

ATTACHMENT 12

NIGHTTIME LIGHTING PLAN

Nighttime Lighting Plan

POINT MOLATE MIXED-USE DEVELOPMENT PROJECT CONTRA COSTA COUNTY, CALIFORNIA

Prepared For:

Marc Magstadt
Winehaven Legacy LLC
2392 Morse Avenue
Irvine, California 92614



Prepared By:

WRA, Inc.
2169-G East Francisco Boulevard
San Rafael, California 94901

Contact: Hope Kingma
Hope.kingma@wra-ca.com

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WRA Project: 29082



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1.0 INTRODUCTION

This report describes measures that can be integrated into the design specifications for the Point Molate Mixed-Use Development Project in Contra Costa County, California, to address the “nighttime lighting plan” requirements outlined in the SEIR for the project.

Mitigation Measure 4.3-6 Nighttime Lighting Plan: *The plan shall describe measures to avoid and/or minimize impacts to shorebirds and migratory birds as well as sensitive eelgrass habitat from nighttime lighting. The nighttime lighting plan shall consider Dark Sky Initiative measures in reducing the impacts of nighttime lighting. All lighting shall comply with the Richmond Municipal Code Article 15.04.604 as applicable.*

2.0 BACKGROUND

Modern society requires outdoor lighting for a variety of needs, including safety, and as such the complete or even partial removal of lighting devices may be neither practical nor desirable for reasons of comfort and safety. However, nocturnal animals can be harmed by light pollution because they are biologically evolved to be dependent on an environment with a certain number of hours of uninterrupted daytime and nighttime. The over-illumination of the night sky is affecting these organisms (especially birds) (Gaston et al. (2012).

The phenomenon of birds being attracted to and disoriented by artificial lighting is well-documented, most particularly for powerful light sources such as lighthouses, lightships and floodlit buildings and structures. This phenomenon is especially pronounced for nocturnally-migrating birds during foggy conditions and/or when the cloud ceiling is low. Ogden (1996) suggested that structures located at critical points along migratory routes may present a greater hazard than those located elsewhere.

Rich and Longcore (2006) suggest that artificial alterations to the diurnal/nocturnal schedule can impact bird physiology and behavior, including singing, reproductive cycles, migration timing, and activity length. Most birds are diurnal, and increased night lighting can increase visibility for predators, increasing predation risk. Conversely, night lighting may increase available forage time, providing a benefit to these birds. A study by Dominoni et al. (2013a) found that songbirds began singing and foraging earlier in the day after being exposed to artificial lighting during a typical “night time.” This change in habits may have broader implications on food-web dynamics as these birds may also be attracting urban predators that have acclimated to altered light regimes. A second study by Dominoni et al. (2013b) found that changes in lighting regimes also had a greater effect on the reproductive cycles of birds in rural environments than those in urban ones, indicating that birds not acclimated to night lights may experience greater impacts and that birds can acclimate to night lights.

The dark-sky movement is a campaign to reduce light pollution. Dark-sky lighting is a concept very important to the dark-sky movement, as it greatly minimizes light pollution. The advantages of reducing light pollution include an increased number of stars visible at night, reducing the effects of electric lighting on the environment, improving the well-being, health and safety of both people and wildlife, and reducing energy use.

3.0 NIGHTTIME LIGHTING PLAN

This Nighttime Lighting Plan identifies several options that would mitigate adverse ecological effects of light pollution and meet the requirements of MM 4.3-6, Nighttime Lighting Plan. The purpose of Richmond Municipal Code (RMC) Article 15.04.604 is “to control outdoor lighting in order to maintain adequate visibility and safety, conserve energy, and protect against direct glare and excessive lighting.”

3.1 Reduction

The advantages of reducing light pollution include reducing the effects of lighting on the environment and reducing energy use. Gaston et al. (2012) states that changing the duration of night-time lighting, such as switching off or dimming lighting, will reduce the ecological consequences of night-time lighting.

The following measures are required:

- All exterior night-time building and path lighting must be motion-sensing.
- Lights must automatically turn-off when daylight provides sufficient illumination for vision and safety, via use of time clocks or photo-sensor systems.
- All outdoor lights, other than those required for safety or security, must be off from the hours of 11 p.m. to 7 a.m.
- Lighting required for safety and security shall be of the minimum duration, intensity, and reach to serve the purpose of illumination.

3.2 Types of Lights

A wide variety of lighting devices contribute to nighttime light pollution. Full-cutoff fixtures that cast little or no light upward should be used to minimize glare and reduce light pollution.

The following measures are required:

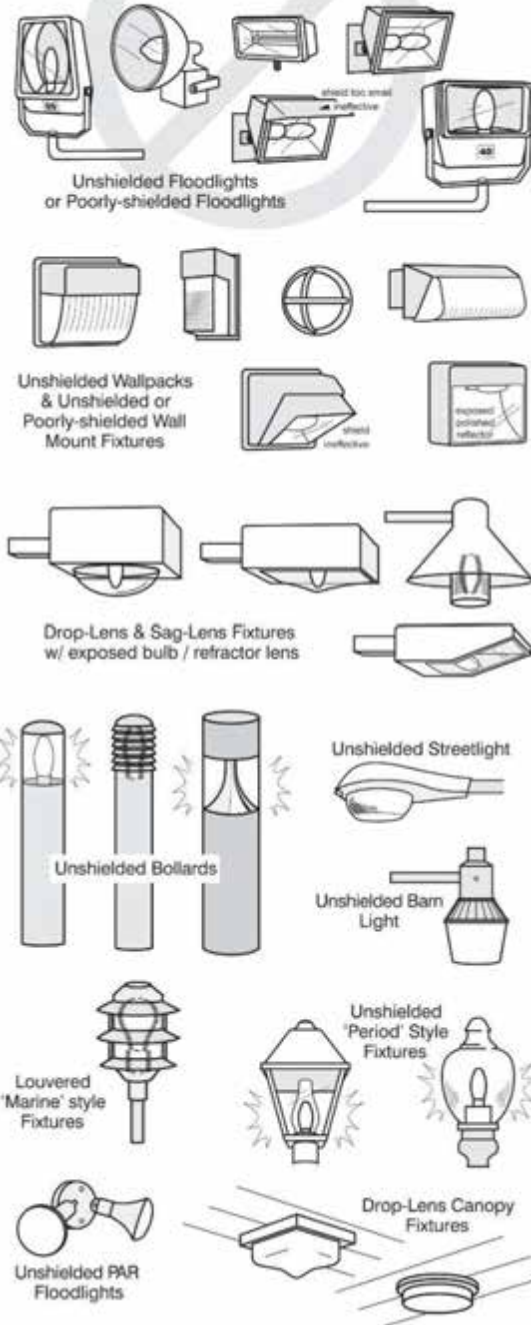
- Outdoor lighting known to attract shorebirds and migratory birds (e.g., searchlight advertising lighting, up-lighting on signs, spotlights, floodlights, etc.) is prohibited.
- Up-lighting is prohibited. Lights must be shielded on the top and sides so light does not go up to the sky.
- All outdoor lighting fixtures shall have shielding, as required by RMC 15.04.604.
- All lighting fixtures must reduce spill over (i.e., light that spills beyond the intended areas to be lit, but that is not projected directly upward) through the use of light cut-off design, such as lighting fixtures that project all of the light in a downward direction.
- Nighttime security lights must be full cut off lights. Illumination should be kept as low as possible while still providing the required security and safety illumination.
- Outdoor lighting known to attract shorebirds and migratory birds (e.g., searchlight advertising lighting, up-lighting on signs, spotlights, floodlights, etc.) is prohibited.
- Use of motion detectors and minimum wattage needed on exterior building lights to minimize excess lighting.

The illustration below from Gaston et al. (2012) provides an easy visual guide to understand the differences between unacceptable, unshielded light fixtures and those fully shielded fixtures that minimize skyglow, glare and light trespass. The project's light fixtures must have the characteristics shown in the "acceptable" category.

Examples of Acceptable / Unacceptable Lighting Fixtures

Unacceptable / Discouraged

Fixtures that produce glare and light trespass



Acceptable

Fixtures that shield the light source to minimize glare and light trespass and to facilitate better vision at night



Illustrations by Bob Crelin © 2005. Rendered for the Town of Southampton, NY. Used with permission.

3.3 Spectrum

Rich and Longcore (2006) suggest that wavelength and light intensity are the most important variables, and that less intense lights are far less likely to attract and/or disorient birds. Hollan (2009) recommends suppressing the blue component (avoiding ultraviolet or ideally the whole short-wave half of the light spectrum) to reduce the harmful impact of artificial lighting to wildlife. Gaston et al. (2012) states that changing the prevailing lighting types can thus influence the spectral composition of night-time light pollution and hence its ecological consequences; the spectral quality of light can be further altered by the use of filters incorporated into lighting design.

Most people are familiar with incandescent or compact fluorescent bulbs for indoor lighting, but outdoor lighting usually makes use of different, more industrial, sources of light. Common light sources include low-pressure sodium (“LPS”), high-pressure sodium (“HPS”), metal halide and light emitting diodes (“LEDs”). Patterson (2012) states that LED light sources are generally regarded by wildlife biologists as less likely to attract birds than more traditional lighting mechanisms (e.g., incandescent lighting).

Lighting with lower color temperatures has less blue in its spectrum and is referred to as being “warm.” Higher color temperature sources of light are rich in blue light. In some areas, the white light of even a low-color-temperature LED can be a threat to the local nighttime environment.

The following measures are required to reduce nighttime light impacts:

- Outdoor lights must be narrow-spectrum LEDs.
- All exterior building lighting fixtures must emit “warm” light spectrum.
- Street lighting and pole-mounted parking lot lighting must emit broad-spectrum lighting.
- Lighting required for safety and security, such as pathway illumination and parking lot lighting, should be the minimum intensity necessary to serve the purpose of illumination, and no higher than 25 lux.

3.4 Light Trespass

Gaston et al. (2012) states that reducing light trespass may not only reduce the ecological impacts of artificial light, but also has economic cost-saving benefits. Reducing light trespass and upward or horizontally directed lighting, can reduce impacts to adjacent habitats. Gaston et al. (2012) found that horizontal and near-horizontal light emittance increases the visibility of light sources from a distance, increasing the potential for disruption of animal navigation, and the encroachment of light into adjacent unlit areas. Gaston et al. (2012) suggested the construction of walls and other structures and planting of vegetation to shield sensitive areas against light for reduction of light trespass into sensitive habitats, providing dark refuges that mobile animals can exploit.

The following measures must be implemented:

- All outdoor lighting shall be designed to prevent glare, light trespass and light pollution, as required by RMC 15.04.604.
- Lighting should be deliberately directed downward and away from beach strand and Bay waters.

- Lighting required for safety and security, such as pathway illumination and parking lot lighting, should be designed to reduce light spillage by using cut-off mechanisms.
- Decorative exterior lighting, including exterior buildings lights and landscape lighting, within 300 feet of a riparian corridor or sensitive habitats, such as beach strand, marshes and Bay water, must be shielded to prevent light intrusion into natural open space areas.

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