ANSI/IES LP-11-20

Illuminating
ENGINEERING SOCIETY

LIGHTING PRACTICE:
ENVIRONMENTAL CONSIDERATIONS FOR OUTDOOR LIGHTING

AN AMERICAN NATIONAL STANDARD

Approved American National Standard
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Publication of this Recommended Practice has been approved by IES.
Suggestions for revisions should be directed to IES.

Prepared by
The IES Outdoor Environmental Lighting Committee

Approved by the IES Standards Committee February 13, 2020 as a Transaction of the Illuminating Engineering Society.

Approved April 21, 2020 as an American National Standard.

Published by the Illuminating Engineering Society, 120 Wall Street, New York, New York 10005

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Printed in the United States of America.

ISBN# 978-0-87995-354-6

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CONTENTS

1.0 Introduction and Scope

1.1 Introduction

The introduction of exterior lighting will often have a profound effect on the natural world. It may change complex ecosystems in ways that are not immediately obvious or easily discernable. For this reason, the first question should always be, is lighting necessary? This should be followed by, what is the specific task to be lighted, how much luminance is required, and for what duration? When designing exterior lighting the environmental effects should always be considered. Lighting is also a sustainability issue, since the energy consumed often comes from power generation that produces its own environmental impacts. While exterior lighting may be necessary for mobility, the feeling of safety, and commerce, used indiscriminately, the light pollution produced by it reduces the enjoyment of the natural nighttime sky, and may create biodiversity issues (see *ANSI/IES LP-10-20, Lighting Practice: Sustainable Lighting – An Introduction to the Environmental Impacts of Lighting*[1]).

These concerns include:

- The addition of electric lighting into the nocturnal environment may generate serious negative ecological consequences to a wide range of species.
- Exterior lighting at night may contribute to human health issues like sleep disruption,[2] obesity,[3] diabetes,[4,5] cancer,[6,7] and depression.[8]
- Blue-rich white light, because of greater atmospheric scattering, disproportionately increases sky glow, but all exterior lighting can increase night sky brightness.
- Light pollution can have severe negative effects on astronomical research.

1.2 Scope

This Lighting Practice (LP) document outlines the environmental considerations of exterior lighting, especially as related to glare, sky glow, light trespass and the impact of electric light at night on flora and fauna. In addition, this LP provides information on how to assign lighting zones, and how to use the *Joint IDA-IES Model Lighting Ordinance (MLO) with User's Guide*, as a basis for an exterior lighting ordinance.[9] Finally, this LP discusses community-based design and makes specific recommendations for lighting outdoor areas.

A number of IES Recommended Practice documents (RPs) provide design guidelines for specific exterior lighting applications. This LP is not intended to supersede those documents. Where conflicting uses and desires for the nighttime environment arise, the parties involved should work together to resolve the issues by reviewing all of the relevant criteria to reach a consensus about which criteria will guide the final resolution.

2.0 Environmental and Health Considerations

Humans have been using nighttime lighting since the dawn of history. However, since the industrial revolution the amount and distribution of this additional light has increased dramatically. Satellite images of the night sky from the U.S. National Oceanic and Atmospheric Administration's National Geophysical Data Center show vividly how heavily illuminated the planet is (see **Figure 2-1**).

Figure 2-1. The United States at night from space. (Image courtesy of NASA/NOAA)

Light pollution is of special concern to astronomical observatories, and the negative effects of exterior lighting on astronomical observations are well documented and can effect research at great distances