

Review Comments of the Appendix B2 of the Pt. Loma High School Draft EIR “Addendum to the Lighting Impact Study”

James R Benya, PE, FIES, FIALD

BENYA BURNETT CONSULTANCY

501 Fillmore Court

Davis, CA 95616

jbenya@benyaburnett.com

February 29, 2016

Introduction

In May, 2014 the Applicant submitted a draft lighting study developed based on data provided by the lighting vendor. At that time we conducted a detailed examination of the site and neighborhood.

Currently, we were asked to review Appendix B2 to the current Draft EIR submitted by the Applicant. Because of significant changes to the lighting technology and design, the current lighting plan is in all respects a new and different lighting plan from 2014. Its primary differences are:

- Poles have been shortened to 70 feet above the field level; and
- The poles are mounted closer to the field; and
- The design employs an LED lighting system with employs heavily shielded downlights on the poles and uplights for aerial balls.

We have direct knowledge of and experience with Musco LED sports lighting systems, having first witnessed early versions of the system in 2012. It makes little sense to compare the new lighting system to the original 2014 metal halide system.

Review Comments Regarding the 2014 Lighting Design and Impact Report

In the analysis presented in 2014 and the summary in this current Appendix B2, the Applicant ultimately reached the conclusion that “implementation of the 2014 project would result in significant and unavoidable lighting impacts”. We agree.

Review Comments Regarding the 2015 Lighting Design and Impact Report

As noted above, the all-new design of sports field lighting employs shorter poles, moved closer to the field, and state of the art LED luminaires. While less than the 8.1 million lumens in the 2014 report, the “new” lighting system will still produce about 3.7 million lumens environmental lumens. This is the same amount of light as produced by about 500 of San Diego’s induction lamp street lights, enough to light over 14 miles of typical city streets.

It is the Applicant’s responsibility to respond to CEQA criteria to determine whether the proposed “new” lighting system causes an environmental impact and to what extent. In lighting assessments, one applies Appendix “G” to the CEQA guidelines to the impacts of light including either substantially degrading the existing visual character or quality of the site and its surroundings, or creating a new source of substantial light or glare which would adversely affect day or nighttime views in the area. To do this, the Applicant relied upon standards developed by the Institution of Lighting Engineers (ILE) in 2000 and the Electric Power Research Institute, and used calculations submitted by Musco.

We have significant reservations about Appendix B2, especially the process and the standards used in reaching its conclusion, and offer the following comments:

- a) The ILE is the not the reference body in the United States. The reference body for lighting standards in North America is the Illuminating Engineering Society (IES), which is an American National Standards Institute recognized standards-writing body.
- b) The Electric Power Research Institute, also cited by the Applicant, is not involved in lighting standards.
- c) The ILE table included in Appendix B2 and used by the Applicant was developed in 2000, long before the advent of LED lighting and modern environmental standards. Instead, the applicable standard in the US is IES Lighting Handbook Tenth Edition (2011), Table 26-5. While a casual observer might find similarity, in fact the IES Table's criteria of impact are measured in the perpendicular plane to the line of sight from the meter to the light source (Perpendicular plane illumination or PPI). All calculations made by Musco and presented in the Appendix are in the horizontal or vertical plane and not consistent with modern standards.
- d) The Applicant determined that the appropriate ambient light level for the neighborhood about Pt. Loma High School is E3, areas of ambient brightness according to Applicant's Table 1. Applicant's Table is out of date; the IES Lighting Handbook, Tenth Edition, has revised descriptions of the lighting zones, including adding another zone, and while the lighting levels are not significantly different, the selection of lighting zone E3 by the Applicant is not correct. Being familiar with Table 26-4 of the IES Handbook and having spent time at night in the neighborhoods surrounding Pt. Loma High School, we contend that the proper Lighting Zone is IES Lighting Zone 2, which is similar to CIE zone and ILE E2. Lighting zone E3 was intended for urban inner city neighborhoods, which is in all respects a far cry from the area potentially affected by lights from Pt. Loma High.
- e) We know that Musco produced all of the calculations, because they do not release photometric data for independent calculations. Both Musco and Applicant should have known to use PPI calculations. From our review of the documents, the light levels submitted by the Applicant are sometimes horizontal illumination and sometimes vertical illumination, but never PPI. PPI values will always be greater than the horizontal or the vertical illumination.
- f) The predicted light levels also exceed maximum values determined by the County of San Diego to cause "significant impact to dark skies or from glare...as a result of project implementation". Guidelines published by the County of San Diego¹ clearly state that light trespass of 0.2 footcandles or more measured 5 feet onto the adjacent property "...will generally be considered to have a significant effect..". This threshold was never mentioned in Appendix B2 despite being clearly applicable in San Diego county.

¹ County of San Diego, Guidelines for Determining Significance, Dark Skies and Glare, July 30, 2007 Modified January 15, 2009

- g) The American Medical Association Policy H-135.937 states:
“Biological adaptation to the sun has evolved over billions of years. The power to artificially override the natural cycle of light and dark is a recent event and represents a man-made self-experiment on the effects of exposure to increasingly bright light during the night as human societies acquire technology and expand industry. In addition to resetting the circadian pacemaker, light also stimulates additional neuroendocrine and neurobehavioral responses including suppression of melatonin release from the pineal gland improving alertness and performance. Low levels of illuminance in the blue or white ... spectrum disrupt melatonin secretion. The primary human concerns with nighttime lighting include ... various health effects (such as) potential carcinogenic effects related to melatonin suppression, especially breast cancer. Other diseases that may be exacerbated by circadian disruption include obesity, diabetes, depression and mood disorders, and reproductive problems.”

This policy, passed in 2012, explains the serious impacts of artificial light at night on human health. This is an important environmental impact not even considered in Appendix B2.

- h) The total light output of sports lighting systems for a single high school football field is generally about 4 to 10 million lumens of light. The fact remains that even with the best equipment, sports lighting has a local and regional impact due to the extreme amount of artificial light that these lighting systems produce. The impact of light from sports luminaires is not limited to the direct beams of light that trespass onto adjacent properties; the reflected light from the field and structures also contributes to the local light pollution. The amount of light per square foot of football field is higher than the light levels found on the front rows of autos at major auto malls. With the exception of the light levels for major league stadiums, there are few if any other outdoor lighting installations of any other kinds that seek to achieve sports lighting levels suitable for high school play.
- i) In addition to direct light trespass and its glare, sports lighting causes a visible “light dome” in and above the venue, caused by Mie scattering. Mie scattering occurs when light is diffused by water vapor. Because of the close proximity of the ocean to Pt. Loma, the humid and somewhat fog-like marine layer will interact with the light beams and reflected light from the field and cause the sky to quite literally glow as a dome over the High School, affecting the entire neighborhood. Due to the high content of water vapor in the air, the dome will be visible even on nights when the marine layer is not appearing as fog. Particularly for sports lighting in areas near the Southern California coast, the light dome can be significant to homes within ¼ mile of the football field and clearly visible for over ½ mile².

² Ibid, Page 13, Section 4.0

Summary of Significant Comments

We contend that errors favoring the Applicant have been made in Appendix B2, as follows:

- 1. Use of the wrong lighting zone.** The current IES definitions allow better interpretation than the outdated ILE standards for the intent of lighting zones for determining appropriate lighting and unacceptable lighting trespass. The current zone system (Table below) is contained in California Title 24 Part 11 (CalGreen), the IES Lighting Handbook (2011), the IES/IDA Model Lighting Ordinance (2011), the IES Recommended Practice for Roadway Lighting (2014) and the IES Design Guide for Residential Street Lighting (2015). The Applicant should have been aware of and used these definitions. By using an outdated system and by choosing a favorable zone, Appendix B2 was able to justify unacceptable levels of light trespass. The proper lighting zone should be Lighting Zone 2 (LZ2), because the lighting on the streets around the High School is not continuous by IES definitions, and the light levels are relatively low. Using the proper zone, the limits of pre-curfew light trespass levels per IES Handbook Table 26.5 "Recommended Light Trespass Illuminance Limits"³ should be 3 lux and post curfew light trespass should be 1 lux. Converting lux to footcandles translates these values into .28 footcandles and .09 footcandles, respectfully. Note that this is still a lot of light: 0.28 footcandles is 14 to 28 times the full moon (depending on lunar altitude), and 0.09 footcandles is approximately 4.5 to 9 times the full moon.
- 2. Incorrectly using horizontal or vertical illumination instead of PPI.** The PPI is approximately the square root of the sum of the squares of the horizontal and vertical illumination. It will always be equal to or greater than either vertical or horizontal illumination. We did not check the calculations sufficiently to determine whether the Applicant was using vertical when horizontal should have been used, or vice versa. However, this would be prevented by simply using all PPI values per IES recommendations. We believe that at many points of calculation, the light levels will be higher than reported in Appendix B and may cause Appendix B to state different conclusions.
- 3. Failure to consider San Diego County Guidelines.** Appendix B2 does not identify or address San Diego County's own Guidelines for Determining Significance, Dark Skies and Glare. If these Guidelines were addressed properly, they would probably cause Appendix B to state different conclusions.
- 4. Failure to address American Medical Association Policies on Light Pollution.** Appendix B2 does not mention the potential impacts on human health caused by light pollution, even at low levels. If this Policy were addressed properly, it would probably cause Appendix B2 to reach different conclusions.
- 5. Failure to address the proximity the Ocean and the potential light dome.** A light dome over the area at night will exacerbate the problems identified by the AMA under (4.), above.

³ Op cit

The following table is reproduced from the IES/IDA Model Lighting Ordinance and is consistent with other applicable and current IES documents.

LZ0: No ambient lighting

Areas where the natural environment will be seriously and adversely affected by lighting. Impacts include disturbing the biological cycles of flora and fauna and/or detracting from human enjoyment and appreciation of the natural environment. Human activity is subordinate in importance to nature. The vision of human residents and users is adapted to total darkness, and they expect to see little or no lighting. When not needed, lighting should be extinguished.

LZ1: Low ambient lighting

Areas where lighting might adversely affect flora and fauna or disturb the character of the area. The vision of human residents and users is adapted to low light levels. Lighting may be used for safety, security and/or convenience but it is not necessarily uniform or continuous. After curfew, most lighting should be extinguished or reduced as activity levels decline.

LZ2: Moderate ambient lighting

Areas of human activity where the vision of human residents and users is adapted to moderate light levels. Lighting may typically be used for safety, security and/or convenience but it is not necessarily uniform or continuous. After curfew, lighting may be extinguished or reduced as activity levels decline.

LZ3: Moderately high ambient lighting

Areas of human activity where the vision of human residents and users is adapted to moderately high light levels. Lighting is generally desired for safety, security and/or convenience and it is often uniform and/or continuous. After curfew, lighting may be extinguished or reduced in most areas as activity levels decline.

LZ4: High ambient lighting

Areas of human activity where the vision of human residents and users is adapted to high light levels. Lighting is generally considered necessary for safety, security and/or convenience.

Conclusion

We conclude that if Appendix B2 were revised to correctly include the foregoing 5 points, we feel that the Applicant will have no choice but to admit that the proposed sports lighting for Pt. Loma High Schools will have a significant, unavoidable and immitigable impact under CEQA and San Diego County Guidelines.

