement if:
    - The light fixture has 1,500 lumens or less; or
    - The light is motion-activated with 4,000 lumens or less, turns off within 5 minutes of motion ceasing, and the light is directed within the property.



Lumens measure light output. This is different from watts which measure electrical power consumption. However, a 100-watt incandescent bulb is about equal to 1,500 lumens and a 250-watt incandescent bulb is approximately 4,000 lumens. The lumens for a light bulb are listed on the packaging and sometimes on the bulb itself.

- Holiday lighting.
- Depending on when the light was installed, it may be allowed to remain.
- Light bulbs must have a color temperature of 3,000K or less.



The K stands for Kelvin which is used to measure color temperature. Color temperature ranges from warmer colors at 3,000K and below to bright blue-white. Lower color temperatures reduce energy use and glare. Color temperature is listed on light bulb packaging.

- Spotlighting of flags, landscaping, or other similar objects must be aimed and shielded to confine the light to the object.
- On lots adjacent to properties that are either residentially zoned and developed, vacant, or homeowner's association open space, all lights must have a setback based on their height or

have additional shielding. This requirement reduces light trespass. It is based on the formula:  $H \leq 3 + D/3$  (where H is the height of the lighting fixture and D is the distance from the lot line). For example, a light located 20 feet from a lot line with adjoining residential can have a maximum height of 9.67 feet; or a light that is placed 20 feet high, such as under an eave, must be located 51 feet from a lot line with adjoining residential. If the setback requirement is not met, additional shielding is required to protect the adjoining residential.

- Light poles 7 feet high or less are allowed in any location; higher poles are subject to height and location standards.
- On all lots (including single-family), sports fields and courts (including pools) over 10,000 square feet or with light poles that are 20 feet or more in height are required to have an approved sports illumination plan.

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## POTENTIAL ZONING ORDINANCE REVISIONS

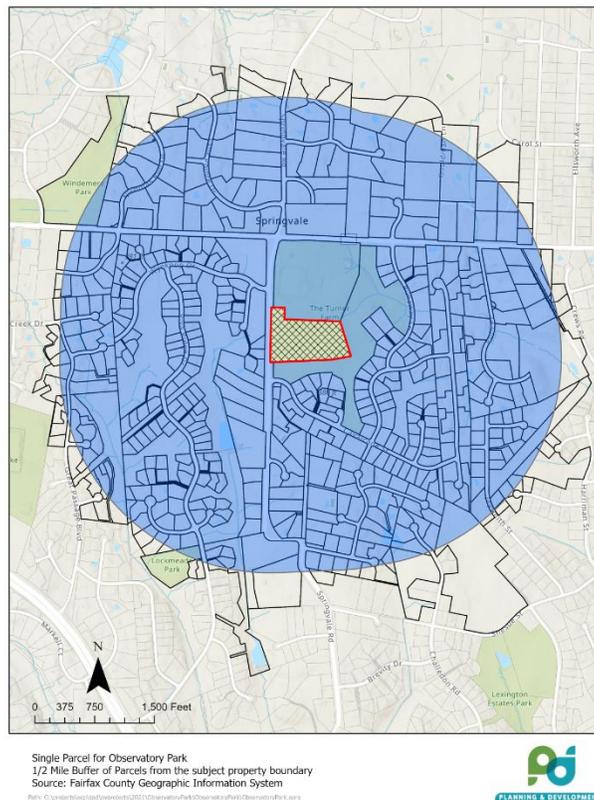
### Process, Timeline, and Neighborhood Survey

Staff has begun the research and outreach process for consideration of an amendment to add regulations that would protect dark skies around the Turner Farm Park Observatory (observatory). Research and community engagement will continue, potentially leading to authorization of the amendment later in the fall or winter of 2022/2023. If authorized, public hearings will be scheduled before the Planning Commission and the Board.

Several community meetings have been held, including a town hall on March 23, 2022. Following the town hall, a survey was open from March 24 to April 24, 2022, to seek feedback from the property owners within the ½ mile area of the observatory. The survey informed all residents within the area of the proposed amendment, provided background information, and solicited preliminary feedback. As further detailed in Attachment 1, the survey results indicated both community support and opposition for additional outdoor lighting regulations. Comments received in support of additional regulations expressed that the amendment would be an important and valuable step in protecting dark skies and the use of the observatory. Comments in opposition indicated that additional regulations are not needed, and concerns were expressed about several issues, including safety and security, and whether additional regulations within ½ mile of the observatory would be meaningful, given the overall light pollution of the area.

Regarding safety and security, representatives of the Fairfax County Policy Department, Reston District Station (FCPD), have advised that proper lighting, following the principles of “Crime Prevention Through Environmental Design,” can be a deterrent for criminal activity. Lighting at access points like exterior doors, garages, driveways, and walkways can provide greater visibility and reduce the opportunity for criminal activity. Lighting design for the type, number, and illumination level of fixtures should vary according to the location and use of the space, and can include, but is not limited to, motion-activated lights, photocell (dusk to dawn) lights, and full cut-off lights. However, overlighting and uplighting are not required to facilitate a safe environment. It is planned that FCPD will participate in a future town hall to respond to questions and concerns.

Although Fairfax is within an area of significant light pollution, limits on lighting in proximity to the observatory can have an important impact on the functioning of the facility. The scientific properties of light, including what is referred to as the inverse-square law, mean that lighting near the observatory has disproportionate effect. For example, one light bulb located ½ mile away has approximately the same impact as almost 200 bulbs located at Tysons, about seven miles away. Around Turner Farm Park, the ½ mile area where the State Code allows for the County to adopt regulations for the purpose of protecting the observatory, is zoned for low-density residential, including the R-E (Residential-Estate) and R-1 (Residential, One Dwelling Unit/Acre) Districts. This area includes 525 lots and is shown below:



### Potential Options for New Regulations

To support dark skies around the observatory while also maintaining the flexibility to install lighting as needed for safety, security, and nighttime visibility, it is recommended that the current exemptions from the requirements for full cut-off (dark sky compliant) lighting be reduced or eliminated within a ½ mile area around the observatory. In general, limits on the number of lights per lot or on the lumens for full cut-off lights are not recommended.

- **Motion-activated:** As noted above, 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. Motion-activated lights are typically mounted at an angle in order to illuminate a door, driveway, or walkway when there is movement, rather than horizontal to the ground. However, within the ½ 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 suggested, consistent with the current exemption for other types of residential lighting.

- **Other residential lighting:** Lights, such as porch lights, lamp posts, and landscape lighting, are not required to be full cut-off or meet the setback/shielding requirements 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.<sup>1</sup> Within the ½ mile area around the observatory, consideration should be given to either eliminating the exemption or further limiting the fixtures that are exempt. For example, all lights could be required to be full cut-off, except for one fixture at each exterior door or garage, each with a maximum of 1,500 lumens. Other exemptions could be considered as well, such as for walkway or driveway lights with ten lumens or less.
- **Spotlighting:** Uplights are allowed for flags, landscaping, and other features if the light is aimed and shielded to be confined to the object. Consideration could be given to either eliminating this allowance with the ½ mile area or establishing a maximum number of allowed spotlights per lot.



All other requirements of the Zoning Ordinance would continue to apply, including the maximum color temperature. Draft text for discussion purposes is included in Attachment 2.

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. Any new regulations should recognize lawfully existing lights. Two options for consideration are included in the draft text, one that would allow fixtures lawfully existing to remain, and one that would require existing fixtures to comply with the new requirements within five years. This latter approach would support the purpose of the amendment for dark skies around the observatory while allowing homeowners additional time to replace existing fixtures.

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## NEXT STEPS

Another town hall, to be co-hosted by the Great Falls Civic Association and the Dranesville District office, is scheduled for September 19, 2022. Information about that meeting will be

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<sup>1</sup> Images from homedepot.com

posted on this website: <https://www.fairfaxcounty.gov/planning-development/zoning-ordinance/amendments>.

Questions and comments can be directed to Carmen Bishop, Deputy Zoning Administrator, at [carmen.bishop@fairfaxcounty.gov](mailto:carmen.bishop@fairfaxcounty.gov) or 703-324-1314.

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## **ATTACHMENTS**

1. Summary of Survey Results
2. Draft Zoning Ordinance Text

## Neighborhood Outdoor Lighting Survey

**Summary:** The neighborhood survey regarding the proposed Zoning Ordinance amendment to protect dark skies around the Turner Farm Park Observatory was intended to:

- a) inform all residents within the potentially affected area of the proposed amendment;
- b) provide information about the current regulations that apply Countywide; and
- c) gauge initial community support and solicit feedback on the proposed amendment.

All potentially affected owners received information about the amendment, and responses were received from just over 30% of the properties. As detailed below, there is both strong support and opposition for additional outdoor lighting regulations. Comments received in support of additional regulations expressed that the amendment would be an important and valuable step in protecting dark skies and the use of the observatory. Comments in opposition indicated that additional regulations are not needed or warranted, and many expressed concerns about safety and security.

**Time period:** The survey was open from March 24 to April 24, 2022.

**Method:** It was an online survey, using the Public Input platform. The survey included background information on the Turner Farm Park Observatory, current Zoning Ordinance regulations for outdoor lighting, and potential new regulations. After reviewing the background information, the respondents entered their name and address, and answered five questions.

**Audience:** The survey was intended for property owners within the ½ mile area around the observatory that could be subject to the new regulations.

**Distribution:** Post cards were mailed to all 521 properties within the area; this does not include properties owned by the Fairfax County Park Authority. The post cards included the website address and a QR code to access the online survey. Links to the survey were emailed to contacts with the homeowners' associations within the area, as well as the Great Falls Civic Association. The survey was also mentioned at the community Town Hall about the proposed amendment held on March 24, 2022.



**Responses:** A total of 182 responses were received; however, 16 did not list an address so it's not possible to know if the respondent lives within the ½ mile area around the observatory. For all but one of these 16, the IP address where the survey was taken was tied to a zip code within the ½ mile area. Of those that listed an address, twenty-one properties had two separate respondents (e.g., both spouses). Therefore, there was participation from at least 30.7% of the properties within the potentially affected area.

**Question 1:** Before taking this survey, were you aware that you are within one-half mile of the Turner Farm Park Observatory?

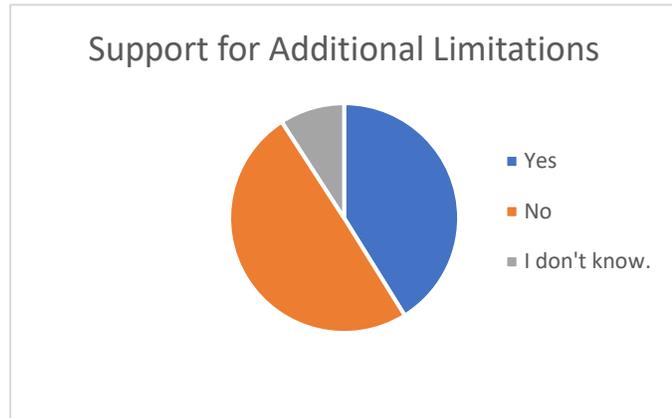
- 92%    yes
- 8%     no

Question 2: Do you believe light pollution is a problem in your area?

- 68% no
- 24% yes
- 8% I don't know

Question 3: Do you support additional limitations on lighting within ½ mile around the Turner Farm Park Observatory to protect the observatory?

- 50% no
- 41% yes
- 9% I don't know



Question 4: If you answered “yes” to Question 3, what types of limitations do you support? Check all that you support.

- 38% Require all new residential lights to be full cut-off and mounted horizontally (i.e., remove the exemptions based on lumens)
- 49% Require most new residential lights to be full cut-off and mounted horizontally, exempting only a few, such as one entry light or motion-activated lights
- 38% Allow exemptions from the requirements for lights to be full cut-off and mounted horizontally but reduce the maximum lumens for the exemptions (current standard: 1,500 lumens or 4,000 lumens if motion-activated)
- 28% Add limits on the lumens for all lights, even when full cut-off
- 30% Reduce the maximum color temperature (current standard: 3,000K)
- 41% Prohibit certain types of lighting, such as landscape lighting
- 14% Other
  - Comments under “Other” included:
    - Whatever best serves the Observatory
    - Prohibit all sports court lighting and set a maximum number of landscape uplights to 15 per property
    - Address transparent roof over poolhouses
    - I don't support any changes

Question 5: Do you have any additional suggestions for this potential Zoning Ordinance amendment?

- 95 comments were submitted.
- Many of the comments expressed general support or opposition, consistent with their response to Question 3.

- A primary concern was safety and security (23 comments). Concerns were also expressed about how additional regulations may affect property values.
- Other comments included:
  - Grandfathering should be provided for existing lighting
  - There should be additional education and enforcement of the existing regulations
  - There should be education on light pollution
  - Additional regulations would provide an incremental benefit to a few astronomy enthusiasts; the observatory is only used occasionally, and it is not a scientific observatory
  - Lighting is needed to find homes
  - Outdoor lights help when walking dogs in the evenings
  - Lighting restrictions should apply to all of Fairfax County
  - Concerns about uses outside of the ½ mile area, e.g., lighting from Tysons and Reston
  - Reduce the affected area to 0.3 mile around the Observatory
  - New regulations should apply to all homes within the neighborhood, even though two of the homes are outside the ½ mile area
  - Uplighting of flags, trees, and houses should not be allowed, but lights at garages and doors should be allowed for safety
  - Prohibit ball field lighting
  - Prohibit decorative lighting
  - Additional regulations would not offset the lighting at the Nike Park fields
  - Limiting additional restrictions to Monday – Wednesday would be more acceptable
  - Only impose additional limits on Fridays when the Observatory is in use
  - Prohibit lighting from 11 p.m. to dawn, except for holiday lights and motion-activated lights

## DRAFT TEXT FOR DISCUSSION

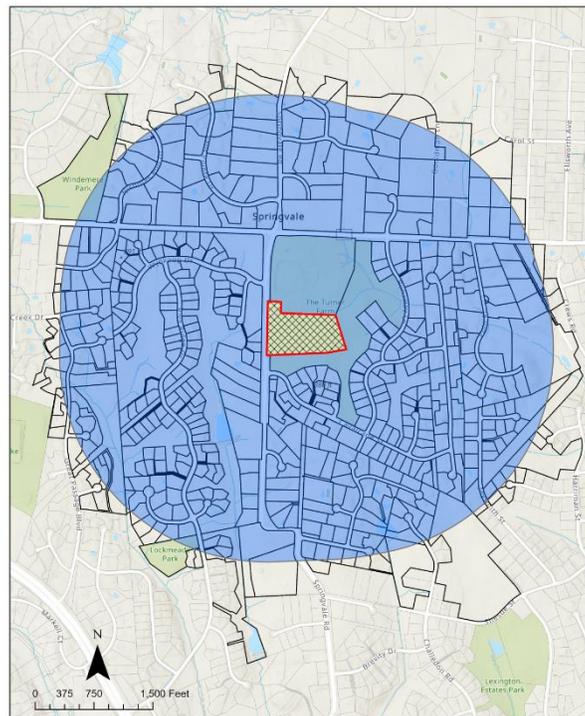
Proposed new subsection 5109.5 is shown below.

### 5. Lighting Standards Surrounding the Turner Farm Park Observatory

#### A. Applicability

- (1) 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.
- (2) Additional applicability provisions are included in subsection 5109.1. *(see proposed revisions below)*

**Figure 5109.5**



#### B. Lighting Fixtures and Mounting

- (1) In lieu of the exemptions in subsections 5109.2.F and 2.G, lighting fixtures on lots developed with single-family dwellings do not need to be full cut-off and mounted horizontal to the ground as otherwise required by subsection 5109.3.A(1), or comply with the setback or shielding requirement in subsection 5109.3.C(3), if the fixtures meet the following:
  - (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 such that the illumination is directed within the property boundary.
- (b) One lighting fixture located at each exterior door or garage with initial lighting levels of 1,500 lumens or less.
- (c) Driveway or walkway lighting fixtures of 10 lumens or less.
- (2) Uplights or spotlights in accordance with subsection 5109.3.A(4) are limited to a maximum of 15 per lot. The lights are not required to be full cut-off and mounted horizontal to the ground but must be 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), 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,

OPTION 1: 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.

OPTION 2: all new outdoor lighting must comply with the provisions of this Ordinance, including 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 until (*insert date which is five years from the effective date*); after this date, all outdoor lighting fixtures must comply with the provisions of this Ordinance.