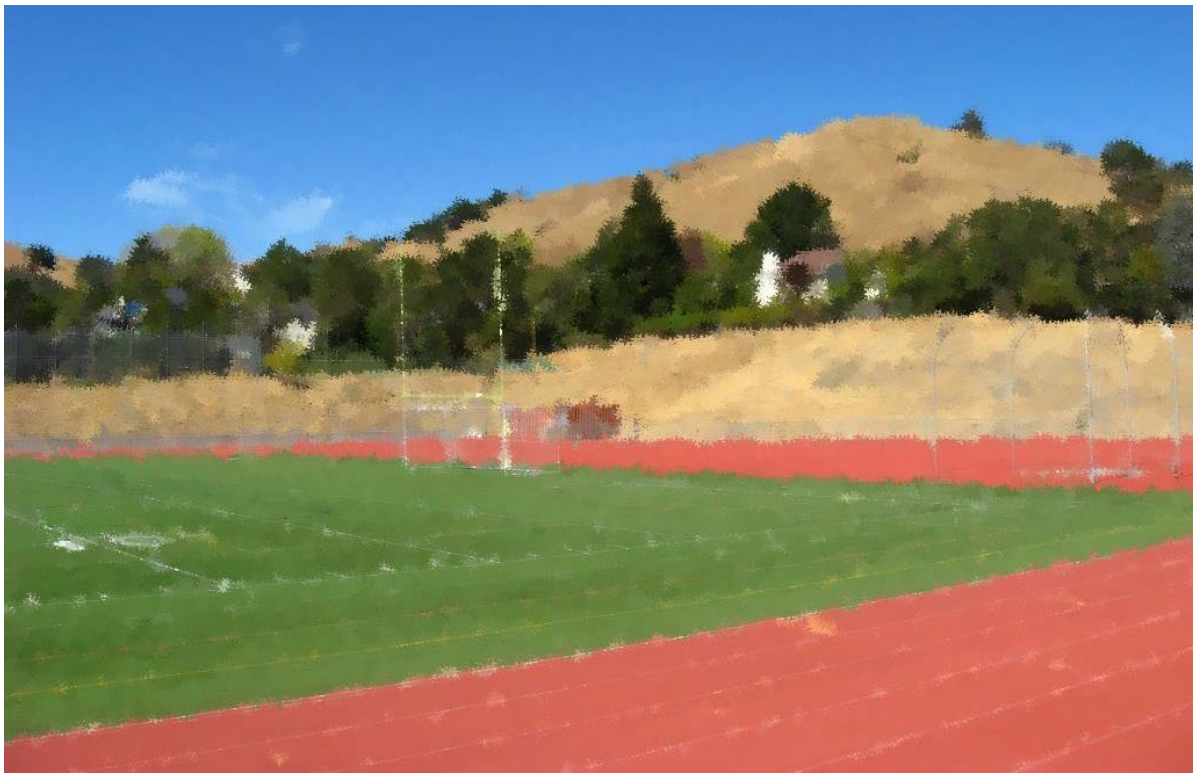


San Marin High School Stadium Lights Project

Partially Revised Final Environmental Impact Report

SCH#2016082068

prepared by

Novato Unified School District
1015 7th Street
Novato, California 94945
Contact: Yancy Hawkins, Assistant Superintendent of Business and Operations

prepared with the assistance of

Rincon Consultants, Inc.
449 15th Street, Suite 303
Oakland, California 94612

October 2019

RINCON CONSULTANTS, INC.
Environmental Scientists | Planners | Engineers
rinconconsultants.com

San Marin High School Stadium Lights Project

Partially Revised Final Environmental Impact Report
SCH#2016082068

prepared by

Novato Unified School District
1015 7th Street
Novato, California 94945
Contact: Yancy Hawkins, Assistant Superintendent of Business and Operations

prepared with the assistance of

Rincon Consultants, Inc.
449 15th Street, Suite 303
Oakland, California 94612

October 2019

RINCON CONSULTANTS, INC.
Environmental Scientists | Planners | Engineers
rinconconsultants.com

This report prepared on 50% recycled paper with 50% post-consumer content.

Table of Contents

Tables

Figures

Appendices

1 Introduction

This document is a Revised Environmental Impact Report (EIR) for the proposed San Marin High School Stadium Lights Project, located in the City of Novato, California. For the purposes of this Revised EIR, the San Marin High School Stadium Lights Project refers to the installation of stadium lighting and athletic field improvements, as detailed in Section 2, *Project Description*, of the original EIR.

1.1 Environmental Impact Report Background

The Novato Unified School District's Board of Trustees certified a Final EIR for the proposed project in May of 2017. In January of 2019, after construction of the project, the Marin County Superior Court ordered NUSD to revise and republish the following sections of the EIR, and to desist from operation of the project until the Revised EIR is certified:

- Aesthetics
- Biological Resources (analyzed in the Initial Study, which was Appendix A to the Final EIR)
- Alternatives
- Cumulative Impacts

Please note that the section numbering in this Partially Revised Draft EIR is different from the numbering of the corresponding sections in the original EIR. The Aesthetics section, Section 2 of this Revised EIR, was Section 4.1 of the original EIR. The Alternatives section, Section 4 of this EIR, was Section 6 of the original EIR. Cumulative Impacts, Section 3 of this EIR, is a new section, presenting the cumulative impacts analyses for all of the topics studied in the original EIR. The Biological Resources from the original EIR was in Appendix A, Initial Study, of the original EIR; here, it is also in Appendix A.

Regarding revised and recirculated EIRs, California Environmental Quality Act (CEQA) Guidelines Section 15088.5(c) states that "If the revision is limited to a few chapters or portions of the EIR, the lead agency need only recirculate the chapters or portions that have been modified." Therefore, this Revised EIR consists only of the revised sections, as well this introduction and a list of new references not cited in the original EIR; it does not include those sections and discussions from the original Final EIR that the Court did not require to be revised and recirculated. Those sections and discussions are incorporated herein by reference. The Final EIR is on file and available for review at District offices, 1015 7th Street, Novato and online at https://nusd.org/departments/maintenance-operations-and-facilities/development-projects/san-marin-high-school-stadium-lights/.

In accordance with CEQA Guidelines Section 15088.5(f)(2), the District requests that reviewers limit the scope of their comments to the revised portions of this revised EIR.

This page intentionally left blank.

2 Aesthetics

This section discusses the project's potential impacts related aesthetics including, visual character and light and glare. In the original EIR, these impacts were discussed in Section 4.1, *Aesthetics*.

The analysis in this section is based primarily on the Sports Lighting CEQA Report prepared by Benya Burnett Consultancy (June 2019), which is included as Appendix B to this EIR; lighting standards, measurements, and concepts referenced in this EIR are contained or referenced in said report.

2.1 Setting

Baseline Visual Character of the Region

The City of Novato is a suburban community in northern Marin County in the San Francisco Bay Area (Novato 1996). Single-family residential neighborhoods with one- and two-story homes predominate, in addition to some multi-family housing that is dispersed mainly along arterial and collector streets (Novato 1996, 2014). Commercial uses are concentrated downtown along Grant Avenue, along Redwood Boulevard, in pockets along Highway 101, and in various small clusters and convenience centers (Novato 1996). Much of the urbanized area of Novato occupies a flat northwest-trending valley that follows Novato Creek, Vineyard Creek, Warner Creek and other tributaries flowing southeast from the hills to the Bay (Novato 2009). The topography of Novato varies from eastern flatlands at the margins of San Pablo Bay to hillsides and valleys to the west.

Scenic natural resources including hillsides, Bay plains, and Bay shorelines frame the City of Novato (Novato 2014). The City finds that views from Novato to the surrounding scenic resources are extremely important to Novato residents. These views provide physical orientation and are integral to the city's character and sense of place. Mt. Burdell, located north of the city, is a natural landmark that dominates views of Novato from U.S. 101 and most areas north and west of State Route (SR) 37. The 1,508-foot-high Mt. Burdell is part of an open space managed by the Marin County Department of Parks and Open Space which offers expansive views of Novato from a number of hiking and biking trails. Hillsides provide a scenic backdrop for developed areas. Designated open space is the largest single land use within Novato's sphere of influence (with 8,383 acres, or 37 percent of total land), followed by residential land uses (8,355 acres, or 37 percent of total land).

While there are no State-designated scenic highways in Marin County, U.S. Highway 101 (U.S. 101) is eligible for State designation as a scenic highway to the north of SR 37 in Novato (Caltrans 2016). This segment of U.S. 101, located approximately 2.3 miles east of the project site, provides scenic views of hillsides and ridgelines to the south, west, and north, and of wetlands and plains connected to San Pablo Bay to the east. The Bay plains are a key component of scenic views from U.S. 101 (Novato 1996).

Baseline Visual Character of the Project Site

San Marin High School is located in a suburban residential neighborhood in northwestern Novato, with single-family residences largely one story in height to the east of San Marin Drive, two-story multi-family residences to the north and northeast, and two-story single-family residences to the

west. The nearest residences are located approximately 120 feet north and northeast of the stadium track. All Saints Lutheran Church is situated to the southeast of the high school, across San Marin Drive (a four-lane road with a tree-lined median). The high school is located at the interface between suburban development and open space. The City's approximately 98-acre O'Hair Park, which includes equestrian facilities at Morning Star Farm, the Dogbone Meadow dog park, and trails through open space areas, is located across Novato Boulevard south of the school. The Dwarf Oak Trail to Mt. Burdell and single-family residences on Sandy Creek Way abut the school site to the west. Open hillsides with grassland and scattered oak trees rise to the north and west of San Marin High School.

The San Marin High School stadium (Mead Field) is at the northeast portion of the campus, with one- and two-story light brown rectangular school buildings and a small surface parking lot to the southwest, a baseball field (Lefty Gomez Field) to the northwest, and a surface parking lot to the southeast. The track and football field at the stadium are elevated approximately 10 to 15 feet above the surrounding parking lots. A retaining wall separates the bleachers at the southeastern side of the stadium from the adjacent parking lot. The northeastern end of the stadium is sunken below the level of multi-family residences to the north by an approximately 25-foot-high grassy berm. A chain-link fence rings the perimeter of the track. The most prominent visual features at the stadium are the relatively flat green athletic field surrounded by a reddish-brown oval track, a mounted scoreboard and flag pole at the southwest end of the field, yellow goal posts at each end, and gray bleachers on both long sides of the field. Mounted Bose speakers in the existing public address system also overlook the bleachers. Figure 1 shows photographs of baseline visual conditions at and surrounding the stadium, taken in 2016 prior to installation of the proposed stadium lighting.

Scenic resources visible from the project site and public viewing locations in its surroundings, as defined in the City's General Plan (adopted 1996), include ridgelines and hillsides that provide a backdrop for developed areas (Novato 1996). Mt. Burdell, a scenic landmark with an elevation of 1,508 feet, is visible to the northeast of San Marin High School. Figure 2 shows existing views of the stadium from the surrounding area. As shown in Photo 3, the Dwarf Oak Trail provides public views looking south toward the stadium. Some nearby residences have views of the stadium. As shown in Photo 4, the stadium's elevated position relative to San Marin Drive and deciduous and evergreen trees in the roadway's median largely obstruct views of the project site from residences to the southeast. School buildings fully obstruct views of the stadium from O'Hair Park to the south. Trees lining the Dwarf Oak Trail block views from residences to the west. A few single-family residences on San Ramon Way to the north have direct southward views looking down on the stadium.

Baseline Light and Glare Conditions

This Revised EIR defines the existing baseline for light and glare conditions as those present when the District released a Notice of Preparation of the original EIR in August 2016, before installation of the proposed stadium lighting system. Light and glare produced by this system are considered impacts of the proposed project and evaluated below in Section 2.2, *Impact Analysis*. As explained in the Methodology section, the impact analysis incorporates actual measurements of light levels generated by use of the stadium lights. As of August 2016, no permanent athletic field lighting was used at the San Marin High School stadium, although the mounted digital scoreboard produced low-intensity light during athletic events. Offsite sources also contribute to existing light conditions (or "illumination") at the stadium. Existing permanent light fixtures are present at the softball field on the southwest portion of the high school, approximately 750 feet southwest of the stadium. Exterior

Figure 1 Photographs of Baseline Conditions at Stadium Site

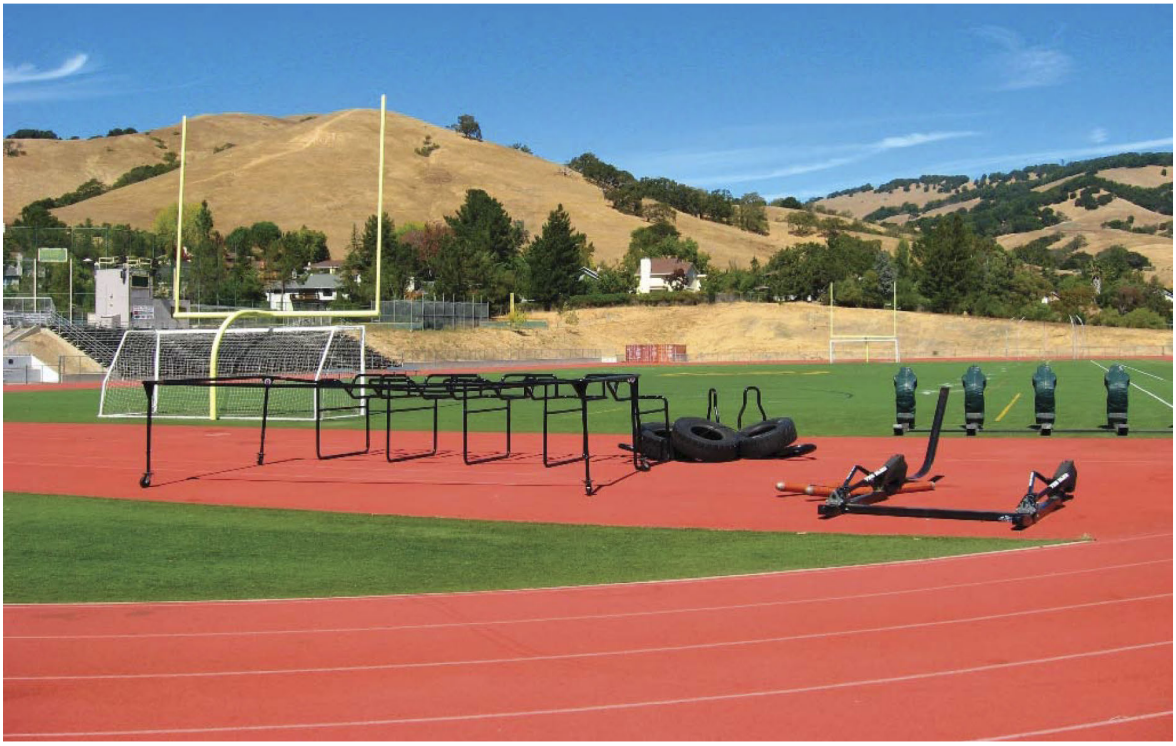


Photo 1: Northward view across stadium toward single-family residences on San Ramon Way and hillside open space.

Photo 2: View to northeast from stadium of school parking lot, San Marin Drive, and hillside open space.

Figure 2 Photographs of Baseline Conditions from Surrounding Area

Photo 3: Southward view of stadium from publicly accessible open space on Dwarf Oak Trail.

Photo 4: View of stadium to northwest from single-family residences on San Marin Drive.

security light fixtures are located at on-site school buildings and at on-site solar panels. In addition, the stadium receives spillover light to varying degrees from nearby streetlamps and the headlights of cars on San Marin Drive.

Glare refers to the discomfort or impairment of vision experienced when a person is exposed to a direct or reflected view of a light source, causing objectionable brightness that is greater than that to which the eyes are adapted (Pennsylvania Outdoor Lighting Council n.d.). By contrast, illumination is defined as the amount of light that strikes an object, including light cast by sources that are not directly seen by viewers. The intensity of glare ranges from the worst case of "disability glare," where visibility is lost, to "discomfort glare," where the light is distracting and uncomfortable. Discomfort glare is a subjective phenomenon and has not been directly linked to a physiological cause (Shuster 2014). The amount of glare depends on a set of factors such as the size of the source, the contrast between background light and the glare source, and the age of the viewer (Hiscocks 2011). General sources of glare at the stadium include headlights on and reflected sunlight from automobiles on adjacent streets and parking lots, and reflected sunlight from the windows of nearby buildings.

Anthropogenic sky glow is caused by all outdoor lighting, including streetlights, retail centers, car dealerships, and other commonly occurring outdoor lighting (Appendix B). In communities near the California coast, there are two types of sky glow: that caused by low clouds (the "marine layer") and that caused by uplight on clear nights (clear sky glow). The former is localized and on a cloudy night the stray uplight from a town or small city can cause a distinctive glow above it. The latter is the accumulation of the upward light from the entire metropolitan Bay Area and is affected by all the lighting within a radius of 100 miles or more from the viewer's location.

Sky glow from low clouds varies considerably depending on the time of year, the altitude of the clouds, the cloud density and reflectivity, temperature, and other factors (Appendix B). The primary causes tend to be downtown districts, regional malls, auto malls, and major freeway commercial corridors. Glow is caused by all the upward light from all the community, and not from just one neighborhood or cause. Sky glow levels from the marine layer throughout other areas of California that have similar proximity to the ocean and population density measure between 0.010 and 0.020 foot-candles.

Clear sky glow is measured using the Bortle Scale, a system of ranking the light pollution caused by communities throughout the world as well as identifying "dark sky" areas with little or no sky glow (Appendix B). The astronomer John Bortle originally published this nine-level scale in Sky & Telescope magazine in February 2001 (Bortle 2006). The entirety of Marin County is Bortle Class 5, which means a moderate amount of anthropogenic sky glow.

Regulatory Setting

State

Government Code Section 53094. This article of California's Government Code states that a school district is not required to comply with the zoning ordinances of a county or city unless the zoning ordinance makes provision for the location of public schools and unless the city or county has adopted a general plan. Furthermore, this article authorizes the governing board of a school district to render a local zoning ordinance inapplicable to a proposed use of property by the school district, by a vote of two-thirds of its members. The governing board may not take this action when the proposed use of the property is for non-classroom facilities, including, but not limited to, warehouses, administrative buildings, and automotive storage and repair buildings. Because the

proposed project is considered an improvement to educational facilities at a public school, the governing board of the District adopted Resolution No. 16-2016/17 to exempt the proposed project from local zoning ordinance requirements pertaining to aesthetics and other issues.

Local

Although the District is not required to comply with local zoning ordinances pursuant to Government Code Section 53094, the following regulatory information for the City of Novato is provided for reference.

City of Novato General Plan. The City of Novato's General Plan (1996) does not include objectives or policies applicable to visual character or scenic resources at the school site. While EN Policy 27 (Scenic Resources) in the Environment Chapter of the General Plan seeks to "protect visual values on hillsides, ridgelines, and other scenic resources," this policy addresses development on hillsides and ridgelines rather than scenic views available to or from such resources. The Community Identity Chapter states that "lighting should serve functional, safety, and aesthetic purposes." CI Policy 13 (Lighting Design Guidelines) calls for amending the City's Zoning Ordinance to incorporate design guidelines for exterior lighting that would mitigate impacts on open space or other valuable views. However, this policy has not been implemented (City of Novato 2015).

Novato Municipal Code. The City of Novato's Municipal Code has qualitative standards for light trespass and glare that would apply to the project, except that the District has exempted itself from the local zoning ordinance pursuant to Government Code Section 53094. Pursuant to the general development standards in Section 19.22.060 (Light and Glare), light or glare from exterior lighting must be shielded or modified to prevent emission of light or glare beyond the property line. The placement of exterior lights is required to eliminate spillover illumination or glare onto adjoining properties to the maximum extent feasible, and not interfere with the normal operation or enjoyment of adjoining properties. In addition, Section 19.22.060 requires that all non-essential internal and exterior lighting be turned off after 11:00 p.m. (except for uses with extended hours).

2.2 Impact Analysis

Significance Thresholds

The thresholds below are based on the CEQA Initial Study checklist contained in Appendix G of the CEQA Guidelines. An aesthetic impact is considered significant if the addition of stadium lights would:

1 Have a substantial adverse effect on a scenic vista;

2 Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway;

3 Substantially degrade the existing visual character or quality of the site or its surroundings; or

4 Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.

The Initial Study (Appendix A) determined that the project would not damage scenic resources such as trees, rock outcroppings, or historic buildings within a state scenic highway corridor. Therefore, the analysis of aesthetic impacts focuses on thresholds 1, 3, and 4.

Methodology

Scenic Vistas and Visual Character Impacts

The analysis of scenic vistas and visual character is based on a field reconnaissance, supplementary review of Google Maps, and photo documentation of the stadium site. The scenic vistas discussion focuses on identified public view locations, but also considers impacts to private views. The visual character analysis considers whether or not the proposed lighting and public address systems would substantially and adversely degrade the overall aesthetic qualities of the site relative to current conditions.

Light Impacts

Light trespass occurs when lighting systems that illuminate one site also illuminate adjacent sites, such as neighboring private property. Light impacts can be analyzed by quantifying illuminance, or the amount of incident light on a place surface, from the spillover of light at property lines nearest to residences (Pennsylvania Outdoor Lighting Council n.d.). The spillover of light is also known as "light trespass." Light trespass is measured on both the vertical plane (e.g., light shining through a window) and the horizontal plane (e.g., light falling on a bed), in terms of lux or foot-candles. Lux is the metric measurement of light levels, and approximately 10 lux is equivalent to 1 foot-candle (Appendix B).

The Revised EIR's analysis of light impacts is based on a lighting study of the proposed stadium lighting system, prepared by internationally recognized lighting consultant James Benya in June 2019 (Appendix B). As discussed in the lighting study, the District has decided to apply a standard set by the International Commission on Illumination (CIE) to limit light trespass. The standard, CIE:150, employs a lighting zone system that ranges from E1 to E4, based on existing ambient light in the general area. For example, in a nature preserve a candle can be seen for a mile, but in downtown San Francisco it would be lost in the haze of thousands of light sources. Lighting zone E1 represents the nature preserve and E4 is the city, with E2 and E3 being steps in between. The choice of lighting zone can be a matter of judgment; the E2 zone is described as "sparsely populated rural areas" and zone E3 is described as "well inhabited rural and urban settlements."

Although the E3 zone would be appropriate to apply to the project site because nearby light-sensitive residences are located in suburban developments, this analysis makes a conservative assumption that the San Marin High School site is located in the rural E2 zone due to its proximity to a substantial open space area, unique among the School District's campuses, particular to this analysis and not applicable to the School District, as a whole. The CIE's allowed maximum light trespass in the E2 zone is 5 lux, which is approximately equivalent to 0.5 foot-candle (Appendix B). In this Revised EIR, the District applies 5 lux as the threshold for significant light trespass at residential property lines. This threshold is more stringent than the 2 foot-candle threshold that the District previously used in the *PBC Parcels 1A and 1B Mitigated Negative Declaration* of June 2006 (NUSD 2006). Furthermore, it is more stringent than thresholds that other school districts have recently applied to comparable lighting projects in California. For example, the Glendale Unified School District has used a standard of 2.5 foot-candles on adjacent properties, while the San Mateo Union High School District has applied a standard of 0.8 foot-candles at the nearest residential property lines (Glendale Unified School District, 2012; San Mateo Union High School District, 2016).

To determine if the proposed stadium lighting system would meet the CIE's threshold for the E2 zone, the lighting study includes field verification of light trespass from the stadium lighting system. Consistent with the CIE:150 standard, illuminance from the lighting system was measured in the

vertical plane at the property boundary at a height of 5 feet above surface grade (Appendix B). The measurements were taken by James Benya on the evening of Monday, May 6, 2019, and are representative of typical lighting conditions during football games at San Marin High School. They were taken along two lines, one reasonably parallel to the northeast property line, and one southeast of the stadium along the west side of the San Marin Drive median. Each line represents a worst-case scenario for the most affected residential properties. This field verification of light trespass from the project reflects the actual performance of the stadium lighting system. Therefore, it is more accurate than and supersedes the predictive photometric studies that the lighting manufacturer, Musco, provided prior to construction of the project (see Appendix C).

Glare Impacts

This updated, in situ analysis properly uses light intensity as a proxy, representative of the amount of discomfort glare that residents near the stadium site would experience, because the visibility of a distant light source is proportional to its intensity (Hiscocks 2011). Discomfort glare is typically measured in terms of candelas. The amount of candelas depends on the luminous power per unit solid angle emitted by a point light source in a particular direction. In layman's terms, the degree of discomfort glare decreases the further that a viewer is located from a light source, due to the dispersion of light across distance. The lighting study prepared for this Revised EIR makes the conservative assumption that illuminance on the vertical plane of 5 lux or greater at adjacent residential property lines would indicate a potentially significant glare impact (Appendix B). This threshold of illuminance is applied as a reasonable surrogate for glare because direct measurement of glare in the field would be prohibitively expensive and unnecessary. Because glare is a complex sensation that factors in the luminance and size of the light source, the luminance and area of the background, the position of the light source in the field of view, as well as the viewer's unique sensitivity and physiology, it is impossible to measure glare directly except under laboratory conditions. Therefore, it is appropriate to rely on illuminance as an indicator of a potentially significant glare impact.

Sky Glow. Sky glow impacts would be significant if the proposed lighting would emit a substantial amount of upward light, significantly contributing to marine layer sky glow or clear sky glow during nighttime hours.

Project Impacts and Mitigation Measures

Threshold 1:	Would the project have a substantial adverse effect on a local scenic vista?

Impact AES-1 THE ADDITION OF LIGHTS AND LIGHT POLES AT THE STADIUM HAS INCREMENTALLY ALTERED VIEWS OF AND THROUGH THE STADIUM SITE. HOWEVER, BECAUSE LIGHT POLES DO NOT SUBSTANTIALLY OBSTRUCT VIEWS OF SCENIC RESOURCES, IMPACTS TO SCENIC VISTAS WOULD BE LESS THAN SIGNIFICANT.

The project has introduced eight light poles up to ~~80~~90 feet tall to the stadium site, incrementally altering existing views of and through the site. In addition, up to 36 poles (18 egress lighting poles and 18 public address system poles), each ~~up to~~ approximately ~~30~~ 15 to 35 feet tall have been installed throughout the project site to provide lighting for safe egress and clean-up and to provide focused, distributed sound during athletic events. These structures do not substantially affect views from scenic roadways. While the segment of U.S. 101 to the north of SR 37 in Novato is eligible for State designation as a scenic highway, this highway is located approximately 2.3 miles east of the

project site; distance, existing trees and vegetation, and intervening hillsides obscure the new light and speaker poles from U.S. 101.

The light and speaker poles would affect views of scenic resources from local residences and parks. To demonstrate the project's effect on views, Figure 3 and Figure 4 show photographs of existing visual conditions after installation of the proposed stadium lighting system. These photographs were taken on a clear day in July 2019. They present approximately the same perspectives as those shown in photographs of baseline visual conditions (from before installation of the lighting system) in Figure 1 and Figure 2. As shown in Photo 8 in Figure 4, residences on the east side of San Marin Drive have views across the stadium to the northwest of hillsides and ridgelines in the Mt. Burdell Open Space area. Existing deciduous and evergreen trees in the median of San Marin Drive partially obstruct these views. In addition, equestrians south of Novato Boulevard at Morning Star Farm in O'Hair Park have similar northward views of hillside, atop the one-to-two-story buildings at San Marin High School. The new light and speaker poles are partially visible in the foreground of views toward scenic hillsides and ridgelines. However, as shown in Figure 3 and Figure 4, the narrow light and speaker poles only occupy a sliver of the overall views through the stadium site from the perspective of nearby residences and parks. In addition, the approximately ~~30~~15 to 35-foot tall egress lighting and speaker poles are similar to poles that were on the stadium site under baseline conditions, such as the speaker poles behind the bleachers on the east side of the stadium, and similar to or shorter and narrower than the existing street lights on San Marin Drive (see Figure 1, Photo 2). The new egress lighting and speaker poles are partially screened by existing trees adjacent to the project site and do not substantially affect views of the surrounding hillsides and ridgelines (see Figure 4, Photo 8). The poles have minimal impact to the overall viewshed from surrounding properties and do not substantially obstruct views of any identified scenic resources. Consequently, impacts to scenic vistas would be less than significant.

Mitigation Measures

No mitigation measures would be required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

Figure 3 Photographs of Stadium Site with New Stadium Lighting System

Photo 5: Northward view across stadium toward single-family residences on San Ramon Way and hillside open space.

Photo 6: View to northeast from stadium of school parking lot, San Marin Drive, and hillside open space.

Figure 4 Photographs from Surrounding Area with New Stadium Lighting System

Photo 7: Southward view of stadium from publicly accessible open space on Dwarf Oak Trail.

Photo 8: View of stadium to northwest from single-family residences on San Marin Drive.

Threshold 3:	Would the project substantially degrade the existing visual character or quality of the site or its surroundings?

Impact AES-2 THE PROPOSED LIGHT POLES HAVE INCREMENTALLY ALTERED DAYTIME AESTHETIC CONDITIONS AT THE STADIUM SITE. HOWEVER, THE LIGHT POLES DO NOT CONFLICT WITH THE VISUAL CHARACTER OF THE STADIUM'S VICINITY AND HAVE A NEGLIGIBLE EFFECT ON OVERALL VISUAL QUALITY. IMPACTS ON VISUAL CHARACTER AND QUALITY WOULD BE LESS THAN SIGNIFICANT.

The project has introduced eight light poles up to ~~80~~90 feet tall to the stadium site, incrementally altering existing daytime visual character in the vicinity. In addition, up to 36 poles (18 egress lighting poles and 18 public address system poles), each up to approximately ~~30~~ 35 feet tall have been installed throughout the project site to provide lighting for safe egress and clean-up and to provide focused, distributed sound during athletic events. As discussed in Impact AES-1, the new light and speaker poles are partially visible from residences on the east side of San Marin Drive and from recreational users at O'Hair Park. In addition, Photo 5 shows that several residences on San Ramon Way have a direct southward line of sight toward the stadium. The light and speaker poles are fully visible to these residences from a distance of at least 225 feet. In addition, Photo 7 shows that people using the Dwarf Oak Trail in the Mt. Burdell Open Space area have direct southward views of the light and speaker poles from a distance of approximately 1,100 feet (0.2 miles). Although the new light and speaker poles are partially or fully visible to neighboring residences and recreational users of open space areas, they are narrow and only occupy a sliver of the overall views through the stadium site. In addition, the approximately ~~30~~15 to 35-foot tall egress lighting and speaker poles are similar to previous poles on-site, such as the speaker poles behind the bleachers on the east side of the stadium, and similar to or shorter and narrower than existing street lights on San Marin Drive (see Figure 1, Photo 2). The new egress lighting and speaker poles are partially screened by existing trees adjacent to the project site and do not substantially affect views through the stadium site (see Figure 4, Photo 8). The light and speaker poles are visually compatible with existing elevated structures at the stadium, including a flag pole at the southwest end of the field, yellow goal posts at each end, and bleachers and mounted speakers alongside the field. The mass, materials, architectural style, and surface treatments of the poles also are typical of elements commonly seen at sports stadiums. Nighttime aesthetics impacts from light and glare are analyzed separately in Impacts AES-3 and AES-4. Therefore, impacts to daytime visual character and quality would be less than significant.

Mitigation Measures

No mitigation measures would be required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

Threshold 4:	Would the project create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?

Impact AES-3 THE PROPOSED PROJECT HAS INTRODUCED A PERMANENT STADIUM LIGHTING SYSTEM TO BE USED FOR SPORTING COMPETITIONS, PRACTICES, AND OTHER EVENTS ON A SITE THAT LACKS EXISTING PERMANENT LIGHT SOURCES. BY DESIGN, THE STADIUM LIGHTING WOULD BE FOCUSED ON THE ATHLETIC FIELD AND WOULD MINIMIZE LIGHT TRESPASS. MEASURED LIGHT LEVELS FROM THE STADIUM LIGHTS DO NOT EXCEED THE CIE THRESHOLD FOR SITES IN THE E2 ZONE. THEREFORE, LIGHT TRESPASS AT PROPERTY LINES FACING RESIDENCES WOULD NOT SUBSTANTIALLY DISTURB RESIDENTS. LIGHTING IMPACTS WOULD BE LESS THAN SIGNIFICANT.

The project has introduced new permanent light sources at the San Marin High School stadium, which lacks existing permanent on-site light sources. Table 1 summarizes the physical features and frequency of use of the proposed lighting system.

Table 1 Characteristics of Proposed Stadium Lighting System

Lighting Feature	Details
Height of Lights	Approximately ~~30~~15 to 9~~8~~0 feet
Number of Light Poles	8 tall poles (up to 9~~8~~0 feet in height) Up to 18 short poles (up to approximately ~~30~~ 35 feet in height)
Lighting Type	Musco Light-Structure System LED (or equivalent)
Times of Use	Evening football, soccer, lacrosse games; evening football, soccer, lacrosse practices; track meets and practices; Powder Puff game, evening school events such as graduation

As shown in Table 1, the eight new primary LED light fixtures rise ~~to 8~~from 80 to 90 feet in height. Downward-facing luminaires have been affixed at a height of approximately 80 to 90 feet on each pole to illuminate the stadium during sport competitions, practices, and other events. Additional downward-facing luminaires are mounted at 70 feet on some poles in order to provide consistent illumination across the field surface. Lower output, upward-facing luminaires are mounted at 20 feet on each pole in order to illuminate airborne objects such as footballs during games. A second set of lower output LED luminaires are installed on up to 18 new and existing poles, each up to approximately ~~30~~ 35 feet tall. These egress and clean-up lighting system poles are spaced evenly around the perimeter of the track and also along pathways leading to ADA-compliant accessible parking spaces.

The project has introduced a new permanent lighting system to a stadium that lacked existing permanent lighting. When the new lighting system is used for athletic events, it would result in a substantial increase in lighting on the field relative to baseline conditions. However, the proposed type of lighting system (state-of-the-art LED system) is designed specifically to minimize light trespass and would be operated during restricted time frames before normal sleeping hours. First, the approximate 80- to 90-foot height of the brightest stadium lights would enable each luminaire to be mounted with a narrow beam angle, which would focus light downward while still covering the athletic field, thereby limiting light trespass at the nearest off-site residences approximately 120 feet away. While it may be counterintuitive that highly mounted light fixtures would reduce light trespass relative to lower fixtures, their narrower beam angle would emit less light visible to neighboring residences. The proposed light fixtures also feature reflectors and visors to block upward light from the brightest fixtures. While lower-output luminaires mounted at 20 feet on each

pole would cast light upward, these fixtures would only be lit during games to illuminate airborne objects such as footballs. The proposed stadium lights also would be used only during certain events, as shown in Table 1, with the main lights turned off at set times:

- Evening football games (22 plus any playoff games per year) 8:30 PM on Thursday and by 9:45 PM on Friday
- Evening soccer games (20 on average per year plus any playoff games per year) by 8:30 PM on Tuesday through Saturday
- Evening lacrosse games (13 on average per year plus any playoff games per year) by 8:30 PM on Monday through Saturday
- Evening track meets (two on average per year plus any Track Finals) by 8:30 PM on Wednesday and Thursday
- Scheduled evening athletic practice by 8:00 PM on Monday through Friday
- Evening school events such as graduation by 9:45 PM
- Powder Puff game (one per year) by 8:00 PM on Friday

For further detail on the anticipated schedule of events, refer to Table 3 and Table 4 on pages 25 and 26 of the original Final EIR. The main stadium lights would be turned off by 9:45 PM or earlier, with the rare exception of games that extend to overtime, which could require the continued use of main stadium lights beyond this cut-off time. It is acknowledged that some neighbors of San Marin High School typically go to sleep before 9:45 PM. In addition, stadium lighting would emit light in the blue spectrum, exposure to which can suppress production of the hormone melatonin and impair sleep quality in the evening (American Medical Association 2016). However, the proposed stadium lights' narrow beam angle, reflectors, and visors would minimize the exposure of nearby residents to lighting that could potentially disturb sleep. Furthermore, unlike LED streetlights that are illuminated all night and have generated complaints from residents in cities like Davis, California, and Seattle, the proposed LED lights would be turned off by 8:30 PM most nights and by 9:45 PM fewer than approximately 15 times per year for home football and Powder Puff games. The stadium lights would have a 9:45 PM cut-off time that precedes the Illuminating Engineering Society of North America's identified "post-curfew" hours of 10:00 PM or later, which correspond to normal sleeping hours.

Table 2 shows the results of field verification of illuminance levels from use of the proposed stadium lighting system at property lines facing residences, and Figure 5 maps the locations of these measurements. As shown in Table 2, light trespass at residential property lines would be 2.75 lux at the greatest. This light level would not exceed the CIE threshold of 5 lux for sites in the E2 zone. Therefore, nearby residences would not be subject to excessive illuminance when stadium lights are in use. Although the District has exempted itself from the local zoning ordinance, illuminance also would not exceed the light and glare standards in the City of Novato's Municipal Code. Consistent with Section 19.22.060 (Light and Glare), exterior lights would be designed to minimize spillover onto adjacent properties to the maximum extent feasible, and all non-essential lighting would be turned off prior to 11:00 p.m. Lighting impacts would be less than significant.

Figure 5 Measurement Locations for Light Trespass from Stadium Lighting System

Source: Benya 2019

Table 2 Measured Light Trespass from Stadium Lighting System at San Marin High School

Measurement Location	Illuminance (Lux)	CIE Illuminance Threshold for E2 Zone (Lux)
Northeast Property Line		
1	2.36	5
2	2.17	
3	2.10	
4	2.63	
5	2.34	
6	2.44	
7	2.20	
8	2.75	
9	1.62	
Southeast Property Line		
11	0.54	5
12	1.10	
13	1.19	
14	1.69	
15	1.63	
16	0.85	

Mitigation Measures

No mitigation measures would be required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

Threshold 4: Would the project create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?

Impact AES-4 THE PROPOSED STADIUM LIGHTS WOULD NOT GENERATE LIGHT LEVELS THAT COULD CAUSE EXCESSIVE DISCOMFORT COMFORT GLARE FOR RESIDENTS OR DISABILITY GLARE FOR PEDESTRIANS AND MOTORISTS. IMPACTS FROM GLARE WOULD BE LESS THAN SIGNIFICANT.

The proposed stadium lights would generate light intensity on-site at nearby residences, and on adjacent public streets and sidewalks. Light intensity at sports facilities can cause discomfort glare, an annoying or painful sensation when people are exposed to a bright light in the field of view (Shuster 2014). As discussed in Impacts AES-1 and AES-2, nearby residents would have at least partial views of the proposed stadium lights from San Ramon Way north of the stadium and east of San Marin Drive. However, sports luminaires focus most of their light onto the sports field, and off-site glare is usually the result of a luminaire that is mis-aimed towards the property line (Appendix B). Based on the field measurements of light trespass from the proposed stadium lighting system, shown in Table 2 above, the project would not generate illuminance on the vertical plane exceeding

5 lux at adjacent residential property lines. Therefore, the stadium lights would not subject nearby residents to excessive discomfort glare, nor would it expose pedestrians and motorists outside the stadium to "disability glare" that reduces visibility. The project would have a less than significant impact from glare.

Mitigation Measures

No mitigation measures would be required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

Threshold 4:	Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area

Impact AES-5 THE PROPOSED STADIUM LIGHTS ARE SHIELDED AND THE BRIGHTEST LIGHTS WOULD BE DOWNWARD-FACING TO REDUCE LIGHT TRESPASS. UPWARD-FACING LIGHTS WOULD ONLY BE USED DURING GAMES AND WOULD BE DESIGNED TO PROVIDE ONLY THE MINIMUM AMOUNT OF ILLUMINATION NECESSARY TO SEE AIRBORNE OBJECTS IN THE STADIUM. THEREFORE, THE PROJECT WOULD NOT SUBSTANTIALLY CONTRIBUTE TO MARINE LAYER OR CLEAR SKY GLOW. IMPACTS FROM SKY GLOW WOULD BE LESS THAN SIGNIFICANT.

As discussed in Impact AES-3, the proposed stadium lighting has been designed to minimize light trespass. The approximate 80-to 90-foot height of the brightest stadium lights would enable each luminaire to be mounted with a narrow beam angle, which would focus light downward, thereby limiting light trespass outside the athletic fields and reducing sky glow. The proposed light fixtures also feature reflectors and a visor to block upward light. Although lower-output luminaires have been mounted facing upward at 20 feet on each light pole and would incrementally increase sky glow when in use by reflecting light off clouds and aerosols, these lights would only be used during games and would be designed to provide only the minimum amount of illumination necessary to see airborne objects in the stadium.

The lighting report prepared for the project evaluated the proposed stadium lighting system's contribution to both marine layer sky glow and clear sky glow. A marine layer was present in Novato on the night of lighting measurements in June 2019 (Appendix B). Sky glow illumination near the project site, in an area that the stadium lights could not directly illuminate, measured 0.016 foot-candles. This lighting level is typical of sky glow when a marine layer is present near the coast in California, which measures between 0.010 and 0.020 foot-candles. The stadium lights did not substantially contribute to sky glow produced by the greater community. Moreover, the lighting report determined that the stadium lighting does not contribute enough uplight to affect clear sky glow in Marin County.

The timing of stadium lights would also limit their contribution to sky glow. The use of all stadium lights would be limited to approximately 152 nights of the year, approximately 83 of which would be games (this estimate includes the maximum number of playoff games that could be played in any given year). For most lighted evenings, the lights would be turned off by 8:30 PM or earlier. For approximately 15 or fewer nights per year, the lights would be cut off by 9:45 PM in the evening. The minimal amount of sky glow that would be introduced with installation of the proposed lighting system would be limited to early evening hours (typically before 8:30 PM), would occur for a

maximum of 152 nights per year, and would occur in a location with existing nighttime lighting (including street lamps along the adjacent roadway and security lighting on the adjacent campus).

Therefore, the proposed stadium lights would not substantially contribute to sky glow during sensitive nighttime hours, and impacts would be less than significant.

Mitigation Measures

No mitigation measures would be required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

3 Cumulative Impacts

CEQA requires EIRs to consider potential cumulative impacts from other past, present, and reasonably foreseeable future projects. CEQA defines "cumulative impacts" as two or more individual impacts that, when considered together, are considerable or will compound other environmental impacts. In the original EIR, cumulative impacts are discussed in the Initial Study (Appendix A to the original EIR) and at the end of each analysis section (Section 4.1, *Aesthetics*; Section 4.2, *Air Quality*; Section 4.3, *Cultural Resources*; Section 4.4, *Greenhouse Gas Emissions*; Section 4.5, *Noise*; and Section 4.6, *Transportation and Traffic*).

3.1 CEQA Requirements

State CEQA Guidelines Section 15130 requires that an EIR discuss cumulative impacts of a project and determine whether the project's incremental effects are "cumulatively considerable." The definition of cumulatively considerable is as follows:

> "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects."
>
> Section 15065(a)(3)

For example, traffic impacts of two nearby projects may be insignificant when analyzed separately, but could have a significant impact when analyzed together. Cumulative impact analysis allows the EIR to provide a reasonable forecast of future environmental conditions and can more accurately gauge the effects of a series of projects. In addition, the CEQA Guidelines state that the mere existence of significant cumulative impacts caused by other projects alone does not constitute substantial evidence that the proposed project's incremental effects are cumulatively considerable.

3.2 Related Projects

Related projects, according to CEQA Guidelines Section 15355, consist of "closely related past, present and reasonably foreseeable probable future projects that would likely result in similar impacts and are located in the same geographic area." Planned and pending projects within the study area are listed in Table 3. Table 4 summarizes cumulative development in the study area by land use.

Table 3 Cumulative Projects List

Project Name/Applicant	Project Location	Description
Projects Located at San Marin High School		
Stadium Field Re-turf	15 San Marin Dr., Novato, CA 94945	Replacement of 12-year-old turf (useful life of 8-10 years), construction completed August 2018
Stadium Press Box	15 San Marin Dr., Novato, CA 94945	Project replaced an existing approx. 410 sq. ft., 19-foot tall press box/snack bar structure with a new 8 x 28 feet (224 sq. ft.) prefabricated building elevated on a platform 9.5 feet above the ground (total height about 23 feet) on the same site. No new lighting or sound system was included in the project.
Performing Arts Building	15 San Marin Dr., Novato, CA 94945	The project will replace the current PAC theater with a new building approximately 1,545 sq. ft. larger than the existing building. The structure will be a total of 8,010 sq. ft. with the capacity to seat 217, the same capacity as the existing PAC theater.
STEM Classroom Building	15 San Marin Dr., Novato CA 94945	The project would replace five existing portable classrooms with a single-story, 24-foot-high STEM building and associated improvements including a courtyard, outdoor project area, and landscaping. The building would contain approximately 18,466 sq. ft. of space. There would be ten classroom/labs, and three tables to create an additional outdoor classroom space. The classrooms would provide capacity for 320 students but would not increase enrollment.
Second Multi-Sport Turf Field	15 San Marin Dr., Novato CA 94945	No schematic design has been prepared for this project; however, it is confirmed that no lighting is proposed. In addition, no funding is identified/allocated for this project at the time of this writing.
Remodel of Current "Academy Building" into Maker Space	15 San Marin Dr., Novato CA 94945	This project involves internal improvements to the existing structure.
Various Misc. Improvements	15 San Marin Dr., Novato CA 94945	Internal renovations to buildings within the high school.
Projects Located within the City of Novato		
Novato Blvd. Improvement Project	Portions of Novato Blvd. between Diablo Ave. and Grant Ave.	City capital project to widen road, including bicycle lanes.
The Square Shopping Center	2001 Novato Blvd.	Mixed use project including renovation of 74,118 sq. ft. of commercial space, demolition of 28,246 sq. ft. of existing commercial space, and addition of 53 apartment units (11 affordable), and 218 on-site and 46 off-site parking spaces. New structures include a mixed-use building at the rear of the site that is 3 stories, up to 42' high, and new 2-story apartments fronting Novato Blvd.
Oakmont Senior Living	1461 S. Novato Blvd.	Development of a 78 room senior assisted living facility, featuring 50 assisted living units and 28 memory care rooms. The facility is proposed at 72,000 square feet and 2-stories in height.
Hamilton Square	970 C St.	31 townhomes in eight, 3-story buildings, and one, two-story building, 6 of which are affordable.

Project Name/Applicant	Project Location	Description
Atherton Place	7533 and 7537 Redwood	1,340 of retail space fronting Redwood Boulevard and 50 residential townhome units. Townhomes would be 2-stories over garage.
Laurel Ridge Senior Apartments	7711 Redwood Blvd.	100 senior apartments in a single 3-story buildings with a basement parking garage, including 20 affordable units.
Wood Hollow Hotel	7701 Redwood Blvd.	Four-story hotel building of 56,430 square-feet, with 87 to 95 rooms. Parking includes a combination of surface stalls (64 cars) and a basement garage (23 cars).
Bahia Heights	End of Misty Ct.	Single-family residential subdivision proposing 9 residences.
Hamilton Cottages	Hamilton Pkwy. West of Marblehead Lane	16 single-family, 2-story residences for senior occupancy, including 2 affordable for-sale homes at the moderate income level.
Landing Court	No address	34 new multi-family units in 2- and 3-story buildings, of which 7 are affordable units.
North Bay Children's Center	933 C St.	Renovate the existing day care center with a new 19,824 sq. ft. building and site amenities.
Former Bridgepoint Academy	1787 Grant Ave.	35 new multi-family units in 2 and 3- story buildings, including 7 affordable units.
Stone Tree Golf Course		Driving range on Marin County Flood Control District Property
McPhail's Office Amendments		Amend General Plan land use designation from BPO to LIO. Master Plan and Precise Development Plan amendments to allow wider range of office and light industrial uses.
Hyppolite Accessory Structure	1468 S. Novato Blvd.	Review of as-built accessory structure in rear yard.
Mohajer Land Division & Variance	1037 Simmons Ln.	Proposed 3 lot land division. Request for variance to allow non-conforming lot area and depth.
Schafer Stream Management Plan	896 Sutro Ave.	Request for use permit to allow the retention of Redwood trees in Stream Protection Zone.
Galvan Use Permit	15 Hamilton Dr.	Request for a use permit to allow outdoor storage of materials for art projects.
Chase Bank Pacheco Plaza	404 Ignacio Blvd.	Request to demolish existing bank building (vacant) and construct new bank of same size.
Muha Accessory Structure	823 Hayden Ave.	Request for design review approval to construct a 484 sq. ft. detached garage on a hillside parcel. Snyder Art Studio
Snyder Art Studio	6 Conchita	Construction of a 399 sq. ft. art studio on a hillside parcel.
McGuire Residence Addition	40 Baywood Cir.	583 sq. ft. first floor addition, 210 sq. ft. garage addition, and new pool and retaining walls on a hillside parcel.
DM Elite Properties	1108 Second St.	Conversion of an existing residence to an accessory dwelling unit and construction of a new primary single family residence.
Ghany Live/Work Unit	Bolling at Marin Valley	Request for entitlements to construct a live/work unit of approximately 1,700 sq. ft.

Project Name/Applicant	Project Location	Description
Johnson Residence Addition	753 Bradley Ave.	Second story addition of 685 sq. ft.
Hamilton Hospital Assisted Living Facility	516 Hospital Dr.	Senior assisted living facility and memory care center at the former Hamilton Hospital.

Source: City of Novato Current Planning Projects, Projects Under Review and In Process, November 2016, and NUSD 2019

Table 4 Cumulative Projects Summary

Land Use	Development
Residential Units	328 units
Non-Residential Space	171,260 square feet

Source: See Table 3

This analysis considers the relevance of the cumulative projects in light of the geographic scope of the specific resource area for which impacts may occur. For instance, cumulative aesthetic impacts are generally limited to potential projects within the immediate viewshed or line-of-sight of the stadium lights or potential projects that would affect the visual character of the immediately surrounding neighborhood, whereas cumulative traffic impacts consider other potential projects within a broader geographic scope. There are seven recently completed, planned or pending projects on the San Marin High School property. The closest project to San Marin High School property within the City of Novato is the mixed-use project at The Square Shopping Center (2001 Novato Boulevard) approximately 1.2 miles east of the project site.

3.3 Cumulative Impact Analysis

Aesthetics

As discussed in Section, *Cumulative Impacts*, proposed and pending development in the City of Novato, and surrounding areas would include at least 151,294 square feet of non-residential development and 328 residential units. In some cases, new cumulative development projects would alter the aesthetic character of the City by introducing larger structures ~~with greater development intensity~~and/or new or expanded uses. As discussed in Chapter 3, there are no cumulative projects within one mile of the project site, with the exception of new performing arts and STEM classroom buildings and other minor improvements at San Marin High School. Therefore, there are no projects within the viewshed of the project that would substantially affect visual character and quality. Therefore, impacts associated with the proposed project would not combine with other projects to cumulatively impact the aesthetics of the area. ~~Furthermore, the proposed lighting and PA systems also would not represent an increase in development intensity in these areas.~~ In addition, as discussed in Impacts AES-3 through AES-5 in Section 2, *Aesthetics*, the stadium lighting system would not generate light trespass approaching the threshold of 5 lux in the CIE's E2 zone for rural areas, would not subject nearby residents to excessive discomfort glare or expose pedestrians and motorists to "disability glare" that reduces visibility, and would not substantially contribute to marine layer sky glow or clear sky glow during nighttime hours in the area. The cumulative project to convert a baseball field to a lighted soccer/lacrosse field at San Marin High School would not involve the addition of lighting. Therefore, cumulative impacts for aesthetics would be less than

significant and the project's contribution to cumulative aesthetic impacts would not be cumulatively considerable.

Agriculture and Forest Resources

The State Department of Conservation has classified much of Novato's agricultural land, particularly Bayfront land, as Farmland of Local Importance. Within the City limits, one active vineyard and one poultry ranch are under Williamson Act contract. The City of Novato has certain policies in place to protect the conversion of farmland and forestland to non-agricultural uses in the City's General Plan and through the establishment of an Urban Growth Boundary. As discussed in the Initial Study (Appendix A to the originally circulated EIR), there is no farmland or forest land on or directly adjacent to the project site. Installation of new lighting and an upgraded public address system at the San Marin High School would not result in the conversion of farmland or forestland to non-agricultural uses. The project would have no impact with respect to the conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland) to non-agricultural use; conflicts with existing agricultural zoning or Williamson Act contract; the loss of forest land or conversion of forest land to non-forest use; or other conversion of farmland to non-agricultural use. The project would not contribute to a cumulative loss of agricultural land or forest land; therefore, the project's contribution to cumulative agricultural and forest resources impacts would not be cumulatively considerable.

Air Quality

The area of geographic consideration of cumulative impacts to air quality is the San Francisco Bay Area Air Basin (SFBAAB). SFBAAB is in nonattainment for the federal and state standards for ozone, as well as the state standard for particulate matter (PM_{10} and $PM_{2.5}$) and the federal standard for 24 hour $PM_{2.5}$. Growth from related projects within the SFBAAB would contribute to existing exceedances of ambient air quality standards when taken as a whole with existing development. The project would not result in an increase in regional population or other growth that is not anticipated under the 2010 Bay Area CAP; therefore, implementation of the project would not conflict with or obstruct the implementation of the 2010 Bay Area CAP. In addition, as discussed in Section 4.2, *Air Quality*, of the originally circulated EIR, all air pollutant emissions would be below BAAQMD thresholds. Therefore, the project's contribution to cumulative regional air quality impacts would not be cumulatively considerable.

Biological Resources

The city has biological resources in the form of oak woodlands which are found in the Novato area promoting a diversity of wildlife including animal, bird, reptile and insect species. Existing City policies and those of the county, state, and federal agencies protect biological resources on a per project basis. As discussed in Appendix A to this Revised EIR, a biological resource reconnaissance site visit was conducted at the proposed project site as well as a review of regulatory agency databases, literature review, an analysis of aerial imagery and review of construction plans. The proposed installation and operation of a new lighting and an upgraded public address system at San Marin High School would result in a less than significant impact to biological resources. The project's contribution to cumulative biological resource impacts would not be cumulatively considerable.

Cultural Resources

Many of the cumulative projects involve ground-disturbing activities that could affect cultural, paleontological, or tribal resources or human remains. However, existing City of Novato policies and County and state regulations would protect cultural and tribal resources on a case-by-case basis as projects are considered. In the event of discovery of cultural resources (e.g., prehistoric sites, human remains), paleontological resources (i.e., fossils), and tribal cultural resources during ground disturbance on the stadium site, the implementation of mitigation measures included in Section 3.4, *Cultural Resources*, of the originally certified Final EIR would have reduced the proposed project's impacts on such resources to less than significant levels. No cultural, paleontological, or tribal cultural resources were observed during ground disturbance for construction of the new stadium lighting system. Therefore, the proposed project has not resulted, and would not result in a cumulatively considerable contribution to a significant cumulative impact relative to cultural resources.

Geology and Soils

Geology and soils cumulative impacts are project specific, as they pertain to the site conditions and characteristics of each project. These impacts may be related to exposure to seismic hazards; increased risks associated with soil liquefaction and subsidence; and risks associated with mass wasting, expansive soils, and erosion. Existing regulations from the City, State and Federal government set mandates for required actions that must be followed during project development to adequately address the potential effects from construction or operation of projects based on the geology, soils, and seismicity of specific project sites. No habitable structures that would subject people to related hazards are proposed, no grading other than that required for lighting installation is required, and the existing use of the site as a sports field would be maintained. As discussed in the Initial Study (Appendix A to the previously certified Final EIR), impacts related to geology and soils would be less than significant. Therefore, the proposed project would not result in a cumulatively considerable contribution to a significant cumulative impact relative to geology and soils.

Greenhouse Gas Emissions

Greenhouse Gas Emissions and climate change are by definition cumulative impacts, as they affect the accumulation of greenhouse gases in the atmosphere. As discussed in Section 4.4, *Greenhouse Gas Emissions*, of the originally certified Final EIR, emissions associated with the project would be less than significant, and the project's impacts are therefore also cumulatively less than significant.

Hazards/Hazardous Materials

The transportation and storage of hazardous materials is a regional issue. Hazardous materials impacts may be related to the transport, use or disposal of hazardous materials; exposure to wildland fires; proximity to airports, and the potential to impair emergency response or evacuation plans. Hazards and hazardous materials impacts are not typically cumulatively considerable unless the projects are adjacent or cause potential releases of hazardous materials that could combine.

Temporary Construction Impacts

Construction of projects listed in Table 3 and the proposed project have the potential to result in a spill or accidental release of hazardous materials. An accidental spill or release of hazardous material or identification of a previously unidentified contamination encountered during construction would be handled, transported, and disposed of at an appropriate facility according to

applicable local, state, and federal regulations. One active case involving known hazardous materials is located on the project site. Construction of the proposed light and public address systems has not resulted in exposure to potential hazardous materials as all ground disturbance associated with the project is located at least 350 feet from the known active case. As discussed in the Initial Study (Appendix A to the previously certified Final EIR), impacts related to hazards and hazardous materials would be less than significant. Since the proposed project has resulted in less than significant impacts related to construction, the proposed project has not contributed to a cumulative impact during construction associated with hazards or hazardous materials. (As construction is already completed for the project, no potential remains for cumulative impacts in this regard.)

Operational Impacts

The proposed project, as well as those projects listed in Table 3, has the potential to involve hazardous materials typically used for cleaning, maintenance, and landscaping. The proposed project lighting and PA system would allow for an expanded schedule of athletic events similar to those that already take place at the stadium. High school and community athletic events do not involve the storage of large quantities of hazardous materials. In addition, the project, though located in a Moderate Fire Hazard Severity Zone, would result in less than significant impact related to fire hazard. As discussed in the Initial Study (Appendix A to the previously certified Final EIR), operation of the project would not create a significant hazard to the public or the environment; impacts would not be cumulatively considerable.

Hydrology & Water Quality

The proposed project would involve the installation of poles to support new lighting and upgraded public address systems and the installation of conduit to provide power to those systems. As discussed in the Initial Study (Appendix A to the previously certified Final EIR), the proposed project would result in a less than significant impact to hydrology, flooding, and water quality. Cumulative projects listed in Table 3 would be required to implement appropriate on and off-site improvements to ensure these projects do not substantially affect water quality or result in flooding impacts. Impacts would not be cumulatively considerable.

Land Use & Planning

Pursuant to Government Code Section 53094, the governing board of a school district may render a local zoning ordinance inapplicable to a proposed use of property by the school district, by a vote of two-thirds of its members. The Governing Board of NUSD made such a finding on November 15, 2016 (Resolution 16-2016-17). All construction and operation activities for the project would occur within Novato Unified School District property and would not be subject to local zoning ordinances. Operation of the project would be subject to the policies and regulations of the District's Board of Education. Projects identified in Table 3 as located off-campus ("Projects Located within the City of Novato") are subject to both environmental and discretionary review by the City of Novato and each cumulative project would be required to demonstrate consistency with applicable plans, policies, and programs adopted by the City. As discussed in the Initial Study (Appendix A to the previously certified Final EIR), the project would not have any impact on land use and planning, therefore the proposed project would not result in a cumulatively considerable land use impact.

Mineral Resources

There are no known State-designated minerals of regional or statewide importance within the City of Novato (California Department of Conservation, 2013). Therefore, cumulative impacts to mineral resources from those projects listed in Table 3 would not result in impacts to mineral resources. No conflicts with the availability of regionally or locally important mineral resource recovery sites would occur. As discussed in the Initial Study (Appendix A to the previously certified Final EIR), no impact to mineral resources would occur due to the construction or operation of the project. Impacts would not be cumulatively considerable.

Noise

Temporary Construction Impacts

Construction of the proposed project and related projects in the area, as identified in Table 3, would generate similar noise levels compared to the proposed project. These noise levels generally would not exceed any local threshold because the applicable noise ordinances contain exemptions for temporary construction noise. Construction noise is localized and rapidly attenuates within an urban environment. Therefore, related projects outside the immediate site vicinity would be located too far from the project site to contribute to an increase in ambient noise levels associated with construction in the project area. The project's contribution to the cumulative increase has been less than cumulatively considerable. Cumulative construction noise impacts would be less than significant. (As construction is already completed for the project, no potential remains for cumulative impacts in this regard.)

Operational Impacts

Cumulative development in the City of Novato would incrementally increase traffic on the roadways in the vicinity of San Marin High School. This cumulative increase in traffic would subject sensitive receptors to additional roadway noise. Table 5 below, shows modeled sound levels for Future Year 2040 with traffic from cumulative traffic, with and without the project, and compares changes in traffic noise to FTA thresholds.

Table 5 Increase in Traffic Noise Under Future (2040) Traffic Conditions

Receptor	Future 2040 (dBA L_{eq})	Future 2040 Plus Project (dBA L_{eq})	Change in Traffic Noise Level	FTA Impact Threshold (dBA L_{eq})	Threshold Exceeded?
1-San Marin Drive	66.8	68.1	1.3	1	Yes
2-San Marin Drive	66.9	68.6	1.7	1	Yes
3-San Marin Drive	67.2	68.4	1.2	1	Yes
4-San Marin Drive	69.8	71.0	1.2	1	Yes
5-San Marin Drive	60.6	61.9	1.3	2	No
6-San Marin Drive	65.4	65.6	0.2	1	No
7-San Marin Drive	63.5	64.0	0.5	2	No
8-San Marin Drive	71.6	72.0	0.4	1	No
9-San Marin Drive	72.2	72.6	0.4	1	No
10-San Marin Drive	67.5	68.0	0.5	1	No
11-San Andreas Drive	59.0	62.1	3.1	3	Yes
12-Sutro Avenue	59.0	60.1	1.1	3	No
13-Wilson Avenue	65.7	66.7	1.0	1	Yes
14-Novato Boulevard	67.8	69.3	1.5	1	Yes
15-Novato Boulevard	65.2	65.7	0.5	1	No
16-Novato Boulevard	67.7	69.7	2.0	1	Yes
17-Novato Boulevard	73.3	73.9	0.6	1	No
18-Novato Boulevard	72.5	73.1	0.6	1	No
19-Novato Boulevard	72.1	72.5	0.4	1	No
20-Novato Boulevard	69.5	70.0	0.5	1	No
21-Novato Boulevard	71.7	72.1	0.4	1	No
22-De Long Avenue	65.8	66.1	0.3	1	No
23-De Long Avenue	73.0	73.3	0.3	1	No
24-De Long Avenue	73.4	73.6	0.2	1	No

As shown in Table 5, traffic generated by the project would incrementally increase roadway noise before and after events under cumulative conditions. The increase in cumulative traffic noise would exceed FTA thresholds at four receptor locations on San Marin Drive, two receptor locations on Novato Boulevard, and one receptor location on San Andreas Drive and Wilson Avenue. However, as described above under Impact N-3, this substantial increase in cumulative traffic noise on area roadways would only occur 16 times per year at home football games (plus any home playoff games) and for a maximum duration of two hours total per event. Traffic noise from spectators of football games would not be typical of the traffic noise associated with project activities during the vast majority of the year. Therefore, traffic noise associated with project and cumulative activities would not exceed FTA thresholds under typical conditions, and this impact would be less than significant.

Proposed and pending development in the City and surrounding areas would include approximately 171,260 square feet of non-residential development and 328 residential units. This cumulative development would result in stationary (non-traffic) operational noise increases in the vicinity of the project site. Implementation of the project would result in a significant noise impact for nearby

sensitive receptors during varsity football games. However, based on the fact that noise dissipates as it travels away from its source, noise impacts from on-site activities and other stationary sources would be limited to the project site and vicinity. Thus, cumulative operational (non-traffic) noise impacts from related projects, in conjunction with project-specific noise impacts, would not have the potential to result in cumulatively considerable adverse effects. Cumulative operational stationary (non-traffic) noise exposure would be less than significant.

Population & Housing

As discussed in the Initial Study (Appendix A to the previously certified Final EIR), the proposed project would not increase school enrollment and would not include the construction of housing or generate a substantial number of new jobs. No impact to population and housing would occur as a result of this project; therefore, impacts would not be cumulatively considerable.

Public Services

The demands for public services by the cumulative projects are consistent with the long-term planning of the City of Novato. Projects identified in Table 3 are subject to both environmental and discretionary review by the City of Novato and each project would be required to meet long-term plans that forecast the demand for services and identify specific facilities projects for public service and utility providers to meet projected demand and needs. The construction and operation of the proposed project would not change the total population served by existing services nor would the periodic concentration of the population of the project site relative to existing conditions. As discussed in the Initial Study (Appendix A to the previously certified Final EIR), impacts of the project to public services would be less than significant; therefore, impacts would not be cumulatively considerable.

Recreation

As discussed in the Initial Study (Appendix A to the previously certified Final EIR), the project would not add population to the City of Novato and would therefore not increase the demand for parks. The project would not contribute to cumulative impacts related to recreation in this regard. The proposed project is itself a recreational facility project. The project would be limited to the installation of support poles for new lighting, upgraded public address systems and electrical conduits to provide power. The potential adverse effects for this project are analyzed throughout this EIR. No additional adverse affects beyond those analyzed would occur. Impacts related to recreation would not be cumulatively considerable.

Transportation and Traffic

Cumulative impacts related to transportation and traffic are described under Impact T-2 in Section 4.6, *Transportation and Traffic*, of the originally certified Final EIR. Increases in traffic under cumulative plus project conditions would not cause intersection operations to fall below the LOS standard at any of the study intersections. The proposed project would not conflict with any of the City of Novato's transportation plans. Therefore, as described under Impact T-2, cumulative traffic impacts would be less than significant.

Utilities & Service Systems

As discussed in the Initial Study (Appendix A to the previously certified Final EIR), the proposed project would result in no impact to utilities and existing service systems in relation to water,

wastewater or stormwater, and a less-than-significant impact related to solid waste. Although the cumulative projects would increase demand for utilities, the project's contribution would not be cumulatively considerable.

This page intentionally left blank.

4 Alternatives

4.1 Introduction

In the original EIR, the discussion and analysis of alternatives is contained in Section 6, *Alternatives*.

The CEQA Guidelines require that EIRs identify and evaluate a reasonable range of alternatives that are designed to reduce the significant environmental impacts of the proposed project, while still satisfying most of the basic project objectives. The CEQA Guidelines also set forth the intent and extent of alternatives analysis to be provided in an EIR.

The following discussion evaluates alternatives to the proposed project and examines the potential environmental impacts associated with each alternative. Through comparison of these alternatives to the proposed project, the relative environmental advantages and disadvantages of each are weighed and analyzed. The CEQA Guidelines require that the range of alternatives addressed in an EIR should be governed by a rule of reason. Not every conceivable alternative must be addressed, nor do infeasible alternatives need to be considered (CEQA Guidelines Section 15126.6(a)). Section 15126.6 of the CEQA Guidelines states that the factors that may be taken into account when addressing the feasibility of alternatives are site suitability, economic viability, availability of infrastructure, general plan consistency or other plans or regulatory limitations, and jurisdictional boundaries. Section 15126.6(b) of the CEQA Guidelines states that the discussion of alternatives must focus on alternatives capable of either avoiding or substantially lessening any significant environmental effects of the project, even if the alternative would impede, to some degree, the attainment of the project objectives or would be more costly. The alternatives discussion should not consider alternatives whose implementation is remote or speculative, and the analysis of alternatives need not be presented in the same level of detail as the assessment of the proposed Project.

Based on the CEQA Guidelines, several factors need to be considered in determining the range of alternatives to be analyzed in the EIR and the level of analytical detail that should be provided for each alternative. These factors include: (1) the nature of the significant impacts of the proposed project, (2) the ability of alternatives to avoid or lessen the significant impacts associated with the proposed project, (3) the ability of the alternatives to meet the objectives of the proposed project, and (4) the feasibility of the alternatives. The analysis in this EIR shows that the proposed project would result in significant and unavoidable impacts with respect to noise at adjacent residences during varsity football games. All other impacts of the project can either be mitigated to a level of less than significant or are less than significant. The alternatives examined herein represent alternatives that could potentially reduce or avoid the significant and less than significant impacts associated with implementation of the proposed project.

As required by Section 15126.6 of the CEQA Guidelines, this section of the EIR examines a range of reasonable alternatives to the proposed project. The following alternatives are evaluated in this EIR:

- Alternative 1: No Project
- Alternative 2: Stadium Lighting at Novato High School

- Alternative 3: Portable Lighting Systems
- Alternative 4: Reduced Athletic Lighting System
- Alternative 5: College of Marin Indian Valley Campus (IVC) Existing Fields

One alternative that was rejected as infeasible in the original Draft EIR is presented here in further detail for informational purposes in response to public comments received on the original Draft EIR. The College of Marin Indian Valley Campus (IVC) Existing Fields alternative is now presented as Alternative 5 to provide additional detail about the potential impacts of that alternative. However, the conclusion in the original Draft EIR that the IVC Existing Fields alternative would be infeasible remains valid.

This section also includes a discussion of the alternatives considered but rejected and the "environmentally superior alternative" among the alternatives analyzed.

As indicated above, project alternatives should feasibly be able to attain "most of the basic objectives of the project" (Section 15126.6(a) of the State CEQA Guidelines), even though implementation of the project alternatives might, to some degree, impede the attainment of those objectives or be more costly (Section 15126.6(b) of the State CEQA Guidelines). The following are the project objectives as described in Section 2.0, Project Description.

1 Provide extended availability of the athletic fields to improve academic performance by minimizing early class dismissal and missed instructional time for student athletes.
2 Allow for the scheduling of games at times when students, parents, and community members can more easily attend the events, which would increase school spirit and increase revenue from ticket purchases.
3 Provide nighttime opportunities for students to gather to cheer on their team offering an alternative to going to parties or other unhealthy recreational activities.
4 Improve athlete safety by providing superior lighting conditions during evening practices and sports events.
5 Improve safety by minimizing incompatible uses from sharing the field (e.g.: lacrosse teams and track/field teams practicing at the same time means that lacrosse balls may hit runners on the track).
6 Improve the public address system to focus and contain sound within the stadium.

4.2 Alternatives Considered but Rejected as Infeasible

Pursuant to CEQA Guidelines §15126.6(c), the District considered several alternative off-site facilities to host nighttime events and practices. These alternate sites were rejected as infeasible during the project's scoping process. This section discusses the alternative sites and the reasons the District decided not to carry them forward for further environmental analysis.

All of the off-site alternatives would require student athletes, coaches, and support staff to be transported to and from the site for games and practices. The off-site alternatives range in distance from adjacent to San Marin High School (O'Hair Park) to approximately seven miles away (Hamilton Site). With the exception of O'Hair Park which is adjacent to the school, the use of alternative sites for games and practices would necessitate cars and buses to transport student athletics, coaches, and support staff from San Marin High School to the alternative site. Therefore, the rejected alternatives would result in additional traffic, traffic noise, and mobile air pollution and greenhouse

gas (GHG) emissions compared to the proposed project. For this reason and the additional reasons listed below, these alternative sites were considered but rejected as infeasible.

Figure 6 and Figure 7 show the locations of the alternative sites considered but rejected.

a. San Andreas Site

NUSD owns the San Andreas site, which is approximately 20 acres located in northern Novato just off San Marin drive. The site is currently undeveloped and ungraded and is surrounded by residential uses. The site is not connected to the electrical grid or to any utilities such as water or wastewater. In order to support nighttime games, events, and practices, the site would need full development of a stadium and parking as well as infrastructure improvements and utility connections. Development of a stadium would result in construction-related impacts such as air pollution and greenhouse gas emissions, noise, and construction traffic. Construction of a full stadium rather than the addition of lights to an existing stadium would result in a longer construction period with additional heavy construction equipment. Therefore, construction-related impacts would be worse than the proposed project. In addition, this site is adjacent to residential uses; therefore, similar crowd and public address (PA) system noise impacts as the proposed project would occur. This alternative likely would not eliminate the unavoidable noise impact during games and events. Further, development of this site would be cost-prohibitive.

b. Hamilton Site

The Hamilton site, known as Parcel 1A and owned by NUSD, is approximately nine acres in size located in south Novato close to Hamilton K-8 School and Novato Charter School. The site is situated on a former Air Force Base. Although there are no structures on the site, the concrete foundations from former buildings remain. This site would also require full development of a stadium and parking as well as infrastructure improvements, utility connections, and significant roadway improvements for access to the site. Development of a stadium would result in construction related impacts such as air pollution and greenhouse gas emissions, noise, and construction traffic. Construction of a full stadium rather than the addition of lights to an existing stadium would result in a longer construction period with additional heavy construction equipment. Therefore, construction-related impacts would be worse than the proposed project. In addition, since the site was a former military installation, significant soil and groundwater contamination may exist. Therefore, this alternative site would have additional impacts related to hazards and hazardous materials compared to the proposed project. Further, this site is adjacent to residential uses; therefore, similar crowd and PA system noise impacts as the proposed project would occur. This alternative likely would not eliminate the unavoidable noise impact during varsity football games. Lastly, development of this site would be cost-prohibitive.

c. Sinaloa Middle School or San Jose Middle School

These middle schools are within the District. Both schools currently have athletic fields and tracks, but the fields are not conducive to holding large events or games since they do not have bleachers, concessions, or restrooms. The District is planning on upgrading the fields at both schools by converting them from grass to artificial turf and upgrading the tracks to regulation size, but no additional facilities, lights, or a PA system are planned at either school. Adding bleachers, concessions, restrooms, lighting and a PA system at either school would be cost prohibitive. Further, both sites are adjacent to residential uses. At San Jose Middle School residences are located

Figure 6 Map of Alternative Sites Considered but Rejected

Figure 7 Map of College of Marin Indian Valley Campus Alternative Sites

approximately 100 feet west of the existing track and at Sinaloa Middle School residences are located approximately 25 feet south of the existing track. Therefore, for both sites, similar crowd and PA system noise impacts as the proposed project would occur. These alternative sites likely would not eliminate the unavoidable noise impact during varsity football games.

d. College of Marin IVC Lot 1

This site would require full development of a stadium as well as infrastructure improvements and utility connections. This site is located next to a major roadway, Ignacio Boulevard, and parking; therefore the site has adequate site access and would require minimal new parking. Due to the topography of this site, extensive grading would be required. Development of a stadium would result in construction related impacts such as air pollution and greenhouse gas emissions, noise, and construction traffic. The nearest sensitive receptors are the residences approximately 800 feet east of the site. Development of this site is not within the Campus Facilities Master Plan; therefore additional environmental analysis under CEQA would be required. Development of a stadium at this location would be cost prohibitive.

e. College of Marin IVC Lot 2

This site would require full development of a stadium and parking as well as infrastructure improvements, roadway improvements, and utility connections. Due to the topography of this site, extensive grading would be required, although less grading would be required than the Lot 1 site. Development of a stadium would result in construction related impacts such as air pollution and greenhouse gas emissions, noise, and construction traffic. However, there are no residential uses within ¼ mile of this site. Development of a stadium at this location would be cost prohibitive.

f. Hill Recreation Area

Development of a stadium would result in construction related impacts such as air pollution and greenhouse gas emissions, noise, and construction traffic. This site is surrounded by sensitive receptors including a senior center, a high school, and residences. Plans for the site are currently being developed through an active community design planning process. During the process, it was decided that the site will not include lighted athletic fields; however, security and pathway lighting would be provided. Development of a stadium at this site would not be consistent with the outcome of the community design planning process. In addition, development of a stadium at this location would be cost prohibitive.

g. O'Hair Park

The City of Novato owns O'Hair Park, which is located adjacent to San Marin High School. Current uses include a lease for an equestrian operation with Morningstar Farm, the City's dog park, as well as public trails and open space. Other than the developed areas for horses and dogs, this park remains predominantly undeveloped with trails and open space. The current lease with Morningstar Farm is in force through October 31, 2022 or can be terminated with 18 months advance notice. Therefore, if the lease with Morningstar Farm was ended, the site could be developed with a stadium. However, this site would require full development of a stadium and parking as well as infrastructure improvements and utility connections which would result in construction related impacts such as air pollution and greenhouse gas emissions, noise, and construction traffic. In addition, Novato Creek runs through the middle of the site. Development of the site with a stadium

may result in water quality impacts or impacts to sensitive riparian species. Further, development of a stadium at this location would be cost prohibitive.

h. Install Turf on Existing Grass Practice Field:

The District desires to install turf on an existing grass practice field at San Marin High School. A resurfaced turf practice field will incrementally increase use of outdoor fields during inclement weather, but would not yield new or additional space for practices. While the conversion to a turf practice field will help with the number or practices by allowing incrementally more use of existing fields, it does not provide adequate additional practice time to solve the larger issue of missed class time. Games times will still need to start at 3:15. Also, in the winter there are four athletic teams that need practice fields. Even with two practice fields, there would not be enough daylight hours in the winter to accommodate four athletic teams. In addition, during overlaps between Fall/winter and winter/spring sports seasons, there can be up to 7 teams that need a place to practice. Finally, the District is considering a later school-day start time, which would reduce available daylight hours for sports practice even further.

i. Reduced Number of Events with Lighting

The District considered a reduction in the number of lighted events compared to the proposed schedule of events. However, as described above under the Additional On-site Turf Fields alternative, the proposed schedule of events is the minimum number of lighted events necessary to accommodate athletic practice needs and achieve the project objectives.

4.3 Alternative 1: No Project

4.3.1 Description

This alternative assumes that the proposed project is not implemented and the project site remains in its current condition. Currently, there are no stadium lights and the public address (PA) system does not focus sound on the field.

4.3.2 Impact Analysis

The No Project alternative would involve no changes to the physical environment and thus would have no environmental effects. As such, air pollution emissions, greenhouse gas (GHG) emissions, and noise associated with construction would be avoided because no lighting system would be installed. In addition, operational impacts associated with light trespass and glare, air pollution and GHG emissions, nighttime PA system and crowd noise, and nighttime event traffic would not occur. The No Project Alternative would eliminate the proposed project's significant and unavoidable noise impact. No mitigation measures would be required for the No Project alternative. Overall impacts would be lower than those of the proposed project since no change to environmental conditions would occur.

The No Project Alternative would not meet any of the objectives of the proposed project. This alternative would not extend play time on the fields and minimize missed instructional time (Objective 1), increase school and community participation (Objective 2), provide nighttime recreational activities for students (Objective 3), improve safety (Objectives 4 and 5), or improve the PA system (Objective 6).

4.4 Alternative 2: Stadium Lighting at Novato High School

4.4.1 Description

This alternative would involve the installation of new lighting at the Novato High School stadium instead of San Marin High School. This stadium would host nighttime events for both Novato and San Marin high schools. The lighting equipment would be similar (height, configuration, type, etc.) to the proposed project. The existing PA system at the school would be updated to focus sound to the field. Like the proposed project, some Novato High School practices and games that currently occur at the field would shift to evening hours. In addition, Novato High School would host some San Marin High School evening events and games. However, the overall number of evening events (e.g.: 16 football games) would remain the same as with the proposed project.

4.4.2 Impact Analysis

a. Aesthetics

Because this alternative would involve similar lighting system and schedule as the proposed project in a neighborhood that is also residential, it would result in similar impacts as the proposed project with respect to views to, through, and from the stadium; change in visual character; and light, glare, and sky glow. However, impacts would be shifted from San Marin High School to Novato High School. At San Marin High School, the nearest residences are 120 feet away. At Novato High School, the nearest residences are adjacent to the stadium less than 25 feet away. Since residences are closer to the Novato High School stadium compared to the San Marin High School stadium, light and glare impacts could be greater under this alternative. Nonetheless, with mitigation measures similar to those in this EIR (AES 3and AES-4) to design the lighting system to reduce light trespass and glare at these residences, impacts are expected to be less than significant. Under this alternative, aesthetic impacts would be generally similar to the proposed project and would remain less than significant or less than significant with mitigation. Mitigation measures related to light and glare would still apply.

b. Air Quality

This alternative would involve the permanent installation of lighting fixtures at Novato High School. The amount and duration of construction would be similar or the same under this alternative. Therefore, construction-related emissions would be similar to or the same compared to the proposed project. Mobile emissions associated with transportation between San Marin High School and Novato High School would be slightly increased. Energy-related operational emissions associated with new lighting systems would be the same as the proposed project. Overall, operational emissions levels would be slightly higher than levels associated with the proposed project. Nonetheless, like the proposed project, impacts would be less than significant.

c. Cultural Resources

Similar to the proposed project, this alternative would involve some subsurface work to install lighting poles. Further research would be needed to determine the likelihood of discovering cultural, paleontological, or tribal resources or human remains at Novato High School. Nonetheless, in order to avoid potential impacts to cultural resources the mitigation measures outlined in Section 4.4, *Cultural*

Resources, of the original EIR, would continue to apply. Impacts would be the same as the proposed project and would remain significant but mitigable.

d. Greenhouse Gas Emissions

This alternative would involve the permanent installation of lighting fixtures at Novato High School. The amount and duration of construction would be similar or the same under this alternative. Therefore, construction-related GHG emissions would be similar to or the same compared to the proposed project. Mobile GHG emissions associated with transportation between San Marin High School and Novato High School would be slightly increased. Energy-related GHG emissions associated with new lighting systems would be the same as the proposed project. Overall, operational emissions levels would be slightly higher than levels associated with the proposed project. However, like the proposed project, impacts would be less than significant.

e. Noise

For the proposed project, the nearest sensitive noise receptors are the classrooms approximately 100 feet from the stadium track and the residences approximately 120 feet from the stadium track. At the Novato High School alternative site, residences are located immediately adjacent to the northwestern boundary of the existing stadium. Therefore, construction-related noise impacts would be greater compared to the proposed project. Additional mitigation measures may be needed related to construction noise for this alternative.

The stadium at Novato High School currently has a PA system but it is only used for daytime events since the stadium has no lighting. Under this alternative, the PA system use would shift to nighttime for night games and additional crowd noise would occur during evening hours. At Novato High School, sensitive noise receptors (residences) are located immediately adjacent to the stadium. Therefore, crowd and PA noise impacts would be greater than those of the proposed project. A mitigation measure similar to Mitigation Measure N-2 required for the proposed project would apply to this alternative. The significant and unavoidable noise impact would remain.

This alternative would also involve additional traffic noise associated with trips to transport San Marin High School transport student athletes, coaches, and support staff to Novato High School for games. Traffic noise impacts would be increased compared to the proposed project but would be expected to remain less than significant.

f. Transportation/Traffic

This alternative would involve additional roadway traffic to transport student athletes, coaches, and support staff to Novato High School for games. Impacts would be increased compared to the proposed project but would be expected to remain less than significant.

4.5 Alternative 3: Portable Lighting

4.5.1 Description

Under this alternative, stadium lighting for night games at San Marin High School would be provided by portable lighting systems that are powered by diesel generators. The portable lighting systems would only be used for nighttime football, soccer, track, and lacrosse games. It is assumed that portable lighting would not remain in place but would be installed prior to games and removed after games

or the following morning. Practices would continue to meet during daytime hours and would not use the portable lighting system.

4.5.2 Impact Analysis

a. Aesthetics

This alternative would not involve the permanent addition of stadium lighting. However, this alternative would involve the use of portable light fixtures. Therefore, this alternative would incrementally alter views of and through the stadium when the fixtures are in use. However, because lighting systems would not be permanent but would be used temporarily and only occasionally, views would be affected to a lesser extent than the proposed project. This alternative would not substantially alter daytime aesthetic conditions and visual character of the stadium since portable fixtures would only be used for nighttime events. Depending on type of fixtures used, portable lighting may be more or less efficient than the proposed permanent light fixtures. Therefore, light and glare impacts may be better or worse than the proposed project. Since this alternative would only involve lighting for nighttime events and not practices, potential light and glare impacts would be less frequent than the proposed project. The mitigation measures required for the proposed project (AES-3and AES-4) would not apply since no permanent lighting systems are proposed. Like the proposed project, this alternative would not substantially increase sky glow. Therefore, overall, aesthetic impacts associated with this project would be less than significant and would be slightly reduced compared to the proposed project.

b. Air Quality

This alternative would not involve the permanent installation of lighting fixtures. This alternative would involve trucks or light machinery to set up and remove the portable fixtures, but emissions associated with installation would be minor. Therefore, construction-related emissions would be reduced compared to the proposed project. However, this alternative would involve diesel-powered portable lighting. Operational diesel emissions would be increased compared to the proposed project. It is anticipated that overall air pollution emissions associated with diesel generators would be more than emissions associated with energy use to power permanent energy-efficient lighting fixtures. In addition, nearby sensitive receptors may be affected by diesel exhaust and odor emissions. Overall, air quality impacts would be increased compared to the proposed project under this alternative.

c. Cultural Resources

This alternative would not involve ground disturbing activities since the lighting poles would not be installed. Therefore, no impacts to cultural resources would occur. The mitigation measures outlined in Section 4.3, *Cultural Resources*, would not apply. Impacts would be reduced compared to the proposed project.

d. Greenhouse Gas Emissions

This alternative would not involve the permanent installation of lighting fixtures. This alternative would involve trucks or light machinery to set up and remove the portable fixtures, but emissions associated with installation would be minor. Therefore, construction-related GHG emissions would be reduced compared to the proposed project. However, this alternative would involve diesel-powered portable lighting. GHG emissions associated with diesel generators would be increased

compared to the proposed project. It is anticipated that overall GHG emissions associated with diesel generators would be more than GHG-emissions associated with energy use to power permanent energy-efficient lighting fixtures. Overall, GHG impacts would be increased compared to the proposed project under this alternative.

e. Noise

Since this alternative would not involve the permanent installation of light fixtures, construction noise would be reduced compared to the proposed project. However, this alternative would involve minor infrequent noise associated with installing and removing the portable fixtures. Like the proposed project, construction noise impacts would be less than significant.

This alternative would still involve a shift of athletic games to the evening hours, though unlike the proposed project this alternative would not shift practices to the evening hours. This alternative would not involve improvements to the PA system that would reduce PA system noise at nearby residences; therefore, PA system noise impacts on nearby receptors would be greater than the proposed project. In addition, this alternative would still involve nighttime varsity football games; therefore, the significant and unavoidable noise impact from crowd noise would remain. The diesel-generators would also produce noise not associated with the proposed project. Overall, noise impacts would be greater under this alternative than for the proposed project. Mitigation measures similar to those required for the proposed project (N-2) would still apply.

f. Transportation/Traffic

Like the proposed project, this alternative would result in a shift of some stadium activities, such as varsity football games to nighttime instead of daytime. Therefore, the traffic impacts associated with evening football games for the proposed project would still occur with this alternative. Impacts would be generally the same as the proposed project and would be less than significant.

4.6 Alternative 4: Reduced Lighting System Alternative

4.6.1 Description

The Reduced Lighting System Alternative would involve the installation of a stadium lighting system with reduced-intensity lighting. As measured in May 2019, the proposed stadium lighting system generates illuminance reaching 441 lux at the center of the field (Appendix B). This alternative would reduce the lighting level during athletic events for the purpose of minimizing the exposure of residential neighbors to light trespass.

4.6.2 Impact Analysis

a. Aesthetics

It is assumed that this alternative would involve the installation of stadium lighting fixtures in the same locations as proposed and up to the same maximum height of 80 to 90 feet. Therefore, this alternative would incrementally alter views of and through the stadium. Similar to the proposed project, light poles would not conflict with the visual character of the stadium's vicinity and would have a negligible effect on overall visual quality.

This alternative would reduce the intensity of lighting during events at the San Marin High School stadium, which would result in incrementally less light trespass at property lines adjacent to

residences than would the proposed stadium lighting system. As shown in Table 2 in Section 4.1, Aesthetics, the proposed system would generate light trespass of up to 2.75 lux. This light level would not exceed the CIE threshold of 5 lux for sites in the E2 zone. Because this alternative would reduce the proposed lighting levels, it would also not generate light trespass exceeding the threshold of 5 lux. The impact from light trespass would be incrementally reduced but would remain less than significant.

By reducing light trespass from the stadium site relative to the proposed project, the alternative would incrementally reduce glare. Similar to the proposed project, illuminance on the vertical plane would not exceed the applied threshold of 5 lux at adjacent residential property lines. Therefore, the impact from glare would be incrementally reduced but would remain less than significant. This alternative also would incrementally reduce the stadium site's contribution to sky glow, which would be minimal under the proposed project. Therefore, the impact from sky glow would be slightly reduced but would remain less than significant.

b. Air Quality

The Reduced Lighting System Alternative would involve a similar duration and intensity of construction to the proposed project. Because the scope of construction activity would not change, the alternative also would not generate construction emissions also would not exceed the BAAQMD's thresholds, and would not expose sensitive receptors to substantial pollutant concentrations. This impact would remain less than significant.

It is assumed that by reducing the intensity of lighting, this alternative would require incrementally less electricity use relative to the proposed project. However, reducing lighting would not alter the number of visitors to athletic events at the stadium site, so mobile emissions would be similar to those generated by the proposed project. Similar to the project, operational emissions would not result in net increase in any criteria pollutant for which the project region is in non-attainment under applicable federal or state ambient air quality standards and would not expose sensitive receptors to substantial pollutant concentrations. Therefore, this impact would be incrementally reduced but would remain less than significant.

c. Cultural Resources

This alternative would involve a similar degree of surface ground disturbance to the proposed project, which would have the potential to disturb previously unidentified archaeological resources, paleontological resources, human remains, or tribal cultural resources. The mitigation measures outlined in Section 4.3, *Cultural Resources*, would apply to identify and protect such cultural resources in the event of their discovery during ground disturbance. Similar to the proposed project, impacts on cultural resources would be less than significant with mitigation.

d. Greenhouse Gas Emissions

This alternative would involve a similar scope of construction activity to the proposed project and would result in a similar amount of construction-related GHG emissions. As noted above, dimmer lighting would incrementally reduce electricity use from the stadium site, although it would not affect the number of visitors and associated mobile emissions. Therefore, this alternative would incrementally reduce operational GHG emissions. Similar to the proposed project, the alternative would not result in a population increase, and as such would be consistent with ABAG population projections. It would also be consistent with goals and measures from the City's CCAP related to

renewable energy, vehicle efficiency, and alternative fuels. Therefore, the overall GHG impact would be slightly reduced but would remain less than significant.

e. Noise

Because this alternative would involve a similar scale of construction activity to the proposed project at the stadium site, it would generate similar temporary increases in noise levels at nearby residences. The impact from construction noise would remain less than significant.

It is assumed that reduced lighting would not affect the type or frequency of athletic events hosted at the stadium site. Therefore, similar to the proposed project, varsity football game noise under this alternative would generate L_5 noise levels that exceed the threshold of 55 dBA at nearby sensitive receptors. The mitigation measures in Section 4.5 to reduce operational noise during athletic events would apply to this alternative. However, similar to the proposed project, it is possible that an L_5 sound level of 55 dBA at the nearest residences would not be achievable even with implementation of mitigation measures. Therefore, the impact from operational noise would remain significant and unavoidable.

f. Transportation/Traffic

Because this alternative would involve a similar amount of athletic use at the stadium site to the proposed project, it would generate a similar number of vehicle trips. Stadium lighting, even at reduced intensity, would still enable nighttime stadium activities such as varsity football games. Therefore, the timing of new vehicle trips would also be similar to the proposed project. Resulting traffic impacts would be less than significant, similar to the proposed project.

4.7 Alternative 5: College of Marin Indian Valley Campus (IVC) Existing Fields

4.7.1 Description

The Indian Valley Campus (IVC) contains two grass athletic fields on the western portion of the campus which are configured for softball and soccer. The fields contain lighting but the lighting is configured to accommodate softball games. Therefore, the fields and lighting system would need to be reconfigured to accommodate football. The field house, restrooms, and bleachers would need to be upgraded to accommodate larger crowds associated with varsity football games. Parking and pathways may need to be improved to meet ADA standards. The fields do not contain a track and could not accommodate track practices or a track meet. In addition, the field would require drainage improvements which would necessitate grading. The fields are surrounded on three sides by open space to the west, north, and east. The Indian Valley Campus Organic Farm and Garden borders the fields to the southwest. Campus buildings, including maintenance facilities, border the fields to the southeast. The nearest sensitive receptors to the field are classroom facilities approximately 1,000 feet to the southeast and residences located on a ridge approximately 1,300 feet to the north-northeast.

Both the College of Marin and the City of Novato use these fields and would not accommodate NUSD's proposed usage. The College of Marin owns the IVC site, and has entered into a 40-year agreement with the City of Novato. That agreement, which governs use of the fields, will be up for renewal in the year 2036. The District would have to enter into a three-way agreement with the college and city to use the fields. Both the City of Novato and the College of Marin have stated that

it would be difficult to reach an agreement between all three parties. Based on the Agreement in place between the City of Novato and Marin Community College District regarding Indian Valley Campus athletic fields, the Marin Community College District has first priority for use of the athletic fields between the hours of 8:00 AM and 3:00 PM on Monday, Wednesday, and Friday and between the hours of 8:00 AM and 5:00 PM on Tuesdays and Thursdays. The City has priority for use of the athletic fields between the hours of 3:00 PM and 10:00 PM on Monday, Wednesday, and Friday; between the hours of 5:00 PM and 10:00 PM on Tuesday and Thursday; between the hours o 9:00 AM and 5:00 PM on Saturdays; and between the hours of 12:00 PM and 5:00 PM on Sundays and holidays. These times correspond with many of the times that San Marin High School students would also use the fields for practices and games. Additionally, the fields are closed November through January for maintenance and to reduce the damage to the natural turf during the rainy season. This closure would impact approximately 66 events that are planned to occur under the proposed project during this time period including both practices and games. Furthermore, there is currently no room to add a new football field under the lights without reducing the space for the existing programs or eliminating many community uses all together. The City of Novato has indicated that there is not room to add a new football field at the IVC site without reducing space for existing City programs or eliminating many community uses at the site altogether. The City does not support use of the IVC site for San Marin High School athletic events (City of Novato, 2017). Therefore, the District's schedule would not be accommodated at this facility.

4.7.2 Impact Analysis

a. Aesthetics

Because this alternative would involve a similar lighting system and schedule as the proposed project, it would result in similar impacts as the proposed project with respect to views to, through, and from the stadium; change in visual character; and light, glare, and sky glow. However, impacts would be shifted from San Marin High School to the IVC. At San Marin High School, the nearest residences are approximately 120 feet away. At the IVC, the nearest residences are located approximately 1,300 feet to the north-northwest on a ridge above the stadium. Since residences are further from the IVC field compared to the San Marin High School stadium, the severity of light and glare impacts on nearby sensitive receptors would be reduced under this alternative compared to the proposed project.

Unlike the stadium at San Marin High School, the IVC fields border directly on open space, and therefore the impact of implementation of this project on the visual character of the surrounding area and ambient lighting levels may be slightly increased.

Nonetheless, with implementation of mitigation measures similar to those contained in Section 4.1, *Aesthetics,* (AES-3 and AES-4) to design the lighting system to reduce light trespass and glare at nearby residences, impacts are expected to be less than significant. Under this alternative, aesthetic impacts would be slightly reduced when compared to proposed project and would remain less than significant or less than significant with mitigation. Mitigation measures related to light and glare would still apply.

b. Air Quality

This alternative would involve the permanent installation of lighting fixtures at the IVC existing fields. The amount and duration of construction for the lighting component of the project would be the same under this alternative. However, the grading associated with the drainage improvements

would be in addition to any excavation or grading associated with the lighting component of the proposed project. Additional construction compared to the proposed project would be required for this alternative (such as improved restrooms, an improved field house, new bleachers, and ADA-compliant parking and pathways). Therefore construction-related emissions would be slightly higher compared to the proposed project. Mobile emissions associated with transportation between San Marin High School and the IVC would also be slightly increased. Energy-related operational emissions associated with new lighting systems would be similar to or the same as the proposed project. Overall, operational emissions levels would be slightly higher than levels associated with the proposed project. Nonetheless, similar to the proposed project, impacts would be less than significant.

c. Cultural Resources

Similar to the proposed project, this alternative would involve some subsurface work to install lighting poles. Further research would be needed to determine the likelihood of discovering cultural, paleontological, or tribal resources or human remains at the IVC. Nonetheless, in order to avoid potential impacts to cultural resources the mitigation measures outlined in Section 4.4, *Cultural Resources*, would continue to apply. Impacts would be the same as the proposed project and would remain significant but mitigable.

d. Greenhouse Gas Emissions

This alternative would involve the permanent installation of lighting fixtures at the IVC existing fields. The amount and duration of construction for the lighting component of the project would be the same under this alternative. However, the grading associated with the drainage improvements would be in addition to any excavation or grading associated with the lighting component of the proposed project. Additional construction compared to the proposed project would be required for this alternative (such as improved restrooms, an improved field house, new bleachers, and ADA-compliant parking and pathways). Therefore, construction-related GHG emissions would be slightly increased compared to the proposed project. Mobile GHG emissions associated with transportation between San Marin High School and the IVC would also be slightly increased. Energy-related GHG emissions associated with new lighting systems would be similar to or the same as the proposed project. Overall, operational emissions levels would be slightly higher than levels associated with the proposed project. However, like the proposed project, impacts would be less than significant.

e. Noise

For the proposed project, the nearest sensitive noise receptors are the classrooms approximately 100 feet from the stadium track and the residences approximately 120 feet from the stadium track. At the IVC alternative site, residences are located approximately 1,300 feet from the northeast boundary of the northernmost existing softball field. Construction activities, including the grading associated with the drainage improvements and construction of improved restrooms, an improved field house, new bleachers, and ADA-compliant parking and pathways would be in addition to any excavation or grading associated with the lighting component of the proposed project. Overall construction noise would be slightly greater compared to the proposed project. However, the nearest sensitive receptors are classrooms and residences located approximately 1,000 feet and 1,300 feet from the IVC field site, respectively. Due to the attenuation of noise over distance, construction noise for this alternative would be lower at the nearest sensitive receptors compared to the proposed project. Therefore, construction-related noise impacts would be reduced in comparison to the proposed project.

The IVC fields do not currently have a PA system and a new system would be installed under this alternative. Crowd noise from attendees at athletic events would be similar compared to the proposed project. This alternative would also involve additional traffic noise associated with trips to transport San Marin High School student athletes, coaches, and support staff to IVC for practices and games. Traffic noise impacts would be increased compared to the proposed project but would be expected to remain less than significant. Due to the distance between the fields and nearby sensitive receptors (approximately 1,000 feet or greater), operational noise impacts would be reduced compared to the proposed project. A mitigation measure similar to Mitigation Measure N-2 required for the proposed project may be required for this alternative in order to reduce potential impacts associated with a new PA system. Because of the distance between the fields and the nearest sensitive receptors, operational noise levels associated with this alternative most likely would be below identified thresholds. This alternative likely would eliminate the significant and unavoidable noise impact associated with the proposed project.

f. Transportation/Traffic

This alternative would involve additional roadway traffic to transport student athletes, coaches, and support staff to IVC for games and practices. Impacts would be increased compared to the proposed project but would be expected to remain less than significant.

4.8 Environmentally Superior Alternative

Table 6 compares the physical impacts for each of the alternatives to the physical impacts of the proposed project. The No Project Alternative (Alternative 1) would be the overall environmentally superior alternative since it would avoid all project impacts. However, the No Project Alternative would not achieve the basic project objectives as stated in Section 2.0, *Project Description*.

Among the development options, Alternative 3 (Portable Lighting System) would reduce aesthetic and cultural impacts compared to the proposed project but would increase noise, air quality, and GHG impacts compared to the proposed project. Alternative 3 would not eliminate the unavoidably significant noise impact. Because this alternative would increase the project's already significant noise impact, while slightly reducing already less than significant aesthetic and cultural impacts, it would not be environmentally superior to the project.

Alternative 4 (Reduced Athletic Lighting System) would slightly reduce light and glare, air quality, and GHG impacts, but these impacts would remain less than significant. It is important to emphasize that further reducing the project's already less than significant light and glare impacts would not achieve a primary CEQA objective for alternatives: to "avoid or substantially lessen any of the significant effects of the project" (CEQA Guidelines Section 15126.6(a)), particularly inasmuch as any reductions that remained useful would be slight. As discussed in Section 2, *Aesthetics*, the project would not cause light trespass exceeding the CIE's threshold of 5 lux in the E2 zone for rural areas. Further reducing light trespass would not alter attainment of this threshold. This alternative also would not avoid the project's unavoidably significant noise impact. Because Alternative 4 would not avoid or substantially lessen a significant impact, it is not environmentally superior to the project.

Alternative 2 (Novato High School Lighting) would have similar aesthetic, air quality, and GHG impacts compared to the proposed project but would shift these impacts to Novato High School instead of San Marin High School. Alternative 2 would also increase traffic compared to the proposed project; but impacts are expected to remain less than significant. Alternative 2 would not eliminate the unavoidably significant noise impact but would shift it to Novato High School. Overall,

Alternative 2 is considered the environmentally superior alternative. However, since Alternative 2 would not involve the installation of stadium lighting at San Marin High School, it would not meet most of the basic project objectives due to the fact that demand for field time from both Novato High School and San Marin High School combined would exceed the lighted field availability.

It should be noted that Alternative 5 (COM IVC Existing Fields) would eliminate the significant and unavoidable noise impact associated with the proposed project and would be considered the environmentally superior alternative. However, as described above, this alternative would be infeasible due to the unavailability of the site for purchase or lease by the District.

Table 6 Impact Comparison of Alternatives

Issue	Proposed Project Impact Classification	Alternative 1: No Project	Alternative 2: Novato High School Lighting	Alternative 3: Portable Lighting System	Alternative 4: Reduced Athletic Lighting System	Alternative 5: COM IVC Existing Fields
Aesthetics	II	+	=	+	+/=	+
Air Quality	II	+	=	-	+/=	-
Cultural Resources	II	+	=	+	=	=
Greenhouse Gas Emissions	III	+	=	-	+/=	-
Noise	I	+	-	-	=	+
Transportation/Traffic	II	+	-	=	=	-

+ Superior to the proposed project (reduced level of impact)

- Inferior to the proposed project (increased level of impact)

= Similar level of impact to the proposed project

5 References

5.1 Bibliography

In the original EIR, references are contained in Section 7, *References*. The references listed below are limited to those in this revised EIR.

Bortle, John. 2006. "Gauging Light Pollution: The Bortle Dark-Sky Scale." *Sky & Telescope Magazine*. July 2006. Available at: https://www.skyandtelescope.com/astronomy-resources/light-pollution-and-astronomy-the-bortle-dark-sky-scale/

Caltrans. 2016. List of Eligible and Officially Designated State Scenic Highways. Available at: http://www.dot.ca.gov/design/lap/livability/scenic-highways/index.html

Glendale Unified School District. June 2012. *Hoover High School Practice Field Lighting Project Initial Study/Negative Declaration.* Available at: http://www.gusd.net/cms/lib03/CA01000648/Centricity/Domain/53/WEB%20PDF%20HooverHS_Field_Lights_DraftISND_2012-06-04.pdf

Hiscocks, Peter D. Updated January 2011. *Measuring Light*. Ryerson University. Available at: http://www.ee.ryerson.ca/~phiscock/astronomy/light-pollution/photometry.pdf

Novato Unified School District (NUSD). June 2006. *PBC Parcels 1A and 1B Draft Mitigated Negative Declaration*.

Pennsylvania Outdoor Lighting Council. No date. *Common Lighting Terms Defined*. Available at: http://www.polcouncil.org/polc2/common_lighting_terms_defined.PDF

San Mateo Union High School District. May 2016. *SMUHSD Stadium Improvement Project Draft Environmental Impact Report*.

Shuster, Jeff. January 2014. *White Paper: Addressing Glare in Solid-State Lighting*. Ephesus Lighting. Available at: http://ephesuslighting.com/wp-content/uploads/2014/01/Addressing-Glare.pdf

5.2 List of Preparers

This EIR was prepared by Rincon Consultants, Inc., under contract to the Novato Unified School District. Consultant staff involved in the preparation of the EIR are listed below.

RINCON CONSULTANTS, INC.

Stephen Svete, AICP, LEED AP ND, Principal
Abe Leider, AICP CEP, Principal
Matthew Long, MESc, MPP, Project Manager
Jonathan Berlin, MESM, Senior Environmental Planner
Karly Kaufman, MESM, Senior Environmental Planner
Hannah Mize, Associate Environmental Planner
Sarah Sorensen, Associate Environmental Planner
Kyle Brudvik, Paleontologist/Geoarchaeologist/Archaeologist
Laura E. Hoffman, M.A., RPA, Archaeological Resources Program Manager & Principal Investigator
Valerie Salazar, Technical Editor / Production Department Manager
Debra Jane Seltzer, Document Production Specialist
Allysen Valencia, GIS Analyst

BENYA BURNETT CONSULTANCY (SPORTS LIGHTING CEQA REPORT)

James Benya, PE, FIES, FIALD

This page left intentionally blank.

6 Responses to Comments on the Revised Draft EIR

This section includes comments received during the circulation of the Revised Draft Environmental Impact Report (EIR) prepared for the San Marin High School Stadium Lights Project (Project), and the Novato Union School District's (NUSD) responses to the comments on the Revised Draft EIR and corrections and information added to the Final EIR, where appropriate, in response to comments relative to the proposed project and its environmental effects. Corrections or additional text discussed in the responses to comments are also shown in the text of the Final EIR in ~~strikethrough~~ (for deleted text) and underline (for added text) format.

Consistent with CEQA Guidelines Section 15088.5(c), since the required revisions to the previously circulated EIR are limited to a few portions of the Draft EIR, the District has elected to recirculate only these portions of the Draft EIR that have been modified. In accordance with CEQA Guidelines Section 15088.5(f)(2), the District requested that reviewers limit the scope of their comments to the revised portions of the revised Draft EIR; pursuant to the CEQA Guidelines, comments on other topics do not require responses in this Revised Final EIR.

The Revised Draft EIR was circulated for a 30-day public review period that began on July 24, 2019 and ended on August 24, 2019. NUSD received 22 comment letters on the Draft EIR during the public review period. The commenters and the page number on which each commenter's letter appear are listed below. The comment letters are generally organized alphabetically.

In Section 15088, the California Environmental Quality Act (CEQA) Guidelines require that "[t]he lead agency shall evaluate comments on *environmental issues* received from persons who reviewed the Draft EIR and shall prepare a written response." (Italics added for emphasis.) Consistent with the Guidelines, the responses to comments focus on those comments that pertain to environmental issues (see also CEQA Guidelines Section 15132).

6.1 Master Response: Light and Glare Impacts

The document on the following pages contains a master response to comments related to light and glare impacts.

Master Response to Aesthetics: Light and Glare Comments

With respect to the

San Marin High School Sports Lighting Revised Draft Environmental Impact Report Comments

James R Benya, PE, FIES, FIALD

BENYA BURNETT CONSULTANCY

Davis, CA

For Novato Unified School District (NUSD) and Rincon Associates

October 7, 2019

A. General Response: Introduction

Anthropogenic (man-made) lighting at night (ALAN) is a phrase commonly used when discussing outdoor light and its impact on astronomy and the environment. With the growth of commerce, industry, recreation and social activity in the 20th century, so increased the number of uses of electric light outdoors, in many cases with little or no concern for the impacts of light. LED technology is generally acknowledged by experts to have made things worse in the 21st century.

A current phrase for the negative impacts of ALAN is "light pollution". It is fair to call it pollution because some of the negative impacts are harmful to living things. There are four primary types of light pollution:

- Anthropogenic sky glow, man-made light that goes upward into the sky, veiling the view of stars and the Milky Way
- Light trespass, in which man-made light shines onto adjacent properties
- Glare, in which excessive amounts of man-made light causes discomfort, disability or annoyance impacts
- Light that disrupts the natural environment, with potentially significant impacts on the circadian rhythms and the natural lives of flora and fauna

The ubiquity of lighting and the perception of it being a human need and a right has historically allowed ALAN a wide berth. Only in the last 50 years have negative impacts of ALAN been identified and the first generations of changes in practice either by education, recommendation, or regulation are now affecting the use of light outdoors at night. Even so, there are comparatively few restrictions and standards, and light pollution is a common outcome of projects and human activity throughout developed and industrialized countries.

CEQA is conscious of ALAN as an environmental impact and addresses it as aesthetic impact. Considering the complexity of lighting and the potentially contradictory standards and beliefs, this was a wise choice. However, for preparing an environmental impact report (EIR[1]), CEQA provides little specific guidance with respect to ALAN. Environmental experts are required to understand the particular set of conditions and potential impacts of ALAN, to consider whether the impacts will be significant and/or can be mitigated, and to set measurable and achievable criteria for proposed projects.

The intent of this report is to explain the basic science and applicable standards and to provide general and specific responses to commenters on the RDEIR for the San Marin High School (SMHS) athletic stadium (hereinafter, the "Project"). This includes explanations of the RDEIR criteria themselves[2] as well as the outcome of field confirmation measurements called for under AES-3 and AES-4 as previously reported[3]. The calculation and field-testing methods employed meet or exceed those that any competent expert would employ to evaluate light related impacts under the circumstances of this project.

[1] This report and the associated field work are based on the September 2019 Revised Draft Environmental Impact Report, hereinafter "RDIER".
[2] RDEIR Table 1, Potential Impacts AES-1 through AES-5, inclusive.
[3] Sports Lighting CEQA report, James Benya, 6-15-19

B. General Response: Selection of Applicable Standards

In developing an Environmental Impact Report (EIR) in compliance with CEQA, developers must choose clear, non-arbitrary standards by which to evaluate the potential impacts to the environment, and preferably, field verify compliance. In lighting, there are several standards that can be applied, but most people are unaware of the existence of all the candidate national and international standards. In most cases there is a reasonable level of coordination among the standards organizations so that the standards of each are reasonably consistent with the others, making the selection of a standard manageable.

Laws

The highest order of applicable standards are laws and regulations, both state and federal. Regardless of the standards of any non-regulatory organization, these take precedent. California has the most state laws regulating lighting of any state in the Nation, especially 24CCR Parts 1, 6, and 11. There are no directly applicable state laws affecting sports lighting[4], but 24 CCR Part 1 establishes lighting zones for the state. By law, the Project is in Lighting Zone 3.

Standards, Guides and Recommended Practices

Standards developed by societies and other organizations are also relevant unless superseded by laws and regulations. In the United States, the primary ANSI certified standards writing organization in lighting applications is the Illuminating Engineering Society (IES). But not all IES publications or standards meet ANSI standards. For example, IES Recommended Practice, ***RP-6-15 Sports and Recreational Area Lighting,*** is not an ANSI standard but is the reference document for the practice of sports lighting in North America.

The IES is a member organization to the Commission Internationale de l'Eclairage (CIE), the international lighting organization that develops standards used throughout the world. CIE standards and recommendations are generally considered the highest order of lighting technology and science. Their standards and publications usually coincide with IES standards and publications, but for practical and political reasons, IES and CIE may differ from time to time on a specific standard or matter. For example, CIE 150, ***Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations*** is different from RP-6 and most other IES publications and was selected by the RDEIR development team as its primary standard regarding lighting for the Project.

The International Dark-sky Association (IDA) is a 501(c)3 advocacy organization originally formed by astronomers to combat the increase in light pollution. In recent years, IDA has emerged as an advocate of preventing light pollution to the benefit of astronomers, humans in every part of the world, and the natural night environment, with increasing emphasis on the impacts of bright night skies to all living beings. Recognizing that sports lighting impacts can be mitigated by state-of-the-art sports lighting equipment and proper design and installation practices, IDA developed a standard and certification program for sports lighting installations[5]. That program, announced in 2018, was not available in time to be used in setting project design standards. However, because this document was developed for exactly this Project's situation,

[4] 24 CCR does not regulate sports lighting. The lighting zone system from 24 CCR Part 1 is used for reference.
[5] IDA-Criteria for Community-Friendly Outdoor Sports Lighting v1.0, https://www.darksky.org/wp-content/uploads/2018/03/IDA-Criteria-for-Community-Friendly-Outdoor-Sports-Lighting.pdf

the design documentation provided by the lighting system supplier was produced to demonstrate compliance with it.[6]

Although the developers of the project's original EIR selected CIE 150:2003, it has been updated by CIE 150:2017, ***Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations*** 2nd Edition (CIE150:2017). CIE Standards have the most comprehensive set of standards by which the project and its performance with respect to the community should be measured, and usually the most recent version should be used when possible. However, since this RDEIR benefits from having an installed and operating system to measure, the appropriate metrics should be field measurable. For this reason, CIE 150:2017, Section 3.6.5.1, "Limitation of Illumination on surrounding properties", Table 2 and CIE 150:2003, Section, Table 2.3, "Maximum values for intensity of luminaires" were chosen to measure the maximum light trespass and the maximum candlepower glare, respectively. Commenters argue that only CIE 150:2017 and Lighting Zone E2 are acceptable, but CIE 150:2017 glare metrics are not field measurable.

C. General Response: Lighting Zones

Commenters generally argued for a different lighting zone choice than that made in the original EIR in order to make the RDEIR criteria more restrictive.

The intent of a lighting zone system is to provide a system to restrict lighting appropriately relative to the situation, allowing more lighting in places like cities where there is already considerable obtrusive lighting and less in natural and rural locations. It allows communities to plan lighting allowances to prevent unacceptable juxtapositions and to be part of the community land use zoning process. It is meant to be interpreted, but not on a street by street basis. The school is in a suburban district, not rural, and while the district may border on rural or natural areas, it is still suburban itself. One commenter called lighting zone descriptions as "superfluous"; they are not because the system is meant to be interpreted into communities and the titles and descriptions give guidance.

CIE 150 uses a lighting zone system, called "environmental lighting zones", to address the impact of obtrusive light relative to the ambient light already present from other sources[7]. An alternative North American lighting zone system appears in many applicable IES publications, particularly the IES Lighting Handbook 10th Edition (IES HB 2011) and the Model Lighting Ordinance (MLO) developed jointly by the IDA and IES. A complicating factor, the California Code of Regulations, Title 24 (24CCR) codifies this North American lighting zone system in 24CCR 1[8], and uses it to limit outdoor lighting energy use in the Building Energy Efficiency Standards, 24CCR 6, and to constrain obtrusive light in CALGreen, 24CCR 11. There are subtle differences between the definitions used by the CIE and North American lighting zone systems. See Table 1.

The Lighting Zone choice is critical because CIE 150 sets strict limits on light trespass, glare and upward light (see following discussions) by zone. Most importantly, because CIE 150 contains specific lighting zone sensitive limits that are measurable, it permits enforcement of light trespass and glare zone limits on the project that are completely objective.

[6] Musco Lighting Drawings by D. Alexander, June 1, 2018, 18 pp
[7] There are terminology and criteria differences between CIE 150:2003 and CIE 150:2017, see Table 1.
[8] Section 10-114

Table 1 International and North American Lighting Zone Definitions

Zone	Definition and/or Examples of Application
E0 (CIE150:2017)	Intrinsically dark; UNESCO Starlight reserves, IDA Dark Sky Parks, Major optical observatories
LZ0 (IES HB 2011) No Ambient Lighting	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 residents and users is adapted to the darkness, and they expect to see little or no lighting. When not needed lighting should be extinguished.
LZ0 (Title 24) Very low ambient light levels	Undeveloped areas of government designated parks, recreation areas, and wildlife preserves.
E1 (CIE150:2003)	Natural environment, intrinsically dark lighting environment. National parks or protected sites.
E1 (CIE150:2017)	Dark environment; Relatively uninhabited areas.
LZ1 (IES HB 2011) 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 and convenience, but it is not necessarily uniform or continuous. After curfew, most lighting should be extinguished or reduced as activity levels decline.
LZ1 (Title 24)	Developed portion of government designated parks, recreation areas, and wildlife preserves. Those that are wholly contained within a higher lighting zone may be considered by the local government as part of that lighting zone
E2 (CIE150:2003)	Rural surroundings, low district brightness; Industrial or residential rural areas
E2 (CIE150:2017)	Low district brightness; Sparsely inhabited rural areas
LZ2 (IES HB 2011) Moderate Ambient Lighting	Areas of human activity where the vision of residents and users is adopted to moderate light levels. Lighting may typically be used for safety or convenience but is not necessarily uniform or continuous. After curfew, lighting may be extinguished or reduced as activity levels decline.
LZ2 (title 24)	Rural Areas as defined by 2010 US Census
E3 (CIE 150:2003)	Suburban; medium district brightness. Industrial or residential suburbs.
E3 (CIE 150:2017)	Medium district brightness. Well inhabited rural and urban settlements.
LZ3 (IES HB 2011) Moderately high ambient lighting	Areas of human activity where the vision of residents and users is adopted to moderately high light levels. Lighting is generally desired for safety or convenience and it is often uniform or continuous. After curfew, lighting may be extinguished or reduced in most areas as activity levels decline
LZ3 (Title 24)	Urban Areas as defined by the 2010 US Census
Lighting Zones E4 and LZ4 are omitted because they are for very high ambient light levels not applicable here.	

Most commenters opined that the appropriate lighting zone is nonetheless E2 or LZ2. But Novato is not rural, as the homes of residents are in developed subdivisions and the district consists of residences, schools, stores and their supporting streets, roads and intersections. There are no barns, pastures, or plowed fields near SMHS. In the evening, there are house lights, streetlights, parking lot lights, store lights and the necessary security and egress lighting on schools and other structures. It is clearly not a rural area. The only standard that might be interpreted to support LZ2 is the IES Handbook, which avoids the phrase "rural".

By all definitions, including California State Law (24CCR Part 1), the lighting zone for the Project is LZ3/E3. However, in deference to the advice of the court and consideration to commenters, the DEIR team agreed to employ Lighting Zone LZ2/E2 standards for the purpose of setting light impact criteria for the sports lighting at San Marin High School.

D. General Response: Project Design

Sports Lighting

The lighting for the project is designed to light the stadium field for football and other compatible field sports. To design lighting, the illuminating engineer is required to provide adequate illumination for the sports, the spectators, and for the safe ingress to and egress from the spectator stands and booth. The amount and quality of light on the field should be designed to meet IES Recommended Practice RP-6-15 while always ensuring adequate circulation and statutory safety and egress illumination. Sports lighting for large field sports like football and soccer must also be set back for player safety, and preferably behind the spectator stands to prevent poor views. The only practical lighting for a high school football field is to mount lights to poles along each side of the field.

The primary challenge is where to place poles and how tall should they be. In CIE 150, the mounting height issue is illustrated and clearly demonstrates the dilemma facing engineers: *stadium lights should be mounted high enough to be aimed more downward than outward*. This maximizes light on the field and minimizes light trespass off the field that causes glare to both spectators and neighbors. But the further that lights are set back from the sideline, the higher the poles and lights must be. Taller poles are expensive, visually obvious, and if lights are not well shielded, they can cause glare from a greater distance because they are not hidden by the stadium structure or nearby trees. On the plus side, further set back poles allow for fewer poles.

The lighting design was performed by Musco Sports Lighting ("Musco"). A complete set of 18 drawings for project file number 120079H2 by D. Alexander was submitted on or about June 1, 2018. A second set of drawings by D. Alexander was submitted on or about May 16, 2019. The second set was produced in 2019 because it was unclear in the first set whether topography was considered.

IES RP-6-15 "Recommended Practice for Sports and Recreational Area Lighting" is the applicable standard to which the lighting for the sports field should be based. IES recommendations contained in Section 9, Illumination Level Tables, are presented according to Classification of Play. Generally, the recommended average light levels are more for spectators[9] than for players; Class I is for competition play for over 5000 spectators; Class II is for competition play up to 5000 spectators; Class III is for competition play up to 2000 spectators[10].

[9] The spectator quantities are based on the capacity of the stadium as the primary concern is view distance.
[10] IES RP-6-15 , p 8

Classes II and III are indicated for high school athletics. Class IV is for recreational and non-spectator activities. The recommended horizontal illuminance for football and soccer: for Class II, 500 lux/50 footcandles; for Class III, 300 lux/30 fc; and for Class IV, 200 lux/20 fc[11].

Reviewing Musco's design, they chose 400 lux/40 footcandles[12], which is prorated between Class II and Class III for a stadium of 3500 spectators. The design uses LED lighting with the downward-aimed luminaires mounted to 80-foot-tall poles behind the stands either on the top mast-arm at 80' feet (nominal) or 70' (lower arm). They will also attach special uplights at the 20' level to illuminate aerial balls during games. The aerial ball uplights are only turned on for football games, which are estimated to constitute 25% of the stadium night use. Based on IES recommendations and the pole setback from the edge of the field, the appropriate light pole height is 80'.[13] Due to changes in topography, poles range from 80 to 90 feet tall.

Design – Ingress, Egress and Utility Lighting

The lighting design for the non-sports lighting was not reviewed in detail, but my casual observation is that this lighting is fully shielded and creates no off-site glare. It is mounted to structures and onto poles. In general, this lighting supports ingress to the field and spectator areas (including restrooms and other facilities) and egress lighting, both normal and emergency. These are required by the building code.[14] In addition, lighting is normally provided on facilities considered to be attractive nuisances. "Attractive nuisance is a defense to trespass by children used in tort law. The doctrine of attractive nuisance is premised on the belief that one who maintains a dangerous condition which is likely to attract children on their property is under a duty to post a warning or take affirmative action to protect children from the dangers of that attraction. It imposes a duty to be sensitive to potentially dangerous conditions which are likely to attract children.[15]" In general, facilities near schools and especially athletic areas are likely to attract children, so some sort of security lighting is generally a good practice.

E. General Response: Alternative Designs

Lower lighting levels

Light levels for sports lighting are a combination of lighting for the sport and lighting for spectators. Proper light levels were selected.

Shorter Poles

Shorter poles will increase offsite glare, as explained in CIE 150:2017[16]. The pole height is optimum per IES RP-6-15, Table 3.[17] A summary is provided by Musco of the consequences, see attachments L-1 and L-2.

Fewer Poles

Fewer poles will increase the sideways aiming angles and cause more off-site glare impacts than the pole quantity used. With 8 poles (4 per side), each has a light beam width (along the field) of

[11] Ibid, pp 38-39
[12] Musco Drawings by D. Alexander, June 1, 2018, sheet 2 of 18
[13] IES RP-6-15 p 39 Table 3
[14] 24CCR Part 2 Section 1008
[15] https://definitions.uslegal.com/a/attractive-nuisance/
[16] CIE 150:20117 Figure 3
[17] Ibid

about ±40 degrees; with 6 poles, each beam increases to ±55 degrees and with 4 poles, ±70 degrees. The narrower the light beam width, the less likely there will be spill light to the sides and back.

Other Options

The only other practical option is no sports lighting. Portable lighting, in addition to forcing the use of shorter poles and having greater trespass and glare impact, will also require trucks to move poles into place. In addition to practical problems such as providing special driveway access, the trucks will use energy and the lighting system will be no more efficient; the system will cause more greenhouse gases (GHG) than the permanent system as installed.

F. General Response: Design Criteria (calculations and verification)

General

The calculation and field-testing methods employed meet or exceed those that any competent expert would employ to evaluate light related impacts under the circumstances of this project.

Field Lighting

a. Calculations: The light levels on the field are calculated to be 40 footcandles average with a maximum variability (hot spots to dim spots) of 2:1 or less. The light level at the center of the field is calculated to be 40 footcandles.

b. Measurement: The light level at the center of the field was 40 footcandles[18]. Variability measurements were not a CEQA concern and not taken[19].

Light Trespass

c. CIE 150:2017 Section 3.6.5.1 provides a table of maximum obtrusive light ("light trespass") for both pre-curfew and post-curfew conditions for vertical plane illuminance. The field measurements were made with sports lighting on at normal levels, i.e. pre-curfew.

d. The maximum permissible level is 5 lux for zone E2 (LZ2).

e. The location of the calculation point or measurement meter is at a point of potential offense, e.g. near a home.

f. As reported[20] points were selected based on accessibility near the property line of the residences most likely to be affected. The field verification protocol did not provide for taking measurements inside of homes. Because of the distance squared law in physics[21], the light levels at all selected points, which are closer to the stadium than the homes, will have higher light levels than at the fence or onto private property.

[18] Sports Lighting CEQA report, James Benya, 6-15-19
[19] Variability of field light levels are not part of the EIR criteria per CIE 150:2017.
[20] Sports Lighting CEQA report, James Benya, 6-15-19
[21] IES Lighting Handbook, 10th Edition

g. All readings were below 3 lux. Because readings were taken with all lights on, this means the contribution of all lighting including reflected light meets the criterion.

In summary, both predicted and field verified values objectively indicate compliance with CIE 150:200 for light trespass in E2/LZ2.

Upward Light Ratio

h. This was not part of CIE 150:2003 and not studied by Musco. Following are hand calculations.

i. The Musco LED sports luminaires have no upward light, except for the (8) luminaires used solely for aerial ball illumination.

j. The 8 upward luminaires are 575 watts; the remaining downlight luminaires constitute (38) 1150 watts and (4) 600 watts. Assuming light emissions proportionate to watts, the upward light ratio is 9.1% with aerial ball lights on and 0% with them off. Because aerial ball lights will only be used about 25% of the time, the time weighted average is less than 2%, addressing the intent of CIE 150:2017 for E2.[22]

Glare

k. According to the IES, there are two types of glare: discomfort glare and disability glare[23]. From the measurement points[24], there is no disability glare; glare, if any, is discomfort glare, defined as "…a sensation of annoyance or pain caused by high luminances in the field of view.[25]"

l. There are presently no simple metrics of glare for a complex and dynamic visual scene. There are no meters by which glare can be measured. This is for many reasons, including ambient light, adaptation of the viewer, area of the glare source, intensity of the glare source, location of the glare source in the field of view, spectrum of the glare source, and other factors.

m. The following four factors are known to participate in the perception of discomfort glare:

i. Luminance of the glare source (cd/m^2)
ii. Size if the glare source (m^2)
iii. Position of the glare source in the field of view
iv. Luminance of the background[26]

Computer tools as described in CIE 150:2017 can be used to assess glare potential. However, these predictive computer calculations cannot be field verified.

[22] CIE 150:2017 Table 6.
[23] IES Lighting Handbook, 10th Edition, p 4.28
[24] Sports Lighting CEQA report, James Benya, 6-15-19
[25] IES Lighting Handbook, 10th Edition, p 4.26
[26] Ibid

n. Recognizing the impracticality of making field measurements of glare, CIE 150:2003 employs luminaire intensity (candlepower) in the direction of the viewer as a surrogate, but field measurable, value for glare. CIE 150:2003 sets maximum candlepower values, both pre- and post-curfew, for any luminaire distributing light other than onto the sports field[27]. This is intended to be used when doing calculations to assist engineers in choosing luminaires and in setting their aiming angles. These values can be used for field verification. The process is:

   i. At a measurement point at a distance from the field and lights, set the lux meter in the perpendicular plane[28]. Determine the distance from the meter to each pole group of lights in meters.

   ii. Point the lux meter at each pole[29].

   iii. For E2, divide 7,500 by the distance to the pole in meters squared.

   iv. The design complies if the reading is less than the quotient in step iii.

o. My lux measurements at selected points were presented in my report and are the maximum values as the meter is pointed at various angles in an arc beginning with aimed at the east-most pole (as viewed) to the west-most. [30].

p. I observed no sensation of brightness from the light poles towards the south end of the field. The only poles with potential observable brightness were those located near the north end, at an approximate distance of 65 meters from the observation point. In each case these were from the uplights.

q. In theory, one luminaire of 7,500 cd at a pole 65m away would produce 1.78 lux of illumination. Because no single point exceeded 2.75 lux, and because the measurement included all luminaires on all poles and the reflected light of the entire football field, I deduced that it was virtually impossible for one luminaire to have candlepower in the direction of the measurement point of 1.78 lux.

r. Musco produced a calculation of maximum candlepower calculated at 32 points along the north property line with the single highest calculated point representing a luminaire of 4964 candela, coinciding with my measurement point #1, where I measured 2.36 cd. Assuming all the light at this point was from a single luminaire, its mounting location would have been about 46 meters away, coinciding with the most likely source of offensive light, pole F4.

In summary, both predicted and field verified values objectively indicate compliance with CIE 150:2017 for glare in E2/LZ2.

There was one exception noted in the report: I noted light striking the upper chimney on the house near point 1, where the resident was taking photographs during my measurements. Because the light pattern on the chimney indicated a cutoff line near the eave, there was no evidence of direct light trespass into second story windows. Nonetheless I discussed this with a

[27] CIE 150:2003 Table 2.3 p 10
[28] Typically, vertical plane or within a few degrees thereof for SMHS measurements
[29] Ideally with a shield to prevent light from other poles being received by the meter.
[30] Sports Lighting CEQA report, James Benya, 6-15-19, p 5

Musco representative and was assured that this was caused by one of the uplights. He indicated that the shielding and/or aiming should be adjusted to eliminate it.

Measurement of Light

One commenter claimed that "Illuminance…has no correlation value with the predicted candela value used to quantify glare for that same receiver." I disagree because they are mathematically related:

$E = I \cos \Phi / d2$, also known as the distance squared law

Where

E = illuminance in lux
I = candlepower in candela aimed at the receiver
d = distance from source to receiver in meters
Φ = angle between the ray of light and normal to the plane of the receiver

For field measurements, we assume that the plane of the receiver is perpendicular to the ray of light and that the cosine of the angle from normal (0°) =1. Using this equation and an illuminance meter, one can measure the worst-case illuminance and simply calculate the candlepower if we know the distance. The problem is that, without a filtering method, the measurement will include ALL luminaires and the reflected light from the field in the direction of the meter. Having received a point-by-point calculation of what to expect from Musco and taking this into account, I determined within a reasonable degree of expectation that the calculations were representative of the outcome and that 5000 cd was not exceeded at any point of concern. Since I did not note any reading larger than 3 lux in my measurements, in my opinion there is no source of candlepower towards off site properties exceeding 5000 cd.

Testing and calculations are everything that meets or exceeds what any competent expert would employ to evaluate light related impacts under the circumstances of this project.

Several other comments make unsubstantiated statements that the amount of light is substantial or excessive. Unless commenters measured light levels in excess of measurable CIE 150 criteria using a reasonable scientific protocol with a recently calibrated forensic grade light meter, the claims are subjective.

Lighting Calculations and Measurement

Calculations addressing the criteria established herein, also called photometric studies, were produced by the manufacturer. A commenter states than photometric modeling is not cost prohibitive and I concur. In fact, photometric modeling was provided as part of the RDEIR (Musco calculations). The calculations made ***predictions*** of

- Field illumination in a grid of points in the horizontal plane
- Light trespass at a series of points along property lines of concern in the vertical plane
- Calculations of lighting impact on the stands and area near the field, in the horizontal plane
- Maximum candela of any light at a series of points along property lines

Musco's latest calculations were made addressing the key topographical feature, namely the hillside along the north property line. Page 95/95 of the RDEIR graphically illustrates Musco's calculated maximum candlepower, which is probably the metric over which field measurements were most concerned, and 94/95 shows vertical illuminance of trespass, the second most concerning value. However, calculations make assumptions and field verification measurements are necessary to ensure compliance with criteria.

A commenter states, "The assertions… that glare measurement is too costly, or the sensation of glare is too complex are simply misdirections (sic)– a smokescreen for the District…".

A reasonable summary of the glare calculation methods currently considered by CIE and IES is presented in a white paper prepared by a competitor of Musco[31]. It states:

> "There are many approaches to quantifying discomfort glare, **but with any approach it remains a subjective measurement**." (emphasis added)
>
> And,
>
> "The LRC's method of Discomfort Glare (DG) provides a robust empirical model but requires measurements of a single light at a time, **which may be impractical for field measurements in a large installation like a sporting venue."** (emphasis added)

In summary, the selected criteria, field measurement protocol and presentation of results meet or exceed what any competent expert would employ to evaluate light related impacts under the circumstances of this project.

G. General Response: Hours of Operation

The schedule in the project description of the original EIR limits the hours of operation of sports lighting. This is a mitigation strategy that considers the desired uses of the community of the lighted field versus the interests of surrounding properties. Moreover, it limits the use of uplights for aerial balls to varsity games only. This constitutes less than 25% of the use of the stadium as presented in the RDEIR.

By restricting hours of operation and the number of nights on which programs of any kind are held is the standard method by which communities typically mitigate the impact of high school sports lighting.

H. General Response: Sky Glow

Sky glow is an important topic, sufficiently so to discuss in the context of the impact of the project on it, and methods to control it are part of CIE 150:2017.

When man-made light travels upward (either direct or reflected from the ground or structures), it is scattered by the atmosphere. The scattering effect effectively veils or hides the dimmer parts of the cosmos on clear nights affecting both astronomy and star gazing. Clear sky ASG has forced observatories to be relocated from relatively convenient communities throughout the

[31] Jeff Shuster, Addressing Glare in Solid State Lighting, Ephesus Lighting, January 2014

world to distant locations removed great distances from human activity, such as the mountains of Hawaii and Chile and remote islands like the Canary Islands off western Morocco.

The amount of impact of clear sky ASG is measured by the Bortle Scale[32], which categorizes regional ASG based on the relative impact. The Bortle Scale has 9 increments, with a scale of 1 representing a perfect, unimpacted sky and 9 representing an inner-city sky in which even the brightest stars are hard to see.

ASG can impact the night sky more than 100 miles from a contributing light source[33]. In the Bay Area, the clear sky Bortle Scale values range from levels as high as 9 over San Francisco to as low as 2 or 3 in Marin near Pt. Reyes. The US 101 corridor is mostly between 4 and 6 around Novato and Petaluma, indicating rural-suburban transition skies along the western edge becoming increasingly impacted above the cities. In my report[34], I indicated that most of Marin was Bortle 5 – and will now clarify and amplify that reference. The Bortle Scale was introduced to explain that SMHS is not in a pristine location. The radiance map based on VIIRS 2019 data indicates light pollution in the San Marin district to be consistent with the closer-in neighborhoods throughout Novato, with more sky glow than Pleasant Valley, Marin Highlands or Novato Heights. The darkness of western Marin is offset by the sky glow contribution of the Bay Area and especially the 101 Corridor in Marin, and the cities of Novato and Petaluma. Most Bortle Scale maps available online show that the immediate area near SMHS is in the range of 4.5, meaning a suburban sky bordering on rural, and that Bortle value and similar values (between 4.0 and 5.0) are present throughout the immediate area near SMHS. The borders between scale values are not distinct, and the exact value is not material as the difference to the human eye of a half step is not readily recognized.

The critical concern about ASG is whether lighting is aimed downwards, or whether light is wasted directly into the sky. The lighting at SMHS is as dark sky friendly as possible. With the exception of the aerial ball lights, all the light is fully shielded and downward aimed. According to the International Dark Sky Association, this is the primary means to prevent light pollution.

The aerial ball lights allow the lighting to be fully shielded. See L-1 and L-2, attached. Conventional sports lighting causes uplighting to illuminate both the field and the sky above, but cause glare to adjacent properties and low angle uplight. Fully shielded sports lights prevent glare and light trespass, but don't illuminate aerial balls. Carefully aimed uplights, aimed well above the horizontal, create a cone of uplight over the field and their glare is not visible. Except for varsity football games, uplights will be off, which means that uplights will be on about 1.5% of the nighttime hours in each year, which makes their impact less than significant.

Cloudy sky ASG is much different. Upward light is reflected downwards by clouds. The impact varies depending on cloud height and density. The marine layer that regularly impacts parts of Marin causes the clouds to glow, sometimes brightly, especially over the more light-polluted areas. Because of the extreme variability of cloudy sky ASG such as altitude, density, etc. there is no scale such as Bortle. On the night on which my report measurements were taken, there were dense clouds over Novato and Petaluma, each city having a distinctive glow over it. Because the SMHS sports lighting is almost completely downward aimed, some brightness of the

[32] http://www.darkskiesawareness.org/nomogram.php
[33] https://www.skyandtelescope.com/astronomy-resources/everything-you-ever-wanted-to-know-about-light-pollution/
[34] Sports Lighting CEQA report, James Benya, 6-15-19, p 5

overhead clouds was apparent but not as bright as the sky over the US 101 corridor to the east or the City of Petaluma to the north.

I. General Response: General Aesthetics (involving lighting)

Commenters expressed concerns about the overall impact of the lights. There is no denying that when turned on, the lighting is noticeable. However, the lighting meets or betters all national and international standards for controlling lighting impacts on neighbors and the night sky.

Commenters also expressed concerns about light poles. As described under E., above, the number, location and height of poles is selected to minimize or prevent light impacts on the environment. Any compromise would have prevented the lighting system from meeting the criteria for Lighting Zone E2/LZ2.

J. Responses to Individual Comments

The topics of comment letters and their authors follow this paper. They have been limited to comments related to lighting and then numbered sequentially and each separate issue raised by the commenter, if more than one, has been assigned a number. The responses to each comment identify first the number of the comment letter, and then the number assigned to each issue (Response 1.1, for example, indicates that the response is for the first lighting issue raised in comment Letter 1).

Letter 2 Coalition to Save Marin, Michael Joly

2.2 Factual error re: Bortle Values. General Response H.

2.5 Lighting Zone argument. General Response C.

2.6 Measurement point argument. General Response F.

Additional comment: The distance squared law states that light levels will diminish as the square of the distance from the light source. In simple terms, light from the stadium, including reflected light from the field surface and structures, will not be greater at distances greater than the measurement point. Because of its size, the reflected light from the stadium may not vary inversely to the square of the distance, but it will diminish. The measurement points were purposely chosen to exhibit higher light level readings than would be experienced at the property line or on any private property, since all the property lines were beyond the meter relative to the stadium.

Additional comment: measurements were taken with a recently calibrated Minolta T-1, which is a forensic grade light meter and is typically used in forensic field measurements.

2.8 Impact argument. General Response F.

Additional comment: To be clear, the CIE:150 criteria from the RDEIR were met and in fact met the criteria for the next lower lighting zone, E2.

2.9 General argument opposing the lighting, based on history and other factors. General Response I.

2.10 Noticeable light on upper levels of nearby structures attributed to aerial ball uplights. General Response F (last paragraph)

2.19 Measurement protocol argument. General Response F.

2.24 Same as 2.19.

2.27 Alternate light level issue. General Response E. Additional Comment 1.13a. The best alternative design is in place.

Letter 8 Cassandra Green

8.1 Inadequate review and assessment of light pollution. General Responses A-I.

Letter 9 Coalition to Save Marin, Michael Graf

9.1 Incomplete lighting analysis. General Responses A-I.

Additional comment: The comment is not supported by what the commenter believes would constitute a complete lighting analysis. Commenter offered a series of paragraphs constituting an opinion as to why the lighting analysis and photometric study is inadequate without explaining what in his opinion is adequate. Commenter demands "receptors" not consistent with the standards being used. I maintain that design calculations confirmed by field measurements meets or exceeds what any competent expert would employ to evaluate light related impacts under the circumstances of this project.

9.2 As 9.1.

9.3 As 9.1

9.4 As 9.1

9.5 As 9.1

9.6 General Response H

9.7 General Response H. Also: with the exception of the aerial ball uplights, all the lighting is fully shielded. Full shielding is the first principle of minimizing sky glow.

9.8 As 9.7

9.9 General Responses A-I.

9.10 General Response E.

9.11 General Responses A-I.

Letter 12 Paul LaPerriere

12.1 General Response E.

Letter 15 Kenneth Levin

15.9 As 9.1

15.10 As 15.9. Additional comment: commenter calls for additional testing but does not offer what kind of testing.

15.18 A photometric study was performed by the manufacturer and the results were field verified. General Responses B, C, and D.

15.19 General Response D. Photographs are always subjective and are not valuable material for evaluation of complex and technical subject such as lighting. This is why CIE criteria were used to make objective evaluations.

15.20 General Response D. The distance squared law ensures that at the northwest property line west of the first measurement point, that light levels caused by the sports lighting will be sufficiently diminished by distance to fall below the selected trespass criterion.

15.21 Answered by 15.20 and 15.19.

15.22 As 15.19.

15.23 General Response F.

15.24 General Response H. Also: commenter conflates clear sky glow and cloudy sky glow, two entirely different phenomena. The Project lighting will not contribute significantly to the clear sky glow because it is fully shielded, except for the 8 aerial ball lights operating less than 1.3% of the annual nighttime hours, making impact to sky glow less than insignificant.

15.25 General Response H.

15.26 General Responses A-I. Also: the reason that national and international standards addressing lighting impacts exist is that they provide objective criteria developed by scientific standards development organizations. Subjective assessments are not relevant to evaluate the objective criteria established in the RDEIR.

15.27 No further comment[35].

15.28 No further comment.

15.29 No further comment.

15.30 No further comment.

15.31 General Response A, B.

15.32 As 15.31.

15.33 No further comment.

15.34 General Responses B-F.

15.35 General Responses B-F.

15.36 No further comment.

15.37 A final photometric study was made by Musco, but the results would be meaningless without field verification. The design calculations were in fact confirmed by field measurements that meet or exceed what any competent expert would employ to evaluate light related impacts under the circumstances of this project.

15.38 No further comment.

15.39 No further comment.

[35] This phrase is used to revert back to the master response list comment.

15.40 General response F, ***Upward Light Ratio***. Moreover, the uplights are only being used a fraction of the night operating time of the stadium. On cloudy nights, the impact of the aerial ball lights will be noticeable but difficult to measure on the ground because the light reflected from the cloud includes the impact of streetlights, commercial lights, residential lights and all lighting at the high school. The uplights will only operate about 1.5% of all nighttime hours, and assuming the luminaires are adjusted to prevent visible uplight at adjacent homes, they will have no effect when on.

15.41 No further comment.

15.42 No further comment.

15.43 General Responses A-I.

15.44 As 15.41.

15.45 As 15.41.

15.46 As 15.33.

15.47 As 15.40.

15.48 No further comment.

15.49 No further comment.

15.50 General Responses A-I. As 15.19.

15.51 General Response D.

15.52 No further comment.

15.53 As 15.19.

15.63 General Responses A-I.

15.64 Uplights as 15.40. Timing: the project as described in the original EIR has a curfew of 10:00 PM for games which includes field lights off at 9:45 PM. Lights are off earlier, typically 8:30 pm when used other nights, with a total of 154 nights per year. This means that lights will only operate a total of about 6% of nighttime hours per year.

15.72 As 15.63.

15.84 As 15.63.

15.90 As 15.63.

15.91 As 15.63.

15.92 General Responses A-I. Also: the most damaging avian impact is upward lighting, such as for the twin towers of light in New York and the lighting of skyscrapers and bridge towers. These are known to cause birds to fly in circles until falling from the sky. That type of lighting has candlepower over 1,000,000 times that of the aerial ball uplights.

15.94 As 15.63.

15.96 As 15.63.

15.101 As 15.92 and General Responses A-I. The impact to avians will be less than significant because most of the lighting is downward and shielded.

15.103 Comparison to major league sports lighting is not made; high school football lighting is much lower and much better controlled.

15.104 General Response H.

15.105 General Responses A-I.

15.107 General Responses A-I.

15.108 As 15.50.

15.109 No further comment.

15.110 General Response A-I.

15.111 As 15.40

15.112 No further comment

15.113 General Response A-I, and as 15.18., 15.37.

15.114 General Response A-I.

15.115 As 15.114.

15.116 As 15.114.

15.117 As 15.114.

15.118 As 15.114.

15.119 No further comment

15.120 General response F. As per the general response, glare is a function of location of source, location of viewer, viewing direction, source luminance in the direction of the viewer, source dimensions, background luminance and other factors. For instance, directly viewing a car's high beam from 10 feet away on axis will be significantly worse in terms of glare than viewing any sports luminaire from off-site.

15.121 General Response F.

15.122 General Response F.

15.123 The maximum intensity value for E2/LZ2 is 5000 cd. The project design calculations and all field measurements confirm that this criterion is not exceeded

15.124 Previous comment asked and answered. See General Responses A-I.

15.125 As 15.124

15.126 As 15.124

15.127 As 15.124 and 15.50.

15.128 General Response A-I.

15.129 As 15.124.

15.130 As 15.124.

15.131 As 15.124

15.132 As 15.124

15.133 As 15.124

15.134 As 15.124

15.135 As 15.123.

15.136 As 15.123

15.137 As 15.40

15.138 As 15.24.

15.139 As 15.24 and General Response H

15.140 No further comment.

Letter 16 Marc Papineau

16.2. General response C.

16.3. General responses B, C, D and F.

16.4. General response F and as 15.40.

16.5. General responses B, C, D, and F.

16.6. As 16.4.

16.7. General responses B, C, D and F.

16.8. General responses F and H.

16.9. As 16.5.

16.10. General response H.

16.11. General Responses A-I. Other than the aerial ball uplights, there is no glare from stadium lights visible from vistas above the stadium. The aerial ball uplights are only used for football games, a total of about 1.5% of all nighttime hours per year.

16.12. General Responses A-I. The International lighting metrics selected as criteria are more technically competent and complete for this situation. FHA considerations primarily involve roadway lighting.

16.13. As 16.12.

16.14. No further comment

16.15. As 16.2-16.13.

Letter 18 Larry Scheibel

18.4. General Responses A-I.

18.5. As 18.4.

18.6. As 18.4, 15.92 and 15.101.

18.7. General Responses A, B and C. Additional comment: the intent of lighting zones is regional, not street by street or trail by trail.

18.8. As 18.4, 16.11 and 15.101.

18.10. As 15.50.

18.11. As 15.50.

18.12. General responses A, B, and C.

18.13. As 15.92.

18.14. General response F. Additional comment: the trespass measurements include the indirect lighting from the field and all surfaces and still betters the criteria.

18.15. General responses A – I.

18.16. General response H.

18.17. No further comment.

18.18. No further comment.

18.19. General response E.

18.20. As 18.17.

18.21. General responses A-I.

18.22. General response. Additional comment: footballs are brown colored, with an approximate reflectance of 15-20%, while soccer and lacrosse balls are generally white with the reflectance of 80-85%. Reflected light from the field as well as lower trajectories make uplight not necessary for competitive soccer or lacrosse.

18.23. No further comment.

18.24. General Responses A and F. As explained, measurements were taken closer to the field to ensure that trespassing light would be less, and in addition, I was neither granted permission to go on private property nor were arrangements made. Commenter observed my taking measurements and if he really wanted to know how much light was trespassing into his bedroom window, he could have asked me.

18.25. General response F. Also similar to 18.22.

18.26. General responses A-I.

18.27. General response H. Also 15.24 and 15.40.

18.28. General response H.

18.29. No further comment.

18.30. No further comment.

18.31. No further comment.

18.32. General responses A, B, F.

18.33. No further comment.

18.34. No further comment.

18.35. General response A-I.

18.36. No further comment.

18.37. Not applicable[36].

18.38. No further comment.

18.39. No further comment.

18.40. General Response D.

18.41. General responses A-I.

18.42. Not applicable.

18.43. As 18.41.

18.44. Not applicable.

18.45. General response F. Additional comment: Light level readings can be made by anyone and light meters with acceptable calibration can be purchased for under $300. However, from my experience the accuracy of such meters is limited to a minimum of 1 lux, with readings of 1/10th of a lux being questionable. For such low-level measurements, a calibrated field meter with an additional digit of full accuracy is needed and cautious reading protocol must be followed.

18.46. General response F. Additional comment: due to the aerial-ball uplights, there is a possibility of higher readings than those taken at levels unreachable without access to the property and a tall ladder. At 5' above ground level, it is almost impossible for lighting levels to be more than 5 lux because (a) they are further away and the distance squared law will apply and (b) the full shielding of the downlights ensures that the most powerful lights cannot spill light beyond the school property in that direction.

18.47. General response F. Proof not provided.

18.48. As 18.47.

18.49. Not applicable.

18.50. No further comment.

[36] Not applicable to lighting, no further comment on other potential impacts.

18.51. The human eye adapts to the ambient light. Adaptation is constantly ongoing. Moreover, the human eye has a total range of about 10^{-4} lux to 10^{5} lux[37], but its contrast ratio is about $10^{4.}$ The eye constantly adapts to the general ambient light level and areas below the range are not visible, and above the range are glare. For instance, in a movie theater the adaptation level is around 1 footcandle, so once adapted someone in the theater can comfortably view objects illuminated at .1 lux or above and does experience glare until an object is 100 lux or more. Then stepping outside on a sunny day (after an adaptation period that increases with age) the new range becomes 100 to 100,000 lux. This clearly explains why when entering a theater, one is temporarily blind because most of the room is 10 lux or less, and when leaving and stepping outside, temporarily suffers disability glare until once again adapting. Because of adaptation, it is difficult for even an experienced and educated expert to ascertain light levels. Therefore, comparisons of the lighting of the football field to any other common experience, e.g. oil rig, are not useful without considerable care and fair assessment of context.

18.52. No further comment.

18.53. As 18.52.

18.54. Wildlife habitat is impacted by any change, including construction and many human activities. Because the light is almost entirely confined to the stadium and because of reduced operating hours, lighting known to significantly disrupt wildlife is not created by this project.

18.55. Migratory birds are mostly affected by powerful lights shining skyward. See 15.92.

18.56. General responses B, C, D, and F.

18.57. Commenter offers no proof.

18.58. General Responses B and C.

18.59. General response F.

18.60. General response F.

18.61. As 18.15.

18.62. General response F and comment 18.24 response.

18.63. No further comment.

18.64. As 18.46.

18.65. General Responses A-F.

18.66. As 18.41

[37] Technically, this explanation should be expressed in object luminance, which is expressed in candelas per meter squared (cd/m2), aka nits. However, given the relatively esoteric and complex nature of nits, I've chosen to explain the phenomenon using illuminance, which is measured in lux.

18.67. As 18.65.

18.68. Calculations are predictions based on the exact data used in the calculation. Minor differences caused by topography, mounting location, aiming location, product manufacturing tolerances, and natural affects such as dirt, animal behavior (e.g. bird excrement), human behavior (especially ball contact), light source age, light source voltage, and a host of other reasons can result in measured values different from predicted. Understanding response 18.51 permits professional judgment to be used in some cases, but in this case the criteria are considered sacrosanct. Therefore, the measured condition is all that matters and was used to confirm compliance with the criteria.

18.69. See 18.68. Because calculated glare values do not represent the actual completed lighting conditions, the glare metric from CIE 150:2003 was used because it can be field measured. General responses A, B, C and F.

18.70. General response H. Clear sky glow will not be impacted by the lighting system. A modest increase in cloudy sky glow may occur.

18.71. General responses A-I. Additional comment: I made it clear several times that we should only use field measurable quantities and chose the CIE 150 criteria from either version that best allowed for field measurements. Also see 18.68.

18.72. As 15.19 and 15.50.

K. Commentary

Typical sports lighting, employed for over 100 years, always creates an impact on the community. In attachments L-1 and L-2 the reason is explained: the poor optical control of legacy bulbous light sources causes light to be emitted onto adjoining properties and up into the sky. Historically, light pollution was inevitable, and at other schools I have regularly measured light trespass 100 times the highest value I found at SMHS.

San Marin High School's lighting system is an innovative new technology. The Musco Sports Lighting LED system employs superior optical properties that prevent upward light, off-site light trespass, and off-site glare. I have personally reviewed and measured the on-field performance and off-field impacts and the inherent mitigation of this system many times since its first-generation prototype in 2011. Its performance sets a new worldwide standard for sports lighting with an absolute minimum of environmental impact. This is the first high school football field that I have seen using it. It currently has no competition in terms of its superior mitigation and prevention of off-site impacts to the environment and to adjoining properties.

James R Benya, PE, FIES, FIALD

BENYA BURNETT CONSULTANCY

Davis, CA

jbenya@benyaburnett.com

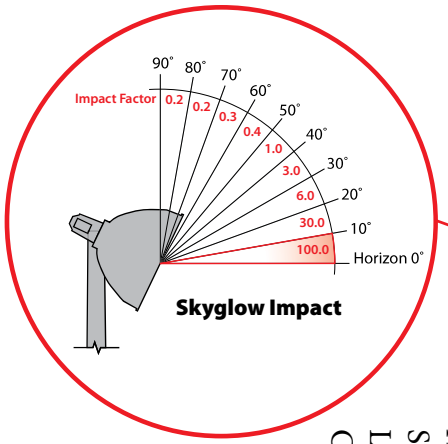
Skyglow Impact

For more information see C. Walker, C. Luginbuhl, R. Wainscoat. (2009). Lighting and Astronomy. Physics Today, Vol. 62, Issue 12

Skyglow is caused by upward light scattered by dust and molecules in the atmosphere.

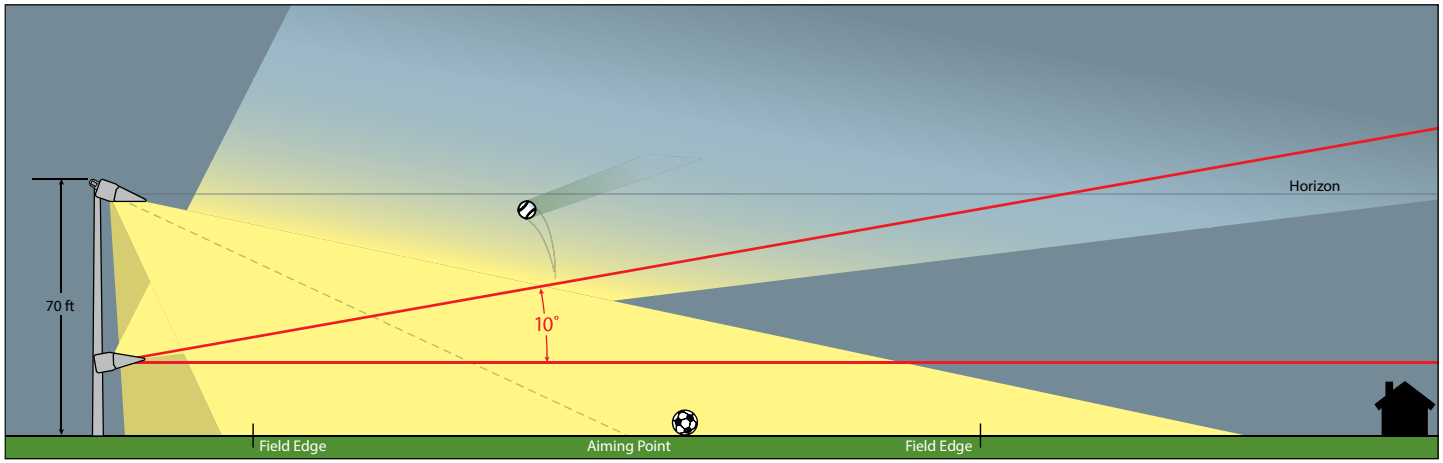
Light emitted in a horizontal direction, at or above the horizon (0–10˚) impacts skyglow by a factor of 100. It also travels through the atmosphere at greater distances.

Light emitted in a vertical direction, i.e. straight up, has a greater chance of escaping the atmosphere without scattering.



As installed at SMHS

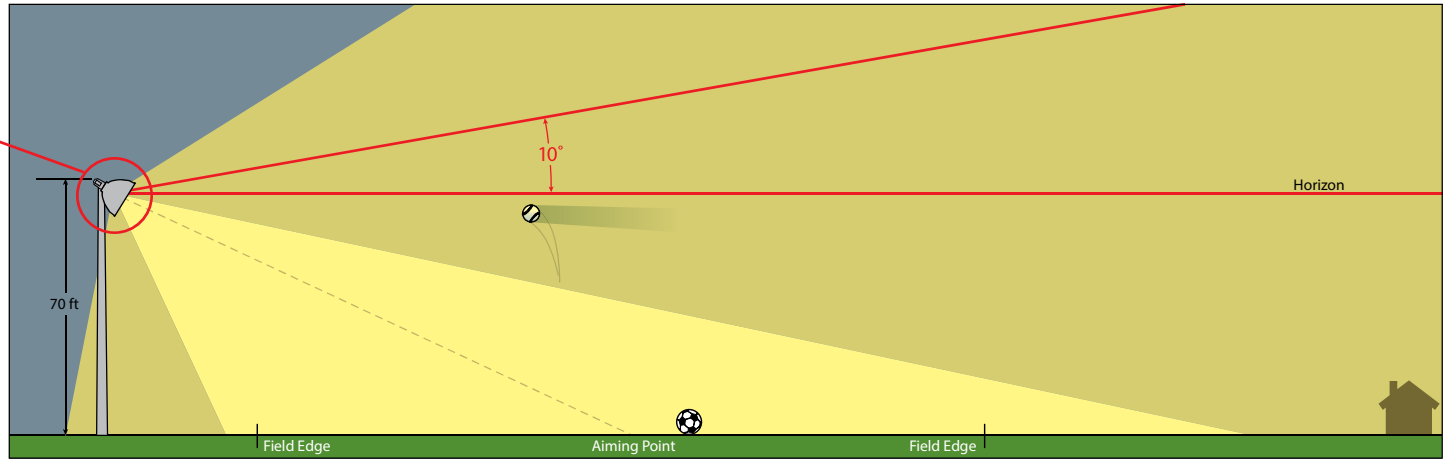
Total Light Control — TLC for LED™ with BallTracker™ technology



- Very little light emitted in critical 0–10˚ angle above horizon
- Limited light emitted in an upward direction by one BallTracker fixture per pole
- Patents pending

Typical High School Football lighting

Typical HID or LED floodlighting



- All fixtures emit light in critical 0–10˚ angle above horizon, causing greater skyglow
- 400+% more skyglow than TLC for LED with BallTracker technology

Light Intensity

Full field of play — Dark sky

Attachment L1
SMHS RDEIR
Lighting Response to Comments

Sky Glow Impact Study – Executive Summary

Prepared by Robert Clear for Musco Lighting

22-June-17

In October 2016, Musco Lighting introduced TLC for LED™. This product line included luminaires intended for recreational sports applications, which were designed to "Improve Field Playability", while effectively negating the light trespass impact on adjacent properties. The primary luminaire utilized for recreational fields is "Full Cutoff". As applied, there are no lumens emitted above 80 degrees above nadir. This concept works well for ground level played sports. However, where aerial lighting is needed (i.e. Baseball, Football, etc…), Improved Playability would not be realized without additional light going skyward. Research on how to address this issue, without losing the light trespass desire, as well as, minimizing negative sky glow effects, resulted in a Patent Pending solution. BallTracker™ technology effectively illuminates the object being viewed (ball), without creating the lighting nuisances closely associated with the lighting of aerial sports.

A study was conducted looking at a 300' radius baseball field lighted to Class III levels (50/30 fc). The field was evaluated based on two separate design solutions:

1. Metal Halide (MH)
2. TLC for LED™ with BallTracker™

For the evaluation process, Musco hired a third party consultant (Robert Clear) to compare the listed designs. He modeled the sky glow contribution based on *Physics Today (2009), Volume 62, Issue 12, Lighting and Astronomy, C. Walker, C. Luginbuhl, R Wainscoat.* Lighting calculations, photometric reports, aiming summaries and lighting layouts were given to Robert for each of the above design solutions.

Robert also looked at a couple of other evaluation metrics utilized for Sky Glow calculations. All of his findings are included in the attached excel spreadsheet titled, *Sky Glow – Executive Summary – Data*.

Musco has also created an illustration, showing the difference between "Typical HID" and TLC for LED™ with BallTracker™. (See attached – *Environmental Sensitivity*)

Results found the Typical HID had 400% more contribution to sky glow than the TLC for LED™ with BallTracker™ solution.

Attachment L-2 SMHS RDEIR

Note: Dr. Robert Clear is a staff scientist at LBNL Berkeley

6.2 Responses to Individual Comments on the Draft EIR

The comment letters and responses follow. The comment letters have been numbered sequentially and each separate issue raised by the commenter, if more than one, has been assigned a number. The responses to each comment identify first the number of the comment letter, and then the number assigned to each issue (Response 1.1, for example, indicates that the response is for the first issue raised in comment Letter 1).

Thrive Athletic Consulting, LLC
4715 NW Kahneeta Drive
Portland, OR. 97229

Letter 1

November 19, 2017

Novato Unified School District
1015 7th St
Novato, CA 94945

Re: Field Lights and Practices at San Marin High

Dear Novato Unified School District,

I was hired by the Coalition to Save San Marin to evaluate the practicality of practicing sports during the winter months at San Marin High without the use of field lights.

I have 35 years of interscholastic and intercollegiate coaching and athletic administration experience in the Pacific Northwest. I am currently the district athletic director in Redmond, OR. I am in midst of completing my Ph.D. in Sport Pedagogy and Character Education from the University of Idaho. I have earned the highest possible certification for high school athletic directors from the National Interscholastic Athletic Administrators Association (NIAAA) earning my Certified Master Athletic Administrator designation (CMAA).

Through my company, Thrive Athletic Consulting LLC, I have been providing consulting services to high school athletic directors for the last five years. During that time I have traveled to fifteen states to lecture, consult and work high school athletic directors on a variety of projects. I have, additionally, written extensively for national magazines on issues facing athletic administrators.

In all my travels throughout the USA and Canada, I am unaware of any high school, community college or small college that practices consistently to the 100 day mark as you suggested you are discussing. In Oregon and Washington, two states with less evening light than California, the only night practices requiring lights that I am aware of happen early in the fall prior to night football games being played. Friday night football games under the lights are a normal part of high school athletics in most communities that I have visited or worked in. Practices, on the other hand on a nightly basis, are not. In the communities where I have served as an athletic administrator, practicing at night with lights would be prohibited by school districts as inappropriate. If attempted by any school, using field lights for practices, would meet with strong resistance from parents, community members, school boards, teachers and city officials.

I have reviewed the geography (using Google Earth), photographs sent to me by the Coalition to Save San Marin and studies prepared for Novato Unified by its consultants. After reviewing these and other materials it is my professional opinion that practice time could be utilized in a variety of ways to minimize the need for lighted practices. I suggest the following:

- One or two teams practicing prior to school starting each day.
- Use of all fields (baseball, softball, practice fields, main field) to minimize or eliminate the need for night practices on the all weather field.
- Development of an athletic period or 7th period where practices could begin earlier than the current 3:45 time slot currently taking place.
- Use of fields at neighboring schools (elementary, middle school/junior high school or even the fields at the nearby community college as needed.
- Practice time could be limited to force coaches to become more focused on their technique, tactics and fitness. Practicing for 90 minutes is an adequate amount of time to warm-up, develop skills, increase fitness and warm-down.
- "Stacking" practices each night (one after each other) would not be allowed in the Pacific Northwest as there would be an outcry related to the challenges of being a true student-athlete. Late night practices do not support the value of education for participants and significantly cuts into quality family time our athletes need at home.

I am available to help your athletic department work out a first class practice and sports program that does not require the use of lights for practices.

I am attaching a suggested field use schedule as well for your consideration.

Sincerely,

Kevin M. Bryant, CMAA
President

Kevin Bryant - August

August will be flexible based on daily doubles and start and end times.
Lights would not be necessary. Heat would be a concern regarding practices and times. .
No lights would be needed for August practice times.

Jamboree or scrimmage game late in August would be permissible.

The following schedule does not assume that a 7th period would be in place for the coming year, 2018-19. These times would be helped significantly with a 7th or athletic period on the last period of the day.

Kevin Bryant - September

Game times would need to be established. Obviously not weekly but every other week on either Friday or Saturday.

JV game times could be played and push the Varsity to the upper baseball field for practice.

Baseball and softball fields would not be used during this period of time.

			September			
Stadium Field	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
2:00 PM			V Football			
2:30 PM			V Football			
3:00 PM			V Football			
3:30 PM	V Football	V Football	V Football	V Football	V Football/Game?	
4:00 PM	V Football	V Football	V Football	V Football	V Football/Game?	
4:30 PM	V Football	V Football	V Football	V Football	V Football/Game?	
5:00 PM	V Football	V Football	V Football	V Football	V Football/Game?	
5:30 PM	Practice ends	Practice ends	Practice ends	Practice ends	V Football/Game?	
6:00 PM					Game?	Game?
6:30 PM					Game?	Game?
7:00 PM					Game?	Game?
7:30 PM					Game?	Game?
8:00 PM					Game?	Game?
8:30 PM					Game?	Game?

Upper Baseball	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
2:00 PM			JV Football			
2:30 PM			JV Football			
3:00 PM			JV Football			
3:30 PM	JV Football	JV Football	JV Football	JV Football	JV Football	
4:00 PM	JV Football	JV Football	JV Football	JV Football	JV Football	
4:30 PM	JV Football	JV Football	JV Football	JV Football	JV Football	
5:00 PM	JV Football	JV Football	JV Football	JV Football	JV Football	
5:30 PM	Practice end	Practice ends	Practice ends	Practice ends	Practice ends	
6:00 PM						
6:30 PM						
7:00 PM						
7:30 PM						
8:00 PM						
8:30 PM						

Kevin Bryant - October

As soccer begins it's preseason work outs the softball/baseball outfield and/or the upper baseball field could begin to be utilized.

Varsity FB using lights for games only. Off campus soccer facility could be utilized in lieu of baseball and softball fields.

Varsity boys and girls soccer could utlize the Stadium Field facility on Fridays or Saturdays as available without lights.

October

Stadium Field	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
2:00 PM			V Football			Game?
2:30 PM			V Football			Game?
3:00 PM			V Football			Game?
3:30 PM	V Football	V Football	V Football	V Football	V Football/Game?	Game?
4:00 PM	V Football	V Football	V Football	V Football	V Football/Game?	Game?
4:30 PM	V Football	V Football	V Football	V Football	V Football/Game?	Game?
5:00 PM	V Football	V Football	V Football	V Football	V Football/Game?	Game?
5:30 PM	Practice ends	Practice ends	Practice ends	Practice ends	V Football/Game?	Game?
6:00 PM					Game?	Game?
6:30 PM					Game?	Game?
7:00 PM					Game?	Game?
7:30 PM					Game?	Game?
8:00 PM					Game?	Game?
8:30 PM					Game?	Game?

Upper Baseball	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
2:00 PM			JV Football			
2:30 PM			JV Football			
3:00 PM			JV Football			
3:30 PM	JV Football	JV Football	JV Football	JV Football	JV Football	
4:00 PM	JV Football	JV Football	JV Football	JV Football	JV Football	
4:30 PM	JV Football	JV Football	JV Football	JV Football	JV Football	
5:00 PM	JV Football	JV Football	JV Football	JV Football	JV Football	
5:30 PM	Practice end	Practice ends	Practice ends	Practice ends	Practice ends	
6:00 PM						
6:30 PM						
7:00 PM						
7:30 PM						
8:00 PM						
8:30 PM						

Kevin Bryant - November

Varsity football would continue to have the priority through playoffs. Boys and Girls varsity soccer would take over from there.

As JV football ends, JV soccer would begin utilzing Upper Baseball field on a daily basis until over then they would inhabit the stadium field.

Soccer practices begin as football ends and take over the use of the stadium field

Care must be taken to assure that girls and boys soccer share similar facilties each day of practice to assure equity.

			November			
Stadium Field	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
2:00 PM			V BG Soccer			Game?
2:30 PM			V BG Soccer			Game?
3:00 PM			V BG Soccer			Game?
3:30 PM	V BG Soccer	V BG Soccer	V BG Soccer	V BG Soccer	V BG Soccer	Game?
4:00 PM	V BG Soccer	V BG Soccer	V BG Soccer	V BG Soccer	V BG Soccer	Game?
4:30 PM	V BG Soccer	V BG Soccer	V BG Soccer	V BG Soccer	V BG Soccer	Game?
5:00 PM	V BG Soccer	V BG Soccer	V BG Soccer	V BG Soccer	V BG Soccer	Game?
5:30 PM	Practice ends	Practice ends	Practice ends	Practice ends	V/JV BG Soccer	Game?
6:00 PM						
6:30 PM						
7:00 PM						
7:30 PM						
8:00 PM						
8:30 PM						

Upper Baseball	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
2:00 PM			JV BG Soccer			
2:30 PM			JV BG Soccer			
3:00 PM			JV BG Soccer			
3:30 PM	JV BG Soccer	JV BG Soccer	JV BG Soccer	JV BG Soccer	JV BG Soccer	
4:00 PM	JV BG Soccer	JV BG Soccer	JV BG Soccer	JV BG Soccer	JV BG Soccer	
4:30 PM	JV BG Soccer	JV BG Soccer	JV BG Soccer	JV BG Soccer	JV BG Soccer	
5:00 PM	JV BG Soccer	JV BG Soccer	JV BG Soccer	JV BG Soccer	JV BG Soccer	
5:30 PM	Practice end	Practice ends	Practice ends	Practice ends	Practice ends	
6:00 PM						
6:30 PM						
7:00 PM						
7:30 PM						
8:00 PM						
8:30 PM						

Kevin Bryant - December

As seasons progress and Lacrosse begins the baseball and softball outfields could be utilized as well the upper baseball field on JV soccer game days.

This schedule assumes that when boys are home, girls are away and vice versa.

			December			
Stadium Field	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
2:00 PM			V BG Soccer			Soccer Games
2:30 PM		Soccer Games	V BG Soccer	Soccer Games		Soccer Games
3:00 PM		Soccer Games	V BG Soccer	Soccer Games		Soccer Games
3:30 PM	V BG Soccer	Soccer Games	V BG Soccer	Soccer Games	V BG Soccer	Soccer Games
4:00 PM	V BG Soccer	Soccer Games	V BG Soccer	Soccer Games	V BG Soccer	Soccer Games
4:30 PM	V BG Soccer	Soccer Games	V BG Soccer	Soccer Games	V BG Soccer	Soccer Games
5:00 PM	V BG Soccer	Soccer Games	V BG Soccer	Soccer Games	V BG Soccer	Soccer Games
5:30 PM	Practice ends	Soccer Games	Practice ends	Soccer Games	V/JV BG Soccer	Soccer Games
6:00 PM						
6:30 PM						
7:00 PM						
7:30 PM						
8:00 PM						
8:30 PM						

Upper Baseball	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
2:00 PM			JV BG Soccer			
2:30 PM			JV BG Soccer			
3:00 PM			JV BG Soccer			
3:30 PM	JV BG Soccer		JV BG Soccer		JV BG Soccer	
4:00 PM	JV BG Soccer	**Game on**	JV BG Soccer	**Game on**	JV BG Soccer	**Game on**
4:30 PM	JV BG Soccer	**Stadium Field**	JV BG Soccer	**Stadium Field**	JV BG Soccer	**Stadium Field**
5:00 PM	JV BG Soccer		JV BG Soccer		JV BG Soccer	
5:30 PM	Practice end		Practice ends		Practice ends	

Kevin Bryant - January

As seasons progress and Lacrosse begins the baseball and softball outfields could be utilized as well the upper baseball field on JV soccer game days. This schedule assumes that when boys are home, girls are away and vice versa.

			January			
Stadium Field	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
2:00 PM			V BG Soccer			Soccer Games
2:30 PM		Soccer Games	V BG Soccer	Soccer Games		Soccer Games
3:00 PM		Soccer Games	V BG Soccer	Soccer Games		Soccer Games
3:30 PM	V BG Soccer	Soccer Games	V BG Soccer	Soccer Games	V BG Soccer	Soccer Games
4:00 PM	V BG Soccer	Soccer Games	V BG Soccer	Soccer Games	V BG Soccer	Soccer Games
4:30 PM	V BG Soccer	Soccer Games	V BG Soccer	Soccer Games	V BG Soccer	Soccer Games
5:00 PM	V BG Soccer	Soccer Games	V BG Soccer	Soccer Games	V BG Soccer	Soccer Games
5:30 PM	Practice ends	Soccer Games	Practice ends	Soccer Games	V/JV BG Soccer	Soccer Games
6:00 PM						
6:30 PM						
7:00 PM						
7:30 PM						
8:00 PM						
8:30 PM						

Upper Baseball	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
2:00 PM			JV BG Soccer			
2:30 PM			JV BG Soccer			
3:00 PM			JV BG Soccer			
3:30 PM	JV BG Soccer		JV BG Soccer		JV BG Soccer	
4:00 PM	JV BG Soccer	**Game on Stadium Field**	JV BG Soccer	**Game on Stadium Field**	JV BG Soccer	**Game on Stadium Field**
4:30 PM	JV BG Soccer		JV BG Soccer		JV BG Soccer	
5:00 PM	JV BG Soccer		JV BG Soccer		JV BG Soccer	
5:30 PM	Practice end		Practice ends		Practice ends	

Kevin Bryant - February

soccer ends but would maintain priority use through playoffs

Spring sports begin later in the month and would need to transition to track and lacrosse use.

Baseball and softball would utilize their own fields with lacrosse splitting use on the stadium field and upper baseball

			February			
Stadium Field	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
2:00 PM						B/G Lacrosse
2:30 PM						B/G Lacrosse
3:00 PM						B/G Lacrosse
3:30 PM	Track/Field	Track/Field	Track/Field	Track/Field	Track/Field	B/G Lacrosse
4:00 PM	Track/Field	Track/Field	Track/Field	Track/Field	Track/Field	B/G Lacrosse
4:30 PM	Track/Field	Track/Field	Track/Field	Track/Field	Track/Field	B/G Lacrosse
5:00 PM	Track/Field	Track/Field	Track/Field	Track/Field	Track/Field	B/G Lacrosse
5:30 PM	Track/Field	Track/Field	Track/Field	Track/Field	Track/Field	B/G Lacrosse
6:00 PM						
6:30 PM						
7:00 PM						
7:30 PM						
8:00 PM						
8:30 PM						

Upper Baseball	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
2:00 PM			JV Baseball			Lacrosse
2:30 PM			JV Baseball			Lacrosse
3:00 PM			JV Baseball			Lacrosse
3:30 PM	JV Baseball	JV Baseball	JV Baseball	JV Baseball	JV Baseball	Lacrosse
4:00 PM	JV Baseball	JV Baseball	Lacrosse	JV Baseball	JV Baseball	Lacrosse
4:30 PM	JV Baseball	JV Baseball	Lacrosse	JV Baseball	JV Baseball	Lacrosse
5:00 PM	JV Baseball	JV Baseball	Lacrosse	JV Baseball	JV Baseball	Lacrosse
5:30 PM	Practice end	Practice ends	Practice ends	Practice Ends	Practice ends	Practice ends

Kevin Bryant - March

As light grows fields can be utilized for lengthening times.

With the number of participants, speed of balls and other track implements there is not safe way to host practices for both track/field and lacrosse on the stadium field at the same time.

Baseball and softball would continue to utilize their individual facilities

			March			
Stadium Field	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
2:00 PM						B/G Lacrosse
2:30 PM						B/G Lacrosse
3:00 PM						B/G Lacrosse
3:30 PM	Track/Field	Track/Field	Lacrosse Match	Track/Field	Track/Field	B/G Lacrosse
4:00 PM	Track/Field	Track/Field	Lacrosse Match	Track/Field	Track/Field	B/G Lacrosse
4:30 PM	Track/Field	Track/Field	Lacrosse Match	Track/Field	Track/Field	B/G Lacrosse
5:00 PM	Track/Field	Track/Field	Lacrosse Match	Track/Field	Track/Field	B/G Lacrosse
5:30 PM	Lacrosse	Lacrosse	Lacrosse Match	Lacrosse	Lacrosse	B/G Lacrosse
6:00 PM	Lacrosse	Lacrosse	Lacrosse Match	Lacrosse	Lacrosse	Lacrosse
6:30 PM	Lacrosse	Lacrosse	Lacrosse Match	Lacrosse	Lacrosse	Lacrosse
7:00 PM	Lacrosse	Lacrosse	Lacrosse Match	Lacrosse	Lacrosse	Lacrosse
7:30 PM						Lacrosse
8:00 PM						
8:30 PM						

Upper Baseball	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
2:00 PM			JV Baseball			Lacrosse
2:30 PM			JV Baseball			Lacrosse
3:00 PM			JV Baseball			Lacrosse
3:30 PM	JV Baseball	JV Baseball	JV Baseball	JV Baseball	JV Baseball	Lacrosse
4:00 PM	JV Baseball	JV Baseball	Lacrosse	JV Baseball	JV Baseball	Lacrosse
4:30 PM	JV Baseball	JV Baseball	Lacrosse	JV Baseball	JV Baseball	Lacrosse
5:00 PM	JV Baseball	JV Baseball	Lacrosse	JV Baseball	JV Baseball	Lacrosse
5:30 PM	Lacrosse	Lacrosse	Lacrosse	Lacrosse	Lacrosse	Lacrosse
6:00 PM	Lacrosse	Lacrosse	Lacrosse	Lacrosse	Lacrosse	Lacrosse
7:00 PM	Lacrosse	Lacrosse	Lacrosse	Lacrosse	Lacrosse	Lacrosse

Kevin Bryant - April

Baseball and softball continue to utlize their own spaces.

Again, as light continues to grow more facilty can be used for a longer period during the day.

			April			
Stadium Field	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
2:00 PM						B/G Lacrosse
2:30 PM						B/G Lacrosse
3:00 PM						B/G Lacrosse
3:30 PM	Track/Field	Track/Field	Lacrosse Match	Track/Field	Track/Field	B/G Lacrosse
4:00 PM	Track/Field	Track/Field	Lacrosse Match	Track/Field	Track/Field	B/G Lacrosse
4:30 PM	Track/Field	Track/Field	Lacrosse Match	Track/Field	Track/Field	B/G Lacrosse
5:00 PM	Track/Field	Track/Field	Lacrosse Match	Track/Field	Track/Field	B/G Lacrosse
5:30 PM	Lacrosse	Lacrosse	Lacrosse Match	Lacrosse	Lacrosse	B/G Lacrosse
6:00 PM	Lacrosse	Lacrosse	Lacrosse Match	Lacrosse	Lacrosse	Lacrosse
6:30 PM	Lacrosse	Lacrosse	Lacrosse Match	Lacrosse	Lacrosse	Lacrosse
7:00 PM	Lacrosse	Lacrosse	Lacrosse Match	Lacrosse	Lacrosse	Lacrosse
7:30 PM	Lacrosse	Lacrosse		Lacrosse	Lacrosse	Lacrosse
8:00 PM						
8:30 PM						

Upper Baseball	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
2:00 PM			JV Baseball			Lacrosse
2:30 PM			JV Baseball			Lacrosse
3:00 PM			JV Baseball			Lacrosse
3:30 PM	JV Baseball	JV Baseball	JV Baseball	JV Baseball	JV Baseball	Lacrosse
4:00 PM	JV Baseball	JV Baseball	Lacrosse	JV Baseball	JV Baseball	Lacrosse
4:30 PM	JV Baseball	JV Baseball	Lacrosse	JV Baseball	JV Baseball	Lacrosse
5:00 PM	JV Baseball	JV Baseball	Lacrosse	JV Baseball	JV Baseball	Lacrosse
5:30 PM	Lacrosse	Lacrosse	Lacrosse	Lacrosse	Lacrosse	Lacrosse
6:00 PM	Lacrosse	Lacrosse	Lacrosse	Lacrosse	Lacrosse	Lacrosse
7:00 PM	Lacrosse	Lacrosse	Lacrosse	Lacrosse	Lacrosse	Lacrosse
7:30 PM	Lacrosse	Lacrosse	Lacrosse	Lacrosse	Lacrosse	Lacrosse

Kevin Bryant - May

As district and state playoffs continue then the stadium field could be changed in use to summer/spring football.
However, track and lacrosse would remain as in season sports with priority use
until such time as they are finished competing for the season.

May

Stadium Field	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
2:00 PM						B/G Lacrosse
2:30 PM						B/G Lacrosse
3:00 PM						B/G Lacrosse
3:30 PM	Track/Field	Track/Field	Lacrosse Match	Track/Field	Track/Field	B/G Lacrosse
4:00 PM	Track/Field	Track/Field	Lacrosse Match	Track/Field	Track/Field	B/G Lacrosse
4:30 PM	Track/Field	Track/Field	Lacrosse Match	Track/Field	Track/Field	B/G Lacrosse
5:00 PM	Track/Field	Track/Field	Lacrosse Match	Track/Field	Track/Field	B/G Lacrosse
5:30 PM	Lacrosse	Lacrosse	Lacrosse Match	Lacrosse	Lacrosse	B/G Lacrosse
6:00 PM	Lacrosse	Lacrosse	Lacrosse Match	Lacrosse	Lacrosse	Lacrosse
6:30 PM	Lacrosse	Lacrosse	Lacrosse Match	Lacrosse	Lacrosse	Lacrosse
7:00 PM	Spring Football	Spring Football	Spring Football	Spring Football	Spring Football	Lacrosse
7:30 PM	Spring Football	Spring Football	Spring Football	Spring Football	Spring Football	Lacrosse
8:00 PM	Spring Football	Spring Football	Spring Football	Spring Football	Spring Football	
8:30 PM	Spring Football	Spring Football	Spring Football	Spring Football	Spring Football	

Upper Baseball	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
2:00 PM			JV Baseball			Lacrosse
2:30 PM			JV Baseball			Lacrosse
3:00 PM			JV Baseball			Lacrosse
3:30 PM	JV Baseball	JV Baseball	JV Baseball	JV Baseball	JV Baseball	Lacrosse
4:00 PM	JV Baseball	JV Baseball	Lacrosse	JV Baseball	JV Baseball	Lacrosse
4:30 PM	JV Baseball	JV Baseball	Lacrosse	JV Baseball	JV Baseball	Lacrosse
5:00 PM	JV Baseball	JV Baseball	Lacrosse	JV Baseball	JV Baseball	Lacrosse
5:30 PM	Lacrosse	Lacrosse	Lacrosse	Lacrosse	Lacrosse	Lacrosse
6:00 PM	Lacrosse	Lacrosse	Lacrosse	Lacrosse	Lacrosse	Lacrosse
7:00 PM	Lacrosse	Lacrosse	Lacrosse	Lacrosse	Lacrosse	Lacrosse

Letter 1

COMMENTER: Kevin Bryant

DATE: November 19, 2017

Response 1

The commenter suggests ways to structure San Marin High School athletics program practices and games to reduce the need for stadium lighting. These suggestions are acknowledged. However, they do not refer to, challenge, or question the analysis or conclusions of the Draft Revised EIR, and therefore do not require a specific response.

Only one significant and unavoidable impact was identified in the originally circulated EIR and the Revised Draft EIR, related to noise from varsity football games. As varsity football games would be a part of the stadium usage even with the commenter's suggested changes, the changes would not reduce the significant and unavoidable impacts of the project. As no other significant impacts have been identified for which mitigation is not available (for example, those related to cultural resources, which would also not be affected by the commenter's suggestions), changes to the program are not warranted.

In addition, the District and San Marin High School Athletic programs staff has reviewed the commenter's suggestions in the context of the specific needs of San Marin High School's athletic programming and found that many of them would be infeasible. For example:

- "One or two teams practicing prior to school starting each day." NUSD's Board has adopted a policy stating that students should not start school prior to 8:00 a.m. for academic and other reasons.
- "Use of all fields (baseball, softball, practice fields, main field) to minimize or eliminate the need for night practices on the all weather field." The rain during the winter months in Marin County would make these fields unplayable for much of the winter. In addition, soccer would damage both the baseball and softball fields. The maintenance requirements of properly maintaining these fields for safety would be substantial and would make this infeasible. Finally, every soccer game played in on a turf field, and only being able to practice on grass, would put students at a competitive disadvantage.
- "Development of an athletic period or 7th period where practices could begin earlier than the current 3:45 time slot currently taking place." In the STEM program at San Main High School, many students are already taking seven full periods.
- "Use of fields at neighboring schools (elementary, middle school/junior high school or even the fields at the nearby community college as needed." This is problematic for the same reasons as stated above regarding use of turf fields.
- "Practice time could be limited to force coaches to become more focused on their technique, tactics and fitness. Practicing for 90 minutes is an adequate amount of time to warm-up, develop skills, increase fitness and warm-down." A 90-minute practice would not allow for a full practice. For example, the sun sets on Monday, December 2, at 4:51 p.m.; school is over at 3:19 pm. That would give students two minutes to get from class to the field in order to get in 90 minutes of practice prior to the sun setting.
- "'Stacking' practices each night (one after each other) would not be allowed in the Pacific Northwest as there would be an outcry related to the challenges of being a true student athlete. Late night practices do not support the value of education for participants and significantly cuts into quality family time our athletes need at home." On the contrary, stacking practices is common practice in high schools in America. It is not uncommon for basketball players to have practice starting at 7:00 p.m. I believe even the school that Kevin works at "stacks" their basketball practice.

Coalition to Save San Marin

Novato, CA 94945

Letter 2

Dear NUSD Board of Trustees,

Page 10 of the Court's 1/30/2019 ruling confirmed "when the informational requirements of CEQA are not complied with an agency has failed to proceed in 'a manner required bylaw' & has therefore abused its discretion".

The NUSD 7/24/2019 Revised EIR (SEIR) fails in its sufficiency as a CEQA required public information document for the following reasons: 2.1

1) Page 1 Sect 1.1 wrongly interprets/characterizes the Court's 1/30/2019 writ saying "to desist from operations of the project until the revised EIR is certified". Only the Court can allow operation of the stadium project by changing its writ. NUSD Trustee certification of its SEIR is not the governing factor since NUSD has "abused its discretion" under CEQA by its legally flawed original EIR requiring this court mandated revision.

2) Page 7 paragraph 5 states a factual error:"The entirety of Marin County is Bortle Class 5". That is simply not true. 2.2

3) Page 7 discusses NUSD's 53094 invoked exemption is only allowed by a court ruling which is not settled law by the California Supreme Court. The wide latitude of the NUSD 53094 exemption from normal city, county & local ordinance highlights the essential need of CEQA & court review to assure full environmental review. On 1/30/2019 NUSD's CEQA required EIR was found lacking by the Marin Superior Court & I believe the Court may well find NUSD's 7/24/2019 revised EIR equally lacking. 2.3

4) Page 7: NUSD 53094 exemption does not exempt NUSD from the laws of trespass to our neighboring property & personal enjoyment rights. The author has been a "good supportive neighbor" for 36 years but NUSD's unilateral change of 51 years of diurnal land use to expand into night time extended use using their 53094 exemption to allow stadium effects trespass beyond their baseline property footprint forced us to seek court protection of an insufficient EIR CEQA process. Neighbor property & privacy protection is at the heart of a proper EIR which NUSD has failed to do. We had hoped respect for non-violation of neighbors would be a stated Project Objective at San Marin but only user project objectives were highlighted & protected. 2.4

5) The EIR on page 9 says the CIE 150 protocol has an E1 - E4 range. The Marin Open Space immediately around the project stadium is likely E1 rather than the blended E2 categor used making light trespass/glare & sky glow more curtailed. Page 30 line 22 of the court's 1/30/19 writ is clear: "The extensive open spaces & unlit hillsides that form a substantial boundary along the south, west & northwest edges of the project site" does not use a "one size fits all " approach when describing the environmental setting. This SEIR itself says "...due to its proximity to a substantial open space area...[San Marin High School is] "unique among the school district's campuses" yet this school district has chosen this very campus to light up with 44 additional light & sound poles, 8 of which at 80' tall are unlike any other lighting structure in this area and that was after this school district's earlier build out of multiple large solar panel structures around campus, structures that obstruct & violate hillside/ridgeline private AND public views and they did that by CEQA exemption which makes this EIR's appreciation of this unique campus site baseline seem like lip service rather than environmental understanding. 2.5

6) Page 9 LIGHT IMPACTS further highlights the inadequacy of this EIR by saying: "...the lighting study includes field [only] verification of light trespass from the stadium lighting system" and goes on to say (page 10 paragraph 1) that this field only verification (at 5' height) "represents a worst-case scenario for the most affected properties BUT their Appendix B study & EIR page 72 shows no measurements or analysis at any offsite receptors beyond the campus property lines which begs the question about 2.6

"represents a worst case scenario for the most affected properties". No offsite light trespass, glare or sky glow measurements were shown from their May 6, 2019 field verification test as measured on actual neighboring private properties and on the actual neighboring open space. Also, their EIR pages 17 & 72 (Appendix B) show 16 measurement points but no measuring points along the campus north perimeter of San Ramon Way which street the EIR mentions has properties with full views of the full lighted stadium project & its effects.

7) The EIR repeatedly uses words like "incremental" & "increase" in categorizing added stadium project resources like poles but the visual & environmental effects morph into cumulative effects which is the important event and which are not measuredin this EIR. Common sense would suggest that adding 44 new thicker 30' & huge 80' poles to a baseline (EIR photo 1, page5) of thinner, shorter & many fewer older speaker poles would render use of the word "incremental" as understatement. Baseline had 4 thin field goal posts & a normal flagpole at the western edge of the project footprint. Nothing like these 80' light poles exist nearby. A basically horizontal campus built in the late 1960's to match ranch style homes on San Marin Dr has had its orientation vertically altered & challenged by this new vertical stadium project. The large number of & size of these 44 new poles is not an incremental but a cumulative change of scenic vista views especially against the backdrop of nearby open space like Senior Hill (immediately north of the stadium & other public Mt Burdell trails. For pedestrians & drivers passing the stadium on public viewing sidewalks & roads this newly introduced "parallax effect" of these many new foreground poles moving against a stationary background of scenic hillsides/ridgelines can create a disorienting & confusing visual sensation. 2.7

8) Pages 15-20 AES 3-4 & 5:New Source of Substantial Light/Glare on Night time Views in the Area:

Many of our neighboring residents' personal & photographic experiences of NUSD's May 6,2019 field verification night lights test proved to us that not only WILL this project "result in a substantial increase in lighting on the field relative to baseline conditions but field light spillage & reflection, glare & skyglow on our neighboring properties & Mt Burdell open space like Senior Hill & Dwarf Oak Trail etc. Our experiences did NOT validate Appendix B field analysis. We observed the 5/06 field test from our private properties open to the testers if they'd expressed any interest and from public view places. NUSD did not allow us access to the stadium to see what the testers were seeing.The glare of the upward facing punt/kickoff lights created extreme discomfort which we neighbors cannot & will not live with. It MUST be mitigated please. In the FEIR of May, 2017 noise impacts were measured & shown by NUSD experts at off stadium receptors. Why did NUSD's May, 2019 stadium lights test not continue this test protocol and show/analyze any test data beyond stadium property lines which makes that test deeply flawed? 2.8

9) It is hard to believe & take seriously this EIR as a CEQA information document of a night time stadium lighting project that has NO night time light photographs, only day time photographs. Our group expert's & member's SEIR responses have shown night time photos and we have many more available for Trustee & court review if needed. Please remember this that stadium has never used activity lights in its 51 year history AND in 1 fell swoop our school & neighboring community are going from no night time land use/no lights to as many as 152 days of lights involving hundreds of hours of lights use which for estimation purposes may total 500 light hours/year which is 21 solid days or 3 solid weeks of continuous night light exposure in an historically E1 open space to E2 blended light environment, and there are NO night time test photos or offsite test results offered for public information & decision. That is not what a serious CEQA required information document requires for informed public decision.Our school neighborhood community which has been very school friendly & cohesive is being asked by a 53094 exemption claiming school district to unilaterally change day only land use to day and night time use after 51 years of darkness at a speed metaphor of 0 to 152 miles per hour (# of nights) on a campus "located at the interface between suburban development & open space" (EIR page 4 paragraph 1) and on a school field that the EIR admits is "unique among the school district's campuses" (EIR page 9, paragraph 4). And this is only a few years after multiple hulking solar panel structures with many all night security lights and which obstruct & destroy vital hillside/ridgeline scenic resources were hastily erected by our school district by CEQA exemption! The EIR itself says the following;"...surrounding scenic resources are extremely important to Novato residents. These views provide physical orientation and are integral to the city's character and sense of place." (EIR Section 2.1 paragraph 2, page 3). 2.9

10) IMPACT AES-5 GLARE pages 18-19

The 4 upward facing punt/kickoff lights at a height of 20' on 4 of the 8 80' poles created discomfort glare for us observing neighbors along San Ramon Way, Santa Gabriella Ct and Santa Yorma Ct where sides of houses facing & above the stadium were lit up as were trees & open space. We have photographic evidence from the May 6, 2019 field lights test to show these points. This discomfort glare from these upward facing lights cannot be lived with by us San Ramon Way neighbors and simply must be mitigated. At 5 Santa Yorma Court at an approximate 190' elevation above the stadium, I easily photographed the owner without use of a flash & the side of his home facing the stadium was fully lit up on a test night with only a crescent moon phase. The owner's white basketball hoop backstop in his driveway in front of his home was also lit up and there was light visible on Senior Hill open space behind & above his house. The 4 upward lights are angled up & seemingly unshielded. The fact that these lights will be used for 83 night games is intolerable glare-wise without adequate protective mitigation. EIR page 19 says: "Upward facing lights...would be designed to provide only the minimum amount of illumination necessary to see airborne objects in the stadium" which statement of design intent I believe, but witnessing those north facing 2 upward lights at elevation above the stadium made 3 of us observing neighbors experience discomfort glare - the clear difference between design intent & actual personal experience. I am not a light expert but I did see sides of homes, tree tops, basket ball backstops and open space fields (Senior Hill) lit up by the stadium light effects at elevation perhaps not measured in field verification at 5' height within only stadium boundaries - such clear light trespass may be a combined effect of stadium lights illuminance levels, angling & shielding problems & field light reflection. Whatever the reasons, the effect must be mitigated please. This neighbor impact experience of glare & light trespass from the stadium, which seems not to have been observed by the May 6 2019 field verification testers at 5' measurements, highlights the difference between actual on site community experience versus narrow on field only test results -
the clear difference between experience and testing.

2.10

11) CUMULATIVE IMPACTS

There are multiple cumulative impacts of this stadium project on aesthetics, noise, biologics and of course light.

According to Judge Chernus in his 1/30/2019 writ de-certifying & stopping the San Marin stadium project: "*The term ' "[cumulative impacts refer[s] to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts. " '* (State CEQA Guidelines, § 15355.)

2.11

This night time sports use extends the normal activity impact on our community by our neighboring San Marin High School by 5-7 hours per day for 152 days which is the basic existential cumulative impact of this project. My wife & I have been great school neighbors for 36 years fully supporting the students & the school. Indeed, we are proud our son is a 1999 San Marin graduate who was very active in sports playing baseball & football. We fully appreciate the value of sports & that being a high school neighbor means living with student & parent activity. We do not understand & appreciate this huge new night time burden being mandated on our persons & property by this project, & we resent the 53094 exemption of normal municipal review of this project which this school district has used. Fortunately, that exemption does NOT apply to CEQA which is a state law and our protective court process which is meant to protect minority rights. NUSD accepted the duty of preparing an EIR in full compliance with CEQA, a duty the court has ruled that they abused. Close review of this revised EIR leads this author to believe nothing has changed from the original EIR methodology & deficits using declarative EIR
author opinions masquerading as seeming expert comment with less than CEQA-adequate testing protocols.

2.12

For example EIR page 24 says "...impacts associated with the proposed project would not combine with other projects to cumulatively impact the aesthetics of the area." We take issue with this declarative EIR opinion. Mention has been made of 5 or more huge solar panel structures erected in the last few years in various parts of the campus. Their public viewing obstruction impacts on our scenic hillsides/ridgelines are very significant and become cumulatively enhanced by the large & confusing vertical footprint of this project.

2.13

In Table 3 page 22 of this EIR mention is made of "the 2nd Multi Sport Turf Field" which is planned to convert the large grass upper baseball field area to turf for extended sports use especially during the wet season when grass must be rested. Mention is made of no lighting proposed and no funding approved but we find these comments less than honest because need for turf practice fields is evident in this stadium lights project; we have seen NUSD funding schedules for this new turf field from Measure G bond releases & we were alerted to all this by NUSD's 5/12/2015 Carducci Associates schematic design with egress safety lighting which we all appreciate DSA (Division of School Architects) will mandate for egress safety in the early darkness of late Fall/winter/early Spring. Lead agencies can "spin" disclosure & timing of planned field build out to best suit their agendas as we have seen. Our Coalition has repeatedly asked NUSD for their detailed Master San Marin stadium build out plans so we can review cumulative impacts that will affect our neighboring persons & properties. We have never been shown or given this document. The multiple large solar panel structures on campus are a case in point because they were put up during our Coalition's vigilance of this stadium project and yet even we did not know of their planned erection until they were being put up because it was done by CEQA exemption & although we suspect all legal notice was given, neighbors around the stadium I talked with knew nothing of these structures going up until they were being put up. 2.14

The Cumulative Impacts Section 3.3 Aesthetics says on page 24: "...the proposed lighting & PA systems also would not represent an increase in 'DEVELOPMENT INTENSITY' [my emphasis] in these areas." Our Coalition could use a more detailed & study based explanation of project 'development intensity' from NUSD so we fully understand & appreciate this phrase & concept please. 2.15

Table 5 page 29 "Increase in traffic noise" highlights San Marin Drive traffic noise exceeding thresholds. 2.16
No cumulative stadium traffic, noise & light spill studies on Morningstar Farms immediately across from San Marin High in O'Hair Park was done. Horses are stabled at night at Morningstar Farms and horses are easily disturbed. In fact NO biological impact study was done for animals at Morningstar Farms which is immediately across Novato Blvd from the presently lighted Gary Gates San Marin girls' softball field. 2.17
We believe additional football stadium project lighting and noise are cumulative impacts on Morningstar Farms when added to softball night games' lights & noise & traffic during same time stadium project lighted use. Morningstar Farms lease per the EIR extends into 2022 & can easily be extended as it has been for many years so that part of O'Hair Park must be more studied for cumulative and stand alone stadium project impacts.

12) Appendix A: Revised...Biological Resource Analysis

A biological resource reconnaissance-level site visit was conducted by Rincon Consultants on April 30, 2019. The reconnaissance survey was conducted to provide field verification of project area habitat types and vegetation communities, document plants and animal species observed on-site, assess the potential for the project site to support sensitive species, and determine if the project site provides suitable nesting bird and roosting bat habitat. 2.18

Previous Rincon site biologics were desktop analysis. But still this April 30, 2019 site visit for the revised EIR mandated by the Court was "field verification of project area" ONLY which is a limited methodology. NUSD's May 6, 2019 Benya photometric test was also "field verification" only. Our Coalition lawsuit is premised on off site effects of this stadium project whereas NUSD revised EIR analysis appears only focused on on site field verification unlike their FEIR traffic & noise studies which did look at effects beyond the on site project property lines. 2.19

Our avian expert Daniel Edelstein's FEIR & current SEIR rebuttal letters deal with mandated avian buffer zone analysis which remains missing in Appendix A by Rincon/NUSD. Similar objections of too narrow on site methodologies were raised by the Marin Audubon Society FEIR letter dated January 27, 2017 which we want again to mention in this revised EIR discussion since many of Audubon's issues remain unaddressed by Appendix A. 2.20

The stadium project abuts neighbors' mature landscape properties & is immediately proximate to O'Hair Park and Mt Burdell open space all of which places have a rich abundance & diversity of resident wildlife and tree/plant life which support wildlife. We see plant identifications and mention of incorrect distance to mature trees but we see nothing in Appendix A or this EIR about the effects of night time artificial lights and noise on the complex biological systems of plants & trees both on site and in buffer neighboring zones. If plants & trees are compromised by stadium project effects then the avian & vast other wildlife they support will be compromised. No plant/tree study seems to be in this biological Appendix A which is a glaring omission since plants/trees are obviously "biological". 2.21

I attach below as personal commentary & observation an email dated August 17, 2019 that I received from Jeanie Murphy who owned 255 San Ramon Way for years, which property abuts San Marin campus. Her bat & avian testimony speaks for itself & is supported by bat videos Mrs Murphy provided which we are happy to put into this EIR & court records:

Hello Mike-
All is well in beautiful Capitola. We love our beach walks along Monterey Bay.
Hope all is well with you.

I sent you my videos of the bats. They roosted under our Master bedroom deck.
As for the raptors, there was a pair of hawks who lived in the trees over by the girls soft ball field. They would sit on the soccer goals and watch for gophers.
I had a bird bath and bird feeder in the back yard. I loved watching DOZENS of birds wash and feed morning and evening.

There you have it.
Best of luck.
Jeanie and Steve [Murphy] 2.22

We believe a faulty inadequate Initial Study by Rincon/NUSD of site and buffer zone/surrounding areas has carried through this whole EIR biological resources analysis process to the detriment of a proper CEQA information document and to the possible detriment of birds, wildlife, plants, trees & other biologic systems resident in the stadium area. 2.23

We further believe an inadequate lights test field verification analysis done May 6, 2019 in Appendix B has not measured & analyzed the effects of night time project lighting on our neighborhood especially sensitive open space because the lights test did not measure light trespass, glare & sky glow beyond the field. 2.24

This faultiness is evident in an owl box at the end of Alder Place in the Madera Marin townhouse neighborhood that immediately abuts the stadium project & which owl box is approximately 250 feet from the project, within the 500' EIR & our avian expert's buffer zone for owls/raptors. Mr Chris Turner HOA head & long time resident of Madera Marin told me in conversation August 17, 2019 that he has personal experience of that own box being used by owls for nesting in 2019 and as many previous years as he can remember. Additionally, Mr. Turner said there are other owl boxes in the Madera Marin footprint and that owls actively and have for years actively used these boxes. 2.25

Finally, as mentioned previously it would appear that NO biological impact review of the horses at immediately neighboring Morningside Farm has been offered in this EIR process especially with this stadium project lights & noise cumulative impacts with the lighted Gary Gates girls' softball field which is literally across Novato Blvd from Morningstar Farm. 2.26

13) On page 59 lines 17-21 Judge Chernus wrote in his 1/30/2019 writ:

"The court finds that an adequate range of alternatives should reasonably have included discussion of the reduced lighting system alternative, and its absence did not foster informed decision making. (See Siena Club v. City of Orange (2008) 163 Cal.App.4th 523, 546-547 [the proper range of the alternatives is evaluated on the facts of each case and is governed by the rule of reason].)"

On page 43 of their revised EIR Section 4.6 Alternative 4 Reduced Lighting System Alternative Rincon/NUSD say: 2.27

4.6.1 Description The Reduced Lighting System Alternative would involve the installation of a stadium lighting system with reduced-intensity lighting. As measured in May 2019, the proposed stadium lighting

system generates illuminance reaching 441 lux at the center of the field (Appendix B). This alternative would reduce the lighting level during athletic events for the purpose of minimizing the exposure of residential neighbors to light trespass. 4.6.2 Impact Analysis a. Aesthetics It is assumed that this alternative would involve the installation of stadium lighting fixtures in the same locations as proposed and up to the same maximum height of 80 feet.

The EIR's above assumption is gratuitously self-serving & assumes away the gist of the judge's basic question asking for "discussion of the reduced lighting SYSTEM alternative" not merely "a stadium lighting system with REDUCED INTENSITY LIGHTING" which Rincon incorrectly assumes since that system with reduced intensity lighting "would involve the installation of stadium lighting fixtures in the same locations as proposed and up to the same maximum height of 80 feet". The Judge seems to be questioning NUSD's lighting system architecture not just their intensity lighting. It is a subtle but essential point difference which NUSD misunderstands and accordingly has NOT addressed in this revised EIR in reply to Judge Chernus' challenge. The judge warned NUSD in court & in his writ that NUSD's having built their present 8 large pole system was done at their own risk & expense partly because of a possibly better & smaller alternative.

Sincerely,

Michael H Joly,
Coalition to Save San Marin

Letter 2

COMMENTER: Coalition to Save Marin

DATE: August 23, 2019

Response 2.1

The commenter provides some background on the previous EIR process for the proposed project and states an opinion that the Revised Draft EIR incorrectly summarizes the process by which the District would be allowed to operate the stadium lights.

The commenter also suggests that the Revised Draft EIR is not sufficient to satisfy CEQA. The commenter states that his reasons for this opinion follow; see subsequent responses to this letter, starting with Response 2.1. The District, as lead agency, has made every effort to prepare an EIR that is adequate, complete and a good-faith effort at full disclosure, consistent with CEQA.

Response 2.2

The commenter states an opinion that the statement in the Revised Draft EIR that Marin County is Bortle Class 5 is incorrect. Please also see Master Response: Light and Glare Impacts, Section J, responses to Letter 2.

Response 2.3

The commenter states an opinion that the District's use of Government Code Section 53094 as discussed in the Revised Draft EIR "is not settled law by the California Supreme Court." This opinion is noted but does not relate to the analysis of environmental impacts in the EIR, and therefore a specific response is not required. The commenter further opines that the Revised Draft EIR may be "lacking," but does not provide specific comments on which to base a response. The District, as lead agency, has made every effort to prepare an EIR that is adequate, complete and a good-faith effort at full disclosure, consistent with CEQA.

Response 2.4

The commenter states an opinion that the project would result in "trespass to our neighboring property & personal enjoyment rights," but does not provide specific comments on the Revised Draft EIR on which to base a response.

The commenter states concerns regarding project impacts beyond the boundary of the San Marin High School campus, but omits specific information or analysis on which to base a response. Impacts related to aesthetics, noise, traffic and other off-site impacts are discussed throughout the original and revised EIRs; impacts related to noise were found to be significant and unavoidable, while impacts in other issue areas would be significant but mitigable or less than significant.

The commenter further suggests a project objective of "non-violation of neighbors." This suggestion is noted. The Project Objectives, as contained in the originally-circulated and certified EIR, were not identified by the Court as requiring revision.

Response 2.5

The commenter states an opinion that the open space area "immediately around the project stadium" should be classified as E1 under the CIE lighting zone classifications. However, the open space area is several hundred feet from the stadium lighting area; immediately surrounding land uses include San

Marin Drive, residences along San Ramon Way and Aspen Drive, and other portions of the high school campus. These land uses do not fit the E1 criteria. The project site and immediate surrounding land uses, including the open space area, are described in the original Final EIR, including on pages 29, 35, 36 and 41, and are accurately classified as E2. Please also see Master Response: Light and Glare Impacts, Section J, responses to Letter 2.

Response 2.6

The commenter states disagreement with the methodology used in the field measurements for lighting impacts, in particular the locations from which the measurements were taken. Please Master Response: Light and Glare Impacts, Section J, responses to Letter 2.

Response 2.7

The commenter states concerns regarding the aesthetic impacts of the new light poles, particularly from surround streets. The visual impacts of the new poles against the existing baseline and other pending and approved projects are discussed in sections 2 and 3, respectively, of the Revised Draft EIR. The street with the most prominent view of the light poles is San Marin Drive; the poles are also visible from some residences on San Ramon Way. As discussed under impacts AES-1 and AES-2 in Section 2, *Aesthetics*, although the new light and speaker poles are partially or fully visible to neighboring residences, public streets, and recreational users of open space areas, they are narrow and only occupy a sliver of the overall views through the stadium site. They are partially screened by existing trees adjacent to the project site from many viewpoints, and do not substantially affect views through the stadium site. The mass, materials, architectural style, and surface treatments of the poles are typical of elements commonly seen at sports stadiums and would not, contrary to the commenter's assertion, create a disorienting or confusing visual sensation. Both project-specific and cumulative impacts are less than significant.

Response 2.8

The commenter states an opinion that impacts related to light spillage and reflection, glare and sky glow would be substantial and require mitigation, and disagrees with the results of the field measurements and related analysis in the Revised Draft EIR. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 2.

Response 2.9

The commenter states an opinion that the Revised Draft EIR should have presented night-time photographs to illustrate the effects of the stadium lights. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 2.

Response 2.10

The commenter states concerns regarding impacts from the upward-facing lights that would be used during some games in the stadium, states an opinion that mitigation is required, and suggests that the measurements and analysis in the Revised Draft EIR did not account for impacts higher than five feet above ground level. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 2.

Response 2.11

The commenter states an opinion that the project would result in cumulative impacts related to aesthetics, noise and biological resources, and quotes language from the results of the legal challenge to

the previously circulated EIR. Please see the following responses to the commenter's specific comments regarding cumulative impacts. Cumulative impacts are discussed in Section 3, *Cumulative Impacts*, of the Revised Draft EIR. As discussed therein, cumulative impacts would be less than significant.

Response 2.12

The commenter states opposition to the project and general disagreement with the analysis in the Revised Draft EIR; these comments are noted, but the commenter does not provide information or analysis on which to base a specific response. The District, as lead agency, has made every effort to prepare an EIR that is adequate, complete and a good-faith effort at full disclosure, consistent with CEQA. Please also see Master Response: Light and Glare Impacts, Section J, responses to Letter 2

Response 2.13

The commenter states an opinion that the aesthetic impacts of solar panels on campus are significant. As the solar panels are not part of the proposed project, this comment is not relevant to the Revised Draft EIR. The existing conditions on campus, including the solar panels, are part of the baseline conditions against which aesthetic impacts of the project are reviewed in sections 2 and 3 of the Revised Draft EIR. As discussed therein, impacts would be less than significant. Please also see Master Response: Light and Glare Impacts, Section J, responses to Letter 2.

Response 2.14

The commenter states an opinion that additional lights are planned for the "Second Multi-Sport Turf Field" listed as a cumulative project in Section 3 of the Revised Draft EIR. The commenter cites Measure G bond information and a schematic plan prepared in 2015.

The commenter is incorrect; no lighting is proposed for the second multi-use field. The schematic plan referenced was prepared by members of the public and presented to the District several years ago, but was not prepared at the request of, nor approved by, the District. Although mentioned in the Measure G list of potential projects, funding is not currently allocated for work on the field. No lighting is proposed for this field. Please also see Response 14.1.

Response 2.15

The commenter requests the definition of "development intensity" in the Revised Draft EIR. Because this phrase is not necessary to support the analysis and conclusions of the EIR, and to avoid confusion, it has been deleted from Page 24 of the Final EIR as follows:

> As discussed in Section, *Cumulative Impacts*, proposed and pending development in the City of Novato, and surrounding areas would include at least 151,294 square feet of non-residential development and 328 residential units. In some cases, new cumulative development projects would alter the aesthetic character of the City by introducing larger structures ~~with greater development intensity~~ and/or new or expanded uses. As discussed in Chapter 3, there are no cumulative projects within one mile of the project site, with the exception of new performing arts and STEM classroom buildings and other minor improvements at San Marin High School. Therefore, there are no projects within the viewshed of the project that would substantially affect visual character and quality. Therefore, impacts associated with the proposed project would not combine with other projects to cumulatively impact the aesthetics of the area. ~~Furthermore, the proposed lighting and PA systems also would not represent an increase in development intensity in these areas.~~

Response 2.16

The commenter notes that a cumulative impact analysis was not performed specifically for Morningstar Farms in the Revised Draft EIR. CEQA does not require a cumulative impact analysis for each individual property near a project site. Cumulative impacts are discussed in Section 3 of the Revised Draft EIR; impacts would be less than significant.

Response 2.17

The commenter states an opinion that there would be cumulative impacts to the horses at Morningstar Farms. CEQA does not require an analysis of impacts to domesticated livestock, which are not considered special status species that are afforded local, state or federal protection under CEQA. Special status species are those taxa that are formally listed as endangered or threatened by the federal government (e.g. U.S. Fish and Wildlife Service [USFWS]), pursuant to the Federal Endangered Species Act (FESA) or as endangered, threatened, or rare (for plants only) by the State of California (i.e. California Fish and Game Commission), pursuant to the California Endangered Species Act or the California Native Plant Protection Act. Some species are considered rare (but not formally listed) by resource agencies, organizations with biological interests/expertise (e.g. Audubon Society, CNPS, The Wildlife Society), and the scientific community. Under CEQA, a proposed project would have a significant effect on sensitive biological resources/special status species if the project would "Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFW or USFWS."

Response 2.18

The commenter reiterates the language regarding the purpose of the biological reconnaissance survey and states an opinion that the biological resources field reconnaissance is a limited methodology. The site assessment was not conducted for "field verification of project area" only. As discussed in the Initial Study (Appendix A, Page 2), the reconnaissance-level site assessment was conducted to provide field verification of project area habitat types and vegetation communities, document plants and animal species observed on-site, assess the potential for the project site to support sensitive species and determine if the project site provides suitable nesting bird and roosting bat habitat. This is a common methodology for project sites with substantial previous disturbance or developed settings, in which specific focused or protocol surveys are not required or warranted. The reconnaissance survey does not preclude a complete and appropriate impacts analysis of biological resource on and adjacent to the project site.

Response 2.19

The commenter states an opinion that Revised Draft EIR analysis of lighting impacts only addresses on-site impacts. The commenter is incorrect. Impacts of the stadium lights on neighboring properties are addressed in the EIR, particularly under impacts AES-3 and AES-4 in Section 2, *Aesthetics*. As discussed therein, for example, light trespass at residential property lines would be 2.75 lux at the most. This light level would not exceed the CIE threshold of 5 lux for sites in the E2 zone. Therefore, nearby residences (i.e., off-site receivers) would not be subject to excessive illuminance when stadium lights are in use. Based on the field measurements of light trespass from the proposed stadium lighting system, the project would not generate illuminance on the vertical plane exceeding 5 lux at adjacent residential property lines, and therefore, the stadium lights would not subject off-site residents to excessive discomfort glare. Impacts would be less than significant. Please see also Master Response: Light and Glare Impacts, Section J, responses to Letter 2.

Response 2.20

The commenter questions the methodology of the biological resources analysis. Please refer to responses to Letter 6.

Response 2.21

The commenter states an opinion that a "plant/tree study" is required for the project and that the stadium lights could result in impacts on plants, trees and wildlife. The Biological Resources section included an analysis of impacts to sensitive vegetation communities, and natural vegetation communities that may support special status species. The analysis of impacts to plants and trees would be limited to those plants/trees that would be directly impacted (trimmed or removed) by project activity, and the resulting potential significant impacts to any special status plants, or special status wildlife that would use that habitat. The project did not include removal of natural vegetation communities or individual trees, and as such no further analysis was conducted or required under CEQA. The EIR did address potential impacts to special status wildlife in adjacent areas and concluded less than significant impacts based on the limited periods of use of the stadium lights.

Response 2.22

The commenter provides a neighbor's account of the existence of bats and birds in the project vicinity. The District acknowledges this comment and concurs that bats are known to occur in the project area. As discussed in the Initial Study (Appendix A, pages 2-4), the analysis assumed that native bird and bat species are present in the project area.

Response 2.23

The commenter questions the methodology of the biological resources analysis. The District acknowledges the comment but disagrees that the Initial Study analysis was faulty. The commenter's specific concerns in this regard follow in the subsequent comments; please see the responses below, including responses 2.25 and 2.26. See also responses to Letter 6.

Response 2.24

The commenter states an opinion that the Revised Draft EIR did not address light trespass, glare and sky glow beyond the field. Please see Response 2.19. Please also see Master Response: Light and Glare Impacts.

Response 2.25

The commenter states that there are owl boxes within a "buffer zone" around the project site. The District acknowledges this statement that there may be an owl box located within the 500 buffer of the project site; however, as noted in Appendix A, Page 4, the presence of owl boxes and owls adjacent to the project site was included in the assessment of impacts to biological resources. Those impacts would be restricted to nesting periods, and the project construction activities took place during the months of September through January thereby avoiding the potential for construction-related impacts to nesting birds.

Response 2.26

The commenter states a concern that impacts on horses were not specifically studied in the Revised Draft EIR. Please refer to Response 2.17 above.

Response 2.27

The commenter states an opinion that Alternative 4, Reduced Lighting System Alternative, in Section 4, *Alternatives*, of the Revised Draft EIR, should include a different light pole configuration and/or quantity, in addition to lower intensity lighting. This opinion is noted. As stated in CEQA Guidelines Section 15126.6, "An EIR need not consider every conceivable alternative to a project." In addition, as discussed further on in Section 4, *Alternatives*, of the Revised Draft EIR, it is important to emphasize that further reducing the project's already less than significant light and glare impacts would not achieve a primary CEQA objective for alternatives: to "avoid or substantially lessen any of the significant effects of the project" (CEQA Guidelines Section 15126.6(a)), particularly inasmuch as any reductions that remained useful would be slight. As discussed in Section 2, *Aesthetics*, the project would not cause light trespass exceeding the CIE's threshold of 5 lux in the E2 zone for rural areas. Further reducing light trespass would not alter attainment of this threshold. See also Master Response: Light and Glare Impacts, Section J, responses to Letter 2.

Letter 3

From: James Coyne [mailto:coyne49@comcast.net]
Sent: Sunday, August 4, 2019 8:28 AM
To: Environmental Report <EIR@nusd.org>
Subject: Lights at San Marin

I have lived in Novato for 30 years and drive by San Marin High School every day. My two children graduated from San Marin. I support the lights for the football field. Jim Coyne

Letter 3

COMMENTER: James Coyne

DATE: August 4, 2019

Response 3

The commenter expresses support for the project. This comment is noted. The commenter does not provide comments on the Draft Revised EIR.

Letter 4

Adam Cretti

18 Malaquita, Coto de Caza, CA 92679
949-540-5816, arcretti@hotmail.com

November 24, 2017

Mike Joly
Coalition to Save San Marin
228 San Ramon Way
Novato, CA 94945

Dear Coalition to Save San Marin,

I am writing, at your request, to investigate the practicality of San Marin High utilizing a winter practice schedule that does not require the use of field lights now that soccer is a winter sport. Currently, NUSD believes lights are a necessity because of later school start times and the winterization of soccer.

I am a former San Marin High student athlete and worked professionally as a coach at the high school and college level after graduating from San Marin High. My last coaching job at the high school level was as a sports performance coach for Mater Dei High School in Orange County, a parochial school, with an unrivaled athletic and academic achievement record. I submitted EIR comment letter #24 and my qualifications as an expert in this area were specifically mentioned in Mr. Ken Levin's Final EIR Response Letter dated 05/15/17. Although my EIR comments were dismissed by Rincon as 'opinions,' I believe I have expertise to add to the discussions between the community and the school district.

4.1

I believe San Marin HIgh (SMHS) has an abundant supply of fields and is underutilizing its resources. The upper baseball field (UBF) is the most important underutilized resource.

When I was an SMHS student and athlete, the UBF was a soccer field for both JV and Varsity soccer teams, served as the varsity softball field and the JV baseball field. Moving softball to the Gary Gates field opens significant space for other teams on the remaining fields, including the UBF. I don't see why the UBF field cannot be turned into a lacrosse stadium and soccer field. This field seems ideal for lacrosse as it is far away from other fields and should meet safety halo requirements.

Presuming lacrosse uses the outfield of the UBF then where will baseball practice? JV and Varsity should share the main baseball field and utilize cages for batting practice. JV starts in the cages working on hitting, and varsity starts in the field with pitchers pitching in bullpens. This allows for a more concentrated practice, and the coach can watch several athletes at one time which allows for the more concise development of the athlete with better reps. The upper

baseball field infield can be maintained with a mobile fence to keep balls in the area and to protect baseball players from errant lacrosse balls.

Installing turf on all fields would make them more resistant to the elements with proper drainage and therefore more useable in wet months, however, I suggest an engineering analysis as there are other economic options, other than turf that may be a better fit. A lacrosse field can easily be painted within the boundaries of a soccer pitch. A field can have multiple lines and uses just like a gymnasium floor.

A simple sample schedule for the fields:

Fall (August to Mid-November)

Gary Gates: Dormant

Upper Baseball: Football frosh and JV

Baseball: Dormant

Stadium: Varsity Football

Winter: (Mid-November to Mid-February)

Gary Gates: Dormant

Upper Baseball: JV Soccer boys and girls. Varsity boys and girls will practice there when games are played in the stadium

Baseball: Dormant

Stadium: Varsity Soccer boys and girls (a full field is not necessary for practice)

Spring: (Mid February-May)

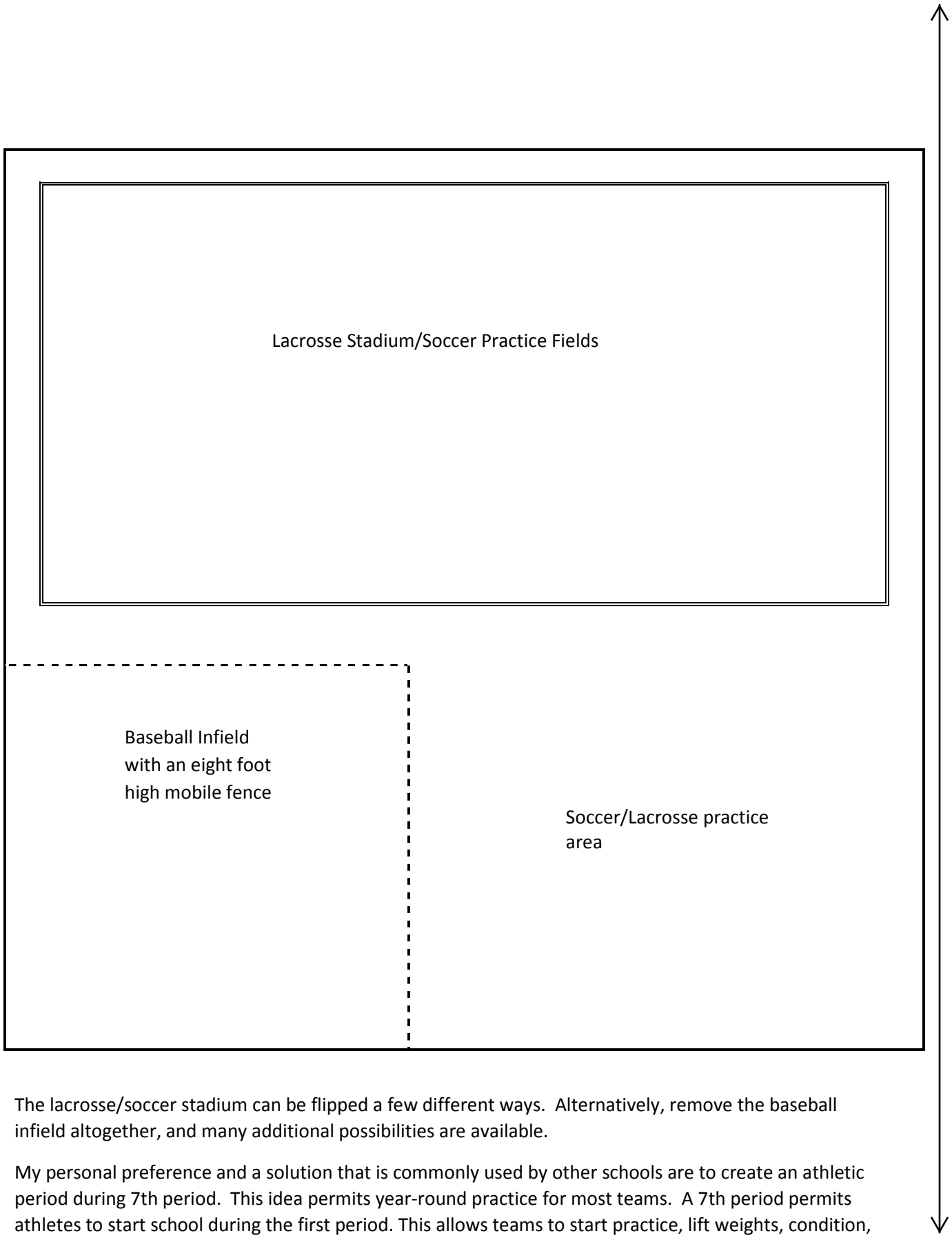
Gary Gates: Softball

Upper Baseball: Varsity and JV Boys and Girls Lacrosse and Baseball infield practice

Baseball: Varsity Baseball

Stadium: Track and Field

Sample field diagram for Upper Baseball Field



The lacrosse/soccer stadium can be flipped a few different ways. Alternatively, remove the baseball infield altogether, and many additional possibilities are available.

My personal preference and a solution that is commonly used by other schools are to create an athletic period during 7th period. This idea permits year-round practice for most teams. A 7th period permits athletes to start school during the first period. This allows teams to start practice, lift weights, condition,

or watch film starting at 2:30 on Monday/Thursday and Friday and at 2 pm on Tuesdays and 1:40 on Wednesdays. Many schools utilize a 7th period, including parochial schools which must include a period for religious instruction. A 7th period permits practices to start earlier, to be held year-round (because it is a class) and causes less disruption when teams must travel for games (because the only class they miss is their athletic class).

Novato Unified School District (NUSD) is capable of establishing an excellent sports program and an excellent practice schedule without the use of lights for practices, even in the winter months. The school district says it wants to be a good neighbor; if this is true it should minimize the impact of lights by agreeing to non-lighted practices and a games schedule that minimizes impacts to neighbors.

4.2

Feel free to contact me, or have NUSD contact me, if I can answer any questions or contribute constructively to the discussions. You have my consent to forward this letter to NUSD.

Sincerely

Adam Cretti

Letter 4

COMMENTER: Adam Cretti

DATE: November 24, 2017

Response 4.1

The commenter suggests ways to structure San Marin High School athletics program practices and games to reduce the need for stadium lighting. These suggestions are acknowledged. However, they do not refer to, challenge, or question the analysis or conclusions of the Draft Revised EIR, and therefore do not require a specific response.

Only one significant and unavoidable impact was identified in the originally circulated EIR and the Revised Draft EIR, related to noise from varsity football games. As varsity football games would be a part of the stadium usage even with the commenter's suggested changes, the changes would not reduce the significant and unavoidable impacts of the project. As no other significant impacts have been identified for which mitigation is not available (for example, those related to cultural resources, which would also not be affected by the commenter's suggestions), changes to the program are not warranted.

In addition, the District and San Marin High School Athletic programs staff has reviewed the commenter's suggestions in the context of the specific needs of San Marin High School's athletic programming and found that many of them would be infeasible. District staff has performed exhaustive analyses on these programs, including practicable adjustments to programming, prior to and after the Board's consideration of the stadium lighting project, and do not deem the speculative comments viable options. See also Response 1.

Response 4.2

The commenter also states an opinion that the District should minimize the impact of lights by agreeing to non-lighted practices and a games schedule that minimizes impacts to neighbors. This comment is noted. As discussed in Section 2, *Aesthetics*, of the Draft Revised EIR, impacts related to lighting would be less than significant. See Response 4.1 for further responses to this comment.

Stadium Lights and 56 San Marin Drive

Letter 5

Jillian Eddy <jillian.eddy56@gmail.com>

Sat 8/24/2019 12:42 PM

To: Environmental Report <EIR@nusd.org>
Cc: mjoly@aol.com <mjoly@aol.com>; segibson@comcast.net <segibson@comcast.net>; jamespetray@comcast.net <jamespetray@comcast.net>; jolyink@gmail.com <jolyink@gmail.com>; edgarcastor@comcast.net <edgarcastor@comcast.net>; Chris Eddy <ceddy@goldenstatelumber.com>; lmcmanus@gryphon.ca <lmcmanus@gryphon.ca>; lawalker1@live.com <lawalker1@live.com>; klevin1011@comcast.net <klevin1011@comcast.net>; lscheibel@comcast.net <lscheibel@comcast.net>

Dear NUSD Board,

I have been a homeowner and good friend to San Marin High School for many years now. Two of my bedroom windows directly face the southeastern poles of the San Marin field. They tower over my home. It's startling really. I defy any of you on the NUSD board to come sit in my home and see what I see. Not one of you on the side of the lights has attempted to understand what you are doing to my home or the home of many, many people who reside near the school.
I'd like you to turn the lights on one evening and come sit in my home. I have never minded the noise from the football games or other events that happen at the field, even when they start as early as 8am on Sunday mornings (Pop Warner), but these lights are not needed and will not make a single bit of difference in the long run to a single child's education. Convenience, yes. But truly helpful to their education? NO! 5.1

The new EIR report has the same fatal flaws as the first one. No one as addressed the traffic, litter or noise pollution of evening events or our rights as neighbors who purchased our homes in a school neighborhood without lights. 5.2

I know this email will be discarded and discounted, as many of have felt from the beginning of this process. 5.3

Sincerely,
Jillian Ottney Eddy
56 San Marin Dr

Letter 5

COMMENTER: Jillian Eddy

DATE: August 24, 2019

Response 5.1

The commenter states concerns regarding aesthetics, including impacts related to the light poles and lighting. These comments are noted. This comment does not relate to the Revised Draft EIR, so a specific response regarding the analysis in the EIR is not possible. Impacts related to aesthetics, including the potential for light pollution, are discussed in Section 2, *Aesthetics*, of the Revised Draft EIR and in Section 3, *Cumulative Impacts*, of the Revised Draft EIR. As discussed therein, impacts would be less than significant. The commenter also states an opinion that the project would not advance educational goals. However, the project's purpose is to advance educational goals, particularly related to athletics; the purposes of the project are discussed in Section 2.0, *Project Description*, of the originally circulated EIR.

Response 5.2

The commenter states an opinion that the Revised Draft EIR does not address traffic, litter or noise. Impacts related to noise are discussed in Section 4.5, *Noise*, of the originally circulated EIR and in Section 3, *Cumulative Impacts*, of the Revised Draft EIR. Impacts related to traffic are discussed in Section 4.6, *Transportation and Traffic*, of the originally circulated EIR and in Section 3, *Cumulative Impacts*, of the Revised Draft EIR. As discussed in those sections, impacts related to these issue areas would be less than significant, except for a significant and unavoidable impact from varsity football game noise. (Litter is not a topic in the Revised Draft EIR.) The commenter does not provide specific information or analysis challenging the discussions or conclusions of the EIR on which to base a more specific response. Nevertheless, this comment is noted. The District, as lead agency, has made every effort to prepare an EIR that is adequate, complete and a good-faith effort at full disclosure, consistent with CEQA.

Response 5.3

The commenter states an opinion that the comments provided will not be taken into account by the District. This comment is noted; however this comment, like all others received on the Draft Revised EIR, will be forwarded to the District's Board of Education for their consideration.

Consulting Biologist For 12 Kingfisher Court 415-382-1827 (Office); 415-246-5404 (iPhone)
The Environmental Consulting Field Novato, CA 94949 danieledelstein@att.net warblerwatch.com

DANIEL EDELSTEIN, ENVIRONMENTAL SCIENTIST & AVIAN BIOLOGIST

August 19, 2019

Letter 6

To: Novato Unified School District Board Of Trustees

Subject: Comment from Consulting Environmental Scientist and Avian Biologist,

1) noting **incomplete#** biological resource assessment method for current Draft Environmental Impact Report (EIR) from Rincon Consultants (Rincon); and

2) **violations#** of CEQA-based biological survey methods by Rincon, per the standard mandate by the Marin County Community Development Agency's for submittal of biological assessment reports/EIRs.

(# = source for comments is from the CEQA guide titled ***Understanding Environmental Impact Assessment: A Layperson's Guide To Environmental Impact Documents And Processes,*** Grassetti Environmental Consulting, 2011.)

To the Board Of Trustees:

As a Marin County-based Certified Wildlife Biologist Asc. & Avian Biologist* who has submitted more than 100 CEQA-related documents, please let me share the following comments related to the San Marin High School light project (Project).

(* = My credentials include 25+ years of experience conducting nesting bird surveys as Avian Biologist. In addition, I am a Certified Wildlife Biologist Asc. with five survey permits from the California Department of Fish and Wildlife (CDFW) and the US Fish and Wildlife Service (USFWS) (permit #101743-0). My bat surveys have also assisted several projects.)

6.1

1. I value your time, so I provide concise thoughts, below.

Especially please note my comments in **bold fact text, below.**

The bold face in **red text** is the most key, imperative comment for you to note, please.

6.2

2. Please note how the current DEIR includes updated information from Rincon.

But it remains **absent** of on-site bird and bat surveys in the **buffer zone,** adjoining areas next to the project site footprint (Site).

Buffer zone survey method protocol, as you may know, means Rincon should have presented in its Initial Study and DEIR

6.3

a) **bird survey results for songbird species within 100 feet of the Site;**
b) **raptor species within 250 to 500 feet of a Site; and**
c) **bat species within 1,000 feet of the Site.**
d)

Rincon did not do these on-site buffer zone surveys during the Initial Study or for the DEIR.

In fact, Rincon admits that it did "desktop surveys" from afar by computer for its Initial Study.

6.3 cont.

Consequently, this procedure is a violation of the typical, normal process by which biological resources should be assesed.

6.4

More specific and related to regulatory, lawful, CEQA compliance, the DEIR remains an incomplete assessment of potential negative impacts upon species protected by several California Department of Fish and Wildlife (CDFW) and, also, US Fish and Wildlife Service (USFWS) code regulations (Regulations).

6.5

2. As you may already know, if a company (e.g., Rincon) omits normal, regular field survey procedures, then the consequence defaults to assuming presence of natural resource species.

Thus, in this case, given Rincon omitted conducting buffer zone field surveys for bird and bat species, it is assumed they are present.

If so, negative impacts upon one or more bird and bat species is assumed to occur — which, as I stated above, means Rincon is violating several existing state and federal Regulations.

6.6

In total, note that CEQA requires mitigation measure implementation in a case such as the above described where omissions have occurred.

See page 25 of the document to which I refer in the subject line above on page one. It states that "Common deficiencies in mitigations include: incomplete of omitted mitigation."

6.7

Indeed, Rincon has omitted conducting the aforementioned bird and bat buffer zone surveys. Consequently, it also was not able to provide mitigation measures based on how omission of the surveys assumes the presence of these species in the buffer zone — and potential negative impacts of the Project upon them.

6.8

Lastly:

a) Please note other submitted comments that sharing videos of bats roosting within the 1,000-foot buffer zone and, also, a Madera Marin nesting owl box that is occupied annually within the 500-foot buffer zone. As a result, the DEIR should add mitigation measures and/or Avoidance Measures to account for these two document wildlife elements present within the buffer zone adjacent to the Site.

6.9

b) Please note the Site lies within a migratory corridor for night-time avian movement, with lights documented to attract songbirds to them, thereby resulting in collision mortality. This proof is based on several research, field studies, including the following sources:
   1. https://abcbirds.org/article/2700-towers-update-lighting-systems-saving-migratory-birds-and-expenses/

   2. http://cescos.fau.edu/observatory/lightpol-Birds.html#HundredsDead-WVHS

6.10

As a result, I believe the potential for negative impacts upon migrating birds at the Site and within 100 feet of the lights could result in mortality incidents. In turn, the Project should be subject an Incidental Take Permit from CDFW to account for any avian deaths upon birds that the Project would incite. 6.11

In summary, given Rincon appears to have violated typical environmental review procedures germane to the CEQA process, I believe it should be required to conduct bird and bat surveys in the buffer zone before the Project is approved. 6.12

Sincerely,

Daniel Edelstein

Daniel Edelstein

Environmental Scientist For CEQA/NEPA Projects

&

Certified Wildlife Biologist Asc.
(valid federal permit #101743-0 from the US Fish & Wildlife Service)

Letter 6

COMMENTER: Daniel Edelstein

DATE: August 19, 2019

Response 6.1

The commenter provides his credentials. The commenter's credentials have been reviewed by the District and are acknowledged.

Response 6.2

The commenter explains the formatting and organization of his comments. This comment is noted; the District has reviewed the comments with this context in mind. The commenter also requests that the District The commenter also states "Please note how the current DEIR includes updated information from Rincon." Please see responses 6.3 through 6.12.

Response 6.3

The commenter states concern regarding survey methodology that was used to evaluate potential impacts to special status species in the Initial Study. As discussed in the Initial Study (Appendix A, Page 2), Rincon conducted a reconnaissance-level site assessment to provide field verification of project area habitat types and vegetation communities, document plants and animal species observed on-site, assess the potential for the project site to support sensitive species and determine if the project site provides suitable nesting bird and roosting bat habitat. The reconnaissance-level site assessment was not intended as a presence/absence survey for birds or a nesting bird/roosting bat survey. CEQA-level analyses are often based on habitat assessments, and do not require focused surveys for non-listed species. The purpose of the reconnaissance survey and habitat assessment is to evaluate the sites potential to support special status biological resources, including migratory birds protected under California Fish and Game Code (CFGC). As stated in the Initial Study, the purpose of the site visit was to document if potentially suitable nesting habitat was present. Results of focused surveys are not specifically required as part of CEQA analysis to evaluate potential impacts. Based on the specifics of the project, it was determined that there was sufficient existing and available information regarding bird and bat occurrences in the region to evaluate potential impacts without conducting additional focused surveys. Industry standards for surveys of non-listed bird and bat species are limited to preconstruction surveys, and there are no requirements for, or agency guidelines that specify, surveys for non-listed species at the environmental review stage. Focused surveys for non-listed nesting birds and maternity roosting bats do not have industry standards or specific agency guidelines regarding survey protocol or survey buffers. Survey buffers are established on project- and/or species-specific bases and are generally consistent with those cited by the commenter; however, as previously stated, surveys would be preconstruction in nature and appropriately timed (nesting season) to ensure impacts are avoided at the time of construction. Analysis of impacts from the proposed project did not require a focused presence/absence survey.

The phrase "desktop surveys" does not appear in the Initial Study. As stated in the Initial Study (Appendix A, Page 2), "In order to determine the potential presence of sensitive species or habitat, Rincon Consultants reviewed regulatory agency databases, conducted a literature review, analyzed aerial imagery, and reviewed the construction plans." Desktop analyses consisting of literature reviews, database searches, and review of aerial imagery and construction plans are routinely conducted as standard practice for all biological resource assessments.

Response 6.4

The commenter states an opinion that Rincon's analysis was a violation of typical, normal processes by which biological resources should be assessed. As stated in Response 6.3, nesting bird and roosting bat presence/absence surveys are not required as part of CEQA analysis to evaluate potential impacts. In fact, focused surveys for non-listed nesting migratory birds are rarely conducted during the environmental review process. Typically, an assessment of potential impacts to non-listed migratory birds is based on a habitat assessment, and if there is potential to impact nesting birds, required mitigation includes preconstruction nesting bird surveys within the project site and appropriate buffer zones only if construction is scheduled to occur during nesting season. The purpose of conducting these surveys immediately prior to construction is to ensure that any active nests present at the time of construction are avoided. Failure to conduct nesting bird and roosting bat presence/absence surveys for CEQA analysis does not constitute a "violation of typical, normal process."

Response 6.5

The commenter states an opinion related to CEQA compliance. The commenter is unclear as to which species protected by CDFW and USFWS code regulations (and which regulations) the commenter is referencing; however, the analysis provided within the Initial Study evaluated potential impacts to known special status species based on the presence of suitable habitat on and adjacent to the project site. Regarding migratory birds and bats, the Initial Study assessed potential impacts to these species, and the commenter provided no substantial contradictory information (beyond noting the absence of surveys that are not typically conducted) to conclude the analysis was insufficient.

Response 6.6

The commenter states an opinion related to consequences under CEQA for omitting regular field survey procedures and asserts that Rincon is violating several existing state and federal regulations. As stated in Response 6.3, presence/absence surveys are not required as part of CEQA analysis to evaluate potential impacts; however, as discussed in the Initial Study (Appendix A, pages 2-4), the analysis did, in fact, assume that native bird and bat species are present in the project area. The commenter is incorrect when stating that if birds or bats are assumed present that "negative impacts upon one or more bird and bat species is assumed to occur." The assumed presence of a species in proximity to a project site does not, in and of itself, constitute a significant impact under CEQA. Once it is determined that a special status species could occur at a project site, an assessment of the potential for impacts to that species from project activity is conducted, the results of which may or may not conclude the potential for significant impacts under CEQA. The potential for impacts to birds and bats was properly evaluated in the Initial Study (see pages 1-5 of Appendix A), based on a review of available information in the context of the project construction and operations and maintenance activity.

Because Rincon is not the lead agency, Rincon cannot have violated state and federal regulations. Furthermore, the District did not violate state or federal regulations, as there are no state or federal regulations requiring buffer zone field surveys for nesting birds and roosting bat species or requiring that negative impacts be identified based on the simple presence or potential for presence of a non-listed species. Because the commenter did not state which specific state and federal regulations they felt were being violated, it is not possible to respond substantively to this comment at this time.

Response 6.7

The commenter states an opinion that mitigation measures are required. Mitigation is not required to address "environmental review omissions;" rather, mitigation measures are to offset potential impacts to a less than significant level under CEQA. In this case, impacts to birds and bats are less than significant

given the relatively minor level of project disturbance, through project design elements (downward facing lights with minimal light trespass) and timing of construction (outside the nesting/roosting season), and no mitigation is required.

Response 6.8

The commenter states an opinion relating to survey method protocol. Refer to Responses 6.3, 6.4, 6.6, and 6.7.

Response 6.9

The commenter refers to other commenters sharing of videos of roosting bats and nesting owls observed in the vicinity of stadium and reiterates the need for the Revised Draft EIR to add mitigation measures to account for the documented wildlife. Mitigation is only required if it is determined that the project would result in significant impacts to biological resources. As explained in responses 6.6 and 6.7, the Initial Study disclosed the presence of birds and bats adjacent to the project area (including the known owl box), evaluated potential impacts to birds and bats, and determined those impacts were not significant. Therefore, mitigation is not required.

Response 6.10

The commenter states an opinion that lights located within migratory corridors attract songbirds resulting in collision mortality and provides links to several articles describing incidents of migratory bird strikes as proof. The referenced studies represent conditions that are fundamentally different from those resulting from the proposed project, and as such are not applicable to the evaluation of potential impacts to birds from project development. The abcbirds.org article referenced in Item 1 of this comment refers to a press release documenting an estimate of yearly migratory bird deaths resulting from collisions with FAA and FCC communication towers. The article states that approximately 7 million migratory birds collide with the 350+ feet tall communications towers and die and that the birds are attracted to and disoriented by the steady-burning red lights on the towers. By contrast, the San Marin High School stadium light towers sit approximately 90-94 feet above grade with narrowly focused, downward-facing lights that are scheduled to operate for no more than approximately 3.75 hours after sunset on the days they are used (152 days/year). The light towers are significantly shorter in height, are not fitted with steady-burning red lights and are downcast as opposed to outwardly displayed. It is not reasonable to assume the stadium light poles would have a comparable effect on migrating birds as those documented in the abcbirds.org article. The Initial Study assessed potential impacts to birds during the operations phase of the project based on similar types of projects in the region (i.e., O.co Coliseum in Oakland, Candlestick Park, AT&T Park and other athletic fields in the Bay Area), bird mortality has not been reported in these cases.

The cescos.fau.edu link referenced in Item 2 of this comment refers to two newspaper articles and one scientific journal article documenting unrelated bird mortality incidents that have occurred over time. Article 1 refers to migratory birds that were found to have become disoriented in foggy conditions and collided with glass widows of a high school building whose lights were left on overnight. The high school was located on a migratory flyway in West Virginia. The incident of bird striking windows with lighting left on inside a school campus is unrelated to the conditions present at San Marin High School where the stadium lights are in an open field located away from school structures and windows.

Article 2 refers to an incident in Kauai where Newell's shearwater fledgling birds were found to have dropped to the ground in exhaustion after circling stadium lights falling prey to domestic cats or vehicles strikes. This is another example with dramatically different conditions from those expected for the proposed project, and referring to a species of bird that does not occur on the mainland United States.

Newell's shearwater are endemic to the Hawaiian Islands with their main colonies located on Kauai. San Marin High School stadium is located within a larger region containing significant urban and suburban areas with abundant night lighting throughout the region, unlike the conditions found on Kauai. The project is designed so that lights are directed downward and are scheduled to remain on no more than 3.75 hours each night they are used.

Article 3 refers the effects artificial night lighting had on the "dawn song" of forest-feeding songbirds. Dawn songs refer to the first songs males sing at or before dawn used to attract females during the breeding season. The study found that males located near steady-burning street lights began singing dawn songs 105 – 145 minutes before dawn as opposed to the normal 45 – 67 minutes before dawn that males in unlit areas began singing. San Marin High School stadium lights would not affect dawn songs of breeding songbirds since lights would be off by no later than 10:00 PM on the nights they are in use. Therefore, there is no similarity or correlation with conditions present at San Marin High School that would lead to similar conclusions.

Response 6.11

The commenter restates his concern that the project will have negative impacts upon migrating birds and that the project should be subject to an Incidental Take Permit from CDFW to account for any project-related mortality to birds. Refer to Responses 6.3, 6.4, 6.5, 6.6, 6.7 and 6.9 above. Incidental Take Permits for state listed species are issued by CDFW for species listed as threatened or endangered under the California Endangered Species Act (CESA). Take authorization for species listed as threatened or endangered or candidate species under the federal Endangered Species Act (ESA) are authorized by USFWS through a Biological Opinion (under Section 7) or Habitat Conservation Plan (under Section 10). In neither situation can a lead agency dictate that a take permit be issued, as this is outside of their regulatory authority. Take authorization is not required for impacts to non-listed species. As described above, the potential for impacts to birds and bats was properly evaluated in the Initial Study (see pages 1-5 of Appendix A), based on a review of available information in the context of the project construction and operations and maintenance activity.

Response 6.12

The commenter restates his opinion that Rincon appears to have violated typical environmental review procedures germane to CEQA. Refer to responses 6.4, 6.5, 6.6 and 6.7 above.

Letter 7

From: Michael Giannini [mailto:mikegiannini@comcast.net]
Sent: Tuesday, August 20, 2019 5:52 PM
To: Environmental Report <EIR@nusd.org>
Subject: Comments on Revised EIR - San Marin Lights Project

The revised EIR does not present an accurate analysis of the following areas/sections:

Project Impacts and Mitigation Measures

Impact AES-1 and AES-2

This section states that the impacts to scenic vistas would be less than significant. In reality, the photos included in the draft document do not accurately depict the impacts on scenic vistas. Specifically, please note the attached photos that show how the light poles do indeed have a very substantial impact on views/vistas. These photos are representative of multiple vistas as observed from San Felipe Way.

7.1

7.1
Cont.

Regarding cumulative impacts. The revised draft EIR fails to include the potential for new traffic control mechanisms at the corner of San Marin Dr. and Novato Blvd. There is an on-going effort to modify that intersection which would have a significant impact on the traffic flow in the area. This is not addressed in the draft and speaks to the inadequacy of the current document. 7.2

Mike Giannini
257 San Felipe Way

Letter 7

COMMENTER: Michael Giannini

DATE: August 20, 2019

Response 7.1

The commenter states an opinion that the photographs included in the Revised Draft EIR do not accurately depict the project's impacts on scenic vistas and presents photographs of the light poles as viewed from San Felipe Way. The photographs show the light poles against a backdrop of hillsides beyond the San Marin High School campus. They are an accurate depiction from that angle, under the prevailing lighting conditions. They are, thus, broadly representative of the visual impact of the light poles. It is infeasible and not a reasonable inquiry to provide photographs from every possible vantage point, in every kind of condition in order to provide a fair and accurate visual representation. Interpretations of visual impacts are inherently subjective; however, the purpose of this report is to provide adequate information to the Governing Board to make its judgments, which these photos accomplish.

The Revised Draft EIR in Section 2, *Aesthetics*, includes photographs of the light poles from several angles, including from public streets and the Dwarf Oak Trail. The analysis concludes that, although the light and speaker poles affect views of scenic resources from local residences and parks, the narrow light and speaker poles only occupy a sliver of the overall views through the stadium site from the perspective of nearby streets, residences and parks. In addition, the approximately 15 to 35-foot tall egress lighting and speaker poles are similar to poles that were on the stadium site under baseline conditions, such as the speaker poles behind the bleachers on the east side of the stadium, and similar to or shorter and narrower than the existing street lights on San Marin Drive. The new egress lighting and speaker poles are partially screened by existing trees adjacent to the project site and do not substantially affect views of the surrounding hillsides and ridgelines. The poles have minimal impact to the overall viewshed from surrounding properties and do not substantially obstruct views of any identified scenic resources. Consequently, impacts to scenic vistas would be less than significant.

It should be noted that the photographs included in the comment letter appear to be "zoomed in," and therefore do not represent an accurate view of the light poles as seen by observers adjacent to and around the project site. In addition, CEQA does not require that every possible viewpoint be assessed; the viewpoints used in the EIR are adequately representative and the impact analysis and conclusions as summarized above remain valid. Impacts to scenic vistas would be less than significant.

Response 7.2

The commenter states an opinion that the revised draft EIR fails to include the potential for new traffic control mechanisms at the intersection of San Marin Drive and Novato Boulevard, and that such changes could affect cumulative impacts related to traffic.

The commenter is correct that the City of Novato is beginning to explore ways to improve traffic operations and pedestrian and bicycle facilities at the intersection of Novato Boulevard and San Marin Drive. After assessing current traffic operations, the City intends to develop conceptual designs and gather public feedback through a formal outreach process; prepare and circulate an environmental document; develop construction plans and specifications and relocate any necessary utilities; and construct improvements. Funding is not yet identified and there is no schedule at this time. It is unknown at this time what the changes to the intersection, if any, would entail; therefore, it would be speculative to include a project at this intersection in the EIR's cumulative impacts analysis. CEQA discourages

speculation (see CEQA Guidelines sections 15064, 15145, and 15384). Finally, according to the City's Public Works Director (Christopher Blunk, pers. comm. August 23, 2019), both the study of traffic operations and any future design consideration would take into account the San Marin High School stadium lights project and its associated vehicle, pedestrian and bicycle traffic, and the purpose of the City's project would be to improve operations, which is likely to reduce cumulative impacts. As discussed in Section 4.6, *Transportation and Traffic*, of the original Draft EIR, traffic impacts associated with implementation of the proposed project would be less than significant. As discussed in Section 3, *Cumulative Impacts*, of the Revised Draft EIR, cumulative traffic impacts would be less than significant. No changes to the EIR are warranted.

Letter 8

From: Cassandra Giesen [mailto:c.rhine.giesen@att.net]
Sent: Sunday, August 18, 2019 1:03 PM
To: Environmental Report <EIR@nusd.org>
Subject: Citizen comment re: The July, 2019 EIR Report for the San Marin High School Lights Project

August 18, 2019

Cassandra Giesen
36 Manzano Court
Novato, California 94945

Yancy Hawkins – Assistant Superintendent of Business and Operations
Novato Unified School District
1015 7th Street
Novato, California 94945

Dear Ms. Hawkins,

From the beginning, the NUSD Board of Trustees failed to discuss or to even consider alternatives to the proposed lights project at San Marin High School. Meanwhile, the NUSD was boldly violating the California Environmental Quality Act by refusing to adequately review and assess the impacts of this lights project on light pollution, noise, and traffic in the San Marin neighborhood. This latest (July 2019) revised Environmental Impact Report does nothing to minimize the long-term, deleterious impact of the San Marin Lights Project on the San Marin community. 8.1

In the end, the NUSD's role in this lights project has been one of disinformation and deception.

For decades, my extended family and I have voted in favor of every bond and tax measure proposed by the NUSD to increase funding for our local schools. No longer. The treacherous and dishonest role that the NUSD Board of Trustees has played in this lights project will force me and my family members to view skeptically any and all future NUSD school-funding proposals submitted to the public for a vote. 8.2

Cordially,

Cassandra Giesen

Letter 8

COMMENTER: Cassandra Giesen

DATE: August 18, 2019

Response 8.1

The commenter states an opinion that the District violated CEQA by not adequately reviewing and assessing the project's impacts related to light pollution, noise, and traffic, and that the Revised Draft EIR does not minimize the "long-term, deleterious impact" of the project. The commenter also asserts that the District has been deceptive in regard to the project but does not provide information to support this assertion.

Impacts related to aesthetics, including the potential for light pollution, are discussed in Section 2, *Aesthetics*, of the Revised Draft EIR and in Section 3, *Cumulative Impacts*, of the Revised Draft EIR. Impacts related to noise are discussed in Section 4.5, *Noise*, of the originally circulated EIR and in Section 3, *Cumulative Impacts*, of the Revised Draft EIR. Impacts related to traffic are discussed in Section 4.6, *Transportation and Traffic*, of the originally circulated EIR and in Section 3, *Cumulative Impacts*, of the Revised Draft EIR. As discussed in those sections, impacts related to these issue areas would be less than significant, except for a significant and unavoidable impact from varsity football game noise. The commenter does not provide specific information or analysis challenging the discussions or conclusions of the EIR on which to base additional, more specific responses. Nevertheless, this comment is noted. The District, as lead agency, has made every effort to prepare an EIR that is adequate, complete and a good-faith effort at full disclosure, consistent with CEQA.

Letter 9

Michael W. Graf
Law Offices

227 Behrens St.,
El Cerrito CA 94530

Tel/Fax: 510-525-1208
mwgraf@aol.com

August 24, 2019

Via Email
Yancy Hawkins
Assistant Superintendent of Business and Operations
Novato Unified School District
1015 7th Street
Novato, California 94945
EIR@nusd.org

Re: Comments on Behalf of Coalition to SAVE SAN MARIN on San Marin High School Stadium Lights Project Revised Environmental Impact Report

To Whom it May Concern:

I am writing on behalf of the Coalition to Save San Marin, concerned citizens living in the vicinity of the San Marin High School regarding the Novato Unified School District's ("District") proposed Stadium Lights Project Revised Environmental Impact Report ("REIR")

Similar to the prior EIR, the REIR again reiterates that the San Marin High School Stadium Lights Project ("Project") will not have significant environmental impacts. However, as discussed below, the REIR does not contain a complete analysis of light impacts of the Project to the surrounding neighborhoods, hillsides and adjacent wildlife habitat. The Coalition hereby restates its former comments and all related comments by other members of the public, that these conclusions remain flawed, thereby rendering the REIR susceptible to legal challenge. 9.1

1. Writ of Mandate Issued by the Superior Court.

The superior court's Writ of Mandate filed on January 20, 2019 found that the District had not adequately assessed the adverse impacts of a lighted stadium project in a number of ways. The court agreed that the District's preliminary photometric studies contained no discussion or explanation of how its values were obtained, and thus failed to provide the necessary information to the decisionmakers and the public, and that, without first conducting the detailed photometric studies, the EIRs did not provide sufficient information to support the District's conclusion that the lighting system could be designed not to exceed the light trespass and glare discomfort thresholds. The court noted that the "need for detailed photometric studies to analyze the impacts from light and glare and to devise mitigation and avoidance s measures to 9.2

ensure the impacts will be reduced to less than significant levels, cannot be doubted." *See* Writ, p. 23. The court goes on to note that the missing photometric studies would have "provided needed planning information to the District on matters, including equipment layout, illumination summary and glare impact at the stadium and the surrounding residences." *Id.* at 26.

The court also agreed with the Coalition's expert, Marc Papineau, who commented that the District had not given "sufficient deference to the dark, undeveloped open space on the edges of the project site," and that the four lighting zones ratings (E- l to E-4) were intended to be "progressive, in order to be suitably protective of the environment" and thus "when a suburban area is adjacent to an unlit, or dimly lit open space the 'prudent planning practice' is to accommodate the contiguous, more light-sensitive area by applying the lighting standards "that are more sensitive to cumulative change in ambient brightness." *See* Writ, p. 29. Based on this testimony and other evidence in the record, the court rejected the District's decision to treat the Project site as located within an E3 light zone: "The District' s classification of the environmental setting as falling in the E-3 rating zone, *supra*, virtually ignores the extensive open spaces and unlit hillsides that form a substantial boundary along the south, west and northwest edges of the project site. The District makes no effort to distinguish the unique physical features of this environmental setting from the typical, suburban neighborhood that falls within the E-3 rating." *Id.* at p. 30. The court noted further that:

> Also, the evidence in the administration record refutes the District ' s conclusion the project area is characterized at nighttime by "medium ambient brightness." It is uncontradicted that the project area is served by only two main thoroughfares, San Marin Dr. and Novato Blvd., with Novato Blvd. being dark or having very low illumination, and San Marin Dr. adjacent to the stadium being dimly lit. *The amount of ambient light affecting in the project area is significantly reduced when one considers the dark, undeveloped hillsides and open spaces abutting several sides of the project area*. These features distinguish the project's setting from the typical "well-inhabited rural and urban areas" in the E-3 zone that may be traversed by many blocks of well-lighted streets.

Id. at p. 31 (emphasis added.) With regard to sky glow impacts, the court observed that the EIR had not addressed "the effects that the nighttime use of lights will have in obscuring the views of the hills and ridgelines." *Id.* at p. 32. The court further rejected as "faulty" the District's argument that sky glow would be 'minimal' it "would occur in a location with existing nighttime lighting," "in the greater San Francisco Bay Area" where nighttime skies are "subject to substantial existing light pollution" and therefore "would not substantially contribute to sky glow during sensitive nighttime hours." *Id.* at 33. The court concluded there is insufficient evidence in the record to support the District ' s conclusion that sky glow on the scenic views will be minimal. *Id.*

On biological issues, the court also ruled the EIR deficient, in including a new biological resources discussion after close of public comment which necessitated the recirculation of the EIR. *Id.* at 46. The court considered that information to be a significant "since the FEIR

identified the potential for stadium lighting to alter the roosting and foraging behavior of these nocturnal species by driving them to other areas surrounding the project site, which matters were not discussed in the DEIR. *Id.*, p. 66. The Court also held that "an adequate range of alternatives should reasonably have included a discussion of the reduced lighting system alternative, and its absence did not foster informed decision making. *Id.* at 59. Finally, the court found the EIR defective in not addressing the cumulative impacts on aesthetics from the project , together with the related impacts of the new lighted soccer and lacrosse field already approved by the District. *Id.* at p. 64.

2. Light Impacts of Stadium Lighting Remain Potentially Significant But Unanalyzed.

The REIR still does not adequately assess light impacts of the Project, which it portrays as insignificant In particular, the REIR provides no actual analysis of the significant aesthetic impacts that will be caused by the Project due to glare, loss of scenic vistas and sky glow.

Instead, the REIR states that significant aesthetic impacts due to light pollution will be avoided based a light study that examined the 'lux' or foot candle (fc) levels at sites located around the field at the edge of the property line. Based on this study, the REIR finds that property line illumination levels will not exceed standards set forth in the new applicable International Commission on Illumination (CIE), 2017 standards for threshold limits on various light technical parameters for outdoor lighting installations ("CIE150: 2017.")

The REIR then relies on its lux readings taken on the Project site to serve as a 'proxy' for the REIR's required analysis for glare. The REIR assumes that a 500 fc level of illumination will not cause any undue glare, and thus that this aesthetic impact is insignificant. The REIR also refers to an overall level of 10,000 candelas as not being exceeded, which is cited as another ground for glare impacts to be insignificant. But this analysis too is faulty. 9.3

Light measurements based on illumination cannot be used as a proxy for glare, which is not a cumulative measurement of brightness taking into account all sources of ambient light, but rather the effect of the actual light beam coming from a specific luminere, potentially adverse effects ranging from annoyance to actual discomfort. As Marc Papineau discusses in his comments, lux or foot candle measurements are an inappropriate substitute for actual measurements of glare effects and the potential for significant impacts to occur. In contrast to the flawed illumination 'proxy' used by the REIR to 'analyze' glare, the CIE150: 2017 establishes glare thresholds based on the size of the light source glare and the angle of the receptor viewpoint. *See* CIE150: 2017, Table 3. Papineau comments, Attachment 1. Here, the appropriate glare threshold for this E2 zone fall between 600-900 candelas, not the 10,000 candela level cited in the REIR. *See* Papineau comments

Another problem for the EIR is it does not consider glare effects on receptor points set at angles from the stadium, which may well be significant and greater that the E2 zone thresholds that would apply in this case. *See* Papineau comments. This can be seen in Figure 4 from 9.4

Papineau's comments, which illustrates with photos the significant difference in glare depending upon the elevation above or below the project site where the receptor is located. Here, the REIR never assesses or analyzes glare at all, much less at these different, more sensitive receptor points. This approach does not meet CEQA's standards, as the court found in its original decision. *See* Writ, p. 34 ("FEIR "omits materia necessary to informed decision[-]making and informed public participation" and this omission is prejudicial. (*citing County ofAmador v. El Dorado County Water Agency* (1999) 76 Cal.App.4th 931 , 946.))

An equally problematic omission for the REIR is its unaccountable failure to assess the glare (and sky glow) impacts of the upward lights, which are proposed for dozens of games and events all fall and winter season. As discussed in the Papineau comments, the upward lights will contribute to glare and sky glow, as well as adversely affecting the surrounding landscape viewsheds of the area. However, the REIR inexplicably does not assess their potential to create adverse effect to receptor points located above the stadium, including the many surrounding residences and open space areas.

9.5

The REIR's discussion of light impacts related to sky glow is also inadequate. The REIR instead relies on the Bortle Scale as a kind of measurement of sky glow, determining that the "entirety of Marin County is [mapped as] Bortle Class 5," an argument that generally is the same as the one rejected by the court in the Writ. *See* e.g, Writ at p. 33 (court rules that District's argument that sky glow would be 'minimal' as it would occur in a location with existing nighttime lighting in the greater San Francisco Bay Area with substantial existing light pollution would not substantially contribute to sky glow during sensitive nighttime hours is "faulty.")

In fact, as discussed in the Papineau comments, the Bortle scale does not list all of Marin County as Class Five, and, moreover, identifies the project area as a transition zone in which light levels, glare and sky glow are considerably less than in a brightly lit urban zone in Marin County. In fact, it was based on the dark night sky and surrounding open space areas surrounding the Project that the court found that this area should be treated as an E2 and not E3 zone. *See* Writ, p. 30 (District' s classification of the environmental setting as falling in the E-3 rating zone "ignores the extensive open spaces and unlit hillsides that form a substantial boundary along the south, west and northwest edges of the project site.")

9.6

Beyond this failure (again) to consider the environmental setting by relying on a general Bortle Scale which treats the entire County as significantly impacted by sky glow, the REIR also wrongly assumes that an incremental contribution to sky glow from a stadium lighting project such as this one will not be cumulatively considerable, without any consideration of the existing sky glow that currently occurs for this area, and the contributing incremental effect of the Project light source.

9.7

At the outset, as discussed, the REIR does not consider any of the impacts caused by upward lights, including effects on sky glow. For that reason, the REIR would be inadequate, even if some analysis had been done, which in this case was not done. Here, the appropriate light

9.8

technical parameter for rating a project's incremental contribution to sky glow is called the Upward Flux Ratio (UFR), set forth in the CIE150: 2017 rule standards. For a project of this size in an E2 zone such as this one, CIE150: 2017 Table 6 recommends a ratio limit of 2. However, here, the REIR provides no UFR information even though calculations show that the UFR levels for this Project potentially reaching ratios of 8-9, over four times greater than might be considered less than significant. *See* Papineau comments. In sum, the REIR has not even a proxy to measure dark sky - sky glow impacts of this Project, while meanwhile ignoring the effects of the majority of the lights that will be pointed or reflected upwards, thereby contributng to sky glow.

As discussed in Papineau's and others' comments, the REIR also does not consider the glare, illumination (including with upward lights), and disturbance of scenic vistas caused by the Project that have not been assessed as a result of the District's limiting its light analysis to receptor points at the Project elevation. *See e.g.,* Papineau comments. 9.9

The REIR's failure to identify the potentially significant visual impacts of the Project due to nightime lighting continues to violate CEQA.

3. REIR Continues Not to Analyze a Lower Light Alternative.

REIR continues not to analyze a lower light alternative, as required by the court's Writ. Instead, the REIR 1) does not describe any particular alternative; and 2) determines that since the Project as proposed will not have significant impacts, looking at an alternative that will have lesser impacts is not required. As noted by Papineau:

> In my opinion, this discussion and conclusion fail to provide enough information for the public to understand what is possible in terms of reducing potentially significant light impacts or the feasibility of operating a lower light operation that would fulfill the purposes of the project while reducing adverse light impacts. For all the reasons previously given, I disagree with the assertions that the project's glare, sky glow, and visual impacts will be less than significant. A Reduced Light Level Alternative could reduce spill light and glare at off-campus receivers and the proposed project's contribution to sky glow A Reduced Light Level Alternative also could reduce the impact on visual quality by reducing the intensity of the illuminated stadium in the field of view of observers. 9.10

The REIR should analyze the feasibility of a 30-35 fc facility operation, which would fulfill the Project purpose while assuring that light impacts will be minimized. However, the REIR's failure to consider this even as an alternative does not meet CEQA's standards while also being contrary to the court's Writ.

We request that the District withdraw this EIR and recirculate a new one that 1) correctly and adequately describes the environmental setting and actual scope of the proposed Project; 2) 9.11

accurately identifies the foreseeable significant impacts of the Project on the local community; and 3) considers an action alternative capable of avoiding such impacts.

Yours Truly,

Michael Graf
Coalition to SAVE SAN MARIN

Letter 9

COMMENTER: Michael Graf

DATE: August 24, 2019

Response 9.1

The commenter states an opinion that the Revised Draft EIR does not contain a complete analysis of light impacts of the project to the surrounding neighborhoods, hillsides and adjacent wildlife habitat, and notes that his specific comments are "discussed below" in his letter. The commenter does not provide information or analysis to challenge or question the analysis in the Revised Draft EIR. Impacts related to the listed topics are discussed in the Revised Draft EIR in sections 2 and 3, and in Appendix A. Impacts would be less than significant, with the exception of the significant noise impact identified in the previous circulated EIR. The commenter's specific concerns in related to these topics are addressed in the responses to the commenter's subsequent comments below.

Response 9.2

The commenter provides an interpretation of the writ of mandate related to the previously circulated EIR. This information is noted but does not question or challenge the analysis or conclusions of the Revised Draft EIR, and therefore does not require a response.

Response 9.3

The commenter states an opinion that the revised Draft EIR does not adequately assess light impacts of the project, and in particular that glare impacts are not adequately addressed. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 9.

Response 9.4

The commenter summarizes comments from Letter 16, including an opinion that the revised Draft EIR does not consider glare effects on receptors "at angles" from the stadium. Please see responses to Letter 16, as well as Master Response: Light and Glare Impacts, Section J, responses to Letter 9.

Response 9.5

The commenter summarizes comments from Letter 16, including an opinion that the revised Draft EIR does not assess glare and sky glow impacts of the upward lights. Please see responses to Letter 16, as well as Master Response: Light and Glare Impacts, Section J, responses to Letter 9.

Response 9.6

The commenter summarizes comments from Letter 16, including an opinion that the characterization of Marin County in relation to the Bortle scale is incorrect and that the Revised Draft EIR's discussion of light impacts related to sky glow is inadequate. Please see responses to Letter 16, as well as Master Response: Light and Glare Impacts, Section J, responses to Letter 9.

Response 9.7

The commenter suggests that the project's cumulative contribution to sky glow would be significant. Please see responses to Letter 16, as well as Master Response: Light and Glare Impacts, Section J, responses to Letter 9.

Response 9.8

The commenter summarizes comments from Letter 16, including an opinion that the Revised Draft EIR's discussion of light impacts from upward lights related to sky glow is inadequate. Please see responses to Letter 16, as well as Master Response: Light and Glare Impacts, Section J, responses to Letter 9.

Response 9.9

The commenter summarizes comments from Letter 16, including an opinion that the Revised Draft EIR does not consider the project's impacts in relation to glare, illumination (including with upward lights), and "disturbance of scenic vistas." Please see responses to Letter 16, as well as Master Response: Light and Glare Impacts, Section J, responses to Letter 9.

Response 9.10

The commenter states an opinion that the Revised Draft EIR does not analyze a lower light alternative. The commenter is incorrect; Alternative 4, Reduced Lighting System Alternative, in Section 4, *Alternatives*, of the Revised Draft EIR, analyzes a lower light alternative. Please see responses to Letter 16, as well as Master Response: Light and Glare Impacts, Section J, responses to Letter 9.

Response 9.11

The commenter requests that the District recirculate a new EIR with a revised description of the environmental setting and project details, a revised impact discussion, and revised alternatives. The commenter does not provide details of what these revisions might entail; please see responses 9.1 through 9.10; responses to Letter 16; and Master Response: Light and Glare Impacts, Section J, responses to Letter 9.

John Holzwarth
100 Corte Elena
Greenbrae, CA 94904

Letter 10

Mr. Yancy Hawkins
Novato Unified School District
EIR@nusd.org

August 23, 2019

RE: Partially Revised Draft Environmental Impact Report for Proposed Lights at San Marin High School

Dear Mr. Hawkins:

I am providing the following comments regarding the flaws in the Partially Revised Draft Environmental Impact Report (PRDEIR) dated 24 July 2019. These comments follow on from my letter of 2 March 2017. The document should be further revised and recirculated to provide a full and complete disclosure of potential significant negative impacts related to this proposed project.

Chapter 3 of the PRDEIR related to cumulative impacts is both incomplete and methodologically flawed.

Chapter 3 is not complete because it does not first identify significant negative impacts already described in the FEIR. For instance, the section of "Noise" in Chapter 3 of the PRDEIR does not identify that the Project would cause significant negative impacts related to noise for most all proposed nighttime uses. Table 30 on page 378 of Section shows that proposed nighttime uses exceed threshold identified in the DEIR. This includes all non-varsity football games, all non-football games, all practices, all community games and practices, all community special events, and graduation. These events span quite likely every proposed use of the Project and therefore would need to be considered in respect of any other potential impact to identify cumulative impacts. All of these noise-related significant negative impacts are unavoidable according to the FEIR. These already identified individual negative impacts need to be separately identified to facilitate a complete assessment of cumulative significant negative impacts. 10.1

Chapter 3 is methodologically flawed because it does not address impacts across types or sources of impacts. For instance, as noted above, the Project will cause unavoidable significant negative impacts related to noise. These noise impacts would likely lead to cumulatively negative impacts for Aesthetics, for example. Citizens enjoying a sunset or evening sky near the proposed Project would experience both significant negative impacts related to noise and also further degraded view due to: (a) obstructed views due to poles, (b) sky glow, and (c) glare. 10.2

While the PRDEIR asserts there are not individual negative impacts related to these Aesthetics issues, it fails to consider that these issues may become significant in combination with other identify unavoidable significant negative issues such as noise. In this way, the PRDEIT is methodologically flawed and will likely fail to identify and disclose potential significant negative cumulative impacts.

Chapter 3's discussion of cumulative impacts related to noise is also methodologically flawed. This Chapter does not consider the already identified unavoidable significant negative impacts related to noise when discussing further new sources of noise. Significant negative impacts can become even worse cumulatively with multiple sources of the same essential type of impact. The PEDEIR fails to identify these cumulative impacts and therefore fails to properly disclose to decision makers the total scope and extent of potential significant negative impacts. 10.3

The aforementioned flaws in the PRDEIR should be corrected. The PRDEIR should be recirculated in order to allow the public to comment upon an appropriate Chapter 3.

In addition, the PRDEIR is flawed in that it did not provide a new and revised Project Executive Summary and Table 1 as were included in the FEIR that identifies potential impacts from a cumulative perspective rather than solely on an individual basis. The lack of a clear and complete summary prevents citizens and decision makers from being able to make an informed decision regarding the costs and benefits of the Project. 10.4

Thank you for your consideration of these comments.

Sincerely,

John Holzwarth

Letter 10

COMMENTER: John Holzwarth

DATE: August 23, 2019

Response 10.1

The commenter states an opinion that Section 3, *Cumulative Impacts*, of the Revised Draft EIR is incomplete because it does not first identify the significant impacts identified in the originally circulated EIR. Section 3 addresses cumulative impacts. As discussed in Section 5, *Noise*, of the originally circulated EIR, and in Section 3, *Cumulative Impacts*, of the Revised Draft EIR, the project would not contribute to a significant cumulative noise impact. The events listed by the commenter would not be occurring simultaneously at the stadium, so would not combine to increase the noise levels of any one event.

The project-specific significant noise impact identified in the originally circulated EIR is not relevant to the Revised Draft EIR because the project-specific noise impacts discussion did not require revised study in the Revised EIR.

Response 10.2

The commenter states an opinion that combined impacts in different issue areas should be studied in the Revised Draft EIR, for example, according to the commenter, noise impacts while enjoying a sunset with the project in view combines noise and aesthetic impacts to create a greater impact than the two individually. This comment is noted. However, the commenter misunderstands CEQA's approach to cumulative impacts, which are studied in each issue area, rather than combining disparate topics.

Response 10.3

The commenter states an opinion that Section 3's discussion of cumulative impacts related to noise is methodologically flawed because it does not consider the already identified unavoidable significant impacts related to noise. Please see Response 10.1.

Response 10.4

The commenter states an opinion that the Revised Draft EIR should have included an Executive Summary section. This comment is noted. However, this section was not required because it was not one of the EIR sections required by the court to be revised.

Letter 11

From: Paul LaPerriere <plaperriere@me.com>
Sent: Friday, August 23, 2019 3:02 PM
To: Environmental Report <EIR@nusd.org>
Cc: YANCY HAWKINS <YHAWKINS@nusd.org>
Subject: San Marin High School - Partially Revised Draft Environmental Impact Report : July 2019 (Public Comment)

Below is my first response to the re-circulated Environmental Review regarding the proposed Stadium Lights project for San Marin High School.

In **Section 3 Cumulative Impacts,** page 21, the District sights as an *example, "traffic impacts of two nearby projects may be insignificant when analyzed separately, but could have a significant impact when analyzed together"*.

Section 3.2 Related Projects further explains CEQA Guidelines Section 15355, consist of "*closely related past, present and reasonably foreseeable probable future projects that would likely result in similar impacts and are located in the same geographic area."*
The District then indicates that planned and pending projects within the study area are listed in Table 3. On page 24 they list as the source of Table 3: *City of Novato Planning Projects, Projects Under Review and in Process, November 2016, and NUSD 2019*.

11.1

In their final analysis of **3.2 Related Projects** on page 24, just below Table 4 the District considers relevance of cumulative projects and states: …"*whereas, cumulative traffic impacts consider potential projects within a broader geographic scope."* Finally, they conclude that *"The closest project to San Marin High School property within the City of Novato is the mixed-use project at The Square Shopping Center (2001 Novato Boulevard) approximately 1.2 miles east of the projected site"***.**

The information gathered in Table 3 regarding City of Novato Planning Projects is incomplete and its final analysis of this Section are misleading at best and is ***inadequate as an informative document. (see Table 3 below)***

First, if the District had reviewed the City's Planning Projects for 2019 as they did for NUSD they would have found that on February 12, 2019 the City Council adopted a resolution amending the 2018/2019 Budget to add Capital Improvement Project (CIP) **# 19 - 009**, Intersection Improvements at Novato Blvd and San Marin Dr./Sutro Avenue, to the Capital Improvement Program. (See link below of City Council Meeting Minutes, February 12, 2019, J2 General Business).

http://novato.granicus.com/DocumentViewer.php?file=novato_43a51f230643358a4de651de17c76174.pdf&view=1

Second, the 2019/2020 City Budget for CIP # 19-009 was approved by the City Council during their June 25, 2019 meeting with an effective date of July 1, 2019.

Third, the City issued a Request For Proposal for a Traffic Study of Pedestrian and Bicyclist Safety in San Marin High School Area with responses due July 24, 2019, ironically the same day this revised E.I.R. was released for public review. The City has received two proposals and is in the process of final negotiations with one of these firms. The scope of this Study will focus on the major intersection affected by pedestrian, bicyclist and vehicle traffic of the San Marin High School and community. As the 2.1 Summary indicates “This intersection has high volumes of students walking and biking to and from San Marin High School but does not have crosswalks, curb ramps, bike lanes, or sidewalks in all directions”. The Study will look at traffic circulation a half mile in all directions capturing the San Carlos Way intersection ignored in the Districts FEIR. The Study is targeted to conclude with a Final Report by the end of January 2020.(see PDF below).
The San Carlos Way intersection is important since there has been a number of pedestrian incidents in the past at this intersection including a September 25, 2018 incident where a student was struck by a vehicle at 15 San Marin Drive, cross street San Carlos Way/Aspen Dr., as reported in the Novato police report L18161859.

Fourth, the other two attached PDF’s (below) are supporting documents used to reinforce the City Councils approval of this CIP and since both were published in the summer of 2017 were readily available for the District to consider in this revised Draft EIR if they chose to review 2019 City “Projects Under Review and in Process “ that were more current than 2016.

Fifth, the included photo showing a two vehicle accident was taken on June 1, 2019 at approximately 8:00 pm at the intersection of San Marin Drive/Novato Blvd /Sutro.

In the final paragraph of Section 3 Cumulative Impacts, 3.2 Related Projects of the recirculated E.I.R. under Table 4 the District states:"This analysis considers the relevance of the cumulative projects in light of the geographic scope of the specific resource areas for which impacts may occur. For instance, cumulative aesthetic impacts are generally limited to potential projects within the immediate view shed or line-of-sight of the stadium lights or potential projects that would affect the visual character of the immediately surrounding neighborhood, **whereas cumulative traffic impacts consider other potential projects within a broader geographic scope". It then concludes incorrectly that "The closest project to San Marin High School Property within the City of Novato is the mixed-use project at The Square Shopping Center (2001 Novato Blvd.) approximately 1.2 miles east of the project site."** If the District had properly included proposed plans for years 2017, 2018 and 2019 to date they would have found that the owner of The Square Shopping Center's planning permit expired during the time period left out of this report. What they would have found and should have included as their final concluding sentence is the fact that "**the closest project to San Marin High School property within the City of Novato is Capital Improvement Project 19-009 to make improvements at Novato Blvd. and San Marin Dr. / Sutro Avenue."**

This new information satisfies Public Resource Code Section 21166 which states: "When an environmental impact report has been prepared for a project pursuant to this division, no subsequent or supplemental environmental impact report shall be required by the lead agency, unless **one** or more of the following events occur:
(C) New Information, which was not known and could not have known at the time the environmental impact report was certified as complete, becomes available."

The City of Novato has recognized the potential traffic pedestrian, bicyclist safety issues at the major intersection of San Marin High School. Their planned study will take a broader look at these issues around the school campus, including the impact of the Stadium Lights Project. With this new information I've provided in my email I am certain that the NUSD Trustees will want to be fully informed by the results of this Study and subsequent solutions as required by CEQA before they make a final decision on this re-circulated EIR.

Sent from my iPad

Memorandum

Date: July 31, 2017

Project: NOV920

To: Mr. Christopher Blunk
City of Novato

From: Mary Jo Yung
myung@w-trans.com

Subject: Evaluation of Novato Boulevard West of San Marin Drive-Sutro Drive

As requested we have completed an evaluation of the traffic characteristics of Novato Boulevard west of San Marin Drive-Sutro Drive, including the street corridor and the intersection of Novato Boulevard/San Marin Drive-Sutro Drive. We understand that the Marin Safe Pathways to School Task Force and residents of Novato have requested various improvements to address their safety concerns, including changes to reduce corridor travel speeds, removing tree limbs to increase natural lighting/reduce shadows, and provide a greater degree of pedestrian facilities, particularly for school-age pedestrians and bicyclists.

Field reviews were conducted on June 14 between 8:30 and 9:30 a.m. and on June 28 between 6:30 and 7:30 a.m. School was not in session, though school-age and adult pedestrians and bicyclists were observed walking or pedaling along Novato Boulevard within the study segment.

Corridor Speed

Posted Speed Limit

The speed limit on Novato Boulevard is posted in accordance with the requirements of the *California Vehicle Code* (CVC) and the *California Manual of Uniform Traffic Control Devices* (MUTCD), including completion of supporting documentation known as Engineering and Traffic Surveys (ETS). ETS expire every five, seven or ten years depending on local agency practices and specific street segment conditions. Novato Boulevard is currently segmented into nine speed zones with the most recent corresponding ETS completed on May 4, 2016. A summary of the segment limits, lengths, posted speed, critical speed and other data is provided in Table 1.

Table 1 Summary of 2016 Novato Boulevard Engineering and Traffic Surveys

Segment	Length (miles)	85th Percentile Speed (mph)	Posted Speed (mph)	Nearest 5 mph Increment	5 mph Reduction (mph)
West City Limit to Rear Lot of San Marin H.S.	0.26	46	45	45	***40***
Rear Lot of San Marin H. S. to Novato Creek	0.68	39	35	40	35
Novato Creek to Estates Drive	0.36	39	35	40	35
Estates Drive to Sierra Vista Lane	0.20	38	35	40	35
Sierra Vista Lane to Simmons Lane	0.26	33	35	35	**30**
Simmons Lane to McClay Drive	0.18	42	40	40	**35**
McClay Drive to Grant Avenue	0.23	42	40	40	**35**
Grant Avenue to Tamalpais Drive	0.28	40	40	40	**35**
Tamalpais Drive to Diablo Boulevard	0.38	36	35	35	**30**

Italics represents Portion of Study Segment; **Bold** represents a potential lower posted speed limit

The critical or 85th percentile speed on the Novato Boulevard at the west city limit is 46 mph, therefore the nearest 5 mph increment is 45 mph, which is the posted speed. However the CVC and MUTCD permit a five mph reduction from the nearest five mph increment if there are factors that would support such a reduction. For example there is no eastbound bicycle lane which forces bicyclists to share the travel lane with eastbound drivers. Segment collision history is another factor that can be considered, which in this segment included a school-age bicyclist fatal collision in 2012. Adjacent speed zones are also factors to be considered: The posted speed in the unincorporated area west of this segment is 45 mph, while the speed zone to the east, between the high school and Novato Creek/Eucalyptus Drive, is 35 mph. If all these factors were taken into account, a 40 mph posted speed limit would be reasonable, and this change in posted speed limit is recommended at this time.

In the long term, when the Novato Boulevard ETS expire or road conditions change, city staff may wish to undertake a review of all the speed zones on Novato Boulevard. One reason is that five of the remaining eight speed zones are posted at speeds higher than the permitted 5 mph reduction speed, as can be seen in Table 1. Additionally, speed zone lengths should be greater than 0.50 miles except in transition areas, according to MUTCD standards. Eight of the nine speed segment lengths on Novato Boulevard are less than 0.40 miles, less than the recommended minimum half-mile, and combining some of them may be beneficial.

Speed Feedback Tools

Police speed enforcement provides feedback to individual drivers though obviously this is labor-intensive and continual police presence is not possible. Automated methods of speed feedback are effective tools for travel speed reduction, whether portable speed feedback signs or pole-mounted signs are used. A portable speed feedback sign is battery-powered and typically deployed upon request. On June 14 a trailer-mounted sign was set up in the shoulder of eastbound Novato Boulevard near San Marin High School, as shown in Plate 1, which we understand was deployed by Novato Police at the request of several residents.

Plate 1: Novato portable speed feedback sign on eastbound Novato

A pole-mounted speed feedback sign is installed on southbound San Marin Drive at the entrance to San Marin High School, which is shown in Plate 2.This sign is set at a height that enables drivers to see it from a greater distance than the trailer-mounted sign. Construction costs vary, though the estimated cost is approximately $12,000, and if funds were available it is recommended that a speed feedback sign be installed on eastbound Novato Boulevard near San Marin High School, possibly included as part of a future street improvement project along this boulevard.

Plate 2: Fixed-mount speed feedback sign at San Marin High School.

Plate 3: Tunnel of trees as seen from westbound Novato Blvd near the high school.

Tree Limbs and Street Lights

Large trees line both sides of Novato Boulevard and tree limbs overhang the road and in some places converge to create a tunnel effect. There are no street lights on the south side of Novato Boulevard west of San Marin Drive-Sutro Drive, while there is one street light at each intersection on the north side of the street, including one at Sandy Creek Way and Copper Hill Way. Though beautiful, some of the trees create shadows and restrict natural light during the daytime, which is less available during the winter months when school is in session. Shadows can be seen in the photo in Plate 3. Some of these trees have been pruned where their limbs encroached onto overhead utility lines. Residents also have expressed concern for dropping limbs; this year after a particularly wet winter we understand that a limb dropped on the north side of the street near the high school rear lot entrance. Several tree branches block signs. Pruning

and/or removing tree limbs is recommended, to improve lighting levels and traffic sign visibility, and to eliminate potential limb drops onto the street below.

Installing a street light at the high school rear lot entrance may be necessary to help drivers locate this access point, especially helpful during high school extra activities. It is recommended that a study be initiated to determine if street lighting in this area is needed.

Traffic Signs and Markings

Signs

There are several *warning* signs posted along both sides of Novato Boulevard, including equestrian signs, pedestrian signs, speed reduction signs, and stop ahead signs. *Regulatory* signs are also posted, including 45 mph speed limit signs, 35 mph speed limit signs, 25 mph school speed zone signs, and no parking signs. Depending on potential changes to the posted speed limit, several of the regulatory signs should be removed or relocated to maximize the benefit of these signs, and the locations of several other traffic signs should be reviewed and signs removed if appropriate in order to eliminate sign clutter.

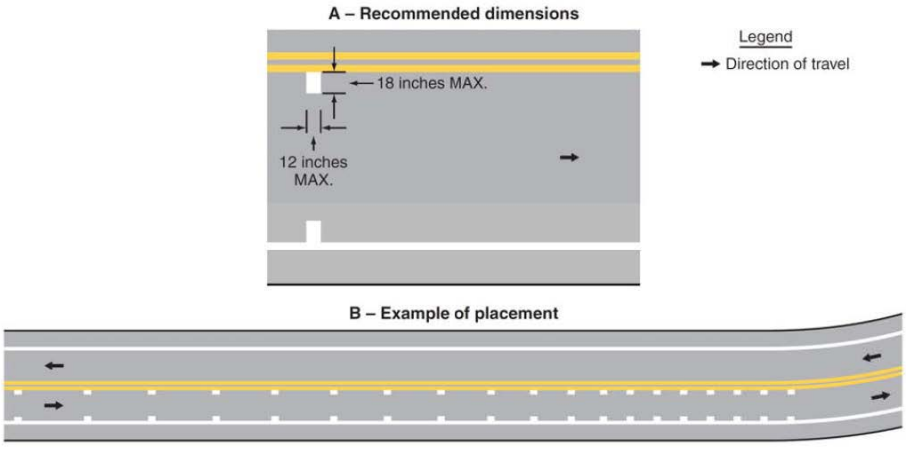
Given the popularity of Dog Bone Meadow and the park's patrons' habit of parking in the Novato Chase neighborhood on the north side of the street, pedestrian crossing signs and possibly enhanced crosswalk facilities should be installed.

Markings

There are various pavement markings and striping, including centerlines, medians, and center turn lanes, and white bike lanes or edge lines. The centerline and median striping details are missing reflective markers, decreasing striping visibility. Refreshing the striping and adding reflective markers is a cost effective improvement that would especially help drivers at night and in foggy conditions.

Other markings can be added or changed in order to affect travel speeds. For example, in the long term, when Novato Boulevard is repaved or reconstructed or otherwise improved, travel lane widths can be reduced and an eastbound bike lane could be added. These changes help reduce travel speeds and increase bicyclists' safety and comfort. Speed reduction markings, as shown in the MUTCD Figure 3B-28 below, could also be installed; they are used to reduce traffic speeds, especially in rural-urban boundaries such as the west city limit on Novato Boulevard. The markings consist of rectangles along each edge of a travel lane with gradually decreasing spacing.

Figure 3B-28. Example of the Application of Speed Reduction Markings



Intersection Controls

The intersection of Novato Boulevard/San Marin Drive-Sutro Drive is an all-way stop controlled intersection. There are nine approach lanes to this large intersection, including four left-turn lanes, four through lanes, and one southbound right-turn lane. During one of the observation periods drivers were seen hesitating to enter the intersection because they were unsure of their right-of-way. When pedestrians entered either of the crosswalks, the hesitation and uncertainty dramatically increased. These behaviors are a concern, and it's likely that inexperienced drivers that are typically found at high schools, would exacerbate this situation. Additionally, the traffic volumes entering the intersection were high when observed, despite the fact that school was out for the summer. It is recommended that a warrant evaluation be initiated to assess the need for a traffic signal or roundabout at his intersection. These controls would be expected to decrease confusion, increase capacity, decrease delay, and/or improve air quality.

Recommendations

1) It is recommended that the existing 45 mph posted speed limit be reduced to 40 mph for the segment of Novato Boulevard between the west city limit and the rear lot of San Marin High School. The existing ETS was re-reviewed and it was determined that the current data supported the lower speed, which is justified as described above and summarized on the updated ETS form.

2) It is recommended that various tree limbs be removed or pruned along Novato Boulevard within the study segment, to improve lighting levels and traffic sign visibility, and to eliminate potential limb drops onto the street below.

3) It is recommended that reflective pavement markers be installed along the existing centerline and median striping on Novato Boulevard west of San Marin Drive-Sutro Drive.

4) It is recommended that various traffic signs, including several posted speed limits, no parking signs, and possibly several warning signs, be removed or relocated to maximize sign benefits.

5) At such time as this segment of Novato Boulevard is resurfaced, which we understand is scheduled to occur next fiscal year, it is recommended that speed reduction markings be installed at the west city limit to reduce travel speeds of eastbound drivers entering the city from rural areas west of Novato.

6) As part of a future improvement project, it is recommended that a pole-mounted speed feedback sign be installed on eastbound Novato Boulevard near the San Marin High School rear lot. This is expected to reduce travel speeds of eastbound drivers.

7) It is recommended that a study be initiated to assess whether a street light is needed on Novato Boulevard at the high school rear lot entrance to help drivers locate this access point, especially helpful during high school nighttime activities.

8) It is also recommended that a warrant evaluation be conducted to determine if traffic signal or roundabout controls are warranted at the intersection of Novato Boulevard/San Marin Drive-Sutro Drive. These controls would be expected to decrease confusion, increase capacity, decrease delay, and/or improve air quality.

Thank you for the opportunity to provide these services.

Memorandum

Date: August 10, 2017

Project: NOV126

To: Mr. Steve Marshall
City of Novato

From: Zack Matley
zmatley@w-trans.com

Copy: Mr. Matt Maddox
Rincon Consultants

Subject: General Plan Circulation Analysis – Preliminary Traffic Mitigation (without Bel Marin Industrial Parks Biotech overlay)

Following is a brief update summarizing the traffic analyses that have been completed to date in support of the forthcoming General Plan Update EIR. We understand that the General Plan "Project" may include additional biotechnology-related development potential in the Bel Marin Industrial Parks area, and that an EIR Alternative will include General Plan buildout *without* this added development potential. The following results reflect the preliminary roadway mitigations that have been identified to maintain LOS D operation under this EIR Alternative (i.e., without additional biotechnology development) under cumulative conditions. Cumulative conditions reflect added traffic attributable to buildout of the City's General Plan, added traffic associated with occupation of currently-vacant office space in the Redwood Boulevard/San Marin Drive area, and added traffic associated with growth in the unincorporated County of Marin. This information may be helpful to Staff in identifying some of the roadway infrastructure improvements to be included in the General Plan document, and will serve the base upon which the potential Biotech overlay traffic will be added.

Preliminary Intersection Mitigations

San Marin Drive/Simmons Lane

- Option 1 – Signalize intersection; maintain all lanes but restripe the San Marin Drive approaches to include separate left, through, and right-turn lanes

  or

- Option 2 – Install roundabout; the westbound approach would have a through-right lane and a left-turn pocket, and the remaining three approaches would have single lanes. One quadrant of the roundabout would have dual circulating lanes.

These improvement options are consistent with the City's Capital Improvement Program (CIP) and prior analyses.

Redwood Boulevard/San Marin Drive

- Widen westbound San Marin Drive approach (the SMART railroad overpass) to include two left-turn lanes, two through lanes, and one right-turn lane, as well as bike lanes and a widened sidewalk on the south side of the overpass
- Widen southbound Redwood Boulevard approach to include a left-turn lane, shared left-turn/through lane, and right-turn lane
- Restripe the northbound Redwood Boulevard to include a left-turn lane, left-turn/through lane, and two right-turn lanes
- Add right-turn overlap signal phasing on the northbound and westbound approaches

These improvements differ somewhat from the CIP and prior analyses completed for the North, North Redwood Boulevard (NNRB) corridor. The railroad overcrossing would only be widened by one lane (as assumed in the CIP), though with the addition of bike lanes and a wider sidewalk the "effective" width may be closer to two added lanes (as envisioned in the NNRB study). Southbound Redwood Boulevard would require an additional vehicle lane only within 300 to 500 feet of San Marin Drive, in contrast to the CIP improvement of extending another southbound lane all the way to Wood Hollow Drive.

San Marin Drive/US 101 Southbound Ramps

- Modify the eastbound San Marin Drive approach (the SMART railroad overpass) to include a through lane, a shared through/right-turn lane, and a right-turn lane
- Provide an enhanced bicycle-pedestrian crossing at the on-ramp entrance, including modified signal phasing to include protected pedestrian and bicyclist movements across the ramp

These improvements differ slightly from the CIP and NNRB study but are needed to provide efficient upstream lane utilization, and ultimately help to minimize the number of lanes needed on the railroad overpass. The use of the recommended combination through-right and right-turn lane on the eastbound approach could be difficult for bicyclists to navigate, hence the need to provide enhanced bicycle-pedestrian crossings as well as a widened sidewalk/path on the south side of the railroad overpass.

Atherton Avenue/US 101 Northbound Ramps

- Widen the northbound off-ramp to include two left-turn lanes and a shared through/right-turn lane

This improvement is consistent with the CIP and NNRB study.

San Marin Drive/Sutro Drive

- Option 1 – Signalize intersection; maintain existing lanes

  or

- Option 2 – Install a single-lane roundabout; reduce all approaches to single-lanes, except for the southbound approach which would also include a right-turn "slip" lane

This is a new improvement/mitigation that has not previously been identified.

Novato Boulevard/Diablo Avenue

- Modify westbound Diablo Avenue to include a left-turn lane, through lane and right-turn lane
- Restripe eastbound Diablo Avenue to include a left-turn lane and shared through/right-turn lane
- Widen southbound Novato Boulevard to provide two left-turn lanes and a shared through/right-turn lane
- Eliminate channelized right-turn islands on the northbound and westbound approaches
- Add bike lanes on the westbound and southbound approaches
- Convert signal phasing to protected left-turns, plus right-turn overlap phasing on the northbound and westbound approaches; incorporate signal timing into the De Long Avenue coordinated system

These improvements should be considered draft in nature; the Public Works Department is intending to reexamine the configuration of the Novato Boulevard widening as part of the project's upcoming CEQA review and the intersection configuration may evolve during that process. The evaluation will also examine whether Novato Boulevard to the north of Diablo Avenue needs to be widened to two through lanes in each direction, or whether single through lanes in each direction with turn pockets, bike lanes, and pedestrian improvements would be appropriate.

Redwood Boulevard/South Novato Boulevard

- Option 1 – Signalize intersection; maintain existing lanes

  or

- Option 2 – Install a single-lane roundabout; reduce all approaches to single-lanes, except for the eastbound approach which would also include a right-turn "slip" lane

This is a new improvement/mitigation that has not previously been identified.

LOS Summary Tables

The following intersection, roadway segment, and freeway Level of Service calculation summaries are being provided for your reference.

Table 1 – Existing and Existing plus Project Alternative Peak Hour Intersection Levels of Service

Study Intersection ***Approach***	**Existing Conditions**				**Existing plus Project Alternative**			
	AM Peak		**PM Peak**		**AM Peak**		**PM Peak**	
	Delay	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**
1. San Marin Dr/Simmons Ln	29.9	D	**74.6**	**F**	**45.9**	**E**	**100.8**	**F**
Mitigated: Traffic Signal	-	-	-	-	17.7	B	20.2	C
Mitigated: Roundabout	-	-	-	-	12.0	B	14.9	B
2. San Marin Dr/W Campus Dr	4.8	A	4.7	A	4.8	A	6.5	A
3. San Marin Dr/E Campus Dr	1.0	A	2.2	A	1.6	A	4.4	A
4. Redwood Blvd/San Marin Dr	29.5	C	38.2	D	35.8	D	**	**F**
Mitigated: Widen overpass and SB Redwood Blvd; modify intersection	-	-	-	-	28.1	C	42.4	D
5. US 101 S/San Marin Dr	12.2	B	10.1	B	14.4	B	11.6	B
6. US 101 N/Atherton Ave	13.6	B	19.7	B	17.8	B	27.1	C
7. Redwood Blvd/Olive Ave	25.8	C	28.2	C	29.6	C	36.0	D
8. Redwood Blvd/Grant Ave	14.6	B	16.7	B	16.7	B	23.3	C
9. Novato Blvd/San Marin Dr-Sutro Ave	23.8	C	**59.9**	**F**	**39.8**	**E**	**89.6**	**F**
Mitigated: Traffic Signal	-	-	-	-	25.9	C	32.9	C
Mitigated: Roundabout	-	-	-	-	7.7	A	10.1	B
10. Wilson Ave/Novato Blvd	21.7	C	18.5	B	24.6	C	21.3	C
11. Simmons Ln/Novato Blvd	47.5	D	14.1	B	47.9	D	14.4	B
12. Grant Ave/Novato Blvd	16.2	B	14.3	B	16.7	B	15.2	B
13. 7th St-Tamalpais Ave/Novato Blvd	19.5	B	26.5	C	20.0	B	29.1	C
14. Diablo Ave/Novato Blvd	35.9	D	**59.2**	**E**	**63.6**	**E**	**93.5**	**F**
Mitigated: Add SB left-turn lane and modify intersection	-	-	-	-	35.9	D	38.4	D
15. Redwood Blvd/Diablo Ave-DeLong Ave	37.9	D	31.5	C	41.5	D	41.6	D

Table 1 – Existing and Existing plus Project Alternative Peak Hour Intersection Levels of Service

Study Intersection *Approach*	Existing Conditions				Existing plus Project Alternative			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
16. DeLong Ave/Reichert Ave	21.0	C	25.1	C	21.9	C	24.8	C
17. US 101 S/DeLong Ave	10.6	B	20.2	C	20.5	C	27.1	C
18. US 101 N/DeLong Ave	11.5	B	29.5	C	12.2	B	23.7	C
19. Redwood Blvd/Lamont Ave	10.5	B	10.8	B	10.6	B	11.1	B
20. Redwood Blvd/Landing Ct	3.4	A	3.4	A	6.2	A	5.4	A
21. S Novato Blvd/Center St	15.8	B	19.9	B	15.9	B	20.0	B
22. S Novato Blvd/Arthur St	18.2	B	13.1	B	17.8	B	13.9	B
23. S Novato Blvd/Rowland Blvd	49.3	D	35.6	D	51.4	D	36.5	D
24. Redwood Blvd/Rowland Blvd	20.9	C	29.3	C	22.3	C	36.4	D
25. US 101 S/Rowland Blvd	9.0	A	13.0	B	11.2	B	17.4	B
26. US 101 N/Rowland Blvd	16.7	B	30.4	C	18.5	B	34.1	C
27. Rowland Blvd/Rowland Way	8.2	A	15.2	B	8.3	A	14.8	B
28. Rowland Blvd/Vintage Way	5.9	A	17.6	B	9.3	A	20.5	C
29. S Novato Blvd/Sunset Pkwy	29.2	C	21.5	C	38.9	D	24.3	C
30. S Novato Blvd/Redwood Blvd	**	**F**	33.7	D	**	**F**	**40.2**	**E**
Mitigated: Traffic Signal	-	-	-	-	46.6	D	17.3	B
Mitigated: Roundabout	-	-	-	-	10.9	B	7.4	A
31. Ignacio Blvd/Alameda del Prado	19.1	B	16.6	B	18.8	B	16.6	B
32. US 101 S/Ignacio Blvd-Enfrente Rd	29.0	C	22.1	C	32.7	C	23.6	C
33. US 101 N/Bel Marin Keys Blvd-Nave Dr	20.2	C	20.9	C	31.7	C	24.0	C
34. Bel Marin Keys Blvd/Commercial Blvd	7.3	A	16.9	B	7.4	A	16.3	B
35. Bel Marin Keys Blvd/Digital Dr	12.4	B	24.8	C	12.2	B	23.2	C
36. US 101 N/Nave Dr	13.6	B	13.1	B	15.5	B	14.6	B
37. Nave Dr/Hamilton Center	7.0	A	11.7	B	8.8	A	14.9	B
38. Nave Dr/N Hamilton Pkwy	16.0	B	17.0	B	18.0	B	18.5	B
39. Nave Dr/Main Gate Dr	9.9	A	9.7	A	13.1	B	15.3	B
40. Nave Dr/Bolling Dr	12.7	B	16.2	B	17.5	B	21.7	C
41. Alameda del Prado/Nave Dr (Overpass)	21.2	C	14.8	B	32.1	D	19.2	C

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; ** = delay greater than 120 seconds;
Bold text = deficient operation; Shaded cells = conditions with recommended improvements; SB=Southbound

Table 2 – Cumulative with Project Alternative Peak Hour Intersection Levels of Service

Study Intersection *Approach*	AM Peak		PM Peak	
	Delay	LOS	Delay	LOS
1. San Marin Dr/Simmons Ln	**63.9**	**F**	**	**F**
Mitigated: Traffic Signal	19.4	B	22.2	C
Mitigated: Roundabout	13.9	B	28.6	C
2. San Marin Dr/W Campus Dr	5.5	A	9.2	A
3. San Marin Dr/E Campus Dr	6.4	A	11.9	B
4. Redwood Blvd/San Marin Dr	36.2	D	**	**F**
Mitigated: Widen overpass and SB Redwood Blvd; modify intersection	30.4	C	48.0	D
5. US 101 S/San Marin Dr	25.5	C	20.8	C
6. US 101 N/Atherton Ave	25.8	C	**65.3**	**E**
Mitigated: Widen to provide dual left-turn lanes	31.9	C	36.4	D
7. Redwood Blvd/Olive Ave	31.2	C	36.8	D
8. Redwood Blvd/Grant Ave	17.3	B	25.1	C
9. Novato Blvd/San Marin Dr-Sutro Ave	**39.0**	**E**	**	**F**
Mitigated: Traffic Signal	26.4	C	28.5	C
Mitigated: Roundabout	8.9	A	11.9	B
10. Wilson Ave/Novato Blvd	26.3	C	22.2	C
11. Simmons Ln/Novato Blvd	52.0	D	14.8	B
12. Grant Ave/Novato Blvd	17.1	B	14.3	B
13. 7th St-Tamalpais Ave/Novato Blvd	21.1	C	32.0	C
14. Diablo Ave/Novato Blvd	**61.2**	**E**	**111.4**	**F**
Mitigated: Add SB left-turn lane and modify intersection	37.0	D	39.6	D
15. Redwood Blvd/Diablo Ave-DeLong Ave	42.2	D	46.2	D
16. DeLong Ave/Reichert Ave	22.2	C	25.8	C
17. US 101 S/DeLong Ave	22.6	C	23.8	C
18. US 101 N/DeLong Ave	12.1	B	25.1	C
19. Redwood Blvd/Lamont Ave	10.6	B	11.2	B
20. Redwood Blvd/Landing Ct	6.9	A	5.4	A
21. S Novato Blvd/Center St	15.9	B	20.0	C
22. S Novato Blvd/Arthur St	18.3	B	14.0	B
23. S Novato Blvd/Rowland Blvd	51.5	D	40.2	D
24. Redwood Blvd/Rowland Blvd	22.3	C	43.9	D
25. US 101 S/Rowland Blvd	11.6	B	20.4	C
26. US 101 N/Rowland Blvd	20.0	B	35.1	D

Table 2 – Cumulative with Project Alternative Peak Hour Intersection Levels of Service

Study Intersection *Approach*	AM Peak		PM Peak	
	Delay	**LOS**	**Delay**	**LOS**
27. Rowland Blvd/Rowland Way	8.4	A	15.1	B
28. Rowland Blvd/Vintage Way	9.4	A	21.2	C
29. S Novato Blvd/Sunset Pkwy	39.1	D	24.3	C
30. S Novato Blvd/Redwood Blvd	**	**F**	**48.8**	**E**
Mitigated: Traffic Signal	46.8	D	17.5	B
Mitigated: Roundabout	12.7	B	7.7	A
31. Ignacio Blvd/Alameda del Prado	19.1	B	17.2	B
32. US 101 S/Ignacio Blvd-Enfrente Rd	33.7	C	24.3	C
33. US 101 N/Bel Marin Keys Blvd-Nave Dr	33.3	C	24.6	C
34. Bel Marin Keys Blvd/Commercial Blvd	7.6	A	16.8	B
35. Bel Marin Keys Blvd/Digital Dr	12.3	B	25.1	C
36. US 101 N/Nave Dr	15.8	B	15.0	B
37. Nave Dr/Hamilton Center	8.9	A	16.8	B
38. Nave Dr/N Hamilton Pkwy	18.0	B	19.1	B
39. Nave Dr/Main Gate Dr	13.2	B	15.4	B
40. Nave Dr/Bolling Dr	17.4	B	22.0	C
41. Alameda del Prado/Nave Dr (Overpass)	33.6	D	19.6	C

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; ** = delay greater than 120 seconds; **Bold** text = deficient operation

Roadway Segment Operation

Table 3 – Existing and Existing plus Project Alternative PM Peak Hour Roadway Segment LOS

Study Segment Direction	Existing		Existing plus Project	
	Speed	LOS	Speed	LOS
Novato Boulevard – San Marin Drive to Eucalyptus Avenue				
Eastbound	29	A	28	A
Westbound	27	A	25	A
Novato Boulevard – Eucalyptus Avenue to Diablo Avenue				
Eastbound	22	B	20	B
Westbound	27	A	26	A
S. Novato Boulevard – Diablo Avenue to US 101				
Northbound	26	A	22	B
Southbound	30	A	30	A
Bel Marin Keys Drive – US 101 to Digital Drive				
Eastbound	18	C	18	C
Westbound	19	C	19	C

Notes: Speed is measured in miles per hour; LOS = Level of Service

Table 4 – Cumulative with Project Alternative PM Peak Hour Roadway Segment Levels of Service

	Speed	LOS
Novato Boulevard – San Marin Drive to Eucalyptus Avenue		
Eastbound	26	A
Westbound	21	B
Novato Boulevard – Eucalyptus Avenue to Diablo Avenue		
Eastbound	18	C
Westbound	25	A
S. Novato Boulevard – Diablo Avenue to US 101		
Northbound	21	B
Southbound	29	A
Bel Marin Keys Drive – US 101 to Digital Drive		
Eastbound	17	C
Westbound	19	C

Notes: Speed is measured in miles per hour; LOS = Level of Service

Freeway Operation

Table 5 – Peak Hour Freeway Operation within City of Novato

Freeway Segment	Existing Conditions		Existing plus Project Alternative	
	AM	PM	AM	PM
US 101 Northbound				
Density	12.0	28.2	13.4	**30.8**
LOS	B	F[1]	B	**F**[1]
US 101 Southbound				
Density	39.1	17.7	**41.1**	19.6
LOS	F[1]	B	**F**[1]	C
SR 37 Eastbound				
Density	7.9	18.2	8.2	18.9
LOS	A	C	A	C
SR 12 Westbound				
Density	17.4	9.8	18.0	10.4
LOS	B	A	B	A

Notes: Density is measured in passenger cars per mile per lane; LOS = Level of Service; **Bold** values = Project increases density by greater than 1% on segment operating at LOS E or worse; [1] Per HCM guidance, LOS F is reported if one or more individual components of the freeway operates at LOS F, even if the freeway segment overall has an average density that indicates a higher LOS

Table 6 – Cumulative with Project Alternative Peak Hour Freeway Operation within City of Novato

Freeway Segment	AM	PM
US 101 Northbound		
Density	14.6	32.8
LOS	B	F[1]
US 101 Southbound		
Density	46.3	19.9
LOS	F	C
SR 37 Eastbound		
Density	8.7	21.1
LOS	A	C
SR 12 Westbound		
Density	19.5	11.2
LOS	C	B

Notes: Density is measured in passenger cars per mile per lane; LOS = Level of Service; [1] Per HCM guidance, LOS F is reported if one or more individual components of the freeway operates at LOS F, even if the freeway segment overall has an average density that indicates a higher LOS

Table 3 Cumulative Projects List

Project Name/Applicant	Project Location	Description
Projects Located at San Marin High School		
Stadium Field Re-turf	15 San Marin Dr., Novato, CA 94945	Replacement of 12-year-old turf (useful life of 8-10 years), construction completed August 2018
Stadium Press Box	15 San Marin Dr., Novato, CA 94945	Project replaced an existing approx. 410 sq. ft., 19-foot tall press box/snack bar structure with a new 8 x 28 feet (224 sq. ft.) prefabricated building elevated on a platform 9.5 feet above the ground (total height about 23 feet) on the same site. No new lighting or sound system was included in the project.
Performing Arts Building	15 San Marin Dr., Novato, CA 94945	The project will replace the current PAC theater with a new building approximately 1,545 sq. ft. larger than the existing building. The structure will be a total of 8,010 sq. ft. with the capacity to seat 217, the same capacity as the existing PAC theater.
STEM Classroom Building	15 San Marin Dr., Novato CA 94945	The project would replace five existing portable classrooms with a single-story, 24-foot-high STEM building and associated improvements including a courtyard, outdoor project area, and landscaping. The building would contain approximately 18,466 sq. ft. of space. There would be ten classroom/labs, and three tables to create an additional outdoor classroom space. The classrooms would provide capacity for 320 students but would not increase enrollment.
Second Multi-Sport Turf Field	15 San Marin Dr., Novato CA 94945	No schematic design has been prepared for this project; however, it is confirmed that no lighting is proposed. In addition, no funding is identified/allocated for this project at the time of this writing.
Remodel of Current "Academy Building" into Maker Space	15 San Marin Dr., Novato CA 94945	This project involves internal improvements to the existing structure.
Various Misc. Improvements	15 San Marin Dr., Novato CA 94945	Internal renovations to buildings within the high school.
Projects Located within the City of Novato		
Novato Blvd. Improvement Project	Portions of Novato Blvd. between Diablo Ave. and Grant Ave.	City capital project to widen road, including bicycle lanes.
The Square Shopping Center	2001 Novato Blvd.	Mixed use project including renovation of 74,118 sq. ft. of commercial space, demolition of 28,246 sq. ft. of existing commercial space, and addition of 53 apartment units (11 affordable), and 218 on-site and 46 off-site parking spaces. New structures include a mixed-use building at the rear of the site that is 3 stories, up to 42' high, and new 2-story apartments fronting Novato Blvd.
Oakmont Senior Living	1461 S. Novato Blvd.	Development of a 78 room senior assisted living facility, featuring 50 assisted living units and 28 memory care rooms. The facility is proposed at 72,000 square feet and 2-stories in height.
Hamilton Square	970 C St.	31 townhomes in eight, 3-story buildings, and one, two-story building, 6 of which are affordable.

Project Name/Applicant	Project Location	Description
Atherton Place	7533 and 7537 Redwood	1,340 of retail space fronting Redwood Boulevard and 50 residential townhome units. Townhomes would be 2-stories over garage.
Laurel Ridge Senior Apartments	7711 Redwood Blvd.	100 senior apartments in a single 3-story buildings with a basement parking garage, including 20 affordable units.
Wood Hollow Hotel	7701 Redwood Blvd.	Four-story hotel building of 56,430 square-feet, with 87 to 95 rooms. Parking includes a combination of surface stalls (64 cars) and a basement garage (23 cars).
Bahia Heights	End of Misty Ct.	Single-family residential subdivision proposing 9 residences.
Hamilton Cottages	Hamilton Pkwy. West of Marblehead Lane	16 single-family, 2-story residences for senior occupancy, including 2 affordable for-sale homes at the moderate income level.
Landing Court	No address	34 new multi-family units in 2- and 3-story buildings, of which 7 are affordable units.
North Bay Children's Center	933 C St.	Renovate the existing day care center with a new 19,824 sq. ft. building and site amenities.
Former Bridgepoint Academy	1787 Grant Ave.	35 new multi-family units in 2 and 3- story buildings, including 7 affordable units.
Stone Tree Golf Course		Driving range on Marin County Flood Control District Property
McPhail's Office Amendments		Amend General Plan land use designation from BPO to LIO. Master Plan and Precise Development Plan amendments to allow wider range of office and light industrial uses.
Hyppolite Accessory Structure	1468 S. Novato Blvd.	Review of as-built accessory structure in rear yard.
Mohajer Land Division & Variance	1037 Simmons Ln.	Proposed 3 lot land division. Request for variance to allow non-conforming lot area and depth.
Schafer Stream Management Plan	896 Sutro Ave.	Request for use permit to allow the retention of Redwood trees in Stream Protection Zone.
Galvan Use Permit	15 Hamilton Dr.	Request for a use permit to allow outdoor storage of materials for art projects.
Chase Bank Pacheco Plaza	404 Ignacio Blvd.	Request to demolish existing bank building (vacant) and construct new bank of same size.
Muha Accessory Structure	823 Hayden Ave.	Request for design review approval to construct a 484 sq. ft. detached garage on a hillside parcel. Snyder Art Studio
Snyder Art Studio	6 Conchita	Construction of a 399 sq. ft. art studio on a hillside parcel.
McGuire Residence Addition	40 Baywood Cir.	583 sq. ft. first floor addition, 210 sq. ft. garage addition, and new pool and retaining walls on a hillside parcel.
DM Elite Properties	1108 Second St.	Conversion of an existing residence to an accessory dwelling unit and construction of a new primary single family residence.
Ghany Live/Work Unit	Bolling at Marin Valley	Request for entitlements to construct a live/work unit of approximately 1,700 sq. ft.

Project Name/Applicant	Project Location	Description
Johnson Residence Addition	753 Bradley Ave.	Second story addition of 685 sq. ft.
Hamilton Hospital Assisted Living Facility	516 Hospital Dr.	Senior assisted living facility and memory care center at the former Hamilton Hospital.

Source: City of Novato Current Planning Projects, Projects Under Review and In Process, November 2016, and NUSD 2019

Table 4 Cumulative Projects Summary

Land Use	Development
Residential Units	328 units
Non-Residential Space	171,260 square feet

Source: See Table 3

This analysis considers the relevance of the cumulative projects in light of the geographic scope of the specific resource area for which impacts may occur. For instance, cumulative aesthetic impacts are generally limited to potential projects within the immediate viewshed or line-of-sight of the stadium lights or potential projects that would affect the visual character of the immediately surrounding neighborhood, whereas cumulative traffic impacts consider other potential projects within a broader geographic scope. There are seven recently completed, planned or pending projects on the San Marin High School property. The closest project to San Marin High School property within the City of Novato is the mixed-use project at The Square Shopping Center (2001 Novato Boulevard) approximately 1.2 miles east of the project site.

3.3 Cumulative Impact Analysis

Aesthetics

As discussed in Section, *Cumulative Impacts*, proposed and pending development in the City of Novato, and surrounding areas would include at least 151,294 square feet of non-residential development and 328 residential units. In some cases, new cumulative development projects would alter the aesthetic character of the City by introducing larger structures with greater development intensity. As discussed in Chapter 3, there are no cumulative projects within one mile of the project site, with the exception of new performing arts and STEM classroom buildings and other minor improvements at San Marin High School. Therefore, there are no projects within the viewshed of the project that would substantially affect visual character and quality. Therefore, impacts associated with the proposed project would not combine with other projects to cumulatively impact the aesthetics of the area. Furthermore, the proposed lighting and PA systems also would not represent an increase in development intensity in these areas. In addition, as discussed in Impacts AES-3 through AES-5 in Section 2, *Aesthetics*, the stadium lighting system would not generate light trespass approaching the threshold of 5 lux in the CIE's E2 zone for rural areas, would not subject nearby residents to excessive discomfort glare or expose pedestrians and motorists to "disability glare" that reduces visibility, and would not substantially contribute to marine layer sky glow or clear sky glow during nighttime hours in the area. The cumulative project to convert a baseball field to a lighted soccer/lacrosse field at San Marin High School would not involve the addition of lighting.

City of Novato

Request for Proposals
for
Traffic Study of Pedestrian and Bicyclist Safety in San Marin High School Area

CITY OF NOVATO
PUBLIC WORKS

Respond By
2:00 p.m., July 24, 2019
to
Gosia Woodfin, Engineer
City of Novato
Department of Public Works
922 Machin Avenue
Novato, CA 94945

For additional information, contact Gosia Woodfin at the Engineering Division, Department of Public Works, (415) 899-8997; gwoodfin@novato.org.

TABLE OF CONTENTS

CITY OF NOVATO

REQUEST FOR PROPOSALS
TRAFFIC STUDY OF PEDESTRIAN AND BICYCLIST SAFETY
IN SAN MARIN HIGH SCHOOL AREA

SECTION 1 - NOTICE OF REQUEST FOR PROPOSALS

1.1 Notice

NOTICE IS HEREBY GIVEN that the CITY OF NOVATO (hereinafter referred to as "CITY") requests Proposals for the above-stated project, and such Proposals to be considered shall be delivered to the front counter, attn.: Gosia Woodfin, located on the 1st floor at 922 Machin Avenue, Novato, CA 94945, up to the hour of 2:00 p.m. the day of Wednesday, July 24, 2019.

1.2 Services

The work to be done is more particularly described in the CITY's proposed contract language set forth in Section 2 of this Request for Proposals. Copies of the Request for Proposals are available for download from the City's website at www.novato.org, (click on the "Business" tab near the top of the page and select "Doing Business with the City" in the drop-down menu).

The general scope of work includes preparation of report consisting of traffic study and recommendations to improve the intersection near San Marin High School area.

1.3 Affirmative Action (CONSULTANT)

The CONSULTANT to whom the Consultant Services Agreement (Agreement) is executed, and any subcontractor under him/her, shall be required to take affirmative action to ensure that minority and women business enterprises will be afforded full opportunity to submit Proposals for subcontracts to the maximum extent feasible. Furthermore, there shall be no discrimination in employment practices on the basis of race, religious creed, color, national origin, ancestry, physical handicap, medical condition, marital status, or sex.

1.4 Affirmative Action (CITY)

The CITY hereby affirmatively ensures that minority, or women business enterprises will be afforded full opportunity to submit proposals in response to this notice and will not be discriminated against on the basis of race, religious creed, color, national origin, ancestry, physical handicap, medical condition, marital status, or sex.

The CITY reserves the right to reject any and all Proposals, and to waive any irregularity.

By: _____ 7/8/19

Christopher Blunk, P.E., Public Works Director

Date: July 8, 2019

SECTION 2 – PROPOSED PROJECT SCOPE

2.1 Summary

The CITY proposes to improve the intersection of Novato Boulevard and San Marin Drive/Sutro Avenue for pedestrian and bicyclist safety. This intersection has high volumes of students walking and biking to and from San Marin High School but does not have crosswalks, curb ramps, bike lanes, or sidewalks in all directions.

The August 2017 Traffic Memorandum prepared as a part of the Draft Novato General Plan 2035 Update identified the same intersection (Novato Boulevard and San Marin Drive/Sutro Avenue) as currently operating at Level of Service (LOS) F--breakdown flow conditions--during afternoon peak hour traffic. This current condition violates the city's minimum operating standard of LOS D for intersections with signals or four-way stop signs.

The purpose of this project is to:

- Study the traffic, bicycle, and pedestrian operations of the intersection;
- Prepare recommendations for improvements, develop conceptual designs.

Study area includes the intersection of San Marin Drive/Sutro Avenue and Novato Boulevard and the corridor approaches within half a mile.

2.2 Scope of Services

The required scope of services includes the following tasks, at a minimum.

2.2.1 Project Initiation

CONSULTANT will meet with CITY staff, obtain all relevant background and studies, and contact Novato Unified School District to obtain information about potential improvements to the high school campus.

2.2.2 Data Collection

The following traffic data is needed:

- New intersection turning movement counts in the AM, PM, and school peak periods. Counts shall be collected while school is in session, Tuesday, Wednesday, or Thursday. Pedestrian and bicycle counts shall be included;
- New turning movement counts midday during weekend at the intersection Copper Hill Way/Dogbone Meadow Park and Novato Blvd;
- Speed data on four corridor approaches;
- 24-hour intersection approach counts;
- Initial queue at study intersections during all three peaks;
- San Marin High School Driveway counts (5).

2.2.3 Vehicle Traffic Operations Analysis

- Collision history for corridors and the study intersection shall be evaluated looking for patterns;

- LOS shall be calculated, and adequacy determined;
- Traffic signal and roundabout warrants shall be performed for the study intersection.

2.2.4 Walking Audit

- A Safe Routes To School (SRTS) type walking audit shall be performed to identify safety issues generated by student commute activities. This shall focus on the corridors but shall also identify problems that originate within the campus;
- Potential SRTS improvements that could benefit the intersection or corridors shall be identified.

2.2.5 Pedestrian Analysis

- Existing pedestrian facilities shall be inventoried at the study intersection and along the corridors, including sidewalks, sidewalk gaps, curb ramps, crosswalks, crosswalk controls, crossing guards, and warning signs;
- Pedestrian safety improvements shall be identified;
- Pedestrian Hybrid Beacon/ RRFB warrants shall be conducted for the study intersection and for the intersection Copper Hill Way/Dogbone Meadow Park and Novato Boulevard;
- Multiple alternatives for pedestrian safety improvements shall be proposed. Recommendations shall include short-term, mid-term, and long-term improvements.

2.2.6 Bicycle Analysis

- Existing bicycle facilities shall be inventoried at the study intersection and along the corridors, including bike lanes, bike lane gaps, bike parking, and any other bike facilities;
- Bicycle safety improvements shall be identified;
- Multiple alternatives for bicycle safety improvements shall be proposed. Recommendations shall include short-term, mid-term, and long-term improvements.

2.2.7 Transit Analysis

- Existing transit facilities shall be inventoried along the corridors and at the study intersection;
- Observations of bus operations shall be noted;
- Transit companies shall be contacted to determine which bus stops do not meet current design guidelines;
- Modifications to bus stops shall be proposed if appropriate. Recommendations shall include short-term, mid-term, and long-term improvements.

2.2.8 Alternatives Development

- Pedestrian and bicyclist safety improvements shall be developed, and conceptual plans prepared;
- Based on discussions and feedback from the CITY a recommended phased approach to these improvements shall be developed.

2.2.9 Report

- A draft report containing the findings, analysis and recommendations shall be prepared, conceptual plans shall be included;
- A final report shall be prepared and submitted after review. Three hard copies and one electronic copy shall be provided.

2.3 Project Schedule

Data collection shall be completed in September and/or October 2019 and the final report shall be submitted in January 2020.

2.4 City Staff Support

The CITY will assign a project engineer who will manage the overall execution of the project and provide coordination services.
City staff will prepare necessary staff reports to the City Council, neighborhood groups or other entities.

SECTION 3 – INSTRUCTIONS FOR SUBMITTING PROPOSALS

3.1 Delivery of Proposals

It is the CONSULTANT'S responsibility alone to ensure that the proposal is received by the City of Novato (hereinafter referred to as the "CITY") prior to the date and hour of the opening of Proposals specified in the Notice of Request for Proposals. Any Proposals received by the CITY after that hour and date shall be returned unopened.

The contract will be administered by the CITY's Department of Public Works. To respond to this RFP, an interested party must submit

- **five (5)** copies of the Technical Proposal (marked TRAFFIC STUDY OF PEDESTRIAN AND BICYCLIST SAFTY IN SAN MARIN HIGH SCHOOL AREA - on the outside);
- **one electronic version** (via email or CD/flash drive included with proposal);
- **one (1)** copy of the Cost Proposal (marked 'COST PROPOSAL, TRAFFIC STUDY OF PEDESTRIAN AND BICYCLIST SAFTY IN SAN MARIN HIGH SCHOOL AREA - on the outside of a separate envelope)

to the following mailing address to be received no later than 2:00 p.m. July 24, 2019 (late proposals will not be considered):

City of Novato
Department of Public Works
Engineering Division
Attn: Gosia Woodfin, Project Engineer
922 Machin Avenue 1st Floor
Novato, CA 94945

3.2 Proposal Documents

In general, the Proposal consists of a detailed technical proposal, and a separate sealed cost proposal. All proposal documents shall be printed in ink clearly and legibly in conformance with the instructions for submitting proposals. The proposal shall be signed by an authorized agent of the CONSULTANT.

Unnecessarily elaborate or glossy proposals are neither expected nor desired. The emphasis of the proposal shall be on responding to the requirements set forth in this Request for Proposals.

Submittals must address all information requested in this RFP. Respondents may add information not requested in this RFP, but the information should be in addition to, not instead of, the requested information and format.

The CONSULTANT shall include, at a minimum, the following information presented in a clear and concise format, in order to demonstrate the CONSULTANT'S competence and professional qualifications for the satisfactory performance of the services required:

3.2.1 Project Approach/Work Plan

A detailed description of the project approach/work plan by which the CONSULTANT intends to perform the work set forth in the Scope of Services. The approach may elaborate on the specific tasks described in the Scope of Services or identify alternative tasks or the sequencing of tasks.

3.2.2 Recent Projects

A list of the most relevant projects completed, or ongoing, for the last three years for which the CONSULTANT has performed similar work of similar size, scope, and complexity for public agencies. This list shall include the names, addresses, and phone numbers of the agency contact person as well as a description of the work performed; the dollar amount of the contract; and the date of completion.

3.2.3 Qualifications of CONSULTANT

Submit an organizational chart depicting the CONSULTANT'S principals, employees, agents, and subcontractors/sub-consultants which the CONSULTANT anticipates assigning to this project. Provide the names of consultant's project manager and the individual authorized to negotiate the contract on behalf of the consulting firm.

This list shall include a summary of the qualifications, licenses, and experience of each individual on the proposed team. Key team members identified in the proposal shall not change (be different than) in the executed contract. Provide a staffing plan depicting the approximate number of hours each team member will devote to the project; and the type of work to be performed by each individual. The CITY will retain under its Agreement with the successful CONSULTANT the right of approval of all persons performing work under the Agreement.

3.2.4 Proposal Cost and Project Schedule

The CONSULTANT'S proposal should include, at a minimum, the following proposed items:

- The Project Schedule: The CONSULTANT shall prepare a project schedule depicting the required tasks and subtasks to be performed within the time period specified; milestones and expected dates of key deliverables; reasonable City review time; and an overall completion date.

- Proposal Cost: The CONSULTANT should submit a detailed cost proposal to provide the entire scope of services. The proposal should specify the major work components, the cost breakdown by major component or phase, and the expected time of completion for each component based on the scope of work outlined in the proposal.

Provide an hourly rate/ fee schedule for staffing assigned to this project as well as other available services. Items such as administration charges, sub-consultant mark-ups, consumables, reproduction costs, etc., and any other terms or conditions shall be identified in the cost proposal.

3.2.5 Acknowledgement of City's Consultant Service Agreement and Insurance Requirements

A copy of the CITY's Consultant Service Agreement (CSA) is attached for your reference and review. The necessary insurance coverages and limits are contained in this contract. Please indicate acceptance of these terms in your qualification's submittal or identification of requested changes. By submitting a qualification statement without exception, the CONSULTANT accepts all terms and conditions contained in attached agreement. The CITY reserves the right to reject any qualification that provides changes to the agreement not acceptable to the CITY. The selected CONSULTANT will be asked to enter an agreement using the attached CSA.

3.2.6 Insurance Certificate

A copy of an insurance certificate, or a letter of intent to provide insurance from the issuing company (including a description of types of coverage and dollar amount limits) providing the minimum coverage described in the Request for Proposal must be submitted.

The City Attorney-approved standard insurance forms and certificates are attached to this RFP. Time is of the essence for this project. Any major deviation and/or alteration to the provisions of these standard forms and certificates will result in the Proposal receiving a lower rating in the evaluation process.

CONSULTANT may elect to use Acord Certificate forms in lieu of the CITY's forms, but Exhibit B-1 must be completed by CONSULTANT'S provider. In addition, the Worker's Compensation and Employer's Liability certificate must include a special endorsement with a Waiver of Subrogation (see Exhibit B-5 of the example CSA attached).

3.2.7 Statement of Conflicts of Interest

A statement which discloses any past ongoing or potential conflicts of interest which the CONSULTANT may have as a result of performing the work for this project.

3.3 Review of Proposals

After the Proposals are received and opened by the assigned Engineer, the Public Works Director will designate a selection committee which shall review and evaluate all Proposals for responsiveness to the Request for Proposals in order to determine whether the CONSULTANT possesses the professional qualifications necessary for the satisfactory performance of the services required. The Director shall also investigate qualifications of all CONSULTANTS to whom the execution of an Agreement is contemplated.

It is anticipated that this review period will last approximately 5 business days.

In reviewing the Proposals, the CITY will consider the following criteria:

3.3.1 Understanding
CONSULTANT'S understanding of the work to be completed based upon the clarity of the proposal and responsiveness to these Instructions for Submitting Proposals.

3.3.2 Experience and Past Performance
The experience and past performance of the CONSULTANT and its agents, employees and sub-consultants in completing projects of a similar type, size, and complexity. The CITY shall consider CONSULTANT'S timely and accurate completion of similar projects within budget.

3.3.3 Quality of Staff/Sub-consultants
The experience and qualifications of the CONSULTANT's proposed staff for this project, including sub-consultants in completing projects of a similar type, size, and complexity.

3.3.4 Agreement
CONSULTANT'S alterations, additions, and/or deletions to the language in the CITY's standard Consultant Services Agreement. Such changes could result in a lower rating for the Proposal.

The CITY will evaluate the proposals using the analysis and rating sheet provided in SECTION 4.

3.4 General Conditions

The issuance of this RFP constitutes only an invitation to present responses. The CITY reserves the right, at its sole discretion, to determine whether or not any aspect of the response satisfactorily meets the criteria established in the RFP. The CITY reserves the right to seek additional information and/or clarification from the CONSULTANT, the right to confer with any CONSULTANT submitting a response and the right to reject any or all responses with or without cause. In the event that the RFP is

withdrawn by the CITY for any reason, the CITY shall have no liability to any respondent for any costs or expense incurred with the preparation of this RFP or related work. The CITY reserves the right, at its sole discretion, to waive any irregularities or informality. The CITY may conduct interviews with any respondent it deems necessary.

In order to minimize the potential for a conflict of interest or unfair competitive advantage, CONSULTANTS must be aware that if they enter into a contract with the CITY to provide services sought by this RFP, the CITY reserves the right, in its sole discretion, to disqualify them from later serving as a consultant, advisor or sub-consultant to others for the project for which the consultant, advisor or sub-consultant provided services to the CITY.

The CITY reserves the right to reject any and all responses for failure to meet the requirements contained herein, to waive any technicalities and to select the responses which, in the City's sole judgment, best meets the requirements of the project.

A copy of the CITY's Consultant Services Agreement is attached for your reference and review. The necessary insurance coverages and limits are contained in this contract. Please indicate acceptance of these terms. By submitting a proposal without exception, the CONSULTANT accepts all terms and conditions contained in attached agreement. The CITY reserves the right to reject any proposal that provides changes to the agreement not acceptable to the CITY. (If the attached Consultant Services Agreement has been revised by the CITY, the CONSULTANT accepts all terms and conditions of the revised contract.)

3.5 Execution of Agreement

It is the CITY's intent to execute an agreement based on the proposal only. Upon completion of the review period, the Director shall notify the CONSULTANT whose proposal will be considered for further evaluation and negotiation. The CONSULTANT so notified shall be required to negotiate in good faith and in an expeditious manner to enter into the agreement. Any delay caused by CONSULTANT'S failure to negotiate in this manner may lead to a rejection of the proposal.

The CITY reserves the right to reject any or all proposals and to waive any irregularity. The execution of the agreement, if made by the CITY, will be based upon a total review and analysis of each proposal.

If the CITY determines, after further evaluation and negotiation, to recommend to the City Council that an agreement be executed, a Notice of Contract Terms, (including but not limited to consultant services agreement, insurance documents, city business license, etc) will be sent to the successful CONSULTANT for the CONSULTANT'S signature. No proposal shall be binding upon the CITY until after the agreement is approved by the City Council and is signed by duly authorized representatives of both the CONSULTANT and the CITY.

SECTION 4 – CONSULTANT SELECTION CRITERIA

The proposal will be scored against each other using the following rating sheet.
Selection will be based on the highest total weighted score (100 points maximum).

Criteria	Maximum	
Understanding of the work to be done	30	
Experience with similar kinds of work	20	
Quality of staff for work to be done	20	
Agreement - Contractual Compliance	10	
Total fees	10	
Fee schedule	10	
Total	100	

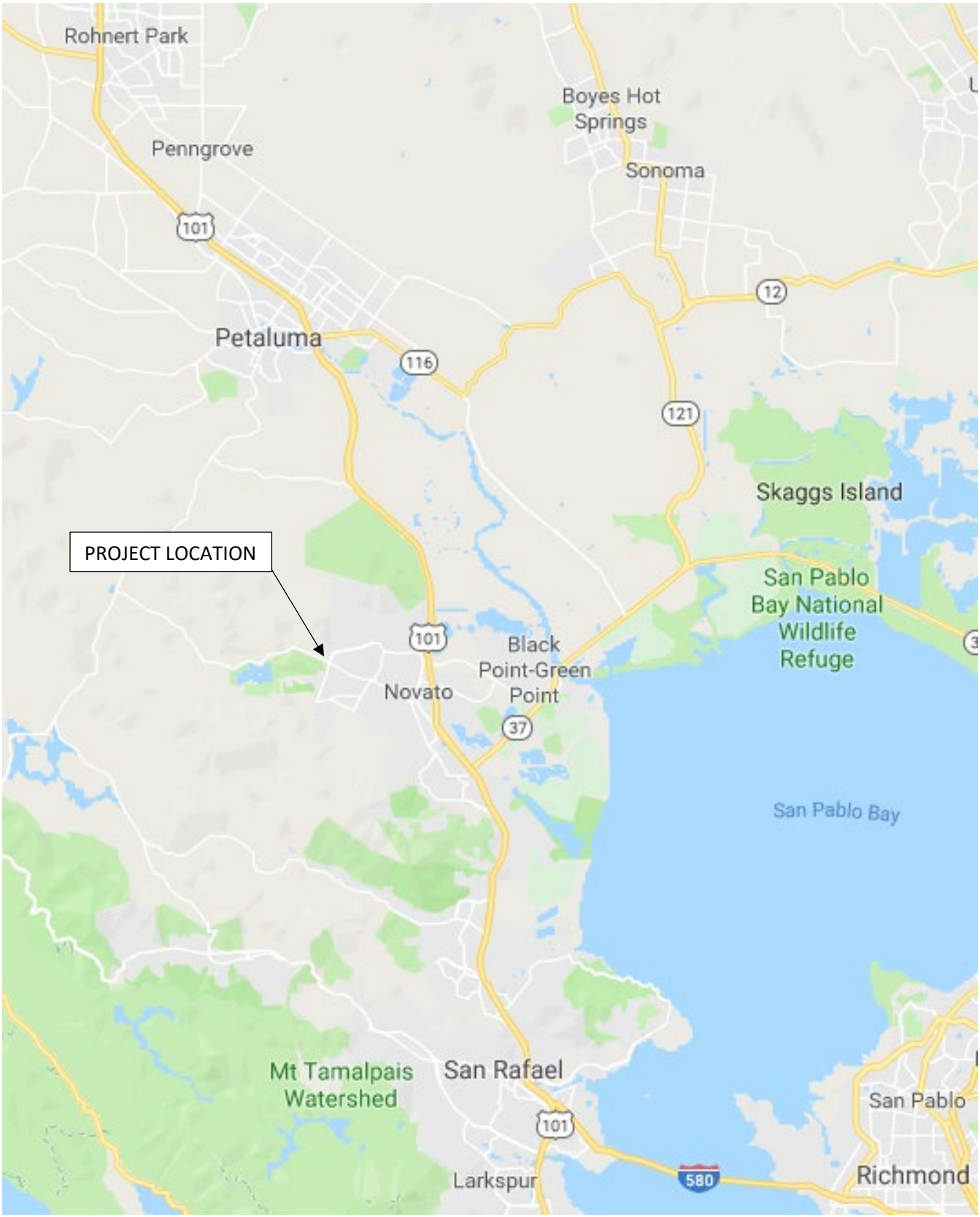
SECTION 5 - APPENDICES

Appendix A – Plans:

- Vicinity Map
- Project Location

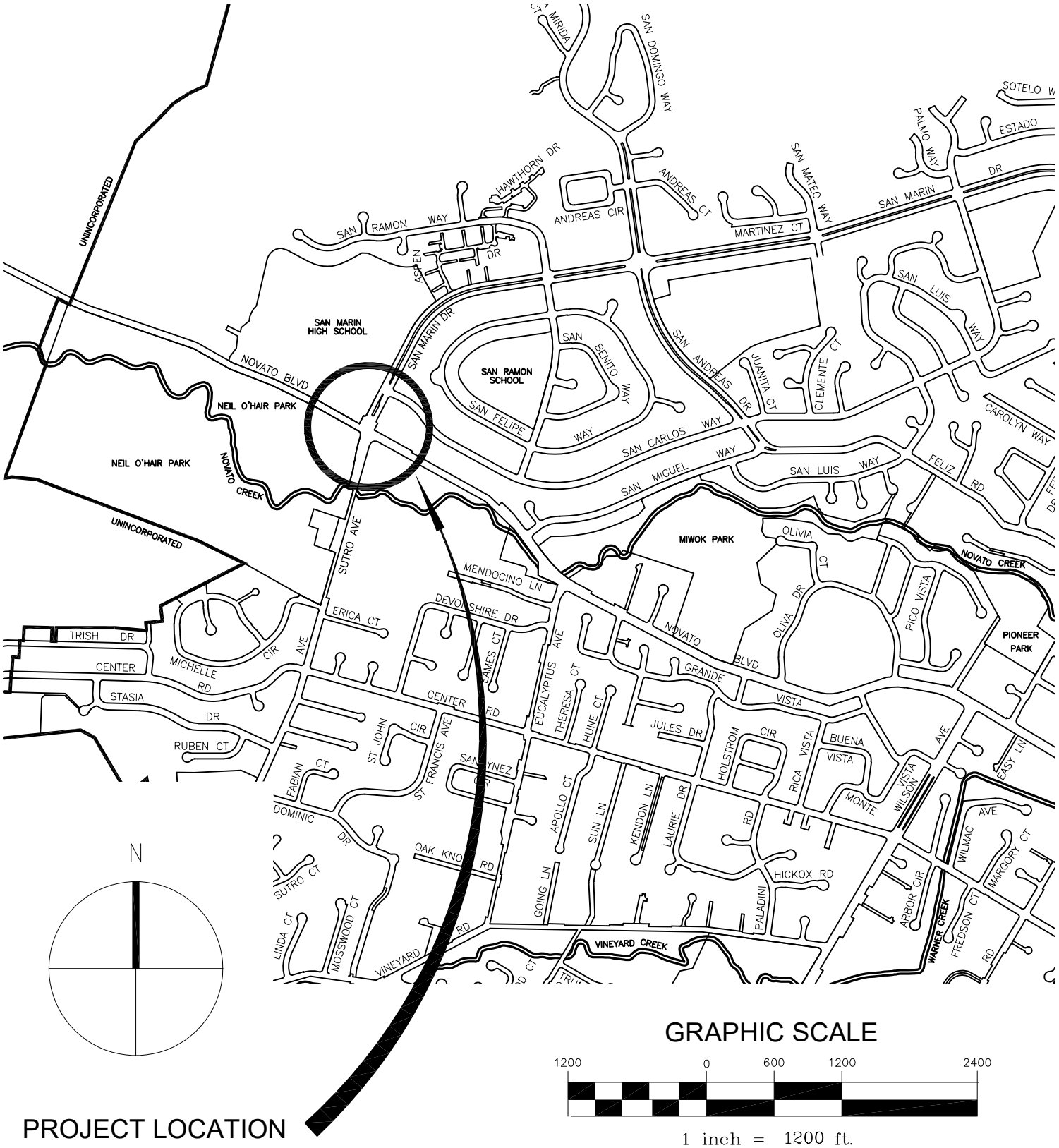
Appendix B – Consultant Services Agreement:

- Agreement
- Insurance
- Business License Application and Fee Schedule (not included, available on the city of Novato website: http://novato.org/business/business-licenses)



VICINITY MAP

PROJECT NAME: Intersection Improvements at Novato Blvd and San Marin-Sutro



GRAPHIC SCALE

1200 0 600 1200 2400

1 inch = 1200 ft.

PROJECT LOCATION

PROJECT NAME: Intersection Improvements at Novato Blvd and San Marin-Sutro

LOCATION MAP

Appendix B

CONSULTANT SERVICES AGREEMENT

THIS AGREEMENT for $_____is entered into as of the _____ day of August 2019, through _____, 2019 by and between the CITY OF NOVATO, a municipal corporation (hereinafter referred to as "City") and _____ (hereinafter referred to as "Consultant").

WHEREAS, City desires to obtain professional services in connection with a traffic study and recommendations to improve the intersection of Novato Boulevard and San Marin Drive/Sutro Avenue for pedestrian and bicyclist safety; and

WHEREAS, Consultant hereby warrants to the City that Consultant is skilled and able to competently provide such services described in Section 1 of this Agreement; and

WHEREAS, City desires to retain Consultant pursuant to this Agreement to provide the services described in Section 1 of this Agreement.

NOW, THEREFORE, THE PARTIES HERETO AGREE AS FOLLOWS:

Section 1. Scope of Services. Subject to such policy direction and approvals as the City through its staff may determine from time to time, Consultant shall perform the services set out in the "Scope of Services" attached hereto as **Exhibit A** and incorporated herein by reference. Consultant shall not commence any work exceeding the Scope of Services without prior written authorization from City.

Section 2. Time of Performance.

Subsections 2.A. and 2.B. are in the alternative. For purposes of this Agreement, Subsection 2.A. [ ] 2.B. [ ] applies. (Check ONE box only.)

A. [Non Cost-Covered Services] The services of Consultant are to commence upon the execution of this Agreement and shall be undertaken and completed within the time limits set forth in **Exhibit A**. Such time limits may be amended by mutual agreement between the City and Consultant.

B. [Cost-Covered Services] Execution of this Agreement does not constitute authorization to proceed with the work described in the Scope of Services. Consultant shall not begin the work described in **Exhibit A** until after the City has issued a written Notice to Start Work, following verification by City staff that the project sponsor has deposited with the City adequate funds to pay for completion of the work described in **Exhibit A**. City and Consultant understand that it is the City's policy for routine projects to obtain full payment from development applicants prior to execution of any consultant services agreements relating to the processing of development applications. In unusual circumstances (such as large, complex projects and projects where the City is serving as the applicant), City may allow deposit of processing costs in phases. In such cases, Consultant shall not begin work on any of the tasks

described in **Exhibit A** until after the City has issued a written Notice to Start Work for that particular task. Each Notice to Start Work will specify the task authorized to be undertaken and will be issued only following verification by the City that the project sponsor has deposited with the City (or the City has budgeted) adequate funds to pay for the completion of the authorized task. For all projects, following issuance of a Notice to Start Work, the services of Consultant shall be undertaken and completed within applicable time limits set forth in **Exhibit A**. Such time limits may be amended by mutual agreement between the City and Consultant. Consultant shall not commence any work exceeding the Scope of Services without prior written authorization from City.

Section 3. Compensation and Method of Payment.

A. Compensation. Consultant shall charge for services performed in accordance with the compensation schedule incorporated in **Exhibit A**, not to exceed a total amount of $_____ (subject to adjustment as appropriate).

B. Method of Payment.

Subsections 3.B.(1) and 3.B.(2) are in the alternative. For purposes of this Agreement, Subsection 3.B.(1) [ ] 3.B.(2) [ ] applies. (Check ONE box only.)

(1) Monthly Statements. [Contract Planners, etc.] As a condition precedent to any payment to Consultant under this Agreement, Consultant shall submit monthly to the City a statement of account which clearly describes the work for which the billing is submitted.

(2) Statements Following Completion of Work Tasks. [EIR Consultants, etc.] As a condition precedent to any payment under this Agreement, Consultant shall submit to the City a detailed statement of account which clearly sets forth the designated work tasks for which the billing is submitted. Payments shall be made following completion of each of the individual work tasks described in the Scope of Services. No payments shall be made for tasks which have not been satisfactorily completed.

C. Payment. City shall review Consultant's statements and pay Consultant for services rendered hereunder at the rates and in the amounts provided hereunder in accordance with the approved statements.

Section 4. Standard of Quality. All work performed by Consultant under this Agreement shall be in accordance with all applicable legal requirements and shall meet the standard of quality ordinarily expected of competent professionals in Consultant's field of expertise.

Section 5. Ownership of Documents. All plans, studies, documents and other writings prepared by and for Consultant, its officers, employees and agents in the course of implementing this Agreement this shall become the sole property of the City upon payment to the Consultant for such work, and the City shall have the exclusive right to use such materials in its sole discretion without further compensation to Consultant or to any other party.

Section 6. Retention of Other Consultants, Specialists or Experts. Consultant will not retain or otherwise incur an obligation to pay other consultants, specialists or experts for services in connection with this Agreement without the prior written approval of the City. In addition, the persons who shall provide the services agreed to be performed hereunder by Consultant are identified below. No other person may provide services under this agreement on behalf of Consultant without the prior, written consent of the City.

Names of Persons Permitted to Perform
Under this Agreement

_____
_____
_____

Section 7. Interest of Consultant. Consultant (including principals, associates and professional employees) covenants and represents that it does not now have and shall not acquire any investment or interest, direct or indirect, in real property which is located within the area covered by this Agreement. Consultant further covenants and represents that it does not now have and shall not acquire any source of income, business entity, interest in real property or investment which would be affected in any manner or degree by the performance of Consultant's services hereunder. Consultant further covenants and represents that no person having any such investment or interest shall perform any services under this Agreement.

Consultant shall comply with the City's conflict of interest code and all other conflict of interest laws, including but not limited to the Political Reform Act of 1974 and the regulations promulgated thereunder. Without limiting the generality of the foregoing and in the event that the Consultant is a "consultant" as defined in 2 Cal. Code Regs. § 18701(a)(2) or its successor regulation and is otherwise required by the City's conflict of interest code to complete and execute the economic disclosure statement required under the City's conflict of interest code, as a condition to commencing the work described herein, Consultant shall complete, execute and deliver to the City said economic disclosure statement.

Section 8. Interest of Members and Employees of City. No member of the City Council and no other officer, employee or agent of the City who exercises any function or responsibility in connection with the review, approval or carrying out of any project to which this Agreement pertains shall have any personal interest, direct or indirect, in this Agreement, nor shall any such person participate in any decision relating to this Agreement which affects his/her personal interest or the interest of any corporation, partnership, association, or other legal entity in which he/she is directly or indirectly interested. If Consultant learns of any such interest, he/she shall promptly disclose such interest in writing to the City Manager.

Section 9. Liability of Members and Employees of City. No member of the City Council and no other officer, employee or agent of the City shall be personally liable to Consultant or otherwise in the event of any default or breach of the City, or for any amount

which may become due to Consultant or any successor in interest, or for any obligations directly or indirectly incurred under the terms of this Agreement.

Section 10. Indemnification of City. Consultant hereby agrees to defend, indemnify and hold harmless the City from and against any and all claims arising out of Consultant's breach of this Agreement and/or the willful or negligent acts, errors or omissions of Consultant relating to this Agreement. The City has no liability or responsibility for any accident, loss or damage to any work performed under this Agreement whether prior to its completion and acceptance or otherwise.

Section 11. Consultant Not an Agent of City. Consultant is not an agent of the City, and the City retains all rights of approval and discretion with respect to the projects and undertakings contemplated by this Agreement. Consultant, its officers, employees and agents shall not have any power to bind or commit the City to any decision or course of action, and Consultant, its officers, employees and agents shall not represent to any person or party that it or they are acting as agents of the City or that it or they have the power to bind or commit the City.

Section 12. Compliance with Laws.

A. General. Consultant shall comply with all applicable federal, state and local laws, code, ordinances and regulations. Consultant represents and warrants to City that it has all licenses, permits, qualifications, insurance and approvals of whatsoever nature which are legally required for Consultant to practice its profession. Consultant represents and warrants to City that Consultant shall, at its sole cost and expense, keep in effect or obtain at all times during the term of this Agreement any licenses, permits, insurance and approvals which are legally required for Consultant to practice its profession. Consultant shall, at all times during the term of this Agreement and for one year thereafter, provide written proof of such licenses, permits, insurance and approvals upon request by the City.

B. Novato Business License. Unless otherwise exempt, Consultant will maintain a valid City of Novato business license pursuant to Chapter VIII of the Novato Municipal Code during the term of this Agreement. Concurrently with execution of this Agreement, and upon request of City thereafter, Consultant will submit proof of compliance with this Subsection.

C. Workers' Compensation. Consultant shall take out and maintain at all times during the life of this agreement, up to the date of acceptance of the work by the City, workers' compensation insurance as required by the Labor Code of the State of California. The Consultant shall require all subconsultants similarly to provide such insurance for all of subconsultants' employees. The amount of said insurance shall be $1 million per accident. Consultant certifies that it is aware of the provision of the California Labor Code which requires every employee to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that Code, and Consultant certifies that it will comply with such provisions before commencing performance of this Agreement.

D. Injury and Illness Prevention Program. Consultant certifies that it is aware of and has complied with the provisions of California Labor Code Section 6401.7, which requires every employer to adopt a written injury and illness prevention program.

E. City Not Responsible. The City is not responsible or liable for Consultant's failure to comply with any and all of said requirements.

Section 13. Insurance.

A. Minimum Scope of Insurance

(1a) Consultant agrees to have and maintain, for the duration of the Agreement, a Commercial General Liability insurance policy insuring him/her and his/her firm to an amount not less than One Million Dollars ($1,000,000) combined single limit per occurrence for bodily injury, personal injury and property damage. At the time the Agreement is entered into the City may require higher limits depending on the nature of the services being provided by the Consultant. Such determination shall be made by the City's Risk Manager.

(1b) In lieu of commercial general liability insurance, the Consultant may secure and maintain a minimum of One Million Dollars ($1,000,000) of excess limit (umbrella) coverage on his/her homeowner's or renter's insurance policy.

(2) Consultant agrees to have and maintain for the duration of the Agreement an Automobile Liability insurance policy insuring him/her and his/her staff to an amount not less than Five Hundred Thousand Dollars ($500,000) combined single limit per accident for bodily injury and property damage. At the time the Agreement is entered into the City may require higher limits depending on the nature of the service being provided by the Consultant. Such determination shall be made by the City's Risk Manager.

(3) Consultants shall have and maintain a Professional Liability insurance policy insuring him/her and his/her staff to an amount not less than ONE MILLION Dollars ($1,000,000) for injuries arising out of the rendering of services or the failure to render services under this Agreement.

(4) Consultant shall provide to the City all certificates of insurance with original endorsements reflecting coverage required by this section. Certificates of such insurance shall be filed with the City on or before commencement or performance of this Agreement. The City reserves the right to require complete, certified copies of all required insurance policies at any time.

(5) Any Consultant utilizing the services of a secondary consultant in the performance of this Agreement shall either provide the required insurance(s) for the type of service being provided by the secondary consultant or provide evidence acceptable to the City demonstrating that the secondary consultant has in effect the required insurance(s).

B. General Liability.

(1) The City, its officers, officials, employees, and volunteers are to be covered as insureds as respects: liability arising out of activities performed by or on behalf of Consultant; products and completed operations of Consultant; premises owned or used by Consultant; or automobiles owned, leased, hired or borrowed by Consultant.

(2) Consultant's insurance coverage shall be primary insurance as respects the City, its officers, officials, employees and volunteers. Any insurance or self-insurance maintained by the City, its officers, officials, employees or volunteers shall be in excess of Consultant's insurance and shall not contribute with it.

(3) Any failure to comply with reporting provisions of the policies shall not affect coverage provided to the City, its officers, officials, employees or volunteers.

(4) Consultant's insurance shall apply separately to each insured against whom a claim is made or suit is brought, except with respect to the limits of the insurer's liability.

C. All Coverages. Each insurance policy required in this item shall be endorsed to state that coverage shall not be suspended, voided, canceled, or reduced in coverage or in limits except after thirty (30) days' prior written notice by certified mail, return receipt requested, has been given to the City. Current certification of such insurance shall be kept on file with the City Clerk at all times during the term of this Agreement.

D. Deductibles and Self-Insured Retentions. Any deductibles or self-insured retentions must be declared to and approved by the City. At the option of the City, either the insurer shall reduce or eliminate such deductibles or self-insured retentions as respects the City, its officers, officials, employees and volunteers, or Consultant shall procure a bond guaranteeing payment of losses and related investigations, claim administration and defense expenses.

E. Acceptability of Insurers. Insurance is to be placed with insurers with a Best's rating of no less than A:VII.

Section 14. Assignment Prohibited. Consultant shall not assign any right or obligation pursuant to this Agreement without the City's prior written consent. Any attempted or purported assignment of any right or obligation hereunder shall be void and of no effect.

Section 15. Expiration and Termination of Agreement. Unless extended by mutual agreement or terminated pursuant to this section, this Agreement shall expire upon Consultant's satisfactory and timely completion of the services contracted for hereunder. This Agreement and all obligations hereunder may be terminated at any time, with or without cause, by the City within its sole discretion upon written notice to the Consultant. Consultant may terminate this Agreement upon thirty (30) days' written notice to the City only for good cause, including without limitation, serious illness or material breach of this Agreement by City. Consultant's

written notice of termination shall contain a full explanation of the facts and circumstances constituting good cause. Upon termination, all finished and unfinished documents, project data and reports shall, at the option of the City, become its sole property and shall, at Consultant's expense, be delivered to the City or to any party the City may so designate. In the event of termination by the Consultant, the Consultant shall only be compensated for all work Consultant satisfactorily performs prior to the time Consultant delivers to the City the termination notice, unless other arrangements are agreed to by the City. In the event of termination by the City, the Consultant shall be compensated for all work satisfactorily performed prior to the time Consultant receives the termination notice, and shall be compensated for materials ordered by the Consultant, and services of others ordered by the Consultant prior to receipt of the City's termination notice whether or not such materials or instruments of services of others have actually been delivered to Consultant or to the City, provided that the Consultant is not able to cancel such orders for materials or services of others. In the event this agreement is terminated pursuant to this section, Consultant shall not be entitled to any additional compensation over that provided herein; nor shall Consultant be entitled to payment for any alleged damages or injuries (including lost opportunity damages) purportedly caused by the termination of this agreement by the City pursuant to this section.

Section 16. Entire Agreement; Amendment. This Agreement, including **Exhibit A** and any other exhibits or attachments made a part hereof constitutes the complete and exclusive expression of the understanding and agreement between the parties with respect to the subject matter hereof. All memoranda, and representations, are superseded in total by this Agreement. This Agreement may be amended or extended from time to time by written agreement of the parties hereto.

Section 17. Litigation Costs. If either party commences any legal action against the other party arising out of this Agreement or the performance thereof, the prevailing party in such action shall be entitled to recover its reasonable litigation expenses, including court costs, expert witness fees, discovery expenses, and attorneys' fees. In any action seeking recovery of monetary damages, the plaintiff shall not be considered to be the prevailing party unless it recovers at least sixty-six percent (66%) of the dollar amount requested in the complaint's prayer for relief.

Section 18. Remedies. In addition to any other available rights and remedies, either party may institute legal action to cure, correct or remedy any default, enforce any covenant herein, or enforce by specific performance the rights and obligation of the parties hereto.

Section 19. Time is of the Essence. It is understood and agreed by City and Consultant that time is of the essence in the completion of the work tasks described in the Scope of Services.

Section 20. Interpretation of Agreement. This Agreement shall be interpreted and enforced in accordance with the laws of the State of California and the City of Novato.

Section 21. Written Notification. Any notice, demand, request, consent, approval or communication that either party desires or is required to give to the other party shall be in

writing and either served personally or sent by prepaid, first class mail. Any such notice, demand, etc. shall be addressed to the other party at the address set forth herein below. Either party may change its address by notifying the other party of the change of address. Notice shall be deemed communicated within two business days from the time of mailing if mailed within the State of California as provided in this Section.

If to City: City of Novato
922 Machin Avenue
Novato, CA 94945

If to Consultant: _____
_____
_____

Section 22. Waiver. No failure on the part of either party to exercise any right or remedy hereunder shall operate as a waiver of any other right or remedy that party may have hereunder.

Section 23. Execution. This Agreement may be executed in several original counterparts, each of which shall constitute one and the same instrument and shall become binding upon the parties when at least one copy hereof shall have been signed by both parties hereto. In approving this Agreement, it shall not be necessary to produce or account for more than one such counterpart.

Section 24. Further Assurances. Each party to this agreement undertakes the obligation that the other's expectation of receiving due performance will not be impaired. When reasonable grounds for insecurity arise with respect to the performance of either party, the other may in writing demand adequate assurance of due performance and until such assurance is received may, if commercially reasonable, suspend any performance for which the agreed return has not been received. After receipt of a demand for assurance, either party's failure to provide, within a reasonable time, but not exceeding 160 days, such assurance of due performance as is adequate under the circumstances is a repudiation of this agreement by that party. Acceptance of any improper delivery of service or payment does not prejudice the aggrieved party's right to demand adequate assurance of future performance.

IN WITNESS WHEREOF, the City and Consultant have executed this Agreement as of the date first above written.

CITY OF NOVATO	CONSULTANT
By: _____	By: _____
Regan M. Candelario, City Manager	
By: _____	_____
Terrie Gillen, City Clerk	Title

Approved as to form:

_____
City Attorney

Attachments:

Exhibit A, Scope of Work (not included)
Exhibit B, Insurance Requirements Summarized and Sample Forms
B-1, Broker's Certificate
B-2, Sample Certificate of Insurance
B-3, Sample Endorsement Adding the City of Novato/ Commercial General Liability Policy
B-4, Sample Endorsement Providing Primary and Non-Contributory Coverage
B-5, Waiver of Subrogation for Workers' Compensation & Employer Liability

THE CITY OF NOVATO CALIFORNIA

CITY OF NOVATO INSURANCE REQUIREMENTS
FOR
GENERAL SERVICES AND CONSTRUCTION AGREEMENTS

Insurance Policies: Contractor shall, at all times during the terms of this Agreement, maintain and keep in full force and effect, the following policies of insurance with minimum coverage as indicated below and issued by insurers with AM Best ratings of no less than A:VII or otherwise acceptable to the City.

	Insurance	**Minimum Coverage Limits**	**Additional Coverage Requirements**
1.	Commercial General Liability	$ 1 million per occurrence $ 2 million aggregate	Coverage must be at least as broad as ISO CG 00 01 **including products and completed operations**. If insurance applies separately to a project/location, aggregate may be equal to per occurrence amount. Coverage may be met by a combination of primary and excess insurance but excess shall provide coverage at least as broad as specified for underlying coverage.
2.	Business Auto Coverage	$ 1 million *Or as set forth in contract/bid documents*	ISO Form Number CA 00 01 covering any auto (Code 1), or if Consultant has no owned autos, then hired, (Code 8) and non-owned autos (Code 9), with limit no less than $ 1 million per accident for bodily injury and property damage.
3.	Workers' Compensation and Employer's Liability	$ 1 million *Or Acknowledgement of No Workers' Comp Insurance and Release Form*	As required by the State of California, with Statutory Limits and Employer's Liability Insurance with limit of no less than $1 million per accident for bodily injury or disease. **The Workers' Compensation policy shall be endorsed with a waiver of subrogation in favor of the City for all work performed by the Contractor, its employees, agents and subcontractors**.
4.	Professional Liability (if Design or Design/Build)	$ 1 million per occurrence or claim and $ 2 million policy aggregate	(When applicable, Contractor may submit evidence in the form of Course of Construction coverage.) **Such coverage shall name the City as a loss payee.**

Endorsements:

1. All policies shall provide or be endorsed to provide that coverage shall not be canceled by either party, except after prior written notice has been provided to the entity in accordance with the policy provisions, and that if canceled for non-payment, then ten (10) days' notice shall be given.

2. **Liability policies shall provide or be endorsed to provide the following:**

   a. For any claims related to this project, Contractor's insurance coverage shall be primary and any insurance or self-insurance maintained by City shall be excess of the Contractor's insurance and shall not contribute with it; and

   b. The City of Novato and The City of Novato as the Successor Agency to the Dissolved Redevelopment Agency, their Officers, Officials, Employees, and Volunteers are to be covered as insureds as respects: liability arising out of activities performed by or on behalf of the Contractor; products and completed operations of Contractor; premises owned or used by Contractor; and automobiles owned, leased, hired or borrowed by Contractor. General liability coverage can be provided in the form of an endorsement to Contractor's insurance **at least as broad as ISO Form CG 20 10 11 85** or if not available, through the addition of both **CG 20 10 10 01 and CG 20 37 10 01** if a later edition is used.

Verification of Coverage and Certificates of Insurance: Contractor's insurance broker shall furnish City with original certificates and endorsements effecting coverage required above. Certificates and endorsements shall make reference to policy numbers. All certificates and endorsements are to be received and approved by the City before work commences and must be in effect for the duration of the contract. The City reserves the right to require complete copies of all required policies and endorsements.

Other Insurance Provisions:

1. No policy required by this Agreement shall prohibit Contractor from waiving any right of recovery prior to loss. Contractor hereby waives such right with regard to the indemnitees.
2. All insurance coverage amounts provided by Contractor and available or applicable to this Agreement are intended to apply to the full extent of the policies. Nothing contained in this Agreement limits the application of such insurance coverage. Defense costs must be paid in addition to coverage amounts.
3. Self-insured retentions above $10,000 must be approved by the City. At the City's option, Contractor may be required to provide financial guarantees.
4. Sole Proprietors must provide a representation of their Workers' Compensation Insurance exempt status.

City reserves the right to modify these insurance requirements while this Agreement is in effect, including limits, based on the nature of the risk, prior experience, insurer, coverage, or other special circumstances.

UNDERWRITER/BROKER/AGENT'S CERTIFICATION

City:
City Project Identification:
Entity Providing Contractual Services:
Insurer(s):
Best Rating(s):
Name and Title of Underwriter, Broker or Agent completing Certification:

I, the undersigned insurance underwriter, broker or insurance agent, do hereby certify that I have examined the insurance specifications prepared by the City for the above-referenced project and have attached herewith company certificates of insurance and all endorsements specified in the insurance specifications.

I further certify that the coverages provided to the Contractor and described in the certificates of insurance and endorsements conform in all respects to the requirements set forth in the insurance specifications, including, but not limited to, the following considerations:

1. The scope of insurance is at least as broad as the minimum requirements identified in the insurance specifications;

2. The minimum occurrence limits and aggregate limits of insurance are consistent with those set forth in the insurance specifications;

3. All deductibles and/or self-insured retentions have been declared;

4. All required endorsements identified in the insurance specifications have been provided and copies have been attached to the appropriate certificate of insurance.

5. All policies of insurance have been placed with insurers with a current rating from the A.M. Best Company of not less than A:VII;

6. All endorsements have been signed by a person authorized by the insurer to bind coverage on its behalf.

I understand that the City will not authorize the Contractor to initiated work on behalf of the City until this certification has been fully executed and returned to the City.

_____ _____

Name of Company Signature of Broker

_____ _____

Business Address Date

_____

Business Phone

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME:	
	PHONE (A/C, No, Ext):	FAX (A/C, No):
	E-MAIL ADDRESS:	
	INSURER(S) AFFORDING COVERAGE	NAIC #
INSURED	INSURER A :	
	INSURER B :	
	INSURER C :	
	INSURER D :	
	INSURER E :	
	INSURER F :	

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
	COMMERCIAL GENERAL LIABILITY						EACH OCCURRENCE	$
	☐ CLAIMS-MADE ☐ OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	$
							MED EXP (Any one person)	$
							PERSONAL & ADV INJURY	$
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	$
	☐ POLICY ☐ PRO-JECT ☐ LOC						PRODUCTS - COMP/OP AGG	$
	☐ OTHER:							$
	AUTOMOBILE LIABILITY						COMBINED SINGLE LIMIT (Ea accident)	$
	☐ ANY AUTO						BODILY INJURY (Per person)	$
	☐ ALL OWNED AUTOS ☐ SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	☐ HIRED AUTOS ☐ NON-OWNED AUTOS						PROPERTY DAMAGE (Per accident)	$
								$
	☐ **UMBRELLA LIAB** ☐ OCCUR						EACH OCCURRENCE	$
	☐ **EXCESS LIAB** ☐ CLAIMS-MADE						AGGREGATE	$
	☐ DED ☐ RETENTION $							$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y / N						☐ PER STATUTE ☐ OTH-ER	
	ANYPROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? ☐ **(Mandatory in NH)**	N / A					E.L. EACH ACCIDENT	$
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE	$
							E.L. DISEASE - POLICY LIMIT	$

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

CERTIFICATE HOLDER

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

ADDITIONAL INSURED – OWNERS, LESSEES OR CONTRACTORS – SCHEDULED PERSON OR ORGANIZATION

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

SCHEDULE

Name of Person or Organization:

(If no entry appears above, information required to complete this endorsement will be shown in the Declarations as applicable to this endorsement.)

A. **Section II – Who Is An Insured** is amended to include as an insured the person or organization shown in the Schedule, but only with respect to liability arising out of your ongoing operations performed for that insured.

B. With respect to the insurance afforded to these additional insureds, the following exclusion is added:

2. Exclusions

This insurance does not apply to "bodily injury" or "property damage" occurring after:

(1) All work, including materials, parts or equipment furnished in connection with such work, on the project (other than service, maintenance or repairs) to be performed by or on behalf of the additional insured(s) at the site of the covered operations has been completed; or

(2) That portion of "your work" out of which the injury or damage arises has been put to its intended use by any person or organization other than another contractor or subcontractor engaged in performing operations for a principal as a part of the same project.

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

PRIMARY AND NONCONTRIBUTORY – OTHER INSURANCE CONDITION

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART
PRODUCTS/COMPLETED OPERATIONS LIABILITY COVERAGE PART

The following is added to the **Other Insurance** Condition and supersedes any provision to the contrary:

Primary And Noncontributory Insurance

This insurance is primary to and will not seek contribution from any other insurance available to an additional insured under your policy provided that:

(1) The additional insured is a Named Insured under such other insurance; and

(2) You have agreed in writing in a contract or agreement that this insurance would be primary and would not seek contribution from any other insurance available to the additional insured.

(Ed. 4-84)

WAIVER OF OUR RIGHT TO RECOVER FROM OTHERS ENDORSEMENT

We have the right to recover our payments from anyone liable for an injury covered by this policy. We will not enforce our right against the person or organization named in the Schedule. (This agreement applies only to the extent that you perform work under a written contract that requires you to obtain this agreement from us.)

This agreement shall not operate directly or indirectly to benefit anyone not named in the Schedule.

Schedule

This endorsement changes the policy to which it is attached and is effective on the date issued unless otherwise stated.

(The information below is required only when this endorsement is issued subsequent to preparation of the policy.)

Endorsement Effective Policy No. Endorsement No.
Insured Premium

Insurance Company Countersigned by_____

WC 00 03 13
(Ed. 4-84)

Letter 11

COMMENTER: Paul LaPerriere

DATE: August 23, 2019

Response 11.1

The commenter states an opinion that the revised draft EIR fails to include the potential for intersection improvements at the intersection of San Marin Drive and Novato Boulevard based on a resolution to amend the CIP and budget with an effective date of July 1, 2019, and on a request for proposals regarding a study of bicycle and pedestrian safety for the school specifically at the same intersection; and that such changes could affect cumulative impacts related to traffic.

The commenter is correct that the City of Novato is beginning to explore ways to improve traffic operations and pedestrian and bicycle facilities at the intersection of Novato Boulevard and San Marin Drive. After assessing current traffic operations, the City intends to develop conceptual designs and gather public feedback through a formal outreach process; prepare and circulate an environmental document; develop construction plans and specifications and relocate any necessary utilities; and construct improvements. Funding is not yet identified and there is no schedule at this time, the date of the change in the budget being unconnected to the schedule of any analysis or implementation. It is unknown at this time what the changes to the intersection, if any, would entail; therefore, it would be speculative to include a project at this intersection in the EIR's cumulative impacts analysis. CEQA discourages speculation (see CEQA Guidelines sections 15064, 15145, and 15384).

Additionally, according to the City's Public Works Director (Christopher Blunk, pers. comm. August 23, 2019), both the study of traffic operations and any future design consideration would take into account the San Marin High School stadium lights project and its associated vehicle, pedestrian and bicycle traffic, and the purpose of the City's project would be to improve operations and pedestrian/bicycle facilities, which are likely to reduce cumulative impacts and improve the safety of the location. As discussed in Section 4.6, *Transportation and Traffic*, of the original Draft EIR, traffic impacts associated with implementation of the proposed project would be less than significant. As discussed in Section 3, *Cumulative Impacts*, of the Revised Draft EIR, cumulative traffic impacts would be less than significant. No changes to the EIR are warranted.

The commenter also states an opinion that the Revised Draft EIR incorrectly recognizes the mixed-use project at the Square Shopping Center (2001 Novato Boulevard) as a relevant cumulative impact, when the planning permit has since expired. This comment is noted, but does not affect the analysis and conclusions of the Revised Draft EIR.

SMHS STADIUM EIR RESPONSE - 8-24-2019

Letter 12

Paul LaPerriere <plaperriere@me.com>

Sat 8/24/2019 10:29 AM

To: YANCY HAWKINS <YHAWKINS@nusd.org>
Cc: Environmental Report <EIR@nusd.org>

1 attachments (11 KB)

SMHS STADIUM EIR RESPONSE - 8-2019.docx;

Yancy,
I've attached an edited letter that replaces the Word Document I submitted yesterday regarding the Re-circulated EIR concerning 4.6 Alternative 4: Reduced Lighting System Alternative.
Sorry for any confusion this may cause you.
Regards,
Paul LaPerriere

Sent from my iPad

Comments on Recirculated Draft SMHS Stadium Light Project

August 24, 2019 (Edited August 23rd Letter)

Authored by: Novato resident Paul LaPerriere

4.6 ALTERNATIVE 4: REDUCED LIGHTING SYSTEM ALTERNATIVE

a. Aesthetics

In the Superior Court's Writ of Mandate filed on January 30, 2019, the court reasoned, " the District cannot support its (District) decision ***not*** *to include a reduced lighting system alternative in its range of feasible alternatives by citing to the speculative outcome of these future photometric studies."*

The Court further finds "that an adequate range of alternatives should reasonably have included a discussion of the reduced lighting system alternative, and its absence did not foster informed decision making.

As such, the court concludes the District failed to proceed as required by law".

Finally, the Court further says, "In the interest of completeness, the court will also evaluate the ***adequacy of the discussion*** *of feasible alternatives identified by the District".*

On page 43 of the Districts Partially Revised Draft Environmental Impact Report it says:
4.6.1. Description. "The Reduced Lighting System Alternative would involve the installation of a stadium lighting system with reduced-intensity lighting. As measured in May 2019, the proposed stadium lighting system generates illuminance reaching 441 lux at the center of the field (Appendix B). This alternative would reduce the lighting level during athletic events for the purpose of minimizing the exposure of residential neighbors to light trespass."

*In Section 4.6.2 Impact Analysis, a. Aesthetics, the Districts response includes the following: "It is **assumed** that this alternative would involve the installation of stadium lighting fixtures in the same locations as proposed and up to the same maximum height of the 80 feet.*

*The Districts response to the Courts ruling completely ignores the Courts mandate to **have included an adequate range of lighting system alternatives** to properly allow for an informed discussion of the these alternatives. The District appears to be spinning their answer by circling back to their May 2019 study of the EXISTING SYSTEM and offers NO alternative options for the public or court to consider when we know that as an example a six-pole design was previously considered as an alternative for this Project. In an email from Tony Franceschini to Superintendent , Jim Hogeboom, and Communications Director, Leslie Benjamin on February 23, 2017 regarding the topic of 8 vs. 6 lighting poles,Tony says:*
"Leslie, Do you think this should go to Mike Jolley and crew and explain the benefits (i.e. better product)? Maybe a brief summary from Mathew why this is better, compared to the 8 pole?? You know once they hear it's been changed they will have some different narrative of why. They will probably request the EIR process be redone or the comment period be extended so they can review, even though they have no clue what they are looking at, nor do they care. It will just be another way for them to muddy the waters".

A couple of points:

*First, Tony Francheshini has said the 6 pole system is a better system than the 8 pole system. However, even if it isn't a better system than the 8 pole then it would seem to me that the District should have studied the alternate 6 pole system and as important, shared this analysis as required by the court with the public in order to have **an adequate discussion** of alternatives. This email suggests a potential bias against the public's right to be informed. Furthermore, by not including an alternative to the 8 pole system it does **not foster informed decision making** by the Districts Trustees as required by the Court.*

*Second, a 6 pole system as an example would contradict the Districts assumption "that it would involve the installation of stadium lighting fixtures in the **same locations** as proposed and up to the same maximum height of the 80 feet". It's hard to believe without a complete analysis of this alternative, that the 6 pole system fixtures would be located in the **same***

locations *as the 8 pole system nor at the* ***maximum height of the 80 foot poles*** *of the proposed system.*

This weakened methodology and evasive response to the courts "Alternative" requirement gives credence to the courts warning and public's concern about the construction of this Project when the Court indicates in its Conclusion of the Writ of Mandate mentioned above on page 69: ***"In prior appearances before this court, Respondent was made aware that its decision to complete the project pending final determination of this writ petition was at its own risk and expense".***

Letter 12

COMMENTER: Paul LaPerriere

DATE: August 24, 2019

Response 12

The commenter states in an email that he is attaching "an edited letter that replaces the Word Document I submitted yesterday regarding the Recirculated EIR concerning 4.6 Alternative 4: Reduced Lighting System Alternative." The District acknowledges that the older version of this letter, reproduced in this EIR as Letter 13, should be disregarded and replaced by the letter attached to the email.

In the letter attached to this email, the commenter states an opinion that the Revised Draft EIR lacks an adequate range of lighting system alternatives" and suggests that an alternative consisting of six, rather than eight, light poles should have been included in the Revised Draft EIR. The commenter does not explain why such an alternative should be included, or what impacts such an alternative would reduce. Based on the District's and the District's consultants' assessment of the project site and needs, an eight-pole design was determined to be the best project approach. Please see Response 2.27 for additional information on this topic, as well as Master Response: Light and Glare Impacts, Section J, responses to Letter 12.

Letter 13

Comments on Recirculated Draft SMHS Stadium Light Project

August 23, 2019

Authored by: Novato resident Paul LaPerriere

4.6 ALTERNATIVE 4: REDUCED LIGHTING SYSTEM ALTERNATIVE

a. Aesthetics

In the Superior Court's Writ of Mandate filed on January 30, 2019, the court reasoned, " the District cannot support its (District) decision ***not*** *to include a reduced lighting system alternative in its range of feasible alternatives by citing to the speculative outcome of these future photometric studies."*

The Court further finds "that an adequate range of alternatives should reasonably have included a discussion of the reduced lighting system alternative, and its absence did not foster informed decision making.

As such, the court concludes the District failed to proceed as required by law".

Finally, the Court further says, "In the interest of completeness, the court will also evaluate the ***adequacy of the discussion*** *of feasible alternatives identified by the District".*

On page 43 of the Districts Partially Revised Draft Environmental Impact Report it says:
4.6.1. Description. "The Reduced Lighting System Alternative would involve the installation of a stadium lighting system with reduced-intensity lighting. As measured in May 2019, the proposed stadium lighting system generates illuminance reaching 441 lux at the center of the field (Appendix B). This alternative would reduce the lighting level during athletic events for the purpose of minimizing the exposure of residential neighbors to light trespass."

*In Section 4.6.2 Impact Analysis, a. Aesthetics, the Districts response includes the following: "It is **assumed** that this alternative would involve the installation of stadium lighting fixtures in the same locations as proposed and up to the same maximum height of the 80 feet.*

*The Districts response to the Courts ruling completely ignores the Courts mandate to **have included an adequate range of lighting system alternatives** to properly allow for an informed discussion of the these alternatives. The District appears to be spinning their answer by circling back to their May 2019 study of the EXISTING SYSTEM and offers NO alternative options for the public or court to consider when we know that as an example a six-pole design was previously considered as an alternative for this Project. In an email from Tony Franceschini to Superintendent , Jim Hogeboom, and Communications Director, Leslie Benjamin on February 23, 2017 regarding the topic of 8 vs. 6 lighting poles,Tony says:*
"Leslie, Do you think this should go to Mike Jolley and crew and explain the benefits (i.e. better product)? Maybe a brief summary from Mathew why this is better, compared to the 8 pole?? You know once they hear it's been changed they will have some different narrative of why. They will probably request the EIR process be redone or the comment period be extended so they can review, even though they have no clue what they are looking at, nor do they care. It will just be another way for them to muddy the waters".

A couple of points:

*First, if in fact the 6 pole system is not a better system than the 8 pole system then it would seem to me that the District would have benefitted by studying this system and as important, shared this analysis as required by the court with the public in order to have **an adequate discussion** of alternatives. This email suggests a potential bias against the public's right to be informed. Furthermore, by not including an alternative to the 8 pole system it does **not foster informed decision making** by the Districts Trustees as required by the Court.*

*Second, a 6 pole system as an example would contradict the Districts assumption "that it would involve the installation of stadium lighting fixtures in the **same locations** as proposed and up to the same maximum height of the 80 feet". It's hard to believe without a complete analysis of this alternative, that the 6 pole system fixtures would be located in the **same***

locations *as the 8 pole system nor at the* ***maximum height of the 80 foot poles*** *of the proposed system.*

This weakened methodology and evasive response to the courts "Alternative" requirement gives credence to the courts warning and public's concern about the construction of this Project when the Court indicates in its Conclusion of the Writ of Mandate mentioned above on page 69: ***"In prior appearances before this court, Respondent was made aware that its decision to complete the project pending final determination of this writ petition was at its own risk and expense".***

Letter 13

COMMENTER: Paul LaPerriere

DATE: August 23, 2019

Response 13

Please see Response 12. This letter appears to be nearly identical to Letter 12. In addition, in Letter 12, the commenter explicitly requested that Letter 12 replace this letter. Nevertheless, it is included here to ensure a complete record. The responses above address the points raised and revised by the commenter in Letter 12.

Letter 14

---------- Original Message ----------
From: KENNETH LEVIN <klevin1011@comcast.net>
To: YANCY HAWKINS <YHAWKINS@nusd.org>, eir@nusd.com
Cc: Mike Cell Joly <mhjoly@aol.com>, LARRY SEHEIBEL <lscheibel@comcast.net>
Date: August 22, 2019 at 9:55 PM
Subject: Fwd: RE: Clarification: Development question regarding San Marin High School in Novato CA

Hi Yancy,

Please accept this email as an official comment letter on the Revised Draft EIR.

I plan to submit a separate letter, but thought this entire email should be in the record.

It addresses the idea that the DSA's office might require egress lighting for the new turf multi-purpose baseball field, and therefore, needs to be considered as a cumulative impact. 14.1

Sincerely

Kenneth Levin

415-493-0319

---------- Original Message ----------
From: "Rooney, Dessa@DGS" <Dessa.Rooney@dgs.ca.gov>
To: "klevin1011@comcast.net" <klevin1011@comcast.net>
Date: August 22, 2019 at 8:53 PM
Subject: RE: Clarification: Development question regarding San Marin High School in Novato CA

Ken,

I am following up my phone message just now with this email.

If I understand your issue correctly and the field will not be used at night by anyone, there are no ***current***code requirements for egress lighting at the baseball field.

With that said, erring on the side of safety would suggest that if the baseball field is used as a safe dispersal area or exit discharge travel to the public way for the adjacent field or a school campus, then lighting is recommended but no ***current*** mandatory code requirement is required. Again, egress illumination should be provided if the baseball field is designated as a safe dispersal area for the football field, or, used for exit discharge travel to the public way (just common sense).

Recently the California Building Standards Commission moved to accept and approve the recommendations by the Office of the State Fire Marshal to adopt the 2018 edition of the International Building Code (IBC) as the model code basis for the 2019 California Building Standards Code. The 2018 IBC contains a new section (1008.2.3) pertaining to means of egress illumination associated with the exit discharge, which as of January 1, 2020 **will be required** to be provided along the path of travel for the exit discharge from each exit to the public way, or safe dispersal area (i.e. the entire exterior path).

The new provision will not become effective in California until January 1, 2020.

I hope this answers your questions.

Dessa Rooney, AIA
Regional Manager / Oakland Regional Office

Phone 510.622.3109
Fax 510.622.3140
Email Dessa.Rooney@dgs.ca.gov

From: Rooney, Dessa@DGS <Dessa.Rooney@dgs.ca.gov>
Sent: Wednesday, August 21, 2019 10:42 AM
To: Cooknick, Kurt@DGS <Kurt.Cooknick@dgs.ca.gov>
Subject: Clarification: Development question regarding San Marin High School in Novato CA

Kurt,

As I thought, there is no direct code requirement for the baseball field to have lighting – see attached email form Raul Cadotte FLSO II.

But, common sense on the side of safety would suggest that if the baseball field is used as a safe dispersal area or exit discharge travel to the public way is provided, then it is recommended but there is no mandatory requirement.

Again, ***if*** lighting is provided, then DSA would review it.

Dessa Rooney, AIA
Regional Manager / Oakland Regional Office

Phone 510.622.3109
Fax 510.622.3140
Email Dessa.Rooney@dgs.ca.gov

From: Rooney, Dessa@DGS
Sent: Tuesday, August 20, 2019 5:38 PM
To: Cooknick, Kurt@DGS <Kurt.Cooknick@dgs.ca.gov>
Subject: RE: development question regarding San Marin High School in Novato CA

Kurt,

I am still looking into this. I realize you probably don't know anything more than what is in the email addressed to Monica's but I am wondering if the baseball field will be used for and by anyone else other than the school district, such as other team sports, community sports? My yellow highlights are added.

DSA to my knowledge has no requirement for field lighting that we enforce. ***If*** it's provided, then there are code requirements that are met. It does not make practical sense that they would not provide lighting from a safety standpoint. Do you want me to call Mr. Levin directly?

I have asked my ACS/FLS supervisor to double check this and will get back to you ASAP.

Dessa Rooney, AIA
Regional Manager / Oakland Regional Office

Phone 510.622.3109
Fax 510.622.3140
Email Dessa.Rooney@dgs.ca.gov

From: Hassan, Monica@DGS <Monica.Hassan@dgs.ca.gov>
Sent: Monday, August 19, 2019 11:57 AM
To: Cooknick, Kurt@DGS <Kurt.Cooknick@dgs.ca.gov>
Subject: FW: development question regarding San Marin High School in Novato CA

Hi Kurt,

Here is the email in follow up to the voicemail I forwarded. Thank you.

Monica Hassan | Deputy Director
Department of General Services
Executive Office - Office of Public Affairs

Direct: 916-376-5038

monica.hassan@dgs.ca.gov

From: Ken Levin <klevin1011@comcast.net>
Sent: Monday, August 19, 2019 11:56
To: Hassan, Monica@DGS <Monica.Hassan@dgs.ca.gov>
Subject: development question regarding San Marin High School in Novato CA

Hi Monica,

I just left you a detailed voicemail and wanted to follow up with this summary.

Briefly: Our community group, Coalition to Save San Marin, is concerned with a development project at San Marin High School in Novato CA (Novato Unified School District). Our group successfully challenged the District's EIR and a Revised Draft EIR was recently circulated for comment. NUSD took a risk and completed construction before the Judge's ruling and is now trying to clean up the record and comply with the court's ruling.

The Revised Draft EIR discloses that the District plans to replace a natural grass baseball field with artificial turf at a future time (funded by a recently passed bond measure). The Revised Draft EIR also says the District has no *current* plans to add lighting to that field.

I thought I would check in with your office because we realize that the DSA must approve the District's plans for development when they are submitted in the future.

Is is possible the DSA's office will require egress lighting on that newly turfed baseball field since it is adjacent to the newly lighted football field? We thought this might be a requirement because the two fields are next to each other and students might use the baseball field to access (or leave) the football field for soccer/football practice in the dark months when the lights will be used for practices. The District should be aware of this possible requirement so the Revised Draft EIR can be an accurate informational document (for the benefit of the Trustees and public).

I don't believe the District plans to add night lighting to the future baseball field; night lighting won't be needed for baseball practice since baseball season has more daylight than football and/or soccer (which is now a winter sport in our county).

Thanks in advance for your prompt response. Please feel free to call me if you have questions or need clarification.

Sincerely

Ken Levin
415-493-0319 - home office (detailed voicemail ok)

Letter 14

COMMENTER: Kenneth Levin

DATE: August 22, 2019

Response 14.1

The commenter suggests that the California Division of the State Architect's office might require egress lighting for the potential second multi-sport turf field and, if so, that such lighting must be considered in the cumulative impact analysis related to aesthetics. However, according to correspondence from Division of the State Architect staff provided by the commenter, current codes do not require such lighting. In addition, no schematic design has been prepared for this potential project; no lighting is proposed at this time; and no funding has been identified/allocated for this project. Please see Response 2.14 for more information. The Revised Draft EIR properly did not analyze lighting on the potential second field because none is proposed, and it is not required by law. An accurate and reasonable environmental analysis cannot be based on or consider speculative possibilities, such as potential changes in building code requirements.

Kenneth Levin
5 Santa Yorma Ct
Novato Ca 94945
415-493-0319
klevin1011@comcast.net

Letter 15

August 22, 2019

Dear NUSD Board of Trustees,

I am writing to comment on the Revised Draft EIR for the San Marin Lights Project dated 07/19/19.

I am by education and work experience both a biomedical engineer and an electrical engineer. I have over forty years of self-employment history in technical industries; most of those years were spent owning and operating a tech business in Novato.

15.1

Judge Chernus confirmed Novato Unified School District ("District" or "NUSD") failed to do a full analysis of the San Marin Lights Project ("Project") before Trustees approved a Final EIR on May 16, 2017. The Coalition to Save San Marin filed a CEQA action after the Trustees approved the Project. This ended up significantly delaying the CEQA process.

This Revised Draft EIR, like the Final EIR, is a flawed document. Analysis of key impacts are missing or glossed over; there are factual inaccuracies and omissions that conveniently avoid discussing impacts. Requirements imposed by the Court are not fully addressed.

15.2

The District can rush to approval, however, that strategy is likely to lead to delays. I suggest the District take a hard look at the detailed comments submitted by me and other concerned citizens then decide if a better strategy might be to actually listen to neighbors and concerned citizens and study the Project's impacts as required by CEQA.

District has failed to serve the public interest in many different ways (all provable through email exchanges or writings in the Official Record from the CEQA action). A few examples:

15.3

A) During the first EIR, the District agreed to meet with the Coalition's attorney to review the District's 'Community Agreement' then reneged on its written promise.

B) The emails produced by NUSD in the CEQA Court action prove that NUSD can ↓ 15.4

command high school students to write letters during class time (which is an inappropriate use of public funds and of classroom time).

C) The official record from the CEQA action proves the District lied to the public about the Project; the Public was told there was no Photometric Study on multiple instances yet there were approximately four Photometric studies contained within the Official Record - the Public was denied the opportunity to weigh in on the Project with the best available facts by choice of the District. 15.5

D) The Official Record's emails (i.e. AR 7019 from November 29, 2016 and AR 00007020 from November 30, 2016) prove that Jim Hogeboom pre-negotiated the results of the alternative site analysis before the first Draft EIR was completed with Matthew Long from Rincon. 15.6

E) Jim Hogeboom's transcript from the May 16, 2017 Trustee meeting proved that the District relied on a letter from the City of Novato (SAR1 02961 from the Official Court Record by email dated March 17, 2017 and AR 00002785) when making its decisions about the project in spite of the fact that the comment period had expired on March 3 and in spite of the fact that the District refused to allow the State of California to submit a comment after March 3.

> Mr. Hogeboom said on May 16 before your Board: *"However, at the end we concluded, based largely on a letter received from the city manager in Novato…"* (AR 3507. 074)

15.7

On the 15th of March, Mr. Hogeboom (AR 00011193) was instructing Mr. Candelario what to include in the letter. The Public was never permitted to see or comment on that letter from the City of Novato, yet Mr. Hogeboom confirmed that the District relied heavily on a letter he helped design that was received after the public comment period had closed when making its decisions about the project - these are all violations of CEQA. I was denied my right to comment on these issues until now because the public comment period had expired (on March 3, 2017), before the District received the City's letter.

F) Rincon's replies in the Final EIR, exposed significant Project changes that were never disclosed to the public, never subject to public comment and never studied as required under CEQA. The Upward Facing Lights were initially to be used only during kickoffs and punts; their impact was determined to be insignificant and were never studied. Then in the Final EIR their use was changed. This constituted a significant change to the Project 15.8

Description but was described as a 'clarification' by Rincon in the Final EIR with Comments was released to the public on May 10, 2017, 6 days before the Board of Trustees voted to approve the Final EIR with Comments. No analysis was performed of the Upward Facing Light's impact and Rincon's responses to comments (in that May 10 document) described their use inconsistently.

It is therefore disappointing to see that nothing has changed in this Revised Draft EIR. The photometric analysis admits it covers the Downward Facing Lights, but fails to analyze Upward Facing Lights, Egress lights and Field Reflection Impacts. Some areas, areas most affected by glare and light trespass, were dismissed (and never studied) by the consultant NUSD hired to evaluate light impacts. I will show photographic evidence that the Upward Facing Lights provide the greatest light impacts in areas simply not studied by this Revised Draft EIR. 15.9

I suggest the Board of Trustees take a step back; arrange another test of the Project's lights and personally visit areas mapped out by the Coalition to Save San Marin during those tests with escorts from the Coalition to observe impacts from the current Project first hand.

If the District decides to comply with CEQA it will need to study items mandated by the Court and CEQA that are, so far, not studied, then recirculate the EIR and invite public comments. Only then will the District's Board of Trustees and the Public have the information needed to make an informed decision about the Project; anything less constitutes a shortcut and a likely violation of CEQA. 15.10

The fastest way for the District to get through the CEQA process is to actually go through the CEQA process and study the impacts without shortcuts.

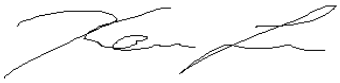
Because of the many flaws in this Revised Draft EIR I have repeated most of the text of the Revised Draft EIR and make comments in a colored font as shown in this section of this sentence.

I am sending two attachments along with this document that I would like to include in the public record. Coalition to Save San Marin hired two consultants, both professional educators and coaches, to analyze the ability of the District to practice during winter time without lights. Those letters (sent to NUSD along with this document) also address the reasonableness of the District's arguments in the Alternative's section of this Revised Draft EIR regarding the 'no project' option and a (not discussed) 'reduced hours' possibility; these 15.11

letters will be referenced as appropriate. One letter is from Kevin Bryant and another from (San Marin High Athlete and graduate) Adam Cretti.

Following my signature line are my detailed comments (in a colored font), consultant's letters and photographs taken the night of May 6, 2019.

Sincerely



Kenneth Levin

Table of Contents

Tables

Figures

Appendices

1 Introduction

This document is a Revised Environmental Impact Report (EIR) for the proposed San Marin High School Stadium Lights Project, located in the City of Novato, California. For the purposes of this Revised EIR, the San Marin High School Stadium Lights Project refers to the installation of stadium lighting and athletic field improvements, as detailed in Section 2, Project Description, of the original EIR.

1.1 Environmental Impact Report Background

The Novato Unified School District's Board of Trustees certified a Final EIR for the proposed project in May of 2017. In January of 2019, after construction of the project, the Marin County Superior Court ordered NUSD to revise and republish the following sections of the EIR, and to desist from operation of the project until the Revised EIR is certified:

The statement "after construction of the project" is misleading as it suggests that the Court's ruling was after-the-fact; that would be an improper interpretation. I was in the courtroom when David Soldani (attorney for NUSD) and Yancy Hawkins (representing NUSD) told Judge Chernus that NUSD wanted to finish construction before a final ruling and accepted any and all risks associated with this plan. Judge Chernus referenced this agreement and the risk NUSD accepted in his final ruling, when Judge Chernus wrote [underline added]: *"In prior appearances before this court, Respondent was made aware that its decision to complete the project pending final determination of this writ petition was at its own risk and expense."* 15.12

Additionally, the above EIR paragraph fails to mention that Judge Chernus ordered NUSD to perform a photometric study prior to project approval and not as a mitigation measure. 15.13

- Aesthetics
- Biological Resources (analyzed in the Initial Study, which was Appendix A to the Final EIR)
- Alternatives
- Cumulative Impacts

The Biological Resources item, according to the Court's ruling, needed to be recirculated. 15.14

Please note that the section numbering in this Partially Revised Draft EIR is different from the numbering of the corresponding sections in the original EIR. The Aesthetics section, Section 2 of this Revised EIR, was Section 4.1 of the original EIR. The Alternatives section, Section 4 of this EIR, was Section 6 of the original EIR. Cumulative Impacts, Section 3 of this EIR, is a new section, presenting the cumulative impacts analyses for all of the topics studied in the original EIR. The Biological Resources from the original EIR was in Appendix A, Initial Study, of the original EIR; here, it is also in Appendix A.

Regarding revised and recirculated EIRs, California Environmental Quality Act (CEQA) Guidelines Section 15088.5(c) states that "If the revision is limited to a few chapters or portions of the EIR, the lead agency need only recirculate the chapters or portions that have been modified." Therefore, this Revised EIR consists only of the revised sections, as well this introduction and a list of new references not cited in the original EIR; it does not include those sections and discussions from the original Final EIR that the Court did not require to be revised and recirculated. Those sections and discussions are incorporated herein by reference. The Final EIR is on file and available for review at District offices, 1015 7th Street, Novato and online at https://nusd.org/departments/maintenance- operations-and-facilities/development-projects/san-marin-high-school-stadium-lights/.

Per the above paragraph: Since this revised EIR includes only "revised sections", it is presumed that all language in this Revised EIR is open for public comment as required by CEQA. Yancy Hawkins agreed with this idea when he sent me an email dated 08/07/19: *"We can confirm that comments are invited for all language and all sections in the revisions we have circulated. "* 15.15

In accordance with CEQA Guidelines Section 15088.5(f)(2), the District requests that reviewers limit the scope of their comments to the revised portions of this revised EIR.

The above seems to conflict with Yancy's email clarification and may unfairly discourage some members of the public from commenting on the Revised Draft EIR. Instead of clearly inviting comments on this entire Revised Draft EIR, the above seems to discourage the public from engaging in the process; it leaves it to the public to determine what language changed between this Revised Draft EIR vs the Final EIR. According to Yancy Hawkin's email (referenced above from 08/07/19), this Revised EIR should be considered in its entirety by the public and the Board of Trustees. This Revised EIR constitutes an updated report of the District's analysis of impacts of the Lights project. Citizens wishing to comment on the revisions must be able to refer to all published language in this Revised EIR else there can be no context and it will be impossible for the Board of Trustees to properly weigh the project's impacts and the public's comments during its decision making process. 15.16

2 Aesthetics

This section discusses the project's potential impacts related aesthetics including, visual character and light and glare. In the original EIR, these impacts were discussed in Section 4.1, *Aesthetics*.

The analysis in this section is based primarily on the Sports Lighting CEQA Report prepared by Benya Burnett Consultancy (June 2019), which is included as Appendix B to this EIR; lighting standards, measurements, and concepts referenced in this EIR are contained or referenced in said report.

2.1 Setting

Baseline Visual Character of the Region

The City of Novato is a suburban community in northern Marin County in the San Francisco Bay Area (Novato 1996). Single-family residential neighborhoods with one- and two-story homes predominate, in addition to some multi-family housing that is dispersed mainly along arterial and collector streets (Novato 1996, 2014). Commercial uses are concentrated downtown along Grant Avenue, along Redwood Boulevard, in pockets along Highway 101, and in various small clusters and convenience centers (Novato 1996). Much of the urbanized area of Novato occupies a flat northwest-trending valley that follows Novato Creek, Vineyard Creek, Warner Creek and other tributaries flowing southeast from the hills to the Bay (Novato 2009). The topography of Novato varies from eastern flatlands at the margins of San Pablo Bay to hillsides and valleys to the west.

Scenic natural resources including hillsides, Bay plains, and Bay shorelines frame the City of Novato (Novato 2014). The City finds that views from Novato to the surrounding scenic resources are extremely important to Novato residents. These views provide physical orientation and are integral to the city's character and sense of place. Mt. Burdell, located north of the city, is a natural landmark that dominates views of Novato from U.S. 101 and most areas north and west of State Route (SR) 37. The 1,508-foot-high Mt. Burdell is part of an open space managed by the Marin County Department of Parks and Open Space which offers expansive views of Novato from a number of hiking and biking trails. Hillsides provide a scenic backdrop for developed areas. Designated open space is the largest single land use within Novato's sphere of influence (with 8,383 acres, or 37 percent of total land), followed by residential land uses (8,355 acres, or 37 percent of total land).

While there are no State-designated scenic highways in Marin County, U.S. Highway 101 (U.S. 101) is eligible for

State designation as a scenic highway to the north of SR 37 in Novato (Caltrans 2016). This segment of U.S. 101, located approximately 2.3 miles east of the project site, provides scenic views of hillsides and ridgelines to the south, west, and north, and of wetlands and plains connected to San Pablo Bay to the east. The Bay plains are a key component of scenic views from U.S. 101 (Novato 1996).

According to the North Marin Water District (in 2015), in an Environmental Analysis of its expansion plans, on page 3-39 [underline added]: *"In addition, portions of Novato Boulevard (from San Marin Drive to the westerly City of Novato Planning Area boundary) are locally-designated scenic routes, per the City of Novato General Plan."*

https://www.nmwd.com/pdfs/eng/NMWD%20Central%20SA_Final%20Addendum%20EA_print.pdf

15.17

The above proves there are government designated scenic resources that should be respected, referenced and discussed in this Revised Draft EIR. Omitting the fact that portions of Novato Blvd from San Marin Drive is a part of a designated scenic route according to governmental agencies is misleading and prevents an informed review of this EIR.

Baseline Visual Character of the Project Site

San Marin High School is located in a suburban residential neighborhood in northwestern Novato, with single-family residences largely one story in height to the east of San Marin Drive, two-story multi-family residences to the north and northeast, and two-story single-family residences to the west. The nearest residences are located approximately 120 feet north and northeast of the stadium track. All Saints Lutheran Church is situated to the southeast of the high school, across San Marin Drive (a four-lane road with a tree-lined median). The high school is located at the interface between suburban development and open space. The City's approximately 98-acre O'Hair Park, which includes equestrian facilities at Morning Star Farm, the Dogbone Meadow dog park, and trails through open space areas, is located across Novato Boulevard south of the school. The Dwarf Oak Trail to Mt. Burdell and single-family residences on Sandy Creek Way about the school site to the west. Open hillsides with grassland and scattered oak trees rise to the north and west of San Marin High School.

The San Marin High School stadium (Mead Field) is at the northeast portion of the campus, with one- and two-story light brown rectangular school buildings and a small surface parking lot to the southwest, a baseball field (Lefty Gomez Field) to the northwest, and a surface parking lot to the southeast. The track and football field at the stadium are elevated approximately 10 to 15 feet above the surrounding parking lots. A retaining wall separates the bleachers at the southeastern side of the stadium from the adjacent parking lot. The northeastern end of the stadium is sunken below the level of multi-family residences to the north by an approximately 25-foot-high grassy berm. A chain-link fence rings the perimeter of the track. The most prominent visual features at the stadium are the relatively flat green athletic field surrounded by a reddish-brown oval track, a mounted scoreboard and flag pole at the southwest end of the field, yellow goal posts at each end, and gray bleachers on both long sides of the field. Mounted Bose speakers in the existing public address system also overlook the bleachers. Figure 1 shows photographs of baseline visual conditions at and surrounding the stadium, taken in 2016 prior to installation of the proposed stadium lighting.

Scenic resources visible from the project site and public viewing locations in its surroundings, as defined in the City's General Plan (adopted 1996), include ridgelines and hillsides that provide a backdrop for developed areas (Novato 1996). Mt. Burdell, a scenic landmark with an elevation of 1,508 feet, is visible to the northeast of San Marin High School. Figure 2 shows existing views of the stadium from the surrounding area. As shown in Photo 3, the Dwarf Oak Trail provides public views looking south toward the stadium. Some nearby residences have views of the stadium. As shown in Photo 4, the stadium's elevated position relative to San Marin Drive and deciduous and evergreen trees in the roadway's median largely obstruct views of the project site from residences to the southeast. School buildings fully obstruct views of the stadium from O'Hair Park to the south. Trees lining the Dwarf Oak Trail block views from residences to the west. A few single-family residences on San

Ramon Way to the north have direct southward views looking down on the stadium.

In the above paragraph, the District maintains that the project site is mostly visually obstructed from residences to the southeast of the football field. Yet, later on in this Revised EIR , in Appendix B (reference the section on Light Trespass Measurements and Glare Measurements), consultant Benya chose to focus his study of light trespass and glare on the two communities with obstructed views (communities to the northeast and southeast of the project site) and to omit study of other neighborhoods that are more impacted. This calls into question the validity and completeness of the light trespass and glare studies. 15.18

Two of the upward facing lights are aimed towards residences to the Northwest of the Project, yet consultant Benya (reference Appendix B) conveniently ignores impacts in areas where those Upward Facing Lights are actually aimed; this is not fair and does not comply with the requirements of CEQA - the Trustees and the Public have a right to know impacts before a decision is made on this Project.

Those Appendix B comments are repeated here for easy reference:

The photo shown below, taken on May 6, 2019 during testing of the San Marin Lights Project, shows illumination of a San Marin Residence by the Upward Facing Lights, Egress Lights and possibly from field reflections. No flash was used.

This Revised EIR, including Appendix B, did not measure glare or light trespass to the Northwest of the Project site and did not study the impacts from Upward Facing Lights and Egress Lights. This home is to the Northwest of the Project site.

Address: 5 Yorma Ct.
Approx. ground elevation: 181 feet
Relative to field: +52 feet
Viewing location: 2nd Flr Wind'w

15.19

Baseline Light and Glare Conditions

This Revised EIR defines the existing baseline for light and glare conditions as those present when the District released a Notice of Preparation of the original EIR in August 2016, before installation of the proposed stadium lighting system. Light and glare produced by this system are considered impacts of the proposed project and evaluated below in Section 2.2, *Impact Analysis*. As explained in the Methodology section, the impact analysis incorporates actual measurements of light levels generated by use of the stadium lights. As of August 2016, no permanent athletic field lighting was used at the San Marin High School stadium, although the mounted digital scoreboard produced low- intensity light during athletic events. Offsite sources also contribute to existing light conditions (or "illumination") at the stadium. Existing permanent light fixtures are present at the softball field on the southwest portion of the high school, approximately 750 feet southwest of the stadium. Exterior

San Marin Lights project is designed to light sports fields for early evening and nighttime use yet there are no (zero) photographs in the Revised EIR showing night conditions or the effects of a light test performed by the District on May 6, 2019.

How can the Board of Trustees make an informed decision about this project if they are denied photographic evidence of the current environs (baseline conditions) and can see similar photographic evidence of the same area lighted up by the project?

The district, therefore, has to rely on charts, tables and graphs showing the number of candelas of illuminance, discussions of the number of lux that the project caused to be measured on scientific equipment.

15.20

Does any Board of Trustee member know what a 2 lux illumination looks like? I bet not; one photograph showing the baseline conditions *and* the impacts is worth many tables and graphs showing lux and candelas.

Those numbers (lux, candelas and foot candles) have no meaning without context. Photographs give easily understood and easily analyzed context to technical tables. Included in my response to the Revised EIR are photographs proving the light impacts observed on May 6 (during a test of the system) were severe and far exceed the descriptions by consultant Benya.

The below photograph shows photos I took on San Ramon Drive taken from my Iphone on a dark night. This is the first baseline photograph covering night time conditions in this Revised Draft EIR. No flash was used and, yes, the illuminated area is from the headlamps on my car.

Going eastward on San Ramon you can see the light effect from a street lamp on San Ramon Drive. Notice the slight hill I am on while driving on San Ramon establishes the location.

Now compare those photos with this one taken of the San Marin Light's Project on the evening of

May 6, 2019 during NUSD's testing. The below photo was taken using the same Iphone from my driveway at 5 Santa Yorma Ct, which is the same home that was shown illuminated above (by the Upward Facing Lights). The glare, which is evident in the photo, was painful to look at. The Upward Facing Lights were far more disturbing than the street lamps on San Ramon. The square shadows are created by my wire framed deer fence. I don't know the actual number of candelas, lux or Foot Candles created by the Upward Facing Lights, however, I do know that the visual impacts were huge and the descriptions, tables and photometric analysis in this Revised Draft EIR do not accurately or completely described what I saw with my own eyes and what I documented with photographs. Those two Upward Facing Lights are aimed towards the Northwest relative to the Project Site. Why then, did consultant Benya fail to measure light impacts to the Northwest?

This Revised Draft EIR and the Final EIR describe the visual impacts as 'lost slivers of view'. In spite of some photographs, I don't believe this EIR gives a fair analysis of the impacts or a meaningful comparison of before and after. Describing the visual effects as 'lost slivers of view' is hardly a statement sensitive to the natural areas the project's design disturbs.

15.21

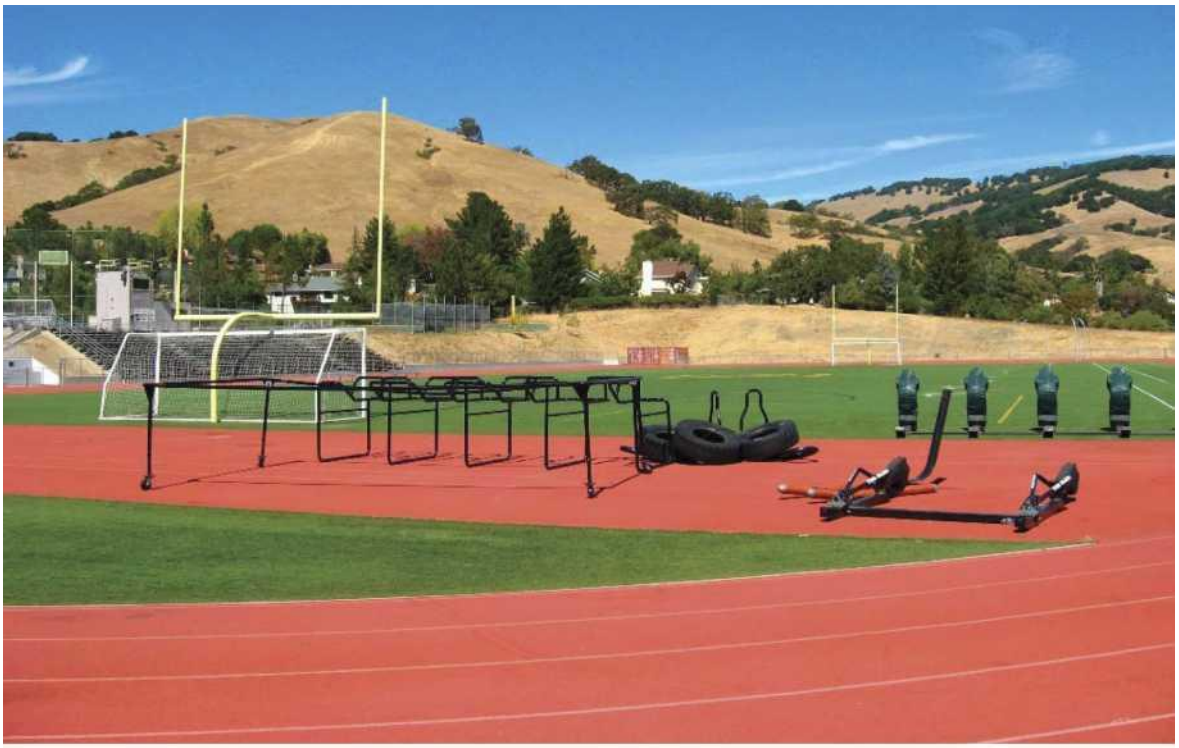


Figure 1 Photographs of Baseline Conditions at Stadium Site

Photo 1: Northward view across stadium toward single-family residences on San Ramon Way and hillside open space.

Photo 2: View to northeast from stadium of school parking lot, San Marin Drive, and hillside open space.

Figure 2 Photographs of Baseline Conditions from Surrounding Area

security light fixtures are located at on-site school buildings and at on-site solar panels. In addition, the stadium receives spillover light to varying degrees from nearby streetlamps and the headlights of cars on San Marin Drive.

Since the project is designed for night time use, the daytime baseline photographs don't establish a true baseline. Night time photographs would establish a more meaningful baseline. In spite of this, the District fails to set a baseline for day time views. The EIR would like us to believe that [quote from AES-1, below] " *poles only occupy a sliver of the overall views*" and therefore the visual disturbances during daytime are negligible. Not true.

Like a 'sliver', a small foreign object in the body that can cause pain, infection, abscess and more, a small sliver of lost view can cause visual discomfort. The best way to deal with a sliver in the body is to remove the sliver; for planning purposes this EIR should recognize that visual impacts from lost slivers of view are significant and painful to nearby residents. Some daytime photos taken from San Felipe way show the impacts to daytime views more clearly than photographs presented in this Revised Draft EIR.

15.22

A single sliver against a San Marin Hillside taken from 257 San Felipe.

Three slivers and a tree taken from the same address on San Felipe:

Glare refers to the discomfort or impairment of vision experienced when a person is exposed to a direct or reflected view of a light source, causing objectionable brightness that is greater than that to which the eyes are adapted (Pennsylvania Outdoor Lighting Council n.d.). By contrast, illumination is defined as the amount of light that strikes an object, including light cast by sources that are not directly seen by viewers. The intensity of glare ranges from the worst case of “disability glare,” where visibility is lost, to “discomfort glare,” where the light is distracting and uncomfortable. Discomfort glare is a subjective phenomenon and has not been directly linked to a physiological cause (Shuster 2014). The amount of glare depends on a set of factors such as the size of the source, the contrast between background light and the glare source, and the age of the viewer (Hiscocks 2011). General sources of glare at the stadium include headlights on and reflected sunlight from automobiles on adjacent streets and parking lots, and reflected sunlight from the windows of nearby buildings.

From the IDA Code book on lighting design: *A principle in good lighting design maintains that the brightest areas in a person's field of vision should not exceed ten times the brightness of the average level to which the eye is adapted.* (http://www.darkskysociety.org/handouts/idacodehandbook.pdf)

The IDA Code Book was created to assist communities writing ordinances regarding lighting. This quantitative approach differs markedly from the vague approach used to analyze glare in this Revised Draft EIR basically says that discomfort and annoyance from glare is in the eye (no pun intended) of the beholder. In spite of what Mr. Benya says in Appendix B (that it is "impossible" to measure glare),

15.23

there appears to be a quantitative method to analyze glare and light impacts that was ignored in this document's analysis which makes this EIR lose credibility. Essentially, there is no meaningful glare analysis in this Revised EIR in spite of a published methodology that might have been used to create a meaningful quantitative analysis. Applying these methodologies are both simple and inexpensive and would give the Public and Trustees meaningful information about the Project's impacts. Another approach: take photographs, like I did and actually visit the sites that are adversely affected by glare and report on what is seen; these simple steps were never taken. I believe CEQA requires that this EIR be "sufficiently credible" and it is not. Why did this EIR substitute no analysis instead of easily available methods of quantitative and qualitative analysis?

Anthropogenic sky glow is caused by all outdoor lighting, including streetlights, retail centers, car dealerships, and other commonly occurring outdoor lighting (Appendix B). In communities near the California coast, there are two types of sky glow: that caused by low clouds (the “marine layer”) and that caused by uplight on clear nights (clear sky glow). The former is localized and on a cloudy night the stray uplight from a town or small city can cause a distinctive glow above it. The latter is the accumulation of the upward light from the entire metropolitan Bay Area and is affected by all the lighting within a radius of 100 miles or more from the viewer's location.

Sky glow from low clouds varies considerably depending on the time of year, the altitude of the clouds, the cloud density and reflectivity, temperature, and other factors (Appendix B). The primary causes tend to be downtown districts, regional malls, auto malls, and major freeway commercial corridors. Glow is caused by all the upward light from all the community, and not from just one neighborhood or cause. Sky glow levels from the marine layer throughout other areas of California that have similar proximity to the ocean and population density measure between 0.010 and 0.020 foot-candles.

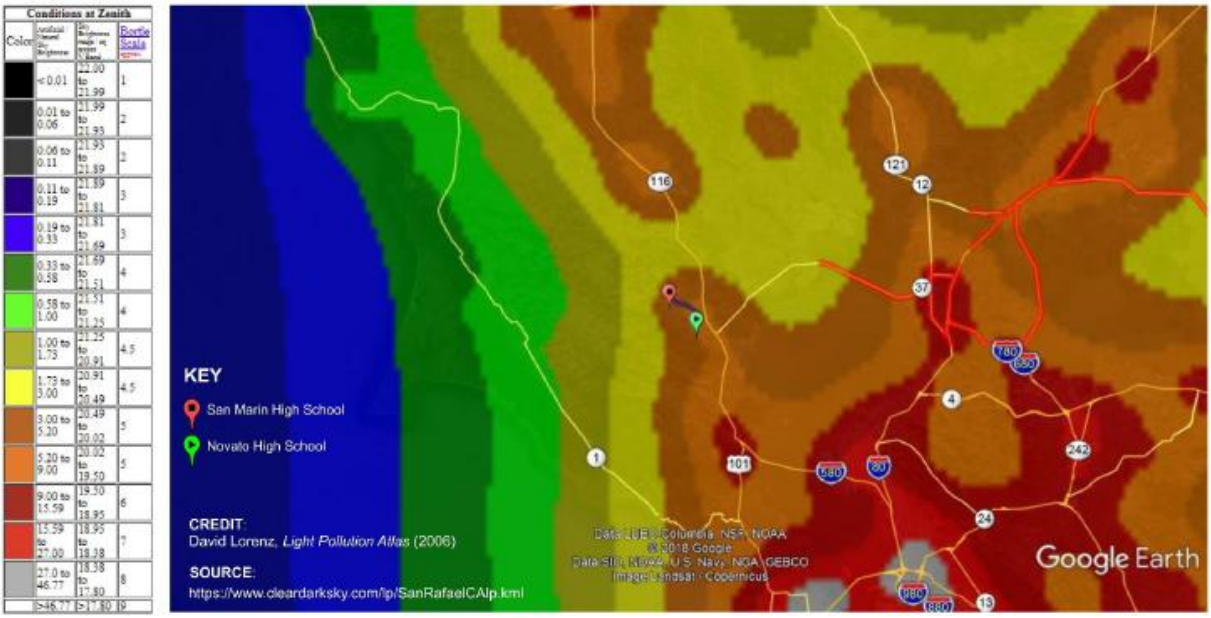
There are no regional malls, auto malls, major freeways (or roads) in the vicinity of the Project. It is clear that this Revised EIR did not study sky glow effects in differing weather conditions. 15.24

Clear sky glow is measured using the Bortle Scale, a system of ranking the light pollution caused by communities throughout the world as well as identifying “dark sky” areas with little or no sky glow (Appendix B). The astronomer John Bortle originally published this nine-level scale in Sky & Telescope magazine in February 2001 (Bortle 2006). The entirety of Marin County is Bortle Class 5, which means a moderate amount of anthropogenic sky glow.

The project site is in an area that is less developed with fewer homes per square mile than other developed areas of Marin County, such as San Rafael and Downtown Novato. The Bortle ratings most applicable to the site can be measured directly from published material showing the project site and the immediate environs. Senior Hill (the hill directly to the North of the San Marin Football field - the hill San Marin High Seniors used to mark with the year of their graduation) is greatly impacted by glare from the project (as per my personal observations during the May 6, 2019 test) but was never studied. The Bortle classification of Senior Hill is 4.5, however, the more important metric, the ratio of artificial to sky light is in the yellow zone (refer to map shown below) 1.73 to 3.00, whereas the High School is in Bortle zone 5 and the ratio referenced above is in the range 3.00 to 5.2. 15.25

Additionally, the Bortle scale is not an effective metric to determine sky glow levels as evidenced by the below charts which show multiple methods to measure sky glow quantitatively (including the Bortle Scale); note below, how the Bortle Scale number does not change over widely diverse areas of sky glow illumination; choice of the Bortle metric obfuscates the ability to do a meaningful analysis. That isn't an opinion, it is a conclusion you can easily draw by comparing how the Bortle Scale

numbers are the same over a wide swath of regions where more granular data is available; those same areas are designated with their ratios of artificial light to natural light and their Bortle equivalent. The ratio of artificial to natural light (shown below compared to Bortle Scale numbers for the Project area and environs) is the better metric. Why use a ruler marked with feet (and no inches) when you can use a ruler marked with inches on a job where you need to make a comparison in inches?



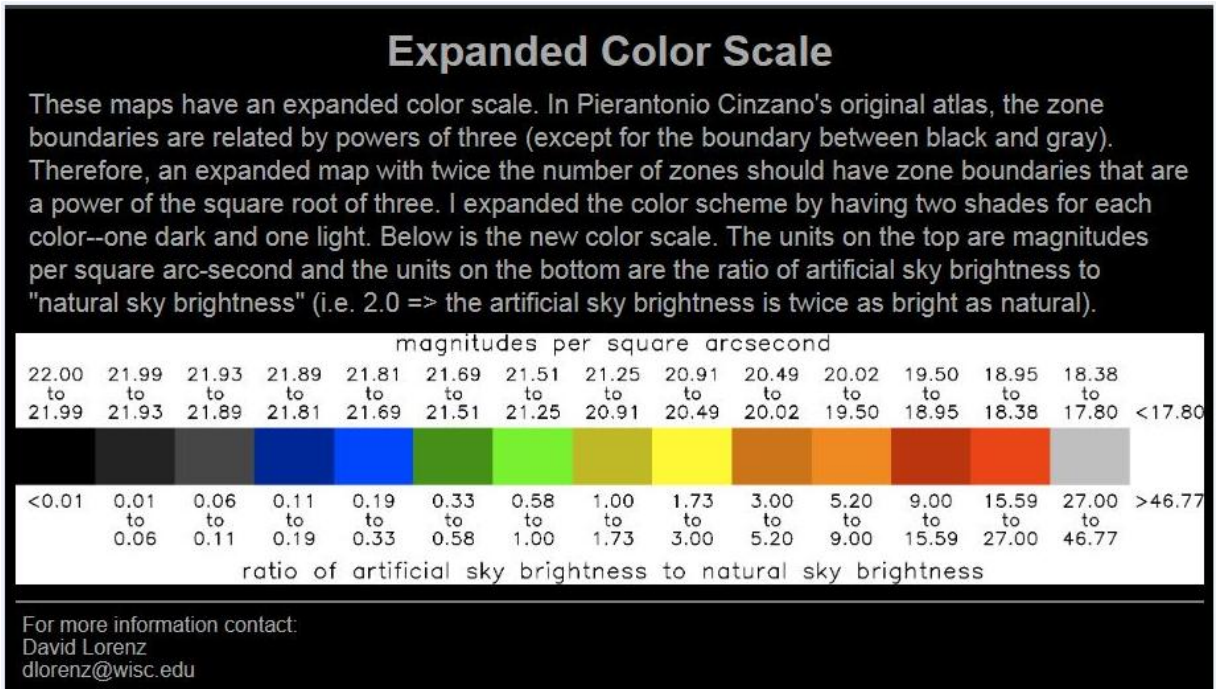
Mapped Bortle Scale
over Portions of Marin, Contra Costa, San Francisco, Sonoma and Solano Counties

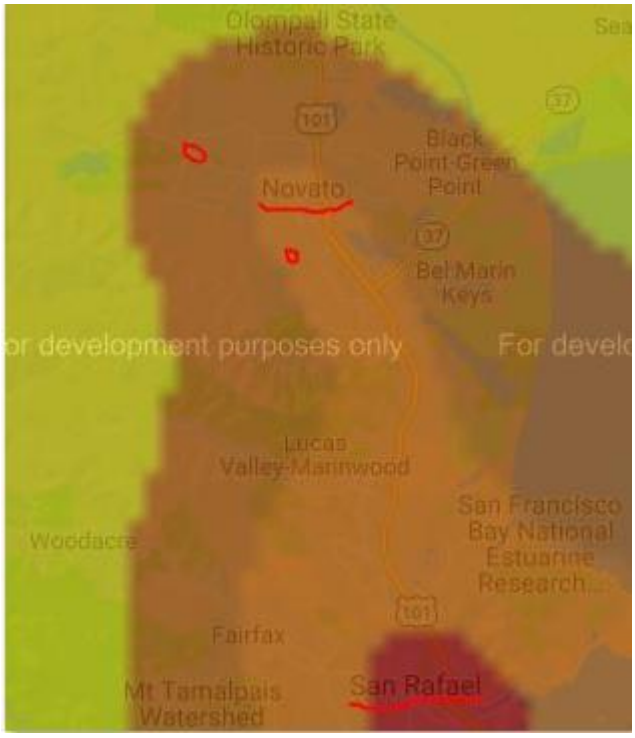
The above image shows San Marin and Novato High Schools. Notice how Novato High is in a brighter sky area than San Marin High and notice how dark the night sky is in San Marin near the High School compared to downtown Novato, San Rafael etc. This Revised Draft EIR, which tries to contrast this project with its impact on the entire night time sky of Marin County is flawed; that type of analysis is designed to confuse and not designed to illuminate (sorry for the pun) the impacts so a meaningful analysis can be made by the public and Board of Trustees.

The Yellow zone is (approx) Bortle Scale 4.5 (artificial natural sky brightness level ratio is 1.73 to 3.00). The Brown areas are darker brown (area includes San Marin High) and lighter brown (area includes Novato High). The dark brown area is Bortle Scale 5 (apprx) and has Artificial Light Brightness ratio of 3.00 to 5.20. The lighter brown areas are Bortle Scale 5 (approx) and have Artificial Natural Sky Brightness ratio of 5.20 to 9.00.

The source of the data and map is NOAA (national weather service), U.S. Navy, NGA GEBCO, Image Landsat, Copernicus. A blown up image of the legend is below.

I also repeat the scale below (once rotated and as an expanded image from the above map) so it can be more easily read and verified by others who read this document. Secondly, the same scale is repeated from an alternate source where the numbers are explained more clearly and the image is clearer. The Bortle Scale, as you can see, is not the best metric; a more accurate method of discriminating sky brightness to artificial sources vs natural sky brightness is given as a ratio of artificial to natural brightness. This number is also shown and cited. San Marin High appears to have a ratio (range) of 3.00 to 5.20; note the explanation in the second scale. The second scale was taken from: http://djlorenz.github.io/astronomy/lp2006/colors.html





This second map was taken from http://djlorenz.github.io/astronomy/lp2006/ The data from this second map ties to the one from NOAA, however, the data was overlaid with Google Maps in a way that permitted me to significantly expand the scale. Note, I added circles where San Marin and Novato High Schools are located and I underlined the words Novato and San Rafael on the map. If you look closely (and carefully) you can see the main roads in San Marin (San Marin Drive and Novato Blvd, where the intersect just to the west of San Marin High). The legend 'For Development Purposes Only', I believe, is a note for software developers who are looking to integrate this data with Google Maps or other mapping software. Notice how dark the night sky is in San Marin vs Novato and San Rafael. Using Marin County as a reference for night sky impacts, as is done in this Revised Draft EIR, is inappropriate, misleading and does not comply with CEQA requirements (prohibits meaningful analysis).

Regulatory Setting

State

Government Code Section 53094. This article of California's Government Code states that a school district is not required to comply with the zoning ordinances of a county or city unless the zoning ordinance makes provision for the location of public schools and unless the city or county has adopted a general plan. Furthermore, this article authorizes the governing board of a school district to render a local zoning ordinance inapplicable to a proposed use of property by the school district, by a vote of two-thirds of its members. The governing board may not take this action when the proposed use of the property is for non-classroom facilities, including, but not limited to, warehouses, administrative buildings, and automotive storage and repair buildings. Because the proposed project is considered an improvement to educational facilities at a public school, the governing board of the District adopted Resolution No. 16-2016/17 to exempt the proposed project from local zoning ordinance requirements pertaining to aesthetics and other issues.

Local

Although the District is not required to comply with local zoning ordinances pursuant to Government Code Section 53094, the following regulatory information for the City of Novato is provided for reference.

City of Novato General Plan. The City of Novato's General Plan (1996) does not include objectives or policies applicable to visual character or scenic resources at the school site. While EN Policy 27 (Scenic Resources) in the Environment Chapter of the General Plan seeks to "protect visual values on hillsides, ridgelines, and other scenic resources," this policy addresses development on hillsides and ridgelines rather than scenic views available to or from such resources. The Community Identity Chapter states that "lighting should serve functional, safety, and aesthetic purposes." CI Policy 13 (Lighting Design Guidelines) calls for amending the City's Zoning Ordinance to incorporate design guidelines for exterior lighting that would mitigate impacts on open space or other valuable views. However, this policy has not been implemented (City of Novato 2015).

Novato Municipal Code. The City of Novato's Municipal Code has qualitative standards for light trespass and glare that would apply to the project, except that the District has exempted itself from the local zoning ordinance pursuant to Government Code Section 53094. Pursuant to the general development standards in Section 19.22.060 (Light and Glare), light or glare from exterior lighting must be shielded or modified to prevent emission of light or glare beyond the property line. The placement of exterior lights is required to eliminate spillover illumination or glare onto adjoining properties to the maximum extent feasible, and not interfere with the normal operation or enjoyment of adjoining properties. In addition, Section 19.22.060 requires that all non-essential internal and exterior lighting be turned off after 11:00 p.m. (except for uses with extended hours).

2.2 Impact Analysis

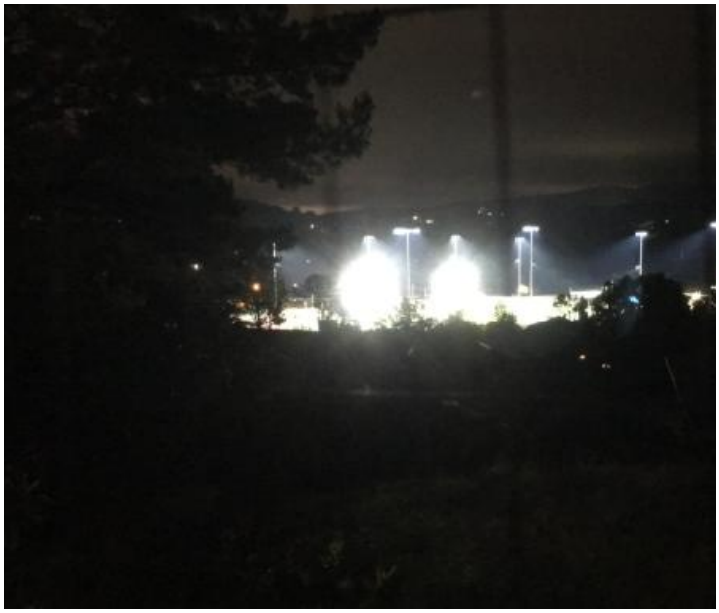
Significance Thresholds

The thresholds below are based on the CEQA Initial Study checklist contained in Appendix G of the CEQA Guidelines. An aesthetic impact is considered significant if the addition of stadium lights would:

1 Have a substantial adverse effect on a scenic vista;

Note the photo below (added by me) which shows the visual disturbance of the Project's lights on the evening of May 6, 2019 (during a test of the lights). The photo was taken from my driveway and if you look carefully you can see shadows created by my wire framed deer fence along that section of my driveway. The glare capture in this photo was much brighter than a street lamp and very disturbing to look at.

15.26



Address: 5 Yorma Ct.
Approx. ground elevation: 181 feet
Relative to field: +52 feet
Viewing location: 2nd Flr Wind'w

2 Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway;

3 Substantially degrade the existing visual character or quality of the site or its surroundings; or

A sliver of impact substantially degrades the quality of the site and its surroundings as shown by the photographs below (taken from 257 San Felipe). 15.27

4 Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.

Reference the photographs above from an area not studied by this EIR for glare and light trespass (to the Northwest of the Project site). The night time photo proves the Project creates substantial glare that adversely affects night views. The day photos taken from San Felipe drive show that daytime views are adversely affected. 15.28

Address: 257 San Felipe Way
Approx. ground elevation: 87 feet
Relative to field: -22 feet
Viewing location: 2nd flr bdrm

15.29

The next photo shows the ridgeline and 3 light poles is also taken from 257 San Felipe.

The Initial Study (Appendix A) determined that the project would not damage scenic resources such as trees, rock outcroppings, or historic buildings within a state scenic highway corridor. Therefore, the analysis of aesthetic impacts focuses on thresholds 1, 3, and 4.

Methodology

Scenic Vistas and Visual Character Impacts

The analysis of scenic vistas and visual character is based on a field reconnaissance, supplementary review of Google Maps, and photo documentation of the stadium site. The scenic vistas discussion focuses on identified public view locations, but also considers impacts to private views. The visual character analysis considers whether or not the proposed lighting and public address systems would substantially and adversely degrade the overall aesthetic qualities of the site relative to current conditions.

Light Impacts

Light trespass occurs when lighting systems that illuminate one site also illuminate adjacent sites, such as neighboring private property. Light impacts can be analyzed by quantifying illuminance, or the amount of incident light on a place surface, from the spillover of light at property lines nearest to residences (Pennsylvania Outdoor Lighting Council n.d.). The spillover of light is also known as “light trespass.” Light trespass is measured on both the vertical plane (e.g., light shining through a window) and the horizontal plane (e.g., light falling on a bed), in terms of lux or foot-candles. Lux is the metric measurement of light levels, and approximately 10 lux is equivalent to 1 foot-candle (Appendix B).

The night time photos above prove light trespass occurs on adjacent sites from the Project in an area that was conveniently not studied by this Revised Draft EIR. | 15.30

The Revised EIR's analysis of light impacts is based on a lighting study of the proposed stadium lighting system, prepared by internationally recognized lighting consultant James Benya in June 2019 (Appendix B). As discussed in the lighting study, the District has decided to apply a standard set by the International Commission on Illumination (CIE) to limit light trespass. The standard, CIE:150, employs a lighting zone system that ranges from E1 to E4, based on existing ambient light in the general area. For example, in a nature preserve a candle can be seen for a mile, but in downtown San Francisco it would be lost in the haze of thousands of light sources. Lighting zone E1 represents the nature preserve and E4 is the city, with E2 and E3 being steps in between. The choice of lighting zone can be a matter of judgment; the E2 zone is described as "sparsely populated rural areas" and zone E3 is described as "well inhabited rural and urban settlements."

The below discussion about the applicability of the E3 standard to this Project is misleading as the Court ruled that the Project is in CIE Zone E2. Additionally, the admission that San Marin High is uniquely located next to designated Open Space areas and adjacent to a Scenic Corridor (see comments above with reference to NMWD and City of Novato General Plan) appears to conflict with Mr. Benya's assertion that the project is appropriately designated as Zone E3. 15.31

Although the E3 zone would be appropriate to apply to the project site because nearby light sensitive residences are located in suburban developments, this analysis makes a conservative assumption that the San Marin High School site is located in the rural E2 zone due to its proximity to a substantial open space area, unique among the School District's campuses, particular to this analysis and not applicable to the School District, as a whole. The CIE's allowed maximum light trespass in the E2 zone is 5 lux, which is approximately equivalent to 0.5 foot-candle (Appendix B). In this Revised EIR, the District applies 5 lux as the threshold for significant light trespass at residential property lines. This threshold is more stringent than the 2 foot-candle threshold that the District previously used in the *PBC Parcels 1A and 1B Mitigated Negative Declaration* of June 2006 (NUSD 2006). Furthermore, it is more stringent than thresholds that other school districts have recently applied to comparable lighting projects in California. For example, the Glendale Unified School District has used a standard of 2.5 foot-candles on adjacent properties, while the San Mateo Union High School District has applied a standard of 0.8 foot-candles at the nearest residential property lines (Glendale Unified School District, 2012; San Mateo Union High School District, 2016).

San Mateo's Hillside High School is in CIE Zone E3 and has significantly higher density in the surrounding area compared to San Marin High. I created density maps comparing the two areas that were included in my Final EIR Letter number 137 (see 137.8). It is not meaningful or fair to compare the area surrounding San Mateo High and San Marin High. Glendale High is located in an area that is even more urbanized than San Mateo High. Why are we discussing this issue in this Revised Draft EIR when Judge Chernus ruled that San Marin High is in CIE Zone E2? 15.32

In the CIE:150-2003 standard, CIE Zone E2 has an after curfew 500 cd standard (1/2 lux) and CIE Zone E3 has a 1000 cd (1 lux) standard for light trespass, not 5 lux; this EIR is silent on the change in the trespass standard after curfew. The CIE curfew standard in CIE:150-2017 is defined differently and requires complex calculations to determine.

Curfew is defined in this document and the Final EIR as beginning at 10PM. This is significant because some football games might extend beyond 10PM if there are game delays due to injury, late arrival of teams or referees due to traffic or weather etc. Most significant, is the fact that this Revised Draft EIR fails to address the issue of light trespass after curfew if a game is delayed and the fact that the 10,000 candela trespass figure is not appropriate for CIE Zone E2 per the CIE:150-2003 or CIE:150-2017 standards. Refer to Marc Papineau and Larry Scheibel's letters for more information on 15.33

interpretation of these standards for CIE Zone E2.

The below chart (CIE standard from 2003) impeaches the idea that 10,000 is the correct number of candelas to use for CIE Zone E2 and clearly confirms the idea that light trespass should be less after curfew. The idea that post-curfew luminous intensity is not discussed in this Revised Draft EIR and represents a failure to apply the CIE standard to the problem your Trustees is being asked to address. Note how this EIR references 10,000 candelas (elsewhere) as the luminous intensity number it uses for analysis; that number clearly comes from CIE Zone E3. Because this EIR is silent on the post curfew concept and should incorporate the post-curfew idea in its analysis. Because this EIR ignores post-curfew restrictions and uses the wrong pre-curfew luminous intensity for its evaluation this Revised Draft EIR is defective and does not comply with CEQA. 15.34

Maximum Values for Luminous Intensity (CIE, 2003)

Maximum Luminous Intensity	**Environmental Zones (cd - candelas)**			
Light Technical Parameter	**E1**	**E2**	**E3**	**E4**
Pre-Curfew Luminous Intensity	2,500	**7,500**	10,000	25,000
Post-Curfew Luminous Intensity	0	**500**	1,000	2,500

Source:
https://www.researchgate.net/publication/264885906_COMPARISON_BETWEEN_THE_CIE_AND_LITG_METHOD_FOR_MINIMIZING_OBTRUSIVE_GLARE_CAUSED_BY_BRIGHT_LUMINAIRES_IN_THE_FIELD

For CIE:150-2017, the allowable glare at any location from any given luminaire is calculated based on the distance to the luminaire and area of the light-emitting element that can be seen from that location (projected area). There is no one size fits all and the final number can't just be read from a chart as with CIE:150-2003. Allowable glare must be calculated at any given location and is based on the aiming angles of the luminaire and distance to the point in question. Refer to Larry Scheibel's letter for more information on this subject. 15.35

The point is that the Revised Draft EIR is silent on these issues and it should be addressing them directly. It isn't our job to write the Revised EIR for the District; what I have done (with assistance from Marc Papineau and Larry Scheibel) is point out that this document fails because it does not offer substantial evidence in support of its opinions on trespass and glare; this Revised Draft EIR is not CEQA compliant. 15.36

Note below where this Revised Draft EIR evaluates solely the "stadium lighting system" which appears to exclude impacts from the Upward Facing Lights, Egress Lights and Field Reflections. There is no photometric study covering the Upward Facing Lights, Egress Lights and there is no discussion of impacts from reflections from the Downward Facing Lights on the playing field. 15.37

The "*most affected residential properties*" referenced below conveniently omits properties to the Northwest of the Project site, including my residence. The night time photographs shown above and elsewhere in my EIR comment submission prove significant impacts that must be studied and included in a valid CEQA analysis. The consultant, Mr. Benya, incorrectly assumed there were no impacts to the Northwest without doing any analysis; CEQA requires more. 15.38

To determine if the proposed stadium lighting system would meet the CIE's threshold for the E2 zone, the lighting study includes field verification of light trespass from the stadium lighting system.

Consistent with the CIE:150 standard, illuminance from the lighting system was measured in the vertical plane at the property boundary at a height of 5 feet above surface grade (Appendix B). The measurements were taken by James Benya on the evening of Monday, May 6, 2019, and are representative of typical lighting conditions during football games at San Marin High School. They were taken along two lines, one reasonably parallel to the northeast property line, and one southeast of the stadium along the west side of the San Marin Drive median. Each line represents a worst-case scenario for the most affected residential properties. This field verification of light trespass from the project reflects the actual performance of the stadium lighting system. Therefore, it is more accurate than and supersedes the predictive photometric studies that the lighting manufacturer, Musco, provided prior to construction of the project (see Appendix C).

The decision to measure ," *illuminance from the lighting system was measured in the vertical plane at the property boundary at a height of 5 feet above surface grad (Appendix B)"* does not appear to be based on any standard (but instead, a choice of Mr. Benya) and, regardless, conveniently omits measuring some of the worst trespass and glare impacts referenced in photographs and comment text elsewhere in this document. The "*lines*" referenced above designed to capture " *a worst-case scenario for the most affected residential properties"* misses impacts on properties to the Northwest of the Project Site.

15.39

Glare Impacts

This updated, in situ analysis properly uses light intensity as a proxy, representative of the amount of discomfort glare that residents near the stadium site would experience, because the visibility of a distant light source is proportional to its intensity (Hiscocks 2011). Discomfort glare is typically measured in terms of candelas. The amount of candelas depends on the luminous power per unit solid angle emitted by a point light source in a particular direction. In layman's terms, the degree of discomfort glare decreases the further that a viewer is located from a light source, due to the dispersion of light across distance. The lighting study prepared for this Revised EIR makes the conservative assumption that illuminance on the vertical plane of 5 lux or greater at adjacent residential property lines would indicate a potentially significant glare impact (Appendix B). This threshold of illuminance is applied as a reasonable surrogate for glare because direct measurement of glare in the field would be prohibitively expensive and unnecessary. Because glare is a complex sensation that factors in the luminance and size of the light source, the luminance and area of the background, the position of the light source in the field of view, as well as the viewer's unique sensitivity and physiology, it is impossible to measure glare directly except under laboratory conditions. Therefore, it is appropriate to rely on illuminance as an indicator of a potentially significant glare impact.

Sky Glow. Sky glow impacts would be significant if the proposed lighting would emit a substantial amount of upward light, significantly contributing to marine layer sky glow or clear sky glow during nighttime hours.

The following photograph was taken (without a flash) of Sky Glow effect on the night of May 6, 2019 as a result of a test of the Project Lights. It clearly shows there is a significant Sky Glow effect from the Project. The EIR does not attempt to study sky glow effect from Upward Facing Lights and variances of the sky glow impacts in various weather patterns (mist, fog, rain, low clouds etc).

15.40

Project Impacts and Mitigation Measures

Threshold 1: Would the project have a substantial adverse effect on a local scenic vista?

Impact AES-1 THE ADDITION OF LIGHTS AND LIGHT POLES AT THE STADIUM HAS INCREMENTALLY ALTERED VIEWS OF AND THROUGH THE STADIUM SITE. HOWEVER, BECAUSE LIGHT POLES DO NOT SUBSTANTIALLY OBSTRUCT VIEWS OF SCENIC RESOURCES, IMPACTS TO SCENIC VISTAS WOULD BE LESS THAN SIGNIFICANT.

The project has introduced eight light poles up to 80 feet tall to the stadium site, incrementally altering existing views of and through the site. In addition, up to 36 poles (18 egress lighting poles and 18 public address system poles), each up to approximately 30 feet tall have been installed throughout the project site to provide lighting for safe egress and clean-up and to provide focused, distributed sound during athletic events. These structures do not substantially affect views from scenic roadways. While the segment of U.S. 101 to the north of SR 37 in Novato is eligible for State designation as a scenic highway, this highway is located approximately 2.3 miles east of the project

site; distance, existing trees and vegetation, and intervening hillsides obscure the new light and speaker poles from U.S. 101.

Throughout this Revised Draft EIR, the light poles, which are now constructed and easily measured, are describe inaccurately. The actual heights are given in the photometric study, however, the actual heights are never referenced (always referred to as 80-foot poles or 30 foot poles for Egress lighting).

This is misleading and skews the EIR's analysis for several reasons:

1) Significantly taller poles means more visual disturbance during the day hours.

2) Significantly shorter Egress Lighting poles means the aimed angle of the Egress Lights is significantly more horizontal (by the necessity of simply geometry) to cover the same area as compared to 30 foot Egress poles. When egress lights are aimed more horizontally the glare and light trespass impacts grow significantly, yet in this Revised Draft EIR, the impacts from Upward Facing Lights (aimed 'up') and Egress lights (now aimed much more horizontally then previously described in the Final EIR) are never studied. The Project description is therefore defective and improperly skews a reader into concluding that there are fewer impacts than there actually are.

I took the pole heights disclosed in a table (Appendix B) and show the calculated pole heights for the Downward Facing Lights. Three poles (without accounting for Grade Effect) are 80 ft (from the manufacturer) and five are 90 ft. Add the Grade Effect and most poles are above 80 ft and half are over 90 ft tall.

15.41

Pole Id	Pole Size	Grade Addition	Total Height
F1	90	4	94
F2	80	11	91
F3	80	13	93
F4	80	13	93
F5	90	-7	83
F6	90	-9	81
F7	90	-11	79
F8	90	-13	77

The visual effects of this project are critical to neighbors and the community, yet the project description has consistently presented the public with inaccurate or incomplete data.

I tried to do a similar analysis of the Egress Poles and found the heights to be undisclosed in this EIR's photometric study. Elsewhere, this EIR discloses that the actual height of the Egress poles is lower than what was discussed in the Final EIR (and in Judge Chernus' final ruling). The language used was 'up to' 30 ft poles, however, it was clear from the Official Court Record (in the recent CEQA case) that NUSD knew the egress poles would be closer to 18 ft (as evidenced by emails sent between NUSD

staff and its consultants). Simple geometry tells any reader that to cover the same geographic area, a pole mounted at 18 ft vs 30 ft will create more glare and light trespass, yet there is no study of glare or light trespass from the Egress Poles; this EIR is silent on those potential impacts.

> On 01/30/17 Eduardo Morales wrote to San Marin High School Teacher Melissa Havel (AR 00010134). That email included another email written by Tony Francescini to Eduardo Morales Eduardo which says [underline added]:
>
> *"Below is the link to the EIR. Note, I believe the shorter poles are displayed at 30 feet tall, and I understand that is incorrect. I believe those posts will be closer to 15 to 18 feet tall. Tony may have more to say about that."*

The bid packet drawings for the project show the egress poles as 15 feet in height, a much lower height than the 30 foot number included in the Project Description. This project description change has significant impacts on the light trespass and glare that can be expected from the egress lighting. The Egress Lights should be included in the Photometric Study (Appendix C) and they are not, and they should be shown with their 'as built' heights. The heights of the egress poles should be disclosed similar to how the Downward Facing Light poles is disclosed. In both cases, the text of this EIR should be changed to accurately reflect 'as built' heights. 'Up to' a maximum of 80 feet is misleading and 'approximately' 30 feet is misleading for Egress Poles.

The light and speaker poles would affect views of scenic resources from local residences and parks. To demonstrate the project's effect on views, Figure 3 and Figure 4 show photographs of existing visual conditions after installation of the proposed stadium lighting system. These photographs were taken on a clear day in July 2019. They present approximately the same perspectives as those shown in photographs of baseline visual conditions (from before installation of the lighting system) in Figure 1 and Figure 2. As shown in Photo 8 in Figure 4, residences on the east side of San Marin Drive have views across the stadium to the northwest of hillsides and ridgelines in the Mt. Burdell Open Space area. Existing deciduous and evergreen trees in the median of San Marin Drive partially obstruct these views. In addition, equestrians south of Novato Boulevard at Morning Star Farm in O'Hair Park have similar northward views of hillside, atop the one-to-two-story buildings at San Marin High School. The new light and speaker poles are partially visible in the foreground of views toward scenic hillsides and ridgelines. However, as shown in Figure 3 and Figure 4, the narrow light and speaker poles only occupy a sliver of the overall views through the stadium site from the perspective of nearby residences and parks. In addition, the approximately 30-foot tall egress lighting and speaker poles are similar to poles that were on the stadium site under baseline conditions, such as the speaker poles behind the bleachers on the east side of the stadium, and similar to or shorter and narrower than the existing street lights on San Marin Drive (see Figure 1, Photo 2). The new egress lighting and speaker poles are partially screened by existing trees adjacent to the project site and do not substantially affect views of the surrounding hillsides and ridgelines (see Figure 4, Photo 8). The poles have minimal impact to the overall viewshed from surrounding properties and do not substantially obstruct views of any identified scenic resources. Consequently, impacts to scenic vistas would be less than significant.

Mitigation Measures

No mitigation measures would be required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

Figure 3 Photographs of Stadium Site with New Stadium Lighting System

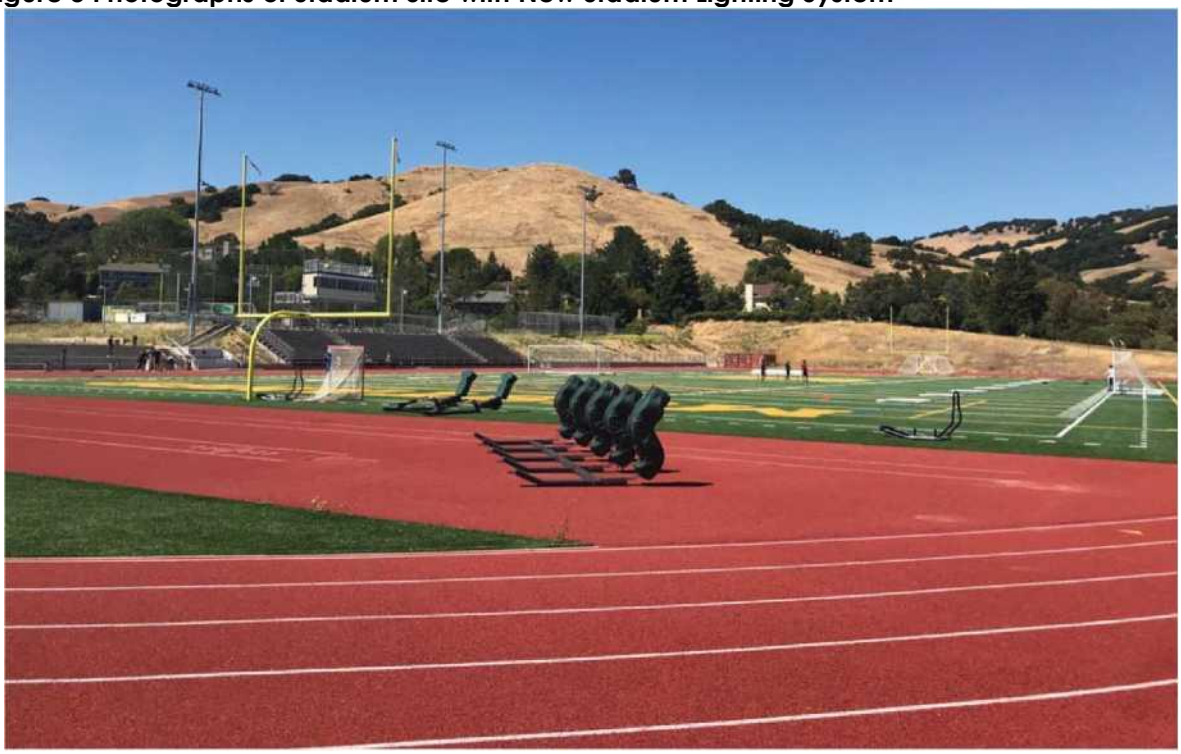


Photo 5: Northward view across stadium toward single-family residences on San Ramon Way and hillside open space.

Photo 6: View to northeast from stadium of school parking lot, San Marin Drive, and hillside open space.

Figure 4 Photographs from Surrounding Area with New Stadium Lighting System

Threshold 3: Would the project substantially degrade the existing visual character or quality of the

site or its surroundings?

Impact AES-2 THE PROPOSED LIGHT POLES HAVE INCREMENTALLY ALTERED DAYTIME AESTHETIC CONDITIONS AT THE STADIUM SITE. HOWEVER, THE LIGHT POLES DO NOT CONFLICT WITH THE VISUAL CHARACTER OF THE STADIUM'S VICINITY AND HAVE A NEGLIGIBLE EFFECT ON OVERALL VISUAL QUALITY. IMPACTS ON VISUAL CHARACTER AND QUALITY WOULD BE LESS THAN SIGNIFICANT.

The 'up to 80 feet' language is inaccurate (as evidenced by my above comments and the tables shown in the photometric analysis). Why does this EIR continue to use vague language; we don't need to qualify the heights with the phrase 'up to'. First, the poles are higher than 80 ft, so 'up to' is misleading and ignores that the project has changed since the Final EIR. Similarly the 'up to' language when referencing Egress Poles is misleading and inaccurate. The 'as built' heights are easily obtainable and should be disclosed to the public. 15.42

The project has introduced eight light poles up to 80 feet tall to the stadium site, incrementally altering existing daytime visual character in the vicinity. In addition, up to 36 poles (18 egress lighting poles and 18 public address system poles), each up to approximately 30 feet tall have been installed throughout the project site to provide lighting for safe egress and clean-up and to provide focused, distributed sound during athletic events. As discussed in Impact AES-1, the new light and speaker poles are partially visible from residences on the east side of San Marin Drive and from recreational users at O'Hair Park. In addition, Photo 5 shows that several residences on San Ramon Way have a direct southward line of sight toward the stadium. The light and speaker poles are fully visible to these residences from a distance of at least 225 feet. In addition, Photo 7 shows that people using the Dwarf Oak Trail in the Mt. Burdell Open Space area have direct southward views of the light and speaker poles from a distance of approximately 1,100 feet (0.2 miles). Although the new light and speaker poles are partially or fully visible to neighboring residences and recreational users of open space areas, they are narrow and only occupy a sliver of the overall views through the stadium site. In addition, the approximately 30-foot tall egress lighting and speaker poles are similar to previous poles on-site, such as the speaker poles behind the bleachers on the east side of the stadium, and similar to or shorter and narrower than existing street lights on San Marin Drive (see Figure 1, Photo 2). The new egress lighting and speaker poles are partially screened by existing trees adjacent to the project site and do not substantially affect views through the stadium site (see Figure 4, Photo 8). The light and speaker poles are visually compatible with existing elevated structures at the stadium, including a flag pole at the southwest end of the field, yellow goal posts at each end, and bleachers and mounted speakers alongside the field. The mass, materials, architectural style, and surface treatments of the poles also are typical of elements commonly seen at sports stadiums. Nighttime aesthetics impacts from light and glare are analyzed separately in Impacts AES-3 and AES-4. Therefore, impacts to daytime visual character and quality would be less than significant.

Mitigation Measures

No mitigation measures would be required. **significance After Mitigation** Impacts would be less than significant without mitigation.

Threshold 4: Would the project create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?

Impact AES-3 THE PROPOSED PROJECT HAS INTRODUCED A PERMANENT STADIUM LIGHTING

SYSTEM TO BE USED FOR SPORTING COMPETITIONS, PRACTICES, AND OTHER EVENTS ON A SITE THAT LACKS EXISTING PERMANENT LIGHT SOURCES. BY DESIGN, THE STADIUM LIGHTING WOULD BE FOCUSED ON THE ATHLETIC FIELD AND WOULD MINIMIZE LIGHT TRESPASS. MEASURED LIGHT LEVELS FROM THE STADIUM LIGHTS DO NOT EXCEED THE CIE THRESHOLD FOR SITES IN THE E2 ZONE. THEREFORE, LIGHT TRESPASS AT PROPERTY LINES FACING RESIDENCES WOULD NOT SUBSTANTIALLY DISTURB RESIDENTS.

My property is not "*at property lines facing residences*", but is significantly further from the school's property line, yet the trespass and glare are significant as evidenced by photos shown elsewhere in this document. My property, to the Northwest of the Project site, was not studied for glare or light trespass per Appendix B. The above paragraph claims CIE thresholds were not exceeded for CIE Zone E2, however, not all CIE metrics were analyzed. Appendix B tries to claim CIE:150 compliance for CIE Zone E2, but without actually performing the testing. At a minimum, CIE:150 compliance needs to be studied for glare and sky glow; additionally, the EIR inadequately addresses light spill and doesn't appear to study impacts from Upward Facing Lights and/or Egress Lights. Appendix B (and therefore this entire EIR) is defective, not compliant with CEQA and misleading to anyone relying on the document to make an informed decision about the Project. The public is unable to comment on statements that are not backed up with facts and the Board of Trustees should not be asked to make project decisions based on an incomplete study. 15.43

LIGHTING IMPACTS WOULD BE LESS THAN SIGNIFICANT.

The project has introduced new permanent light sources at the San Marin High School stadium, which lacks existing permanent on-site light sources. Table 1 summarizes the physical features and frequency of use of the proposed lighting system.

Sixty two 1/2 % of the Downward Facing Light Poles are significantly higher than 80 feet and seventy-five percent of the Downward Facing Light Poles are higher than 80 ft when the Grade underneath the pole is considered.

The exact heights of the Egress Poles don't seem to be given, however, they appear to be significantly shorter than 30 ft which impacts their spillage, trespass and glare effects. These effects need to be studied so an informed EIR decision can be made by the Trustees and so the public can be informed before it is asked to comment on the EIR. 15.44

Table 1 characteristics of Proposed stadium Lighting system

Lighting Feature	Details
Height of Lights	Approximately 30 to 80 feet
Number of Light Poles	8 tall poles (up to 80 feet in height) Up to 18 short poles (up to approximately 30 feet in height)
Lighting Type	Musco Light-Structure System LED (or equivalent)
Times of Use	Evening football, soccer, lacrosse games; evening football, soccer, lacrosse practices; track meets and practices; Powder Puff game, evening school events such as graduation

As shown in Table 1, the eight new primary LED light fixtures rise to 80 feet in height. Downward facing luminaires have been affixed at a height of approximately 80 feet on each pole to illuminate the stadium during sport competitions, practices, and other events. Additional downward-facing luminaires are mounted at 70 feet on some poles in order to provide consistent illumination across the field surface. Lower output, upward-facing luminaires are mounted at 20 feet on each pole in order to illuminate airborne objects such as footballs during games. A second set of lower output LED luminaires are installed on up to 18 new and existing poles, each up to approximately 30 feet tall. These egress and clean-up lighting system poles are spaced evenly around the perimeter of the track and also along pathways leading to ADA-compliant accessible parking spaces.

The idea that the egress poles "will be" *approximately 30 feet tall* conflicts with the Official Court Record item AR 10134. On 01/30/17 Eduardo Morales wrote to San Marin High School Teacher Melissa Havel (AR 00010134). That email included another email written by Tony Francescini to Eduardo Morales Eduardo which says [underline added]:

"Below is the link to the EIR. Note, I believe the shorter poles are displayed at 30 feet tall, and I understand that is incorrect. I believe those posts will be closer to 15 to 18 feet tall. Tony may have more to say about that."

The District knew in January of 2017, before the Final EIR was presented to the public for comment that the egress light poles would be significantly shorter than 30 feet, yet Rincon (the EIR preparers) sat on their hands, did nothing and as a result the Public was misled and the Trustees were asked to make decisions based on defective information.

15.45

Since the District took a significant financial risk by building out the project without an approved EIR, we do get to measure those poles and their actual height(s) should be disclosed in this EIR; actual heights of the egress poles are not disclosed in this EIR (that I can find). It matters because a shorter pole requires a light fixture to be pointed more horizontally to achieve the same illumination radius and this more horizontal aiming increases light trespass and glare effects. None of this is disclosed or discussed in this Revised Draft EIR.

The project has introduced a new permanent lighting system to a stadium that lacked existing permanent lighting. When the new lighting system is used for athletic events, it would result in a substantial increase in lighting on the field relative to baseline conditions. However, the proposed type of lighting system (state-of-the-art LED system) is designed specifically to minimize light trespass and would be operated during restricted time frames before normal sleeping hours. First, the approximate 80-foot height of the brightest stadium lights would enable each luminaire to be mounted with a narrow beam angle, which would focus light downward while still covering the athletic field, thereby limiting light trespass at the nearest off-site residences approximately 120 feet away. While it may be counterintuitive that highly mounted light fixtures would reduce light trespass relative to lower fixtures, their narrower beam angle would emit less light visible to neighboring residences. The proposed light fixtures also feature reflectors and visors to block upward light from the brightest fixtures. While lower-output luminaires mounted at 20 feet on each pole would cast light upward, these fixtures would only be lit during games to illuminate airborne objects such as footballs. The proposed stadium lights also would be used only during certain events, as shown in Table 1, with the main lights turned off at set times:

Use of the phrase 'set times' is misleading since the game length will determine when the main lights are to be extinguished. Reference is made elsewhere (Final EIR, Community Agreement and in the transcript of the May 16, 2017 Board of Trustees meeting) that field injuries might delay games and

15.46

games may start late if traffic interferes with referee or opposing team travel to San Marin High.

- Evening football games (22 plus any playoff games per year) 8:30 PM on Thursday and by 9:45 PM on Friday
- Evening soccer games (20 on average per year plus any playoff games per year) by 8:30 PM on Tuesday through Saturday
- Evening lacrosse games (13 on average per year plus any playoff games per year) by 8:30 PM on Monday through Saturday
- Evening track meets (two on average per year plus any Track Finals) by 8:30 PM on Wednesday and Thursday
- Scheduled evening athletic practice by 8:00 PM on Monday through Friday
- Evening school events such as graduation by 9:45 PM
- Powder Puff game (one per year) by 8:00 PM on Friday

For further detail on the anticipated schedule of events, refer to Table 3 and Table 4 on pages 25 and 26 of the original Final EIR. The main stadium lights would be turned off by 9:45 PM or earlier, with the rare exception of games that extend to overtime, which could require the continued use of main stadium lights beyond this cut-off time. It is acknowledged that some neighbors of San Marin High School typically go to sleep before 9:45 PM. In addition, stadium lighting would emit light in the blue spectrum, exposure to which can suppress production of the hormone melatonin and impair sleep quality in the evening (American Medical Association 2016). However, the proposed stadium lights' narrow beam angle, reflectors, and visors would minimize the exposure of nearby residents to lighting that could potentially disturb sleep. Furthermore, unlike LED streetlights that are illuminated all night and have generated complaints from residents in cities like Davis, California, and Seattle, the proposed LED lights would be turned off by 8:30 PM most nights and by 9:45 PM fewer than approximately 15 times per year for home football and Powder Puff games. The stadium lights would have a 9:45 PM cut-off time that precedes the Illuminating Engineering Society of North America's identified “post-curfew” hours of 10:00 PM or later, which correspond to normal sleeping hours.

The above paragraph ignores the fact that the Upward Facing Lights (and possibly Egress Lights) are aimed directly at some residences; this was never studied and not really disclosed as an impact in this Revised Draft EIR. This EIR is misleading on its face, does not identify key impacts and makes conclusions about impacts from the Project without actually studying the impacts of items designed into the Project specifications. Appendix B conveniently ignores the spillage, trespass and glare impacts from the project on properties to the Northwest of the Project Site, yet these residences are the ones most adversely affected by the Upward Facing Lights and perhaps Egress Lights and Field Reflections.

15.47

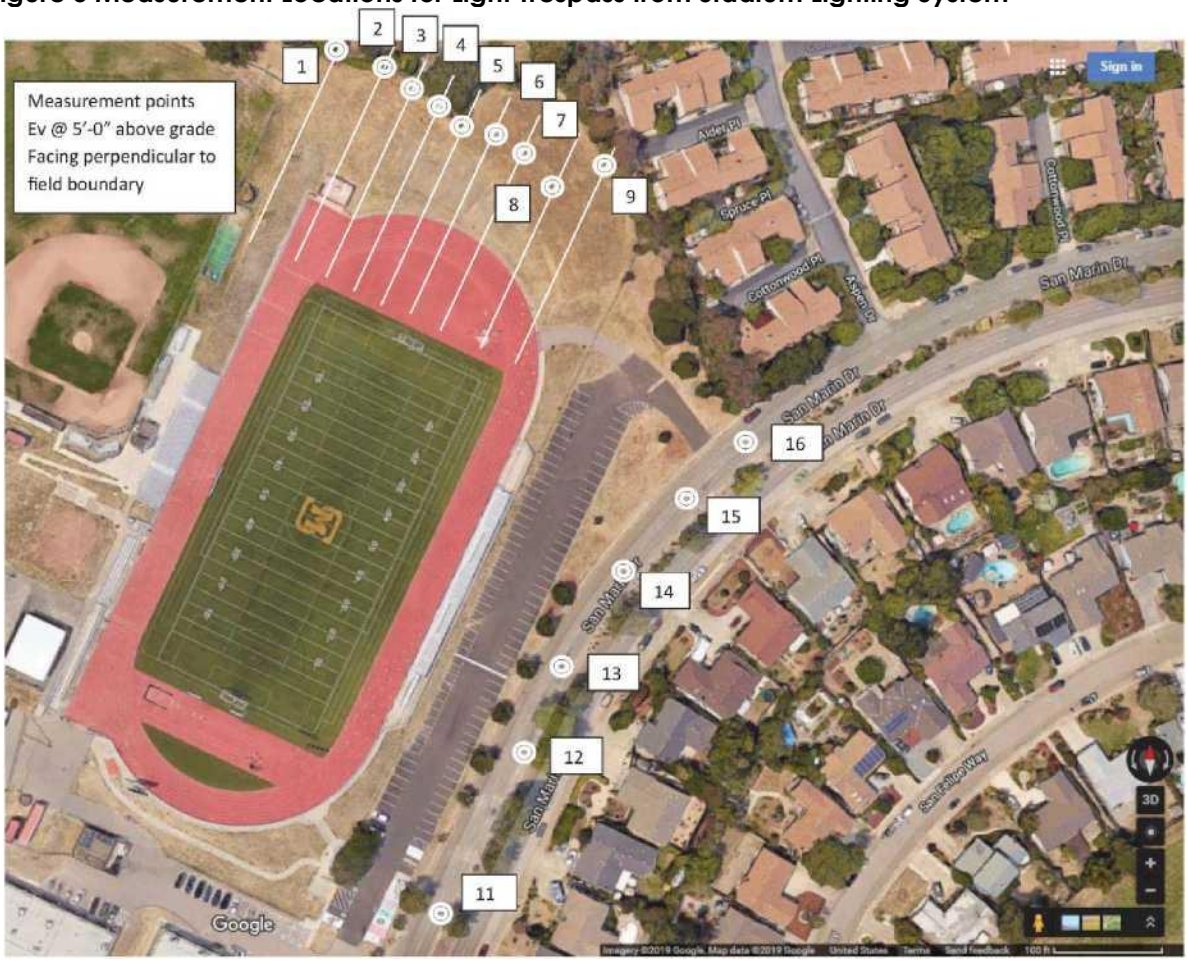
In the below paragraph: were the impacts from Upward Facing Lights analyzed with respect to the 5 lux threshold referenced for CIE Zone 2? I can't find any reference to any analysis of the Upward Facing Lights beyond dismissing their impacts (without study). Does the Project meet City of Novato municipal code with respect to spillover and glare from the Upward Facing Lights and Egress Lights? I don't believe these items were ever studied. The EIR is therefore incomplete, inaccurate and misleading as presented and not a tool that should be used for decision making by the Trustees or Public.

Again and again, this EIR claims spillover light, trespass and glare are minimal due to the careful aiming of the lights (and the tall light poles) which can only lead to one conclusion since I personally viewed and measured significant spillage, trespass and glare during the May 6, 2019 test: the Upward Facing Lights and Egress Light contribution were never considered. I don't see evidence these items

were studied in Appendix B as the spillage and glare patterns seem to be limited to that which is created by the Downward Facing Lights. This EIR is not CEQA compliant.

Table 2 shows the results of field verification of illuminance levels from use of the proposed stadium lighting system at property lines facing residences, and Figure 5 maps the locations of these measurements. As shown in Table 2, light trespass at residential property lines would be 2.75 lux at the greatest. This light level would not exceed the CIE threshold of 5 lux for sites in the E2 zone. Therefore, nearby residences would not be subject to excessive illuminance when stadium lights are in use. Although the District has exempted itself from the local zoning ordinance, illuminance also would not exceed the light and glare standards in the City of Novato's Municipal Code. Consistent with Section 19.22.060 (Light and Glare), exterior lights would be designed to minimize spillover onto adjacent properties to the maximum extent feasible, and all non-essential lighting would be turned off prior to 11:00 p.m. Lighting impacts would be less than significant.

Figure 5 Measurement Locations for Light Trespass from Stadium Lighting System



Note how the above photograph omits taking measurements from the Northwest of the Project Site. Two of the Upward Facing Lights are aimed towards the Northwest. How can this be acceptable under CEQA? It is the 'ostrich' method of studying environmental impacts (Ostriches are incorrectly thought to stick their heads in the sand and ignore danger). The purpose of this EIR is to actually study impacts not avoid studying areas with the most impacts. 15.48

Table 2 Measured Light Trespass from Stadium Lighting System at San Marin High School

Measurement Location	Illuminance (Lux)	CIE Illuminance Threshold for E2 Zone (Lux)
Northeast Property Line		
1	2.36	5
2	2.17	
3	2.10	
4	2.63	
5	2.34	
6	2.44	
7	2.20	
8	2.75	
9	1.62	
Southeast Property Line		
11	0.54	5
12	1.10	
13	1.19	
14	1.69	
15	1.63	
16	0.85	

The above table proves no trespass measurements were taken to the Northwest of the project site. 15.49

Mitigation Measures

No mitigation measures would be required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

Threshold 4: Would the project create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?

Impact AES-4 **THE PROPOSED STADIUM LIGHTS WOULD NOT GENERATE LIGHT LEVELS THAT COULD** CAUSE EXCESSIVE DISCOMFORT COMFORT GLARE FOR RESIDENTS OR DISABILITY GLARE FOR PEDESTRIANS AND MOTORISTS. IMPACTS FROM GLARE WOULD BE LESS THAN SIGNIFICANT.

Excessive discomfort glare was documented in my earlier comments on May 6, 2019 during the lights test (primarily) from the Upward Facing Lights directed towards the Northwest. The image below, taken from Google Maps (North is on the vertical axis and the red arrow points from an approximate position of the Upward Facing Lights towards my observation point, to the Northwest. With the Upward Facing Lights aimed towards the Northwest, it is curious then, why no impacts were measured in the direction where they were aimed; Appendix B intentionally dismisses impacts from the Project to the Northwest. I believe this was done because the Upward Facing Lights were not considered for impacts; the Egress lights were not considered for impacts. The below discussion talks about the fact that *".. sports luminaires focus most of their light onto the sports field, and offsite glare is usually the result of a luminaire that is mis-aimed towards the property line";* the EIR is discussing light effects from the Downward Facing Lights, not the lights aimed at homes to the Northwest of the Project site. 15.50

When proclaiming there won't be impacts, the EIR (below paragraph) conveniently discusses impacts "*at the adjacent property lines"* to the Northwest, not those residences in the line of sight of the Upward Facing Lights. The conclusion that there won't be disability glare is meaningless because the impacts were never studied; they were discounted without study.

This is what the Project Lights look like from that vantage point:

and this is their effect on residences in the area (to the Northwest - photo taken without a flash):

The proposed stadium lights would generate light intensity on-site at nearby residences, and on adjacent public streets and sidewalks. Light intensity at sports facilities can cause discomfort glare, an annoying or painful sensation when people are exposed to a bright light in the field of view (Shuster 2014). As discussed in Impacts AES-1 and AES-2, nearby residents would have at least partial views of the proposed stadium lights from San Ramon Way north of the stadium and east of San Marin Drive. However, sports luminaires focus most of their light onto the sports field, and offsite glare is usually the result of a luminaire that is mis-aimed towards the property line (Appendix B). Based on the field measurements of light trespass from the proposed stadium lighting system, shown in Table 2 above, the project would not generate illuminance on the vertical plane exceeding 5 lux at adjacent residential property lines. Therefore, the stadium lights would not subject nearby residents to excessive discomfort glare, nor would it expose pedestrians and motorists outside the stadium to "disability glare" that reduces visibility. The project would have a less than significant impact from glare.

Mitigation Measures

No mitigation measures would be required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

Threshold 4: Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area

The discussion above proves (with photographs and images) that the Upward Facing Lights are aimed at residences to the Northwest of the Project site; the Upward Facing Lights are a new source of substantial light and glare that adversely affect night time views from that vantage point. Additionally, the poles (which according to Appendix B, are mostly 90 ft tall) create significant visual disturbances for residents living to the South of the Project Site (reference photographs above

showing slivers of visual disturbances).

Impact AES-5 THE PROPOSED STADIUM LIGHTS ARE SHIELDED AND THE BRIGHTEST LIGHTS WOULD BE DOWNWARD-FACING TO REDUCE LIGHT TRESPASS. UPWARD-FACING LIGHTS WOULD ONLY BE USED DURING GAMES AND WOULD BE DESIGNED TO PROVIDE ONLY THE MINIMUM AMOUNT OF ILLUMINATION NECESSARY TO SEE AIRBORNE OBJECTS IN THE STADIUM. THEREFORE, THE PROJECT WOULD NOT SUBSTANTIALLY CONTRIBUTE TO MARINE LAYER OR CLEAR SKY GLOW. IMPACTS FROM SKY GLOW WOULD BE LESS THAN SIGNIFICANT.

As discussed in Impact AES-3, the proposed stadium lighting has been designed to minimize light trespass. The approximate 80-foot height of the brightest stadium lights would enable each luminaire to be mounted with a narrow beam angle, which would focus light downward, thereby limiting light trespass outside the athletic fields and reducing sky glow. The proposed light fixtures also feature reflectors and a visor to block upward light. Although lower-output luminaires have been mounted facing upward at 20 feet on each light pole and would incrementally increase sky glow when in use by reflecting light off clouds and aerosols, these lights would only be used during games and would be designed to provide only the minimum amount of illumination necessary to see airborne objects in the stadium.

Those 'minimum amount of illumination' Upward Facing Lights were never studied for impacts. Contrary to Judge Chernus' final ruling, there doesn't appear to be any EIR study directed towards a lower illumination project. What is the minimum amount of illumination necessary to see airborne objects; there is no discussion of how this was determined and no reference to the calculations. 15.51

The lighting report prepared for the project evaluated the proposed stadium lighting system's contribution to both marine layer sky glow and clear sky glow. A marine layer was present in Novato on the night of lighting measurements in June 2019 (Appendix B). Sky glow illumination near the project site, in an area that the stadium lights could not directly illuminate, measured 0.016 foot candles. This lighting level is typical of sky glow when a marine layer is present near the coast in California, which measures between 0.010 and 0.020 foot-candles. The stadium lights did not substantially contribute to sky glow produced by the greater community. Moreover, the lighting report determined that the stadium lighting does not contribute enough uplight to affect clear sky glow in Marin County.

The below paragraph tries to minimize the lights impacts by spreading the total number of nights lights are planned to be used over an entire year; that is misleading. There will be 152 nights of lights use during a 9 month window; that is more than 50% of the total nights during the darkest (and most light sensitive) time of year. 15.52

The timing of stadium lights would also limit their contribution to sky glow. The use of all stadium lights would be limited to approximately 152 nights of the year, approximately 83 of which would be games (this estimate includes the maximum number of playoff games that could be played in any given year). For most lighted evenings, the lights would be turned off by 8:30 PM or earlier. For approximately 15 or fewer nights per year, the lights would be cut off by 9:45 PM in the evening. The minimal amount of sky glow that would be introduced with installation of the proposed lighting system would be limited to early evening hours (typically before 8:30 PM), would occur for a maximum of 152 nights per year, and would occur in a location with existing nighttime lighting (including street lamps along the adjacent roadway and security lighting on the adjacent campus).

Therefore, the proposed stadium lights would not substantially contribute to sky glow during

sensitive nighttime hours, and impacts would be less than significant.

Sky glow Impacts from Field Reflections, Egress Lighting and Upward Facing Lighting were not studied. Those impacts are significant as proven by the only evidence in the EIR that addresses those impacts: photographs and personal testimony I am submitting with these comments. 15.53

Mitigation Measures

No mitigation measures would be required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

3 Cumulative Impacts

CEQA requires EIRs to consider potential cumulative impacts from other past, present, and reasonably foreseeable future projects. CEQA defines “cumulative impacts” as two or more individual impacts that, when considered together, are considerable or will compound other environmental impacts. In the original EIR, cumulative impacts are discussed in the Initial Study (Appendix A to the original EIR) and at the end of each analysis section (Section 4.1, *Aesthetics*; Section 4.2, *Air Quality*; Section 4.3, *Cultural Resources*; Section 4.4, *Greenhouse Gas Emissions*; Section 4.5, *Noise*; and Section 4.6, *Transportation and Traffic*).

The definition used for "cumulative impacts" differs slightly from that used by Judge Chernus in his final ruling of the recent CEQA action. According to Judge Chernus [underline added]: "*The term ‘ “[cumulative impacts refer[s] to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts.” ’* (State CEQA Guidelines, § 15355.)

Note the difference; the words 'or increase' were used in the Court's ruling but are absent from the EIR. I can think of several cumulative impacts that will increase as a result of multiple planned (or currently ongoing) projects that may not 'compound' on top of each other. I suspect this EIR failed to account for projects that increase impacts and just looked at projects that might compound impacts. If so, that would be a violation of CEQA.

Here is an example of a few projects that will increase (and perhaps compound impacts): 15.54

1) The STEM Building construction, which is a new project started after approval of the May 2017 EIR, has brought new noise to our neighborhood, in the day time (not the night time). Those impacts are not compounding (because they occur at different times of day), but they do increase overall noise impacts from school activity. The construction noise is expected to last for several years while those buildings are constructed.

2) A new (multi-purpose) Baseball field is scheduled to be added with Measure G funds. California's Dept of Architecture, which must approve the design of all School Projects may require additional egress lighting on that field (and the EIR authors should know this). Instead (below), this EIR says "*The cumulative project to convert a baseball field to a lighted soccer/lacrosse field at San Marin High School would not involve the addition of lighting."* Egress lighting requirements for the planned baseball field should be discussed so the public and Trustees know if cumulative impacts might effect that project.

3) A new traffic stop sign was added to the intersection of San Marin Drive and the westerly most intersection of San Carlos Way (right outside San Marin High's Admin Offices). This was a three way stop sign intersection when the original EIR study was started and subsequent approval of the project, in May 2017, a fourth stop sign was added. The additional stop sign was added for a reason, recognizing a change to the environment.

This is the intersection where, several months ago, a student was hit by a car in the crosswalk.

Because of the changed conditions (an increase in something), subsequent to the publication of the Final EIR, a stop sign was added and this intersection now meets the requirement for study per the 15.55

standards established in the Final EIR for this project. According to California Code Section 21166, this item should be studied and included in this Revised Draft EIR.

Perhaps NUSD's attorney disagrees that Code Section 21166 demands additional traffic study at this intersection. Should NUSD study this intersection anyway, even though the court didn't mandate a review? I think so, because it is a public safety issue; pro-lights or anti-lights, we all agree that we want our pedestrians to be safe when crossing the street at a busy intersection, especially at night. NUSD should also ask that the Safe Routes to School Task Force evaluate this intersection/crosswalk.

No one wants a pedestrian to be hurt or killed in the intersection at San Carlos and San Marin Drive (the intersection that was never studied in the EIR for traffic impacts). This Board of Trustees can do the right thing now and study this intersection for impacts and possibly save a life or go on record as ignoring an opportunity to make our community a safer place.

I can't explain why the District would intentionally setup its traffic analysis criteria to omit study of the single most-effected intersection (San Carlos and San Marin, right in front of the school's administration building). I hope that omission can be fixed.

Novato City Planning Commission Minutes from last November 2018 has a discussion of the San Marin / Novato Blvd. intersection. There was a clear expectation that all of the campus traffic issues should be considered when we looking at projects that include San Carlos. So, why then, did our School District ignore traffic at this intersection? Will our District once again ignore public safety so it can rush towards field lights?

4) Cumulative ("increased") impacts of noise from the Gary Gates Field's softball games was not considered along with noise from evening and night sports activities using Project lights at San Marin High. The Morningstar Horse Farm has (horse) residents that are sensitive to noise and the cumulative impact of field noise from Gary Gates games (also lighted and at night) must be considered with San Marin High activities. The cumulative impacts on neighbors in Novato Chase and San Marin Unit 10 must be considered as Gary Gate's noise is additive to the insults delivered on neighbors. None of this has been studied and perhaps the justification results from the omission of the words 'or increase' from the CEQA definitions used in this EIR (which differ from the statute's definitions.

15.56

3.1 CEQA Requirements

State CEQA Guidelines Section 15130 requires that an EIR discuss cumulative impacts of a project and determine whether the project's incremental effects are “cumulatively considerable.” The definition of cumulatively considerable is as follows:

> “Cumulatively considerable” means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.”
>
> Section 15065(a)(3)

For example, traffic impacts of two nearby projects may be insignificant when analyzed separately, but could have a significant impact when analyzed together. Cumulative impact analysis allows the EIR to provide a reasonable forecast of future environmental conditions and can more accurately gauge the effects of a series of projects. In addition, the CEQA Guidelines state that the mere existence of significant cumulative impacts caused by other projects alone does not constitute substantial evidence that the proposed project's incremental effects are cumulatively considerable.

California Code Section 15355 (b) also says: *"Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time."*

15.57

The omission (referenced above regarding 15355) of the words 'or increase' added to the significant words from Code Section 15355 (b) we know that minor increases over time are cumulative and important under CEQA.

Below, reference is made to an additional turf field, where no lighting has been proposed. Was the DSA's (Division of Architecture's) Office asked to see if they might require egress lighting when the turf field is installed due to its proximity to a lighted football field? I suspect not. The District could and should confirm its contention that the multi-purpose baseball field will not require lighting due to state imposed architecture standards.

15.58

3.2 Related Projects

Related projects, according to CEQA Guidelines Section 15355, consist of "closely related past, present and reasonably foreseeable probable future projects that would likely result in similar impacts and are located in the same geographic area." Planned and pending projects within the study
""

The quote given above for Section 15355 (b) differs from what I found on the State of California's website and omits a key sentence referenced above (also from 15355 (b)). The full quote of 15355 (b) is: http://www.resources.ca.gov/ceqa/guidelines/art20.html → source

(b) The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time.

Notice, the words offered in the EIR that are attributed to 15355 "*would likely result in similar impacts and are located in the same geographic area*" aren't actually in the statute as published by the State of California on its website. It appears the EIR authors are presenting a conclusion as if it was part of CEQA when no such conclusion is offered in the statute. I believe this error makes it impossible for the public to absorb how it should analyze this EIR; there is a presumption that the EIR will be truthful when quoting the law and it has strayed from accuracy. Presumably, the EIR's authors used the above quote when analyzing other projects for cumulative effects and therefore used an invalid yardstick creating a faulty analysis.

The truth is that the real requirements for a cumulative effect is that the analysis must allow for minor increases (that word ' increases' comes directly from code section 15355 (and was cited in Judge Chernus' ruling). I believe this error is material and requires correction and recirculation of the EIR.

15.59

The State's Architect may require egress lights on the new turf field (item mentioned in Table 3, below), there will be significant noise over several years from construction of several new buildings at the high school and a new stop sign at a critical (previously unstudied) intersection are all reasons to do additional study on noise and traffic; those can be focused, however, they must be studied as required under CEQA (especially considering Code Section 21166 and related sections).

15.60

The additional stop sign added at the western most intersection of San Carlos and San Marin Drive is not listed in Table 3 below.

15.61

Table 3 Cumulative Projects List

Project Name/Applicant	Project Location	Description
Projects Located at San Marin High School		
Stadium Field Re-turf	15 San Marin Dr., Novato, CA 94945	Replacement of 12-year-old turf (useful life of 8-10 years), construction completed August 2018
Stadium Press Box	15 San Marin Dr., Novato, CA 94945	Project replaced an existing approx. 410 sq. ft., 19-foot tall press box/snack bar structure with a new 8 x 28 feet (224 sq. ft.) prefabricated building elevated on a platform 9.5 feet above the ground (total height about 23 feet) on the same site. No new lighting or sound system was included in the project.
Performing Arts Building	15 San Marin Dr., Novato, CA 94945	The project will replace the current PAC theater with a new building approximately 1,545 sq. ft. larger than the existing building. The structure will be a total of 8,010 sq. ft. with the capacity to seat 217, the same capacity as the existing PAC theater.
STEM Classroom Building	15 San Marin Dr., Novato CA 94945	The project would replace five existing portable classrooms with a single-story, 24-foot-high STEM building and associated improvements including a courtyard, outdoor project area, and landscaping. The building would contain approximately 18,466 sq. ft. of space. There would be ten classroom/labs, and three tables to create an additional outdoor classroom space. The classrooms would provide capacity for 320 students but would not increase enrollment.
Second Multi-Sport Turf Field	15 San Marin Dr., Novato CA 94945	No schematic design has been prepared for this project; however, it is confirmed that no lighting is proposed. In addition, no funding is identified/allocated for this project at the time of this writing.
Remodel of Current "Academy Building" into Maker Space	15 San Marin Dr., Novato CA 94945	This project involves internal improvements to the existing structure.
Various Misc. Improvements	15 San Marin Dr., Novato CA 94945	Internal renovations to buildings within the high school.
Projects Located within the City of Novato		
Novato Blvd. Improvement Project	Portions of Novato Blvd. between Diablo Ave. and Grant Ave.	City capital project to widen road, including bicycle lanes.
The Square Shopping Center	2001 Novato Blvd.	Mixed use project including renovation of 74,118 sq. ft. of commercial space, demolition of 28,246 sq. ft. of existing commercial space, and addition of 53 apartment units (11 affordable), and 218 on-site and 46 off-site parking spaces. New structures include a mixed-use building at the rear of the site that is 3 stories, up to 42' high, and new 2-story apartments fronting Novato Blvd.
Oakmont Senior Living	1461 S. Novato Blvd.	Development of a 78 room senior assisted living facility, featuring 50 assisted living units and 28 memory care rooms. The facility is proposed at 72,000 square feet and 2-stories in height.
Hamilton Square	970 C St.	31 townhomes in eight, 3-story buildings, and one, two-story building, 6 of which are affordable.

1 Project Name/Applicant	Project Location	Description
Atherton Place	7533 and 7537 Redwood	1,340 of retail space fronting Redwood Boulevard and 50 residential townhome units. Townhomes would be 2-stories over garage.
Laurel Ridge Senior Apartments	7711 Redwood Blvd.	100 senior apartments in a single 3-story buildings with a basement parking garage, including 20 affordable units.
Wood Hollow Hotel	7701 Redwood Blvd.	Four-story hotel building of 56,430 square-feet, with 87 to 95 rooms. Parking includes a combination of surface stalls (64 cars) and a basement garage (23 cars).
Bahia Heights	End of Misty Ct.	Single-family residential subdivision proposing 9 residences.
Hamilton Cottages	Hamilton Pkwy. West of Marblehead Lane	16 single-family, 2-story residences for senior occupancy, including 2 affordable for-sale homes at the moderate income level.
Landing Court	No address	34 new multi-family units in 2- and 3-story buildings, of which 7 are affordable units.
North Bay Children's Center	933 C St.	Renovate the existing day care center with a new 19,824 sq. ft. building and site amenities.
Former Bridgepoint Academy	1787 Grant Ave.	35 new multi-family units in 2 and 3- story buildings, including 7 affordable units.
Stone Tree Golf Course		Driving range on Marin County Flood Control District Property
McPhail's Office Amendments		Amend General Plan land use designation from BPO to LIO. Master Plan and Precise Development Plan amendments to allow wider range of office and light industrial uses.
Hyppolite Accessory Structure	1468 S. Novato Blvd.	Review of as-built accessory structure in rear yard.
Mohajer Land Division & Variance	1037 Simmons Ln.	Proposed 3 lot land division. Request for variance to allow non-conforming lot area and depth.
Schafer Stream Management Plan	896 Sutro Ave.	Request for use permit to allow the retention of Redwood trees in Stream Protection Zone.
Galvan Use Permit	15 Hamilton Dr.	Request for a use permit to allow outdoor storage of materials for art projects.
Chase Bank Pacheco Plaza	404 Ignacio Blvd.	Request to demolish existing bank building (vacant) and construct new bank of same size.
Muha Accessory Structure	823 Hayden Ave.	Request for design review approval to construct a 484 sq. ft. detached garage on a hillside parcel. Snyder Art Studio
Snyder Art Studio	6 Conchita	Construction of a 399 sq. ft. art studio on a hillside parcel.
McGuire Residence Addition	40 Baywood Cir.	583 sq. ft. first floor addition, 210 sq. ft. garage addition, and new pool and retaining walls on a hillside parcel.
DM Elite Properties	1108 Second St.	Conversion of an existing residence to an accessory dwelling unit and construction of a new primary single family residence.
Ghany Live/Work Unit	Bolling at Marin Valley	Request for entitlements to construct a live/work unit of approximately 1,700 sq. ft.

I Project Name/Applicant	Project Location	Description	1
Johnson Residence Addition	753 Bradley Ave.	Second story addition of 685 sq. ft.	
Hamilton Hospital Assisted Living Facility	516 Hospital Dr.	Senior assisted living facility and memory care center at the former Hamilton Hospital.	

Source: City of Novato Current Planning Projects, Projects Under Review and In Process, November 2016, and NUSD 2019

Table 4 Cumulative Projects Summary

1 Land Use	Development
Residential Units	328 units
Non-Residential Space	171,260 square feet

Source: See Table 3

This analysis considers the relevance of the cumulative projects in light of the geographic scope of the specific resource area for which impacts may occur. For instance, cumulative aesthetic impacts are generally limited to potential projects within the immediate viewshed or line-of-sight of the stadium lights or potential projects that would affect the visual character of the immediately surrounding neighborhood, whereas cumulative traffic impacts consider other potential projects within a broader geographic scope. There are seven recently completed, planned or pending projects on the San Marin High School property. The closest project to San Marin High School property within the City of Novato is the mixed-use project at The Square Shopping Center (2001 Novato Boulevard) approximately 1.2 miles east of the project site.

3.3 Cumulative Impact Analysis

Aesthetics

The addition of a fourth stop sign at the western most intersection of San Carlos and San Marin Drive is a project that is within one mile of the project site. Therefore the statement below that "*there are no cumulative projects within one mile of the project site…"* is inaccurate. That fourth stop sign is significant and qualifies the intersection for further traffic study per the criteria established in the Final EIR. The EIR, in the below paragraph, discounts the impacts from construction of the new STEM building and performing arts building, however, the noise from construction will go on for years and is additive ('an increase') to other noise impacts. These are significant project changes since the project was approved in May of 2017. Civil Code Section 21166 requires the traffic segment of the EIR be opened to study this environmental change. 15.62

Additionally, the claim that the project would not generate " light trespass approaching a threshold of 5 lux" is unknowable since the impact of Upward Facing Lights (which are aimed at residences to the Northwest of the Project Site) and Egress lights have never been studied, just discounted as immaterial. I have provided evidence elsewhere in this document that prove these impacts with photographs and notes of my personal observations. There is no conflicting EIR evidence or testing that refutes my observations as Mr. Benya (Appendix B) did not test residences to the Northwest, especially those elevated from the Project Site. 15.63

Additionally, the 5 lux figure does not take into account the appropriate after curfew permitted lux numbers in CIE Zone E2 permitted under the CIE:150-2003 standard (.5 lux) or the CIE:150-2017 standard (requires calculations to determine). 15.64

As discussed in Section, *Cumulative Impacts*, proposed and pending development in the City of Novato, and surrounding areas would include at least 151,294 square feet of non-residential development and 328 residential units. In some cases, new cumulative development projects would alter the aesthetic character of the City by introducing larger structures with greater development intensity. As discussed in Chapter 3, there are no cumulative projects within one mile of the project site, with the exception of new performing arts and STEM classroom buildings and other minor improvements at San Marin High School. Therefore, there are no projects within the viewshed of the project that would substantially affect visual character and quality. Therefore, impacts associated with the proposed project would not combine with other projects to cumulatively impact the aesthetics of the area. Furthermore, the proposed lighting and PA systems also would not represent an increase in development intensity in these areas. In addition, as discussed in Impacts AES-3 through AES-5 in Section 2, *Aesthetics*, the stadium lighting system would not generate light trespass approaching the threshold of 5 lux in the CIE's E2 zone for rural areas, would not subject nearby residents to excessive discomfort glare or expose pedestrians and motorists to “disability glare” that reduces visibility, and would not substantially contribute to marine layer sky glow or clear sky glow during nighttime hours in the area. The cumulative project to convert a baseball field to a lighted soccer/lacrosse field at San Marin High School would not involve the addition of lighting.

The language above suggests the developed density of the area surrounding the project site is going to change as a result of "..larger structures with a greater development density." This is misleading as there are no major projects in the list above in the immediate vicinity of the project site. The two closest shopping centers to the site are both plagued with chronic vacancies and one of those centers is contemplating mixed-use development. Those mixed-use plans are stymied due to that project's failure to comply with City of Novato parking requirements. 15.65

Therefore, cumulative impacts for aesthetics would be less than significant and the project's contribution to cumulative aesthetic impacts would not be cumulatively considerable.

Agriculture and Forest Resources

The State Department of Conservation has classified much of Novato's agricultural land, particularly Bayfront land, as Farmland of Local Importance. Within the City limits, one active vineyard and one poultry ranch are under Williamson Act contract. The City of Novato has certain policies in place to protect the conversion of farmland and forestland to non-agricultural uses in the City's General Plan and through the establishment of an Urban Growth Boundary. As discussed in the Initial Study (Appendix A to the originally circulated EIR), there is no farmland or forest land on or directly adjacent to the project site. Installation of new lighting and an upgraded public address system at the San Marin High School would not result in the conversion of farmland or forestland to non- agricultural uses. The project would have no impact with respect to the conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland) to non-agricultural use; conflicts with existing agricultural zoning or Williamson Act contract; the loss of forest land or conversion of forest land to non-forest use; or other conversion of farmland to non-agricultural use. The project would not contribute to a cumulative loss of agricultural land or forest land; therefore, the project's contribution to cumulative agricultural and forest resources impacts would not be cumulatively considerable.

Air Quality

The area of geographic consideration of cumulative impacts to air quality is the San Francisco Bay Area Air Basin (SFBAAB). SFBAAB is in nonattainment for the federal and state standards for ozone, as well as the state standard for particulate matter (PM_{10} and $PM_{2.5}$) and the federal standard for 24 hour $PM_{2.5}$. Growth from related projects within the SFBAAB would contribute to existing exceedances of ambient air quality standards when taken as a whole with existing development. The project would not result in an increase in regional population or other growth that is not anticipated under the 2010 Bay Area CAP; therefore, implementation of the project would not conflict with or obstruct the implementation of the 2010 Bay Area CAP. In addition, as discussed in Section 4.2, *Air Quality*, of the originally circulated EIR, all air pollutant emissions would be below BAAQMD thresholds. Therefore, the project's contribution to cumulative regional air quality impacts would not be cumulatively considerable.

Biological Resources

The city has biological resources in the form of oak woodlands which are found in the Novato area promoting a diversity of wildlife including animal, bird, reptile and insect species. Existing City policies and those of the county, state, and federal agencies protect biological resources on a per project basis. As discussed in Appendix A to this Revised EIR, a biological resource reconnaissance site visit was conducted at the proposed project site as well as a review of regulatory agency databases, literature review, an analysis of aerial imagery and review of construction plans. The proposed installation and operation of a new lighting and an upgraded public address system at San Marin High School would result in a less than significant impact to biological resources. The project's contribution to cumulative biological resource impacts would not be cumulatively considerable.

Biological impacts from lights were not fully studied in this Revised EIR. Example: significant glare impacts on surrounding hills were not studied for glare, light trespass and their impact on nesting and other behaviors even though this Revised EIR concedes these areas are used by wildlife for nesting. How can we conclude that impacts are "*less than significant*" if no study was performed; this seems to be a conclusion in the absence of both data and research. 15.66

Cultural Resources

Many of the cumulative projects involve ground-disturbing activities that could affect cultural, paleontological, or tribal resources or human remains. However, existing City of Novato policies and County and state regulations would protect cultural and tribal resources on a case-by-case basis as projects are considered. In the event of discovery of cultural resources (e.g., prehistoric sites, human remains), paleontological resources (i.e., fossils), and tribal cultural resources during ground disturbance on the stadium site, the implementation of mitigation measures included in Section 3.4, *Cultural Resources*, of the originally certified Final EIR would have reduced the proposed project's impacts on such resources to less than significant levels. No cultural, paleontological, or tribal cultural resources were observed during ground disturbance for construction of the new stadium lighting system. Therefore, the proposed project has not resulted, and would not result in a cumulatively considerable contribution to a significant cumulative impact relative to cultural resources.

Geology and Soils

Geology and soils cumulative impacts are project specific, as they pertain to the site conditions and characteristics of each project. These impacts may be related to exposure to seismic hazards; increased risks associated with soil liquefaction and subsidence; and risks associated with mass wasting, expansive soils, and erosion. Existing regulations from the City, State and Federal government set mandates for required actions that must be followed during project development to adequately address the potential effects from construction or operation of projects based on the geology, soils, and seismicity of specific project sites. No habitable structures that would subject

people to related hazards are proposed, no grading other than that required for lighting installation is required, and the existing use of the site as a sports field would be maintained. As discussed in the Initial Study (Appendix A to the previously certified Final EIR), impacts related to geology and soils would be less than significant. Therefore, the proposed project would not result in a cumulatively considerable contribution to a significant cumulative impact relative to geology and soils.

Greenhouse Gas Emissions

Greenhouse Gas Emissions and climate change are by definition cumulative impacts, as they affect the accumulation of greenhouse gases in the atmosphere. As discussed in Section 4.4, *Greenhouse Gas Emissions*, of the originally certified Final EIR, emissions associated with the project would be less than significant, and the project's impacts are therefore also cumulatively less than significant.

Hazards/Hazardous Materials

The transportation and storage of hazardous materials is a regional issue. Hazardous materials impacts may be related to the transport, use or disposal of hazardous materials; exposure to wildland fires; proximity to airports, and the potential to impair emergency response or evacuation plans. Hazards and hazardous materials impacts are not typically cumulatively considerable unless the projects are adjacent or cause potential releases of hazardous materials that could combine.

Temporary Construction Impacts

Construction of projects listed in Table 3 and the proposed project have the potential to result in a spill or accidental release of hazardous materials. An accidental spill or release of hazardous material or identification of a previously unidentified contamination encountered during construction would be handled, transported, and disposed of at an appropriate facility according to applicable local, state, and federal regulations. One active case involving known hazardous materials is located on the project site. Construction of the proposed light and public address systems has not resulted in exposure to potential hazardous materials as all ground disturbance associated with the project is located at least 350 feet from the known active case. As discussed in the Initial Study (Appendix A to the previously certified Final EIR), impacts related to hazards and hazardous materials would be less than significant. Since the proposed project has resulted in less than significant impacts related to construction, the proposed project has not contributed to a cumulative impact during construction associated with hazards or hazardous materials. (As construction is already completed for the project, no potential remains for cumulative impacts in this regard.)

Operational Impacts

The proposed project, as well as those projects listed in Table 3, has the potential to involve hazardous materials typically used for cleaning, maintenance, and landscaping. The proposed project lighting and PA system would allow for an expanded schedule of athletic events similar to those that already take place at the stadium. High school and community athletic events do not involve the storage of large quantities of hazardous materials. In addition, the project, though located in a Moderate Fire Hazard Severity Zone, would result in less than significant impact related to fire hazard. As discussed in the Initial Study (Appendix A to the previously certified Final EIR), operation of the project would not create a significant hazard to the public or the environment; impacts would not be cumulatively considerable.

Hydrology & Water Quality

The proposed project would involve the installation of poles to support new lighting and upgraded public address systems and the installation of conduit to provide power to those systems. As discussed in the Initial Study (Appendix A to the previously certified Final EIR), the proposed project

would result in a less than significant impact to hydrology, flooding, and water quality. Cumulative projects listed in Table 3 would be required to implement appropriate on and off-site improvements to ensure these projects do not substantially affect water quality or result in flooding impacts. Impacts would not be cumulatively considerable.

Land Use & Planning

The below paragraph says Projects in Table 3 "*are subject to both environmental and discretionary review by the City of Novato*" and "*each cumulative project would be required to demonstrate consistency with.."* I believe this is both inaccurate and misleading. Did the City of Novato review traffic with respect to the Lights Project's impacts at the westerly most intersection of San Carlos and San Marin Drive when a fourth stop sign was added at that intersection? Will the City of Novato review CIE Zone E2 light impacts from egress lighting if it is required by the Division of State Architect's office for the new turf field? The simple fact is that the District exempted this project from City review and ordinance. Although the City is very concerned by the Project, its hands are tied. 15.67

Novato City Planning Commission Minutes from November 2018 has a discussion of the San Marin / Novato Blvd. intersection. There was a clear expectation that all of the campus traffic issues should be considered when we looking at projects that include San Carlos. So, why then, hasn't the City and School District agreed to look into traffic to insure the public's safety at this intersection? The 53094 exemption makes it difficult for the City to weigh in on insults created by the District to residents; this EIR is the only vehicle the public has to question the District's plans. Cumulative development is a sneaky way for the District to eventually build a different project without the same degree of scrutiny as it might if all changes were asked for at one time. 15.68

Below the EIR claims the projects in Table 3 "*are subject to both environmental and discretionary review by the City of Novato"* . This is inaccurate as several projects in Table 3 are School District projects on San Marin High's property and are either exempt from City review and ordinance or can be except if the District wishes them to be exempt at a future date. This is why this cumulative section is so important, to protect the community from piecemealing on the part of the District. 15.69

Pursuant to Government Code Section 53094, the governing board of a school district may render a local zoning ordinance inapplicable to a proposed use of property by the school district, by a vote of two-thirds of its members. The Governing Board of NUSD made such a finding on November 15, 2016 (Resolution 16-2016-17). All construction and operation activities for the project would occur within Novato Unified School District property and would not be subject to local zoning ordinances. Operation of the project would be subject to the policies and regulations of the District's Board of Education. Projects identified in Table 3 are subject to both environmental and discretionary review by the City of Novato and each cumulative project would be required to demonstrate consistency with applicable plans, policies, and programs adopted by the City. As discussed in the Initial Study (Appendix A to the previously certified Final EIR), the project would not have any impact on land use and planning, therefore the proposed project would not result in a cumulatively considerable land use impact.

Mineral Resources

There are no known State-designated minerals of regional or statewide importance within the City of Novato (California Department of Conservation, 2013). Therefore, cumulative impacts to mineral resources from those projects listed in Table 3 would not result in impacts to mineral resources. No conflicts with the availability of regionally or locally important mineral resource recovery sites would occur. As discussed in the Initial Study (Appendix A to the previously certified Final EIR), no impact to

mineral resources would occur due to the construction or operation of the project. Impacts would not be cumulatively considerable.

Noise

Temporary Construction Impacts

Construction of the proposed project and related projects in the area, as identified in Table 3, would generate similar noise levels compared to the proposed project. These noise levels generally would not exceed any local threshold because the applicable noise ordinances contain exemptions for temporary construction noise. Construction noise is localized and rapidly attenuates within an urban environment. Therefore, related projects outside the immediate site vicinity would be located too far from the project site to contribute to an increase in ambient noise levels associated with construction in the project area. The project's contribution to the cumulative increase has been less than cumulatively considerable. Cumulative construction noise impacts would be less than significant.(As construction is already completed for the project, no potential remains for cumulative impacts in this regard.)

Operational Impacts

Cumulative development in the City of Novato would incrementally increase traffic on the roadways in the vicinity of San Marin High School. This cumulative increase in traffic would subject sensitive receptors to additional roadway noise. Table 5 below, shows modeled sound levels for Future Year 2040 with traffic from cumulative traffic, with and without the project, and compares changes in traffic noise to FTA thresholds.

Table 5 Increase in Traffic Noise Under Future (2040) Traffic Conditions

Receptor	Future 2040 (dBA L_{eq})	Future 2040 Plus Project (dBA L_{eq})	Change in Traffic Noise Level	FTA Impact Threshold (dBA L_{eq})	Threshold Exceeded?
1-San Marin Drive	66.8	68.1	1.3	1	Yes
2-San Marin Drive	66.9	68.6	1.7	1	Yes
3-San Marin Drive	67.2	68.4	1.2	1	Yes
4-San Marin Drive	69.8	71.0	1.2	1	Yes
5-San Marin Drive	60.6	61.9	1.3	2	No
6-San Marin Drive	65.4	65.6	0.2	1	No
7-San Marin Drive	63.5	64.0	0.5	2	No
8-San Marin Drive	71.6	72.0	0.4	1	No
9-San Marin Drive	72.2	72.6	0.4	1	No
10-San Marin Drive	67.5	68.0	0.5	1	No
11-San Andreas Drive	59.0	62.1	3.1	3	Yes
12-Sutro Avenue	59.0	60.1	1.1	3	No
13-Wilson Avenue	65.7	66.7	1.0	1	Yes
14-Novato Boulevard	67.8	69.3	1.5	1	Yes
15-Novato Boulevard	65.2	65.7	0.5	1	No
16-Novato Boulevard	67.7	69.7	2.0	1	Yes
17-Novato Boulevard	73.3	73.9	0.6	1	No
18-Novato Boulevard	72.5	73.1	0.6	1	No
19-Novato Boulevard	72.1	72.5	0.4	1	No
20-Novato Boulevard	69.5	70.0	0.5	1	No
21-Novato Boulevard	71.7	72.1	0.4	1	No
22-De Long Avenue	65.8	66.1	0.3	1	No
23-De Long Avenue	73.0	73.3	0.3	1	No
24-De Long Avenue	73.4	73.6	0.2	1	No

As shown in Table 5, traffic generated by the project would incrementally increase roadway noise before and after events under cumulative conditions. The increase in cumulative traffic noise would exceed FTA thresholds at four receptor locations on San Marin Drive, two receptor locations on Novato Boulevard, and one receptor location on San Andreas Drive and Wilson Avenue. However, as described above under Impact N-3, this substantial increase in cumulative traffic noise on area roadways would only occur 16 times per year at home football games (plus any home playoff games) and for a maximum duration of two hours total per event. Traffic noise from spectators of football games would not be typical of the traffic noise associated with project activities during the vast majority of the year. Therefore, traffic noise associated with project and cumulative activities would not exceed FTA thresholds under typical conditions, and this impact would be less than significant.

Proposed and pending development in the City and surrounding areas would include approximately 171,260 square feet of non-residential development and 328 residential units. This cumulative development would result in stationary (non-traffic) operational noise increases in the vicinity of the project site. Implementation of the project would result in a significant noise impact for nearby sensitive receptors during varsity football games. However, based on the fact that noise dissipates as it travels away from its source, noise impacts from on-site activities and other stationary sources would be limited to the project site and vicinity. Thus, cumulative operational (non-traffic) noise

impacts from related projects, in conjunction with project-specific noise impacts, would not have the potential to result in cumulatively considerable adverse effects. Cumulative operational stationary (non-traffic) noise exposure would be less than significant.

Population & Housing

As discussed in the Initial Study (Appendix A to the previously certified Final EIR), the proposed project would not increase school enrollment and would not include the construction of housing or generate a substantial number of new jobs. No impact to population and housing would occur as a result of this project; therefore, impacts would not be cumulatively considerable.

Public Services

The demands for public services by the cumulative projects are consistent with the long-term planning of the City of Novato. Projects identified in Table 3 are subject to both environmental and discretionary review by the City of Novato and each project would be required to meet long-term plans that forecast the demand for services and identify specific facilities projects for public service and utility providers to meet projected demand and needs. The construction and operation of the proposed project would not change the total population served by existing services nor would the periodic concentration of the population of the project site relative to existing conditions. As discussed in the Initial Study (Appendix A to the previously certified Final EIR), impacts of the project to public services would be less than significant; therefore, impacts would not be cumulatively considerable.

Recreation

As discussed in the Initial Study (Appendix A to the previously certified Final EIR), the project would not add population to the City of Novato and would therefore not increase the demand for parks. The project would not contribute to cumulative impacts related to recreation in this regard. The proposed project is itself a recreational facility project. The project would be limited to the installation of support poles for new lighting, upgraded public address systems and electrical conduits to provide power. The potential adverse effects for this project are analyzed throughout this EIR. No additional adverse affects beyond those analyzed would occur. Impacts related to recreation would not be cumulatively considerable.

Transportation and Traffic

Cumulative impacts related to transportation and traffic are described under Impact T-2 in Section 4.6, *Transportation and Traffic*, of the originally certified Final EIR. Increases in traffic under cumulative plus project conditions would not cause intersection operations to fall below the LOS standard at any of the study intersections. The proposed project would not conflict with any of the City of Novato's transportation plans. Therefore, as described under Impact T-2, cumulative traffic impacts would be less than significant.

As mentioned above, the addition of a fourth stop sign at the western most intersection of San Carlos and San Marin Drive represents a changed environment; that stop sign was added for a reason. A pedestrian was hit by an automobile at that intersection and that intersection was called out for further study by the City of Novato and the Safe Routes to Schools Task Force. The situation on the ground has changed and traffic impacts at this intersection, previously not studied when the Final EIR was approved, should be studied; this is a public safety issue. Additionally, CEQA code section 21166 requires additional study of this intersection. 15.70

Utilities & Service Systems

As discussed in the Initial Study (Appendix A to the previously certified Final EIR), the proposed project would result in no impact to utilities and existing service systems in relation to water, wastewater or stormwater, and a less-than-significant impact related to solid waste. Although the cumulative projects would increase demand for utilities, the project's contribution would not be cumulatively considerable.

This page intentionally left blank.

4 Alternatives

4.1 Introduction

Missing from the alternatives section is a serious discussion of a lower light alternative. My understanding, is that the IES RP-6-15 standard provides a rationale for assigning an appropriate lighting value to a project based on attendance. Most of the time, with the possible exception of San Marin vs Novato playoff games, attendance will be significantly lower than the IES RP-6-15 threshold permitting the project to be operated at 30 FC instead of the current 40 FC.

I am an electrical engineer and although I don't have power engineering experience I have designed, patented and manufactured electronic instruments during my career. I have expertise about what can and cannot be performed with electronics and I know the current feed to a LED lamp can be adjusted and used to adjust its brightness. There is no discussion of using a variable controller to adjust the light intensity to match the crowd size. No doubt, the already-constructed bulbs can handle a 40 FC brightness level. Reducing the voltage (is what a controller would do) or adding resistance to the line (similar to what a rheostat or potentiometer does in an electronic circuit) would permit the District to minimize visual impacts compared to what is proposed in this EIR except on the very few nights in a year when crowds exceed the thresholds designated in IES RP-6-15. 15.71

This is an inexpensive and practical solution that would reduce visual impacts on (guestimating) over 90% of the nights that the lights are intended to be used.

Additionally, the Upward Facing Lights which, so far, have been dismissed from study, need to be studied for impacts. I believe the two Upward Facing Lights currently aimed at my neighborhood (and which cause significant glare and trespass interference to the Northwest of the project site) need to be relocated and reaimed to eliminate the glare and trespass that clearly exists (but is denied in this EIR). 15.72

I suggest an additional test of the lights and that the Superintendent, the Trustees and their consultants be escorted to viewing points around the project site so the decision makers can see, first hand, the concerns of the neighbors. I suggest the Trustees drive up San Ramon Way on an evening without a full moon when the lights are not being tested and notice how dark our environs are. 15.73

I would also like to propose an additional alternative that I believe might improve the project's utility to the District and simultaneously reduce impacts to the residents near San Marin High. I suggest the District purchase, with the City of Novato or on its own, all or part of the land/buildings where the Birkenstock property is located. There are two properties for sale along the frontage road with sufficient acreage to support practice and playing fields for both Novato and San Marin High Schools.

The ideal situation would be for the City to join with the District to create a community rec center with lit tennis courts, teen center etc. This is a vision, one that gives the sports minded more than they will get with this Project, one that benefits both High Schools and one that would unite Lights proponents with those most critical of the project. The District can contact me if there is an opportunity to discuss this concept, one that would turn this project into a better win for students and the community. 15.74

The fact that this project has been built out cannot be an objection to a better alternative given Judge Chernus' ruling and admonition that the District has taken the financial risk by proceeding to completion before resolution of the CEQA action. 15.75

The no-project alternative must be very distasteful for the District to consider, especially given the history of this project and the fact that the site has been built out. To that end, in the hope that the District will actually follow CEQA and give serious consideration to a 'no project' solution I offer the following:

Coalition to Save San Marin hired two consultants to evaluate the Project and the Districts plans and practice schedule. One consultant, a San Marin High Graduate who went on to enjoy a successful career as a High School and College Coach, and another, an athletic director of a school district with more students and schools than the Novato District. That athletic director has more education and practical experience than his counterparts within the Novato District. Both consultants felt lights are not needed at San Marin High; both worked out practice schedules for the District to consider. These experts prove Lights are a want item not a necessity; they are a 'want' item with a heavy social, financial and environmental cost. The relationship between the District and its neighbors will forever be harmed by this project unless the District takes seriously its obligation to be a good neighbor and comply with both the letter and spirit of CEQA. Those two letters (one from Kevin Bryant and one from Adam Cretti) are attached to my EIR comments and are incorporated herein. 15.76

No Project Alternative - Consultants Kevin Bryant and Adam Cretti both present practical methods for practices to proceed now that soccer is a winter sport without lights. Currently, and for the past several years, practices have been held without lights while soccer has been a winter sport. Novato High and every other High School in the MCAL (except San Rafael High which has field lights) is able to accommodate soccer as a winter sport without field lights.

Reduced hours alternative. Kevin Bryant and Adam Cretti clearly prove that the no project option is practical, after all, that is what the school is doing now and that is what most other schools in the MCAL do, practice and play games without lights. If the District decides is must have lights for Friday Night Football, it can certainly eliminate or significantly reduce the hours that lights are used during the week. The District's analysis of its needs are not credible. A reduced hours alternative was never considered, yet is an inexpensive and practical way to reduce impacts to neighbors. 15.77

Additionally, since there likely will be use of the field lights after the 10PM curfew indicated in this EIR (due to game delays, field injuries and late arrival of visiting teams), it is practical to consider earlier starting times for Friday Night Lights games in order to meet CIE's post-curfew trespass and glare requirements. 15.78

In the original EIR, the discussion and analysis of alternatives is contained in Section 6, *Alternatives*. The CEQA Guidelines require that EIRs identify and evaluate a reasonable range of alternatives that are designed to reduce the significant environmental impacts of the proposed project, while still satisfying most of the basic project objectives. The CEQA Guidelines also set forth the intent and extent of alternatives analysis to be provided in an EIR.

The following discussion evaluates alternatives to the proposed project and examines the potential environmental impacts associated with each alternative. Through comparison of these alternatives

to the proposed project, the relative environmental advantages and disadvantages of each are weighed and analyzed. The CEQA Guidelines require that the range of alternatives addressed in an EIR should be governed by a rule of reason. Not every conceivable alternative must be addressed, nor do infeasible alternatives need to be considered (CEQA Guidelines Section 15126.6(a)). Section 15126.6 of the CEQA Guidelines states that the factors that may be taken into account when addressing the feasibility of alternatives are site suitability, economic viability, availability of infrastructure, general plan consistency or other plans or regulatory limitations, and jurisdictional boundaries. Section 15126.6(b) of the CEQA Guidelines states that the discussion of alternatives must focus on alternatives capable of either avoiding or substantially lessening any significant environmental effects of the project, even if the alternative would impede, to some degree, the attainment of the project objectives or would be more costly. The alternatives discussion should not consider alternatives whose implementation is remote or speculative, and the analysis of alternatives need not be presented in the same level of detail as the assessment of the proposed Project.

Based on the CEQA Guidelines, several factors need to be considered in determining the range of alternatives to be analyzed in the EIR and the level of analytical detail that should be provided for each alternative. These factors include: (1) the nature of the significant impacts of the proposed project, (2) the ability of alternatives to avoid or lessen the significant impacts associated with the proposed project, (3) the ability of the alternatives to meet the objectives of the proposed project, and (4) the feasibility of the alternatives. The analysis in this EIR shows that the proposed project would result in significant and unavoidable impacts with respect to noise at adjacent residences during varsity football games. All other impacts of the project can either be mitigated to a level of less than significant or are less than significant. The alternatives examined herein represent alternatives that could potentially reduce or avoid the significant and less than significant impacts associated with implementation of the proposed project.

As required by Section 15126.6 of the CEQA Guidelines, this section of the EIR examines a range of reasonable alternatives to the proposed project. The following alternatives are evaluated in this EIR:

- Alternative 1: No Project
- Alternative 2: Stadium Lighting at Novato High School
- Alternative 3: Portable Lighting Systems
- Alternative 4: Reduced Athletic Lighting System

One alternative that was rejected as infeasible in the original Draft EIR is presented here in further detail for informational purposes in response to public comments received on the original Draft EIR. The College of Marin Indian Valley Campus (IVC) Existing Fields alternative is now presented as Alternative 5 to provide additional detail about the potential impacts of that alternative. However, the conclusion in the original Draft EIR that the IVC Existing Fields alternative would be infeasible remains valid.

This section also includes a discussion of the alternatives considered but rejected and the “environmentally superior alternative” among the alternatives analyzed.

As indicated above, project alternatives should feasibly be able to attain “most of the basic objectives of the project” (Section 15126.6(a) of the State CEQA Guidelines), even though implementation of the project alternatives might, to some degree, impede the attainment of those objectives or be more costly (Section 15126.6(b) of the State CEQA Guidelines). The following are the project objectives as described in Section 2.0, Project Description.

1 Provide extended availability of the athletic fields to improve academic performance by minimizing early class dismissal and missed instructional time for student athletes.
2 Allow for the scheduling of games at times when students, parents, and community members can more easily attend the events, which would increase school spirit and increase revenue from ticket purchases.
3 Provide nighttime opportunities for students to gather to cheer on their team offering an alternative to going to parties or other unhealthy recreational activities.
4 Improve athlete safety by providing superior lighting conditions during evening practices and sports events.
5 Improve safety by minimizing incompatible uses from sharing the field (e.g.: lacrosse teams and track/field teams practicing at the same time means that lacrosse balls may hit runners on the track).
6 Improve the public address system to focus and contain sound within the stadium.

4.2 Alternatives Considered but Rejected as Infeasible

Alternative solutions that require any sort of transportation seem to be rejected out of hand as infeasible, however, if that solution also opened up Lights use for Novato High, then the benefits might outweigh that inconvenience. A school bus could be employed to transport the team to the practice field and back to the San Marin (or Novato) campus. Visiting teams would not have to trespass through neighborhoods unaccustomed to heavy traffic and noise. If the Project were relocated to Novato High, trips to San Marin High would be reduced and trips to Novato High would increase; parents visiting the game from San Marin would add trips, but parents staying local at Novato High would reduce trips. This EIR ignores those 'wash' effects. 15.79

Pursuant to CEQA Guidelines §15126.6(c), the District considered several alternative off-site facilities to host nighttime events and practices. These alternate sites were rejected as infeasible during the project's scoping process. This section discusses the alternative sites and the reasons the District decided not to carry them forward for further environmental analysis.

All of the off-site alternatives would require student athletes, coaches, and support staff to be transported to and from the site for games and practices. The off-site alternatives range in distance from adjacent to San Marin High School (O'Hair Park) to approximately seven miles away (Hamilton Site). With the exception of O'Hair Park which is adjacent to the school, the use of alternative sites for games and practices would necessitate cars and buses to transport student athletics, coaches, and support staff from San Marin High School to the alternative site. Therefore, the rejected alternatives would result in additional traffic, traffic noise, and mobile air pollution and greenhouse gas (GHG) emissions compared to the proposed project. For this reason and the additional reasons listed below, these alternative sites were considered but rejected as infeasible.

Figure 6 and Figure 7 show the locations of the alternative sites considered but rejected.

a. San Andreas Site

NUSD owns the San Andreas site, which is approximately 20 acres located in northern Novato just off San Marin drive. The site is currently undeveloped and ungraded and is surrounded by residential uses. The site is not connected to the electrical grid or to any utilities such as water or wastewater. In order to support nighttime games, events, and practices, the site would need full development of a stadium and parking as well as infrastructure improvements and utility connections. Development of

a stadium would result in construction-related impacts such as air pollution and greenhouse gas emissions, noise, and construction traffic. Construction of a full stadium rather than the addition of lights to an existing stadium would result in a longer construction period with additional heavy construction equipment. Therefore, construction-related impacts would be worse than the proposed project. In addition, this site is adjacent to residential uses; therefore, similar crowd and public address (PA) system noise impacts as the proposed project would occur. This alternative likely would not eliminate the unavoidable noise impact during games and events. Further, development of this site would be cost-prohibitive.

b. Hamilton Site

The Hamilton site, known as Parcel 1A and owned by NUSD, is approximately nine acres in size located in south Novato close to Hamilton K-8 School and Novato Charter School. The site is situated on a former Air Force Base. Although there are no structures on the site, the concrete foundations from former buildings remain. This site would also require full development of a stadium and parking as well as infrastructure improvements, utility connections, and significant roadway improvements for access to the site. Development of a stadium would result in construction related impacts such as air pollution and greenhouse gas emissions, noise, and construction traffic. Construction of a full stadium rather than the addition of lights to an existing stadium would result in a longer construction period with additional heavy construction equipment. Therefore, construction-related impacts would be worse than the proposed project. In addition, since the site was a former military installation, significant soil and groundwater contamination may exist. Therefore, this alternative site would have additional impacts related to hazards and hazardous materials compared to the proposed project. Further, this site is adjacent to residential uses; therefore, similar crowd and PA system noise impacts as the proposed project would occur. This alternative likely would not eliminate the unavoidable noise impact during varsity football games. Lastly, development of this site would be cost-prohibitive.

c. Sinaloa Middle School or San Jose Middle School

These middle schools are within the District. Both schools currently have athletic fields and tracks, but the fields are not conducive to holding large events or games since they do not have bleachers, concessions, or restrooms. The District is planning on upgrading the fields at both schools by converting them from grass to artificial turf and upgrading the tracks to regulation size, but no additional facilities, lights, or a PA system are planned at either school. Adding bleachers, concessions, restrooms, lighting and a PA system at either school would be cost prohibitive. Further, both sites are adjacent to residential uses. At San Jose Middle School residences are located


Novato Blvd
San Andreas Site
O'Hair Park
San Marin High School
San Marin Dr
Center Rd
Redwood Blvd
Atherton Ave
Vineyard Rd
Indi
Rd
Old Ranch Rd
Cambridge St
101
37
San Jose Middle School
Fairway Dr
Hamilton Site
0

Figure 6 Map of Alternative Sites Considered but Rejected

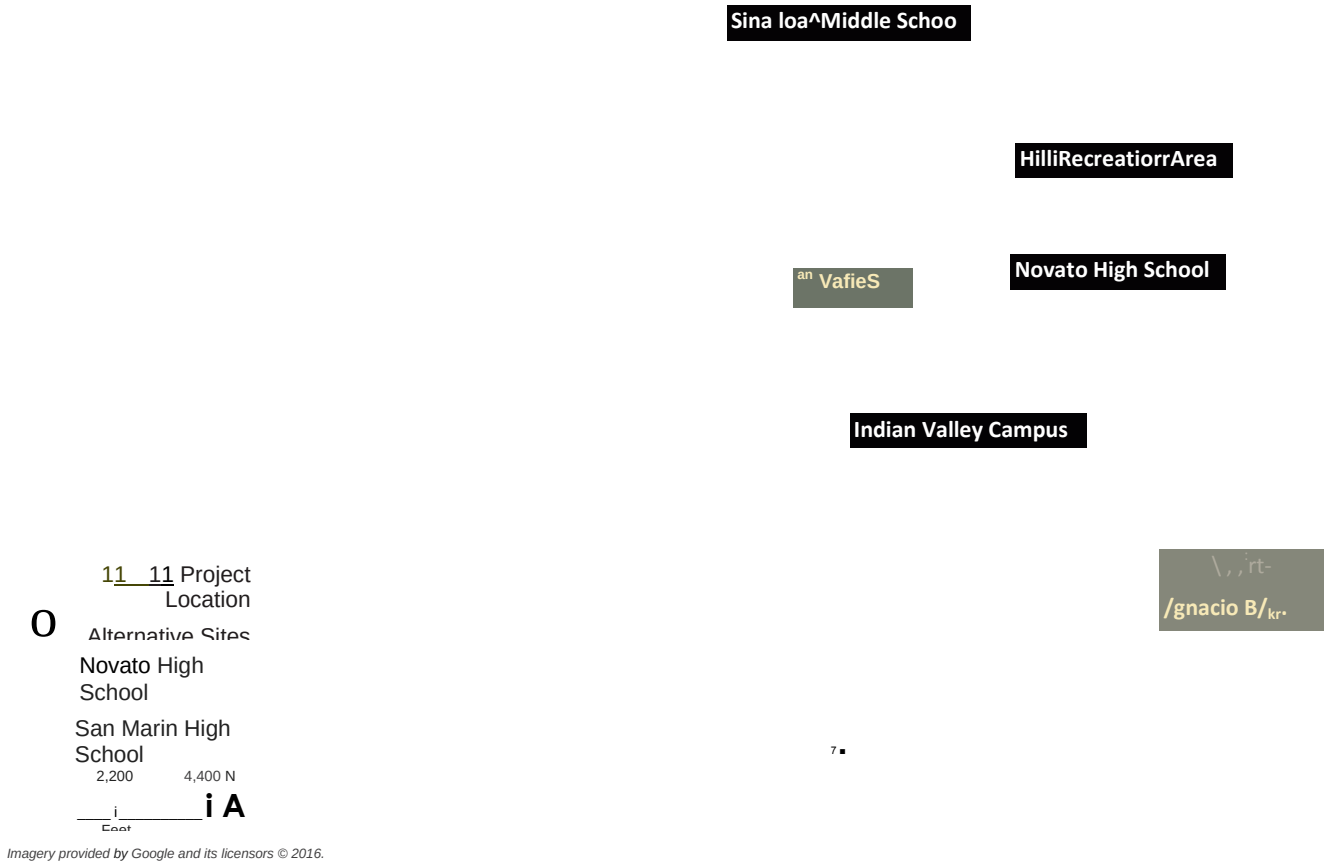
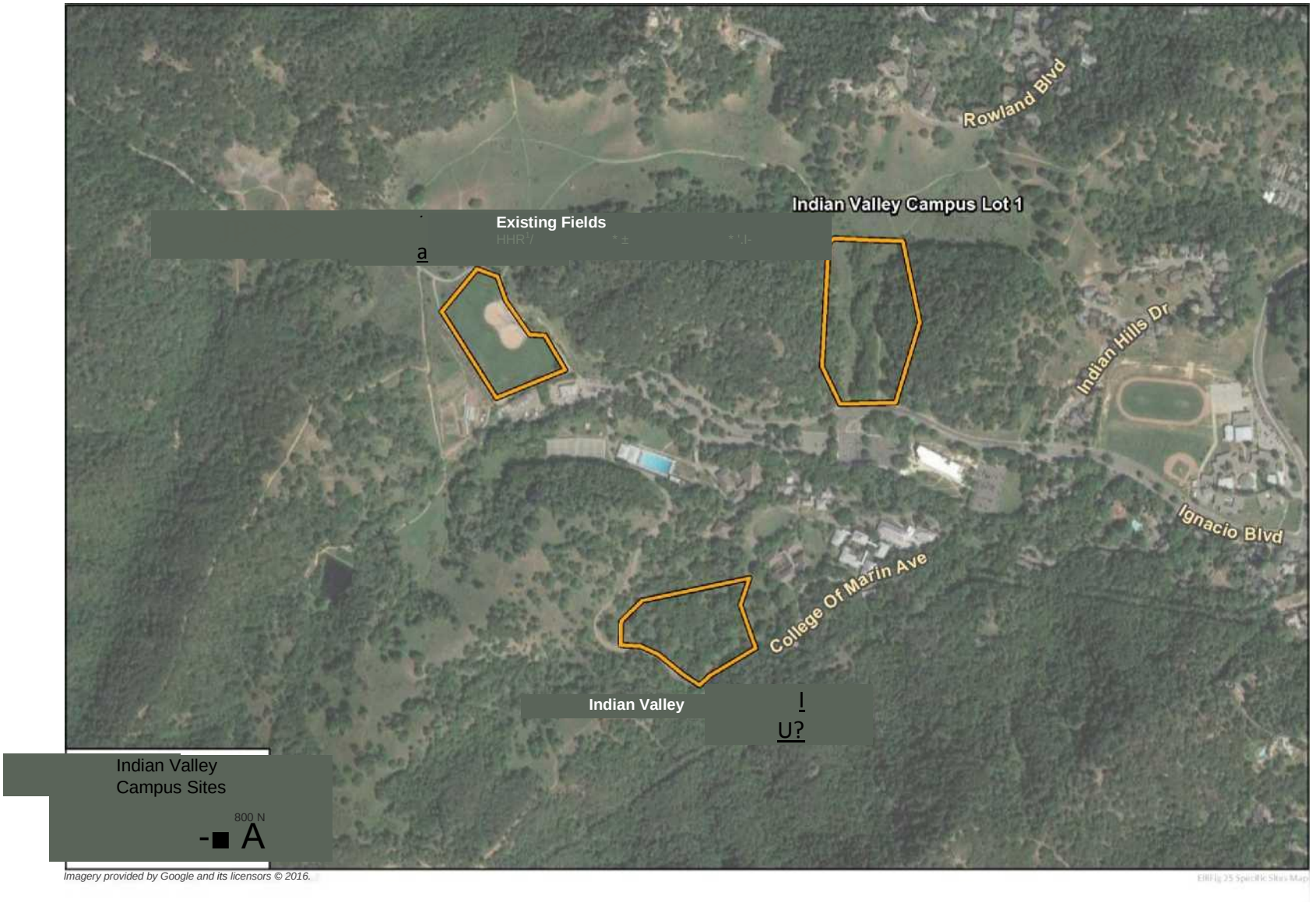


Figure 7 Map of College of Marin Indian Valley Campus Alternative Sites



approximately 100 feet west of the existing track and at Sinaloa Middle School residences are located approximately 25 feet south of the existing track. Therefore, for both sites, similar crowd and PA system noise impacts as the proposed project would occur. These alternative sites likely would not eliminate the unavoidable noise impact during varsity football games.

d. College of Marin IVC Lot 1

This site would require full development of a stadium as well as infrastructure improvements and utility connections. This site is located next to a major roadway, Ignacio Boulevard, and parking; therefore the site has adequate site access and would require minimal new parking. Due to the topography of this site, extensive grading would be required. Development of a stadium would result in construction related impacts such as air pollution and greenhouse gas emissions, noise, and construction traffic. The nearest sensitive receptors are the residences approximately 800 feet east of the site. Development of this site is not within the Campus Facilities Master Plan; therefore additional environmental analysis under CEQA would be required. Development of a stadium at this location would be cost prohibitive.

e. College of Marin IVC Lot 2

This site would require full development of a stadium and parking as well as infrastructure improvements, roadway improvements, and utility connections. Due to the topography of this site, extensive grading would be required, although less grading would be required than the Lot 1 site. Development of a stadium would result in construction related impacts such as air pollution and greenhouse gas emissions, noise, and construction traffic. However, there are no residential uses within % mile of this site. Development of a stadium at this location would be cost prohibitive.

f. Hill Recreation Area

Development of a stadium would result in construction related impacts such as air pollution and greenhouse gas emissions, noise, and construction traffic. This site is surrounded by sensitive receptors including a senior center, a high school, and residences. Plans for the site are currently being developed through an active community design planning process. During the process, it was decided that the site will not include lighted athletic fields; however, security and pathway lighting would be provided. Development of a stadium at this site would not be consistent with the outcome of the community design planning process. In addition, development of a stadium at this location would be cost prohibitive.

g. O'Hair Park

The City of Novato owns O'Hair Park, which is located adjacent to San Marin High School. Current uses include a lease for an equestrian operation with Morningstar Farm, the City's dog park, as well as public trails and open space. Other than the developed areas for horses and dogs, this park remains predominantly undeveloped with trails and open space. The current lease with Morningstar Farm is in force through October 31, 2022 or can be terminated with 18 months advance notice. Therefore, if the lease with Morningstar Farm was ended, the site could be developed with a stadium. However, this site would require full development of a stadium and parking as well as infrastructure improvements and utility connections which would result in construction related impacts such as air pollution and greenhouse gas emissions, noise, and construction traffic. In addition, Novato Creek runs through the middle of the site. Development of the site with a stadium may result in water quality impacts or impacts to sensitive riparian species. Further, development of a stadium at this location would be cost prohibitive.

h. Install Turf on Existing Grass Practice Field:

The District desires to install turf on an existing grass practice field at San Marin High School. A resurfaced turf practice field will incrementally increase use of outdoor fields during inclement weather, but would not yield new or additional space for practices. While the conversion to a turf practice field will help with the number or practices by allowing incrementally more use of existing fields, it does not provide adequate additional practice time to solve the larger issue of missed class time. Games times will still need to start at 3:15. Also, in the winter there are four athletic teams that need practice fields. Even with two practice fields, there would not be enough daylight hours in the winter to accommodate four athletic teams. In addition, during overlaps between Fall/winter and winter/spring sports seasons, there can be up to 7 teams that need a place to practice. Finally, the District is considering a later school-day start time, which would reduce available daylight hours for sports practice even further.

i. Reduced Number of Events with Lighting

The District considered a reduction in the number of lighted events compared to the proposed schedule of events. However, as described above under the Additional On-site Turf Fields alternative, the proposed schedule of events is the minimum number of lighted events necessary to accommodate athletic practice needs and achieve the project objectives.

I refer the reader to the two consultant letters referenced above which refute the idea that lights are needed and that lights are the best method to solve the problems the District perceives at San Marin High. 15.80

4.3 Alternative 1: No Project

4.3.1 Description

This alternative assumes that the proposed project is not implemented and the project site remains in its current condition. Currently, there are no stadium lights and the public address (PA) system does not focus sound on the field.

4.3.2 Impact Analysis

The No Project alternative would involve no changes to the physical environment and thus would have no environmental effects. As such, air pollution emissions, greenhouse gas (GHG) emissions, and noise associated with construction would be avoided because no lighting system would be installed. In addition, operational impacts associated with light trespass and glare, air pollution and GHG emissions, nighttime PA system and crowd noise, and nighttime event traffic would not occur. The No Project Alternative would eliminate the proposed project's significant and unavoidable noise impact. No mitigation measures would be required for the No Project alternative. Overall impacts would be lower than those of the proposed project since no change to environmental conditions would occur.

The No Project Alternative would not meet any of the objectives of the proposed project. This alternative would not extend play time on the fields and minimize missed instructional time (Objective 1), increase school and community participation (Objective 2), provide nighttime recreational activities for students (Objective 3), improve safety (Objectives 4 and 5), or improve the PA system (Objective 6).

4.4 Alternative 2: Stadium Lighting at Novato High School

4.4.1 Description

This alternative would involve the installation of new lighting at the Novato High School stadium instead of San Marin High School. This stadium would host nighttime events for both Novato and San Marin high schools. The lighting equipment would be similar (height, configuration, type, etc.) to the proposed project. The existing PA system at the school would be updated to focus sound to the field. Like the proposed project, some Novato High School practices and games that currently occur at the field would shift to evening hours. In addition, Novato High School would host some San Marin High School evening events and games. However, the overall number of evening events (e.g.: 16 football games) would remain the same as with the proposed project.

4.4.2 Impact Analysis

a. Aesthetics

Because this alternative would involve similar lighting system and schedule as the proposed project in a neighborhood that is also residential, it would result in similar impacts as the proposed project with respect to views to, through, and from the stadium; change in visual character; and light, glare, and sky glow. However, impacts would be shifted from San Marin High School to Novato High School. At San Marin High School, the nearest residences are 120 feet away. At Novato High School, the nearest residences are adjacent to the stadium less than 25 feet away. Since residences are closer to the Novato High School stadium compared to the San Marin High School stadium, light and glare impacts could be greater under this alternative. Nonetheless, with mitigation measures similar to those in this EIR (AES 3and AES-4) to design the lighting system to reduce light trespass and glare at these residences, impacts are expected to be less than significant. Under this alternative, aesthetic impacts would be generally similar to the proposed project and would remain less than significant or less than significant with mitigation. Mitigation measures related to light and glare would still apply.

b. Air Quality

This alternative would involve the permanent installation of lighting fixtures at Novato High School. The amount and duration of construction would be similar or the same under this alternative. Therefore, construction-related emissions would be similar to or the same compared to the proposed project. Mobile emissions associated with transportation between San Marin High School and Novato High School would be slightly increased. Energy-related operational emissions associated with new lighting systems would be the same as the proposed project. Overall, operational emissions levels would be slightly higher than levels associated with the proposed project. Nonetheless, like the proposed project, impacts would be less than significant.

c. Cultural Resources

Similar to the proposed project, this alternative would involve some subsurface work to install lighting poles. Further research would be needed to determine the likelihood of discovering cultural, paleontological, or tribal resources or human remains at Novato High School. Nonetheless, in order to avoid potential impacts to cultural resources the mitigation measures outlined in Section 4.4, *Cultural Resources*, of the original EIR, would continue to apply. Impacts would be the same as the proposed project and would remain significant but mitigable.

d. Greenhouse Gas Emissions

This alternative would involve the permanent installation of lighting fixtures at Novato High School. The amount and duration of construction would be similar or the same under this alternative. Therefore, construction-related GHG emissions would be similar to or the same compared to the

proposed project. Mobile GHG emissions associated with transportation between San Marin High School and Novato High School would be slightly increased. Energy-related GHG emissions associated with new lighting systems would be the same as the proposed project. Overall, operational emissions levels would be slightly higher than levels associated with the proposed project. However, like the proposed project, impacts would be less than significant.

e. Noise

For the proposed project, the nearest sensitive noise receptors are the classrooms approximately 100 feet from the stadium track and the residences approximately 120 feet from the stadium track. At the Novato High School alternative site, residences are located immediately adjacent to the northwestern boundary of the existing stadium. Therefore, construction-related noise impacts would be greater compared to the proposed project. Additional mitigation measures may be needed related to construction noise for this alternative.

The stadium at Novato High School currently has a PA system but it is only used for daytime events since the stadium has no lighting. Under this alternative, the PA system use would shift to nighttime for night games and additional crowd noise would occur during evening hours. At Novato High School, sensitive noise receptors (residences) are located immediately adjacent to the stadium. Therefore, crowd and PA noise impacts would be greater than those of the proposed project. A mitigation measure similar to Mitigation Measure N-2 required for the proposed project would apply to this alternative. The significant and unavoidable noise impact would remain.

This alternative would also involve additional traffic noise associated with trips to transport San Marin High School transport student athletes, coaches, and support staff to Novato High School for games. Traffic noise impacts would be increased compared to the proposed project but would be expected to remain less than significant.

f. Transportation/Traffic

This alternative would involve additional roadway traffic to transport student athletes, coaches, and support staff to Novato High School for games. Impacts would be increased compared to the proposed project but would be expected to remain less than significant.

This is a specious argument as the flip side is that Novato High students and parents would avoid making the same trips if the project were constructed at Novato High. A school bus could easily transport an entire team with coaching staff to visit an alternative site if not within walking distance. There will be significant roadway traffic generated to whatever site ends up with the Lights Project, even a no-project alternative would generate traffic if the number of games and practices do not change. Splitting practices serially after school ends will add to traffic counts under the current plan as some students will go home after school before practice, others will run errands (visit friends etc) and many more vehicle trips will occur under the existing plan than is currently the case. Many of those trips will be in the evening hours when driving conditions are more dangerous, especially for young drivers on rainy or misty nights. 15.81

4.5 Alternative 3: Portable Lighting

4.5.1 Description

Under this alternative, stadium lighting for night games at San Marin High School would be provided by portable lighting systems that are powered by diesel generators. The portable lighting systems would only be used for nighttime football, soccer, track, and lacrosse games. It is assumed that portable lighting

would not remain in place but would be installed prior to games and removed after games or the following morning. Practices would continue to meet during daytime hours and would not use the portable lighting system.

4.5.2 Impact Analysis

a. Aesthetics

This alternative would not involve the permanent addition of stadium lighting. However, this alternative would involve the use of portable light fixtures. Therefore, this alternative would incrementally alter views of and through the stadium when the fixtures are in use. However, because lighting systems would not be permanent but would be used temporarily and only occasionally, views would be affected to a lesser extent than the proposed project. This alternative would not substantially alter daytime aesthetic conditions and visual character of the stadium since portable fixtures would only be used for nighttime events. Depending on type of fixtures used, portable lighting may be more or less efficient than the proposed permanent light fixtures. Therefore, light and glare impacts may be better or worse than the proposed project. Since this alternative would only involve lighting for nighttime events and not practices, potential light and glare impacts would be less frequent than the proposed project. The mitigation measures required for the proposed project (AES-3and AES-4) would not apply since no permanent lighting systems are proposed. Like the proposed project, this alternative would not substantially increase sky glow. Therefore, overall, aesthetic impacts associated with this project would be less than significant and would be slightly reduced compared to the proposed project.

b. Air Quality

This alternative would not involve the permanent installation of lighting fixtures. This alternative would involve trucks or light machinery to set up and remove the portable fixtures, but emissions associated with installation would be minor. Therefore, construction-related emissions would be reduced compared to the proposed project. However, this alternative would involve diesel-powered portable lighting. Operational diesel emissions would be increased compared to the proposed project. It is anticipated that overall air pollution emissions associated with diesel generators would be more than emissions associated with energy use to power permanent energy-efficient lighting fixtures. In addition, nearby sensitive receptors may be affected by diesel exhaust and odor emissions. Overall, air quality impacts would be increased compared to the proposed project under this alternative.

c. Cultural Resources

This alternative would not involve ground disturbing activities since the lighting poles would not be installed. Therefore, no impacts to cultural resources would occur. The mitigation measures outlined in Section 4.3, *Cultural Resources*, would not apply. Impacts would be reduced compared to the proposed project.

d. Greenhouse Gas Emissions

This alternative would not involve the permanent installation of lighting fixtures. This alternative would involve trucks or light machinery to set up and remove the portable fixtures, but emissions associated with installation would be minor. Therefore, construction-related GHG emissions would be reduced compared to the proposed project. However, this alternative would involve diesel- powered portable lighting. GHG emissions associated with diesel generators would be increased compared to the proposed project. It is anticipated that overall GHG emissions associated with diesel generators

would be more than GHG-emissions associated with energy use to power permanent energy-efficient lighting fixtures. Overall, GHG impacts would be increased compared to the proposed project under this alternative.

e. Noise

Since this alternative would not involve the permanent installation of light fixtures, construction noise would be reduced compared to the proposed project. However, this alternative would involve minor infrequent noise associated with installing and removing the portable fixtures. Like the proposed project, construction noise impacts would be less than significant.

This alternative would still involve a shift of athletic games to the evening hours, though unlike the proposed project this alternative would not shift practices to the evening hours. This alternative would not involve improvements to the PA system that would reduce PA system noise at nearby residences; therefore, PA system noise impacts on nearby receptors would be greater than the proposed project. In addition, this alternative would still involve nighttime varsity football games; therefore, the significant and unavoidable noise impact from crowd noise would remain. The diesel-generators would also produce noise not associated with the proposed project. Overall, noise impacts would be greater under this alternative than for the proposed project. Mitigation measures similar to those required for the proposed project (N-2) would still apply.

The school did not use temporarily lighting last winter for regular soccer and regular football practices. I saw temporarily lighting used for about a week for the football team (and a little bit for soccer) when the football team needed extra practice time before participating in championship games. 15.82

f. Transportation/Traffic

Like the proposed project, this alternative would result in a shift of some stadium activities, such as varsity football games to nighttime instead of daytime. Therefore, the traffic impacts associated with evening football games for the proposed project would still occur with this alternative. Impacts would be generally the same as the proposed project and would be less than significant.

4.6 Alternative 4: Reduced Lighting System Alternative

4.6.1 Description

The Reduced Lighting System Alternative would involve the installation of a stadium lighting system with reduced-intensity lighting. As measured in May 2019, the proposed stadium lighting system generates illuminance reaching 441 lux at the center of the field (Appendix B). This alternative would reduce the lighting level during athletic events for the purpose of minimizing the exposure of residential neighbors to light trespass.

I support the reduced lighting alternative, however, I don't believe it was seriously considered and certainly there has been no discussion of adding a smart or variable controller to permit the intensity to be dialed down to 30 FC when IES RP-6-15 permits. This would be a relatively inexpensive option. 15.83

4.6.2 Impact Analysis

a. Aesthetics

It is assumed that this alternative would involve the installation of stadium lighting fixtures in the same locations as proposed and up to the same maximum height of 80 feet. Therefore, this

alternative would incrementally alter views of and through the stadium. Similar to the proposed project, light poles would not conflict with the visual character of the stadium's vicinity and would have a negligible effect on overall visual quality.

This alternative would reduce the intensity of lighting during events at the San Marin High School stadium, which would result in incrementally less light trespass at property lines adjacent to residences than would the proposed stadium lighting system. As shown in Table 2 in Section 4.1, Aesthetics, the proposed system would generate light trespass of up to 2.75 lux. This light level would not exceed the CIE threshold of 5 lux for sites in the E2 zone. Because this alternative would reduce the proposed lighting levels, it would also not generate light trespass exceeding the threshold of 5 lux. The impact from light trespass would be incrementally reduced but would remain less than significant.

By reducing light trespass from the stadium site relative to the proposed project, the alternative would incrementally reduce glare. Similar to the proposed project, illuminance on the vertical plane would not exceed the applied threshold of 5 lux at adjacent residential property lines. Therefore, the impact from glare would be incrementally reduced but would remain less than significant. This alternative also would incrementally reduce the stadium site's contribution to sky glow, which would be minimal under the proposed project. Therefore, the impact from sky glow would be slightly reduced but would remain less than significant.

There is no way to know what the measured lux is of trespass and glare to the Northwest of the Project Site since it was never measured. The best available evidence in this EIR was submitted by concerned citizens, including me, and document that the Upward Facing Lights (and possibly Egress lights and reflected light off the field) produce significant disruptive glare. This EIR has done no study, provided no factual information (other than its own opinions) that disputes observations and measurements submitted by the community (including me).

15.84

b. Air Quality

The Reduced Lighting System Alternative would involve a similar duration and intensity of construction to the proposed project. Because the scope of construction activity would not change, the alternative also would not generate construction emissions also would not exceed the BAAQMD's thresholds, and would not expose sensitive receptors to substantial pollutant concentrations. This impact would remain less than significant.

It is assumed that by reducing the intensity of lighting, this alternative would require incrementally less electricity use relative to the proposed project. However, reducing lighting would not alter the number of visitors to athletic events at the stadium site, so mobile emissions would be similar to those generated by the proposed project. Similar to the project, operational emissions would not result in net increase in any criteria pollutant for which the project region is in non-attainment under applicable federal or state ambient air quality standards and would not expose sensitive receptors to substantial pollutant concentrations. Therefore, this impact would be incrementally reduced but would remain less than significant.

c. Cultural Resources

This alternative would involve a similar degree of surface ground disturbance to the proposed project, which would have the potential to disturb previously unidentified archaeological resources, paleontological resources, human remains, or tribal cultural resources. The mitigation measures outlined in Section 4.3, *Cultural Resources*, would apply to identify and protect such cultural resources in the event of their discovery during ground disturbance. Similar to the proposed project, impacts on cultural resources would be less than significant with mitigation.

d. Greenhouse Gas Emissions

This alternative would involve a similar scope of construction activity to the proposed project and would result in a similar amount of construction-related GHG emissions. As noted above, dimmer lighting would incrementally reduce electricity use from the stadium site, although it would not affect the number of visitors and associated mobile emissions. Therefore, this alternative would incrementally reduce operational GHG emissions. Similar to the proposed project, the alternative would not result in a population increase, and as such would be consistent with ABAG population projections. It would also be consistent with goals and measures from the City's CCAP related to renewable energy, vehicle efficiency, and alternative fuels. Therefore, the overall GHG impact would be slightly reduced but would remain less than significant.

e. Noise

Because this alternative would involve a similar scale of construction activity to the proposed project at the stadium site, it would generate similar temporary increases in noise levels at nearby residences. The impact from construction noise would remain less than significant.

It is assumed that reduced lighting would not affect the type or frequency of athletic events hosted at the stadium site. Therefore, similar to the proposed project, varsity football game noise under this alternative would generate L_5 noise levels that exceed the threshold of 55 dBA at nearby sensitive receptors. The mitigation measures in Section 4.5 to reduce operational noise during athletic events would apply to this alternative. However, similar to the proposed project, it is possible that an L_5 sound level of 55 dBA at the nearest residences would not be achievable even with implementation of mitigation measures. Therefore, the impact from operational noise would remain significant and unavoidable.

f. Transportation/Traffic

Because this alternative would involve a similar amount of athletic use at the stadium site to the proposed project, it would generate a similar number of vehicle trips. Stadium lighting, even at reduced intensity, would still enable nighttime stadium activities such as varsity football games. Therefore, the timing of new vehicle trips would also be similar to the proposed project. Resulting traffic impacts would be less than significant, similar to the proposed project.

4.7 Alternative 5: College of Marin Indian Valley Campus (IVC) Existing Fields

4.7.1 Description

The Indian Valley Campus (IVC) contains two grass athletic fields on the western portion of the campus which are configured for softball and soccer. The fields contain lighting but the lighting is configured to accommodate softball games. Therefore, the fields and lighting system would need to be reconfigured to accommodate football. The field house, restrooms, and bleachers would need to be upgraded to accommodate larger crowds associated with varsity football games. Parking and pathways may need to be improved to meet ADA standards. The fields do not contain a track and could not accommodate track practices or a track meet. In addition, the field would require drainage improvements which would necessitate grading. The fields are surrounded on three sides by open space to the west, north, and east. The Indian Valley Campus Organic Farm and Garden borders the fields to the southwest. Campus buildings, including maintenance facilities, border the fields to the southeast. The nearest sensitive receptors to the field are classroom facilities approximately 1,000

feet to the southeast and residences located on a ridge approximately 1,300 feet to the north-northeast.

Both the College of Marin and the City of Novato use these fields and would not accommodate NUSD's proposed usage. The College of Marin owns the IVC site, and has entered into a 40-year agreement with the City of Novato. That agreement, which governs use of the fields, will be up for renewal in the year 2036. The District would have to enter into a three-way agreement with the college and city to use the fields. Both the City of Novato and the College of Marin have stated that it would be difficult to reach an agreement between all three parties. Based on the Agreement in place between the City of Novato and Marin Community College District regarding Indian Valley Campus athletic fields, the Marin Community College District has first priority for use of the athletic fields between the hours of 8:00 AM and 3:00 PM on Monday, Wednesday, and Friday and between the hours of 8:00 AM and 5:00 PM on Tuesdays and Thursdays. The City has priority for use of the athletic fields between the hours of 3:00 PM and 10:00 PM on Monday, Wednesday, and Friday; between the hours of 5:00 PM and 10:00 PM on Tuesday and Thursday; between the hours o 9:00 AM and 5:00 PM on Saturdays; and between the hours of 12:00 PM and 5:00 PM on Sundays and holidays. These times correspond with many of the times that San Marin High School students would also use the fields for practices and games. Additionally, the fields are closed November through January for maintenance and to reduce the damage to the natural turf during the rainy season. This closure would impact approximately 66 events that are planned to occur under the proposed project during this time period including both practices and games. Furthermore, there is currently no room to add a new football field under the lights without reducing the space for the existing programs or eliminating many community uses all together. The City of Novato has indicated that there is not room to add a new football field at the IVC site without reducing space for existing City programs or eliminating many community uses at the site altogether. The City does not support use of the IVC site for San Marin High School athletic events (City of Novato, 2017). Therefore, the District's schedule would not be accommodated at this facility.

4.7.2 Impact Analysis

a. Aesthetics

Because this alternative would involve a similar lighting system and schedule as the proposed project, it would result in similar impacts as the proposed project with respect to views to, through, and from the stadium; change in visual character; and light, glare, and sky glow. However, impacts would be shifted from San Marin High School to the IVC. At San Marin High School, the nearest residences are approximately 120 feet away. At the IVC, the nearest residences are located approximately 1,300 feet to the north-northwest on a ridge above the stadium. Since residences are further from the IVC field compared to the San Marin High School stadium, the severity of light and glare impacts on nearby sensitive receptors would be reduced under this alternative compared to the proposed project.

Unlike the stadium at San Marin High School, the IVC fields border directly on open space, and therefore the impact of implementation of this project on the visual character of the surrounding area and ambient lighting levels may be slightly increased.

Nonetheless, with implementation of mitigation measures similar to those contained in Section 4.1, *Aesthetics,* (AES-3 and AES-4) to design the lighting system to reduce light trespass and glare at nearby residences, impacts are expected to be less than significant. Under this alternative, aesthetic impacts would be slightly reduced when compared to proposed project and would remain less than significant or less than significant with mitigation. Mitigation measures related to light and glare would still apply.

b. Air Quality

This alternative would involve the permanent installation of lighting fixtures at the IVC existing fields. The amount and duration of construction for the lighting component of the project would be the same under this alternative. However, the grading associated with the drainage improvements would be in addition to any excavation or grading associated with the lighting component of the proposed project. Additional construction compared to the proposed project would be required for this alternative (such as improved restrooms, an improved field house, new bleachers, and ADA-compliant parking and pathways). Therefore construction-related emissions would be slightly higher compared to the proposed project. Mobile emissions associated with transportation between San Marin High School and the IVC would also be slightly increased. Energy-related operational emissions associated with new lighting systems would be similar to or the same as the proposed project. Overall, operational emissions levels would be slightly higher than levels associated with the proposed project. Nonetheless, similar to the proposed project, impacts would be less than significant.

c. Cultural Resources

Similar to the proposed project, this alternative would involve some subsurface work to install lighting poles. Further research would be needed to determine the likelihood of discovering cultural, paleontological, or tribal resources or human remains at the IVC. Nonetheless, in order to avoid potential impacts to cultural resources the mitigation measures outlined in Section 4.4, *Cultural Resources*, would continue to apply. Impacts would be the same as the proposed project and would remain significant but mitigable.

d. Greenhouse Gas Emissions

This alternative would involve the permanent installation of lighting fixtures at the IVC existing fields. The amount and duration of construction for the lighting component of the project would be the same under this alternative. However, the grading associated with the drainage improvements would be in addition to any excavation or grading associated with the lighting component of the proposed project. Additional construction compared to the proposed project would be required for this alternative (such as improved restrooms, an improved field house, new bleachers, and ADA-compliant parking and pathways). Therefore, construction-related GHG emissions would be slightly increased compared to the proposed project. Mobile GHG emissions associated with transportation between San Marin High School and the IVC would also be slightly increased. Energy-related GHG emissions associated with new lighting systems would be similar to or the same as the proposed project. Overall, operational emissions levels would be slightly higher than levels associated with the proposed project. However, like the proposed project, impacts would be less than significant.

e. Noise

For the proposed project, the nearest sensitive noise receptors are the classrooms approximately 100 feet from the stadium track and the residences approximately 120 feet from the stadium track. At the IVC alternative site, residences are located approximately 1,300 feet from the northeast boundary of the northernmost existing softball field. Construction activities, including the grading associated with the drainage improvements and construction of improved restrooms, an improved field house, new bleachers, and ADA-compliant parking and pathways would be in addition to any excavation or grading associated with the lighting component of the proposed project. Overall construction noise would be slightly greater compared to the proposed project. However, the nearest sensitive receptors are classrooms and residences located approximately 1,000 feet and 1,300 feet from the IVC field site, respectively. Due to the attenuation of noise over distance, construction noise for this alternative would be lower at the nearest sensitive receptors compared to the proposed project.

Therefore, construction-related noise impacts would be reduced in comparison to the proposed project.

The IVC fields do not currently have a PA system and a new system would be installed under this alternative. Crowd noise from attendees at athletic events would be similar compared to the proposed project. This alternative would also involve additional traffic noise associated with trips to transport San Marin High School student athletes, coaches, and support staff to IVC for practices and games. Traffic noise impacts would be increased compared to the proposed project but would be expected to remain less than significant. Due to the distance between the fields and nearby sensitive receptors (approximately 1,000 feet or greater), operational noise impacts would be reduced compared to the proposed project. A mitigation measure similar to Mitigation Measure N-2 required for the proposed project may be required for this alternative in order to reduce potential impacts associated with a new PA system. Because of the distance between the fields and the nearest sensitive receptors, operational noise levels associated with this alternative most likely would be below identified thresholds. This alternative likely would eliminate the significant and unavoidable noise impact associated with the proposed project.

f. Transportation/Traffic

This alternative would involve additional roadway traffic to transport student athletes, coaches, and support staff to IVC for games and practices. Impacts would be increased compared to the proposed project but would be expected to remain less than significant.

4.8 Environmentally Superior Alternative

Table 6 compares the physical impacts for each of the alternatives to the physical impacts of the proposed project. The No Project Alternative (Alternative 1) would be the overall environmentally superior alternative since it would avoid all project impacts. However, the No Project Alternative would not achieve the basic project objectives as stated in Section 2.0, *Project Description*.

Among the development options, Alternative 3 (Portable Lighting System) would reduce aesthetic and cultural impacts compared to the proposed project but would increase noise, air quality, and GHG impacts compared to the proposed project. Alternative 3 would not eliminate the unavoidably significant noise impact. Because this alternative would increase the project's already significant noise impact, while slightly reducing already less than significant aesthetic and cultural impacts, it would not be environmentally superior to the project.

Alternative 4 (Reduced Athletic Lighting System) would slightly reduce light and glare, air quality, and GHG impacts, but these impacts would remain less than significant. It is important to emphasize that further reducing the project's already less than significant light and glare impacts would not achieve a primary CEQA objective for alternatives: to “avoid or substantially lessen any of the significant effects of the project” (CEQA Guidelines Section 15126.6(a)), particularly inasmuch as any reductions that remained useful would be slight. As discussed in Section 2, *Aesthetics*, the project would not cause light trespass exceeding the CIE's threshold of 5 lux in the E2 zone for rural areas. Further reducing light trespass would not alter attainment of this threshold. This alternative also would not avoid the project's unavoidably significant noise impact. Because Alternative 4 would not avoid or substantially lessen a significant impact, it is not environmentally superior to the project.

Alternative 2 (Novato High School Lighting) would have similar aesthetic, air quality, and GHG impacts compared to the proposed project but would shift these impacts to Novato High School instead of San Marin High School. Alternative 2 would also increase traffic compared to the proposed project; but impacts are expected to remain less than significant. Alternative 2 would not eliminate the

unavoidably significant noise impact but would shift it to Novato High School. Overall, Alternative 2 is considered the environmentally superior alternative. However, since Alternative 2 would not involve the installation of stadium lighting at San Marin High School, it would not meet most of the basic project objectives due to the fact that demand for field time from both Novato High School and San Marin High School combined would exceed the lighted field availability.

It should be noted that Alternative 5 (COM IVC Existing Fields) would eliminate the significant and unavoidable noise impact associated with the proposed project and would be considered the environmentally superior alternative. However, as described above, this alternative would be infeasible due to the unavailability of the site for purchase or lease by the District.

Table 6 Impact Comparison of Alternatives

Issue	Proposed Project Impact Classification	Alternative 1: No Project	Alternative 2: Novato High School Lighting	Alternative 3: Portable Lighting System	Alternative 4: Reduced Athletic Lighting System	Alternative 5: COM IVC Existing Fields
Aesthetics	II	+	=	+	+/=	+
Air Quality	II	+	=	-	+/=	-
Cultural Resources	II	+	=	+	=	=
Greenhouse Gas Emissions	III	+	=	-	+/=	-
Noise	I	+	-	-	=	+
Transportation/Traffic	II	+	-	=	=	-

+ Superior to the proposed project (reduced level of impact)

- Inferior to the proposed project (increased level of impact) = Similar level of impact to the proposed project

5 References

5.1 Bibliography

In the original EIR, references are contained in Section 7, *References*. The references listed below are limited to those in this revised EIR.

Bortle, John. 2006. "Gauging Light Pollution: The Bortle Dark-Sky Scale." *Sky & Telescope Magazine*. July 2006. Available at: https://www.skyandtelescope.com/astronomy-resources/light-pollution-and-astronomy-the-bortle-dark-sky-scale/

Caltrans. 2016. List of Eligible and Officially Designated State Scenic Highways. Available at: http://www.dot.ca.gov/design/lap/livability/scenic-highways/index.html

Glendale Unified School District. June 2012. *Hoover High School Practice Field Lighting Project Initial Study/Negative Declaration.* Available at: http://www.gusd.net/cms/lib03/CA01000648/Centricity/Domain/53/WEB%20PDF%20HooverHS_Field_Lights_DraftISND_2012-06-04.pdf

Hiscocks, Peter D. Updated January 2011. *Measuring Light*. Ryerson University. Available at: http://www.ee.ryerson.ca/~phiscock/astronomy/light-pollution/photometry.pdf

Novato Unified School District (NUSD). June 2006. *PBC Parcels 1A and 1B Draft Mitigated Negative Declaration*.

Pennsylvania Outdoor Lighting Council. No date. *Common Lighting Terms Defined*. Available at: http://www.polcouncil.org/polc2/common_lighting_terms_defined.PDF

San Mateo Union High School District. May 2016. *SMUHSD Stadium Improvement Project Draft Environmental Impact Report*.

Shuster, Jeff. January 2014. *White Paper: Addressing Glare in Solid-State Lighting*. Ephesus Lighting. Available at: http://ephesuslighting.com/wp-content/uploads/2014/01/Addressing-Glare.pdf

5.2 List of Preparers

This EIR was prepared by Rincon Consultants, Inc., under contract to the Novato Unified School District. Consultant staff involved in the preparation of the EIR are listed below.

RINCON CONSULTANTS, INC.

Stephen Svete, AICP, LEED AP ND, Principal
Abe Leider, AICP CEP, Principal
Matthew Long, MESc, MPP, Project Manager
Jonathan Berlin, MESM, Senior Environmental Planner
Karly Kaufman, MESM, Senior Environmental Planner
Hannah Mize, Associate Environmental Planner
Sarah Sorensen, Associate Environmental Planner
Kyle Brudvik, Paleontologist/Geoarchaeologist/Archaeologist
Laura E. Hoffman, M.A., RPA, Archaeological Resources Program Manager & Principal Investigator
Valerie Salazar, Technical Editor / Production Department Manager
Debra Jane Seltzer, Document Production Specialist
Allysen Valencia, GIS Analyst

BENYA BURNETT CONSULTANCY (SPORTS LIGHTING CEQA REPORT)

James Benya, PE, FIES, FIALD

This page left intentionally blank.

Appendix A

Revised Initial Study Biological Resources Analysis

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
IV. BIOLOGICAL RESOURCES -- Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☐	■	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☐	■	☐
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	■
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	■	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	■	☐
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	■

a) ***LESS THAN SIGNIFICANT IMPACT***. The project site is situated in a suburban neighborhood in Novato, California within the campus of San Marin High School. The project site is bordered to south by a parking lot, to the east by a grass field, to the north by baseball fields, and to the west by the high school campus. Residential neighborhood surrounds the high school campus on the south, east, and north. To the south and west, Novato Boulevard separates the high school

campus from a riparian corridor along Novato Creek. Approximately 700 feet north of the stadium, and separated from the project site by the residential neighborhood, is open space consisting of oak/grassland vegetation community. Mature trees are present adjacent to the project site on the south and eastern sides and few scattered mature trees are present on the high school campus to the west of the project site. The closest mature trees are located over 100 feet away from the proposed locations for the main stadium light poles.

A biological resource reconnaissance-level site visit was conducted by Rincon Consultants on April 30, 2019. The reconnaissance survey was conducted to provide field verification of project-area habitat types and vegetation communities, document plants and animal species observed on-site, assess the potential for the project site to support sensitive species, and determine if the project site provides suitable nesting bird and roosting bat habitat.

The project site is completely developed with athletic field infrastructure, bare ground, and stadium seating. The fill slopes encircling the athletic field and the grassy field north of the stadium support a mix of non-native annual grasses and ruderal vegetation consisting predominantly of wild oat (*Avena fatua*), annual ryegrass (*Lolium multiflorum*), foxtail barley (*Hordeum murinum*), black mustard (*Brassica nigra*), bristly ox-tongue (*Helminthotheca echioides*) and purple star thistle (*Centaurea solstitialis*). A few individual coyote bush (*Baccharis pilularis*) and ornamental maple (*Acer* sp.) occur within the vegetated peripheries of the stadium. Mature trees occur on the school property within a few hundred feet of the athletic field and between the project site and the residential neighborhood to the east, including coast live oak (*Quercus agrifolia*), valley oak (*Quercus lobate*), pine (*Pinus* sp.), scrub oak (*Quercus sp.*), coast redwood (*Sequoia sempervirens*) and blue gum eucalyptus (*Eucalyptus globulus*). Wildlife observed during the reconnaissance survey include American crow (*Corvus brachyrhynchos*), turkey vulture (*Cathartes aura*), mourning dove (*Zenaida macroura*), cliff swallow (*Petrochelidon pyrrhonota*) and California ground squirrel (*Otospermophilus beecheyi*).

Box 1 a) This item should be checked as "Potentially significant". Why? A bat specialist needs to conduct a survey. That survey may discover the presence of a rare, special-status species within the site or buffer zone. The EIR cannot establish the 'less than significant' impact status because there is not significant evidence to support the conclusion; it is an opinion of the EIR's authors. 15.85

Box 1 d) Currently 'Less than Significant' Box is checked. This item should be checked as "Significant Impact" Why? Because when the lights are on in the evening and at night (during practices and games) the migration behavior of birds will be altered. Research studies show birds are attracted to lights and, as a result, mortality occurs due to collisions. 15.86

The Audubon.org says this in an article reporting on research study results: *" Birds have to use things to orient. One of the tools in their kit is celestial cues, so they can use the star maps like early navigators," Susan Elbin, director of conservation and science at NYC Audubon, says. Believing they're flying toward starlight or something similar, nocturnal migrants are drawn to the dazzling display, where they end up wasting crucial energy flying around and sounding off in distress."*
https://www.audubon.org/news/we-finally-know-how-bright-lights-affect-birds-flying-night

Box 1 e) Currently 'Less than Significant' Box is checked in the Revised Draft EIR ↓ 15.87

Should be checked "potential significant impacts". Why? The project violates the Marin Countywide Plan. The County Wide Plan establishes the need for migration corridors and contiguous green space.

Sensitive Species

In order to determine the potential presence of sensitive species or habitat, Rincon Consultants reviewed regulatory agency databases, conducted a literature review, analyzed aerial imagery, and reviewed the construction plans. According to the California Natural Diversity Database (CNDDB 2016), there is potential for special status wildlife species to occur within a five-mile radius of the project site. Based on the reconnaissance survey, the project site does not support special status species habitat and no special status species were observed during the survey. No nesting birds or potential bat roosting habitat was observed within the project site. Potential nesting habitat is present within mature trees and shrubs located within the surrounding residential neighborhood outside of the project area. Few special status birds and bats may fly through or over the project site, but project activities will not have a significant impact on any bird or bat species such that population size is reduced to a level below being self-sustaining.

The conclusion from the above paragraph: *" Based on the reconnaissance survey, the project site does not support special status species habitat and no special status species were observed during the survey. No nesting birds or potential bat roosting habitat was observed within the project site."* is not a correct assessment. No in-season surveys were conducted when birds were nesting and bats might have maternal sites within the site or in the buffer zone. Two years of bird surveys and bat surveys should be required.

15.88

The quote from the above EIR paragraph (starting with the title Sensitive Species) says: "P*otential nesting habitat is present within mature trees and shrubs located within the surrounding residential neighborhood outside of the project area."* Admitting the presence of nesting habitat in the buffer zone nearby the site establishes that potential negative impacts can occur (on birds). As a result, mitigation measures should be mandated. No mitigations are called for in this study.

15.89

This additional discussion is based on the results of the lighting report prepared by lighting consultant James Benya in June 2019 (Appendix B to the Revised EIR), which was provided after publication of the Draft EIR. Light impacts can be analyzed by quantifying illuminance from the spillover of light, or "light trespass." Light trespass is measured on both the vertical plane (e.g., light shining through a window) and the horizontal plane (e.g., light falling on a bed), in terms of lux or foot-candles (more detailed definitions can be found in Section 2, *Aesthetics,* of the EIR). The lighting report found that illuminance at residential property lines adjacent to the stadium site was no greater than 2.75 lux, which is consistent with lighting levels in sparsely populated rural areas. As discussed in Section 2, *Aesthetics*, this level of light trespass beyond the stadium site would not exceed the International Commission on Illumination's (CIE) allowed maximum of 5 lux in rural areas.

The above paragraph draws conclusions that does not rely on data actually measured from the Project Site. Therefore, the conclusions regarding light trespass in this section are flawed. The impacts of egress lighting and upward facing lighting were not considered or measured in the photometric analysis in this Draft Revised EIR or in prior versions of the Draft or Final EIRs. Failing to study the impacts of all

15.90

components of the lights project means no meaningful conclusions can be drawn about light trespass (or glare) impacts on wild life, sky glow or nearby residents.

The egress lighting poles are significantly lower than how they are described in this document (much less height than the estimated 'up to' 30 ft number bandied about in all EIR versions). This means the angle of the egress lights are more horizontal than vertical compared to taller light poles which approximate the original 30 ft design target. The bid drawings for the project indicate the egress pole heights are 15 feet, not 30 feet.

15.91

The use of Upward Facing Lights, which were described in the initial EIR as being for use during 'kickoffs only', was 'clarified' in the Final EIR subsequent to the public comment period that expired on March 3, 2017. Upward Facing Lights are now to be lighted continuously during games, however no analysis has been done of these impacts and the public has never been given a chance to comment on the changed status of the Upward Facing Lights until now.

The conclusions about lights in this section (and in this Revised Draft EIR) focus on the impacts and light intensities of the downward facing 8 light poles and conveniently ignore important and disruptive lighting sources that have never been studied for trespass or glare impacts.

By failing to study important attributes of the project (items changed after the most recent comment period was closed to the public in March of 2017) the Trustees cannot make an informed decision about the project and the public is not able to weigh in on the merits and impacts as is required by CEQA.

15.92

The impacts of the Upward Facing Lights, Egress lights and Field Reflections from Downward Facing Lights have not been evaluated with respect to Sky Glow, affects to bird migration, bird nesting and impacts to other wildlife at the site and in areas impacted by the project that are off the site. Those egress and Upward Facing Lights, during a test of the light system on May 6, 2019 lit up 'Senior Hill' like a Christmas Tree. (Senior Hill is the hill to the north of the football field where senior high students used to mark the graduation year of their class.)

These are not opinions. I have included photographic evidence taken on May 6, 2019 during a test of the light system elsewhere in this document. The glare and light trespass shown come from the egress and upward facing lights per my personal observations (and photographic evidence), which, according to CEQA, must be taken as expert commentary.

Special Status and Other Bat Species. Native bats species that have not been identified as threatened or endangered may be present in the project area. Seven bat species that could potentially occur around the project site are considered California species of special concern (CSSC) either due to lacking information or because of suspected decline of the species range in California. These species (global and state ranking and CDFW special status included in parenthesis) include: the pallid bat (G5 S3; Class II), Townsend's big-eared bat (G3G4 S2; Class I), western red bat (G5 S3; Class II), fringed myotis (G4 S3; Class II), long-legged myotis (G5 S3; Class II), western mastiff bat (G5T4 S3S4; Class II), and big free-tailed bat (G5 S3; Class II). Two additional species are placed on the Watch List (WL) because of restricted distribution and the need for additional field efforts to establish population trends. These two species include: the silver-haired bat (G5 S3S4) and the hoary bat (G5 S4). The CDFW lists the primary reasons for bat decline as closures, human disturbance, and direct extermination thought "pest control"

measures at colony rooting sites (Bolster 1998). Additionally, unsustainable management practices of public and private forest lands for cavity-dwelling species, and farming practices such as removal of riparian forests and use of insecticides are notes as causes of bat declines. No evidence currently exists that would suggest the installation of the stadium lights would have a significant impact on bat populations.

Studies that have shown effects on species biology as a result of artificial light are generally related to long periods of lighting, for example streets and other city lights that are on all night (Rowse et al. 2016). The few hours each night that stadium lights would be on may have some effect on bat foraging behavior, but not to the level of a negative impact on the population. On the contrary, evidence exists that while not natural behavior, bat foraging around lights may have a positive effect by increasing foraging efficiency, especially for insectivorous species that hunt in open spaces above canopy or along vegetation edges (Rowse et al. 2016 and references therein). Many Myotis species have been found to simply avoid lit areas, seemingly preferring to forage in darkness. The open space to the north of the project site and along the riparian corridor associated with Novato Creek provides ample dark foraging opportunities.

Native bats use roosting habitats such as trees, bridges, and abandoned buildings. However, the proposed project plans do not include the removal of any nearby trees, and no other suitable habitat in proximity to the project site would be impacted. Furthermore, higher quality foraging and roosting habitat is located one quarter-mile south at Novato Creek, making it less likely that any bats would frequent the proposed project area. Bats that are roosting around the project site could generally be considered habituated to human activities and are unlikely to be disturbed by any increased activities associated with the stadium lighting. Bats have been shown to be very resilient to urbanization and urban activities and in some cases have been found to be more diverse and abundant in association with urban landscapes (Jung and Threlfall 2016).

It is possible that bats may forage around the lights during the brief periods lights are on. However, little to no evidence exists that bats would be specifically attracted to the lights (Evans Ogden, 1996) and the lack of light trespass beyond 100 feet from the stadium further reduces the likelihood that bats would be attracted to the lights. The brief period of illumination combined with the distance from any suitable bat roosting areas and lack of light trespass makes it unlikely for lighting to have a negative impact on bat behavior. As discussed in the introductory section to this Initial Study under *Description of Project - Project Components,* project activities would take place during the months of September through January. Since construction would occur early in general mating season for native bats, it would not impact maternity roosting colonies. Based on available information, no evidence exists that the project would negatively impacts bat behavior. Potential impacts to incidental foraging bats would be less than significant.

Why does the language in this section not reflect the current 'as built' status of the project? 15.93

The above EIR paragraph states: "*the lack of light trespass beyond 100 feet from the stadium further reduces…*". and "*Since construction would occur early in general mating season for native bats, it would not impact maternity roosting colonies.*"

In reference to the above quotes: The light trespass so referenced is understated as it does not consider light trespass (or glare) from egress and Upward Facing Lights. No meaningful conclusion can be drawn about the project in the EIR if some lights are considered for impacts and others not considered. Please reference the photographs shown above that document some 15.94

of the glare and light trespass I personally observed (and documented with photographs) from egress and Upward Facing Lights.

Why does the above EIR paragraph reference impacts during construction since construction was completed in approximately May of 2019? Ongoing impacts are much more concerning to the community and wildlife that may be asked to live with impacts going forward if the project is approved. 15.95

Nesting or Migratory Birds

Nesting birds and raptors are protected by the Migratory Bird Treaty Act (MBTA) and California Fish and Game Code (CFGC). Common avian species that have adapted to urban and suburban environments, such as sparrows, finches, American crows, and barn owls, are present in the project area.

Construction. The nesting season in the area generally extends from February through August. As discussed in the introductory sections to this Initial Study under *Description of Project - Project Components*, project activities would take place during the months of September through January. Therefore, construction during this period would avoid the potential for impacts to nesting birds. In addition, construction of the project would occur within previously disturbed areas adjacent to the sports stadium and parking area on the San Marin High School campus. Work would occur on previously paved areas or areas that are landscaped with non-native vegetation, including non-native lawn grass. No activity would occur on previously undisturbed ground. Disturbed vegetation (consisting primarily of lawn) above trenches and bore pits would be restored to pre-construction conditions following installation of the electrical conduits. No tree removal or trimming is proposed as part of this project. Therefore, no impacts during construction would occur.

Operation. Once constructed, poles would be a maximum of 80 feet (24.3 meters) tall. Given the small surface area of their vertical and horizontal structure, poles would not have a significant impact on bird flight, including during migration.

The above paragraph promises the EIR reader that the poles will be a "*maximum of 80 feet tall.*" This is not true. Sixty two 1/2 percent of the poles are taller than 80 feet; none are shorter than 80 ft. Add the grade effect and several poles are above 90 feet tall. This data is available in photometric study that is part of this EIR. The table below shows the pole heights of the downward facing lights and the grade effect; you have to add the pole height to the grade height to get the actual height. 15.96

Pole Id	Pole Size	Grade Addition	Total Height
F1	90	4	94
F2	80	11	91
F3	80	13	93
F4	80	13	93
F5	90	-7	83
F6	90	-9	81
F7	90	-11	79
F8	90	-13	77

Faulty data throws all conclusions into doubt. This EIR needs to be corrected and recirculated for public comment.

Nighttime events at the stadium requiring lighting would occur approximately 152 or fewer times per year, with the majority of the light use occurring between October and May. Lighting would occur for approximately two hours per evening during week days (6 to 8 PM) to 3.75 hours during 15 or fewer Friday evenings (6 to 9:45 PM). Therefore, stadium light would be on for only short periods consisting of two to four hours a night for up to four months. There have been some cases where lighting has been shown to impact bird species; however, this has typically occurred where light is otherwise scarce, such as on offshore oil platforms (Huppop et al., 2015) and in forests (The Nature Conservancy, 2015). There is no evidence that shows birds are attracted to urban lights (Evans Ogden 1996). Since lighting would occur during short durations and little light trespass would occur, stadium lights are unlikely to result in birds becoming trapped within the light zone, known as the "trapping effect" (Evans Ogden 1996), especially on diurnal (daytime active) birds (Outen 2002). In addition, lighting events would mostly occur during August through December which falls outside the usual nesting bird season. Therefore, lighting is optimally planned to have little to no impact on nesting birds (Gason et al. 2012).

Not true. The old 1996 study referenced above is incorrect. New studies show birds are attracted to lights. Resulting mortality occurs. This quote from the Audubon Society (which references a study performed at Cornell University is also referenced above) proves the 1996 citation to be invalid .

15.97

Additionally, this project is not located in an urban environment; we are in CIE Zone E2, a more rural environment and one that is adjacent to Designated Open Space. A City of Novato Scenic Corridor begins where San Marin Drive intersects with Novato Blvd (referenced elsewhere in this document).

15.98

The Audubon.org says this in an article reporting on research study results: *" Birds have to use things to orient. One of the tools in their kit is celestial cues, so they can use the star maps like early navigators," Susan Elbin, director of conservation and science at NYC Audubon, says. Believing they're flying toward starlight or something similar, nocturnal migrants are drawn to the dazzling display, where they end up wasting crucial energy flying around and sounding off in distress."*
https://www.audubon.org/news/we-finally-know-how-bright-lights-affect-birds-flying-night

15.99

The above EIR paragraph confirms that the 152 nights the lights are to be used represents approximately

15.100

240 total nights (beginning of October through and including May); that means that according to the EIR the lights will be used up to 152/240 evenings during the period from October 1 through May 31, or on 63% of the total evenings in that period.

The above paragraph confirms that dark environs are more impacted by lighting systems than areas with existing background light 'noise.' This is significant because the Upward Facing Lights and the egress lights directly illuminate Senior Hill which is, according to Bortle Charts, shown elsewhere in this document, properly in CIE zone E1. The impacts from egress and Upward Facing Lights on Marin Open Space areas has not been analyzed in this or any other EIR regarding this project.

With that said, the above paragraph from the EIR says 'there is no evidence birds are attracted to *urban* lights. The project is in zone E2 which is not an urban area. Additionally, Daniel Edelstein, Coalition to Save San Marin's biological resources expert claims there are newer studies showing birds are attracted to lights. The EIR admits the impacts are greater in areas with less night time ambient lighting. This should be studied so the Trustees can make an informed decision.

15.101

Three owl boxes have been installed around the margin of the high school campus to the north and west, the nearest of which is approximately 700 feet from the project site, which is beyond the standard agency-required buffer distance of 500 feet between active raptor nests and active project construction activities. These owl boxes would most likely be occupied by barn owls given the size and location of the owl boxes. Barn owls adapted to urbanized landscapes (as would be expected for existing resident barn owls) would already be tolerant of, and acclimated to, the current level of human activities from the existing athletic field and surrounding residences. The addition of lights and sporting activities carry on for up to 3.75 hours after sunset would have no additional impact on nesting owls above that already occurring during day-time. Natural prey availability for owls, such as native small rodents, is unlikely to occur in the athletic field area and owls are more likely to forage in open space to the north of the project site and along the riparian corridor to the west and south. Potential impacts to barn owls would be less than significant. Overall impacts to nesting and migratory birds would be less than significant. Based on the project parameters discussed above, impacts associated with adverse effects on candidate, sensitive, or special-status species would be less than significant and further analysis of this issue in an EIR is not warranted.

My wife and I were awakened one very early morning during August 2019 by an owl in our backyard. I am not a bird expert, but believe the long and loud 'whooo whooo' sounds we heard was from an owl.

15.102

b) ***LESS THAN SIGNIFICANT IMPACT***. Construction of the project would occur within previously disturbed areas on the San Marin High School campus. Ground disturbance during construction of the proposed project would be limited. Excavation would be required for the installation of pole foundations, and limited trenching and boring would be required for the installation of new electrical connections. This ground disturbance would occur on previously disturbed areas within and near the existing stadium. The nearest riparian area to the stadium is located approximately one-quarter mile to the south and southwest at Novato Creek in O'Hair Park. Although light pollution can adversely affect wildlife in riparian areas, the proposed light fixtures would be narrowly focused on the stadium and downcast. Given that light trespass would not exceed 2.75 lux at residential property lines approximately 125 feet from light poles

on the stadium site, light trespass at the greater distance of Novato Creek (about one-quarter mile) would be negligible. The lighting design for the project follows standard recommendations from The Nature Conservancy regarding downward facing design and reduced period when lights are on (The Nature Conservancy 2015, https://www.nature.org). Therefore, construction and operation of the project would not have a substantial adverse effect on riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulation, or by state or federal agencies. The impact on riparian habitat and sensitive natural communities would be less than significant, and further analysis of this issue in an EIR is not warranted.

c) ***NO IMPACT***. As described above, ground disturbance associated with construction of the project would occur on previously disturbed areas within and near the existing stadium. As shown on the U.S. Fish and Wildlife Service's National Wetlands Inventory, there are no federally protected wetlands on or adjacent to the stadium (USFWS, 2016). The nearest mapped wetland area is an intermittent stream that runs immediately north of the San Marin High School tennis courts, located approximately 600 feet southwest of the stadium. Limited ground disturbance within the stadium would not adversely affect this wetland area. Implementation of the project would not result in adverse effects on wetlands and further analysis of this issue in an EIR is not warranted.

d) ***LESS THAN SIGNIFICANT IMPACT***. Construction of the project would involve the installation of free-standing poles to support new lighting and upgraded public address systems and underground electrical conduits to supply electricity to those systems, all within the existing stadium. No fences, walls, or other linear obstructions to wildlife movement would be constructed. No streams would be affected.

Trees near the project site and those in the riparian vegetation to the northwest may provide nesting opportunities for birds. However, as discussed in detail under subsection (a), no disturbance to birds nesting behavior would occur. Light disturbance levels at nearby trees that could support nesting would be low relative to ambient levels associated with the residential neighborhood and would be short-term in daily duration. Birds that may nest in the trees near the stadium (approximately 100 feet away from the main stadium light pole locations at the nearest) would likely be habituated to human activity and would not likely be disturbed by the increased activity level and lighting resulting from the project.

Implementation of the project would increase the frequency and intensity of evening and nighttime lighting at the stadium. Many migratory birds use the stars to orient themselves during the spring and fall migratory season (generally April through May and September through November). In overcast conditions or heavy fog, they can become disoriented and attracted to any elevated light source. The birds would fly around the light source rather than continuing to migrate and may excessively use up fat stores. However, as discussed in Section 2, *Aesthetics*, the proposed modern lighting system would be designed to minimize glare and fugitive light, and it would not substantially contribute to existing sky glow in the area. The timing of lighting would also limit effects on migratory birds. While nighttime bird migration begins about one hour after sunset and continues until about 2:00 AM, peak activity generally occurs after 10:00 PM (Petting ill, 1985). Lighting would generally not occur after 10:00 PM and would occur that late nine or fewer times a year. Lighting would not have a significant impact on bird migratory behavior.

The project site lies within the general area known as the "Pacific Flyway," an area that extends across the width of California, though most migration occurs along the immediate coast and offshore and through the inland Sacramento and San Joaquin Valleys. The number of birds present at any one portion of the flyway at a particular time is dependent on a wide variety of conditions, including current weather patterns and the amount of available food resources as the birds need to "re-fuel" during daytime hours to continue their migration.

The project is not expected to "interfere substantially with the movement of any native resident or migratory fish or wildlife species" for multiple reasons. First, migratory bird kills as a result of athletic field lighting at O.co Coliseum in Oakland, Candlestick Park, AT&T Park and other athletic fields in the Bay Area have not been reported. Second, because the project site is within a suburban area, available food resources for migratory species and most wildlife species are lacking on-site and large numbers of migratory birds do not occur at the project site or in the immediate vicinity. Third, current night lighting conditions for the area show bright light sources already present in the suburban area of Novato (NASA, International Space Station,

Comparing San Marin High (CIE Zone E2) with the Oakland Coliseum, Candlestick Park and AT*T Park is like comparing one apple to three oranges; not a valid comparison. The Oakland Coliseum and other venues so listed are all in urban areas with much more dense sky glow, much more dense urban environmental lighting and are not adjacent to designated Open Space areas. Any conclusions drawn are defective. 15.103

The idea that there are current "*bright light*" conditions in the immediate vicinity of San Marin High is simply inaccurate and proved by the Bortle Maps (sourced by NOAA), especially the detailed (expanded view) map which clearly shows San Marin's sensitive location near designated Open Space areas. Elsewhere in this EIR the author attempts to compare the San Marin Site with all of Marin County and here with all of Novato. The Bortle maps clearly show that Novato doesn't have a homogeneous bright light sources at night. San Marin High is located in a darker, more sensitive area, adjacent to Designated Open Space with darker night time skies and fewer man made sources of light. The language above is confusing, misleading and inaccurate on its face and should not be relied upon by the public or decision makers; these errors should be corrected and the EIR recirculated. 15.104

2013). Fourth, the proposed lights would be turned off before the peak time period of migratory activity (after 10:00 PM). Impacts related to substantial interference with the movement of any native or migratory fish or wildlife species or their established movement corridors would be less than significant, and further analysis of this issue in an EIR is not warranted.

e) ***LESS THAN SIGNIFICANT IMPACT***. Construction of the project would not result in impacts to environmentally sensitive biological resources. Vegetation removal would be limited to the areas above trenching sites bore pits for conduit installation. This vegetation would typically consist of non-native lawn grass. Any vegetation that is disturbed during conduit installation would be restored to pre-construction conditions after completion of the installation. Therefore, implementation of the project would not conflict with local policies or ordinances targeting these resources. No tree removal is proposed, so tree preservation ordinances or policies would not apply. This impact would be less than significant and no further analysis in an EIR is warranted.

f) ***NO IMPACT***. The project would not occur within the area of an adopted Habitat Conservation Plan or Natural Community Conservation Plan (CDFW, 2015). No other approved local,

regional, or state habitat conservation plans have been identified on any of the project site. No further analysis of this issue in an EIR is warranted.

REFERENCES

Bolster, B. C., editor. 1998. Terrestrial Mammal Species of Special Concern in California. Draft Final Report prepared by P. V. Brylski, P. W. Collins, E. D. Pierson, W. E. Rainey and T. E. Kucera. Report submitted to California Department of Fish and Game Wildlife Management Division, Nongame Bird and Mammal Conservation Program for Contract No. FG3146WM.

CDFW (California Department of Fish & Wildlife). 2015. California Regional Conservation Plans, August 2015. Accessed July 21, 2016 at: https:/ / nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=68626&inline.

CDFW. 2016, California Natural Diversity Database. RareFind v5. Online: https://map.dfg.ca.gov/rarefind/

Evans Ogden, L.J. 1996. Collision course: the hazards of lighted structures and windows to migrating birds. World Wildlife Fund Canada and the Fatal Light Awareness Program, Toronto, Canada.

Gason, K. J., T. W. Davies, J. Bennie, and J. Hopkins. 2012. Reducing the ecological consequences of night-time light pollution: options and developments. Journal of Applied Ecology 49: 1256-1266.

Huppos, O., K. Huppop, J. Dierschke, and R. Hill. 2015. Bird collisions at an offshore platform in the North Sea. Bird Study (63)1: 73-82.

Jung, K. and C. G. Threlfall. 2016. Urbanization and Its Effects on Bats - A Global MetaAnalysis. Pp 13-33. In: Bats in the Anthropocene: Conservation of Bats in a Changing World. C. C. Voigt and T. Kingston (eds). SpringerOpen.

NASA, International Space Station, San Francisco Bay Area at Night, September 2013. Available at: http:/ / spaceref.com/earth/san-francisco-bay-area-at-night-as-seen-from-orbit.html

Outen, A. 2002. The possible ecological implications of artificial lighting. In: Sherwood, B., D. Cutler, and J Burton (Eds.), 2002. Wildlife and Roads, the Ecological Impact. Imperial College Press, London, 299 pp.

Pettingill, Olin Sewall, Jr. 1985. Ornithology in Laboratory and Field, *Fifth Edition*.

Rowse, E. G., D. Lewanzik, E. L. Stone, S. Harris, G. Jones. 2016. Dark Matters: The Effects of Artificial Lighting on Bats. Pp 187-213. In: Bats in the Anthropocene: Conservation of Bats in a Changing World. C. C. Voigt and T. Kingston (eds). SpringerOpen.

The Nature Conservancy. 2015. Reducing Ecological Impacts of Shale Development: Recommended Practices for the Appalachians. www.nature.org/ shale-practices.

USFWS (United States Fish & Wildlife Service). 2016. National Wetlands Inventory - Wetlands Mapper. Accessed July 21, 2016 at: http:/ / www.fws.gov/wetlands/Data/Mapper.html

Appendix B

Lighting Report

Sports Lighting CEQA Report

New Football Field Lighting at San

Marin
High School

Novato, CA
June 15, 2019

James R Benya, PE, FIES, FIALD
BENYA BURNETT CONSULTANCY
Davis, CA

Abstract

In 2015, the Novato Unified School District ("NUSD") undertook to install LED sports lighting for the San Marin High School ("SMHS") stadium. An Environmental Impact Report filed in May 2017 ("EIR") demonstrating compliance with the California Environmental Quality Act ("CEQA") was developed by Rincon Consultants for and approved by NUSD. It listed Potential Aesthetic Impacts that might be caused by new lighting, all of which were deemed less than significant when mitigated as described in the EIR.

To demonstrate compliance with the EIR, field measurements of the lighting impact on the field, adjacent hillsides and residences were taken on the evening of May 6, 2019 by James Benya, PE, Principal of Benya Burnett Consultancy, Davis, CA, who was retained by Rincon Consultants. Field measurements confirmed compliance with the EIR by meeting light level requirements for lighting zone E3 of (a) less than 2.0 footcandles at the SMHS property line per AES-3 of the EIR and (b) less than 10,000 cd of illumination at the SMHS property line per AES-4 of the EIR. In fact, lighting measurements showed compliance with the stricter requirements of lighting zone E2. Although not part of the EIR, light levels on the football field proper are designed and measured to be about 400 lux, average, which is slightly less than IES Class II and slightly more than IES Class III, which is appropriate for the location and size of the stadium seating.

15.105

The Court mandated that the Project be considered to be in CIE Zone E2. The language in the above paragraph is therefore misleading. The 2.0 FC figure referenced above was never justified in the Final EIR and no longer applies. Elsewhere in this EIR, the authors appear to rely on CIE:150 and this site's classification as CIE Zone E2, yet this discussion seems to presume a different set of facts.

The appropriate spillover number from the CIE standard for CIE Zone E2 is .5 FC before curfew and .1 FC after curfew. The 10,000 cd of illumination figure is also inaccurate and not applicable to a CIE Zone E2 project. This number, 10,000 cd, was assigned as a Project metric in the Final EIR section AES-4 where it was justified because the Project was then considered to be in a CIE Zone E3. A Marin Superior Court ruling designated the project as CIE Zone E2. CIE Zone E2 is not likely to use the same metric as CIE Zone E3; if so, the EIR should reference an authority justifying the 10,000 cd number as appropriate for CIE Zone E2. I suspect the 10,000 cd was inherited from the Final EIR and the was never adjusted to reflect the change in CIE Zoning mandated by the Court.

15.106

My understanding is that IES RP-6-15 recommends that attendance determine light intensity of the downward facing lights. A variable controller should permit the light intensity to be set for crowd sizes well below the threshold and for crowd sizes that meet or exceed the threshold.

15.107

Egress light poles are significantly shorter than the descriptions given in the Final EIR which increases horizontal trespass and glare. Impacts of the Upward Facing Lights were not studied in the Final EIR because they were initially to be turned on solely during kickoffs and punts, then their use was changed ('clarified' according to language in the Final EIR) but never studied. The Final EIR Responses (Section 8 of the Final EIR) had conflicting language regarding the Upward Facing Lights. In some areas Rincon dismissed concerns over the Upward Facing Lights because 'they were only to be used during kickoffs' and elsewhere Rincon said Upward Facing Lights were to be kept on during games.

To properly describe the project the EIR needs to accurately and consistently describe the Upward Facing Lights

and to study and report on their impacts so the public and Board of Trustees are informed. This has not been done; light impacts from the Upward Facing Lights has not been performed.

This respondent took pictures of glare and light trespass created by the Upward Facing Lights 'as built' when the lights were tested on May 6 (shown below). The glare was distracting, disruptive, painful to look at and very objectionable. The light trespass was captured by photographs shown below. My home, on Santa Yorma Court, is not in an area measured for light impacts in any EIR studies, including this Revised Draft EIR.

Failing to study documented impacts proved by photographs and witness accounts requires a detailed response according to CEQA. This EIR and the project description are inadequate if light trespass and glare are not analyzed from all project lights.

15.108

Above photograph taken by Mike Joly using his iPhone (without a flash) during light tests on May 6, 2019 shows impact of egress and upward facing lights on a residence not studied for light trespass or glare impacts. No flash was used when taking this photo and this residence is above (elevation wise) street lights, so the light effect you see in the photograph is 100% from the San Marin Lights project.

My Iphone camera was unable to take the same photo without the illumination assistance from the Upward Facing Lights without a flash as there was insufficient light for the camera to take a photo under those very dark conditions.

Introduction

According to the Novato Unified School District ("NUSD") website, the project to install lights and other stadium improvements (the "Project") at the San Marin High School ("SMHS") began in 2015. Following normal procedures for such projects, NUSD retained consultants to prepare the design and to produce the Environmental Impact Report required by the California Environmental Quality Act ("CEQA"). The current Environmental Impact Report ("EIR") was produced in May 2017 for review by the NUSD and the public. It established lighting criteria using an international anti-light pollution standard, CIE:150, that addresses light trespass and glare.

It is my understanding that this report was commissioned to assess and confirm the lighting performance relative to the EIR criteria and directly related considerations.

The Final EIR's criteria regarding the E2 vs E3 lighting classification became irrelevant when the Marin Superior Court ruled that the project is to be considered as CIE Zone E2. The Court also ruled that lower intensity lighting options were to be considered.

15.109

Mr. Benya should have said: "relative to the EIR Criteria, as amended by the Court." The Final EIR was deemed to be defective by the Court, so simply studying the old EIR and asking already settled questions won't lead to a CEQA compliant EIR this time around. The term "directly related considerations" is vague; we don't need or want a vague EIR or vague criteria used to evaluate this EIR. Shortly below this paragraph, Mr. Benya confirms his confusion when he admits the primary focus of his study is to determine *" Whether the project's criteria for its impact should be based on lighting zone E2 or E3 as defined by CIE:150, an international standard for controlling light pollution."*

Issues

I reviewed the May, 2017 EIR and responses to comments concerning it to become more acquainted with the findings and recommendations upon which the project was based. The principal lighting issues appear to be:

- Whether the project's criteria for its impact should be based on lighting zone E2 or E3 as defined by CIE:150, an international standard for controlling light pollution;

15.110

It is clear from the above that Mr. Benya is confused about the primary focus of his work. The E2 vs E3 issue was settled by the Court; the Project and its surroundings are in CIE Zone E2.

- Because the lighting is now installed and its performance measured, the extent to which the photometric reports are germane to the approval process at this time;

The above language is vague. It seems to say a new photometric study was not designed to show all impacts of the lights, but just the minimum, enough to verify "*the extent to which the [pre-existing] photometric reports are germane*".

15.111

The Court demanded an accurate photometric study be performed showing light impacts from the Project, all impacts. The Court didn't ask if the pre-construction photometric studies, the ones that were hidden from the public, were accurate. The photometric study and Mr. Benya's analysis should not be limited to the 8 downward facing light poles; the Upward Facing Lights and the Egress Lights should also be included in

any photometric analysis and appear to be missing from the analysis (Appendixes B and C). The Musco Preliminary Photometric study did not consider the Upward Facing Lights or the Egress Lights; consider this quote from consultant Benya in Appendix B: [underline added] "*Photometrics supplied by the manufacturer are predictions of light levels produced by the sports lighting system exclusively."*

Why can we conclude that the term "sports lighting system" excludes Egress and Upward Facing Lights? Because the Photometric Study, Appendix C, does not include any reference to Upward Facing Lights or Egress Lights even though these lights have impacts on neighbors and need analysis for impacts. The Sports Lighting System is therefore what is identified in the Photometric Study and Upward Facing Lights and Egress Lights are not referenced in that study, so the term Sports Lighting System consists solely of the Downward Facing Lights and excludes all other lights.

Additionally, the word 'exclusively' means something in the totality of the lights project was excluded from inclusion in the Photometric Study. The entire lighting system must include Downward Facing Lights (what Mr. Benya seems to call the Sports Lighting System), the Egress Lights (which are not designed to light the field sufficiently for sports activities) and the Upward Facing Lighting system (designed for ball-in-flight lighting). Without the word 'exclusively' we could conclude the Photometric Study is simply defective and doesn't study impacts from Egress Lighting and Upward Facing Lights by accident. Instead, it appears the Photometric Study was designed to omit those elements; the Photometric Study is still defective because it doesn't cover the entire project, however, this appears to be an intentional omission. Because (elsewhere in this EIR), Mr. Benya concedes he measured light trespass and glare on neighbors using a 5 foot plane (his personal choice as far as I can tell), he also seemed to design the glare and trespass analysis to omit the impacts from both the Upward Facing Lights and the Egress Lights (which are both mounted higher than 5 feet on the vertical plane). The Upward Facing Lights are mounted approximately 20 feet off the ground and are aimed upwards; the Egress Lights are on poles 'up to' 30 feet (but are actually mounted on poles that are approximately 18 feet according to AR 00010134 in the Official Court Record. This EIR is silent on the actual height of the Egress Lighting Poles.

The Final EIR says in its Project Description [underline added]: "These poles would be up to approximately 30 feet tall and would be installed at up to 18 locations throughout the athletic field site to provide adequate lighting for safe egress."

On 01/30/17 Eduardo Morales wrote to San Marin High School Teacher Melissa Havel (AR 00010134). That email included another email written by Tony Francescini to Eduardo Morales Eduardo which says [underline added]:

15.112

"Below is the link to the EIR. Note, I believe the shorter poles are displayed at 30 feet tall, and I understand that is incorrect. I believe those posts will be closer to 15 to 18 feet tall. Tony may have more to say about that."

To me, that says the project description changed before the EIR was approved and the Final EIR was never updated to reflect the change. This Revised Draft EIR is silent on the height of the Egress Poles. This may seem like a small point, however, it is not as shorter Egress Poles means their LED bulbs must be aimed more horizontally (to cover the same area compared to taller Egress Poles) and will therefore cause more

glare and light trespass, something never studied in any of the EIRs or the Photometric Study in Appendix C.

From Judge Chernus' ruling [underline added]: "*As reflected by the District's own comments in the record, preparation of a photometric study is essential to determine whether the light/glare impacts from the project could be mitigated to less than* significant *levels.*"

It is clear Judge Chernus wanted the Photometric study to determine light/glare impacts from the "*project",* not just the Sports Lighting System *exclusively*. I believe CEQA demands a photometric study to determine light/glare analysis for the entire project, not just the Downward Facing Lights. 15.113

Simply opining that glare and light trespass from Upward Facing Lights and Egress Lights are not going to cause discomfort glare, but then consciously omitting those light sources from the newest Photometric study and arbitrarily not measuring impacts from those sources to the Northwest of the Project Site (the location where the Upward Facing Lights (on the South side of the football field) are aimed) eliminates evidence the Board of Trustees needs to make an informed decision. The public is also denied the ability to create informed comments because the EIR lacks what was deemed 'essential' in its official record. I believe the District fails to meet the substantial evidence burden referenced in CEQA.

- Whether the stadium lighting could be reduced as a mitigating measure.

This last issue is a Court mandated requirement to investigate the use of a lower lighting design. I don't find evidence within Appendix B or in this Revised Draft EIR of any serious study that lower intensity lighting might be employed in the Project. This writer suggests the District study the use of an electronic controller to reduce the light intensity when crowd sizes are less than the limits suggested in IES RP-6-15. This is a simple and effective way to reduce impacts to neighbors and reduce harmful blue light exposure to athletes, coaches and spectators. 15.114

Also, this document fails to address if the Upward Facing Lights should be repositioned (different or relocated poles), re-aimed or eliminated to avoid light trespass and glare to neighbors. Also, sky glow impacts have not been studied or measured from Upward Facing Lights, the Downward Facing Light's reflections off the field, and egress lights. 15.115

Lighting Zones

NUSD and its design and environmental consulting team chose to employ an international lighting environmental standard developed by the Commission Internationale de 1'Eclairage (CIE) that establishes criteria to limit light trespass and glare. The Standard, CIE:150[1], employs a lighting zone system based on ambient light in the general area. For example, in a nature preserve a candle can be seen for a mile, but in downtown San Francisco it is lost into the haze of thousands of light sources. Lighting zone E1 is the nature preserve and E4 is the city, with E2 and E3 being steps in between. Zone E2 is described as "sparsely populated rural areas" and zone E3 is described as "well inhabited rural and urban settlements". Choice of lighting zone requires some professional judgment and further information such as population density.

[1] *CIE 15:2017 is the most recent version of the standard. The values differ slightly from those used in the EIR in that they are stricter and are therefore used in my analysis.*

I agree, it makes sense to employ CIE:150 as the standard to use for this study, however, the standard was not fully employed. Mr. Benya conveniently ignored elements of CIE:150 (reference letters from Larry Scheibel and Marc Papineau). Larry Scheibel is a retired Civil Engineer with a long history working on projects in the State of California and Marc Papineau is a professional lighting consultant who is evaluating the technical aspects of this Revised Draft EIR on behalf of Coalition to Save San Marin.

15.116

Mr. Benya states, at the end of Appendix B, that " *The lighting for the SMHS Stadium meets and betters the applicable light impact standards set for lighting zone E2 as set by CIE:150-2017…*" How can this be known given that Mr. Benya did not study glare, sky glow and did an inadequate analysis of checking light spill? Mr. Benya offers his opinion that the Project meets the CIE:150-2017 standard, however, the Board of Trustees and Public are not informed by any substantial evidence he provides in those areas. His claims require further study and recirculation of the EIR for a new round of public comments.

Light Trespass (EIR AS-3)

Light trespass occurs when lighting systems illuminating one site (the sports field) also illuminate adjacent sites, such as neighboring private property. The metric used by CIE:150 is to restrict measured illuminance in the vertical plane at the property boundary at 5' above grade. The allowed maximum is 10 lux[2] in zone E3 and 5 lux in zone E2, which are by convention the same as 1 footcandle in zone E3 and 0.5 footcandle in zone E2. For my work, I use a field meter calibrated in lux and used that to evaluate the lighting.

Mr. Benya simply did not study illumination above a 5' grade; this conveniently ignores significant light trespass and glare impacts on my residence by Upward Facing Lights and, perhaps, Egress Lights as evidenced by photographs (above) and personal observations referenced above. I am not aware of any standard that permits Mr. Benya to arbitrarily limit what should be studied, or not studied; all potential light impacts should be studied so the Trustees and Public can make informed decisions about the project.

15.117

Light trespass and glare have heretofore been analyzed with respect to the project site and directly adjacent neighbors given the assumption that neighbors closest to the project will be the ones most impacted and that the Upward Facing Lights would only be lighted for very brief periods.

The project has never studied impacts from egress lighting and from Upward Facing Lighting which are magnified because those lights face up, not down like the field lights. Hence, limiting the measurement of trespass and glare to 5 feet at the vertical plane can't comply with CEQA which requires the study of significant impacts; CEQA doesn't specify which standard(s) shall be used to create the studies but demands that the decisions made are relevant to possible impacts and that they be based on substantial evidence.

The impact of the egress lights is significantly increased compared to the Draft and Final EIR studies because the poles are significantly shorter than described; therefore any analysis needs to be revisited. Because those lights and poles exist; I suggest light analysis of both Upward Facing Lights and egress lights be measured against actual impacts measured in both the immediate area and surrounding areas.

15.118

One area not analyzed are the impacts to Senior Hill (the hill to the north of the football field where High School Seniors used to mark their graduation year on the hill). Arguably, and according to night time data on lighting

15.119

[2] *Lux is the metric measurement of light levels. It is equal to lumens per square meter whereas foot-candles is equal to lumens per square foot. Technically, 1 foot-candle is equal to 10.76 lux, but for general convenience, the ratio is simplified to 10 lux=1 footcandle.*

interference, this area should be considered as CIE Zone E1. [Reference the Bortle Maps elsewhere in this document that show that undeveloped open space areas adjacent to the Project Site are very dark at night and have no artificial light sources.] Light impacts to Senior Hill and residences, like mine, which are significantly elevated from the football fields have not been considered. It is likely that that wildlife in the vicinity will be impacted by illumination on 152 nights per year during 8 months, including (approximately 63% of the total nights) during winter months, which are normally darker months.

Glare (EIR AS-4)

Glare is a sensation based on a combination of light source luminance, the luminance of the background, the size of the light source, the area of the background, the position of the light source in the field of view, the spectrum of the light source, and other factors. It can also be affected by the viewer's unique sensitivities, physiology, correction (glasses), age, and especially, the viewer's adaptation. Being this complex, there is no such thing as a “glare” meter. It is essentially impossible to measure glare except under laboratory conditions and, even then, because the perception of glare is so subjective, no practical standard exists to characterize field measurements.

Mr. Benya states: "*Being this complex, there is no such thing as a “glare” meter. It is essentially impossible to measure glare except under laboratory conditions…*" There is, however, a simple method to measure glare that doesn't require complex instrumentation: look at it from various perspectives, especially perspectives defined by how the lights are aimed. Mr. Benya omitted measuring glare to the Northwest of the project site, yet the Upward Facing Lights are aimed to the Northwest. A camera is another simple device to measure glare (except that auto focusing and auto exposure circuits within electronic cameras may reduce the visual nature of glare). Some aspects of glare, such as the degree that glare may cause discomfort are subjective, however, in simple terms, can the glare be defined against known references? I think so. How does the glare from the Upward Facing Lights compare to looking at an automobile's headlamps? I tried this experiment and concluded the disruptive glare from the Upward Facing Lights (with possible contributions from the Egress Lights and/or Field reflections) are worse qualitatively than that from automobile headlamps. 15.120

Mr. Benya's protestation that it is "*impossible to measure glare*" reminds me of a true story from our NASA space program. NASA spent millions developing a pen (the common writing instrument we all use) that could be used in zero gravity; a great accomplishment. The Russians used a pencil on their missions, a simpler method that worked perfectly in zero gravity. Actually looking at the glare and commenting on relative glare is a much better option than giving up and more meaningful than complex calculations that result in metrics given in lux or candelas that are not understandable in the context of what a normal person can understand. The only data available to measure glare to the Northwest comes from my observations, pictures and those of my neighbors; the EIR is silent on these measurements as Mr. Benya concluded it was "*impossible.*"

In CIE:150, the intensity (candlepower) of a light source is used as a surrogate measurement of glare. The EIR established a maximum off-site intensity taken from CIE:150 of 10,000 candela (cd) aimed in the direction(s) of the viewer. Sports luminaires focus most of their light onto the sports field and excessive off-site glare is usually the result of a luminaire that is mis-aimed towards the property line.

My photographs prove the Upward Facing Lights on the southern portion of the field are aimed at my home and at my neighbor's homes. Considering glare solely at 5 feet at the vertical plane conveniently omits catching 15.121

that impact in Mr. Benya's analysis.

There is currently not a practical field instrument capable of measuring candlepower at a distance. However, using the distance squared law, it is practical to use same measurements made for light trespass to identify glare problems. I determined that perpendicular plane illuminance at the property line of 5 lux would indicate a possible glare problem requiring additional study.

Were these calculations performed and do they consider glare from Upward Facing Lights and Egress lights at my residence? Do the numbers make sense. I recall in engineering school my professors warning us that numbers that don't make sense should not be relied upon. I know glare is a problem because I observed the problem first hand. My observations only prove the numbers are the wrong metric if they do not agree with my observations (and the observations of a reasonable person). 15.122

The 10,000 candela number referenced above comes from the Final EIR AES-4 which references a CIE Zone E3 project as its justification for using the 10,000 candela number. Is the 10,000 candela number the right number to use for a CIE Zone E2 project? Why doesn't this Revised Draft EIR justify the basis by which it chose the 10,000 candela number? What standard was relied upon? As given, we know the CIE Zone status was changed by the Court and that the 10,000 candela number came out of AES-4 in the Final EIR; the project description was changed by the Court and there is no audit trail of significant evidence to inform the public or the Trustees. It therefore is the opinion of Mr. Benya that 10,000 candelas is the correct number for CIE Zone E2. 15.123

The assumption that the lights focused on the field (sports luminary lighting referenced above) is the sole concern is incorrect. The downward facing lights, lighted from poles that are as tall as 94 ft (not 80 ft as is reported in this EIR), can be aimed to limit light trespass and glare. Egress lights, especially when egress lighting poles were shortened, force those lights to be aimed more horizontally causing more trespass and glare. This project change was never analyzed, never disclosed to the public or the Board of Trustees. The Upward Facing Lights have never been studied for sky glow effects (especially in the wet months when mist is expected to be in the air). The use of the Upward Facing Lights was changed significantly when 'clarified' in the Final EIR, yet there has never been any study of the Upward Facing Light's impact on neighboring residents. Given, that the lights are now built: the impacts of the Downward facing Field Lights (8 poles), Upward Facing Lights and egress lights should be measured for what impacts they actually have. The District should coordinate its analysis with lighting experts from the Coalition to Save San Marin (plaintiff in the recent CEQA case) to make sure the District doesn't inadvertently skip important analysis. 15.124

Appropriate Amount of Light on the Field

Although not addressed in the EIR, it is reasonable to question whether the amount of lighting is appropriate and whether reduced lighting could be an additional potential mitigation measure. The reference standard for North America is IES Recommended Practice RP-6-15, Sports and Recreational Area Lighting ("RP-6"). For football stadiums of up to 2,000 spectators, RP-6 recommends 300 lux (30 footcandles) of average illumination and for stadiums up to 5,000 spectators, it recommends 500 lux (50 footcandles).

The vast number of lighted uses will have very small crowd sizes (practices, soccer games and most football games). Championship games and arch rival games (i.e. Novato High) can be expected to have better attendance. A digital (or analog) controller should be able to control the intensity so the Project can minimize impacts and meet IES RP-6-15 on those few instances when crowd sizes suggest a higher level of illumination are appropriate. This EIR fails to study lower light solutions except to discount them. I am an electrical engineer 15.125

and believe the solution I suggest here to be relatively inexpensive and practical.

Field Measurements

General

Prior to proceeding with measurements, I surveyed the perimeter of the entire site. Residential properties to the northwest and west were unaffected by the sports lighting largely because the baseball field and tree line provided an excellent buffer, and the school and topography mitigates stray light in the southwest and south directions. My measurements were made using a Minolta T-1 field illuminance meter that was laboratory calibrated in October 2017. The meter was mounted in the vertical plane to a tripod set at 5'-0" (1.5 meters) above grade.

Mr. Benya's statement that: *"Residential properties to the northwest and west were unaffected by the sports lighting largely because the baseball field and tree line provided an excellent buffer" is factually inaccurate.*

Below is a photograph taken of the lights on the evening of May 6, 2019. Is this what Mr. Benya means when he says '*unaffected'?*

15.126

And here is the affect on my residence on May 6, 2019:

Mr. Benya's contention that residences, like mine, to the Northwest of the project site are '*unaffected*' by the project's glare and light trespass is false and misleading.

My residence is significantly higher than 5'above grade; it is located to the Northwest of the San Marin Football field. The glare and illumination noted during the May 6, 2019 test were significant (see photos above and further discussion below). This proves Mr. Benya's assumptions about areas "*unaffected by the sports lighting*" are incorrect. I suspect two items explain Mr. Benya's error:

1) Mr. Benya evaluated the impacts from the 'sports' lighting and ignored impacts from Upward Facing Lights and egress lights. Why? Because he didn't identify these as Issues (noted at the top of Appendix B).

2) It appears Mr. Benya mistakenly felt his job was to re-evaluate the Final EIR, the one deemed inadequate by the Court, rather than do a photometric study of the 'as built' project including Upward Facing and Egress lighting.

The photo shown below, taken on May 6, 2019 during testing of the San Marin Lights Project, shows illumination of a San Marin Residence by the Upward Facing Lights, Egress Lights and possibly from field reflections. No flash was used.

This Revised EIR, including Appendix B, did not measure glare or light trespass to the Northwest of the Project site and did not study the impacts from Upward Facing Lights and Egress Lights. This home is to the northwest of the Project site.

According to Appendix G of the State of California's CEQA guidelines, the critical question is: "*Would the Project create a new source of substantial light or glare which would adversely affect day or nighttime views in the*

area?" The answer is clearly "yes."

Light Trespass Measurements

From my review of site plans and discussions with NUSD officials, I determined that the necessary lighting measurements would be made along two lines, one reasonably parallel to the northeast property line, and one southeast of the stadium along the west side of the San Marin Drive median. Each would represent a worst case for the most affected residential properties. The northeast property line was the more difficult, being 15' to 20' higher at the property line than field level and uneven ground. The southeast measurements were on more-or-less flat land at or near the field level. In both cases, locations were chosen where the land was sufficiently flat for the tripod to be level and measurements not affected by trees or overhanging branches. The measurement points and readings are presented in the following Google Earth photograph and Table A. All measurements were less than 5 lux, and therefore the installed lighting complies with the maximum light trespass limits for both Lighting Zones E2 (5 lux) and E3 (10 lux).

The light trespass limits referenced above are for times before curfew; the permitted number of lux for CIE Zone E2 after curfew is .5 lux (500 cd) and 1 lux (1000 cd) for CEI Zone E3. Curfew is defined in the Final EIR and this Revised Draft EIR as beginning at 10PM, however, it is feasible that a football game might end later than 10PM if an injury or late team arrival causes game delays; what is the plan to mitigate glare when the more strict 1 lux restriction is the appropriate glare standard? The CIE standard is not the definitive arbiter if disruptive glare is created by the Project; looking at the actual glare caused by the Project (since it was constructed before it was approved at the risk of the District) is a simple method to determine if impacts are severe (they are according to my observations) and require additional mitigation.

15.127

Maximum Values for Luminous Intensity (CIE, 2003)

Maximum Luminous Intensity	**Environmental Zones (cd - candelas)**			
Light Technical Parameter	**E1**	**E2**	**E3**	**E4**
Pre-Curfew Luminous Intensity	2,500	**7,500**	10,000	25,000
Post-Curfew Luminous Intensity	0	**500**	1,000	2,500

Source:
https://www.researchgate.net/publication/264885906_COMPARISON_BETWEEN_THE_CIE_AND_LITG_METHOD_FOR_MINIMIZING_OBTRUSIVE_GLARE_CAUSED_BY_BRIGHT_LUMINAIRES_IN_THE_FIELD

Mr. Benya admits when he said he took his measurements [underlines added] *"one reasonably parallel to the northeast property line, and one southeast of the stadium along the west side of the San Marin Drive median*" that he did not take trespass measurements to the Northwest; this area (to the Northwest, is the one), which experiences the worst glare and light trespass from Upward Facing Lights. Mr. Benya asserts his measurements would capture "*the worst*" impacts; the above photographs of a residence lit up by Upward Facing Lights to the Northwest of the Project site prove Mr. Benya's assertions false and confirm (by his own admissions that) Mr. Benya never studied all areas surrounding the Project site for glare and trespass impacts.

15.128

Light measurements were made to the northeast of the project area and to the southeast of the project site (along the west side of the San Marin Drive median). The Revised Draft EIR failed to measure light impacts from Upward Facing Lights and egress lights at my residence which is to the Northwest of the project site.

Image below and photographs elsewhere in this EIR response letter prove there are significant impacts to the Northwest of the project, yet, in Appendix B, the consultant admits measurements were never performed to the Northwest of the project. This is clearly a violation of CEQA.

Image from Google Maps (satellite view) shows the location of my residence compared to the San Marin Football Field. North is along the vertical axis of the image; my home is to the Northwest of the San Marin Football Field.

There were significant impacts observed from the lights project during the May 6, 2019 lights test. This comment is based on personal observations and photographs taken during that test. CEQA requires a detailed response, something significantly more than noting my opinion (as was the practice in the Final EIR).

15.129

Mr. Benya states at the end of Appendix B that the lighting system meets or betters the applicable light impact standards set by CIE:150-2017, even though he never checked glare and sky glow and did not correctly measure light spill (refer also to Marc Papineau and Larry Scheibel letters).

Glare Measurements

Since all my light trespass measurements were less than 3 lux, based on the distance squared law referenced above, I determined that there was no reasonable chance that glare at the property line met or exceeded the maximum threshold of 10,000 cd according to CIE:150.

It has not been established that the 10,000 candela standard is the correct standard for a CIE Zone E2 project. The 10,000 cd number was derived from section AES-4 in the Final EIR, which assumed this was a CIE Zone E3 project. Therefore the above analysis is flawed as it is based on opinion and lacks substantial evidence.

15.130

The Final EIR stated: *Impact AES-4 The proposed stadium lights would be visible from nearby residences and could generate light intensity in excess of the CIE's international standards for the E3 lighting zone at residential property lines facing the stadium. Impacts from glare would be potentially significant, but mitigable.*

15.131

AES-4 is an admission that light intensity and glare would be a problem even when the project was considered to be in CIE Zone E3; the fact that the project is actually in CIE Zone E2 means the impacts referenced in AES-4 are a greater concern. Where are the mitigations referenced in AES-4? Answer: they don't exist and therefore the project and the EIRs, including this Revised Draft EIR do not comply with CEQA.

Sports Field Illumination

The SMHS stadium has a bleacher capacity of 2,400 persons with standing room around the field for an additional approximately 1,600 persons. The photometric calculations supplied by the lighting system manufacturer indicated that the lighting was designed to provide 400 lux (40 footcandles) average on the field for football or soccer. To confirm the outcome, I did not take a full set of readings of the sports field lighting, but I took a center-of-the-field measurement of 441 lux (41 footcandles), horizontal at grade. For the lighting on the field, in my opinion the lighting system performs essentially as calculated and the amount of light is consistent with RP-6.

The highlighted text above confirms*: " I did not take a full set of readings of the sports field lighting, but I took a center-of-the-field measurement of 441 lux (41 footcandles), horizontal at grade*." How can we apply CIE:150-2017 to the entire project if the measurements are limited to the center of the football field? The Upward Facing Lights are pointed above the center of the football field and those LED fixtures are mounted 20 feet above the vertical plane. Their impacts were never measured and therefor each and every conclusion Mr. Benya makes about the project and its compliance with CIE:150-2017, glare impacts to the Northwest and light spill to the Northwest of the Project Site are opinions not based on substantial evidence. Table A confirms no measurements were taken to the Northwest of the Project Site.

15.132


1
2
3
5
6
9
Sign in
Alder Pl
Spruce Pl
Cottonwood Pl
Aspen Dr
San Marin Dr
Cottonwood Pl
San Marin Dr
San Marin Dr
San Felipe Way
3D
Google
Imagery ©2019 Google, Map data ©2019 Google United States Terms Send feedback 100 ft

TABLE A - VERTICAL PLANE MEASUREMENTS AT 5' ABOVE ADJACENT GRADE ALONG AXIS TO FIELD CENTERLINE

Approximate distance including elevation 125' to nearest light pole

Point	Location Note	E_v, Lux	Criterion, Lux (1 foot-candle = 10.76 lux) E3 and E2	Comment
NORTHEAST PROPERTY LINE				
1	About 5' from fence	2.36	E3 =10 E2 = 5	Resident was taking photos from property line
2	About 8' from fence/bush	2.17		
3	About 10' from fence/tree and bush	2.10		
4	About 15' from fence/bushes	2.63		Lost pen due to terrain
5	About 20' from fence/bushes	2.34		
6	About 20' from fence/flat, open	2.44		
7	About 20' from fence/flat, open	2.29		
8	About 20' from fence/flat, open	2.75		
9	About 10' from fence sloping toward house	1.62		
SOUTHEAST PROPERTY LINE				
11	At curb facing stadium	0.54	E3 =10 E2 = 5	
12	At curb facing stadium	1.10		
13	At curb facing stadium	1.19		
14	At curb facing stadium	1.69		
15	At curb facing stadium	1.63		
16	At curb facing stadium	0.85		

To confirm light levels on the field, I took one sample measurement of light levels on the field at midfield and the reading was 441 lux (41 footcandles), effectively the same as predicted by the manufacturer.

Summary of Measurements and Observations

AES-3 (Light Trespass) Compliance

The installed lighting meets the more restrictive E2 limits as well as the limits for E3 used by the EIR. No single measurement exceeded 3 lux, with the maximum allowable under E2 being 5 lux.

Why does Mr. Benya continue to discuss this project as if it was a CIE Zone E3 project?

Perhaps this indicates that the CIE lighting standard isn't an adequate yardstick to evacuate light impacts. In a light study conducted in Los Angeles, CA that is available online at: https://planning.lacity.org/eir/AcademyMuse_MotionPictures/DEIR/DEIR/4.A.2_Light_and_Glare.pdf

The authors claim lux readings taken along Wilshire Blvd in an "Urban" setting (according to that light study) were all less than 5 Lux. The goal of this San Marin Light's Project should not be to recreate light interference conditions along Wilshire Blvd in Los Angeles; rather, the light impacts should meet the criteria established by CEQA and more specifically be designed to satisfy the screening question in CEQA Appendix G guidelines: ""*Would the Project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?*" Clearly, whether at .5 lux (for CIE Zone E2 post curfew), 1 lux (for CIE Zone E3 post curfew), 7.5 lux (CIE Zone E2 pre-curfew) or 50 lux, this project, as currently designed and constructed creates new sources of substantial light and glare with deleteriously affects nighttime (and daytime to a lesser extent) views. This Revised Draft EIR focuses on engineering metrics as a substitute for evaluating the actual impacts which can be easily ascertained by actually looking at the glare from the areas surrounding the Project Site and with photographs. 15.133

AES-4 from the Final EIR acknowledges that "…i*mpacts from glare would be potentially significant, but mitigable.*" The application of the 10,000 cd standard from AES-4 is flawed since AES-4 was written when the project was considered to be a CIE Zone E3 project and the project is a CEI Zone E2 project per a Marin Superior Court ruling. 15.134

Refer to a discussion above relative to the difference between determining the correct number of candelas for CIE:150-2017 vs CIE:150-2013. For simplicity, I will omit the CIE:150-2017 language but repeat the simple chart that applies for CIE:150-2013 that clearly proves my assertion that 10,000 cd is incorrectly applied to a CIE Zone E2 project. I expect the correct number of cd to be defined by the standard embraced by Mr. Benya (CIE:150-2017) to be approximately equal to the CIE:150-2003 figures of 7,500 candela during the day and 500 candelas after the 10PM curfew. 15.135

Maximum Values for Luminous Intensity (CIE, 2003)

Maximum Luminous Intensity	**Environmental Zones (cd - candelas)**			
Light Technical Parameter	**E1**	**E2**	**E3**	**E4**
Pre-Curfew Luminous Intensity	2,500	**7,500**	10,000	25,000
Post-Curfew Luminous Intensity	0	**500**	1,000	2,500

Source:

https://www.researchgate.net/publication/264885906_COMPARISON_BETWEEN_THE_CIE_AND_LITG_METHOD_FOR_MINIMIZING_OBTRUSIVE_GLARE_CAUSED_BY_BRIGHT_LUMINAIRES_IN_THE_FIELD

AES-4 Compliance

The installed lighting does not create substantial glare impinging on off-site viewers that reaches or exceeds the maximum candlepower of 10,000 cd per CIE:150.

Nothing in this Revised Draft EIR or the Final EIR establishes the correct cd value for a CIE Zone E2 project. Section AES-4 from the Final EIR does assert 10,000 cd as the correct number for a CIE Zone E3 project. As stated above, these are opinions of Mr. Benya and are not backed up with substantial evidence as required under CEQA. 15.136

Notes About Photometric Analyses developed by Manufacturer (Musco)

Photometrics supplied by the manufacturer are predictions of light levels produced by the sports lighting system exclusively. Once installed, the actual performance of the lighting is what matters and is the subject of this report. The Manufacturer's photometrics, attached as an appendix, differ slighting from reality and this is not unusual as the field readings can also include light from buildings, streetlights, and other local and stray light sources. I feel there is no significance in the differences between measurements and predictions since the installed lighting complies with the strict requirements of the E2 lighting zone.

The above paragraph contains an admission that the photometric study only considers the sports lighting system *exclusively.* I discussed (above) the implications of using the word "*exclusively*" when referencing the Photometric Study (Appendix C) . Here, we are reminded of this Revised Draft EIR's failings. What about the impacts from the Upward Facing Lights and egress lighting? What about reflections from the Football Field? Impacts from these lighting systems don't appear to have been studied. The actual performance, not the engineering numbers, but the actual impacts of the lights (all of the lights in the lights project) are important. Views, glare and trespass all need to be evaluated from every direction, not just the Northeast and Southeast as is the case for this Revised Draft EIR. Additionally, glare and light trespass need to be measured above the arbitrary 5 foot vertical plane selected by Mr. Benya, as the Upward Facing Lights are aimed up and are mounted at approximately 20 feet on the vertical plane; the Egress Lights are mounted on poles that are 'up to' 30 feet tall (but are likely only 18 feet tall) and are designed to light a larger horizontal area (they aren't aimed downwards like the Sports Lighting Poles). 15.137

Notes About Sky Glow

Anthropogenic sky glow is caused by all outdoor lighting, including streetlights, retail centers, car dealerships, and other commonly occurring outdoor lighting. In communities near the California coast, there are two types of sky glow: that caused by low clouds (the “marine layer”) and that caused by uplight on clear nights (clear sky glow). The former is localized and on a cloudy night the stray uplight from a town or small city can cause a distinctive glow above it. The latter is the accumulation of the upward light from the entire Bay Area metropolitan area and is affected by all the lighting within a radius of 100 miles or more from the viewer's location.

Sky glow seemed significant to me during the evening of the May 6, 2019 lights test as evidenced by this iPhone photograph.

15.138

Low cloud sky glow varies considerably depending on the time of year, the altitude of the clouds, the cloud density and reflectivity, temperature and other factors. The primary causes tend to be downtown districts, regional malls, auto malls, and major freeway commercial corridors. Glow is caused by all the upward light from all the community, and not from just one neighborhood or cause. Based on my experience, marine layer sky glow levels throughout other areas of California having similar proximity to the ocean and population density measure between 0.010 and 0.020 footcandles. A marine layer was present on the night of measurements. There was no distinctive relationship of the sky glow to the stadium - the sky glow persisted over a much larger area, and I was able to measure 0.016 footcandles of sky glow illumination in an area near SMHS that the stadium lights could not directly illuminate. In my opinion the contribution of the stadium lighting to the sky glow I observed did not significantly increase the sky glow compared to the community's contribution without the stadium lighting.

Clear sky glow is measured using the Bortle Scale, a system of ranking the light pollution caused by communities throughout the world as well as identifying “dark sky” areas with little or no sky glow. The entirety of Marin County is Bortle Class 5, which means a moderate amount of anthropogenic sky glow. The stadium lighting creates far too little uplight to affect the clear sky glow of Marin County.

The purpose of this EIR should not be to evaluate how this project contributes to the overall sky glow

15.139

effect in all of Marin County (or even all of Novato). Instead, we should be concerned about sky glow impacts at the project site and in the immediate vicinity (and not just to the Northeast and Southeast). The above photograph proves the sky glow effects from the project are significant. Because no sky glow testing or analysis was performed considering prevailing conditions in the wet months, and because this EIR's analysis seems to (mistakenly) evaluate sky glow effects on the entire County of Marin, it is safe to conclude that a meaningful sky glow analysis was not performed as part of this Revised Draft EIR. CEQA requires a meaningful sky glow analysis and there is none.

Conclusion

The lighting for the SMHS Stadium meets and betters the applicable light impact standards set for lighting zone E2 as set by CIE:150-2017, which in my professional opinion demonstrates that the impact of the sports lighting is less than significant as claimed by NUSD and their consultants.

Mr. Benya cannot know if the lighting system meets CIE:150-2017 because a complete analysis has not been performed of all of the metrics contained in CIE:150-2017. Additionally, Mr. Benya concedes he measured light intensity at the center of the field and from some locations (Table A in Appendix B) to the Southeast and Northeast of the Project Site, but suspiciously, not to the Northwest where he discounts possible impacts. Measuring impacts on a 5 foot vertical plane is not helpful since the Upward Facing Lights are located higher than five feet on the vertical plan and are pointed upwards. Egress lights are on approximately 18 foot poles (not 30 foot poles if my information is correct - although this information is NOT provided in the photometric study) which means they are aimed more horizontally to illuminate the same area as was expected in the Final EIR; this project change (relative to the Egress lights) is potentially significant, but has never been studied and exact pole heights of the egress lights has not been disclosed. The Trustees and Public do not have sufficient information in this Revised Draft EIR to make an informed decision about the project. 15.140

Sincerely

Kenneth Levin

Submitted June 15, 2019

James R Benya, PE, FIES, FIALD
Jbenya@benyaburnett.com
+1 (503) 519-9631


REGISTERED PROFESSIONAL ENGINEER
JAMES R. BENYA
No. 12078
Exp 12-31-19
ELECTRICAL
STATE OF CALIFORNIA

Appendix: Musco Calculations *[these are contained in Appendix C to the EIR]*

Appendix C

Photometric Studies

San Marin High School Football

Novato,CA

Lighting System

Pole / Fixture Summary

Pole ID	Pole Height	Mtg Height	Fixture Qty	Luminaire Type	Load	Circuit
F1	90'	90'	5	TLC-LED-1150	5.75 kW	A
F2	80'	14'	2	TLC-BT-575	1.15 kW	A
		80'	4	TLC-LED-1150	4.60 kW	A
		52'	1	TLC-LED-600	0.58 kW	B
F3	80'	12'	2	TLC-BT-575	1.15 kW	A
		80'	4	TLC-LED-1150	4.60 kW	A
		47'	1	TLC-LED-600	0.58 kW	B
F4	80'	80'	6	TLC-LED-1150	6.90 kW	A
F5	90'	90'	6	TLC-LED-1150	6.90 kW	A
		64'	1	TLC-LED-600	0.58 kW	B
F6	90'	34'	2	TLC-BT-575	1.15 kW	A
		90'	4	TLC-LED-1150	4.60 kW	A
F7	90'	36'	2	TLC-BT-575	1.15 kW	A
		90'	4	TLC-LED-1150	4.60 kW	A
F8	90'	90'	5	TLC-LED-1150	5.75 kW	A
		64'	1	TLC-LED-600	0.58 kW	B
8			***50***		***50.62 kW***	

Circuit Summary

Circuit	Description	Load	Fixture Qty
A	Field Lights	48.3 kW	46
B	Bleacher	2.32 kW	4

Fixture Type Summary

Type	Source	Wattage	Lumens	L90	L80	L70	Quantity
TLC-BT-575	LED 5700K - 75 CRI	575W	52,000	>63,500	>63,500	>63,500	8
TLC-LED-1150	LED 5700K - 75 CRI	1150W	121,000	>63,500	>63,500	>63,500	38
TLC-LED-600	LED 5700K - 75 CRI	580W	65,600	>63,500	>63,500	>63,500	4

Light Level Summary

Calculation Grid Summary

Grid Name	Calculation Metric	Illumination					Circuits	Fixture Qty
		Ave	Min	Max	Max/Min	Ave/Min		
East Res Prop Line	Horizontal	0	0	0	0.00		A,B	50
East Res Prop Line	Max Candela (by Fixture)	17.9	0	204	0.00		A,B	50
East Res Prop Line	Max Vertical Illuminance Metric	0	0	0	0.00		A,B	50
Football	Horizontal Illuminance	40.7	33.2	47.3	1.43	1.22	A	46
Home Bleachers - Egress	Horizontal	11.5	2.90	23.9	8.25	3.96	B	4
Home Bleachers	Horizontal	12	2.60	22.4	8.47	4.63	A	46
Home Safe Dispersal Area	Horizontal	12.2	1.49	28	18.76	8.14	B	4
North Res Prop Line	Horizontal	0	0	0	0.00		A,B	50
North Res Prop Line	Max Candela (by Fixture)	61.2	0	266	0.00		A,B	50
North Res Prop Line	Max Vertical Illuminance Metric	0	0	0.01	0.00		A,B	50
Soccer	Horizontal Illuminance	40.2	32.2	47.9	1.49	1.25	A	46
Track	Horizontal Illuminance	18.4	1.90	38	20.28	9.69	A	46
Visitor Bleachers - Egress	Horizontal	3.54	0.90	8.60	9.72	3.93	B	4
Visitor Bleachers	Horizontal	13.4	1.20	28.3	23.15	11.14	A	46
Visitor Safe Dispersal Area	Horizontal	6.91	1.20	11.1	9.41	5.76	B	4

From Hometown to Professional

PROJECT SUMMARY

San Marin High School Football

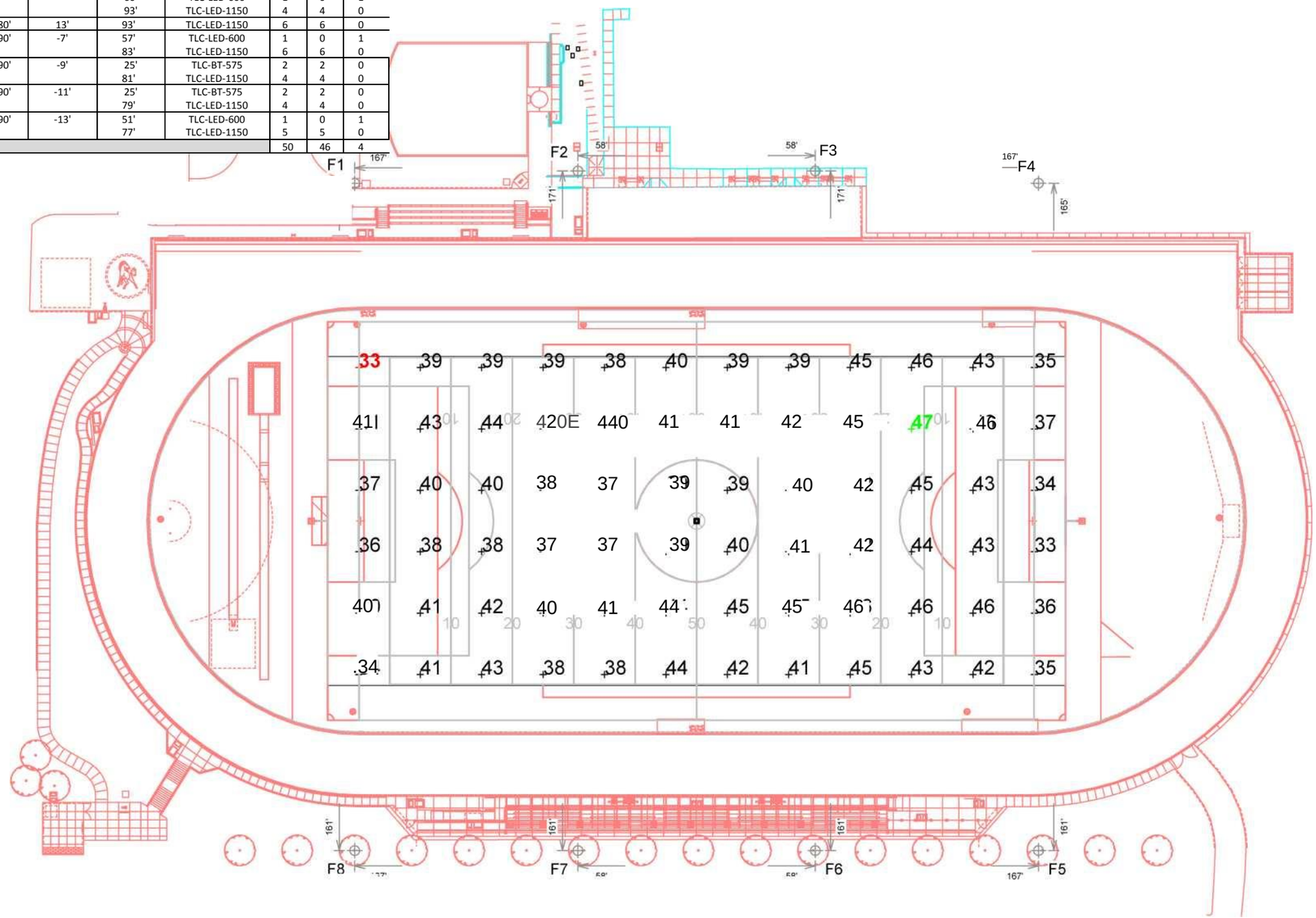
Novato,CA

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

PROJECT SUMMARY

EQUIPMENT LIST FOR AREAS SHOWN

		Pole			Luminaires			
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F1	90'	4'	94'	TLC-LED-1150	5	5	0
1	F2	80'	11'	25'	TLC-BT-575	2	2	0
				63'	TLC-LED-600	1	0	1
				91'	TLC-LED-1150	4	4	0
1	F3	80'	13'	25'	TLC-BT-575	2	2	0
				60'	TLC-LED-600	1	0	1
				93'	TLC-LED-1150	4	4	0
1	F4	80'	13'	93'	TLC-LED-1150	6	6	0
1	F5	90'	-7'	57'	TLC-LED-600	1	0	1
				83'	TLC-LED-1150	6	6	0
1	F6	90'	-9'	25'	TLC-BT-575	2	2	0
				81'	TLC-LED-1150	4	4	0
1	F7	90'	-11'	25'	TLC-BT-575	2	2	0
				79'	TLC-LED-1150	4	4	0
1	F8	90'	-13'	51'	TLC-LED-600	1	0	1
				77'	TLC-LED-1150	5	5	0
8						50	46	4



SCALE IN FEET 1 : 60

0' 60' 120'

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

Pole location(s) "F dimensions are relative to 0,0 reference point(s) 0

San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**Football**
Size:	360' x 160'
Spacing:	30.0' x 30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Guaranteed Average:	**40**
Scan Average:	40.66
Maximum:	47.3
Minimum:	33.2
Avg / Min:	1.23
Guaranteed Max / Min:	**2**
Max / Min:	1.43
UG (adjacent pts):	1.28
CU:	0.54
No. of Points:	72

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 121,000 lumens
No. of Luminaires:	**46**
Total Load:	48.3 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>63,500	>63,500	>63,500
TLC-LED-1150	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

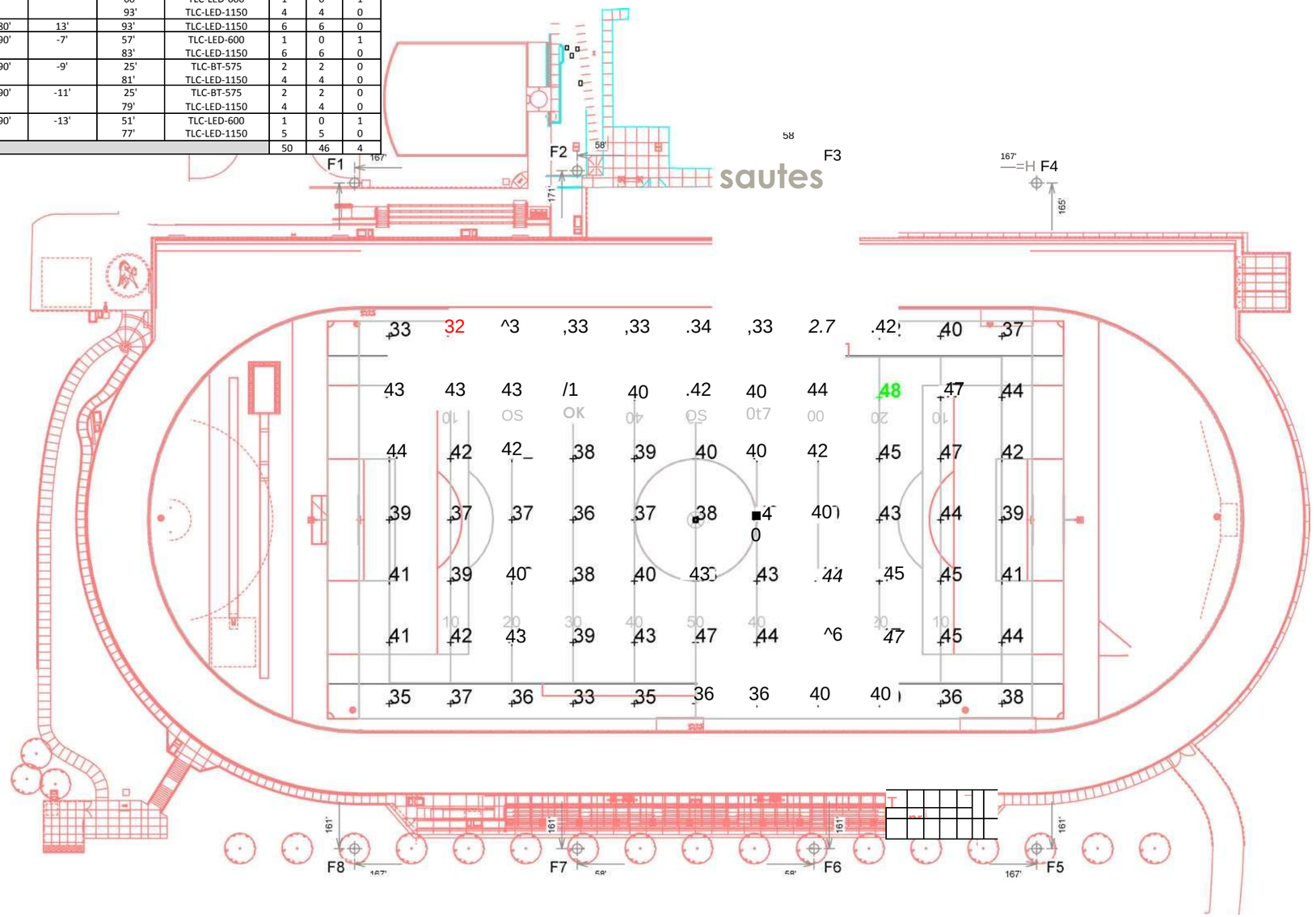
0000

mus We Make It Happen

ILLUMINATION SUMMARY

EQUIPMENT LIST FOR AREAS SHOWN

QTY	LOCATION	Pole SIZE	GRADE ELEVATION	MOUNTING HEIGHT	Luminaires LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F1	90'	4'	94'	TLC-LED-1150	5	5	0
1	F2	80'	11'	25'	TLC-BT-575	2	2	0
				63'	TLC-LED-600	1	0	1
				91'	TLC-LED-1150	4	4	0
1	F3	80'	13'	25'	TLC-BT-575	2	2	0
				60'	TLC-LED-600	1	0	1
				93'	TLC-LED-1150	4	4	0
1	F4	80'	13'	93'	TLC-LED-1150	6	6	0
1	F5	90'	-7'	57'	TLC-LED-600	1	0	1
				83'	TLC-LED-1150	6	6	0
1	F6	90'	-9'	25'	TLC-BT-575	2	2	0
				81'	TLC-LED-1150	4	4	0
1	F7	90'	-11'	25'	TLC-BT-575	2	2	0
				79'	TLC-LED-1150	4	4	0
1	F8	90'	-13'	51'	TLC-LED-600	1	0	1
				77'	TLC-LED-1150	5	5	0
8						50	46	4



SCALE IN FEET 1 : 60

0' 60' 120'

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

Pole location(s) "F dimensions are relative to 0,0 reference point(s) 0

San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**Soccer**
Size:	330' x 195'
Spacing:	30.0' x 30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Guaranteed Average:	**40**
Scan Average:	40.19
Maximum:	47.9
Minimum:	32.2
Avg / Min:	1.25
Guaranteed Max / Min:	**2**
Max / Min:	1.49
UG (adjacent pts):	1.35
CU:	0.57
No. of Points:	77

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 121,000 lumens
No. of Luminaires:	**46**
Total Load:	48.3 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>63,500	>63,500	>63,500
TLC-LED-1150	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

musco We Make It Happen

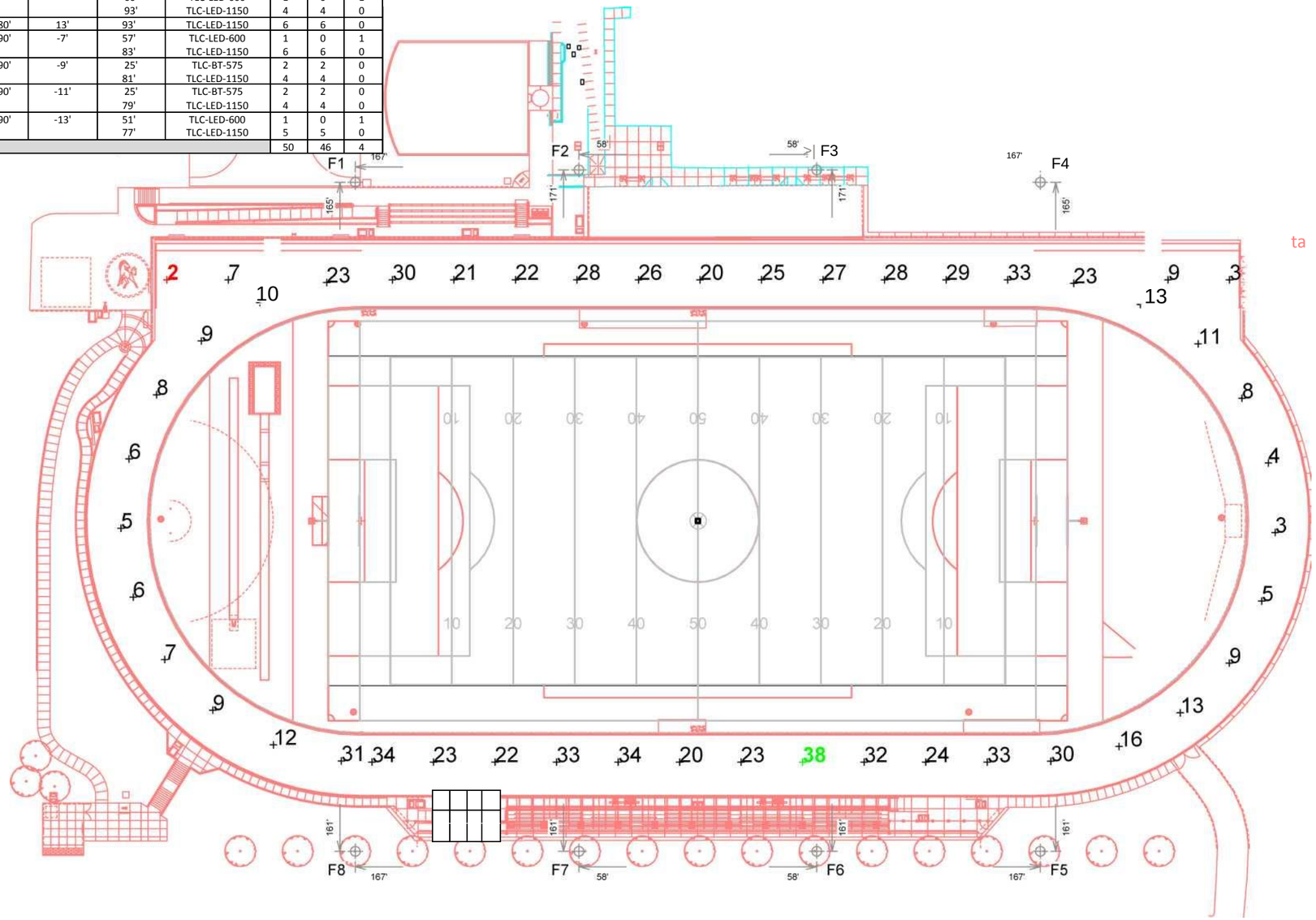
ILLUMINATION SUMMARY

San Marin High School Football

Novato,CA

EQUIPMENT LIST FOR AREAS SHOWN

QTY	LOCATION	Pole SIZE	GRADE ELEVATION	MOUNTING HEIGHT	Luminaires LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F1	90'	4'	94'	TLC-LED-1150	5	5	0
1	F2	80'	11'	25'	TLC-BT-575	2	2	0
				63'	TLC-LED-600	1	0	1
				91'	TLC-LED-1150	4	4	0
1	F3	80'	13'	25'	TLC-BT-575	2	2	0
				60'	TLC-LED-600	1	0	1
				93'	TLC-LED-1150	4	4	0
1	F4	80'	13'	93'	TLC-LED-1150	6	6	0
1	F5	90'	-7'	57'	TLC-LED-600	1	0	1
				83'	TLC-LED-1150	6	6	0
1	F6	90'	-9'	25'	TLC-BT-575	2	2	0
				81'	TLC-LED-1150	4	4	0
1	F7	90'	-11'	25'	TLC-BT-575	2	2	0
				79'	TLC-LED-1150	4	4	0
1	F8	90'	-13'	51'	TLC-LED-600	1	0	1
				77'	TLC-LED-1150	5	5	0
8						50	46	4



SCALE IN FEET 1 : 60

0' 60' 120'

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

GRID SUMMARY

Name:	**Track**
Spacing:	30.0' x 30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**18.41**
Maximum:	38.0
Minimum:	1.9
Avg / Min:	9.83
Max / Min:	**20.28**
UG (adjacent pts):	0.00
CU:	0.16
No. of Points:	48

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 121,000 lumens
No. of Luminaires:	**46**
Total Load:	48.3 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>63,500	>63,500	>63,500
TLC-LED-1150	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

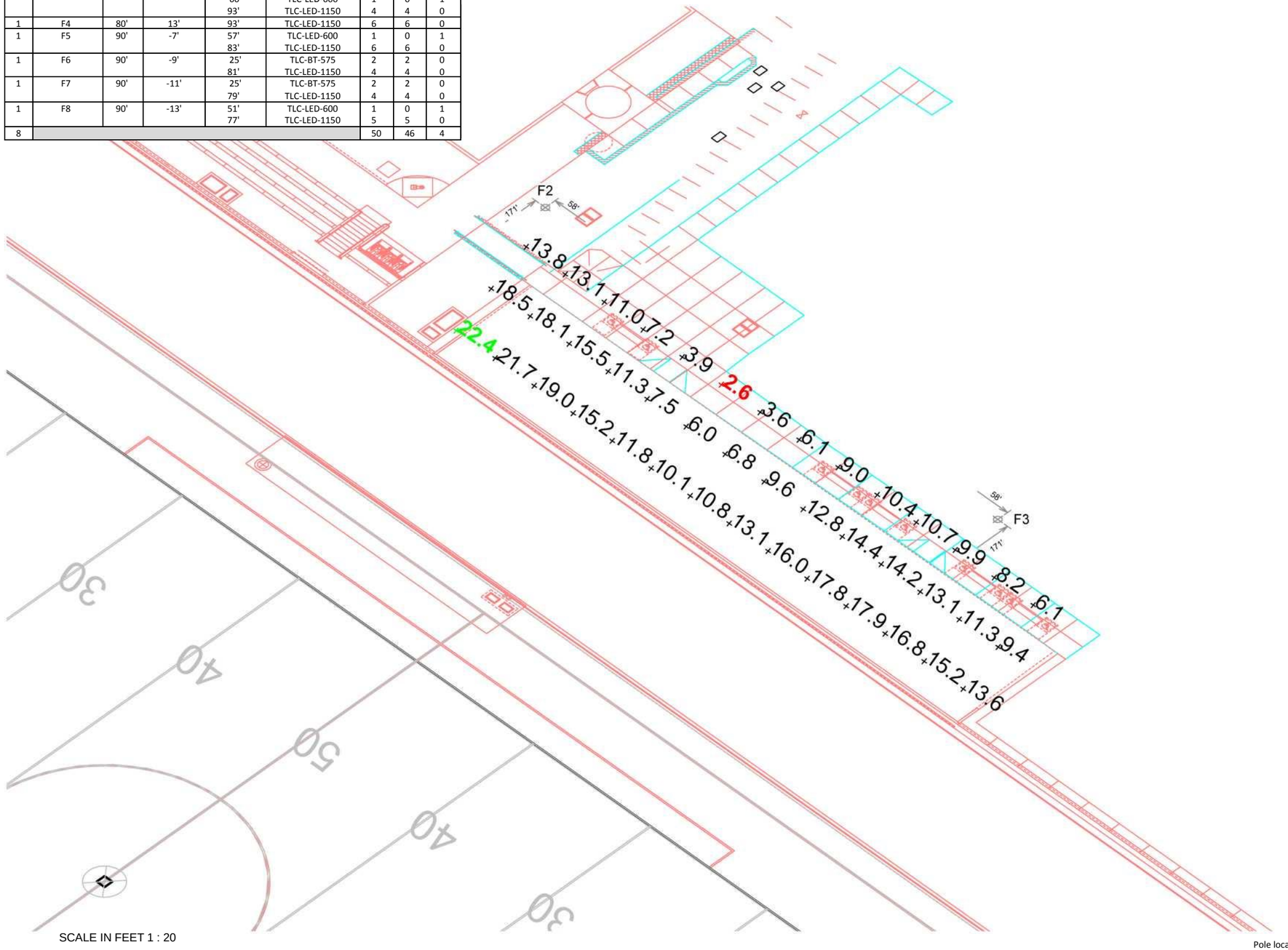
Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

Pole location(s) "F dimensions are relative to 0,0 reference point(s) 0

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F1	90'	4'	94'	TLC-LED-1150	5	5	0
1	F2	80'	11'	25'	TLC-BT-575	2	2	0
				63'	TLC-LED-600	1	0	1
				91'	TLC-LED-1150	4	4	0
1	F3	80'	13'	25'	TLC-BT-575	2	2	0
				60'	TLC-LED-600	1	0	1
				93'	TLC-LED-1150	4	4	0
1	F4	80'	13'	93'	TLC-LED-1150	6	6	0
1	F5	90'	-7'	57'	TLC-LED-600	1	0	1
				83'	TLC-LED-1150	6	6	0
1	F6	90'	-9'	25'	TLC-BT-575	2	2	0
				81'	TLC-LED-1150	4	4	0
1	F7	90'	-11'	25'	TLC-BT-575	2	2	0
				79'	TLC-LED-1150	4	4	0
1	F8	90'	-13'	51'	TLC-LED-600	1	0	1
				77'	TLC-LED-1150	5	5	0
8						50	46	4



Pole location(s) "F dimensions are relative to 0,0 reference point(s) 0

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**Home Bleachers**
Spacing:	10.0' x 10.0'

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**12.04**
Maximum:	22.4
Minimum:	2.6
Avg / Min:	4.56
Max / Min:	**8.47**
UG (adjacent pts):	2.26
CU:	0.01
No. of Points:	42

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 121,000 lumens
No. of Luminaires:	**46**
Total Load:	48.3 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>63,500	>63,500	>63,500
TLC-LED-1150	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

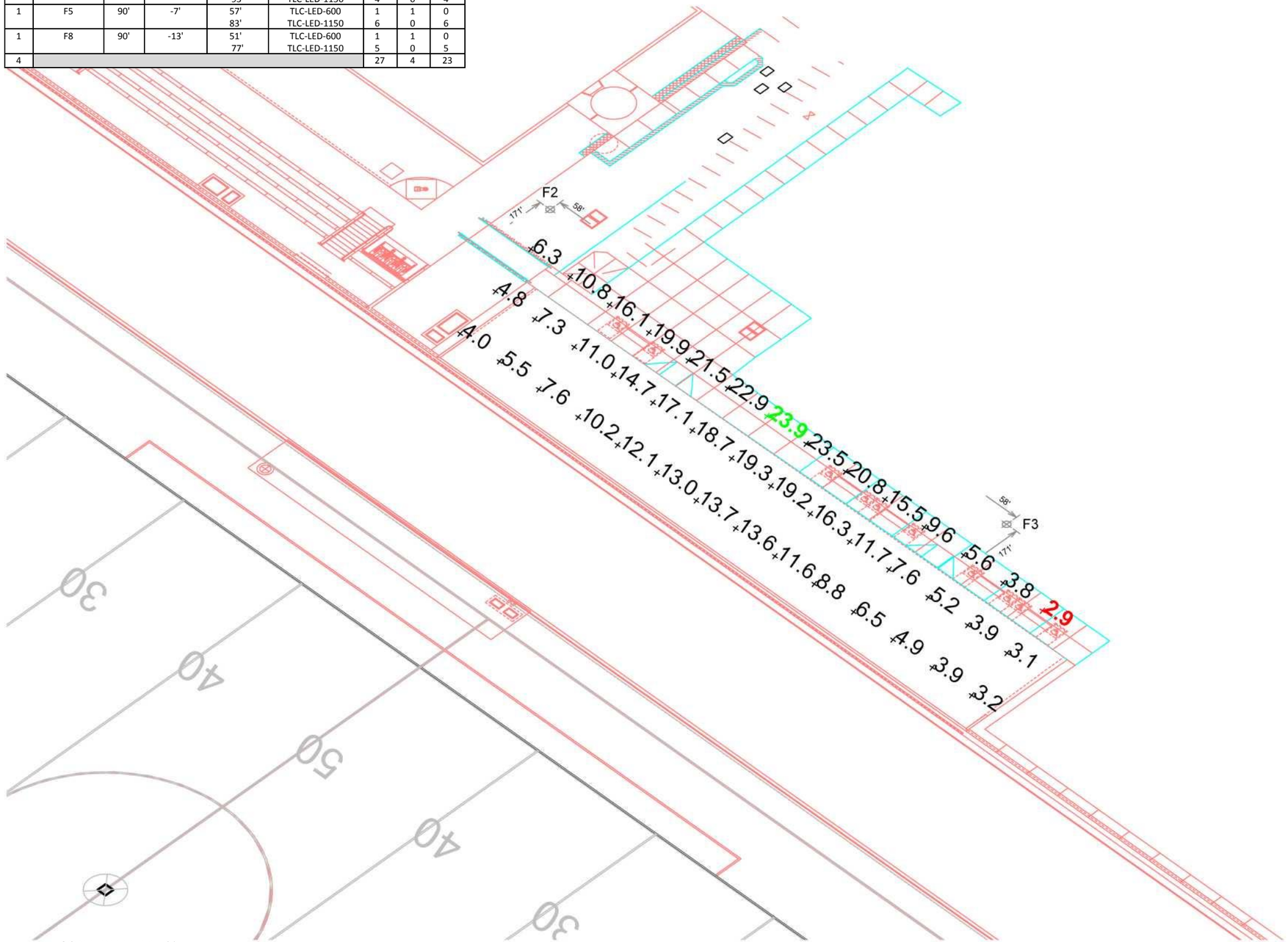
Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

musco We Make It Happen

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F2	80'	11'	25'	TLC-BT-575	2	0	2
				63'	TLC-LED-600	1	1	0
				91'	TLC-LED-1150	4	0	4
1	F3	80'	13'	25'	TLC-BT-575	2	0	2
				60'	TLC-LED-600	1	1	0
				93'	TLC-LED-1150	4	0	4
1	F5	90'	-7'	57'	TLC-LED-600	1	1	0
				83'	TLC-LED-1150	6	0	6
1	F8	90'	-13'	51'	TLC-LED-600	1	1	0
				77'	TLC-LED-1150	5	0	5
4						27	4	23



SCALE IN FEET 1 : 20

0' 20' 40'

Pole location(s) "F dimensions are relative to 0,0 reference point(s) 0

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**Home Bleachers - Egress**
Spacing:	10.0' x 10.0'

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**11.47**
Maximum:	23.9
Minimum:	2.9
Avg / Min:	3.95
Max / Min:	**8.25**
UG (adjacent pts):	1.71
CU:	0.14
No. of Points:	42

LUMINAIRE INFORMATION

Color / CRI: Luminaire	5700K - 75 CRI
Output: **No. of**	65,600 lumens
Luminaires: Total	**4**
Load:	2.32 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-600	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

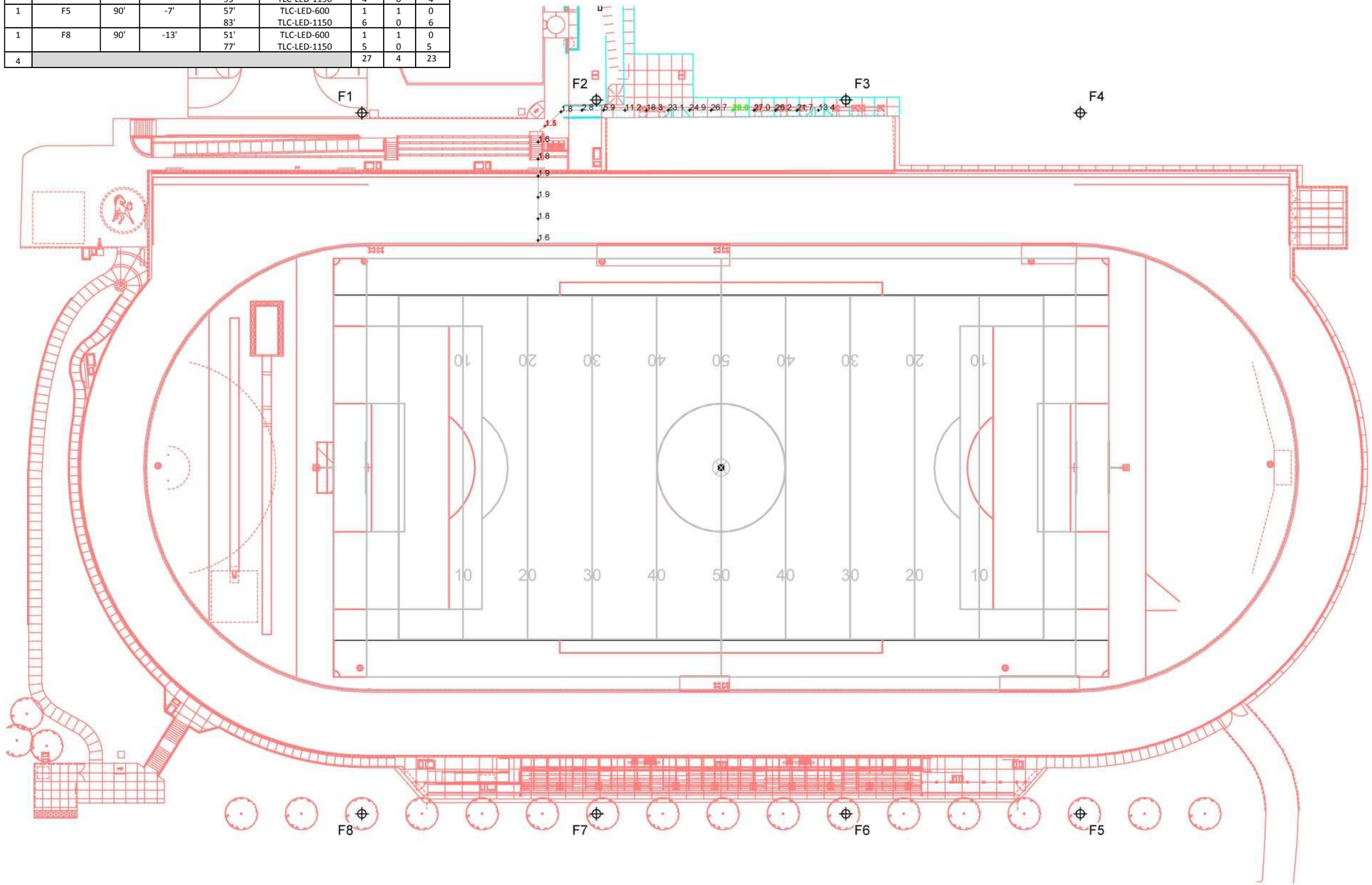
Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

musco We Make It Happen

EQUIPMENT LIST FOR AREAS SHOWN

QTY	LOCATION	Pole SIZE	GRADE ELEVATION	MOUNTING HEIGHT	Luminaires LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F2	80'	11'	25'	TLC-BT-575	2	0	2
				63'	TLC-LED-600	1	1	0
				91'	TLC-LED-1150	4	0	4
1	F3	80'	13'	25'	TLC-BT-575	2	0	2
				60'	TLC-LED-600	1	1	0
				93'	TLC-LED-1150	4	0	4
1	F5	90'	-7'	57'	TLC-LED-600	1	1	0
				83'	TLC-LED-1150	6	0	6
1	F8	90'	-13'	51'	TLC-LED-600	1	1	0
				77'	TLC-LED-1150	5	0	5
4						27	4	23



SCALE IN FEET 1 : 50

0' 50' 100'

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

Pole location(s) "F dimensions are relative to 0,0 reference point(s) 0

San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**Home Safe Dispersal Area**
Spacing:	10.0'
Height:	3' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**12.1594**
Maximum:	28.028
Minimum:	1.494
No. of Points:	20

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	65,600 lumens
No. of Luminaires:	**4**
Total Load:	2.32 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-600	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

ILLUMINATION SUMMARY

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F1	90'	4'	94'	TLC-LED-1150	5	5	0
1	F2	80'	11'	25'	TLC-BT-575	2	2	0
				63'	TLC-LED-600	1	0	1
				91'	TLC-LED-1150	4	4	0
1	F3	80'	13'	25'	TLC-BT-575	2	2	0
				60'	TLC-LED-600	1	0	1
				93'	TLC-LED-1150	4	4	0
1	F4	80'	13'	93'	TLC-LED-1150	6	6	0
1	F5	90'	-7'	57'	TLC-LED-600	1	0	1
				83'	TLC-LED-1150	6	6	0
1	F6	90'	-9'	25'	TLC-BT-575	2	2	0
				81'	TLC-LED-1150	4	4	0
1	F7	90'	-11'	25'	TLC-BT-575	2	2	0
				79'	TLC-LED-1150	4	4	0
1	F8	90'	-13'	51'	TLC-LED-600	1	0	1
				77'	TLC-LED-1150	5	5	0
8						50	46	4

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**Visitor Bleachers**
Spacing:	10.0' x 10.0'

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**13.37**
Maximum:	28.3
Minimum:	1.2
Avg / Min:	10.95
Max / Min:	**23.15**
UG (adjacent pts):	2.73
CU:	0.01
No. of Points:	60

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 121,000 lumens
No. of Luminaires:	**46**
Total Load:	48.3 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>63,500	>63,500	>63,500
TLC-LED-1150	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

mus We Make It Happen

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F2	80'	11'	25'	TLC-BT-575	2	0	2
				63'	TLC-LED-600	1	1	0
				91'	TLC-LED-1150	4	0	4
1	F3	80'	13'	25'	TLC-BT-575	2	0	2
				60'	TLC-LED-600	1	1	0
				93'	TLC-LED-1150	4	0	4
1	F5	90'	-7'	57'	TLC-LED-600	1	1	0
				83'	TLC-LED-1150	6	0	6
1	F8	90'	-13'	51'	TLC-LED-600	1	1	0
				77'	TLC-LED-1150	5	0	5
4						27	4	23

Pole location(s) + dimensions are relative to 0,0 reference point(s) ⊗

San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**Visitor Bleachers - Egress**
Spacing:	10.0' x 10.0'

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**3.54**
Maximum:	8.6
Minimum:	0.9
Avg / Min:	4.00
Max / Min:	**9.72**
UG (adjacent pts):	1.55
CU:	0.07
No. of Points:	60

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	65,600 lumens
No. of Luminaires:	**4**
Total Load:	2.32 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-600	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

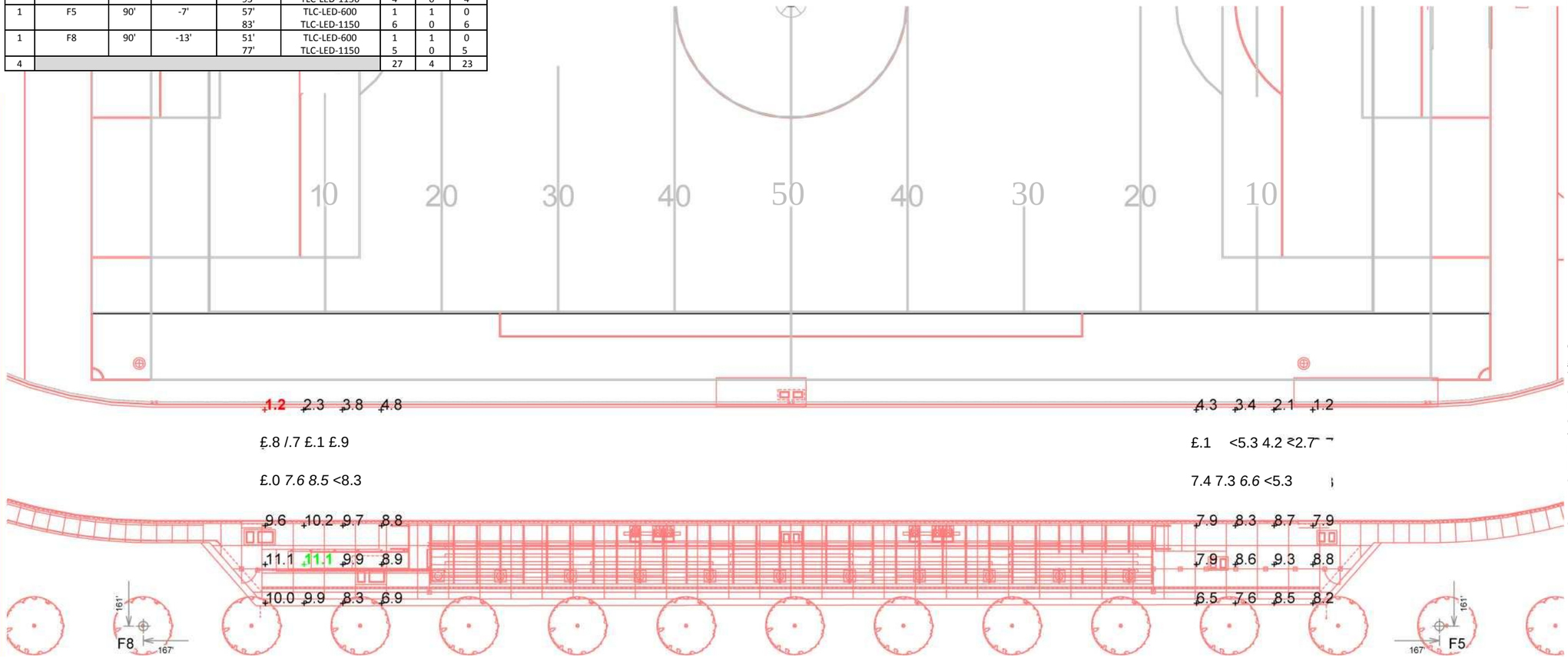
Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

EQUIPMENT LIST FOR AREAS SHOWN

QTY	LOCATION	Pole SIZE	GRADE ELEVATION	MOUNTING HEIGHT	Luminaires LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F2	80'	11'	25'	TLC-BT-575	2	0	2
				63'	TLC-LED-600	1	1	0
				91'	TLC-LED-1150	4	0	4
1	F3	80'	13'	25'	TLC-BT-575	2	0	2
				60'	TLC-LED-600	1	1	0
				93'	TLC-LED-1150	4	0	4
1	F5	90'	-7'	57'	TLC-LED-600	1	1	0
				83'	TLC-LED-1150	6	0	6
1	F8	90'	-13'	51'	TLC-LED-600	1	1	0
				77'	TLC-LED-1150	5	0	5
4						27	4	23



SCALE IN FEET 1 : 30

0' 30' 60'

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**Visitor Safe Dispersal Area**
Spacing:	10.0' x 10.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**6.91**
Maximum:	11.1
Minimum:	1.2
Avg / Min:	5.85
Max / Min:	**9.41**
UG (adjacent pts):	2.37
CU:	0.13
No. of Points:	48

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	65,600 lumens
No. of Luminaires:	**4**
Total Load:	2.32 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-600	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

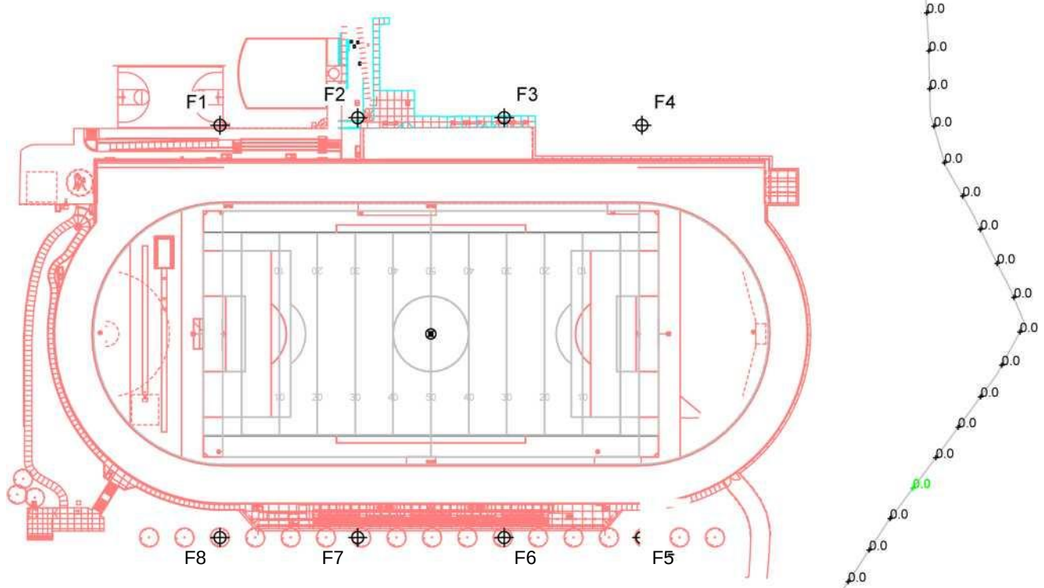
Pole location(s) "F dimensions are relative to 0,0 reference point(s) 0

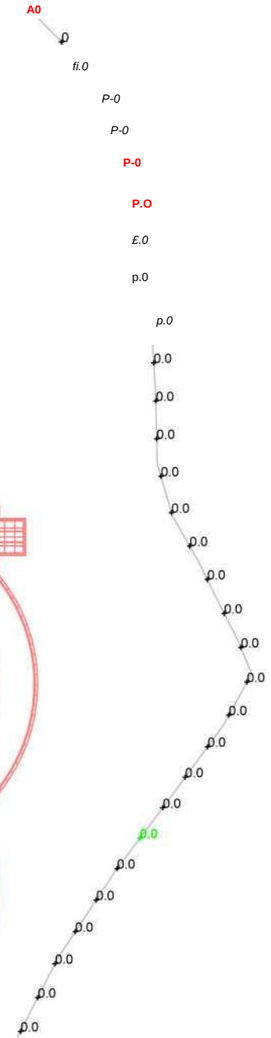
0000

mus We Make It Happen

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F1	90'	4'	94'	TLC-LED-1150	5	5	0
1	F2	80'	11'	25'	TLC-BT-575	2	2	0
				63'	TLC-LED-600	1	1	0
				91'	TLC-LED-1150	4	4	0
1	F3	80'	13'	25'	TLC-BT-575	2	2	0
				60'	TLC-LED-600	1	1	0
				93'	TLC-LED-1150	4	4	0
1	F4	80'	13'	93'	TLC-LED-1150	6	6	0
1	F5	90'	-7'	57'	TLC-LED-600	1	1	0
				83'	TLC-LED-1150	6	6	0
1	F6	90'	-9'	25'	TLC-BT-575	2	2	0
				81'	TLC-LED-1150	4	4	0
1	F7	90'	-11'	25'	TLC-BT-575	2	2	0
				79'	TLC-LED-1150	4	4	0
1	F8	90'	-13'	51'	TLC-LED-600	1	1	0
				77'	TLC-LED-1150	5	5	0
8						50	50	0





SCALE IN FEET 1 : 120

0' 120' 240'

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

Pole location(s) "F dimensions are relative to 0,0 reference point(s) 0

San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**North Res Prop Line**
Spacing:	30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**0.0003**
Maximum:	0.002
Minimum:	0.000
No. of Points:	31

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 121,000 / 65,600 lumens
No. of Luminaires:	**50**
Total Load:	50.62 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>63,500	>63,500	>63,500
TLC-LED-1150	>63,500	>63,500	>63,500
TLC-LED-600	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

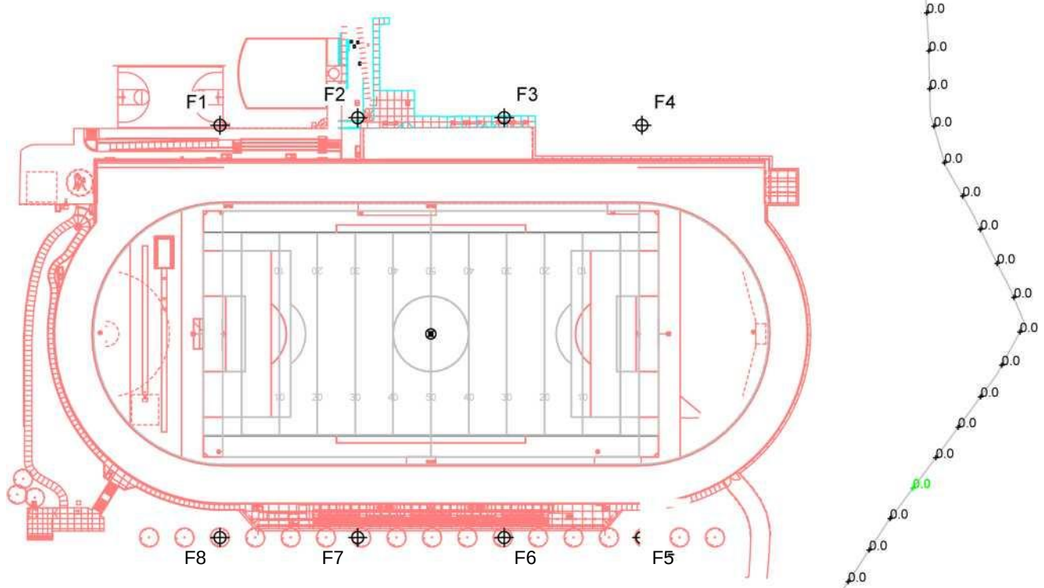
Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

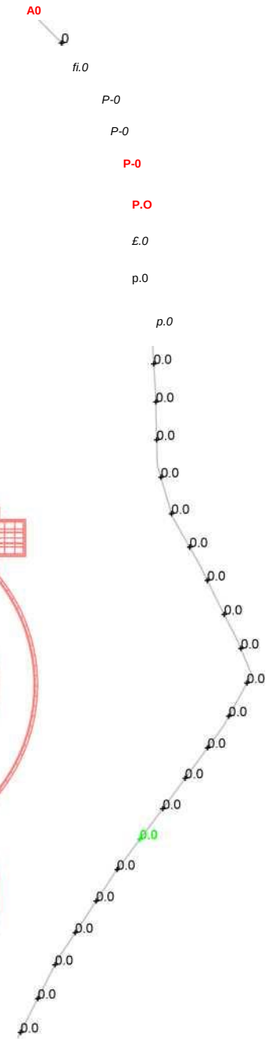
musco We Make It Happen

ILLUMINATION SUMMARY

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F1	90'	4'	94'	TLC-LED-1150	5	5	0
1	F2	80'	11'	25'	TLC-BT-575	2	2	0
				63'	TLC-LED-600	1	1	0
				91'	TLC-LED-1150	4	4	0
1	F3	80'	13'	25'	TLC-BT-575	2	2	0
				60'	TLC-LED-600	1	1	0
				93'	TLC-LED-1150	4	4	0
1	F4	80'	13'	93'	TLC-LED-1150	6	6	0
1	F5	90'	-7'	57'	TLC-LED-600	1	1	0
				83'	TLC-LED-1150	6	6	0
1	F6	90'	-9'	25'	TLC-BT-575	2	2	0
				81'	TLC-LED-1150	4	4	0
1	F7	90'	-11'	25'	TLC-BT-575	2	2	0
				79'	TLC-LED-1150	4	4	0
1	F8	90'	-13'	51'	TLC-LED-600	1	1	0
				77'	TLC-LED-1150	5	5	0
8						50	50	0





San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**North Res Prop Line**
Spacing:	30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED MAX VERTICAL FOOTCANDLES

	Entire Grid
Scan Average:	**0.0009**
Maximum:	0.005
Minimum:	0.000
No. of Points:	31

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 121,000 / 65,600 lumens
No. of Luminaires:	**50**
Total Load:	50.62 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>63,500	>63,500	>63,500
TLC-LED-1150	>63,500	>63,500	>63,500
TLC-LED-600	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

SCALE IN FEET 1 : 120

0' 120' 240'

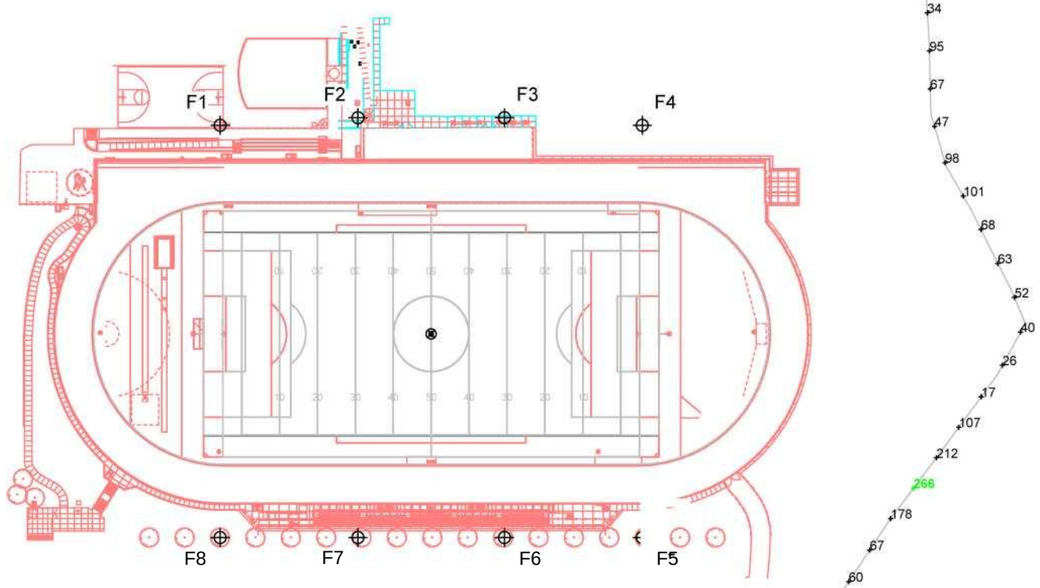
ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

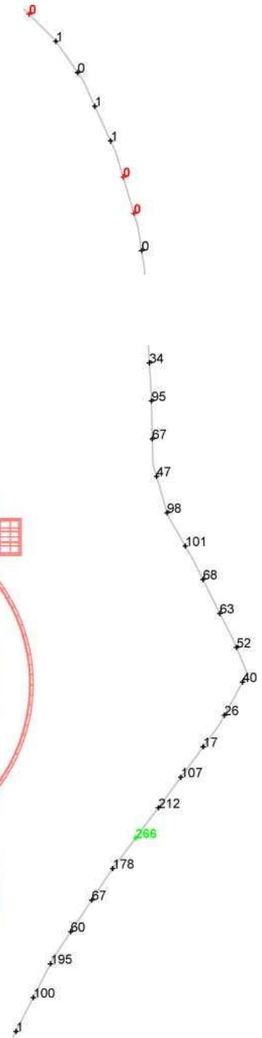
Pole location(s) "F dimensions are relative to 0,0 reference point(s) 0

ILLUMINATION SUMMARY

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F1	90'	4'	94'	TLC-LED-1150	5	5	0
1	F2	80'	11'	25'	TLC-BT-575	2	2	0
				63'	TLC-LED-600	1	1	0
				91'	TLC-LED-1150	4	4	0
1	F3	80'	13'	25'	TLC-BT-575	2	2	0
				60'	TLC-LED-600	1	1	0
				93'	TLC-LED-1150	4	4	0
1	F4	80'	13'	93'	TLC-LED-1150	6	6	0
1	F5	90'	-7'	57'	TLC-LED-600	1	1	0
				83'	TLC-LED-1150	6	6	0
1	F6	90'	-9'	25'	TLC-BT-575	2	2	0
				81'	TLC-LED-1150	4	4	0
1	F7	90'	-11'	25'	TLC-BT-575	2	2	0
				79'	TLC-LED-1150	4	4	0
1	F8	90'	-13'	51'	TLC-LED-600	1	1	0
				77'	TLC-LED-1150	5	5	0
8						50	50	0





SCALE IN FEET 1 : 120

0' 120' 240'

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**North Res Prop Line**
Spacing:	30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED CANDELA (PER FIXTURE)

	Entire Grid
Scan Average:	**61.1800**
Maximum:	265.781
Minimum:	0.000
No. of Points:	31

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 121,000 / 65,600 lumens
No. of Luminaires:	**50**
Total Load:	50.62 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>63,500	>63,500	>63,500
TLC-LED-1150	>63,500	>63,500	>63,500
TLC-LED-600	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

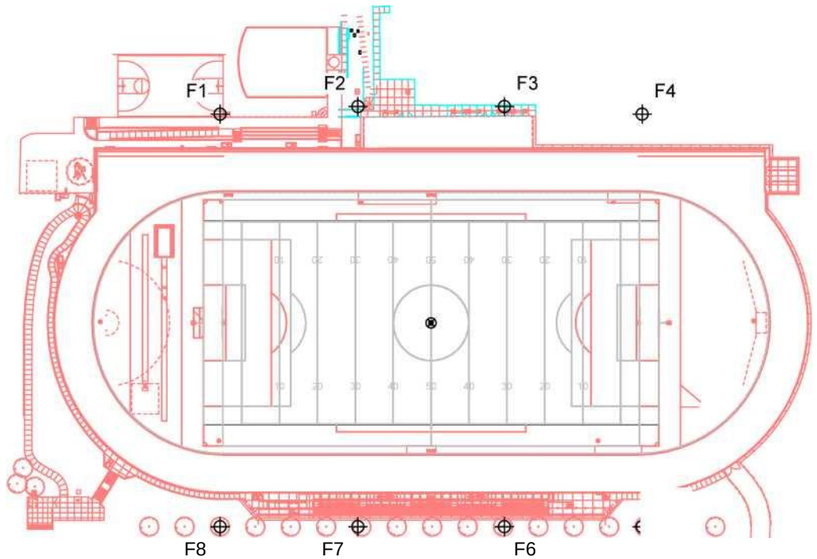
Pole location(s) "F dimensions are relative to 0,0 reference point(s) 0

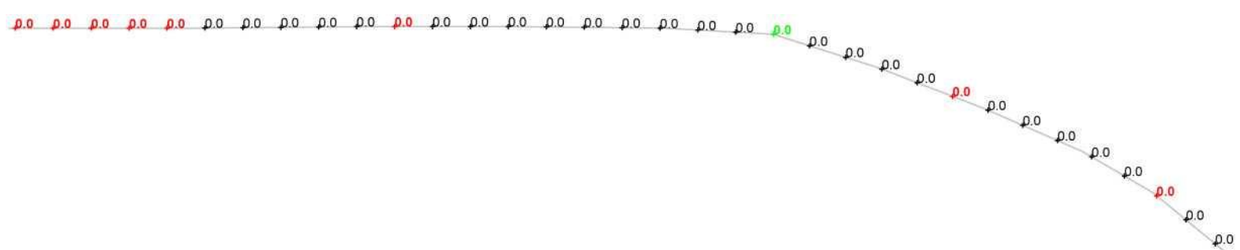
musco We Make It Happen

ILLUMINATION SUMMARY

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F1	90'	4'	94'	TLC-LED-1150	5	5	0
1	F2	80'	11'	25'	TLC-BT-575	2	2	0
				63'	TLC-LED-600	1	1	0
				91'	TLC-LED-1150	4	4	0
1	F3	80'	13'	25'	TLC-BT-575	2	2	0
				60'	TLC-LED-600	1	1	0
				93'	TLC-LED-1150	4	4	0
1	F4	80'	13'	93'	TLC-LED-1150	6	6	0
1	F5	90'	-7'	57'	TLC-LED-600	1	1	0
				83'	TLC-LED-1150	6	6	0
1	F6	90'	-9'	25'	TLC-BT-575	2	2	0
				81'	TLC-LED-1150	4	4	0
1	F7	90'	-11'	25'	TLC-BT-575	2	2	0
				79'	TLC-LED-1150	4	4	0
1	F8	90'	-13'	51'	TLC-LED-600	1	1	0
				77'	TLC-LED-1150	5	5	0
8						50	50	0





SCALE IN FEET 1 : 120

0' 120' 240'

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**East Res Prop Line**
Spacing:	30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**0.0000**
Maximum:	0.000
Minimum:	0.000
No. of Points:	34

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 121,000 / 65,600 lumens
No. of Luminaires:	**50**
Total Load:	50.62 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>63,500	>63,500	>63,500
TLC-LED-1150	>63,500	>63,500	>63,500
TLC-LED-600	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

Pole location(s) "F dimensions are relative to 0,0 reference point(s) 0

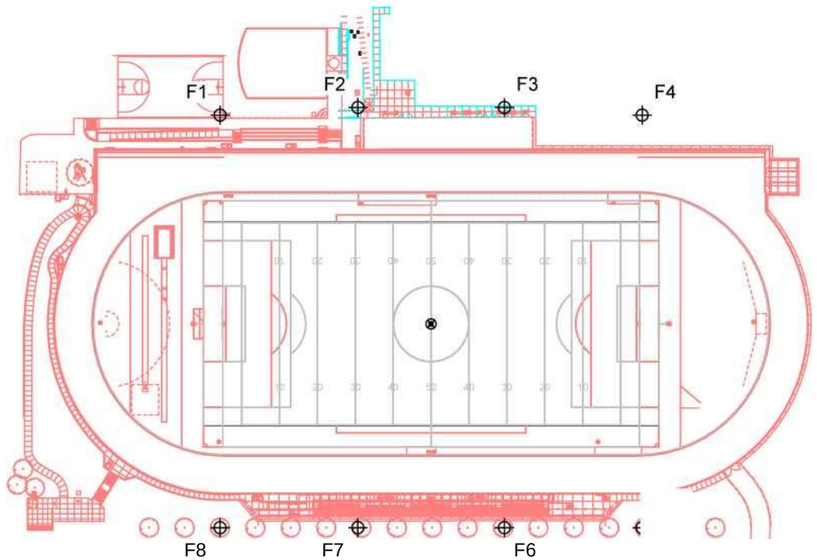
OOOO

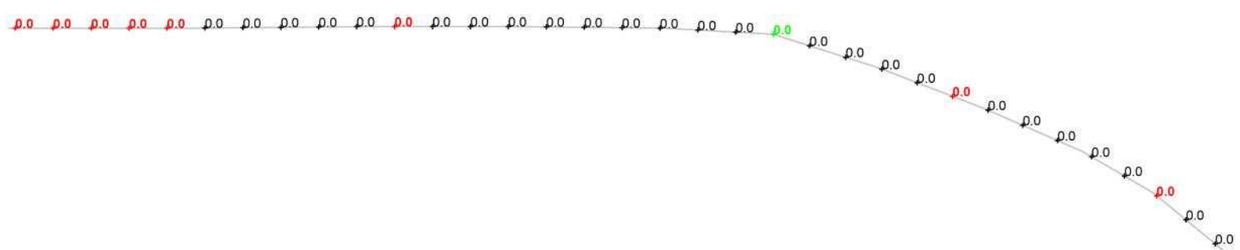
We Make It Happen

ILLUMINATION SUMMARY

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F1	90'	4'	94'	TLC-LED-1150	5	5	0
1	F2	80'	11'	25'	TLC-BT-575	2	2	0
				63'	TLC-LED-600	1	1	0
				91'	TLC-LED-1150	4	4	0
1	F3	80'	13'	25'	TLC-BT-575	2	2	0
				60'	TLC-LED-600	1	1	0
				93'	TLC-LED-1150	4	4	0
1	F4	80'	13'	93'	TLC-LED-1150	6	6	0
1	F5	90'	-7'	57'	TLC-LED-600	1	1	0
				83'	TLC-LED-1150	6	6	0
1	F6	90'	-9'	25'	TLC-BT-575	2	2	0
				81'	TLC-LED-1150	4	4	0
1	F7	90'	-11'	25'	TLC-BT-575	2	2	0
				79'	TLC-LED-1150	4	4	0
1	F8	90'	-13'	51'	TLC-LED-600	1	1	0
				77'	TLC-LED-1150	5	5	0
8						50	50	0





SCALE IN FEET 1 : 120

0' 120' 240'

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**East Res Prop Line**
Spacing:	30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED MAX VERTICAL FOOTCANDLES

	Entire Grid
Scan Average:	**0.0001**
Maximum:	0.001
Minimum:	0.000
No. of Points:	34

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 121,000 / 65,600 lumens
No. of Luminaires:	**50**
Total Load:	50.62 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>63,500	>63,500	>63,500
TLC-LED-1150	>63,500	>63,500	>63,500
TLC-LED-600	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

Pole location(s) "F dimensions are relative to 0,0 reference point(s) 0

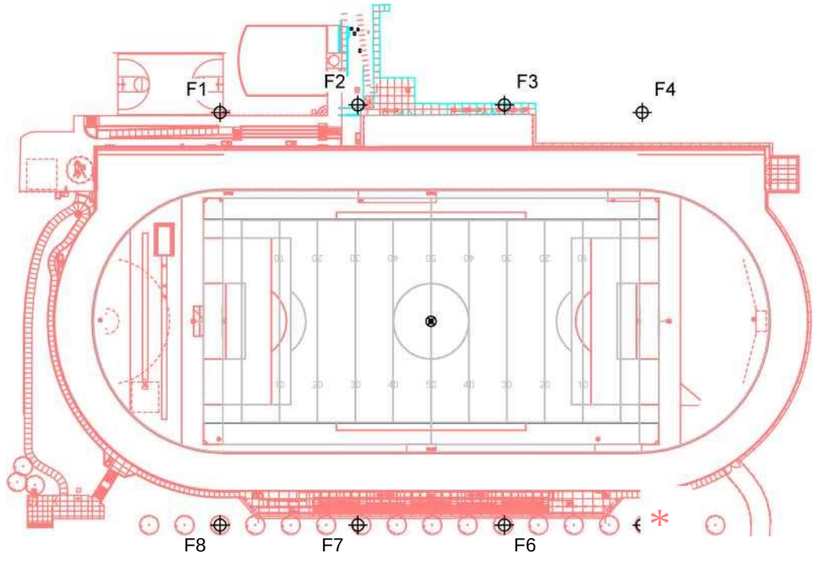
OOOO

We Make It Happen

ILLUMINATION SUMMARY

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F1	90'	4'	94'	TLC-LED-1150	5	5	0
1	F2	80'	11'	25'	TLC-BT-575	2	2	0
				63'	TLC-LED-600	1	1	0
				91'	TLC-LED-1150	4	4	0
1	F3	80'	13'	25'	TLC-BT-575	2	2	0
				60'	TLC-LED-600	1	1	0
				93'	TLC-LED-1150	4	4	0
1	F4	80'	13'	93'	TLC-LED-1150	6	6	0
1	F5	90'	-7'	57'	TLC-LED-600	1	1	0
				83'	TLC-LED-1150	6	6	0
1	F6	90'	-9'	25'	TLC-BT-575	2	2	0
				81'	TLC-LED-1150	4	4	0
1	F7	90'	-11'	25'	TLC-BT-575	2	2	0
				79'	TLC-LED-1150	4	4	0
1	F8	90'	-13'	51'	TLC-LED-600	1	1	0
				77'	TLC-LED-1150	5	5	0
8						50	50	0



SCALE IN FEET 1 : 120

0' 120' 240'

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**East Res Prop Line**
Spacing:	30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED CANDELA (PER FIXTURE)

	Entire Grid
Scan Average:	**17.9049**
Maximum:	204.261
Minimum:	0.000
No. of Points:	34

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 121,000 / 65,600 lumens
No. of Luminaires:	**50**
Total Load:	50.62 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>63,500	>63,500	>63,500
TLC-LED-1150	>63,500	>63,500	>63,500
TLC-LED-600	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

Pole location(s) "F dimensions are relative to 0,0 reference point(s) 0

mus We Make It Happen

ILLUMINATION SUMMARY

San Marin High School Football

Novato,CA

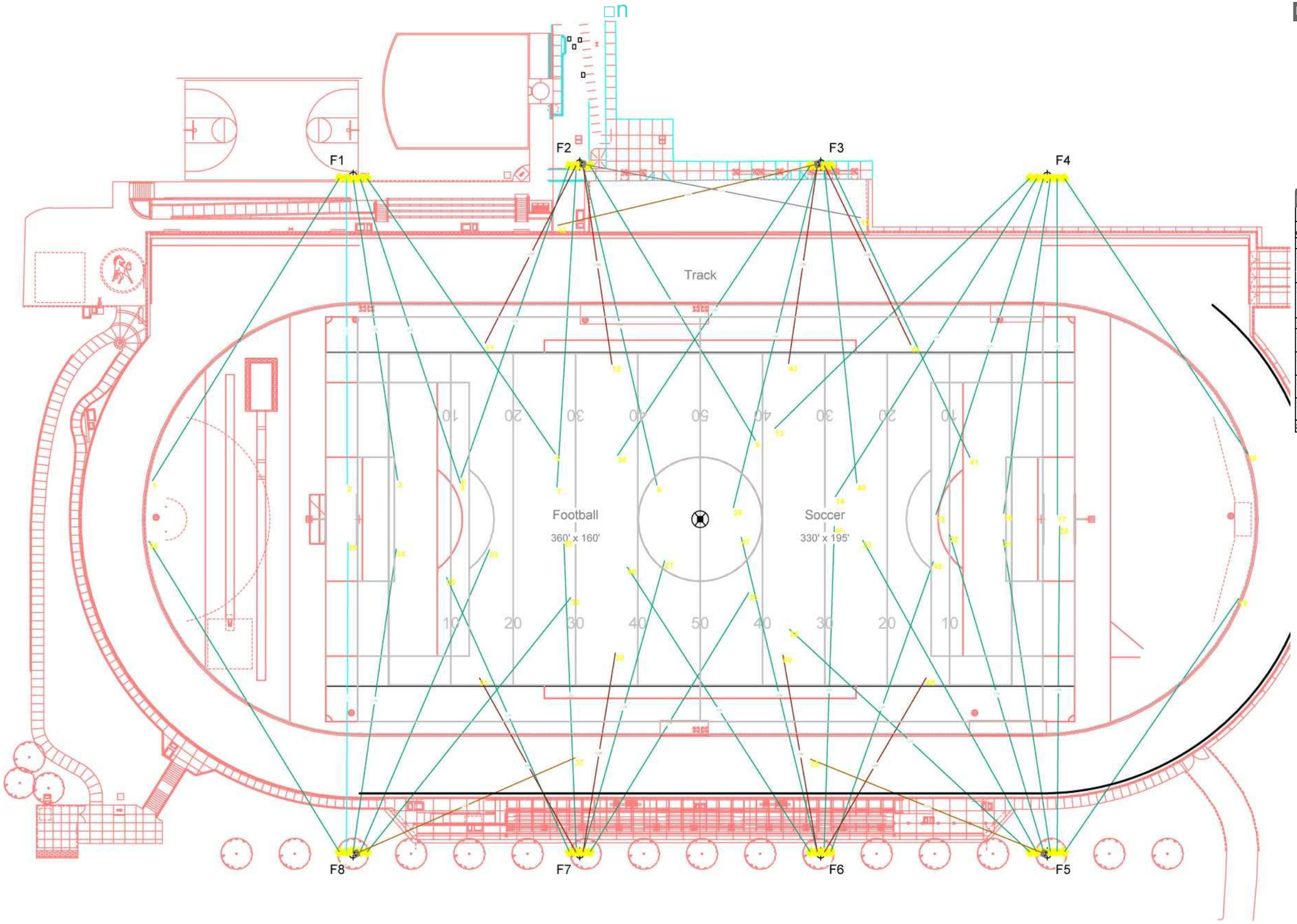
EQUIPMENT LAYOUT

INCLUDES:

- Bleacher
- Football
- Soccer
- Track

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.



EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires		
QTY	LOCATION	CLASS	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE
1	F1	LSS90A	4'	94'	TLC-LED-1150	5
1	F2	LSS80B	11'	25'	TLC-BT-575	2
				63'	TLC-LED-600	1
				91'	TLC-LED-1150	4
1	F3	LSS80B	13'	25'	TLC-BT-575	2
				60'	TLC-LED-600	1
				93'	TLC-LED-1150	4
1	F4	LSS80B	13'	93'	TLC-LED-1150	6
1	F5	LSS90B	-7'	57'	TLC-LED-600	1
				83'	TLC-LED-1150	6
1	F6	LSS90B	-9'	25'	TLC-BT-575	2
				81'	TLC-LED-1150	4
1	F7	LSS90B	-11'	25'	TLC-BT-575	2
				79'	TLC-LED-1150	4
1	F8	LSS90B	-13'	51'	TLC-LED-600	1
				77'	TLC-LED-1150	5
8						50

SINGLE LUMINAIRE AMPERAGE DRAW CHART

Ballast Specifications (.90 min power factor)	Line Amperage Per Luminaire (max draw)						
Single Phase Voltage	208 (60)	220 (60)	240 (60)	277 (60)	347 (60)	380 (60)	480 (60)
TLC-BT-575	3.2	3.0	2.8	2.4	1.9	1.7	1.4
TLC-LED-1150	6.8	6.5	5.9	5.1	4.1	3.7	3.0
TLC-LED-600	3.4	3.2	3.0	2.6	2.0	1.9	1.5

SCALE IN FEET 1 : 50

0' 50' 100'

Pole location(s) ^dimensions are relative to 0,0 reference point(s) 0

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

EQUIPMENT LAYOUT

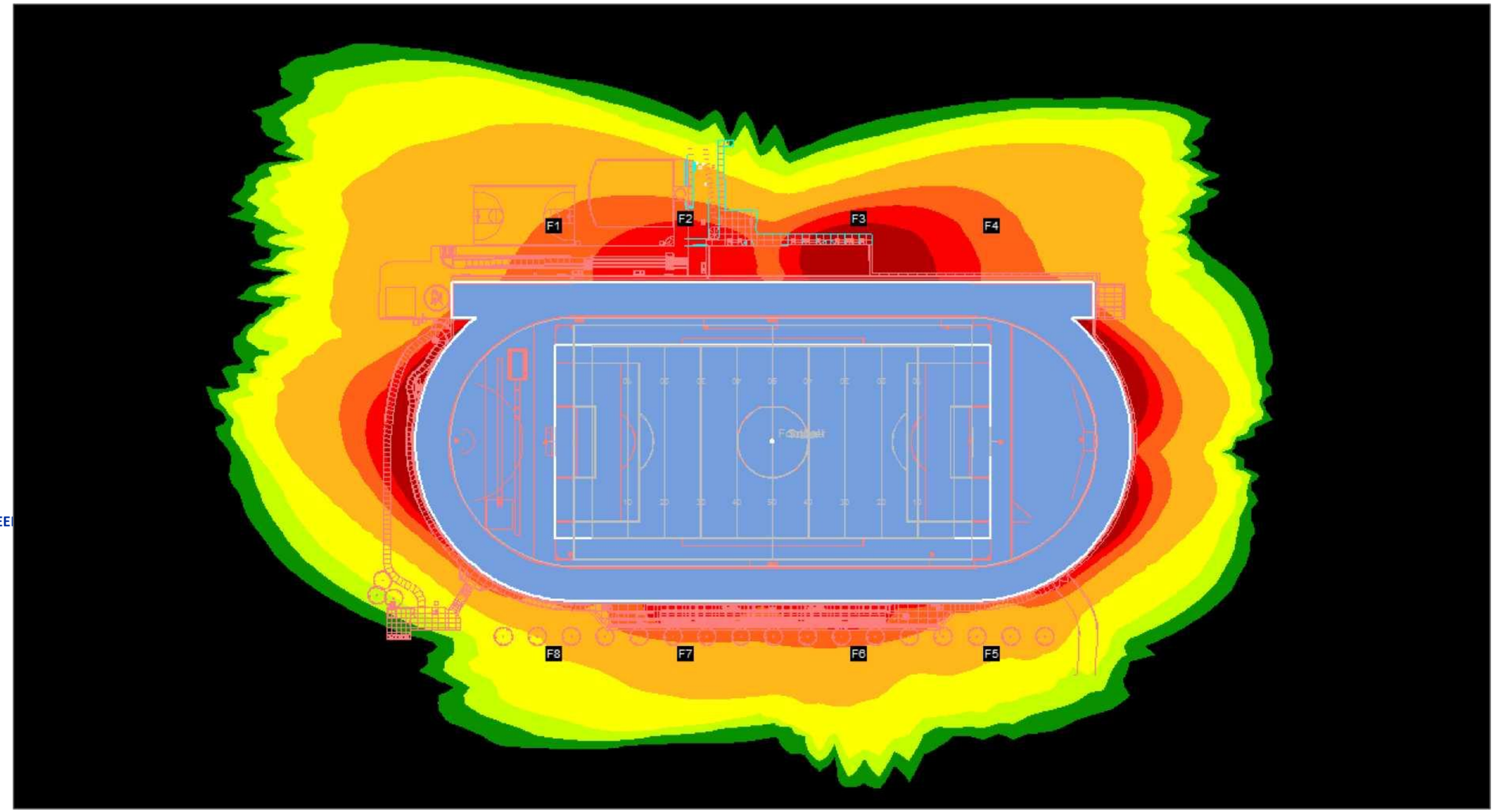
San Marin High School Football

Novato,CA

Summary

Map indicates the maximum candela an observer would see when facing the brightest light source from any direction.

A well-designed lighting system controls light to provide maximum useful on-field illumination with minimal destructive off-site glare.



GLARE

Candela Levels

High Glare: 150,000 or more candela
Should only occur on or very near the lit area where the light source is in direct view. Care must be taken to minimize high glare zones.

Significant Glare: 25,000 to 75,000 candela
Equivalent to high beam headlights of a car.

Minimal to No Glare: 500 or less candela
Equivalent to 100W incandescent light bulb.

GLARE IMPACT

0000

mus

ENGINEE

ENVIRONMENTAL GLARE IMPACT

250

We Make It Happen

Letter 15

COMMENTER: Kenneth Levin

DATE: August 22, 2019

Response 15.1

The commenter describes his professional background and provides his interpretation of the legal process related to the previous EIR. These comments do not pertain to the revised Draft EIR, but are noted.

Response 15.2

The commenter states an opinion that the Revised Draft EIR is "flawed," but does not present specific information or analysis on which to base a response. The District, as lead agency, has made every effort to prepare an EIR that is adequate, complete and a good-faith effort at full disclosure, consistent with CEQA. The commenter's specific comments in this regard are assumed to follow; see subsequent responses to the commenter's specific comments. Nevertheless, this comment is noted.

Response 15.3 through 15.8

These comments relate to the legal and procedural background for the previous EIR. These comments do not pertain to the revised Draft EIR, but are noted.

Response 15.9

The commenter states an opinion that the revised Draft EIR fails to analyze impacts related to upward facing lights, egress lights, field reflection impacts, glare and light trespass. However, the commenter does not present specific information or analysis on which to base a response. Impacts related to field lighting are discussed in Section 2, *Aesthetics*, and Section 3, *Cumulative Impacts*, of the Revised Draft EIR. Impacts would be less than significant. See also Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.10

The commenter suggests more testing of the project lighting system, more study of impacts, and recirculation of the EIR, but does not present specific information or analysis on which to base a response. The commenter's suggestion that the EIR be revised and recirculated is noted. However, recirculation of an EIR is only required when significant new information has been or must be added to an EIR. As discussed throughout these responses to comments, significant new information is not required.

Response 15.11

The commenter refers to letters 1 and 4 regarding optional practice and game schedules for San Marin High School. Please see responses to letters 1 and 4.

Response 15.12

The commenter provides his interpretation of the legal proceedings related to the previous EIR. This comment does not pertain to the environmental analysis of conclusions of the revised Draft EIR, but is noted.

Response 15.13

The commenter states an opinion that the District is required to perform a photometric study prior to project approval. Please see Appendix C to the Revised Draft EIR for photometric studies, as well as Appendix B, which includes a lighting analysis based on actual operation of the stadium lights. Consistent with both of these studies, as discussed in Section 3, *Aesthetics*, impacts related to lighting would be less than significant. Please see also Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.14

The commenter states an opinion that the biological resources analysis in the original EIR needed to be recirculated. Please see Appendix A of the Revised Draft EIR for the revised biological resources analysis that was recirculated as part of the Revised Draft EIR.

Response 15.15

The commenter states that public comment is invited on the Revised Draft EIR. The commenter is correct.

Response 15.16

The commenter states confusion over whether the entire Revised Draft EIR may be commented on by the public. As discussed in Section 1, *Introduction*, and in the Notice of Availability of a Revised Draft EIR that was issued in July 2019, the District invites comments on the Revised Draft EIR. The District is not required to respond to comments that do not pertain to the Revised Draft EIR.

Response 15.17

The commenter states an opinion that portions of Novato Boulevard, from San Marin Drive to the westerly City of Novato Planning Area boundary, are locally-designated scenic routes, per the City of Novato General Plan. The commenter is incorrect; this portion of Novato Boulevard is not designated as a scenic route in the Novato General Plan.

The commenter also opines that there are "designated scenic resources that should be respected, referenced and discussed in this Revised Draft EIR." The commenter is correct; the open space area to the north of the project site is a scenic resource that is discussed in the Revised Draft EIR in Section 2, *Aesthetics*.

Response 15.18

The commenter disagrees with the locations of light measurements used in the Revised Draft EIR's aesthetics impacts analysis. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.19

The commenter provides a photograph of a residence northwest of the project site and asserts that it shows impacts there and that this neighborhood was not properly studied in the lighting impacts analysis. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.20

The commenter states an opinion that the Revised Draft EIR should have presented night-time photographs to illustrate the effects of the stadium lights. The commenter also provides photographs that the commenter states were taken during the testing for the lights that formed the basis of much of the lighting impacts analysis. The commenter also repeats his opinion that impacts to the neighborhood northwest of the project site were not sufficiently studied. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.21

The commenter disagrees with the characterization in the Revised Draft EIR of the daytime aesthetics impacts of the light poles and states an opinion that the discussion is not "sensitive to the natural areas the project's design disturbs." The commenter does not provide information or analysis upon which to base a specific response. This discussion is contained under Impact AES-1 in Section 2, *Aesthetics*, of the Revised Draft EIR; the EIR correctly concludes that the impacts would be less than significant. The analysis concludes that, although the light and speaker poles affect views of scenic resources from local residences and parks, the narrow light and speaker poles only occupy a sliver of the overall views through the stadium site from the perspective of nearby streets, residences and parks. In addition, the approximately 15 to 35-foot tall egress lighting and speaker poles are similar to poles that were on the stadium site under baseline conditions, such as the speaker poles behind the bleachers on the east side of the stadium, and similar to or shorter and narrower than the existing street lights on San Marin Drive. The new egress lighting and speaker poles are partially screened by existing trees adjacent to the project site and do not substantially affect views of the surrounding hillsides and ridgelines. The poles have minimal impact to the overall viewshed from surrounding properties and do not substantially obstruct views of identified scenic resources. Consequently, impacts to scenic vistas would be less than significant.

Response 15.22

The commenter states an opinion that nighttime photographs would be more useful than daytime photographs to establish a visual baseline against which to measure daytime impacts. The commenter is incorrect. Daytime photographs allow for a comparison of the daytime visual conditions during the daytime before and after project construction. Daytime impacts are discussed under Impact AES-1 and AES-2; nighttime impacts are discussed in impacts AES-3 through AES-5.

The commenter also provides photographs to purportedly illustrate daytime impacts. The photographs included in the comment letter are "zoomed in," and therefore do not represent an accurate view of the light poles as seen by observers adjacent to and around the project site. In addition, CEQA does not require that every possible viewpoint be assessed; the viewpoints used in the EIR are adequately representative and the impact analysis and conclusions as summarized above remain valid. Impacts to scenic vistas would be less than significant.

Response 15.23

The commenter suggests that there is "a quantitative method to analyze glare and light impacts that was ignored" in the Revised Draft EIR, that the EIR does not adequately study glare impacts, and that nighttime photographs should have been in the EIR. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.24

The commenter states an opinion that there "are no regional malls, auto malls, major freeways (or roads) in the vicinity of the Project" site. The commenter is referring to language in the Revised Draft EIR that characterizes the types of light sources that contribute to sky glow, not language specifically describing the exact land uses in the immediate project vicinity. No changes to the EIR are warranted. Please see also Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.25

The commenter disagrees with the application of the Bortle scale in the analysis of lighting impacts. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.26

The commenter provides an account of his personal experience of the lighting equipment test, and provides photographs along with a description of the photographs and an assertion regarding the brightness experienced. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.27

This comment is similar to comments 15.21 and 15.22. See responses 15.21 and 15.22. Please see also Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.28

The commenter states similar comments as Comment 15.26. Please see Response 15.26. The commenter also provides comments similar to 15.21 and 15.22. See responses 15.21 and 15.22. Please see also Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.29

This comment is similar to comments 15.21 and 15.22. See responses 15.21 and 15.22. Please see also Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.30

The commenter states similar comments as Comment 15.18 and 15.19. Please see responses 15.18 and 15.19. Please see also Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.31

The commenter appears to be suggesting that the proper lighting zone classification for the Revised Draft EIR should be E2. Zone E2 was used in the analysis, consistent with this comment. The language referenced by the commenter correctly states that although E3 was not used in the Revised Draft EIR, it also reasonable describes the project site and adjacent land uses ("well inhabited rural and urban settlements"); despite this, Zone E2 was used in the Revised Draft EIR to provide a conservative analysis. Please see also Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.32

The commenter appears to be suggesting that the proper lighting zone classification for the Revised Draft EIR should be E2. Please see Response 15.31. The commenter also takes issue with the discussion

of other areas and the less stringent standards for lighting impacts used there; however, this is meant to provide context for the more stringent standards appropriately used in the Revised Draft EIR. Please see also Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.33

The commenter suggests that lighting would be on after 10:00 PM. As discussed in the originally circulated EIR, which contains the description of the project, in Section 2, Project Description, "The main stadium lights would be turned off 15 minutes after the end of a game, by approximately 9:45 PM on Fridays and by approximately 8:30 PM on Thursdays." There is a possibility that the kind of circumstance envisioned by the commenter could occur, but only during a Friday Night Football Games, of which there would be several each year. Under rare circumstances, the end of a game could be delayed slightly, for example, if there were a significant injury or unavoidable issue with one of the teams delaying the start of the game. Based on many years of athletics program history, it is unlikely that such a circumstance would arise more than once each year, if at all. This would not change the analysis or conclusions of the Draft EIR.

Response 15.34

The commenter disagrees with the threshold used for lighting impacts. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.35

The commenter disagrees with the threshold used for glare impacts. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15. The commenter also refers to Letter 18. See responses to Letter 18.

Response 15.36

The commenter states general disagreement with the lighting impacts analysis in the Revised Draft EIR, but does not present specific information or analysis on which to base a response. Nevertheless, this comment is noted. Please see also Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.37

The commenter states an opinion that the Revised Draft EIR excludes "impacts from the Upward Facing Lights, Egress Lights and Field Reflections," and asserts that "there is no photometric study covering the Upward Facing Lights, Egress Lights and there is no discussion of impacts from reflections from the Downward Facing Lights on the playing field." Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.38

The commenter states similar comments as Comment 15.18 and 15.19. Please see responses 15.18 and 15.19. Please see also Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.39

The commenter disagrees with the methodology used in the analysis of lighting impacts in the Revised Draft EIR. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.40

The commenter provides a photograph that he asserts shows impacts from the stadium lights, and states an opinion that the revised Draft EIR "does not attempt to study sky glow effect from Upward Facing Lights and variances of the sky glow impacts in various weather patterns." Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.41

The commenter states an opinion that the light poles are not accurately described in the Revised Draft EIR.

Regarding the taller poles, the commenter is correct that there are variations in the pole heights as actually installed. The final pole height was adjusted to provide optimum light spill and glare control. Pole heights on the west side range include on 90-foot pole and three 80-foot poles (height above finished grade at pole location). Taller poles allow for steeper aiming angles of the fixtures, thus reducing spill light. The poles on the east side are 90 feet tall to allow for an approximately 80-foot height from the field grade due to topography.

Regarding the shorter poles, the commenter states an opinion that they result in more glare and light trespass than if they were built to the full 30 feet. Please note that the Revised Draft EIR has been corrected to reflect the built height of these poles, which ranges from 15 to 35 feet.

Regarding these comments, it should be noted that the aesthetics impact analysis in the Revised Draft EIR is based on the built condition; therefore, the impacts analysis, which is based on actual measurements of built conditions, reflects the actual height of the installed poles. Nevertheless, the heights have been corrected/clarified accordingly in the Revised Draft EIR. Please see also Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.42

The commenter requests that the Revised EIR be updated to reflect as-built heights. See response 15.41. Please see also Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.43

The commenter disagrees with the methodology used in the analysis of lighting impacts in the Revised Draft EIR. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.44

This comment is similar to Comment 15.41. See Response 15.41. Please see also Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.45

This comment is similar to Comment 15.41. See Response 15.41. Please see also Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.46

This comment is similar to Comment 15.33. See Response 15.33. Please see also Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.47

The commenter suggests that the Revised Draft EIR does not adequately address impacts from upward-facing lights. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.48

This comment is similar to comments 15.18, 15.19 and 15.47. See responses 15.18, 15.19 and 15.47. Please see also Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.49

This comment is similar to comments 15.18 and 15.19. See responses 15.18 and 15.19. Please see also Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.50

This comment is similar to comments 15.18, 15.19, 15.20 and 15.47. The commenter also provides photographs that purportedly show lighting impacts during testing. See responses 15.18, 15.19, 15.20 and 15.47. Please see also Master Response: Light and Glare Impacts, Section J, responses to Letter 15. The commenter provides comments similar to comments 15.21 and 15.22. Please see responses 15.21 and 15.22.

Response 15.51

The commenter appears to be suggesting a lower-level illumination project alternative. Alternative 4, Reduced Lighting System Alternative, in Section 4, *Alternatives*, of the Revised Draft EIR, analyzes a lower light alternative.

Response 15.52

The commenter takes issue with how the frequency and duration of lighting is explained in the Revised Draft EIR, and presents the same information in a different way. This comment is noted; however, the frequency and duration of lighting is correctly explained under the discussion of Impact AES-5 in Section 2 as well as in the project description section of the originally circulated EIR. No changes to the EIR are warranted.

Response 15.53

The commenter states an opinion that lighting impacts were not adequately studied in the Revised Draft EIR and would be significant, and that his opinions and photographs prove this. No other information or analysis is provided upon which to base a specific response. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.54

The commenter suggests that additional projects should have been considered in the cumulative impact analysis in the Revised Draft EIR.

The commenter also appears to misunderstand CEQA's approach to cumulative impacts, apparently assuming that an increase in impacts from more than one project constitutes a significant impact per CEQA. On the contrary, in order for a project's contribution to a cumulative impact to be cumulatively considerable, the cumulative impact must be significant. The commenter provides no evidence or information to indicate that there are significant cumulative noise, traffic or aesthetic impacts (CEQA

Guidelines Section 15130). Cumulative impacts are discussed in Section 3 of the Revised Draft EIR, and would be less than significant.

Regarding construction of other campus projects, there is no possibility of cumulative impacts with the stadium lighting project because noise-generating construction would not take place during lighted games.

The commenter also states an opinion that the second multi-use field would include lights. Please see Response 14.1.

Response 15.55

The commenter states an opinion that the addition of a stop sign for safety purposes and following a pedestrian collision at San Marin Drive and the westerly most intersection of San Carlos Way would result in greater cumulative traffic impacts, including traffic safety, than were studied in the Revised Draft EIR. It should be noted that while a stop sign was added, it was done so at a driveway approach, the majority of which do not have signed stop control but are still operated as if stop controlled. As a result, the addition of a stop sign is a visibility- and safety-based improvement as opposed to an operational one, and would not result in increased delay to the intersection and therefore would not warrant a change to the selection of study intersections included in the Revised Draft EIR.

Response 15.56

The commenter suggests that cumulative noise impacts to horses and residents from the proposed project plus noise from the Gary Gates Field's softball games should have been studied in the Revised Draft EIR. It should be noted that the two fields are several hundred feet from one another, and that the distance and intervening topography and school buildings would prevent the limited noise and lighting from either facility from combining to result in a significant cumulative impact on sensitive receivers. In addition, the Gary Gates Field is used during the spring season for softball; the only overlap with games at the stadium would be with softball and lacrosse games, which have substantially lower attendance and noise compared to a football game. Cumulative impacts are discussed in Section 3 of the Revised Draft EIR and would be less than significant. Please see Response 15.54.

Response 15.57

The commenter discusses the potential for significant cumulative impacts. Please see Response 15.54.

Response 15.58

The commenter inquires regarding lighting at the second multi-use field. Please see Response 14.1.

Response 15.59

This comment is similar to Comment 15.54. Please see Response 15.54.

Response 15.60

The commenter summarizes previous comments. Please see responses 15.54 through 15.59.

Response 15.61

This comment is similar to Comment 15.55. Please see Response 15.55.

Response 15.62

The commenter states concerning regarding a new stop sign and campus construction projects. Please see responses 15.54 and 15.55.

Response 15.63

The commenter suggests that the Revised Draft EIR does not adequately address impacts from the stadium lights. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.64

The commenter suggests that the Revised Draft EIR does not adequately address impacts from upward-facing lights or timing of field lighting. Please see Response 15.33 and Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.65

The commenter questions language in the Revised Draft EIR regarding development intensity. Please see Response 2.15.

Response 15.66

The commenter states an opinion that impacts to biological resources were not adequately studied in the Revised Draft EIR. This comment is noted. Please refer to the Initial Study, Appendix A, Page 5, for a discussion of light trespass on the surrounding environment as it relates to nesting birds. Additionally, as discussed in Section 3, *Aesthetics*, of the Revised Draft EIR, the lighting system would be designed to minimize glare and fugitive light, and it would not substantially contribute to existing sky glow in the area.

Response 15.67

The commenter states concerning regarding a new stop sign and lighting at the second multi-use field. Please see responses 14.1, 15.54 and 15.55.

Response 15.68

The commenter states concerns about traffic safety at the San Marin Drive / Novato Boulevard intersection, but does not provide information or analysis to challenge or question the information in the Draft Revised EIR. The project would not result in traffic safety impacts at this intersection. Cumulative traffic impacts are discussed in Section 3, and would be less than significant.

Response 15.69

The commenter points out an error in Section 2, *Cumulative Impacts*. It has been corrected in the Revised Draft EIR as follows; this correction does not change the analysis or conclusions of the revised Draft EIR.

> Projects identified in Table 3 as located off-campus ("Projects Located within the City of Novato") are subject to both environmental and discretionary review by the City of Novato and each cumulative project would be required to demonstrate consistency with applicable plans, policies, and programs adopted by the City.

Response 15.70

This comment is similar to previous comments about a new stop sign. Please see responses 15.54 and 15.55.

Response 15.71

The commenter suggests use of a device that would turn down the intensity of the lights as needed. This suggestion is acknowledged, although such a feature is not required based on project impacts, which would be less than significant as discussed in Section 2, *Aesthetics*, or the Revised Draft EIR.

Response 15.72

The commenter disagrees with the methodology used in the analysis of lighting impacts in the Revised Draft EIR and repeats previous comments. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.73

The commenter suggests an additional test of the lights "and that the Superintendent, the Trustees and their consultants be escorted to viewing points around the project site so the decision makers can see, first hand, the concerns of the neighbors." This suggestion is noted, but the tests performed for the light measurements were sufficient to complete an adequate environmental analysis in the opinion of the District and the District's expert consultants. The District, as lead agency, has made every effort to prepare an EIR that is adequate, complete and a good-faith effort at full disclosure, consistent with CEQA.

Response 15.74

The commenter suggests an additional off-site alternative. This suggestion is noted; however, there are no significant impacts identified in the analysis in the Revised Draft EIR, so additional alternatives are not required.

Response 15.75

The commenter suggests that the fact that the project is constructed does not preclude addition of another alternative. This comment is noted. Please see Response 15.74.

Response 15.76

The commenter refers to letters 1 and 4 regarding optional practice and game schedules for San Marin High School. Please see responses to letters 1 and 4.

Response 15.77

The commenter refers to letters 1 and 4 regarding optional practice and game schedules for San Marin High School. Please see responses to letters 1 and 4.

Response 15.78

This comment is similar to Comment 15.33. Please see Responses 15.33.

Response 15.79

The commenter disagrees that certain off-site alternatives would be infeasible, suggesting use of school buses to transport teams. However, as discussed in Section 4, *Alternatives*, of the Revised Draft EIR, there are additional reasons the alternatives were found to be infeasible. Please see also Response 15.74.

Response 15.80

The commenter refers to letters 1 and 4 regarding optional practice and game schedules for San Marin High School. Please see responses to letters 1 and 4.

Response 15.81

This comment is similar to Comment 15.79. Please see Responses 15.79.

Response 15.82

The commenter states that he "saw temporarily lighting used for about a week for the football team (and a little bit for soccer)." The occasional use of temporary lights does not conflict with nor change the analysis or conclusions of the Revised Draft EIR. This comment is noted but does not question or challenge the environmental analysis or conclusions of the Revised Draft EIR.

Response 15.83

The commenter states support for the Reduced Lighting System alternative. This comment is noted. The commenter also provides a similar comment to Comment 15.74. See Response 15.74.

Response 15.84

The commenter repeats previous comments taking issue with the methodology and scope of the lighting impact analysis in the Revised Draft EIR. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.85

The commenter states an opinion that a "bat specialist needs to conduct a survey" to further support the conclusions of the Revised Draft EIR regarding biological resources. Please refer to Response 6.6 and 6.7. The analysis acknowledges that birds and native bat species occur in the project area. The District determined that impacts to birds and bats would be less than significant given the relatively minor level of project disturbance, through project design elements (downward facing lights with minimal light trespass) and timing of construction (outside the nesting/roosting season). While use of stadium lights may incidentally affect foraging bats and birds, impacts would only rise to the level of significance if project related impacts resulted in impacts to non-listed bird or bat species that would place a local or regional population in jeopardy. Consequently, impacts to bird and bats would be less than significant and, therefore, do not warrant development or implementation of mitigation measures to reduce impacts to a less than significant level.

Response 15.86

The commenter suggests that Box 1d) should be checked "Significant Impact" because lights on in the evening and at night would alter the migration behavior of birds. There is no evidence that temporary lighting at the scale presented for this project would alter migratory behavior or result in jeopardy to a population of migratory birds. The referenced studies would suggest that on the contrary, local street

lights and the lights of the surrounding suburban areas that burn all night, every night would be a greater draw to migratory birds. Please refer to the Initial Study (Appendix A, Page 6) for an analysis and discussion of potential impacts of night lighting on migrating birds.

Response 15.87

The commenter suggests that Box 1e) should be checked "Potential Significant Impacts" because the project "violates" the Marin Countywide Plan that establishes the need for migration corridors and contiguous green space. The Marin Countywide Plan discusses wildlife corridors in the context of acquiring and preserving open space, defining a Wildlife Corridor as "A continuous land area or natural feature such as a stream, shoreline, or ridge top used for wildlife movement." The only reference to migration is in relation to maintaining fish migration corridors. The proposed project would not result in removal of or impacts to vegetation or green spaces, and does not alter wildlife corridors or fish migration corridors. Therefore, the project would not conflict with local policies or ordinances protecting biological resources.

Response 15.88

The commenter suggests that no in-season surveys were conducted when birds were nesting and bats might have been present within the "buffer zone" and that two years of bird and bat surveys should be required. As discussed in the Initial Study (Appendix A, Page 2), a biological resource reconnaissance-level site visit was conducted by Rincon Consultants on April 30, 2019. The reconnaissance survey was conducted to provide field verification of project-area habitat types and vegetation communities, document plants and animal species observed on-site, assess the potential for the project site to support sensitive species, and determine if the project site provides suitable nesting bird and roosting bat habitat. The project site itself (i.e., the location where the lighting would be installed within the existing athletic field) did not contain special status species, nor did it contain habitat that would support special status species, nesting birds or roosting bats. Please refer to responses to Letter 6 for a discussion of appropriate and standard survey protocol for a project of this type.

Response 15.89

The commenter suggests that mitigation measures should be mandated since the Draft EIR states that potential habitat is present within trees and shrubs located in the surrounding residential neighborhood outside of the project area. Project construction activities took place during the months of September through January thereby avoiding the potential for construction-related impacts to nesting birds and roosting bats. Mitigation measures are not required since impacts to nesting birds and bats were avoided by constructing outside of the nesting season.

Response 15.90

The commenter repeats previous comments taking issue with the methodology and scope of the lighting impact analysis in the Revised Draft EIR. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.91

The commenter repeats previous comments related to the heights of light poles as described in the Revised Draft EIR. Please see Response 15.41 and Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.92

The commenter repeats previous comments related to the heights of light poles, the methodology and scope of the lighting impact analysis, and bird impact discussion in the Revised Draft EIR, as well as photographs he has provided. These comments are addressed in many of responses 15.1 through 15.91 above, and in Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.93

The commenter points out that some language in the biological resources analysis in the Revised Draft EIR does not reflect the as-built status. However, the analysis accurately reflected the actual construction timing and program; therefore, this discussion accurately assesses project impacts.

Response 15.94

The commenter repeats previous comments related to the methodology and scope of the lighting impact analysis. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.95

This comment is similar to Comment 15.93. Please see Response 15.93.

Response 15.96

The commenter repeats previous comments related to the heights of light poles as described in the Revised Draft EIR. Please see Response 15.41 and Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.97

The commenter disputes the cited 1996 Evans Ogden study, disagreeing with the study's conclusion that birds are attracted to urban lights. This comment is noted. Refer to Response 6.10 above for a discussion on cited incidental occurrences of bird strikes.

Response 15.98

The commenter states an opinion that the project area is "rural" and near open space, rather than urban. San Marin High School is located in an outer suburban residential development area with adjacent open space located several hundred feet away.

Response 15.99

The commenter refers to an article discussing how migrating birds are attracted to the xenon light display emanating from the top of the 9/11 memorial tower in New York. This display of lights occurs one night per year, every September 11, over a 24-hour period to commemorate the lives lost September 11, 2001 terrorist attack on the World Trade Center. The article suggests that migrating birds are drawn to the display of lights where they end up wasting crucial energy flying around and sounding off in distress. Again, this article references conditions that are not relatable to those at San Marin High School. San Marin High School stadium lights have been designed to direct light downward and are scheduled to remain on no more than 3.75 hours each night they are used. Please refer to the Initial Study (Appendix A, Page 6) for an analysis and discussion of potential impacts of night lighting on migrating birds, and further responses regarding similar cited references in responses to Letter 6.

Response 15.100

The commenter states an opinion that the stadium lights would be on for 240 nights per year. The commenter is incorrect; as stated in the EIR, the use of all stadium lights would be limited to approximately 152 nights of the year, approximately 83 of which would be games (this estimate includes the maximum number of playoff games that could be played in any given year). For most lighted evenings, the lights would be turned off by 8:30 PM or earlier. For approximately 15 or fewer nights per year, the lights would be cut off by 9:45 PM in the evening.

Response 15.101

The commenter states an opinion that the impacts from egress and upward facing lights has not been analyzed in the Revised Draft EIR. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15. The commenter further opines that birds would be attracted to the stadium lights because they are not "urban." The commenter again references the two news articles and study previously provided in Comment 6.10. Please refer to Response 6.10.

Response 15.102

The commenter states that he saw an owl in the neighborhood. This comment is noted. It is acknowledged that owls may be found in the project vicinity. Potential impacts to birds, including owls, are discussed in the Revised Draft EIR in Appendix A and would be less than significant.

Response 15.103

The commenter suggests that San Marin High School's lighting is not similar in scale or intensity to that of major lit facilities such as the Oakland Coliseum. The commenter is correct. The Revised Draft EIR does not state that these facilities are similar. Please see also Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.104

The commenter states disagreement to the references to the Bortle Scale in the Revised Draft EIR. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.105

This comment is similar to Comment 15.31. Please see Response 15.31 and Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.106

This comment is similar to Comment 15.71. Please see Response 15.71.

Response 15.107

The commenter repeats previous comments regarding pole height and the methodology and scope of the Revised Draft EIR discussion of lighting impacts. Please see Response 15.41 and Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.108

The comment, and the photograph provided, are similar to previous comments using photographs to question the technical lighting measurements and study conducted and prepared as part of the Revised Draft EIR. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.109

The commenter questions whether the Revised Draft EIR uses Zone E2 or Zone E3 classification for the project site and direct surroundings (not including the open space area). The analysis sin the Revised Draft EIR is based on Zone E2. Please see also Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.110

This comment is similar to Comment 15.109. Please see Response 15.109 and Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.111

The commenter states an opinion that the impacts of upward-facing lights were not properly addressed in the Revised Draft EIR, including the lighting impacts study and the photometric plans. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.112

The commenter repeats previous comments regarding the height of the light poles. Please see Response 15.41 and Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.113

The commenter states an opinion that the Revised Draft EIR must include a photometric study that includes upward facing lights and egress lights. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.114

The commenter states an opinion that a reduced lighting alternative is not included in the Revised Draft EIR. Please see Response 9.10. The commenter also states a comment similar to Comment 15.71 Please see Response 15.71.

Response 15.115

The commenter repeats previous comments regarding the methodology and scope of the Revised Draft EIR discussion of lighting impacts. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.116

The commenter repeats previous comments regarding the methodology and scope of the Revised Draft EIR discussion of lighting impacts. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15. The commenter also refers to letters 16 and 18. Please see responses to letters 16 and 18.

Response 15.117

The commenter repeats previous comments regarding the methodology and scope of the Revised Draft EIR discussion of lighting impacts. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.118

The commenter repeats previous comments regarding the methodology and scope of the Revised Draft EIR discussion of lighting impacts. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.119

The commenter states an opinion that the open space areas several hundred feet from the project site (not "adjacent," as asserted by the commenter; see Response 2.5) should be classified as Zone E1. Because the open space area is not within or adjacent to the project site, nor directly affected by the proposed project, a lighting zone classification is not established for it in the Revised EIR. The commenter also states that the project could have impacts on wildlife, but does not provide information or analysis on which to base a specific answer. Impacts to biological resources are discussed in Appendix A to the Revised Draft EIR and would be less than significant. Please see also responses to Letter 6.

Response 15.120

The commenter states an opinion that glare can be adequately measured by looking at it and by taking pictures of it, and that the glare from the project is "worse qualitatively" than automobile headlights. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.121

The commenter disagrees with how lighting was measured for the Revised Draft EIR and states an opinion that it is underestimated in relation to specific properties. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.122

The commenter asks whether glare was measured at his residence. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.123

The commenter asks whether the 10,000-candela number is the right number to use for a CIE Zone E2 project. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.124

The commenter repeats previous comments regarding pole height and the methodology and scope of the Revised Draft EIR discussion of lighting impacts. Please see Response 15.41 and Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.125

The commenter repeats previous comments about a device to lower lighting and about project alternatives. Please see responses 9.10 and 15.71.

Response 15.126

The comment, and the photographs provided, are similar to previous comments using photographs and discussion to question the technical lighting measurements and study conducted and prepared as part of the Revised Draft EIR. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.127

This comment is similar to Comment 15.33 Please see Response 15.33.

Response 15.128

The commenter repeats previous comments regarding the methodology and scope of the Revised Draft EIR discussion of lighting impacts. The commenter states an opinion that impacts would be significant. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.129

The commenter repeats previous comments regarding the methodology and scope of the Revised Draft EIR discussion of lighting impacts. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.130

The commenter states disagreements with the methodology used in the Revised Draft EIR discussion of lighting impacts. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.131

The commenter states disagreements with the methodology used in the Revised Draft EIR discussion of lighting impacts. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.132

The commenter states disagreements with the methodology used in the Revised Draft EIR discussion of lighting impacts. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.133

The commenter suggests that the wrong thresholds and standards were used in the Revised Draft EIR's discussion of lighting impacts. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.134

The commenter suggests that the wrong thresholds and standards were used in the Revised Draft EIR's discussion of lighting impacts. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.135

The commenter states an opinion that 10,000 candelas is incorrectly applied to a CIE Zone E2 project. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.136

The commenter states an opinion that use of the 10,000-candela threshold is not supported in the Revised Draft EIR. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.137

The commenter states an opinion that upward facing lighting and egress lighting were not studied in the Revised Draft EIR. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.138

The commenter provides a photograph as evidence, according to the commenter, that sky glow impacts would be significant. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.139

The commenter states an opinion that the analysis of sky glow impacts in the revised Draft EIR is inadequate due to the methodology used. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

Response 15.140

The commenter restates and summarizes previous comments. Please see responses 15.1 through 15.140 and Master Response: Light and Glare Impacts, Section J, responses to Letter 15.

SMHS Revised Draft EIR - Comment Letter dated August 23, 2019

Marc Papineau <marc_p@sbcglobal.net>

Letter 16

Sat 8/24/2019 3:06 PM

To: YANCY HAWKINS <YHAWKINS@nusd.org>
Cc: Environmental Report <EIR@nusd.org>

1 attachments (3 MB)

SanMarinHS_NOVATO_light_ltr_8-23-2019_r7_assembled.pdf;

Mr. Hawkins,

The attached letter dated August 23, 2019, supersedes my previous letter dated August 19, 2019. Please disregard my previous letter. 16.1

Thank you for the opportunity to comment of the Revised Draft EIR.

Sincerely,

Marc Papineau
O: (510) 881-8574
C: (510) 331-5749

environmental service
by Papineau

August 23, 2019

Mr. Yancy Hawkins, Assistant Superintendent
Business and Operations
Novato Unified School District
1015 7th Street
Novato, California 94945

Subject: Comments on San Marin High School Stadium Lights Project Revised Draft Environmental Impact Report, SCH#2016082086, dated July 2019

Dear Mr. Hawkins:

Comments submitted by this letter are made respectfully on behalf of the neighbors of San Marin High School:

1. Classification of environmental setting as Zone E2

The Writ of Mandate acknowledges (p. 14, ll. 11-14) that the District used thresholds of significant effect based on the guidance published by the International Commission on Illumination (CIE), which industry group sets relevant threshold limits on various light technical parameters for outdoor lighting installations. Three separate threshold limits, all set forth in CIE150: 2017, apply to spill light, glare, and sky glow added by a project. The threshold limits vary depending on which of the CIE ambient brightness zones the surrounding area falls within, *i.e.*, E0 and E1 for the darkest areas to E4 for the brightest urban centers.

We appreciate that the District has followed the advice of the Court and has acknowledged the appropriate low ambient brightness zone for the project site and neighborhood as the CIE150: 2017 E2 zone. Zone E2, according to the Revised Draft EIR (page 9), can be described as "sparsely populated rural areas." We add, borrowing from the language of CIE150: 2017 and other relevant guidance such as that of the ILP and IESNA, that the E2 zone essentially is an area having low ambient brightness and, for example, could include relatively dark outer suburban areas in addition to rural areas. The school's neighborhood adjoins unlighted open space preserves (Mt. Burdell, Little Mountain, Verissimo Hills), an unlighted city park (O'Hair Park), an unlighted riding stable, an unlighted natural riparian corridor (Novato Creek), and the Bay Area Ridge Trail. Or, as stated by Court: 16.2

> *In all, the roads and neighborhoods adjacent to the school have low brightness against a dark background of undeveloped hills and open space*. (Writ of Mandate, p. 3)

The area is acknowledged to have low ambient brightness. It is superfluous to add the phrase "for rural areas" after E2 zone or to add the adjective "rural" before E2 zone anywhere in the Revised Draft EIR (see pages 3, 9, 24, and 48).

5789 Gold Creek Drive Castro Valley, California 94552 FAX (510) 581-7204 TEL (510) 881-8574

2. CIE's thresholds of significant effect

The Writ of Mandate acknowledges (p. 14, ll. 11-14) that the District used thresholds of significant effect based on the guidance published by (CIE), which are tailored to each of four defined ambient brightness zones. As stated on the previous page, published thresholds in CIE150: 2017 apply to three light technical parameters known as spill light, glare, and sky glow. These thresholds are set out in Tables 2, 3, and 6 of CIE150: 2017. (See Attachment 1)

The Revised Draft EIR (page 3) asserts that the proposed project's lighting system would meet CIE's threshold [singular] for the E2 zone. About this assertion, we emphasize that CIE150: 2017 has three separate thresholds of significant effect, one each for spill light, glare, and sky glow contributed by artificial lighting systems. The District refers to this as CIE's threshold [singular] and also as the CIE150 standard [singular]. In the Revised Draft EIR, the District applied only the threshold for spill light in the E2 zone.

The Revised Draft EIR and its appendices include analysis of spill light and comparison to the CIE150: 2017 Table 2 threshold for the E2 zone but no evaluation of glare or sky glow relative to relevant methodology or thresholds of significant effect. In particular, the evaluation in the Revised Draft EIR refers (pages 9, 15-16, 18, 44 and Appendix B) to CIE150 or CIE150: 2017 but omits application of Tables 3 and Table 6 of CIE150: 2017. This omission would not necessarily be critical if the District had applied some other reasonable methodology and threshold limits to evaluate glare and sky glow impacts in place of those set forth in CIE150: 2017. This is not the case. 16.3

In place of the relevant thresholds for glare and sky glow, the District instead applied both 10,000 candela (cd) and 5 lux for glare and the Bortle Scale for sky glow. The 10,000 cd glare threshold is an inappropriate threshold for the E2 zone. It is too bright for areas of low ambient brightness. Applying Table 3 of CIE150: 2017, one could find glare threshold limits lower than 1,000 cd at some off-site receivers. (See Comment 4, page 6, third paragraph.)

Rather than pursue this 10,000 cd glare threshold throughout the Revised Draft EIR, the District substituted (pages 18-19) 5 lux as a "surrogate" threshold for too much glare. The Revised Draft EIR, therefore, essentially asserts that projects with spill light less than 5 lux cannot have glare impacts.

Illuminance, expressed in lux or foot-candles, for any given receiver has no correlation with the predicted candela value used to quantify glare for that same receiver. The decision to use spill light as a proxy for glare is unfounded, inappropriate, and inconsistent with available relevant guidance such as CIE150: 2017 Table 3. Photometric modeling in Appendix C of the Revised Draft EIR makes predictions of glare in candela for on-campus receivers. The same photometric model, which so far has been limited to predict impacts at on-campus receivers, could be applied to make predictions of glare in candela for off-campus receivers. Further, as discussed below, photometric modeling is not cost prohibitive and is applied routinely to predict candela values from individual luminaires as in Appendix C of the Revised Draft EIR. The assertions in the Revised Draft EIR (page 10) that glare measurement is too costly or the sensation of glare is too complex are simply misdirections—a smokescreen for the District to avoid the required and easily feasible analysis.

The Bortle Scale is a descriptive index or scale used for classifying whole-sky viewing quality for nighttime viewing of stars, nebulae, and the Milky Way galaxy. The Bortle scale is not a light technical parameter useful for gauging upward-directed or upward-reflected light from individual lighting projects

and, therefore, is not useful for measuring project-level impacts on sky glow. The District should delete references to 10,000 cd and the Bortle Scale and should apply relevant and appropriate threshold limits.

The CIE150: 2017 threshold limits are appropriate limits to apply in the EIR, because they account for the ambient brightness zone in which the artificial lighting is to be located and address the three separate kinds of effects relevant to outdoor sports lighting (*i. e.*, spill light, glare, and sky glow). CIE150: 2017 Table 2 addresses spill light, Table 3 address glare, and Table 6 addresses sky glow. (See Attachment 1, pp. 1, 3, and 6-10.)

The main body of the Revised Draft EIR mentions glare (pp. 4, 6, 10, 14, 16, 19, 24, 39-46, 48) and also mentions sky glow (pp. 7, 10, 19-20, 24, 40-46) without substantive consideration of appropriate thresholds and without substantive consideration of key project elements that could cause significant glare and sky glow. One such key project element is the upward-directed, ball-in-flight lighting on poles F2, F3, F6 and F7. Lack of evaluation of glare and sky glow from upward-directed, ball-in-flight lighting based upon the relevant and appropriate light technical parameters and threshold limits is an additional conspicuous omission in the Revised Draft EIR that should be corrected.

3. Appropriate thresholds of significant effect for spill light in the E2 zone

The Revised Draft EIR and its appendices include analysis of spill light and comparison to the CIE150: 2017 Table 2 threshold for the E2 zone. The relevant and appropriate measure of spill light is illuminance in the vertical plane of the observer, which is expressed in units of lux or foot-candles. We concur with the District's choice of 5 lux (0.5 foot-candles) for the threshold limit on spill light in the E2 zone as it properly reflects the sensitivity of the E2 zone to added spill light.

While we agree with the threshold limit for spill light, we question the completeness of the forecasts and measurements. Illuminance was modeled and measured at the northeastern perimeter of the campus. Measured lux readings were inclusive of all light sources, natural and artificial, at the locations and elevations considered (here termed the "receivers"). Modeling results in Appendix C were reported as 0.0 lux, and measurement results in Appendix B were reported as 2-3 lux (approximately 0.2 – 0.3 fc).

We wish to point out that illuminance at the considered receivers, for which measurement or modeling results were reported, represent light received directly from downward-directed luminaires and from reflection. Illuminance reported for receivers at the northeastern edge of the campus would not be expected to capture or represent any of the light emitted from upward-directed, ball-in-flight luminaires. Therefore, measured spill light at other receivers, such as those located off-campus north of the stadium, which are elevated above the stadium, were not represented by modeling or measurements. While 5 lux is a relevant and appropriate threshold limit for spill light, illuminance levels at off-campus neighbors were not represented in the modeling or measurements presented in the Revised Draft EIR. 16.4

The incompleteness of the representation of off-site receivers is especially problematic when one considers upward-directed, ball-in-flight luminaires and reflection. Four (4) upward-directed, ball-in-flight luminaires are mounted on poles F6 and F7, and four (4) additional upward-directed, ball-in-flight luminaires are mounted on poles F2 and F3. Unlike the downward-directed lights aimed onto the field, the upward-directed, ball-inflight lights on poles F6 and F7 are aimed uphill toward the north and northwest. Each upward-directed luminaire has a rated output of 50,000 lumens. In comparison, one HID or LED headlight is rated at approximately 2,800-3,000 lumens. The picture: Thirty-four cars with headlights turned on and aimed uphill at various horizontal (azimuth) angles. Due to their upward

aiming, the proposed upward-directed luminaires mounted on poles F6 and F7 could reasonably be expected to illuminate off-campus receivers located at higher elevations.

The District has not properly considered the potential effects of these upward-directed, ball-in-flight lights and has not documented any real reason that the upward-directed luminaires would not cause significant spill light at off-campus receivers. The upward-directed, ball-in-flight lights are described in the Revised Draft EIR (page 15, bottom) as "lower output," which is true in that each has a rated output of 50,000 lumens compared to 111,320 lumens each for the main downward-directed luminaires. The total output of the four upward-directed, ball-in-flight luminaires of poles F6 and F7 is 200,000 lumens, which represents the equivalent of approximately 34 pairs of HID or LED headlights. The effect of this lighting will be directed at residents and open space trail hikers located above the project site. Even so, the photometric modeling of spill light (Appendix C) does not include these receivers. For these reasons, in my view, analysis presented in the Revised Draft EIR to conclude that spill light at off-campus receivers would be insignificant is inadequate.

4. Inappropriate thresholds of significant effect for glare in the E2 zone

Illuminance generally is a total from all contributing sources rather than from a specific source. Unwanted illuminance is termed spill light. We may want illuminance to enjoy dinner or do the dishes, but we may not want it from a neighbor's security light to light up our deck or bedroom. In contrast, glare is another independent aspect of light pollution, which results from nearly direct viewing of the bright light source in a specific luminaire. Glare is almost always unwanted.

According to the Writ of Mandate (p. 14, ll. 3-8), the original Draft and Final EIR evaluated the effect of glare on residents and on adjacent public streets and sidewalks by units of intensity called "candelas." Bright lights from stadiums can cause an annoying or painful sensation in persons, ranging from the painful, but less serious "discomfort glare" to "disabling glare", depending on a person's proximity to the stadium lights. (AR 70) The original EIR assumed that light intensity of 500 candelas (cd), or less, when measured at the school's property lines would result in no "discomfort glare" at those residences which face the school.

16.5

For considering potential glare effects of the proposed project, the Revised Draft EIR does not use a 500 cd threshold or any other relevant or appropriate threshold limit for the E2 zone. The Revised Draft EIR (pp. 10) instead asserts that 5 lux (0.5 foot-candles) is useful as a proxy threshold limit for glare impact—in other words, that projects having less than 5 lux (0.5 fc) spill light could not have a significant glare impact. Appendix B (pp. 1-3, 6) of the Revised Draft EIR further asserts that projects having modeled candela levels less than 10,000 cd could not have a significant glare impact. Based upon application of either the proxy lux threshold or the 10,000 cd threshold for significant glare effect, the proposed project was determined in the Revised Draft EIR to have a less-than-significant glare impact.

This determination is flawed in several ways. It is based on application of inappropriate threshold limits, applies faulty reasoning, and fails to consider elevated off-campus receivers who would look down on the upward-directed luminaires. Glare results from nearly direct viewing of the light source in a specific luminaire; therefore, glare effects are critically dependent on location and elevation, the aiming line of the luminaire, and the line-of-sight of the receiver. Spill light lux levels from stadium lighting are additive from the entire lighting system as opposed to specific to a single luminaire. The two, glare and spill light, are not comparable or correlated lighting effects; therefore, each has its own independent lighting technical parameter.

Because glare may be exacerbated by the aiming angle of the light source vis-à-vis the line-of-sight of the receiver, we have reason to expect that the glare at elevated off-campus receivers caused by the upward-directed, ball-in-flight lights will be significant. Such elevated receivers are located north of the stadium, including receivers on private property and in public spaces such as the Bay Area Ridge Trail. This expectation is based upon photographs taken and observations made during the May 2019 tests (see Figure 4, Photo A).

Photos A, B, and C (Figure 4) show various amounts of glare depending on elevation and location relative to the aiming lines of upward-directed, ball-in-flight luminaires. Photo A represents an elevated receiver located upslope and near the aiming lines from the upward-directed luminaries on poles F6 and F7. Photo B represents a receiver located near the same elevation as the upward-directed lights but substantially off the aiming lines of those lights. Photo C represents a depressed receiver located downslope and near the aiming lines from the downward-directed luminaires on poles F1 through F4.

While observations made during the District's light test and inspection of the photos suggests glare sources at specific off-campus receivers, there is an absence of attention to off-site glare effects off-campus. Current photometric modeling presented in the Revised Draft EIR, Appendix C, does not evaluate any off-site receivers or any off-site elevated receivers on private property or in public spaces. Of the receiver locations for which modeling results are provided in Appendix C, none qualifies as an elevated receiver above the horizontal plane of the upward-directed luminaires (*i.e.*, above an elevation of approximately 129 feet). Therefore, we question whether the modeling captured any of the potential glare effect of the proposed upward-directed, ball-in flight lights on these off-campus receivers.

The Revised Draft EIR does not evaluate glare relative to the relevant and appropriate threshold limit for glare in the E2 zone as recommended in CIE150: 2017 Table 3. The Revised Draft EIR instead cites the spill light threshold for the E2 zone (5 lux or approximately 0.5 fc) and seems to apply this threshold for light trespass as a 'proxy' for glare impact. This is unjustified. The Revised Draft defends (p 10) the use of a proxy as follows: "This threshold of illuminance is applied as a reasonable surrogate for glare because direct measurement of glare in the field would be prohibitively expensive and unnecessary. Because glare is a complex sensation that factors in the luminance and size of the light source, the luminance and area of the background, the position of the light source in the field of view, as well as the viewer's unique sensitivity and physiology, it is impossible to measure glare directly except under laboratory conditions. Therefore, it is appropriate to rely on illuminance as an indicator of a potentially significant glare impact."

This makes no sense at all. Spill light is not indicative of presence or absence of glare. The District's own Appendix C shows many locations with zero foot-candles of spill light yet non-zero glare. At one on-campus receiver, 0.0 foot-candle is predicted but 266 candela. At another on-campus receiver, 0.0 foot-candle is predicted but 40 candela. Simply put, vertical illumination in foot-candles, or lux, is not predictive of glare in candela. Spill light (in lux) fundamentally is a measure of illuminance in a vertical plane. At a given location, illuminance indicates whether one could have enough light to read a poster or whether the amount of light shining through a window would trespass and disturb occupants in the room. Illuminance where measured or modeled is a total from all contributing sources. It is non-specific to any given luminaire.

Glare is a completely different aspect of unwanted light. In contrast to spill light (lux), glare (candela) fundamentally is a measure of the intensity or perceived brightness of one particular source as viewed at a specified receiver. At a given location, glare indicates whether an observer's viewing might

be disturbed owing to the intensity, aiming, and visibility of a particular bright source. Glare where measured or modeled is specific, that is, is attributable to individual offending luminaire(s). (See, for example, specific offending glare sources in Figure 4, Photos A and C.)

Northeast of the end zone, where on-campus illumination was modeled and measured, upward-directed, ball-in-flight lights are not in view. They are shielded from below and they are aimed toward the north or northwest (poles F6 and F7) and toward the south (poles F2 and F3). Glare evaluation as presented in the Revised Draft EIR does not consider glare caused by the upward-directed, ball-in-flight luminaires at off-campus receivers at higher elevations and locations closer to the aiming lines of these upward-directed, ball-in-flight lights.

The ball-in-flight lights or upward-directed lights are parts of the project. The ball-in-flight lights,—on poles F2, F3, F6 and F7,—are barely discussed in the Revised Draft EIR (see pages 15 and 19). The District should describe the ball-in-flight lights, identify their locations (*e.g.*, by pole and elevation), their aiming lines, and geometric area of the LED source. Where they are mentioned, these upward-directed ball-in-flight lights are described as in the Revised Draft EIR a "lower output" and are asserted not to cause glare that could be problematic. This statement seems problematic in view of the comparison to 34 cars with headlights on and pointed upslope. (See Comment 3.)

The District should evaluate the effect of the upward-directed ball-in-flight lights. Glare should be modeled at off-site receivers including those which are elevated above the elevation of the ball-in-flight luminaires (approximately 129 feet).

Contrary to the assertions in the Revised Draft EIR, adverse glare effects could be manifest even though spill light at perimeter campus locations is less than 5 lux (approximately 0.5 fc) and also could be manifest at thresholds much lower than 10,000 cd. Glare is not a simple function of distance, and depends critically on geometry and observer elevation relative to the proposed light sources. This means that predictions of glare effects at the property line at a given receiver elevation are not necessarily representative of glare effects as viewed off-site at receivers having a higher elevation (*i.e.*, above the horizontal plane of the upward-directed lights).

Current CIE guidance addresses these issues in CIE 150: 2017 Table 3, which sets threshold limits for glare that depend on the environmental setting, apparent size of the light source, and receiver distance from the light source. This is a refinement since previous publication of CIE's guidance in 2003, which considered candela threshold limits without regard to the size of the light source or distance of the receiver from the light source. Compared to the current guidance, the 10,000 cd threshold limit applied in the Revised Draft EIR and its Appendix B is a one-size-fits-all limit that would not even fit all receivers in the E3 zone. Table 3 accounts for ambient brightness zone, the aiming and apparent size of light source relative to a specific receiver, and the distance of the receiver from the light source. Off-campus elevated receivers are not even considered in the Revised Draft EIR, which also fails to apply Table 3.

Glare impacts will be worse at specific off-site receivers that are elevated relative to the upward-directed, ball-in-flight lights than at the perimeter locations modeled in the Revised Draft EIR, Appendix C. Off-site glare levels could exceed 1,000 cd and therefore, could exceed the CIE150: 2017 glare threshold limits for the E2 zone. Based upon Table 3, these limits were calculated to be as low as 660-940 cd at specific receivers located 132-188 meters from the upward-directed luminaires. The threshold limits vary depending on receiver location, distance and elevation. In ambient brightness zone E2, in the Table 3 column for projected light source area less than 0.13 square meter (<0.13 m^2), the threshold of

significant glare effect is 5 times the source-receiver distance, in meters (5× d). This equates to 660 cd at 132 m and 940 cd at 188 m.

The reasons for the apparently contrary result wherein off-site glare could exceed on-site or on-campus glare is explained as follows. First, for the on-campus receivers located below approximately 129 feet in elevation, the LED sources of ball-in-flight lights would not be directly visible. Photometric modeling in Appendix C presents results for on-campus receivers which generally are below the 129 feet elevation of upward-directed ball-in-flight lights. Photometric modeling truncated at the property line and did not extend off-site to elevated locations above the elevation of upward-directed ball-in-flight lights. Further, photometric modeling was limited to on-site locations 3 feet above existing grade elevation. (See Revised Draft EIR, Appendix C, Illumination Summaries, upper right boxes labeled "GRID SUMMARY"). Existing grade elevation of the field is approximately 109 feet. Relative elevation of the ball-in-flight lights is approximately +20 feet or 129 feet. Receivers at Santa Yorma Court, San Ramon Way, Santa Gabriella Court and at other observers (also termed "receivers") above an elevation of 129 feet would look down on the ball-in-flight lights. Photographic documentation supports this (see, for example, Figure 4, photo A). Looking down from elevated receivers is especially problematic because the upward-directed ball-in-flight lights are not shielded from this viewing angle. Since off-site receivers were not included in the modeling in Appendix C, this means the glare impact on elevated receivers has not been considered or assessed.

Second, it is essential to model glare for specific off-site receivers, because glare from the upward-directed ball-in-flight luminaires would not manifest until sufficient elevation were attained. Truncating the modeling around the perimeter does not fully capture potential off-site glare impacts. Photo A in Figure 4 suggests that substantial glare will occur at elevated receivers (*e.g.*, 5 Santa Yorma Court), which clearly originates from ball-in-flight luminaires. Photos A and B suggest that this glare originates from the ball-in-flight luminaires mounted on poles F6 and F7 and that the glare increases for the higher elevations despite increased distance from the light sources. 16.6

Third, the threshold of significant effect in the E2 zone is not uniform for all receivers and certainly is not 10,000 cd for any receiver located within 200 meters of the glare source. According to CIE150: 2017 Table 3, the lowest glare threshold limit would not be more than approximately 1,000 cd (predicting a range of 660-940 cd) for receivers at 132 - 188 meters (433 - 616 feet) from the glare source.[1] Appropriate threshold limits depend on the light source's elevation and aiming and the receiver's location, elevation and distance from the source. Table 3 accounts for the relevant variables and applies for all receivers including receivers depressed below the luminaire elevation, at the elevation of the luminaires, and elevated above the elevation of the luminaires. 16.7

In particular, none of the modeled glare results at the selected perimeter locations chosen for modeling appears to be influenced by or take into account upward-directed ball-in-flight lights. Therefore, we expect that glare specifically from the upward-directed luminaries could easily exceed 1,000 cd at elevated receivers. Ball-in-flight lights are mounted at 20 feet above field elevation (109 feet) or 129 feet. Due to a grassy berm about 15-25 feet high (relative to stadium field elevation), elevations of perimeter locations chosen for modeling appear to be near only 124-134 feet. Standing on a backyard 16.8

[1] In Table 3 of CIE150: 2017, the appropriate Luminaire Group in the vertical columns is the fourth column from the left, where the projected area (A_p) of the light source is greater than 0.03 square meter but less than or equal to 0.13 square meter, based on the size and aiming of Musco Luminaires Model #TLC-BT-575. In environmental zone E2, the pre-curfew glare threshold limit expressed in candela is 5× d, which is a function of receiver distance in meters (m) from the light source. Using the Table 3 formula, the maximum acceptable glare at 100 m would be 500 cd (= 5 × 100).

deck or on ridgeline trail, off-campus observers will not be viewing from lower than approximately 139 feet or, in the case of the open space trails, from lower than approximately 159 feet. Figure 4 photos A, B, and C suggest that glare will be significant at the receivers elevated above the ball-inflight luminaires or depressed below the main luminaires. These photos were selected to represent the three cases: 1) substantially depressed (Photo C), near the elevation of the luminaires (Photo B), and substantially elevated (Photo A). Independent calculations presented in Footnote 1, which were based upon CIE150: 2017 glare thresholds for the E2 zone, show that 1,000 cd will exceed threshold limits at specific elevated receivers located 132 - 188 m from the ball-in-flight glare sources.

The Revised Draft EIR should evaluate glare relative to the CIE150: 2017 recommended threshold limits for glare because glare impacts are not related to spill light levels and there is a methodology for their assessment in CIE150: 2017. The threshold limits are outlined for the E2 zone in Table 3 of CIE150: 2017. Threshold limits depend on the apparent area of the glare source termed the "projected area" (A_p) and also depend on receiver distances from the glare source. The photometric modeling should extend to off-site receivers, and evaluation specifically should account for the effect of ball-in-flight luminaires on these elevated off-site receivers. 16.9

5. Appropriate thresholds of significant effect for sky glow in E2 zone

The EIR states that stadium lights may have a significant effect if: 1) they have a substantial adverse effect on a scenic vista; 2) they substantially degrade the existing visual character or quality of the site or its surroundings; or 3) the lights create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.

Potential sky glow is within the charge of the EIR; however, it is less than clear from the narrative how the impact of sky glow is to be gauged. The Court in its Writ of Mandate (p. 33, ll. 10-24) has previously rejected as faulty all of the following lines of reasoning:

1. The amount or effect of sky glow will be "minimal" because it will be limited to the early evening hours (before 8:30 p.m.).

2. The amount or effect of sky glow will occur in a location with existing nighttime lighting (including street lamps along the adjacent roadway and security lighting on the adjacent campus) and, therefore, will not substantially contribute to sky glow during sensitive nighttime hours.

3. The City of Novato and the greater San Francisco Bay Area have nighttime skies that are subject to substantial existing light pollution and are not sensitive to additional artificial light.

16.10

The original Draft and Final EIR concluded that the proposed stadium lights would not contribute substantially to sky glow near the school site and impacts would be less than significant. They did so on the basis of faulty reasoning invoking both the timing of the light and the "drop-in-a-bucket story," which assumes that a project's contribution to a larger light impact is not 'significant.' The court found the premises of this reasoning to be faulty, and the court found insufficient evidence in the record to support the District's conclusion that the effect of sky glow on the scenic views would be minimal.

Ironically, the Revised Draft EIR again takes a similar position that the project's effect could only be significant if it caused a change in nighttime viewing of astronomical bodies including stars, nebulae

or the Milky Way galaxy. As before, sky glow is conceptualized by the EIR preparers as a regional-only phenomenon, which is true in the sense that the San Francisco Bay Area is an intensively developed area and sky glow extends across the region. But it does so to varying degrees, and impacts of artificial lighting at the margins of development generally have more potential to be significant than impacts of artificial lighting in the urban core. So, there are two points here:

1) Small contributions to this regional phenomenon are still potentially significant impacts; and,

2) Local additions to sky glow in the immediate area of the stadium can cumulatively impact the local viewshed.

Table 6 of CIE150: 2017 is relevant to the evaluation of the significance of a project's incremental contribution to sky glow. As for spill light in Table 2 and glare in Table 3, CIE150:2017 in Table 6 sets out threshold limits for added sky glow in terms of the Upward Flux Ratio. For sports lighting projects in the E2 zone, CIE150: 2017 recommends a UFR of 2 or less.

Rather than assess the effect based upon the applicable UFR criterion in CIE150:2017, this time the Revised Draft EIR effectively asserts that no individual project such as the proposed stadium lighting project could cause sky glow or change the existing degree of sky glow in the region. To wit, the Revised Draft EIR (page 7) asserts as follows: "The entirety of Marin County is [mapped as] Bortle Class 5." From there, the Revised Draft EIR proceeds to apply Bortle Scale as a light technical parameter or metric for assessing project's effect.

Bortle Scale refers to a night sky viewing scale used by astronomers to describe the darkness of the night sky and relative viewing quality of an area for views of stars, the Milky Way galaxy, and nebulae. The Revised Draft EIR asserts that the proposed project's effect would be less-than-significant because the proposed project would not change the Bortle Scale rating of night sky viewing in the area and upward-directed lights would be designed to provide only the minimum amount of illumination necessary to see airborne objects [often called "balls"] in the stadium.

This is not a lucid exposition of either the project's potential effect on sky glow or its effect on nighttime views. The Revised Draft EIR appears to be stuck in the "drop-in-a-bucket story." The revised exposition is incorrect on many levels. Here's a list:

1. Factually, the statement that all of Marin County is mapped as an area today having a Bortle Scale of 5 is untrue. In Novato, heading west along Novato Boulevard, the Bortle Scale drops from 5^{+} near U.S. Highway 101 to $5^{+}/5^{-}$ near Novato High School to 4.5^{+}, 4.5^{-} and to 4. Figure 1 shows the variability of sky glow cross the region, and further shows that views of the nighttime sky are better on the urban fringe away from the urban core.

2. An area's sky glow and the Bortle Scale are related; indeed, it would be an onerous task to isolate the individual contributions of existing land developments to sky glow and assign responsibility or rank all the increments. This does not mean that individual projects cannot have individually minor yet cumulatively considerable impacts on the area's sky glow. It should be abundantly clear that the sky glow over a city or region is a cumulative effect.

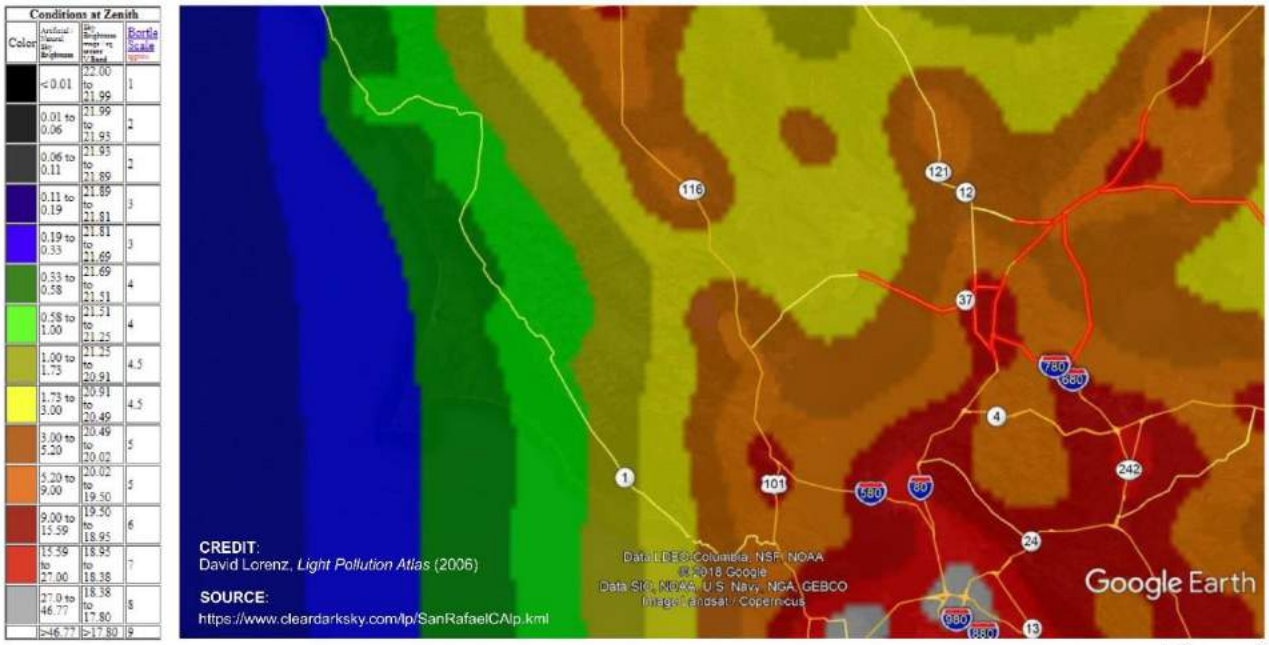


Figure 1
Mapped Bortle Scale
over Portions of Marin, Contra Costa, San Francisco, Sonoma and Solano Counties

3. The Bortle Scale is a qualitative or relative scale like highway level of service A to F. The Bortle Scale is not a threshold of significant effect and is not among the light technical parameters set forth in CIE150: 2017.

4. The appropriate and relevant light technical parameter for sky glow is Upward Flux Ratio (UFR), as discussed below.

The Bortle Scale is not an appropriate metric for measuring sky glow impacts. It does not relate the amount of a project's upward cast or upward reflected light to any metric. The Bortle scale is a purely descriptive scale used to describe the quality of nighttime sky viewing. It is a specious argument to maintain that projects which do not change the Bortle Scale rating of an area have no sky glow effect. Lighting projects with upward-directed, upward reflected lighting, or lighting aimed above the horizon line have the potential to contribute to sky glow.

The appropriate light technical parameter for rating a project's incremental contribution to sky glow is called the Upward Flux Ratio (UFR). For sports lighting in the E2 zone, CIE150: 2017 Table 6 recommends a limit of 2, which can be conceived as a ratio of upward-directed or reflected light divided by the overall downward-directed light output. CIE150: 2017 recommends that a UFR up to 2 is acceptable in the E2 zone, up to 6 in the E3 zone, and up to 15 in the E3 zone.

The reason for this "sliding" threshold is to be more protective of low ambient brightness areas by curtailing the proliferation of upward-directed light into those existing low ambient brightness areas. If this or a similar kind of approach as set forth in CIE150: 2017 Table 6 were not followed, the end result could be that someday in the future all of Marin County would have a Bortle Scale of 5^{+}. To avoid such

effects, CEQA Guidelines acknowledge that some project effects although individually minor may be cumulatively considerable and requires avoidance or mitigation of those effects.

The Revised Draft EIR (page 19) maintains as follows: "The lighting report prepared for the project evaluated the proposed stadium lighting system's contribution to both marine layer sky glow and clear sky glow…The stadium lights did not substantially contribute to sky glow produced by the greater community. Moreover, the lighting report determined that the stadium lighting does not contribute enough uplight to affect clear sky glow in Marin County."

Turning to the lighting technical report (Appendix B, pp. 6-7) one finds in place of a technical analysis a repeat of the "drop-in-a-bucket story": "The entirety of Marin County is Bortle Class 5, which means a moderate amount of anthropogenic sky glow. The stadium light creates far too little uplight to affect the clear sky glow of Marin County."

This approach does not consider that the cumulative effects of sky glow are increasingly significant due to the incremental contribution of projects that increase sky glow, particularly in low light areas that are more substantially affected. The UFR provides the framework for considering whether a proposed project emits acceptable uplight or too much uplight. For sports lighting, the UFR threshold limits are 2 in Zone E2, 6 in Zone E3 and 15 in Zone E4. CIE150: 2017 Table 6 threshold limits. (See Attachment 1.)

The EIR's approach is not an analysis but rather an opinion, which is ultimately not relevant to the issue, which is the degree of incremental sky glow impact caused by this project. Individual projects do not single-handedly create the sky glow seen over the region or the county. Collectively, however, they do contribute to the area's sky glow and, locally, they do create observable sky glow.

The particular statements in the Revised Draft EIR on page 19 and in Appendix B on pages 6-7 are not relevant statements about the project's potential impact per CEQA Guidelines, which acknowledge that a project's effects can be individually minor yet cumulatively considerable. The District expert's opinion does not qualify as an analysis. A true analysis of the project's potential effect would follow guidance such as that presented in CIE150: 2017, Table 6. Such an analysis would have considered the UFR, upward-directed ball-in-flight luminaires, downward directed luminaires, and reflection from the field and bleachers, and would have compared the UFR to the Table 6 threshold limit which is 2 UFR for sports lighting in the E2 zone.

One purpose of distinguishing among ambient brightness zones is to acknowledge that lower ambient brightness zones are more sensitive to incremental additions of new light sources. Simply stated, changes in light are more noticeable. A similar situation occurs with ambient noise: industrial zoned-land may tolerate 70-75 decibels (dBA) but residential-zoned land not more than 55-60 dBA. The noise added by a project in a high ambient noise zone is less noticeable. A related purpose of distinguishing among ambient brightness zones is to protect the natural lightscape through the definition of desired conditions or expectations within each zone. Higher ambient brightness zones are kept compact around the urban core by setting lower threshold limits for the lower ambient brightness zones. For this reason, CIE150: 2017 sets forth graduated limits on sports lighting project-level contributions to sky glow as measured by UFR, being 2 in the E2 zone, but 6 in the E3 zone and 15 in the E4 zone. Figure 6 illustrates the situation for sky glow over urbanized land.

Figure 6 shows in cross-section the sky glow dome typical over urban land. Interference with night sky viewing drops off with distance from the urban core. The outer fringe zone is more sensitive

than the core to added light sources, especially of added upward-directed light sources. Absence of real consideration of the project's upward-directed and reflected light and the project's UFR are conspicuous omissions in the Revised Draft EIR, which provides no information about the actual performance of the project relative to the CIE150: 2017 Table 6 UFR threshold limit.

My independent calculations for a range of realistic assumptions suggest that the ball-in-flight lights in combination with other project elements will greatly exceed the CIE150: 2017 Table 6 UFR threshold limit of 2 UFR. Calculations (see Attachment 2) show this project's UFR is in the range of 3 to 4. However, owing to the blue-white quality of the LED light sources, the effect on the nighttime sky will be equivalent to a UFR of 6 to 8, compared to the UFR threshold limit of 2 for sports lighting in the E2 zone. Blue-white light of LED lighting systems has greater effect on scotopic or "nighttime" vision than other artificial lighting.

6. Effects of nighttime stadium lighting on glare and views

The Writ of Mandate states (p. 32, ll. 21-24) that while the original Draft and Final EIRs did discuss the obscuring effect of the light poles on scenic daytime views of the surrounding hills and ridgelines (AR 66, 854), neither document addressed the effects of the nighttime lights in obscuring views of the hills and ridgelines.

The Revised Draft EIR still does not evaluate potential effects of the proposed project on dusk or nighttime views of the hillsides or ridgelines. In part, this results from failure to consider off-campus effects including off-site glare and reflection. The Revised Draft EIR presents daytime Photo 3 (page 6) and daytime Photo 7 (page 13). Photo 3 shows a panoramic daytime view of the southern ridgeline as viewed from a segment of the Bay Area Ridge Trail known as Dwarf Oaks Trail. Photo 7 shows the same panoramic daytime view of the southern ridgeline with the addition of stadium sound and lighting equipment (*e.g.*, light poles, speaker poles, and luminaires). Views at dusk or nighttime are not presented in the original Draft and Final EIRs or in the Revised Draft EIR.

16.11

The Revised Draft EIR (page 11) maintains that light and speaker poles would not obstruct views and, therefore, would have a less than significant effect on scenic resources. The Revised Draft EIR asserts (page 14) that potential effects of light and glare on nighttime visual character and visual quality are evaluated under the subheadings AES-3 and AES-4 in the Revised Draft EIR (pages 15-20).

The Revised Draft EIR uses faulty reasoning that, since most of the proposed stadium light is focused onto the playing field, nearby neighbors would not be subjected to glare and, therefore, glare would not adversely affect nighttime views. It makes this assertion while 1) not presenting photographs taken during the light test; 2) assuming that the lux levels measured on-campus at perimeter locations are predictive of the presence or absence of off-site glare; and, 3) without modeling glare at off-site locations such as Dwarf Oaks Trail, 5 Santa Yorma Court, 10 Santa Gabriella Court, or 257 San Felipe Way. Glare is especially evident in Figure 4, Photo A taken from the Dwarf Oaks Trail, and Photo C taken from 257 San Felipe Way.

For the reasons explained previously, lux levels measured on-campus at perimeter locations are not proxies for potential off-campus glare effects. Photometric modeling of glare (candela) was truncated, that is, it did not extend off campus to elevated receivers and did not account for upward-directed ball-in-flight lights. Dusk or nighttime photographs would have shown this; however, such photos are not presented in the Revised Draft EIR.

Figures 2 and 3 illustrate three observer locations and viewing lines-of-sight. The viewing location at 5 Santa Yorma Court is similar to a viewing location on Dwarf Oaks Trail, but at lower elevation. The three observer locations represent three separate viewing elevations:

1) Below the elevation of the stadium downward-directed and upward directed light;
2) Slightly above the elevation of upward-directed ball-in-flight lights; and,
3) Substantially above the elevation of upward-directed ball-in-flight lights.

Figure 4 illustrates the variation in glare effects caused by the proposed project. Importantly, the dusk photograph (B) and nighttime photographs (A, B and C) show that glare and illumination of the stadium field will affect the character and quality of views of the southern ridgeline. Unlike single-family development with relatively spare light sources (*e.g*, interior lighting showing through windows), the proposed stadium lighting exudes approximately the same light as could be emitted from twenty (20) typical highway billboards.[2]

In Figure 4, Photos A and C demonstrate that glare depends critically upon the receiver's elevation relative to the lights and also depends on the receiver's location relative to the aiming line of the lights. Near the elevation of the stadium field, glare does not appear as pronounced as it is at receivers whose elevations are substantially below or substantially above the imaginary horizontal plane of the lights. Elevated receivers located to the northwest and west of the stadium will look down on unshielded ball-inflight light sources will experience substantial glare from the upward-directed, ball-in-flight luminaires mounted on poles F6 and F7.[3]

The Revised Draft EIR should include photometric modeling at off-campus receivers, including the public trail receiver on Dwarf Oaks Trail represented in viewing vantage point of Revised Draft EIR Photo 3/7 (or, same as, Photo D1 here in Figure 5). Many off-campus receivers on both private and public land are elevated above the upward-directed ball-in-flight lights. The Revised Draft EIR should evaluate predicted glare relative to threshold limits for glare as outlined in Table 3 of CIE150: 2017.

7. Effects of stadium lighting on view quality and character

In the Writ of Mandate (p. 32, ll. 21-24), the court advises that neither of the original EIRs addresses the effects that the nighttime use of lights will have on the existing views of the hills and ridgelines. One such adverse effect would be reduction in clarity—that is, the potential obscuring of views caused by glare or sky glow. In addition, other view quality impacts could result owing to changes in the available scenic views.

16.12

[2] The average illumination level on a billboard is 250-300 lux (25-30 fc). The average billboard is approximately 5 yards tall × 16 yards wide.

[3] Note to readers who notice that the downward viewing angle at 10 Santa Gabriella Court (eye elev. 154 feet) exceeds the downward viewing angle at 5 Santa Yorma Court (eye elev. 186 feet): The Santa Gabriella Court observer is located much closer to the stadium, so the downward viewing angle is slightly higher.

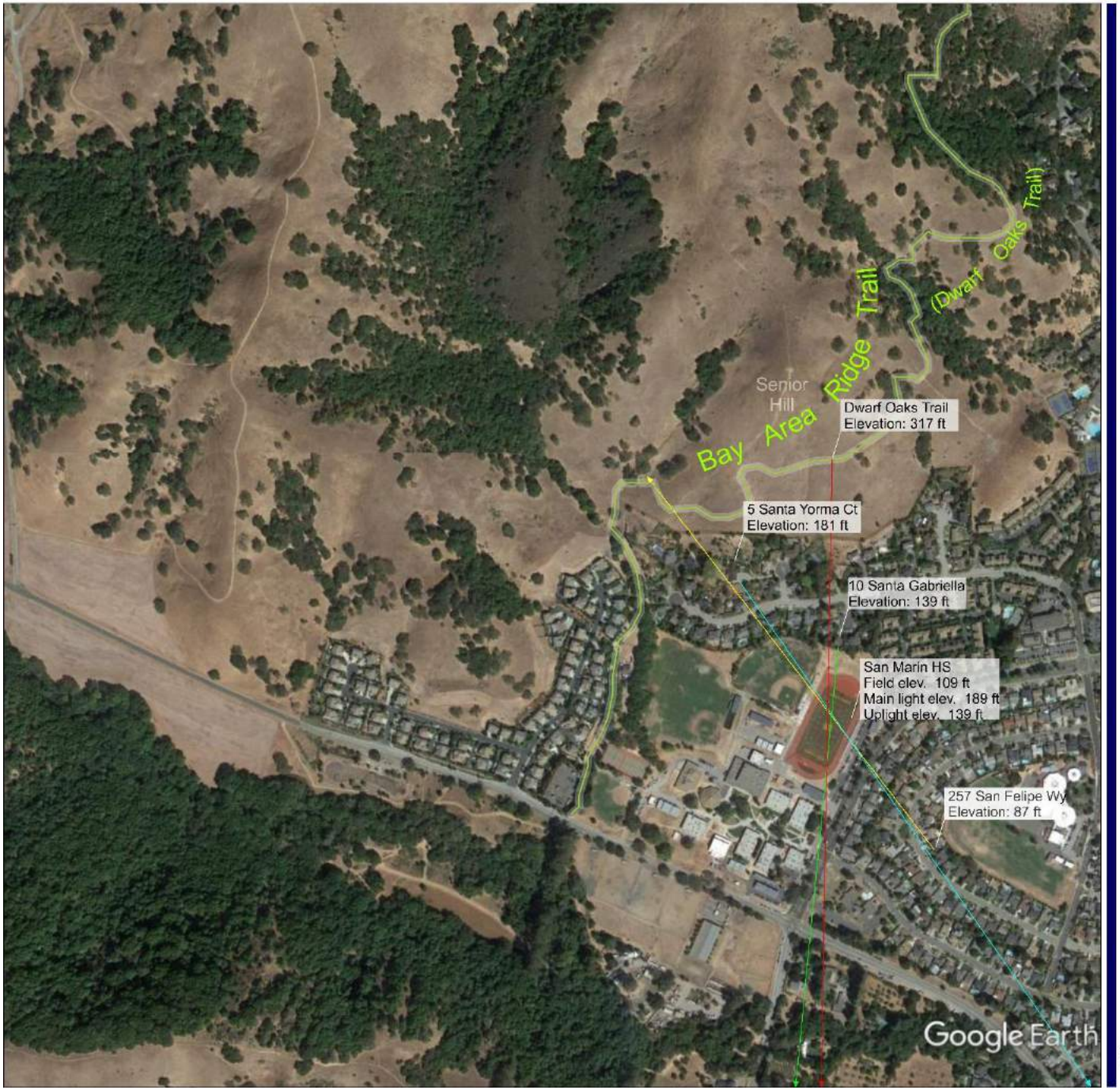
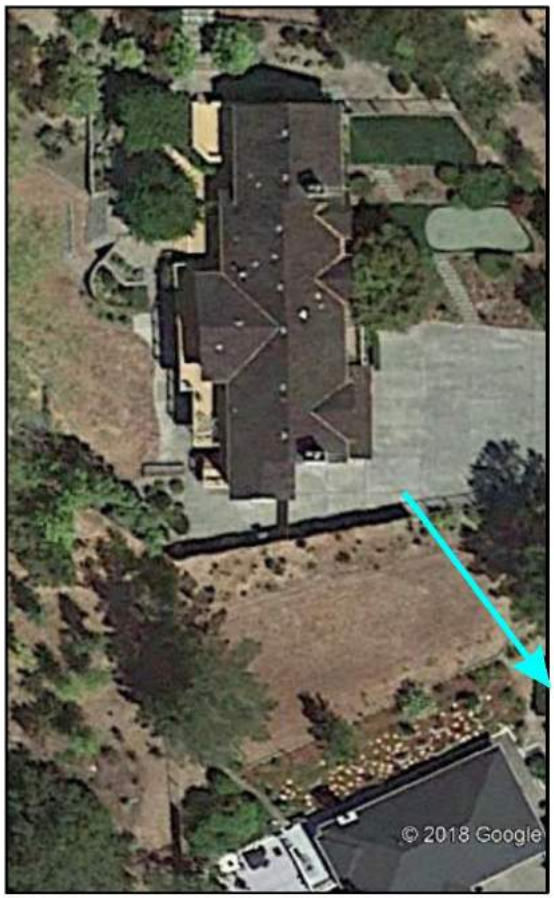


Figure 2
Observer Locations and Viewing Lines of Sight



Address: 5 Santa Yorma Court
Approx. ground elevation: 181 feet
Relative to field: +172 feet
Viewing location: Driveway
Photo IDs: A1, A2

Address: 10 Santa Gabriella Court
Approx. ground elevation: 139 feet
Relative to field: +30 feet
Viewing location: Deck
Photo IDs: B1, B2

Address: 257 San Felipe Way
Approx. ground elevation: 87 feet
Relative to field: -22 feet
Viewing location: 2nd floor bedroom
Photo IDs: C2

Figure 3
Observer Details with Viewing Lines of Sight

Figure 4
Glare Examples

5 Santa Yorma Court
Ground elevation: 181 feet
Observer's eye elevation: 186 feet
Viewing angle to upward-directed luminaires: DOWN
Approximate angle: down 2.5 degrees from horizontal

10 Santa Gabriella Court
Ground elevation: 139 feet
Deck observer's eye elevation: 154 feet
Viewing angle to upward-directed luminaires: DOWN
Approximate angle: down 3 degrees from horizontal

257 San Felipe Way
Ground elevation: 87 feet
Second floor observer's eye elevation: 104 feet
Viewing angle to downward-directed luminaires: UP
Approximate angle: up +6 degrees from horizontal

Photo 3: Southward view of stadium from publicly accessible open space on Dwarf Oak Trail.

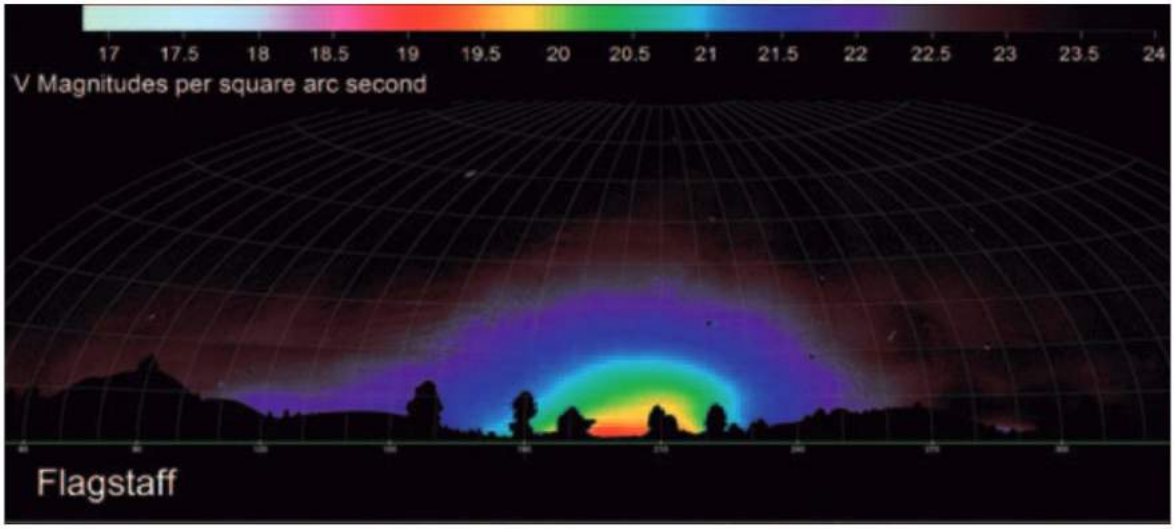
Looking South from Dwarf Oaks Trail
Ground elevation: 317 feet
Observer's eye elevation: 322 feet
Viewing angle to upward-directed luminaires: DOWN
Approximate angle: down 8 degrees from horizontal

Looking South from Dwarf Oaks Trail
Ground elevation: 317 feet
Observer's eye elevation: 322 feet
Viewing angle to upward-directed luminaires: DOWN
Approximate angle: down 8 degrees from horizontal

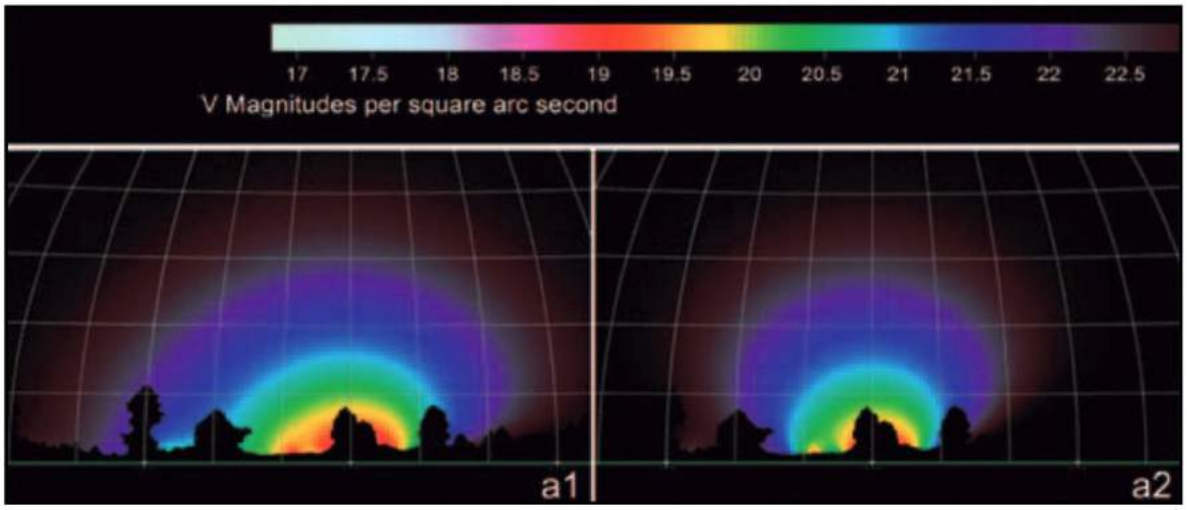
Looking South from Dwarf Oaks Trail
Ground elevation: 317 feet
Observer's eye elevation: 322 feet
Viewing angle to upward-directed luminaires: DOWN
Approximate angle: down 8 degrees from horizontal

Figure 5
Scenic Vista
from
Bay Area Ridge Trail

Dwarf Oaks Trail Segment



Measured sky glow using the Suomi NPP satellite's visible infrared imaging radiometer suite (VIIRS) as viewed from 21.8 km (13.5 miles) north-northeast of Flagstaff's city center.



Modeled using the sky glow model developed by Garstang, as implemented and calibrated by Duriscoe, Luginbuhl, & Elvidge.
a1--existing condition a2--with full cut-offs on all luminaires

SOURCE: D. M. Duriscoe, C. B. Luginbuhl, and C.D. Elvidge, 2014.
The relation of outdoor lighting characteristics to sky glow from distant cities, Lighting Res. Technol. 2014; Vol 46: 35–49.

Figure 6
Sky Glow over a City's Urban Core and Fringe

7. Effects of stadium lighting on view quality and character (*continued from page 13*)

For visual quality and visual impact evaluation, the standard for evaluation is based on three (3) keys set forth in recognized planning guidance such as that published by FHWA for evaluation of its projects:[4] The three keys are:

- **Vividness** = Memorability of landscape elements as they combine in striking and distinctive visual patterns.
- **Intactnes**s = The integrity of the visual pattern, or degree to which the landscape is free from visual encroachments.
- **Unity** = The degree to which the landscape elements join to form a coherent, harmonious visual pattern.

The method and vocabulary for describing a landscape and the effect of manmade changes on the visual quality of a landscape are standard. The effect of changes can be objectively described (*i.e*., meaning that many people would agree on the assessment once they understand and agree on the vocabulary of the three keys).

In the current situation, views of the surrounding area, its scenic open space hills and ridgelines as available from the locale (*e.g*., neighbors' yards, windows, driveways sidewalks, Dwarf Oaks Trail, Senior Hill) will change in terms of intactness and unity. One such view is the view of the landscape shown in Figure 5 for daytime, dusk and early evening conditions. With the proposed project, the open space hills and ridgelines as shown in Figure 5 will remain; however, the added illuminated field will introduce a new element into the landscape. Considering the low ambient brightness of the existing setting, and absence of major illuminated edifices or billboards, most viewers could agree that this added element will be a visual encroachment, the size and brightness of which will detract from the intactness of the existing view and overall visual quality.

In considering visual quality, the illuminated field and visible glare sources juxtaposed with the dark hills and ridgelines are a visual encroachment, which would detract from the intactness of the existing landscape as viewed at dusk and evening when the stadium is lighted (see Figure 5, Photos D2 and D3). The southern ridgeline's silhouette itself would be uninterrupted by the proposed project, but the overall view would be changed. The addition and prominence of the illuminated field and glare sources that would create a visual encroachment and reduce visual quality of the landscape. As viewed from Dwarf Oaks Trail (Figure 5), or from private land (Figure 4), the effect of the stadium lighting is similar to the effect of adding many highly illuminated bright green billboards or a car dealership lot of lime green Volvos.

8. Reduced light alternative

In the Writ of Mandate (p. 59, ll. 17-22), the court found that the District had failed to consider a reduced light alternative that would generate less light impacts on the surrounding neighborhoods and hillsides.

16.13

[4] Federal Highway Administrative (FHWA), 1988. *Visual Impact Assessment for Highway Projects*, Publication FHWA HI-88-054), (136 pp.).

Review of the Revised Draft EIR shows that that the District has not adequately considered such an alternative. For example, a feasible reduced light level could be as low as 30-35 fc (300-350 lux) average on field illumination level. However, the alternative presented in the Revised Draft EIR does not describe the alternative being evaluated nor does it define the alternative light level being proposed. Thus, it does not expound upon any of the visual quality or visual character advantages of the alternative. The Revised Draft EIR finally concludes that the undefined 'reduced light' alternative would incrementally reduce light impacts, but would remain less than significant. In my opinion, this discussion and conclusion fail to provide enough information for the public to understand what is possible in terms of reducing potentially significant light impacts or the feasibility of operating a lower light operation that would fulfill the purposes of the project while reducing adverse light impacts. For all the reasons previously given, I disagree with the assertions that the project's glare, sky glow, and visual impacts will be less than significant. A Reduced Light Level Alternative could reduce spill light and glare at off-campus receivers and the proposed project's contribution to sky glow. A Reduced Light Level Alternative also could reduce the impact on visual quality by reducing the intensity of the illuminated stadium in the field of view of observers.

9. Cumulative effects

The Writ of Mandate advises (p. 64, ll. 12-24) that the original Draft and Final EIRs contained no discussion of the proposed project's cumulative impacts on aesthetics in view of contemplated, reasonably foreseeable projects such as the new lighted soccer and lacrosse field already approved by the District. (AR 13 86) The District's failure to explain why it determined the cumulative impact not to be significant violated CEQA procedures and rendered the original Draft and Final EIRs inadequate as informative documents.

16.14

In addition, the degree of impact on specific dusk and nighttime views of open space hillsides and ridgelines could be made cumulatively more severe and/or made more frequent by the District's additional lighting projects. Even without coincidence in times of field use for football, soccer or lacrosse, the duration of field lighting and the number of evenings with lights activated could increase, so the duration and frequency of impact on views at dusk and nighttime could increase. Spill light from cumulative illumination and glare from specific luminaires could increase. Incremental sky glow could be added by each source of light, reflected light or upward-directed light. Upward directed ball-in-flight lights would be necessary for sports like softball and possibly also for lacrosse. A more precise statement probably is not possible without the District's further definition of the reasonably foreseeable future projects.

Therefore, the Revised Draft EIR should be adjusted and recirculated to include the following:

- ☑ Reduced Light Alternative design illumination level (*e.g.*, 30-35 fc).
- ☑ Dusk and nighttime view photographs and mitigation to reduce potential adverse effects on visual quality.
- ☑ Specifically address the proposed project's contribution to sky glow by estimating the Upward Flux Ratio and comparing it to the appropriate UFR threshold limit of 2 in accordance with CIE150: 2017 (Table 6).
- ☑ Delete references to Bortle Scale as the Bortle Scale is not a light technical parameter used for evaluating lighting projects in accordance with CIE150: 2017.

16.15

- ☑ Specifically address potential glare at off-campus receivers originating from upward-directed ball-in-flight luminaires mounted at 20 feet above stadium field level. Compare predicted glare to the appropriate threshold limits for the E2 zone in accordance with CIE150: 2017 (Table 3).
- ☑ Address the other of the District's reasonably foreseeable lighting projects and explain their cumulative effects on visual quality, off-campus spill light, glare and sky glow.

If you have any questions about the comments please call me at (510) 881-8574.

Sincerely,

Marc Papineau
Environmental Scientist

Attachments: 1 & 2

Attachment 1

Excerpts from CIE150: 2017

This Technical Report has been prepared by CIE Technical Committee 5-28 of Division 5 "Exterior Lighting and Other Applications" and has been approved by the Board of Administration as well as by Division 5 of the Commission Internationale de l'Eclairage for study and application. The document reports on current knowledge and experience within the specific field of light and lighting described, and is intended to be used by the CIE membership and other interested parties. It should be noted, however, that the status of this document is advisory and not mandatory.

Ce rapport technique a été élaboré par le Comité Technique CIE 5-28 de la Division 5 "Eclairage extérieur et autres applications" et a été approuvé par le Bureau et Division 5 de la Commission Internationale de l'Eclairage, pour étude et emploi. Le document expose les connaissances et l'expérience actuelles dans le domaine particulier de la lumière et de l'éclairage décrit ici. Il est destiné à être utilisé par les membres de la CIE et par tous les intéressés. Il faut cependant noter que ce document est indicatif et non obligatoire.

Dieser Technische Bericht ist vom Technischen Komitee CIE 5-28 der Division 5 "Außenbeleuchtung und andere Lichtanwendungen" ausgearbeitet und vom Vorstand sowie Division 5 der Commission Internationale de l'Eclairage gebilligt worden. Das Dokument berichtet über den derzeitigen Stand des Wissens und Erfahrung in dem behandelten Gebiet von Licht und Beleuchtung; es ist zur Verwendung durch CIE-Mitglieder und durch andere Interessierte bestimmt. Es sollte jedoch beachtet werden, dass das Dokument eine Empfehlung und keine Vorschrift ist.

Any mention of organizations or products does not imply endorsement by the CIE. Whilst every care has been taken in the compilation of any lists, up to the time of going to press, these may not be comprehensive.

Toute mention d'organisme ou de produit n'implique pas une préférence de la CIE. Malgré le soin apporté à la compilation de tous les documents jusqu'à la mise sous presse, ce travail ne saurait être exhaustif.

Die Erwähnung von Organisationen oder Erzeugnissen bedeutet keine Billigung durch die CIE. Obgleich große Sorgfalt bei der Erstellung von Verzeichnissen bis zum Zeitpunkt der Drucklegung angewendet wurde, besteht die Möglichkeit, dass diese nicht vollständig sind.

GUIDE ON THE LIMITATION OF THE EFFECTS OF OBTRUSIVE LIGHT FROM OUTDOOR LIGHTING INSTALLATIONS

Summary

This report is a revision and update of CIE 150:2003 *Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations*. The purpose of this Guide is to help formulate guidelines for assessing the environmental impacts of outdoor lighting and to give recommended limits for relevant lighting parameters to contain the obtrusive effects of outdoor lighting within tolerable levels. As the obtrusive effects of outdoor lighting are best controlled initially by appropriate design, the guidance given is primarily applicable to new installations; however, some advice is also provided on remedial measures which may be taken for existing installations.

This Guide refers to the potentially adverse effects of outdoor lighting on both natural and man-made environments for people in most aspects of daily life, from residents, sightseers, transport users to environmentalists and astronomers. (Astronomers also see CIE 126-1997.)

The daytime appearance of the lighting installation is important. The size and nature of the lighting support structures may be intrusive by day although this subject is not addressed in this Guide.

The publication replaces CIE 150:2003 *Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations*.

GUIDE SUR LA LIMITATION DES EFFETS DE LA LUMIERE INDESIRABLE DUS AUX INSTALLATIONS D'ECLAIRAGE EXTERIEUR

Résumé

Ce rapport a pour objet la mise à jour du rapport technique CIE 150:2003 *Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations*. Le but de ce guide est d'aider à la formulation de directives pour évaluer l'impact sur l'environnement de l'éclairage extérieur et de recommander des limites pour les paramètres pertinents de l'éclairage afin de maintenir les effets indésirables de l'éclairage extérieur dans des limites tolérables. Comme le contrôle des effets indésirables dus à l'éclairage extérieur est plus efficace s'il est pris en compte dès la conception de l'installation, les directives données s'appliquent principalement aux installations neuves ; cependant quelques conseils sur les mesures correctives qui peuvent s'appliquer aux installations existantes sont également fournis.

Ce guide s'applique aux effets potentiellement néfastes de l'éclairage extérieur sur les environnements naturel et artificiel, et sur les individus tels que les résidents, les touristes, les usagers des transports, les écologistes et les astronomes, dans la plupart des aspects de leur vie quotidienne. (Pour les astronomes voir également CIE 126-1997).

L'aspect visuel des installations d'éclairage dans la journée est important. La taille et la nature des structures supportant les luminaires peuvent être également inopportunes dans la journée, mais ce sujet n'est pas traité dans ce guide.

Le rapport remplace CIE 150:2003 *Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations*.

1 Scope

This Guide is an update of Publication 150:2003 which sets out guidelines for assessing the environmental impacts of outdoor lighting and gives recommended limits for relevant lighting parameters to contain the obtrusive effects of outdoor lighting within tolerable levels. As the obtrusive effects of outdoor lighting are best controlled initially by appropriate design, the guidance given is primarily applicable to new installations; however, some advice is also provided on remedial measures which may be taken for existing installations.

The Guide specifically refers to the potentially adverse effects of outdoor lighting on nearby residents (e.g. of dwellings such as houses, hotels, hospitals), users of adjacent roads (e.g. vehicle drivers, pedestrians, cyclists), sightseers and transport signalling systems (e.g. air, marine, rail), and on astronomical observations.

The effects of lighting on the natural environment can be difficult to quantify. When there are fields, mountains, forests, rivers, lakes and/or coastline, located close to a lighting installation, there is the possibility, depending upon the season, of the lighting having an adverse effect on insects, plants and animals within the area.

This Guide does not deal with the environmental impacts associated with the daytime appearance of outdoor lighting systems, including their support structures.

The Guide is intended for reference by the following:

(a) Planning bodies, particularly local government authorities, to assist in assessing the potential obtrusiveness of outdoor lighting installations.

(b) Designers of outdoor lighting as an aid to producing lighting systems which control obtrusive effects to an acceptable degree.

2 Terms and definitions

For the purpose of this Guide, the definitions given in the International Lighting Vocabulary (CIE, 2011a) and the following apply:

2.1
upward light output ratio
ULOR$_\alpha$
$R_{\mathrm{ULO},\alpha}$

proportion of the total luminous flux of all lamps considered in a luminaire or a lighting installation which is emitted above the horizontal plane passing through the luminaires in their installed position

Note 1 to entry: The index α points out that the installed position on site is defined by the tilting angle, α, of the luminaire which must be taken into account.

2.2
downward light output ratio
DLOR$_\alpha$
$R_{\mathrm{DLO},\alpha}$

proportion of the total luminous flux of all lamps considered in a luminaire or a lighting installation which is emitted under the horizontal plane passing through the luminaires in their installed position

Note 1 to entry: The index α points out that the installed position on site is defined by the tilting angle, α, of the luminaire which must be taken into account.

2.3
upward light ratio
ULR
R_{UL}

proportion of the luminous flux of a luminaire or installation that is emitted, at and above the horizontal, when the luminaire(s) is (are) mounted in its (their) installed position(s)

2.4
upward flux ratio
UFR
R_{UF}

ratio of the luminous flux above the horizon resulting directly from all the luminaires, reflected from the surface area intentionally lit, and reflected from the surrounding surface areas lit unintentionally because of spill light, to the luminous flux above the horizon in the hypothetical ideal situation where the luminaires have no direct light radiated above the horizon, and all their light is concentrated only to the surface area lit intentionally and that area has exactly the required lighting level

3 Potential obtrusive effects and associated light technical parameters

This clause describes the purposes for which outdoor lighting is provided and the potential effects that such lighting may have on surrounding areas. It also describes how the importance of these effects may be influenced by the nature of the surrounding areas and recommends limits for the relevant light technical parameters which should contain the effects to within tolerable levels.

3.1 The purposes of outdoor lighting

Outdoor lighting is provided for a variety of purposes, examples of which are as follows:

a) for work or recreation – to enable people to see essential detail, in order that they may undertake the work or recreation activities at night for which the area is intended, e.g. freight yards, sporting fields;

b) for safety or security – to light the area so as to facilitate the safety or security of persons or property, e.g. lighting of roads, pedestrian pathways, and perimeter lighting;

c) for amenity – to light features of architectural or historical significance, or to light parks or gardens;

d) for advertising or display – to promote products or services, e.g. lighting of advertising signs, or to give emphasis to commercial premises by means of lighting.

Irrespective of the purpose for which the lighting is to be installed, consideration should be given to the potential obtrusive effects of the lighting system, both by night and by day.

3.2 Total environmental effects of a development

For any development requiring outdoor lighting, the environmental impact from the lighting will not be the only impact, and may not be the most important one. Other factors relating to the uses which are facilitated by the lighting system could be more significant than the lighting system itself, e.g. noise, traffic or parking. In this case lighting should become part of a wider environmental impact study.

Lighting is often the focus of complaints because it is, by nature, highly visible and is the means by which the conduct of the night activity is made possible. The potential effects of the lighting should therefore be assessed, as part of the overall impacts of a development, by the relevant development approval authority.

The environmental impact of a lighting installation is not limited to obtrusive light. The designers of a lighting installation should be encouraged to utilize luminaires and light sources that efficiently direct the light into the area required, thereby minimizing the energy consumption and waste light.

3.3 Potential effects of outdoor lighting

Outdoor lighting, no matter how well designed, will generally have some effect on the environment in which it is installed.

The objectives of the lighting may be incompatible with the containment of light within the intended area of application. For example, some activities require the illumination of a volume or space, not just of a surface at ground level. The following examples illustrate this point:

a) lighting for certain sports, e.g. tennis or golf where it is essential to be able to see the movement of the ball in the space above the playing surface to an appropriate height;

b) lighting a freight terminal where it is necessary to identify containers in multiple container stacks; or

c) security lighting at or adjacent to the property boundary.

For such applications, light must be directed at high angles to illuminate the space satisfactorily, but this can create difficulties in controlling the light spilled beyond the boundaries of the installation. Restriction of direct views of bright luminaires also becomes difficult. There will also be a general diffusion of light within the lit space resulting from reflection from surfaces and atmospheric scattering.

In the case of amenity lighting, everything needs to be in balance. One over-floodlit building can ruin a total nightscape and lead to an undesirable spiralling of brighter and brighter buildings that in time can raise the overall district brightness to unnecessary and undesirable levels.

In the design and installation of an outdoor lighting system, consideration should be given to the potential effects of the lighting on occupants of surrounding properties and on transport users in the vicinity of the installation. These effects include the following:

a) changes to the amenity of an area due to the intrusion of spill light into otherwise dark areas, both outdoors and indoors, and to the direct view of bright luminaires and to overlit facades and signs;

b) a reduction in the ability of transport system users to see essential details of the route ahead, including signalling systems, due to glare from bright luminaires; and

c) changes to night sky viewing conditions due to a general luminous glow, i.e. sky glow caused by the scattering of light in the atmosphere.

People will have a range of reactions to the installation of outdoor lighting; responses may vary from positive acceptance to outright rejection. The degree of response will depend, in part, on the nature of surrounding developments (see 3.4), past experiences, novelty of the installation, and frequency and times of operation.

3.4 Influence of surrounding developments

The perception of the lighting system may be significantly influenced by the following factors:

a) The zoning of the area abutting the proposed development. There is a greater potential for complaints where the area is zoned for residential development.

b) The state of development of the area described in Item (a), i.e. whether the area is sparsely settled or fully built-up.

c) The topography of the area surrounding the lighting installation. Residential developments which are at a lower level than that of the lighting installation should be particularly considered, where a direct view of the luminaires is possible.

d) Physical features such as adjacent tall buildings, trees and spectator stands, which may be effective in restricting light spill beyond the boundaries of the development.

e) The presence or absence of other lighting in the immediate area and the type of lighting involved. The effect of the proposed lighting will be lessened where the surrounding area is reasonably well lit by, e.g. an arterial road lighting or lighting from adjacent commercial developments.

While ULR takes account of the direct upward luminous flux emitted from the luminaire, it does not take account of the light from the luminaires reflected upwards from the surface to be lit. The upward flux ratio (UFR) takes this into account.

As mentioned above, light emitted just above the horizon in a zone between 90° and 110° is extra-critical for sky glow in the far surroundings of observatories. Therefore, around observatories, luminous intensities in the zone between 90° and 110° ($I_{90°-110°}$) should be limited as well as the ULR and UFR.

3.6 Recommended limits for light technical parameters

3.6.1 Basis of recommendations

The light technical parameters identified in 3.5 as indicators of potential obtrusive effects are listed in 3.6.5 together with recommended maximum values for various situations on the basis of present knowledge, experience and precedent. Although these values should control the obtrusive effects, they will not necessarily ensure that a complying installation will receive no adverse reaction whatsoever from those affected by the spill light, as annoyance levels are subjective.

The limiting values recommended for the control of obtrusive effects have been developed taking account of the following:

a) the level of brightness existing in the area;

b) the times that the proposed lighting is to operate;

c) the type of lighting technology available to light the activity; and

d) the use of readily available and easily understood technical data on the lighting installations that can easily be verified at the design and assessment stages.

For installations that are to operate during both pre-curfew and post-curfew hours, no assessment of illuminance, E, and luminous intensity, I, need to be made for compliance with pre-curfew limits provided compliance can be demonstrated with the limits for post-curfew hours.

For the reasons stated in this clause, two sets of limits are given in 3.6.5 for the parameters E and I, based on the times that the lighting system is to operate. For determining which set of limits applies, post-curfew hours should be taken as being between (not later than) 23:00 h and 06:00 h, unless otherwise specified by the controlling authority.

3.6.2 Applicable limits

The more restrictive values, applying after the curfew hour, are predicated on the maintenance of amenity and environmental integrity being the dominant considerations. The spill light at these times should be such that it will not be obtrusive to the majority of recipients. To achieve this goal, the need for the proposed lighting and its use during curfew hours should be considered in the first instance. If the lighting is to operate during curfew hours then careful attention needs to be given to the limitation of spill light, including consideration of the type of lighting system to be used, the type of floodlights (i.e. light distribution) and their specific location and aiming, and the need for the fitting of louvres, baffles or shields. Compliance with the recommendations of 3.6.5 will require a detailed analysis of the situation with the identification of actual potential problem locations, see Figure 1.

The less restrictive values are predicated on dark hour activity taking place whilst giving passive recipients of spill light relief from it being excessively obtrusive. The limiting values are based on the use of conventional lighting technology but with good practice being employed through the selection of appropriate lighting levels, floodlighting equipment and aiming practices.

Therefore, two sets of limiting values are given dependent on the levels of lighting already in the area. One, with higher values, is for application before a nominated or curfew hour set by the controlling authority and one, with lower values, is for application after that hour.

Studies have shown that intensity of bright light sources necessary to satisfy the majority of people as being at all times unobtrusive are rather low. Furthermore, these values can easily be exceeded with conventional lighting practice, especially if the area of activity being lit is large and the required light level is relatively high. Thus, the potentially conflicting requirements for dark hours activity and the maintenance of amenity and environmental integrity have to be resolved.

These criteria have been employed to ensure that the Guide is both credible to the interested parties and pragmatic in application.

Where a different curfew time applies for other reasons (e.g. noise control), consideration should be given to the co-ordination of the curfews, i.e. allowing sufficient time of operation for the lighting after the conclusion of the activity to facilitate crowd dispersal, particularly where large numbers of spectators are involved.

3.6.3 Determination of compliance

It is recommended that the procedures set out in Clause 4 and summarized in Figure 2 be used in the process of determining whether a particular lighting installation complies with 3.6.5. Compliance with the limiting values recommended in 3.6.5 should be assessed on the basis of calculations of the applicable light technical parameters in accordance with Clause 6.

The values recommended in 3.6.5 refer to the installation alone. When evaluating a proposed lighting installation for compliance, account should be taken of existing obtrusive light. If there is already significant obtrusive light from existing lighting, the designer of the installation should endeavour to achieve values of light technical parameters that are well within the recommended limits.

If there is likely to be a significant addition to the vertical illuminance as a consequence of reflected light (see 4.2.5), the designer should endeavour to achieve values of E_v that are well below the recommended maximum.

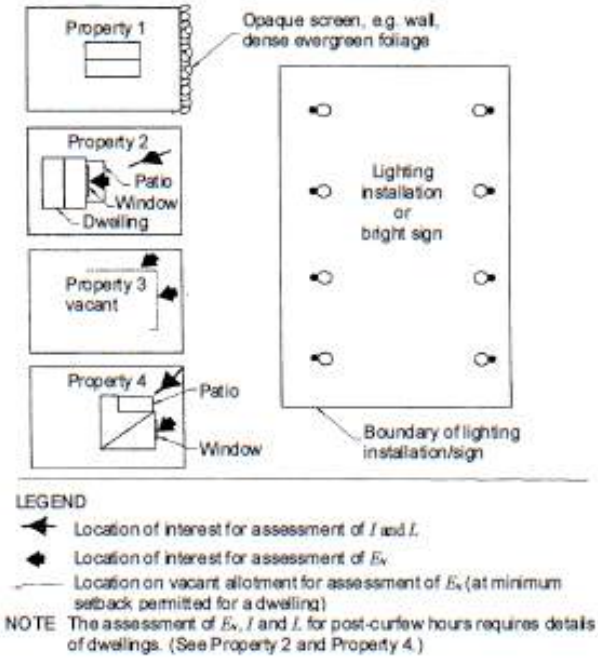


Figure 1 – Example showing application of limits for E_v and I (and, in the case of bright signs, L)

3.6.4 Basis for differentiation of limits according to area type

The limits given in 3.6.5 are differentiated according to the environmental zone. The differentiation takes account of the ambient brightness of the environment to be experienced. The environmental zones are defined in Table 1.

Table 1 – Environmental lighting zones

Zone	Lighting Environment	Examples
E0	Intrinsically dark	UNESCO Starlight Reserves, IDA Dark Sky Parks, Major optical observatories
E1	Dark	Relatively uninhabited rural areas
E2	Low district brightness	Sparsely inhabited rural areas
E3	Medium district brightness	Well inhabited rural and urban settlements
E4	High district brightness	Town and city centres and other commercial areas
NOTE Regardless of the level of urban development, the recommendations for Environmental Zone 1 or 0, should be followed for all locations within 100 km of a major optical astronomy observatory. Regardless of the level of urban development, the recommendations for Environmental Zone 2 (or better) should be followed for locations within 30 km of an operating urban optical astronomy observatory, and for locations between 100 km and 300 km from a major optical astronomy observatory.		

3.6.5 Recommended maximum values of light technical parameters for the control of obtrusive light

3.6.5.1 Limitation of illumination on surrounding properties (light intrusion)

Table 2 shows maximum values of vertical illuminance on properties. Limits apply to nearby dwellings, or potential dwellings, more specifically to their relevant surfaces or parts of surfaces, especially where windows are. The values consider the summation of all lighting installations.

Table 2 – Maximum values of vertical illuminance on properties

Light Technical Parameter	Application Conditions	Environmental Zones				
		E0	E1	E2	E3	E4
Illuminance in vertical plane (E_v)	Pre-curfew	n/a	2 lx	5 lx	10 lx	25 lx
	Post-curfew	n/a	< 0,1 lx*	1 lx	2 lx	5 lx
* If the installation is for public (road) lighting then this value may be up to 1 lx.						

3.6.5.2 Limitation of bright luminaires in the field of view

The limits for the luminous intensity of bright luminaires are dependent on the viewing distance, d, (between observer and the bright luminaire) and the projected area, A_p, of the bright part of the luminaire in direction to the observer. Table 3 shows the maximum values for the luminous intensity of luminaires in designated directions where views of bright surfaces of luminaires are likely to be troublesome to residents or, from positions where such views are likely to be maintained, i.e. not where momentary or short-term viewing is involved.

Table 3 – Maximum values for luminous intensity of luminaires in designated directions

Light Technical Parameter	Application Conditions	Luminaire group (projected area A_p in m²)				
		$0<A_p\leq0{,}002$	$0{,}002<A_p\leq0{,}01$	$0{,}01<A_p\leq0{,}03$	$0{,}03<A_p\leq0{,}13$	$0{,}13<A_p\leq0{,}50$
Maximum luminous intensity emitted by luminaire (I in cd)	**Environmental Zone E0** Pre-curfew: Post-curfew:	0 0	0 0	0 0	0 0	0 0
	Environmental Zone E1 Pre-curfew: Post-curfew:	$0{,}29\cdot d$ 0	$0{,}63\cdot d$ 0	$1{,}3\cdot d$ 0	$2{,}5\cdot d$ 0	$5{,}1\cdot d$ 0
	Environmental Zone E2 Pre-curfew: Post-curfew:	$0{,}57\cdot d$ $0{,}29\cdot d$	$1{,}3\cdot d$ $0{,}63\,d$	$2{,}5\cdot d$ $1{,}3\cdot d$	$5{,}0\cdot d$ $2{,}5\cdot d$	$10\cdot d$ $5{,}1\cdot d$
	Environmental Zone E3 Pre-curfew: Post-curfew:	$0{,}86\cdot d$ $0{,}29\cdot d$	$1{,}9\cdot d$ $0{,}63\cdot d$	$3{,}8\cdot d$ $1{,}3\cdot d$	$7{,}5\cdot d$ $2{,}5\cdot d$	$15\cdot d$ $5{,}1\cdot d$
	Environmental Zone E4 Pre-curfew: Post-curfew:	$1{,}4\cdot d$ $0{,}29\cdot d$	$3{,}1\cdot d$ $0{,}63\cdot d$	$6{,}3\cdot d$ $1{,}3\cdot d$	$13\cdot d$ $2{,}5\cdot d$	$26\cdot d$ $5{,}1\cdot d$

NOTE 1 d is the distance between the observer and the glare source in metres.
NOTE 2 A luminous intensity of 0 cd can only be realized by a luminaire with a complete cut-off in the designated directions.
NOTE 3 For further information, please refer to Annex C.

3.6.5.3 Limitation of the effects on transport systems

Limits apply where users of transport systems are subject to a reduction in the ability to see essential information. Table 4 gives values that are for relevant positions and for viewing directions in the path of travel.

Table 4 – Maximum values of threshold increment and veiling luminance from non-road lighting installation

Light Technical Parameter	Road Classification[1]			
	No road lighting	M6 / M5	M4/ M3	M2 / M1
Veiling luminance[2] (L_v)	0,037 cd/m²	0,23 cd/m²	0,40 cd/m²	0,84 cd/m²
Threshold increment	15 % based on adaptation luminance of 0,1 cd/m²	15 % based on adaptation luminance of 1 cd/m²	15 % based on adaptation luminance of 2 cd/m²	15 % based on adaptation luminance of 5 cd/m²

[1] Road Classifications as given in CIE 115:2010 (CIE, 2010).
[2] The veiling luminance values specified in this table are based on a permissible TI value of 15 %.

3.6.5.4 Limitation of sky glow

Table 5 specifies maximum values of upward light ratio (ULR) of luminaires, without taking into account the effect of light reflected upwards from the ground that also contributes to sky glow. This is the traditional method to limit sky glow and suitable to compare different single luminaires.

Table 6 enables the effect of both direct and reflected upward components of a whole installation to be taken into account. Here the limiting parameter is the upward flux ratio (UFR). It is suggested that Table 6 be used for all installations consisting of four or more luminaires. Clauses 6.4.2 and 6.4.3 describe the calculation methods for both ULR and UFR.

As mentioned earlier, that light emitted just above the horizon in a zone between 90° and 110° is extra-critical for sky glow in large areas around observatories. Therefore, as a measure additional to ULR or UFR in these areas, the luminous intensities in this critical zone ($I_{90°-110°}$) should be limited as follows:

between 90° and 100°: < 0,5 cd/1000 lm, and

between 100° and 110°: 0 cd.

Table 5 – Maximum values of upward light ratio of luminaires

Light Technical Parameter	Environmental Zones				
	E0	E1	E2	E3	E4
Upward light ratio (ULR) / %	0	0	2,5	5	15

Table 6 – Maximum values of upward flux ratio of installation (of four or more luminaires)

Light Technical Parameter	Type of Installation	Environmental Zones				
		E0	E1	E2	E3	E4
Upward flux ratio (UFR) / %	Road	n/a	2	5	8	12
	Amenity	n/a	n/a	6	12	35
	Sports	n/a	n/a	2	6	15

3.6.5.5 Limitation of the effects of over-lit building façades and signs

In urban lighting it is important to audit and determine appropriately the luminance values that provide visibility. When such factors are not observed, lighting levels are often increased, and these increased lighting levels can often cause negative impacts, such as:

1) the continuous increase in the lighting levels (ratcheting),
2) the rise of energy usage,
3) light pollution,
4) the increase in the production and usage expenses of the lighting.

As users perceive the higher lighting levels during the day, they often like high lighting levels also during the night-time as for utility and architectural lightings and they feel themselves safe and secure. Therefore, some restrictions to the lighting must be made accordingly, ideally following a "Masterplan".

Annex C

Derivation of Table 3

Besides the fact that the maximum values for intensity of luminaires in designated directions as fixed in CIE 150:2003 do not depend on the distance between the glare source and the observer, it is more useful and accurate to use maximum values of luminance $\bar{L}_{s,max}$ for the assessment of the obtrusive glare effect. Therefore, the maximum values for luminance are used here to derive the maximum values for intensity as given in Table 3. As a consequence, these limiting values, $I_{s,max}$, depend on the distance between the glare source and the observer (Walkling and Schierz, 2011).

In the field of emission control, the following formula can be used as a convention for calculating values for the maximum tolerable mean luminance of a technical glare source (LiTG, 2011; Eberbach, 2002):

$$\bar{L}_{s,max} = k\sqrt{\frac{L_b}{\Omega_s}}. \tag{C.1}$$

Assuming that $I_{s,max} = \bar{L}_{s,max} \cdot A_p$ leads to the following equations:

$$I_{s,max} = k\sqrt{\frac{L_b}{\Omega_s}} \cdot A_p \tag{C.2}$$

$$I_{s,max} = k\sqrt{L_b} \cdot \sqrt{A_p} \cdot d \tag{C.3}$$

where

$\bar{L}_{s,max}$ is the maximum tolerable mean luminance of a glare source in cd·m^{-2}, averaged over the associated solid angle Ω_s;

$I_{s,max}$ is the maximum tolerable luminous intensity of a glare source in cd;

L_b is the dominant luminance of the background/surroundings of the glare source in cd·m^{-2}. If the ambient luminance determined from measurements is less than 0,10 cd·m^{-2}, then L_b = 0,10 cd·m^{-2} is used for calculation;

Ω_s is the solid angle of the glare source seen from the observer position (immission point) in sr;

A_p is the projected area or apparent size of the glare source seen from the observer position in m^2;

d is the distance between the glare source and the observer position in m;

k is the proportionality factor that is used to decide the limiting values for $I_{s,max}$, depending on the environmental zone (cf. Table C.1)

The scope of Equation C.1 is limited to 0,10 cd·m^{-2} ≤ L_b ≤ 10 cd·m^{-2} and 10^{-7} sr ≤ Ω_s ≤ 10^{-2} sr. Table 3 is based on using L_b = 0,10 cd·m^{-2}. In case of a background luminance value greater than 0,10 cd·m^{-2}, a corrected maximum tolerable luminous intensity, $I'_{s,max}$, should be used, which is calculated as follows:

$$I'_{s,max} = I_{s,max} \cdot \sqrt{\frac{L_b}{0,10}} \tag{C.4}$$

The luminous intensity, I_s, of the assessed glare source should not exceed the values $I_{s,max}$ calculated according to Equation C.3 or C.4 and Table C.1. This applies to constant light that is switched on several times a week for more than an hour each time. If the light is on for shorter

times or less frequently, higher limiting values than $I_{s,max}$ are possible (e.g. in sports facilities). This must be dealt with separately on a case-by-case basis.

The assessment method can only be used on the condition that sight of the glare source from the observer position is feasible. This sight of the glare source is then taken as the line of sight because the eye generally turns involuntarily to the glare source since this is often the most prominent light object that can be seen in the field of view.

Table C.1 – Proportionality factor k used to decide for the maximum permitted luminous intensity, $I_{s,max}$, of technical light sources during the hours of darkness based on the environmental zones E0 – E4

Environmental zones	Proportionality factor k	
	Pre-curfew	Post-curfew
E0	0	0
E1	32	0
E2	64	32
E3	96	32
E4	160	32

Assuming that conventional luminaires show an elliptical or circular light emitting area of less than 80 cm in (mean) diameter, one can derive a number of luminaire groups, based on the size of their light emitting area, as shown in Table C.2. The table shows the derivation of the corresponding representative area for each of these groups, used for the calculation of the values in Table 3 (Brewig, 2008).

Table C.2 – Determination of the representative area used for the specification of the maximum permitted luminous intensity, $I_{s,max}$, of technical light sources

Parameter	Geometric grading of luminaires (according to mean diameter)				
	2 cm – 5 cm	**5 cm – 10 cm**	**10 cm – 20 cm**	**20 cm – 40 cm**	**40 cm – 80 cm**
Luminaire group (Area A in m²)	$0{,}0003<A\leq0{,}002$	$0{,}002<A\leq0{,}01$	$0{,}01<A\leq0{,}03$	$0{,}03<A\leq0{,}13$	$0{,}13<A\leq0{,}50$
Geometric mean of the diameter (in cm)	3,2	7,1	14,1	28,3	56,6
Corresponding representative area (in m²)	0,0008	0,004	0,016	0,063	0,251

Given the margins of error of the illuminance and luminance meters assumed to be used here, and assuming careful execution of the measurement (e.g. correct aiming, focussing and positioning), a breach of the limiting values regarding $I_{s,max}$ as a motive for official restrictions can only be detected by measurement when the measured luminous intensity for I_s of the assessed light glare source is at least 30 % above the corresponding limiting value as given in Table 3. A relative error is assumed for each of the variables as follows: L_b (20 %), A (20 %), and d (10 %).

Annex D

Derivation of UFR formula

The calculation of luminous flux which contributes to light nuisance presented in this annex can easily be used by lighting design software.

The following equation, applied to a single lighting pole representative of the whole lighting installation, as in Figure 5, reflects the luminous flux balance by calculating the maximum upward luminous flux potentially lost towards the sky (UPF_{max}), symbol $\Phi_{UP,max}$, thus:

$$\Phi_{UP,max} = \Phi_{la} [R_{ULO,\alpha} + \rho_1 u + \rho_2 (R_{DLO,\alpha} - u)] \quad (D.1)$$

where

Φ_{la} is the assigned luminous flux of all involved lamps;

$R_{ULO,\alpha}$ is the upward light output ratio of the installation for a tilting angle α of the luminaire;

$R_{DLO,\alpha}$ is the downward light output ratio of an installation for a tilting angle α of the luminaire;

ρ_1 is the average reflectance of the reference surface;

ρ_2 is the average reflectance of the surroundings;

u is the utilization factor of the installation for the reference surface S.

This expression shows explicitly the sum of three portions that are the sources of the maximum upward luminous flux (UPF_{max}): the portion leaving the luminaires directly, the portion reflected by the reference surface and the portion reflected by the surroundings represented by a flat surface, assumed to be infinite.

In Equation D.1, the luminous flux of all lamps to be assigned to the installation, Φ_{la}, is dependent on the level of illuminance (or luminance) to be maintained and the maintenance factor, f_m, specific to the project. It is essential to express UPF_{max} related to these quantities.

The initial average illuminance, $\bar{E}_i$, of the installation on the reference surface S, issued from the lighting design, must be such that:

$$\bar{E}_i \geq \frac{\bar{E}_m}{f_m} \quad (D.2)$$

where

$\bar{E}_m$ is the average maintained illuminance, required on the reference surface S.

The average maintained illuminance from the lighting design, $\bar{E}'_m$, is:

$$\bar{E}'_m = \bar{E}_i \cdot f_m . \quad (D.3)$$

The utilization factor, u, is expressed as:

$$u = \frac{\bar{E}'_m \cdot A_r}{f_m \cdot \Phi_{la}} = \frac{\bar{E}_i \cdot A_r}{\Phi_{la}} \quad (D.4)$$

where

A_r is the area of the reference surface S.

From this we can derive:

$$\Phi_{la} = \frac{\bar{E}'_m \cdot A_r}{u \cdot f_m} = \frac{\bar{E}_i \cdot A_r}{u} \quad (D.5)$$

and, as a result, a new expression for Φ_{UPmax}:

$$\Phi_{UP,max} = \frac{\overline{E}'_m \cdot A_r}{f_m} \cdot \left[\frac{R_{ULO,\alpha}}{u} + \rho_1 + \rho_2 \left(\frac{R_{DLO,\alpha}}{u} - 1 \right) \right]. \quad (D.6)$$

The minimum value of UPF_{max}, UPF_{min} (symbol $\Phi_{UP,min}$), is obtained when $R_{ULO,\alpha} = 0$, $R_{DLO,\alpha} = u$, $f_m = 1$, and $\overline{E}'_m = \overline{E}_m$ then:

$$\Phi_{UP,min} = \rho_1 \cdot \overline{E}_m \cdot A_r . \quad (D.7)$$

The upward flux ratio can therefore be expressed by the equation:

$$R_{UF} = \frac{\Phi_{UP,max}}{\Phi_{UP,min}} . \quad (D.8)$$

With Equations D.6 and D.7 this leads to:

$$R_{UF} = \frac{\overline{E}_i}{\overline{E}_m} \cdot \left[1 + \frac{R_{ULO,\alpha}}{\rho_1 \cdot u} + \frac{\rho_2}{\rho_1} \left(\frac{R_{DLO,\alpha} - u}{u} \right) \right]. \quad (D.9)$$

When the UFR calculation is applied to the width of the carriageway, W_c, plus adjacent areas, 2 W_a, as explained in 6.4.3, there is no variation of $\Phi_{UP,max}$ when the average reflectance of the adjacent areas is the same as of the surroundings, ρ_2. The following applies:

$$\Phi_{UP,max} = \Phi_{la} \left[R_{ULO,\alpha} + \rho_1 u + \rho_2 \left(u' - u \right) + \rho_2 \left(R_{DLO,\alpha} - u' \right) \right] = \Phi_{la} \left[R_{ULO,\alpha} + \rho_1 u + \rho_2 \left(R_{DLO,\alpha} - u \right) \right] \quad (D.10)$$

where

u' is the utilization factor for the extended reference area, W_c + 2 W_a.

At the same time, however, $\Phi_{UP,min}$ changes due to the variation of the reflectance and the area. Assuming that $\overline{E}_m/2$ is the requirement on each adjacent area ($\overline{E}_m$ being the requirement for the carriageway), respecting thus a contiguity factor of 50 % on the adjacent areas, Equation D.7 becomes:

$$\Phi_{UP,min} = \rho_1 \cdot \overline{E}_m \cdot A_c + 2\rho_2 \frac{\overline{E}_m}{2} \cdot A_a = \rho_1 \cdot \overline{E}_m \cdot W_c \cdot s + 2\rho_2 \frac{\overline{E}_m}{2} \cdot W_a \cdot s = \left(\rho_1 \cdot W_c + \rho_2 \cdot W_a \right) \cdot s \cdot \overline{E}_m \quad (D.11)$$

where

s is the spacing of luminaires in the installation;
W_c is the width of the carriageway;
W_a is the width of the adjacent area on one side;
A_c is the area of the carriageway within one luminaire spacing ($A_c = W_c \cdot s$);
A_a is the area of the adjacent area on one side within one luminaire spacing ($A_a = W_a \cdot s$).

Finally, $\Phi_{UP,max}$ expressed for the carriageway area limited to one spacing becomes:

$$\Phi_{UP,max} = \overline{E}_i \cdot W_c \cdot s \cdot \left[1 + \frac{R_{ULO,\alpha}}{\rho_1 \cdot u} + \frac{\rho_2}{\rho_1} \left(\frac{R_{DLO,\alpha} - u}{u} \right) \right], \quad (D.12)$$

and the upward flux ratio for the same limited area, R'_{UF}, becomes:

$$R'_{\mathrm{UF}} = \frac{\overline{E}_{\mathrm{i}}}{\overline{E}_{\mathrm{m}}} \cdot \frac{W_{\mathrm{c}}}{W_{\mathrm{c}} + \frac{\rho_2}{\rho_1} W_{\mathrm{a}}} \cdot \left[1 + \frac{R_{\mathrm{ULO},\alpha}}{\rho_1 \cdot u} + \frac{\rho_2}{\rho_1} \left(\frac{R_{\mathrm{DLO},\alpha} - u}{u} \right) \right] \tag{D.13}$$

Considering Equation D.9, the upward flux ratio for the carriageway area limited to one spacing can be expressed as:

$$R'_{\mathrm{UF}} = \frac{\rho_1 \cdot W_{\mathrm{c}}}{\rho_1 \cdot W_{\mathrm{c}} + \rho_2 \cdot W_{\mathrm{a}}} \cdot R_{\mathrm{UF}}$$

It should be noted that in case of road lighting design based on luminance requirements, an increasing reflectance of the road surface, ρ_1, results in a decreasing initial average illuminance, $\overline{E}_{\mathrm{i}}$, and, consequently, less spill light by reflection.

Attachment 2

Upward Flux Ratio Calculations & Sensitivity Analysis

Upward Flux Ratio (UFR)

Per CIE150: 2017, page 26, Equation 4

by M. Papineau, August 22, 2019

UFR is obtained from the formula:

$$R_{UF} = \frac{E_i}{E_m}\left[1 + \frac{R_{ULO,\alpha}}{\rho_1 \cdot u} + \frac{\rho_2}{\rho_1}\left(\frac{R_{DLO,\alpha} - u}{u}\right)\right]$$

UFR Calculator

ENTER DATA:

Ei/Em	1.08	initial illuminance/maintained illuminance
$R_{ULO,\alpha}$	0.082	ratio of upward directed light
$R_{DLO,\alpha}$	0.918	ratio of downward directed light
ρ_1	0.25	field turf reflection
ρ_2	0.23	other reflection by surroundings
u	0.4	utilization factor

RESULT:

UFR= 3.3 — Exceeds limit for zone E2.

*See CIE150: 2017, Table 6.

UFR sensitivity to utilization factor, "u"

UFR equals or exceeds 3 (rounded) for "u" between 0.35 and 0.43.

	Case 1	Case 2	Case 3	Case 4	Case 5
Ei/Em	1.08	1.08	1.08	1.08	1.08
$R_{ULO,\alpha}$	0.082	0.082	0.082	0.09	0.1
$R_{DLO,\alpha}$	0.918	0.918	0.918	0.91	0.9
ρ_1	0.25	0.25	0.25	0.30	0.30
ρ_2	0.21	0.22	0.23	0.23	0.23
u	**UFR**	**UFR**	**UFR**	**UFR**	**UFR**
0.35	3.6	3.6	3.7	3.3	3.4
0.36	3.5	3.5	3.6	3.2	3.3
0.37	3.4	3.4	3.5	3.2	3.2
0.38	3.3	3.4	3.4	3.1	3.2
0.39	3.2	3.3	3.3	3.3	3.1
0.4	3.1	3.2	3.3	2.9	3.0
0.41	3.1	3.1	3.2	2.9	2.9
0.42	3.0	3.1	3.1	2.8	2.9
0.43	2.9	3.0	3.0	2.8	2.8

UFR sensitivity to reflectances

UFR equals or exceeds 3 (rounded) for cases where turf reflection is 0.22 to 0.30 and other reflection >0.20.

1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08
0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082
0.918	0.918	0.918	0.918	0.918	0.918	0.918	0.918	0.918	0.918	0.918	0.918	0.918	0.918	0.918	0.918
0.22	0.24	0.26	0.25	0.25	0.25	0.25	0.27	0.27	0.27	0.27	0.28	0.28	0.28	0.28	0.30
0.20	0.22	0.23	0.20	0.21	0.22	0.23	0.21	0.22	0.23	0.24	0.21	0.22	0.23	0.24	0.23
0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
3.4	3.3	3.2	3.1	3.1	3.2	3.3	3.0	3.0	3.1	3.1	2.9	3.0	3.0	3.1	2.9

CIE150: 2017 Threshold Limits

Table 6 – Maximum values of upward flux ratio of installation (of four or more luminaires)

Light Technical Parameter	Type of Installation	Environmental Zones				
		E0	E1	E2	E3	E4
Upward flux ratio (UFR) / %	Road	n/a	2	5	8	12
	Amenity	n/a	n/a	6	12	35
	Sports	n/a	n/a	2	6	15

NOTE: *SMHS proposes eight (8) upward-directed. ball-in-flight luminaires, with two on each of poles F2, F3, F6, and F7.*

Data for UFR calculation

San Marin High School Stadium Lighting

Novato, CA

			maintained	initial		maintained	initial	
DLO	38	**Downward-directed luminaires**	111,320	121,000	lumens	4230160	4598000	lumens
ULO	8	**Upward-directed luminaires**	50,000	52,000	lumens	400000	416000	lumens
DLO	4	**Bleacher lights**	63,600	65,600	lumens	254400	262400	lumens
LO	50	**Total light output**		SUM		4884560	5276400	
Ei/Em		initial lumens divided by maintained lumens			ratio		1.08	unitless
ULO		uplight output subtotal				400000		lumens
R_{ULO}		uplight output ratio (uplight lumens dividied by total lumens)				0.082		unitless
DLO		downlight output subtotal				4484560		lumens
R_{DLO}		downlight output ratio (downlight lumens divided by total lumens)				0.918		unitless

NOTE: *This assumption that none of the doward-directed luminaires emits any light above the horizontal plane of the luminaires is conservative.*

u		utilization (football field divided by total)	0.43	ratio
		football field area (53 yds x 120 yd)	5,320	m^2
		other area	6,970	m^2
		total area	12,290	m^2
ρ_1	100%	reflectance of turf field	0.25	unitless
ρ_2	5%	reflectance of new concrete	0.45	unitless
ρ_2	40%	reflectance of aged concrete	0.25	unitless
ρ_2	15%	reflectance of matt aluminum	0.57	unitless
ρ_2	5%	reflectance of aged asphalt	0.11	unitless
ρ_2	15%	reflectance of soil	0.17	unitless
ρ_2	5%	reflectance of facial skin	0.30	unitless
ρ_2	15%	reflectance of plaster	0.42	unitless
ρ_2		average reflectance of surroundings	0.23	unitless

Glossary & Notation

u — utilization factor (playing field area divided by the total illuminated area)
The numerator used for estimating utilization factor is the football field area ~53 yards x 120 yds (~5320 m2).
The denominator used for the estimate is the field plus additional area (*e.g* ., sideline, track, and bleachers).
The total area is ~12,290 m2.

$\rho 1$ — reflectance of the surface being lit

$\rho 2$ — reflectance of the surrounding area

R_{ULO} — ratio of upward light output to total light output

R_{DLO} — ratio of downward light output to total light output

Letter 16

COMMENTER: Marc Papineau

DATE: August 23, 2019

Response 16.1

The commenter states in an email that he is attaching a letter dated August 23, 2019; that this letter (Letter 16) supersedes his previous letter (dated August 19, 2019, included as Letter 17 here); and that the District should disregard his previous letter (Letter 17). The District acknowledges that the older version of this letter, reproduced in this EIR as Letter 17, should be disregarded and replaced by the letter attached to the email (Letter 16).

Response 16.2

The commenter provides background on the legal process leading to the Revised Draft EIR, and states an opinion that the use of the word "rural" in describing lighting zone E2 is superfluous. This comment is noted; however, removing the word "rural" would not make the discussion of the lighting zone more accurate or clear, so is not necessary.

Response 16.3

The commenter disagrees with the thresholds and standards used to assess lighting impacts in the Revised Draft EIR. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 16.

Response 16.4

The commenter disagrees with the methodology and assessment of lighting impacts in the Revised Draft EIR, including how the EIR assesses impacts of light from upward-facing luminaires on certain off-site receivers. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 16.

Response 16.5

The commenter disagrees with the thresholds and methodology used to assess glare impacts in the Revised Draft EIR. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 16.

Response 16.6

The commenter states an opinion that upward-facing lights were not accounted for properly in the Revised Draft EIR impact analysis. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 16.

Response 16.7

The commenter states an opinion that glare impacts should have been modeled for specific individual receivers, including those farther from the project site. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 16.

Response 16.8

The commenter states an opinion that upward-facing lights were not accounted for properly in the Revised Draft EIR impact analysis, and suggests that impacts would be significant. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 16.

Response 16.9

The commenter disagrees with the thresholds and methodology used to assess glare impacts in the Revised Draft EIR. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 16.

Response 16.10

The commenter states an opinion that the project's small contribution regional sky glow is potentially significant, and that local additions to sky glow in the immediate area of the stadium can cumulatively impact the local viewshed. The commenter goes on to challenge the thresholds and methodology used to assess sky glow impacts in the Revised Draft EIR, as well as the EIR's characterization of the setting for sky glow. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 16.

Response 16.11

The commenter states an opinion that the project would have greater impacts on nighttime scenic views from various vantage points from stadium light glare and illumination than identified in the Revised Draft EIR. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 16.

Response 16.12

The commenter states an opinion that the stadium lights would have greater impacts on dusk and evening view quality and character than identified in the Revised Draft EIR. The commenter presents methodology from another agency, the Federal Highway Administration, to assess these impacts. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 16.

Response 16.13

The commenter states an opinion that aesthetic impacts of the project related to lighting would be significant. The commenter also suggests that the Reduced Lighting System Alternative does not provide enough detail on the lighting levels of the alternative, and that the alternative should specify a quantitative lighting level. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 16.

Response 16.14

The commenter states an opinion that the District could increase use of the field or could propose "additional lighting projects" that could result in cumulative impacts, and that such projects are not listed in the Revised Draft EIR. This comment is noted; however, such projects are not listed because they are not proposed at this time, so the cumulative setting presented in Section 3, Cumulative Impacts, is accurate and forms an accurate basis for the cumulative impacts analysis. No changes to the EIR are necessary.

Response 16.15

The commenter summarizes the previous comments. Please see responses 16.2 through 16.14, as well as Master Response: Light and Glare Impacts, Section J, responses to Letter 16.

Letter 17

August 19, 2019

Mr. Yancy Hawkins, Assistant Superintendent
Business and Operations
Novato Unified School District
1015 7th Street
Novato, California 94945

Subject: Comments on San Marin High School Stadium Lights Project Revised Draft Environmental Impact Report, SCH#2016082086, dated July 2019

Dear Mr. Hawkins:

Comments submitted by this letter are made respectfully on behalf of the neighbors of San Marin High School:

1. Classification of environmental setting as Zone E2

The Writ of Mandate acknowledges (p. 14, ll. 11-14) that the District used significance thresholds for glare based on the guidance published by the International Commission on Illumination (CIE), which industry group sets relevant limits on various light technical parameters for outdoor lighting installations. The published thresholds apply to spill light, glare, and sky glow added by a project and vary depending on which of the five CIE ambient brightness zones the surrounding area falls within, *i.e*., E0 and E1 for the darkest areas to E4 for the brightest urban centers.

We appreciate that the District has followed the advice of the Court and has acknowledged the appropriate low ambient brightness zone for the project site and neighborhood as the CIE150: 2017 E2 zone. Zone E2, according to the Revised Draft EIR (page 9) can be described as "sparsely populated rural areas." We add, borrowing from the language of CIE150:2017 and other relevant guidance such as the ILP and IESNA guidance, that the E2 zone essentially is an area having low ambient brightness and, for example, could include relatively dark outer suburban areas in addition to rural areas. The school's neighborhood adjoins unlighted open space preserves (Mt. Burdell, Little Mountain, Verissimo Hills), an unlighted city park (O'Hair Park), an unlighted riding stable, an unlighted natural riparian corridor (Novato Creek), and the Bay Area Ridge Trail. Or, as stated by Court:

> *In all, the roads and neighborhoods adjacent to the school have low brightness against a dark background of undeveloped hills and open space.* (Writ of Mandate, p. 3)

The area is acknowledged to have low ambient brightness. It is superfluous to add the phrase "for rural areas" after E2 zone or to add the adjective "rural" before E2 zone anywhere in the Revised Draft EIR (see pages 3, 9, 24, and 48).

5789 Gold Creek Drive Castro Valley, California 94552 FAX (510) 581-7204 TEL (510) 881-8574

2. CIE's thresholds of significant effect

The Writ of Mandate acknowledges (p. 14, ll. 11-14) that the District used significance thresholds based on the guidance published by (CIE), which are tailored to each of four defined ambient brightness zones. As stated on the previous page, published thresholds in CIE150: 2017 apply to spill light, glare, and sky glow added by a project. These thresholds are set out in Tables 2, 3, and 6 of CIE150: 2017.

Continuing in the District's CEQA document, the Revised Draft EIR (page 3) asserts that the proposed project's lighting system would meet CIE's threshold [singular] for the E2 zone. In regard to this assertion, I wish to point out that CIE150: 2017 has three separate thresholds of significant effect, one for each for spill light, glare, and sky glow contributed by artificial lighting systems. The District refers to this as CIE's threshold [singular] and also as the CIE150 standard [singular] and applied only the threshold for spill light in the E2 zone.

Continuing deeper into the Revised Draft EIR and its appendices, one finds analysis of spill light and comparison to the CIE150: 2017 Table 2 threshold for the E2 zone. However, oddly, one finds no evaluation of glare or sky glow relative to the methodology or thresholds of significant effect in CIE150: 2017 Tables 3 and 6. CIE150:2017 Table 3 sets out thresholds of significant effect for project-caused glare, and Table 6 sets out performance standards for a project's incremental contribution to sky glow.

The main body of the Revised Draft EIR mentions glare (pp. 4, 6, 10, 14, 16, 19, 24, 39-46, 48) without substantive consideration of CIE150: 2017 Table 3 and key project elements that could cause significant glare. One such project element are the upward-directed ball-in-flight luminaires on poles F6 and F7. The main body of the Revised Draft EIR mentions sky glow (pp. 7, 10, 19-20, 24, 40-46) without substantive consideration of CIE150: 2017 Table 6 and key project elements that could cause significant incremental sky glow. Lack of evaluation of glare and sky glow relative to appropriate light technical parameters and thresholds is a conspicuous omission in the Revised Draft EIR, which oddly does apply CIE150: 2017 Table 2 in evaluating spill light while omitting reference to Table 3 which is relevant to glare and Table 6 which is relevant to sky glow.

In place of the relevant thresholds for glare and sky glow, the District instead applies 10,000 candela (cd) and the Bortle Scale. Neither is an appropriate threshold for the E2 zone, and neither is based on CIE150: 2017. The Bortle Scale is a descriptive index or scale used for classifying astronomical viewing quality for nighttime viewing of stars, the Milky Way galaxy, and nebulae. The District preferably should delete references to 10,000 cd and the Bortle Scale and apply the thresholds set forth in CIE150: 2017

3. Key project elements

One related observation here is that the ball-in-flight lights or upward-directed lights that are parts of the project,—on poles F2, F3, F6 and F7,—are barely discussed in the Revised Draft EIR (see pages 15 and 19). Where they are mentioned, these upward-directed lights are described as "lower output" and, where they are mentioned, the upward-directed lights are asserted not to cause glare that could be problematic.

To the contrary, we believe that the glare caused by the ball-in-flight lights will be significant at elevated viewer locations including private property and public spaces such as the Bay Area Ridge Trail. Furthermore, these upward-directed ball-in-flight lights and reflection from the field and bleachers will likely cause incremental sky glow that exceeds the CIE150: 2017 threshold of significant effect.

Current photometric modeling presented in the Revised Draft EIR, Appendix C, does not evaluate any off-site receivers or any off-site elevated receivers. In particular, therefore, we question whether the modeling captures the effect of the proposed upward-directed ball-in flight lights. Of the receiver locations for which modeling results are provided, none qualifies as an elevated receiver above the horizontal plane of the upward-directed luminaires (*i.e.*, above an elevation of approximately 129 feet).

The District should describe the ball-in-flight lights, identify their locations (*e.g.*, by pole and elevation), their aiming lines, and geometric area of the LED source. The District should evaluate the effect of the upward-directed ball-in-flight lights. Glare should be modeled at off-site receivers including those which are elevated above the elevation of the ball-in-flight lights (approximately 129 feet).

4. Appropriate thresholds of significant effect for glare in E2 zone

According to the Writ of Mandate (p. 14, ll. 3-8), the original Draft and Final EIRs evaluated the effect of glare on residents and on adjacent public streets and sidewalks by units of intensity called "candelas." Bright lights from stadiums can cause an annoying or painful sensation in persons, ranging from the painful, but less serious "discomfort glare" to "disabling glare", depending on a person's proximity to the stadium lights. (AR 70) The original EIRs assumed that light intensity of 500 candelas (cd) or less when measured at the school's property lines would result in no "discomfort glare" at those residences which face the school.

For considering potential glare effects of the proposed project, the Revised Draft EIR does not use a 500 cd threshold or any other appropriately determined threshold limit for the E2 zone based upon CIE150: 2017. The Revised Draft EIR (pp. 10) instead asserts that 5 lux (0.5 foot-candles) is useful as a proxy threshold for glare impact—in other words, that projects having less than 5 lux (0.5 fc) spill light could not have a glare impact. Appendix B (pp. 1-3, 6) of the Revised Draft EIR further asserts that projects having modeled candela levels less than 10,000 cd could not have a glare impact. Based upon application of either the proxy lux threshold or the 10,000 cd threshold for significant glare effect, the proposed project was determined in the Revised Draft EIR to have a less-than-significant glare impact.

The Revised Draft EIR cites CIE150:2017 in regard to the spill light threshold for the E2 zone (5 lux or approximately 0.5 fc). Even so, the Revised Draft EIR does not evaluate glare relative to the CIE150: 2017 recommended threshold limit for glare in the E2 zone, does not consider off-campus glare, and applies 10,000 cd threshold rather than 500 cd or another appropriately determined candela threshold limit for the E2 zone based upon CIE150: 2017.

Contrary to the assertions in the Revised Draft EIR, adverse glare effects could be manifest even though spill light at perimeter campus locations is less than 5 lux (approximately 0.5 fc) and also could be manifest at much lower thresholds than 10,000 cd. Glare is not a simple function of distance, and depends critically on geometry and observer elevation relative to the proposed light sources. This means that predictions of glare effects at the property line at a given receiver elevation are not necessarily representative of glare effects as viewed off-site at receivers having a higher elevation (*i.e.*, above the horizontal plane of the upward-directed lights). This would have been apparent if the District had applied CIE150: 2017 Table 3.

Glare impacts will be worse at specific off-site receivers that are elevated relative to the upward-directed ball-in-flight lights than at the perimeter locations modeled in the Revised Draft EIR, Appendix C. Off-site glare levels could exceed 1,000 cd and therefore, could exceed the CIE150: 2017 glare thresholds for the E2 zone at specific receivers. These thresholds vary depending on receiver location,

distance and elevation. Independent implementation of Table 3 shows that the threshold of significant effect for glare at off-site receivers could be as low as approximately 660-940 cd, depending on off-site location, distance and elevation.

The reasons for the apparently contrary result wherein off-site glare could exceed on-site or on-campus glare is explained as follows. First, for the on-campus receivers located below approximately 129 feet in elevation, the LED sources of ball-in-flight lights would not be directly visible. Photometric modeling in Appendix C presents results for on-campus receivers which generally are below the 129 feet elevation of upward-directed ball-in-flight lights. Photometric modeling truncated at the property line and did not extend off-site to elevated locations above the elevation of upward-directed ball-in-flight lights. Photometric modeling appears to have been limited to on-site locations 3 feet above existing grade elevation. Existing grade elevation of the field is approximately 109 feet. Relative elevation of the ball-in-flight lights is approximately +20 feet or 129 feet. Receivers at Santa Yorma Court, San Ramon Way, Santa Gabriella Court and at other observers (also termed "receivers") above an elevation of 129 feet would look down on the ball-in-flight lights. Photographic documentation supports this.

Second, it is unclear whether any of the ball-in-flight luminaires is accounted for in the photometric modeling presented in Appendix C. This is not critical for on-campus receivers near field level; however, it becomes critical for elevated off-site receivers. It appears that spill light (fc or lux) and glare (candela) were modeled generally for on-campus receivers or, if off-site, for receivers at elevations below 129 feet. It is essential to model glare for specific off-site receivers, because glare from the upward-directed ball-in-flight luminaires would not manifest until sufficient elevation were attained. Photographs suggest that substantial glare will occur at elevated receivers (*e.g.*, 5 Santa Yorma Court and 10 Santa Gabriella Court), which clearly originates from ball-in-flight luminaires. Photographs suggest that this glare originates from the ball-in-flight luminaires mounted on poles F6 and F7 and that the glare increases for the higher elevations despite increased distance from the light source.

Third, the threshold of significant effect in the E2 zone is not uniform for all receivers and certainly is not 10,000 cd for any receiver located within 200 meters of the glare source. According to CIE150: 2017 Table 3, the lowest glare threshold limit would not be more than approximately 1,000 cd for receivers at 132 - 188 meters (433 - 616 feet) from the glare source. Appropriate threshold limits depends on the light source's elevation and aiming and the receiver's location, elevation and distance from the source.

None of the modeled glare results at the selected perimeter locations chosen for modeling appears to be influenced by or take into account upward-directed ball-in-flight lights. Ball-in-flight lights are mounted at 20 feet above field elevation (109 feet) or 129 feet. Due to a grassy berm about 15-25 feet high (relative to stadium field elevation), elevations of perimeter locations chosen for modeling appear to be near 124-134 feet. Standing on a backyard deck or on ridgeline trail, off-campus observers will not be viewing from lower than approximately 139 feet or, in the case of the open space trails, from lower than 159 feet or higher. Photographs suggest that glare will be significant at these and other elevated locations. Independent calculations, which were based upon CIE150: 2017 glare thresholds for the E2 zone, show that 1,000 cd will exceed threshold limits at specific elevated receivers located 132 - 188 m from the ball-in-flight glare sources.

The Revised Draft EIR should evaluate glare relative to the CIE150: 2017 recommended threshold limits for glare. The threshold limits are outlined in Table 3 of CIE150: 2017. For the E2 zone, thresholds depend on the apparent area of the glare source termed the "projected area" and also depend on

receiver distances from the glare source and elevations above the glare sources. The modeling and evaluation specifically should account for the effect of ball-in-flight luminaires on elevated receivers.

4. Appropriate thresholds of significant effect for sky glow in E2 zone

The Writ of Mandate recites (p. 13, ll. 12-18) the charge or objective of the EIR as promised in the original Draft and Final EIRs, which is to assess the project's potential aesthetic impacts on scenic vistas; visual character; light spillover/trespass; glare; and sky glow. Stadium lights may have a significant effect if: 1 - they have a substantial adverse effect on a scenic vista; 2 - they substantially degrade the existing visual character or quality of the site or its surroundings; or 3 - the lights create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.

Potential sky glow is within the charge of the EIR; however, it is less than clear from the narrative how the impact of sky glow is to be gauged. The Court in its Writ of Mandate (p. 33, ll. 10-24) has previously rejected as faulty all of the following lines of reasoning:

1. The amount or effect of sky glow will be "minimal" because it will be limited to the early evening hours (before 8:30 p.m.).

2. The amount or effect of sky glow will occur in a location with existing nighttime lighting (including street lamps along the adjacent roadway and security lighting on the adjacent campus) and, therefore, will not substantially contribute to sky glow during sensitive nighttime hours.

3. The City of Novato and the greater San Francisco Bay Area have nighttime skies that are subject to substantial existing light pollution and are not sensitive to additional artificial light.

The original Draft and Final EIRs concluded that the proposed stadium lights would not substantially contribute to sky glow near the school site and impacts would be less than significant. (AR 860) They did so on the basis of faulty reasoning invoking both the timing of the light and the "drop-in-a-bucket story." The court found the premises of this reasoning to be faulty and the court found insufficient evidence in the record to support the District's conclusion that the effect of sky glow on the scenic views would be minimal.

Ironically, the Revised Draft EIR again takes a similar position that the project's effect could only be significant if it caused a change in nighttime viewing of astronomical bodies including stars, nebulae or the Milky Way galaxy. As before, sky glow is conceptualized as a regional phenomenon, which is true in that the San Francisco Bay Area is an intensively developed area and sky glow extends across the region. This time, the Revised Draft EIR effectively asserts that no individual project such as the proposed stadium lighting project could cause sky glow or change the existing degree of sky glow in the region. To wit, the Revised Draft EIR (page 7) asserts as follows: "The entirety of Marin County is [mapped as] Bortle Class 5." From there, the Revised Draft EIR proceeds to apply Bortle Scale as a light technical parameter or metric for assessing project's effect.

Bortle Scale refers to a night sky viewing scale used by astronomers to describe the darkness of the night sky and relative viewing quality of an area for views of stars, the Milky Way galaxy, and nebulae. The Revised Draft EIR asserts that the proposed project's effect would be less-than-significant

because the proposed project would not change the Bortle Scale rating of night sky viewing in the area or upward-directed lights would be designed to provide only the minimum amount of illumination necessary to see airborne objects [often called "balls"] in the stadium.

This is not a lucid exposition of either the project's potential effect on sky glow or its effect on nighttime views. The Revised Draft EIR appears to be stuck in the "drop-in-a-bucket story." The revised exposition is incorrect on many levels. Here's a list:

1. Factually, the statement that all of Marin County is mapped as an area today having a Bortle Scale of 5 is untrue. In Novato, heading west along Novato Boulevard, the Bortle Scale drops from 5^{+} near U.S. Highway 101 to $5^{+}/5^{-}$ near Novato High School to 4.5^{+}, 4.5^{-} and to 4. See Figure 1.

2. An area's sky glow and the Bortle Scale are related; indeed, it would be an onerous task to isolate the individual contributions of existing land developments to sky glow and assign responsibility or rank all the increments. This does not mean that individual projects cannot have individually minor yet cumulatively considerable impacts on the area's sky glow.

3. The Bortle Scale is a relative scale like highway level of service A to F. The Bortle Scale is not a threshold of significant effect and is not among the light technical parameters set forth in CIE150: 2017.

Bortle Scale is not the appropriate metric, so what is? An appropriate light technical parameter for rating a project's incremental contribution to sky glow is called the Upward Flux Ratio (UFR). For sports lighting in the E2 zone, CIE150: 2017 Table 6 recommends a limit of 2. (*NOTE: UFR is not additive. Two identical side-by-side installations each having a UFR of 2 would have a combined UFR of 2—not 4!*) CIE150: 2017 recommends that a UFR up to 2 could be acceptable in the E2 zone, up to 6 in the E3 zone, and up to 15 in the E3 zone.

The reason for this "sliding" threshold is to be more protective of sensitive areas by curtailing the proliferation of upward-directed light into existing low ambient brightness areas. If this or a similar kind of approach as set forth in CIE150: 2017 Table 6 were not followed, the end result is that someday in the future all of Marin County could have a Bortle Scale of 5^{+}. To avoid such effects, CEQA Guidelines acknowledge that some project effects although individually minor may be cumulatively considerable.

The Revised Draft EIR (page 19) maintains as follows: "The lighting report prepared for the project evaluated the proposed stadium lighting system's contribution to both marine layer sky glow and clear sky glow…The stadium lights did not substantially contribute to sky glow produced by the greater community. Moreover, the lighting report determined that the stadium lighting does not contribute enough uplight to affect clear sky glow in Marin County."

Turning to the lighting technical report (Appendix B, pp. 6-7) one finds in place of a technical analysis a repeat of the "drop-in-a-bucket story": "The entirety of Marin County is Bortle Class 5, which means a moderate amount of anthropogenic sky glow. The stadium light creates far too little uplight to affect the clear sky glow of Marin County."

Conditions at Zenith			
Color	Artificial / Natural Sky Brightness	Sky Brightness mags / sq arcsec V Band	Bortle Scale approx.
	< 0.01	22.00 to 21.99	1
	0.01 to 0.06	21.99 to 21.93	2
	0.06 to 0.11	21.93 to 21.89	2
	0.11 to 0.19	21.89 to 21.81	3
	0.19 to 0.33	21.81 to 21.69	3
	0.33 to 0.58	21.69 to 21.51	4
	0.58 to 1.00	21.51 to 21.25	4
	1.00 to 1.73	21.25 to 20.91	4.5
	1.73 to 3.00	20.91 to 20.49	4.5
	3.00 to 5.20	20.49 to 20.02	5
	5.20 to 9.00	20.02 to 19.50	5
	9.00 to 15.59	19.50 to 18.95	6
	15.59 to 27.00	18.95 to 18.38	7
	27.0 to 46.77	18.38 to 17.80	8
	>46.77	>17.80	9

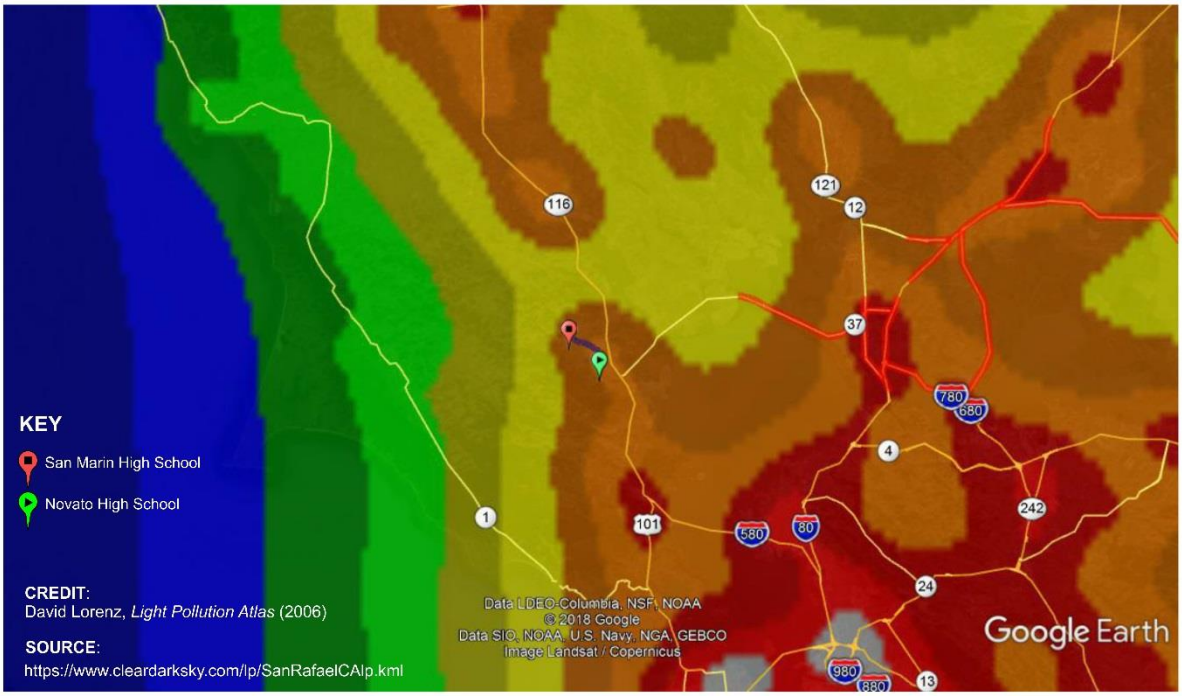


Figure 1
Mapped Bortle Scale
over Portions of Marin, Contra Costa, San Francisco, Sonoma and Solano Counties

This is scarcely an analysis but rather an opinion. And, it is an opinion of the obvious. It should be abundantly clear that individual projects do not single-handedly create the sky glow seen over the region or the county. Collectively, however, they do create observable sky glow, and individually they do contribute to sky glow.

The particular statements in the Revised Draft EIR on page 19 and in Appendix B on pages 6-7 are not relevant statements about the project's potential impact per CEQA Guidelines, which acknowledge that a project's effects can be individually minor yet cumulatively considerable. The District expert's opinion does not qualify as an analysis. A true analysis of the project's potential effect would follow guidance such as that presented in CIE150: 2017, Table 6. Such an analysis would have considered the Upward Flux Ratio (UFR), upward-directed ball-in-flight luminaires, downward directed luminaires, and reflection from the field and bleachers, and would have compared the UFR to the Table 6 threshold limit which is 2 for sports lighting in the E2 zone. Absence of such consideration is a conspicuous omission in the Revised Draft EIR which might cause one to wonder about the actual performance of the project relative to the CIE150: 2017 Table 6 UFR threshold.

Independent calculations for a range of realistic assumptions suggest that the ball-in-flight lights in combination with other project elements are probably inconsistent with the CIE150: 2017 Table 6 UFR threshold limit. UFR was independently calculated to be in the range of 4.5 to 9, which exceeds by an approximate multiplicative factor of ×2 to ×4 the UFR performance threshold limit of 2 for sports lighting in the E2 zone. Coincidentally, this independent calculation also shows that the proposed project potentially could be consistent with zones E3 and E4, where the threshold limits for UFR are 6 and 15.

5. Effects of nighttime stadium lighting on glare and views

The Writ of Mandate admonished (p. 32, ll. 21-24) that while the original Draft and Final EIRs did discuss the obscuring effect of the light poles on scenic views of the surrounding hills and ridgelines (AR 66, 854), neither document addressed the effects of the nighttime lights in obscuring views of the hills and ridgelines.

The Revised Draft EIR still does not evaluate potential effects of the proposed project on dusk or nighttime views of the hillsides or ridgelines. In part, this results from failure to consider off-campus effects including off-site glare and reflection. The Draft EIR presents daytime Photo 3 (page 6) and daytime Photo 7 (page 13). Photo 3 shows a panoramic daytime view of the southern ridgeline as viewed from a segment of the Bay Area Ridge Trail known as Dwarf Oaks Trail. Photo 7 shows the same panoramic daytime view of the southern ridgeline with the addition of stadium sound and lighting equipment (*e.g.*, light poles, speaker poles, and luminaires). Views at dusk or nighttime are not presented in the original Draft and Final EIRs or in the Revised Draft EIR.

The Revised Draft EIR (page 11) maintains that light and speaker poles would not obstruct views and, therefore, would have a less than significant effect on scenic resources. The Revised Draft EIR asserts (page 14) that potential effects of light and glare on nighttime visual character and visual quality are evaluated under the subheadings AES-3 and AES-4 in the Revised Draft EIR (pages 15-20).

The Revised Draft EIR uses faulty reasoning that, since most of the proposed stadium light is focused onto the playing field, nearby neighbors would not be subjected to glare and, therefore, glare would not adversely affect nighttime views. It makes this assertion while 1) not presenting photographs taken during the light test; 2) assuming that the lux levels measured on-campus at perimeter locations are predictive of the presence or absence of off-site glare; and, 3) without modeling glare at off-site elevated locations such as Dwarf Oaks Trail, 5 Santa Yorma Court, or 5 Santa Gabriella Court.

For the reasons explained previously, lux levels measured on-campus at perimeter locations are not proxies for potential off-campus glare effects. Photometric modeling of glare (candela) was truncated, that is, it did not extend off campus to elevated receivers and did not account for upward-directed ball-in-flight lights. Dusk or nighttime photographs would have shown this; however, such photos are not presented in the Revised Draft EIR.

Figures 2 and 3 illustrate three observer locations and viewing lines-of-sight. The viewing location at 5 Santa Yorma Court is similar to a viewing location on Dwarf Oaks Trail, but at lower elevation. The three observer locations represent three separate viewing elevations:

1) Below the elevation of the stadium downward-directed and upward directed light;
2) Slightly above the elevation of upward-directed ball-in-flight lights; and,
3) Substantially above the elevation of upward-directed ball-in-flight lights.

Figure 4 illustrates the variation in glare effects caused by the proposed project. Importantly, the dusk and nighttime photographs A1, A2, B1 and B2 show that glare and illumination of the stadium field will affect the character and quality of views of the southern ridgeline. Unlike single-family development with relatively spare light sources (*e.g*, interior lighting showing through windows), the proposed stadium

lighting exudes approximately the same light as could be emitted from twenty (20) typical highway billboards.[1]

In Figure 4, Photos A2 and C2 demonstrate that glare depends critically upon the receiver's elevation relative to the lights and also depends on the receiver's location relative to the aiming line of the lights. Near the elevation of the stadium field, glare does not appear as pronounced as it is at receivers whose elevations are substantially below or substantially above the imaginary horizontal plane of the lights. Elevated receivers located to the northwest and west of the stadium will experience substantial glare from the upward-directed ball-in-flight luminaires mounted on poles F6 and F7.

The Revised Draft EIR should include photometric modeling at off-campus receivers, including the public trail receiver on Dwarf Oaks Trail represented in viewing vantage point of Photo 3/7 (or, same as, D1 in Figure 5). Many off-campus receivers on both private and public land are elevated above the upward-directed ball-in-flight lights. The Revised Draft EIR should evaluate predicted glare relative to threshold limits for glare as outlined in Table 3 of CIE150: 2017. The Revised Draft EIR in its discussion off-campus glare effects should delete reference to on-campus lux, in view of the fact that on campus lux is not predictive of off-campus glare.

6. Effects of stadium lighting on view quality and character

In the Writ of Mandate (p. 32, ll. 21-24), the court advises that neither of the original EIRs addresses the effects that the nighttime use of lights will have on the existing views of the hills and ridgelines. One such adverse effect would be reduction in clarity—that is, the potential obscuring of views caused by glare or sky glow. In addition, other view quality impacts could result owing to changes in the available scenic views.

For visual quality and visual impact evaluation, the standard for evaluation is based on three (3) keys set forth in recognized planning guidance such as that published by FHWA for evaluation of its projects:[2] The three keys are:

- **Vividness** = Memorability of landscape elements as they combine in striking and distinctive visual patterns.
- **Intactnes**s = The integrity of the visual pattern, or degree to which the landscape is free from visual encroachments.
- **Unity** = The degree to which the landscape elements join to form a coherent, harmonious visual pattern.

The method and vocabulary for describing a landscape and the effect of manmade changes on the visual quality of a landscape are standard. The effect of changes can be objectively described (*i.e.*, meaning that many people would agree on the assessment once they understand and agree on the vocabulary of the three keys).

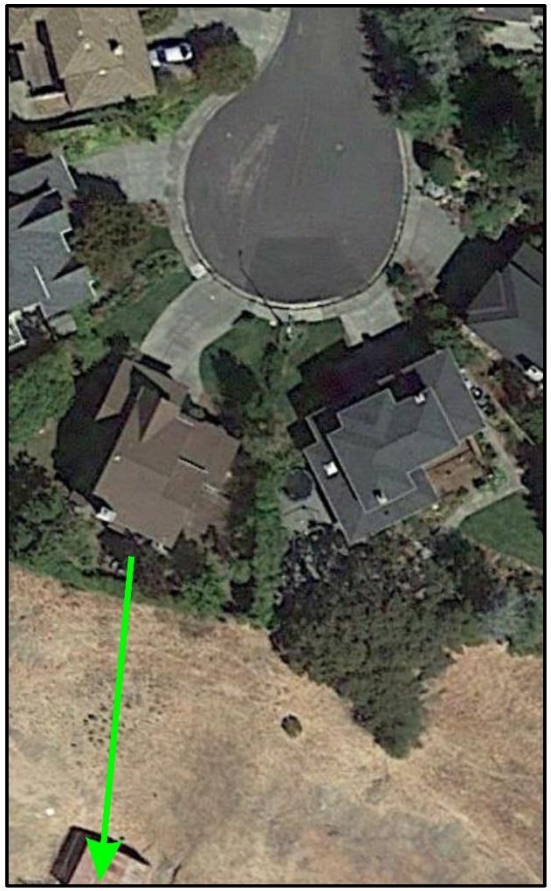
---

1 The average illumination level on a billboard is 250-300 lux (25-30 fc). The average billboard is approximately 5 yards tall × 16 yards wide.

2 Federal Highway Administrative (FHWA), 1988. *Visual Impact Assessment for Highway Projects*, Publication FHWA HI-88-054), (136 pp.).

Figure 2
Observer Locations and Viewing Lines of Sight

Address: 5 Santa Yorma Court
Approx. ground elevation: 181 feet
Relative to field: +172 feet
Viewing location: Driveway
Photo IDs: A1, A2



Address: 10 Santa Gabriella Court
Approx. ground elevation: 139 feet
Relative to field: +30 feet
Viewing location: Deck
Photo IDs: B1, B2

Address: 257 San Felipe Way
Approx. ground elevation: 87 feet
Relative to field: -22 feet
Viewing location: 2nd floor bedroom
Photo IDs: C2

Figure 3
Observer Details with Viewing Lines of Sight

5 Santa Yorma Court
Ground elevation: 181 feet
Observer's eye elevation: 186 feet
Viewing angle to upward-directed luminaires: DOWN
Approximate angle: down 2.5 degrees from horizontal

10 Santa Gabriella Court
Ground elevation: 139 feet
Deck observer's eye elevation: 154 feet
Viewing angle to upward-directed luminaires: DOWN
Approximate angle: down 3 degrees from horizontal

257 San Felipe Way
Ground elevation: 87 feet
Second floor observer's eye elevation: 104 feet
Viewing angle to downward-directed luminaires: UP
Approximate angle: up +6 degrees from horizontal

Figure 4
Glare Examples

Photo 3: Southward view of stadium from publicly accessible open space on Dwarf Oak Trail.

Looking South from Dwarf Oaks Trail
Ground elevation: 317 feet
Observer's eye elevation: 322 feet
Viewing angle to upward-directed luminaires: DOWN
Approximate angle: down 8 degrees from horizontal

CREDIT: Rincon Consultants, Inc., San Marin High School Stadium Lights Project, Revised Draft EIR, July 2019

Looking South from Dwarf Oaks Trail
Ground elevation: 317 feet
Observer's eye elevation: 322 feet
Viewing angle to upward-directed luminaires: DOWN
Approximate angle: down 8 degrees from horizontal

Looking South from Dwarf Oaks Trail
Ground elevation: 317 feet
Observer's eye elevation: 322 feet
Viewing angle to upward-directed luminaires: DOWN
Approximate angle: down 8 degrees from horizontal

Figure 5
Scenic Vista from Bay Area Ridge Trail

Dwarf Oaks Trail Segment

In the current situation, views of the surrounding area, its scenic open space hills and ridgelines as available from the locale (*e.g*., neighbors' yards, windows, driveways sidewalks, Dwarf Oaks Trail, Senior Hill) will change in terms of intactness and unity. One such view is the view of the landscape shown in Figure 5 for daytime, dusk and early evening conditions. With the proposed project, the open space hills and ridgelines as shown in Figure 5 will remain; however, the added illuminated field will introduce a new element into the landscape. Considering the low ambient brightness of the existing setting, and absence of major illuminated edifices or billboards, most viewers could agree that this added element will be a visual encroachment, the size and brightness of which will detract from the intactness of the existing view and overall visual quality.

In contrast to visual quality, visual character is not readily discussed using an agreed objective vocabulary or method. Desirable characteristics and how these are articulated depend on who you ask in the community. Many of the neighbors who prefer the existing dark setting and scarcity of artificial light sources might comment that the proposed stadium lights are inconsistent with their concept of the preferred visual character of the area. In so commenting, some might use terms such as the "rural feel" or "rural atmosphere." Others might choose "small town look" and still others might select "country-like" to describe how they view the area's existing visual character.

Objectively, however, the illuminated field and visible glare sources juxtaposed with the dark hills and ridgelines are a visual encroachment, which would detract from the intactness of the existing landscape as viewed at dusk and evening when the stadium is lighted (see Figure 5, Photos D2 and D3). The southern ridgeline's silhouette itself would be uninterrupted by the proposed project. It is the addition, color and prominence of the illuminated field and glare sources that would cause the key impact on visual quality. As viewed from Dwarf Oaks Trail (Figure 5), or from private land (Figure 4), the effect of the stadium lighting is similar to the effect of adding many highly illuminated bright green billboards or a car dealership lot of lime green Volvos. A question that remains unanswered in the District's documents is whether a Reduced Light Alternative could mitigate this visual encroachment and reduce the effect on the quality of dusk and nighttime views.

7. Reduced light alternative

In the Writ of Mandate (p. 59, ll. 17-22), the court found that an adequate range of alternatives should reasonably have included a discussion of a reduced lighting system alternative, and its absence did not foster informed decision-making. (See Sierra Club v. City of Orange (2008) 163 Cal.App.4th 523, 546-547 the proper range of the alternatives is evaluated on the facts of each case and is governed by the rule of reason].) As such, the court concluded that the District failed to proceed as required by law.

By reduced lighting it should be abundantly clear the court meant lower field illumination less than approximately 40 fc (400 lux). For example, a feasible reduced light level could be as low as 30-35 fc (300-350 lux) average on field illumination level. The alternative presented in the Revised Draft EIR does not define an alternative light level and does not expound upon any of the visual quality or visual character advantages of the alternative.

The District should define a Reduced Light Alternative and should explain any of its potential advantages.

8. Cumulative effects

The Writ of Mandate advises (p. 64, ll. 12-24) that the original Draft and Final EIRs contained no discussion of the proposed project's cumulative impacts on aesthetics in view of contemplated, reasonably foreseeable projects such as the new lighted soccer and lacrosse field already approved by the District. (AR 13 86) The District's failure to explain why it determined the cumulative impact not to be significant violated CEQA procedures and rendered the original Draft and Final EIRs inadequate as informative documents.

The degree of impact on specific dusk and nighttime views of open space hillsides and ridgelines could be made cumulatively more severe and/or made more frequent by the District's additional lighting projects. Even without coincidence in times of field use for football, soccer or lacrosse, the duration of field lighting and the number of evenings with lights activated could increase, so the duration and frequency of impact on views at dusk and nighttime could increase. Spill light from cumulative illumination and glare from specific luminaires could increase. Incremental sky glow could be added by each source of light, reflected light or upward-directed light. We should probably assume that upward directed ball-in-flight lights would be necessary for sports like softball and possibly also for lacrosse. A more precise statement probably is not possible without the District's further definition of the reasonably foreseeable future projects.

The District should define its project and advise the public with regard to the number of downward-directed light and upward-directed ball-in-flight lights. If ball-in-flight lights are reasonably expected, the District should acknowledge that these ball-in flight lights could cause off-site glare. If the fields could be illuminated on more evenings, for longer elapsed periods, or concurrently (*e.g*., for football and soccer), the District also should advise as such.

Therefore, the Revised Draft EIR should be adjusted and recirculated to include the following:

- ☑ Reduced Light Alternative design illumination level (*e.g*., 30-35 fc);
- ☑ Dusk and nighttime view photographs and mitigation to reduce potential adverse effects on visual quality;
- ☑ Specifically address the proposed project's contribution to sky glow by estimating the Upward Flux Ratio and comparing it to the appropriate threshhold limit of 2 in accordance with CIE150: 2017 (Table 6).
- ☑ Delete references to Bortle Scale as the Bortle Scale is not a light technical parameter used for evaluating lighting projects in accordance with CIE150: 2017.
- ☑ Specifically address potential glare from upward-directed ball-in-flight luminaires mounted at 20 feet above stadium field level, as received at off-campus receivers. Compare predicted glare to the appropriate threshhold limits for the E2 zone in accordance with CIE150: 2017 (Table 3).
- ☑ Address the other of the District's reasonably foreseeable lighting projects and explain their cumulative effects on visual quality, off-campus glare and sky glow.

If you have any questions about the comments please call me at (510) 881-8574.

Sincerely,

Marc Papineau
Environmental Scientist

Letter 17

COMMENTER: Marc Papineau

DATE: August 19, 2019

Please see Response 16. This letter appears to be nearly identical to Letter 16. In addition, in Letter 16, the commenter explicitly requested that Letter 16 replace this letter. Nevertheless, it is included here to ensure a complete record. The responses above address the points raised and revised by the commenter in Letter 17.

Letter 18

Comments on Revised Draft EIR

San Marin High School Stadium Lights Project

July 2019

Prepared by: Larry Scheibel
Retired Professional Civil and Geotechnical Engineer

General Comments

The football stadium lighting system covered by this Revised Draft EIR has already been constructed. In spite of the Court's warning during previous appearances that the District was proceeding at its own risk and expense, construction of the project was completed before the court's Writ of Mandate was issued. Although this Revised Draft EIR was prepared after construction of the project was complete, it still refers to approximate numbers of poles, approximate heights of poles, approximate mounting heights of luminaires, etc. All of these things are known and should have been incorporated into this Revised Draft EIR. Some of the information, such as the pole locations where upward-facing lights are installed, is actually wrong and should be corrected. Indicating that the light poles are up to eighty feet in height does not convey the real impact when you realize that several of them are actually 90 feet high and one of them, along the southwest side of the field, actually extend up about 110 feet above the elevations along San Marin Drive and the adjacent homes. 18.1 18.2

A table should have been included identifying all new poles that were installed along with their heights, elevations, mounting elevations of the luminaires, and purposes for the luminaires. Other information for the luminaires including aiming angles and luminous intensity distribution should be provided. In addition, a topo map should have been included showing the areas surrounding the stadium that are likely to be affected by the lights. For a reviewer to identify potential problem areas for light spill and glare, and to check whether the results of the photometric analysis are reasonable, it is necessary to know which surrounding areas are lower than the field surface and might be affected more by the downward-facing lights. It is also necessary to know which areas surrounding the site are actually higher than the mounting elevations for the upward-facing lights and could experience significant light spill and glare because of these lights. 18.3

The District's consultants have adopted CIE 150, Guide on the Limitations of the Effects of Obtrusive Light from Outdoor Lighting Installations, for design and evaluation of the lighting system. The district's lighting consultant made the following statement in the conclusion of his report, which is included in the Revised Draft EIR as Appendix B: *"The lighting for the SMHS Stadium meets and betters the applicable light impact standards set for lighting zone E2 as set by CIE:150-2017, which in my professional opinion demonstrates that the impact of the sports* 18.4

lighting is less than significant as claimed by NUSD and their consultants." He did not provide any documentation or any indication that the specific requirements contained in CIE:150-2017 for both maximum allowable glare and sky glow had been evaluated. Until this information on glare and sky glow is provided, it is not possible to evaluate whether this lighting project conforms with the requirements of CIE:150-2017.

I observed both tests performed on the stadium lights from locations in my neighborhood. I observed the May 2nd test from the Bay Area Ridge Trail, north of the stadium, in the Mt. Burdell Open Space Preserve, and the May 6th test was observed from the deck in back of my house on Santa Gabriella Court. The observed lighting parameters of light spill, glare, and sky glow were all much greater than the FEIR and previous photometric studies had indicated, and significantly greater than baseline conditions in these areas. The impacts in the residential area and open space preserve were very disturbing to me and could not be considered less than significant. Because of the existing ambient nighttime light conditions at this site, the impacts of this project cannot be compared with other schools and lighted fields, such as those in San Mateo, located in metropolitan areas with very different baseline conditions. 18.5

The Bay Area Ridge Trail from where I observed and photographed the first lights test on May 2nd, is a regional trail that extends around the outer edges of the entire Bay Area. It generally follows ridgelines that provide views of the surrounding areas and in many cases follows the alignment of existing local trails that predated the establishment of the Ridge Trail. In the vicinity of the project site, it follows the entire length of the Marin County Park's Dwarf Oak Trail in the Mt. Burdell Open Space Preserve. The trail rises along the southern flank of Senior Hill and provides views of the stadium and surrounding area. The open space rangers refer to this hill, north of the stadium, as Senior Hill because in the past seniors at the high school have often put graffiti on the hillside.

In the review of biological impacts, the court relied on statements in the FEIR about light spill and other lighting parameters that were based on the preliminary photometric study inserted into the document at the last minute without any chance for review or comment. Statements such as "light trespass on trees located 100 feet from the stadium will be non-existent" and "lack of light trespass beyond 100 feet from the stadium makes it unlikely for lighting to have a negative impact on bat behavior" were cited in the Writ of Mandate. As discussed in the following comments, we now know those statements are not true and the biological impacts should be reevaluated considering the actual observed conditions of light trespass and glare during the light tests. 18.6

This Revised Draft EIR, as well as the previous FEIR, does not consider the low ambient lighting condition at this site and the cumulative incremental changes caused by the project that will result in significant impacts. Instead, what we have are various attempts to lump our neighborhood into metropolitan areas within the greater Bay Area region using things such as nighttime photographs taken from the International Space Station. The discussion of alternatives 18.7

does not consider variations in ambient lighting at each of the studied sites, including the impact from moving the project from lighting Zone E2 to an E3. In addition, no real evaluation has been made of ways to reduce or avoid potential glare and incremental sky glow impacts at the proposed site. For these, and other reasons discussed in the following comments, I believe this Revised Draft EIR is just as flawed, if not more so, than the previous DEIR and FEIR. 18.8

1 Introduction

1.1 Environmental Impact Report Background

In the first paragraph, this section states that the Marin County Superior Court ordered NUSD to revise and republish four sections of the EIR and to desist from operation of the project until the Revised EIR is certified. I have not found anything in the court order that indicated the District could start using the lights as soon as the NUSD Board recertified the project EIR. Does the Court need to review the Revised EIR and give the District approval to use the lights before they can be used for anything other than testing? 18.9

2 Aesthetics

2.1 Setting

Baseline Light and Glare Conditions

Photographs should have been included showing the existing conditions at night as well as the daytime photos you provided. In my neighborhood on Santa Gabriella Court, and along San Ramon Way, north and west of the field, existing light levels after dark are very low. The Mt. Burdell Open Space Preserve immediately north of us has no artificial lighting. There are no businesses in our neighborhood north and west of the stadium and very few street lights.

Since you have elected not to document the existing lighting conditions around the site after dark, I have included three sets of photos to illustrate these conditions. These photos are presented at the end of my comments and the approximate locations and aiming directions of the photos are shown on Figure 1. Two photos were taken at each of three locations with the first photo taken under natural daylight conditions to indicate the area covered by the photo and the second after dark with little or no natural ambient light. 18.10

Photos 1 and 2 were taken from the Bay Area Ridge Trail on the Mt. Burdell Open Space Preserve north of the stadium, looking generally south across the site. Photos 3 and 4 were taken from the deck at the back of my house on Santa Gabriella Court and were also looking generally south across the stadium. Photos 5 and 6 were taken from the sidewalk along San Marin Drive

adjacent to the main stadium parking lot. These photos were taken in a general northwest direction across the stadium site. These photos were all taken before the field lights were installed at the site. As indicated in these photos, artificial lighting levels are very low in this area.

Sky glow viewed from the general area of the stadium site on a clear night, without any clouds, depends very much on the direction you are looking. There is more sky glow visible to the south and east and very little, if any, to the west. It was apparent to me during the lights test performed on May 6, 2019, that the stadium lights did contribute noticeably to sky glow directly above the site when low clouds were present. On that evening, there was significant sky glow looking east from the site but almost no sky glow visible when looking west. The entirety of Marin County is not Bortle Class 5 as stated in the last paragraph of this section. The Bortle Scale classification numbers generally decrease from east to west across Marin County.

As in the previous FEIR, it appears that you are attempting to lump our neighborhood into the greater San Francisco Bay Area region to show that nighttime lighting conditions are much worse than they actually are. The logic seems to be that conditions at the site are already so bad that it is perfectly all right to make them worse with this lighting project. Our neighborhood is on the very edge of development on the west side of Novato, surrounded on three sides by unlit hills in parks, open space preserves, and ranches. There is very little existing artificial light at night without the stadium lights and conditions are far different from what you are describing in this Revised Draft EIR.

2.2 Impact Analysis

I observed and photographed both light tests performed at the site. On May 2nd, I observed the test from the Bay Area Ridge Trail in the Mt. Burdell Open Space Preserve at the approximate location shown on Figure 1. Photographs taken during that test are included as Photos 7 through 9. During the May 6th test, I observed and photographed the stadium area from my house at the approximate location also shown in Figure 1. Two photos taken during that test are included as Photos 10 and 11. Photo 10 shows the lighting conditions during the test and Photo 11 was taken from the same location a few seconds after the lights were turned off. My observations during these tests are presented in the following sections on light, glare, and sky glow impacts.

18.11

Methodology – Light Impacts

CIE:150-2017, which the District's consultants have adopted for the design and evaluation of the lighting system, employs a lighting zone system that ranges from E0 to E4, and not E1 through E4 as indicated in this section. The classification system is based entirely on ambient brightness and not on whether the location is arbitrarily described as urban, suburban, rural, etc. The lighting environment described in CIE:150-2017 varies from intrinsically dark for Zone E0 to

18.12

high district brightness in Zone E4. The open space preserve, located just north of the site, has no artificial lighting and practically zero existing light spill from surrounding areas and would be classified as E1, dark. The other areas surrounding the site, including my neighborhood, would have to be classified as E2, low district brightness.

It would be unreasonable, using this scale of E0 to E4, to consider this site to be Zone E3. Using Zone E2 for this project is not a "conservative assumption" as suggested in this section. It is also unreasonable to compare the lighting criteria for this site with other schools such as those in San Mateo which have very different ambient light conditions because of their locations. Spill light observed during both lights tests was significant and objectionable to me. The spill light on the Bay Area Ridge Trail during the first test was so bright it was possible to walk anywhere on the hillside without a flashlight or headlamp on a moonless night. This is very different from the baseline condition on the trail, with essentially zero light spill from the residential area to the south, when it is not possible to walk around without a flashlight. There will certainly be some impact on wildlife that live in this area and are often active during this period of late evening into the early nighttime hours. The District's lighting consultant did not make any measurements of light trespass in this area during the second light test. 18.13

During the second light test on May 6th, I observed significant light spill on my property and especially on the south side of my house facing the stadium. The spill light appeared to increase in intensity up the side of the house and was brightest near the top. No spill light was visible on the house after the field lights were turned off. Shadows cast on the house from a nearby tree, indicated that a significant amount of the spill light was coming from the upward-facing, unshielded luminaires mounted on poles along the southeast side of the stadium. These upward-facing lights are apparently mounted on the poles at approximately Elevation 130 feet. Results of the spill light measurements made by the District's consultant are presented in Table 2 of the Revised Draft EIR and the locations where the readings were made are shown on Figure 5. The elevations of the measuring points near my house, at 5 feet above grade, appear to be slightly below the mounting elevations for the upward-facing lights.

Table 2 in CIE:150-2017 indicates the maximum allowable vertical illumination on properties in Zone E2 is 5 lux for pre-curfew conditions. It also states that the limits apply to nearby dwellings, or portions of dwellings, and more specifically to their relevant surfaces or parts of surfaces, especially where windows are located. My house is located approximately 20 feet north of the school property line. The windows in our master bedroom, which faces the stadium, extend up about 20 feet higher than the elevations of the District's measuring points, and several feet above the mounting elevations of the upward-facing, unshielded lights. Because of this, it is possible that the light spill from the upper-facing lights on my master bedroom window is greater than that measured by District's consultant on school property. I do not understand how measuring light spill on school property at a height of 5 feet above grade can verify the maximum light spill requirements in CIE:150-2017. Because of variations in topography, measurements should have been made at various locations on surrounding properties in the 18.14

residential area and open space preserve to verify that the requirements of CIE:150-2017 have been achieved.

As indicated in Photo 10, presented at the end of my comments, the reflected light from the field is very bright when the lights are on. Photo 11 shows the existing baseline conditions for the same view of the field from my house. The artificial turf on the field obviously has a very high reflectance and serves as a giant reflector of spill light on to the surrounding area and up into the sky affecting sky glow. The impact on nighttime views from our property and our neighbors' properties is very significantly impacted by this lighting project and the bright reflected light off the field. Photos should have been included in the Revised Draft EIR of the nighttime conditions around the site with and without the lights.

Methodology – Glare Impacts

CIE:150-2017 presents very specific recommendations for calculating expected and allowable glare in the vicinity of a lighting project and even provides calculation examples for sports facilities, such as this stadium. There is no indication in this Revised Draft EIR that the District's consultants performed any of these calculations. Why was the allowable glare on nearby properties evaluated by relying on measurements of light spill on school property when CIE:150-2017 presents specific procedures that need to be followed to evaluate glare?

18.15

As indicated in Photos 7 through 9 at the end of my comments, glare observed on the Bay Area Ridge Trail from the upward-facing luminaires along the southeast side of the field was very significant. Significant glare could also be observed from many locations north and west of the site that are higher in elevation than the upward-facing luminaires. Expected and allowable glare from the upward-facing lights need to be evaluated for this area using the procedures in CIE:150-2017. Because of the varying topography, other areas around the site may have significant glare from either the upward or downward-facing lights. These areas should be identified from a topo map and evaluated.

Methodology – Sky Glow

CIE:150-2017 also presents very specific requirements for evaluating sky glow. Sky glow is evaluated by calculating the upward flux ratio (UFR) of the lighting facility. Table 6 in that publication lists maximum values for upward flux ratio, which considers not only the upward facing lights but also upward reflected light from the field and surrounding area. The maximum allowable UFR for sports facilities in Zone 2 is 2. There is no indication in this Revised Draft EIR that these calculations have been performed to verify the allowable sky glow limitations in CIE:150-2017.

18.16

Project Impacts and Mitigation Measures – Threshold 1, Impact AES-1

On page 10, it is stated that the project has introduced eight light poles up to eighty feet tall and up to 36 egress light poles approximately 30 feet tall. Five of the eight light poles are actually 90 feet tall and extend up as much as 110 feet above existing grade on San Marin Drive and adjacent properties. Construction of the project has been completed and the numbers of poles and their heights are known. The actual numbers, heights, locations and other pertinent data should be provided so that a proper evaluation can be made of the visual impacts of the poles on nearby properties. 18.17

Photo 12, presented at the end of my comments, shows the view from the back of my house across the stadium to the scenic hills and ridgelines south of the site. The light poles completely dominate views from this area toward the south. This photo illustrates much more realistically the impact of the light poles on views of the surrounding scenic ridgelines and hillsides than any presented in the Revised Draft EIR. My house sits at an elevation over 25 feet above the playing field at the stadium and views from lower elevations would be even more impacted. These poles and luminaires are huge and detract from views of scenic hills and ridgelines from both public and private viewing locations. You state in this section that impacts to scenic vistas would be less than significant, but as illustrated in my Photo 12, I strongly disagree. 18.18

Project Impacts and Mitigation Measures – Threshold 3, Impact AES-2

In this section you indicate that new light and speaker poles are visually compatible with existing elevated structures at the stadium including a flag pole, goal posts, bleachers, and mounted speakers. This may be true for the egress light poles but it is absolutely not true for the eight main light poles which are several times higher than any of these existing structures. This section ends with the statement that impacts to daytime visual character and quality would be less than significant. Photo 12, presented at the end of my comments, illustrates that the actual impacts are very significant. 18.19

Project Impacts and Mitigation Measures – Threshold 4, Impact AES-3

Table 1 in this section again indicates only approximate numbers and heights of lights. The actual numbers, heights, elevations, and other pertinent data should be shown in this table and discusses in the narrative that follows it. The narrative indicates that upward-facing luminaires are mounted at 20 feet on each pole. The upward-facing lights are only mounted on the middle two poles on both sides of the field. The correct number of luminaires, their mounting elevations on the poles, and other required information including the aiming angles, rated lumen output, and luminous intensity distribution should be provided. 18.20

As illustrated in Photos 7, 8, & 9, taken from the Bay Area Ridge Trail, and photos 10 and 11 taken from my house, the lighting project has a significant impact on nighttime views in the area. The bright light reflected off the field totally dominates views to the south from my house and 18.21

the surrounding neighborhood. The bright reflected light from the field is also very distracting when viewed from the Bay Area Ridge Trail. In addition, glare from the upward-facing luminaires is very annoying when viewed from both the residential neighborhood and the Mt. Burdell Open Space Preserve.

This section indicates that the upward-facing luminaires would only be lit during games to illuminate airborne objects such as footballs. I assume these lights would also be necessary to illuminate airborne soccer and lacrosse balls and would therefore be used during games at least 50 nights, according to the schedule of events. In addition, it is difficult for me to understand how football practices could be conducted without throwing passes or kicking balls into the air or how soccer practices could be conducted by only kicking the ball on the ground. I suspect these upward-facing lights will be lit every time the stadium lights are used. It appears they are on the same circuit as the main downward-facing lights. 18.22

The proposed stadium lights usage with regard to events and durations is governed by administrative regulations adopted by the NUSD Board of Trusties. These regulations can be changed by a simple majority vote of the Trustees. We have no real assurance that the Board will not decide to include more events, extend the usage hours, or rent out the stadium and lights to outside groups in the future. If that happens, the only recourse for neighbors would be additional expensive litigation. 18.23

The illumination levels presented in Table 2 for the northeast property line were measured at a height of 5 feet above grade on school property. As previously discussed, there was very significant spill light on my property and especially the south side of my house facing the stadium during this test. A strong shadow cast on the house from a nearby tree indicated that much of the light spill was caused by the four upward-facing luminaires mounted on Poles 6 and 7 on the southeast side of the field. Light spill from the unshielded upward-facing luminaires will depend not only on the distance from the luminaire but also the elevation of the measuring point with respect to both the mounted elevation and aiming angles of the luminaires. It is very possible that light spill on the upper story of my house, which is higher than the luminaires, was greater than that measured at a location on school property lower in elevation than the luminaires. Measurements made by the District's consultant do not prove that spill light levels would not exceed the CIE threshold of 5 lux for adjacent properties. 18.24

Project Impacts and Mitigation Measures – Threshold 4, Impact AES-4

This section states that sports luminaires focus most of their light onto the sports field, and off-site glare is usually the result of a luminaire that is mis-aimed towards the property line. However, during the two lights tests performed in May, it was obvious that four unshielded upward-facing lights on poles F6 and F7, on the southeast side of the field, were generating both significant light spill and glare in the residential area and open space preserve north and west of 18.25

the stadium. As previously discussed, this occurred because these areas are at higher elevations than the four unshielded luminaires.

The evaluation of glare should have been performed using Section 3.6.5.2, Limitation of bright luminaires in the field of view, and Section 6.2.2, Luminous intensity calculations, in CIE:150-2017. Using spill light measurements at the property line does not satisfy any of the requirements of CIE:150-2017 for evaluating glare. It is obvious from observations at the site during the two light tests that glare north and west of the stadium increased with increasing elevation. This cannot be evaluated from light spill measurements at five feet above grade near the property line. Impacts from glare need to be evaluated using the very specific requirements included in CIE:150-2017. Preliminary calculations using CIE:150-2017 and assumptions about aiming angles of the lights indicate that candela generated by at least two of the upward-facing lights could be problematic for observers at higher elevations in the E2 Zone, looking down on the upward-facing lights.

Project Impacts and Mitigation Measures – Threshold 4, Impact AES-5

Sky glow from the proposed lighting system should have been evaluated using the maximum upward flux ratio specified in Table 6 of CIE:150-2017. The maximum allowable upward flux ratio for a sports facility in Zone 2 is 2. The upward flux ratio enables the effects of both direct and reflected components of a whole installation to be taken into account. The UFR is obtained from formula (4) presented in Section 6.4.3 of CIE:150-2017. Many of the input quantities required for calculating the UFR have not been provided in the Revised Draft EIR. Using estimates of the aiming angles of luminaires, utilization factor, reflectance of the field, and reflectance of the surrounding surfaces, it appears that the UFR would likely exceed the maximum allowable of 2. Calculations must be performed using measured values for these inputs to determine if the actual UFR is 2, or less, indicating that the impacts from sky glow would be less than significant.

18.26

In this section, it is indicated that a sky glow illumination of 0.016 foot-candles was measured near the project site, in an area that the stadium lights could not directly illuminate. Why were no measurements made of the sky glow above the site during and after the lights test to compare the values? It is also stated in this section that the stadium lights did not substantially contribute to sky glow produced by the greater community. Based on my observations at the site both during and after the second light test, I do not believe that statement is true.

18.27

The last paragraph of this section attempts to minimize the impact of sky glow from the stadium by suggesting that the number of days and the hours of use for the lights would limit their impact on sky glow. However, 152 nights of use during a year is not an insignificant amount. The maximum allowable UFR value of 2 presented in CIE:150-2017 is specified for sports facilities where lights which would not be expected to be on all night.

18.28

3 Cumulative Impacts

3.2 Related Projects

Table 3 in this section presents a list of planned and pending projects within the study area. This list includes the second multi-sport turf field at San Marin High School that is both planned and funded. The description for this project included in Table 3 states: *"No schematic design has been prepared for this project; however, it is confirmed that no lighting is proposed. In addition, no funding is identified /allocated for this project at the time of this writing"*. This statement is actually not true.

A schematic design for this project was previously prepared by Carducci Associates and included in their report to the Novato Unified School District, RE: Proposed Synthetic Turf Fields at Novato High School and San Marin High School, dated May 12, 2015. The schematic design for San Marin High School was included on the last page of this report and is shown on Figure 2 at the end of my comments. This plan clearly shows access lighting consisting of LED fixtures on 15-foot-high poles. In addition, at the request of the District, Carducci Associates also studied the option of installing field lighting on this project but this was not included in the schematic design. It is my understanding that the Division of State Architect would recommend that this project include egress lighting. 18.29

The consultants preparing the EIR were also aware of this planned project and the lighting scheme. An email sent on February 1, 2017, from William Fee of Carducci Associates to Matthew Long, the project manager for Rincon Consultants, states: *"Also attached is San Marin HS upper field renovation plan. It shows pathway lights in part of the stadium as lighted egress for the upper field. Please use this as applicable for lighting the stadium and extend it to the upper field as a future project"*. The upper field he is referring to is the second multi-sport turf field listed in Table 3. This and other emails quoted in my comments were taken from the records of Case No.: CIV 1702295, Coalition to Save San Marin vs. Novato Unified School District, Superior Court of California, County of Marin. 18.30

Funding for this project, and a similar project at Novato High School, was included in the Measure G bond proposal approved by voters in 2016. Work on the second multi-sport turf field at Novato High has already started. The District has delayed the final design and construction of the second field at San Marin, perhaps until after they get final approval for the lighting project on the existing stadium. 18.31

3.3 Cumulative Impact Analysis

Aesthetics

In this section, it is stated that the stadium lighting system would not generate light trespass approaching the threshold of 5 lux in Zone 2; would not subject nearby residents to excessive 18.32

discomfort glare; and would not substantially contribute to sky glow. As discussed in previous comments, none of these lighting conditions have been shown to be in conformance with CIE:150-2017, the standard the District and its consultants selected to evaluate the lighting scheme.

This section also states: *"The cumulative project to convert a baseball field to a lighted soccer/lacrosse field at San Marin High School would not involve the addition of lighting"*. The conversion of an unlighted area into a lighted soccer/lacrosse field cannot be accomplished without the addition of lighting. The existing schematic design for this second multi-sport turf field shows egress lighting which does not currently exist in this area. 18.33

Geology and Soils

The construction of 90-foot-high light poles with luminaires attached at the top and at various other points must result in some additional risk to people in the stadium and surrounding area during strong seismic activity, because of the possibility of falling luminaires or even total collapse of the light poles. I am sure this was evaluated in the design but there still must be some additional risk with the lights installed. Unanticipated problems with designs previously thought to be safe are sometimes discovered after strong seismic events. 18.34

4 Alternatives

4.1 Introduction

In this section, you indicate that all impacts of the project, other than noise, are less than significant or can be mitigated to a level of less than significant. However, analyses of lighting impacts have not been carried out in accordance with the lighting standard adopted by the District and it is not possible at this time to know if there are significant impacts. 18.35

The push to install lights on this field has been brought up several times in the past because of the desire of football players, coaches, and booster club members to play games on Friday night instead of Saturday. Each time it has been brought up new wrinkles have been added to the argument in the attempt to get it passed by the NUSD Board of Trustees. The latest arguments are included in the six objectives listed in this section. 18.36

San Marin High School and Novato High School have approximately the same numbers of students and participate in the same sports. Neither school had permanent lights on their stadiums in the past. On at least two occasions when this lighting proposal was being discussed, I heard the Principal of Novato High indicate very clearly that lights were not necessary at Novato High, he did not want them, and he wanted to be a good neighbor by not installing lights at his school. Has the District Superintendent or the Board of Trustees ever attempted to get these two

principles and their coaching staffs together and try to find out why one school cannot get along without lights and the other does not need them?

The Coalition to Save San Marin hired two consultants with extensive experience in high school athletic programs to evaluate whether field lighting was really required for practices at San Marin High School. They included Mr. Kevin Bryant, Thrive Athletic Consulting, who has over 35 years interscholastic and intercollegiate coaching and athletic administration experience, and Mr. Adam Cretti, who also has extensive experience in high school athletics and was a student and athlete at San Marin High School. Based on a review of the number of sports teams and existing available practice areas, they both agreed that team practices could be accommodated without the need for lights. Letters from both consultants expressing their opinions and recommendations are being submitted separately in review comments prepared by others.

Some of the objectives stated in this section, such as number 3, seem to defy logic. Friday night football games are not going to serve as an alternative to going to parties or other unhealthy recreational activities but are actually going to enable parties and other unhealthy activities to occur during and after games. I am sure the majority of students and others attending Friday night games will behave in a reasonable and responsible manner both during and after the games. However, after 24 years of observing alcohol consumption and drug use both during and after school hours in open space preserves, parks, and residential areas around the school, I am also sure there will be major problems at some point during Friday night football games. The open space rangers have done a good job responding to problems occurring in their open space preserves but the problems have just moved to other adjacent areas.

18.37

4.2 Alternatives Considered but Rejected as Infeasible

h. Install Turf on Existing Grass Practice Field

As previously discussed, two experts who looked at the conditions at San Marin High School, including the numbers of teams and areas available for games and practices, both indicated that practices for all teams could be accommodated without the need for lights. Construction of this planned and funded second turf practice field could accomplish all of the project's objectives except for the desire of some to play football games on Friday night instead of Saturday.

18.38

i. Reduced Number of Events with Lighting

Two experts have looked at this and have stated that team practice times could be accommodated without the need for lights and yet the school is insisting that even with the second field they cannot eliminate a single lighted event from their schedule. It is obvious there is a very real problem with the school's attitude on this issue, and everything they say should be questioned.

4.5 Alternative 3: Portable Lighting

Why were electrically-powered temporary lights not considered? Air quality, greenhouse gas emissions, and noise would all be improved. There is no reason that improvements to the PA system could not be made along with temporary lights. 18.39

4.6 Alternative 4: Reduced Lighting System Alternative

a. Aesthetics

The Illuminating Engineering Society (IES) provides illumination recommendations for a variety of outdoor sport activities. These recommendations are presented in their publication IES RP-6-15, Sports and Recreational Area Lighting, which the District's lighting consultant has referenced in his report. The IES illumination recommendations are based on the classification of play determined from the number of spectators viewing the sports activity. As stated in the consultant's report, the recommended illumination level for football stadiums is 30 foot-candles for Class III and 50 foot-candles for Class II. Class III includes sporting events with up to 2,000 spectators and Class II recommendations are for events with spectators greater than 2,000 but less than 5,000.

In section 2.4.1.6, Proposed Schedule of Events, of the FEIR, it is stated that the maximum attendance at any football game would be 1440. This number was used throughout the FEIR in the evaluation of crowd noise, traffic, and other environmental impacts. Based on this maximum attendance number, the stadium field lighting should have been designed for 30 foot-candles instead of the 40 foot-candles currently used or the 50-foot-candle value that showed up in previous photometric studies. 18.40

Reducing the design field lighting to 30 foot-candles as recommended in IES RP-6-15, could be accomplished in more ways than by simply reducing the output of the downward-facing luminaires installed on the existing 80 to 90-foot light poles at the site. With a lower design field illumination, it may have been possible to design a lighting system using only six or perhaps four light poles. This would have significantly reduced the environmental impacts on aesthetics around the site.

We know that a six-pole-design was previously considered for this site. The following is an email sent by Tony Franceschini to the District superintendent, Jim Hogeboom, and his administrative assistant Leslie Benjamin, on February 23, 2017 with the subject of 8 to 6 poles:

"*Leslie, Do you think this should go to Mike Jolley and crew and explain the benefits (i.e. better product)? Maybe a brief summary from Matthew why this is better, compared to the 8 pole?? You know once they hear it's been changed they will have some different narrative of why. They will probably request the EIR process be redone or the comment period be extended so they can*

review, even though they have no clue what they are looking at, nor do they care. It will be just another way for them to muddy the waters".

Mr. Franceschini's construction company was eventually awarded the contract to construct the lighting project but at the time of this email he was apparently coordinating the design team. It is not known in what way this six-pole design was considered to be a "better product" at that time, but the six-pole design was not adopted. Six-pole-designs can be used to shift light trespass and glare toward the sidelines and away from the endzones, where neighbors look down on the lighted field. Using the lower recommended design field illumination of 30 foot-candles, evaluations should have been of the feasibility of using fewer poles, and perhaps even shorter poles. The environmental impacts of these schemes compared to the existing eight pole design should have been evaluated and discussed in this section.

Reducing the output from luminaires on the existing eight pole system could reduce spill light, glare, and sky glow around the site. However, simply reducing the output from the existing downward-facing lights to lower the design field illumination, would not necessarily reduce light spill and glare in some of the surrounding areas because of the upward facing lights. Unless the output from the upward-facing lights is also reduced, light spill and glare in areas with higher surface elevations may not be reduced. Sky glow would also be dependent on how much the output from the upward-facing lights is reduced. I have seen no real evidence presented in this Revised Draft EIR that the existing eight pole system meets all the requirements for light spill, glare, and sky glow specified in CIE:150-2017, and some major modifications to the lighting system may actually be required.

18.41

f. Transportation/Traffic

This section states that traffic impacts for a reduced lighting system alternative would be less than significant and similar to the proposed project. The traffic impacts would not be less than significant for this alternative because the traffic analysis performed for the proposed project contained a major flaw that completely changed the conclusions that should have resulted from the study. From a traffic standpoint, the most important intersection for this project is at San Marin Drive and San Carlos Way, located directly east of the school. This intersection will create more traffic problems than any other in the vicinity of the project. However, this intersection was not even studied during the traffic analysis.

18.42

The traffic consultant, Mr. Josh Pilachowski, stated in comments made to the NUSD Board of Trustees on May 16, 2017, that this intersection was not included in the study for two reasons. The first reason was that most of the traffic to the stadium will be entering parking lots located on either side of the intersection and not through the school driveway opposite San Carlos Way. The second reason he stated was that traffic passing through this intersection was uncontrolled with no stop signs for people travelling along San Marin Drive.

Anyone visiting this site can see there are stop signs in both directions of San Marin Drive and on San Carlos Way at this intersection. The school has also added a stop sign on their driveway leading into this intersection from the west. The District's consultants should have known about the stop signs, and statements by Mr. Pilachowski illustrates a significant lack of knowledge of actual conditions at the site and a serious factual error in the traffic analysis.

The main problems at this intersection would occur after football and other sporting events. Exits from the main stadium parking lot are located along San Marin Drive, north of this intersection with San Carlos Way. Because San Marin Drive is a four-lane road with a median divider, almost every car leaving the main stadium parking lot will need to enter San Marin Drive and pass through this intersection with San Carlos Way. Spectators who parked along the west side of San Marin, north of San Carlos, will also need to pass through this intersection. Some of the cars passing through this intersection will continue to the south, some of them will turn left on to San Carlos Drive, and many will make a U-turn to return north on San Marin Drive.

Vehicular traffic through this intersection will be further complicated by the large number of pedestrians attempting to cross San Marin Drive to the east away from the stadium. Spectators who parked on the east side of San Marin Drive, on San Carlos Way, and in the parking lot at All Saints Church will be attempting to cross San Marin Drive at this intersection to return to their cars. In addition, most of the spectators who walked to the stadium will be attempting to cross here. Backups from this intersection will also impact nearby intersections such as San Marin Drive and Novato Blvd.

I am a retired civil engineer and have lived in this neighborhood over 23 years. I do not believe there is any possible way this intersection can operate at LOS D conditions after nighttime sports events, even with police officers directing traffic. I believe any realistic traffic study that included this intersection at San Marin Drive and San Carlos Way would show traffic operating at less than LOS D conditions, and that traffic impacts for the lighting project were significant and unavoidable.

4.8 Environmentally Superior Alternative

I have seen no evidence in this Draft Revised EIR that the lighting project already constructed meets any of the light spill, glare, or sky glow requirements contained in CIE:150-2017. Until these requirements have been evaluated in accordance with the very specific requirements of CIE:150-2017, it is not possible to know if the lighting impacts for various other alternatives might be environmentally superior.

18.43

Appendix A: Revised Initial Study Biological Resources Analysis

a) Less than Significant Impact

It is stated on Page 2 that a biological resource reconnaissance-level site visit was conducted by Rincon Consultants on April 30, 2019. No information is provided about the number of people involved and their qualifications, the time actually spent at the site, the actual area of the site and surrounding locations visited, and other information that would be useful to evaluate the thoroughness of this site visit. For instance, was the area observed early in the morning and late in the evening when most of the native wildlife in the area are most active? Did the site visit extend after dark when the impacts of the lights will be greatest? Did the biological survey include all areas within the 500-foot buffer zone for raptors and the 1,000-foot buffer zone for bats? 18.44

Sensitive Species

In this section, it is stated that the lighting report found that illuminance at residential property lines adjacent to the stadium site was not greater than 2.75 lux, which is consistent with lighting levels in sparsely populated rural areas. I measured light levels in my yard at approximately 5 feet above grade at a location only a few feet north of where the District's consultant was obtaining his readings during the light test on May 6th. I obtained readings of 0.20 foot-candles during the test, which is consistent with the consultant's readings, and I also obtained a reading of 0.00 foot-candles at the same location after the lights were turned off. I do not believe an illumination value of 2.75 lux is consistent with sparsely populated rural areas since I measured an ambient reading of 0.00 foot-candles, much less than 2.75 lux, at the back of my house, facing the stadium, after the light test. 18.45

This section also states that the light measurements by the consultant show that the level of light trespass beyond the stadium site would not exceed the CIE:150-2017 allowable maximum of 5 lux for Zone 2. Because of the upward-facing luminaires, I do not believe that illumination readings made on school property along the fence line can demonstrate that spill light levels in the residential and open space areas north and west of the stadium, at higher ground surface elevations, will be less than 5 lux. 18.46

I observed the first lights test on May 2nd from the Bay Area Ridge Trail, in the Mt. Burdell Open Space Preserve, north of the stadium. Based on previous photometric studies provided for the project, I was not expecting any light spill, and I did not have a light meter with me. I was very surprised at the amount of spill light reaching this area from the stadium. It was bright enough to walk around anywhere on the hillside without a flashlight or headlamp. Under normal conditions there is little or no spill light in this area from the residential area and school site to the south, and a flashlight is required to walk around, even if you stay on the trail. This area may not provide the ample dark foraging opportunities for bats as stated in this section. 18.47

Under Special Status and Other Bat Species, it is stated on page 4 that the lack of light trespass beyond 100 feet of the stadium further reduces the likelihood that bats would be attracted to the lights. The Writ of Mandate indicates that the court relied significantly on this statement about the extent of light trespass, obtained from the preliminary photometric study, when reviewing the FEIR. This statement is absolutely not correct. I observed both very significant light trespass and glare from the stadium lighting at a viewing location on the Bay Area Ridge Trail approximately 1,100 feet from the stadium. I and several others residents in my neighborhood observed the hillside north of the stadium, referred to by open space rangers as "Senior Hill", completely lit up by spill light from the second light test on May 6th. The significant spill light extended at least 1,800 feet from the stadium. Illumination readings need to be obtained in this open space preserve to determine if the maximum spill light requirements of CIE:150-2017 have been met and to evaluate what impact this spill light might have on bats and other wildlife. 18.48

Bats are commonly observed by residents along San Ramon Way and the surrounding neighborhood. Three videos showing nesting bats at 255 San Ramon Way are being submitted to the District by others for inclusion in the review comments for this Revised Draft EIR. This location is approximately 600 feet from the stadium. Information such as this should have been documented during on-site bird and bat surveys performed at various times of the year in the buffer zone. 18.49

Nesting or Migratory Birds

This section indicates that the stadium lighting would occur approximately 152 nights per year with the majority of the light use occurring between October and May. Later in the same paragraph it states that the stadium lights would be on for only short periods consisting of two to four hours a night for up to four months. Later, on page 5, it is stated that lighting events would occur mostly during August through December. Which one of these statements is actually true? The Revised Draft EIR seems to pick different time frames to fit the points that it is trying to make. Although the Revised Draft EIR consistently tried to downplay the 152 nights of usage a year, it is an incredible amount of usage and much of it is really not necessary. The lights will be on for some period of time every month of the year except July. 18.50

On page 4, it is stated: *"There have been some cases where lighting has been shown to impact bird species; however, this has typically occurred where light is otherwise scarce, such as on offshore platforms (Huppop et al.,2015) and in forest (The Nature Conservancy, 2015). There is no evidence that shows birds are attracted to urban lights (Evans Ogden 1996)."* This project is located in an area where existing ambient nighttime light levels are very low. The Revised Draft EIR's continuing attempts to suggest that conditions in our neighborhood are similar to urban areas such as San Francisco or Oakland are ridiculous. 18.51

On page 5, the Revised Draft EIR stated: "*Three owl boxes have been installed around the margin of the high school campus to the north and west, the nearest of which is approximately* 18.52

700 feet from the site, which is beyond the standard agency-required buffer distance of 500 feet between active raptor nests and project construction activities". There is an active owl box near the west end of Alder Place on the Madera Marin Townhouse property, that is approximately 250 feet from the stadium. Nearby residents indicate that the box is used every year, but they were not able to identify the type(s) of owls using the box. I believe there are four other owl boxes on their property, some of which might also be in the 500-foot buffer zone. A properly conducted buffer zone survey should have documented this information.

Also, in this section, on Page 5, it is stated that natural prey availability for owls, such as native small rodents, is unlikely to occur in the athletic field area. I have seen mice, rats, baby skunks, baby opossums, baby racoons, and other relatively small animals in my yard at night on numerous occasions. It would be unreasonable to think that these same animals are not present on the other side of the fence at the north end of the football field. 18.53

d) Less Than Significant Impact.

Numerous white-crowned sparrows and other migratory bird nest in small trees in my yard every winter. These nesting areas are approximately 200 feet from the nearest light pole. The ambient nighttime lighting and noise conditions are essentially zero. This will change dramatically with the field lighting project. Testing of the lighting system performed by the District has indicated that significant spill light extends beyond 1,800 feet from the stadium. Because of the upward-directed, ball-in-flight luminaires, and specular and diffuse reflections off the stadium field, both glare and trespass light will be greater near the tops of trees north of the stadium. Noise from the stadium, even during practices, extends even further than 1,800 feet during the day and will be worse at night. I do not see any meaningful discussion in this appendix of the noise impacts on birds and other wildlife animals in the surrounding area. This project will impact many birds including sparrows, finches, jays, crows, hawks, and owls that nest within areas impacted by both light and noise from the project. 18.54

In the last paragraph on Page 6, it is stated that the project is not expected to "interfere substantially with the movement of any native resident or migratory fish or wildlife species" for multiple reasons. The first stated reason is that migratory bird kills as a result of athletic field lighting at O.co Coliseum in Oakland, Candlestick Park, AT&T Park and other athletic fields in the Bay Area have not been reported. Comparing this site to stadiums in San Francisco and Oakland, in the centers of large metropolitan areas, is a real stretch. There is almost no artificial night lighting west of this site for miles to the Pacific Ocean. The site is located along a route that migratory birds take from the "Coastal Pacific Flyway" to seek food and rest at many locations around the north end of San Pablo Bay. 18.55

In the last paragraph on page 6, it is stated that current lighting conditions for the area show bright light sources already present in the suburban area of Novato, referencing a photo taken from the International Space Station. A photo taken from any of the hills surrounding the site or

from a drone operating over the lighted stadium would provide a much better comparison of the stadium lights with existing lighting in the surrounding area. I have lived in my home for over 23 years and I have never seen anything in Novato that would be remotely comparable with the bright lights from this stadium.

Appendix B: Sports Lighting CEQA Report

Abstract

Measuring illumination levels on school property at a height of 5 feet above grade does not show compliance with any of the requirements of CIE:150-2017, which the District's consultant states has been adopted as the lighting standard for the project. This standard includes very specific procedures to be followed in evaluating compliance with maximum limits on light spill, glare, and sky glow. I do not see any evidence in this report to suggest that these factors have been evaluated in accordance with this standard and that the lighting design conforms to the standard.

18.56

The design and measured illumination of 400 lux for the field is not appropriate for this site using the reference cited in a following section, Appropriate Amount of Light on the Field. Additional comments on this will be provided in a following discussion of this issue.

18.57

Issues

Lighting Zones

As previously discussed, the lighting zones defined in CIE:150-2017 are based on ambient light conditions and not some arbitrary description of sites as rural, suburban, or urban. The lighting zones are defined in CIE:150-2017 as varying from Zone E0, intrinsically dark, to Zone E5, high district brightness. The existing ambient nighttime light levels in our neighborhood are low and match the description for E2, low district brightness. This can be seen in Photos 2, 4, and 6 presented at the end of my comments. The consultants chose not to include any nighttime photos of the neighborhood surrounding the stadium in the Revised Draft EIR. The existing low ambient nighttime light levels can also easily be verified by simply visiting the site at night.

18.58

Light Trespass (EIR AS-3)

I have been unable to locate anything in CIE:150-2017 stating that the metric for light trespass is to restrict measured illuminance in the vertical plane at the property boundary at 5 feet above grade, as suggested in this section. I believe that the limitation of 5 lux for Zone 2 applies to all off-site locations and not just the property line. Because of the upward facing lights and the higher surface elevations north and west of the site, it is possible that illumination levels in this and other areas may be higher than those measured on the school property line. Illumination

18.59

level readings in these areas would be required to verify if the requirements of CIE:150-2017 have been satisfied.

Glare (EIR AS-4)

CIE:150-2017 presents very specific recommendations for calculating expected and allowable glare in the vicinity of the project and even provides calculation examples for sports facilities, such as this stadium. As previously discussed, there is no indication in the consultant's report that any of these calculations have been performed. The limit of 10,000 candela (cd) stated in the report appears to come from lighting Zone E3 requirements obtained from an older, superseded version of CIE:150. 18.60

As indicated in my photos 7 through 9, glare observed on the Bay Area Ridge Trail from the upward-facing luminaires along the southeast side of the field was very significant. Significant glare could also be observed from many locations north and west of the stadium which are higher in elevation than the upward-facing luminaires. Expected and allowable glare from the upward-facing lights needs to be evaluated in this area using the procedures in CIE:150-2017. Because of the varying topography, other areas around the site may have significant glare from either the upward or downward-facing lights. These areas should be identified from a topo map and evaluated. 18.61

Photos 13 and 14 illustrate the impacts of elevation and horizontal positioning around the site with respect to glare from the upward-facing ball-in-flight luminaires. Photo 13 was taken from the back yard of my house at 10 Santa Gabriella Court with the camera pointed directly at the two upward-facing luminaires on pole F6, along the southeast side of the field. The elevation this photo was taken from was approximately 140 feet, or about 10 feet above the mounting elevation of the luminaires. Photo 14 was taken along the Bay Area Ridge Trail, approximately 80 feet north of the residential property line, at the location shown on Figure 1. The camera at this location was also pointed directly at the two upward-facing luminaires on pole F6 and the elevation of the photo was approximately 250 feet, or 120 feet above the mounting elevation of the luminaires. 18.62

As indicated in photo 13, neither of the two luminaires was pointed directly at my house in the horizontal direction. Some areas of the white, light-emitting elements at the backs of the luminaires are visible from this location but other areas are blocked from view by the housing of the luminaire. However, in photo 14, taken from the Bay Area Ridge Trail, one of the upward-facing luminaires is pointed almost directly at this location. Because of this, and the higher elevation, almost all areas of the white, light-emitting elements are visible from both luminaires. Increasing the area of the light emitting element of a luminaire that is visible from a given location, results in increased glare. I believe that is why significant glare and spill light have been observed at both residential and open space areas north and west of the stadium from the upward-facing luminaires on the southeast side of the field.

The stadium lights include a total of eight upward-facing, ball-in-flight luminaires with two mounted on each of the two middle poles on both sides of the field (poles F2, F3, F6, and F7). As indicated in photos 13 and 14, the luminaires on each pole are aimed in different horizontal directions. Because of this, there are many areas around the field at elevations higher than 130 feet that could experience significant glare and spill light from the upward-facing luminaires. In addition to areas north and west of the stadium which could be affected by glare from ball-in-flight luminaires on poles F6 or F7, the Little Mountain Open Space Preserve, which is located southwest of the stadium, appears to be another area that could be impacted by these luminaires.

Appropriate Amount of Light on the Field.

As previously discussed, recommended field illumination levels provided by The Illuminating Engineering Society (IES) in their publication IES RP-6-15, Sports and Recreational Area Lighting, are based on the classification of play determined from the number of spectators viewing the sports activity. As stated in this section of the appendix, the recommended illumination level for football stadiums is 30 foot-candles for Class III, and 50 foot-candles for Class II. Class III includes sporting events with up to 2,000 spectators and Class II recommendations are for events with spectators greater than 2,000 but less than 5,000.

Section 2.4.1.6, Proposed Schedule of Events, of the FEIR, states that the maximum attendance at any football game would be 1440. This number was used throughout the FEIR in the evaluation of crowd noise, traffic, and other environmental impacts. Based on this maximum attendance number, the stadium lighting should have been designed for 30 foot-candles instead of the 40 foot-candles currently used. If the District wants to use a higher attendance number than 2,000 to justify the 40-foot-candle field illumination, then all other sections of the EIR including traffic and noise need to be reevaluated using this higher attendance figure.

18.63

Field Measurements

Light Trespass Measurements.

Because of the upward-facing lights, illumination readings made along the northeast property line, at 5 feet above grade, may not represent the worst case for residential and open space areas north and west of this property line. Additional readings should have been attained in these off-site areas to verify the consultant's worse case assumption that measurements along the property represent the highest values.

18.64

Glare Measurements.

As previously discussed, CIE:150-2017 includes specific requirements for calculating expected glare and allowable glare at any point. Measuring light trespass at school property lines to evaluate glare is not an option in this standard.

18.65

Sports Field Illumination.

As previously discussed, the design and measured field illumination of 40 foot-candles is not consistent with RP-6. The value recommended in RP-6 is 30 foot-candles. 18.66

Summary of Measurements and Observations

AES-3 and AES-4 Compliance.

Compliance requirements presented in AES-3 and AES-4 of the FEIR are not consistent with CIE:150-2017, which is the standard adopted by the District and its consultants to evaluate the environmental impacts of the lighting project. Light trespass and sky glow should be evaluated based on the allowable values and standards for measurement specified in CIE:150-2017. 18.67

Notes About Photometric Analyses developed by Manufacturer (Musco).

I understand that the measured values of illumination would be expected to vary somewhat from those predicted in a photometric study. However, the photometric study predicted zero light spill along the northeast border of the school property, and by implication zero at any point further north and west of the border since no values are shown in these areas. Measured values of light spill obtained along this property line and observations of significant light spill in areas north and west of the property line indicate this is not the reality. Has any attempt been made to evaluate why this happened? Did the photometric analysis include impacts of reflected light from the field and spill light from the upward-facing luminaires? Could this explain why spill light observed on the Bay Area Ridge Trail, over 1,000 feet from the stadium, was very noticeable and obviously not zero? Spill light from the upward-facing luminaires could increase with increasing elevation above the mounting height of the luminaires. Spill light reflected off the very bright playing field could also be contributing to light trespass. 18.68

To check compliance of the lighting system with the glare requirements of CIE:150-2017, it will be necessary to determine the allowable glare in accordance with Table 3 in Section 3.6.5.2 of that standard and compare that to the calculated glare at any specific location. Were the glare values presented in the photometric study calculated in accordance with Section 6.2.2 of CIE:150-2017? 18.69

Notes About Sky Glow.

As previously discussed, CIE:150-2017 presents specific requirements for evaluating sky glow for sports projects like this. It is not necessary to revert to general discussions about sky glow throughout other areas of California having similar proximity to the ocean or incorrect statements that the entirety of Marin County is Bortle Class 5. The Bortle scale is a tool for describing astronomical viewing quality and was not meant to be used as a gage of incremental impacts of lighting projects on sky glow. Sky glow is evaluated by calculating the upward flux ratio for the project which considers the effects of both the upward facing lights and light 18.70

reflected off the playing field and adjacent surfaces. Table 6 in CIE:150-2017 specifies that the maximum allowable upward flux ratio (UFR) for a sports facility in Zone 2 is 2.

The UFR is calculated from formula (4) presented in Section 6.4.3 of CIE:150-2017. Many of the input quantities required for calculating the UFR have not been provided in the Revised Draft EIR. Values of the reflectance of the artificial turf playing field and surrounding areas should have been measured during the lights test and included in the report. Using estimates of the aiming angles of the luminaires, utilization factor, reflectance of the field, and reflectance of the surrounding surfaces, it appears that the UFR would significantly exceed the maximum allowable of 2. Calculations must be performed using measured values for these inputs to determine if the actual UFR is 2, or less, indicating if the impacts from sky glow would be less than significant.

In this section, it is also indicated that a sky glow illumination of 0.016 foot-candles was measured near the project site, in an area that the stadium lights could not directly illuminate. Why were no measurements made of the sky glow above the site during and after the lights test to compare the values? It is also stated in this section that the stadium lights did not substantially contribute to sky glow produced by the greater community. Based on my observations at the site both during and after the second light test, I do not believe that statement is true.

Conclusions

In the conclusions, it is stated: *"The lighting for the SMHS Stadium meets and betters the applicable light impact standards set for lighting zone E2 as set by CIE:150-2017, which in my professional opinion demonstrates that the impact of the sports lighting is less than significant as claimed by NUSD and their consultants"*. I am not a lighting consultant, nor a registered electrical engineer, and therefore cannot provide a professional opinion, but I do not see documentation in this report that demonstrates compliance of this project with the light spill, glare, and sky glow requirements specified in CIE:150-2017.

18.71

Requirements for supporting documentation of lighting projects are presented in Section 5.2 of CIE:150-2017. Much of the required information has not been provided including topographical information, plans illustrating the geometric relationship between the locations of luminaires and critical locations considered in the design, calculated values of the relevant lighting parameters, and both luminous intensity distribution data and aiming angles for the luminaires. This information is required to facilitate any meaningful review of the design.

Photo 1 – Daytime View of Stadium and Neighborhood from the Bay Area Ridge Trail

Photo 2 – Nighttime View of the Stadium and Neighborhood from the Bay Area Ridge Trail

18.72

Photo 3 – Daytime View of San Marin High School Stadium from my House

Photo 4 – Nighttime View of San Marin High School Stadium from my House

Photo 5 – Daytime View of San Marin High School Stadium from San Marin Drive

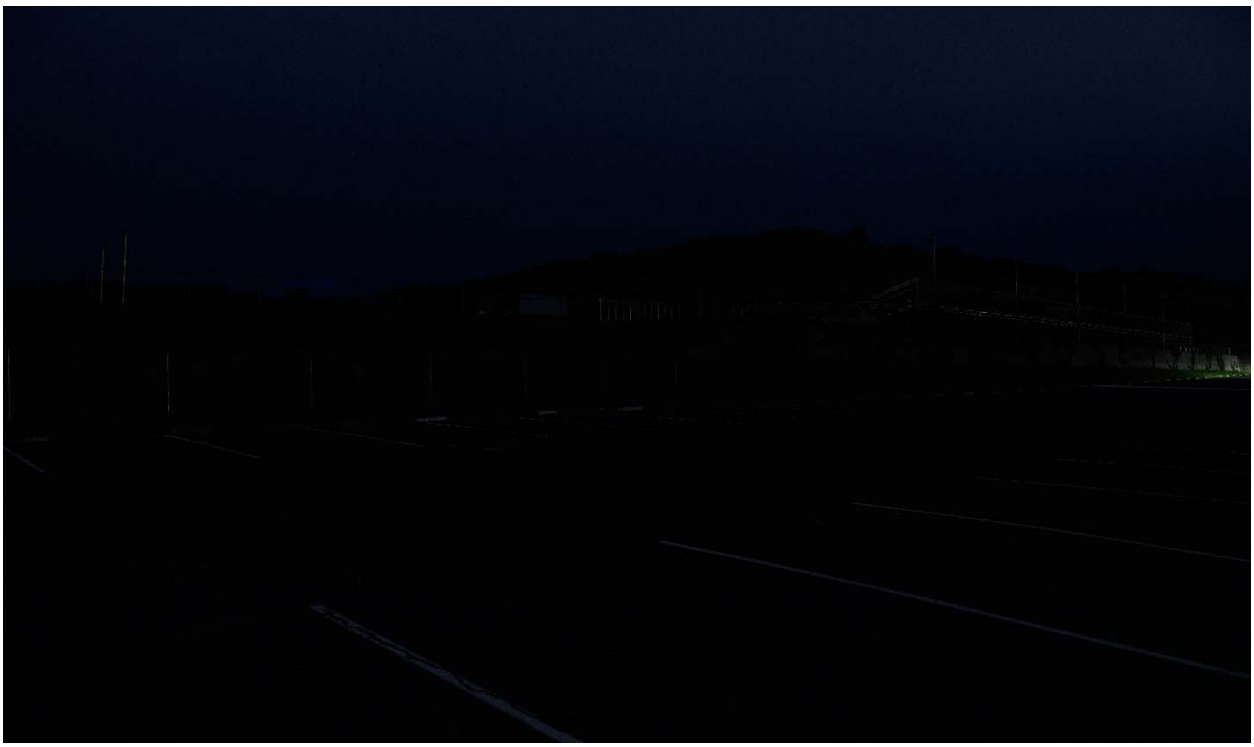


Photo 6 – Nighttime view of San Marin High School Stadium from San Marin Drive

Photo 7– View of May 2nd Light Test from the Bay Area Ridge Trail

Photo 8 – View of May 2nd Light Test from the Bay Area Ridge Trail

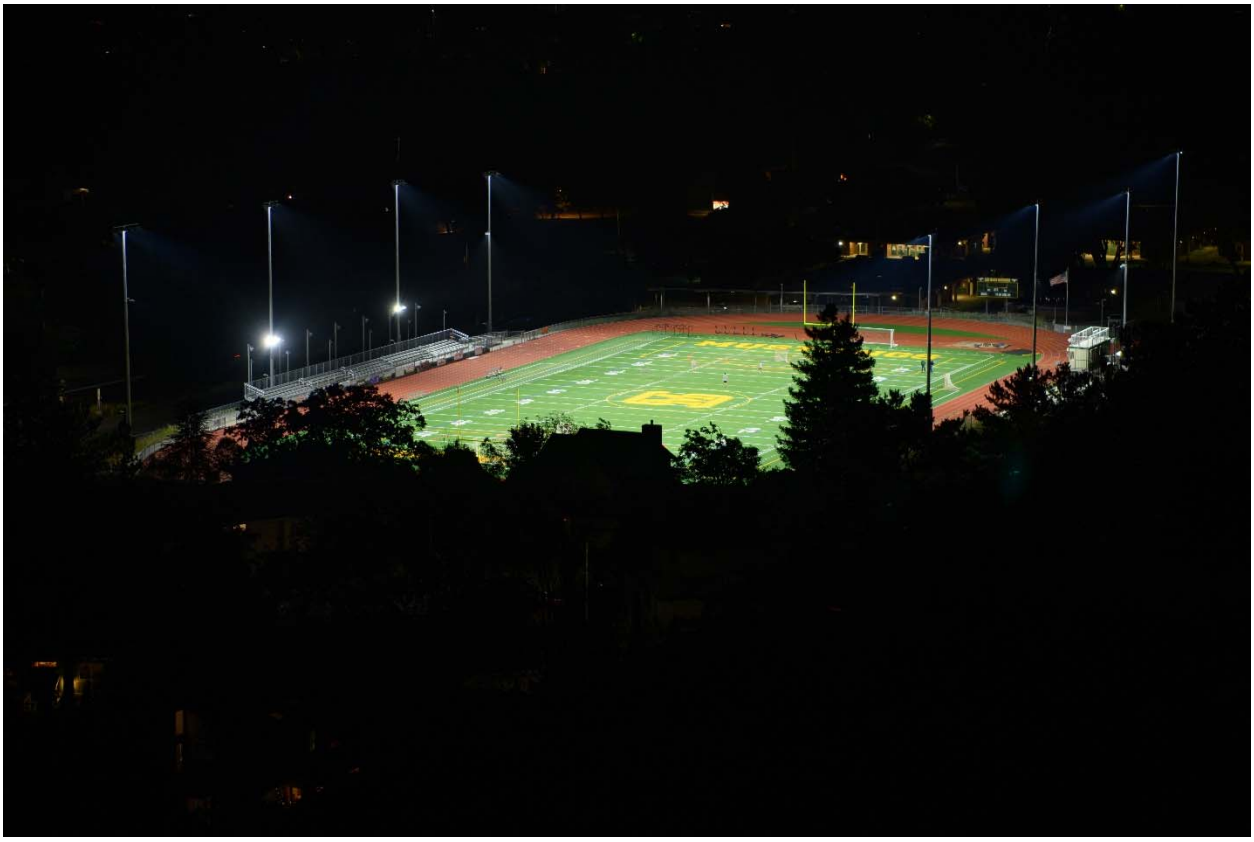


Photo 9 – View of May 2nd Light Test from the Bay Area Ridge Trail

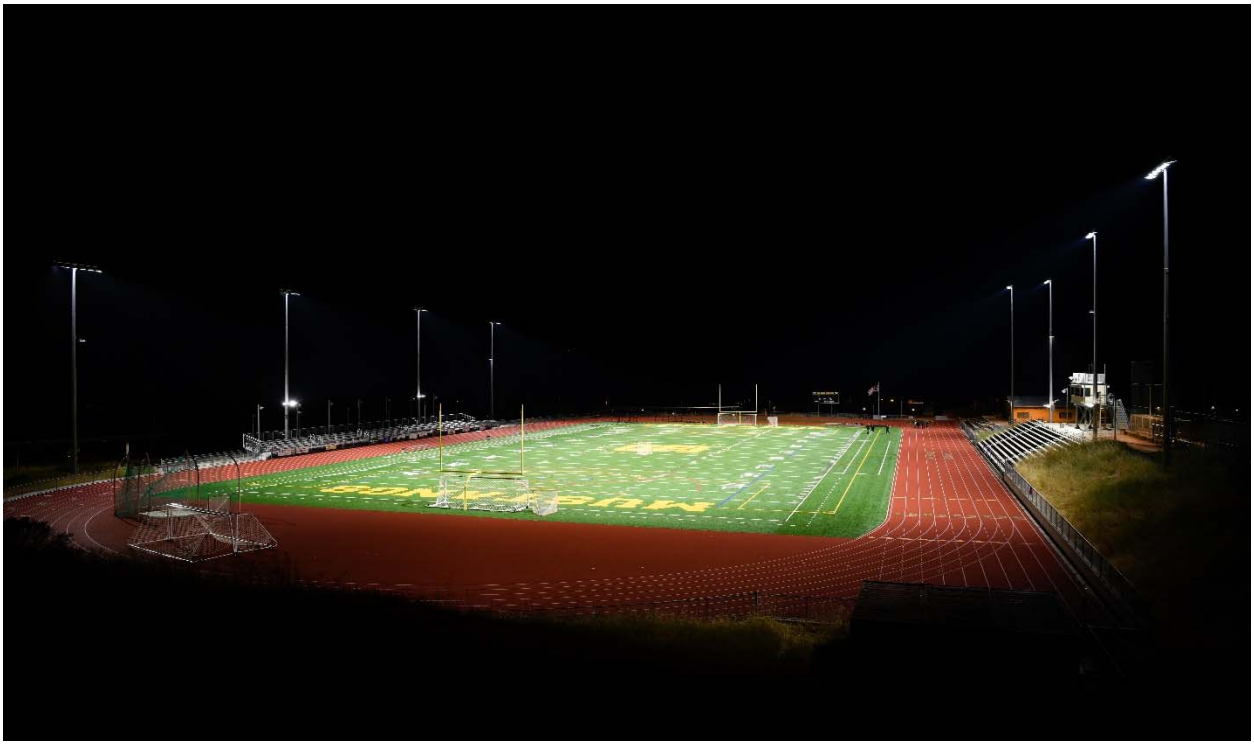


Photo 10 – View of San Marin Stadium from My House During May 6th Lights Test

Photo 11 – View of San Marin Stadium from My House After May 6th Lights Test

Photo 12– Daytime View of Light Poles, Luminaires, and Scenic Hills from My House

Photo 13 – View of Upward-Facing Luminaires on Pole 6 from My House

Photo 14 – View of Upward-Facing Luminaires on Pole 6 from the Bay Area Ridge Trail

Figure 1 – Locations and Directions of Photographs

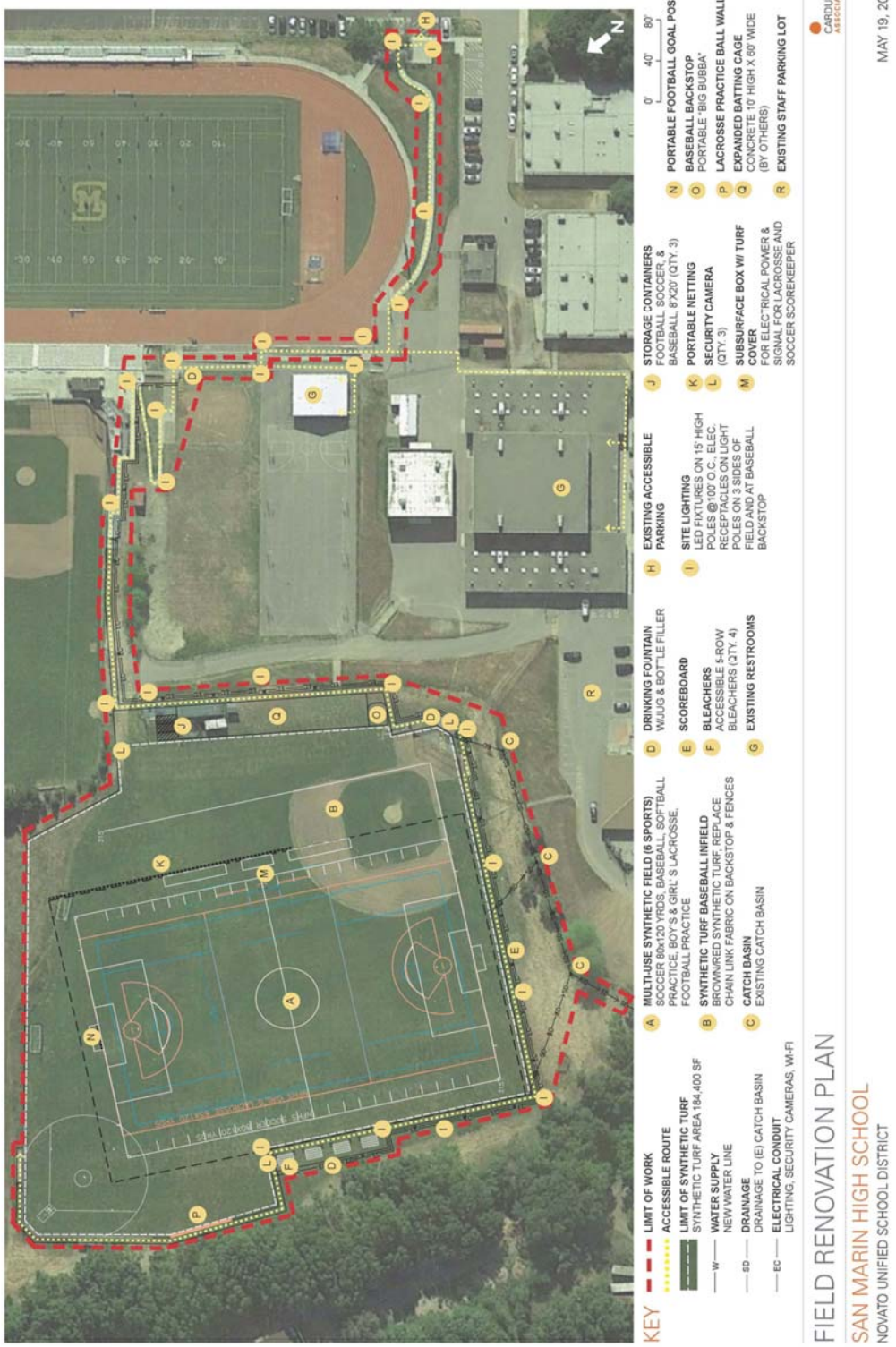


Figure 2 – Schematic Design for Second Artificial Turf Field

Letter 18

COMMENTER: Larry Scheibel

DATE: Dated "July, 2019;" received August 23, 2019

Response 18.1

The commenter states an opinion that the Revised Draft EIR does not accurately describe the project. Please see response 15.41.

Response 18.2

The commenter states an opinion that the Revised Draft EIR does not accurately describe the project, and that this may have resulted in an incorrect impact assessment. Please see response 15.41.

Response 18.3

The commenter states an opinion that the Revised Draft EIR should have more specific details about the project. As well as a topographic map. However, the aesthetics impact analysis in the Revised Draft EIR is based on the built condition; therefore, the impacts analysis, which is based on actual measurements of built conditions, reflects the actual height of the installed poles as well as the topography.

Response 18.4

The commenter states an opinion that glare and sky glow impacts were not properly evaluated in the Revised Draft EIR. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 18.

Response 18.5

The commenter states an opinion that, based on personal observations, impacts from stadium lighting are significant, and provides information about the Dwarf Oak Trail. This comment does not contain specific information or analysis on which to base a specific response. Lighting impacts are discussed in Section 3, *Aesthetics*, of the Revised Draft EIR and were found to be less than significant. Please also see Master Response: Light and Glare Impacts, Section J, responses to Letter 18.

Response 18.6

The commenter states an opinion that biological impacts should be reevaluated considering the actual observed conditions of light trespass and glare during the light tests. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 18. Please refer to the Initial Study (Appendix A, Page 6) for an analysis and discussion of potential impacts of night lighting on migrating birds.

Response 18.7

The commenter disagrees with the characterization of lighting levels at the project site and in the region. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 18. The commenter also states an opinion that the lighting zone for each off-site alternative must be disclosed and assessed. The discussion of lighting impacts for the alternative sites is sufficient for purposes of CEQA alternatives, which is to "allow meaningful evaluation, analysis, and comparison with the proposed project…the significant effects of the alternative shall be discussed, but in less detail than the significant effects of the

project as proposed." The analysis of the alternative site describes the setting of the site, including general lighting levels.

Response 18.8

The commenter states an opinion that the Revised Draft EIR does not evaluate ways to reduce or avoid glare or sky glow impacts. Because impacts would be less than significant, as discussed in Section 3, *Aesthetics*, of the Revised Draft EIR, no mitigation is required. Nevertheless, Alternative 4, Reduced Lighting System Alternative, in Section 4, *Alternatives*, of the Revised Draft EIR, evaluates a reduced lighting alternative.

Response 18.9

The commenter asks whether the Court must review the Revised EIR and give the District approval to use the lights before they can be used for anything other than testing. This question is noted, but does not require a response here as it does not pertain to the analysis or conclusions of the Revised Draft EIR.

Response 18.10

The commenter states an opinion that nighttime photographs should have been used in the Revised Draft EIR to show existing conditions and provides his own photographs. The commenter discusses his personal observations of the light test during which measurements were taken for the Revised Draft EIR and disagrees with the application of the Bortle Scale in the Revised Draft EIR analysis. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 18.

Response 18.11

The commenter states that he took photographs during the light test, and that the photographs are reproduced in the comment letter. This comment is noted; responses related to the photographs are within individual responses below as warranted. Please see also Master Response: Light and Glare Impacts, Section J, responses to Letter 18.

Response 18.12

The commenter states an opinion, consistent with the Revised Draft EIR, that "areas surrounding the site…would have to be classified as E2" rather than E3, and that portions of the open space areas to the north would be E1. The commenter goes on to opine that lighting on the trail in the open space area was substantial. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 18.

Response 18.13

The commenter states an opinion that lighting impacts to the open space area would result in impacts to wildlife. Please refer to the Initial Study (Appendix A, Page 6) for an analysis and discussion of potential impacts of night lighting on migrating birds.

Response 18.14

The commenter discusses his observations during the light test, and states an opinion that light impacts above/beyond the measurement locations may not have been accounted for in the analysis. The commenter suggests that measurements should have been made at various locations on surrounding properties. Finally, the commenter asserts that the field surface serves as a "giant reflector" of light, that impacts on neighboring properties are significant, and that photographs to illustrate the lighting should

have been included in the Revised Draft EIR. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 18.

Response 18.15

The commenter states an opinion that the analysis of glare impacts in the revised Draft EIR is inadequate, refers to provided photographs, and asserts that glare impacts are significant based on his observations and photographs. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 18.

Response 18.16

The commenter disagrees with the Revised Draft EIR's methodology and analysis for sky glow impacts. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 18.

Response 18.17

The commenter questions the accuracy of the project details in the Revised Draft EIR. Please see response 15.41.

Response 18.18

The commenter refers to a photograph of the light poles and opines that "poles and luminaires are huge and detract from views of scenic hills and ridgelines from both public and private viewing locations" and that impacts would be significant. However, the photograph included in the comment letter appears to be "zoomed in," and therefore does not represent an accurate view of the light poles as seen by observers adjacent to and around the project site. In addition, CEQA does not require that every possible viewpoint be assessed; the viewpoints used in the EIR are adequately representative and the impact analysis and conclusions as summarized in Sections 3, *Aesthetics*, of the Revised Draft EIR remain valid. Impacts to scenic vistas would be less than significant.

Response 18.19

The commenter states an opinion that the eight taller light poles are taller than existing structures and are therefore not visually compatible with on-site and surrounding development, and that impacts would be significant. The commenter suggests that his photograph illustrates this. Regarding the photograph, please see Response 18.18. The analysis of visual impact in Section 3, *Aesthetics*, of the Revised Draft EIR is based on the general type of development that exists at the high school campus and is typical for high school campuses; the light poles need not be at or below the height of all structures to be considered visually compatible with the built high school's facilities, other light poles etc.

Response 18.20

This comment is similar to Comment 18.17. Please see Response 18.17.

Response 18.21

The commenter states an opinion that impacts related to nighttime view and glare would be significant and refers to provided photographs and his observations. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 18.

Response 18.22

The commenter states that he assumes that upward-facing lights would also be necessary to illuminate airborne soccer and lacrosse balls and would therefore be used during games at least 50 nights. However, the District's lighting specialists have confirmed that the purpose of the upward-facing lights is to track football kickoffs and punts and are typical for football stadiums. In general, punts and kickoffs fly much higher than soccer balls and lacrosse balls, and more frequently during games. Contrary to the commenter's assumptions, the upward-facing lights are not proposed to be on at all times when the main lights are illuminated.

Response 18.23

The commenter states an opinion that the District may decide to include more events, extend the usage hours, or rent out the stadium and lights to outside groups in the future. Tis comment is noted. However, since none of these things are proposed, they are correctly not analyzed in the Revised Draft EIR.

Response 18.24

The commenter states an opinion that, based on his observations during the lighting test, his residence was affected by the stadium lights and that due to the measurement locations and heights this impact was not adequately addressed in the Revised Draft EIR. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 18.

Response 18.25

The commenter states concerns about light cast by upward-facing luminaires towards residences and open space. The commenter also states disagreement with the methodology and thresholds used in the Revised Draft EIR for lighting impacts. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 18.

Response 18.26

The commenter disagrees with the methodology and thresholds used in the Revised Draft EIR for sky glow impacts. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 18.

Response 18.27

The commenter disagrees with the methodology and thresholds used in the Revised Draft EIR for sky glow impacts, including the location of measurements. The commenter also states an opinion that the project substantially contributes to sky glow produced by the greater community. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 18.

Response 18.28

The commenter states an opinion that 152 nights a year of lighting should be considered a high number when evaluating sky glow impacts, and that sky glow thresholds are intended for facilities that are on only part of the night. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 18.

Response 18.29

The commenter states an opinion that information in Table 3 of the Revised Draft EIR about the plans for the second multi-use field is incorrect, and that schematic designs showing lighting were produced for the District. Please see responses 2.14 and 14.1.

Response 18.30

The commenter states an opinion that the preparers of the Revised Draft EIR were aware of the information provided in Comment 19.29. Although not a comment on the Revised Draft EIR, this comment is noted. Please see responses 2.14 and 14.1.

Response 18.31

The commenter states an opinion that field improvements at the second multi-use field were included in the District's Measure G bond proposal, which was approved by voters in 2016. Please see Response 2.14.

Response 18.32

The commenter states an opinion regarding project lighting in relation to the CIE standards used in the Revised Draft EIR. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 18.

Response 18.33

This comment is similar to Comment 18.29. Please see Response 18.29.

Response 18.34

The commenter states an opinion regarding structural stability of the light poles based on geologic conditions. The comment does not relate to cumulative impacts related to geology or to any other environmental analysis in the Revised Draft EIR, but is noted. Project-specific impacts related to geology were discussed in the previously circulated EIR and would be less than significant.

Response 18.35

The commenter states an opinion that analyses of lighting impacts in the Revised Draft EIR "have not been carried out in accordance with the lighting standard adopted by the District and it is not possible at this time to know if there are significant impacts." Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 18. Impacts related to field lighting are discussed in Section 2, *Aesthetics*, and Section 3, *Cumulative Impacts*, of the Revised Draft EIR. Impacts would be less than significant.

Response 18.36

The commenter states an opinion regarding the need for the project. This comment is noted, but does not pertain to the analysis or conclusions of the Draft Revised EIR. The need for the project was discussed in the previously circulated EIR in Section 2.0, *Project Description*. The commenter also refers to letters 1 and 4 regarding optional practice and game schedules for San Marin High School. Please see responses to letters 1 and 4.

Response 18.37

The commenter states concerns about alcohol and drug use. This comment does not relate to the environmental analysis in the Revised Draft EIR, but is noted. The project would not increase drug and alcohol use such that it would indirectly result in a significant impact to the environment, as discussed in the previously certified Final EIR.

Response 18.38

This comment is similar to Comment 18.36. Please see Response 18.36.

Response 18.39

The commenter Asks why electric temporary lights are not an alternative, and states an opinion that impacts related to air quality, greenhouse gas emissions, and noise would be reduced. However, because the proposed (and built) stadium lights are also electric, temporary electric lights would not reduce impacts. In fact, transporting large light fixtures to and from the site for every nighttime game and practice may increase these impacts. Nevertheless, this suggestion is noted.

Response 18.40

The commenter states an opinion that, based on expected attendance at football games, the stadium field lighting should have been designed for 30 foot-candles. The commenter also suggests that a six-pole design might be superior to the eight-pole design. These comments are noted. Based on the District's and the District's consultants' assessment of the project site and needs, an eight-pole design was determined to be the best project approach. Alternative 4, Reduced Lighting System, examines a reduced lighting system alternative as requested by the commenter.

Response 18.41

The commenter states an opinion that the Revised Draft EIR does not adequately study lighting impacts. The commenter does not provide specific information or analysis on which to base a specific response. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 18. Impacts related to field lighting are discussed in Section 2, *Aesthetics*, and Section 3, *Cumulative Impacts*, of the Revised Draft EIR. Impacts would be less than significant.

Response 18.42

The commenter states concerns regarding potential traffic impacts at the intersection of San Marin Drive and San Carlos way at one of the school entrances. However, the project's impacts in relation to traffic, other than cumulative conditions, are not a topic in the Revised Draft EIR; they were studied in the previously circulated EIR and concerns about this specific location were already identified and responded to. Nevertheless, these comments are noted. No significant impacts were anticipated to occur at this intersection based on the traffic analysis performed for the project as part of the originally circulated EIR.

The commenter also suggests that further study of cumulative traffic impacts is required because of a new stop sign installed at the school driveway. It should be noted that while a stop sign was added, it was done so at a driveway approach, the majority of which do not have signed stop control but are still operated as if yield/stop controlled. As a result, the addition of a stop sign is a visibility- and safety-based improvement as opposed to an operational one and is not expected to result in any increased delay to the intersection and therefore would not warrant any change to the selection of study intersections included in the Revised Draft EIR.

Response 18.43

The commenter states an opinion that the Revised Draft EIR does not adequately study lighting impacts. The commenter does not provide specific information or analysis on which to base a specific response. Impacts related to field lighting are discussed in Section 2, *Aesthetics*, and Section 3, *Cumulative Impacts*, of the Revised Draft EIR. Impacts would be less than significant. See also Master Response: Light and Glare Impacts, Section J, responses to Letter 18.

Response 18.44

The commenter asks about the personnel and methodology employed in the biological resources site visit and analysis. The reconnaissance-level site assessment was not intended as a presence/absence nesting bird/roosting bat survey, which would have included surveys of the project site and appropriate nest buffers. Rather, one stated purpose of the site visit was to document if potentially suitable nesting habitat was present. Additionally, nesting bird and roosting bat presence/absence surveys are not required as part of CEQA analysis to evaluate potential impacts.

A Rincon Senior Biologist with over 20 years of experience conducting surveys for special status species conducted the reconnaissance-level site visit between the hours of 10:00 AM and 11:30 AM. Rincon assessed the project site for presence of bird and roosting bat habitat during the reconnaissance site visit within the project area, which was limited to the stadium facility, adjacent fields and parking lot. As discussed in the Initial Study (Appendix A, Page 2) nesting bird and roosting bat habitat is present within trees and shrubs located in the surrounding residential neighborhood outside of the project area.

Response 18.45

The commenter discusses results of light readings that the commenter states he took on his property. The commenter states that his readings indicate light levels below 2.75 lux, and states an opinion that the Revised Draft EIR is incorrect that the project area is generally below 2.75 lux. However, since the commenter's measurements indicate levels below 2.75 lux, the comment is consistent with the referenced text in Revised Draft EIR. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 18.

Response 18.46

The commenter states an opinion that he does "not believe that illumination readings made on school property along the fence line can demonstrate that spill light levels in the residential and open space areas north and west of the stadium, at higher ground surface elevations, will be less than 5 lux." Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 18.

Response 18.47

The commenter states an opinion that there would be substantial light spillage onto the open space areas north of the project site, and that this would have an adverse impact on bat foraging. Please refer to the Initial Study (Appendix A, Page 6) for an analysis and discussion of potential impacts of night lighting on migrating birds. Please also see Master Response: Light and Glare Impacts, Section J, responses to Letter 18.

Response 18.48

The commenter states an opinion that "significant spill light extended at least 1,800 feet from the stadium" during the testing of the stadium lights, and that light spill would have an adverse impact on bats. Please refer to the Initial Study (Appendix A, Page 6) for an analysis and discussion of potential impacts of night lighting on migrating birds. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 18.

Response 18.49

The commenter states an opinion that bats are commonly observed by residents along San Ramon Way and the surrounding neighborhood, including approximately 600 feet from the stadium. The commenter further suggests that this should have been documented during on-site bird and bat surveys performed

at various times of the year. This comment is noted and is consistent with the assumed presence of bats in the area of the project, documented in the Initial Study, Appendix A to the Revised Draft EIR.

Response 18.50

The commenter refers to different descriptions from the Revised Draft EIR of when the stadium lights would be used. This comment is noted. As the different descriptions do not conflict with one another and are consistent, no changes to the EIR are necessary.

Response 18.51

The commenter states an opinion that the project is located in an area where existing ambient nighttime light levels are very low. The intent was not to imply that the project is within an urban area, only that it is located immediately adjacent to the greater San Francisco Bay urban center, and the lights form this project would not present a significant or unique attraction to migrating birds in the context of the vast expanse of permanent lighting in San Francisco and the surrounding urban centers.

Response 18.52

The commenter states an opinion that there are owl boxes, that are used by owls, within 500 feet of the project site, and that the Revised Draft EIR should have included a survey that identified this. Please refer to responses to comment Letter 6 for a discussion of the appropriate surveys for a project of this type.

Response 18.53

The commenter states an opinion that because he has seen small animals in his yard, the Revised Draft EIR is incorrect that prey availability for owls, such as native small rodents, is unlikely to occur on the athletic field. The extensive use and maintenance of an athletic field significantly reduces its value as habitat for wildlife. Most occurrence of wildlife on the field would be transient; however, the proposed project would not change the way wildlife use the field, as the lights would only be on when the field is in active use, and wildlife would be avoiding the site. This has no bearing on the analysis of impacts to biological resources.

Response 18.54

The commenter states an opinion that numerous birds nest in the small trees in his yard every winter and that ambient nighttime lighting and noise conditions are essentially zero. The commenter additionally asserts that the project would impact many birds that nest within the surrounding area by both light and noise from the project. As described in the Initial Study, Appendix A, Page 4, project construction activities would take place during the months of September through January thereby avoiding the potential for construction-related impacts to nesting birds. An evaluation of potential impacts on birds and wildlife resulting from noise levels emanating from the stadium during regular usage was not required as part of the CEQA analysis. This noise would be consistent with the existing noise levels experienced during daytime activity but would extend the number of hours that noise emanates from the stadium on the days stadium lights are in use. As described in the Initial Study (Appendix A, Page 6), birds nesting in this area would likely already be habituated and accustomed to human activity and would not likely be disturbed by the increased activity level and lighting resulting from the project. Lighting impacts to nesting and migratory birds were considered in the Revised Draft EIR Initial Study (Appendix A, Pages 4-5). Impacts would be less than significant.

Response 18.55

The commenter states an opinion that the Revised Draft EIR compares the project site to the Bay Area's major sports stadiums in Oakland and San Francisco. The commenter also opines that the project site is along a migratory bird route. This comment is noted. The EIR evaluated potential impacts to migrating birds through a review of available information on stadium lighting. Although the analogy is imperfect, the information is pertinent to the discussion. The urban stadiums produce far higher levels of light than the proposed project, and as such represent a unique lighting source within their surroundings. Migratory birds traveling at high altitudes would see the lighting from the proposed project within the context of the broader setting of the San Francisco Bay area (including Novato, Petaluma, Santa Rosa, San Rafael, Richmond, Berkeley, Oakland and San Francisco). Consequently, the comparatively low light and short duration of lighting on any given evening is unlikely to substantially alter migratory behavior. Minor alterations in migratory behavior that would not be expected to jeopardize population viability are not significant impact under CEQA.

Response 18.56

The commenter disagrees with the methodology used to measure light in the Revised Draft EIR. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 18.

Response 18.57

The commenter states an opinion that the design and measured illumination for the field is not appropriate for the project site but does not provide information or analysis on which to base a specific response. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 18.

Response 18.58

The commenter states an opinion that the project area should be classified as Zone E2. This comment is consistent with the impact analysis in the Revised Draft EIR, which classifies the project site and immediately surrounding neighborhood as Zone E2.

Response 18.59

The commenter states an opinion that light measurements should have been taken at additional locations to properly assess impacts from lighting. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 18.

Response 18.60

The commenter disagrees with the methodology and thresholds used in the Revised Draft EIR for glare impacts, and states an opinion that the threshold used for glare impacts "appears to come from lighting Zone E3 requirements obtained from an older, superseded version of CIE:150." Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 18.

Response 18.61

This comment is similar to Comment 18.15. Please see Response 18.15.

Response 18.62

The commenter states an opinion that photographs taken from his house demonstrate that the project would result in "significant glare and spill light" that has "been observed at both residential and open

space areas north and west of the stadium." Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 18.

Response 18.63

This comment is similar to Comment 18.40. Please see Response 18.40. The commenter further suggests that if "the District wants to use a higher attendance number than 2,000 to justify the 40-foot-candle field illumination, then all other sections of the EIR including traffic and noise need to be reevaluated using this higher attendance figure." Attendance is not anticipated to exceed approximately 1,440 people.

Response 18.64

The commenter states an opinion that the measurements taken during the lighting tests "may not represent the worst case for residential and open space areas north and west of this property line," and that additional readings should have been taken in offsite areas. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 18.

Response 18.65

The commenter disagrees with the methodology and thresholds used in the Revised Draft EIR for glare impacts. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 18.

Response 18.66

This comment is similar to comments 18.40, 18.41 and 18.63. Please see responses 18.40, 18.41 and 18.63.

Response 18.67

The commenter disagrees with the methodology and thresholds used in the Revised Draft EIR for light trespass and sky glow impacts. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 18.

Response 18.68

The commenter asks why light levels shown on photometric plans, which are based on design calculations, and levels observed during actual field measurements, are not precisely the same. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 18.

Response 18.69

The commenter asks whether the glare values presented in the photometric study were calculated in accordance with Section 6.2.2 of CIE:150-2017. Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 18.

Response 18.70

The commenter disagrees with the methodology and thresholds used in the Revised Draft EIR for sky glow impacts, and states an opinion that the project would "substantially contribute to sky glow produced by the greater community." Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 18.

Response 18.71

The commenter states an opinion that he does "not see documentation in this report [Appendix B to the Revised Draft EIR] that demonstrates compliance of this project with the light spill, glare, and sky glow requirements specified in CIE:150-2017." The commenter further opines that important information is missing from the Revised Draft EIR such as "topographical information, plans illustrating the geometric relationship between the locations of luminaires and critical locations considered in the design, calculated values of the relevant lighting parameters, and both luminous intensity distribution data and aiming angles for the luminaires." Please see Master Response: Light and Glare Impacts, Section J, responses to Letter 18.

Response 18.72

The commenter provides photographs, which are referenced in the comments above. The responses to these comments were prepared taking these photographs into account where referenced. Please see responses 18.1 through 18.71.

Letter 19

Lynda Scheibel <lscheibel@comcast.net>
Thu 8/22/2019 4:40 PM

- Environmental Report

Yancy,

This is my response to the proposed partially revised draft environmental impact report.

The project for the lighted field at San Marin High School has been based on a series of frustrating lies and approximations. The height of the poles has been misrepresented in that not all of the poles are 80 feet high. There apparently was even a consideration made at one time for just six poles at a lower height. This alternative was never presented to the neighbors or NUSD as a compromise that would cause less negative impact to the neighborhood. So now we have eight poles that have ruined our view of the surrounding hills and sky line to the south of our home. The attached photo, taken from the back of our house, shows four of these poles and the impact they have on views from our neighborhood to the hills south of the stadium. What was once a peaceful and inviting scene to enjoy and relax with at the end of a long day's work, is now crowded with tall metal lights that essentially were never needed in the first place. Instead of the pleasing, quiet darkness that has been the standard of our neighborhood when the sun goes down, we will be subjected to a sea of lights flooding the area that has been dark for the 23 years we have lived here. It has been extremely hurtful to hear from the coaches and trustees of NUSD that once these special lights have been installed we will hardly notice them. It is impossible not to notice the 80 to 100 foot poles marching across the skyline.

19.1

19.2

19.3

Lynda Scheibel

Letter 19

COMMENTER: Lynda Scheibel

DATE: August 22, 2019

Response 19.1

The commenter states an opinion that the light poles are not accurately described in the Revised Draft EIR. Please see response 15.41.

The commenter also states interest in an alternative that has only six tall light poles. This comment is noted. Based on the District's and the District's consultants' assessment of the project site and needs, an eight-pole design was determined to be the best project approach. Please see also Response 12.

Response 19.2

The commenter provides a photograph of the light poles and states opposition to the project. This comment is noted. Please see also Response 15.22.

Response 19.3

The commenter states concerns about aesthetic impacts of the proposed project. These concerns are noted and will be forwarded to the District's decision-makers for their consideration. This comment is based on the commenter's objective experience of the project, which is acknowledged. Aesthetic impacts are analyzed and evaluated pursuant to CEQA in Section 2, *Aesthetics*, of the Revised Draft EIR, and would be less than significant.

Letter 20

From: Mary Schmitz [mailto:erikmary2@comcast.net]
Sent: Saturday, August 3, 2019 10:11 AM
To: Environmental Report <EIR@nusd.org>
Subject: field lights, yes

We have been homeowner neighbors (11 San Carlos Way) of San Marin High School for over 20 years. That's been close enough to hear every announcing of Saturday morning games, and student rendition of songs to start those games. We have been inundated by crowds for graduations, back to school nights, and big games flooding the parking spaces in front of our house. We daily - during the school year - work through student parking and driving in the neighborhood. 20.1

It's all good, folks.

We bought this house knowing the school was part of the community. We love that the school is a community center. We look forward to the possibility of lights to expand and continue community events, two driveways away from ours. 20.2

Best of luck on the vote.

Erik and Mary Schmitz

Letter 20

COMMENTER: Mary Schmitz

DATE: August 3, 2019

Response 20.1

The commenter states support for the proposed project. The commenter's stated support of the project, while noted, is not a comment on the Draft EIR.

Letter 21

From: Todd Towey [mailto:todd.towey@ring.com]
Sent: Saturday, August 3, 2019 2:26 PM
To: Environmental Report <EIR@nusd.org>
Subject: Let the Kids and the Community have Lights

Our kids and community deserve to have lights. Period! | 21.1

--
Todd Towey

Letter 21

COMMENTER: Todd Towey

DATE: August 3, 2019

Response 21.1

The commenter states support for the proposed project. The commenter's stated support of the project, while noted, is not a comment on the Draft EIR.

From: NORMAN ZEISER <normanzee@me.com

comments on revised EIR

Letter 22

To the NUSD School Board,

Thank you for the opportunity to submit comments on the revised EIR for the SMHS stadium field lights. My comments follow.

Data is the key to making decisions on anything of importance. The decision to install stadium lights on the SMHS field lacks critical data to support the conclusion made in the original EIR and now in the revised EIR. For example: was an exhaustive survey made of the current usage of alternate fields for practices for the outdoor sports SMHS claims are not available. There is no concrete data to back up this conclusion. There is no data to support the claim that field lights and night games will keep kids off the streets. In actuality the reverse might happen. More students in one place to meet and plan follow-up parties in the nearby hills after the games. 22.1

It is disheartening to read the revised EIR for the SMHS stadium lights as it more or less just reiterates what the original EIR found. Night glare generated several nights per week will undoubtedly have a great impact on neighbors as well as on the wildlife that is abundant in the hills and airways that are within the visual reach of the lights. Consider the different species of birds that have a flyway which crosses over much of Novato including the SMHS. Just go out to the Rush Creek area on many days the birdlife on the water can include hundreds of egrets, avocets and curlew and others I can't identify without the help of a wildlife bird identification handbook. Many, if not all of them may fly over the SMHS area to reach Rush Creek. Also Mt Burdell is a dominant area where many other wildlife habitats, including mule deer, 22.2

coyotes, various species of owls and many other 4 legged animals. It is impossible to know what the impact of these creatures will be, and the resultant impact to the natural beauty of the San Marin area. Mt Burdell is a gift we are so lucky to have for all of the Bay area residents. Many times when I have been on hikes on the mountain I have run into other hikers from as far away as San Jose. The hikes on the mountain have been written up in several of the Bay area newspapers.

•

• *I retired in 2002. My career was in environmental conservation. I have an advanced degree in Air Pollution Toxicology. I spent over 20 years as a Board Certified Industrial Hygienist. There are inherent health issues associated with the stadium lights proposed to be installed.* **As reported in 2016 in CNN**:

•

• **"The American Medical Association (AMA) has just adopted an official policy statement about street lighting: cool it and dim it.**
The statement, adopted unanimously at the AMA's annual meeting in Chicago on June 14, comes in response to the rise of new LED street lighting sweeping the country. An AMA committee issued guidelines on how communities can choose LED streetlights to "minimize potential harmful human health and environmental effects."
Municipalities are replacing existing streetlights with efficient and long-lasting LEDs to save money on energy and maintenance. Although the streetlights are delivering these benefits, the AMA's stance reflects how important proper design of new technologies is

22.3

and the close connection between light and human health.

•

The AMA's statement recommends that outdoor lighting at night, particularly street lighting, should have a color temperature of no greater than 3000 Kelvin (K). Color temperature (CT) is a measure of the spectral content of light from a source; how much blue, green, yellow and red there is in it. A higher CT rating generally means greater blue content, and the whiter the light appears.

<image001.jpg>

A white LED at CT 4000K or 5000K contains a high level of short-wavelength blue light; this has been the choice for a number of cities that have recently retrofitted their street lighting such as Seattle and New York.

Explainer: What is seasonal affective disorder?

But in the wake of these installations have been complaints about the harshness of these lights. An extreme example is the city of Davis, California, where the residents demanded a complete replacement of these high color temperature LED street lights.

Can communities have more efficient lighting without causing health and safety problems?

Two problems with LED street lighting

An incandescent bulb has a color temperature of

2400K, which means it contains far less blue and far more yellow and red wavelengths. Before electric light, we burned wood and candles at night; this artificial light has a CT of about 1800K, quite yellow/red and almost no blue. What we have now is very different.

The new "white" LED street lighting which is rapidly being retrofitted in cities throughout the country has two problems, according to the AMA. The first is discomfort and glare. Because LED light is so concentrated and has high blue content, it can cause severe glare, resulting in pupillary constriction in the eyes. Blue light scatters more in the human eye than the longer wavelengths of yellow and red, and sufficient levels can damage the retina. This can cause problems seeing clearly for safe driving or walking at night.

You can sense this easily if you look directly into one of the control lights on your new washing machine or other appliance: it is very difficult to do because it hurts. Street lighting can have this same effect, especially if its blue content is high and there is not appropriate shielding.

The other issue addressed by the AMA statement is the impact on human circadian rhythmicity.

Color temperature reliably predicts spectral content of light -- that is, how much of each wavelength is present. It's designed specifically for light that comes off the tungsten filament of an incandescent bulb.

However, the CT rating does not reliably measure color from fluorescent and LED lights.

Another system for measuring light color for these sources is called correlated color temperature (CCT). It adjusts the spectral content of the light source to the color sensitivity of human vision. Using this rating, two different 3000K light sources could have fairly large differences in blue light content.

Therefore, the AMA's recommendation for CCT below 3000K is not quite enough to be sure that blue light is minimized. The actual spectral irradiance of the LED -- the relative amounts of each of the colors produced -- should be considered, as well.

The reason lighting matters

The AMA policy statement is particularly timely because the new World Atlas of Artificial Night Sky Brightness just appeared last week, and street lighting is an important component of light pollution.

According to the AMA statement, one of the considerations of lighting the night is its impact on human health.

In previous articles for The Conversation, I have described how lighting affects our normal circadian physiology, how this could lead to some serious health consequences and most recently how lighting the night affects sleep.

In the case of white LED light, it is estimated to be five times more effective at suppressing melatonin at night than the high pressure sodium lamps (given the same light output) which have been the mainstay of street

lighting for decades. Melatonin suppression is a marker of circadian disruption, which includes disrupted sleep.

A dark night is good for your health

Bright electric lighting can also adversely affect wildlife by, for example, disturbing migratory patterns of birds and some aquatic animals which nest on shore.

Street lighting and human health

The AMA has made three recommendations in its new policy statement:

First, the AMA supports a "proper conversion to community based Light Emitting Diode (LED) lighting, which reduces energy consumption and decreases the use of fossil fuels."

Second, the AMA "encourage[s] minimizing and controlling blue-rich environmental lighting by using the lowest emission of blue light possible to reduce glare."

Join the conversation

See the latest news and share your comments with CNN Health on Facebook and Twitter.

Third, the AMA "encourage[s] the use of 3000K or lower lighting for outdoor installations such as roadways. All LED lighting should be properly shielded to minimize glare and detrimental human and environmental effects, and consideration should be given to utilize the ability of LED lighting to be dimmed for off-peak time periods."

There is almost never a completely satisfactory

solution to a complex problem. We must have lighting at night, not only in our homes and businesses, but also outdoors on our streets. The need for energy efficiency is serious, but so too is minimizing human risk from bad lighting, both due to glare and to circadian disruption. LED technology can optimize both when properly designed."

Richard G. "Bugs" Stevens is a professor in the School of Medicine at the University of Connecticut.

Letter 22

COMMENTER: Norman Zeiser

DATE: August 17, 2019

Response 22.1

The commenter states an opinion that the decision to install stadium lights on the SMHS field lacks critical data to support the conclusion made in the original EIR and now in the revised EIR. The commenter does not specify what data is missing from the EIR. The District, as lead agency, has made every effort to prepare an EIR that is adequate, complete and a good-faith effort at full disclosure, consistent with CEQA. The commenter asks whether an exhaustive survey was made of the current usage of alternate fields for practices for outdoor sports. The District did study alternative locations; please see Section 4, Alternatives, of the Revised Draft EIR. The commenter also opines that the project would lead to "follow-up parties in the nearby hills after the games." However, the project would not increase "parties" such that they would indirectly result in a significant impact to the environment, as discussed in the previously certified Final EIR.

Response 22.2

The commenter states concerns about lighting impacts on wildlife. Please see responses to Letter 6 for information on this topic.

The commenter states an opinion that there are inherent health issues associated with the stadium lights proposed to be installed. The commenter includes an excerpt from CNN dated 2016.

The main stadium lights would be turned off by 9:45 PM or earlier, with the rare exception of games that extend to overtime, which could require the continued use of main stadium lights incrementally beyond this cut-off time. It is acknowledged that some neighbors of San Marin High School may go to sleep before 9:45 PM. In addition, stadium lighting would emit light in the blue spectrum, exposure to which can suppress production of the hormone melatonin and impair sleep quality in the evening (American Medical Association 2016). However, as described above under the heading *Light Trespass and Glare*, the proposed stadium lights' narrow beam angle, reflectors, and visors would minimize the exposure of nearby residents to lighting that could potentially disturb sleep. As described above, preliminary photometric analyses indicate that potential light trespass would be very low (likely less than 1.0 foot-candle at neighboring property lines). Furthermore, unlike LED streetlights that are illuminated all night and have generated complaints from residents in cities like Davis, California, and Seattle, Washington, the proposed LED lights would be turned off by 8:30 PM most nights and by 9:45 PM fewer than 15 times per year for home football and Powder Puff games. For approximately 210 of the 365 nights of the year, the lights would not be in use. The stadium lights would have a 9:45 PM cut-off time that precedes the "post-curfew" hours of 10:00 PM or later identified by Illuminating Engineering Society of North America's, which correspond to normal sleeping hours.

Due to the low levels of light trespass and glare and the lack of use of the lights during normal sleeping hours, it is not anticipated that implementation of the proposed project would substantially disturb sleep patterns or result in adverse health effects for nearby residents. There is no scientific consensus that LED lighting would result in adverse effects to human health. A thorough review of all available literature on the potential effects of solid-state lighting (e.g., LED lighting) on human health was conducted by the International Energy Agency 4E Solid State Lighting Annex (2014). That review found that in comparison with other lighting technologies, solid-state lighting technology is not expected to have more direct negative impacts on human health with respect to non-visual effects. Commenters also referred to a report entitled "Human and Environmental Effects of Light Emitting Diode (LED) Community Lighting" to

support concerns about health effects. However, this report pertains to LED street lights that are on every night and for all or most of the night and not sports field lights that are on for relatively limited durations. It should also be noted that the report states that the "American Medical Association (AMA) support[s] the proper conversion to community based Light Emitting Diode (LED) lighting, which reduces energy consumption and decreases the use of fossil fuels." In addition, the proposed project generally incorporates most of the article's recommendations regarding LED lights, i.e. that they be minimized, shielded and turned off when not needed.

As discussed in Section 2 of the Draft EIR, *Aesthetics*, impacts related to night lighting would be less than significant.

International Energy Agency - Energy Efficient End-Use Equipment (4E) SSL Annex Task 1. 2014. Solid State Lighting Annex: Potential Health Issues of SSL – Final Report. September. Available at: http://ssl.iea-4e.org/files/otherfiles/0000/0072/IEA_4E_SSL_Annex_Health_Aspects_Study_final.pdf

Appendix A

Revised Initial Study Biological Resources Analysis

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
IV. BIOLOGICAL RESOURCES				
-- Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☐	■	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☐	■	☐
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	■
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	■	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	■	☐
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	■

a) ***LESS THAN SIGNIFICANT IMPACT***. The project site is situated in a suburban neighborhood in Novato, California within the campus of San Marin High School. The project site is bordered to south by a parking lot, to the east by a grass field, to the north by baseball fields, and to the west by the high school campus. Residential neighborhood surrounds the high school campus on the south, east, and north. To the south and west, Novato Boulevard

separates the high school campus from a riparian corridor along Novato Creek. Approximately 700 feet north of the stadium, and separated from the project site by the residential neighborhood, is open space consisting of oak/grassland vegetation community. Mature trees are present adjacent to the project site on the south and eastern sides and few scattered mature trees are present on the high school campus to the west of the project site. The closest mature trees are located over 100 feet away from the proposed locations for the main stadium light poles.

A biological resource reconnaissance-level site visit was conducted by Rincon Consultants on April 30, 2019. The reconnaissance survey was conducted to provide field verification of project-area habitat types and vegetation communities, document plants and animal species observed on-site, assess the potential for the project site to support sensitive species, and determine if the project site provides suitable nesting bird and roosting bat habitat.

The project site is completely developed with athletic field infrastructure, bare ground, and stadium seating. The fill slopes encircling the athletic field and the grassy field north of the stadium support a mix of non-native annual grasses and ruderal vegetation consisting predominantly of wild oat (*Avena fatua*), annual ryegrass (*Lolium multiflorum*), foxtail barley (*Hordeum murinum*), black mustard (*Brassica nigra*), bristly ox-tongue (*Helminthotheca echioides*) and purple star thistle (*Centaurea solstitialis*). A few individual coyote bush (*Baccharis pilularis*) and ornamental maple (*Acer* sp.) occur within the vegetated peripheries of the stadium. Mature trees occur on the school property within a few hundred feet of the athletic field and between the project site and the residential neighborhood to the east, including coast live oak (*Quercus agrifolia*), valley oak (*Quercus lobate*), pine (*Pinus* sp.), scrub oak (*Quercus sp.*), coast redwood (*Sequoia sempervirens*) and blue gum eucalyptus (*Eucalyptus globulus*). Wildlife observed during the reconnaissance survey include American crow (*Corvus brachyrhynchos*), turkey vulture (*Cathartes aura*), mourning dove (*Zenaida macroura*), cliff swallow (*Petrochelidon pyrrhonota*) and California ground squirrel (*Otospermophilus beecheyi*).

Sensitive Species

In order to determine the potential presence of sensitive species or habitat, Rincon Consultants reviewed regulatory agency databases, conducted a literature review, analyzed aerial imagery, and reviewed the construction plans. According to the California Natural Diversity Database (CNDDB 2016), there is potential for special status wildlife species to occur within a five-mile radius of the project site. Based on the reconnaissance survey, the project site does not support special status species habitat and no special status species were observed during the survey. No nesting birds or potential bat roosting habitat was observed within the project site. Potential nesting habitat is present within mature trees and shrubs located within the surrounding residential neighborhood outside of the project area. Few special status birds and bats may fly through or over the project site, but project activities will not have a significant impact on any bird or bat species such that population size is reduced to a level below being self-sustaining.

This additional discussion is based on the results of the lighting report prepared by lighting consultant James Benya in June 2019 (Appendix B to the Revised EIR), which was provided after publication of the Draft EIR. Light impacts can be analyzed by quantifying illuminance from the spillover of light, or "light trespass." Light trespass is measured on both the vertical

plane (e.g., light shining through a window) and the horizontal plane (e.g., light falling on a bed), in terms of lux or foot-candles (more detailed definitions can be found in Section 2, *Aesthetics,* of the EIR). The lighting report found that illuminance at residential property lines adjacent to the stadium site was no greater than 2.75 lux, which is consistent with lighting levels in sparsely populated rural areas. As discussed in Section 2, *Aesthetics*, this level of light trespass beyond the stadium site would not exceed the International Commission on Illumination's (CIE) allowed maximum of 5 lux in rural areas.

Special Status and Other Bat Species. Native bats species that have not been identified as threatened or endangered may be present in the project area. Seven bat species that could potentially occur around the project site are considered California species of special concern (CSSC) either due to lacking information or because of suspected decline of the species range in California. These species (global and state ranking and CDFW special status included in parenthesis) include: the pallid bat (G5 S3; Class II), Townsend's big-eared bat (G3G4 S2; Class I), western red bat (G5 S3; Class II), fringed myotis (G4 S3; Class II), long-legged myotis (G5 S3; Class II), western mastiff bat (G5T4 S3S4; Class II), and big free-tailed bat (G5 S3; Class II). Two additional species are placed on the Watch List (WL) because of restricted distribution and the need for additional field efforts to establish population trends. These two species include: the silver-haired bat (G5 S3S4) and the hoary bat (G5 S4). The CDFW lists the primary reasons for bat decline as closures, human disturbance, and direct extermination thought "pest control" measures at colony rooting sites (Bolster 1998). Additionally, unsustainable management practices of public and private forest lands for cavity-dwelling species, and farming practices such as removal of riparian forests and use of insecticides are notes as causes of bat declines. No evidence currently exists that would suggest the installation of the stadium lights would have a significant impact on bat populations.

Studies that have shown effects on species biology as a result of artificial light are generally related to long periods of lighting, for example streets and other city lights that are on all night (Rowse et al. 2016). The few hours each night that stadium lights would be on may have some effect on bat foraging behavior, but not to the level of a negative impact on the population. On the contrary, evidence exists that while not natural behavior, bat foraging around lights may have a positive effect by increasing foraging efficiency, especially for insectivorous species that hunt in open spaces above canopy or along vegetation edges (Rowse et al. 2016 and references therein). Many Myotis species have been found to simply avoid lit areas, seemingly preferring to forage in darkness. The open space to the north of the project site and along the riparian corridor associated with Novato Creek provides ample dark foraging opportunities.

Native bats use roosting habitats such as trees, bridges, and abandoned buildings. However, the proposed project plans do not include the removal of any nearby trees, and no other suitable habitat in proximity to the project site would be impacted. Furthermore, higher quality foraging and roosting habitat is located one quarter-mile south at Novato Creek, making it less likely that any bats would frequent the proposed project area. Bats that are roosting around the project site could generally be considered habituated to human activities and are unlikely to be disturbed by any increased activities associated with the stadium lighting. Bats have been shown to be very resilient to urbanization and urban activities and in some cases have been found to be more diverse and abundant in association with urban landscapes (Jung and Threlfall 2016).

It is possible that bats may forage around the lights during the brief periods lights are on. However, little to no evidence exists that bats would be specifically attracted to the lights (Evans Ogden, 1996) and the lack of light trespass beyond 100 feet from the stadium further reduces the likelihood that bats would be attracted to the lights. The brief period of illumination combined with the distance from any suitable bat roosting areas and lack of light trespass makes it unlikely for lighting to have a negative impact on bat behavior. As discussed in the introductory section to this Initial Study under *Description of Project – Project Components*, project activities would take place during the months of September through January. Since construction would occur early in general mating season for native bats, it would not impact maternity roosting colonies. Based on available information, no evidence exists that the project would negatively impacts bat behavior. Potential impacts to incidental foraging bats would be less than significant.

Nesting or Migratory Birds

Nesting birds and raptors are protected by the Migratory Bird Treaty Act (MBTA) and California Fish and Game Code (CFGC). Common avian species that have adapted to urban and suburban environments, such as sparrows, finches, American crows, and barn owls, are present in the project area.

Construction. The nesting season in the area generally extends from February through August. As discussed in the introductory sections to this Initial Study under *Description of Project – Project Components*, project activities would take place during the months of September through January. Therefore, construction during this period would avoid the potential for impacts to nesting birds. In addition, construction of the project would occur within previously disturbed areas adjacent to the sports stadium and parking area on the San Marin High School campus. Work would occur on previously paved areas or areas that are landscaped with non-native vegetation, including non-native lawn grass. No activity would occur on previously undisturbed ground. Disturbed vegetation (consisting primarily of lawn) above trenches and bore pits would be restored to pre-construction conditions following installation of the electrical conduits. No tree removal or trimming is proposed as part of this project. Therefore, no impacts during construction would occur.

Operation. Once constructed, poles would be a maximum of ~~80~~ 90 feet (24.3 meters) tall. Given the small surface area of their vertical and horizontal structure, poles would not have a significant impact on bird flight, including during migration.

Nighttime events at the stadium requiring lighting would occur approximately 152 or fewer times per year, with the majority of the light use occurring between October and May. Lighting would occur for approximately two hours per evening during week days (6 to 8 PM) to 3.75 hours during 15 or fewer Friday evenings (6 to 9:45 PM). Therefore, stadium light would be on for only short periods consisting of two to four hours a night for up to four months. There have been some cases where lighting has been shown to impact bird species; however, this has typically occurred where light is otherwise scarce, such as on offshore oil platforms (Huppop et al., 2015) and in forests (The Nature Conservancy, 2015). There is no evidence that shows birds are attracted to urban lights (Evans Ogden 1996). Since lighting would occur during short durations and little light trespass would occur, stadium lights are unlikely to result in birds becoming trapped within the light zone, known as the "trapping effect" (Evans Ogden 1996),

especially on diurnal (daytime active) birds (Outen 2002). In addition, lighting events would mostly occur during August through December which falls outside the usual nesting bird season. Therefore, lighting is optimally planned to have little to no impact on nesting birds (Gason et al. 2012).

Three owl boxes have been installed around the margin of the high school campus to the north and west, the nearest of which is approximately 700 feet from the project site, which is beyond the standard agency-required buffer distance of 500 feet between active raptor nests and active project construction activities. These owl boxes would most likely be occupied by barn owls given the size and location of the owl boxes. Barn owls adapted to urbanized landscapes (as would be expected for existing resident barn owls) would already be tolerant of, and acclimated to, the current level of human activities from the existing athletic field and surrounding residences. The addition of lights and sporting activities carry on for up to 3.75 hours after sunset would have no additional impact on nesting owls above that already occurring during day-time. Natural prey availability for owls, such as native small rodents, is unlikely to occur in the athletic field area and owls are more likely to forage in open space to the north of the project site and along the riparian corridor to the west and south. Potential impacts to barn owls would be less than significant. Overall impacts to nesting and migratory birds would be less than significant. Based on the project parameters discussed above, ~~I~~impacts associated with adverse effects on candidate, sensitive, or special-status species would be less than significant and further analysis of this issue in an EIR is not warranted.

b) ***LESS THAN SIGNIFICANT IMPACT***. Construction of the project would occur within previously disturbed areas on the San Marin High School campus. Ground disturbance during construction of the proposed project would be limited. Excavation would be required for the installation of pole foundations, and limited trenching and boring would be required for the installation of new electrical connections. This ground disturbance would occur on previously disturbed areas within and near the existing stadium. The nearest riparian area to the stadium is located approximately one-quarter mile to the south and southwest at Novato Creek in O'Hair Park. Although light pollution can adversely affect wildlife in riparian areas, the proposed light fixtures would be narrowly focused on the stadium and downcast. Given that light trespass would not exceed 2.75 lux at residential property lines approximately 125 feet from light poles on the stadium site, light trespass at the greater distance of Novato Creek (about one-quarter mile) would be negligible. The lighting design for the project follows standard recommendations from The Nature Conservancy regarding downward facing design and reduced period when lights are on (The Nature Conservancy 2015, https://www.nature.org). Therefore, construction and operation of the project would not have a substantial adverse effect on riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulation, or by state or federal agencies. The impact on riparian habitat and sensitive natural communities would be less than significant, and further analysis of this issue in an EIR is not warranted.

c) ***NO IMPACT***. As described above, ground disturbance associated with construction of the project would occur on previously disturbed areas within and near the existing stadium. As shown on the U.S. Fish and Wildlife Service's National Wetlands Inventory, there are no federally protected wetlands on or adjacent to the stadium (USFWS, 2016). The nearest mapped wetland area is an intermittent stream that runs immediately north of the San Marin High School tennis courts, located approximately 600 feet southwest of the stadium. Limited ground

disturbance within the stadium would not adversely affect this wetland area. Implementation of the project would not result in adverse effects on wetlands and further analysis of this issue in an EIR is not warranted.

d) ***LESS THAN SIGNIFICANT IMPACT***. Construction of the project would involve the installation of free-standing poles to support new lighting and upgraded public address systems and underground electrical conduits to supply electricity to those systems, all within the existing stadium. No fences, walls, or other linear obstructions to wildlife movement would be constructed. No streams would be affected.

Trees near the project site and those in the riparian vegetation to the northwest may provide nesting opportunities for birds. However, as discussed in detail under subsection (a), no disturbance to birds nesting behavior would occur. Light disturbance levels at nearby trees that could support nesting would be low relative to ambient levels associated with the residential neighborhood and would be short-term in daily duration. Birds that may nest in the trees near the stadium (approximately 100 feet away from the main stadium light pole locations at the nearest) would likely be habituated to human activity and would not likely be disturbed by the increased activity level and lighting resulting from the project.

Implementation of the project would increase the frequency and intensity of evening and nighttime lighting at the stadium. Many migratory birds use the stars to orient themselves during the spring and fall migratory season (generally April through May and September through November). In overcast conditions or heavy fog, they can become disoriented and attracted to any elevated light source. The birds would fly around the light source rather than continuing to migrate and may excessively use up fat stores. However, as discussed in Section 2, *Aesthetics*, the proposed modern lighting system would be designed to minimize glare and fugitive light, and it would not substantially contribute to existing sky glow in the area. The timing of lighting would also limit effects on migratory birds. While nighttime bird migration begins about one hour after sunset and continues until about 2:00 AM, peak activity generally occurs after 10:00 PM (Pettingill, 1985). Lighting would generally not occur after 10:00 PM and would occur that late nine or fewer times a year. Lighting would not have a significant impact on bird migratory behavior.

The project site lies within the general area known as the "Pacific Flyway," an area that extends across the width of California, though most migration occurs along the immediate coast and offshore and through the inland Sacramento and San Joaquin Valleys. The number of birds present at any one portion of the flyway at a particular time is dependent on a wide variety of conditions, including current weather patterns and the amount of available food resources as the birds need to "re-fuel" during daytime hours to continue their migration.

The project is not expected to "interfere substantially with the movement of any native resident or migratory fish or wildlife species" for multiple reasons. First, migratory bird kills as a result of athletic field lighting at O.co Coliseum in Oakland, Candlestick Park, AT&T Park and other athletic fields in the Bay Area have not been reported. Second, because the project site is within a suburban area, available food resources for migratory species and most wildlife species are lacking on-site and large numbers of migratory birds do not occur at the project site or in the immediate vicinity. Third, current night lighting conditions for the area show bright light sources already present in the suburban area of Novato (NASA, International Space Station,

2013). Fourth, the proposed lights would be turned off before the peak time period of migratory activity (after 10:00 PM). Impacts related to substantial interference with the movement of any native or migratory fish or wildlife species or their established movement corridors would be less than significant, and further analysis of this issue in an EIR is not warranted.

e) ***LESS THAN SIGNIFICANT IMPACT***. Construction of the project would not result in impacts to environmentally sensitive biological resources. Vegetation removal would be limited to the areas above trenching sites bore pits for conduit installation. This vegetation would typically consist of non-native lawn grass. Any vegetation that is disturbed during conduit installation would be restored to pre-construction conditions after completion of the installation. Therefore, implementation of the project would not conflict with local policies or ordinances targeting these resources. No tree removal is proposed, so tree preservation ordinances or policies would not apply. This impact would be less than significant and no further analysis in an EIR is warranted.

f) ***NO IMPACT***. The project would not occur within the area of an adopted Habitat Conservation Plan or Natural Community Conservation Plan (CDFW, 2015). No other approved local, regional, or state habitat conservation plans have been identified on any of the project site. No further analysis of this issue in an EIR is warranted.

REFERENCES

Bolster, B. C., editor. 1998. Terrestrial Mammal Species of Special Concern in California. Draft Final Report prepared by P. V. Brylski, P. W. Collins, E. D. Pierson, W. E. Rainey and T. E. Kucera. Report submitted to California Department of Fish and Game Wildlife Management Division, Nongame Bird and Mammal Conservation Program for Contract No. FG3146WM.

CDFW (California Department of Fish & Wildlife). 2015. California Regional Conservation Plans, August 2015. Accessed July 21, 2016 at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=68626&inline.

CDFW. 2016, California Natural Diversity Database. RareFind v5. Online: https://map.dfg.ca.gov/rarefind/

Evans Ogden, L.J. 1996. Collision course: the hazards of lighted structures and windows to migrating birds. World Wildlife Fund Canada and the Fatal Light Awareness Program, Toronto, Canada.

Gason, K. J., T. W. Davies, J. Bennie, and J. Hopkins. 2012. Reducing the ecological consequences of night-time light pollution: options and developments. Journal of Applied Ecology 49: 1256-1266.

Huppos, O., K. Huppop, J. Dierschke, and R. Hill. 2015. Bird collisions at an offshore platform in the North Sea. Bird Study (63)1: 73-82.

Jung, K. and C. G. Threlfall. 2016. Urbanization and Its Effects on Bats – A Global Meta-Analysis. Pp 13-33. In: Bats in the Anthropocene: Conservation of Bats in a Changing World. C. C. Voigt and T. Kingston (eds). SpringerOpen.

NASA, International Space Station, San Francisco Bay Area at Night, September 2013. Available at: http://spaceref.com/earth/san-francisco-bay-area-at-night-as-seen-from-orbit.html

Outen, A. 2002. The possible ecological implications of artificial lighting. In: Sherwood, B., D. Cutler, and J Burton (Eds.), 2002. Wildlife and Roads, the Ecological Impact. Imperial College Press, London, 299 pp.

Pettingill, Olin Sewall, Jr. 1985. Ornithology in Laboratory and Field, *Fifth Edition*.

Rowse, E. G., D. Lewanzik, E. L. Stone, S. Harris, G. Jones. 2016. Dark Matters: The Effects of Artificial Lighting on Bats. Pp 187-213. In: Bats in the Anthropocene: Conservation of Bats in a Changing World. C. C. Voigt and T. Kingston (eds). SpringerOpen.

The Nature Conservancy. 2015. Reducing Ecological Impacts of Shale Development: Recommended Practices for the Appalachians. www.nature.org/shale-practices.

USFWS (United States Fish & Wildlife Service). 2016. National Wetlands Inventory – Wetlands Mapper. Accessed July 21, 2016 at: http://www.fws.gov/wetlands/Data/Mapper.html

Appendix B

Lighting Report

Sports Lighting CEQA Report

New Football Field Lighting at San Marin High School

Novato, CA
June 15, 2019

James R Benya, PE, FIES, FIALD
BENYA BURNETT CONSULTANCY
Davis, CA

Abstract

In 2015, the Novato Unified School District ("NUSD") undertook to install LED sports lighting for the San Marin High School ("SMHS") stadium. An Environmental Impact Report filed in May 2017 ("EIR") demonstrating compliance with the California Environmental Quality Act ("CEQA") was developed by Rincon Consultants for and approved by NUSD. It listed Potential Aesthetic Impacts that might be caused by new lighting, all of which were deemed less than significant when mitigated as described in the EIR.

To demonstrate compliance with the EIR, field measurements of the lighting impact on the field, adjacent hillsides and residences were taken on the evening of May 6, 2019 by James Benya, PE, Principal of Benya Burnett Consultancy, Davis, CA, who was retained by Rincon Consultants. Field measurements confirmed compliance with the EIR by meeting light level requirements for lighting zone E3 of (a) less than 2.0 footcandles at the SMHS property line per AES-3 of the EIR and (b) less than 10,000 cd of illumination at the SMHS property line per AES-4 of the EIR. In fact, lighting measurements showed compliance with the stricter requirements of lighting zone E2. Although not part of the EIR, light levels on the football field proper are designed and measured to be about 400 lux, average, which is slightly less than IES Class II and slightly more than IES Class III, which is appropriate for the location and size of the stadium seating.

Introduction

According to the Novato Unified School District ("NUSD") website, the project to install lights and other stadium improvements (the "Project") at the San Marin High School ("SMHS") began in 2015. Following normal procedures for such projects, NUSD retained consultants to prepare the design and to produce the Environmental Impact Report required by the California Environmental Quality Act ("CEQA"). The current Environmental Impact Report ("EIR") was produced in May 2017 for review by the NUSD and the public. It established lighting criteria using an international anti-light pollution standard, CIE:150, that addresses light trespass and glare.

It is my understanding that this report was commissioned to assess and confirm the lighting performance relative to the EIR criteria and directly related considerations.

Issues

I reviewed the May, 2017 EIR and responses to comments concerning it to become more acquainted with the findings and recommendations upon which the project was based. The principal lighting issues appear to be:

- Whether the project's criteria for its impact should be based on lighting zone E2 or E3 as defined by CIE:150, an international standard for controlling light pollution;
- Because the lighting is now installed and its performance measured, the extent to which the photometric reports are germane to the approval process at this time;
- Whether the stadium lighting could be reduced as a mitigating measure.

Lighting Zones

NUSD and its design and environmental consulting team chose to employ an international lighting environmental standard developed by the Commission Internationale de l´Eclairage (CIE) that establishes criteria to limit light trespass and glare. The Standard, CIE:150[1], employs a lighting zone system based on ambient light in the general area. For example, in a nature preserve a candle can be seen for a mile, but in downtown San Francisco it is lost into the haze of thousands of light sources. Lighting zone E1 is the nature preserve and E4 is the city, with E2 and E3 being steps in between. Zone E2 is described as "sparsely populated rural areas" and zone E3 is described as "well inhabited rural and urban settlements". Choice of lighting zone requires some professional judgement and further information such as population density.

Light Trespass (EIR AS-3)

Light trespass occurs when lighting systems illuminating one site (the sports field) also illuminate adjacent sites, such as neighboring private property. The metric used by CIE:150 is to restrict measured illuminance in the vertical plane at the property boundary at 5' above grade. The allowed maximum is 10 lux[2] in zone E3 and 5 lux in zone E2, which are by convention the same as 1 footcandle in zone E3 and 0.5 footcandle in zone E2. For my work, I use a field meter calibrated in lux and used that to evaluate the lighting.

Glare (EIR AS-4)

Glare is a sensation based on a combination of light source luminance, the luminance of the background, the size of the light source, the area of the background, the position of the light source in the field of view, the spectrum of the light source, and other factors. It can also be affected by the viewer's unique sensitivities, physiology, correction (glasses), age, and especially, the viewer's adaptation. Being this complex, there is no such thing as a "glare" meter. It is essentially impossible to measure glare except under laboratory conditions and, even then, because the perception of glare is so subjective, no practical standard exists to characterize field measurements.

In CIE:150, the intensity (candlepower) of a light source is used as a surrogate measurement of glare. The EIR established a maximum off-site intensity taken from CIE:150 of 10,000 candela (cd) aimed in the direction(s) of the viewer. Sports luminaires focus most of their light onto the sports field and excessive off-site glare is usually the result of a luminaire that is mis-aimed towards the property line.

There is currently not a practical field instrument capable of measuring candlepower at a distance. However, using the distance squared law, it is practical to use same measurements made for light trespass to identify glare problems. I determined that perpendicular plane illuminance at the property line of 5 lux would indicate a possible glare problem requiring additional study.

---

[1] CIE 15:2017 is the most recent version of the standard. The values differ slightly from those used in the EIR in that they are stricter and are therefore used in my analysis.

[2] Lux is the metric measurement of light levels. It is equal to lumens per square meter whereas foot-candles is equal to lumens per square foot. Technically, 1 foot-candle is equal to 10.76 lux, but for general convenience, the ratio is simplified to 10 lux=1 footcandle.

Appropriate Amount of Light on the Field

Although not addressed in the EIR, it is reasonable to question whether the amount of lighting is appropriate and whether reduced lighting could be an additional potential mitigation measure. The reference standard for North America is IES Recommended Practice RP-6-15, Sports and Recreational Area Lighting ("RP-6"). For football stadiums of up to 2,000 spectators, RP-6 recommends 300 lux (30 footcandles) of average illumination and for stadiums up to 5,000 spectators, it recommends 500 lux (50 footcandles).

Field Measurements

General

Prior to proceeding with measurements, I surveyed the perimeter of the entire site. Residential properties to the northwest and west were unaffected by the sports lighting largely because the baseball field and tree line provided an excellent buffer, and the school and topography mitigates stray light in the southwest and south directions. My measurements were made using a Minolta T-1 field illuminance meter that was laboratory calibrated in October 2017. The meter was mounted in the vertical plane to a tripod set at 5'-0" (1.5 meters) above grade.

Light Trespass Measurements

From my review of site plans and discussions with NUSD officials, I determined that the necessary lighting measurements would be made along two lines, one reasonably parallel to the northeast property line, and one southeast of the stadium along the west side of the San Marin Drive median. Each would represent a worst case for the most affected residential properties. The northeast property line was the more difficult, being 15' to 20' higher at the property line than field level and uneven ground. The southeast measurements were on more-or-less flat land at or near the field level. In both cases, locations were chosen where the land was sufficiently flat for the tripod to be level and measurements not affected by trees or overhanging branches. The measurement points and readings are presented in the following Google Earth photograph and Table A. All measurements were less than 5 lux, and therefore the installed lighting complies with the maximum light trespass limits for both Lighting Zones E2 (5 lux) and E3 (10 lux).

Glare Measurements

Since all my light trespass measurements were less than 3 lux, based on the distance squared law referenced above, I determined that there was no reasonable chance that glare at the property line met or exceeded the maximum threshold of 10,000 cd according to CIE:150.

Sports Field Illumination

The SMHS stadium has a bleacher capacity of 2,400 persons with standing room around the field for an additional approximately 1,600 persons. The photometric calculations supplied by the lighting system manufacturer indicated that the lighting was designed to provide 400 lux (40 footcandles) average on the field for football or soccer. To confirm the outcome, I did not take a full set of readings of the sports field lighting, but I took a center-of-the-field measurement of 441 lux (41 footcandles), horizontal at grade. For the lighting on the field, in my opinion the lighting system performs essentially as calculated and the amount of light is consistent with RP-6.


Measurement points
Ev @ 5'-0" above grade
Facing perpendicular to
field boundary
1
2
3
4
5
6
7
8
9
11
12
13
14
15
16
Alder Pl
Spruce Pl
Cottonwood Pl
Cottonwood Pl
Aspen Dr
San Marin Dr
San Marin Dr
San Marin Dr
San Felipe Way
Sign in
3D
Google
Imagery ©2019 Google, Map data ©2019 Google United States Terms Send feedback 100 ft

TABLE A – VERTICAL PLANE MEASUREMENTS AT 5' ABOVE ADJACENT GRADE ALONG AXIS TO FIELD CENTERLINE

Approximate distance including elevation 125' to nearest light pole

Point	Location Note	E_v, Lux	Criterion, Lux (1 foot-candle = 10.76 lux) E3 and E2	Comment
NORTHEAST PROPERTY LINE				
1	About 5' from fence	2.36	E3 =10 E2 = 5	Resident was taking photos from property line
2	About 8' from fence/bush	2.17		
3	About 10' from fence/tree and bush	2.10		
4	About 15' from fence/bushes	2.63		Lost pen due to terrain
5	About 20' from fence/bushes	2.34		
6	About 20' from fence/flat, open	2.44		
7	About 20' from fence/flat, open	2.29		
8	About 20' from fence/flat, open	2.75		
9	About 10' from fence sloping toward house	1.62		
SOUTHEAST PROPERTY LINE				
11	At curb facing stadium	0.54	E3 =10 E2 = 5	
12	At curb facing stadium	1.10		
13	At curb facing stadium	1.19		
14	At curb facing stadium	1.69		
15	At curb facing stadium	1.63		
16	At curb facing stadium	0.85		

To confirm light levels on the field, I took one sample measurement of light levels on the field at midfield and the reading was 441 lux (41 footcandles), effectively the same as predicted by the manufacturer.

Summary of Measurements and Observations

AES-3 (Light Trespass) Compliance

The installed lighting meets the more restrictive E2 limits as well as the limits for E3 used by the EIR. No single measurement exceeded 3 lux, with the maximum allowable under E2 being 5 lux.

AES-4 Compliance

The installed lighting does not create substantial glare impinging on off-site viewers that reaches or exceeds the maximum candlepower of 10,000 cd per CIE:150.

Notes About Photometric Analyses developed by Manufacturer (Musco)

Photometrics supplied by the manufacturer are predictions of light levels produced by the sports lighting system exclusively. Once installed, the actual performance of the lighting is what matters and is the subject of this report. The Manufacturer's photometrics, attached as an appendix, differ slighting from reality and this is not unusual as the field readings can also include light from buildings, streetlights, and other local and stray light sources. I feel there is no significance in the differences between measurements and predictions since the installed lighting complies with the strict requirements of the E2 lighting zone.

Notes About Sky Glow

Anthropogenic sky glow is caused by all outdoor lighting, including streetlights, retail centers, car dealerships, and other commonly occurring outdoor lighting. In communities near the California coast, there are two types of sky glow: that caused by low clouds (the "marine layer") and that caused by uplight on clear nights (clear sky glow). The former is localized and on a cloudy night the stray uplight from a town or small city can cause a distinctive glow above it. The latter is the accumulation of the upward light from the entire Bay Area metropolitan area and is affected by all the lighting within a radius of 100 miles or more from the viewer's location.

Low cloud sky glow varies considerably depending on the time of year, the altitude of the clouds, the cloud density and reflectivity, temperature and other factors. The primary causes tend to be downtown districts, regional malls, auto malls, and major freeway commercial corridors. Glow is caused by all the upward light from all the community, and not from just one neighborhood or cause. Based on my experience, marine layer sky glow levels throughout other areas of California having similar proximity to the ocean and population density measure between 0.010 and 0.020 footcandles. A marine layer was present on the night of measurements. There was no distinctive relationship of the sky glow to the stadium – the sky glow persisted over a much larger area, and I was able to measure 0.016 footcandles of sky glow illumination in an area near SMHS that the stadium lights could not directly illuminate. In my opinion the contribution of the stadium lighting to the sky glow I observed did not significantly increase the sky glow compared to the community's contribution without the stadium lighting.

Clear sky glow is measured using the Bortle Scale, a system of ranking the light pollution caused by communities throughout the world as well as identifying "dark sky" areas with little or no sky glow. The

entirety of Marin County is Bortle Class 5, which means a moderate amount of anthropogenic sky glow. The stadium lighting creates far too little uplight to affect the clear sky glow of Marin County.

Conclusion

The lighting for the SMHS Stadium meets and betters the applicable light impact standards set for lighting zone E2 as set by CIE:150-2017, which in my professional opinion demonstrates that the impact of the sports lighting is less than significant as claimed by NUSD and their consultants.

Submitted June 15, 2019

James R Benya, PE, FIES, FIALD
Jbenya@benyaburnett.com
+1 (503) 519-9631

Appendix: Musco Calculations

Appendix C

Photometric Studies

San Marin High School Football

Novato,CA

Lighting System

Pole / Fixture Summary

Pole ID	Pole Height	Mtg Height	Fixture Qty	Luminaire Type	Load	Circuit
F1	90'	90'	5	TLC-LED-1150	5.75 kW	A
F2	80'	14'	2	TLC-BT-575	1.15 kW	A
		80'	4	TLC-LED-1150	4.60 kW	A
		52'	1	TLC-LED-600	0.58 kW	B
F3	80'	12'	2	TLC-BT-575	1.15 kW	A
		80'	4	TLC-LED-1150	4.60 kW	A
		47'	1	TLC-LED-600	0.58 kW	B
F4	80'	80'	6	TLC-LED-1150	6.90 kW	A
F5	90'	90'	6	TLC-LED-1150	6.90 kW	A
		64'	1	TLC-LED-600	0.58 kW	B
F6	90'	34'	2	TLC-BT-575	1.15 kW	A
		90'	4	TLC-LED-1150	4.60 kW	A
F7	90'	36'	2	TLC-BT-575	1.15 kW	A
		90'	4	TLC-LED-1150	4.60 kW	A
F8	90'	90'	5	TLC-LED-1150	5.75 kW	A
		64'	1	TLC-LED-600	0.58 kW	B
8			***50***		***50.62 kW***	

Circuit Summary

Circuit	Description	Load	Fixture Qty
A	Field Lights	48.3 kW	46
B	Bleacher	2.32 kW	4

Fixture Type Summary

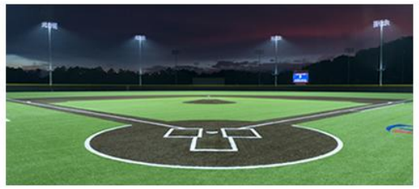
Type	Source	Wattage	Lumens	L90	L80	L70	Quantity
TLC-BT-575	LED 5700K - 75 CRI	575W	52,000	>63,500	>63,500	>63,500	8
TLC-LED-1150	LED 5700K - 75 CRI	1150W	121,000	>63,500	>63,500	>63,500	38
TLC-LED-600	LED 5700K - 75 CRI	580W	65,600	>63,500	>63,500	>63,500	4

Light Level Summary

Calculation Grid Summary

Grid Name	Calculation Metric	Illumination					Circuits	Fixture Qty
		Ave	Min	Max	Max/Min	Ave/Min		
East Res Prop Line	Horizontal	0	0	0	0.00		A,B	50
East Res Prop Line	Max Candela (by Fixture)	17.9	0	204	0.00		A,B	50
East Res Prop Line	Max Vertical Illuminance Metric	0	0	0	0.00		A,B	50
Football	Horizontal Illuminance	40.7	33.2	47.3	1.43	1.22	A	46
Home Bleachers - Egress	Horizontal	11.5	2.90	23.9	8.25	3.96	B	4
Home Bleachers	Horizontal	12	2.60	22.4	8.47	4.63	A	46
Home Safe Dispersal Area	Horizontal	12.2	1.49	28	18.76	8.14	B	4
North Res Prop Line	Horizontal	0	0	0	0.00		A,B	50
North Res Prop Line	Max Candela (by Fixture)	61.2	0	266	0.00		A,B	50
North Res Prop Line	Max Vertical Illuminance Metric	0	0	0.01	0.00		A,B	50
Soccer	Horizontal Illuminance	40.2	32.2	47.9	1.49	1.25	A	46
Track	Horizontal Illuminance	18.4	1.90	38	20.28	9.69	A	46
Visitor Bleachers - Egress	Horizontal	3.54	0.90	8.60	9.72	3.93	B	4
Visitor Bleachers	Horizontal	13.4	1.20	28.3	23.15	11.14	A	46
Visitor Safe Dispersal Area	Horizontal	6.91	1.20	11.1	9.41	5.76	B	4

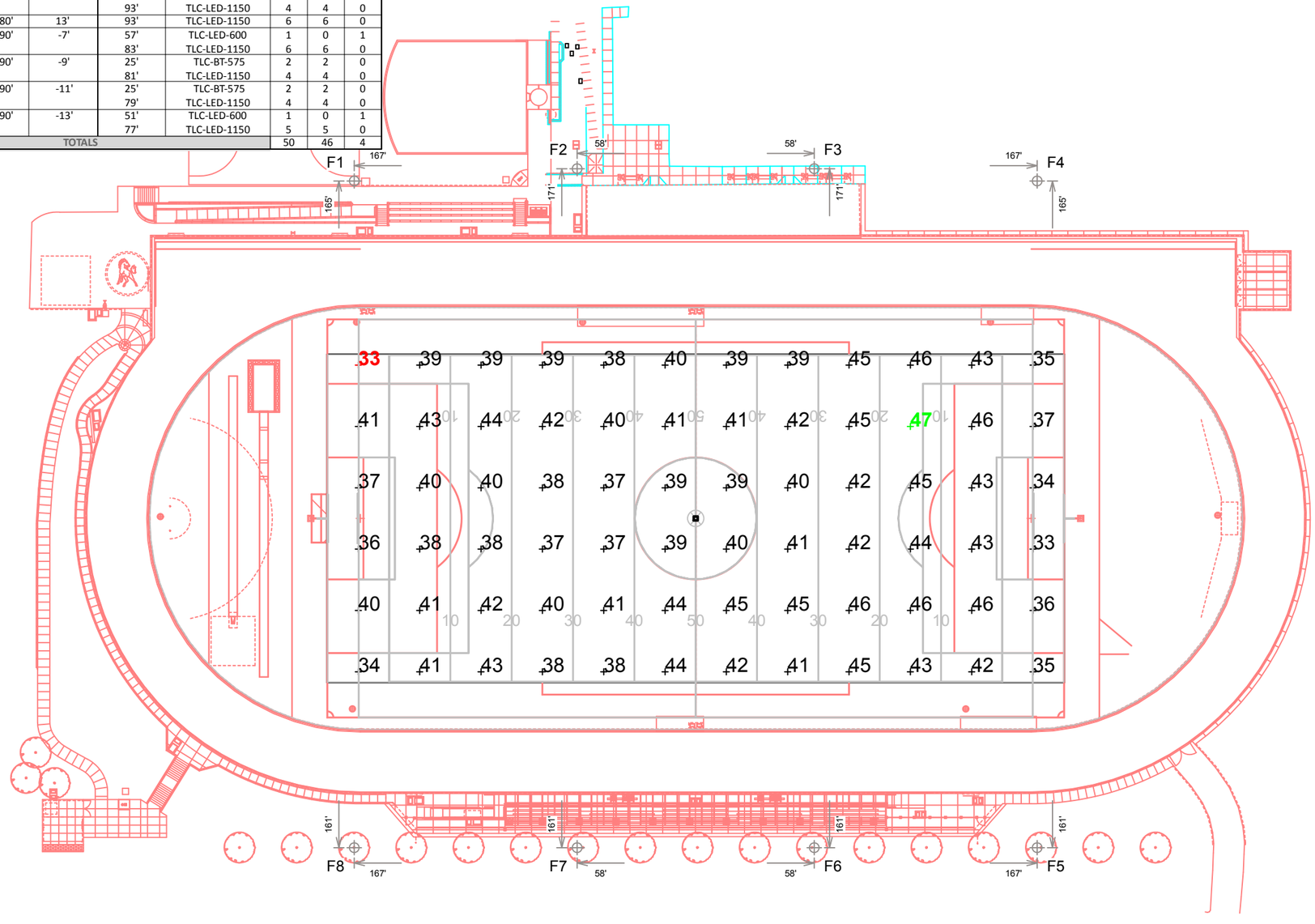
From Hometown to Professional



We Make It Happen.

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F1	90'	4'	94'	TLC-LED-1150	5	5	0
1	F2	80'	11'	25'	TLC-BT-575	2	2	0
				63'	TLC-LED-600	1	0	1
				91'	TLC-LED-1150	4	4	0
1	F3	80'	13'	25'	TLC-BT-575	2	2	0
				60'	TLC-LED-600	1	0	1
				93'	TLC-LED-1150	4	4	0
1	F4	80'	13'	93'	TLC-LED-1150	6	6	0
1	F5	90'	-7'	57'	TLC-LED-600	1	0	1
				83'	TLC-LED-1150	6	6	0
1	F6	90'	-9'	25'	TLC-BT-575	2	2	0
				81'	TLC-LED-1150	4	4	0
1	F7	90'	-11'	25'	TLC-BT-575	2	2	0
				79'	TLC-LED-1150	4	4	0
1	F8	90'	-13'	51'	TLC-LED-600	1	0	1
				77'	TLC-LED-1150	5	5	0
8	TOTALS					50	46	4



SCALE IN FEET 1 : 60

0' 60' 120'

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**Football**
Size:	360' x 160'
Spacing:	30.0' x 30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Guaranteed Average:	**40**
Scan Average:	40.66
Maximum:	47.3
Minimum:	33.2
Avg / Min:	1.23
Guaranteed Max / Min:	**2**
Max / Min:	1.43
UG (adjacent pts):	1.28
CU:	0.54
No. of Points:	72

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 121,000 lumens
No. of Luminaires:	**46**
Total Load:	48.3 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>63,500	>63,500	>63,500
TLC-LED-1150	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

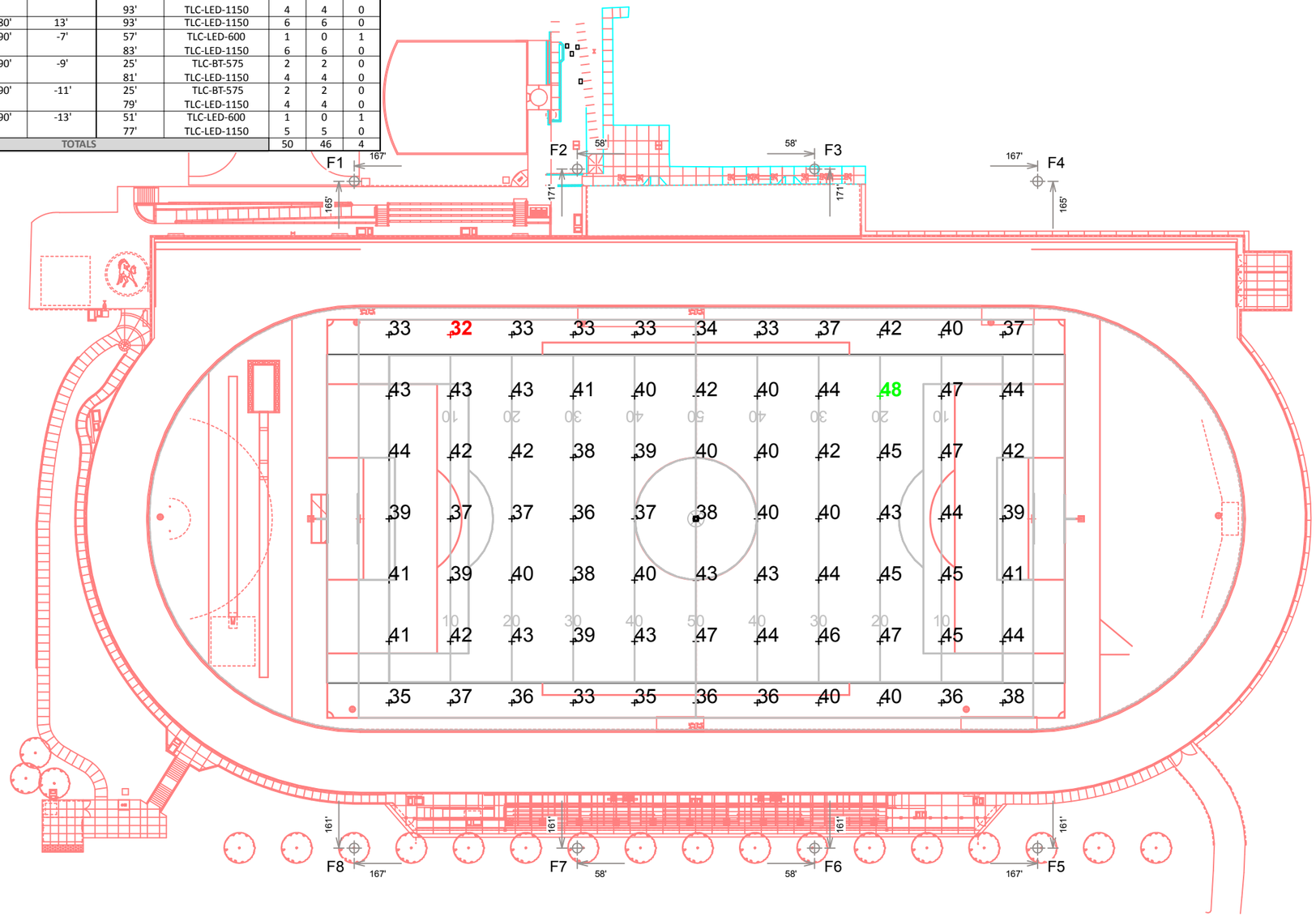
musco Lighting
We Make It Happen.

San Marin High School Football

Novato,CA

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F1	90'	4'	94'	TLC-LED-1150	5	5	0
1	F2	80'	11'	25'	TLC-BT-575	2	2	0
				63'	TLC-LED-600	1	0	1
				91'	TLC-LED-1150	4	4	0
1	F3	80'	13'	25'	TLC-BT-575	2	2	0
				60'	TLC-LED-600	1	0	1
				93'	TLC-LED-1150	4	4	0
1	F4	80'	13'	93'	TLC-LED-1150	6	6	0
1	F5	90'	-7'	57'	TLC-LED-600	1	0	1
				83'	TLC-LED-1150	6	6	0
1	F6	90'	-9'	25'	TLC-BT-575	2	2	0
				81'	TLC-LED-1150	4	4	0
1	F7	90'	-11'	25'	TLC-BT-575	2	2	0
				79'	TLC-LED-1150	4	4	0
1	F8	90'	-13'	51'	TLC-LED-600	1	0	1
				77'	TLC-LED-1150	5	5	0
8	TOTALS					50	46	4



SCALE IN FEET 1 : 60

0' 60' 120'

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

GRID SUMMARY

Name:	**Soccer**
Size:	330' x 195'
Spacing:	30.0' x 30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Guaranteed Average:	**40**
Scan Average:	40.19
Maximum:	47.9
Minimum:	32.2
Avg / Min:	1.25
Guaranteed Max / Min:	**2**
Max / Min:	1.49
UG (adjacent pts):	1.35
CU:	0.57
No. of Points:	77

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 121,000 lumens
No. of Luminaires:	**46**
Total Load:	48.3 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>63,500	>63,500	>63,500
TLC-LED-1150	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

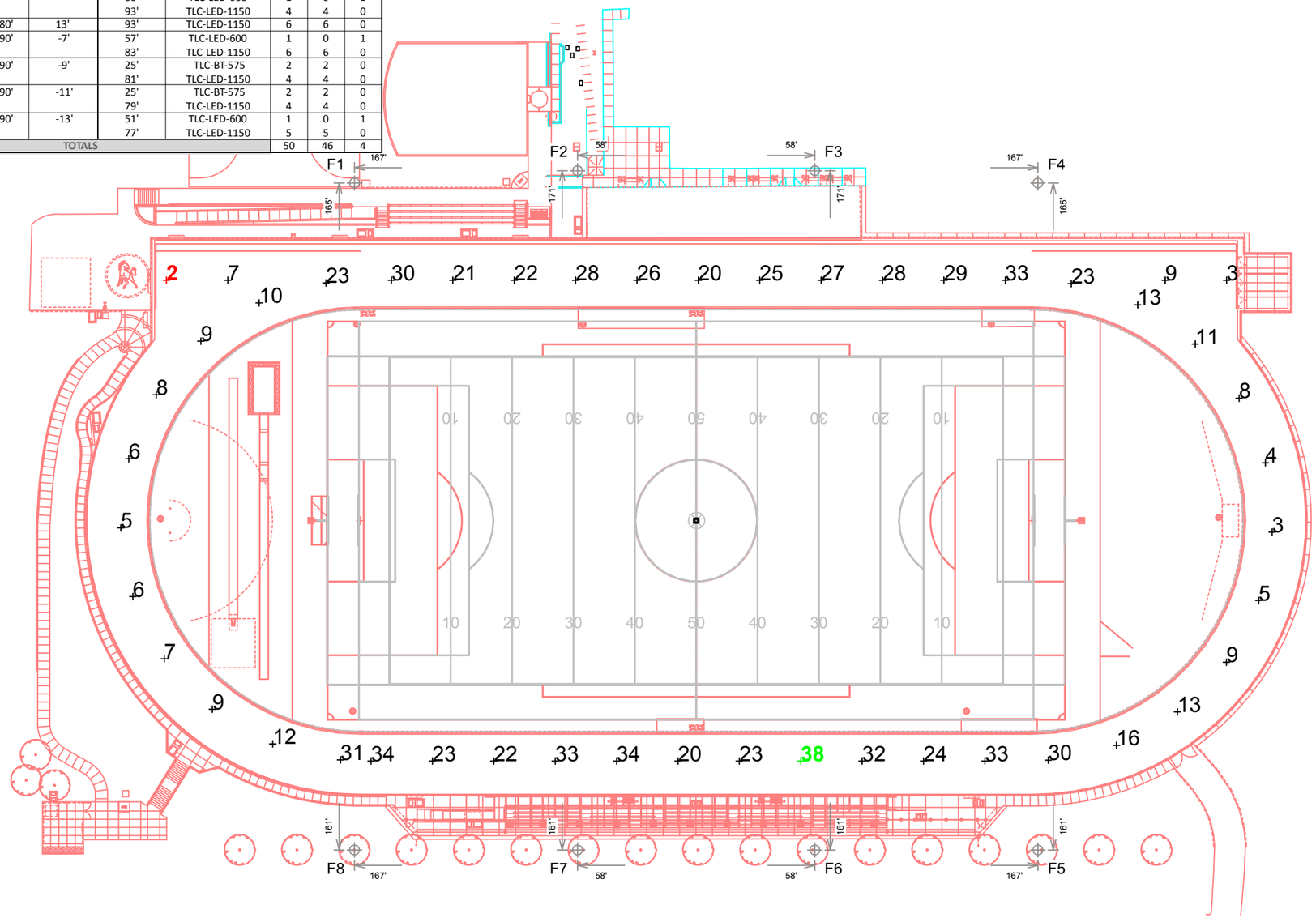
Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

We Make It Happen.

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F1	90'	4'	94'	TLC-LED-1150	5	5	0
1	F2	80'	11'	25'	TLC-BT-575	2	2	0
				63'	TLC-LED-600	1	0	1
				91'	TLC-LED-1150	4	4	0
1	F3	80'	13'	25'	TLC-BT-575	2	2	0
				60'	TLC-LED-600	1	0	1
				93'	TLC-LED-1150	4	4	0
1	F4	80'	13'	93'	TLC-LED-1150	6	6	0
1	F5	90'	-7'	57'	TLC-LED-600	1	0	1
				83'	TLC-LED-1150	6	6	0
1	F6	90'	-9'	25'	TLC-BT-575	2	2	0
				81'	TLC-LED-1150	4	4	0
1	F7	90'	-11'	25'	TLC-BT-575	2	2	0
				79'	TLC-LED-1150	4	4	0
1	F8	90'	-13'	51'	TLC-LED-600	1	0	1
				77'	TLC-LED-1150	5	5	0
8	TOTALS					50	46	4



SCALE IN FEET 1 : 60

0' 60' 120'

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**Track**
Spacing:	30.0' x 30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**18.41**
Maximum:	38.0
Minimum:	1.9
Avg / Min:	9.83
Max / Min:	**20.28**
UG (adjacent pts):	0.00
CU:	0.16
No. of Points:	48

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 121,000 lumens
No. of Luminaires:	**46**
Total Load:	48.3 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>63,500	>63,500	>63,500
TLC-LED-1150	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

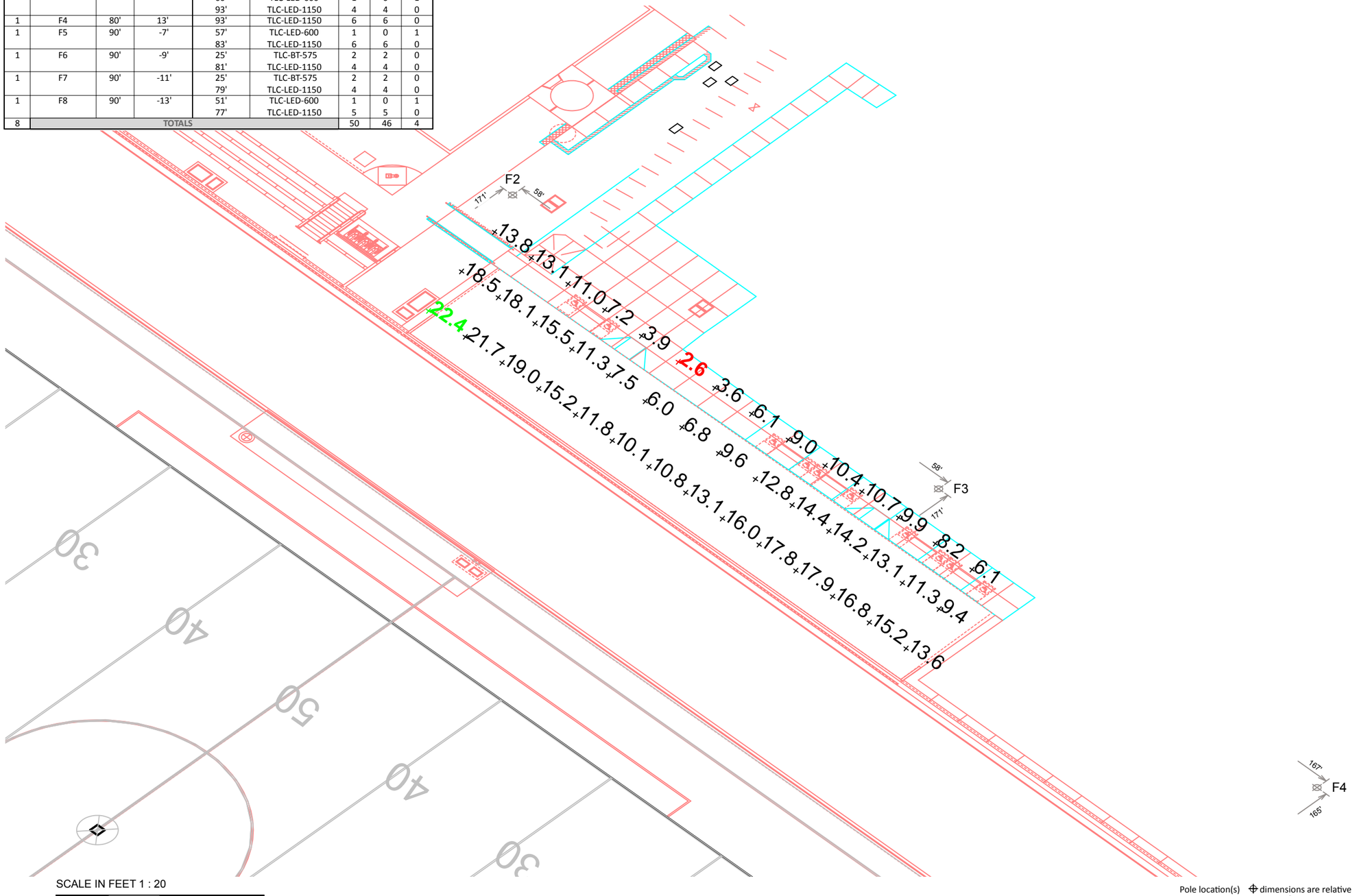
Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

We Make It Happen.

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F1	90'	4'	94'	TLC-LED-1150	5	5	0
1	F2	80'	11'	25'	TLC-BT-575	2	2	0
				63'	TLC-LED-600	1	0	1
				91'	TLC-LED-1150	4	4	0
1	F3	80'	13'	25'	TLC-BT-575	2	2	0
				60'	TLC-LED-600	1	0	1
				93'	TLC-LED-1150	4	4	0
1	F4	80'	13'	93'	TLC-LED-1150	6	6	0
1	F5	90'	-7'	57'	TLC-LED-600	1	0	1
				83'	TLC-LED-1150	6	6	0
1	F6	90'	-9'	25'	TLC-BT-575	2	2	0
				81'	TLC-LED-1150	4	4	0
1	F7	90'	-11'	25'	TLC-BT-575	2	2	0
				79'	TLC-LED-1150	4	4	0
1	F8	90'	-13'	51'	TLC-LED-600	1	0	1
				77'	TLC-LED-1150	5	5	0
8	TOTALS					50	46	4



Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**Home Bleachers**
Spacing:	10.0' x 10.0'

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**12.04**
Maximum:	22.4
Minimum:	2.6
Avg / Min:	4.56
Max / Min:	**8.47**
UG (adjacent pts):	2.26
CU:	0.01
No. of Points:	42

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 121,000 lumens
No. of Luminaires:	**46**
Total Load:	48.3 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>63,500	>63,500	>63,500
TLC-LED-1150	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

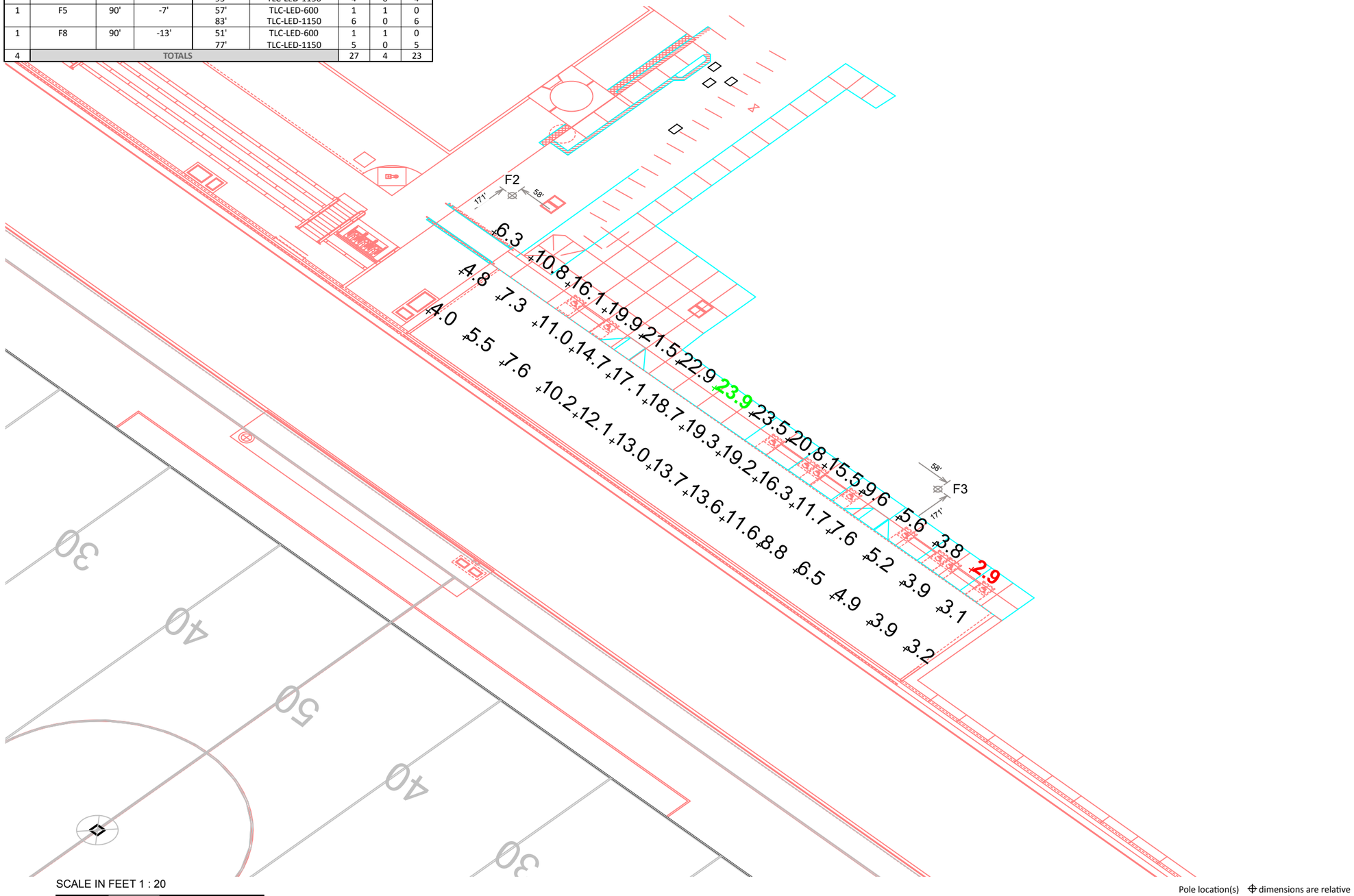
Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

We Make It Happen.

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F2	80'	11'	25'	TLC-BT-575	2	0	2
				63'	TLC-LED-600	1	1	0
				91'	TLC-LED-1150	4	0	4
1	F3	80'	13'	25'	TLC-BT-575	2	0	2
				60'	TLC-LED-600	1	1	0
				93'	TLC-LED-1150	4	0	4
1	F5	90'	-7'	57'	TLC-LED-600	1	1	0
				83'	TLC-LED-1150	6	0	6
1	F8	90'	-13'	51'	TLC-LED-600	1	1	0
				77'	TLC-LED-1150	5	0	5
4	TOTALS					27	4	23



Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**Home Bleachers - Egress**
Spacing:	10.0' x 10.0'

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**11.47**
Maximum:	23.9
Minimum:	2.9
Avg / Min:	3.95
Max / Min:	**8.25**
UG (adjacent pts):	1.71
CU:	0.14
No. of Points:	42

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	65,600 lumens
No. of Luminaires:	**4**
Total Load:	2.32 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-600	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

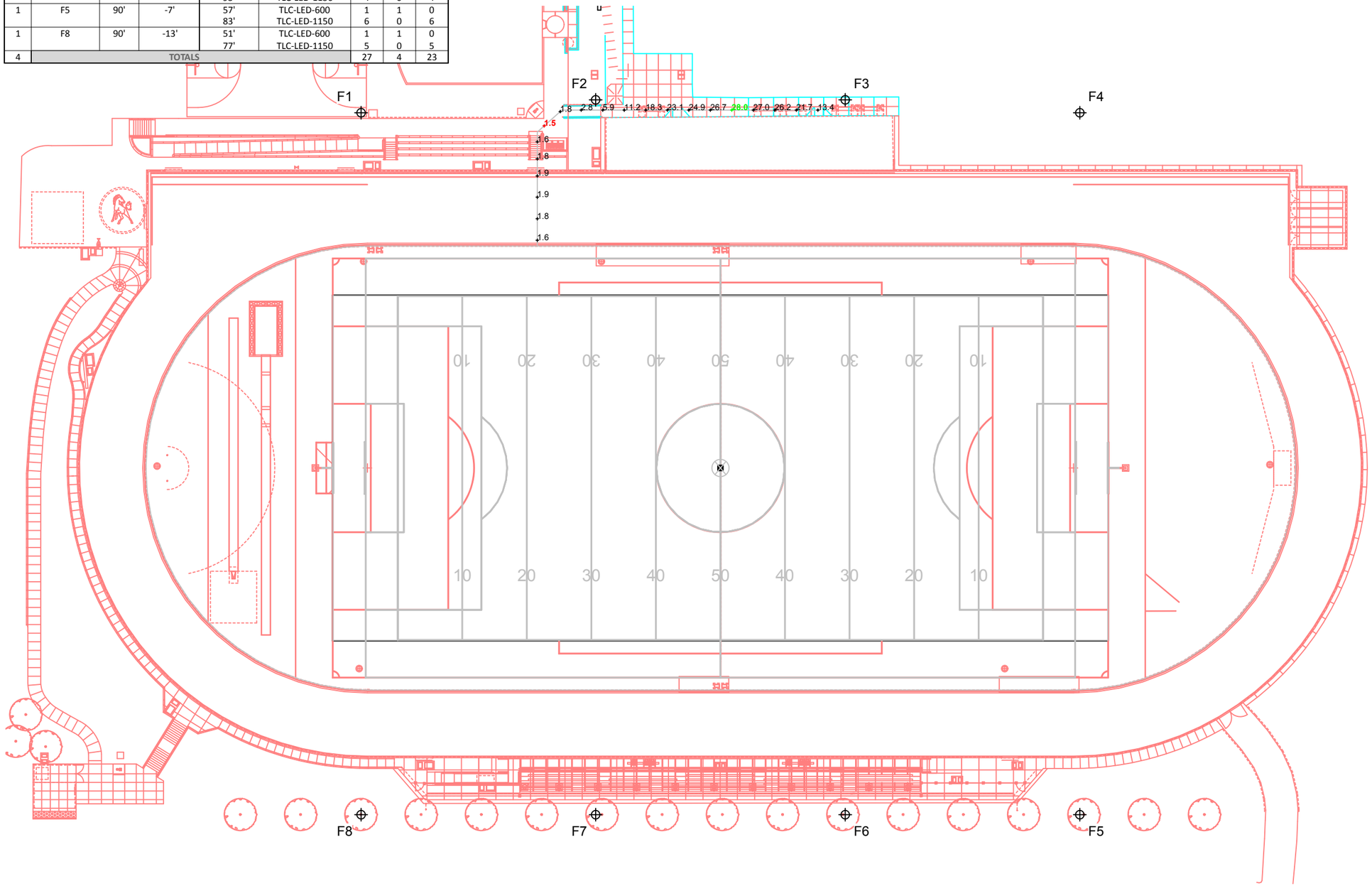
Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

We Make It Happen.

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F2	80'	11'	25'	TLC-BT-575	2	0	2
				63'	TLC-LED-600	1	1	0
				91'	TLC-LED-1150	4	0	4
1	F3	80'	13'	25'	TLC-BT-575	2	0	2
				60'	TLC-LED-600	1	1	0
				93'	TLC-LED-1150	4	0	4
1	F5	90'	-7'	57'	TLC-LED-600	1	1	0
				83'	TLC-LED-1150	6	0	6
1	F8	90'	-13'	51'	TLC-LED-600	1	1	0
				77'	TLC-LED-1150	5	0	5
4	TOTALS					27	4	23



SCALE IN FEET 1 : 50

0' 50' 100'

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**Home Safe Dispersal Area**
Spacing:	10.0'
Height:	3' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**12.1594**
Maximum:	28.028
Minimum:	1.494
No. of Points:	20

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	65,600 lumens
No. of Luminaires:	**4**
Total Load:	2.32 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-600	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

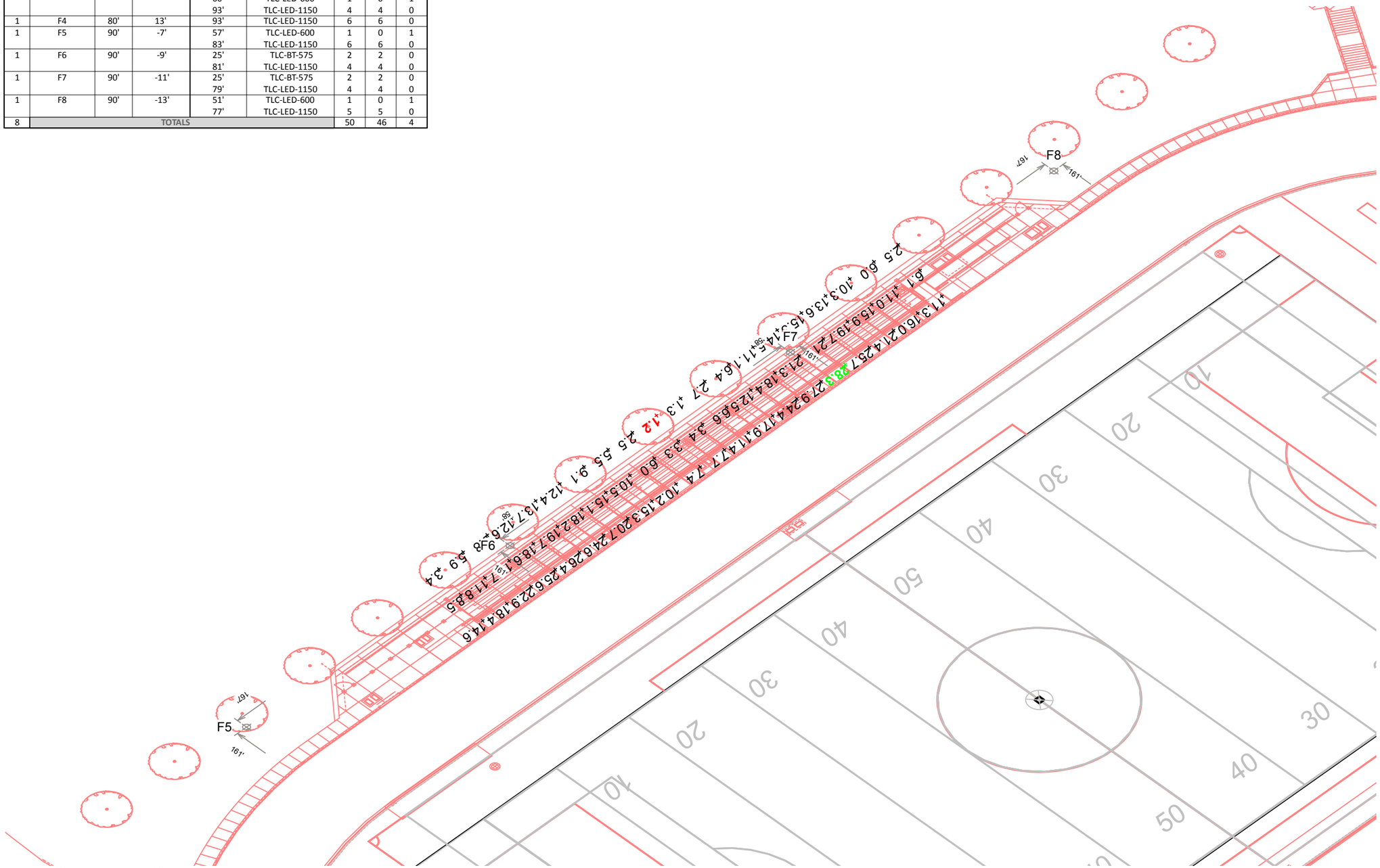
Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

We Make It Happen.

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F1	90'	4'	94'	TLC-LED-1150	5	5	0
1	F2	80'	11'	25'	TLC-BT-575	2	2	0
				63'	TLC-LED-600	1	0	1
				91'	TLC-LED-1150	4	4	0
1	F3	80'	13'	25'	TLC-BT-575	2	2	0
				60'	TLC-LED-600	1	0	1
				93'	TLC-LED-1150	4	4	0
1	F4	80'	13'	93'	TLC-LED-1150	6	6	0
1	F5	90'	-7'	57'	TLC-LED-600	1	0	1
				83'	TLC-LED-1150	6	6	0
1	F6	90'	-9'	25'	TLC-BT-575	2	2	0
				81'	TLC-LED-1150	4	4	0
1	F7	90'	-11'	25'	TLC-BT-575	2	2	0
				79'	TLC-LED-1150	4	4	0
1	F8	90'	-13'	51'	TLC-LED-600	1	0	1
				77'	TLC-LED-1150	5	5	0
8	TOTALS					50	46	4



Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**Visitor Bleachers**
Spacing:	10.0' x 10.0'

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**13.37**
Maximum:	28.3
Minimum:	1.2
Avg / Min:	10.95
Max / Min:	**23.15**
UG (adjacent pts):	2.73
CU:	0.01
No. of Points:	60

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 121,000 lumens
No. of Luminaires:	**46**
Total Load:	48.3 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>63,500	>63,500	>63,500
TLC-LED-1150	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

We Make It Happen.

San Marin High School Football

Novato,CA

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F2	80'	11'	25'	TLC-BT-575	2	0	2
				63'	TLC-LED-600	1	1	0
				91'	TLC-LED-1150	4	0	4
1	F3	80'	13'	25'	TLC-BT-575	2	0	2
				60'	TLC-LED-600	1	1	0
				93'	TLC-LED-1150	4	0	4
1	F5	90'	-7'	57'	TLC-LED-600	1	1	0
				83'	TLC-LED-1150	6	0	6
1	F8	90'	-13'	51'	TLC-LED-600	1	1	0
				77'	TLC-LED-1150	5	0	5
4	TOTALS					27	4	23

SCALE IN FEET 1 : 30

0' 30' 60'

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

GRID SUMMARY

Name:	**Visitor Bleachers - Egress**
Spacing:	10.0' x 10.0'

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**3.54**
Maximum:	8.6
Minimum:	0.9
Avg / Min:	4.00
Max / Min:	**9.72**
UG (adjacent pts):	1.55
CU:	0.07
No. of Points:	60

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	65,600 lumens
No. of Luminaires:	**4**
Total Load:	2.32 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-600	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

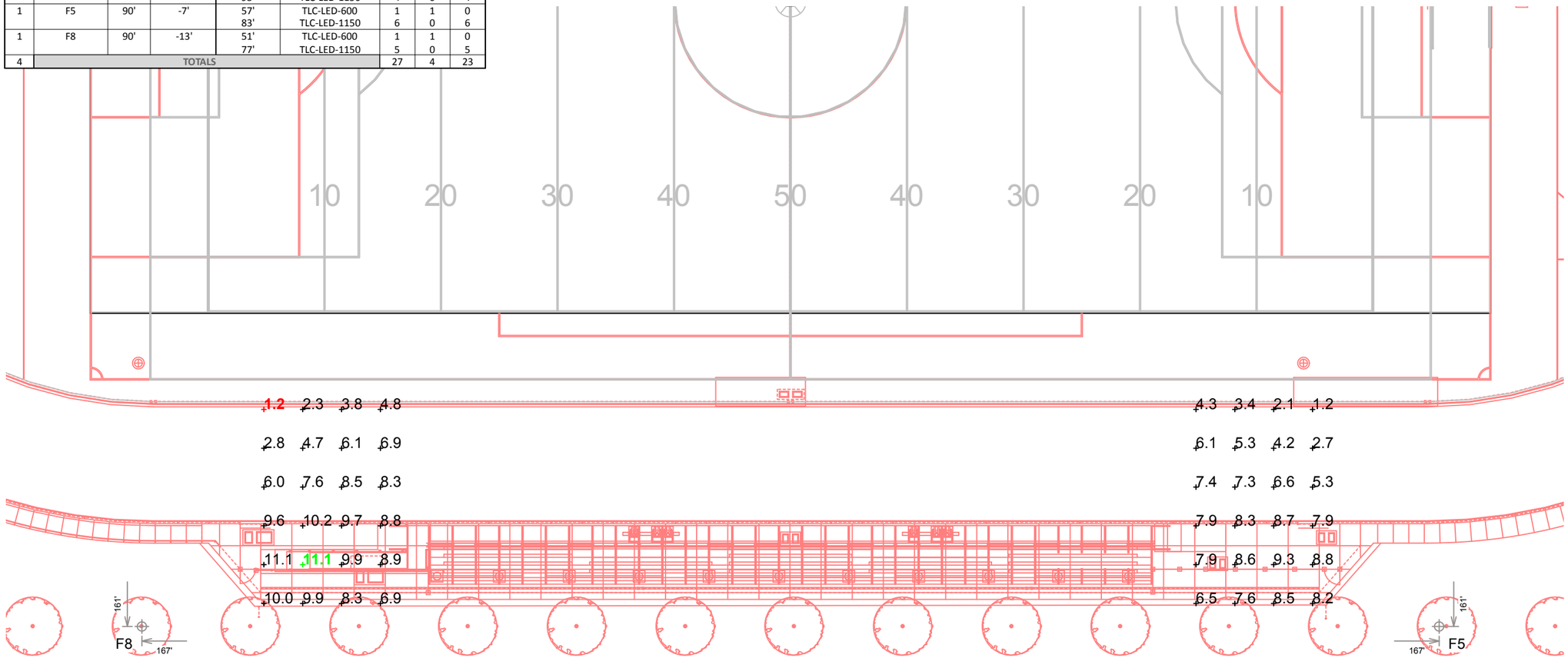
Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

We Make It Happen.

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F2	80'	11'	25'	TLC-BT-575	2	0	2
				63'	TLC-LED-600	1	1	0
				91'	TLC-LED-1150	4	0	4
1	F3	80'	13'	25'	TLC-BT-575	2	0	2
				60'	TLC-LED-600	1	1	0
				93'	TLC-LED-1150	4	0	4
1	F5	90'	-7'	57'	TLC-LED-600	1	1	0
				83'	TLC-LED-1150	6	0	6
1	F8	90'	-13'	51'	TLC-LED-600	1	1	0
				77'	TLC-LED-1150	5	0	5
4	TOTALS					27	4	23



SCALE IN FEET 1 : 30

0' 30' 60'

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**Visitor Safe Dispersal Area**
Spacing:	10.0' x 10.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**6.91**
Maximum:	11.1
Minimum:	1.2
Avg / Min:	5.85
Max / Min:	**9.41**
UG (adjacent pts):	2.37
CU:	0.13
No. of Points:	48

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	65,600 lumens
No. of Luminaires:	**4**
Total Load:	2.32 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-600	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

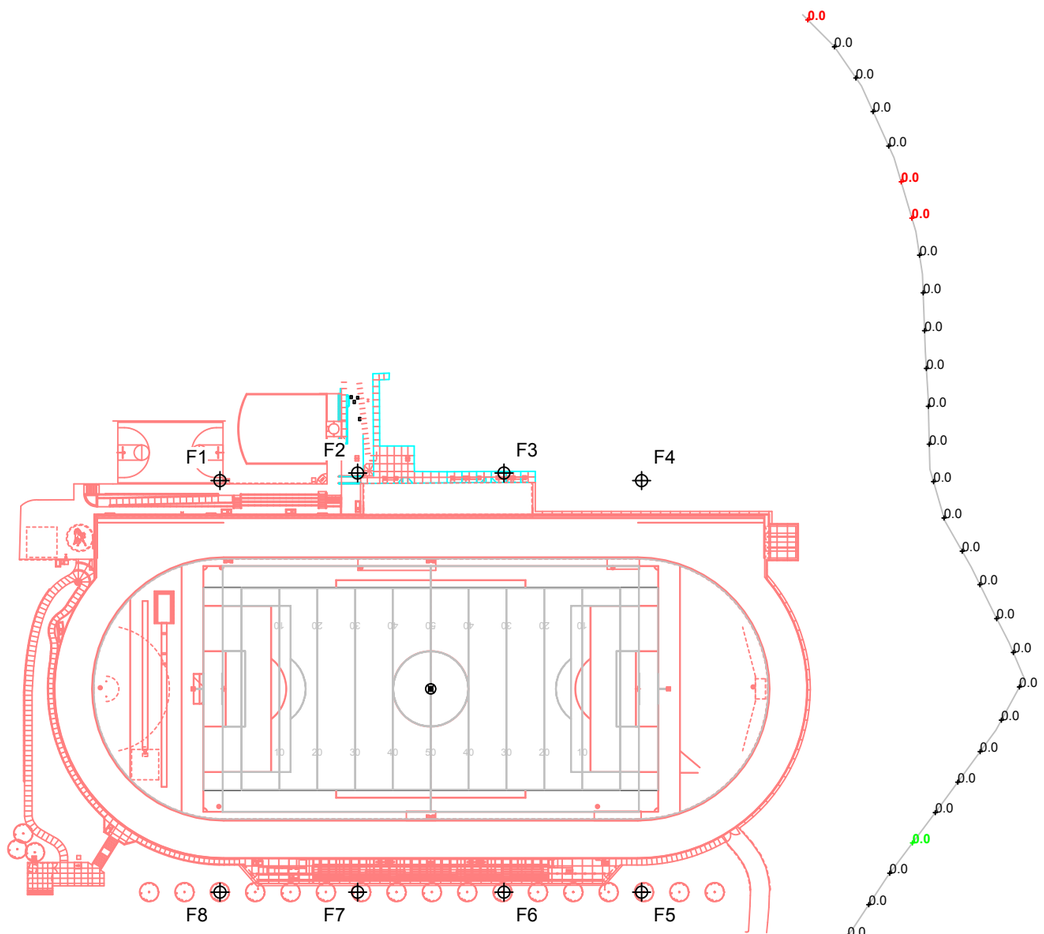
We Make It Happen.

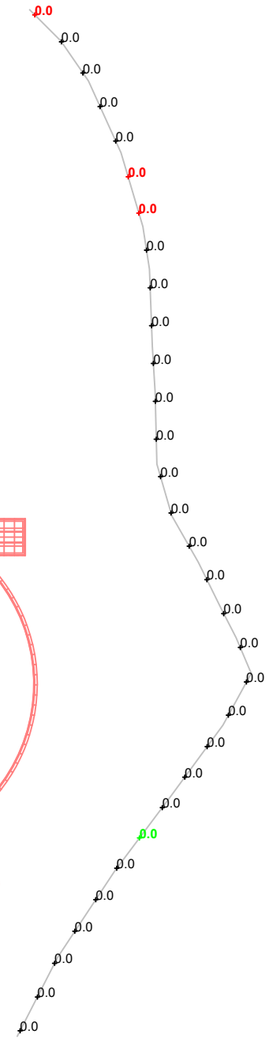
San Marin High School Football

Novato,CA

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F1	90'	4'	94'	TLC-LED-1150	5	5	0
1	F2	80'	11'	25'	TLC-BT-575	2	2	0
				63'	TLC-LED-600	1	1	0
				91'	TLC-LED-1150	4	4	0
1	F3	80'	13'	25'	TLC-BT-575	2	2	0
				60'	TLC-LED-600	1	1	0
				93'	TLC-LED-1150	4	4	0
1	F4	80'	13'	93'	TLC-LED-1150	6	6	0
1	F5	90'	-7'	57'	TLC-LED-600	1	1	0
				83'	TLC-LED-1150	6	6	0
1	F6	90'	-9'	25'	TLC-BT-575	2	2	0
				81'	TLC-LED-1150	4	4	0
1	F7	90'	-11'	25'	TLC-BT-575	2	2	0
				79'	TLC-LED-1150	4	4	0
1	F8	90'	-13'	51'	TLC-LED-600	1	1	0
				77'	TLC-LED-1150	5	5	0
8	TOTALS					50	50	0





GRID SUMMARY

Name:	**North Res Prop Line**
Spacing:	30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**0.0003**
Maximum:	0.002
Minimum:	0.000
No. of Points:	31

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 121,000 / 65,600 lumens
No. of Luminaires:	**50**
Total Load:	50.62 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>63,500	>63,500	>63,500
TLC-LED-1150	>63,500	>63,500	>63,500
TLC-LED-600	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

SCALE IN FEET 1 : 120

0' 120' 240'

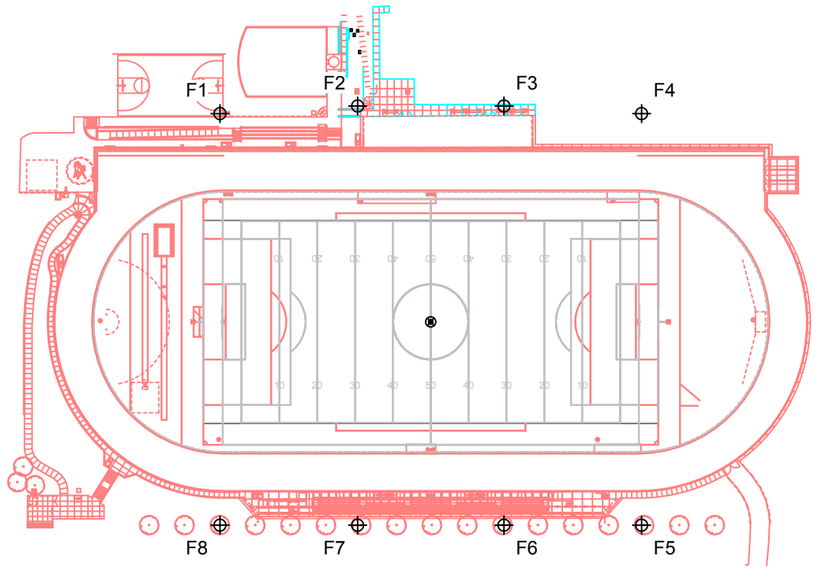
Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

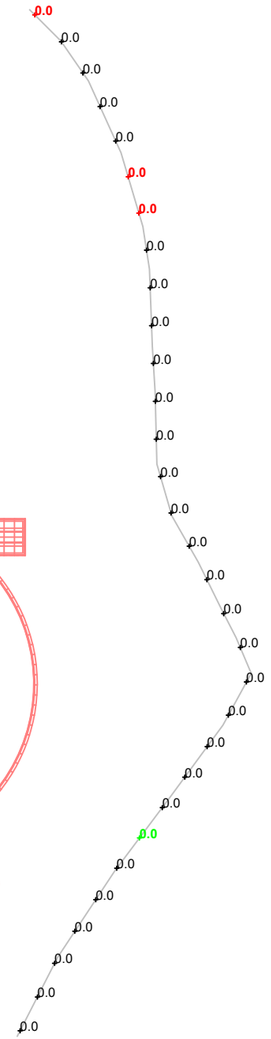
ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

We Make It Happen.

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F1	90'	4'	94'	TLC-LED-1150	5	5	0
1	F2	80'	11'	25'	TLC-BT-575	2	2	0
				63'	TLC-LED-600	1	1	0
				91'	TLC-LED-1150	4	4	0
1	F3	80'	13'	25'	TLC-BT-575	2	2	0
				60'	TLC-LED-600	1	1	0
				93'	TLC-LED-1150	4	4	0
1	F4	80'	13'	93'	TLC-LED-1150	6	6	0
1	F5	90'	-7'	57'	TLC-LED-600	1	1	0
				83'	TLC-LED-1150	6	6	0
1	F6	90'	-9'	25'	TLC-BT-575	2	2	0
				81'	TLC-LED-1150	4	4	0
1	F7	90'	-11'	25'	TLC-BT-575	2	2	0
				79'	TLC-LED-1150	4	4	0
1	F8	90'	-13'	51'	TLC-LED-600	1	1	0
				77'	TLC-LED-1150	5	5	0
8	TOTALS					50	50	0





SCALE IN FEET 1 : 120

0' 120' 240'

San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**North Res Prop Line**
Spacing:	30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED MAX VERTICAL FOOTCANDLES

	Entire Grid
Scan Average:	**0.0009**
Maximum:	0.005
Minimum:	0.000
No. of Points:	31

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 121,000 / 65,600 lumens
No. of Luminaires:	**50**
Total Load:	50.62 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>63,500	>63,500	>63,500
TLC-LED-1150	>63,500	>63,500	>63,500
TLC-LED-600	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

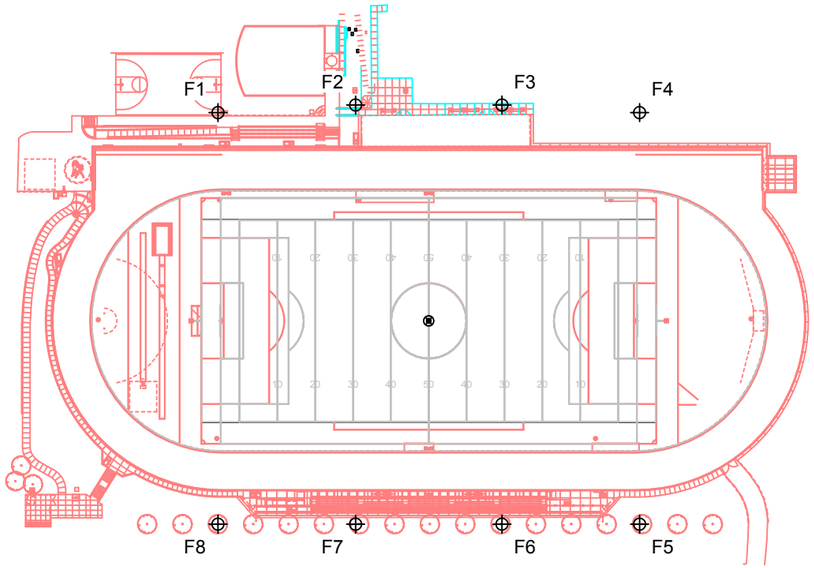
Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

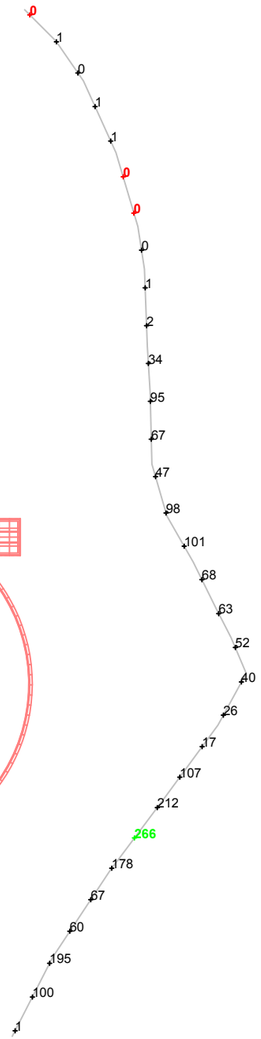
ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

We Make It Happen.

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F1	90'	4'	94'	TLC-LED-1150	5	5	0
1	F2	80'	11'	25'	TLC-BT-575	2	2	0
				63'	TLC-LED-600	1	1	0
				91'	TLC-LED-1150	4	4	0
1	F3	80'	13'	25'	TLC-BT-575	2	2	0
				60'	TLC-LED-600	1	1	0
				93'	TLC-LED-1150	4	4	0
1	F4	80'	13'	93'	TLC-LED-1150	6	6	0
1	F5	90'	-7'	57'	TLC-LED-600	1	1	0
				83'	TLC-LED-1150	6	6	0
1	F6	90'	-9'	25'	TLC-BT-575	2	2	0
				81'	TLC-LED-1150	4	4	0
1	F7	90'	-11'	25'	TLC-BT-575	2	2	0
				79'	TLC-LED-1150	4	4	0
1	F8	90'	-13'	51'	TLC-LED-600	1	1	0
				77'	TLC-LED-1150	5	5	0
8	TOTALS					50	50	0





San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**North Res Prop Line**
Spacing:	30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED CANDELA (PER FIXTURE)

	Entire Grid
Scan Average:	**61.1800**
Maximum:	265.781
Minimum:	0.000
No. of Points:	31

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 121,000 / 65,600 lumens
No. of Luminaires:	**50**
Total Load:	50.62 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>63,500	>63,500	>63,500
TLC-LED-1150	>63,500	>63,500	>63,500
TLC-LED-600	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

SCALE IN FEET 1 : 120

0' 120' 240'

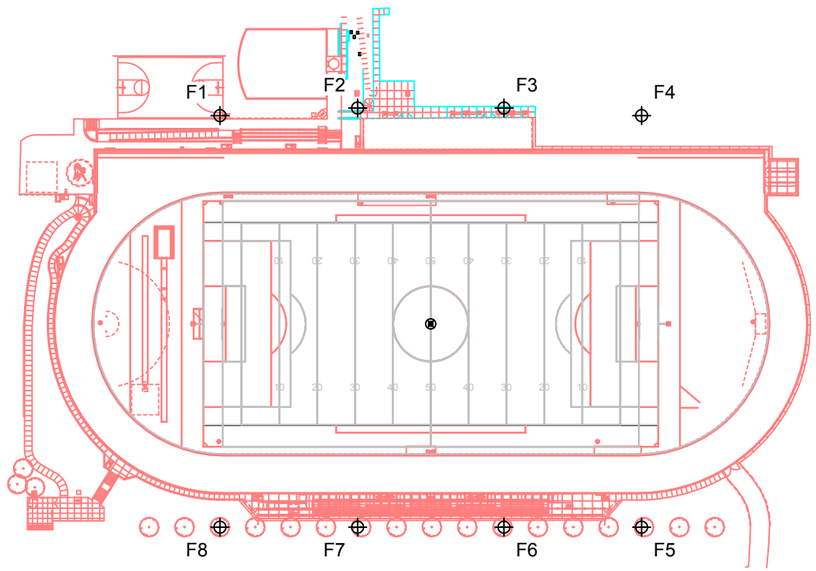
Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

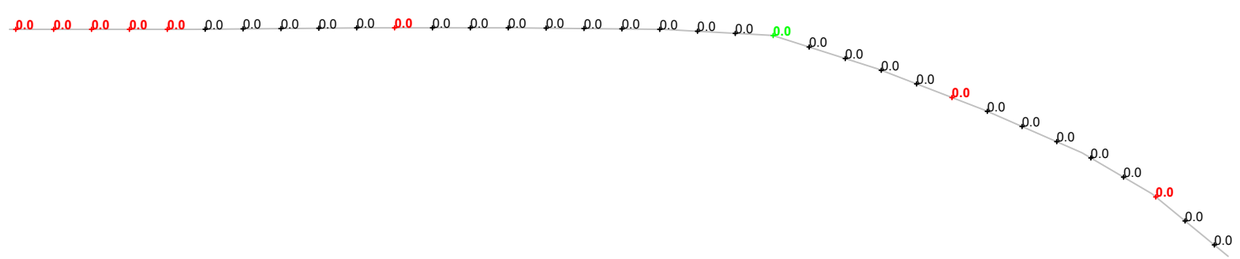
ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

We Make It Happen.

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F1	90'	4'	94'	TLC-LED-1150	5	5	0
1	F2	80'	11'	25'	TLC-BT-575	2	2	0
				63'	TLC-LED-600	1	1	0
				91'	TLC-LED-1150	4	4	0
1	F3	80'	13'	25'	TLC-BT-575	2	2	0
				60'	TLC-LED-600	1	1	0
				93'	TLC-LED-1150	4	4	0
1	F4	80'	13'	93'	TLC-LED-1150	6	6	0
1	F5	90'	-7'	57'	TLC-LED-600	1	1	0
				83'	TLC-LED-1150	6	6	0
1	F6	90'	-9'	25'	TLC-BT-575	2	2	0
				81'	TLC-LED-1150	4	4	0
1	F7	90'	-11'	25'	TLC-BT-575	2	2	0
				79'	TLC-LED-1150	4	4	0
1	F8	90'	-13'	51'	TLC-LED-600	1	1	0
				77'	TLC-LED-1150	5	5	0
8	TOTALS					50	50	0





SCALE IN FEET 1 : 120

0' 120' 240'

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**East Res Prop Line**
Spacing:	30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**0.0000**
Maximum:	0.000
Minimum:	0.000
No. of Points:	34

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 121,000 / 65,600 lumens
No. of Luminaires:	**50**
Total Load:	50.62 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>63,500	>63,500	>63,500
TLC-LED-1150	>63,500	>63,500	>63,500
TLC-LED-600	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

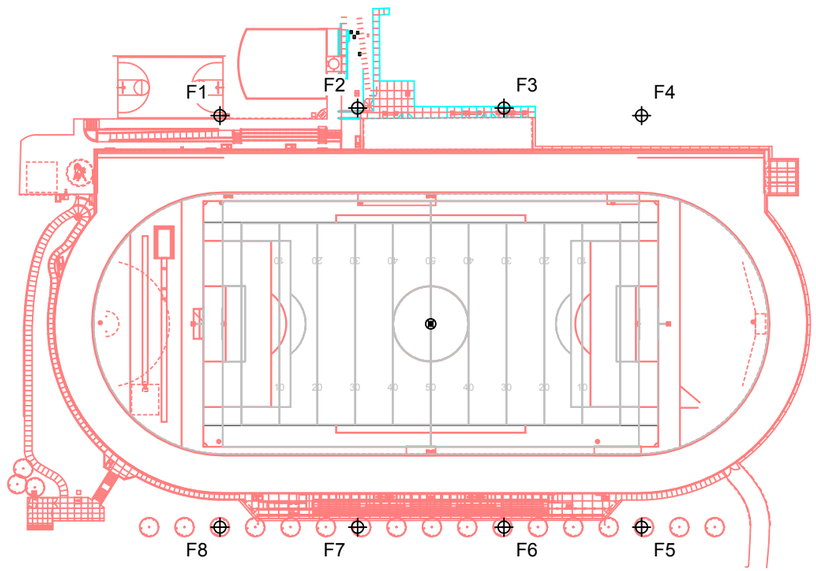
Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

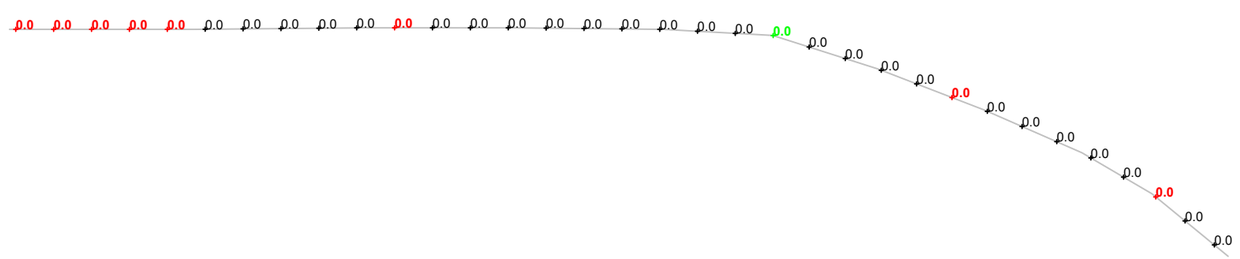
Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

We Make It Happen.

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F1	90'	4'	94'	TLC-LED-1150	5	5	0
1	F2	80'	11'	25'	TLC-BT-575	2	2	0
				63'	TLC-LED-600	1	1	0
				91'	TLC-LED-1150	4	4	0
1	F3	80'	13'	25'	TLC-BT-575	2	2	0
				60'	TLC-LED-600	1	1	0
				93'	TLC-LED-1150	4	4	0
1	F4	80'	13'	93'	TLC-LED-1150	6	6	0
1	F5	90'	-7'	57'	TLC-LED-600	1	1	0
				83'	TLC-LED-1150	6	6	0
1	F6	90'	-9'	25'	TLC-BT-575	2	2	0
				81'	TLC-LED-1150	4	4	0
1	F7	90'	-11'	25'	TLC-BT-575	2	2	0
				79'	TLC-LED-1150	4	4	0
1	F8	90'	-13'	51'	TLC-LED-600	1	1	0
				77'	TLC-LED-1150	5	5	0
8	TOTALS					50	50	0





SCALE IN FEET 1 : 120

0' 120' 240'

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**East Res Prop Line**
Spacing:	30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED MAX VERTICAL FOOTCANDLES

	Entire Grid
Scan Average:	**0.0001**
Maximum:	0.001
Minimum:	0.000
No. of Points:	34

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 121,000 / 65,600 lumens
No. of Luminaires:	**50**
Total Load:	50.62 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>63,500	>63,500	>63,500
TLC-LED-1150	>63,500	>63,500	>63,500
TLC-LED-600	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

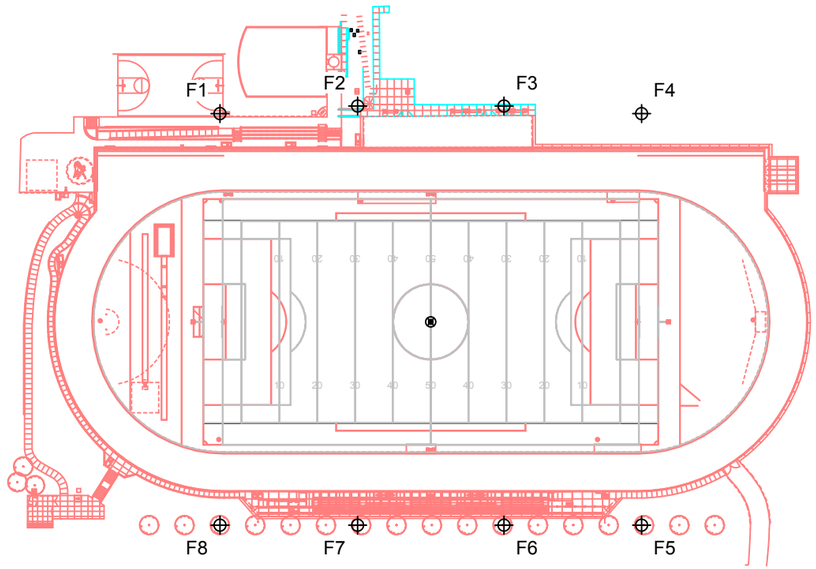
Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

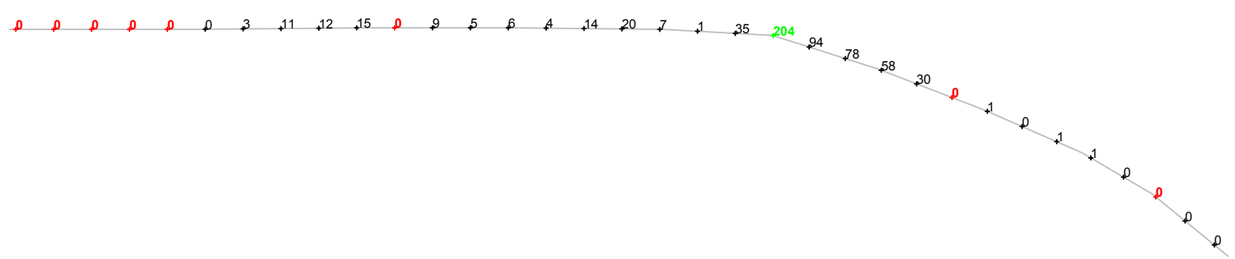
Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

We Make It Happen.

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F1	90'	4'	94'	TLC-LED-1150	5	5	0
1	F2	80'	11'	25'	TLC-BT-575	2	2	0
				63'	TLC-LED-600	1	1	0
				91'	TLC-LED-1150	4	4	0
1	F3	80'	13'	25'	TLC-BT-575	2	2	0
				60'	TLC-LED-600	1	1	0
				93'	TLC-LED-1150	4	4	0
1	F4	80'	13'	93'	TLC-LED-1150	6	6	0
1	F5	90'	-7'	57'	TLC-LED-600	1	1	0
				83'	TLC-LED-1150	6	6	0
1	F6	90'	-9'	25'	TLC-BT-575	2	2	0
				81'	TLC-LED-1150	4	4	0
1	F7	90'	-11'	25'	TLC-BT-575	2	2	0
				79'	TLC-LED-1150	4	4	0
1	F8	90'	-13'	51'	TLC-LED-600	1	1	0
				77'	TLC-LED-1150	5	5	0
8	TOTALS					50	50	0





SCALE IN FEET 1 : 120

0' 120' 240'

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**East Res Prop Line**
Spacing:	30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED CANDELA (PER FIXTURE)

	Entire Grid
Scan Average:	**17.9049**
Maximum:	204.261
Minimum:	0.000
No. of Points:	34

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 121,000 / 65,600 lumens
No. of Luminaires:	**50**
Total Load:	50.62 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>63,500	>63,500	>63,500
TLC-LED-1150	>63,500	>63,500	>63,500
TLC-LED-600	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

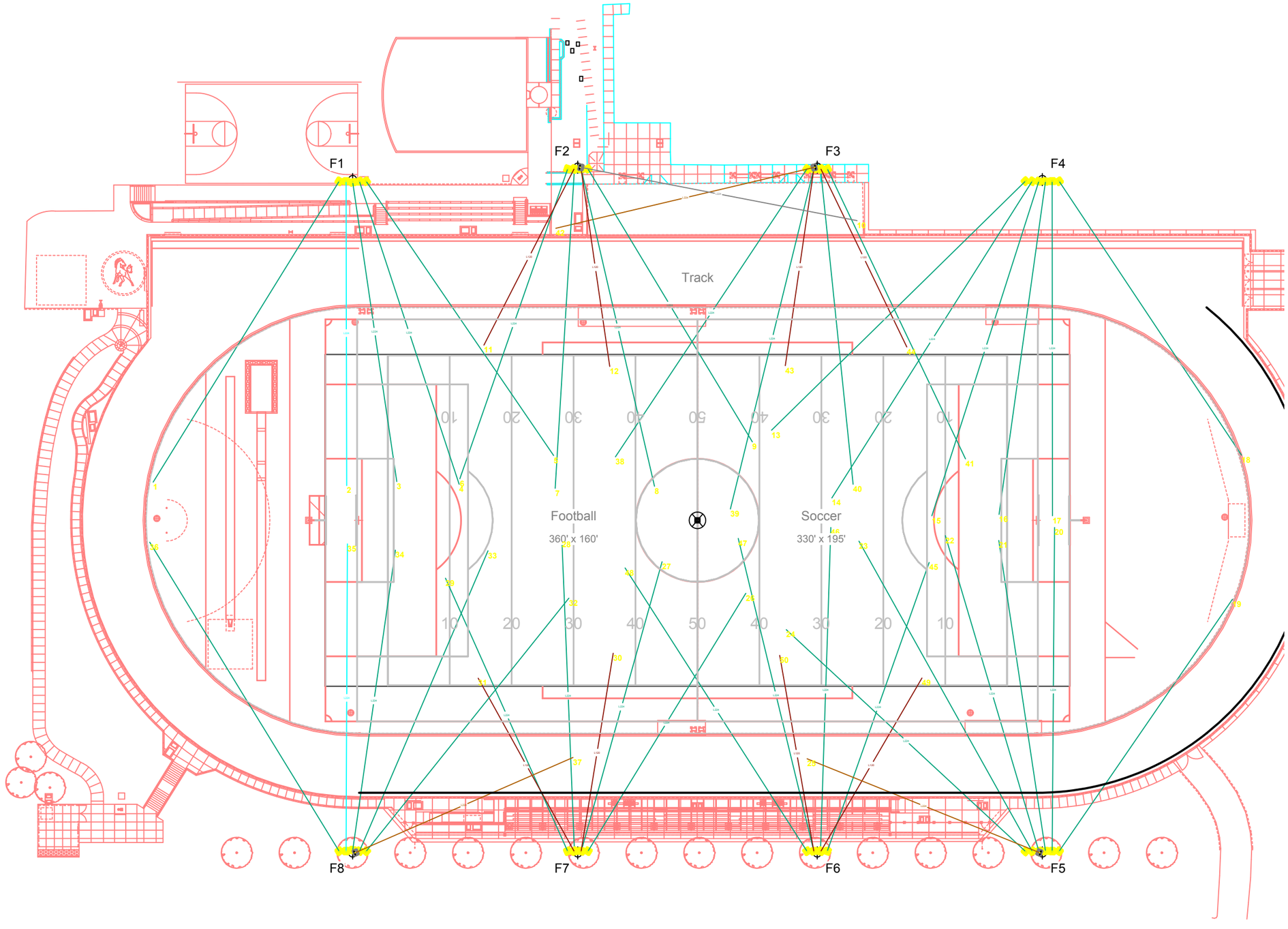
Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

musco Lighting
We Make It Happen®

San Marin High School Football

Novato,CA



EQUIPMENT LAYOUT

INCLUDES:
- Bleacher
- Football
- Soccer
- Track

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

EQUIPMENT LIST FOR AREAS SHOWN

		Pole		Luminaires		
QTY	LOCATION	CLASS	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE
1	F1	LSS90A	4'	94'	TLC-LED-1150	5
1	F2	LSS80B	11'	25'	TLC-BT-575	2
				63'	TLC-LED-600	1
				91'	TLC-LED-1150	4
1	F3	LSS80B	13'	25'	TLC-BT-575	2
				60'	TLC-LED-600	1
				93'	TLC-LED-1150	4
1	F4	LSS80B	13'	93'	TLC-LED-1150	6
1	F5	LSS90B	-7'	57'	TLC-LED-600	1
				83'	TLC-LED-1150	6
1	F6	LSS90B	-9'	25'	TLC-BT-575	2
				81'	TLC-LED-1150	4
1	F7	LSS90B	-11'	25'	TLC-BT-575	2
				79'	TLC-LED-1150	4
1	F8	LSS90B	-13'	51'	TLC-LED-600	1
				77'	TLC-LED-1150	5
8	TOTALS					50

SINGLE LUMINAIRE AMPERAGE DRAW CHART

Ballast Specifications (.90 min power factor)	Line Amperage Per Luminaire (max draw)						
Single Phase Voltage	208 (60)	220 (60)	240 (60)	277 (60)	347 (60)	380 (60)	480 (60)
TLC-BT-575	3.2	3.0	2.8	2.4	1.9	1.7	1.4
TLC-LED-1150	6.8	6.5	5.9	5.1	4.1	3.7	3.0
TLC-LED-600	3.4	3.2	3.0	2.6	2.0	1.9	1.5

SCALE IN FEET 1 : 50

0' 50' 100'

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

We Make It Happen.

San Marin High School Football

Novato,CA

GLARE IMPACT

Summary

Map indicates the maximum candela an observer would see when facing the brightest light source from any direction.

A well-designed lighting system controls light to provide maximum useful on-field illumination with minimal destructive off-site glare.

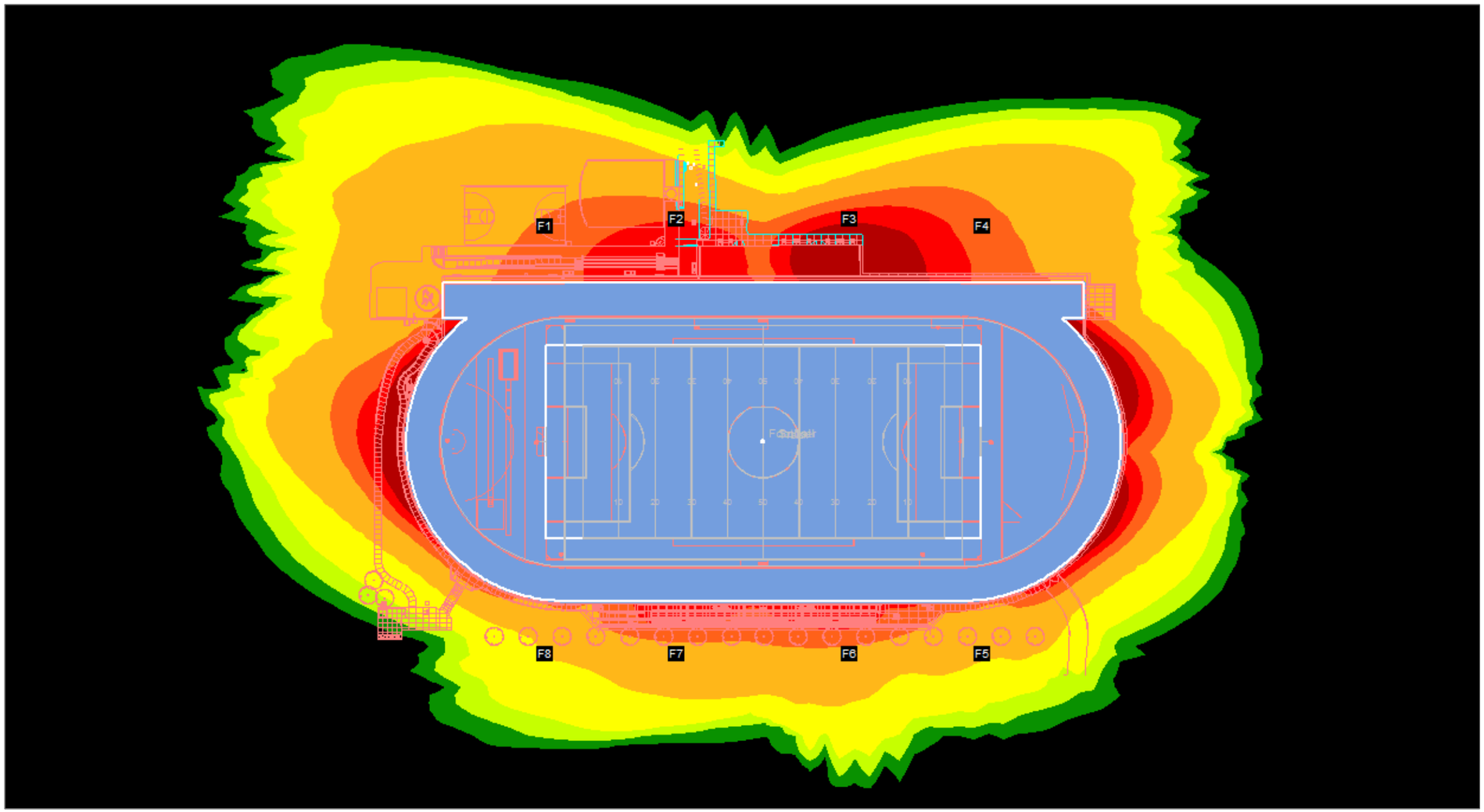
GLARE

Candela Levels

High Glare: 150,000 or more candela
Should only occur on or very near the lit area where the light source is in direct view. Care must be taken to minimize high glare zones.

Significant Glare: 25,000 to 75,000 candela
Equivalent to high beam headlights of a car.

Minimal to No Glare: 500 or less candela
Equivalent to 100W incandescent light bulb.



ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

We Make It Happen.