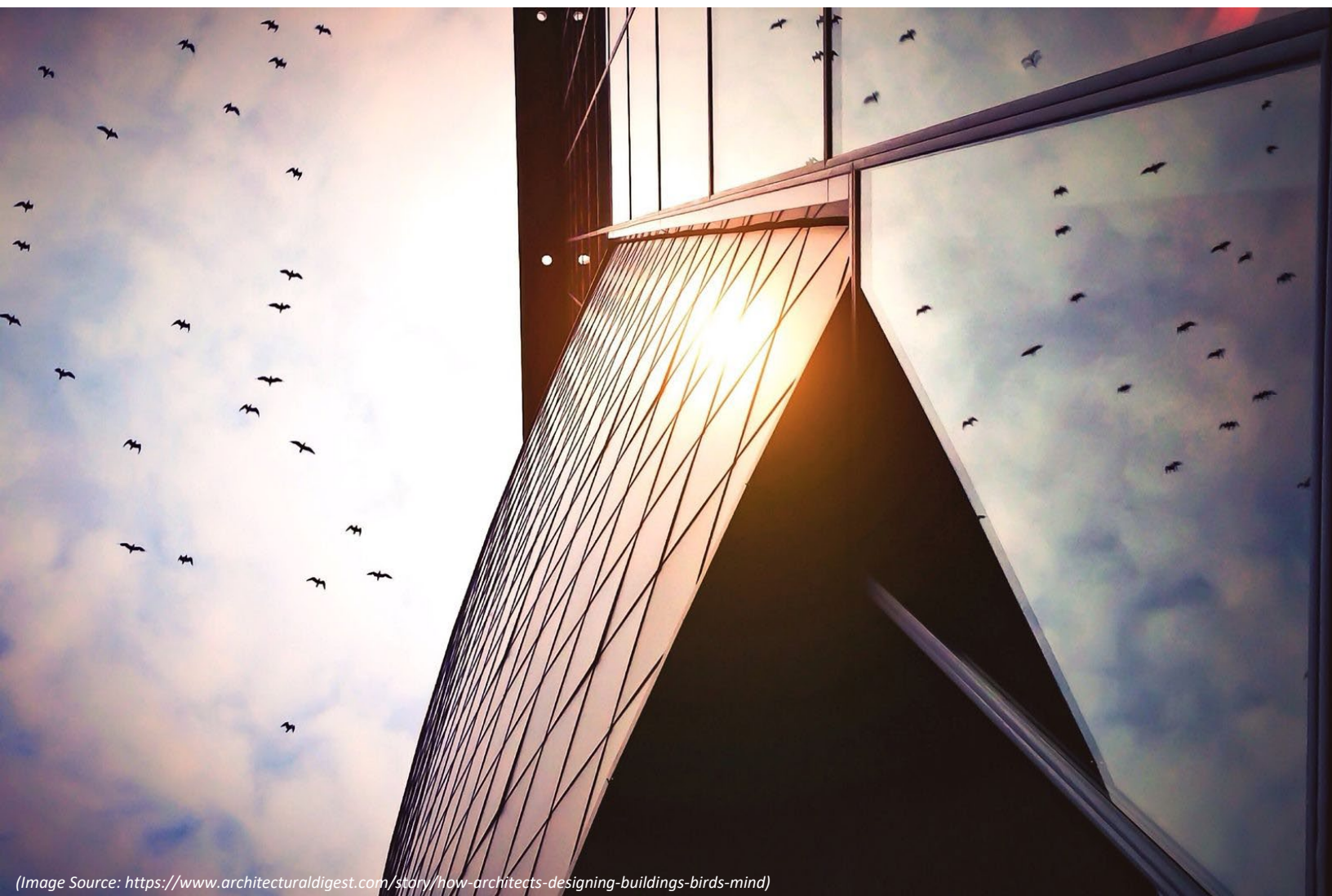




(Image Source: <https://www.architecturaldigest.com/story/how-architects-designing-buildings-birds-mind>)

Tips for Creating a Bird-Friendly Design in Architectural Services Department's Projects

(June 2025)

(For ArchSD's Internal Reference)



建築署

Architectural Services Department

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(Image Source: https://www.dailysabah.com/gallery/home-to-birds-and-fish-hong-kongs-lut-chau-wetlands-at-risk/images?gallery_image=78960)

A flock of great cormorants (鸕鷀) fly above Lut Chau in Hong Kong.

Introduction

1 Introduction

1.1 Limitations and challenges

This study mainly conducted a literature review and desktop research to understand the situation of bird-window collision in Hong Kong. Tips for bird-friendly design are being composed of mainly two parts in this study:

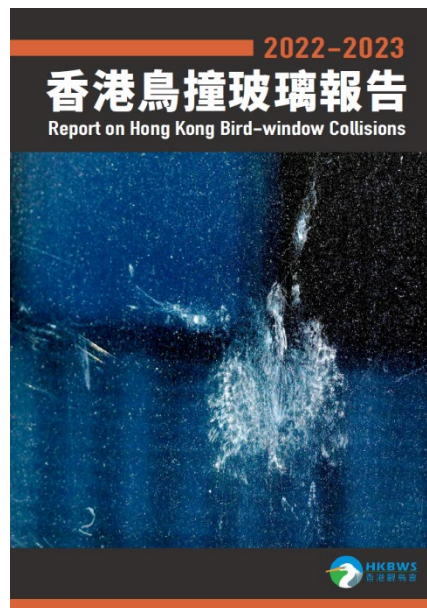
1. Building design
2. Landscape design

Only limited systematic monitoring and documentation for the bird-window collision cases are currently available in Hong Kong.



The preliminary analysis of the bird-window collision cases in Hong Kong 2023
(The Hong Kong Bird Watching Society).

(Image Source: <https://www.hkbws.org.hk/cms/phocadownload/submissions/HKBirdWindowCollisionAnalysis2022.pdf>)



Report on Hong Kong Bird-Window Collisions 2022-2023
(The Hong Kong Bird Watching Society).

(Image Source: https://cms.hkbws.org.hk/cms/phocadownload/Conservation/BWC2024_HKBWSc.pdf)



Bird-Friendly Building Design
(American Bird Conservancy).

(Image Source: https://abcbirds.org/wp-content/uploads/2015/05/Bird-friendly-Building-Guide_2015.pdf)

1.2 Why bird-friendly design is essential?

Hong Kong has:

- diverse habitats and a rich biodiversity;
- **Over 570 bird species in HK**, accounting for a third of the number of bird species in China;
- **65 of them are listed as Threatened Species** by the International Union for Conservation of Nature;
- **over a hundred are on the List of Wildlife under Special State Protection in China.** (Source: A14, P.1)

Ongoing habitat loss and urbanization place threat to wild birds. Urban environments are ambushed with death traps to birds.

(Source: A14, P.1)



Birds in Hong Kong Wetland Park.

(Image Source: <https://www.itishk.com/2015/03/hong-kong-wetland-park-bird-watching/>)

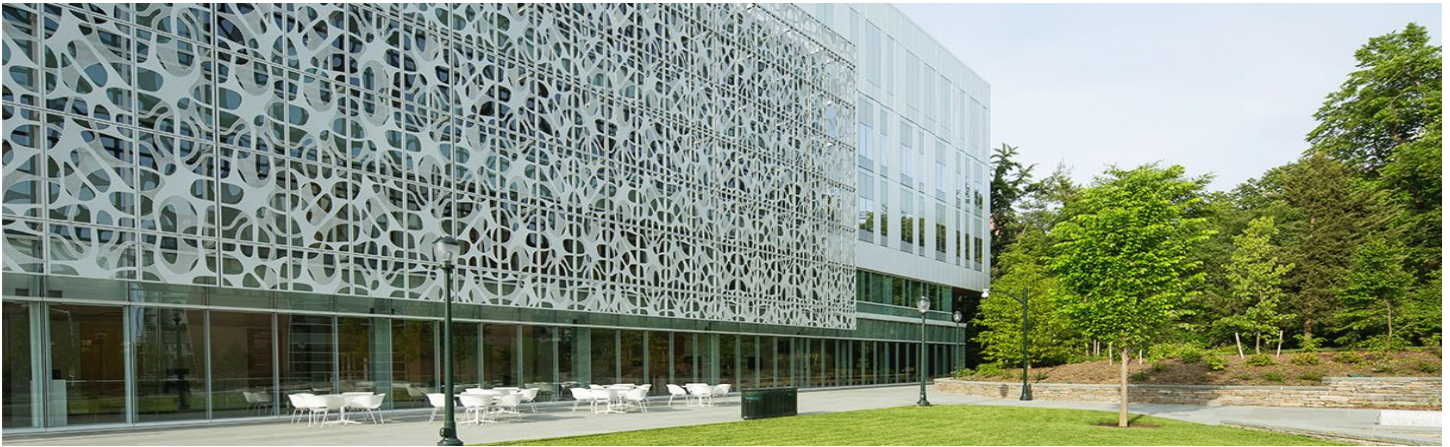


Sparrows in urban areas.

(Image Source: <https://cms.hkbws.org.hk/cms/en/hkbws/work/resarch/sparrow-tw/sparrow2020e>)

1.3 Objectives of the Study

The main objective of this study is to formulate references for during project design stage to align suitable measures in tracking bird-friendly issues for different situations in building and open space projects in Hong Kong for Architectural Services Department's (ArchSD) projects.



*Bird-friendly sunshade on the Levin Neuroscience Building on the University of Pennsylvania campus.
(Image Source: <https://abcbirds.org/blog/bird-friendly-design-coming-soon/>)*

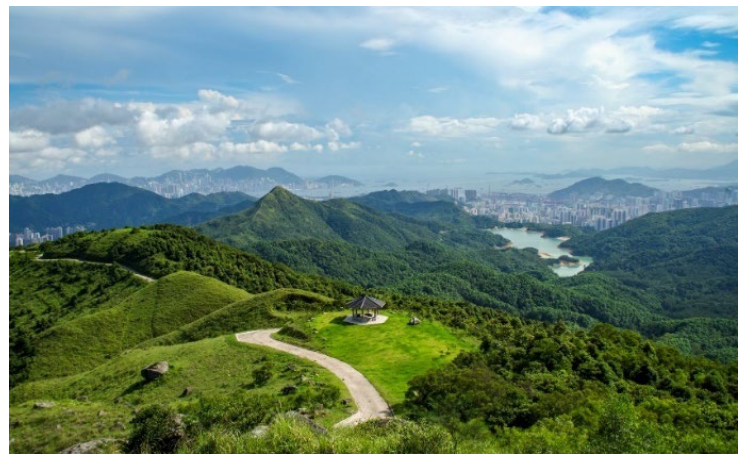
1.4 Background

1.4.1 Why are there so many bird species in Hong Kong?



East Asian-Australasian Flyway

(Image Source:
https://www.afcd.gov.hk/english/conservation/con_fau/con_fau_bird/con_fau_bird_bhk/files/Watching_Birds.pdf)



Shing Mun Country Park

(Image Source:
https://www.afcd.gov.hk/english/country/cou_lea/the_facts.html)

1. Hong Kong is located on the East Asia – Australian Flyway, one of the main waterbird migration routes.

2. A wide diversity of habitats within its borders, especially in the country parks, wetlands (brackish and freshwater), open country, streams, coastal area and islands, woodland and urban area. (Source: A25)

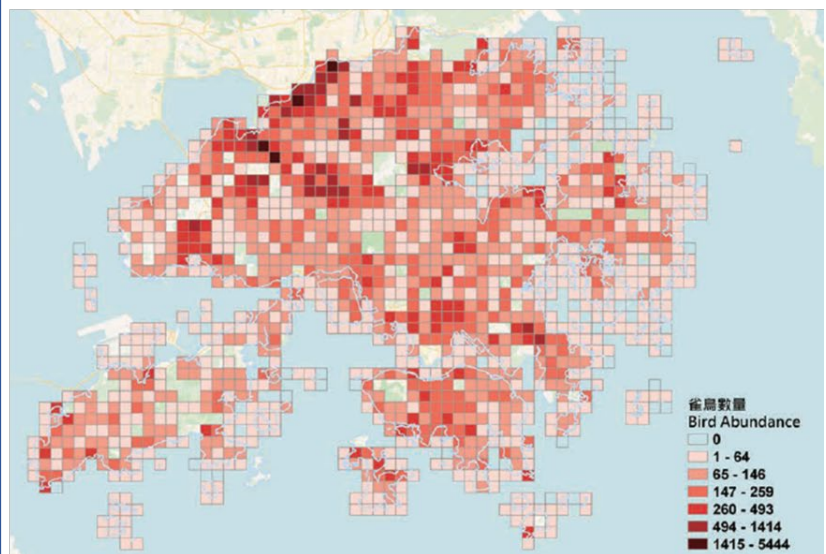
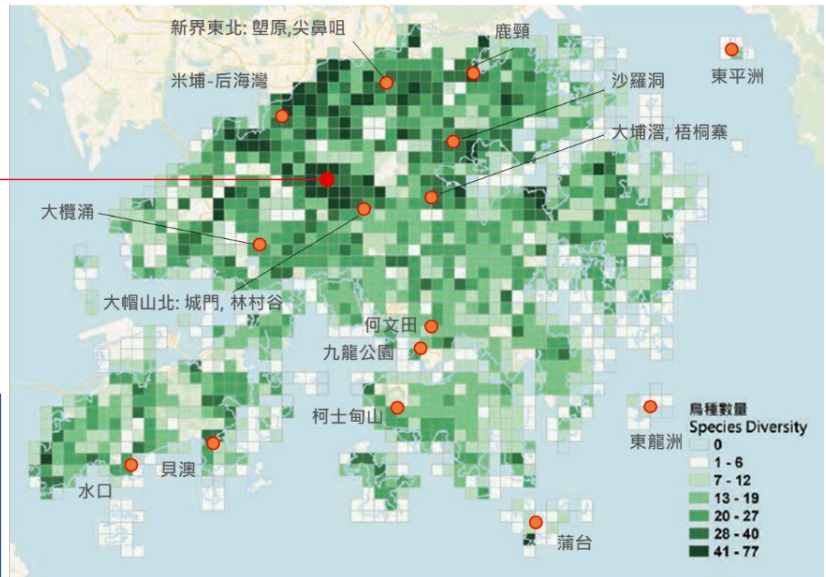
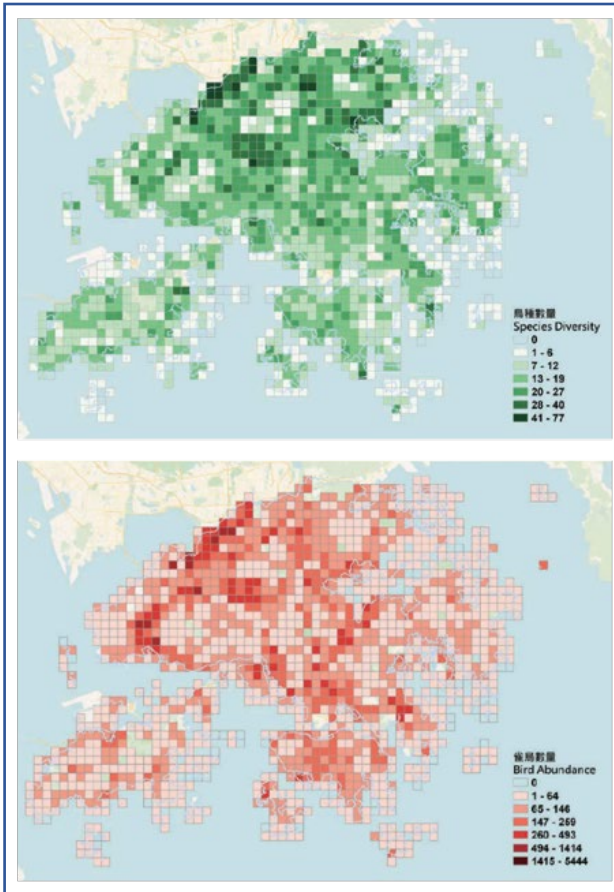
1.4.2 Bird distribution in Hong Kong Hong Kong Bird Atlas Surveys in 2016-19, HKBWS

Hong Kong Winter Bird

Bird Diversity Hotspot
(Kam Tin Plain: 八鄉, 錦田)

General bird watching spots
in Hong Kong

Hong Kong Breeding Bird



(Image Source: https://cms.hkbws.org.hk/cms/phocadownload/report/HK_Bird_Atlas_2016-19_ebooklet_20200802.pdf)

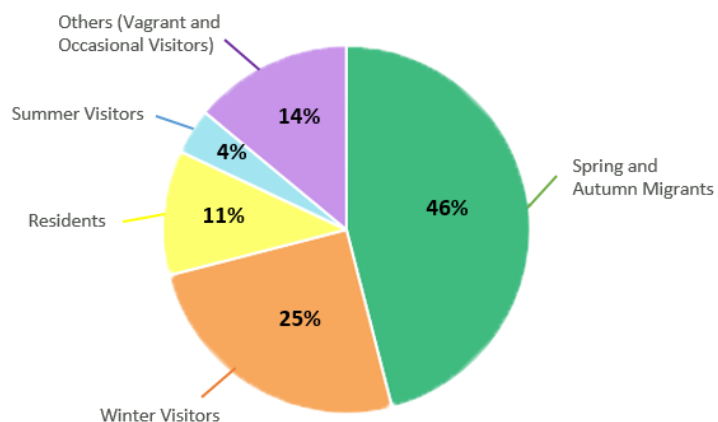
- Areas with most species are usually grids with the most diverse habitats.
- Quite a number of woodland bird species recorded.
- **Winter Bird Atlas** - Record all birds which arrive in autumn and leave in spring.
- **Breeding Bird Atlas** - Record breeding evidence of all birds if any is observed.
- Project team can make reference to the latest Bird Atlas Survey from HKBWS to understand the density of birds near the site area in the early design stage. (Source: A11, P.17)
- Project team can make reference to the websites about Hong Kong bird watching spots to understand the general hot-spot locations for bird watching near the site area in the early design stage. (例如尖鼻咀、南生圍、鹿頸、大埔滘、城門、龍虎山等。)

(https://www.afcd.gov.hk/tc_chi/conservation/con_fau/con_fau_bird/con_fau_bird_tips/con_fau_bird_tips.html)

(<https://www.hkoutdoors.com/hk-birding-sites.html/>)

1.5 Composition of birds in Hong Kong

According to the migratory habits and species of birds, we may classify birds in Hong Kong into the following major categories:
(Source: A31)



Hong Kong bird composition.



Spring and Autumn Migrants (46%)



Brown Shrike
紅尾伯勞



Chinese Sparrowhawk
赤腹鷹



Spoon-billed Sandpiper
勺嘴鷸



Winter Visitors (25%)



Black-faced Spoonbill
黑臉琵鷺



Stejneger's Stonechat
黑喉石鵯



Orange-headed Trush
橙頭地鸝



Summer Visitors (4%)



Bridled Tern
褐翅燕鷗



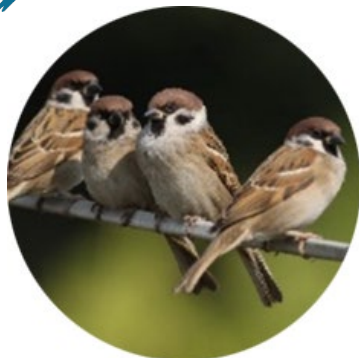
Roseate Tern
粉紅燕鷗



Hainan Blue Flycatcher
海南藍仙鷯



Residents (11%)



Eurasian Tree Sparrow
樹麻雀



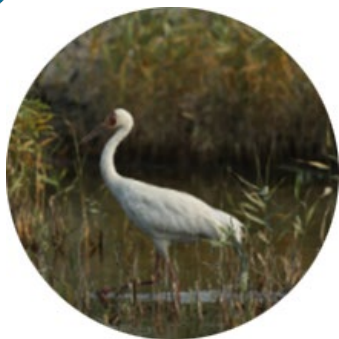
Oriental Magpie-Robin
鵲鵒



Red-whiskered Bulbul
紅耳鸲



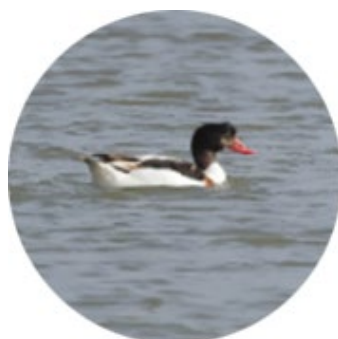
Vagrant and Occasional Visitors (14%)



Siberian Crane
白鶴



Lapland Longspur
鐵爪鵒



Common Shelduck
翹鼻麻鴨



(Image Source: <https://www.salon.com/2023/02/16/bird-window-prevention-study/>)

Bird Flying By Window

Bird-window Collision

2 Bird-window Collision

2.1 What is birds-window collision?

Bird-window collision refers to birds colliding into building objects as they are unable to perceive glass or mirror as obstacles, resulting in injuries or even death. (Source: A14, P.3)



Bird carcasses collected from the World Trade Center after collisions
(Image Source: <https://www.dezeen.com/2022/03/09/glass-collisions-bird-deaths/>)



2.2 Why do birds collide with windows?

Reflection

- Transparent glass on buildings can form a mirror, reflecting sky, clouds, or nearby habitat attractive to birds.
- Reflected vegetation is the most dangerous.
(Source: A3, P.13)
- Bird-window collisions to buildings can happen at various heights

Glass facades on buildings such as the 3 World Trade Center (centre) and 4 World Trade Center (right) in New York are responsible for millions of bird deaths each year. Photo by Joe Woolhead
(Image Source: <https://www.dezeen.com/2022/03/09/glass-collisions-bird-deaths/>)

各類建築物高度所接獲的懷疑鳥撞個體及拓印數量

The number of suspected bird window collision bird(s) and imprint(s) at different building heights

建築物高度 Building Height	數量 No. of Structure(s)	鳥撞個體數量 No. of individual(s)	鳥撞拓印數量 No. of imprint(s)
低矮建築物 (1-3 層高) Low-rise Building (1-3 stories)	26	115	28
中層建築物 (4-11 層高) Mid-rise Building (4-11 stories)	29	47	37
高樓建築物 (11 層高以上) High-rise Building (above 11 stories)	58	147	4
總數 Total	114	309	69

(Image Source: https://cms.hkbws.org.hk/cms/phocadownload/Conservation/BWC2024_HKBWSc.pdf)

2.3 Overview of bird-window collision in Hong Kong

The Hong Kong Bird Watching Society (HKBWS) conducted a report to summarize and initially analyses the data of bird-window collisions in Hong Kong during the period of 1 September 2022 – 31 August 2023. (Source: A14a)

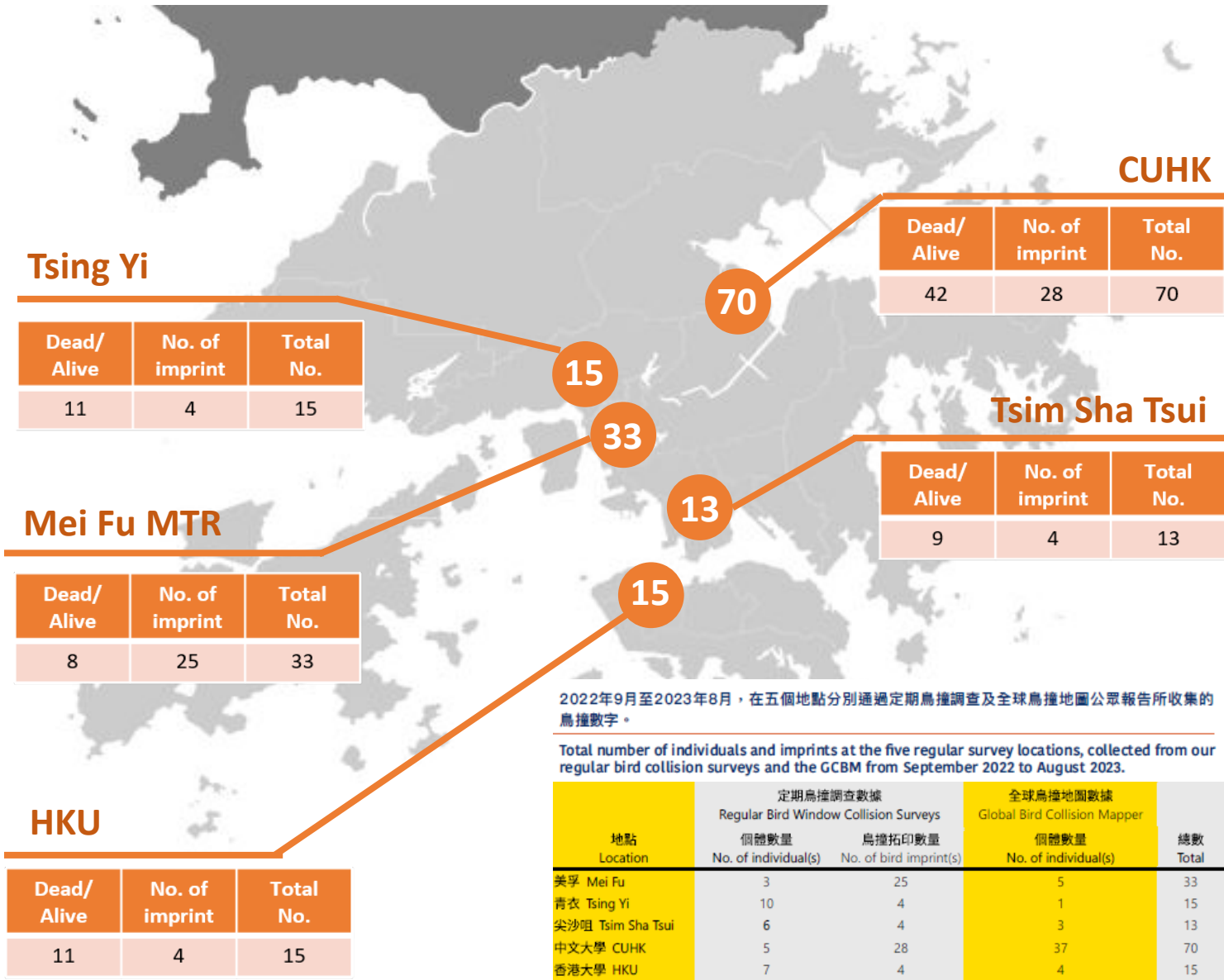


Distribution of Hong Kong Bird-window collisions from September 2022 to August 2023.

(Image Source:

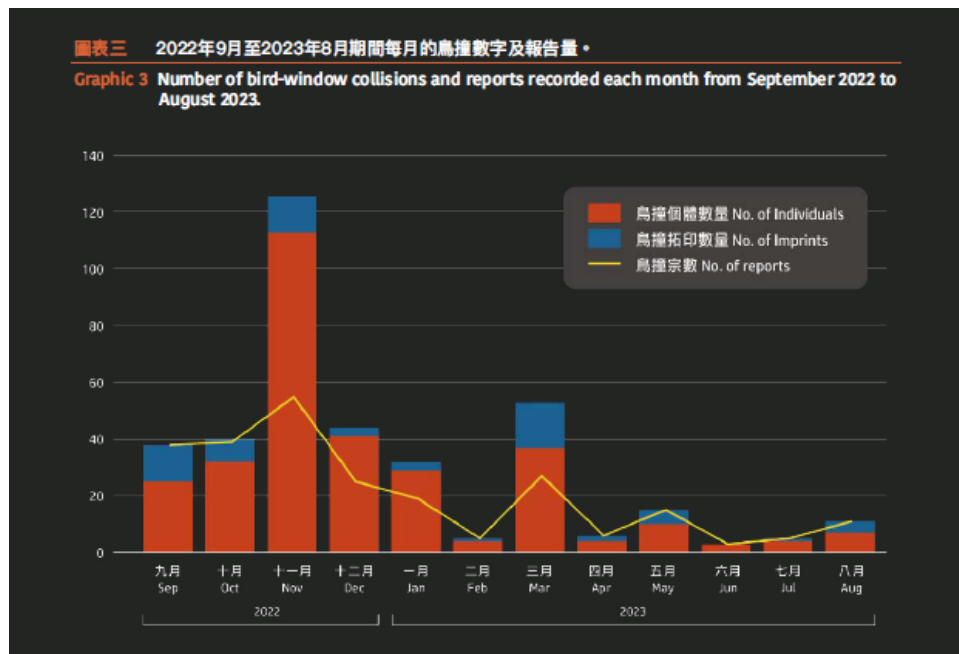
https://cms.hkbws.org.hk/cms/phocadownload/Conservation/BWC2024_HKBWSc.pdf)

Specific location with bird-window collision record:



2.4 Seasonal distribution of bird-window collision

2.4.1 Bird species of bird-window collision



The large number of bird-window collisions in November could be related to the autumn migration. (Source: A14a, P.18)

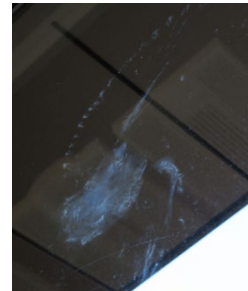
Number of bird-window collision individuals recorded each month from September 2022 to August 2023.

(Image Source: https://cms.hkbws.org.hk/cms/phocadownload/conservation/BWC2024_HKBWSc.pdf)



A mass bird-window collision of 10 Indochinese Yuhinas (栗頸鳳鵒) was recorded at AIA Tower in North Point.

(Image Source: <https://www.hkbws.org.hk/cms/phocadownload/submissions/HKBirdWindowCollisionAnalysis2022.pdf>)



The bird imprints left on the glass in Mei Fu MTR station.

(Image Source: <https://www.hkbws.org.hk/cms/phocadownload/submissions/HKBirdWindowCollisionAnalysis2022.pdf>)



Pallas's Grasshopper Warbler (小蝗鶯) of "Local Concern" was reported in Mei Fu MTR station.

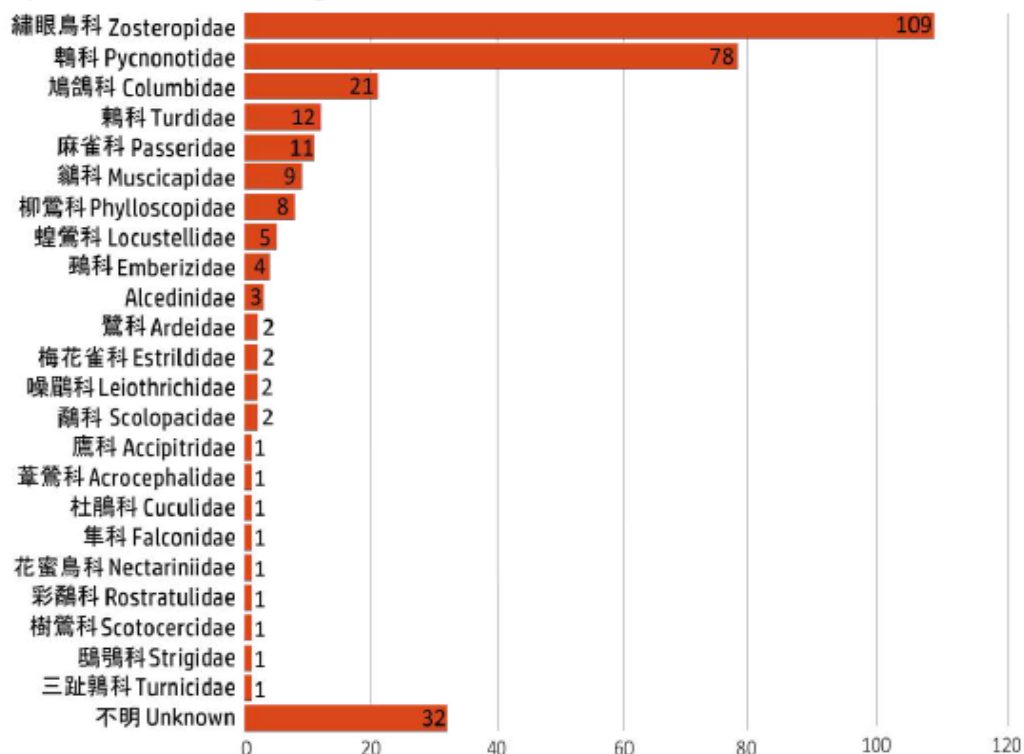
(Image Source: <https://www.hkbws.org.hk/cms/phocadownload/submissions/HKBirdWindowCollisionAnalysis2022.pdf>)

From the collected bird collision data, we had 249 collision cases involving 309 individuals and 69 imprints. Out of these cases, 51 came from our regular bird collision surveys, comprising 16 bird individuals and 35 imprints.

According to *Report on Hong Kong Bird-window Collisions 2022-23*, 61.4% of the species we recorded are migratory, such as Indochinese Yuhina, Asian Brown Flycatcher and Lanceolated Warbler; with 17.2% classified as residents, such as Spotted Dove, Eurasian Tree Sparrow and Red-whiskered Bulbul; and the remaining 21.4% either residents or migrants such as Swinhoe's White-eye. (Source: A14a, P.11-15)

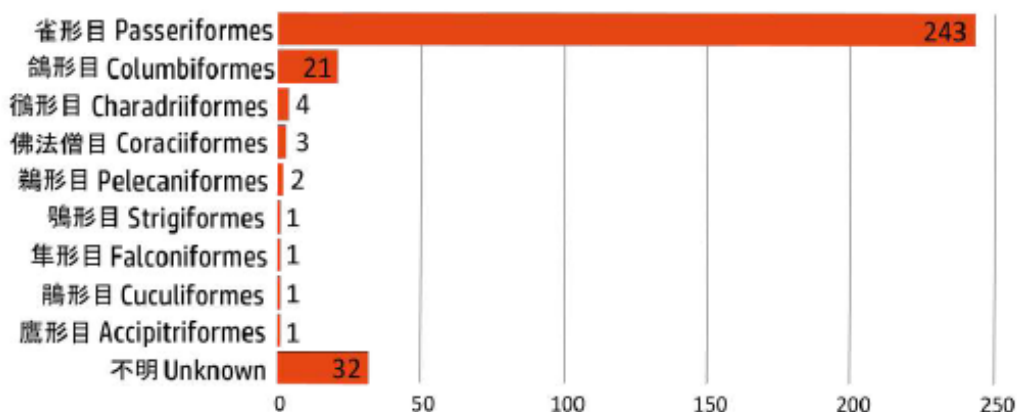
2022年9至2023年8月期間記錄的鳥撞個體所屬的科及其數量

Different families and numbers of corresponding window collision individuals recorded from September 2022 to August 2023



2022年9至2023年8月期間記錄的鳥撞個體所屬的目及其數量

Different orders and numbers of corresponding window collision victims recorded from September 2022 to August 2023



2.5 Glass Problem

2.5.1 Transparency

Birds strike into transparent windows as they attempt to access potential perches, plants, food or water sources, or other lures seen through the glass, whether inside or outside.

Large planted atria are frequent problems, as are glass balcony railings and “skywalks” joining buildings.

The increasing trend toward glass used in landscapes, as walls around roof gardens, glass parapets and glass-enclosed flyovers are dangerous because birds perceive an unobstructed route through them to habitat beyond.



This atrium has more plants than anywhere nearby on surrounding streets, making the glass deadly for birds seeking food or shelter in this area.

(Image Source: <https://www.allaboutbirds.org/news/glass-action-advances-in-the-science-of-making-windows-safer-for-birds>)

2.5.2 Light problem

Birds have the following natural habits:

- Birds have poor night vision
- They are attracted to relative brightness
- Night-migratory birds flying over a city can become confused by the effects of light pollution, which draws them toward dense urban centres. (Source: A3, P.29; A7, P.7)



This walkway at Valle de Oro National Wildlife Refuge is illuminated in a way that helps birds. By focusing the light towards the walkway, there is not unnecessary light in the sky. The area can remain safe and dark for those birds

(Image Source: <https://www.hkbws.org.hk/cms/phocadownload/submissions/HKBirdWindowCollisionAnalysis2022.pdf>)



A nighttime view of a building in Portland. Portland Audubon's Lights Out Program is supported in part by the Service's Urban Bird Treaty Program.

The lights on (left) and then with the lights off (right).

(Image Source: <https://www.hkbws.org.hk/cms/phocadownload/submissions/HKBirdWindowCollisionAnalysis2022.pdf>)





(Image Source: <https://www.chi-atheneum.org/the-2019-american-architecture-awards/2019/08/20/sherman-and-joyce-bowie-scott-hall-pittsburgh-pennsylvania-2017/>)

*Carnegie Mellon University, Pittsburgh, PA
Higher Education, Interdisciplinary Teaching and Research
(LEED Gold Certified)*

Anti-collision Policy and Control in Overseas Countries

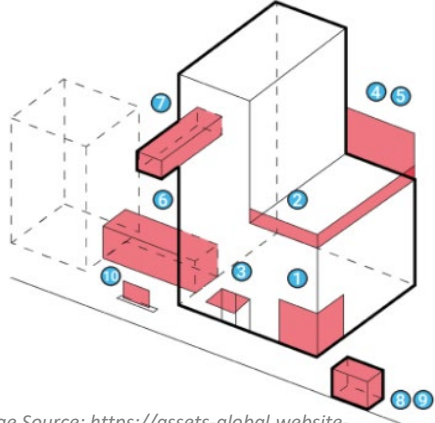
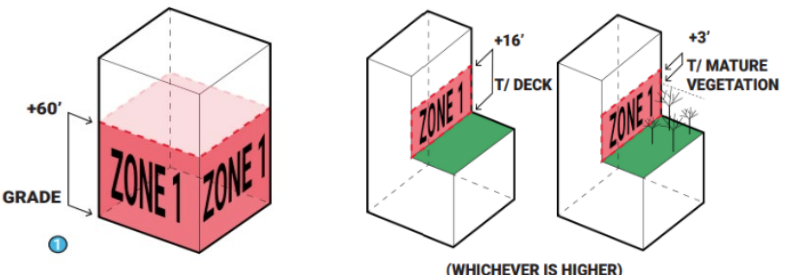
The United States of America and Canada have comprehensive national laws and regulations to address bird collisions, requiring developers and building owners to implement bird-safe measures, while Singapore currently has guidelines for reducing bird-window collision.

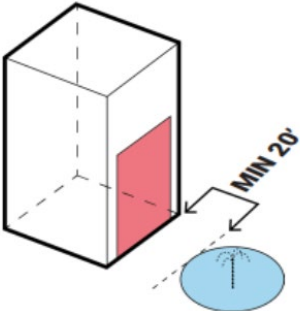
3 Anti-collision Policy and Control in Overseas Countries

3.1 Bird Friendly Building Design Guide

3.1.1 City of Evanston, United State of America

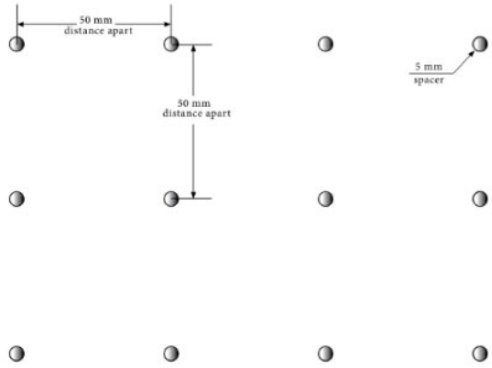
The City of Evanston has adopted policy to encourage inclusion of bird-friendly design strategies into development projects to reduce bird collisions and death. These practices include consideration of the overall architectural design to reduce hazards, the use of bird friendly materials, especially glass, review of exterior and interior lighting, the provision of controls to reduce or eliminate lighting at critical migration times, and consideration of site planning and landscape design to reduce other potentially hazardous situations.

Building Façade	<u>High risk features</u> High risk features shall have a Material Threat Factor (MTF) of 30 or less: 1. All exterior fly-through conditions 2. Railings 3. Awnings 4. Windbreak/ windscreen panels 5. Acoustic barriers 6. Ground level building links 7. Skywalks (elevated walkways) 8. Bus shelters 9. Guard shelters 10. Exterior decorative panels or signage  (Image Source: https://assets-global.website-files.com/63444fe3155378915bcd2b41/654bb9c424348d30b11411ba_Ev%20Guide-Bird%20Friendly%20Evanston%20.pdf)
	<u>Zone 1 (high risk façade areas)</u> The following facade areas shall have a Building Collision Threat Rating (BCTR) of fifteen (15) or less. 1. Facade areas up to sixty (60) feet above grade 2. Facade areas up to sixteen (16) feet (or three (3) feet above the height of mature vegetation, whichever is higher) above green roofs, roof gardens, or landscape/amenity decks.  (Image Source: https://assets-global.website-files.com/63444fe3155378915bcd2b41/654bb9c424348d30b11411ba_Ev%20Guide-Bird%20Friendly%20Evanston%20.pdf)

Exterior Lighting	<u>Lighting control</u> Control to extinguish exterior and decorative lighting on the upper stories of buildings after 11 p.m.
Exterior Features	At grade ventilation grates within twenty (20) feet of glass facades shall have openings such that a 3/4- inch diameter sphere cannot pass through any opening. Exterior pools and fountains shall not be located closer than twenty (20) feet to glass façade areas. (Image Source: https://assets-global.website-files.com/63444fe3155378915bcd2b41/654bb9c424348d30b11411ba_Ev%20Guide-Bird%20Friendly%20Evanston%20.pdf) 

3.1.2 Toronto, Canada

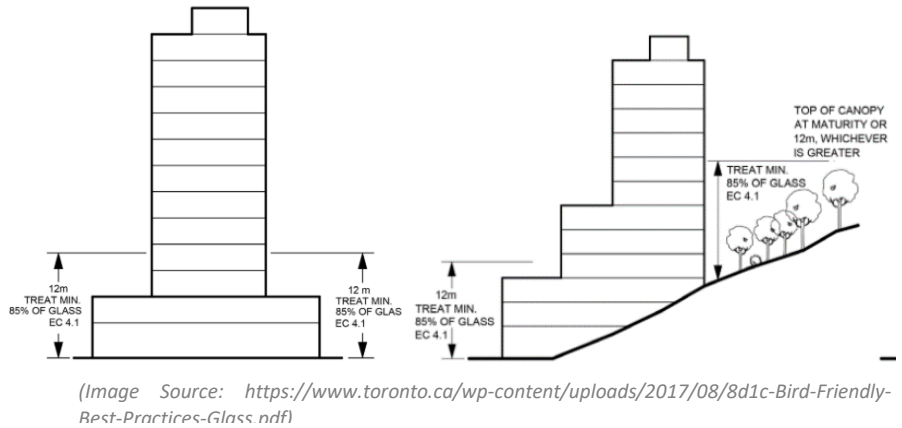
In 2007, the original Bird-Friendly Development Guidelines offered a groundbreaking comprehensive list of strategies to make new and existing buildings less dangerous to migratory birds. The guidelines were developed with the participation of architects, development corporations, property management corporations, bird advocacy groups and city staff.

Building Façade	<u>Area requiring glass treatment</u> • 0-12 m above grade: exterior glass, fly-through conditions and balcony railings • 4 m above rooftop vegetation: exterior glass, fly-through conditions and balcony railings • At all heights: parallel glass such as bridges and walkways • Treating exterior glazing within the first 16 m of the building and providing a denser pattern of visual markers on glass at a spacing of 50 mm x 50 mm. • Visual markers must be designed to meet the following criteria: 1. minimum diameter of 5 mm 2. maximum spacing of 100 mm x 100 mm (Image Source: https://www.toronto.ca/wp-content/uploads/2017/08/8d1c-Bird-Friendly-Best-Practices-Glass.pdf) 
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Building Façade

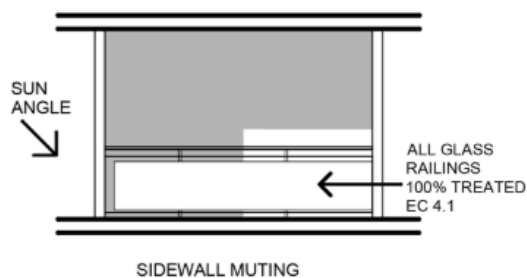
Bird friendly glazing

Treating a minimum of 85 percent of all exterior glazing within the first 12 m of the building above grade (including balcony railings, clear glass corners, parallel glass and glazing surrounding interior courtyards and other glass surfaces)

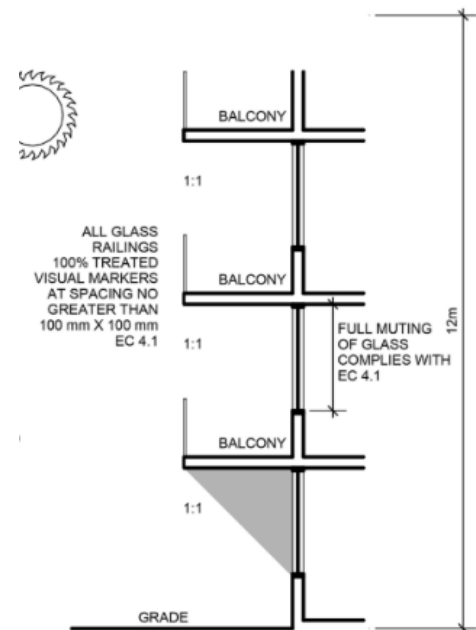


Balcony railings

Treating all glass balcony railings within the first 12 m of the building above grade with visual markers provided with a spacing of no greater than 100 mm x 100 mm.



(Image Source: <https://www.toronto.ca/wp-content/uploads/2017/08/8d1c-Bird-Friendly-Best-Practices-Glass.pdf>)



Fly-through conditions

Glass corners:

Within the first 12m of the building, treat all glazing located at building corners with visual markers at a spacing of no greater than 100 mm x 100 mm.

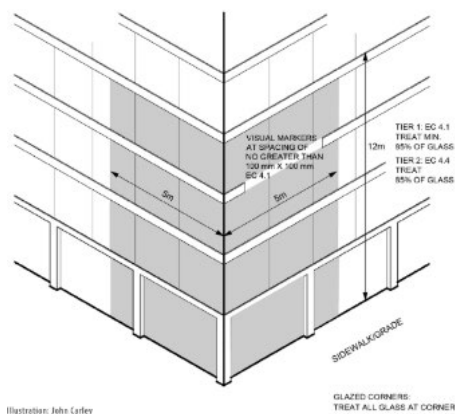
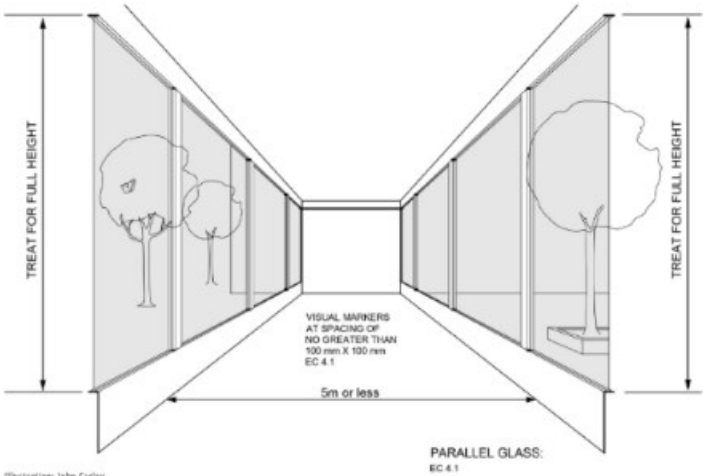
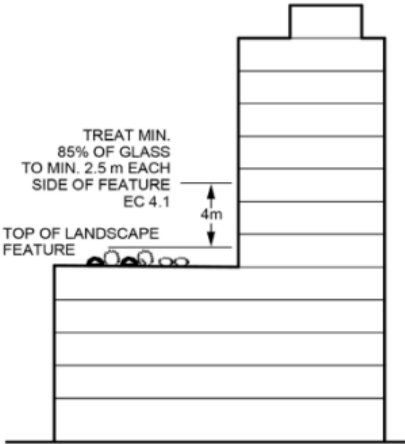
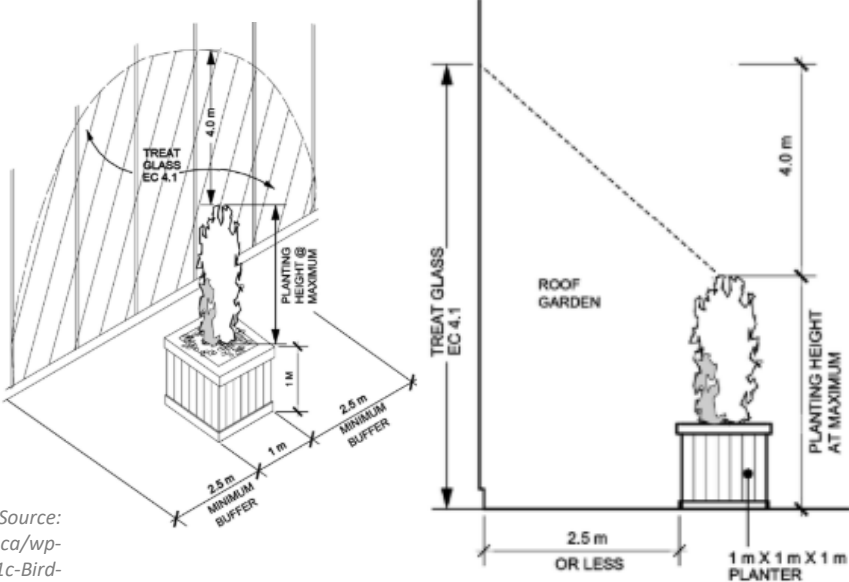


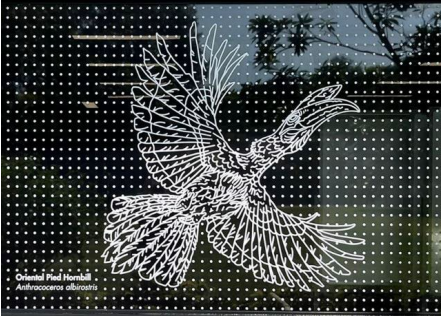
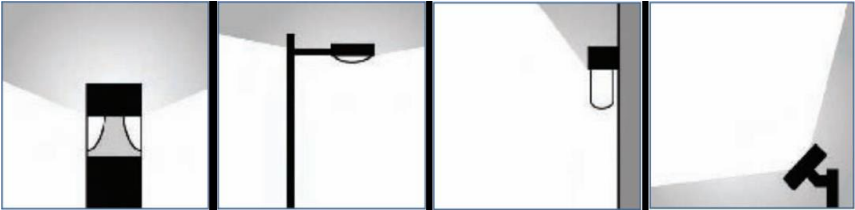
Illustration: John Carley

(Image Source: <https://www.toronto.ca/wp-content/uploads/2017/08/8d1c-Bird-Friendly-Best-Practices-Glass.pdf>)

Building Façade	<u>Parallel glass</u> Treat parallel glass at all heights with visual markers at a spacing of no greater than 100 mm x 100 mm. (Image Source: https://www.toronto.ca/wp-content/uploads/2017/08/8d1c-Bird-Friendly-Best-Practices-Glass.pdf)  The diagram shows a perspective view of a building's parallel glass facade. It illustrates the requirement to treat the glass with visual markers. Labels include: 'TREAT FOR FULL HEIGHT' on both sides, 'VISUAL MARKERS AT SPACING OF NO GREATER THAN 100 mm X 100 mm EC 4.1' in the center, '5m or less' for the distance between markers, and 'PARALLEL GLASS: EC 4.1' at the bottom right. The illustration is credited to John Carley.
Building Façade	<u>Rooftop vegetation</u> Treating the first 4 m of glazing above the feature and a buffer width of at least 2.5 m on either side of the feature.  The diagram shows a cross-section of a building facade with a rooftop feature. It illustrates the treatment requirements for glazing above the feature. Labels include: 'TREAT MIN. 85% OF GLASS TO MIN. 2.5 m EACH SIDE OF FEATURE EC 4.1', 'TOP OF LANDSCAPE FEATURE', and '4m' indicating the height of the treatment area above the feature. (Image Source: https://www.toronto.ca/wp-content/uploads/2017/08/8d1c-Bird-Friendly-Best-Practices-Glass.pdf)
Exterior Lighting	<u>Lighting control</u> Minimize office lighting after-hours by using timers, area control switches and occupancy sensors.  The diagram shows two views of a building facade with a rooftop garden. The left view is a perspective showing the treatment area. Labels include: 'TREAT GLASS EC 4.1', '4.0 m' for the height of the treatment area, 'PLANTING HEIGHT @ MAXIMUM', '2.5 m MINIMUM BUFFER', and '1 m' for the width of the treatment area. The right view is a cross-section showing the treatment area. Labels include: 'TREAT GLASS EC 4.1', '4.0 m' for the height of the treatment area, 'ROOF GARDEN', 'PLANTING HEIGHT AT MAXIMUM', '2.5 m OR LESS' for the width of the treatment area, and '1 m X 1 m X 1 m PLANTER'. (Image Source: https://www.toronto.ca/wp-content/uploads/2017/08/8d1c-Bird-Friendly-Best-Practices-Glass.pdf)

3.1.3 Singapore

The Bird-Safe Building Guidelines focuses on various ways of designing bird-safe building interiors and exteriors. The guidelines take reference from International standards and targets building managers, architects and developers to encourage them to incorporate biophilic design principles into developments. They are also part of the Building and Construction Authority's Green Mark 2021, which aims to encourage the industry and professional to collaborate and develop green building schemes, raising Singapore's built environment's sustainability standards.

Building Façade	<u>Visual markers</u> Maximum spacing of 5 cm by 10 cm, ideally 5 cm x 5 cm to account for even the smallest bird species.  Decals applied onto the exterior glass surfaces of buildings at HortPark. (Image Source: https://www.nparks.gov.sg/-/media/urban-biodiversity/bdg-bird-collisions-updated-25-jun-24.pdf) <u>External screens and netting</u> Netting should be installed at least 7 cm away from the glass surface.
Exterior Lighting	<u>Lighting control</u> Interior lighting should be turned off at night or designed to minimize spill light. Example of up-lighting that can increase the risk of bird-building collisions in urban areas.  (Image Source: https://www.nparks.gov.sg/-/media/urban-biodiversity/bdg-bird-collisions-updated-25-jun-24.pdf)



(Image Source: <https://www.glassonweb.com/news/new-bell-museum-features-bird-safe-glass-windows/>)

University of Minnesota Bell Museum, United State of America

All exterior windows use a custom patterned glass to aid in bird conservation.

The glass features line or dot patterns that are screen printed onto its surface.

Case Studies of Bird-Friendly Design

4 Case Studies

4.1 Case study: Javits Center, New York, USA (Source: A3, P.27)

In 2009, the New York City Audubon Society identified the Jacob K. Javits Convention Center as having one of the highest bird-collision mortality rates in New York City, USA.

A major renovation and expansion, designed by the bird-friendly architectural firm of FXFOWLE, was completed in 2014. Some especially deadly glass at street level was replaced with opaque panels. Large panes of clear fritted glass with varying surface characteristics were brought to the site and compared to find the right combination for birds and people.



(Image Source: <https://calendar.aiany.org/2020/11/05/nycs-bird-friendly-building-law-local-law-15-of-2020/>)



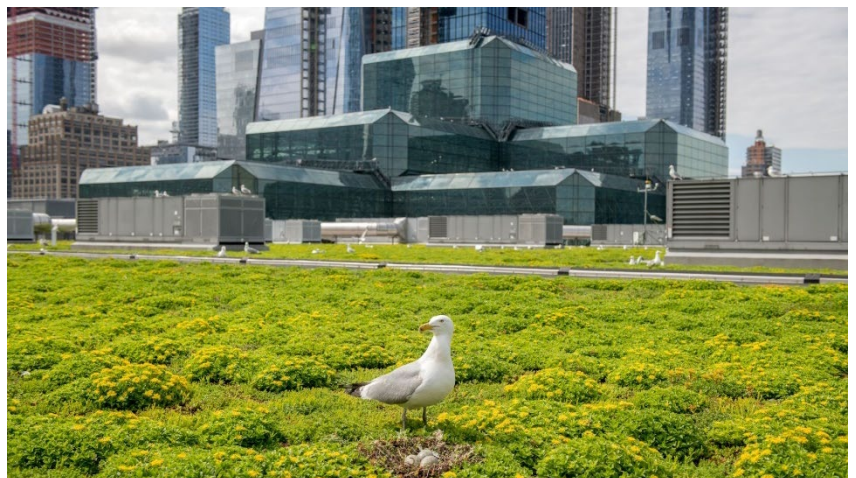
The new glass panes include a frit-dot pattern that alerts birds to the presence of a solid barrier, while blurring reflected images.

(Image Source: <https://pbs.twimg.com/media/ENTSi0XUAIk8-A?format=jpg&name=large>)

After the Javits Center's major renovation and expansion works, NYC Bird Alliance's Project Safe Flight monitoring revealed a striking **90 percent** reduction in collisions at the Center.

The Javits Center new green roof also hosted 150 pairs of nesting Herring Gulls in 2022.

(Source: <https://nycbirdalliance.org/blog/the-javits-center-leading-from-the-rooftops>)



4.2 Case study: Minneapolis Central Library, Minneapolis, USA *(Source: A5, P.32)*



The Minneapolis Central Library incorporates bird-safe design techniques in several ways. Its variegated and curtained facade presents an identifiable pattern to birds, while an indigenous shale and birch garden at the building's north perimeter filters views to and from the main level reading rooms.

(Image Source: <https://pcparch.com/media/pages/work/minneapolis-central-library/00aa61694a-1722322339/minneapolis-central-library-1440x-q80.jpg>)

This technique of planting very close to a building facade, in addition to providing shade, prevents incidents of fatal bird strike. Birds cannot see reflections cast upon the glass and are less likely to develop fatally high speed collision rates due to the close proximity of planting to glass. The Library's central atrium features angled glass, a dramatic architectural feature that also greatly eliminates reflections of habitat and sky from most angles. The likelihood of fatal collisions at this angle is also greatly reduced.



(Image Source: <https://www.viracon.com/projects/view/id/397/>)



(Image Source: <https://pcparch.com/media/pages/work/minneapolis-central-library/2decadccc5-1722322324/minneapolis-central-library-frosted-glass-windows-640x-q80.jpg>)

4.3 Case study: Mei Fu MTR Station

Mei Foo MTR Station is one of the black spots for bird collisions.

According to the Hong Kong Bird Watching Society (HKBWS) report, total 28 bird collisions were found during the period 1 September – 31 December 2022. (Source: A14, P.1)

Pallas's Grasshopper Warbler of "Local Concern" was reported and the bird imprints left on the glass in Mei Fu MTR station. (Source: A14, P.6,7)



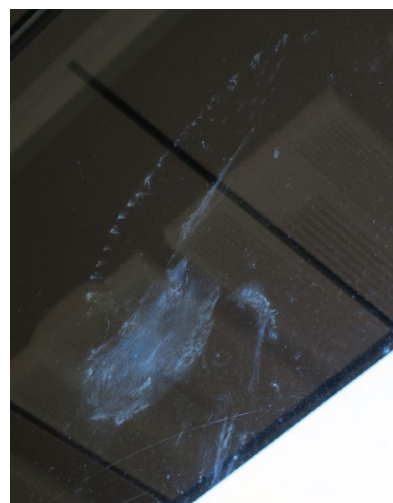
Glass wall without anti-collision film at Mei Foo MTR Station.

(Image Source: https://www.hk01.com/社會新聞/715024/雀鳥疑撞美孚港鐵站亡-落地玻璃變自殺陷阱-觀鳥會籲加防撞貼紙?utm_source=01webshare&utm_medium=referral&utm_campaign=non_native)



Pallas's Grasshopper Warbler of "Local Concern" was reported in Mei Fu MTR station.

(Image Source: <https://www.hkbws.org.hk/cms/phocadownload/submissions/HKBirdWindowCollisionAnalysis2022.pdf>)



The bird imprints left on the glass in Mei Fu MTR station.

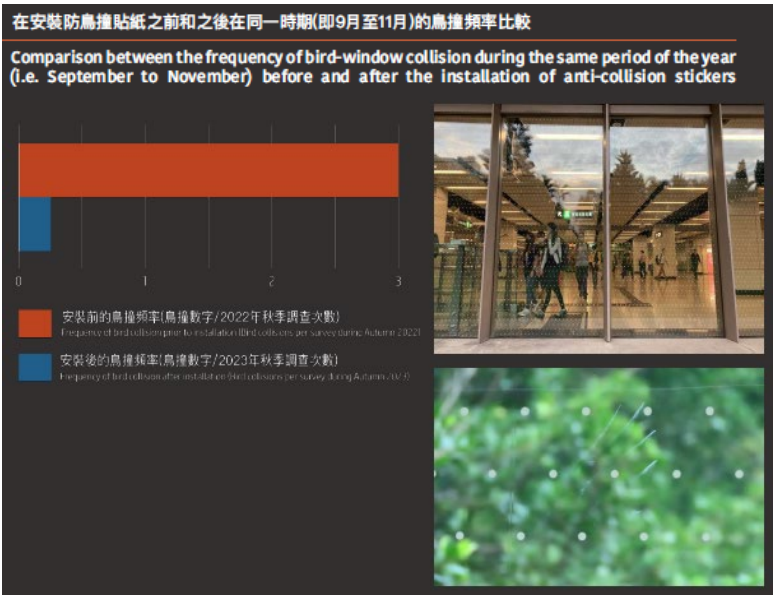
(Image Source: <https://www.hkbws.org.hk/cms/phocadownload/submission/s/HKBirdWindowCollisionAnalysis2022.pdf>)



The MTRC installed anti-bird-collision stickers for a total of 107 high-risk glass panels at Mei Foo MTR Station in December 2022. (Source: A14, P.11)



(Image Source:
[https://www.facebook.com/photo/?fbid=759018976329387&set=a.482273517337269&__cft__\[0\]=AZWx7MJXkWU5f1oQz5ysah5mSYCdQUdPp2iEj2mFMWunYkV5KGQgspyknuM5zuvEd7evPk4NHDAx2WnbGE9TZGRJ6Q96Q56gKWA1OsDumWyzQjclKQinPQmDtNzuCc_rjrVMZ8UtVurpknK5-T0S9ni_-27NGw-dCroFrKdQomyZn-0Pxs6-_y6sHiN9h9nF8&__tn__=EH-R](https://www.facebook.com/photo/?fbid=759018976329387&set=a.482273517337269&__cft__[0]=AZWx7MJXkWU5f1oQz5ysah5mSYCdQUdPp2iEj2mFMWunYkV5KGQgspyknuM5zuvEd7evPk4NHDAx2WnbGE9TZGRJ6Q96Q56gKWA1OsDumWyzQjclKQinPQmDtNzuCc_rjrVMZ8UtVurpknK5-T0S9ni_-27NGw-dCroFrKdQomyZn-0Pxs6-_y6sHiN9h9nF8&__tn__=EH-R))



After installing anti-bird-collision stickers, bird-window collisions were reduced by 90%.
 (Source: A14, A14a, P.36)

(Image Source:
https://cms.hkbws.org.hk/cms/phocadownload/Conservation/BWC2024_HKBWSc.pdf)



(Image Source: <https://ajcarchitects.com/wp-content/uploads/2020/09/Tracy-for-AIA-Award.jpg>)

Tracy Aviary Visitor Center, United State of America
The Tracy Aviary's new LEED Gold Visitors Center meets the requirements of LEED's Reducing Bird Collisions credit, using an array of high- and low-tech solutions, including decals and a dramatic screen.

Tips for Consideration: Building Design

5 Tips for Consideration: Building Design

5.1 Architectural Treatments

Large area of glass façade that are threats to birds, there are ways to reduce the amount of visible glass. Such as decorative facades that wrap entire structures e.g. netting, screens, grilles, shutters and exterior shades are commonly used elements that can make glass safer for birds. They can be retrofitted on an existing building or integrated into the design of a new building, and can significantly reduce bird mortality. We will explore the options commonly used in this section.



The Tracy Aviary's new LEED Gold Visitors Center meets the requirements of LEED's Reducing Bird Collisions credit, using an array of high- and low-tech solutions, including decals and a dramatic screen.

5.1.1 Creating Visual Markers – the 2x 4 Rule

Ceramic dots “frits” or other materials can be screened, printed, or otherwise applied to glass surfaces. This is often done to reduce the transmission of light and heat and can also provide design detail. In some cases, frit patterns are hardly visible, but when designed according to the 2 x 4 rule, patterns on glass can also prevent bird collisions. Patterns on the outside surface of glass deter collisions most effectively because they are always visible, even with strong reflections which are visible to birds. (Source: A3, P.20)

Tips for Designing Visual Markers

- Ensure the pattern density is 10 cm by 10 cm or less
- Visual markers must be at least 5 mm in diameter
- Visual markers are applied to low reflectance glass
- Visual markers should be high contrast
- Exterior surface is the most effective surface to deter bird collisions

The 2 x 4 Rule

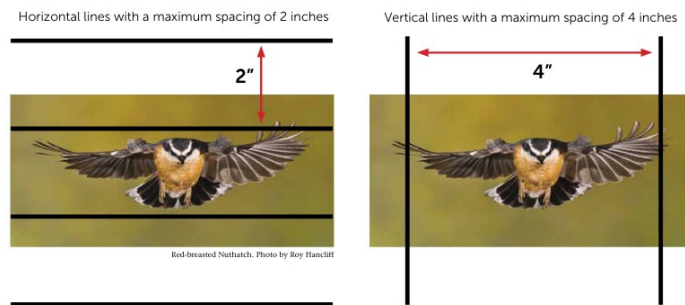


Figure: The 2 x 4 Rule.

(Image Source: https://abcbirds.org/wp-content/uploads/2015/05/Bird-friendly-Building-Guide_2015.pdf)



Pattern is both a branding strategy and deterrent for bird collisions.



5.2 Fritted and Patterned Glass

Using fritted glass is one the simplest and most common ways to make buildings more bird-friendly without jeopardizing architectural façade design. Printed with a ceramic frit or dot pattern, this type of glass is primarily used to reduce glare and help cut a building's cooling costs, but it also makes glass more visible to birds.

If the existing building condition does not allow adding another layer over the glazing, an alternative method is to put visible patterns on the glazing. This could be as simple as taping vertical or horizontal lines onto the glass following the 2 x 4 inches safe spacing rule. It is better when patterns are on the external side of the glass as their visibility will not be affected by even the strongest reflections.

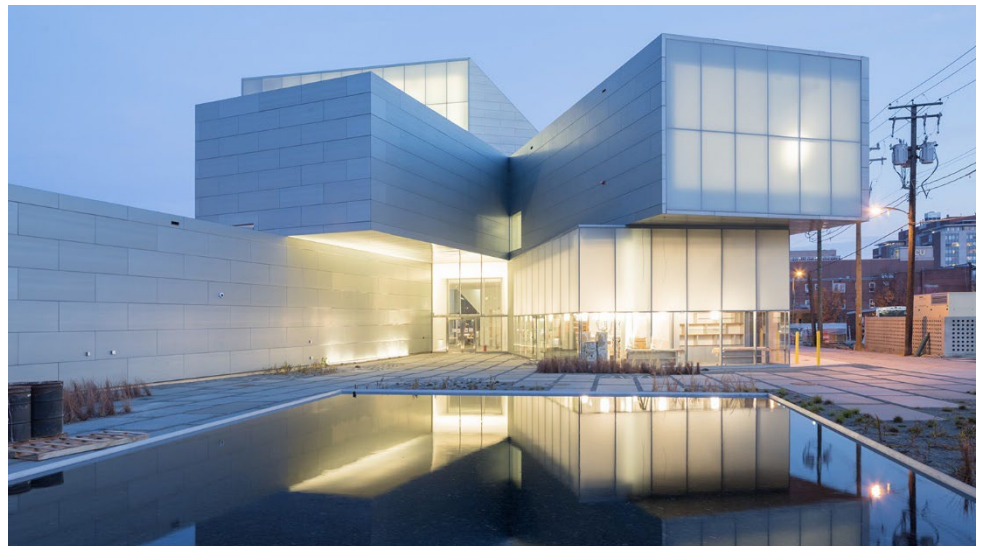


Fritted patterned glass (exterior or interior) which does not affect the visual from interior.

(Image Source: <https://www.urbanwildlifetrust.org/portfolio/project-window-strike/>)

5.2.1 Translucent Glass

Similar to patterned glass, glass with reduced reflectiveness and transmission rates can be retrofitted using sandblasting on-site or incorporated into the design at the very beginning. The result might run against the stereotype of glass being clear and shiny, creating a soft and dreamy appearance. By sacrificing transparency, birds' life and safety and people's privacy are secured.



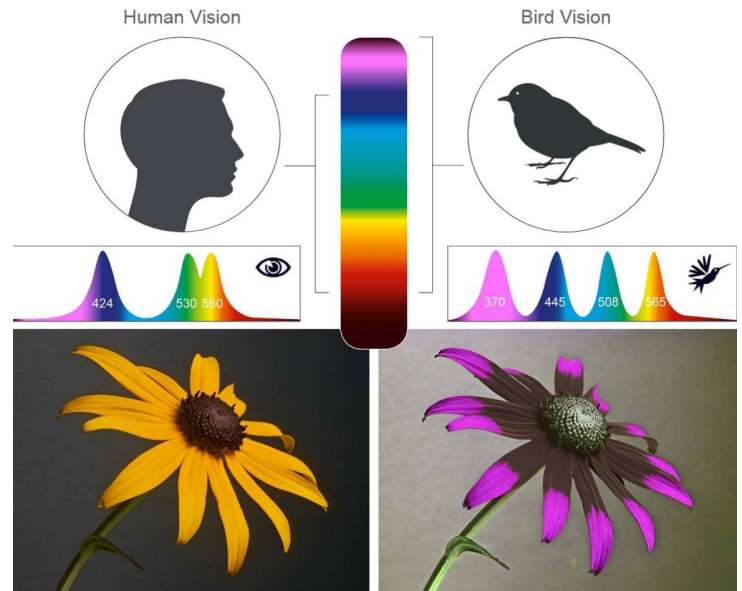
Institute for Contemporary Art, VCU by Steven Holl Architects, Richmond, Virginia.

(Image Source: <https://blog.architizer.com/wp-content/uploads/Steven-Holl.jpg>)

5.2.2 Bird vision

The world of birds is awash in a vibrant spectrum of colors invisible to human eyes. Their tetrachromatic vision allows them to perceive ultraviolet light, a dimension absent in our visual experience.

Unlike humans, birds cannot distinguish between transparent glass and open space. They often mistaken reflective surfaces for potential flyways, leading to fatal collisions. This is further exacerbated by the ability of glass to reflect ultraviolet light, creating patterns invisible to us but highly attractive to birds increasing their risks of injury or death.



Comparison of human and bird vision.

(Image Source: <https://photographyoftheinvisibleworld.blogspot.com/2017/09/>)

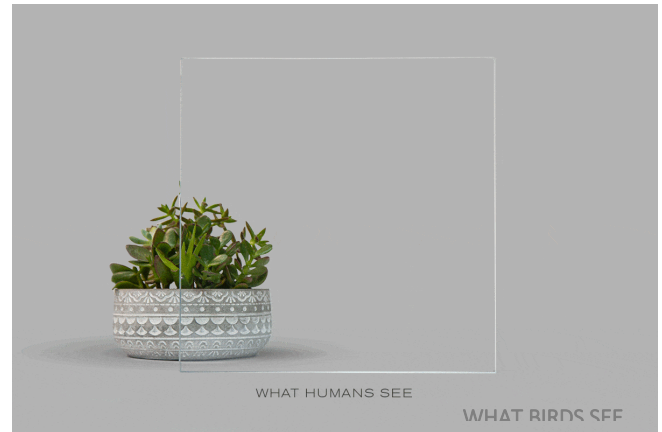


Bird safe ultraviolet reflective pattern glass.

(Image Source: <https://glas-pro.com/products/bird-safe-glass/ultraviolet-reflective-pattern/>)

5.2.3 UV Coated Glass

To retain the transparency and reflectiveness of glazing but still reducing bird collisions chances, ultraviolet coated glass can be considered. The principle behind this is that UV lights are visible to most avian visions but not to human visions. Therefore, using paints that reflect UV lights to paint patterns on glass following the 2 x 4 rule can partially achieve the protective effects of patterned glass without disrupting human's views.



Use of UV coated glass to maintain the necessary transparency and reflectiveness.

(Image Source: <https://glas-pro.com/products/bird-safe-glass/ultraviolet-reflective-pattern/>)



Use of UV coated glass to maintain the necessary transparency and reflectiveness.

(Image Source: <https://glas-pro.com/products/bird-safe-glass/ultraviolet-reflective-pattern/>)



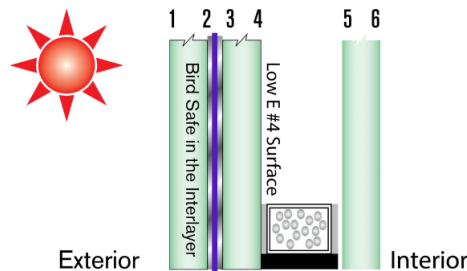
Nonetheless, some types of birds such as raptors, kingfishers, hummingbirds, and pigeons, are less sensitive to UV lights, so the range of lights reflected by the coating needs to be carefully tested to adapt to all birds' eyes while minimizing its visibility to human eyes. UV coated glass is a more costly solution and are often not recommended as certain birds are less sensitive to UV light.

Vassar College Bridge for Laboratory Sciences

(Image Source: https://www.architectmagazine.com/project-gallery/vassar-college-bridge-for-laboratory-sciences-integrated-science-commons_o)

FEATURES

- Laminated Safety glass ANSI z97.1
- Meets the performance standards required throughout North America when combined with high-performance low-E glass.
- Earned a Threat Factor of 21
- LEED Innovation: Bird Collision Deterrence
- Highly-transparent to the human eye
- Fast lead times
- Made in the United States
- Easy to implement at the manufacturing stage
- Requires minimum upkeep
- High quality offers extremely long-life



Product	Outboard - Inboard Substrate	Appearance	Transmittance			Reflectance			U-Value Winter Nighttime		Relative Heat Gain	Solar Heat Gain Co-efficient	Light to Solar Gain (LSG)
			Visible Light %	Ultra-violet %	Solar Energy %	Visible Light Out %	Visible Light In %	Solar Energy Out %	Air	Argon			
4mm/062 BirdSafe / 6mm Low E / Air Space / 6mm (Coating on the #4 surface)													
SNX 62/27 with GlasPro Bird Safe	UltraClear - UC/UC Clear - Clr/Clr	Ultra Clear Clear	63	0	23	11	12	51	0.28	0.23	64	0.26	2.37
			59	0	21	11	12	39	0.28	0.23	64	0.26	2.25
SNX 51/23 with GlasPro Bird Safe	UltraClear - UC/UC Clear - Clr/Clr	Light Blue Light Blue	52	0	19	14	14	45	0.28	0.23	56	0.23	2.26
			49	0	17	14	13	36	0.28	0.23	56	0.23	2.14
SN 68 with GlasPro Bird Safe	UltraClear - UC/UC Clear - Clr/Clr	Ultra Clear Clear	69	0	34	11	12	42	0.28	0.24	92	0.39	1.79
			66	0	30	11	12	33	0.28	0.24	89	0.37	1.77

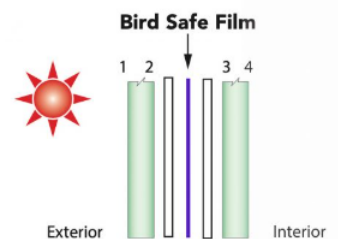
Laminated (Outdoor Exposed Edges Use TPU or SGP)

Ideal for Glass Railings

	AI*	Visible Light	Reflectance	SHGC
Clear Bird Safe Clear	79 - 84	88	8	77
Low Iron Bird Safe Low Iron	79 - 84	89	8	76

* AI is the American Bird Conservancy "Avoidance Index"

(Image Source: <https://glas-pro.com/products/bird-safe-glass/ultraviolet-reflective-pattern/>)



5.2.4 Uneven Surface

Angled surfaces can also help prevent bird collisions as they create contrast and uneven reflections, preventing the illusion of continued space. This approach was used at Herzog & de Meuron's AstraZeneca research centre in Cambridge (right). The architect says it has so far been "very successful" in deterring birds.

At Southampton Maggie's Center, architect AL_A opted for mottled stainless steel cladding in place of flat mirrors, while Studio Gang used undulating balconies to break up walls of windows at the Aqua Tower in Chicago.

Southampton Maggie's Center

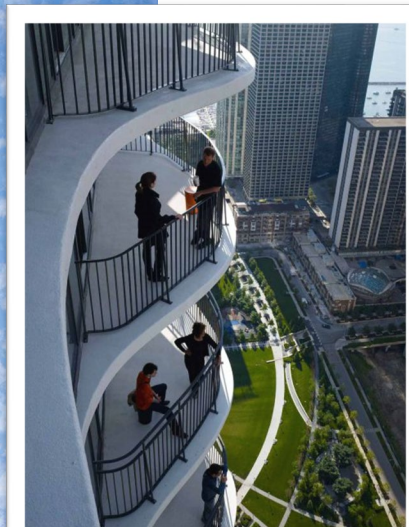


(Image Source: <https://www.archdaily.com/774920/al-a-submits-plans-for-southampton-maggies-center>)



Herzog & de Meuron's AstraZeneca research centre in Cambridge

(Image Source: https://static.dezeen.com/uploads/2022/03/the-discovery-centre-disc-astrazeneca-by-herzog-and-de-meuron-cambridge_dezeen_2364_sq.jpg)



The glass and lights of skyscrapers in downtown Chicago pose danger to hundreds of thousands of migratory birds. But the 82-story Aqua Tower Studio Gang is a beacon of a different sort: one for architects embracing bird-friendly design. Compared to some of its neighbors, the Aqua Tower is safer for birds because its undulating, wave-like balconies and fritted glass break the reflections that confuse birds and invite collisions.

Studio Gang's designed Aqua Tower is one of few tall buildings to create a community on its facade.

(Image Source: <https://parametric-architecture.com/aqua-tower-by-studio-gang/>)

5.2.5 Decals and Stickers

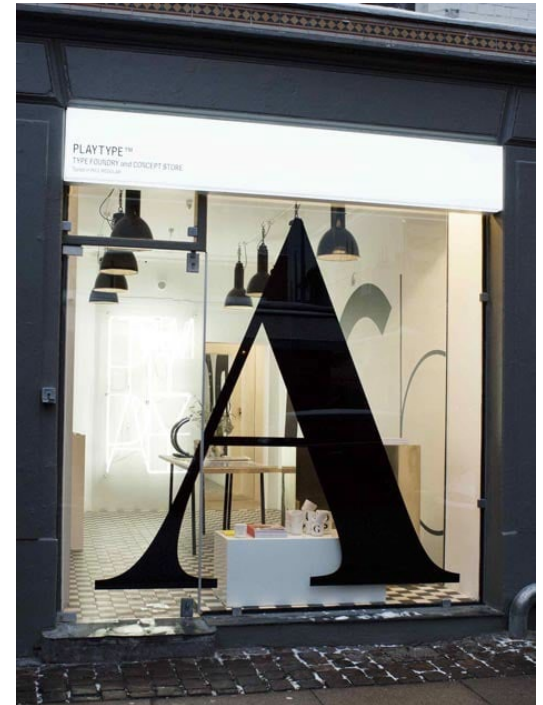
One of the more familiar low-tech solutions available is decorative stickers or decals. These can range from stickers that resemble silhouettes of animals to simple strips of tape.

If applied correctly to the outside of a reflective surface, birds can identify decals as obstacles that they must try to fly around. Mei Foo MTR station used retrofit stickers which reduced by 90% of the bird collisions.

Many factors come into play in selecting how to make glass safe for birds. The table below compares common solutions according to their effectiveness, appearance, relative cost, ease of application, longevity, and required maintenance. (Source: A3, P.49)

COMPARISON OF RETROFIT OPTIONS						
Material	Effectiveness	Cost	Application	Appearance	Longevity	Upkeep
Seasonal, temporary solutions	*****	\$	*	*	na	na
Netting	*****	\$\$	**	***	****	***
Window film	*****	\$\$\$	****	*****	***	****
Screens	*****	\$\$	***	****	*****	****
Shutters	*****	\$\$\$	***	****	*****	****
Grilles	*****	\$\$\$	****	*****	*****	****
Replace glass	*****	\$\$\$\$\$	*****	*****	*****	****
5 stars/dollars =	highly effective	expensive	easy	attractive	long-lasting	minimal

Comparison of retrofit options.



Decals can also serve a decorative purpose, such as on shop windows.

(Image Source: <https://www.dezeen.com/2011/03/01/playtype-foundry-and-concept-store-by-e-types/>)

5.2.6 Digital Printing Glass

Ceramic screen printing a ceramic coating onto glass while toughening is an optimal method for wall cladding and spandrels. It also offers low maintenance and enhanced heat resistance compared to annealed or laminated glass. Print striking, colorful designs with high-performance inks for architecture and interior design.

- High gloss and wide color gamut
- High mechanical, chemical, and weather resistance
- RAL and Pantone color matching library



Comparison of retrofit options.

5.2.7 Additional Exterior Layer- Double Skin/ Recessed Facades



One of the bird friendly design option is to incorporate during design stage, with an additional layer outside the glazed area in the architectural design can help reduce the size of the visual voids. The additional layer could be external nettings, grilles, shutters or anything that visually breaks the visible glass area down. These could be either applied to only the glazing area or incorporate into the façade design. This additional skin can be aesthetically pleasing while assure natural lighting and views inside the building.

Orange Cube by Jakob + Macfarlane Architects.

(Image Source: <https://blog.architizer.com/wp-content/uploads/Orange-cube.jpg>)

5.2.7 Artificial Lights

When birds encounter beams of light, especially in inclement weather, they tend to circle in the illuminated zone. One of the easiest ways to decrease bird collisions is by simply turning off lights in buildings at night as well as buildings are designed not to be overlit.

Exterior Lighting

- Install only shielded, downward-directed fixtures.
- Limit lighting to areas where required for safety and security.
- Limit exterior architectural lighting to grade level.
- Prohibit spots, floods, and advertising lighting during bird migration months: March through early June and August through mid-November.

Lights at staircases and rooftops often attracts birds circle around the illuminated zone, causing collision.

(Image Source:

https://www.oregonlive.com/environment/2011/03/light_pollution_lites_out_for.html)





(Image Source: <https://www.brplusa.com/projects/florida-international-university-tamiami-hall>)

*Florida International University (FIU), Tamiami Hall
and College of Engineering & Computing Center, USA
The presence of a native tree forest on campus to prevent
bird-glass strikes resulting from reflection and transparency.*

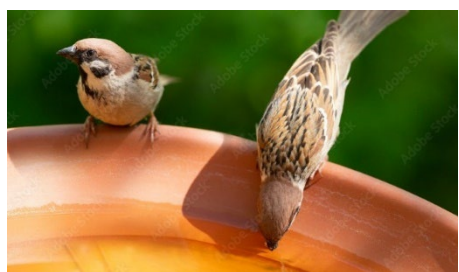
Tips for Consideration: Landscape Design

6 Tips for Consideration: In Landscape Design



Food and water are
absolute basics

- How is the context??
- Bird needs ??
- We can provide ?



Landscape design

1. Foods (plantings)
2. Shallow water
3. Shelter (plants for hiding) and
4. Silent corner (undisturbed space)



6.1 Planning Stage

Good Practice:

- Assess the existing habitat and identify any bird nesting or foraging areas (築巢或覓食區域) on the site
- Conduct tree survey to understand the existing tree conditions and species
- Develop a plan to preserve and enhance existing bird-friendly features, such as food source and resting place for birds.
- Retain existing trees especially native/ fruit trees as far as possible for bird nesting and food sources
- Avoid or minimize tree removal during breeding seasons (繁殖季節) (in general 3M – 8M)/ of the record bird type.
- Set buffer zones around any active nests or sensitive area to minimize disturbance



© Jay Kong/ HKBWS

(Image Source: <https://cms.hkbws.org.hk/cms/join-us-tw/zh-tw/project-tw/endangered-species-tw/bfs/bfs-census-2023>)

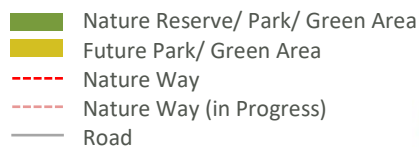
6.1.1 Design tips for size and shape



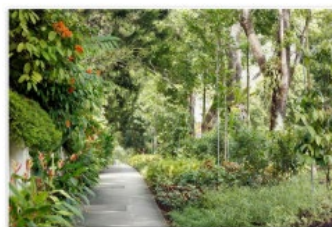
	Better	Less Good
a. Design in a larger habitat patch is better than a small patch for biodiversity.		
b. Design in circular habitat patches are better than other shapes.		
c. Design in a one large habitat patch is better than several small isolated patches.		
d. Design in connected patches are better than isolated patches of similar sizes.		
e. Design in a greener landscape matrix e.g. green belt is better than concreted areas.		

6.1.2 Case Study: Park Connectors in Singapore

The island-wide network of green links are formed to improve connectivity to major parks, nature sites and housing estates in Singapore, by taking advantage of drainage and road reserve land.



Bedok Nature Way



Jalan Jurong Kechil Nature Way



Ang Mo Kio Nature Way



Sembawang-Woodlands Nature Way

(image Source: <https://www.nparks.gov.sg/-/media/handbook-on-habitat-restoration/handbook-on-habitat-restoration-chapter-07.pdf>)

6.1.3 Detailed Design Stage

Good Practice:

- Utilize multi-layer planting and diverse species to create diverse habitat for different bird species
- Select native plant species that offer food and shelter for local bird species
- Incorporate green roofs to provide additional habitat and foraging opportunities for birds
- Incorporate water sources, such as bird baths or small ponds, to provide drinking and bathing
- Water features and vegetation should not be stayed at least 5 m from glass façade area

Figures: Habitat Preferences of Birds



Nectar Feeders



Fork-tailed Sunbird
叉尾太陽鳥



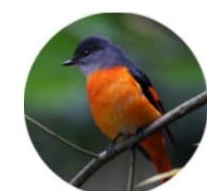
Swinhoe's White-Eye
暗綠繡眼鳥



Seed Eaters



Yellow-cheeked Tit
黃頰山雀



Grey-chinned Minivet
灰喉山椒鳥



Spotted Dove
珠頸斑鳩



Insectivores



Yellow-cheeked Tit
黃頰山雀



Grey-chinned Minivet
灰喉山椒鳥



Black-throated Laughingthrush
黑喉噪鵲



Fruit Eaters



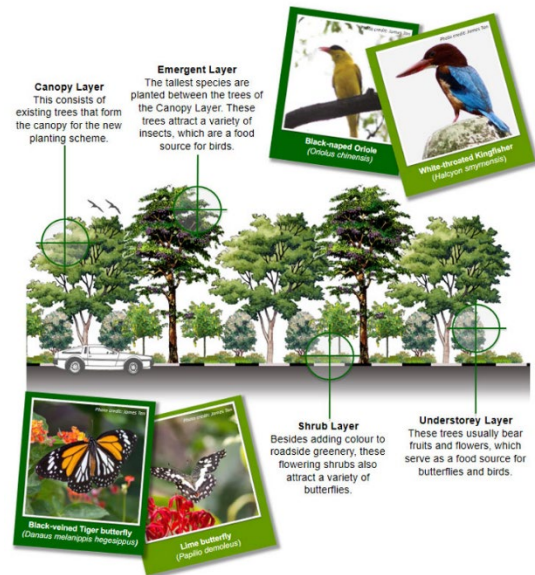
Oriental Magpie-robin
鵲鴝



Black-throated Laughingthrush
黑喉噪鵲



Red-whiskered Bulbul
紅耳鸲



Habitat Preference:

Shrubs and trees for foraging, perching and nesting. Some require hollows for nesting

Food Source: Flowers

Habitat Preference:

Shrubs and trees for perching, nesting and foraging

Food Source: Seed

(Image Source:

https://www.plkcastar.edu.hk/greencastar/c/bird/common_birds_found_in_tsi_ng_yi/kinds_of_bird_in_ty/forktailed_sunbird.htm
<https://www.hkbws.org.hk/BBS/viewthread.php?tid=10737>
<https://minimacau.com/bird/%E6%A0%97%E8%83%8C%E7%9F%AD%E8%85%B3%E9%B5%AF-chestnut-bulbul/>
<https://www.hkbws.org.hk/BBS/viewthread.php?action=printable&tid=13672>

Habitat Preference:

Dense shrubs for protection and nest sites as well as some open areas for foraging

Food Source: Insects

Habitat Preference:

Tall tree and dense shrub for foraging, perching and nesting

Food Source: Fruit

<https://www.wetlandpark.gov.hk/en/biodiversity/beauty-of-wetlands/wildlife/spilopelia-chinensis>
<https://www.hkbws.org.hk/BBS/redirect.php?tid=26295&goto=lastpost>
https://encrypted-tbn3.gstatic.com/images?q=tbn:AND9GcSKdJDh_YtwVdQemsrjOP_WFT-HXwx7TLCrw4cT13BqrUE7hJrd
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6.1.4 Tips for Consideration: Planting Palette

A diversity of native plants, which have evolved to thrive in local conditions. (Source: A10, P.14; A12, P.2; A24; A29)

 Nectar Feeders	 Insectivores
Fork-tailed Sunbird 叉尾太陽鳥 Swinhoe's White-Eye 暗綠繡眼鳥	Yellow-cheeked Tit 黃頰山雀 Grey-chinned Minivet 灰喉山椒鳥 Black-throated Laughingthrush 黑喉噪鵲
Habitat Preference: Shrubs and trees for foraging, perching and nesting. Some require hollows for nesting	Habitat Preference: Dense shrubs for protection and nest sites as well as some open areas for foraging
Food Source: Flowers	Food Source: Insects
 Suggested Tree	 Suggested Tree
Bridelia tomentosa 土蜜樹 Schefflera actinophylla 傘樹 Eucalyptus robusta 大葉桉	Michelia x alba 白蘭 Larvae of Graphium agamemnon 統帥青鳳蝶幼蟲 Cinnamomum camphora 樟樹 Larvae of Charaxes bernardus 白帶螭蛱蝶幼蟲
 Suggested Shrub	 Suggested Shrub
Clerodendrum myricoides 藍蝴蝶 Senna bicapsularis 雙英決明 Clerodendrum japonicum 赭桐	Michelia figo 含笑 Larvae of Graphium doson 木蘭青鳳蝶幼蟲 Asclepias curassavica 馬利筋 Larvae of Danaus chrysippus 金斑蝶幼蟲

 Seed Eaters	 Fruit Eaters
Yellow-cheeked Tit 黃頰山雀 Grey-chinned Minivet 灰喉山椒鳥 Black-throated Laughingthrush 黑喉噪鵲	Oriental Magpie-robin 鵲鴝 Black-throated Laughingthrush 黑喉噪鵲 Red-whiskered Bulbul 紅耳鶯
Habitat Preference: Shrubs and trees for perching, nesting and foraging	Habitat Preference: Tall tree and dense shrub for foraging, perching and nesting
Food Source: Seed	Food Source: Fruit
 Suggested Tree	 Suggested Shrub
Schefflera actinophylla 傘樹 Ficus variegata 青果榕 Triadica cochinchinensis 山烏桕	Rhodomyrtus tomentosa 桃金娘
Ficus microcarpa 細葉榕 Celtis sinensis 朴樹 Ilex rotunda 鐵冬青	Psychotria asiatica 九節

6.2 Construction Stage

Good Practice:

- Implement erosion and sediment control measures to protect nearby water bodies and wetlands
- Construction activities avoid disrupting critical breeding or migratory periods for birds

Tai Po tree pruning incident:

【大埔鷺鳥林】雛鳥巢邊下刀剪樹 碎蛋亂枝堆坡底 鳥成群不復見



(Image Source: https://www.hk01.com/社會新聞/96392/大埔鷺鳥林-雛鳥巢邊下刀剪樹-碎蛋亂枝堆坡底-鳥成群不復見?utm_source=01webshare&utm_medium=referral&utm_campaign=non_native)

6.3 Maintenance Stage

Good Practice:

- Avoid tree pruning if there is bird nest
- Reduce chemical use, avoid use of pesticides or other chemicals that could be harmful to birds
- Install signage to raise awareness about the bird-friendly design features

Contract Ref.: AFCD/SQ/303/20/C
Mai Po Inner Deep Bay Ramsar Site
Waterbird Monitoring Programme
2021 - 22

Egretty Counts in Hong Kong,
with particular reference to the
Mai Po Inner Deep Bay Ramsar Site

Summer 2022 Report

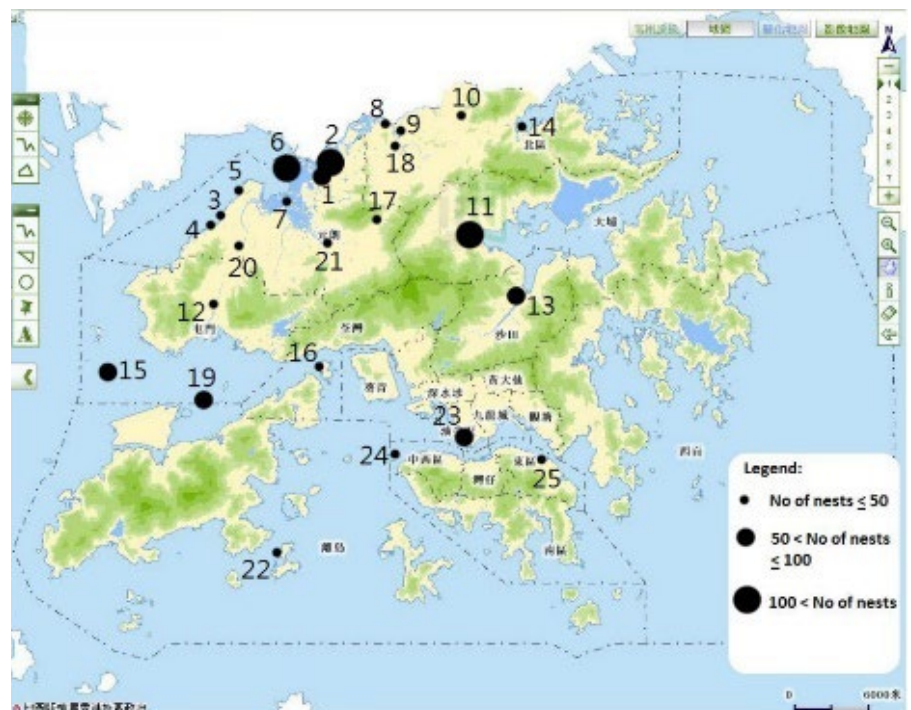


Submitted by
The Hong Kong Bird Watching Society

To Agriculture, Fisheries and Conservation Department,
Hong Kong SAR Government

November 2022

Printed on Recycled Paper



(Image Source: <https://www.hkbws.org.hk/cms/component/phocadownload/file/841-egretry-summer-report-2022>)



(Image Source: https://bau.com.hk/article/2024-02/02/content_1204078185601658880.html)

Birds flying in Mai Po Nature Reserve in Hong Kong

Summary and Conclusion

7 Summary and Conclusion

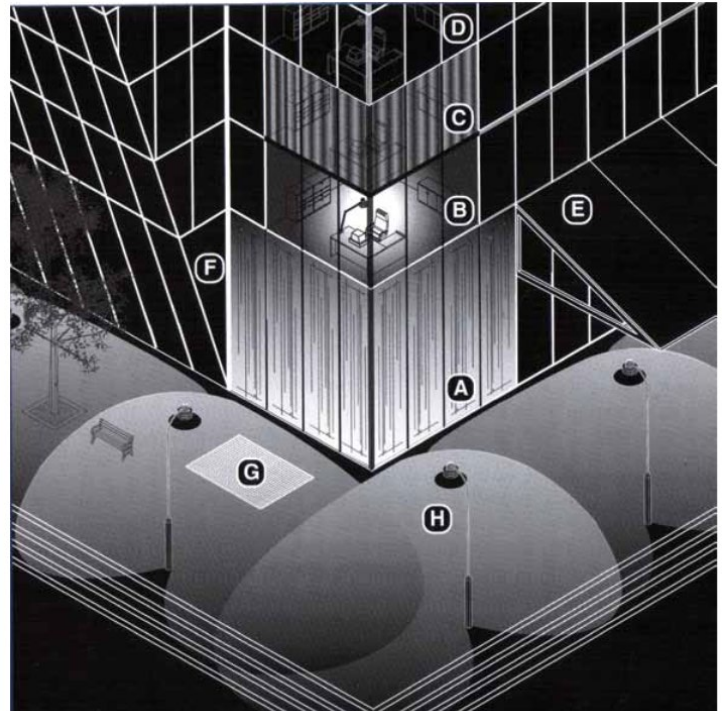
Based on the above studies, the following strategy and considerations could be considered. Due consideration shall also be given based on the local parameters, existing ecosystem and urban design shall be taken into account holistically.

Local guidelines shall be developed to address the area's parameters with thorough technical assessments.

7.1 Comprehensive Site Strategy

The overall rate of collisions at a given building is based on many variables. Solutions can be implemented at the initial design stage or with modifications or operational changes. The following examples represent a comprehensive bird-friendly site strategy. (Source: A5, P.27)

- A. Treatment applied to glass projecting visual markers to make it visible to birds
- B. Task lighting in use after dark
- C. Blinds drawn after dark
- D. Lights off after work hours
- E. Awning blocks reflections on lobby windows from above
- F. Glass effectively angled to reduce strike angle and project reflections downward



7.2 Planning Stage

- ☐ Assess the existing habitat and identify any bird nesting or foraging areas on the site
- ☐ Develop landscape plan that preserves and enhances existing bird-friendly features, such as mature trees, native species and water sources
- ☐ Conduct tree survey to understand the existing tree conditions and species
- ☐ Retain existing trees especially native/ fruit trees as far as possible for bird nesting and food sources
- ☐ Avoid or minimize tree removal during breeding seasons
- ☐ Set buffer zones around any active nests or

7.3 Detailed Design Stage (Building)

Building window design and placement considerations:

- ☐ Use of windows with patterns, stripes or other visual markers that are visible to birds, reducing the risk of collisions
- ☐ Avoid large, uninterrupted expanses of glass, especially on the ground floor or near vegetation
- ☐ Position windows to minimize reflection of the surrounding landscape and sky
- ☐ Atrium design with interior landscaping not to be visually connected directly with the exterior

7.3 Detailed Design Stage (Building) (cont')

Architectural special feature considerations:

- ☐ Incorporate nesting ledges, cavities or other architectural elements that can serve as bird habitat
- ☐ Avoid using sharp, exposed edges or narrow spaces that could trap or injure birds
- ☐ Design building overhangs, eaves or porches to provide shelter and nesting sites for birds
- ☐ Downward lighting and designed to minimise light pollution especially at night hours

7.4 Detailed Design Stage (Landscape)

- ☐ Utilize multi-layer planting and diverse species to create diverse habitat for different bird species
- ☐ Select native plant species that offer food and shelter for local bird species
- ☐ Incorporate green roofs to provide additional habitat and foraging opportunities for birds
- ☐ Incorporate water sources, such as bird baths or small ponds, to provide drinking and bathing
- ☐ Water features and vegetation should not be located closer than 5 m to glass façade area

7.5 Construction Stage

- ☐ Implement erosion and sediment control measures to protect nearby water bodies and wetlands
- ☐ Construction activities avoid disrupting critical breeding or migratory periods for birds

7.6 Maintenance Stage (By Operator / Management Office)

- ☐ Reduce chemical use, avoid use of pesticides or other chemicals that could be harmful to birds
- ☐ Install signage to raise awareness about the bird-friendly design features

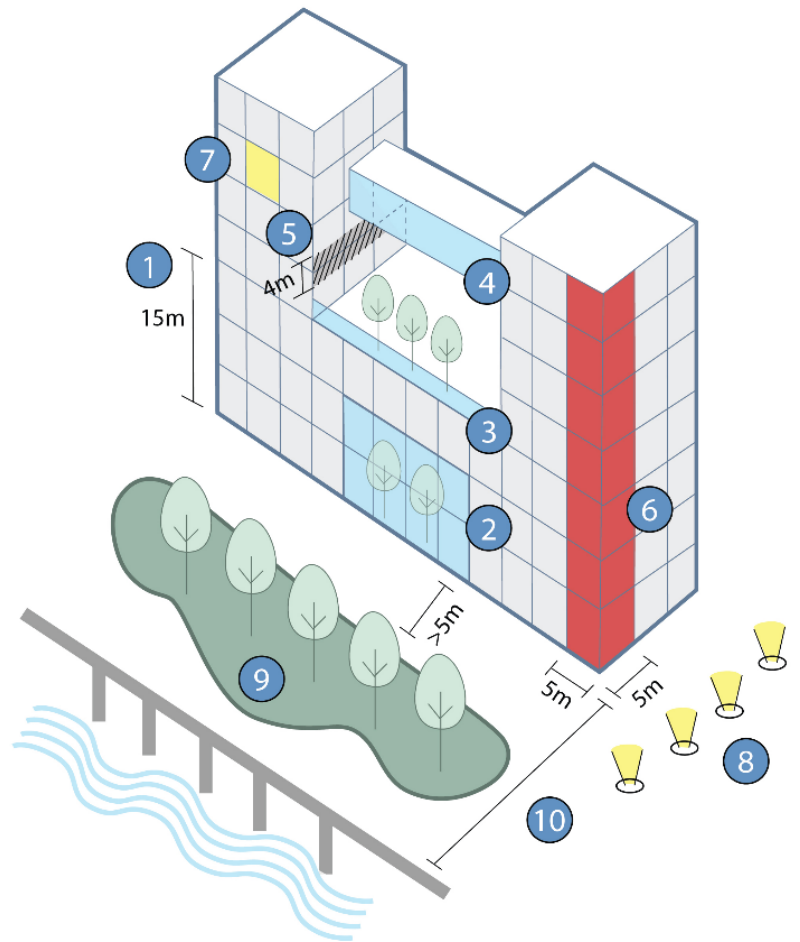
Outdoor lighting:

- ☐ Use downward-facing or fully shielded outdoor lighting to minimize light pollution
- ☐ Avoid bright, continuous lighting that can disorient and disrupt migratory birds

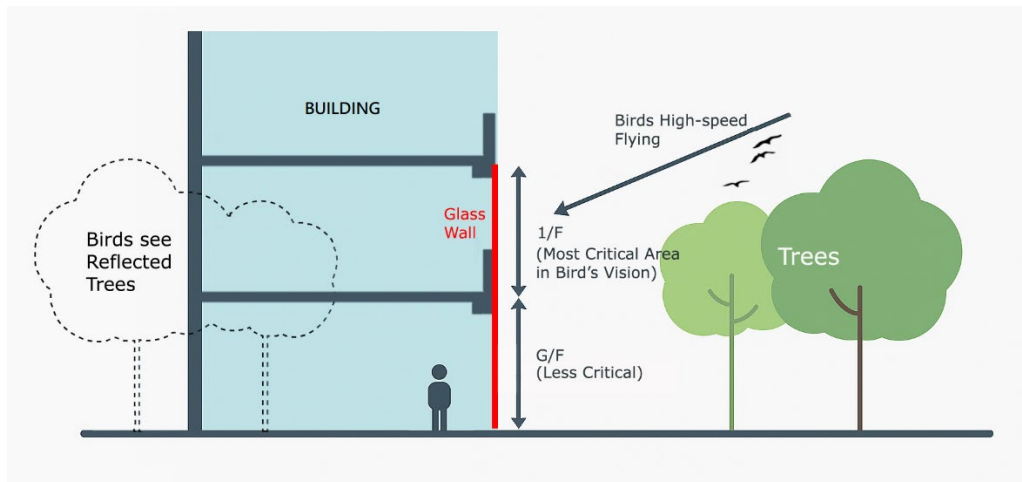
7.7 Summary and Conclusion

7.7.1 A Visual Guide and Recommendation

- 1 Lower Zone (15m from Ground Floor Level) is high risk zone
- 2 Avoid internal atrium / plants in proximity of glass wall
- 3 Glass parapet at podium level should be considered with measures
- 4 Parallel glass at footbridge enclosure should be treated with measures
- 5 4m above the top of the vegetation at podium level, shall be considered with glass treatments
- 6 Critical corner zone of 5m each side (especially at low zone <15m) should be carefully designed and treated. For high zone, the glass wall should avoid direct see through
- 7 Task lighting should be considered during night hours
- 8 Minimize light pollution and consider the use of downward-facing lights with shields
- 9 Design of landscaping in connected patches and green belt
- 10 Allow sufficient setback zone from waterfront to glass wall



7.7.2 Critical Area Consideration on Glazing Design



Project team shall take into consideration different site situations and derive suitable measures case by case.

For example, the location of the markers at the glasswall near a tree may be more suitable at 1/F instead of G/F to avoid collision of birds flying from higher level towards the reflected image of the tree.

7.7.3 Recommended Possible Design Measures on Glazing

Recommended Measures for different situations	No measure required	Light visual markers (50x100mm)	Heavy visual markers (25x25mm)	No/Low reflective glass (not >20% glass reflectance)	Avoid
<u>No / low risk situation</u> - Large surface glass wall at high level (above 15m from GFL) - Large surface glass wall at low level (below 15m from GFL) - Large surface glass wall above landscape deck vegetation (4m above top of vegetation) - Corner situation with transparent glass (below 15m from GFL) - Corner situation with transparent glass (above 15m from GFL) - Glass parapet (below 15m from GFL) - Parallel Glass (e.g. Glass bridge with two side wall in transparent glass) (at all height)	X X X X X X	X			
<u>With vegetation at the vicinity of the glass wall (within 5m inside or outside)</u> - Large surface glass wall at high level (above 15m from GFL) - Large surface glass wall at low level (below 15m from GFL) - Large surface glass wall above landscape deck vegetation (4m above top of vegetation) - Corner situation with transparent glass (above 15m from GFL) - Corner situation with transparent glass (below 15m from GFL) - Glass parapet (below 15m from GFL) - Parallel Glass (e.g. Glass bridge with two side wall in transparent glass) (at all height)	X	X X X X X	X		
<u>Adjacent to area of high bird population (e.g. bird watching zone, large scale park area with dense vegetation)</u> - Large surface glass wall at high level facing the area with birds (above 15m from GFL) - Large surface glass wall at low level (below 15m from GFL) - Large surface glass wall above landscape deck vegetation (4m above top of vegetation) - Corner situation with transparent glass (above 15m from GFL) - Corner situation with transparent glass (below 15m from GFL) - Glass parapet (below 15m from GFL) - Parallel Glass (e.g. Glass bridge with two side wall in transparent glass) (at all height)		X X	 X X X X X	X X X X X	 X X X

Remarks:

1. Facade lighting lit up at night time casting directly onto birds shall be prohibited.
2. Alternatives to visual markers may be considered if other measures such as architectural fins, features, screens etc. of suitable density / design are proposed on the façade.



(Image Source: <https://wetlandpark.gov.hk/tc/biodiversity/reserve-highlights/bird-of-the-month/saxicola-stejnegeri/1>)

Amur Stonechat 黑喉石鵲

Amur Stonechat is a common spring and autumn passage migrant and winter visitor.

Other Studies and Wayforward

8 Other Studies and Wayforward

8.1 Shenzhen (Feb 2024) Consultation Paper

深圳新編鳥類友好城市規劃與設計指引

- 深圳市規劃和自然資源局 (2024年02月) 發布《鳥類友好城市規劃與設計指引 (征求意见稿)》，在全國率先為建設生物多樣性友好城市提供適用性解決方案，為打造“國際紅樹林中心”的深圳城市新生態名片提供重要支撐。



(Image Source: https://www.hkcd.com.hk/content_app/2024-02/22/content_8624127.html)

深圳市鳥類友好城市規劃與設計指引要點

空間格局	• 避免損害水鳥棲息地和覓食地、保護鳥類飛行通道
高度管控	• 海岸線向陸地延伸50米範圍內，應避免新建設施 • 海岸線向陸地延伸50至200、200至500、500至800米範圍內，新建設施高度應分別不超過30、50、100米
建築佈局	• 控制單體建築高度和立面闊度 • 優化建築面向鳥類棲息地方向的佈局，避免形成空間圍合
外牆設計	• 宜減少玻璃幕牆使用 • 無法避免採用玻璃幕牆的，可作遮擋、分隔或標識 • 防撞視標不使用樹木、花草圖案 • 玻璃幕牆應採用反射率低、不透明或半透明玻璃
景觀設計	• 綠色屋頂區域不安裝反射玻璃 • 植物景觀遠離反射牆，或植物景觀1米範圍內的反射牆安裝鳥類防撞視標 • 植物景觀選擇本地物種，優化群落配置，避免外來物種入侵
照明與聲量	• 夜間不開放的濱海、濱河空間的自然生境區域不宜設置夜景照明 • 可能導致鳥類棲息地內噪聲值升高的重型機械作業，宜避開鳥類活動高峰期和休養期

資料來源：深圳《鳥類友好城市規劃與設計指引 (征求意见稿)》



每年遷徙季節，都有候鳥在深圳灣附近海面飛翔。深圳擬訂立建築規劃指引，建設鳥類友好城市。

8.2 Policy Address 2023 & HK Biodiversity Strategy and Action Plan

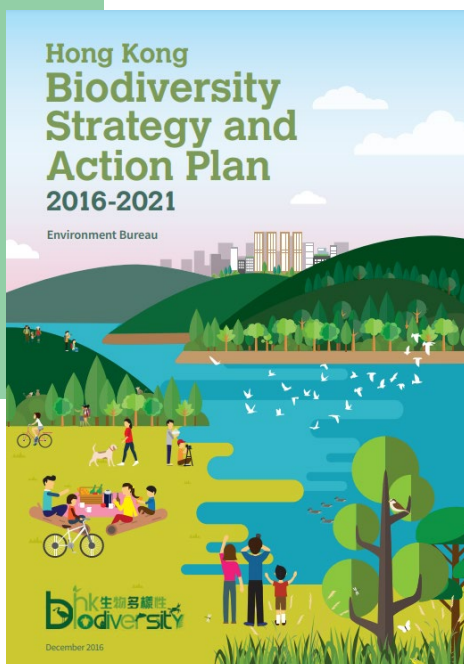
8.2.1 PA 2023 - Section 154 mentioned:

- (iv) protect Hong Kong's ecosystems – We will update and implement the Hong Kong Biodiversity Strategy and Action Plan based on the Kunming-Montreal Global Biodiversity Framework, endorsed at the 15th meeting of the Conference of the Parties to the Convention on Biological Diversity, and having regard to the actual situation of Hong Kong.

8.2.2 BSAP Update:

The BSAP will be updated, focus on four strategic areas:

- 1 – Conservation: sustain healthy ecosystems for a thriving city;
- 2 – Mainstreaming: realise a city in harmony with nature;
- 3 – Capacity: build capacities to enable everyone to contribute, and;
- 4 – Partnering: collaborate to bring natural benefit to more people. The implementation period could extend (e.g. covering ten years) to facilitate more high-impact actions.



8.3 The Northern Metropolis

北部都會區 Northern Metropolis



(Image Source: <https://www.nm.gov.hk/en/northern-metropolis-travel-project>)

The development of the Northern Metropolis will inevitably meet the requirements to address the co-existence with the local eco-system, relevant guidelines on Bird-friendly design will be developed in due course.



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9. Bibliography & Sources of Images

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- END -

