

**MEMORANDUM**

**DATE:** November 5, 2019  
**TO:** Christine Daniel, City Manager  
**FROM:** Charles S. Bryant, Community Development Director  
**SUBJECT: Study Session: Bird-Safe Building Standards**

**RECOMMENDATION**

Staff recommends that the City Council review this report, receive public comment, and provide direction on whether and how to adopt bird-safe building standards.

**BACKGROUND**

On October 2, 2018, the City Council directed staff to schedule a Council discussion on bird-friendly design guidelines. On February 5, 2018, the Council held a discussion on the topic; the staff report for that discussion is attached (Attachment 1). The Council directed staff to schedule a Planning Commission study session, which took place on September 26, 2019.

**DISCUSSION**

**History of Bird-Safe Building Design: Technology, Science and Policy**

A timeline of the history of the technology, science and legislation regarding bird-safe building design is attached (Attachment 2). Much of this information is from the American Bird Conservancy's booklet *Bird-Friendly Building Design*.<sup>1</sup> Also attached are the US Green Building Council's LEED Pilot Credit 55 Bird Collision Deterrence (Attachment 3), the American Bird Conservancy's Material Threat Factors that are referred to in the LEED pilot credit (Attachment 4), a proposal to the California Building Standards Commission to add Bird-Friendly Building Design provisions to the California Green Building Code (Attachment 5), a table of existing policy documents adopted by several cities and a state (Attachment 6), and maps showing 300-foot buffers around open spaces with vegetation or water in Emeryville (Attachment 7).

Birds have always provided benefits to humans, beyond their beauty and songs. They control insects and rodents, reducing plant damage and transmission of diseases. They also pollinate plants and disperse seeds. About 25% of bird species are on the US Fish and Wildlife Service's watch list of birds of conservation concern. The biggest cause of

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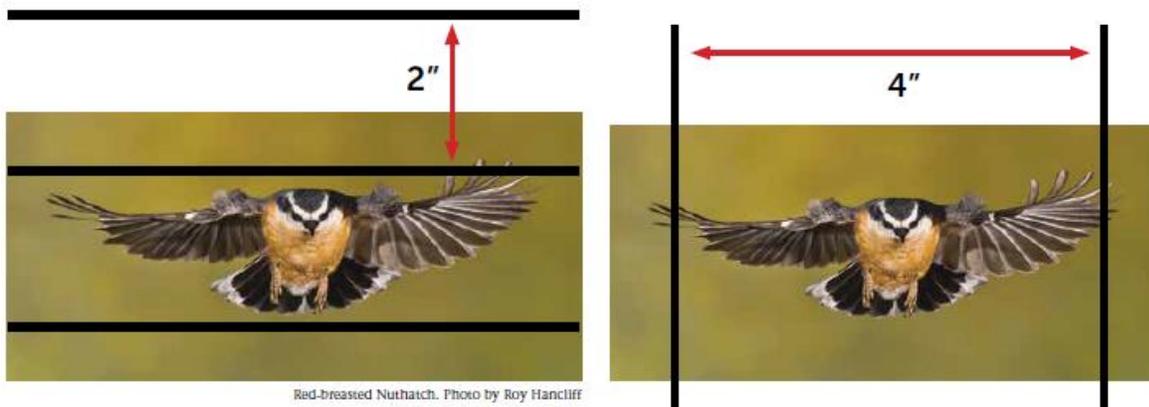
<sup>1</sup> Sheppard, Christine and Glenn Phillips. *Bird-Friendly Building Design*, 2nd Ed. (The Plains, VA: American Bird Conservancy, 2015).

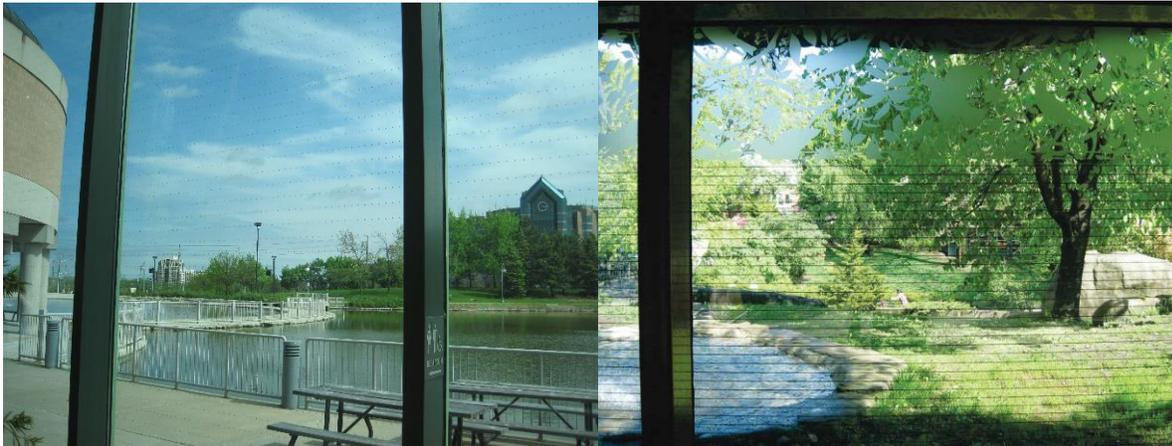
bird mortality is habitat loss, and the biggest direct, measurable cause is cats (estimated at 2.4 billion/year), but bird-glass collisions (estimated at up to 988 million per year) are preventable.

Before 1960, windows were generally limited in size, were openable, and had insect screens; this limited the potential for birds to fly into them. During the 1960s, large plate glass windows became available, and picture windows that did not open and had no screens were installed widely. During the 1980s, glass buildings became common, along with free-standing glass structures such as balconies, railings, skywalks, greenhouses and gazebos.

Birds do not have the depth perception or contrast sensitivity that people have; therefore, birds cannot see transparent or reflective glass. Another problem is lighting, which disorients migrating birds. Birds have magnetic sensors in their retinas; red and warm-white light interfere with these sensors. They fly toward the light and land, then in the daytime they fly into transparent or reflective windows.

During the 1990s and early 21<sup>st</sup> century, scientists studied ways to reduce bird-glass collisions. The studies led to recommendations for treating glass including screens, netting, reduced glass area, and patterns on glass. Patterns of 1/4-inch dots or stripes 4 inches apart horizontally or 1/8-inch dots or stripes 2 inches apart vertically (the “2 by 4 rule”), and other patterns that meet that rule, were found to greatly reduce bird-glass collisions. Minimizing light can involve operational changes, which are difficult for a city to administer; however, placing lights on timers or photo-sensitive switches, along with providing shades, blinds or curtains, can decrease light emitted by buildings at night.





Markham, Ontario Civic Center

Philadelphia Zoo Bear Country

Following a forum on bird-safe building design in Chicago in 2005, the City of Toronto adopted a bird-safe building ordinance in 2007. It addresses visual markers and muting reflections to make glass visible to birds, lighting design to prevent disorientation of migrating birds; building operations including turning off lights, cleaning buildings in the daytime, and locating greenery away from clear glass; and site design measures such as fine-grained ventilation grates and gardens without mirrors.

The American Bird Conservancy (ABC) published the first edition of Bird-Friendly Development Guidelines in 2011. In that year, the US Green Building Council added LEED Pilot Credit 55: Bird Collision Deterrence, to its library of pilot credits (Attachment 3). This credit refers to numeric Material Threat Factors developed by ABC (Attachment 4). Patterns that meet the 2 by 4 rule such as netting, screens, ridged glass block, and translucent glass used on given percentages of the building, qualify. The Material Threat Factor is multiplied by the building zone factor. (Zone 1 is up to 36 feet from grade or 12 feet from a green roof; the rest is Zone 2). The maximum percentage is 15% in the first 36 feet, at rooftop gardens, and in glazed corners and pass-through conditions. The credit has specific requirements for exterior lighting. It also requires a performance monitoring plan.

In 2011, San Francisco adopted the first bird-safe building ordinance in the US. As a pioneering ordinance, and based on the logic that more birds would fly into buildings in the lower six stories and near vegetated open spaces and water, San Francisco limited its glass façade treatment requirement to the lower 60 feet of buildings within 300 feet of two-acre open spaces.

Also in 2011, Highland Park, Illinois, adopted requirements for City buildings; and Calgary adopted design guidelines. The next year Portland adopted voluntary measures. In 2013, the State of Minnesota adopted guidelines for state buildings, and Oakland adopted measures for building plan review. Oakland changed the applicability to adjacent to one-acre open spaces. Sunnyvale used the same applicability location standard as San Francisco. In 2014, Sunnyvale adopted voluntary design guidelines.

In 2014, a US Fish and Wildlife Service study<sup>2</sup> estimated annual bird deaths from building collisions based on 23 data sets totaling 92,000 records. This group estimated that between 365 and 988 million birds are killed annually by building collisions in the US, with roughly 56% of the mortality at low-rises, 44% at residences, and less than 1% at high rises. The number per building is higher for high rises, but there are fewer of them.

In 2015, ABC updated its Bird-Friendly Building Design booklet, emphasizing that birds fly into all parts of buildings (not just the lower 60 feet), all sizes of window panes (not just those larger than 24 square feet), and all locations (not just adjacent to large open spaces). They also noted that hummingbirds and raptors do not see ultraviolet-patterned glass.

In 2015, San Jose adopted voluntary measures with no location limit; measures included reducing large areas of transparent or reflective glass; locating bird habitat away from building exteriors; reducing visibility of landscaped areas behind glass; reducing spotlights; and turning non-emergency lighting off at night, especially during migration in February-May and August-November.

Also in 2015, Highland Park, Illinois, adopted requirements for all buildings, and a Federal Bird-Safe Buildings bill was introduced allowing up to 10% clear glass below 40 feet and 40% clear glass above 40 feet.

In 2016, Richmond adopted an ordinance requiring treatment of the lower 60 feet of glass adjacent to 1-acre open spaces and panes with areas of 24 square feet or more. The ordinance applies to buildings 45 feet tall with floor areas of 10,000 square feet, and to free-standing glass walls over 15 feet high and 30 feet long.

In 2018 Alameda adopted an ordinance. It is the most recent ordinance in the Bay Area, and the Building Industry Association's Bay Area chapter had no comments on its current form. The BIA's requests are not to list specific products and to allow the Planning Director to approve alternatives that are approved by a qualified biologist. The Alameda ordinance is summarized below along with staff comments because, as the most recent local ordinance, it could form a starting point for Emeryville's standards.

Also in 2018, Portland, Oregon adopted an ordinance. It applies in the Central City Plan District, which extends from a quarter mile to a mile on both sides of the Willamette River. It does not apply to one-to-three-unit houses. It requires treatment of at least 90% of the glass on the lower 60 feet of facades with 30% or more glass, balcony railings, and glass within 15 feet of green roofs. Treatment can consist of patterns meeting the 2x4 rule, or, above the first floor, screens, grilles, nets, louvers, fins or mullions spaced as far apart as they are wide.

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<sup>2</sup> Loss, Scott R., Tom Will, Sara S. Loss and Peter P. Marra, 2014. Bird-building collisions in the United States: Estimates of annual mortality and species vulnerability. *Condor* 116:8-23.

In addition, the California Building Standards Commission, which updates and publishes the California Building Code, has received a petition to consider adding Section A5.107, “Bird-Friendly Building Design”, to the California Green Building Code (“CALGreen”) as part of the 2019 Intervening Code Adoption Cycle. If approved, this Section would become effective July 1, 2021, and would be voluntary. The proposed Section would address “bird-friendly” standards for planning and design of buildings that specifically reduce the negative impact of bird deaths caused by collisions with buildings. CBSC is proposing concepts and alternative materials to vision glazing and other building features for designers and developers to use when designing buildings to reduce bird collisions. The petition for voluntary bird-friendly building design standards is proposed for non-residential buildings across California that can be adopted by local governments. While it is not intended to become mandatory within three years, future mandate is not precluded if the role of buildings in birds' decline becomes more critical (Attachment 5).

In September 2019, the Berkeley Community Environmental Advisory Commission recommended adoption of a draft ordinance. It would apply to buildings with two stories or more where glass constitutes at least 50% of the façade, and replacement of windows with areas of 8 square feet or more. It would require treatment of 90% of the glass. It would also apply to freestanding glass structures such as glass walls, wind barriers, skywalks, balconies, greenhouses, and rooftop appurtenances. Treatment options include screens, blinds or curtains, translucent or opaque glass, mullions, patterns meeting the 2x4 rule, ultraviolet patterns, or other treatments approved by the Planning Director. With a biologist's approval, recessed, angled or faceted glass, louvres, overhangs, awnings, glass block, bird netting, grilles, photovoltaic cells, or landscape placement could be used.

Also in September of 2019, the journal *Science* published an article with findings that, since 1970, bird populations in the US and Canada have declined 29%, a decline of 2.9 billion birds, including losses of diverse groups from songbirds to migrants. Shorebird populations have declined more than a third.

## **Alameda 2018 Ordinance**

### **Applicability**

- Buildings 35 feet tall, facades 50% glass – treat panes 12 square feet or more – new or replaced windows [50% glass is a new limit to applicability]
- Free-standing glass structures including balconies, skywalks, greenhouses, wind barriers and rooftop appurtenances – treat panes 24 square feet or more
- Storefronts on sidewalk exempt

### **Glass Treatment**

- Treat at least 90% of façade or freestanding structure to include features that enable birds to perceive glass as a solid object. Options include:

- External screens
- Pattern 1/8-inch tall and 2 inches apart vertically, or 1/4-inch wide and 4 inches apart horizontally
- Translucent or opaque glass or film [stained glass would work as well]
- Light-colored blinds or curtains [not recommended by ABC because glass can still reflect landscape]
- Ultraviolet-pattern reflective glass [not recommended by ABC because many birds do not see it]
- Other treatments providing equivalent bird safety and approved by Planning Director

Alternative Compliance – instead of treating glass, plan prepared by qualified biologist

- Bird Netting
- Louvres
- Glass embedded with photovoltaic cells [some only become opaque in full sun]
- Overhangs and awnings [may still reflect depending on location]
- Layered and recessed glass [may still reflect depending on location]
- Angled or faceted glass that minimizes reflectivity and transparency [not all do]
- Glass block [grooved glass block works well but wavy glass block does not]
- Placement of landscaping to minimize bird collisions [may not be sufficient]

Outdoor lighting

- No searchlights, floodlights, aerial lasers, or mercury vapor fixtures
- No very intense lighting exceeding 200,000 lumens or 2 million candelas
- Shield exterior lights and direct light downward and on the property [Emeryville has such a regulation]
- Lights on architectural fixtures or public art shall use less than 100 watts, or 20-watt equivalent LED, and emit less than 1600 lumens per fixture
- Walls may be lighted for 8 feet above grade for security

To address nighttime use of interior lighting without requiring operational measures, which are difficult to administer, adding interior lights on timers or photo sensors, and window coverings such as shades, blinds or curtains could be considered. Site treatment could address ventilation grates and mirrors.

### **Topical Summary of Existing Standards**

Jurisdictions' approaches to various topics are summarized below, indicating the number of jurisdictions with each type of provision:

- Type of document: 7 ordinances with requirements, 4 voluntary measures, 4 design guidelines, 1 bonus option.

- Residential applicability: 10 all buildings, 1 45 feet high, 1 two stories, 1 four units or more, 1 50% glass, 1 multi-family, 1 no residential buildings
- Portion of building: 7 all of building, 6 lower 60 feet, 4 lower 40 feet
- Location: 10 City-wide, 6 near open space with vegetation or water
- Kinds of glass treatment: 9 follow 2x4 rule; 7 ultraviolet; 5 mullions, louvers, angled glass, overhangs but 4 limited
- Free-standing glass: four 24-foot panes, 4 all panes
- Indoor lighting: 8 timers, sensors or turn lights off; 4 blinds, curtains or shades; 5 during migration, 7 all year
- Outdoor lighting: 5 no spotlights, searchlights, beams, floodlights or lasers; 2 no or low light on architectural features
- Landscaping and water: 6 not near clear or reflective glass, 2 no mirrors in landscaping

## Potential Provisions

Based on the above analysis, staff suggests consideration of the following provisions:

- Applicability: window panes of 12 square feet or larger, all buildings city-wide, 90% of façade or freestanding glass
- Glass treatment: Screens, nets, patterns, art, translucent glass, grooved glass block, louvers, or photovoltaics following 2x4 rule; with biologist approval, mullions, grates, louvers, overhangs, awnings, recesses, or angled glass
- Outdoor lighting (Emeryville prohibits up-lighting<sup>3</sup>): no spotlights, beams, searchlights, floodlights, lasers, or mercury vapor lights; down-lights on architectural features and art no brighter than 100-watt bulbs or equivalent; walls may be lighted up to 8 feet high for security
- Interior Lighting: automatic shutoff with timers or photo sensors; shades, blinds, curtains or other window coverings
- Site Design: no mirrors in landscaping, vent grates same pattern size as glass treatment; no indoor landscaping near clear glass, no outdoor landscaping near reflective glass

## Cost and Architectural Practice

Glass treatments generally add about 5% to the cost of the glass. Ultraviolet pattern glass costs much more than fritting. Portland, Oregon found that treatment of two of their civic buildings added 0.03% and 0.05% to the total cost of the project. Glass costs more than concrete and steel, so reducing the amount of glass can reduce cost.

Many of the measures used to reduce bird-building collisions reduce heating and cooling costs, so they can pay for themselves. The American Society of Heating, Refrigerating and Air-Conditioning Engineers states that if a building façade is more than 20-30% glass

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<sup>3</sup> Planning Regulations Section 9-4.705(c)(1): "... No light fixture shall emit any direct light above a horizontal plane through the fixture. ..."

(depending on climate – here it would be 30%), then the amount of glass contributes significantly to heating and cooling costs.

The San Francisco chapter of the American Institute of Architects originally opposed San Francisco's ordinance but soon reversed its position to support. The Golden Gate Audubon Society teaches a class on bird-safe building design for American Institute of Architects continuing education credits.

### **Form of Standards – Potential Areas of Regulation**

California Environmental Quality Act (CEQA) review. CEQA does not explicitly address bird-building collisions. For projects that require environmental review, the standard CEQA checklist includes questions on impacts on biological resources, including interference with the movement of any native resident or migratory wildlife species or with established native resident or migratory wildlife corridors. Staff could develop standards as mitigation measures if any impact in this area were identified.

Project Conditions of Approval. Standards could be added to Conditions of Approval for a project. However, some projects do not require approvals that would include Conditions of Approval; the standards would not be applied to those projects.

Design Guidelines. A section could be added to the Emeryville Design Guidelines. This would provide written standards that apply to projects requiring Design Review, and would be easy for applicants to find. It would provide for flexibility in enforcement of the standards as long as the spirit of the guidelines is met.

Planning Regulations. An amendment to the Planning Regulations section of the Emeryville Municipal Code would require staff to apply the standards consistently, to the letter of the law, but would not allow for flexibility. However, it would not apply to projects that did not require planning approvals.

Building Regulations. An amendment to the Building Regulations section of the Emeryville Municipal Code would apply to any project requiring a building permit. Such an amendment could be based on the California Building Standards Commission proposal described above, expanded to include both residential and non-residential buildings. Alternatively, measures for building plan review, similar to Oakland's, could be adopted.

In response to the Planning Commission's preferences discussed below, staff suggests a section in the Planning Regulations referring to a section in the Design Guidelines. The Regulations section could be in Chapter 4, Site Development Regulations, Article 7 Other Site Development Regulations, as new section 9-4.706. The new Design Guidelines section could be in Chapter 2, General Guidelines, at the end of Section F, Architecture and Building Materials. Compliance with the standards would be reviewed as part of Design Review, which applies to all new construction and building modifications that affect exterior appearance.

## **Comments from the Staff Development Coordinating Committee**

The committee prefers adding the standards to the Emeryville Design Guidelines, because implementation is flexible and because architects are more likely to see the standards if they are in the guidelines. The committee prefers no operational standards because they are difficult to monitor and enforce. The committee also prefers city-wide applicability because it is easier to implement than applicability in areas defined by proximity to open space. If applicability were limited to locations near open spaces, the requirements would apply in the areas shown in Attachment 7.

## **Planning Commission Comments and Staff Follow-up**

The Planning Commission held a study session on bird-safe building design on September 26, 2019. All of the Commissioners supported the idea of some kind of standard; three preferred to have sections in both the Planning Regulations and the Design Guidelines. In terms of applicability, most wanted the guidelines to apply city-wide (not only near open space and water), and half wanted them to apply to entire buildings (not just the lower 60 feet). Most thought the Alameda ordinance (the most recent adopted standard) could be used as a starting point and strengthened. The Commissioners thought the size of clear, undivided glass was key.

Commissioner Barrera, who is a planner for the City of Alameda, worked on Alameda's ordinance. She said the residential exception was included because the houses there have small windows, and that they have not had complaints about their ordinance.

The Commissioners asked for staff to research the science behind some cities' focus on the lower 60 feet of buildings. Portland's windows list states that more than 50% of bird collisions in buildings up to 11 stories tall are in the lower 60 feet.

The Commissioners also asked about other cities' experience implementing standards. Richmond has had no complaints about their ordinance. Oakland found that residences next to large parks complied by using awnings, balconies, and ultraviolet-pattern glass. Developers of Howard Terminal stadium have asked the Audubon Society to help them address nighttime lighting. The new Kaiser Center will have a roof garden, so they will also need to address nighttime lighting. Santa Cruz's ordinance applies within 300 feet of the coast, parks, or natural areas. Planners have met with some resistance from applicants. The architect for a house addition said that bird-safe glass is hard to source. One fritted glass manufacturer has a 4,000-pound minimum order. For small projects, tape, film, or screens might be a more feasible solution than fritted glass.

## **FISCAL IMPACT**

Other than staff time to add sections to the Planning Regulations and Design Guidelines, bird-safe standards should not have a fiscal impact on the City. Staff does not believe that bird-safe building standards would pose a significant deterrent to development in Emeryville.

## **CONCLUSION**

After hearing the staff presentation and taking public comment, staff requests that the City Council provide comment and direction on the questions below and any other issues identified by the Council:

1. Does the Council support the adoption of bird-safe building standards in Emeryville?
2. If so, what form should the standards take?
  - Voluntary measures
  - Bonus points
  - Design guidelines
  - CEQA mitigation measures
  - Standard condition of approval
  - Planning Regulations amendment
  - Building Regulations amendment
  - Other
3. Should the standards apply citywide, or near large open spaces with vegetation and/or water? Should the standards apply to the lower 60 feet of buildings, or to the entire building?
4. What requirements should be in the standards?
5. Does the Council have any other comments or direction for the adoption of bird-safe building standards in Emeryville?

**PREPARED BY:** Diana Keena, Associate Planner

**APPROVED AND FORWARDED TO THE  
CITY COUNCIL OF THE CITY OF EMERYVILLE:**



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Christine Daniel, City Manager

## **ATTACHMENTS**

1. City Council staff report from February 5, 2019
2. Bird-Safe Buildings Timeline - Technology, Science, and Policy
3. LEED Pilot Credit 55: Bird Collision Deterrence, US Green Building Council
4. American Bird Conservatory Bird Collision Deterrence: Summary of Material Threat Factors
5. Existing Bird-Safe Building Standards
6. California Building Standards Commission Proposed Bird-Friendly Design Amendments to California Green Building Standards Code
7. Open Spaces with Vegetation or Water and 300-Foot Buffer Maps