City of Emeryville
CALIFORNIA

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.[1] 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

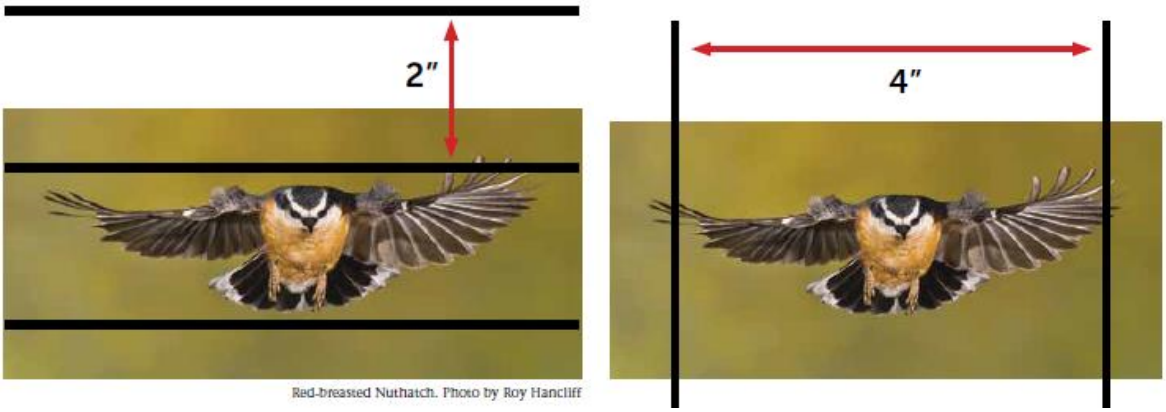
[1] Sheppard, Christine and Glenn Phillips. *Bird-Friendly Building Design,* 2nd Ed. (The Plains, VA: American Bird Conservancy, 2015).

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.

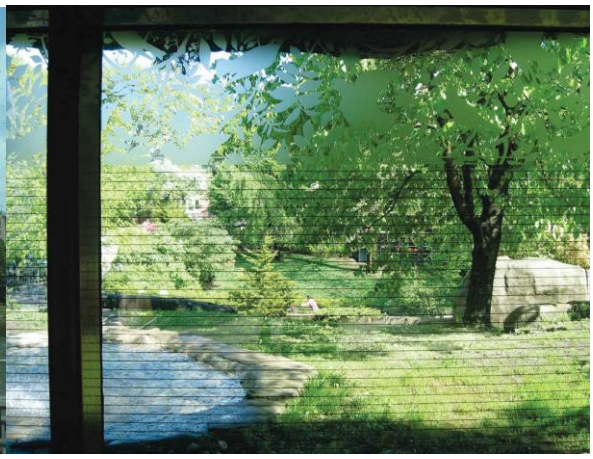
Birds do not have the depth perception or contrast sensitivity that people have; therefore, birds cannot see transparent or reflective glass. Another problem is lighting, which disorients migrating birds. Birds have magnetic sensors in their retinas; red and warm-white light interfere with these sensors.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

During the 1990s and early 21st 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.



Red-breasted Nuthatch. Photo by Roy Hancliff

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[2] 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.

[2] 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 biologists' approval, recessed, angled or faceted glass, louvres, overhangs, awnings, glass block, bird netting, grilles, photovoltaic calls, 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, louvres, or photovoltaics following 2x4 rule; with biologist approval, mullions, grates, louvres, overhangs, awnings, recesses, or angled glass
- Outdoor lighting (Emeryville prohibits up-lighting[3]): 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

[3] 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:

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

City of Emeryville
CALIFORNIA

MEMORANDUM

DATE: February 5, 2019

TO: Christine Daniel, City Manager

FROM: Charles S. Bryant, Community Development Director

SUBJECT: **Direction on Development of Bird-Safe Building Standards**

RECOMMENDATION

Staff requests that the City Council provide direction as to whether and how Emeryville should adopt bird-safe building standards.

BACKGROUND

At the City Council meeting on October 2, 2018, then Mayor Bauters requested that the Planning Commission study bird-friendly design guidelines in Emeryville in the next 6-12 months. Following discussion, the Council directed that the matter be brought to the Council for discussion and direction at a future meeting. This report is responsive to that Council direction.

While staff is not aware that bird strikes and other bird safety issues related to building design have been significant problems in Emeryville, they have been raised as concerns in the urban environment generally. According to the U.S. Fish and Wildlife Service (FWS), collisions with building glass are estimated to kill between 365 million and 988 million birds annually in the United States, with a median annual estimate of 599 million. This makes building collisions the second greatest source of direct mortality of birds. The greatest threat to birds, according to FWS, is cats, accounting for a median annual estimate of 2.4 billion bird deaths per year. Other threats cited by FWS, and their median estimates of bird mortality, include collisions with motor vehicles (214.5 million bird deaths per year), poison (72 million), collisions with electrical lines (25.5 million), collisions with communication towers (6.6 million), electrocutions (5.6 million), oil pits and evaporation ponds (750,000), and collisions with wind turbines (234,000). In addition, habitat loss is thought to pose by far the greatest threat to birds, both directly and indirectly; however, its overall impact on bird populations is very difficult to directly assess. (Source: https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds.php.)

According to the Golden Gate Audubon Society (GGAS), in 2011, San Francisco became the first city in the nation to adopt bird safe building standards. On July 14, 2011, the San Francisco Planning Commission adopted “Standards for Bird-Safe Buildings”. This was followed by an ordinance codifying bird-safe building standards in the San Francisco Planning Code, passed by the Board of Supervisors on September 27, 2011 and signed by the Mayor on October 27, 2011. GGAS further notes that the City of Oakland’s planning

Attachment 1

staff added Bird Safety Measures to their standard building permit requirements in June 2013, Richmond approved Bird Safe Standards in 2016, and Alameda approved Bird Safe Building Standards in 2018. Other cities that have passed bird-safe building standards, according to GGAS, include Sunnyvale and Palo Alto, while Portland, Oregon, and Highland Park, Illinois, are currently considering them.

According to San Francisco's Standards for Bird-Safe Buildings (the "Standards"), glass and lighting are the two primary types of building-related hazards for birds, and there are two categories of these hazards: "location-related" hazards, and "feature-related" hazards.

Location-related hazards pertain to the "Bird Collision Zone" of buildings within 300 feet of an "Urban Bird Refuge". The "Bird Collision Zone" is the portion of building most likely to sustain bird strikes. It begins at grade and extends upwards for 60 feet. This zone also applies to glass façades directly adjacent to large landscaped roofs of two acres or larger, and extends upward 60 feet from the level of the roof. An "Urban Bird Refuge" is an open space two acres or larger dominated by vegetation, including vegetated landscaping, forest, meadows, grassland, water features or wetlands; open water; and green rooftops of two acres or larger.

A feature-related hazard is a feature that creates hazards for birds in flight unrelated to the location of the building. Feature-related hazards include free-standing clear glass walls, skywalks, greenhouses on rooftops, and balconies that have unbroken glazed segments 24 square feet and larger.

In both cases, the Standards include glass and façade treatments, lighting treatments, and provisions for wind generators. Glass and façade treatments include fritted and frosted glass, angled glass, ultra-violet glass, film and art treatment of glass, external screens, architectural features, and netting. Lighting treatments include standards for lighting design and lighting operations. Concerning wind generators, the Standards notes: "While it is unreasonable to believe that these small urban systems would cause the annihilation of birds … a certain amount of caution is prudent in the absence of established scientific research. …The only clear way at present to learn whether small urban wind generators will harm birds is to allow the installation of a few, and to monitor the interactions with animals, if any."

DISCUSSION

Should the City Council wish to move forward with this topic, based on the experience of other cities, there appear to be a number of ways that Emeryville could consider adopting bird safe building standards. One option for action would be to rely on the CEQA process to identify potential bird hazards of proposed new projects on a case-by-case basis. Alternatively, staff could develop bird safety measures that could be included in projects' conditions of approval, similar to what Oakland has done. Another possibility would be to add bird safety measures to the Emeryville Design Guidelines, which are implemented

through the design review process (all new and modified buildings require design review in Emeryville). Finally, an ordinance amending the Planning Regulations to codify bird safe building regulations could be considered, similar to what San Francisco has done.

Either the CEQA option or the standard condition of approval option would be implemented by staff upon the direction of the City Council. An amendment to the Emeryville Design Guidelines requires passage of a Resolution by the City Council following a recommendation from the Planning Commission. Similarly, an amendment to the Planning Regulations requires passage of an Ordinance by the Council following a recommendation from the Commission.

CONCLUSION

Staff recommends that the matter be referred to the Planning Commission for a study session to weigh the various options. Staff would then bring the Commission's recommendation from the study session back to the Council for further direction.

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

Christine Daniel, City Manager

Bird-Safe Buildings Timeline - Technology, Science, and Policy

1916	US Migratory Bird Treaty Act adpted for treaty with Canada
1950s	Most windows are openable with insect screens, which prevent collisions
1960s	Picture windows become widely available, installed without screens
1973	US Endangered Species Act adopted
1980s	Glass buildings, balconies, railings, skywalks, greenhouses, gazebos become common
1980s	Biologists begin studying bird-glass collisions
1989	Klem finds window height and size do not affect chance of bird-glass collisions
1990s	Scientists recommend screens or netting and reduced glass area
2000s	Glass treatments tested - patterns 2" apart vertically or 4" apart horizontally
2005	Birds and Building forum held in Chicago
2007	Toronto adopts Bird-Friendly Development Guidelines (updated in 2013 and 2017)
2008	Hager finds area of windows predict bird strikes more than height or nearby habitat
2011	American Bird Conservancy (ABC) publishes Bird-Friendly Building Design booklet
2011	ABC publishes numeric Material Threat Factors for glass treatments
2011	US Green Buildling Council adds LEED Pilot Credit 55: Bird Collision Deterrence
2011	Highland Park, IL adopts requirements for City buildings including patterns on windows
2011	Calgary adopts Bird-Friendly Urban Design Guideliens
2011	San Francisco adopts Ordinance requiring more treatment in first 6 stories near open spaces
2012	Portland adopts voluntary measures
2013	State of Minnesota adopts design guidelines for state funded buildings using Threat Factors
2013	Oakland adopts measures for Building Permit Review for first 6 stories near open spaces
2014	Sunnyvale adopts voluntary Design Guidelines toavoid reflective glass first 60 feet
2014	US Fish and Wildlife Service study (Loss et al) estimates annual mortality at 365-999 million/year - all sizes of buildings
2015	American Bird Conservancy updates Bird-Friendly Building Design booklet - all parts of buildings, all sizes of windows, all locations, hummingbirds see UV-treated glass
2015	San Jose adopts voluntary measures with no location limit
2015	Federal Bird-Safe Buildings Bill (HR 2280) introduced, 10% clear glass below 40', 40% above
2015	HIghland Park, IL adopts requirements for all buildings
2016	Richmond adopts ordinance, treat first 6 stories near open spaces, residential panes 24 sq ft
2016	California Academy of Sciences study (Kahle et al) - mitigation is required all year here, low rise buildngs need to be treated, and most victims in the study were hummingbirds
2018	Alameda adopts ordinance, no locaiton limit, treat residential panes 12 sq feet
2019	Berkeley committee approves ordinance, no location limit, residential panes 8 sq ft
2019	Science publishes estimate that since 1970 bird populations in US and Canada have declined by 29%, almost 4 billion birds, hundreds of species, shorebirds by a third.

Note: Much of this information is from Seewagen, C. L. and Christine Sheppard, 2017. *Bird collisions with windows: An annotated bibliography* . American Bird Conservancy, Washington, DC. 41 pages.

Attachment 2

LEED BD+C: New Construction | v3 - LEED 2009

Bird collision deterrence

SSpc55 | Possible 1 point

Intent

Reduce bird injury and mortality from in-flight collisions with buildings.

Requirements

Comply with the “Building façade and site structures,” “Exterior lighting,” and “Performance monitoring plan” requirements below.

Building façade and site structures

Develop a building façade and site design strategy to make the building and site structures visible as physical barriers to birds.

If all materials on the building façade have a Threat Factor of 15 or below, the project is exempt from the building façade requirements and the following Bird Collision Threat Rating calculations are not required. If any material on the building façade has a Threat Factor above 15, then the Bird Collision Threat Factor Rating calculations are required.

All other structures on the site, including, but not limited to handrails, guardrails, windscreens, noise barriers, gazebos, pool safety fencing, bus shelters, band shells, etc. must be constructed entirely of materials with a threat score value of 15 or less.

Steps for calculating the Bird Collision Threat Rating (BCTR)
First separate each building facade into Façade Zone 1 and Façade Zone 2. Façade Zone 1 includes the first 36 feet above grade, measured from grade at all points, as well as 12 feet above any green roof. Façade Zone 2 includes all façade areas above 36 feet. Establish total areas for Façade Zone 1, Façade Zone 2 and for the Adjusted Building Façade Area. Then identify the Material Types present

Attachment 3

on each façade, the corresponding Threat Factor of each material (for detailed types and associated threat factors, see the Bird Collision Deterrence Material Threat Factors developed by the American Bird Conservancy), and the total area of each Material Type. Lastly, establish the Factored Area for each Zone.

No more than 15% of the facade area in Façade Zone 1 can have a Threat Factor higher than 75. This area is quantified separately as the Hazardous Glazing Factor (HGF) in the calculator. However, more than 15% of the glazed area in Zone 2 may have a Factor higher than 75. All glazed corners or fly-through conditions must have a Threat Factor less than or equal to 25.

Table 1: General material types: threat potential

	Material Type
Greatest Threat Potential	Glass: Highly reflective and/ or completely transparent surface
	Glass: Reflective or transparent surface interrupted by a visible pattern based on the 2 x 4 Rule*.
	Glass: Reflective or transparent surface shielded by screens, shutters, or louvers where the resultant exposed glass satisfies the 2 x 4 Rule*.
	Glass: Translucent with matte or textured surface
Least Threat Potential	Opaque surface

*The 2 x 4 Rule is defined as a collision deterrence module based upon the physical profile of a bird in flight. Current research has established maximum module dimensions of 2” high x 4” wide.

Using the formulas below, achieve a maximum total building Bird Collision Threat Rating (BCTR) of 15 or less. The **Bird Collision Threat Rating Calculation Spreadsheet** can also be used.

For each Façade Zone, calculate the Factored Area:
[(Material Type 1 Threat Factor) x (Material Type Area)] + [(Material Type 2 Threat Factor) x (Material Type Area)]... = Façade Zone Factored Area

Determine the Adjusted Building Façade Area:
[(2 x Zone 1 Area) + Zone 2 Area] = Adjusted Building Façade Area

Calculate the total building Bird Collision Threat Rating by dividing the sum of Zone 1 and Zone 2 Factored Areas by the Adjusted Building Façade Area:
(Zone 1 Factored Area + Zone 2 Factored Area) / Adjusted Building Façade Area = Total Building BCTR

AND

Exterior lighting

Exterior building fixtures that are not necessary for safety, building entrances, and circulation shall be automatically shut off from midnight until 6 a.m. Manual override capability may be provided for occasional after-hours use.

In addition, meet these requirements for all exterior luminaires located inside the project boundary (except those listed under “Exemptions”), based on the following:

> The photometric characteristics of each luminaire when mounted in the same orientation and tilt as specified in the project design; and
>
> The lighting zone of the project property (at the time construction begins). Classify the project under one lighting zone using the lighting zones definitions provided in the Illuminating Engineering Society and International Dark Sky Association (IES/IDA) Model Lighting Ordinance (MLO) User Guide.

Do not exceed the following luminaire uplight ratings, based on the specific light source installed in the luminaire, as defined in IES TM-15-11, Addendum A.

Table 2. Maximum uplight ratings for luminaires

MLO lighting zone	Luminaire uplight rating
LZ0	U0
LZ1	U1
LZ2	U2
LZ3	U3
LZ4	U4

Exemptions from the exterior lighting requirements

The following exterior lighting is exempt from the requirements, provided it is controlled separately from the nonexempt lighting:

specialized signal, directional, and marker lighting for transportation;
government-mandated roadway lighting;
hospital emergency departments, including associated helipads; and
lighting for the national flag in MLO lighting zones 2, 3, or 4.

AND

Performance monitoring plan

Develop a three-year post-construction monitoring plan to routinely monitor the effectiveness of the building and site design in preventing bird collisions. Include methods to identify and document locations where repeated bird strikes occur, the number of collisions, the date, the approximate time, and features that may be contributing to collisions. List potential design solutions and provide a process for voluntary corrective action.

General Pilot Documentation Requirements

REGISTER FOR THE PILOT CREDIT

Participate in the LEEDuser pilot credit forum
Complete the feedback survey:

CREDITS 1-14

CREDITS 15-27

CREDITS 28-42

CREDITS 43-56

CREDITS 57-67

CREDITS 68-82

CREDITS 83--96

Credit Specific: BD+C

Building façade and site features

For materials on the building and site with a Threat Factor of 15 or below, submit a narrative describing why the materials, and building in general, are “bird-friendly.” Include a material list and supporting data.

A completed Bird Collision Threat Rating spreadsheet

Plan(s) and/or elevation(s) depicting the location of all materials and shading/screening devices used to comply with this credit

Applicable specification details on all materials and shading/screening devices used to comply with this credit. If a chosen material does not have a Threat Factor value, provide an estimated value with justification.

A narrative or statement acknowledging that both surface reflection and visibility of any surface 3 frit patterns have been taken into account.

Exterior lighting

Site lighting plan with boundaries, elements, location of fixtures, lighting zone, and applicable measurements

Luminaire schedule showing uplight ratings, nighttime off-time durations for a typical day, and manual override capability

Performance monitoring plan

A copy of the post-construction monitoring plan

Changes:

11/22/2016:
Edited the Credit Specific: BD+C submittals.

10/16/2015:
Expanded the applicability to all rating systems
Added site features (site structures with glass) to the credit
Adjusted and simplified the “Bird Collision Threat Rating” calculation
Simplified the lighting requirements
Adjusted the documentation based on the above changes to Requirements
Miscellaneous edits to the background information, for reference

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Fly-through conditions - situations in which glass elements provide any clear line of sight to birds, creating the illusion of a void leading to the other side; parallel glass elements or a convergence of glass sides creating a perpendicular, acute, or obtuse horizontal corner. Examples include glass bridges and walkways, outdoor railings, free-standing glass architectural elements and building corners where glass walls or windows converge.

Bird Collision Deterrence: Summary of Material Threat Factors
The American Bird Conservancy
October, 2011

Façade Material Type	Threat Factor
Opaque Material	0
Plexiglass	
Clear plexiglass with 5/64” thick black filament in horizontal arrangement spaced 1-3/16” apart (Evonik Paraglas or similar)	9
Translucent Plastics- all colors except clear	
Fiberglass panel, single pane or insulated (Kalwall or similar)	2
Corrugated fiberglass panel, single pane or insulated (Resolite or similar)	2
Glass	
Clear Glass, single pane or insulated	100
Glass with pattern on interior (#2) surface, single pane or IGU. 1/8” minimum line thickness or dot diameter. 2” maximum space between horizontal elements and 4” maximum space between vertical elements.	
Examples:	
Medium grey ceramic frit - 1/8" vertical lines spaced 1/2" apart, 20% coverage (Viracon V-948 or similar)	10
Dark grey ceramic frit - 1/8" horizontal lines spaced 1/2" apart, 20% coverage (Viracon V-901 or similar)	6
White ceramic frit - 1/8" dia. dots w/20% coverage (Viracon 5065 or similar)	41
White ceramic frit - 1/8" dia. dots w/40% coverage (Viracon 5006 or similar)	24
Glass with continuous frit on interior (#2) surface, single pane or IGU	25
Glass continuously etched (translucent level 4) on interior (#2) surface, single pane or IGU (Carvart or similar)	25
Clear wire glass with maximum 2” wire spacing, single pane or IGU (wire on outer pane).	20
Glass IGU with ½” thick white polycarbonate inner layer, 2” maximum diameter honeycomb (Panelite or similar)	25
Glass with pattern on exterior (#1) surface, single pane or IGU. 1/8” minimum line thickness or dot diameter. 2” maximum space between horizontal elements and 4” maximum space between vertical elements.	

Attachment 4

Façade Material Type	Threat Factor
Examples: (all Eckelt 4 Bird or similar)	
Orange ceramic frit- 1/4" vertical lines on 3½" centers	10
Orange & black ceramic frit- ½" alternating color vertical lines on 3½" centers	15
Black ceramic frit- 5/8" vertical "dot-screened" lines on 4" centers	10
Orange & black ceramic frit- 5/8" alternating color vertical "dot-screened" lines on 4" centers	10
Orange & black ceramic frit- 1" alternating color vertical "dot-screened" lines on 4 1/4" centers	10
Glass continuously etched (translucent level 4) on exterior (#1) surface, single pane or IGU (Carvart or similar)	5
Specialty Glass Products	
Coated glass with 1/16" UV reflective lines arranged in an irregular "webbed" pattern with 2" maximum spacing on interior (#2) surface, IGU (Ornilux Mikado or similar)	34
Translucent channel glass with cast "orange peel" or linear textured surface- 9" maximum face width (Pilkington Profilit or similar)	10
Glass block, 8" x 8" x 4" deep with "wavy" translucent appearance and polished surface (Pittsburgh Corning Decora or similar)	20
Glass block, 8" x 8" x 4" deep with grooved textured surface (Pittsburgh Corning Argus or similar)	10
Adhesive Films for Glass Retrofit	
Matte perforated vinyl signage film applied to outer (#1) surface (Scotchgal or similar)	2
Patterned film on interior (#2) surface. 1/8" minimum line thickness or dot diameter. 2" maximum space between horizontal elements and 4" maximum space between vertical elements.	see glass
Patterned film on exterior (#1) surface. 1/8" minimum line thickness or dot diameter. 2" maximum space between horizontal elements and 4" maximum space between vertical elements.	see glass
Adhesive decals applied to outer (#1) surface, spaced as indicated for patterned film above	10
Protective Screen External to Glass (fixed in place)	
Horizontal or vertical slats with 1/8" minimum face thickness and 2" maximum space between horizontal elements and 4" maximum space between vertical elements.	5

Façade Material Type	Threat Factor
Horizontal or vertical slats with 1/8” minimum face thickness. Slat depth and spacing ratio shall obscure 85% of glass when analyzed from all possible viewing angles	15
Expanded metal or perforated screens having elements with maximum spacing of 2" horizontal or 4" vertical	10
Welded wire mesh with minimum 1/8” dia. wire and 2” maximum space between horizontal elements and 4” maximum space between vertical elements.	10
Fixed copper or fiberglass insect screens installed 2” minimum outboard of glass	5
Poly or nylon netting with maximum 1” opening installed 6” minimum outboard of glass	5
Operable Shutters External to Glass	
Perforated hinged shutter with maximum opening 2” high x 4” wide.	15
Solid opaque hinged shutter	10
Roll-up solar screen- translucent polyester woven fabric	15

CALIFORNIA BUILDING STANDARDS COMMISSION

August 20, 2019
GREEN BUILDING
WORKSHOP
Agenda Item 6

DRAFT EXPRESS TERMS
CALIFORNIA GREEN BUILDING STANDARDS CODE,
(CALGreen), PART 11,
CALIFORNIA BUILDING STANDARDS CODE,
TITLE 24, CALIFORNIA CODE OF REGULATIONS

- **Proposed code language for the 2019 Intervening Code Adoption Cycle**

LEGEND FOR EXPRESS TERMS

1. New California amendments: All such language appears <u>underlined</u>.
2. Repealed text: All such language appears in ~~strikeout~~.

A5.107 Bird-friendly building design
(Voluntary Measures)

- **Statement of specific purpose, problem, rationale and benefits:**

  The California Building Standards Commission's (CBSC) is proposing to add Section A5.107 Bird-friendly building design, and adopt the following amendments that 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 collision. By identifying and incorporating “bird friendly” strategies for designers and developers, the number of birds killed by collision with buildings will likely be reduce.

  History:
  At the conclusion of the 2007 legislative session, then-Governor Schwarzenegger vetoed three assembly bills of enrolled green building laws, writing "building standards should not be statutory" and recognizing the (CBSC) public process for the adoption of building regulations. He instructed CBSC to work with authoritative state agencies to develop and adopt green building standards for the 2010 building code cycle.

  Subsequent amendments to the Health and Safety Code established CBSC's authority for green building standards absent the authority of other state agencies, but also requiring it [CBSC] coordinate with other agencies' experts in standards' development. The administrative regulations also called for cost analysis and a recommendation for voluntary or mandatory status; and if voluntary, whether the standards should become mandatory over the next several years.

The subject petition for voluntary bird-friendly building design standards relies on this authority and is proposed for non-residential buildings across California that can be adopted by local governments. While it is not intended to become mandatory within 3 years, future mandate is not precluded if the role of buildings in birds' decline becomes more critical.

The problem and rationale

The problem the petition sets out to address is the sheer number of bird deaths, numbering in the hundreds of millions, caused by collisions with buildings across the nation. Populations at risk are generally small perching birds, or passerines, that utilize various migratory routes from summer breeding grounds to winter feeding areas, and some residents. Also at risk are shorebirds and raptors. All of these birds perform environmental services for humans in controlling insect and rodent populations and in pollinating plants and spreading seed; and they give many human observers great pleasure to the tune of a $40 billion bird-watching industry.

What creates the greatest threat to these birds is building glass, which birds and humans alike find invisible. However, birds' poor depth- and contrast perception as well as the speed at which they approach building glass puts them at high risk for collision. Most building collisions occur in morning hours, but building lighting can create reflections and disrupt birds' orientations, causing some collisions to occur at night.

Material alternatives to vision glass for the treatment of building areas posing the greatest risk for collision do not need to be prohibitively expensive and can be cost-neutral. Portland, OR, in its bird friendly guidelines, notes that vision glass is the least energy efficient of façade materials, attributing an operating cost to it that is higher than that of patterned glass. A House of Representatives proposal for bird safe design for federal building (H.R. 919) was opined by a Congressional Budget Office to generate no premium in cost. Portland cites cost studies of a local library and a health center, comparing vision glass to fritted or UV-patterned glass and found increases of .05% and .03%, respectively, in the overall building costs. Independently, this author evaluated building materials for cost, finding that opaque materials like concrete or plaster are about half the cost of glass. Some designers of bird-friendly buildings note that costs are not significant if the features are incorporated early in design; retrofitting elements to shield glass will add cost, but economical options can be found.

Any cost impacts of bird-friendly design are further tempered by findings that lower floors typically are those that pose the most threat to at-risk birds, and incorporating specialty features is not necessary over an entire tall building.[13]

Statewide significance

Beginning in 2010, local jurisdictions in Toronto and San Francisco proposed ordinances to address this problem. Since then, many other California jurisdictions have done so, including San Jose and Oakland, and there is a good deal of variety in the policies. The United States Green Building Council (USGBC) initiated a pilot credit in its Leadership in Energy and Environmental

Design (LEED) green building rating system, which ABC has incorporated into a model ordinance.

Many of the birds addressed by California's various policies utilize the Pacific Flyway to travel from summer breeding grounds to winter feeding areas, flying from as far away as Siberia to South America and back, almost a billion birds of over 350 species. Many of these are waterfowl, managed for hunting and conservation; these ducks, geese and swans face habitat loss and other threats but are not typically at risk by building collisions. It is the smaller species that fly at lower altitudes that are in most danger, and they occur throughout California in migration, with some stopping to breed or winter here, within our communities.

With many species already in decline due to building sprawl and loss of habitat, the direct kills of often-healthy birds from collisions with building glass exacerbates their fragile existence. To paraphrase the Portland guidelines, consistent bird-friendly building design policy is necessary for "comprehensive urban sustainability strategy" to which a green building code is a major contributor.

A5.107 Bird-friendly building design. Building design elements and features considered "bird-friendly" shall comply with Sections A5.107.1 through A5.107.3.

A5.107.1 Glazing. No more than 10% of building facades to a height of 40 feet (12 m) or to that of the average height of local tree canopy, whichever is higher; and no more than 40% of facades above that shall be see-through glazing, reflective glazing or acrylic glass unless:

A. It is glazing that meets the energy requirements of the current California Energy Code and can include, but is not limited to, the following:

1. Etched or fritted glass with patterns of elements on the exterior having minimum dimensions of 3/8" diameter for dots or 1/8" width for stripes in a density of 2 inches (5.1 cm) maximum horizontally or 4 inches (10.2 cm) maximum vertically (the 2x4 rule).

Note: If the frit is on the interior of the glass, it can be effective if visible on a non-reflective exterior surface.

2. Interior or exterior glazing films with a pattern visible from the outside conforming to the 2x4 rule;

3. Laminated glass with 2x4 patterns, patterned UV coating or use of contrasting patterned UV-absorbing and UV reflective films; or

4. Glass block or channel glass; or

B. It is protected by exterior features that may include, but not be limited to:

1. Grilles or screens with openings no more than 2 inches (5.1 cm) maximum horizontally or 4 inches (10 cm) maximum vertically (the 2x4 rule) installed on the exterior side of glass.

2. Netting with 2x2 maximum openings.

3. Sunshades or louvers with 3 dimensional elements spaced a maximum vertical or horizontal 9"; or

4. Interior blinds with 2x4 patterns visible from the exterior during the day and shielding interior lighting at night, included as part of the construction contract.

A5.107.2 Special conditions. Vegetated roofs, site structures, comers and passageways, and facades of atria and courtyards shall comply with the following:

1. Railings and facades adjacent to vegetated roofs shall meet the standards in A5.107.1 (A) or (B) treated to a height of 1 unit per 4 units of perpendicular length of green roof.

2. Auxiliary buildings such as pavilions or gazebos and facades of atria or courtyards with water features or plants shall meet the standards of A5.107.1 (A) or (B); and

3. There shall be no see-through passageways and comers exposed to sky or habitat on the other side.

A5.107.3 Nighttime conditions. Nighttime building lighting at the top of the building, interiors of all floors, lobby and atria shall be controlled as follows:

A. Lighting is extinguished between March 15 and May 31 and between August 15 and October 31 from midnight to dawn.

B. Time-switch control devices or occupancy sensors are installed complying with the current *California Energy Code*, that can be programmed to turn off lights during those time frames.

Exception: Emergency lighting and lighting required for nighttime security.

A5.107.3.1 Systems or operation and maintenance manual. Include written recommendations that lighting is extinguished pursuant to Section A5.107.3 and janitorial services to the building are scheduled between sunrise and sunset.

Existing Bird-Safe Building Standards

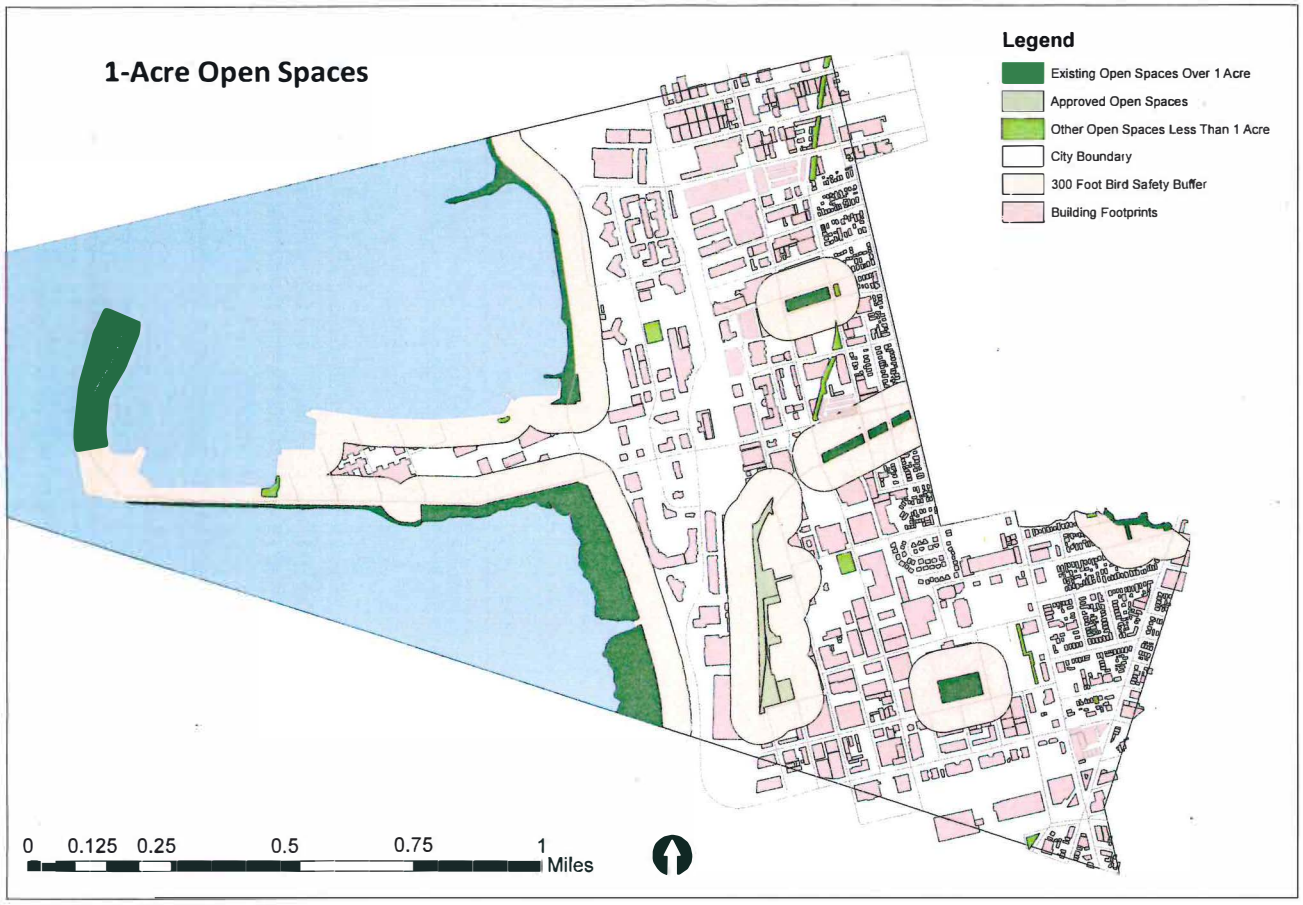
Year	Jurisdiction	Form	Applicability: Location	Window Treatment	Landscaping	Outdoor Lighting	Indoor Lighting	Free-standing glass
2011	Calgary	Design Guidelines	City-wide, especially near nature, first 4 levels, building corners	Visual markers, mute reflection, awnings, curtains or blinds, angled glass	Away from clear glass	Minimize near biding	Turn off, task lighting, close curtains or blinds, timers or motion sensors, day cleaning	
2011	San Francisco	Ordinance	Within 300 feet of 2-acre open space, 90% of glass on first 6 stories above ground or roof garden	Fritting, netting, stencils, frosted glass, screens meeting 2x4 rule: 1/4 inch wide 4 inches apart horizontally, or 1/8 inch wide 2 inches apart vertically	-	Minimize, shield, no up-lighting, no searchlights	-	Treat 100% city-wide, panes 24 square feet
2012	Portland, OR	Voluntary Measures	City-wide	Patterns, netting, screens, grilles, exterior shades, angled, tinting	-	Shielding, no up-lighting	Lights-out program	-
2013	Minnesota	Design Guidelines	New and renovated State buildings	Meet LEED Pilot Credit 55 Bird Collision Deterrence	-	Shield from sky, no light trespass	Lights-out program	Treat railings and glass-sided walkways
2013	Oakland	Building Permit review measures	Adjacent to 1-acre open space, 90% of glass on first 6 stories above ground or landscaping, vegetated atrium	Patterns, mullions , grilles, screens, netting, or louvres meeting 2x4 rule; awnings at glass recessed on all sides; and/or opaque glass	Not near clear glass, no mirrors	No illumination of architectural features, full cut-off shielding to reduce spill lighting, no beams during migration	Time switch controls; blinds, shades, or other window coverings	-
2013	Toronto, Ontario (updated from 2007)	Design Guidelines	City-wide	Visual markers: patterns, mullions, grilles, louvres, art; mute reflections: angled glass, screens, awnings, sunshades; vent grates meet 2x4 rule; treat 12 feet above green roof	No mirrors, vent grates meet 2x4 rule	Project light down - minimize upward and spill light	Automatic system to adjust levels and turn off unnecessary light, blinds. Draw blinds, clean in daytime	-
2014	Markham, Ontario	Design Guidelines	City-wide, first 52 feet above grade. 85% primary treatment, 15% secondary treatment	Primary: stripes, dots, patterns, net, frit, etch 2x4 rule. Secondary: mullions, blinds, shades, UV, tint, angle, vegetation placement.	Not near clear or reflective glass	No up-lighting	Off 11pm-6am, sensors	Apply treatment to courtyards, atria, and free-standing glass
2014	Sunnyvale	Voluntary Design Guidelines	Within 300 feet of 1-acre open space, no transparent or reflective glass in lower 60 feet; some apply everywhere	Reflectivity < 25%; louvres, awnings sunshades; fritted or etched glass; prevent water reflections; angled glass; avoid transparent building corners	Not at reflective glass, not funnel toward glass. Interior plants not near clear glass	No up-lighting or spot lights, shield all site fixtures	Install blinds or turn lights off at night, light task areas,	Avoid skyways or freestanding glass walls
2015	San Jose	Voluntary Measures	City-wide	Reduce large areas of transparent or reflective glass	Locate away from building, reduce behind glass	Reduce spotlights	Turn non-emergency lights off at night, especially during migration	-

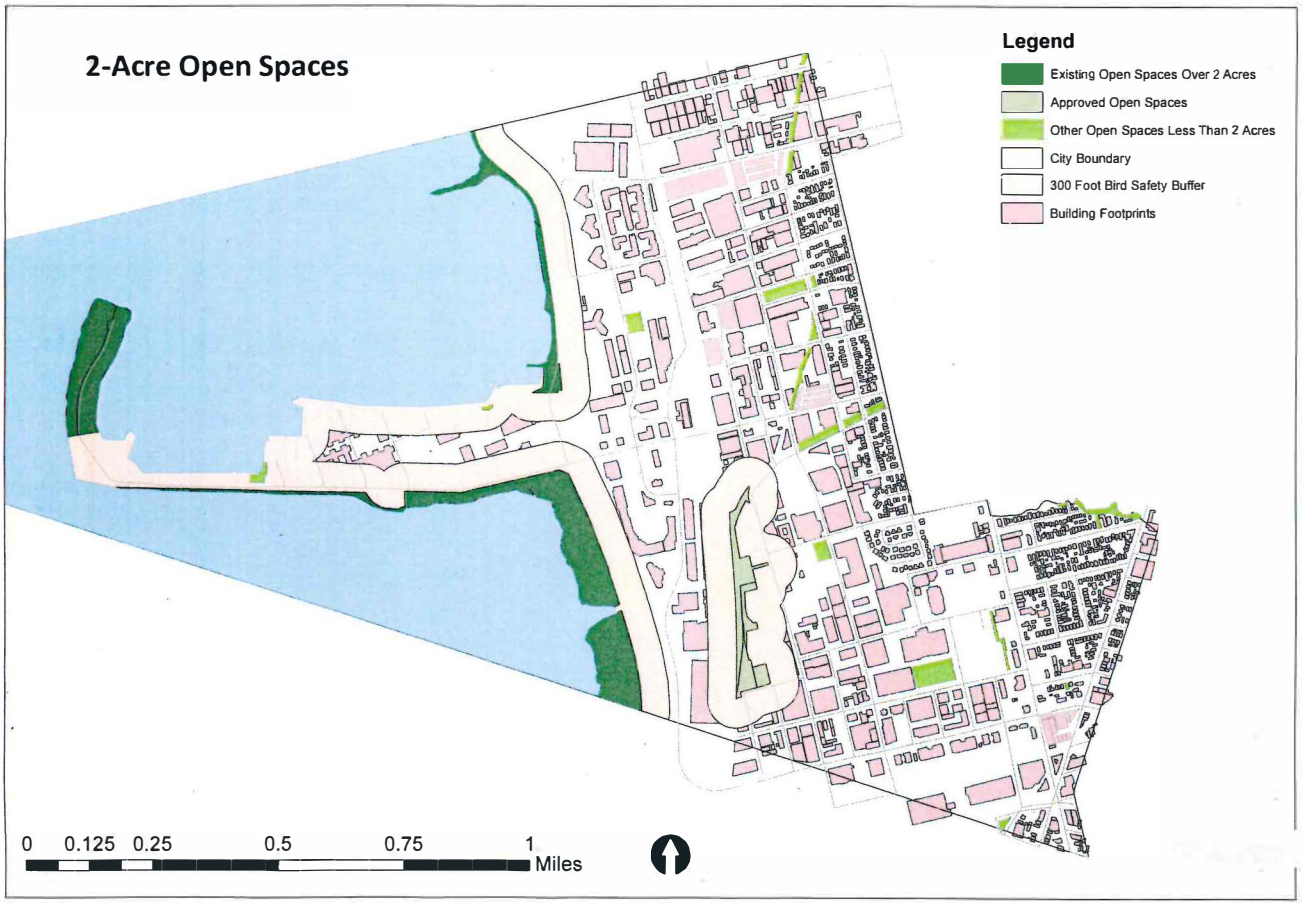
Attachment 6

Existing Bird-Safe Building Standards - continued

Year	Jurisdiction	Form	Applicability: Location	Window Treatment	Landscaping	Outdoor Lighting	Indoor Lighting	Free-standing glass
2015	Highland Park, IL	Bonus Option	Commercial, industrial, multi-family buildings	Meet LEED Pilot Credit 55 Bird Collision Deterrence.	-			
2016	Richmond	Ordinance	Adjacent to 2-acre open spaces, 2-story 10,000-square-foot buildings, 80% of first 60 feet from ground or roof garden	Fritting, netting, stencils, frosted glass, screens, meeting 2x4 rule. Reflectance < 10% (exception may be granted if frit, louvres or nets are used)	-	No up-lighting	-	15 feet by 30 feet, 24-square-foot panes city-wide, treat 100% of glass
2018	Santa Cruz	Standards	Within 300 feet of coast, parks, or natural areas, treat 90% of glazing within lower 40 feet	Fritting, patterns, nets, screens, UV patterns in some locatioins, or measures approved by ABC or a qualified proessional		No up-lighting		
2018	Alameda	Ordinance	Building 35 feet tall, façade 50% glass, panes 12 square feet: 90% of façade	Screens, blinds or curtains, opaque or translucent glass, mullions, patterns; with biologist approval layering, angled glass, louvers, overhangs, glass block, netting, grilles, embedded photo-voltaics, landscape placement	-	No searchlights, lasers, mercury vapor, or very intense lighting. Shielding, no light trespass, no floodlights. Security lighting can light 8 feet high on wall, use 100-watt bulbs	-	24 square-foot panes 90%: wind barriers, skywalks, balconies, greenhouses, rooftop appurtenances
2018	Portland, OR	Ordinance	Central City Plan District - within 1/4 to 1 mile of river. 90% of glass in facades with 30% glass in lower 60 feet and within 15 feet of roof garden	Fritting, etching, UV coating, or films on ground floor 2x4 rule; upper floors those or frosting or exterior appratus (screen, grille, net, louvers, fins or mullions) spacing = width.	-	-	-	Balcony railings, sky bridges, fences
2019	California Building Code	Proposed Voluntary Measures	90% of glass on lower 40 ft, and at green roof, gazebos, atria, avilions, passageways and corners; 60% above 40 ft	Pattern meeting 2x4 rule etched, fritted, film or laminated; or channel glass or glass block; or grilles, screens, netting, sunshades, blinds	-	-	Timers or sensors to turn lights off during migration except security and emergency lights.	-
2019	Berkeley	Proposed Ordinance	City-wide, 2+ stories, facades 50% glass, windows 8 sq ft +	Screens, blinds or curtains, opaque or translucent glass, mullions, patterns 2x4, UV, others with Director OK; recessed, angled or faceted glass, louvres, overhangs, awnings, glass block, netting, grilles, photovoltaics, landscape placement with biologist OK	-	-	-	24 square-foot panes - walls, wind barriers, skywalks, balconies, greenhouses, rooftop appurtenances

Open Spaces with Vegetation or Water and 300-foot Buffer





Attachment 7