

ENVIRONMENT AND ENERGY CONSERVATION COMMISSION

c/o Department of Environmental Services 2100 Clarendon Blvd., Suite 705 Arlington, VA 22201

August 30, 2017 (Please disregard the 8/29/17 version. This version reflects all approved Commission edits.)

The Honorable Jay Fisetto, Chair
Arlington County Board
2100 Clarendon Blvd.
Arlington, VA 22201

Re: Williamsburg Lights

Dear Mr. Fisetto:

The Environment and Energy Conservation Commission (E2C2) welcomes this opportunity to provide comments on the County staff's recommendations for lighting the Williamsburg Middle School (Williamsburg) soccer fields. More than two years ago, the County Board appointed the Williamsburg Field Site Evaluation Work Group (Work Group) to determine whether the "environmental, noise and light spillage impacts" of lighting the Williamsburg soccer fields could be mitigated sufficiently to preserve "the character of the neighborhood and provide a reasonable quality of life to the nearest neighbors." Like other members of the Work Group, E2C2 representatives attended Work Group meetings, participated in County-sponsored site visits, attended County Board work sessions, helped present the Open House held in November, 2016, and communicated extensively with County staff and lighting authorities regarding technical and zoning issues. E2C2 also reviewed the staff report and recommendation dated June 30, 2017, and hosted staff and community presentations on July 24th.

The proposal to light the fields raises, as the language of the County Board's charge acknowledges, a number of potentially significant adverse environmental impacts. Below, E2C2 provides a brief overview of its history with this issue (and with County lights generally) and discusses the issues it considers to be of greatest concern. It also sets forth several recommendations for County Board consideration related to (1) following generally-accepted industry standard to reduce light spill and glare; (2) selecting luminaires with the lowest practicable correlated color temperature (CCT); (3) adopting measures to mitigate nighttime athletic field noise; (4) re-evaluating sole-source contracting of field lighting; and (5) developing and using neutral criteria to identify and prioritize sites for sports lighting. Our recommendations apply to the Williamsburg site as well as other potential sports field lighting locations. Without consideration and implementation of these further recommendations, all of which were discussed in the Work Group, E2C2 does not support lighting the Williamsburg soccer fields.

Background:

As the County Board may be aware, the issue of the Williamsburg Lights has a long history with E2C2. The issue first arose in 2013 when E2C2 was requested to review the original Environmental Assessment (EA) for the Discovery Elementary School. Concerned about the Department of Parks and Recreation's (DPR's) late proposal to add synthetic turf and lights to the soccer fields and the absence of any discussion in the EA, E2C2 expressed its expectation that it would be informed of any such plans in the future and "receive a draft EA for review." During Work Group discussions, the

E2C2 representative repeated, at various times, his expectation that an EA was now timely and appropriate. In the Work Group's transmittal of its Final Report in February of this year, the Work Group unanimously recommended that the "County staff should prepare a revised EA prior to the Use Permit Amendment hearing by the County Board with sufficient time to allow for review by E2C2."

Although staff believe that an EA is more appropriate after the County Board has acted to approve lights and after design documents have been prepared, E2C2 continues to believe that a full and complete EA, in compliance with Regulation 4.4 and responsive to the elements in the EA Checklist, would help E2C2, the County Board, and the public understand more fully whether lights are appropriate at this Site. Such a review could be particularly useful here, in light of the extraordinarily complex technical and engineering issues raised during Work Group deliberations. Nevertheless, considerable technical information was generated during the Work Group process and E2C2 appreciates the County Board's decision to provide the staff recommendation for review and to schedule the July 24th staff presentation to the Commission. With those caveats in mind, E2C2 provides its comments below.

Discussion:

For a number of years, E2C2 has expressed concern about the impact of outdoor lighting on County quality of life. In 2010, the Commission expressed to the County Board its belief that the County's lighting policies should be revised to ensure that, among other things, new development projects minimize light pollution and lighting plans give more careful consideration to preventing glare and other adverse effects. More recently, in 2016, E2C2 adopted a "White Paper on Mitigating Light Pollution in Arlington County Projects." (Attached). The White Paper cautioned that "inappropriate or excessive use of artificial lighting has myriad negative impacts on environmental quality, human health, and energy conservation." In particular, the White Paper stated that poorly-designed lighting can create significant glare, causing substantial discomfort to those viewing the lights.

The White Paper also cautioned that high intensity LED lights, in particular, contain a disproportionate amount of light in the blue-white spectrum and have been found to impair the production of melatonin and disrupt the circadian rhythm of humans and wildlife. Among other measures, the White Paper recommended that the County take steps to control glare in outdoor lighting and use warm-white LEDs with a correlated color temperature (CCT) of less than 3,000 Kelvin to minimize adverse effects on circadian rhythm. The International Dark Sky Association (IDA) — a national organization devoted to minimizing light pollution — similarly has recommended that LED outdoor fixtures be fully shielded to reduce glare with a CCT not to exceed 3,000 Kelvin. (E2C2 notes that the County has, in recent months, issued a request for information to vendors for new street lights with CCTs beginning at 2500 Kelvin).

Although the designs presented by the County's vendor (Musco Lighting) have changed over time, the best-case proposal submitted to-date continues to implicate both concerns — excessive glare and potential adverse health effects.

A. Glare: E2C2 acknowledges that the discussion of lighting impacts in the staff's presentation is necessarily summary in nature and that the final staff recommendation will provide additional narrative support and justification for the proposal. The current staff proposal, however, represents the end-product of a lengthy process that has struggled to light the fields in a way that does not result in significant adverse environmental effects.

Early during Work Group deliberations, it became clear to all participants that the lighting using elsewhere on Arlington's sports fields (metal halide lamps) could not be used at Williamsburg because, even with 80' light poles erected well above applicable zoning limits, the light spill and glare would greatly exceed generally-accepted industry standards at the residential property line. Site difficulties include the proximity of nearby homes, the elevated topography of the field, and the technical challenge presented by the need to light two contiguous fields with lights situated at the field periphery (instead of lights located, as is typically the case when lighting two fields simultaneously, mid-way between the two fields). The peripherally-located lights dictate aiming angles that, together with minimum requirements for on-site illuminance and over-all lighting uniformity — restrict lighting options. To minimize off-site effects the lighting vendor proposed — for nearly the entirety of Work Group deliberations — the installation of six peripherally-located 80' high poles with LED lights with a CCT of 5700 Kelvin. Ultimately, during the last few weeks of the Work Group process and without Work Group evaluation, Musco proposed to install LED lights at 4500 Kelvin.

Throughout its tenure, the Work Group has been entirely dependent on Musco for an understanding of potential lighting effects. During the entirety of the two-year community process, neither Musco nor the County staff have provided the Work Group with any technical briefing on lighting terms and technology, on lighting standards deemed appropriate for residential neighborhoods, or on lighting fundamentals and principles unique to sports lighting. Rather, it has been left entirely to Work Group members, none of whom possesses a degree in light physics or related fields, to decipher highly technical and typically summary Musco predictions and determine whether, if accurate, they conform to industry standards for adverse lighting effects and have any applicability to low-density residential neighborhoods. No County staff member has any technical expertise in the area of athletic field lighting, and thus the Work Group has been unable to independently and objectively verify vendor's predictions of lighting effects.

Frustrated with their inability to understand the very new and highly complex area of LED lighting technology, some Work Group members eventually hired — at their expense — a nationally respected expert in sustainable lighting practices — Clanton & Associates — to help them understand the brief summaries provided by Musco. Clanton's analysis, attached to the Work Group's Final Report at Appendix F, underscored several of E2C2's long-standing concerns about outdoor lighting. She concluded that Musco's best-case design (the design with the least light spill and glare) would nevertheless continue to exceed generally-accepted standards for glare at the property line for historically dark residential settings. Glare levels with 4500 Kelvin lights are projected at up to 3125 candela at the residential property line, well above the 2500 candela threshold recommended for residential settings such as Williamsburg. She also expressed her opinion that, under real-world conditions, perceived glare will be considerably greater than that estimated by Musco because of reflected light from water molecules in the air during humid summers and light reflected from the school buildings, towards which much of the light was directed. Overall, Ms. Clanton stated, the high poles and very bright LED lights would “transform the overall ambiance of the setting from dark, quiet and tranquil to bright, active and quasi-urban.”

The problem with glare is not surprising given the difficulty communities face in retrofitting lights to existing fields. The preliminary draft report of the Public Spaces Master Plan, prepared in part to examine how best to use Arlington's limited park space, cautioned that “unlike many localities where park systems were planned well in advance of development and helped shape the way they grew, Arlington's network of public parks and public spaces have largely been retrofitted into neighborhoods as space and funding has become available.” (Draft Master Plan p. 89). The ad hoc nature of park development can complicate the introduction of field lights to existing fields. As Fairfax County warned with respect to field lighting, “field orientation during the initial master planning stage

may make it possible to minimize glare problems, but this is unusual when retrofitting lights to existing fields.” (2010 Fairfax County, Athletic Field Lighting and Control of Obtrusive Light Pollution p. 9). The high glare levels predicted for the proposed lights at Williamsburg appear to bear out those observations.

The staff does note that potential glare might be mitigated by shielding and a dimming option. However, all of the Musco options have employed best available shielding. Throughout the two-year history of the Work Group deliberations, no dimming option was ever proposed and it is unclear how safe and uniform lighting standards could be maintained on the field (30 foot candles and a minimum of 3 to 1 lighting uniformity, as specified by the Illuminating Engineering Society of North America (IESNA) Recommended Practice for Sports and Recreational Area Lighting), if field lights are dimmed. Although staff indicate that lights could perhaps be dimmed during some practices, dimming has implications for player safety. Minimum illumination and uniformity standards were established by the IESNA to ensure that soccer — a “multi-directional ground level sport with the ball frequently being kicked very high into the air” — can be played safely.

Recommendation: E2C2 recommends that the County ensure that sports lighting designs and specifications conform to minimum standards for sports lighting recommended by the IESNA, the International Commission on Illumination, and other national and international lighting authorities. In particular, County staff should make every effort, in designing lighting for all County sports fields, to reduce light spill and glare levels to generally-accepted industry standards and also ensure that a third-party independent evaluation is conducted of projected levels. An independent third-party evaluation is particularly important here because, unlike other lighting vendors, the County’s sole-source vendor (Musco) has refused to release its photometric data for analysis and verification, claiming that it is proprietary.

B. Health Effects: Musco’s recent proposal to reduce Kelvin levels from 5700 to 4500 appears to be in response to concerns raised by the American Medical Association (AMA) and other health groups about the human health effects of high-intensity cool-white LED lighting. E2C2 understands, of course, that absolute scientific certainty regarding complex health effects information is rarely attainable — particularly with a new and rapidly developing technology such as LED lighting. Nevertheless, the effects of LED lights on melatonin production, essential to proper human circadian rhythm, as well as acute eye effects, have been documented by many authorities, including the AMA reports referenced by the County. The AMA, the IDA and other groups (including E2C2) have recommended that the CCT for LED lighting be reduced to 3000 Kelvin, as the maximum. The County’s slide also seems to acknowledge this concern, where the staff commit that — “as technology continues to improve” — they will seek to reduce the Kelvin level of the County’s lights further.

In its summary of potential health impacts, the County states that “there appears to be minimal to no risk for light spilling into homes from the proposed field lights and therefore retinitis, glare, and circadian rhythm disruption are not expected.” Although light spill may, in fact, be negligible at the residential property line (although no independent evaluation has been possible of Musco’s projections), glare levels are predicted to be excessive for neighbors observing the very bright LED point sources. In addition, the risks emphasized by some Work Group members are those presented to players and field visitors, not simply to residents. Sports lighting produces light levels that are 20 to 30 times the levels presented by street lights, for example. Field luminance will be quite high and the current design appears to violate standards for soccer field lighting by installing poles and luminaires within prohibited critical glare zones on the field. Accordingly, both glare and circadian rhythm dysfunction remain concerns for field users and visitors.

Recommendation: E2C2 recommends that, in selecting and designing sports fields County-wide, the County select luminaires with the lowest practicable CCT, particularly here where (1) Musco very recently proposed a significant reduction in CCT levels; (2) LED technology continues to evolve, as the County staff's recommendation acknowledges; and (3) the County's recent Request for Information from street light vendors seeks lighting as low as 2500 Kelvin. E2C2 also recommends that the County confirm that the light poles and luminaires in the current design are not located within critical glare zones on the fields, as recommended by the U.S. Soccer Foundation.

C. Indirect Effects of Lighting: The staff's recommendation raises concerns for the existing tree canopy and ambient noise levels, as well. The proximity of neighbors' homes to the field (some homes are closer than 75') will expose homeowners to high levels of nighttime athletic field noise. In amending its noise ordinance just two years ago, Arlington County acknowledged that "exposure to noise has deleterious effects on humans, animals and property," including hypertension, sleep disorders, and stress. Although Arlington has now established strict quantitative daytime and nighttime noise standards necessary to protect the public health, public parks and schools are exempt from those standards. Williamsburg neighbors frequently measure daytime noise on the athletic fields well in excess of the 60 decibel daytime standard and nighttime noise from the two adjacent soccer fields is expected to exceed, by considerable margins, the 55 decibel nighttime limit. DPR's insistence, during public debate on the new ordinance, on a blanket exemption from the noise limitations reflects its understanding that high levels of athletic field noise are inevitable during daytime and nighttime and that field events simply cannot be conducted in compliance with otherwise applicable Arlington law.

The current lighting proposal will also affect the existing tree buffer. Installation and maintenance operations are complicated by the presence of the surrounding synthetic turf and underlying geothermal well field as well as by the location of numerous school trailers on the eastern side of the site.

Recommendation: E2C2 recommends that, for all planned County sports fields, measures be adopted to mitigate nighttime athletic field noise. Noise measurements should be taken to quantify maximum short-term and long-term noise during field use. At a minimum, where facilities are located near residences, the County should prohibit all electronic amplification of sound by field users and visitors. E2C2 also recommends that County-wide lighting operations (installation and maintenance) make every effort to predict and minimize effects on surrounding green space and trees and preserve existing buffers and infrastructure.

D. Sole-Source Contracting Concerns: E2C2 has concerns about the County's current approach to sports field lighting. As E2C2 understands it, Musco is the County's sole-source contractor for all sports field lighting applications. Ordinarily, the County purchases goods and services through competitive bidding subject to requests for information submitted to a variety of vendors. This is the process pursued by the County currently in seeking vendors for its street lighting and helps to ensure an open, transparent, and economical contracting process. As part of the proposal, the County develops state-of-the-art specifications for the technology at issue and guarantees a level playing field for vendors. As part of their response, vendors typically would be required to submit full laboratory testing data to an independent testing facility for validation, including data necessary to meet specifications for the application at issue. The County might also require pilot field testing of sports lighting, prior to system-wide installation, to test community acceptance and compliance with specifications. The County has scheduled such field testing of candidate street lights.

Recommendation: The County should consider revising its current "sole source" approach to sports field lighting and, instead, consider developing specifications for best available sports lighting technology for response by multiple vendors. The process could result in the development of a

Sports Lighting Management Plan, similar to the Street Lights Management Plan currently under development. At the same time, the County should take measures to ensure that sports lighting vendors provide full access to all photometric data necessary to confirm that luminaries comply with aesthetic and performance criteria when applied to the specific fields at issue. Furthermore, E2C2 recommends that, for any future project of this complexity, the County make available independent technical expertise in the subject matter at issue.

E. Field Utilization and The POPs Process:

Although the current draft Public Space Master Plan (PSMP) treats all sites as eligible for field lighting, it does identify some criteria to use in prioritizing sites for synthetic turf and lights (capacity, availability of amenities, preparation of a park master plan that has identified the site for lighting, and site-specific features (topography, existence of barriers to light, location)).” (Draft PSMP p. 218). At the suggestion of County Board members, the Work Group had earlier researched and prepared a document, as part of its Final Report, to identify “neutral criteria for sports field lighting decisions.” The criteria were drawn from those developed by national and international lighting groups and include some identified in the Draft PSMP. Among such factors are the area’s zoning, its overall state of development and activity level, whether lights were included as part of park master planning efforts, physical features that mitigate lighting effects, and existing levels of ambient light.

Appendix M to the Final Report applies these criteria to the Williamsburg site. They provide a starting point for making difficult and frequently contentious policy decisions that compel choices among stakeholders with very different interests at stake. At the very least, the lengthy record developed by the Work Group over nearly two years demonstrates that the siting of sports lighting on County fields raises significant technical issues — some of which remain unresolved.

Recommendation: The County should continue to develop and refine, in cooperation with the PSMP and the product of the Work Group, neutral criteria to identify and prioritize sites as appropriate ones for sports lighting. The extraordinarily resource-intensive process followed by the Work Group at Williamsburg cannot reasonably be used to identify or evaluate future candidate lighted sports fields.

Conclusion:

Thank you for giving us the opportunity to participate in the Work Group and to review and comment on the staff recommendation. Please do not hesitate to contact me if you have any questions or concerns about the above.

Sincerely,



Christine Ng
Chair, Environment & Energy Conservation Committee