New Mexico Night Sky Protection Act

In 1999, New Mexico enacted the Night Sky Protection Act [74-12-1 to 74-12-10 NMSA 1978]; *its purpose is to regulate outdoor night lighting fixtures to preserve and enhance the state's dark sky while promoting safety, conserving energy and preserving the environment for astronomy*. One of the first of its kind in the U.S., the Night Sky Protection Act makes dark skies a priority in New Mexico for the health of its people, wildlife, and economy.

The act requires that outdoor lighting be fitted with shielding that directs light downward, rather than upward or laterally. The act allows present lighting to remain throughout its useful life, but requires the installation of conforming lights whenever replacement would normally occur, so that any economic burden is limited or avoided altogether. The law also allows local communities to enact more stringent local ordinances. The New Mexico Night Sky Protection Act takes important steps to stop continued increase in light pollution while the bright stars are still among the things that make New Mexico the "Land of Enchantment."

The Monument's Lighting Management Plan

Introduction

A natural lightscape is one that is free of light pollution. Spilled light or wasted light are phrases that describe the misuse of outdoor lighting, especially in a natural or protected environment such as a national park. The term light pollution has commonly been used to emphasize the concept that anthropogenic light in the naturally dark environment is indeed a pollutant with undesirable ecological consequences, not just a nuisance. There are many good reasons to eliminate light pollution in national parks, including:

- The preservation of natural lightscapes (the intensity and distribution of light on the landscape at night) will maintain the nocturnal scotopic (vision under low light conditions) environment within the range of natural variability. Excursions outside this natural range may result in a modification to natural ecosystem function, especially to systems involving the behavior and survival of nocturnal animals. The natural night sky is therefore one of the physical resources under which natural ecosystems have evolved.
- The scenery of national park areas does not just include the daytime hours. A natural starry sky absent of anthropogenic light is a key scenic resource, especially in parts of the Southwest.
- The history and culture of many civilizations are steeped in interpretations of night sky observations, whether for scientific, religious, or time-keeping purposes. As such, the natural night sky is an important cultural resource, especially in areas where evidence of aboriginal cultures is present.

The remote location of Salinas Pueblo Missions National Monument within the high desert of central New Mexico allows for pristine night skies that are relatively free of light pollution. The Monument believes that preserving the natural night sky is an integral part of the resource protection performed at this park unit, and is committed to the ongoing conservation of this important cultural, natural, and scientific resource. Through responsible lighting management and night sky interpretation and public education, the Monument will continue to preserve natural night skies for this and future generations.

Purpose and Goal

The purpose of this Lighting Management Plan (LMP) is to provide guiding principles, lighting guidelines, and standards and best practices for the use of artificial outdoor lighting in the Monument in order to preserve the fundamental resources and visitor experience of this special place. The LMP was developed to conform to the goals and requirements of NPS Management Policy 4.10— Natural Lightscapes. This LMP is the official outdoor lighting policy of the Monument. It has been codified as a park Standard Operating Procedure (SOP) and was approved by the park Superintendent on August 31, 2016.

The goal of this LMP is to provide for the safety of NPS staff and the security of NPS facilities without any significant impact on the night skies of the Monument.

Guiding Principles

The following principles will be followed:

- Providing light for visitor and staff safety in commonly used developed areas, as well as for building security purposes, will be achieved while protecting the natural environment from light pollution. Decisions on lighting necessary for employee and visitor safety must be made by considering factors such as the expectation of permanent artificial lighting, existing safety hazards (such as tripping, falling, criminal activity, and wildlife), type of tasks performed, frequency of those tasks or use level, and available alternatives.
- Energy efficiency should be a goal for all outdoor lighting, as it lessens the Monument's carbon footprint. An important distinction here, however, is that – especially with new LED technology - an energy efficient light is not necessarily a night-friendly light.
- Long term sustainability in the operation and maintenance of outdoor lighting solutions should be maximized. The total lifecycle cost should be weighed in a sustainability assessment. In many cases, the lower wattage requirements of a lighting installation designed to preserve night skies makes that installation more economical than the traditional alternatives over the life of the products.
- Outdoor lighting will be sensitive to the impact upon wildlife. The addition of artificial light into a park setting will alter nocturnal habitat, and the impact may reach beyond the bounds of the developed area. Parameters of direct light intensity, scattered light intensity, light color, light timing and duration are all important considerations for wildlife.
- External threats to the natural lightscape within the parks will be addressed, primarily by setting a leadership example for surrounding communities. NPS management policies put a positive responsibility upon superintendents to partner, to the extent possible, with these communities to protect the natural environment of parks. Part of this effort is to provide examples of outdoor lighting Best Practices for the public. This requires that outdoor lighting in parks be held to a high standard, that the existing lights incorporate these principles, and that park facility lighting is interpreted to visitors and the surrounding community.

Lighting Guidelines

The guiding principles can be distilled into four main lighting guidelines:

1. Artificial light should exist only where deemed necessary.

2. Artificial light should exist at a minimum practical level.
3. The area of illumination should be restrained to the area judged necessary.
4. Duration of illumination should be similarly restrained to a practical and required area.

Lighting Standards and Best Practices

All exterior lighting in the Monument shall be designed to eliminate light trespass, minimize glare, and use an intensity, color, and duration that will preserve the natural darkness as much as possible.

NPS Management Policies direct parks to use artificial light on an "only as needed" basis and to minimize impact whenever possible. Merely shielding a light does not necessarily constitute lightscape, wildlife, or night-sky friendliness; especially if that light is unnecessary in the first place. Even when a light is necessary, the incorporation of a timer, motion sensor, or switch can greatly reduce its impact. The mitigation of outdoor lighting impacts upon the environment is best accomplished by addressing six parameters of lighting.

1) Warranting- Light only WHERE you need it

a. Lighting installations should be placed only where uses dictate.

2) Controls- Light only WHEN you need it

a. Rather than defaulting to a dusk-till-dawn operational cycle, lighting controls should be designed to minimize the amount of time the light is on while still fulfilling the need met by installing the light at that spot in the first place.

3) Shielding- Direct light DOWNWARD

a. No fixture should emit light above the horizontal. In most cases, beams of light should be restricted even further. Lights should be directed downward and shielded.

4) Spectrum- Select LAMPS that minimize negative impacts

a. Humans and many other animals are most sensitive to blue/white light. Most evening lighting goals can be achieved using warmer temperature lighting, which decreases the disruption to wildlife (including insects), maintains the human ability to adapt to low light conditions, and decreases sky glow. Amber or yellow light sources are preferable, both to limit attraction by insects and to reduce sky glow. Light sources should be chosen for energy efficiency, long life and low maintenance.

b. The color tint (correlated color temperature, or CCT) of white light is measured in Kelvins (K), a scale in which warm-toned white light has smaller values (1800-3000K) and cold-toned light has larger values (5000K and higher). Between 3000 and 5000K, light is said to be "neutral" in tone. The common incandescent lamp is 2700K. Lights should be selected with warm colors, such as amber (not to exceed 3000K). Any fixtures that exceed 3000K must be limited in duration of operation and utilize motion sensors to activate the light only when needed.

5) Intensity- Use the minimum AMOUNT of light necessary

a. Lights should only exist in the minimum amount necessary. Any fixtures used in continuous overnight operation that exceed 500 lumens should be fully shielded.

6) Efficiency- Select the most energy EFFICACIOUS lamp and fixture

a. Energy efficiency should be considered when choosing lighting. Standard bulbs should be compact fluorescent (CFL), which are low-wattage, or light-emitting diodes (LED).

7) Monitoring- Make sure lights are WORKING PROPERLY

a. Evaluate and monitor lighting performance to ensure that fixtures are calibrated and working properly. Utilize the Monument's maintenance work order system to annually inspect and adjust lighting as needed.

Fortunately, due to the small scale of facilities in the three units, both extant and planned, the LMP for Salinas Pueblo Missions is generally simple. In its simplest form, the main components are:

- Lighting used to secure the Monument property should be restricted to motion sensor lights wherever possible; and these lights should be fully-shielded and use low wattage, warm-colored bulbs.
- Any light that does not have a motion sensor should be on a timer or day-time light sensor so that they operate not to exceed dusk to dawn nighttime hours; the wattage should be as minimal as practical and warm-colored bulbs should be used.
- Any light used for safety purposes (including at the employee housing area) should adhere to the standards and best practices presented on the previous page.

All future outdoor lighting will conform to these standards.