

**Correia Middle School Sports Complex Project
Draft EIR**

Appendix F

Lighting Impact Study

Prepared by T&B Planning, Inc.

December 1, 2014

Lighting Impact Study
for
Correia Middle School Sports Complex

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Executive Summary

This report has been prepared to evaluate the potential for visual quality impacts related to artificial lighting and glare that could result from implementation of the Correia Middle School Sports Complex Project (hereafter “Project”). Specifically, this report includes a discussion of relevant lighting standards, plans, regulations and guidelines; a description of the existing lighting conditions and sensitive receptors surrounding the Project site; thresholds of significance for evaluating the potential significance of lighting and/or glare impacts; an assessment of potential adverse lighting effects which could result from implementation of the proposed Project; and discussion of mitigation measures that may be necessary to reduce Project-related light and glare impacts to a level below significant.

The Project encompasses a portion of the Correia Middle School campus, generally located in the Peninsula community of the City of San Diego. Specifically, the Correia Middle School is located northwest of Famosa Boulevard and southwest of Valeta Street, while Nimitz Boulevard occurs southwesterly of the site. The Project site includes the school’s existing athletic field area comprised of baseball and multi-use soccer/football/lacrosse fields. The Project proposes construction of a new Sports Complex on the Correia Middle School campus. The complex would include an improved softball field (including additional bleachers and a concession stand with restroom facilities), track and field facilities (including a long jump pit), four multi-purpose fields (including either natural grass or artificial turf with an irrigation type cooling system), and new classroom and restroom buildings. Proposed artificial lighting improvements include the construction of ten light standards dispersed throughout the site to provide artificial lighting for the softball field and the multi-use fields. During school hours, the Sports Complex would only be available for use by Correia students. After school hours, the complex would be open to use by Correia students and Point Loma High School students, and would also be rented to public and private sports teams/clubs for community use on evenings and weekends.

The analysis of potential visual impacts related to artificial lighting and glare included mathematical quantifications of the illumination provided by the Project lighting engineer to evaluate whether the proposed lighting would result in substantial spill-over of light onto adjacent light-sensitive receptors (*i.e.*, residential uses located to the northeast and southeast) affecting occupant vision or privacy.

As a result of this analysis, it has been determined that the proposed Project would result in no significant adverse impacts related to sky glow, glare, or light trespass due to the urbanized character of the Project area, the design of the proposed lighting system, and the distance between proposed light standards and nearby residences.

1.0 Introduction

1.1 Document Purpose

The purpose of this study is to assess the visual quality impacts related to artificial lighting and glare that would occur as a result of the proposed Project, determine the significance of the impacts under the California Environmental Quality Act (CEQA), and to propose measures to avoid, minimize, or mitigate adverse visual quality impacts associated with the construction of permanent, artificial lighting at the Correia Middle School athletic fields.

CEQA Guidelines §15126.2(a) require that environmental documentation “*identify and focus on the significant environmental effects*” of a proposed project. “Effects” and “impacts” are used interchangeably within this report and have the same meaning. The State CEQA Guidelines definition of environment (§15360) includes “objects of ... aesthetic significance.” The State Guidelines also indicate that a project would normally have a significant effect on the environment if it would have a “substantial, demonstrable negative visual effect.”

The Project, as described further in Section 3.0, consists of a proposal to install ten (10) artificial light standards in association with planned construction of four multi-use fields and an upgraded softball field. Single family residences are located northeast and southeast of the proposed Correia Middle School Sports Complex. As such, the proposed Project has the potential to result in adverse impacts to adjacent light-sensitive receptors.

1.2 Concepts Related to Artificial Lighting

The following section provides an overview of the lighting concepts and terminology used throughout this report.

Foot-candle

A foot-candle is the unit for measuring the light present on a surface or workplane. One foot-candle is roughly equal to the uniform distribution of light from an ordinary wax candle on a one-square foot surface, located one foot away from the flame.

Lumens

The amount of radiant energy (in the form of light) produced by a lighting fixture is measured in lumens.

Illuminance or Light Intensity

Measured in foot-candles, illuminance is the density of the flow of light falling on a surface. Illuminance is inversely proportional to the square of the distance between the light source and the surface. Thus, generally speaking, illuminance will decrease by approximately 75-percent when the distance from the light source is doubled.

- Horizontal illuminance is the density of the flow of light falling on the horizontal plane, such as a bed or the ground.
- Vertical illuminance is the density of the flow of light falling on the vertical plane, such as a window, and is an effective measure of perceived levels of illuminance at the human eye.

Light Pollution

Nighttime lighting in excess of what is necessary for its purpose is referred to as light pollution. Typical effects of light pollution include sky glow, light trespass and glare.

- **Sky glow** is the brightening of the sky that occurs as a result of outdoor lighting fixtures emitting a portion of their light directly into the sky (sky glow also occurs as a result of natural atmospheric conditions). Sky glow is of particular concern near observatories and in rural areas where there is low ambient light.
- **Light trespass** (also known as obtrusive light or spill light) is the condition where poorly shielded or poorly aimed light fixtures cast light to areas where it is unwanted or not needed. Light trespass commonly occurs in urbanized areas when streetlights, floodlights, building signs, etc., illuminate a bedroom – making it difficult to sleep – or otherwise illuminate private residential property so as to reduce privacy or disrupt nighttime views.
- **Glare** is the objectionable brightness caused by over-illumination, as well as poorly shielded or poorly aimed light fixtures. Glare can result in the temporary reduction or loss of visibility (disability glare) and pain or annoyance (discomfort glare).

1.3 Document Format

In order to address the potential visual quality impacts of the proposed Project related to artificial lighting and glare, this document has been organized into the following sections:

- **Section 1.0, Introduction.** Section 1.0 of this document provides an overview of the purpose of this report, a brief discussion of basic lighting concepts and issues, and a summary of the document organizational format.
- **Section 2.0, Existing Conditions.** Section 2.0 sets forth the existing conditions upon which the lighting impact analysis is based.
- **Section 3.0, Project Description.** Section 3.0 of this document provides a detailed description of the actions and development features that are proposed by the Project. Elements of the proposed Project which have the potential to result in visual quality impacts related to artificial lighting and glare are described in detail in this section.
- **Section 4.0, Basis for Determining Significance.** Section 4.0 discusses the standards against which the visual quality impact analysis determinations are made.
- **Section 5.0, Impact Analysis.** Section 5.0 provides a detailed analysis of the ways in which the proposed Project could result in a significant, adverse visual quality impact. The analysis focuses specifically on the Project's potential to create substantial amounts of spill-light and glare affecting nearby light-sensitive receptors.
- **Section 6.0, Mitigation Measures, and Section 7.0, Conclusion,** discusses whether measures are necessary to reduce any identified visual quality impacts to a level below significant and draws a conclusion as to the significance of project impacts.

2.0 Existing Conditions

2.1 Site Location

The Project site is generally located in the Peninsula community of the City of San Diego and is depicted on Figure 2-1, *Regional Location Map*. More specifically, the Project site is located on the southern and western portions of the Correia Middle School campus, and is bounded by Valeta Street to the northeast and Famosa Boulevard to the southeast, while Nimitz Boulevard occurs to the southwest of the site, as depicted on Figure 2-2, *Vicinity Map*. Figure 2-3, *Aerial Photograph*, shows the Project site in relation to the immediately surrounding land area. As shown on Figure 2-3, land uses within the site's vicinity include open space, residential, park, and institutional uses.

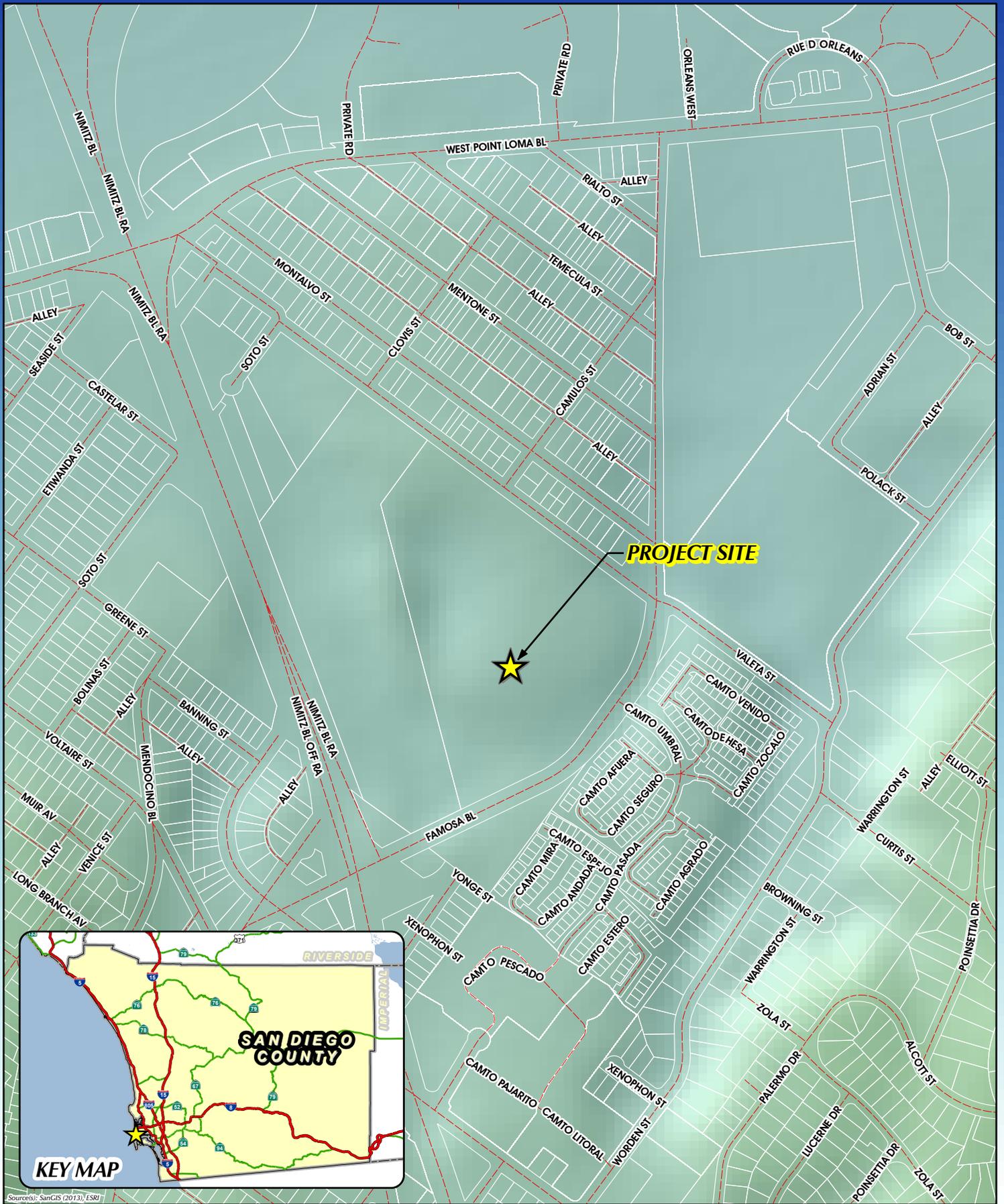
2.2 Description of Site

The Project site is currently developed with various athletic and athletic support facilities. Specifically, the southern portion of the site contains one baseball field with bleachers. Also in the southern portion of the site, overlapping the baseball field, is an existing natural turf field. The northern portion of the site is paved and striped to accommodate numerous existing tennis and basketball courts. In the central and eastern portions of the site is an existing dirt track area. Within the northeastern portion of the site is an existing parking lot and three portable structures. Currently, there are no artificial lighting elements on-site to provide illumination for the athletic fields and there are no sources of substantial glare on the Project site.

2.3 Description of Surrounding Environment

The Project site is located in an urbanized, primarily residential neighborhood. To the south and southeast of the site are a small open space area and an existing single-family residential neighborhood. To the west of the site is Cleator Community Park, which is improved with sports fields that do not include artificial lighting, except for lighting associated with the existing parking lot and restrooms. To the northwest of the Project site is the Correia Middle School campus (which is not planned for improvement as part of the Project), beyond which is an existing residential neighborhood with both single-family and multi-family residential uses. Areas to the northeast of the site also contain single- and multi-family uses, beyond which is the Famosa Slough, an open space wetland area.

With exception of the open space that occurs immediately to the southeast of the proposed Project site, the nearby Famosa Slough, and the Cleator Community Park, street lighting is prevalent throughout the surrounding area.



CORREIA MIDDLE SCHOOL ATHLETIC FIELD LIGHTING

FIGURE 2-2

DATE: November 2014

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VICINITY MAP



CORREIA MIDDLE SCHOOL ATHLETIC FIELD LIGHTING

FIGURE 2-3

DATE: November 2014

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AERIAL PHOTOGRAPH

3.0 Project Description

3.1 Proposed Project Actions

The proposed Project includes the construction and operation of upgraded athletic facilities on the Correia Middle School campus, as depicted on Figure 3-1, *Site Plan*. Improvements proposed as part of the Project include the following:

Multi-Use Fields

- Construction of four multi-use fields: two soccer/lacrosse/field-hockey fields with a football/soccer/lacrosse/field-hockey field overlay (artificial turf with irrigation type cooling) and one football/soccer/lacrosse/hockey practice field overlay at the softball location (natural turf)
- Removable football goal posts; and
- Portable five (5) row bleachers.

Softball Field

- Replace the existing baseball field;
- New dugouts/bullpens/portable bleachers/players bench;
- Fence enclosed bench areas and bullpens; and
- Bleacher seating.

Hard Courts

- Construction of one (1) basketball court and six (6) tennis courts.

Track and Field Facilities

- Installation of a long jump pit and runway.

Construction of two new buildings

- New approximately 6,200 square foot two-story classroom/team room/restroom building (this building will replace some existing portable classroom buildings located in the same area);
- New approximately 1,000 square foot concession/restroom/equipment storage building;

New Landscaping

- Installation of new landscaping in support of the above-listed improvements.

Field Lighting

- Ten light poles are proposed to provide field lighting for the softball field and multi-use fields.

3.2 Proposed Events

New school athletic events are not anticipated as part of the Project; however, existing events conducted on the football field/track that were only possible during daylight hours, or with temporary lights, would have the ability to occur in the evening. These athletic events include softball, football, lacrosse, field hockey, soccer, and track & field. During school hours, usage of the sports complex would be limited to students. Outside of school hours, the complex would be available for usage by the students of both Correia Middle School and also Point Loma High School. The facilities would also be rented to the public and private sports teams/clubs for community use on evenings and weekends.

3.3 Proposed Lighting System

Proposed artificial lighting improvements include installation of the Musco Light-Structure Green™ sports lighting system throughout the site. Figure 3-1, *Site Plan*, depicts the location of the lighting elements. A total of ten light standards are proposed to be constructed on-site. Four (4) light standards would be constructed in the southern portion of the site to illuminate the upgraded softball field. Six (6) lighting standards are proposed at the perimeter of the three multi-use fields in the northern portion of the site, with two (2) lighting standards occurring at the southwestern portion of the fields, two (2) lighting standards at the northeastern portion of the fields, and two (2) lighting standards proposed at the northwestern and southeastern edges of the field. Lighting elements proposed along the southwestern portion of the multi-use fields would include back-to-back mounting configurations to illuminate the southern field. Figure 3-1, depicts the location of the lighting elements proposed as part of the Project.

Lighting standards proposed for the upgraded softball field include two 70-foot tall standards located near the dugouts (Standards A1 and A2 on Figure 3-1), with an additional two 80-foot tall standards proposed along the northwest and northeastern portions of the outfield (Standards B1 and B2 on Figure 3-1). A total of ten 1,500-watt metal halide fixtures are proposed for Standards A1 and A2, while Standards B1 and B2 would include a total of 18 1,500-watt metal halide fixture.

At the multi-use fields, a total of six (6) lighting standards would be provided. Along the southeastern portion of the northern three fields, two 80-foot lighting standards would be installed (Standards S1 and S2 on Figure 3-1) and would contain back-to-back mounting configurations to provide lighting for the southern-most multi-use field (i.e., overlapping with the softball field). Along the northwestern and southeastern edges of the multi-use fields, an additional two standards measuring 80 feet in height would be installed (Standards S3 and S4 on Figure 3-1). An additional two lighting standards, also measuring 80 feet in height, are proposed at the northeastern edge of the multi-use fields (Standards S7 and S8 on Figure 3-1). All of the multi-use luminaires would include 1,500-watt metal halide fixtures. A total of 10 luminaires are proposed for Standards A1 and A2, and 18 luminaires are proposed for Standards B1 and B2. Standards S1 and S2 would be constructed with a total of 14 luminaires each, with a total of 12 luminaires directed toward the southernmost multi-use field and a total of 16 luminaries directed towards the northern three multi-use fields. Standards S3 and S4 would each include 12 luminaries directed towards the central portions of the northern three multi-use fields. Finally, Standards S7 and S8 would each feature six luminaires, directed towards the southwest onto the multi-use fields.

In total, 92 luminaires would be installed on the ten lighting standards proposed as part of the Project. In addition, each fixture would be fitted with an external visor to reduce glare and a reflective insert to focus light onto the playing field.

According to manufacturer's specifications, the Musco Light-Structure Green™ includes a light spill and glare control system that is designed to minimize off-site impacts from the lighting system. The reflector and external visor are designed so the majority of the light is in the lower portion of the beam, and direct line of site to the lamp (source of glare) is minimized when viewed from off-site areas. Each light fixture housing contains a reflective insert which directs, shifts, and focuses light onto the field and reduces spill and glare.

A summary of the proposed lighting system is provided below in Table 3-1, *Correia Middle School Lighting System Summary*.

LEGEND

- Existing Buildings
- Parking
- Boundary Of Proposed Sports Complex Project
- Proposed Natural Landscaping
- Proposed Natural Turf
- Proposed Artificial Turf
- Proposed Concrete Paving
- Proposed Layout of New Basketball/Tennis Courts
- Proposed New Buildings
- Proposed Field Lights (10 Total)

Restroom / Concession /
Storage Building

Basketball / Tennis Courts

Long Jump Pit
And Runway

Multi-Use Fields

Softball Field

Bleachers

FAMOSA BOULEVARD

SHOPS

MUSIC

CLASSROOMS

AUDITORIUM

CLASSROOMS

ADMIN

CLASSROOMS

SHOWERS &
LOCKERS

CLASSROOMS

LIBRARY

CLASSROOMS

VALETA STREET

Parking Lot

2-Story Classroom
Building

Parking Lot

Bleachers

Landscaping

Field Lighting Pole
(10 Total)

B1

A1

A2

B2

S2

S1

S4

S3

S7

S8

Source: AVRP Studios (11-13-14)

CORREIA MIDDLE SCHOOL ATHLETIC FIELD LIGHTING

FIGURE 3-1

Table 3-1 Correia Middle School Lighting System Summary.

POLE		LUMINAIRES		
LOCATION ¹	SIZE (FT.)	MOUNTING HEIGHTS (FT.)	LAMP TYPE	QUANTITY/POLE
A1	70'	70'	1500W MZ	5
A2	70'	70'	1500W MZ	5
B1	80'	80'	1500W MZ	9
B2	80'	80'	1500W MZ	9
S1	80'	80'	1500W MZ	6/8 ²
S2	80'	80'	1500W MZ	6/8 ²
S3	80'	80'	1500W MZ	12
S4	80'	80'	1500W MZ	12
S7	80'	80'	1500W MZ	6
S8	80'	80'	1500W MZ	6
TOTAL:				92

1. Refer to Figure 3-1 for location of each lighting element.
 2. Structure utilizes a back-to-back mounting configuration
- Source: Musco Lighting, 2014.*

Based on typical operational characteristics at other high school facilities within the San Diego Unified School District (SDUSD), it is anticipated that field lighting would be completely extinguished by approximately 10:00pm. In no case would field lighting elements be used between the hours of 11:00pm and dawn.

4.0 Basis for Determining Significance

4.1 Thresholds of Significance

The following significance guideline is the basis for determining the significance of direct impacts to visual quality related to artificial lighting and glare:

1. *The Project would create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.*

The above-listed threshold for significance is based on Appendix G of the CEQA Guidelines. This threshold addresses the potential for a project to produce a substantial amount of light which could result in adverse effects due to light pollution. It also addresses the potential for a project to produce glare which could result in discomfort or disability.

4.2 Evaluation Criteria

For purposes of this report, the proposed Project would be regarded as having an adverse lighting impact if it would produce a substantial amount of light pollution, including sky glow, light trespass or glare (for example, by proposing poorly shielded light fixtures).

Sky glow and glare impacts will be evaluated within this report according to the design (shielding, angular distribution of light, etc.) of the proposed lighting system, as the physical characteristics of the lighting system correlate directly to the contribution of sky glow and glare. Sky glow impacts would be considered significant under CEQA if the proposed artificial lighting installation would emit a substantial amount of upward light. Glare impacts would be considered significant under CEQA if the proposed artificial lighting fixtures would be unshielded and/or installed at a height or angle that would permit direct view of the main beam from off-site locations.

Light trespass impacts will be evaluated within this report against levels of illumination emitted by the proposed lighting system on the horizontal and vertical planes. Under certain circumstances it may be appropriate to measure light trespass on the vertical plane (e.g., light shining through a window), while in other circumstances it may be appropriate to measure light trespass on the horizontal plane (e.g., light falling on a bed). Furthermore, light trespass is subjective, as a given illuminance level may be acceptable to some, but objectionable to others. Regardless, research on the topic of light trespass has resulted in the creation of suggested limits on the amount of light spilled onto adjacent residential properties.

According to the Institution of Lighting Engineers (ILE) and the Electric Power Research Institute (EPRI), light trespass varies according to surrounding environmental characteristics. Areas that are more rural in character, and therefore exhibit few existing artificial sources of light, are more susceptible to impacts resulting from the installation of new artificial lighting sources. By contrast, urbanized areas are characterized by a large number of existing artificial lighting sources and are therefore less susceptible to adverse effects associated with new artificial lighting sources. Therefore, different lighting standards are applied which vary according to the amount and intensity of existing lighting sources in the area. In order to determine appropriate lighting standards that are reflective of the existing lighting conditions, land uses are typically categorized into one of four Environmental Zones, which are described below:

- **E1: Areas with intrinsically dark landscapes.** This environmental zone includes national parks, areas of outstanding natural beauty, and rural areas.

- **E2: Areas of low ambient brightness.** This environmental zone includes outer urban and rural residential areas.
- **E3: Areas of medium ambient brightness.** This environmental zone includes urban residential areas.
- **E4: Areas of high ambient brightness.** This environmental zone includes urban areas with mixed residential and commercial uses with a high level of nighttime activity.

Based on these environmental zones, the ILE and EPRI have established recommendations for limiting light trespass onto adjacent residential properties. The recommendations established by the ILE are summarized in Table 4-1, *Obtrusive Light Limitations for Exterior Lighting Installations*. As discussed in Section 2.0, the Project site is located in an urban residential area. As such, the Project area is characterized as an area of medium ambient brightness (E3 environmental zone). Accordingly, light trespass impacts would be considered potentially significant under CEQA if illuminance produced by the Project would impact sensitive receptors with lighting levels that exceed 0.8 foot-candles during pre-curfew hours (before 11:00pm) and 0.2 foot-candles during the post-curfew hours, as measured on the vertical and horizontal planes.

Table 4-1 Obtrusive Light Limitations for Exterior Lighting Installations

ENVIRONMENTAL ZONE	LIGHT TRESPASS ILLUMINANCE			
	PRE-CURFEW (DUSK-11:00 PM)		POST CURFEW (11:00 PM – 7:00 AM)	
ILE				
E1	2 lx	0.2 fc	1 lx	0.1 fc
E2	5 lx	0.5 fc	1 lx	0.1 fc
E3	10 lx	0.9 fc	2 lx	0.2 fc
E4	25 lx	2.3 fc	5 lx	0.5 fc
EPRI				
E1	1 lx	0.1 fc	1 lx	0.1 fc
E2	3 lx	0.3 fc	1 lx	0.1 fc
E3	9 lx	0.8 fc	3 lx	0.3 fc
E4	16 lx	1.5 fc	7 lx	0.6 fc

lx = lux

fc = foot-candles

Source: Adapted from ILE (2005) and EPRI (2000)

As a frame of reference, a full moonlit night in rural areas with negligible ambient light would equal approximately 0.02-0.03 foot-candles, while a typical 30-foot tall streetlamp would have an illumination of 1.3 foot-candles at a distance of 10 feet.

For purposes of analysis within this report, light trespass will be evaluated against the recommendations established by the ILE and EPRI. Because there is no universally accepted standard for measuring and evaluating the significance of light trespass, this report will use the pre-curfew limits recommended by EPRI and the post-curfew limits recommended by the ILE, as these limitations represent the most stringent standard by which Project impacts may be evaluated.

This report also will apply the recommended limitations listed in Table 4-1 to levels of horizontal illuminance. In urban residential environments, such as the area surrounding the Project site, a common adverse effect associated with light trespass is sleep disruption. As horizontal illumination assesses the amount of light falling on a horizontal plane (like a bed, for instance), while vertical illumination assesses the amount of light falling on a vertical plane (such as a window), both are

considered to be appropriate units of measure for the proposed Project. The potential for sleep disruption is the critical component in determining the level of impact for light trespass. Accordingly, sleeping areas (bedrooms) within nearby residences shall be considered sensitive receptors for purposes of evaluating the significance of the Project impacts.

4.3 Methodology

This report is based upon a photometric analysis conducted by the Project lighting system designer, Musco Lighting. The photometric analysis includes a quantification of the levels of illumination produced by the Project on both the vertical and horizontal planes. This report assesses the levels of illumination produced by the Project and evaluates the compatibility of the proposed illumination with the surrounding residential community.

5.0 Analysis of Project Effects

Table 5-1, *Project Impact Summary*, provides a summary of the proposed Project’s impacts and the level of significance for each impact. A detailed discussion of each Project impact is provided in the corresponding subsection below.

Table 5-1 Project Impact Summary

PROJECT IMPACT	LEVEL OF SIGNIFICANCE	REFERENCE SECTION
Sky Glow	No impact due to urbanized nature of Project area and the design of the proposed lighting elements.	5.1
Glare	Less than Significant due to the design of the proposed lighting elements.	5.2
Light Trespass		
<ul style="list-style-type: none"> • Vertical Illuminance 	Less than Significant due to the design of the proposed lighting elements and the distance between proposed lighting elements and existing homes.	5.3.1A
<ul style="list-style-type: none"> • Horizontal Illuminance 		5.3.1B

5.1 Sky Glow

The Project site is located in an urbanized area with medium ambient brightness and is not especially sensitive to the effects of sky glow. In addition, the Project site is located approximately 60 miles southwest of Palomar Mountain Observatory and would therefore have less potential to impact operations at the observatory than more closely-situated properties. Regardless, the proposed Project would result in the erection of ten light standards, each with a total height ranging between 70 and 80 feet in height. The height of the proposed light standards would allow for each luminaire to be mounted with a narrow beam angle, which would focus light downward. In addition, the proposed luminaires would feature a highly efficient reflector and visor; the reflector would focus light toward the field, while the visor would minimize upward light. These design features would minimize sky glow to the maximum feasible extent. Based on the physical characteristics of the area surrounding the Project site and the design of the proposed light fixtures, implementation of the Project would result in no impact associated with sky glow.

5.2 Glare

The proposed Project would introduce new outdoor artificial lighting elements, which have the potential to result in glare if the main beams of proposed lighting elements (*i.e.*, the portion of the lamp with the greatest illuminance) are visible from off-site locations, resulting in excessive, uncontrolled brightness. However, many of the same design features that would minimize sky glow also would minimize glare impacts. The high mounting heights of the light fixtures would allow the light fixtures to be aimed at a steep angle that would focus the main beam of the lamp onto the field of play. In addition, the light fixtures would feature a reflective insert that would further focus the main beam of the lamp onto the field of play. Furthermore, each light fixture would be fitted with a visor that would minimize and/or block a direct line-of-site to the main beam of the lamp from off-site locations. These design features would ensure that a direct line-of-site to the main beam of the lamp would be minimized and/or blocked from off-site locations. Although new sources of outdoor artificial light would be introduced into the community, the design of the proposed lighting system would ensure that off-site residential land uses and motorists, including motorists along Famosa Boulevard and other nearby

roadways, would not be exposed to excessive, uncontrolled brightness. Glare impacts are therefore evaluated as less than significant.

5.3 Light Trespass

Implementation of the Project would result in the construction of ten artificial light standards. The proposed artificial lighting system has been specifically designed to minimize light trespass. The high mounting height (70 to 80 feet) of the luminaires would allow the lamps to be installed with a narrow beam angle to direct light downward, onto the fields of play, and away from adjacent residential properties. In addition, each luminaire would feature a reflective insert and an external visor, which would capture and redirect primary light onto the field and would result in less spill light off-field.

As described in Section 3.2, *Proposed Events*, the proposed artificial lighting system would be used to illuminate the activities of the sports complex that may occur during non-daylight hours. There is the potential for the fields to host additional evening events on a regular basis, including routine practices, playoff games, and/or community events. Based on typical operational characteristics at other high school facilities within the SDUSD, it is anticipated that field lighting would be completely extinguished by approximately 10:00pm. In no case would the artificial lighting elements for the sports complex be used between the hours of 11:00pm and dawn.

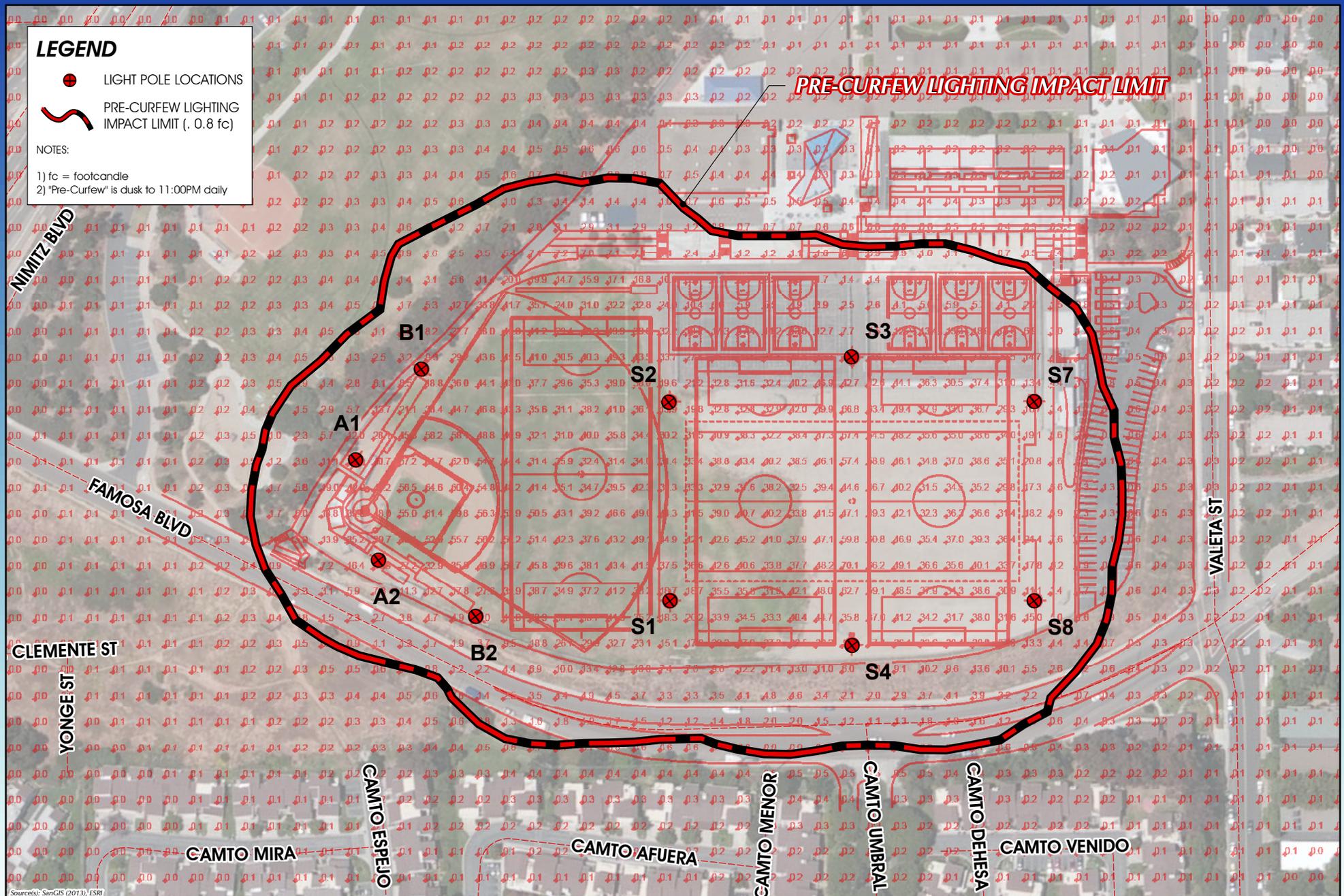
Areas to the immediate west (Cleator Neighborhood Park) and northwest (Correia Middle School campus) do not contain light-sensitive uses and spill light in these areas would result in no impact.

To the south/southeast, northeast, and north of the proposed Project site are existing residential neighborhoods that have the potential to be adversely affected by light trespass effects associated with the Project's proposed lighting elements. The affected neighborhoods are primarily located easterly of Famosa Boulevard and northerly of Valeta Street (refer to Figure 2-3, *Aerial Photograph*). Potential impacts to the residential homes surrounding the Project site are addressed below.

5.3.1 Potential Impacts to Residential Areas Southeast of Project Site

A. Vertical Illuminance

Figure 5-1, *Constant Illumination – Vertical Foot-candles*, depicts projected levels of vertical spill light at the “edge of spill line” for the proposed sports complex lighting elements. As described above, light sensitive receptors that have the potential to be significantly impacted by Project lighting elements include residential homes surrounding the proposed Project site. Lighting Standard B2 (refer to Figure 5-1) would occur nearest to existing residential uses at a distance of approximately 150 feet from the nearest residential home (located southeasterly of Famosa Boulevard). It is important to note that the illumination levels depicted on Figure 5-1 do not account for reductions in lighting intensity caused by intervening structures, topography, and/or landscaping. However, the lighting levels do account for distance; specifically, as one approaches the nearby residential homes and the distance from the proposed lighting standards increases, lighting intensity would decrease at a rate of approximately 75% for each doubling of distance. As discussed above, light intensity is reduced greatly as the distance from a light source increases. Additionally, when two lighting sources are combined, the resulting illuminance only significantly increases if the individual lighting sources have similar lighting intensity at the point of observation when viewed individually.



CORREIA MIDDLE SCHOOL ATHLETIC FIELD LIGHTING

FIGURE 5-1

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CONSTANT ILLUMINATION - VERTICAL FOOTCANDLES

As shown on Figure 5-1, no residential homes surrounding the Project site would be exposed to lighting levels exceeding 0.8 foot-candles. The highest intensity of lighting affecting nearby residential uses would occur at a home located along Camto Afuera, where several homes would be exposed to lighting levels up to 0.4 foot candles. Several existing homes in the community southeasterly of the site would be exposed to lighting levels exceeding 0.2 foot candles.

❑ **Pre-Curfew Impacts**

During pre-curfew hours (before 11:00pm), a significant impact could occur if spill light generated by the Project exceeded 0.8 foot-candles affecting sensitive receptors (*i.e.*, residents). This is because the primary environmental impact associated with light trespass is sleep disruption or sleep deprivation, which only could occur if residential structures are exposed to lighting levels exceeding 0.8 foot-candles.

As shown on Figure 5-1, no homes would be exposed to lighting levels in excess of 0.8 foot-candles, as measured on the vertical plane. Therefore, Project lighting would result in a less-than-significant impact during pre-curfew hours.

❑ **Post-Curfew Impacts**

In the event that the proposed lighting system was in operation during post-curfew hours (*i.e.*, after 11:00pm), spill light is expected to exceed the threshold of significance (*i.e.*, 0.2 vertical foot-candles) at residences located southeasterly of Famosa Boulevard. However, as described above in Section 3.3, all lighting elements would be dimmed by 9:00pm daily and extinguished by 10:00pm daily, and in no case would the lighting elements remain on between the hours of 11:00pm and dawn. Because all lighting elements would be extinguished by 10:00pm there would be no potential for the Project to result in adverse effects associated with light trespass during post-curfew hours. Therefore, there would be no impact due to light trespass during post-curfew hours (*i.e.*, 11:00pm to dawn) as measured on the vertical plan.

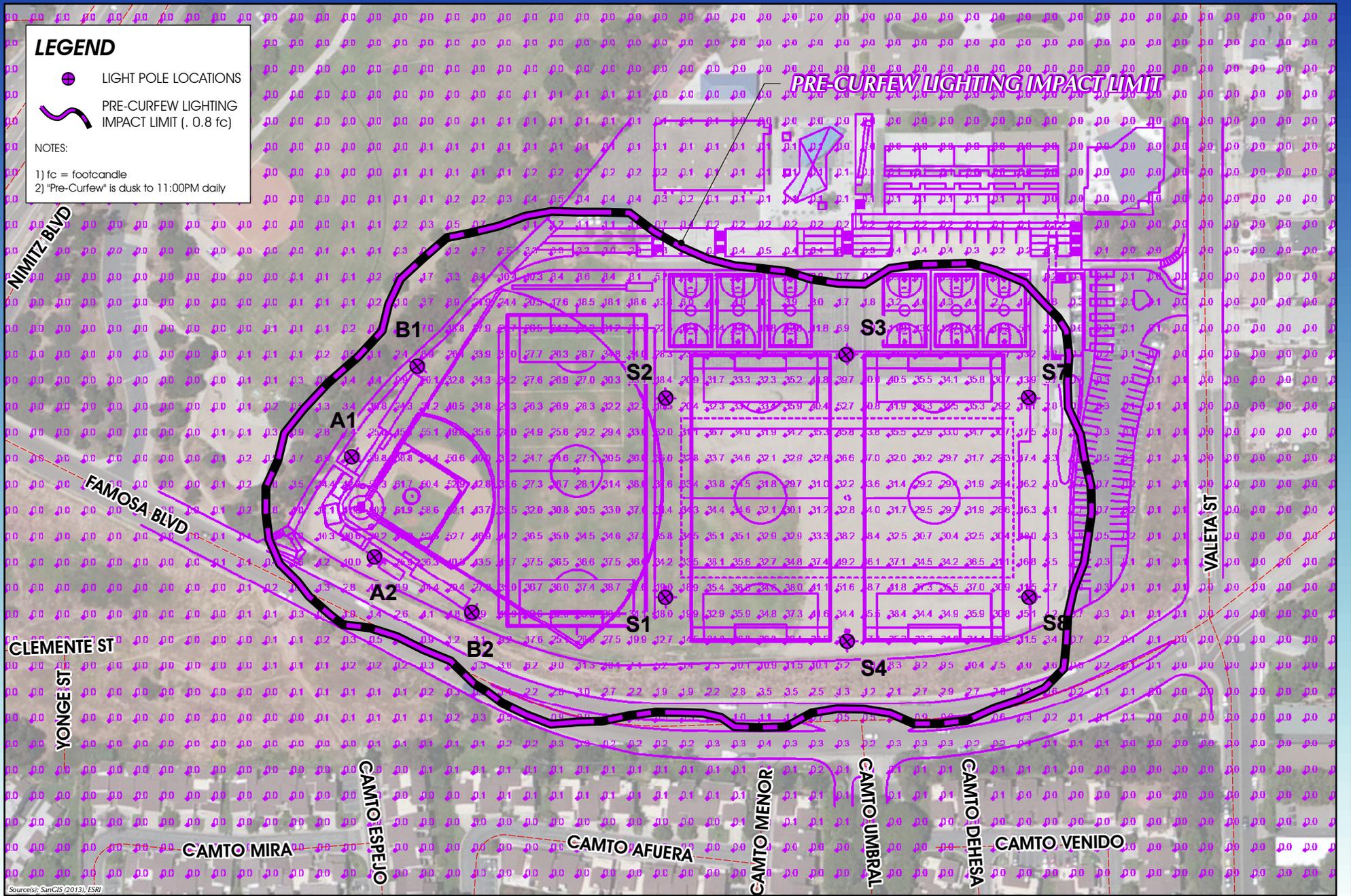
B. Horizontal Illuminance

Figure 5-2, *Constant Illumination – Horizontal Foot-candles*, displays the calculated levels of spill light that would be created by the Project along the “edge of spill line” for the proposed football field lighting elements (on the horizontal plane). As described above, the only light sensitive receptors that have the potential to be significantly impacted by Project lighting elements include a row of homes located to the south and southeast of the proposed Project site, primarily along Famosa Boulevard.

As shown on Figure 5-2, none of the residential homes located along Famosa Boulevard would be exposed to Project-related lighting levels exceeding 0.8 horizontal foot-candles. Additionally, no homes would be exposed to Project-related lighting levels exceeding 0.2 horizontal foot-candles. The highest level of illumination affecting nearby residences would be 0.1 horizontal foot-candles.

❑ **Pre-Curfew Impacts**

A significant impact would occur during pre-curfew hours if the Project produced spill light that exceeded 0.8 horizontal foot-candles at the property line of any residence located to the southwest of the Project site. As depicted on Figure 5-2, spill light created by the Project would result in illumination that would be less than 0.8 horizontal foot-candles at all residential homes surrounding



the Project site. As measured on the horizontal plane, the highest level of illuminance affecting residential homes would be 0.1 foot candles at the homes located southeasterly of Famosa Boulevard. Accordingly, Project lighting elements would not expose any sensitive receptors to lighting levels in excess of 0.8 horizontal foot-candles, and a less-than-significant impact would occur during pre-curfew hours.

❑ **Post-Curfew Impacts**

As shown on Figure 5-2, no residential homes would be exposed to lighting levels exceeding 0.2 horizontal foot-candles. Additionally, all lighting elements would be extinguished by 10:00pm daily. Therefore, there would be no impact due to light trespass during post-curfew hours (i.e., 11:00pm to dawn) as measured on the horizontal plan.

6.0 Mitigation Measures

As a result of this analysis, it has been determined that the proposed Project would result in no significant adverse impacts related to sky glow, glare or light trespass, due to the urbanized character of the Project area, the proposed design of the lighting system, and the distance between proposed light standards and light sensitive receptors (i.e., existing residential development). In addition, all athletic field lighting elements would be dimmed by 9:00pm and extinguished by 10:00pm in order to avoid light trespass impacts during post-curfew hours. As such, impacts are evaluated as less than significant and mitigation measures are not required.

7.0 Conclusion

Implementation of the Project would result in the construction of ten (10) new light standards at the Correia Middle School Sports Complex. These light standards would represent a new source of substantial outdoor lighting in the community. However, the Project site and the immediate vicinity are characterized as an area of medium ambient brightness. As discussed throughout this report, the proposed lighting elements have been designed to preclude significant impacts associated with sky glow and glare. In addition, illumination levels at nearby sensitive receptors (i.e., existing residential homes located southeast of the football field) would be below 0.8 foot-candles (both horizontal and vertical) during pre-curfew hours, and the proposed lighting elements would not be used during post-curfew hours. As such, implementation of the upgraded athletic facilities on the Correia Middle School campus would not result in any significant lighting impacts, and no mitigation would be required.

8.0 References

Electric Power Research Institute. *Light Trespass Research (TR-114914)*. April 2000.

Illuminating Engineering Society of North America. *Lighting for Exterior Environments (RP-33-99)*. 1997.

Institution of Lighting Engineers. *Guidance Notes for the Reduction of Obtrusive Light*. 2005.

Musco Lighting. *Correia Middle School Multi-Use Fields Illumination Summary*. June 13, 2014.

Musco Lighting. *Light Structure Green*. Available at:
<http://www.musco.com/outdoor/lightstructuregreen.html> (accessed July 6, 2014).

National Lighting Product Information Program. *Lighting Answers: Light Pollution*. March 2003 (updated February 2007). available at
<http://www.lrc.rpi.edu/nlpip/publicationDetails.asp?id=884&type=2>