

Staff Report



To	Committee of the Whole
Service Area	Public Services
Date	Wednesday, July 3, 2024
Subject	Light Pollution By-law Review

Recommendation

1. That Council direct staff to create a by-law or an amendment to the existing property standards by-law (2000)-16456 prohibiting light generated from fixtures from trespassing from one private property to another private property.
 2. That Council direct staff to create lighting guidelines that encourage the use of full cut off light fixtures. These guidelines will allow the residents to adjust their outdoor lighting to eliminate light pollution.
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Executive Summary

Purpose of Report

At Council's request, staff had been directed to conduct a by-law review of light pollution. This report seeks to satisfy that request and proposes recommendations to Council.

Key Findings

Current by-laws do not protect Guelph's residents from the ever-growing effects of light pollution. As Guelph continues to grow, the negative effects of light pollution caused by over lighting and improperly placed light fixtures will continue to grow. Current residents can become frustrated if neighbouring light sources trespass on their property and negatively affect their standard of living.

Strategic Plan Alignment

As the City of Guelph strives to meet the provincial housing targets, it is important to safeguard current residents' rights to access the night sky and protect residents from light pollution. A light pollution by-law would align with Guelph's strategic goal of supporting community well-being by protecting Guelph residents from the negative effects of light pollution.

Future Guelph Theme

People and Economy

Future Guelph Objectives

People and Economy: Support community well-being

Financial Implications

This review was conducted within the existing operation department budget. If the recommendations are passed by Council, work will be completed by existing resources; therefore, there will be no additional operational costs.

Report

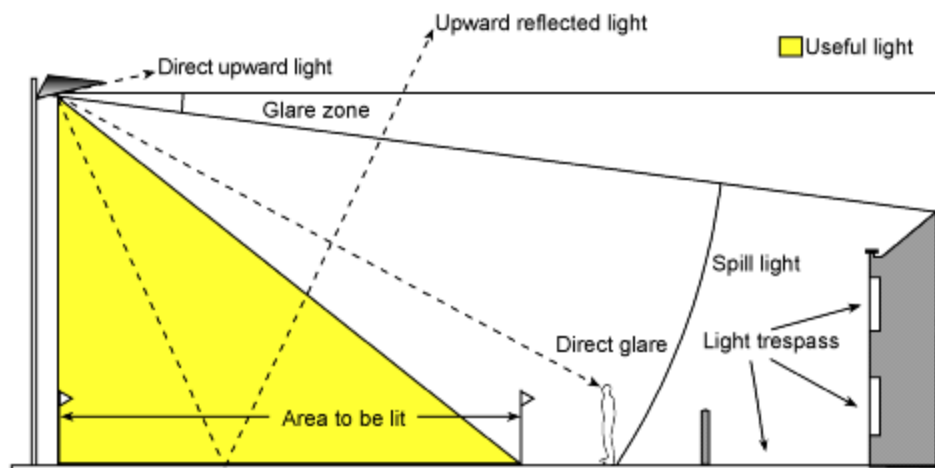
Background

The UN Environment Program – Law & Environment Assistance Program (LEAP) Defines light pollution as follows:

“Light pollution refers to artificial light that alters the natural patterns of light and dark in ecosystems. It comprises direct glare, chronically increased illumination, and temporary, unexpected fluctuations in lighting. The sources of ecological light pollution include sky glow, illuminated buildings, streetlights, security lights, and lights on vehicles.... Harmful effects involve the animal kingdom, the vegetable kingdom and humankind. While light pollution is eminently detrimental to nocturnal and migratory animals and animals in flight, it also harms plants.”

If applied correctly, outdoor lighting has a significant role in the community. It illuminates roads and crosswalks to keep cars and pedestrians safe. It allows residents to see and access businesses at night. It illuminates sporting and artistic performances at night.

The overuse of lighting can negatively affect the community. The different components of light pollution can be seen in [Figure 1](#) below. Glare from bright lights creates shadows where criminals can hide. Some crimes, like vandalism and graffiti, thrive on illumination. Glare can also be dangerous to pedestrians and drivers. It shines into our eyes, constricting our pupils and diminishing our ability to adapt to low-light conditions.



Light pollution is often caused by the way light is emitted from lighting equipment. Choosing proper equipment and carefully mounting and aiming it can make a significant difference.

Figure 1: Example of useful light and light pollution from a typical pole-mounted outdoor luminaire. ([Adapted from the Institution of Lighting Engineers](#))

Research suggests that artificial light at night can negatively affect human health. Artificial light can also affect the natural world around us. It can dispute the nocturnal and migratory patterns of birds, fish, livestock, and insects.

The advent of low-cost LED lighting has made it possible to illuminate roads, parking lots, and other areas that might have never been lit. LED lights have significant energy savings compared to the previously used sodium-vapor lamps and are brighter. With these advancements, light pollution is becoming a more substantial concern worldwide. Scientists estimated that carbon dioxide, the primary contributor to climate change, is growing at 2two per cent per year globally – doubling every 30 years. By comparison, light pollution is increasing by 9.6 per cent annually – doubling in less than eight years.

Using satellite data provides a holistic view of Guelph and the surrounding area, as seen in Figure 2~~Figure-2~~, below, which shows Guelph, the tri-cities, and part of the GTA. Most of Guelph is grey; the entire sky is grayish or brighter. Familiar constellations are missing stars, fainter constellations are absent, and less than 20 stars are visible over 30 degrees elevation in brighter areas.

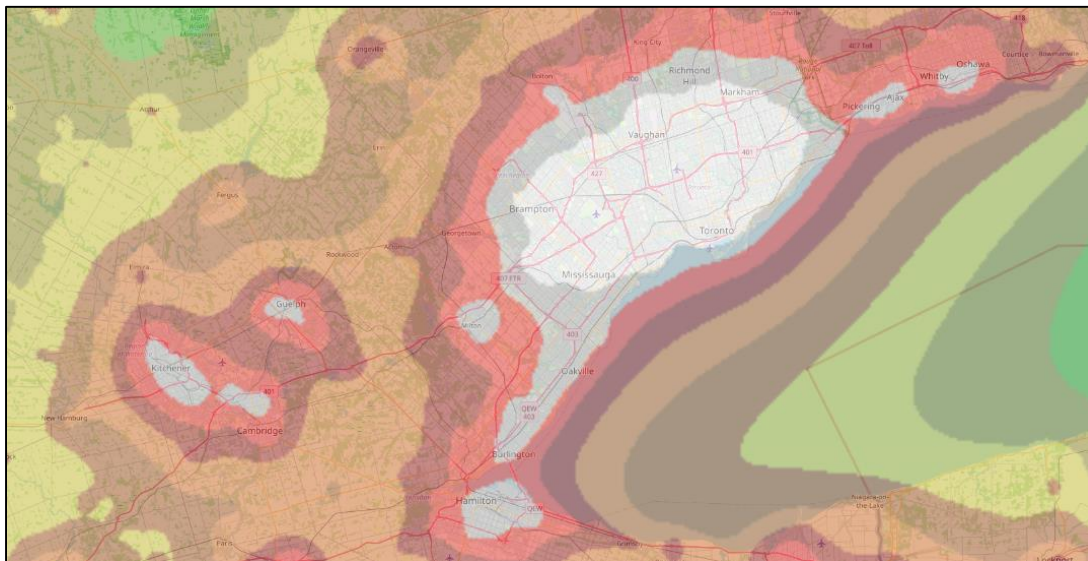


Figure 2: Light Pollution of Guelph and the surrounding area. - <https://www.cleardarksky.com/>

For a more detailed view of where light pollution is the strongest in Guelph, we can use Figure 3, below, in which one can see where the highest light pollution is produced. The major light pollution hot spots in Guelph are the commercial plaza at Clair Road and Gordon Street, the Hanlon Industrial Park, along Stone Road West from Stone Road Mall to the University of Guelph, Downtown Guelph, the west end industrial sector, and auto dealers on Woodlawn Road. Large, brightly lit parking lots are the common factor that ties all these areas together.

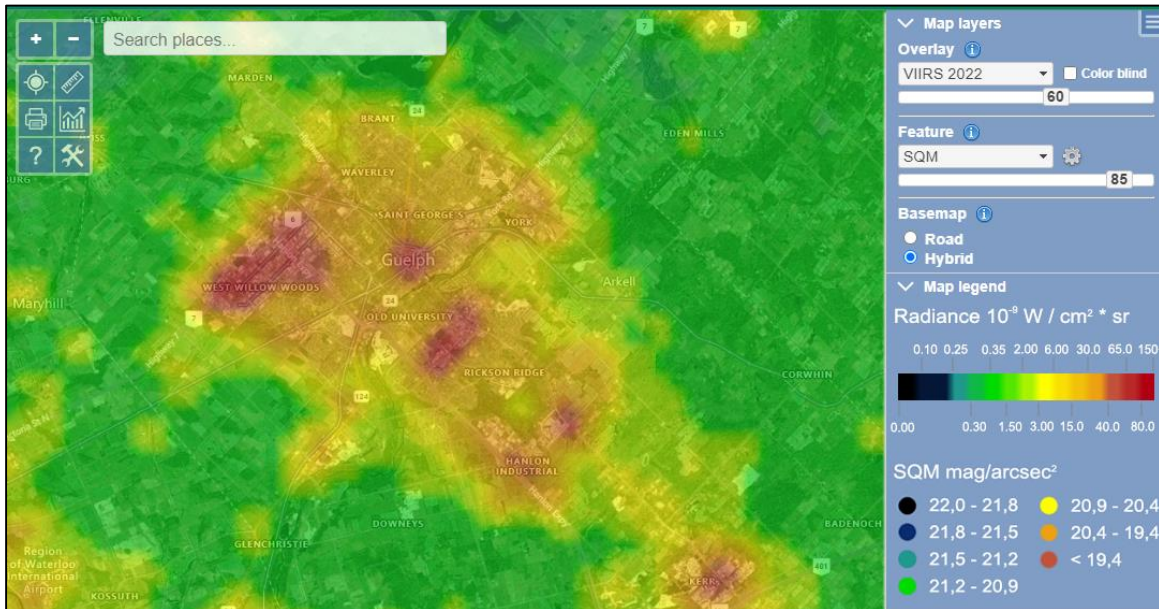


Figure 3: Light Pollution of Guelph <https://www.lightpollutionmap.info/>

Like all cities, Guelph is facing the effects of light pollution, and the residents of Guelph are losing access to the night sky.

The City of Guelph currently does not have a by-law that addresses the wider problem of light pollution. The City's Zoning ~~B~~by-law does have a provision that regulates light trespass into a window only.

- Zoning By-law (1995)-14864 4.8.3: Outdoor lights and lighting shall not be erected in such a way as to shine directly into any window of any other property.
- Zoning By-law (2023) 4.8.(c): Outdoor lights and lighting shall not be erected in such a way as to shine into any window of any other property.

This regulation is very limited and does not deal with light trespass onto any other aspect of the property. It should be noted the Planning and Building Services Department has dark sky design standards for new build developments.

- Lighting Guidelines: <https://guelph.ca/wp-content/uploads/Guelph-Outdoor-Lighting-Guidelines.pdf>
- Commercial Built Form Standards: <https://guelph.ca/city-hall/planning-and-development/community-plans-studies/urban-design/commercial-built-form-standards/>
- Downtown Streetscape Manual and Built Form Standards – Performance Standard #20: https://guelph.ca/wp-content/uploads/Streetscape_Section_3.pdf

Effects of Lighting on Crime and Safety

A [2015 study published in the Journal of Epidemiology and Community Health](#) found that streetlights don't prevent accidents or crime. The researchers looked at data on road traffic collisions and crime in 62 local authorities in England and Wales and found that lighting had no effect, whether authorities had turned them off

completely, dimmed them, turned them off at certain hours, or substituted low-power LED lamps. According to the study, “[W]hen risks are carefully considered, local authorities can safely reduce street lighting, saving both costs and energy ... without necessarily impacting negatively upon road traffic collisions and crime.”

A [1997 National Institute of Justice study](#) concluded, “We can have very little confidence that improved lighting prevents crime.”

Furthermore, lighting can assist criminal activity by displaying the victim and the target property. And the perception of safety provided by the light may have the opposite effect by encouraging unsafe behavior.

Effects on Humans

Humans evolved to the rhythms of the natural light-dark cycle of day and night. The spread of artificial lighting means most of us no longer experience dark nights. Research suggests that artificial light at night can negatively affect human health, increasing risks for obesity, depression, sleep disorders, diabetes, breast cancer and more.

Like most life on earth, humans adhere to a circadian rhythm, our biological clock, a sleep-wake pattern governed by the day-night cycle. Artificial light at night can disrupt that cycle. Our bodies produce the hormone melatonin in response to circadian rhythm. Melatonin helps keep us healthy. Nighttime exposure to artificial light suppresses melatonin production.

Effects of Lighting on Nature

Studies show that light pollution impacts animal behaviors such as migration patterns, wake-sleep habits, and habitat formation. Because of light pollution, sea turtles and birds guided by moonlight during migration get confused, lose their way, and often die. Large numbers of insects, a primary food source for birds and other animals, are drawn to artificial lights and are instantly killed upon contact with light sources.

Public Engagement

As part of the direction from Council, Sage Solutions conducted community engagement on behalf of the City. The engagement consisted of an in-person event at City Hall on November 9, 2023, and an online event on November 14, 2023. It was followed by an online survey between January 16 and February 25, 2024. The survey was completed by 704 people. Sage Solutions compiled the results in Attachment-1 Sage Solutions Survey Summary; Attachment-2 Sage Solutions Engagement Summary Report; Attachment-3 Sage Solutions Meetings, November 9 and 14, 2023; and Attachment-4 City of Guelph Engagement Summary.

The engagement results show that Guelph residents support regulating outdoor lighting, but are concerned with potential safety risks. Staff have ensured residents can still feel safe when drafting lighting regulations or guidelines for their property.

Recommendations.

Due to the growing problem of light pollution from new lighting and housing developments, staff recommend creating a regulation to limit light trespass and to create guidelines that the public can use to reduce light pollution. Given that most consumer-grade outdoor light fixtures purchased today have an average life span of four to six years, staff recommend a phased approach.

The first phase is to create a stand-alone by-law or an amendment to the Property Standards By-law (2000)-16454 that focuses on light trespassing. The decision to create a stand-alone by-law or amending the Property Standards By-law will be determined by Legal staff during the development of the regulation. The intent of the regulation is to ensure light created in a property stays within the property. This will not apply to street lighting or other lighting implemented by the City for safety reasons.

In addition, staff will develop light fixture guidelines and encourage the use of full cut off light fixtures. This will provide residents with information on how they can reduce light pollution when installing or replacing outdoor light fixtures. After five years of public education, staff will review the progress on light pollution and if warranted, will report back to Council with possible recommendations to further implement restrictions that will eliminate direct upward light.

Consultations and Engagement

As indicated in this report, staff held fulsome public engagement sessions both online and in person. The original engagement result along with the staff summary are attached to this report.

In addition to public engagement, staff reached out to a number of City divisions and external agencies including Corporate and Community Safety, Facilities, Engineering, and Guelph Police Services.

Financial Implications

This review was conducted within the existing operation department budget. If the recommendations are passed by Council, work will be completed by existing resources; therefore, there will be no additional operational costs.

Attachments

Attachment-1 Sage Solutions Survey Summary

Attachment-2 Sage Solutions Engagement Summary Report

Attachment-3 Sage Solutions Meetings, November 9 and 14, 2023

Attachment-4 City of Guelph Engagement Summary

Departmental Approval

None

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