



Cerulean Warbler  
Status: *Threatened*  
(Ontario Species at Risk, 2023)  
(TGreybirds, 2015)

# Bird-Safe Design: Planner's Toolkit

# Attributions



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Faculty of Community Services

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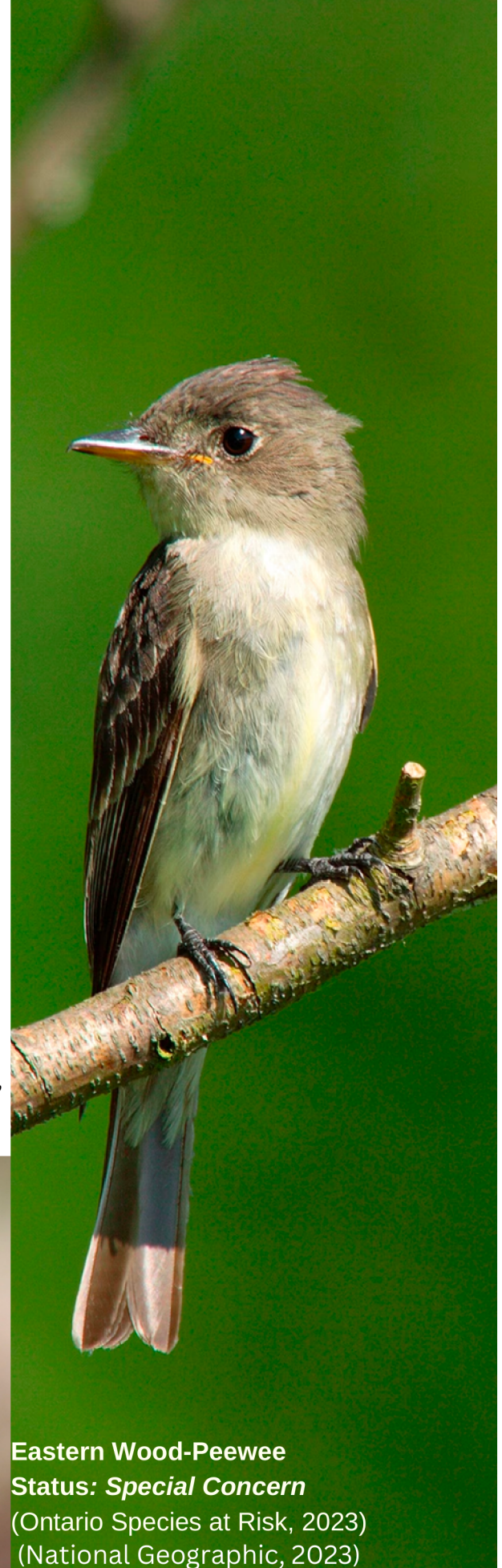


**Canada Warbler**

**Status: *Special Concern***

(Ontario Species at Risk, 2023)

(Birds Canada, 2022)



**Eastern Wood-Pee wee**

**Status: *Special Concern***

(Ontario Species at Risk, 2023)

(National Geographic, 2023)





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**Piping Plover**

**Status: *Endangered***

(Ontario Species at Risk, 2023)  
(Greg Gard, 2022)



**Lesser Yellowlegs**

**Status: *Threatened***

(Ontario Species at Risk, 2023)  
(Greg Gard, 2021)

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**Piping Plover**  
**Status: *Endangered***  
(Ontario Species at Risk, 2023)  
(Conserve Wildlife, 2018)



**Rusty Blackbird**  
**Status: *Special Concern***  
(Ontario Species at Risk, 2023)  
(Seabrook Leckie, 2010)



## Section 1

# General Overview



**Piping Plover**

**Status: *Endangered***

(Ontario Species at Risk, 2023)

(Greg Gard, 2021)



# Purpose

## Context

Why is this a planning problem?

The toolkit is intended to inform planners of the best practices in bird safe design to mitigate the loss of birds due to window collisions. As windows make up a significant part of the urban design landscape, planners need to implement best design practices to protect birds and reduce biodiversity loss.

## Due Diligence

Empower planners to identify relevant legislations pertaining to bird-safe design

Different policies at the federal, provincial and municipal levels are relevant to implementing bird-safe design. For example, the court has found that companies have committed an offence, contrary to the federal *Species at Risk Act* and the provincial *Environmental Protection Act*, by using highly reflective glass that caused death or injury to birds, or by permitting the discharge of light from highly reflective glass, which caused death or injury to birds (s. 32(1) & ss. 14(1) respectively (*Podolsky v. Cadillac Fairview Corp.*, 2013 ONCJ 65)

## Design Implementation

Application of effective bird-safe design

The toolkit will arm planners with effective ways to identify best design practices. It outlines with examples which designs are misleading, or wrong, while identifying acceptable solutions. This is implemented using a questionnaire for planners to know whether the property is subject to the Toronto Green Standard, enforced through Site Plan Control, and what the requirements will be.



**Prothonotary Warbler**

**Status: Endangered**

(Ontario Species at Risk, 2023)

(Dodson Farm, 2020)



## Loss of Biodiversity

Bird population are estimated around 50 billion worldwide accounting for 9,700 species of the estimated 1 to 6 billions species that make up our biodiversity (Callaghan et al., 2021; Larsen et al., 2017). They provide many benefits to the natural environment and to us humans. However, the loss of birds has been increasing, with 3 billion birds that have died since the 1970s (Axelson, 2019), native bird populations have declined by 29% in the last 50 years (Zimmer, 2019). Overall between 381 million and 1 billion birds in North America will die en route following a collision with a building (Nichols et al., 2018). Such loss to biodiversity has been shown to eliminate 40% of native bird species (BirdLife International, 2022). As such, it is important to recognize the loss of birds are inherent to the well-being of our society.

## Root Causes

Birds collide with buildings due to their properties, including reflectivity of glass, transparency of glass, and the presence of interior and exterior lighting. Birds are unable to perceive the presence of glass, where they can get attracted by vegetation or other natural features located inside buildings, hitting the windows while trying to reach these features. The reflective conditions produces a similar effect where birds will attempt to reach the features, hitting and injuring themselves in the process (The Cornell Lab, 2023).

Lighting causes a hazard to birds due to their inherent nature of using natural light as guidance during migratory seasons. Artificial lighting can cause confusion and disorientation in birds, trapping them and inciting additional bird deaths (FLAP Canada, 2022b).



Red-headed Woodpecker

Status: *Endangered*

(Ontario Species at Risk, 2023)

(Ali Hooper, 2023)



**Canada Warbler**  
**Status: *Special Concern***  
(Ontario Species at Risk, 2023)  
(Pinterest, n.d.)

## Benefits of Birds

(Leffer, 2021)



Birds disperse seeds



Bird droppings spread nutrients



Birds consume insects that may become pests



Birds create habitats for other cavity-nesting species



Birds control potential biohazards by eating carrion and rodents



Birds are parts of the foodchain and interact with ecosystems

Bird populations contribute to significant economic activities with benefits to industry and human wellbeing (Şekercioğlu, 2017).

The mental health benefits of birds on human wellbeing is being affected by their loss. As Cox et al. (2017) found a positive relationship between nature (including birds) and mental health, the loss of biodiversity from bird window collisions can cause unwanted negative effects on human's mental health.



# The Problem with Glass

(FLAP Canada, 2022a)



**Vegetation** and **lighting** can contribute to bird-window collisions, through reflections that appear to be an extension of the environment



**Transparent glass** and **reflective surfaces** cause bird-window collisions, as birds are unable to differentiate the surface of the glass from the surrounding environment



Vegetation and lighting, in conjunction with transparent and reflective glass, **creates unacceptable risks to birds**

# Environmental Advocacy



Yellow-breasted Chat  
Status: *Endangered*  
(Ontario Species at Risk, 2023)  
(Tibbetts, 2017)

Planners have an obligation to the profession and the community to value, respect, and balance a variety of interests (Ontario Professional Planners Institute, n.d.). Our position involves planning for both the built and natural environments. Therefore, we have a responsibility to all that inhabit and play a role in our ecosystem. This notion is supported by the current policy and legislative framework that regulates the protection of the environment and wildlife, including native and migratory birds, as well as the planning profession.

## Environmental Legislative Framework

- *Podolsky v. Cadillac Fairview Corp.*, 2013 ONCJ 65
- *Species at Risk Act*, S.C. 2002, 1990, c. 29.
- *Environmental Protection Act*, R.S.O. 1990, c. E. 19.

## Professional Regulatory Bodies

- Canadian Institute of Planners (2023)
- Ontario Professional Planners Institute (2023)





## CSA A460:19 *Bird-friendly building design standard*

In its efforts to help protect the natural environment, the CSA Group published the *A460:19, Bird-friendly building design standard* in 2019, which is a voluntary national standard that applies to “new construction and existing buildings and is intended to reduce bird collisions with buildings” (CSA Group, 2019, at s. 1.1). The standard is updated every five years and therefore, is expected to be updated in 2024 (CSA Group, 2023).

Although voluntary, cities including Winnipeg and Ottawa recognize the significance of the *A460:19 Bird-friendly building design standard*. In 2021, the City of Winnipeg adopted the standards city-wide intending to amend their zoning by-laws to conform accordingly (City of Winnipeg, n.d.; see also Klein, 2021). Further, the City of Ottawa modelled their *Bird Safe Design Guidelines* (2022) to be consistent with the CSA Group standard (at p. 5).

The *A460:19 Bird-friendly building design standard* informs how bird-safe strategies can be implemented with respect to the following (CSA Group, 2019, at s. 3.4 to 3.7):

- Buildings (i.e., specifying the height of bird-friendly strategies in relation to tree canopy and green roofs, outlining glazing and visual markers required on windows, glass, and balconies, and mitigating fly-through areas).
- Building accessories (i.e. guidance when buildings incorporate shades, screens, grilles, mesh, and shutters).
- Lighting (i.e., interior, and exterior); and
- Other elements, including vegetation and bird feeders near buildings.

By referencing the *CSA A460:19 Bird-friendly building design standard* through by-laws, or other applicable legislation, it becomes mandatory, furthering bird-safe building design implementation and enforcement. Municipalities can adopt *CSA A460:19 Bird-friendly building design standard* to contribute to a unified national approach to bird safety.



Piping Plover

Status: *Endangered*

(Ontario Species at Risk, 2023)

(Maryland Biodiversity Project, n.d.)

# Design Considerations

## Best Practices for Bird-Safe Design: Glass Visual Markers

### Frit, Film, Acid-Etched Patterns



Image: University of British Columbia

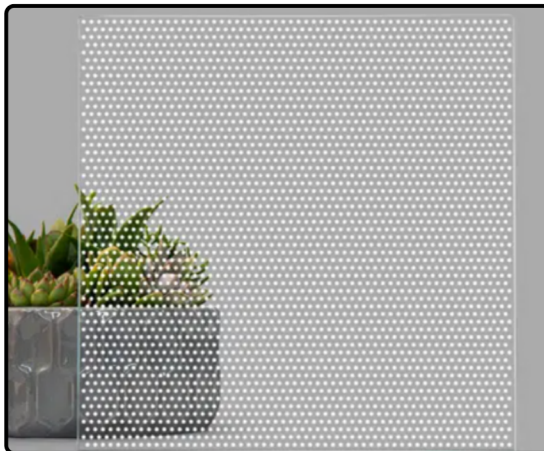


Image: Surface Products Inc.

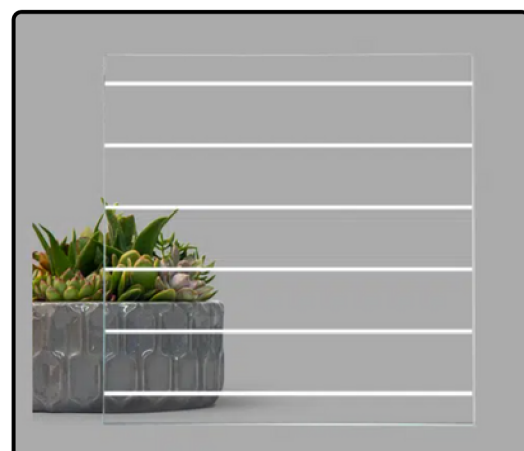


Image: Surface Products Inc.

### Diameter: 4mm, Spacing: 50mm x 50mm

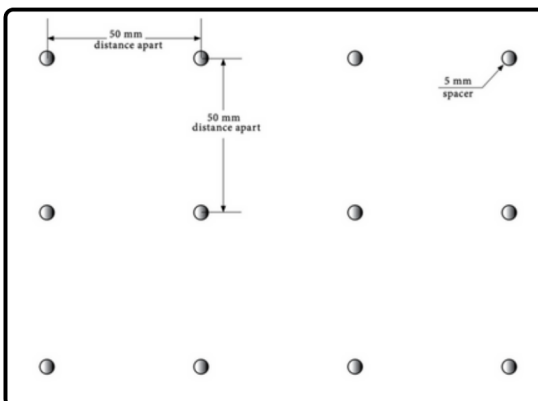


Image: Monika Hoxha

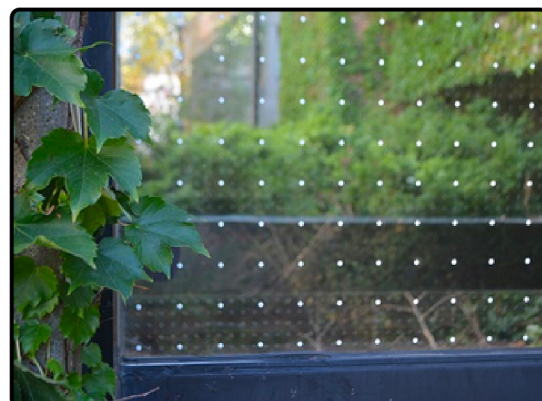


Image: Bird Safe

Visual markers should be high contrast in order to increase legibility. For example, if glass is glazed in a dark colour, the visual marker should be bright in order to stand out (CSA, 2019)



# Design Considerations

## Best Practices for Bird-Safe Design: Glass

### Areas that Require Treatment

#### 1-16m Above Grade & 4m Above Rooftop Vegetation

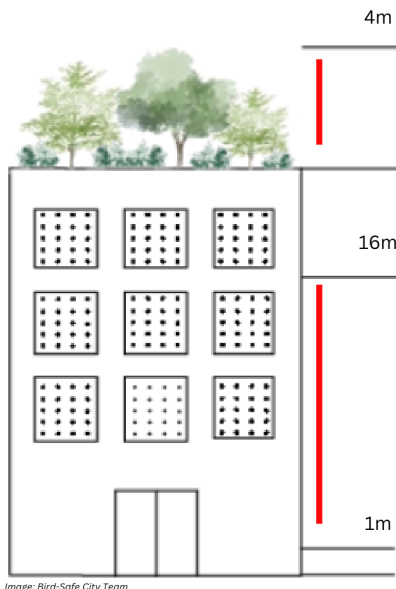


Image: Bird-Safe City Team

Ground level and rooftop vegetation are reflected in windows, creating confusion for birds as to where the vegetation ends and begins. This can result in bird-window collisions.

Treating 85% windows within 16m of vegetation or up to the top of the tree canopy (whichever is greater) can help reduce bird-window collisions (City of Toronto, 2022).

#### Within 99m of Vegetation

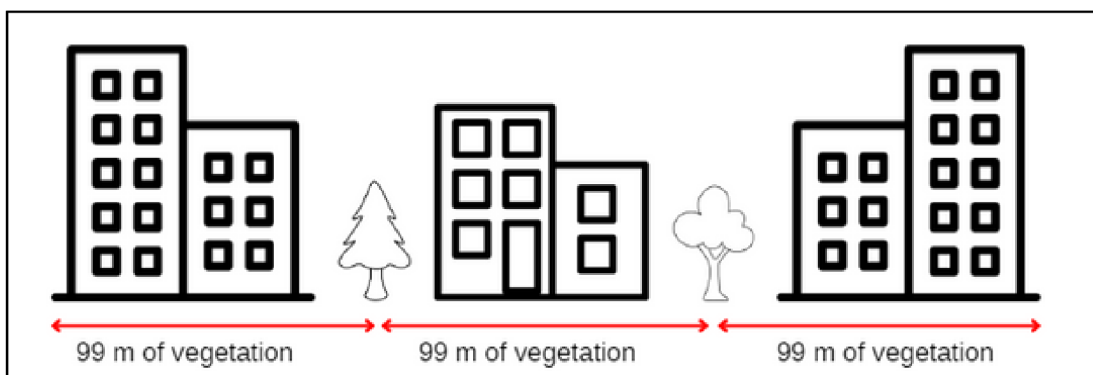


Image: Bird-Safe City Team

Within Toronto, it has been found that the highest rate of bird-window collisions occurs within 99m of buildings, where vegetation is located. For this reason, it is recommended that windows are treated where vegetation is present within 99m of the building. (Perreault, Khan, Nomani, 2023).

# Design Considerations

## Best Practices for Bird-Safe Design: Glass

### Areas that Require Treatment

#### Fly-Through Conditions



Image: S. Deer



Image: M. Khan

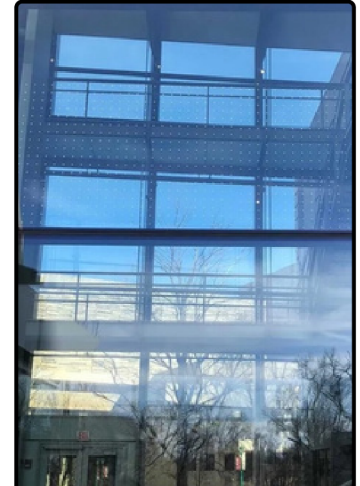


Image: Feather Friendly

Fly-through conditions represent a bird hazard as a result of the presence of glass and the perception that 'flying through' the glass will lead to the vegetation. Birds have different vision than humans, and will not see the glass, causing them to fly directly into it trying to access the vegetation on the other side. Corners comprised of glass also represent a fly-through condition. (FLAP Canada, 2018).

#### Exterior Glass

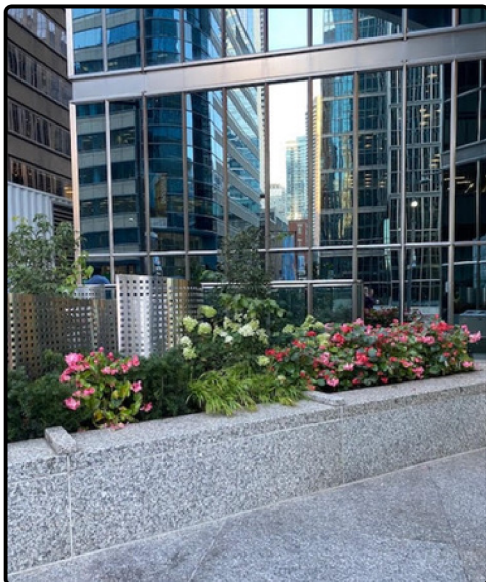


Image: S. Deer

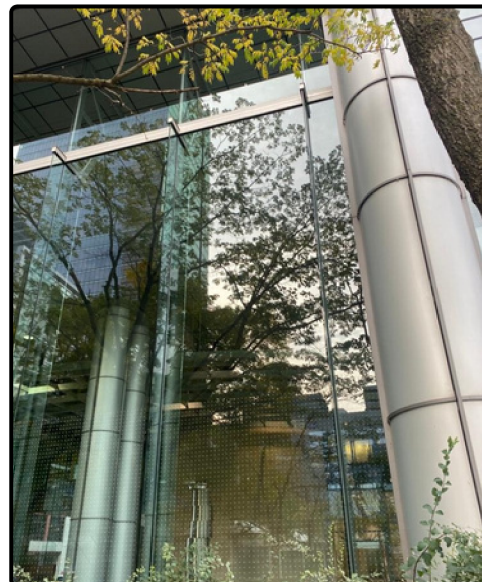


Image: M. Khan



# Design Considerations

Best Practices for Bird-Safe Design: Glass

## Areas that Require Treatment

### Balcony Railings



Image: S. Deer

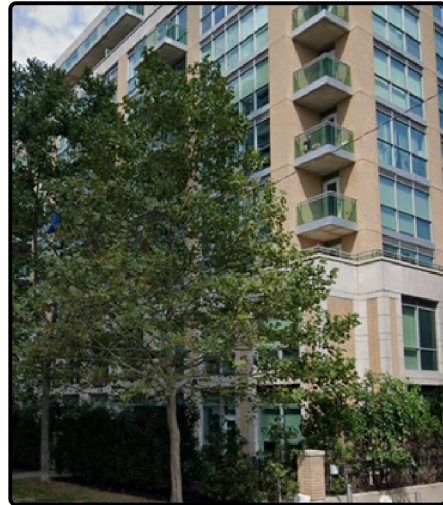


Image: Google Maps

### Window Area: 25%-40% relative to facade

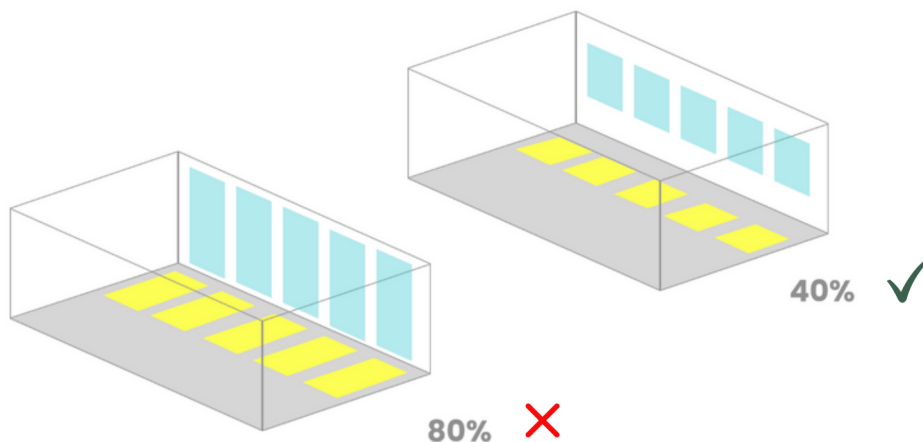


Image: Snaptrude

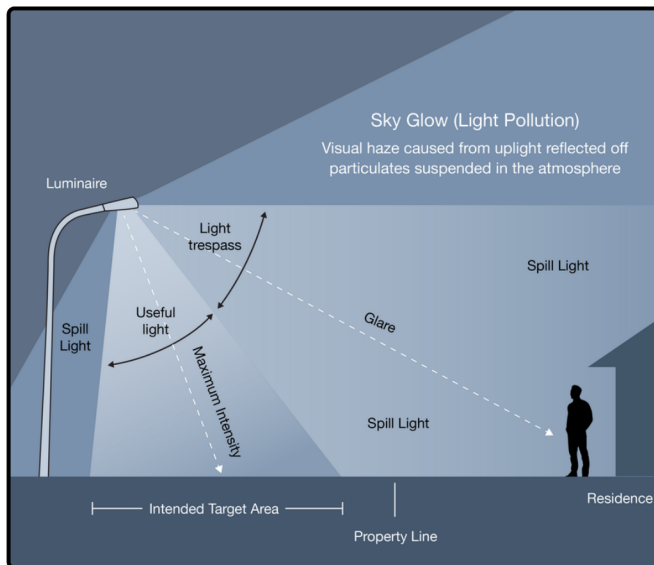
Keeping the window area of the building at 25-40% relative to the facade can reduce unacceptable risks to birds (City of Toronto, 2016, p. 24)

# Design Considerations

## Best Practices for Bird-Safe Design: Lighting



(Bright Vest Africa, nd)



(Evluma, 2023)

Skyglow is disorienting for birds during migration season (March-May, August-October) and can increase the risk of collisions, therefore:

- Avoid directing light upward, as these impact migratory pathways
- Reduce glare
- Ensure the lighting being used has a necessary purpose, such as provision of safety enhancement
- Ensure lighting fixtures are third-party approved Dark Sky Compliant (Best Practices for Effective Lighting, 2017)

Furthermore, it can be helpful to limit architectural lighting to the grade level, and prohibit lighting that creates spots and floods during months that are known for high migration (March-June; August-November) (Bird Safe, 2023)

### Henslow's Sparrow

Status: *Endangered*

(Ontario Species at Risk, 2023)

(Carolina Bird Club, 2023)







Image: C. Chieffari

# How to Identify Bird-Safe Features

What to look out for when identifying bird-safe designs

Building designs are to follow the listed considerations to be bird-safe. The following list provides examples of acceptable designs. These can include visual markers, such as dots or other patterns, applied using materials such as fritted or etched glass, or exterior application film.



## Window Surface

First surface  
(exterior facing glass)



## Visual Markers and Patterns

High contrast, pattern density and at least 5mm in diameter



## Other glass features

Transparent glass railings



## Bird-safe design not achieved with:

Angled glass, blinds, interior screens, bird decals

# Window Surface

Applying markers on the **first surface** is paramount to obstructing the appearance of reflection.

## First Surface

The exterior facing glass surface must be used when applying visual markers.



Image: C. Chieffari



*The use of visual markers on the first surface exterior glass.*

## Other Surfaces

Other interior surfaces of double or triple-pane windows of buildings should not be treated with visual markers for bird safety, because they provide less visual contrast and do not break up the appearance of reflection on the exterior glazing

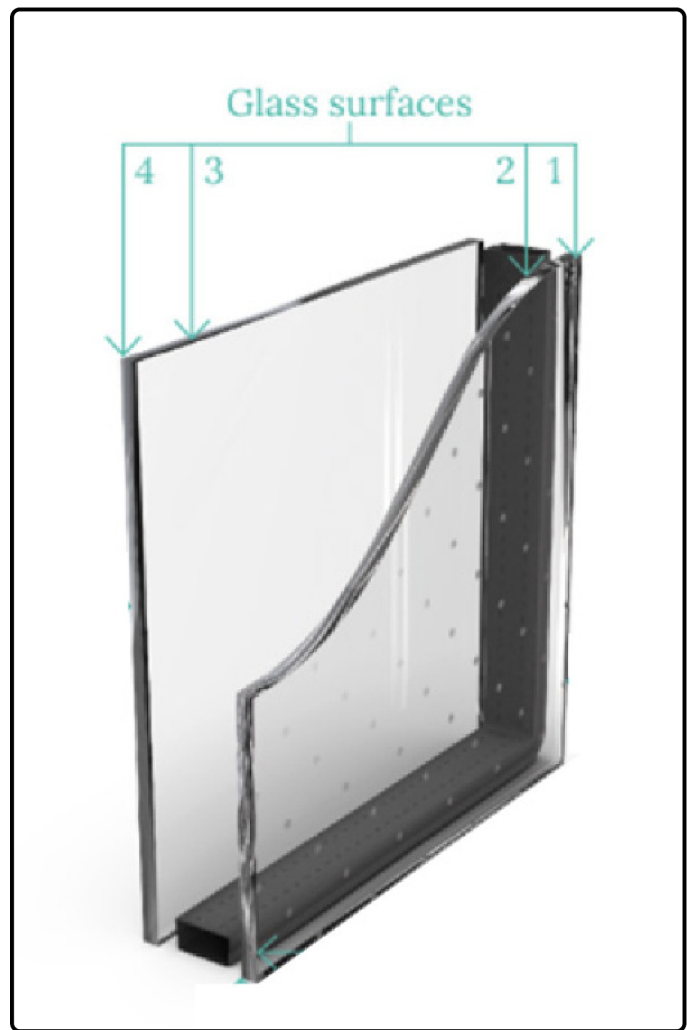


Image: Preloco



*Second, third, and fourth surfaces cannot be treated with visual markers.*



# Visual Markers and Patterns

## Size, Density, and Contrast

Visual markers must be 5mm in diameter, must be at least 50mm apart from each other, and must be high contrast.



Image: C. Chieffari



*Markers can come in a variety of shapes and forms, and when properly applied, they provide good bird-safe designs.*

Other variation of patterns can be used to achieve bird-safe design, including fritted glass.



Image: McKnight 2015



*Properly treated windows with fritted glass can be applied to a variety of structures, including institutional buildings*

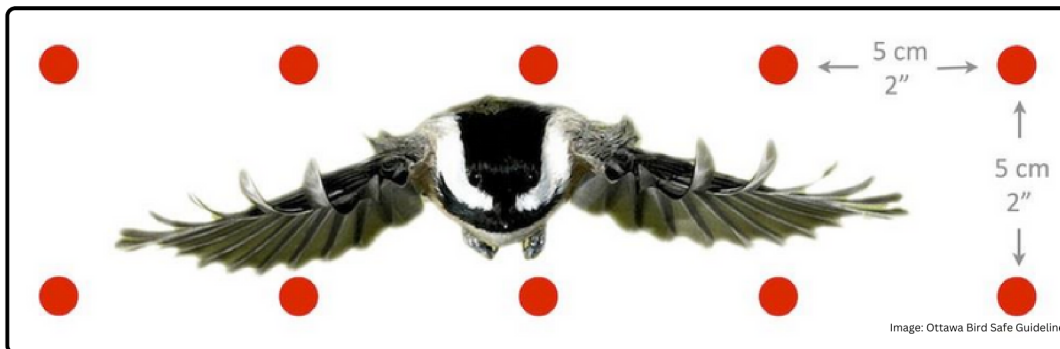


Image: Ottawa Bird Safe Guidelines



*When markers are improperly spaced smaller birds are able to fit through. Smaller birds are one of the biggest victims of bird-window collisions due to their size.*

# Glass Railings

## Transparent glass railings

Buildings can include glass railings which must be treated when applying bird-safe design.



Image: C. Chieffari



*The absence of visual markers on the glass railings poses unmitigated risk to birds.*



Image: M. Nomani



*Properly treated glass with visual markers.*



**Olive-sided Flycatcher**

**Status: *Special Concern***

(Ontario Species at Risk, 2023)

(Clark, n.d.)



# Improper Bird-Safe Design Application

Buildings cannot use the follow strategies to achieve bird-safe designs:

## Angled glass

Angling glass at downwards is not an acceptable bird-safe design.

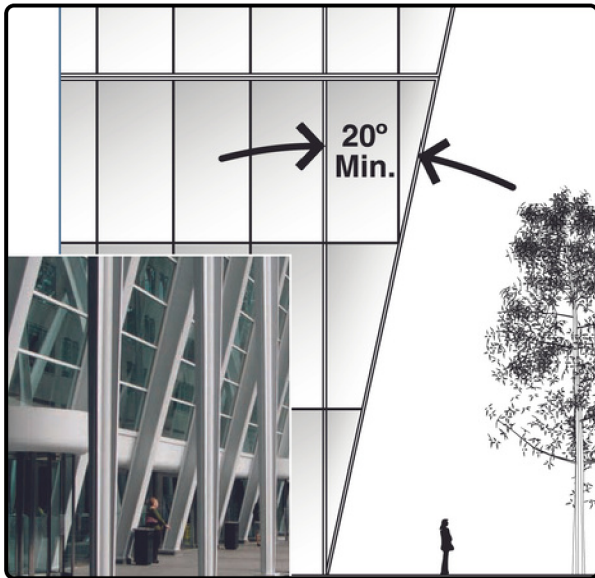


Image: G. Guillen, City of Toronto 2016



*Angling windows on buildings does not prevent bird collisions.*

## Blinds

Using interior blinds as visual markers is not an acceptable bird-safe design as they are inside the glass.



Image: S. Deer



*The use of blinds does not prevent reflections and therefore not an acceptable solution.*



**Gold-winged Warbler**  
**Status: Special Concern**  
(Ontario Species at Risk, 2023)  
(Audubon Vermont, 2016)

# Improper Bird-Safe Design Application

Building must avoid using the follow strategies that are not longer accepted as bird-safe designs.

## Interior screens

Installing interior screens close to the window is not an acceptable bird-safe design.



Image: City of Toronto



*Interior screens are no longer an acceptable solution.*

## Bird decals

Using large bird decals, such as hawks, does not deter birds whether applied on the first or other surfaces.



Image: M. Khan



*Bird decals, at such low density, are not an acceptable solution.*



**Henslow's Sparrow**

**Status: *Special Concern***

(Ontario Species at Risk, 2023)

(Sherony, 2011)



## Section 2

# Toronto's Policy Context



Eastern Meadowlark  
**Status:** *Threatened*  
(Ontario Species at Risk, 2023)  
(Macaulay Library, 2022)

# Legal Considerations



**Evening Grosbeak**  
**Status: *Special Concern***  
(Ontario Species at Risk, 2023)  
(Feeder Watch, 2017)

## Implementation

Bird-Friendly Design Guidelines are implemented through the Toronto Green Standard, under the Ecology and Biodiversity section, within Tier 1. The inclusion of Bird-Friendly Design under Tier 1 constitutes mandatory design requirements, meaning that their application is necessary to receive a development approval from the City.

The Toronto Green Standard contains design requirements for Low-Rise Residential and Mid-High Rise Residential buildings.

## Enforceability

The Toronto Green Standard is enforced through Site Plan Control, which is applicable to residential buildings with 11 or more units. Under required 'Information & Studies' the Toronto Green Standard is listed as a requirement for Notice of Approval Conditions.

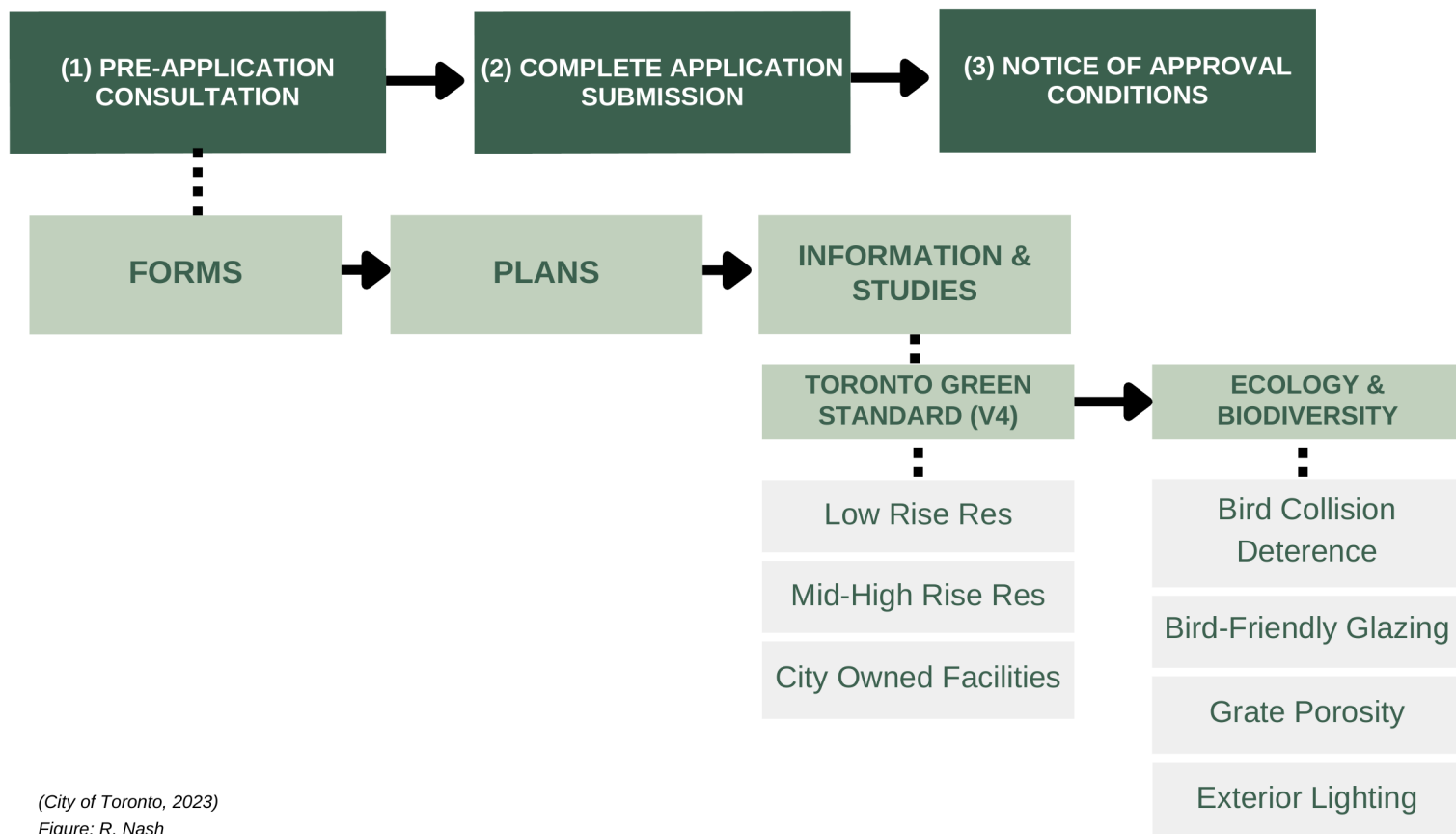
The entire City of Toronto is subject to Site Plan Control, however, there are some exemptions. To check if your property is exempt from Site Plan Control, review City of Toronto By-law 774-2012.





# Planning Considerations

## SITE PLAN CONTROL



(City of Toronto, 2023)  
Figure: R. Nash

## IMPLEMENTATION

Bird Friendly Design Guidelines are implemented through the Toronto Green Standard, which is enforced through Site Plan Control.



Bank Swallow

Status: *Threatened*

(Ontario Species at Risk, 2023)

(U.S Fish and Wildlife Services, 2021)

# Toronto Green Standard

## Ecology & Biodiversity Mandatory Requirements

	APPLICABLE TO	REQUIREMENT	DESCRIPTION
TIER 1	LOW-RISE RES & MID-HIGH RISE RES	Bird Friendly Glazing	85% of all exterior glazing within the first 16m treated including fly-through and High Hazard Areas, to reduce bird collisions
	MID-HIGH RISE RES	Rooftop Vegetation	Glazing 4m above rooftop vegetation is treated to reduce bird collisions
	MID-HIGH RISE RES	Grate Porosity	Maximum porosity of ventilation grate is 20mm x 20mm or 10mm x 50mm
	MID-HIGH RISE RES	Exterior Lighting	Dark sky compliant fixtures

(City of Toronto, 2023)  
Figure: R. Nash



Cerulean Warbler  
Status: *Threatened*  
(Ontario Species at Risk, 2023)  
(Lilibirds, 2009)



# APPLICANT QUESTIONNAIRE

## IDENTIFY TGS REQUIREMENTS REGARDING BIRD-SAFE DESIGN

### INSTRUCTIONS:

Answer the questions below to find out if your property is subject to the Toronto Green Standard, enforced through Site Plan Control, and what the requirements will be regarding bird-safe design.

### SECTION 1: SITE PLAN CONTROL

**1) Is your development residential, containing 11 or more dwelling units or non-residential?**

Yes

☐

No

☐

If no, your development is not subject to Site Plan Control or the Toronto Green Standard.  
If yes, proceed to question 2.

**2) Does your development contain exemptions from City of Toronto By-law 774-2012?**

Yes

☐

No

☐

If yes, your development is not subject to Site Plan Control or the Toronto Green Standard.  
If no, proceed to question 3.

### SECTION 2: TORONTO GREEN STANDARD

**3) Is your property less than 4 storeys?**

Yes

☐

No

☐

If yes, your development is subject to *Toronto Green Standard Version 4 Low-Rise Residential Development standards*.  
If no, proceed to question 4.

**4) Is your property residential, containing more than 4 storeys; or non-residential?**

Yes

☐

No

☐

If yes, your development is subject to *Toronto Green Standard Version 4 Mid-High Rise Residential Development standards*.

Piping Plover

Status: *Endangered*

(Ontario Species at Risk, 2023)

(Digital Camera World, 2022)



# Further Resources

Organizations supporting bird safe design

## FLAP Canada

Standardize designs across different pages!

### About:

FLAP (Fatal Light Awareness Program) Canada is a charity organization that aims to reduce overall bird collision rates through education, advocacy, and engagement. Their collaboration with other entities has produced important milestones including the Toronto Bird-Friendly Development Guidelines and the first commercial grade solution with Feather Friendly.

### Website:

<https://flap.org/>

## Commercial and Residential Solutions

Numerous resources offer products and solutions towards bird-safe design for both residential and commercial applications.

### *American Bird Conservancy: Product & Solutions Database*

The American Bird Conservancy offers a database of solutions for glass. Numerous products are available for purchase.

### Website:

<https://abcbirds.org/glass-collisions/products-database/>

### *BirdSafe*

Offers commercial and risk assessment solutions.

### Website:

<https://birdsafeca/>

### *Feather Friendly*

Feather Friendly is an industry supplier, specializing in the provision of CSA standard compliant products that individuals can utilize to ensure their buildings are bird-safe.

### Website:

<https://www.featherfriendly.com/architect-sign-up-lp>





**Piping Plover**

**Status: *Endangered***

(Ontario Species at Risk, 2023)

(Greg Gard, n.d)

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## Piping Plover

Status: *Endangered*

(Ontario Species at Risk, 2023)

(Greg Gard, 2016)

