The People's Stadium

Final Scoping Decision Document

November 2012

Kimley-Horn and Associates, Inc.

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1.0 Report Purpose

In accordance with Minnesota Rule Part 4410.2100, subp. 6, this is the Final Scoping Decision Document for the People's Stadium Project (the Proposed Project). The Final Scoping Decision Document is based on the findings from the Scoping Environmental Assessment Worksheet (Scoping EAW)/Draft Scoping Decision Document (Draft SDD) and comments received during the comment period on the Scoping EAW/Draft SDD. This document reflects the Scoping Decision set forth by the Minnesota Sports Facilities Commission (MSFA), the Responsible Governmental Unit (RGU), and Project Proposer, on November 16, 2012. The Scoping Decision resolution is found on the following page.

The Final Scoping Decision Document discusses the following:

Section 2 – Project Description: This section provides a brief overview of the Proposed Project.

Section 3 – Alternatives: This section describes the alternatives that will be evaluated in the Environmental Impact Statement (EIS) for the Proposed Project.

Section 4 – Social, Economic, and Environmental Impacts: This section identifies the issues that will be analyzed in the EIS. It also specifically lists the issues that will be excluded from further analysis in the EIS.

Section 5 – Schedule: This section presents the schedule for the Proposed Project.

Section 6 – Agency Coordination and Permit Decisions: This section identifies the permits and agency actions that are anticipated for the Proposed Project. An overview of agency coordination is also discussed.

Section 7 – Identification of Necessary Studies: This section identifies the studies that will be necessary based upon the findings and comments received on the Scoping EAW/Draft SDD.

Section 8 – Identification of Phased or Connected Actions: This section summarizes the information included in the Scoping EAW relative to phases or connected actions.

Section 9 – Public Involvement: This section summarizes the Scoping EAW/Draft SDD outreach process and future public review activities.

Appendices: The Final Scoping Decision Document includes copies of all comments received during the public comment period and responses to comments by issue area.

MINNESOTA SPORTS FACILITIES AUTHORITY

RESOLUTION NO. 2012-13

RESOLUTION ACCEPTING ENVIRONMENTAL IMPACT STATEMENT SCOPING

WHEREAS, the People's Stadium is a proposed project to construct a new Stadium on the current Hubert H. Humphrey Metrodome site in Downtown Minneapolis. Construction of the new Stadium would include demolition of the existing Metrodome stadium and construction of a new stadium facility and ancillary parking and access facilities. The new 65,000-seat stadium (with expansion up to 73,000 seats) will include suites, club seats, shops, restaurants, a National Football League (NFL) team museum, and Hall of Fame, and;

WHEREAS, the People's Stadium project must comply with the requirements of the Minnesota Environmental Policy Act (MEPA), and;

WHEREAS, the Minnesota Sports Facilities Authority (MSFA) is the project proposer and the designated Responsible Governmental Unit (RGU) for the mandatory Environmental Impact Statement (EIS) under the state environmental review requirements, and;

WHEREAS, the MSFA published a notice of availability of the People's Stadium Scoping Environmental Assessment Worksheet (EAW)/Draft Scoping Decision Document (Draft SDD) in the *Minnesota Environmental Quality Board (EQB) Monitor* on October 1, 2012, and;

WHEREAS, the MSFA issued press releases on October 1 and 19, 2012; and published legal notices regarding the Scoping EAW/Draft SDD document availability and public open house in the Star Tribune and Finance and Commerce, and;

WHEREAS, the MSFA distributed the Scoping EAW/Draft SDD to the Minnesota EQB distribution list and other project stakeholders, and held of public open house on October 23, 2012, and;

WHEREAS, the comment period for the Scoping EAW/Draft SDD began on October 1 and ended on October 31, 2012, and;

WHEREAS, approximately 40 people attended the open house meeting held during the Scoping EAW review period, and ;

WHEREAS, a total of 19 comments were received during the Scoping EAW process, both in written format and through oral testimony recorded by a court reporter at the open house meeting, and;

WHEREAS, the MSFA has reviewed and considered technical analysis conducted during the Scoping EAW process as well as the comments received on the project during Scoping, and;

WHEREAS, the Final Scoping Decision Document will reflect the decision of the MSFA, and will include project information in compliance with Minnesota Rule 4410.2100, Subp. 6, and;

WHEREAS, the legislation passed in the Minnesota legislature and signed by the governor of Minnesota in May 2012 states that the EIS shall not be required to consider alternate stadium sites.

NOW THEREFORE BE IT RESOLVED, that the MSFA adopt that the No-Build Alternative (serving as a base of comparison for the Build Alternative) and the proposed new Stadium Alternative, as described below;

- Demolition of the Existing Metrodome Stadium (900,000 square feet [sf])
- At Least 1,500,000 sf
- 65,000 Seats, Expandable up to 73,000
- 150 Suites
- 7,500 Club Seats
- Concessions and Restaurants, NFL Team Museum, Hall of Fame, Administrative and Ticket Offices and Team Meeting Space, Lockers, and Training Rooms
- 2,000 Parking Spaces Within One Block of Stadium, Connected by Skyway or Tunnel
- 500 Spaces Within Two Blocks of the Stadium, With Dedicated Walkway on Game Days
- Stadium Infrastructure (Plazas, Parking Structures, Rights of Way, Connectors, Skyways and Tunnels)

be carried forward for further evaluation in the Draft EIS, and;

BE IT FURTHER RESOLVED, that the closure of 5th Street from Chicago to 11th Avenues be studied in the EIS, and;

BE IT FURTHER RESOLVED, that the issue areas to be excluded from the EIS are listed below (specific Scoping EAW question noted in parenthesis for reference):

- Cover types (#10)
- Fish, Wildlife, and Ecologically Sensitive Resource (#11)
- Physical Impacts on Water Resources (#12)
- Water-Related Land use Management District I#14)
- Water Surface Use (#15)
- Geologic Hazards (#19a)
- Nearby Resources: Prime Farmlands, Scenic Views and Vistas and Other Unique Resources (#25 b, d, e)
- Compatibility with Plans and Land Use Regulations (#27)

are confirmed through this resolution, and;

BE IT FURTHER RESOLVED, that the issues to be addressed in the EIS include (specific Scoping EAW question noted in parenthesis for reference):

- Land Use (#9)
- Water Use (#13)
- Erosion and Sedimentation (#16)
- Water Quality: Surface Water Runoff (#17)
- Water Quality: Wastewaters (#18)
- Soil Conditions/Contamination (#19b)
- Solid Wastes, Hazardous Wastes, Storage Tanks (#20)
- Transportation (referenced as Traffic in EAW - #21)
- Vehicle Related Air Emissions (#22)
- Stationary Source Air Emissions (#23)
- Odors, Noise and Dust (#24)
- Nearby Resources: Archaeological, Historical or Architectural Resources and Designated Park, Recreation Areas or Trails (#25a and c)
- Visual Impacts (#26)

- Impact on Infrastructure and Public Services (#28)
- Cumulative Potential Effects (#29)
- Other Potential Environmental Impacts (#30)

BE IT FURTHER RESOLVED, that two design options for the Build Alternative will be evaluated – a fixed roof and a design with a retractable element such as a roof or wall, and;

BE IT FURTHER RESOLVED, that if, through more detailed study in the Draft EIS, it is revealed that one of the two design options is determined to no longer be a prudent and feasible design option, the MSFA will make a determination regarding whether the design option should be further screened. If this decision is made, the MSFA, serving as the project proposer and RGU will provide notice of the decision to all persons on the Minnesota EQB distribution list, along with Scoping commenters and publish the decision in the *Minnesota EQB Monitor*.

ADOPTED this 16th day of November, 2012, by the Minnesota Sports Facilities Authority.

Secretary / Treasurer

Chair

Moved by: _____

Seconded by: _____

Abstentions Nays Ayes

2.0 Project Description

The Proposed Project is a multi-purpose stadium and related infrastructure to be used as a venue for the National Football League (NFL) and a broad range of other civic, community, athletic, educational, cultural, and commercial activities in Downtown Minneapolis, Minnesota. The new Stadium will include the following elements:

- Demolition of the existing Metrodome Stadium
- Construction of a New Stadium Facility (See Alternatives section for details)
- Possible retractable element such as roof or wall
- Parking (see Alternatives section for details)
- Potential closure of 5th Street from Chicago to 11th Avenues
- Stadium infrastructure (see Alternatives section for details)

The MSFA is the RGU and the Project Proposer for the new stadium. The MSFA project manager is:

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3.0 Alternatives

Legislation was passed in the Minnesota legislature and signed by the governor of Minnesota in May 2012. The legislation states that the new Stadium to be constructed shall be located at the existing stadium (Metrodome) site in the City of Minneapolis. It also states that the MSFA is the RGU for an Environmental Impact Statement (EIS) for the new Stadium prepared under section 116D.04, if an EIS is necessary, and that the EIS shall not be required to consider alternate stadium sites. Therefore, the alternatives that will be evaluated in the EIS will be a No Build Alternative and the Proposed Project Alternative, as described below.

3.1 No Build Alternative

As required by Minnesota Rule 4410.2300, an analysis will be conducted of the No Build Alternative. The No Build Alternative assumes continued use of the existing Metrodome facility by the Minnesota Vikings.

3.2 Build Alternative

The Build Alternative (also referred to as the "Proposed Project" or the "new Stadium") is the construction of a multi-purpose stadium and related infrastructure to be used as a venue for the National Football League (NFL) and a broad range of other civic, community, athletic, educational, cultural, and commercial activities in Downtown Minneapolis, Minnesota.

The Proposed Project will involve the construction of a new Stadium on the current Hubert H. Humphrey Metrodome (Metrodome) site and will include demolition of the existing Metrodome. The new Stadium facility and ancillary parking and access facilities will seat 65,000 persons (with expansion up to 73,000 seats) and will include suites, club seats, shops, restaurants, an NFL team museum, and Hall of Fame. The MSFA, in conjunction with the NFL Team (the Minnesota Vikings), is proposing to build the Proposed Project. The stadium site for the Proposed Project is defined by Minnesota legislation (473J.03 Section 10, subd. 12) as "*all or portions of the current site of the existing football stadium and adjacent areas, bounded generally by Park and Eleventh Avenues and Third and Sixth Streets in the city of Minneapolis, the definitive boundaries of which shall be determined by the authority and agreed to by the NFL team.*"

The legislation (Minn. Stat. § 473J.11, Section 15, subd. 3) identifies the Proposed Project as "*The stadium and stadium infrastructure shall be designed and constructed incorporating the following general program and design elements:(1) unless otherwise agreed to by the authority and the NFL team, the stadium shall comprise approximately 1,500,000 square feet (sf) with approximately 65,000 seats, expandable to 72,000, shall meet or exceed NFL program requirements, and include approximately 150 suites and approximately 7,500 club seats or other such components as agreed to by the authority and the NFL team;(2) space for NFL team-related exhibitions and sales, which shall include the following: NFL team museum and Hall of Fame, retail merchandise and gift shop retail venues, and themed concessions and restaurants;(3) year-round space for the NFL team administrative operations, sales, and marketing, including a ticket office, team meeting space, locker, and training rooms;(4) space for administrative offices of the authority;(5) 2,000 parking spaces within one block of the stadium, connected by skyway or tunnel to the stadium, and 500 parking spaces within two blocks of the stadium, with a dedicated walkway on game days;(6) elements sufficient to provide community and civic uses as determined by the authority; and (7) a roof that is fixed or retractable, provided that if the roof is retractable, it is accomplished without any increase to the funding provided by the state or the city.*"

Figure 1 (Appendix A) illustrates the stadium site for the Proposed Project, as defined by state legislation. The Proposed Project also includes stadium infrastructure, defined by Minnesota legislation (Minn. Stat. § 473J.03, Section 10, subd. 10) as "*Stadium infrastructure means plazas,*

parking structures, rights of way, connectors, skyways and tunnels, and other such property, facilities and improvements, owned by the authority or determined by the authority to facilitate the use and development of the stadium." At the time this Final Scoping Decision Document was prepared, the specific locations of the stadium infrastructure had not been specifically defined. Hence, their locations have not been specifically identified in Figure 1. There is also consideration for on-site utility functions, such as cooling tower(s) within the stadium site boundaries. Additionally, while the state legislation for the Proposed Project calls for seating capacity up to 72,000 to meet NFL requirements for hosting a Super Bowl event, the stadium will be designed to accommodate up to 73,000 seats.

The new Stadium and supporting facilities (parking, sidewalks, etc.) will be designed to comply with with Americans with Disabilities Act (ADA) requirements.

The Proposed Project will require demolition of the existing Metrodome, which has a maximum seating capacity of 63,962. The total size of the Metrodome is 900,000 square feet. The total size of the new Stadium will be at least 1,500,000 square feet, a net increase of approximately 600,000 square feet. The Proposed Project will also include the potential closure of 5th Street from Chicago to 11th Avenues.

Two design options will be moved forward as a part of the Build Alternative. These two options include a fixed roof and a design with retractable elements, such as a roof or wall. If additional study reveals that one of the two design options is not prudent and feasible, the MSFA may determine that the EIS will analyze only the prudent and feasible design option as the Build Alternative.

The construction of the new Stadium could take up to 35 months, requiring one to two NFL football seasons to be played off-site at the existing TCF Bank Stadium on the University of Minnesota campus. The EIS will address the temporary impacts from the use of TCF Bank Stadium.

4.0 Social, Economic, and Environmental Impacts

The EIS will assess the potential impacts of the Proposed Project, as guided by the Final Scoping Decision Document. The general criteria used to select issues for further analysis in the EIS are as follows:

- The potential for significant environmental effects
- Adequacy of information provided in the Scoping EAW
- Type, extent, and reversibility of environmental effects
- Extent to which environmental effects are subject to mitigation by ongoing public regulatory authority

4.1 Issues to be Excluded from the EIS

Table 4.1-1 outlines each potential impact category and rationale for exclusion from evaluation in the EIS. The number in parentheses refers to the Scoping EAW question corresponding to the potential impact category for reference.

Table 4.1-1 Issues to be Excluded from the EIS

POTENTIAL IMPACT CATEGORY	RATIONALE FOR EXCLUSION FROM EIS EVALUATION
Cover Types (#10)	The land cover (cover types) in the Proposed Project site area is not anticipated to change materially with the construction of the new Stadium.
Fish, Wildlife, and Ecologically Sensitive Resources (#11)	There are no fish and wildlife resources and habitats on or near the Proposed Project site area. In addition, the Minnesota Department of Natural Resources has concurred that the Proposed Project will have no effect on endangered, threatened, or special concern species, rare plant communities, or other sensitive ecological resources on or near the Proposed Project site area.
Physical Impacts on Water Resources (#12)	No water resources were identified within the Proposed Project site area. The Proposed Project will not involve any physical or hydrologic alterations of any surface waters.
Water-Related Land Use Management District (#14)	No part of the Proposed Project involves a shore land zoning district, a delineated 100-year flood plain, or a state or federally designated wild or scenic river land use district. The Mississippi National River and Recreation Area (MNRRA) boundary lies two blocks north of the project site area, running along 2nd Street. The Proposed Project will not impact any areas within this boundary.
Water Surface Use (#15)	The Proposed Project will not change the number or type of watercraft on any water body. There are no water bodies within the Proposed Project site area.
Geologic Hazards (#19a)	There are no geologic site hazards identified within the Proposed Project site area that require further evaluation.

POTENTIAL IMPACT CATEGORY	RATIONALE FOR EXCLUSION FROM EIS EVALUATION
Nearby Resources (#25 b, d, e)	The Proposed Project will not affect any nearby prime farmland, scenic vistas, other unique resources, as documented in the Scoping EAW. Historic or architectural resources will be discussed in the EIS, as described in Section 4.2 below.
Compatibility with Plans and Land Use Regulations (#27)	The new Stadium legislation specifically finds that the Proposed Project is "consistent with the adopted area plan, is the preferred stadium location, and is a permitted land use." Minn. Stat. § 473J.17, Section 20, subd. 6.

4.2 Issues and Impacts to be Addressed in the EIS

Based on analysis conducted during the Scoping EAW process, along with comments received on the Scoping EAW/Draft SDD, the following issue areas will be addressed in the EIS.

- Land use (Scoping EAW Question #9)

A governmental database records search will be completed for the Proposed Project study area, which will supplement any Phase I Environmental Site Assessments (ESAs) completed for specific properties within the study area. The studies and searches will be used to determine the potential extent of the environmental hazards from past site uses that could be encountered by the Proposed Project.

A pre-demolition survey will be completed on the existing structures to determine the environmental hazards that could be encountered during demolition of the existing Metrodome and in removing and disposing of construction debris from the Metrodome site.

The EIS will summarize the findings of the studies, searches, and surveys as the information relates to potential contamination found within the Proposed Project site area.

- Water use (Scoping EAW Question #13)

The EIS will address changes that need to be made to the public water supply as a result of the incremental increase in water demand of the proposed new Stadium, as compared with the existing Metrodome. The Proposed Project will not involve installation or abandonment of water wells, but the EIS will address any appropriation of ground or surface water during construction, including dewatering.

- Erosion and Sedimentation (Scoping EAW Question #16)

A summary of regulatory requirements, anticipated erosion, sedimentation control measures, and any issues raised by regulatory agencies regarding erosion and sedimentation during the consultation process will be provided in the EIS.

- Water quality: Surface Water Runoff (Scoping EAW Question #17)

The EIS will compare the quantity and quality of stormwater runoff before and after the Proposed Project. The EIS will also describe the Proposed Project's stormwater management plan, including any stormwater pollution prevention plans.

The EIS will assess the impacts of the Proposed Project stormwater design on the water quality of the Mississippi River as well as additional relevant concerns identified during agency consultation.

- Water Quality: Wastewaters (Scoping EAW Question #18)

The EIS will identify the incremental wastewater produced by the Proposed Project as compared with the existing Metrodome stadium, as well as whether any additional wastewater infrastructure is needed to accommodate the incremental wastewater produced by the Proposed Project.

The EIS will assess the impact of the Proposed Project stormwater design on the water quality of the Mississippi River, as well as any additional concerns identified during agency consultation.

If on-site cooling tower(s) are included in the new Stadium design, the EIS will assess the potential impact associated with the blow down of the cooling tower(s). The analysis methodology and results will be reviewed with the MPCA.

- Soil Conditions (Scoping EAW #19b)

The EIS will include analysis of the soils, any soil contamination, the potential for groundwater contamination, and any measures to prevent contamination.

- Solid Wastes, Hazardous Wastes, Storage Tanks (Scoping EAW Question #20)

The EIS will identify solid wastes resulting from demolition, construction, and operation and will note any associated management and/or disposal measures.

The EIS will identify the anticipated type and quantity of hazardous and regulated wastes resulting from demolition, construction, and operation and will note any associated management and/or disposal measures.

The EIS will also identify any toxic or hazardous materials that will be used or present and the number and type of storage tanks necessary for construction or operations of the new Stadium.

- Traffic (Scoping EAW Question #21)

A transportation study addressing parking, transit, event traffic management, and regulatory and permitting issues will be completed. A summary of the transportation study will be provided as an appendix to, and will be summarized within, the EIS. The transportation study will also evaluate the potential traffic impacts from the use of TCF Bank Stadium during construction of the new Stadium.

- Vehicle-Related Air Emissions (Scoping EAW Question #22)

The EIS will study the effects of the new Stadium traffic on air quality and compliance with the standards and regulations for vehicle-related emissions. The study will include motor vehicle emissions associated with vehicles traveling to and from the new Stadium and vehicle emissions associated with the new Stadium's construction. The air quality analysis methodology and results will be reviewed with the MPCA. Mitigation measures, if necessary, to reduce carbon monoxide concentrations in the vicinity of the new Stadium will be identified.

Based on the air quality findings from the University of Minnesota On-Campus Football Stadium EIS and Travel Demand Management Plan (TDMP), the People's Stadium EIS will identify differences between conditions documented in the U of M On-Campus EIS and the potential impacts associated with the temporary use of TCF Bank Stadium for NLF games, and identify appropriate mitigation measures, if needed.

- Stationary Source Air Emissions (Scoping EAW Question #23. *This issue area was added in response to formal comments received during the public scoping period*)

If on-site cooling towers are included in the new Stadium design, the EIS will address the potential air quality impacts and requirements of the cooling towers.

- Odors, Noise, and Dust (Scoping EAW Question #24)

The EIS will discuss odors, noise, and dust, including fugitive dust, generated during Stadium construction and identify appropriate mitigation measures. The EIS will also summarize the results of the vehicular traffic and event noise analyses and identify appropriate mitigation measures.

For areas surrounding TCF Bank Stadium, an evaluation of potential traffic noise impacts will be described based on the findings of traffic study results.

- Nearby Resources: Archaeological, Historical, or Architectural Resources (Scoping EAW Question #25a)

The EIS will summarize efforts to verify archaeological, historical, and architectural resources near the Proposed Project site area, as well as any potential effects on these resources. Identification of these resources will include consultation with the State Historic Preservation Office and the Minneapolis Heritage Preservation Commission. Although the Proposed Project is not anticipated to have direct impacts to archaeological, historical, and architectural resources, the EIS will assess the potential for significant adverse indirect effects, including changes to traffic patterns and visual settings.

- Nearby Resources: Parkland, Recreation Areas, or Trails (Scoping EAW Question #25c. *This issue area was added in response to formal comments received during the public scoping period*)

A qualitative assessment of bicycle facilities on the site and leading to the site will be conducted. Identification of the facilities will include consultation with the City of Minneapolis and the Minneapolis Bike Coalition. The EIS will assess the potential for impacts to the bike facilities around the stadium and provide mitigation measures if applicable.

- Visual Impacts (Scoping EAW Question #26)

A visual analysis of the new Stadium structure and the nighttime lighting during events will be completed to determine the potential for significant visual impacts, including effects to the Downtown Minneapolis skyline.

- Impact on Infrastructure and Public Services (Scoping EAW Question #28)

The EIS will include a list and discussion of the public infrastructure improvements associated with the new Stadium project.

- Cumulative Potential Effects (Scoping EAW Question #29)

The EIS will consider the cumulative potential effects of the new Stadium project, in addition to other projects in the environmentally relevant area that might reasonably be expected to affect the same environmental resources as the new Stadium project, including future projects actually planned or for which a basis of expectation has been laid.

- Other Potential Environmental Impacts (Scoping EAW Question #30)

The EIS will address any other potential environmental impacts of the Proposed Project not included in items 1 to 28, as well as any proposed mitigation of these impacts.

5.0 Schedule and Contacts

The preliminary schedule for the completion of the EIS for the Proposed Project is outlined below in **Table 5-1.**

Table 5-1 Anticipated Review Schedule

EVENT/ACTIVITY	DATE	COMMENTS	COMPLETED AS OF NOVEMBER 16, 2012
Start EIS Scoping Period	October 1, 2012	*EQB Monitor* publication and distribution of the Scoping EAW	X
Scoping Public Meeting	October 23, 2012	At least 15 working days after *EQB Monitor* publication	X
End Scoping Period	October 31, 2012	Close the 30-day comment period	X
Scoping Decision	November 16, 2012	Must be issued within 15 working days from end of scoping period, except if extension is approved by Project Proposer	X
Final Scoping Decision Document Published	December 10, 2012	*EQB Monitor* Publication and distribution of Scoping Decision Document	
EIS Preparation Notice in *EQB Monitor*	December 10, 2012	Maximum 280-day EIS process starts here	
Publish Draft EIS (DEIS) and Start Public Comment Period	March 2013	*EQB Monitor* publication	
Public Meeting	March 2013	Must be held at least 15 working days after *EQB Monitor* publication	
End DEIS Public Comment Period	March/April 2013	At least 10 working days after public meeting	
Final EIS (FEIS) Notice of Availability	June 2013	*EQB Monitor* publication	
End of Comment Period on FEIS	June 2013	At least 10 working days after *EQB Monitor* publication of FEIS notice of availability	

EVENT/ACTIVITY	DATE	COMMENTS	COMPLETED AS OF NOVEMBER 16, 2012
FEIS Adequacy Decision and Publication of the Decision in the *EQB Monitor*	July 2013	The RGU must provide notice of its adequacy decision within 5 working days of its decision to all persons receiving a copy of the FEIS (those who commented on the DEIS and those requesting a copy of the FEIS). The RGU must also publish its adequacy decision in the *EQB Monitor*.	

6.0 Agency Coordination

6.1 Permits and Approvals

Table 6.2-1 identifies known federal, state, and local permits and approvals anticipated for the Proposed Project, as well as current status. The legislation (473J.17, subd.3) states that *"the environmental impact statement must be determined to be adequate before commencing work on the foundation of the stadium, but the stadium and stadium infrastructure may otherwise be started and all preliminary and final government decisions and actions may be made and taken including, but not limited to, acquiring land; obtaining financing' granting permits or other land use approvals; entering into grant, lease, or use agreements; or preparing the site or related stadium infrastructure prior to a determination of adequacy of the environmental impact statement*."

6.2 Coordination and Permits Required

On October 1, 2012, a Draft Scoping Decision Document was published and circulated with a Scoping EAW to all agencies/organizations on the Minnesota EQB distribution list. Comments on both documents were accepted through October 31, 2012. This public comment period also included an open house held on October 23, 2012 (see materials in Appendix B). Comments received during the public comment period and at the open house are included in Appendix C of this document and are reflected in this Final Scoping Decision Document where appropriate.

Coordination will take place with a number of agencies as part of the permitting process as listed in the response in **Table 6.2-1**.

Table 6.2-1 Permits and Approvals Required

UNIT OF GOVERNMENT	TYPE OF APPLICATION	STATUS
FEDERAL		
Federal Aviation Administration	Airspace hazard permit (for any structures more than 200 feet above ground level)	To be applied for, if needed
STATE		
Minnesota Department of Health	Abandonment of Water Wells	To be applied for, if needed
	Water Main Installation Permit	To be applied for
	Drainage Permit	To be applied for
Minnesota Department of Natural Resources	Water Appropriation Permit	To be applied for, if needed
Minnesota Department of Transportation	Permit for any work within MnDOT right-of-way	To be applied for, if needed
Minnesota Historical Society	Minnesota Historic Sites Act Minnesota Field Archaeology Act	Provisions will be met during construction, as applicable
Minnesota Pollution Control Agency	NPDES/SDS Construction Stormwater Permit	To be applied for
	Sanitary Sewer Extension Permit	To be applied for

UNIT OF GOVERNMENT	TYPE OF APPLICATION	STATUS
	Soil and Groundwater Remediation Plan Approval	To be applied for, if needed
	Storage Tank Registration	To be applied for
Minnesota Sports Facilities Authority	Adequacy Determination	In process
REGIONAL		
Metropolitan Council	Sanitary Sewer Extension Permit	To be applied for, if needed
Middle Mississippi River Watershed District (*which defers to City of Minneapolis for permitting*)	Stormwater management plan approval	To be applied for
LOCAL		
City of Minneapolis	Building permits	To be applied for
	Demolition permit	To be applied for
	Emergency Generator Fuel Storage Permit	To be applied for
	Erosion and Sedimentation Control Plan Approval and Grading Permit	To be applied for
	Approval of Street Vacation (5th Street)	To be applied for
	Review of site plan and zoning	To be applied for
	Conditional Use Permit	To be applied for, if needed

7.0 Identification of Supporting Studies

Based on the findings and comments received on the Scoping EAW/Draft SDD, the following studies will be completed to better understand the potential impacts of the new Stadium and possible mitigation measures.The findings from these studies will be incorporated into the EIS document.

- Transportation and Parking Study
- Air Quality Study
- Noise Study
- Visual Quality Study
- Cultural Resources Study
- Soil Contamination Study (to extent necessary)

8.0 Identification of Phased or Connected Actions

As outlined in the Scoping EAW for the People's Stadium, future development plans or projects by others within or adjacent to the Proposed Project site boundaries are not part of the Proposed Project and will not be covered by this EIS. Such future projects are not phased or connected actions by the MSFA and will be reviewed independently of this project by the City of Minneapolis or other appropriate governing agencies, if proposed. The EIS will consider the cumulative potential effects of the new Stadium project, in addition to other projects in the environmentally relevant area that might reasonably be expected to affect the same environmental resources as the Proposed Project, including future projects actually planned or for which a basis of expectation has been laid.

9.0 Public Involvement

Consistent with the requirements of Minnesota Rule 4410.2100, Subpart 3 (Scoping Period), the public was informed when the Scoping EAW/Draft SDD became available for public review and comment on October 1, 2012. A copy of the document was available by request or could be reviewed at the MSFA Office, the Minneapolis Public Library, or the Legislative Reference Library in St. Paul. The Scoping EAW/Draft SDD as well as information presented at the October 23, 2012, public open house is also available on the MSFA website (www.msfa.com).

Section 5.0 includes a summary of upcoming EIS activities for the Proposed Project. As presented in **Table 5-1**, a Draft EIS will analyze the alternatives and issue areas outlined in this Final Scoping Decision Document. Once completed, the Draft EIS will be circulated for a 30-day public comment period. In addition, a public meeting will be held during the comment period on the Draft EIS. The availability of the Draft EIS will be published in the *EQB Monitor* and in local media sources. The Draft EIS will be distributed to the EQB distribution list and posted on the MSFA website.

Comments received during the Draft EIS comment period will be evaluated in preparing the Final EIS. Following publication of the Final EIS, the MSFA will determine its adequacy consistent with Minnesota environmental review requirements. Notification of the MSFA's adequacy determination will be published in the *EQB Monitor*, sent to the EQB distribution list, and provided to local media sources.

9.1 Public Open House – October 23, 2012

A Public Open House on the Scoping EAW was held October 23, 2012, from 5:00 to 7:00 p.m. at the Hubert H. Humphrey Metrodome–Halsey Hall Room at 900 South 5th Street in Minneapolis to gain stakeholder input. Forty individuals signed in at the meeting.

An outreach effort was used to solicit public and agency comments for the People's Stadium project during the formal scoping period, which extended from October 1 to October 31, 2012. Meeting announcements were emailed to the Stadium Implementation Committee, 12 surrounding neighborhood organizations, 7 downtown business organizations, and 28 agencies and organizations that received the Scoping EAW/Draft SDD. Press releases were also sent on October 1 and 19, 2012, to approximately 60 reporters and major news outlets. Legal notices were posted in the Star Tribune newspaper and the Finance & Commerce newspaper. Open House Materials may be found in Appendix B and at the MSFA website (www.msfa.com).

9.2 Comments Received During the Scoping Process

During the scoping process, comments were received in writing via e-mail, U.S. mail, or submitted directly to the MSFA at the public open house. Verbal comments were also received at the public open house and were transcribed by a court reporter. **Table 9.2-1** presents a summary of the comments received during the Scoping process.

Table 9.2-1 Summary of Comment Types

TYPE OF COMMENT	NUMBER
Comment forms submitted at open house	3
Verbal statements received at open house	4
Written comments (mail and electronic)	12
Total	**19**

As shown in **Table 9.2-1**, 19 comments were received through October 31, 2012. Of these, 3 written comments and 4 verbal comments were received at the scoping open house. The balance of the comments was received by mail or e-mail before the end of the comment period. In addition to comments from the general public, written statements were received from the following municipalities, agencies, and organizations: City of Minneapolis Department of Public Works, Minnesota Department of Transportation (MnDOT), Minnesota Department of Natural Resources (DNR), Minnesota Pollution Control Agency (MPCA), Metropolitan Council, University of Minnesota, Minnesota Historical Society, Minneapolis Bicycle Coalition, and the Marcy-Holmes Neighborhood Association.

9.2.1 Comments by Topic

The topics of written or verbal comments are summarized in **Table 9.2-2**. Each topic listed in the table is discussed in the subsequent text.

Table 9.2-2 Summary of Topics of Public Concern

TOPICS OF CONCERN	NUMBER
Accessibility	3
Air Quality	3
Bikeways and Pedestrians	4
Bird Collisions	1
Construction Impacts	3
Cultural Resources	1
Design Suggestions	7
Game Day Concerns	2
Noise and Vibration	4
Parks and Trails	1
Permitting	3
Regulated Material / Waste / Trash	5
Snow Removal	2
Social and Economic Impacts	5
Traffic	6
Transit	5
Visual	3
Water and Water Quality	3
Miscellaneous	2

Responses to the comment topics presented during the public comment period, including verbal statements submitted as comments at the open house and the written comments received from the regulatory review agencies, are included in Appendix C.

Appendix A

Figure 1. Stadium Site Area and Description

Kimley-Horn and Associates, Inc.

NORTH

0 350 700 Feet

FIGURE 1. STADIUM SITE AREA AND DESCRIPTION

Appendix B

Minnesota EQB Monitor Notification

Press Release/Legal Notice

Open House Materials

SCOPING ENVIRONMENTAL ASSESSMENT WORKSHEET

Comment Deadline: October 31, 2012

Project Title: The People's Stadium

Description: The proposed project is the construction of a new Stadium on the current Hubert H. Humphrey Metrodome (Metrodome) site. Construction of the new Stadium includes demolition of the existing Metrodome stadium and construction of a new stadium facility and ancillary parking and access facilities. The new 65,000-seat stadium (with expansion up to 73,000 seats) will include suites, club seats, shops, restaurants, a National Football League (NFL) team museum, and Hall of Fame. Copies of the Scoping EAW are available for public review beginning October 1, 2012, at the following locations:

- **Project website -** http://www.msfa.com/
- **Hennepin County Public Library -** 300 Nicollet Mall Minneapolis

To afford an opportunity for all interested persons, agencies and groups to be informed about the details of the People's Stadium project, one public open house is scheduled for the following date and location:

Public Open House
Tuesday October 23, 2012
5:00-7:00 pm
Hubert H. Humphrey Metrodome- Halsey Hall Room
900 South 5th Street, Minneapolis, MN

The public meeting location is accessible for persons with disabilities.

Written materials, project updates, and materials presented at the public open house will be available on the MSFA website noted above. Copies of the Scoping EAW are being distributed to agencies on the current Minnesota EQB list. Comments will be accepted through **October 31, 2012.**

Project Proposer: Minnesota Sports Facilities Authority

RGU: Minnesota Sports Facilities Authority

Contact: Steve Maki, Project Manager
Minnesota Sports Facilities Authority (MSFA)
900 South 5th Street
Minneapolis, MN 55415
Phone: 612-335-3313
Fax: 612-332-8334
steve.maki@msfa.com

PETITION FILED

The following petitions have been filed with the EQB requesting preparation of an EAW. The EQB has assigned the indicated unit of government to review the petition and decide on the need for an EAW.

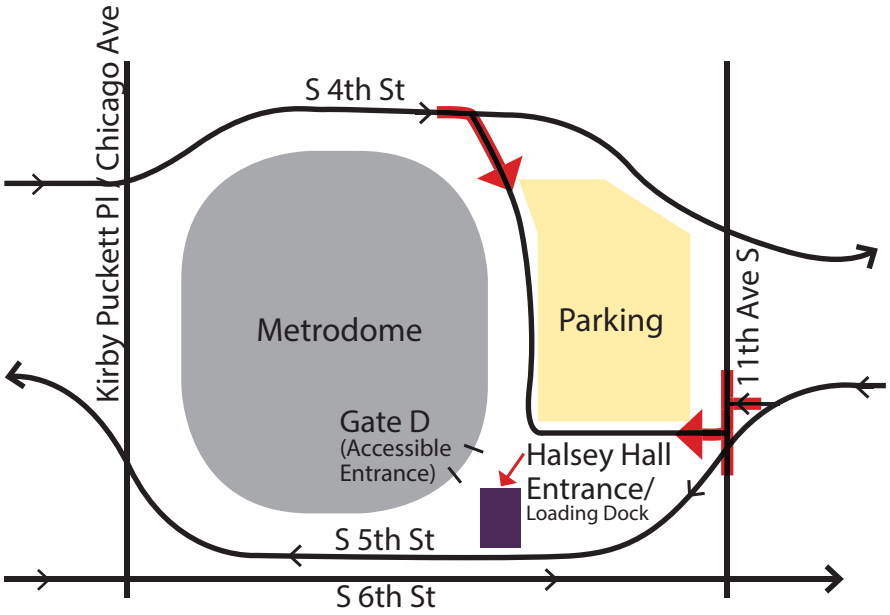
- Stearns County, Huls Brothers Trucking Inc. Proposed Manure Storage Expansion

THE PEOPLE'S STADIUM
PUBLIC OPEN HOUSE &
ENVIRONMENTAL IMPACT SCOPING MEETING

October 23, 2012
5:00pm to 7:00pm

Hubert H. Humphrey Metrodome
-- Halsey Hall Room --
900 South 5th Street
Minneapolis, Minnesota 55415

This public meeting location is accessible for persons with disabilities. Gate D will be open for persons requiring an accessible entrance.



Provide your comments on:

• Ecological Effects • Traffic • Access • Noise • Parking

• Transit • Tailgating & Railgating • Historic Issues •Visual/Aesthetics

• Any Other Issue Important to You

The Scoping Enviromental Assessment Worksheet and Draft Scoping Decision Document can be viewed at:
- Minnesota Sports Facilities Authority website: www.msfa.com
- Hennepin County Library - 300 Nicollet Mall, Minneapolis

Written comments must be submitted by October 31st, 2012. Comments can be submitted in writing by U.S. mail or email:

U.S. Mail: Steve Maki, Project Manager
Minnesota Sports Facilities Authority (MSFA)
900 South 5th Street
Minneapolis, MN 55415

Email: steve.maki@msfa.com

Kimley-Horn and Associates, Inc.

Minnesota Sports Facilities Authority
900 South 5th Street, Minneapolis, MN 55415

Media Contact: Jenn Hathaway
612-335-3308
jenn.hathaway@msfa.com

FOR IMMEDIATE RELEASE
October 19, 2012 (Minneapolis, MN)

ENVIRONMENTAL WORK ON PEOPLE'S STADIUM BEGINS, FIRST PUBLIC SCOPING MEETING SET

The Minnesota Sports Facilities Authority will be providing information on the required state environmental review process for the new Viking's stadium, known as the People's Stadium, and is seeking the public's help in identifying potential impacts stemming from the project.

Public Open House - Environmental Impact Scoping Meeting
October 23, 2012
5:00pm to 7:00pm
Hubert H. Humphrey Metrodome -- Halsey Hall Room
900 South 5th Street, Minneapolis, Minnesota 55415

This public meeting location is accessible for persons with disabilities. Gate D will be open for persons requiring an accessible entrance.

Completion of the Scoping Environmental Assessment Worksheet (EAW) is an early step in the approximately year-long state environmental review process that is required for the new People's Stadium. The Scoping EAW provides a preliminary assessment of the project's potential effects on a variety of issues including ecological effects, traffic, noise, parking, and visual impacts. It also identifies which issues will be addressed in detail in the upcoming Environmental Impact Statement (EIS).

The public scoping meeting set for October 23rd, 2012 at the Halsey Hall room in the Metrodome will give interested parties, stakeholders, and members of the public a chance to review the Scoping EAW and comment on potential impacts, positive or negative that will then be addressed in the Environmental Impact Statement.

Written comments on the Scoping EAW and draft Scoping Decision Document must be submitted by Oct 31st, 2012. Comments can be submitted in writing by U.S. mail or by email:

U.S. Mail: Steve Maki; Project Manager
Minnesota Sports Facilities Authority (MSFA)
900 South 5th Street
Minneapolis, MN 55415

Email: steve.maki@msfa.com

The complete Scoping EAW and draft Scoping Decision Document can be viewed at:
- Minnesota Sports Facilities Authority website: www.msfa.com
- Hennepin County Library - 300 Nicollet Mall, Minneapolis

Minnesota Sports Facilities Authority
900 South 5th Street, Minneapolis, MN 55415

People's Stadium Project Description
A multi-purpose stadium and related infrastructure to be used as a venue for the National Football League (NFL) and a broad range of other civic, community, athletic, educational, cultural, and commercial activities in Downtown Minneapolis, MN.

The proposed project is the construction of a new Stadium on the current Hubert H. Humphrey Metrodome (Metrodome) site. Construction of the new Stadium includes demolition of the existing Metrodome stadium and construction of a new stadium facility and ancillary parking and access facilities. The new 65,000-seat stadium (with expansion up to 73,000 seats) will include suites, club seats, shops, restaurants, a National Football League (NFL) team museum, and Hall of Fame.

About the Minnesota Sports Facilities Authority (MSFA)
In May 2012, the Minnesota Legislature and the Minneapolis City Council approved funding for the new $975 million multipurpose stadium to replace the Metrodome. The new stadium is scheduled to open in time for the 2016 NFL season. The Minnesota Sports Facilities Authority (MSFA), which currently owns the Metrodome, will own and operate the new stadium.

MSFA is also responsible for the design and construction of the new stadium. The Authority's role is to ensure the new stadium remains the People's Stadium.

###

STATE OF MINNESOTA)
COUNTY OF HENNEPIN)

Karen Greenhoe, being duly sworn, on oath says she is and during all times herein stated has been an employee of Star Tribune Media Company LLC, a Delaware limited liability company with offices at 425 Portland Avenue, Minneapolis, Minnesota 55488, publisher and printer of the *Star Tribune* newspaper (the "Newspaper"), published 7 days a week, and has full knowledge of the facts herein stated as follows:

1. The Newspaper meets the following qualifications:

(a) The Newspaper is printed in the English language in newspaper format and in column and sheet form equivalent in printed space to at least 1,000 square inches;

(b) The Newspaper is printed daily and distributed at least five days each week;

(c) In at least half of its issues each year, the Newspaper has no more than 75 percent of its printed space comprised of advertising material and paid public notices. In all of its issues each year, the Newspaper has not less than 25 percent of its news columns devoted to news of local interest to the community that it purports to serve. Not more than 25 percent of the Newspaper's non-advertising column inches in any issue duplicates any other publication;

(d) The Newspaper is circulated in the local public corporation which it purports to serve, and has at least 500 copies regularly delivered to paying subscribers;

(e) The Newspaper has its known office of issue established in either the county in which it lies, in whole or in part, the local public corporation which the Newspaper purports to serve, or in an adjoining county;

(f) The Newspaper files a copy of each issue immediately with the state historical society;

(g) The Newspaper is made available at single or subscription prices to any person, corporation, partnership, or other unincorporated association requesting the Newspaper and making the applicable payment;

(h) The Newspaper has complied with all the foregoing conditions for at least one year immediately preceding the date of the notice publication which is the subject of the Affidavit; and

(i) Between September 1 and December 31 of each year, the Newspaper publishes and submits to the secretary of state, along with a filing fee of $25, a sworn United States Post Office periodical class statement of ownership and circulation.

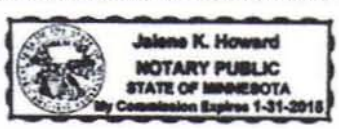
2. The printed copy of the matter attached hereto (the "Notice") was copied from the columns of the Newspaper and was printed and published in the English language on the following days and dates: **Sunday, October 21, 2012.**

3. Except as otherwise directed by a particular statute requiring publication of a public notice, the Notice was printed in a typeface no smaller than six point with a lowercase alphabet of 90 point.

4. The Newspaper's lowest classified rate paid by commercial users for space comparable to the space in which the Notice was published is **$247.50.**

Karen Greenhoe

Subscribed and sworn to before me on October 22, 2012



Jolene K. Howard

Ad Number:	13621264	Advertiser:	Zan Associates
Insertion Number:	N/A	Agency:	N/A
Size:	1 Col x 3.958 in	Section-Page-Zone(s):	K-7-Southwest
Color Type:	0	Description:	(MET)NOTICEOFPUBLICMEETINGAPublic...

StarTribune
Sunday, October 21, 2012

Don't miss the 2012 Salute to Veterans

A SPECIAL SECTION ON SUNDAY, NOVEMBER 11.

This Veteran's Day, we are paying tribute to friends and family in the military in a wonderful way with a special section filled with photos and messages.

To place your message, call 612-673-7000 or go to StarTribune.com/veterans by Thursday, November 8 at 12 pm.

IN HONOR ★ IN GRATITUDE ★ IN THE PAPER

StarTribune

Affidavit of Publication

NOTICE OF PUBLIC MEETING

A Public Open House, hosted by the Minnesota Sports Facilities Authority (MSFA), is being held to receive comments on the Scoping Environmental Assessment Worksheet (EAW) and Draft Scoping Decision Document for the new Vikings' Stadium (The People's Stadium).

The proposed project is the construction of a new Stadium on the current Hubert H. Humphrey Metrodome (Metrodome) site in Minneapolis. Construction of the new Stadium includes demolition of the existing Metrodome stadium and construction of a new stadium facility and ancillary parking and access facilities. The new 65,000-seat stadium (with expansion up to 73,000 seats) will include suites, club seats, shops, restaurants, a National Football League (NFL) team museum, and Hall of Fame.

Tuesday, October 23, 2012
5:00 pm to 7:00 pm
Metrodome, Halsey Hall Room
900 South 5th Street,
Minneapolis, MN 55415

The complete Scoping EAW/Draft Scoping Decision Document can be viewed at:

- Minnesota Sports Facilities Authority website: www.msfa.com
- Hennepin County Library - 300 Nicollet Mall, Minneapolis

Written comments on the Scoping EAW/Draft Scoping Decision Document are due by Oct 31st, 2012. Send comments to Steve Maki, Minnesota Sports Facilities Authority, 900 South 5th Street, Minneapolis, MN 55415 or email to steve.maki@msfa.com.

(October 17, 2012)
10159831

STATE OF MINNESOTA)
(SS.
COUNTY OF HENNEPIN)

Description:
Public Meeting RE: Vikings Stadium

Carrie Retzack , being duly sworn on oath say she/he is and during all times herein stated has been the publisher or the publishers designated agent in charge of the newspaper known as

Finance and Commerce

and has full knowledge of the facts herein stated as follows:

(A) The newspaper has complied with all of the requirements constituting qualifications as a legal newspaper, as provided by Minnesota Satute 331A.02, and 331A.07, and other applicable laws, as amended.

(B) She/He further states on that the printed

Hearings
10159831

hereto printed as part as it was printed and published there in the English language; that it was first so published on

October 17, 2012 for 1 time(s):
the subsequent dates of publications being as follows:
10/17/2012

And that the following is a printed copy of the lower case alphabet from A to Z, both inclusive, and is hereby acknowledged as being the size and kind of type used in the

X abcdefghijklmnopqrstuvwxyz
abcdefghijklmnopqrstuvwxyz

Carrie Retzack

Subscribed and
Sworn to before me this 17th day of October, 2012

(Notarial Seal) Notary Public, Hennepin County, Minnesota

SHAWNA RHEA SCHMITZ
Notary Public-Minnesota
My Commission Expires Jan 31, 2015

RATE INFORMATION:

1. Lowest classified rate paid by commercial users for comparable space:	$	16.0000
2. Maximum rate allowed by law for the above matter:	$	1.40227
3. Rate actually charged for the above matter:	$	1.2748

MEETING GUIDE

ENVIRONMENTAL SCOPING MEETING

- **Sign In & Sign Up for Future Notices.** It's important that we document participation and have a way to keep you informed about upcoming meetings and events.

- **Put a Dot on the Map to Show Where You Live or Work.** This helps us plan for future meetings.

- **Review Project Materials.** We encourage you to review project information and to ask questions of the project team. You can also view the complete Scoping Environmental Assessment Worksheet (EAW) and Draft Scoping Decision Document at:

  - *Minnesota Sports Facilities Authority Website: www.msfa.com*
  - *Hennepin County Library - 300 Nicollet Mall, Minneapolis*

- **Share Your Comments.** Our goal tonight is to hear from you. You can share your comments with us in any of the following ways:

  - Write your comments on a comment card and leave it in the comment box tonight
  - Share your verbal comments with the court reporter here tonight
  - Send your comments by U.S. mail or email no later than October 31st, 2012

U.S. Mail: Steve Maki, Project Manager
Minnesota Sports Facilities Authority (MSFA)
900 South 5th Street
Minneapolis, MN 55415
Email: steve.maki@msfa.com

- **Thank You.** We appreciate your time and interest in the People's Stadium project.

MINNESOTA SPORTS FACILITIES AUTHORITY

PROJECT DESCRIPTION

The People's Stadium is a proposed multi-purpose stadium and related infrastructure to be used as a venue for the National Football League (NFL) and a broad range of other civic, community, athletic, educational, cultural, and commercial activities in Downtown Minneapolis, Minnesota. The new stadium will include the following elements:

- **Demolition of the Existing Metrodome Stadium**
  - *900,000 Square Feet (sf)*
  - *Seating Capacity 63,962*
- **Construction of a New Stadium Facility**
  - *At Least 1,500,000 Square Feet (sf)*
  - *65,000 Seats, Expandable up to 73,000*
  - *150 Suites*
  - *7,500 Club Seats*
  - *Concessions and Restaurants*
  - *NFL Team Museum and Hall of Fame*
  - *Administrative Offices & Ticket Office*
  - *Team Meeting Space, Lockers, and Training Rooms*
- **Approximately 35 Month Construction Timeframe**
  - *1-2 Seasons Played at TCF Stadium*
- **Possible Retractable Element such as Roof or Wall**
- **Parking**
  - *2,000 Spaces within 1 Block of the Stadium, Connected by Skyway or Tunnel*
  - *500 Spaces within 2 Blocks of the Stadium, with Dedicated Walkway on Game Days*
- **Closure of 5th Street from Chicago to 11th Avenue**
- **Stadium Infrastructure**
  - *Plazas*
  - *Parking Structures*
  - *Rights of Way*
  - *Connectors, Skyways, and Tunnels*
- **Does NOT Include**
  - *Future Development Plans*
  - *Projects by Others In or Adjacent To Study Area*

Existing Metrodome and Project Study Area Outlined in Red.

MINNESOTA SPORTS FACILITIES AUTHORITY

ENVIRONMENTAL IMPACT STATEMENT (EIS) PURPOSE & SCHEDULE

- **Project Proposer and Responsible Governmental Unit (RGU):** Minnesota Sports Facilities Authority (MSFA)
- **What is the purpose of the EIS?** The state EIS provides information about the extent of potentially significant impacts and how they may be avoided or minimized.
- **What are the steps in the EIS process?** Completion of the Scoping Environmental Assessment Worksheet (EAW) is an early step in the approximately year-long state environmental review process. The Scoping EAW/Draft Scoping Decision Document provides a preliminary assessment of the project's potential effects on all of the issue areas and provides a preliminary indication of which issues will be addressed in the EIS. The next step in the EIS process is the preparation of the Draft EIS, followed by the Final EIS, and culminates in the Determination of Adequacy. Similar to the Scoping EAW/Draft Scoping Decision Document, the Draft and Final EIS are circulated for public and agency review and comments (See schedule below).
- **What is the purpose of tonight's Scoping Open House?** This meeting provides interested parties the opportunity to review the findings from the Scoping EAW/Draft Scoping Decision Document, ask questions of the project team, and provide either written or verbal comments on the proposed project and the issues to be further addressed in the EIS.
- **How do I provide written comments?** Written comments on the Scoping EAW/Draft Scoping Decision Document must be submitted by October 31, 2012. You can submit comments in writing by US mail, or e-mail to:

  Steve Maki, Project Manager
  Minnesota Sports Facilities Authority
  900 South 5th Street
  Minneapolis, MN 55415
  steve.maki@msfa.com

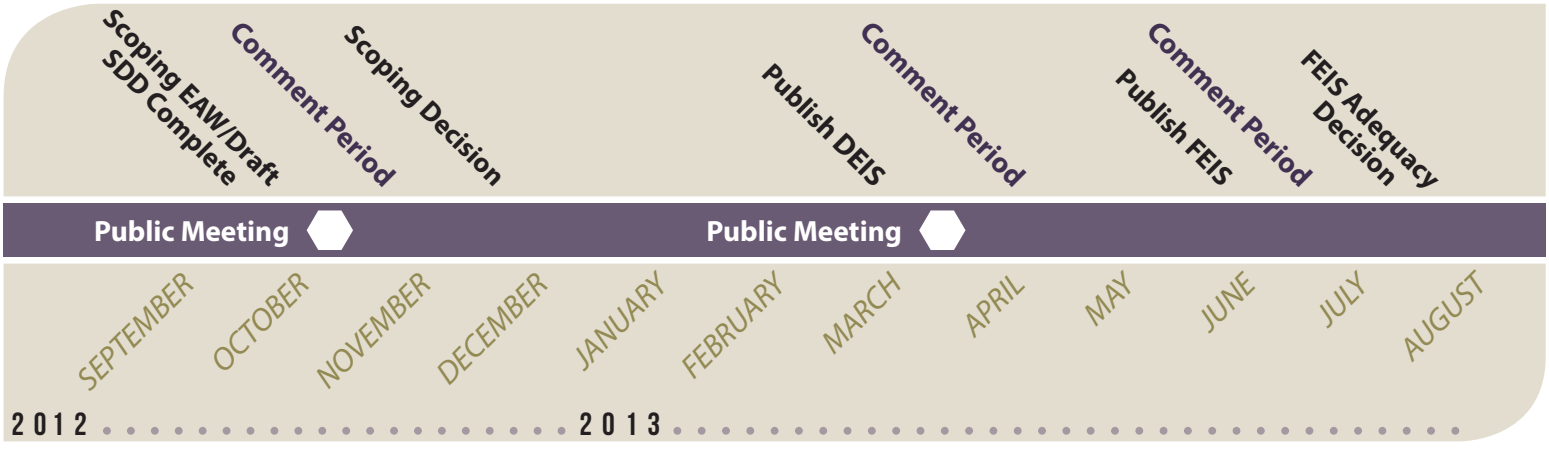
- **How do I provide verbal comments?** Please share your verbal comments with the court reporter here tonight.
- **Where can I find more information on the project?** The complete Scoping EAW/Draft Scoping Decision Document can be viewed at:

  MSFA website: www.msfa.com
  Hennepin County Library – 300 Nicollet Mall, Minneapolis

Issues Proposed To Be Addressed in the EIS

- Traffic
- Air Quality
- Odors, Noise and Dust
- Visual Impacts
- Public Infrastructure Improvements
- Archaeological, Historical and Architectural Resources
- Past Site Uses
- Soil Conditions
- Water Use
- Water Quality
- Solid Waste, Hazardous Materials, Storage Tanks
- Cumulative Impacts

Project Need as Defined by State Legislation:
The Minnesota Legislature "finds and declares that the expenditure of public money for this purpose is necessary and serves a public purpose" and government assistance to facilitate the presence of professional football provides to the state of Minnesota and its citizens highly valued intangible benefits." (473J.01, Section 9).



The People's Stadium
ENVIRONMENTAL IMPACT STATEMENT

WELCOME

The purpose of tonight's meeting is to:

- Present the findings of the Scoping Environmental Assessment Worksheet (EAW) and Draft Scoping Decision Document

- Gather comments on issues that should be addressed in the Draft Environmental Impact Statement (DEIS)

■ Please sign in

MINNESOTA SPORTS FACILITIES AUTHORITY

PROJECT DESCRIPTION

A multi-purpose stadium and related infrastructure to be used as a venue for the National Football League (NFL) and a broad range of other civic, community, athletic, educational, cultural, and commercial activities in downtown Minneapolis, MN.

- **Demolition of the Existing Metrodome Stadium**
  - 900,000 square feet (sf), seating capacity 63,962
- **Construction of a New Stadium Facility**
  - At least 1,500,000 sf
  - 65,000 seats, expandable up to 73,000
  - 150 suites
  - 7,500 club seats
  - Concessions and restaurants
  - NFL Team Museum and Hall of Fame
  - Administrative offices and ticket office
  - Team meeting space, lockers, and training rooms
- **Approximately 35-Month Construction**
  - 1-2 seasons played at TCF Stadium
- **Possible Retractable Element such as Roof or Wall**
- **Parking**
  - 2,000 spaces within 1 block of the stadium, connected by skyway or tunnel
  - 500 spaces within 2 blocks of the stadium, with dedicated walkway on game days
- **Closure of 5th Street from Chicago to 11th Avenues**
- **Stadium Infrastructure**
  - Plazas
  - Parking structures
  - Rights of way
  - Connectors, skyways, and tunnels
- **Does NOT Include**
  - Future development plans
  - Projects by others in or adjacent to study area

DRAFT SCOPING DECISIONS

Issue Areas Proposed to Be Addressed in the EIS

- **Traffic**
  - Vehicular network traffic analysis
  - Parking analysis
  - Transit analysis
  - Event traffic management
  - Analyze potential traffic impacts at TCF Bank Stadium during construction
- **Air Quality**
  - Motor vehicle emissions
- **Odors, Noise, and Dust**
  - Vehicular noise
  - Event noise
  - Construction noise and dust
- **Visual Impacts**
  - Views of new structure
  - Night time lighting during events
  - Effects on downtown skyline views
- **Public Infrastructure Improvements**
  - Streets
  - Sidewalks and skyways
  - Other public infrastructure needed
- **Archaeological, Historical, and Architectural Resources**
  - Direct impacts (none expected)
  - Changes to traffic patterns
  - Changes to visual settings

DRAFT SCOPING DECISIONS

Issue Areas Proposed to Be Addressed in the EIS

- **Past Site Uses (Land Use)**
  - Contamination from previous site uses
- **Erosion and Sedimentation**
- **Soil Conditions**
  - Potential for soil contamination and groundwater contamination
  - Prevention measures
- **Water Use**
  - Changes to accommodate increase in water demand
- **Water Quality – Surface Water Runoff and Wastewater**
  - Assess quantity and quality of stormwater runoff
  - Amount of additional wastewater
  - Potential impact on the Mississippi River
- **Solid Waste, Hazardous Materials, Storage Tanks**
  - Solid wastes (trash) generated from demolition, construction, and operation
  - Management and Disposal Measures
  - Hazardous materials generated
  - Storage tanks needed
- **Cumulative Impacts**
  - Combined consideration of impacts of the People's Stadium and other planned projects in the area

DRAFT SCOPING DECISIONS

Issue Areas Proposed to Be Excluded from the EIS

- Land Cover (Hard Surfaces, Vegetation, Etc.)
- Fish, Wildlife, and Ecologically Sensitive Resources
- Physical Impacts on Water Resources
- Water-Related Land Use Management District (Floodplains, Shorelands, Zoning District, MNRRA)
- Water Surface Use (Watercraft Use)
- Geologic Hazards
- Stationary Source Air Emissions
- Impacts on Farmlands, Parklands, and Scenic Vistas
- Compatibility with Existing Land Use Plans and Regulations

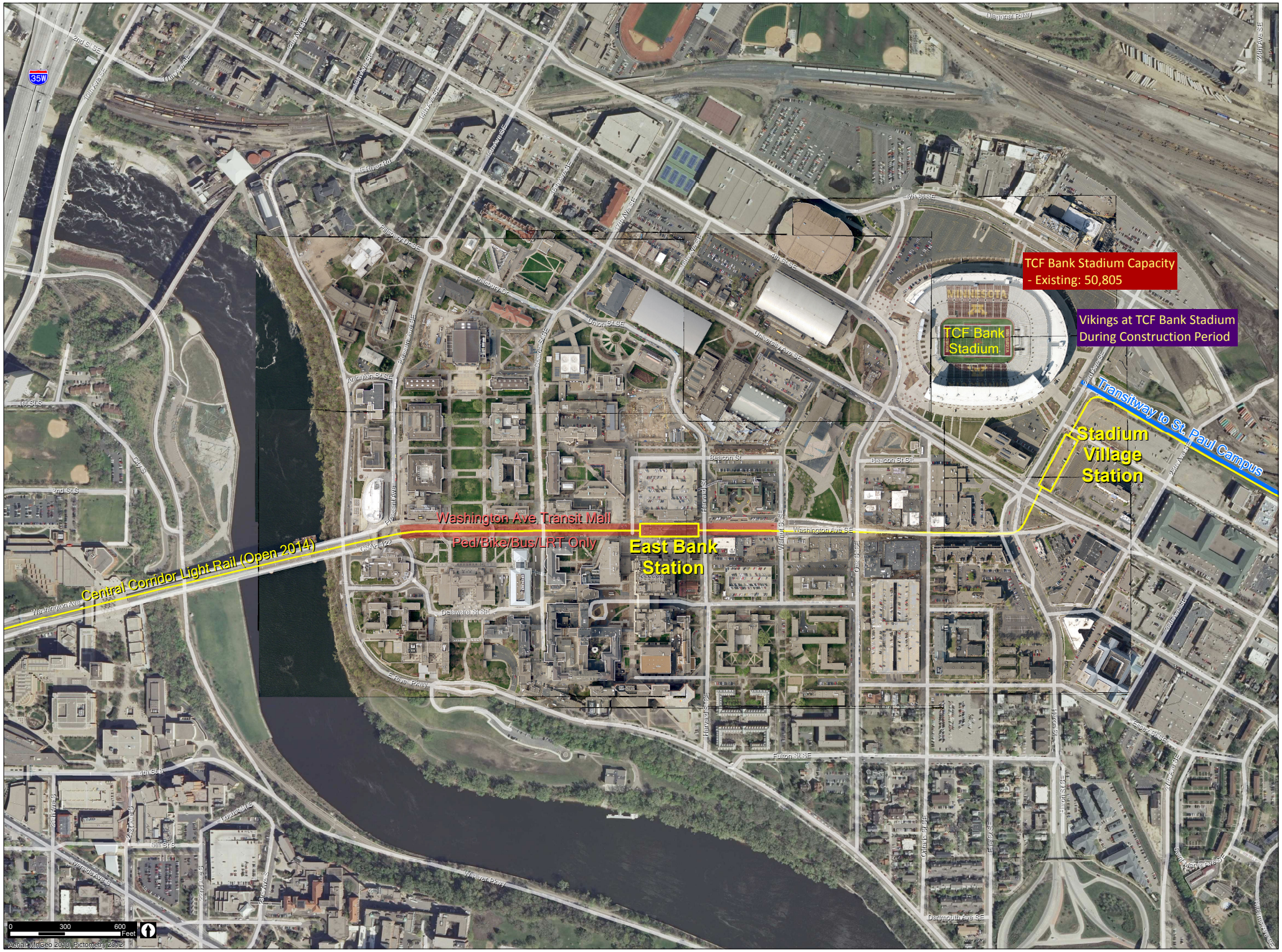
PROJECT STUDY AREA

MINNESOTA SPORTS FACILITIES AUTHORITY

EXISTING SITE CONDITIONS

STATE ENVIRONMENTAL REVIEW PROCESS/SCHEDULE

EVENT/ACTIVITY	DATE	COMMENTS
Start EIS Scoping Period	October 1, 2012	*EQB Monitor* publication and distribution of the Scoping EAW.
Scoping Public Meeting	**October 23, 2012**	**At least 15 working days after *EQB Monitor* publication.**
End Scoping Period	October 31, 2012	Close the 30-day comment period.
Scoping Decision Issued	November 21, 2012	Issued within 15 working days from end of scoping period, except if extension is approved by Project Proposer.
EIS Preparation Notice in *EQB Monitor*	December 10, 2012	Maximum 280-day EIS process starts here.
Publish DEIS and Start Public Comment Period	March 2013	*EQB Monitor* publication.
Public Meeting	March 2013	Must be held at least 15 working days after *EQB Monitor* publication.
End DEIS Public Comment Period	March/April 2013	At least 10 working days after public meeting.
FEIS Notice of Availability	June 2013	*EQB Monitor* publication.
End of Comment Period on FEIS	June 2013	At least 10 working days after *EQB Monitor* publication of FEIS notice of availability.
FEIS Adequacy Decision and Publication of the Decision in the *EQB Monitor*	July 2013	The RGU must provide notice of its adequacy decision within 5 working days of its decision to all persons receiving a copy of the FEIS (those who commented on the DEIS and those requesting a copy of the FEIS). The RGU also must publish its adequacy decision in the *EQB Monitor*.


TCF Bank Stadium Capacity
- Existing: 50,805
Vikings at TCF Bank Stadium
During Construction Period
TCF Bank Stadium
Transitway to St. Paul Campus
Stadium Village Station
Washington Ave Transit Mall
Ped/Bike/Bus/LRT Only
East Bank Station
Central Corridor Light Rail (Open 2014)
0 300 600 Feet
Aerial: MnGeo 2010, Pictometry 2012

SCOPING COMMENTS

Your feedback is important. We welcome your comments on the Scoping Environmental Assessment Worksheet and Draft Scoping Decision for the People's Stadium Environmental Impact Statement (EIS). Please write your comments below and leave in the comment box tonight or E-mail or mail your written comments by October 31st, 2012 to:

U.S. Mail: Steve Maki, Project Manager
Minnesota Sports Facilities Authority (MSFA)
900 South 5th Street
Minneapolis, MN 55415

E-mail: steve.maki@msfa.com

Name _____

Address/Affiliation _____

E-mail _____

All comments will be recorded and included in the EIS process.

If you prefer, you can share your comments verbally with the court reporter at the meeting tonight. The reporter will transcribe your comments word for word for the project record.

Appendix C

Comments Received and Responses to Comments

Comments by Topic

Table C-1 provides a summary of the issues raised in the Scoping EAW and Draft Scoping Decision Dcoument comments. Each topic listed in the table is discussed in the subsequent text.

Table C-1 Summary of Topics of Public Concern

Topics of Concern	Number
Accessibility	3
Air Quality	3
Bikeways and Pedestrians	4
Bird Collisions	1
Construction Impacts	3
Cultural Resources	1
Design Suggestions	7
Game Day Concerns	2
Noise and Vibration	4
Parks and Trails	1
Permitting	3
Regulated Material / Waste / Trash	5
Snow Removal	2
Social and Economic Impacts	5
Traffic	6
Transit	5
Visual	3
Water and Water Quality	3
Miscellaneous	2

Accessibility

The City of Minneapolis Department of Public Works requested that the EIS review parking for persons with disabilities.

Two individuals requested that all areas of the People's Stadium, including sidewalks and parking in surrounding areas, be completely accessible to persons with disabilities. One of those two individuals also requested that a group of local stakeholders (persons with disabilities) be part of an ongoing review committee working with the consultant on the design of the People's Stadium.

Response

The new Stadium and its associated infrastructure improvements (including sidewalks and parking) will be designed to comply with Americans with Disabilities Act (ADA) requirements. Suggestions for committee representation will be forwarded to the Stadium Design Team.

Air Quality

The Metropolitan Council requested inclusion of traffic re-routing in analysis of vehicle related air emissions around the People's Stadium site.

The University of Minnesota requested that the EIS analyze particulate and other air emissions resulting from additional traffic around the TCF Bank Stadium during Vikings team home games while the People's Stadium is under construction.

One individual expressed concerns about impacts to air quality for residents living near the People's Stadium.

Response

Results of the traffic evaluation, which will include traffic rerouting effects, will be reviewed with Minnesota Pollution Control Agency (MPCA) at the air quality coordination meeting. Traffic impacts will be evaluated at locations affected by potential roadway changes, including changes that may affect traffic patterns beyond the identified Proposed Project site boundaries. These impacts will be taken into consideration when identifying the intersections where air quality modeling will be performed.

The EIS will evaluate the air quality findings from the University of Minnesota On-Campus Football Stadium EIS and the Travel Demand Management Plan (TMDP), as appropriate, identify differences between the conditions documented in the University of Minnesota On-Campus Fottball Stadium EIS and potential impacts associated with the temporary use of TCF Bank Stadium for NFL games, and discuss appropriate measures to address potential temporary impacts.

Bikeways and Pedestrians

The Metropolitan Council requested detailed analysis of: pedestrian connections from points of transit from within the project area to People's Stadium entrances and exits; the needs of bicyclists, including those destined for People's Stadium events and other locations; and the need to provide grade-separated pedestrian improvements. The Metropolitan Council also requested review of the Chicago Avenue/4th Street intersection for pedestrian impacts.

The Minneapolis Bicycle Coalition requested that the EIS include a robust analysis of impacts on existing bicycle facilities during and after construction; evaluate opportunities to implement the Bike Master Plan; and examine ways to minimize impacts to bike facilities during construction when possible, especially for the Hiawatha Trail.

One individual requested that the People's Stadium be connected to parking areas and the business district via skyways. Another individual asked if there are plans to connect the People's Stadium to the business district via a skyway.

Response

A qualitative assessment of pedestrian and bicycle facilities on the site, including from parking and transit facilities, and leading to the site will be conducted as part of the EIS. Key pedestrian and bicycle routes, as well as potential impacts to pedestrian and bicycle traffic, will be identified.

Bird Collisions

The DNR indicated that impacts to rare features are not likely and requested that project designers consider bird-friendly building designs to reduce potential for bird collisions.

Response

This information will be provided to the Stadium Design Team.

Construction Impacts

The Metropolitan Council requested that the EIS identify impacts to existing transit service (light rail transit and bus) that may occur during construction of the People's Stadium, including how construction access, staging, limits, lay down, etc., will need to be addressed to minimize or avoid adverse transit impacts. The Metropolitan Council also requested that the EIS analyze transit impacts and any necessary mitigation at TCF Bank Stadium site during the period when the NFL team uses TCF Bank Stadium while the new Stadium is under construction.

One individual requested that residents living near the People's Stadium be kept informed of construction hours/days, noise levels, and major events (road closures, demolition, etc.) via email, mail, and/or posters placed in residential building entrances.

Response

The EIS will include a discussion of construction staging and impacts, including potential impacts to existing transit service. As noted in Section 3.2 of this Final Scoping Decision Document, construction of the new Stadium could take up to 35 months, requiring one to two NFL football seasons to be played off-site at the existing TCF Bank Stadium on the University of Minnesota campus. The EIS will address the temporary impacts from the use of TCF Bank Stadium.

Communication requests noted.

Cultural Resources

The Minnesota Historical Society, State Historic Preservation Office (SHPO) stated that an archaeological survey is unnecesssary because it is unlikely that any intact archaelogical sites remain in the Proposed Project area. However, the SHPO noted that the St. Anthony Falls Historic District should be added to the list of historic and architectural resources existing in the vicinity of the Proposed Project area and that consultation with the SHPO should occur. The SHPO also noted that such consultation typically occurs by submitting project plans to the SHPO for review at the 30, 60, and 90 percent complete stages. The SHPO also stated that its comment does not address the requirements of Section 106 of the National Historic Preservation Act of 1966 and 36CFR800, procedures of the Advisory Council on Historic Preservation for the protection of historic properties.

Response

Comments noted. The cultural resource evaluation (see Section 4.2 of the Final Scoping Decision Document) conducted as part of the EIS will take into account the comments provided by the SHPO.

Design Suggestions

Two individuals requested that the People's Stadium have rollerblading facilities, similar to the existing Metrodome Stadium.

Three individuals requested that the People's Stadium have a roof. Two of those three individuals recommended that the roof be retractable, and one individual suggested that the People's Stadium should have a sizeable window that can be opened if a retractable roof is not possible.

One individual requested that the People's Stadium: be designed so that public areas are never blocked or closed, even during events (similar to Target Field and Target Plaza); be designed to be LEED certified; and be placed on the same site, as close as possible to the central business district.

One individual requested that the People's Stadium have facilities for running and that the Kirby Puckett seat be kept in the People's Stadium.

Response

Requests for alternative uses of the facility are noted.

Two design options will advance as a part of the Build Alternative studied in the Draft EIS - a fixed roof and a design with a retractable elements such as a roof or wall. If additional study reveals that one of the two design options is not prudent and feasible, the MSFA may determine that the EIS will analyze only the prudent and feasible design option as the Build Alternative.

The stadium site and design criteria, including provisions for environmental and energy efficiency, are governed by and included in the stadium legislation (Minnesota Statues, Chapter 473J).

Game Day Concerns

The University of Minnesota requested that the EIS analyze the following items regarding NFL games played at TCF Bank Stadium during construction of the new Stadium: possible impacts of adding seating to accommodate 2,788 additional fans; impacts resulting from other large athletic or community events occurring at the same time; general impacts to the University and community; traffic, transit, and parking impacts in surrounding areas, as well as mitigation; event related noise; and potential impacts associated with the use of alcohol in TCF Bank Stadium.

The Marcy-Holmes Neighborhood Association requested that the EIS analyze the following items regarding NFL games played at TCF Bank Stadium during construction of the new Stadium: traffic, parking, and crowds in surrounding neighborhoods; measures to keep fans from parking and tailgating in residential areas; security and crowd control in surrounding neighborhoods, as well as the radius that will be policed; and the cost of and responsibility for crowd control, security, and trash removal in neighborhoods surrounding TCF Bank Stadium.

Response

A detailed traffic analysis was completed as part of the TCF Bank Stadium EIS, including several scenarios that discussed the effects of events occurring at TCF Bank Stadium at the same time as other events on the University's East Bank Campus. The traffic analysis in the EIS for the Proposed Project will rely upon this analysis to evaluate the potential traffic impacts from the use of TCF Bank Stadium for NFL football during construction of the new Stadium.

The MSFA, along with the Vikings, will continue to work with the University of Minnesota regarding game day requirements, services, and permitted use. The EIS will evaluate the potential impacts associated with the temporary use of TCF Bank Stadium by the NFL team during the construction phase of the Proposed Project.

Noise and Vibration

The University of Minnesota requested that the EIS analyze potential traffic noise impacts in the areas surrounding the TCF Bank Stadium.

One individual requested that the Minnesota Sports Facilities Authority (MSFA) contact the Hennepin County Medical Center (HCMC) regarding concerns about vibration during demolition and construction activities and that the EIS include a discussion of whether the project will cause earthborne vibration at HCMC and, if so, a commitment to pause work that would cause vibration at HCMC during critical activities such as surgery.

One individual requested scheduling of "less noisy" construction activities during times when most nearby residents are at home and installation of noise reducing windows in their building if construction noise will be constant (as mitigation). This individual also expressed concern about event noise levels for residents living near the People's Stadium.

Response

The EIS will evaluate traffic noise associated with the Proposed Project.

For areas surrounding the existing TCF Bank Stadium, an evaluation of potential traffic noise impacts resulting from the interim use of this stadium for NFL games will be described based on the findings of traffic evaluation results.

Both the traffic noise study results for the Proposed Project and the evaluation of traffic noise impacts associated with the interim use of TCF Bank Stadium will be reviewed with MPCA.

The MSFA will continue to coordinate with the HCMC throughout the EIS, design, demolition, and construction process regarding potential groundborne vibration at HCMC.

See the responses to "Construction Impacts" regarding construction-related noise.

As outlined in Section 4.2 of this Scoping Decision Document, the EIS will evaluate the potential event noise for the Proposed Project.

Parks and Trails

One individual suggested connecting Elliot Park to Gold Medal Park and the River Parks and connections to public areas of the People's Stadium by improving 11th Avenue as a greenway park.

Response

Comment noted. In response to comments received on the Scoping EAW and the Draft Scoping Decision Document, the EIS will include an evaluation of potential impacts to surrounding parks and trails.

Permitting

MnDOT indicated that any work within their right-of-way will require a permit.

The Metropolitan Council indicated that any structure more than 200 feet above ground level will require a permit from the Federal Aviation Administration due to airspace hazards.

The Minnesota Historical Society requested that the Minnesota Historic Sites Act (138.665-6) and the Minnesota Field Archaeology Act (138.40) be added to the table of required permits and approvals.

Response

Permits and referenced state Acts have been added to **Table 6.2-1**, as requested in noted comments.

Regulated Material, Waste, and Trash

The University of Minnesota requested that the EIS analyze trash removal at the TCF Bank Stadium during and after game day events.

The Marcy-Holmes Neighborhood Association requested that the EIS analyze trash removal in neighborhoods surrounding TCF Bank Stadium.

One individual requested that statements in the EAW regarding minimization of hazardous materials in the operation of the People's Stadium and an installation of an onsite single sort recycling facility in the People's Stadium not be included in the EIS, as they are concerned that it is too early in the planning process to commit to these items and that the EIS pertains only to demolition and construction activities. This same individual also requested that the recycling rate be provided to the public and updated weekly on construction perimeter signage as well as websites and blogs used by the Vikings team and MSFA, and that the EIS address how potential emissions, spills, or other contamination during demolition and/or construction would be handled.

One individual expressed concerns about solid waste treatment at the People's Stadium and related odor in surrounding neighborhoods.

Response

As outlined in Section 4.2 of this Scoping Decision Document, the EIS will evaluate the potential impacts of any contamination and soil conditions likely to be encountered during construction of the Proposed Project, as well as the potential impact of solid and hazardous wastes generated by the Proposed Project during both the construction and operational phases. In addition, on-going

coordination will take place with the University of Minnesota regarding required game day services for NFL games played at TCF Bank Stadium.

Snow Removal

Two individuals requested that the EIS address snow removal at accessible parking, curb cuts, and sidewalks.

Response

The EIS will identify operational maintenance requirements and commitments, to the extent known at the time the EIS is prepared and published, including snow removal.

Social and Economic Impacts

The Marcy-Holmes Neighborhood Association requested that the EIS analyze measures to encourage fans to patronize local businesses surrounding the TCF Bank Stadium. They also asked whether the current Stadium Area Advisory Group will be the conduit between the Vikings team and neighborhoods surrounding the TCF Bank Stadium, as well as whether the Vikings team will have a local connection and do community outreach in neighborhoods surrounding the TCF Bank Stadium.

One individual requested that the MSFA consider allowing public use of the facility for improving the health of the public, such as allowing schools to use the facility, providing physical fitness testing, providing health fairs and education, and possibly having a separate gym for testing and monitoring physical activity levels.

One individual expressed concerns about job loss for individuals working at the Metrodome Stadium.

One individual requested that a strong emphasis be placed on helping charitable organizations through the People's Stadium.

Response

Alternative use of the Stadium facility will be pursuant to the legislative requirements and MSFA's management of the site. Measures to promote patronage of local businesses will not be addressed in the Draft EIS but will be taken under consideration by the MSFA and the Vikings.

Traffic

MnDOT stated that they will work with the People's Stadium development team on traffic issues once the traffic study is complete to ensure that potential traffic impacts to the local and regional transportation system are mitigated.

The Metropolitan Council expressed concerns that the study area shown in Figure 3 of the EAW may not be large enough to cover all of the roadways that will be affected by the Proposed Project. The Metropolitan Council also recommended that the traffic study include all entrance points to the downtown area (particularly 11th Street) as well as a review of the Chicago Avenue/4th Street intersection for traffic impacts, and that the EIS consider the traffic impacts of the more frequent, non-full capacity events at the People's Stadium.

The City of Minneapolis Department of Public Works recommended use of baseline traffic conditions (including currently programmed roadway improvements) for the traffic study, and analysis of impacts to parking facility access as well as effect on traffic flow of movements into and out of existing and future parking facilities as a result of construction of the People's Stadium.

The Marcy-Holmes Neighborhood Association requested that the EIS analyze measures to manage traffic flow on University Avenue and 4th Street Southeast near TCF Bank Stadium.

One individual recommended that tickets sold for Vikings games at TCF Bank Stadium include transportation from the garages near Target Center or on the Central Corridor or Hiawatha LRT lines to and from the game to prevent traffic congestion and parking shortages.

One individual requested that the EIS analyze: the opportunity to improve traffic flow from I-94 to the central business district as a result of closing 5th Street from Chicago Avenue to 11th Avenue; improvements to 11th Avenue to provide better traffic flow from I-94 to Washington Avenue and the central business district; and fixing the conflict with 11th Avenue and the rail tracks.

Response

The project boundary shown in Figure 3 of the Scoping EAW encompasses the footprint of the Proposed Project. For clarification, the project boundary referenced in the comments summarized above reflects the new Stadium site, as defined in state legislation. For purposes of the EIS, the area of the traffic analysis is being defined in consultation with the roadway and transit authorities, will include numerous intersections outside the defined boundary for the Proposed Project, and will take into consideration the proposed locations of parking facilities constructed as part of the Proposed Project. The consultation with the roadway and transit authorities will include identification of currently programmed projects, which will be incorporated into the No Build Alternative analysis.

Non-capacity events occur at the existing Metrodome facility. The impacts of these types of events for the proposed new Stadium is not anticipated to be significantly different than existing conditions. Therefore, the EIS will not include a detailed evaluation of such non-capacity events.

The proposed closure of 5th Street between Chicago and 11th Avenue South is expected to affect the travel patterns of approximately 3,000 vehicles per day, based on current traffic counts. The EIS will analyze traffic conditions at the 5th Street South/11th Avenue South intersection that will result from the Proposed Project, including any queuing issues. However, based upon current information, it is expected that the local roadway network will be able to accommodate the traffic that will result from the proposed closure of 5th Street between Chicago and 11th Avenue South. As a result, freeway modeling is not proposed to be completed as part of the EIS analysis.

The transportation study completed for the Proposed Project will also evaluate the potential traffic impacts from the use of TCF Bank Stadium during construction of the new Stadium.

Transit

The Metropolitan Council requested that the EIS include the site identified by Metro Transit and the City of Minneapolis as a priority location for a weekday bus layover facility in the cumulative potential impact discussion. The Metropolitan Council also requested review of the Chicago Avenue/4th Street intersection for transit (bus and LRT) impacts.

The City of Minneapolis Department of Public Works requested that the EIS address staging of taxis, public transit, and charter buses at the People's Stadium.

One individual requested that the EIS analyze improving the LRT station to accommodate additional traffic on Central and Hiawatha LRT lines and new various destinations of travelers and to fix conflict with pedestrian and car traffic so that LRT is not a barrier to the People's Stadium. The individual also recommended building the new LRT station below grade to eliminate traffic conflicts and to allow for a better design of LRT passenger flow, as well as building the approach below grade to resolve 11th Avenue conflicts.

Response

Transit near the Proposed Project will be evaluated qualitatively in the EIS to identify potential impacts on transit operations and service during events. Analysis of LRT and bus service will be coordinated with Metro Transit as the operator, and charter buses and taxis will also be part of the qualitative assessment.

Visual

One individual expressed concerns that the existing outdoor marquee at the Metrodome Stadium is on all night and is too bright and requested that the People's Stadium have a less obtrusive marquee.

One individual requested that additional parking be at or below ground level to avoid blocking the view of and access to the People's Stadium. This individual also recommended constructing the Stadium to be equally, if not more visible than the Metrodome Stadium, to contribute to the skyline as much as the Metrodome Stadium.

Response

A visual analysis of the new Stadium structure and the nighttime lighting during events will be completed to determine the potential for significant visual impacts, including effects to the Downtown Minneapolis skyline.

Water and Water Quality

One individual requested that the People's Stadium be constructed to accommodate 100 percent of stormwater on site, and possibly water from the surrounding area as well.

One individual expressed concerns about possible changes to water pressure in their residential building as a result of the project.

The MPCA requested that the EIS address the impact of the blow down from the potential cooling tower(s) within the proposed stadium site boundaries.

Response

Stormwater and other utility accommodations and potential impacts will be coordinated with the Stadium Design Team. A summary of impacts and mitigation will be included in the EIS. The EIS will also address the discharge of blow down from the potential cooling tower(s) within the stadium site boundaries.

Miscellaneous

MnDOT requested that either one electronic or three to seven printed sets of plans be submitted for review once they are complete.

One individual requested that future public meetings be held at the same time and place as the previous Scoping open house.

Response

Comments noted.

Minnesota Pollution Control Agency
520 Lafayette Road North | St. Paul, Minnesota 55155-4194 | 651-296-6300
800-657-3864 | 651-282-5332 TTY | www.pca.state.mn.us | Equal Opportunity Employer

October 31, 2012

Mr. Steve Maki
Project Manager
Minnesota Sports Facilities Authority
900 South 5th Street
Minneapolis, MN 55415

Re: The People's Stadium Scoping Environmental Assessment Worksheet/
Draft Scoping Decision Document

Dear Mr. Maki:

Thank you for the opportunity to review and comment on the Scoping Environmental Assessment Worksheet/Draft Scoping Decision Document (SEAW) for The People's Stadium project (Project) located in the city of Minneapolis, Hennepin County, Minnesota. The Project consists of the construction of a new stadium facility and ancillary parking and access facilities. Regarding matters for which the Minnesota Pollution Control Agency (MPCA) has regulatory responsibility and other interests, the MPCA staff has the following comments for your consideration.

Description (Item 6)
Please provide information in the Draft Environmental Impact Statement regarding the discharge of the blown down from the cooling towers.

We appreciate the opportunity to review this Project. Please be aware that this letter does not constitute approval by the MPCA of any or all elements of the Project for the purpose of pending or future permit action(s) by the MPCA. Ultimately, it is the responsibility of the Project proposer to secure any required permits and to comply with any requisite permit conditions. If you have any questions concerning our review of this SEAW, please contact me at 651-757-2508.

Sincerely,

Karen Kromar

Karen Kromar
Planner Principal
Environmental Review Unit
Resource Management and Assistance Division

KK:mbo

cc: Craig Affeldt, MPCA, St. Paul
Doug Wetzstein, MPCA, St. Paul

Minnesota Historical Society
STATE HISTORIC PRESERVATION OFFICE

October 30, 2012

Steve Maki, Project Manager
Minnesota Sports Facilities Authority
900 South 5th Street
Minneapolis MN 55415

RE: The People's Stadium
Construction of a new Vikings stadium and parking facilities; demolition of the Metrodome
Minneapolis, Hennepin County
SHPO Number: 2013-0115

Dear Mr. Maki:

Thank you for the opportunity to comment on the above project. Although it has been sent to us as a Draft EAW, our review authority lies under two other Minnesota Statutes: the Minnesota Historic Sites Act (138.665-6) and the Minnesota Field Archaeology Act (138.40). Please add both these Acts to your table of required permits and approvals shown on page 4 of the draft Environmental Assessment Worksheet.

Due to the nature and location of the proposed project, we believe it is unlikely that any intact archaeological sites remain. Therefore, no archaeological survey work is requested, and **we believe that the proposed project will have no effect on archaeological resources.**

As the EAW correctly notes, several historic and architectural resources do exist in the project vicinity, including the Minneapolis Armory, Advance Thresher Company and Great Northern Implement Company. We would add the St. Anthony Falls Historic District, which is located just two blocks from the project site. All these properties are listed in the National Register of Historic Places. **Per the Minnesota Historic Sites Act, please continue to consult with our office regarding the appropriate treatment for these historic resources**. Consultation typically occurs through submittal of project plans to our office at the 30, 60 and 90% complete stages, to assure that any direct or indirect adverse effects to these properties will be avoided or minimized. Preparation of the EAW alone does not constitute compliance with the Minnesota Historic Sites Act.

Please note that this comment letter does not address the requirements of Section 106 of the National Historic Preservation Act of 1966 and 36CFR800, procedures of the Advisory Council on Historic Preservation for the protection of historic properties. If this project is considered for federal assistance, or requires a federal license or permit, it should be submitted to our office by the responsible federal agency.

We look forward to working with you on this important project. If you have any questions regarding our review, please contact me at (651) 259-3456.

Sincerely,

Mary Ann Heidemann, Manager
Government Programs and Compliance

cc: Minneapolis Heritage Preservation Commission

-------- Original Message --------
Subject: Re: The People's Stadium Scoping EAW - DNR Comments
From: "Doperalski, Melissa (DNR)" <melissa.doperalski@state.mn.us>
To: steve.maki@msfa.com
CC:

The Department of Natural Resources (DNR) has reviewed the Scoping EAW for the People's Stadium project to be located in downtown Minneapolis. The DNR offers a comment for consideration in the Environmental Impact Statement. The DNR agrees that due to the location of the project site and current land use, impacts to rare features are not likely. However, the DNR would like to encourage project designers to consider bird-friendly building designs that would help to reduce the potential for a bird collision to occur. A flyer and brochure are attached that offer some suggestions and information regarding this concern.

Please feel free to contact me if you have any questions during the development of the project.

Thank you,

Melissa

Melissa Doperalski

Regional Environmental Assessment Ecologist

Department of Natural Resources, Central Region

1200 Warner Road

Saint Paul, Minnesota 55106

651.259.5738

melissa.doperalski@state.mn.us

Minnesota Department of Transportation
Metropolitan District
Waters Edge Building
1500 County Road B2 West
Roseville, MN 55113

October 30, 2012

Steve Maki, Project Manager
Minnesota Sports Facilities Authority (MSFA)
900 South 5th Street Fax: 612-332-8334
Minneapolis, MN 55415

SUBJECT: **The People's Stadium, # EAW12-008**
West of I-35W, south of Washington Ave.
Minneapolis, Hennepin County
Control Section 2783

Dear Mr. Maki:

Thank you for the opportunity to review the Environmental Assessment for The People's Stadium (#EAW12-008). Please note that MnDOT's review of this document does not constitute approval and is not a specific approval for access or new roadway or transitway improvements. As plans are refined, we would like the opportunity to meet with project partners and to review the updated information. Coordination and consultation with several local units of government including MnDOT needs to continue as this project goes forward.

Traffic:
We look forward to working with the development team on all the traffic issues once they are identified and quantified in the pending traffic study to ensure the potential traffic impacts to the local and regional transportation system are mitigated. Direct questions regarding these comments to Ryan Coddington, Metro Traffic, at 651-234-7841.

Permits:
Any use of or work within or affecting MnDOT right of way requires a permit. Direct any questions regarding permit requirements to Buck Craig, Metro Permits, at 651-234-7911.

As a reminder, address all initial future correspondence for development activity such as plats and site plans to:

Development Review Coordinator
MnDOT - Metro Division
Waters Edge
1500 West County Road B-2
Roseville, Minnesota 55113

Review Submittal Options:
MnDOT's goal is to complete the review of plans within 30 days. Submittals sent in electronically can usually be turned around faster. There are four submittal options. Submit either:

1. One (1) electronic pdf version of the plans. MnDOT can accept the plans via e-mail at metrodevreviews.dot@state.mn.us provided that each separate e-mail is less than 20 megabytes.
2. Three (3) sets of full size plans. Although submitting seven sets of full size plans will expedite the review process. Plans can be sent to:

   MnDOT – Metro District Planning Section
   Development Reviews Coordinator
   1500 West County Road B-2
   Roseville, MN 55113

3. One (1) compact disk.
4. Plans can also be submitted to MnDOT's External FTP Site. Send files to: ftp://ftp2.dot.state.mn.us/pub/incoming/MetroWatersEdge/Planning. The Internet Explorer webs browser may not work using ftp so use an FTP Client or your Windows Explorer (My Computer). Also, send a note to metrodevreviews.dot@state.mn.us indicating that the plans have been submitted on the FTP site.

If you have any questions concerning this review, contact me at (651) 234-7789.

Sincerely, Molly McCartney

Molly McCartney
Sr. Transportation Planner

Copy sent via E-Mail:
Ron Rauchle, Area Engineer
Scott Pederson, Area Manager
Bruce Irish, Water Resources
Nancy Jacobson, Design
Ryan Coddington, Traffic
Peter Wasko, Noise Abatement/Air Quality
John Griffith,
Buck Craig, Permits
Dale E. Matti, Right-of-Way
Tori Nill, Transit
Pat Bursaw, Planning
Paul Czech, Planning
Tod Sherman, Planning

October 30, 2012

Steve Maki, Project Manager
Minnesota Sports Facilities Authority
900 South 5th Street
Minneapolis, MN 55415

RE: The People's Stadium Scoping Environmental Assessment Worksheet (EAW) / Draft Scoping Decision Document
Metropolitan Council Review File No. 21040-1
Metropolitan Council District 8

Dear Mr. Maki:

The Metropolitan Council received the Scoping EAW / Draft Scoping Decision Document for The People's Stadium project in Minneapolis on October 1, 2012. The proposed project is the construction of a new stadium on the current Hubert H. Humphrey Metrodome site. The project includes demolition of the existing Metrodome and construction of a new 65,000-seat stadium facility (with expansion up to 73,000 seats), and ancillary parking and access facilities.

The following sections offer comments regarding issues that are required to be addressed in the forthcoming environmental impact statement (EIS) for the document to be complete for regional system review. In addition, the staff offers advisory comments regarding technical information that should be included in the EIS.

Question 21 – Traffic (Mark Filipi, 651-602-1725)
The study area illustrated in Figure 3 of the EAW is generally bounded by 3rd Street on the north, 11th Avenue on the east, 6th Street on the south, and Park Avenue on the west. Given some of the changes to the road system proposed for analysis in the EAW particularly the permanent closure of 5th Street between 11th Avenue and Chicago Avenue), this study area may not be large enough to cover all of the affected roadways.

Forcing all traffic entering the downtown area from I-94 on 5th Street to turn north or south on 11th Avenue may have a significant impact on queuing on the ramp. Micro-simulation modeling will be necessary to evaluate potential impacts on the I-94 mainline from ramp queuing. Such a major change in the ease of access to the downtown area is likely to affect the access routes that traffic use, so the study area will need to include all of the entrance points to the downtown area, particularly the 11th Street entrance.

The EAW details that three "Build" scenarios will be evaluated: weekday full event, weekend full event, and one non-event). In the analysis conducted by the Council for the risk assessment of the Arden Hills site (*Stadium Proposal Risk Analysis*, October 2011) it was found that there are a number of less than full capacity events that occur much more frequently than do the full capacity events. While the traveling public may be willing to accept significant roadway impacts on a limited basis for major football games, the impact of these more frequent non-full capacity events on the road system should also be evaluated.

This analysis of traffic re-routing will also need to be carried into the analysis of vehicle related air emissions.

Question 21 – Transit (James Harwood, 612-349-7339)
The document identified four specific areas to be included in the EIS traffic analysis. The intersection of Chicago Avenue and 4th Street should also be specifically identified and thoroughly reviewed for traffic, transit (bus and LRT), and pedestrian impacts resulting from the proposed project.

The document identified the development of an Event Traffic Management Plan for inclusion in the EIS. A detailed analysis of pedestrian connections from points of transit within the project area to stadium entrances/exits should include as part of developing this Plan. The EIS should also evaluate the needs of bicyclists, including bicyclists who are destined for the People's Stadium events, as well as bicyclists who may be using facilities adjacent to the Stadium and bound for other destinations. In addition to evaluating pedestrian movements generally, the EIS should evaluate the need to provide grade-separated pedestrian improvements.

The EIS should identify impacts to existing transit service, both LRT and bus service, that may occur during construction of the new Stadium. This analysis should include how construction access, staging, limits, lay down, etc., will need to be addressed in order to minimize or avoid adverse transit impacts. The study should also analyze potential transit impacts and required mitigation due to the use of TCF Bank Stadium while the proposed Stadium is under construction. This is not clearly defined in the Scoping EAW or the Draft Scoping Decision Document.

Question 29 – Cumulative Potential Impacts (Transit, James Harwood, 612-349-7339)
This section indicates that the EIS will consider the cumulative potential effects of the new Stadium project, in addition to other projects, "including future projects actually planned or for which a basis of expectation has been laid." Metro Transit, with the City of Minneapolis, has identified a location within the project area as a priority location for a weekday bus layover facility. Analysis included in the EIS as part of addressing this question should consider this layover facility as being "actually planned or for which a basis of expectation has been laid."

Question 8 – Permits (Aviation, Russ Owen, 651-602-1724)
Any structure (cranes, construction equipment, etc.) that are more than 200 feet above ground level will need to acquire a permit from the Federal Aviation Administration due to airspace hazards.

If you have any questions or need further information with respect to these matters, please contact the technical reviewer indicated in a particular section or contact me at (651) 602-1895.

Sincerely,

LisaBeth Barajas, Manager
Local Planning Assistance

CC: Julie Monson, MHFA
Tod Sherman, Development Reviews Coordinator, MnDOT - Metro Division
Adam Duininck, Metropolitan Council District 12
Freya Thamman, Sector Representative
LisaBeth Barajas, Principal Reviewer
Cheryl Olsen, Reviews Coordinator

From: Handeland, Jeff S. [mailto:Jeff.Handeland@ci.minneapolis.mn.us]
Sent: Tuesday, October 16, 2012 10:23 AM
To: Steve Maki
Subject: EAW Comments

Steve,

I value the efforts to date of the Minnesota Sports Facilities Authority to coordinate its environmental assessment with City of Minneapolis staff. The City of Minneapolis is committed to work with the MSFA and it designees to complete a thorough environmental impact statement which includes the items summarized in the environmental assessment worksheet as well as the following additional or more specific items. City of Minneapolis staff believe the study should:

- use baseline traffic conditions which include roadway improvements currently programmed by the City and other agencies
- include analysis of impacts to parking facility access as well as the effect on traffic flow of movements into and out of existing and future parking facilities
- include review of disability parking
- include review of staging of taxis, public transit and charter busses

Will you please assure me that the MFSA will include these items in the EIS process?

Sincerely,
Jeff

Jeffrey S. Handeland, P.E.
City of Minneapolis
(612) 673-2363

UNIVERSITY OF MINNESOTA

Twin Cities Campus

University Services
Office of the Vice President

317 Morrill Hall
100 Church Street S.E.
Minneapolis, MN 55455
Office: 612-624-3557
Fax: 612-626-2278

October 31, 2012

Via Email and U.S. Mail

Minnesota Sports Facilities Authority
900 South 5th St.
Minneapolis, MN 55415
Attn: Steve Maki, Project Manager
Email: steve.maki@msfa.com

Re: Comments from the University of Minnesota on the Environmental Assessment Worksheet (EAW) for The People's Stadium

Dear Mr. Maki:

In support of the People's Stadium project, the University of Minnesota (University) has been working diligently with the Vikings for the past several months to come to an agreement that will allow the Vikings to play at the University's TCF Bank Stadium during construction of the People's Stadium. In the coming months (and years), the University will continue to collaborate with the Vikings to make the construction and completion of the People's Stadium a reality. In the meantime, the University wishes to submit comments on the EAW, on its own behalf and on behalf of its students, employees, visitors and neighbors, to ensure that the Vikings' use of the TCF Bank Stadium is consistent with the University's need to continue to operate as a world-class academic and research institution.

The EAW specifically acknowledges that construction of the multi-purpose stadium and related infrastructure could take up to 35 months requiring Vikings football games for two seasons (or longer) to be played at the TCF Bank Stadium. The EAW states that the EIS will address the temporary impacts of using the TCF Bank Stadium, and specifically mentions that traffic impacts will be analyzed. The University wishes to clarify that the EAW's study of the temporary use of TCF Bank Stadium should include more than the study of traffic.

The University currently has up to eight home football games per year. In seasons the Vikings play at TCF Bank Stadium, ten additional home football games (or more, if home playoff games are scheduled) may be played at TCF Bank Stadium. Vikings game day operations will have a cumulative impact on neighborhoods surrounding the University and on activities at the University. Currently, the campus and surrounding neighborhoods must accommodate the impacts of capacity events at TCF Bank Stadium on up to eight intermittent weekends in the Fall season. Adding 10 or more Vikings games at TCF Bank Stadium will mean a major-event impact on the campus and surrounding neighborhoods virtually every weekend from September through December. Vikings game day operations will add to impacts already associated with large events at the TCF Bank Stadium such as traffic and parking, air quality, noise, and fan behavior.

The Vikings may add additional seating to accommodate up to 2,788 additional fans more than can currently be accommodated in TCF Bank Stadium. The EIS should analyze the impact of these additional fans attending a Vikings game at TCF Bank Stadium. The EIS should also consider the possibility that Vikings events might occur at the same time as other large athletic or community events at the University, or might be scheduled on a weekday when the University is fully occupied by its normal business. The EIS should consider impacts associated with Vikings operations on Sundays and weekday evening events.

Minimizing traffic congestion and parking impacts is important to University students, employees, and visitors, as well as affected businesses and residents near the University. Traffic generated by large events at the University disrupt normal traffic flow by crowding roadway corridors and adds particulate and other air emissions. Overflow parking spreads into nearby neighborhoods. The EIS should consider measures to mitigate traffic and parking problems when the Vikings play at the TCF Bank Stadium.

Noise associated with traffic, game day festivities and events in TCF Bank Stadium has been expressed as a significant concern by nearby residents. The EIS should analyze traffic noise and event related noise from game day festivities, including parties and tailgating.

Fan behavior associated with Vikings events also are matters of concern for the affected community. If the University's Board of Regents approves, alcohol may be served and consumed in the stadium, as well as at parties and by event participants who are tailgating. Rowdy behavior and trash should be controlled. The EIS should consider how to reduce problems associated with the use of alcohol in the stadium and surrounding areas, as well as nuisances caused by trash.

The University has supported and will continue to support the efforts of the Minnesota Sports Facilities Authority and the Vikings to construct the People's Stadium by working toward a definitive agreement with the Vikings to allow the team to use the TCF Bank Stadium during construction. In furtherance of that effort, the University understands that the EIS for the People's Stadium will address all of the temporary impacts of the Vikings' use of TCF Stadium and identify mitigation measures as appropriate to address the concerns of the University community that are mentioned in this letter.

Respectfully submitted,

Regents of the University of Minnesota

By: Pamela Wheelock

Pamela Wheelock,
Vice President of University Services

MINNEAPOLIS BICYCLE COALITION

Mr. Steve Maki
Minnesota Sports Facilities Authority
900 South 5th Street
Minneapolis, MN 55415

Dear Mr. Maki:

The MSFA's Environmental Assessment Worksheet (EAW) includes a section on how stadium construction affects transportation around the construction site. As stated on page 14 of the drafted worksheet, "transportation" includes bicycles and pedestrians.

As such, the Minneapolis Bicycle Coalition would ask that the final Environmental Impact Statement (EIS) take into consideration the following bicycle/pedestrian areas:

- The impact on high quality bike connections from the Hiawatha trail to downtown Minneapolis, which is used by 1,420 cyclists and 120 pedestrians daily, according to the 2011 bicycle count report, and the 380 bikers and 80 pedestrians that use the trail west of 11th avenue. (Note: we believe these numbers are low, as the Hiawatha trail was completed just prior to construction on the Green Line.)

- The impact on 11th Avenue, used by 540 bicyclists and 80 pedestrians a day.

- The impact on the S 4th Street bike lane, which is the principal funnel out of downtown (via Norm McGrew Place) to the southbound Hiawatha Trail.

- The impact on the Park Avenue bike lane on the west side.

- The south side (S 5th and 6th Streets) of the People's Stadium

All of the aforementioned streets are included in the official bicycle master plan of the city of Minneapolis, and we ask that construction minimize the impact on these bike facilities when possible, especially for the highly used Hiawatha Trail. We request that the draft EIS include a robust analysis of impacts on existing bicycle facilities during and after construction of the Stadium as well as evaluate opportunities to implement the Bike Master Plan as part of the Transportation Study.

Respectfully submitted,

Lisa Peterson Bender
Minneapolis Bicycle Coalition

-------- Original Message --------
Subject: Comments from Marcy-Holmes Neighborhood Association re Vikings Stadium EIS
From: Melissa Bean <office@marcy-holmes.org>
To: steve.maki@msfa.com
CC:

Please add these comments, on behalf of the MHNA Board of Directors, to the public record. Thank you.

While the new stadium will be in the new Third Ward, it is more the concern of Elliot Park and Downtown neighborhoods than Marcy-Holmes.

However, we wish to comment on the likely environmental impacts on our neighborhood during the years the Vikings play at TCF stadium.

In particular the EIS should suggest strategies to minimize negative impacts of game-day traffic, parking and crowds on the surrounding neighborhoods.

How will parking and tailgating be kept out of residential areas?

How will traffic flow be managed so that University Avenue and Fourth St SE are not backed up all day?

How can fans be induced to patronize our business areas before and after a game? This might even the flow of traffic and bring some positive benefit to the area.

How will trash get picked up? During Gophers games temporary cardboard boxes are placed at the edges of the neighborhood. Can we expect more of them? Or could we instead get some new attractive permanent containers that would also have recycling options? ...and be graffiti-proof?

Who provides security and crowd control away from the TCF stadium? How far into the neighborhoods will it reach?

Who pays the costs for mitigating the effects on the neighborhood of game day operations away from TCF stadium?

Will the current Stadium Area Advisory Group be the conduit between neighborhoods and the Vikings?

Will the Vikings have a more local connection with the University neighborhoods, in terms of charities and "good deeds"? Particularly local schools, parks and other neighborhood institutions – as in sponsorships, fundraising help, giving kids access to Vikings games, merchandise, etc. This will go a long way toward building relationships with our community.

Melissa Bean
Executive Director

Marcy-Holmes Neighborhood Association
500 8th Ave SE
Minneapolis, MN 55414
612.623.7633
office@marcy-holmes.org
www.marcy-holmes.org
www.livenearyourwork.net

-----Original Message-----
From: Barett Steenrod [mailto:steenrod@warpmail.net]
Sent: Wednesday, October 24, 2012 1:42 PM
To: Steve Maki
Subject: Comments Regarding DEIS

Mr. Maki,

It was good to speak with you last night at the Metrodome.
Below are my comments.

Sincerely,

Barett Steenrod

Comments regarding the scoping Environmental Assessment Worksheet (EAW) and creation of the draft Environmental Impact Statement (DEIS) for the People's Stadium.

Within the scoping document- on page 13 in reference to a question about the use of hazardous materials during the operation and maintenance of a new stadium, an answer is given that sounds really nice. The answer was that hazardous materials would be minimized in the operation of a new stadium. In the DEIS, this answer needs to be removed. Such an answer cannot be given with any confidence at this point in the process, let alone the creation of a DEIS that pertains only to demolition and construction activities.

Within the scoping document- in reference to a question about the plan for managing sanitary waste during the operation and maintenance of a new stadium, an answer is given that sounds really nice. The answer was that an onsite single sort recycling facility would be installed into the stadium. Has this actually been decided as a "must have" in the stadium? If so, this is terrific, but this is the first I have heard about the installation of an onsite waste separator in the features for the new stadium. I am dubious that such a decision has actually been this early in the process and feel that for the DEIS, this answer needs to be removed. I believe such an answer cannot be given with any confidence at this point in the process, let alone the creation of a DEIS that pertains only to demolition and construction activities.

While demolition and construction is ongoing, the recycling rate for the project should be updated weekly and provided on construction site perimeter signage and websites and blogs that are used by the Vikings and the MFSA to update the public on the status of the project. Such an easy task of displaying the recycling rate, a rate that is required to be measured, is very easy to do and is common practice in many places, one of which is Madison, Wisconsin. Such an act is one more thing that can be done to foster communication with the public and build trust.
This is worth considering in light of calling the project, "The People's Stadium."

Will MSFA contact Hennepin County Medical Center (HCMC) regarding their concerns that noise, but especially vibration from demolition and construction activities may pose a risk to the delivery of medical care
to patients? Can MSFA be certain that construction activities,
especially those that involve excavation or foundation work will not be transmitted to the hospital? If so, the type of work that could send vibration through the ground and into the foundation of HCMC should not occur when critical activities like surgery are being performed.

At the time of the Oct. 23 public meeting, Steve Maki did not know whether demolition or construction activities of the People's Stadium could be disruptive to HCMC. An answer to this question is important and should be included in the DEIS and Final Environmental Impact Statement (FEIS).

Despite the MFSA's ability to work to protect the air, soil and water from potential contamination or impairment from demolition and construction activities of the People's Stadium, it is possible that an emission, spill, or act of contamination may occur; if this happens, what then? Is it good and appropriate for MSFA to address how it expects to respond to such a situation in the DEIS or FEIS?
Master's Degree in Landscape Architecture Master's Degree in Urban and Regional Planning University of Minnesota-Twin Cities

www.barettsteenrod.com

SCOPING COMMENTS

Your feedback is important. We welcome your comments on the Scoping Environmental Assessment Worksheet and Draft Scoping Decision for the People's Stadium Environmental Impact Statement (EIS). Please write your comments below and leave in the comment box tonight or E-mail or mail your written comments by October 31st, 2012 to:

U.S. Mail: Steve Maki, Project Manager
Minnesota Sports Facilities Authority (MSFA)
900 South 5th Street
Minneapolis, MN 55415

E-mail: steve.maki@msfa.com

Name Claudia Fuglie

Address/Affiliation 4556 Lake Dr

E-mail WHEELS2@Q.COM

All comments will be recorded and included in the EIS process.

Accessibility is most important along with having the best stadium for everyone. Accessible parking with easy access to stadium. Sidewalks accessible and shoveled during snow storms. Safety issues for pedestrians. Total accessibility in the stadium

If you prefer, you can share your comments verbally with the court reporter at the meeting tonight. The reporter will transcribe your comments word for word for the project record.

The People's Stadium
ENVIRONMENTAL IMPACT STATEMENT

SCOPING COMMENTS

Your feedback is important. We welcome your comments on the Scoping Environmental Assessment Worksheet and Draft Scoping Decision for the People's Stadium Environmental Impact Statement (EIS). Please write your comments below and leave in the comment box tonight or E-mail or mail your written comments by October 31st, 2012 to:

U.S. Mail: Steve Maki, Project Manager
Minnesota Sports Facilities Authority (MSFA)
900 South 5th Street
Minneapolis, MN 55415

E-mail: steve.maki@msfa.com

Name John Schatzlein
Address/Affiliation 10933 Johnson Ave So Bloomington MN 55437 Disability Advocate
E-mail John. Schatzlein e Q.com

All comments will be recorded and included in the EIS process.

H. TRAFFIC - Should address # of handicapped parking spaces + location + possible HOODING of meters game day + the SNOW Removal issue of curb cuts + sidewalks.

Parking analysis will need to include H. spaces

Curb cut issues - size/width at ea corners etc.

* Of the 2000 parking spaces w/in 1 Blk who will they be fare and how many will be disabled parking spaces -

Same question for the 500 w/in 2 BLKS

* While a consultant may be hired a group of local stakeholders (persons w/disabilities) should be apart of an ongoing review committee working w/the consultant

If you prefer, you can share your comments verbally with the court reporter at the meeting tonight. The reporter will transcribe your comments word for word for the project record.

The People's Stadium

ENVIRONMENTAL IMPACT STATEMENT

SCOPING COMMENTS

Your feedback is important. We welcome your comments on the Scoping Environmental Assessment Worksheet and Draft Scoping Decision for the People's Stadium Environmental Impact Statement (EIS). Please write your comments below and leave in the comment box tonight or E-mail or mail your written comments by October 31st, 2012 to:

U.S. Mail: Steve Maki, Project Manager
Minnesota Sports Facilities Authority (MSFA)
900 South 5th Street
Minneapolis, MN 55415

E-mail: steve.maki@msfa.com

Name KATHY GYRO

Address/Affiliation 906 S. 7th St. #510, MPLS, MN 55415

E-mail mangirlmusic@mac.com

All comments will be recorded and included in the EIS process.

water use - water pressure in my apartment?
solid waste - smell " " "
air pollution - health side effects for residents living 1 block away
construction noise - hours/days affecting " "
event noise - how loud is too loud? " "
communication about major construction elements - develop an effective way to keep neighborhood residents in the loop about events that will have a major impact on us.. e.g. "we will be imploding the metrodome & there will be loud noises & lots of dust on such & such a day @ such + such a time.." emailed or something - mail - postering in apartment buildings.
I live less than 1 block from the current "Dome & am very interested in the process...
Also - I rollerblade in the rollerdome every winter.. please include " in the new people's stadium! This impacts my well-being & physical fitness, having a social + physical gathering place in my neighborhood!
Thank you for your consideration!
Sincerely, Kathy Gyro

If you prefer, you can share your comments verbally with the court reporter at the meeting tonight. The reporter will transcribe your comments word for word for the project record.

-------- Original Message --------
Subject: people's stadium
From: denny gyro <mangirlmusic@mac.com>
To: steve.maki@msfa.com
CC: denny gyro <mangirlmusic@mac.com>

hi, steve! i am an elliot park resident, i believe my apartment building @ 7th avenue south & carew drive is the closest residential building to the stadium site!

i attended the scoping meeting a couple of weeks ago @ halsey hall room in metrodome & submitted some comments, here's a few more:

the current outdoor marquee is too bright, & runs all night, shining right into my window... hopefully, the new lights will be less obtrusive...

what will the construction schedule be? days of the week, times of day, amount of noise relating to schedule... eg: weekends/evenings? can less noisy jobs be scheduled @ those times when people are normally @ home, trying to relax? it is now fairly quiet in our neighborhood @ those times... we'd like to keep it that way!

if the noise is to be constant, we possibly would request double noise reducing windows in our building, paid for by the stadium...

i am not sure where this next point fits in (economic environment impact?): my son, & many other people, work @ the metrodome for non-football related events... what will happen to their jobs? he works as an announcer, among other things, for some of the college baseball games... i think we would definitely need a roof for most of those games to still be played in the new stadium... anyways, if this is not your area, sorry to bother you about it...

finally, i appreciated the time & place of the scoping meeting, which allowed me to attend on my way home from work... hopefully some of the future public meetings will be held @ the dome as well to accommodate elliot park residents!

thanks for your time & consideration,
kathy gyro

-------- Original Message --------
Subject: Environmental Scoping Meeting - COMMENTS
From: Kevin Rush NCARB AIA CSI <kevin.rush@archdesignpartners.com>
To: steve.maki@msfa.com
CC:

Thank you for giving us the opportunity to comment on the Peoples Stadium. The following comments are not in any particular order:

1. The closing of 5th street from Chicago to 11th Ave should be an opportunity to improve the traffic flow from I-94 to the central business district.

2. 11th Avenue:
- should be improved to provide better traffic flow from I-94 to Washington Av and the Central Business District.
- fix the conflict with 11th Av and the Rail Tracks. The conflict with cars being held up by trains will increase with the additional train traffic the intersection will see.
- Elliot Park could be connected to Gold Medal Park and the River Parks and connections to the public areas of this stadium by improving 11th Av as a GREENWAY PARK.

3. Connect to the Park System and Bike Trails and the River.

4. Design so that the stadium's Public Areas are never "closed" or "blocked" - even during event. (Refer to the Twins Target Field and TARGET PLAZA and the surrounding walks.

5. Focus new parking to be deeper in the ground not taller. We don't want "Walls" of parking around the stadium, blocking it from sight and access.

6. Improve the LRT station so it accommodates
- the additional traffic (Central and Hiawatha)
- the new various destinations of train travelers
- fix the conflict with pedestrian and car traffic so it isn't a barrier / wall / blockage to the stadium, like it is now.
- Consider building the new LRT station below grade to eliminate traffic conflicts of all kinds and to allow for a better design of LRT passenger flow for passengers of all destinations. The approach could be below grade too and resolve the 11th Av conflicts.

7. Connect the Stadium to the Central Business District.
- Locate the stadium on the site, as close as possible to the CBD. It should be closer than the existing stadium.
- "Connect" the stadium and the CBD and parking with skyways. Make it a part of the fabric of downtown.

8. The stadium MUST HAVE A ROOF. (Retractable if budget allows.) This is MINNESOTA! We need a roof for reasons of weather and NOISE to the local neighbors.

9. The entire project should bee LEED GREEN.

10. 100% Storm water should be accommodated on Site. Even better, the project should accommodate water from a larger area surrounding the site, giving it a net PLUS.

11. VISUAL IMPACT - It should be just as visible or more visible "JEWEL" than the existing inflated roof. Caution with how strikingly "hidden from view" the existing stadium was, when the roof deflated and was demolished for replacement. The new stadium must be built high enough to contribute as much to the skyline as the existing stadium does. (Don't build it down in hole.)

Thank you for accepting my comments.

Please let me know how I can help/be of assistance.

Kevin Rush, AIA CSI
NCARB Architect / Partner

"Designing Building Solutions, Solving the Details, and Organizing the Work"

Architectural Design Partners, P.A.
244 First Avenue North, Suite 200
Minneapolis, MN 55401

612-904-6580
612-904-6581 Fax

PUBLIC COMMENT

PEOPLE'S STADIUM

10/23/2012

CERTIFIED

NORTHWESTERN COURT REPORTERS

1-800-628-7551

THE PEOPLE'S STADIUM
PUBLIC OPEN HOUSE &
ENVIRONMENTAL IMPACT SCOPING MEETING

* * * * * *

PUBLIC COMMENT
TAKEN ON THE 23RD DAY OF OCTOBER 2012
AT HUBERT HUMPHREY METRODOME
MINNEAPOLIS, MINNESOTA
5:00 P.M. - 7:00 P.M.

* * * * * *

Taken before Pauline Hanson, RPR

www.nwcourtreporters.com
nwcr@nwcourtreporters.com
1-800-628-7551

STEVE PANY: Steve, and last name is spelled P-A-N-Y, City of Minneapolis. And I would like to see included Rollerblading facilities with Rollerbladers, running for the runners, and continuing that from the Metrodome tradition. I would also like to keep the Kirby Puckett seat in the stadium. And what else? A strong emphasis on helping charitable organizations through the new stadium. If not a retractable roof, at least a sizeable window that opens. And that's about all I can think of.

SPEAKER: Anonymous. I'm curious if there is any plans to skyway connect the Metrodome to the downtown business district.

RAY LEWIS: My name is Ray Lewis. I live 2 Circle Drive, Circle Pines, Minnesota 55018, email rayrlewis@gmail.com, phone number 612-227-4209. Should match the registration information. I am interested in the public use of the facility for improving the health of the public, the next step beyond the environmental worksheet that's the focus tonight. But I see a big need for the public to become more fit, to have better physical -- physical fitness levels. And having a professional sports stadium based on the best physically fit

individuals working as a team seems like a natural fit. Looking at the health impact assessment that would promote the positive benefit to local residents, whether schools could come in and use the facility, have physical fitness testing done, health fairs, education, maybe a separate gym for testing and monitoring physical activity levels. When different sports teams from high school, football, soccer, when they come to the Twin Cities to play in a championship, have the availability of physical fitness assessment testing and health education available for all the people in that community that were volunteer, and fresh food too, farmer's market.

ANDREW HAUER: I just have a very short comment. Andrew Hauer, H-A-U-E-R, address 19 South First Street, Minneapolis, Minnesota 55401. We were just looking at the University of Minnesota map and the TCF Stadium. And we came up with a suggestion that when the Vikings do play within the TCF Stadium with the limited amount of parking and with the availability of the LRT, we make a strong suggestion that the tickets that are sold for the game includes a pass on the LRT, the Central Corridor or the Hiawatha Line or at least passage

from the garages located in downtown west adjacent to the Target Center, et cetera; where right now if you went to the Metrodome, there's a free pass, free ride on the LRT from the parking garages to the Metrodome stadium. We want to see it expanded where it's -- it includes free rides on the days of the game all the way from the parking garages downtown and downtown west all the way to the TCF Stadium both ways, both directions so people have a chance to actually ride the LRT. And also, you know, it will correct and eliminate a lot of the problems of parking, especially the congestion of the amount of parking that would be required by the TCF Stadium. So that's my only comment so far. I'm also going to do another one, but I'm going to send a direct email.

(The comments came to a close at approximately 7:00 p.m.)

STATE OF MINNESOTA)
COUNTY OF RAMSEY)

I, Pauline H. Hanson, do hereby certify the foregoing is a true and correct transcript of the proceedings taken by me in stenotypy and thereafter transcribed by me to the best of my ability.

Dated this 23rd day of October 2012.

Pauline Hanson, RPR

Documents Referenced in the Minnesota Department of Natural Resources Comment

AMERICAN BIRD CONSERVANCY

YOU CAN SAVE BIRDS FROM FLYING INTO WINDOWS!

Christine Sheppard, ABC

Millions of birds die every year flying into windows, because they can't tell reflections from trees, plants and sky. *Most of those windows are on houses.*

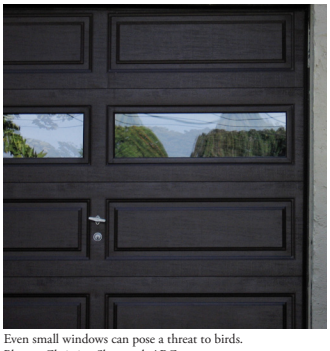
Never had a bird hit your window? Perhaps you have been lucky—so far. More likely, you haven't been around to see or hear it when it happened, and the bird has either flown off to die elsewhere or been scavenged by a neighborhood cat, raccoon, or crow. But the odds are that sooner or later, your windows will kill a bird.

Wood Thrush killed after colliding with a window.
Photo: Mike Parr

This Barn Swallow dove through the small space shown at top flight speed —over 30 miles per hour! Photo: Keith Ringland

Black horizontal stripes spaced one inch apart are an effective way to keep birds from hitting your windows. Photo: Christine Sheppard, ABC

Not all windows are equally hazardous. Check to see which of your windows are most reflective, and closest to areas where you see birds when they are active. **Collisions happen more frequently during spring and fall migration periods.**



Even small windows can pose a threat to birds.
Photo: Christine Sheppard, ABC

Even small windows can be dangerous, as many birds fly into small spaces such as tree cavities or between branches.

Research has identified solutions to alert birds to windows. The easiest of these involve applying visible markings to the outside of windows in patterns that the birds can see while requiring **minimal glass coverage** to keep your view unobscured. Although we don't yet have all the answers, we know that most birds will avoid windows with one-quarter-inch-wide, white, vertical stripes spaced four inches apart, or one-eighth-inch, black, horizontal stripes spaced one inch apart. More complicated or irregular patterns will also work as long as they follow the general spacing guidelines specified above.

On the other side of this page, we provide information on some of the products you can use to help prevent birds from crashing into your windows and where to find them.

For more information contact:
Dr. Christine Sheppard, ABC Bird Collisions Campaign Manager,
csheppard@abcbirds.org

Here are some quick and affordable ways to protect birds from your windows. These should be applied to the outside of the glass to break up reflections.

Window tape patterns are easy to apply and provide an effective deterrent against bird strikes.

Tempera paint is a washable, long-lasting, and non-toxic solution to preventing bird/window collisions.

Window netting provides a see-through screen that will cut down on bird strikes. Photo: John Pace, BirdMaster Bird Control Systems

All photos on this page by Christine Sheppard (unless noted)

1. Apply Tempera paint (available at most art supply and craft stores) freehand with brush or sponge, or use a stencil. Tempera is long-lasting, even in rain, and non-toxic, but comes right off with a damp rag or sponge. Find stencils at **www.michaels.com**, **www.amazon.com,** or download stencils for free at **www.spraypaintstencils.com**.

2. Use tape to create patterns. Duck brand tape comes in a range of colors and tears easily, to make lines of different widths. Chart tape (**www.magnatag.com**) comes in a range of widths (tape may require a utility knife to remove).

3. Most window films designed for external use are not patterned and will not deter birds. However, interior window films come in many colors and styles, and can be applied on the outside of windows to prevent collisions (see **www.thesunshieldpros.us**, **www.fauxdecorandmore.com**). Collid-Escape, designed for external use, is see-through from the inside, opaque from the outside (**www.lfdcollidescape.com**).

4. If you don't want to alter the glass itself, you can stretch lightweight netting, screen, or other material over the window. The netting must be several inches in front of the window, so birds don't hit the glass after hitting the net. Several companies, (**www.birdbgone.com, www.birdscreen.com**) sell screens that can be attached with suction cups or eye hooks (also see **www.nixalite.com, www.birdmaster.com**).

5. What about prefabricated decals? Decals are a well-known alternative to the techniques listed above. However, to be effective, they must be spaced more closely than recommended by manufacturers and so may block more of the glass surface than other options (**www.pines.com, www.windowdressingetc.com**). Or make your own! *Arti Stick Window Color* paints come in 18 colors and are marketed for children. Drawings on sheets of plastic become translucent as they dry, and can be peeled off and applied to windows (visit **www.budgetartkids.com**, **www.dickblick.com**, and **www.artsuppliesforartists.com**).

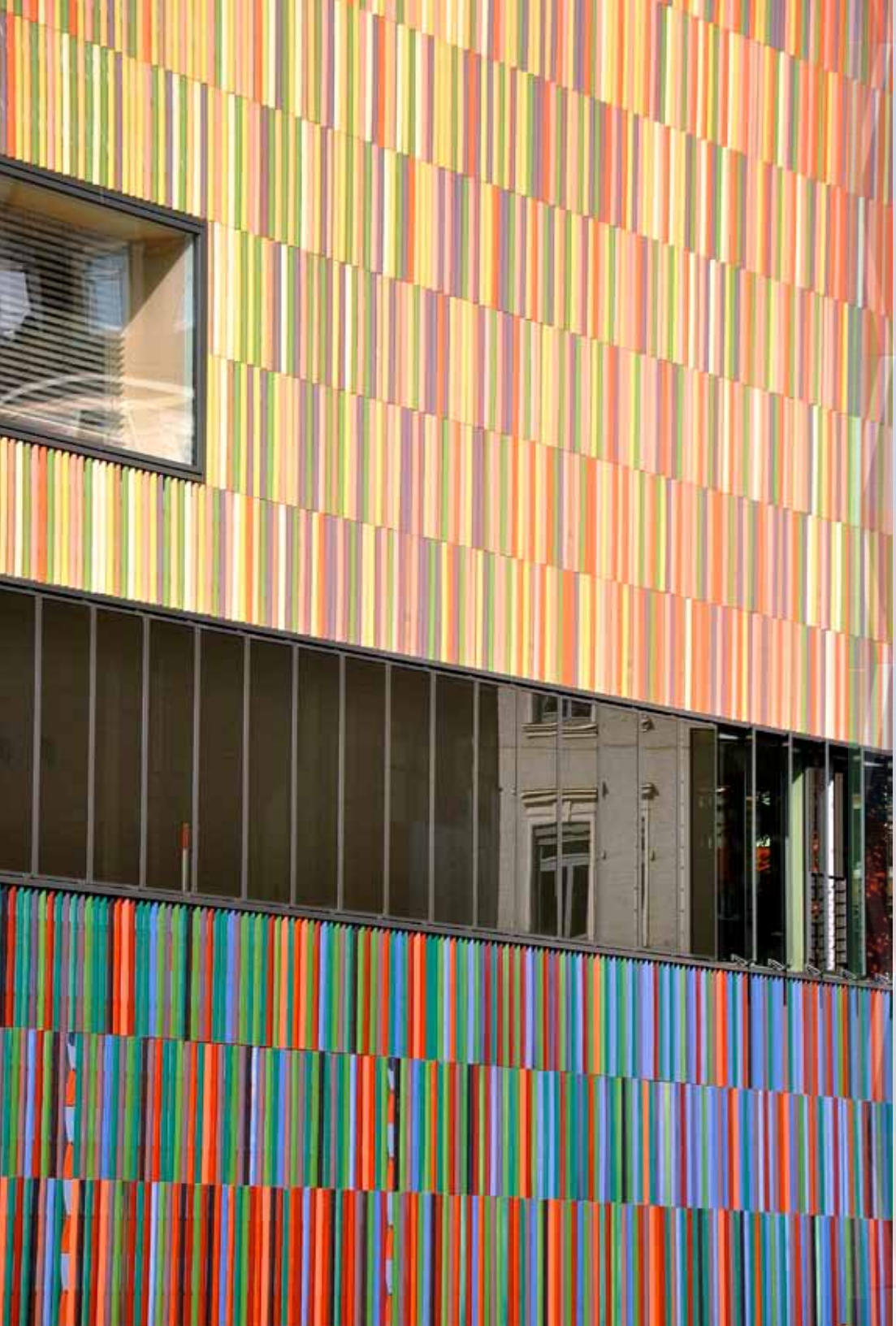
For more information, contact:

AMERICAN BIRD CONSERVANCY

P.O. Box 249, 4249 Loudoun Avenue
The Plains, VA 20198
www.abcbirds.org • abc@abcbirds.org
540-253-5780 • 888-247-3624

To donate to ABC's Collisions program, visit
www.abcbirds.org/membership/donatecol.htm

Bird-Friendly Building Design



The area of glass on a façade is the strongest predictor of threat to birds. The façade of Sauerbruch Hutton's Brandhorst Museum in Munich is a brilliant example of the creative use of non-glass materials. Photos: Tony Brady (left), Anton Schedlbauer (background)

(Front cover) Boris Pena's Public Health Office building in Mallorca, Spain, sports a galvanized, electro-fused steel façade. Photo courtesy of Boris Pena

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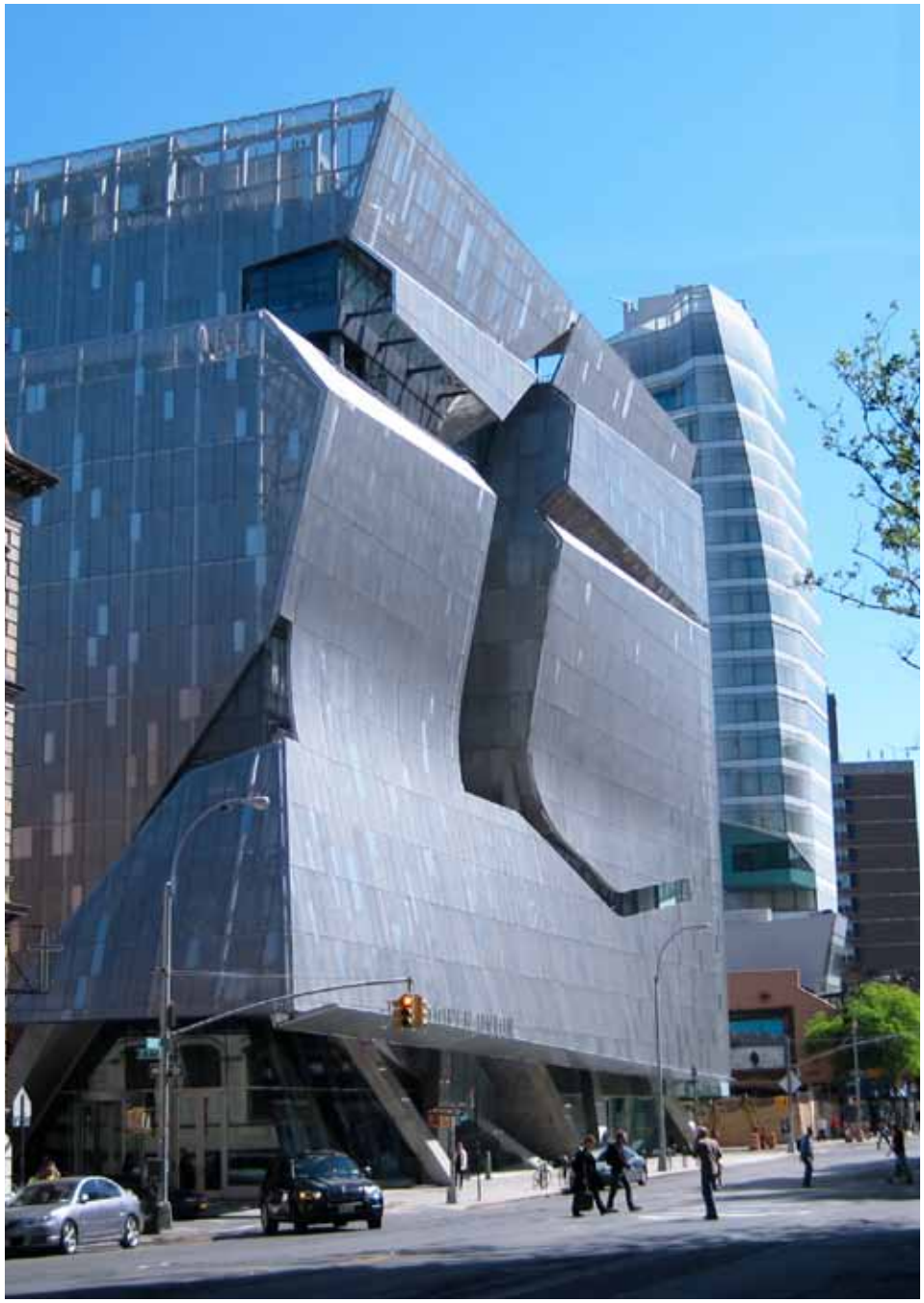
Ruby-throated Hummingbird: Greg Lavaty



Issues of cost prompted Hariri Pontarini Architects, in a joint venture with Robbie/ Young + Wright Architects, to revise a planned glass and limestone façade on the School of Pharmacy building at the University of Waterloo, Canada. The new design incorporates watercolors of medicinal plants as photo murals. Photo: Anne H. Cheung

41 Cooper Square in New York City, by Morphosis Architects, features a skin of perforated steel panels fronting a glass/aluminum window wall. The panels reduce heat gain in summer and add insulation in winter while also making the building safer for birds. Photo: Christine Sheppard, ABC

Executive Summary

Collision with glass is the single biggest known killer of birds in the United States, claiming hundreds of millions or more lives each year. Unlike some sources of mortality that predominantly kill weaker individuals, there is no distinction among victims of glass. Because glass is equally dangerous for strong, healthy, breeding adults, it can have a particularly serious impact on populations.

Bird kills at buildings occur across the United States. We know more about mortality patterns in cities, because that is where most monitoring takes place, but virtually any building with glass poses a threat wherever it is. The dead birds documented by monitoring programs or turned in to museums are only a fraction of the birds actually killed. The magnitude of this problem can be discouraging, but there are solutions if people can be convinced to adopt them.

The push to make buildings greener has ironically increased bird mortality because it has promoted greater use of glass for energy conservation, but green buildings don't have to kill birds. Constructing bird-friendly buildings and eliminating the worst existing threats requires imaginative design and recognition that not only do birds have a right to exist, but their continued existence is a value to humanity.

New construction can incorporate bird-friendly design strategies from the beginning. However, there are many ways to reduce mortality from existing buildings, with more solutions being developed all the time. Because the science is constantly evolving, and because we will always wish for more information than we have, the temptation is to postpone action in the hope that a panacea is just round the corner, but we can't wait to act. We have the tools and the strategies to make a difference now. Architects, designers, city planners, and legislators are key to solving this problem. They not only have access to the latest building construction materials and concepts, they are also thought leaders and trend setters in the way we build our communities and prioritize building design issues.

This publication, produced by American Bird Conservancy (ABC), and built upon the pioneering work of the NYC Audubon Society, aims to provide planners, architects, designers, bird advocates, local authorities, and the general public with a clear understanding of the nature and magnitude of the threat glass poses to birds. This edition includes a review of the science behind available solutions, examples of how those solutions can be applied to new construction and existing buildings, and an explanation of what information is still needed. We hope it will spur individuals, businesses, communities, and governments to address this issue and make their buildings safe for birds.

ABC's Collisions Program works at the national level to reduce bird mortality by coordinating with local organizations, developing educational programs and tools, conducting research, developing centralized resources, and generating awareness of the problem.

A bird, probably a dove, hit the window of an Indiana home hard enough to leave this ghostly image on the glass. Photo: David Fancher

Introduction

Why Birds Matter

For many people birds and nature have intrinsic worth. Birds have been important to humans throughout history, often used to symbolize cultural values such as peace, freedom, and fidelity.

In addition to the pleasure they can bring to people, we depend on them for critical ecological functions. Birds consume vast quantities of insects, and control rodent populations, reducing damage to crops and forests, and helping limit the transmission of diseases such as West Nile virus, dengue fever, and malaria. Birds play a vital role in regenerating habitats by pollinating plants and dispersing seeds.

Birds are also a vast economic resource. According to the U.S. Fish and Wildlife Service, bird watching is one of the fastest growing leisure activities in North America, and a multi-billion-dollar industry.

The Legal Landscape

At the start of the 20th Century, following the extinction of the Passenger Pigeon and the near extinction of other bird species due to unregulated hunting, laws were passed to protect bird populations. Among them was the Migratory Bird Treaty Act (MBTA), which made it illegal to kill a migratory bird without a permit. The scope of this law, which is still in effect today, extends beyond hunting, such that anyone causing the death of a migratory bird, even if unintentionally, can be prosecuted if that death is deemed to have been foreseeable. This may include bird deaths due to collisions with glass, though there have yet to be any prosecutions in the United States for such incidents. Violations of the MBTA can result in fines of up to $500 per incident and up to six months in prison.

The Bald and Golden Eagle Protection Act (originally the Bald Eagle Protection Act of 1940), the Endangered Species Act (1973), and the Wild Bird Conservation Act (1992) provide further protections for birds that may be relevant to building collisions.

Recent legislation, primarily at the city and state level, has addressed the problem of mortality from building collisions and light pollution. Cook County, Illinois, San Francisco, California, Toronto, Canada, and the State of Minnesota have all passed laws or ordinances aimed at reducing bird kills, while other authorities have pushed for voluntary measures.

The International Dark Skies Foundation, an environmental organization whose mission is "to preserve and protect the nighttime environment" now actively supports legislation designed to protect birds by curbing light emissions.

Glass: The Invisible Threat

Glass can be invisible to both birds and humans. Humans learn to see glass through a combination of experience (how many of us at some time in our lives have walked into a glass door or seen somebody do so?), visual cues, and expectation, but birds are unable to use these signals. Most birds' first encounter with glass is fatal when they collide with it at full speed.

No one knows exactly how many birds are killed by glass – the problem exists on too great a scale, both in terms of geography and quantity – but estimates range from 100 million to one billion birds each year in the United States. Despite the enormity of the problem, however, currently available solutions can reduce bird mortality while retaining the advantages that glass offers as a construction material, without sacrificing architectural standards.

(Opposite) The White-throated Sparrow is the most frequent victim of collisions reported by urban monitoring programs. Photo: Robert Royse

The hummingbird habit of 'trap-lining' – flying quickly from one feeding spot to another – causes collisions when flowers or feeders are reflected in glass. Photo: Terry Sohl

Lighting: Exacerbating the Threat

The problem of bird collisions with glass is greatly exacerbated by artificial light. Light escaping from building interiors or from exterior fixtures can attract birds, particularly during migration on foggy nights or when the cloud base is low. Strong beams of light can cause birds to circle in confusion and collide with structures, each other, or even the ground. Others may simply land in lighted areas and must then navigate an urban environment rife with other dangers, including more glass.

Birds and the Built Environment

Humans first began using glass in Egypt, around 3500 BCE. Glass blowing, invented by the Romans in the early First Century CE, greatly increased the ways glass could be used, including the first use of crude glass windows. Although the Crystal Palace in London, England, erected in 1851, is considered by

architects to mark the beginning of the use of glass as a structural element, the invention of float glass in the 1950s allowed mass production of modern windows. In the 1980s development of new production and construction technologies culminated in today's glass skyscrapers.

Sprawling land-use patterns and intensified urbanization degrade the quality and quantity of bird habitat across the globe. Cities and towns encroach on riverbanks and shorelines. Suburbs, farms, and recreation areas increasingly infringe upon wetlands and woodlands. Some bird species simply abandon disturbed habitat. For species that can tolerate disturbance, glass is a constant threat, as these birds are seldom far from human structures. Migrating birds are often forced to land in trees lining our sidewalks, city parks, waterfront business districts, and other urban green patches that have replaced their traditional stopover sites.

The amount of glass in a building is the strongest predictor of how dangerous it is to birds. However, even small areas of glass can be lethal. While bird kills at homes are estimated at one to ten birds per home per year, the large number of homes multiplies that loss to millions of birds per year in the United States. Other factors can increase or decrease a building's impact, including the density and species composition of local bird populations, local geography, the type, location, and extent of landscaping and nearby habitat, prevailing wind and weather, and patterns of migration through the area. All must be considered when planning bird-friendly buildings.

Warblers, such as this Black-and-white, are often killed by window collisions as they migrate. Photo: Luke Seitz

Impact of Collisions on Bird Populations

About 25% of species are now on the U.S. WatchList of birds of conservation concern (www.abcbirds.org/abcprograms/science/watchlist/index.html), and even many common species are in decline. Habitat destruction or alteration on both breeding and wintering grounds remains the most serious man-made problem, but collisions with buildings are the largest known fatality threat. Nearly one third of the bird species found in the United States, over 258 species, from hummingbirds to falcons, are documented as victims of collisions. Unlike natural hazards that predominantly kill weaker individuals, collisions kill all categories of birds, including some of the strongest, healthiest birds that would otherwise survive to produce offspring. This is not sustainable and most of the mortality is avoidable. This document is one piece of a strategy to keep building collisions from increasing, and ultimately, to reduce them.

The Impact of Trends in Modern Architecture

In recent decades, advances in glass technology and production have made it possible to construct buildings with all-glass curtain walls, and we have seen a general increase in the amount of glass used in construction. This is manifest in an increase in picture windows on private homes and new applications for glass are being developed all the time. Unfortunately, as the amount of glass increases, so does the incidence of bird collisions.

In recent decades, growing concern for the environment has stimulated the development of "green" standards and rating systems. The best known is the Green Building Council's (GBC) Leadership in Energy and Environmental Design, or LEED. GBC agrees that green buildings should not threaten Wildlife, but until recently, did not include language addressing the threat of glass to birds.

Their Resource Guide, starting with the 2009 edition, calls attention to parts of existing LEED credits that can be applied to reduce negative impacts on birds. (One example: reducing light pollution saves energy and benefits birds.) As of October 14, 2011, GBC has added Credit 55: Bird Collision Deterrence, to their Pilot Credit Library (http://www.usgbc.org/ShowFile.aspx?DocumentID=10402), drafted by ABC, members of the Bird-safe Glass Foundation, and the GBC Site Subcommittee.

The Common Yellowthroat may be the most common warblers in North America and is also one of the most common victims of collisions with glass. Photo: Owen Deutsch

Essential to this credit is quantifying the threat level to birds posed by different materials and design details. These threat factors are used to calculate an index representing the building's façade and that index must be below a standard value to earn the credit. The credit also requires adopting interior and exterior lighting plans and post-construction monitoring. The section on Research in Appendix I reviews the work underlying the assignment of threat factors.

ABC is a registered provider of AIA continuing education, with classes on bird-friendly design and LEED Pilot Credit 55 available in face-to-face and webinar formats. Contact Christine Sheppard, csheppard@abcbirds.org, for more information.

Defining What's Good for Birds

It is increasingly common to see the phrase "bird-friendly" used in a variety of situations to demonstrate that a particular product, building, legislation, etc., is not harmful to birds. All too often, however, this term is unaccompanied by a clear definition, and lacks a sound scientific foundation to underpin its use.

Ultimately, defining bird friendly is a subjective task. Is bird-friendliness a continuum, and if so, where does friendly become unfriendly? Is bird-friendly the same as bird-safe? How does the definition change from use to use, situation to situation?

It is impossible to know exactly how many birds a particular building will kill before it is built, and so realistically, we cannot declare a building to be bird-friendly before it has been carefully monitored for several years. However, there are several factors that can help us predict whether a building will be particularly harmful to birds or generally benign, and we can accordingly define simple "bird-smart standards" that, if followed, will ensure a prospective building poses a minimal potential hazard to birds.

ABC's Bird-Friendly Building Standard

A bird-friendly building is one where:

- At least 90% of exposed façade material from ground level to 40 feet (the primary bird collision zone) has been demonstrated in controlled experiments[1] to deter 70% or more of bird collisions
- At least 60% of exposed façade material above the collisions zone meets the above standard
- There are no transparent passageways or corners, or atria or courtyards that can trap birds
- Outside lighting is appropriately shielded and directed to minimize attraction to night-migrating songbirds[2]
- Interior lighting is turned off at night or designed to minimize light escaping through windows
- Landscaping is designed to keep birds away from the building's façade[3]
- Actual bird mortality is monitored and compensated for (e.g., in the form of habitat preserved or created elsewhere, mortality from other sources reduced, etc.)

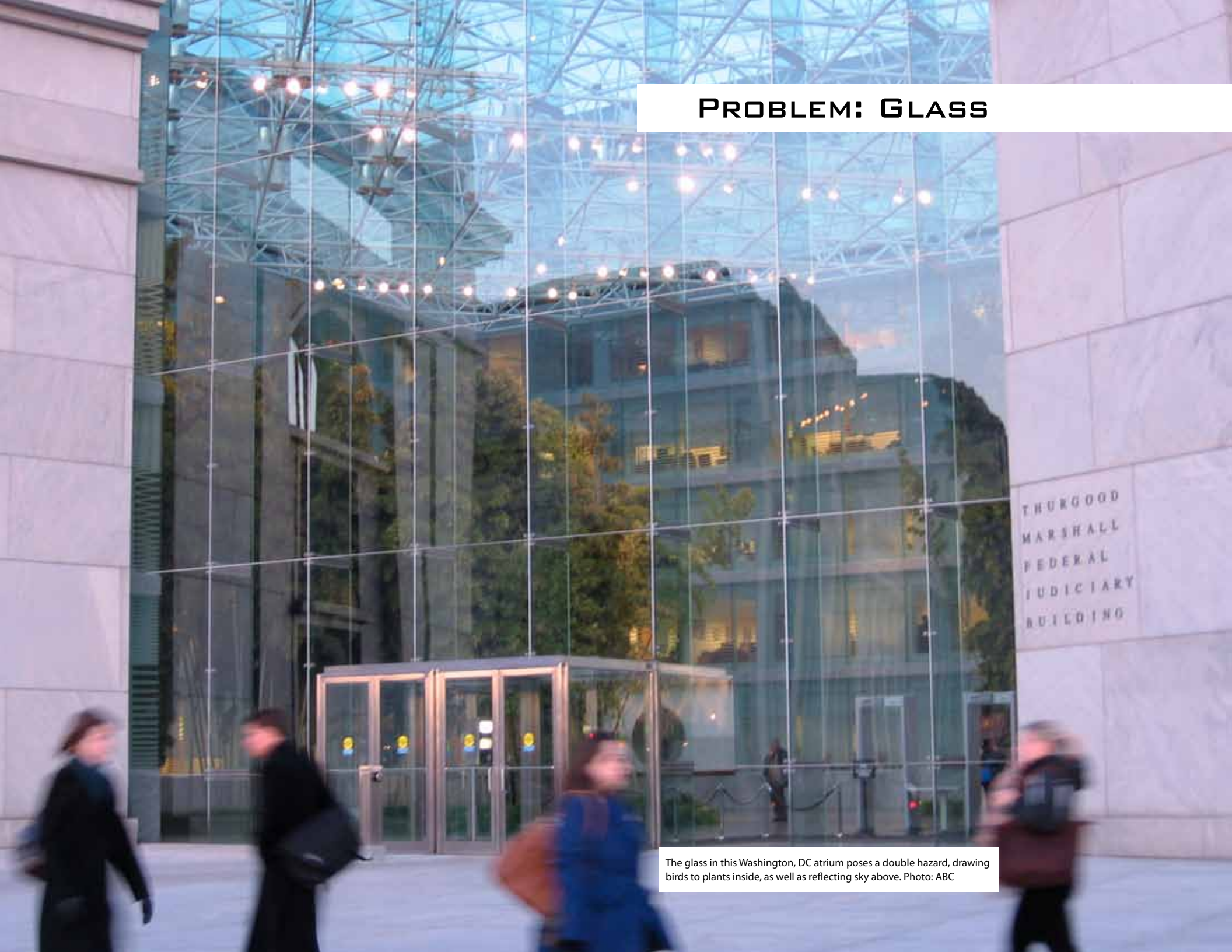
[1]See the section *Research: Deterring Bird Collisions* in Appendix I for information on these controlled studies.

[2]See the section *Solutions: Lighting Design* on page 31

[3]See *Landscaping and Vegetation,* Appendix I on Page 40

The Hotel Puerta America in Mexico City was designed by Jean Nouvel, and features external shades. This is a flexible strategy for sun control, as well as preventing collisions; shades can be lowered selectively when and where needed. Photo: Ramon Duran

Problem: Glass



The glass in this Washington, DC atrium poses a double hazard, drawing birds to plants inside, as well as reflecting sky above. Photo: ABC

The Properties of Glass

Glass can appear very differently depending on a number of factors, including how it is fabricated, the angle at which it is viewed, and the difference between exterior and interior light levels. Combinations of these factors can cause glass to look like a mirror or dark passageway, or to be completely invisible. Humans do not actually "see" most glass, but are cued by context such as mullions, roofs or doors. Birds, however, do not perceive right angles and other architectural signals as indicators of obstacles or artificial environments.

The glass-walled towers of the Time-Warner Center in New York City appear to birds as just another piece of the sky. Photo: Christine Sheppard, ABC

Reflection

Viewed from outside, transparent glass on buildings is often highly reflective. Almost every type of architectural glass, under the right conditions, reflects the sky, clouds, or nearby habitat familiar and attractive to birds. When birds try to fly to the reflected habitat, they hit the glass. Reflected vegetation is the most dangerous, but birds also attempt to fly past reflected buildings or through reflected passageways.

Transparency

Birds strike transparent windows as they attempt to access potential perches, plants, food or water sources, and other lures seen through the glass. Glass "skywalks" joining buildings, glass walls around planted atria, windows installed perpendicularly on building corners, and exterior glass handrails or walkway dividers are dangerous because birds perceive an unobstructed route to the other side.

Black Hole or Passage Effect

Birds often fly through small gaps, such as spaces between leaves or branches, nest cavities, or other small openings. In some light, glass can appear black, creating the appearance of just such a cavity or "passage" through which birds try to fly.

Factors Affecting Rates of Bird Collisions for a Particular Building

Every site and every building can be characterized as a unique combination of risk factors for collisions. Some, particularly aspects of a building's design, are very building-specific. Many negative design features can be readily countered, or, in new construction, avoided. Others, for example a building's location and siting, relate to migration routes, regional ecology, and geography–factors that are difficult if not impossible to modify.

Transparent handrails are a dangerous trend for birds, especially when they front vegetation. Photo: Christine Sheppard, ABC

Architectural cues show people that only one panel on the face of this shelter is open; to birds, all the panels appear to be open. Photo: Christine Sheppard, ABC

Large facing panes of glass can appear to be a clear pathway. Photo: Christine Sheppard, ABC

The same glass can appear transparent or highly reflective, depending on weather or time of day. Photo: Christine Sheppard, ABC

Building Design

Glass causes virtually all bird collisions with buildings. The relative threat posed by a particular building depends substantially on the amount of exposed glass, as well as the type of glass used, and the presence of glass "design traps". Klem (2009) in a study based on data from Manhattan, New York, found that a 10% increase in the area of reflective and transparent glass on a building façade correlated with a 19% increase in the number of fatal collisions in spring and a 32% increase in fall.

Type of Glass

The type of glass used in a building is a significant component of its danger to birds. Mirrored glass is often used to make a building "blend" into an area by reflecting its surroundings. Unfortunately, this makes those buildings especially deadly to birds. Mirrored glass is reflective at all times of day, and birds mistake reflections of sky, trees, and other habitat features for reality. Non-mirrored glass can be highly reflective at one time, and at others, appear transparent or dark, depending on time of day, weather, angle of view, and other variables, as with the window pictured below. Tinted glass reduces collisions, but only slightly. Low-reflection glass may be less hazardous in some situations, but does not actively deter birds and can create a "passage effect," appearing as a dark void that could be flown through (see page 11).

Building Size

As building size increases for a particular design, so usually does the amount of glass, making larger buildings more of a threat. It is generally accepted that the lower stories of buildings are the most dangerous because they are at the same level as trees and other landscape features that attract birds. However, monitoring programs accessing setbacks and roofs of tall buildings are finding that birds also collide with higher levels.

Building Orientation and Siting

Building orientation in relation to compass direction has not been implicated as a factor in collisions, but siting of a building with respect to surrounding habitat and landscaping can be an issue, especially if glass is positioned so that it reflects vegetation. Physical features such as outcrops or pathways that provide an open flight path through the landscape can channel birds towards or away from glass and should be considered early in the design phase.

Design Traps

Windowed courtyards and open-topped atria can be death traps for birds, especially if they are heavily planted. Birds fly down into such places, and then try to leave by flying directly towards reflections on the walls. Glass skywalks and outdoor handrails, and building corners where glass walls or windows are perpendicular are dangerous because birds can see through them to sky or habitat on the other side.

Birds flying from a meadow on the left are channeled towards the glass doors of this building by a rocky outcrop to the right of the path. Photo: Christine Sheppard, ABC

Mirrored glass is dangerous at all times of day, whether it reflects vegetation, sky, or simply open space through which a bird might try to fly. Photo: Christine Sheppard, ABC

Plantings on setbacks and rooftops can attract birds to glass they might otherwise avoid. Photo: Christine Sheppard, ABC

Vines cover most of these windows, but birds might fly into the dark spaces on the right. Photo: Christine Sheppard, ABC

Reflections on home windows are a significant source of bird mortality. The partially opened vertical blinds seen here may break up the reflection enough to reduce the hazard to birds. Photo: Christine Sheppard, ABC

Reflected Vegetation

Glass that reflects shrubs and trees causes more collisions than glass that reflects pavement or grass (Gelb and Delecretaz, 2006). Studies have only quantified vegetation within 15-50 feet of a façade, but reflections can be visible at much greater distances. Vegetation around buildings will bring more birds into the vicinity of the building; the reflection of that vegetation brings more birds into the glass. Taller trees and shrubs correlate with more collisions. It should be kept in mind that vegetation on slopes near a building will reflect in windows above ground level. Studies with bird feeders (Klem *et al.*, 1991) have shown that fatal collisions result when birds fly towards glass from more than a few feet away.

Green Roofs and Walls

Green roofs bring habitat elements attractive to birds to higher levels, often near glass. However, recent work shows that well designed green roofs can become functional ecosystems, providing food and nest sites for birds. Siting of green roofs, as well as green walls and rooftop gardens should therefore be carefully considered, and glass adjacent to these features should have protection for birds.

Local Conditions

Areas where fog is common may exacerbate local light pollution (see below). Areas located along migratory pathways or where birds gather prior to migrating across large bodies of water, for example, in Toronto, Chicago, or the southern tip of Florida, expose birds to highly urban environments and have caused large mortality events (see Appendix II for additional information on how migration can influence bird collisions).

Lighting

Interior and exterior building and landscape lighting can make a significant difference to collisions rates in any one location. This phenomenon is dealt with in detail in the section on lighting.

Planted, open atrium spaces lure birds down, then prove dangerous when birds try to fly out to reflections on surrounding windows. Photo: Christine Sheppard, ABC

This atrium has more plants than anywhere outside on the surrounding streets, making the glass deadly for birds seeking food in this area.
Photo: Christine Sheppard, ABC

Solutions: Glass

It is possible to design buildings that can reasonably be expected not to kill birds. Numerous examples exist, not necessarily designed with birds in mind, but to be functional and attractive. These buildings may have windows, but use screens, latticework, grilles, and other devices outside the glass or integrated into the glass.

Finding glass treatments that can eliminate or greatly reduce bird mortality while minimally obscuring the glass itself has been the goal of several researchers, including Martin Rössler, Dan Klem, and Christine Sheppard. Their research, discussed in more detail in Appendix I, has focused primarily on the spacing, width, and orientation of lines marked on glass, and has shown that patterns covering as little as 5% of the total glass surface can deter 90% of strikes under experimental conditions. They have consistently shown that most birds will not attempt to fly through horizontal spaces less than 2" high nor through vertical spaces 4" wide or less. We refer to this as the "2 x 4" rule. There are many ways that this can be used to make buildings safe for birds.

Designing a new structure to be bird friendly does not need to restrict the imagination or add to the cost of construction. Architects around the globe have created fascinating and important structures that incorporate little or no exposed glass. In some cases, inspiration has been born out of functional needs, such as shading in hot climates, in others, aesthetics; being bird-friendly was usually incidental. Retrofitting existing buildings can often be done by targeting problem areas, rather than entire buildings.

Emilio Embasz used creative lighting strategies to illuminate his Casa de Respira Espiritual, located north of Seville, Spain. Much of the structure and glass are below grade, but are filled with reflected light. Photo courtesy of Emilio Ambasz and Associates

(Opposite) The external glass screen on the GSA Regional Field Office in Houston, TX, designed by Page Southerland Page, means windows are not visible from many angles. Photo: Timothy Hursley

FOA made extensive use of bamboo in the design of this Madrid, Spain public housing block. Shutters are an excellent strategy for managing bird collisions as they can be closed as needed. Photo courtesy of FOA

Facades, netting, screens, grilles, shutters, exterior shades

There are many ways to combine the benefits of glass with bird-safe or bird-friendly design by incorporating elements that preclude collisions without completely obscuring vision. Some architects have designed decorative facades that wrap entire structures. Recessed windows can functionally reduce the amount of visible glass and thus the threat to birds. Netting, screens, grilles, shutters and exterior shades are more commonly used elements that can make glass safe for birds. They can be used in retrofits or be an integral part of an original design, and can significantly reduce bird mortality.

Before the current age of windows that are unable to be opened, screens protected birds in addition to their primary purpose of keeping bugs out. Screens and nets are still among the most cost-effective methods for protecting birds, and netting can often be installed so as to be nearly invisible. Netting must be installed several inches in front of the window, so impact does not carry birds into the glass. Several companies sell screens that can be attached with suction cups or eye hooks for small areas of glass. Others specialize in much larger installations.

Decorative grilles are also part of many architectural traditions, as are shutters and exterior shades, which have the additional advantage that they can be closed temporarily, specifically during times most dangerous to birds, such as migration and fledging (see Appendix II).

Functional elements such as balconies and balustrades can act like a façade, protecting birds while providing an amenity for residents.

The façade of the New York Times building, by FX Fowle and Renzo Piano, is composed of ceramic rods, spaced to let occupants see out, while minimizing the extent of exposed glass. Photo: Christine Sheppard, ABC

External shades on Renzo Piano's California Academy of Sciences in San Francisco are lowered during migration seasons to eliminate collisions. Photo: Mo Flannery

For the Langley Academy in Berkshire, UK, Foster + Partners used louvers to control light and ventilation, also making the building safe for birds. Photo: Chris Phippen Ofis

The combination of shades and balustrades screens glass on Ofis Architect's Apartments on the Coast in Izola, Slovenia. Photo courtesty of Ofis

Instead of glass, this side of Jean Nouvel's Institute Arabe du Monde in Paris, France features motor-controlled apertures that produce filtered light in the interior of the building. Photo: Vicki Paull

A series of balconies, such as those pictured here, can hide glass from view. Photo: Elena Cazzaniga

Overhangs block viewing of glass from some angles, but do not necessarily eliminate reflections. Photo: Christine Sheppard, ABC

Awnings and Overhangs

Overhangs have been said to reduce collisions, however, they do not eliminate reflections, and only block glass from the view of birds flying above. They are thus of limited effectiveness as a general strategy.

UV Patterned Glass

Birds can see into the ultraviolet (UV) spectrum of light, a range largely invisible to humans (see page 36). UV-reflective and/or absorbing patterns (transparent to humans but visible to birds) are frequently suggested as the optimal solution for many bird collision problems. Progress in the search for bird-friendly UV glass has been slow, however, due to the inherent technical complexities, and because, in the absence of widespread legislation mandating bird-friendly glass, only a few glass companies recognize this as a market opportunity. Research indicates that UV patterns need strong contrast to be effective.

Reflections in this angled façade can be seen clearly over a long distance, and birds can approach the glass from any angle. Photo: Christine Sheppard, ABC

Angled Glass

In a study (Klem et al., 2004) comparing bird collisions with vertical panes of glass to those tilted 20 degrees or 40 degrees, the angled glass resulted in less mortality. For this reason, it has been suggested that angled glass should be incorporated into buildings as a bird-friendly feature. While angled glass may be useful in special circumstances, the birds in the study were flying parallel to the ground from nearby feeders. In most situations, however, birds approach glass from many angles, and can see glass from many perspectives. Angled glass is not recommended as appropriate or useful strategy. The New York Times printing plant, pictured opposite, clearly illustrates this point. The angled glass curtain wall shows clear reflections of nearby vegetation, visible from a long distance away.

Deeply recessed windows, such as these on Stephen Holl's Simmons Hall at MIT, can block viewing of glass from most angles. Photo: Dan Hill

Translucent glass panels on the Kunsthaus Bregenz in Austria, designed by Atelier Peter Zumthor, provide light and air to the building interior, without dangerous reflections. Photo: William Heltz

The glass facade of SUVA Haus in Basel, Switzerland, renovated by Herzog and de Meuron, is screen-printed on the outside with the name of the company owning the building. Photo: Miguel Marqués Ferrer

Dense stripes of internal frit on University Hospital's Twinsburg Health Center in Cleveland, by Westlake, Reed, Leskosky will overcome virtually all reflections. Photo: Christine Sheppard, ABC

Patterns on Glass

Patterns are often applied to glass to reduce the transmission of light and heat; they can also provide some design detail. When designed according to the 2x4 rule, (see p. 17) patterns on glass can also prevent bird strikes. External patterns on glass deter collisions effectively because they block glass reflections, acting like a screen. Ceramic dots or 'frits' and other materials can be screened, printed, or otherwise applied to the glass surface. This design element, useful primarily for new construction, is currently more common in Europe and Asia, but is being offered by an increasing number of manufacturers in the United States.

More commonly, patterns are applied to an internal surface of double-paned windows. Such designs may not be visible if the amount of light reflected from the frit is insufficient to overcome reflections on the glass' outside surface. Some internal frits may only help break up reflections when viewed from some angles and in certain light conditions. This is particularly true for large windows, but also depends on the density of the frit pattern. The internet company IAC's headquarters building in New York City, designed by Frank Gehry, is composed entirely of fritted glass, most of high density. No collision mortalities have been reported at this building after two years of monitoring by Project Safe Flight. Current research is testing the relative effectiveness of different frit densities, configurations, and colors.

The Studio Gang's Aqua Tower in Chicago was designed with birds in mind. Strategies include fritted glass and balcony balustrades. Photo: Tim Bloomquist

The dramatic City Hall of Alphen aan den Rijn in the Netherlands, designed by Erick van Egeraat Associated Architects, features a façade of etched glass. Photo: Dik Naagtegal

RAU's World Wildlife Fund Headquarters in the Netherlands uses wooden louvers as sunshades; they also diminish the area of glass visible to birds. Photo courtesy of RAU

External frit, as seen here on the Lile Museum of Fine Arts, by Ibos and Vitart, is more effective at breaking up reflections than patterns on the inside of the glass. Photo: G. Fessy

A detail of a pattern printed on glass at the Cottbus Media Centre in Germany. Photo: Evan Chakroff

While some internal fritted glass patterns can be overcome by reflections, Frank Gehry's IAC Headquarters in Manhattan is so dense that the glass appears opaque. Photo: Christine Sheppard, ABC

Renzo Piano's Hermes Building in Tokyo has a façade of glass block. Photo: Mariano Colantoni

Opaque and Translucent Glass

Opaque, etched, stained, frosted glass, and glass block can are excellent options to reduce or eliminate collisions, and many attractive architectural applications exist. They can be used in retrofits but are more commonly in new construction.

Frosted glass is created by acid etching or sandblasting transparent glass. Frosted areas are translucent, but different finishes are available with different levels of light transmission. An entire surface can be frosted, or frosted patterns can be applied. Patterns should conform to the 2x4 rule described on page 17. For retrofits, glass can also be frosted by sandblasting on site.

Stained glass is typically seen in relatively small areas but can be extremely attractive and is not conducive to collisions.

Glass block is extremely versatile, can be used as a design detail or primary construction material, and is also unlikely to cause collisions.

Frosted glass façade on the Wexford Science and Technology building in Philadelphia, by Zimmer, Gunsul, Frasca. Photo: Walker Glass

Galeo, part of a complex designed by Atelier Christian de Portzamparc in Issy les Moulineaux, France, has an external skin of printed glass scales. Photo: Sipane

A dramatic use of glass block denotes the Hecht Warehouse in Washington, DC, by Abbott and Merkt. Photo: Sandra Cohen-Rose and Colin Rose

ABC BirdTape

ABC, with support from the Rusinow Family Foundation, has produced ABC BirdTape to make home windows safer for birds. This easy-to-apply tape lets birds see glass while letting you see out, is easily applied, and lasts up to four years.
For more information, visit www.ABCBirdTape.org

Photos : Dariusz Zdziebkowski, ABC

Internal Shades, Blinds, and Curtains

Light colored shades are often recommended as a way to deter collisions. However, they do not effectively reduce reflections and are not visible from acute angles. Blinds have the same problems, but when visible and partly open, they are more likely to break up reflections than solid shades.

Window Films

Currently, most patterned window films are intended for use inside structures as design elements or for privacy, but this is beginning to change. 3M™ Scotchcal™ Perforated Window Graphic Film, also known as CollidEscape, is a well-known external solution. It covers the entire surface of a window, appears opaque from the outside, but still permits a view out from inside. Interior films, when applied correctly, have held up well in external applications, but this solution has not yet been tested over decades. A film with a pattern of narrow, horizontal stripes was applied to a building, in Markham, Ontario and successfully eliminated collisions. Another film has been effective at the Philadelphia Zoo's Bear Country exhibit (see photo on opposite page). In both cases, the response of people has also been positive.

A single decal is ineffective for collision prevention on a window of this size, as birds will simply attempt to fly around it. Photo: Christine Sheppard, ABC

Temporary Solutions

In some circumstances, especially for homes and small buildings, quick, low-cost, temporary solutions such as making patterns on glass with tape or paint can be very effective. Even a modest effort can reduce collisions. Such measures can be applied when needed and are most effective following the 2x4" rule. For more information, see ABC's informative flyer "You Can Save Birds from Flying into Windows" at www.abcbirds.org/abc

Decals

Decals are probably the most popularized solution to bird collisions, but their effectiveness is widely misunderstood.

Birds do not recognize decals as silhouettes of birds, spider webs, or other items, but simply as obstacles that they may try to fly around. Decals are most effective if applied following the 2" x 4" rule, but even a few may reduce collisions. Because decals must also be replaced frequently, they are usually considered a short-term strategy for small windows.

Tape decals (Window Alert shown here) placed following the 2 x 4 rule can be effective at deterring collisions. Photo: Christine Sheppard, ABC

This window at the Philadelphia Zoo's Bear Country exhibit was the site of frequent bird collisions until this window film was applied. Collisions have been eliminated, with no complaints from the public. Photo courtesy of Philadelphia Zoo

Problem: Lighting

Each white speck seen here is a bird, trapped in the beams of light forming the *9/11 Tribute in Light* in New York City. Volunteers watch during the night and the lights are turned off briefly if large numbers of birds are observed. Photo: Jason Napolitano

Artificial light is increasingly recognized as a negative factor for humans as well as wildlife. Rich and Longcore (2006) have gathered comprehensive reviews of the impact of "ecological light pollution" on vertebrates, insects, and even plants. For birds especially, light can be a significant and deadly hazard.

Beacon Effect and Urban Glow

Light at night, especially during bad weather, creates conditions that are particularly hazardous for night-migrating birds. Typically flying at altitudes over 500 feet, migrants often descend to lower altitudes during inclement weather, where they may encounter artificial light from buildings. Water vapor in very humid air, fog, or mist refracts light, forming an illuminated halo around light sources.

There is clear evidence that birds are attracted to light, and once close to the source, are unable to break away (Rich and Longcore, 2006; Poot et al., 2008; Gauthreaux and Belser, 2006). How does this become a hazard to birds? When birds encounter beams of light, especially in inclement weather, they tend to circle in the illuminated zone, appearing disoriented and unwilling or unable to leave. This has been documented recently at the *9/11 Memorial in Lights*, where lights must be turned off briefly when large numbers of birds become caught in the beams. Significant mortality of migrating birds has been reported at oil platforms in the North Sea and the Gulf of Mexico. Van de Laar (2007) tested the impact on birds of lighting on an off-shore platform. When lights were switched on, birds were immediately attracted to the platform in significant numbers. Birds dispersed when lights were switched off. Once trapped, birds may collide with structures or each other, or fall to the ground from exhaustion, where they are at risk from predators.

While mass mortalities at very tall illuminated structures (such as skyscrapers) during inclement weather have received the most attention, mortality has also been associated with ground-level lighting during clear weather. Light color also plays a role, with blue and green light much safer than white or red light. Once birds land in lighted areas, they are at risk from colliding with nearby structures as they forage for food by day.

In addition to killing birds, overly-lit buildings waste electricity, and increase greenhouse gas emissions and air pollution levels. Poorly designed or improperly installed outdoor fixtures add over one billion dollars to electrical costs in the United States every year, according to the International Dark Skies Association. Recent studies estimate that over two thirds of the world's population can no longer see the Milky Way, just one of the nighttime wonders that connect people with nature. Together, the ecological, financial, and cultural impacts of excessive building lighting are compelling reasons to reduce and refine light usage.

Overly-lit buildings waste electricity and increase greenhouse gas emissions and air pollution levels, as well as posing a threat to birds. Photo: Matthew Haines

Houston skyline at night. Photo: Jeff Woodman

Solutions: Lighting Design

Reducing exterior building and site lighting has proven effective at reducing mortality of night migrants. At the same time, these measures reduce building energy costs and decrease air and light pollution. Efficient design of lighting systems plus operational strategies to reduce light "trespass" or "spill light" from buildings while maximizing useful light are both important strategies. In addition, an increasing body of evidence shows that red lights and white light (which contains red wavelengths) particularly attract and confuse birds, while green and blue light have far less impact.

Light pollution is largely a result of inefficient exterior lighting, and improving lighting design usually produces savings greater than the cost of changes. For example, globe fixtures permit little control of light, which shines in all directions, resulting in a loss of as much as 50% of energy, as well as poor illumination. Cut-off shields can reduce lighting loss and permit use of lower powered bulbs.

Most "vanity lighting" is unnecessary. However, when it is used, building features should be highlighted using downlighting rather than up-lighting. Where light is needed for safety and security, reducing the amount of light trespass outside of the needed areas can help by eliminating shadows. Spotlights and searchlights should not be used during bird migration. Communities that have implemented programs to reduce light pollution have not found an increase in crime.

Using automatic controls, including timers, photo-sensors, and infrared and motion detectors is far more effective than reliance on employees turning off lights. These devices generally pay for themselves in energy savings in less than a year. Workspace lighting should be installed where needed, rather than lighting large areas. In areas where indoor lights will be on at night, minimize perimeter lighting and/or draw

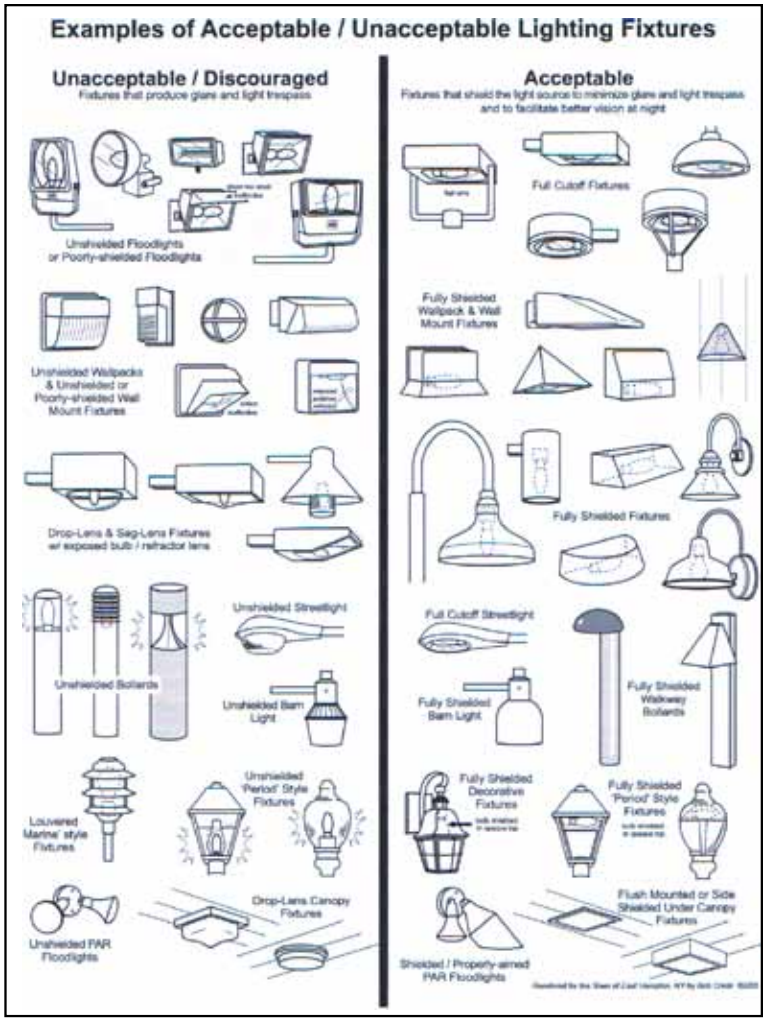
Shielded light fixtures are widely available in many different styles. Photo: Susan Harder

shades after dark. Switching to daytime cleaning is a simple way to reduce lighting while also reducing costs.

Lights Out Programs

Birds evolved complex, complementary systems for orientation and vision long before humans developed artificial light. We still have much more to learn, especially the differences between species, but recent science has begun to clarify how artificial light poses a threat to birds, especially nocturnal migrants. These birds use a magnetic sense which is dependent on dim light from the blue-green end of the spectrum.

Research has shown that different wavelengths cause different behaviors, with yellow and red light preventing orientation. Different intensities of light also produce different



Reprinted courtesy of DarkSkySociety.org

(Opposite) Fixtures such as these reduce light pollution, saving energy and money, and reducing negative impacts on birds. Photo: Dariusz Zdziebkowski, ABC

Shielded lights, such as those shown above, cut down on light pollution and are much safer for birds. Photo: Susan Harder

reactions. Despite the complexity of this issue, there is one simple way to reduce mortality: turn lights off.

Across the United States and Canada, "Lights Out" programs at the municipal and state level encourage building owners and occupants to turn out lights visible from outside during spring and fall migration. The first of these, Lights Out Chicago, was started in 1995, followed by Toronto in 1997. There are over twenty programs as of mid-2011.

The programs themselves are diverse. Some are directed by environmental groups, others by government departments, and still others by partnerships of organizations. Participation in some, such as Houston's, is voluntary. Minnesota mandates turning off lights in state-owned and -leased buildings, while Michigan's governor proclaims Lights Out dates annually. Many jurisdictions have a monitoring component or work with local rehabilitators. Monitoring programs can provide important information in addition to quantifying collision levels and documenting solutions. Toronto, for example, determined that if short buildings emit more light, they can be more dangerous to birds than tall building emitting less light.

Ideally, Lights Out programs would be in effect year round, saving birds and energy costs and reducing emissions of greenhouse gases. ABC stands ready to help develop new programs and to support and expand existing programs.

Lights Out map legend

Red: state ordinance

Yellow: cities in state-wide programs

Turquoise: program in development

Blue: local programs

Distribution of Lights Out Programs in North America

Downtown Houston during Lights Out. Photo: Jeff Woodman

Solutions: Legislation

Changing human behavior is generally a slow process, even when the change is uncontroversial. Legislation can be a powerful tool for modifying behavior. Conservation legislation has created reserves, reduced pollution, and protected threatened species and ecosystems. Initial efforts to document bird mortality and recommend ways to remediate collisions have more recently given way to legislation that promotes bird-friendly design and reduction of light pollution.

Most of these ordinances refer to external guidelines, rather than specifying how their goals must be achieved, and because there are many guidelines, created at different times and often specific to particular places, this can lead to contradiction, confusion, and cases of 'shopping' for the cheapest option. These ABC guidelines are intended to address collisions at a national level and may be distributed by other groups.

One challenge in creating legislation is to provide specific strategies and create objective measures that architects can use to accomplish their task. ABC has incorporated objective criteria into this document and created a model ordinance to be found in Appendix V .

ABC is willing to partner with local groups in creating additions to the Guidelines with local focus and to assist in promoting local, bird-friendly legislation.

Cook County, Illinois, was the first to pass bird-friendly construction legislation, sponsored by then-Assemblyman Mike Quigley.

In 2006, Toronto, Canada, proposed a Green Development Standard, initially a set of voluntary guidelines to promote sustainable site and building design, including guidelines for bird-friendly construction. Development Guidelines became mandatory on January 1, 2011, but the process of translating guidelines into blueprints is still underway. San Francisco adopted Standards for Bird-safe Buildings in September, 2011. Listed below are some examples of current and pending ordinances at levels from federal to municipal.

Federal (proposed)

Illinois Congressman Mike Quigley (D-IL) introduced the Federal Bird-Safe Buildings Act of 2011 (HR 1643), which calls for each public building constructed, acquired, or altered by the General Services Administration (GSA) to incorporate, to the maximum extent possible, bird-safe building materials and design features. The legislation would require GSA to take similar actions on existing buildings, where practicable. Importantly, the bill has been deemed cost-neutral by the Congressional Budget Office. See http://thomas.loc.gov/cgi-bin/query/z?c112:H.R.1643.IH

State: Minnesota (enacted)

Chapter 101, Article 2, Section 54: Between March 15 and May 31, and between August 15 and October 31 each year, occupants of state-owned or state-leased buildings must attempt to reduce dangers posed to migrating birds by turning off building lights between midnight and dawn, to the extent turning off lights is compatible with the normal use of the buildings. The commissioner of administration may adopt policies to implement this requirement. See www.revisor.leg.state.mn.us/laws/?id=101&doctype=Chapter&year=2009&type=0

Song Sparrow: Greg Lavaty

State: Minnesota (enacted; regulations pending)

Beginning on July 1, 2010, all Minnesota State bonded projects – new and substantially renovated –that have not already started the schematic design phase on August 1, 2009 will be required to meet the Minnesota Sustainable Building 2030 (SB 2030) energy standards. See www.mn2030.umn.edu/

State: New York (pending)

Bill S04204/A6342-A, the Bird-friendly Buildings Act, requires the use of bird-friendly building materials and design features in buildings. See http://assembly.state.ny.us/leg/?bn=S04204&term=2011

City: San Francisco (enacted)

The city adopted Standards for Bird-safe Buildings in September, 2011. The city's Planning Department tried to make these standards objective, defining areas where the regulations are mandated, others where they are recommended and including criteria for ensuring that designs will be effective for protecting birds. See http://www.sf-planning.org/index.aspx?page=2506

City: Toronto

On October 27, 2009, the Toronto City Council passed a motion making parts of the Toronto Green Standard mandatory. The standard, which had previously been voluntary, applies to all new construction in the city, and incorporates specific Bird-Friendly Development Guidelines, designed to eliminate bird collisions with buildings both at night and in the daytime.

Beginning January 31, 2010, all new, proposed low-rise, non-residential, and mid- to high-rise residential and industrial, commercial, and institutional development will be required under Tier 1 of the Standard, which applies to all residential apartment buildings and non-residential buildings that are four stories tall or higher. See www.toronto.ca/planning/environment/greendevelopment.htm

United States Capitol, Washington, DC . Photo: stock.xchng

The number of birds killed by collisions with glass every year is astronomical.

Hundreds of species of birds are killed by collisions. These birds were collected by monitors with FLAP in Toronto, Canada. Photo: Kenneth Herdy

APPENDIX I: THE SCIENCE OF BIRD COLLISIONS

Magnitude of Collision Deaths

The number of birds killed by collisions with glass every year is astronomical. Based on studies of homes and commercial structures, Klem (1990) estimated conservatively that each building in the United States kills one to ten birds per year. Using 1986 United States Census data, he combined numbers of homes, schools, and commercial buildings for a maximum total of 97,563,626 buildings. Dunn (1993) surveyed 5,500 people who fed birds at their homes and recorded window collisions. She derived an estimate of 0.65-7.7 bird deaths per home per year for North America, supporting Klem's calculation.

The number of buildings in the United States has increased significantly since 1986, and it has been shown that commercial buildings generally kill more than ten birds per year, as would be expected since they have large expanses of glass (Hager *et al*., 2008; O'Connell, 2001). Thus, one billion annual fatalities is likely to be closer to reality, and possibly even too low.

Klem *et al*., (2009a) used data from New York City Audubon's monitoring of seventy-three Manhattan building facades to estimate 0.5 collision deaths per acre per year in urban environments, for a total of about 34 million migratory birds annually colliding with city buildings in the United States.

Patterns of Mortality

It is difficult to get a complete and accurate picture of avian mortality from collisions with glass. Collision deaths can occur at any time. Even intensive monitoring programs only cover a portion of a city, usually visiting the ground level of a given site at most once a day and often only during migration seasons. Many city buildings have stepped roof setbacks that are inaccessible to monitoring teams. Recognizing these limitations, some papers have focused on reports from homeowners on backyard birds (Klem, 1989; Dunn, 1993) or on mortality of migrants in an urban environment (Gelb and Delacretaz, 2009; Klem *et al*., 2009a, Newton, 1999). Others have analyzed collision victims from single, large-magnitude incidents (Sealy, 1985) or that have become part of museum collections (Snyder, 1946; Blem et al., 1998; Codoner, 1995).

There is general support for the fact that birds killed in collisions are not distinguished by age, sex, size, or health (for example: Blem and Willis, 1998; Codoner, 1995; Fink and French, 1971; Hager et al., 2008; Klem, 1989). However, some species, such as the White-throated Sparrow, Ovenbird, and Common Yellowthroat, seem to be more vulnerable than others, appearing consistently on top ten lists. Snyder (1946), examining window collision fatalities at the Royal Ontario Museum, noted that the majority were "tunnel flyers" – species that frequently fly through small spaces in dense, understory habitat. Recent work (J. A. Clark, pers. comm.) suggests that there may be species differences in attraction to light that could explain these findings. Interestingly, species well adapted to and common in urban areas, such as the House Sparrow and European Starling, are not prominent on lists of fatalities, and there is evidence that resident birds are less likely to die from collisions than migratory birds.

Collision mortality appears to be a density-independent phenomenon. Hager *et al*. (2008) compared the number of species and individual birds killed at buildings at Augustana College in Illinois with the density and diversity of bird species in the surrounding area. The authors concluded that total window area, habitat immediately adjacent to windows, and

A sample of collision victims from Baltimore.
Photo: Daniel J. Lebbin, ABC

behavioral differences among species were the best predictors of mortality patterns, rather than simply the size and composition of the local bird population.

From a study of multiple Manhattan buildings in New York City, Klem *et al* (2009a) similarly concluded that the expanse of glass on a building facade is the factor most predictive of mortality rates, calculating that every increase of 10% in the expanse of glass correlates to a 19% increase in bird mortality in spring, 32% in fall. How well these equations predict mortality in other cities remains to be tested. Collins and Horn (2008) studying collisions at Millikin University in Illinois concluded that total glass area and the presence/absence of large expanses of glass predicted mortality level. Hager *et al* (2008) came to the same conclusion. Gelb and Delacretaz's (2009) work in New York City indicated that collisions are more likely to occur on windows that reflect vegetation.

Dr. Daniel Klem maintains running totals of the number of species reported in collision events in countries around the world. This information can be found at: www.muhlenberg.edu/main/academics/biology/faculty/klem/aco/Country%20list.htm#World

He notes 859 species globally, with 258 from the United States. The intensity of monitoring and reporting programs varies widely from country to country, however. Hager (2009) noted that window strike mortality was reported for 45% of raptor species found frequently in urban areas of the United States, and represented the leading source of mortality for Sharp-shinned Hawks, Cooper's Hawks, Merlins, and Peregrine Falcons.

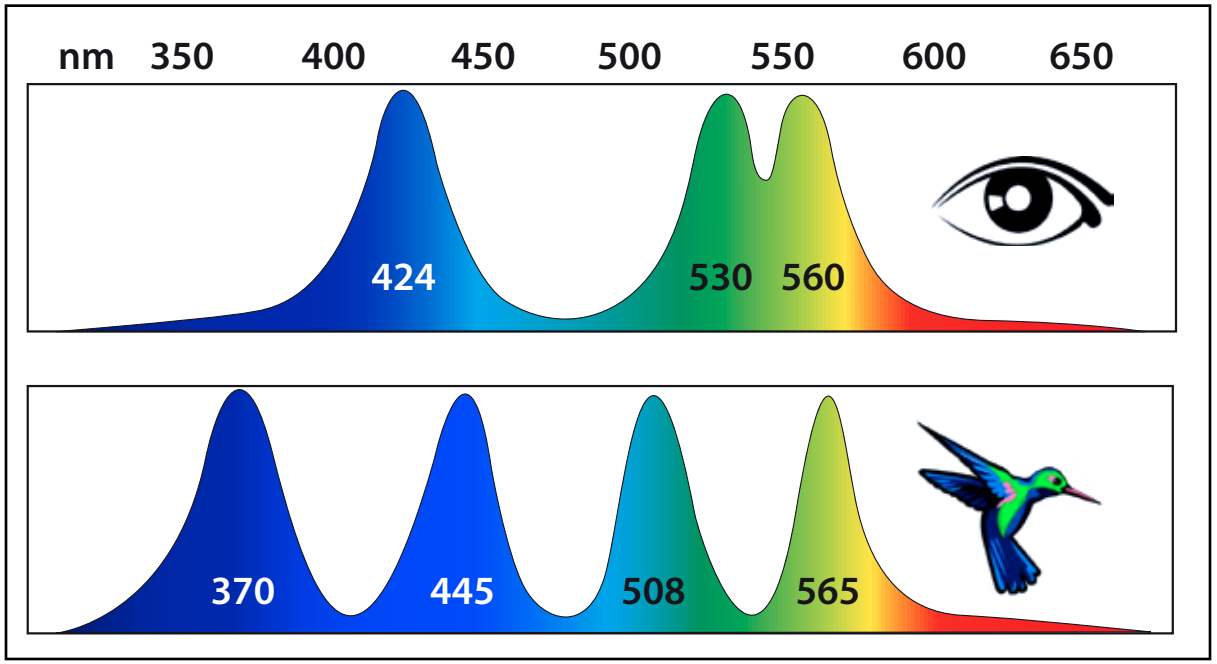
Avian Vision and Collisions

Taking a "bird's-eye view" is much more complicated than it sounds. To start with, where human color vision relies on three types of sensors, birds have four, plus an array of color filters that allow them to see many more colors than people (Varela *et al*., 1993) (see chart below). Many birds, including most passerines (Ödeen and Håstad, 2003) also see into the ultraviolet spectrum. Ultraviolet can be a component of any color (Cuthill *et al*., 2000). Where humans see red, yellow, or red + yellow, birds may see red + yellow, but also red + ultraviolet, yellow + ultraviolet, and red + yellow + ultraviolet, colors for which we have no names. They can also see polarized light (Muheim *et al*., 2006, 2011), and they process images faster than humans; where we see continuous motion in a movie, birds would see flickering images (D'Eath, 1998; Greenwood *et al*., 2004; Evans *et al*., 2006). To top it all off, birds have not one, but two receptors that permit them to sense the earth's magnetic field, which they use for navigation (Wiltschko *et al*., 2006).

Avian Orientation and the Earth's Magnetic Field

Thirty years ago, it was discovered that birds possess the ability to orient themselves relative to the Earth's magnetic field and locate themselves relative to their destination. They appear to use cues from the sun, polarized light, stars, the Earth's magnetic field, visual landmarks, and even odors to find their way. Exactly how this works – and it likely varies among

Comparison of Human and Avian Vision



Based on artwork by Sheri Williamson

species – is still being investigated, but there have been interesting discoveries that also shed light on light-related hazards to migrating birds.

Lines of magnetism between the north and south poles have gradients in three dimensions. Cells in birds' upper beaks, or maxillae, contain the iron compounds maghemite and magnetite. Micro-synchrotron x-ray fluorescence analysis shows these compounds in three different compartments, a three-dimensional architecture that probably allows birds to detect their "map" (Davila, 2003; Fleissner *et al*., 2003, 2007). Other magnetism-detecting structures are found in the retina of the eye, and depend on light for activity. Light excites receptor molecules, setting off a chain reaction. The chain in cells that respond to blue wavelengths includes molecules that react to magnetism, producing magnetic directional cues as well as color signals. For a comprehensive review of the mechanisms involved in avian orientation, see Wiltschko and Wiltschko, 2009.

Birds and Light Pollution

The earliest reports of mass avian mortality caused by lights were from lighthouses, but this source of mortality essentially disappeared when steady-burning lights were replaced by rotating beams (Jones and Francis, 2003). Flashing or interrupted beams apparently allow birds to continue to navigate. While mass collision events at tall buildings and towers have received most attention (Weir, 1976; Avery *et al*., 1977; Avery *et al*., 1978; Crawford, 1981a, 1981b; Newton, 2007), light from many sources, from urban sprawl to parking lots, can affect bird behavior and cause bird mortality (Gochfeld, 1973). Gochfeld (in Rich and Longcore, 2006) noted that bird hunters throughout the world have used lights from fires or lanterns near the ground to disorient and net birds on cloudy, dark nights. In a review of the effects of artificial light on migrating birds, Gauthreaux and Belser (2006) report on the use of car headlights to attract birds at night for tourists on safari.

Steady-burning red and white lights are most dangerous to birds. Photo: Mike Parr, ABC

Evans-Ogden (2002) showed that light emission levels of sixteen buildings ranging in height from eight to 72 floors correlated directly with bird mortality, and that the amount of light emitted by a structure was a better predictor of mortality level than building height, although height was a factor. Wiltschko *et al* (2007) showed that above intensity thresholds that decrease from green to UV, birds showed disorientation. Disorientation occurs at light levels that are still relatively low, equivalent to less than half an hour before sunrise under clear sky. It is thus likely that light pollution causes continual, widespread, low-level mortality that collectively is a significant problem.

The mechanisms involved in both attraction to and disorientation by light are poorly understood and may differ for different light sources (see Gauthreaux and Belser (2006) and Herbert (1970) for reviews.) Recently, Haupt and Schillemeit described the paths of 213 birds flying through beams uplighting from several different outdoor lighting schemes. Only 7.5% showed no change in behavior. Migrating birds are severely impacted, while resident species may show little or no effect. It is not known whether this is because of differences in physiology or simply familiarity with local habitat.

Light Color and Avian Orientation

Starting in the 1940s, ceilometers, powerful beams of light used to measure the height of cloud cover, came into use, and were associated with significant bird kills. Filtering out long (red) wavelengths and using the blue/ultraviolet range greatly reduced mortality. Later, replacement of fixed beam ceilometers with rotating beams essentially eliminated impact on migrating birds (Laskey, 1960). A complex series of laboratory studies in the 1990s demonstrated that birds required light in order to sense the Earth's magnetic field. Birds could orient correctly under monochromatic blue or green light, but longer wavelengths (yellow and red) caused disorientation (Rappli et al., 2000; Wiltschko *et al*., 1993, 2003, 2007). It was demonstrated that the magnetic receptor cells on the eye's retina are inside the type of cone cell responsible for processing blue and green light, but disorientation seems to involve a lack of directional information.

Fog increases the danger of light both by causing birds to fly lower and by refracting light so it is visible over a larger area. Photo: Christine Sheppard, ABC

Poot *et al*. (2008) demonstrated that migrating birds exposed to different colored lights in the field respond the same way they do in the laboratory. Birds were strongly attracted to white and red light, and appeared disoriented by them, especially under overcast skies. Green light was less attractive and minimally disorienting; blue light attracted few birds and did not disorient those that it did attract (but see Evans *et al*., 2007). Birds were not attracted to infrared light. This work was the basis for development of the Phillips "Clear Sky" bulb, which produces white light with minimal red wavelengths (Marquenie *et al*., 2008) and is now in use in Europe on oil rigs and at some electrical plants. According to Van de Laar *et al*. (2007), tests with this bulb on an oil platform during the 2007 fall migration produced a 50-90% reduction in birds circling and landing. Recently, Gehring *et al*. (2009) demonstrated that mortality at communication towers was greatly reduced if strobe lighting was used as opposed to steady-burning white, or especially red lights. Replacement of steady-burning warning lights with intermittent lights at locations causing collisions is an excellent option for protecting birds, as is manipulating light color.

Weather Impact on Collisions

Weather has a significant and complex relationship with avian migration (Richardson, 1978), and large-scale, mass mortality of migratory birds at tall, lighted structures (including communication towers) has often correlated with fog or rain (Avery et al., 1977; Crawford, 1981b; Newton, 2007) The conjunction of bad weather and lighted structures during migration is a serious threat, presumably because visual cues used by birds for orientation are not available.

Lower floor windows are thought to be more dangerous to birds because they are more likely to reflect vegetation. Photo: Christine Sheppard, ABC

However, not all collision events take place in bad weather. For example, in a report of mortality at a communications tower in North Dakota (Avery *et al*., 1977), the weather was overcast, usually with drizzle, on four of the five nights with the largest mortality. On the fifth occasion, however, the weather was clear.

Landscaping and Vegetation

Gelb and Delacretaz (2006, 2009) evaluated data from collision mortality at Manhattan building facades. They found that sites where glass reflected extensive vegetation were associated with more collisions than glass reflecting little or no vegetation. Of the ten buildings responsible for the most collisions, four were "low-rise." Klem (2009) measured variables in the space immediately associated with building facades in Manhattan, as risk factors for collisions.

Both increased height of trees and increased height of vegetation increased the risk of collisions in fall. Ten percent increases in tree height and the height of vegetation corresponded to 30% and 13% increases in collisions in fall. In spring, only tree height had a significant influence, with a 10% increase corresponding to a 22% increase in collisions. Confusingly, increasing "facing area" defined as the distance to the nearest structure, corresponded strongly with increased collisions in spring, and with reduced collisions in fall. Presumably, vegetation increases risk both by attracting more birds to an area, and by being reflected in glass.

This security grille also creates a pattern that will deter birds from flying to reflections. Photo: Christine Sheppard, ABC

Research: Deterring Collisions

Systematic efforts to identify signals that can be used to make glass visible to birds began with the work of Klem in 1989. Testing glass panes in the field and using a dichotomous choice protocol in an aviary, Klem (1990) demonstrated that popular devices like "diving falcon" silhouettes were only effective if they were applied densely, spaced two to four inches apart. Owl decoys, blinking holiday lights, and pictures of vertebrate eyes were among items found to be ineffective. Grid and stripe patterns made from white material, one inch wide were tested at different spacing intervals. Only three were effective: a 3x4 inch grid, vertical stripes spaced four inches apart, and horizontal stripes spaced about an inch apart across the entire surface.

In further testing using the same protocols, Klem (2009) confirmed the effectiveness of 3M™Scotchcal™ Perforated Window Graphic Film (also known as CollidEscape), WindowAlert® decals, if spaced at the two- to four-inch rule, as above, and externally applied ceramic dots or "frits," (0.1 inch dots spaced 0.1 inches apart). Window films applied to the outside surface that rendered glass opaque or translucent were also effective. The most effective deterrents in this study were stripes of highly reflective 40% UV film (D. Klem, pers. comm., March 2011) alternating

Patterns on the outside of glass, such as that shown above, are more effective than patterns on an inside surface. Photo: Hans Schmid

A dense internal frit pattern on the glass of the Bike and Roll building, near Union Station in Washington D.C., makes it look almost opaque. Photo: Christine Sheppard, ABC

A pattern of narrow horizontal stripes has proven to be highly effective at deterring bird collisions, while covering only about 7% of the surface of the glass. Photo: Hans Schmid

with high UV absorbing stripes. Completely covering glass with clear or reflective window film that also absorbed UV marginally reduced collisions.

Building on Klem's findings, Rössler developed a testing program in Austria starting in 2004 and continuing to the present (Rössler and Zuna-Kratky, 2004; Rössler, 2005; Rössler, *et al*., 2007; Rössler and Laube, 2008; Rössler, 2009). Working at the banding center at the Hohenau Ringelsdorf Biological Station outside Vienna, Austria made possible a large sampling of birds for each test, in some instances permitting comparisons of a particular pattern under different intensities of lighting. This program has focused primarily on geometric patterns, evaluating the impact of different spacing, orientation, and dimensions. Birds are placed in a "tunnel," where they can view two pieces of glass: one unmodified, (the control) and the other with the pattern to be tested. Birds fly down the tunnel and are scored according to whether they try to exit through the control or the pattern. A mist net keeps the bird from hitting the glass and it is then released. The project focuses not only on finding patterns effective for deterring collisions, but on effective patterns that cover a minimal part of the glass surface. To date, some patterns have been found to be highly effective, while covering only 5% of the glass.

Building on Rössler's work, ABC has collaborated with the Wildlife Conservation Society and the Carnegie Museum to construct a tunnel at Carnegie's Powdermill Banding Station, primarily to test commercially available materials. This project has been supported by the Association of Zoos and Aquarium's Conservation Endowment Fund, the Colcom Foundation, and New York City Audubon. Results from the first season showed that making an entire surface UV reflective was not an effective way to deter birds. With UV materials, contrast seems to be important. Glass fritted in patterns conforming to the 2 x 4-inch rule, however, scored well as deterrents.

Most clear glass made in the United States transmits about 96% of light falling perpendicular to the outside surface, and reflects about 4%. The amount of light reflected increases at sharper angles – clear glass reflects about 50% of incident light at angles over 70 degrees. Light on the inside of the glass is also partly reflected and partly transmitted. The relative intensities of light transmitted from the inside and reflected from the outside surfaces of glass, plus the viewing angle determine if the glass appears transparent or mirrors the surrounding environment. Patterns on the inside surfaces of glass and objects inside the glass may not always be visible. These changeable optical properties support the

ABC's Chris Sheppard testing a bird in the tunnel at the Carnegie Museum's Powdermill Banding Station in southwestern Pennsylvania. Photo: Susan Elbin, 2011

The tunnel – an apparatus for safely testing effectiveness of different materials and designs for deterring bird collisions. Photo: Christine Sheppard, ABC

A bird's eye view of glass in the tunnel. Photo: Christine Sheppard, ABC

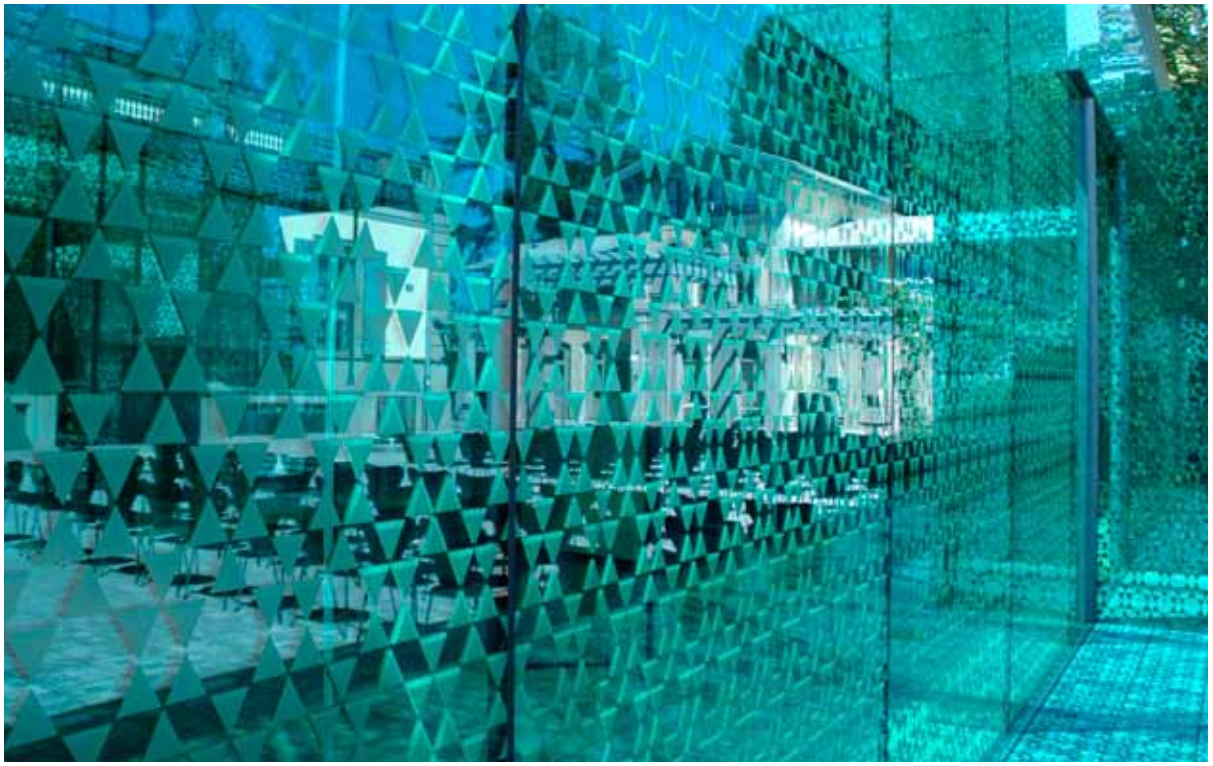
argument that patterns applied to the outer surface of glass are more effective than patterns applied to the inner surface.

The majority of the work described here uses protocols that approximate a situation with free-standing glass – birds can see through glass to the environment on the other side, patterns tested are between the bird and the glass and patterns are primarily back-lit. While this is useful and relevant, it does not adequately model most glass installed in buildings. In that situation, light levels behind the glass are usually substantially lower than light falling on the outside surface. New protocols have been developed to test materials whose effectiveness depends on the glass being primarily front-lit. This includes UV patterns and frit patterns on the inside surfaces of insulated glass.

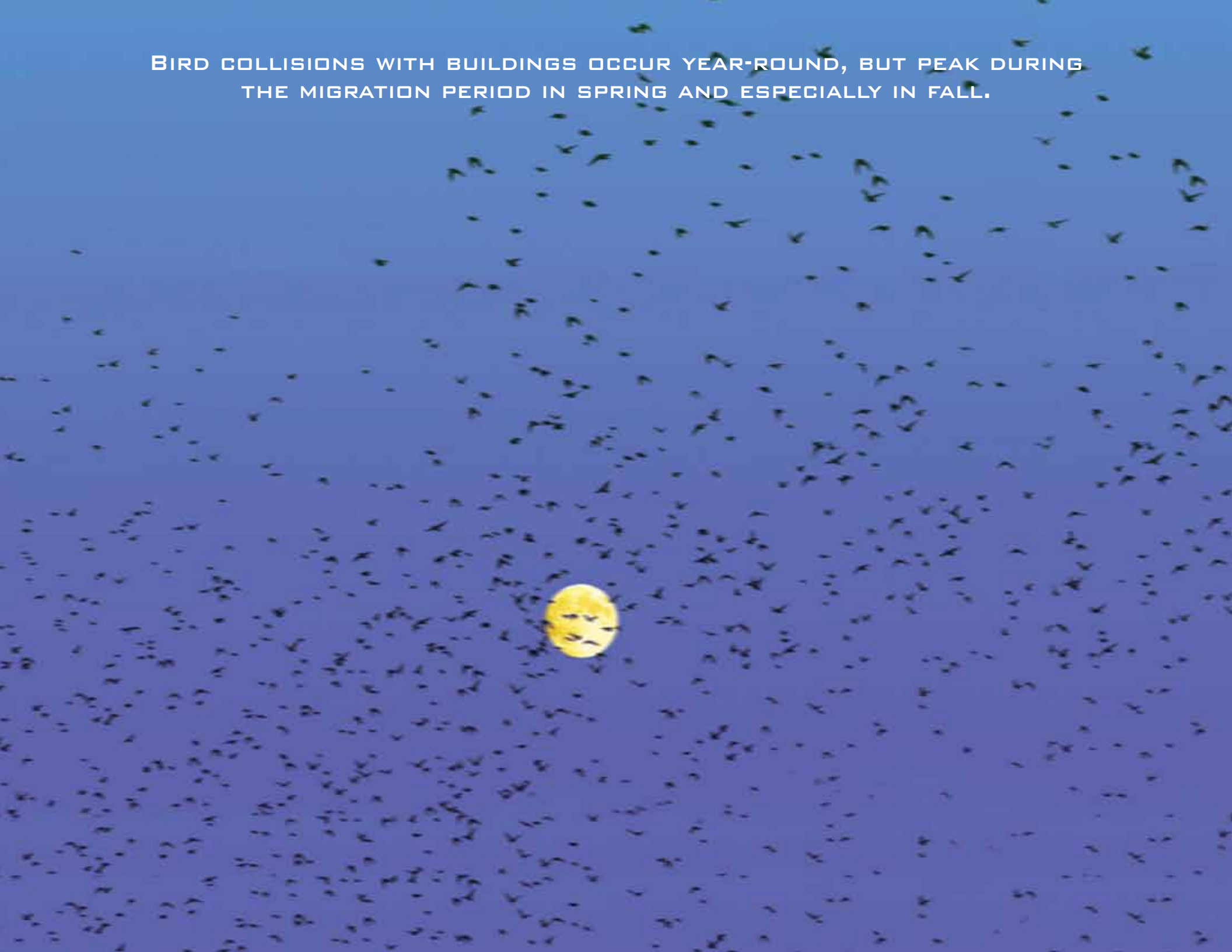
Ornilux Mikado's pattern reflects UV wavelengths. The spiderweb effect is only visible from very limited viewing angles. Photo courtesy of Arnold Glass

All-over patterns such as the one shown above are less effective at deterring collisions. Patterns with more contrast and distinct spaces, such as the one shown on the left, are much more effective. Photo: Christine Sheppard, ABC

A panel of fritted glass, ready for testing. Photo: Christine Sheppard, ABC



This glass facade, of a modern addition to the Reitberg Museum in Zürich, Germany, was designed by Grazioli and Krischanitz. It features a surface pattern formed of green enamel triangles, beautiful and also bird-friendly. Photo: Hans Schmidt



Bird collisions with buildings occur year-round, but peak during the migration period in spring and especially in fall.

APPENDIX II: BIRD MIGRATION

Bird collisions with buildings occur year-round, but peak during the migration period in spring and especially in fall when millions of adults and juvenile birds travel between breeding and wintering grounds. Migration is a complex phenomenon, and different species face different levels of hazards depending on their migration strategy, immediate weather conditions, availability of food, and human-made obstacles encountered on the way.

Many species have a migratory pattern that alternates flight with stopovers to replenish their energy stores. Night-flying migrants, including many songbirds, generally take off within a few hours of sunset and land after midnight but before dawn (Kerlinger, 2009). Once birds have landed, they may remain for several days, feeding and waiting for appropriate weather to continue. During that time, they make flights around the local area, hunting for good feeding sites. Almost anywhere they stop – in cities, suburbs or business parks – they run the risk of hitting glass. Most collision monitoring programs involve searching near dawn for birds that have been killed or injured during the night. Programs that also monitor during the day, however, continue to find birds that have collided with windows (Gelb and Delecretaz, 2009; Olson, pers. comm; Russell, pers. comm; Hager, 2008). These diurnal collisions are widespread, and represent the greatest number of bird deaths and the greatest threat to birds.

Diurnal Migrants

Daytime migrants include raptors such as the Broad-winged Hawk and Merlin that take advantage of thermal air currents to reduce the energy needed for flight. Other diurnal migrants, including Red Knots, Canada Geese, and Sandhill Cranes, fly in flocks, and their stopover sites are localized because of their dependence on bodies of water. This means that daytime migration routes often follow land forms such as rivers and mountain ranges as well as coastlines. Birds tend to be concentrated along these routes or "flyways." Some songbird species such as the American Robin, Horned Lark, and Eastern Kingbird also migrate during the day. Diurnal migrant flight altitudes are generally lower than those of nocturnal migrants, putting them at greater risk of collisions with tall buildings.

As seed dispersers, birds such as the Cedar Waxwing play an important role in maintaining many types of habitat. Photo: Chip Miller

Larger birds, such as the Sandhill Crane, migrate in flocks during the day. Photo: Alan Wilson

Nocturnal Migrants

Many songbirds migrate at night, possibly to take advantage of cooler temperatures and less turbulent air, and because they hunt insects or find berries during daylight hours. Generally, these birds migrate individually, not in flocks, spread out across most of the species' range, although local geography may channel birds into narrower routes. Songbirds may fly as many as 200 miles in a night, then stop to rest and feed for one to three days, but these patterns are strongly impacted by weather, especially wind and temperature. Birds may delay departure, waiting for good weather. They generally fly at an altitude of about 2,000 feet, but may descend or curtail flight altogether if they encounter a cold front, rain, or fog. There can be a thousand-fold difference in the number of birds aloft from one night to the next. Concentrations of birds may develop in "staging areas", where birds make ready to cross large barriers such as the Great Lakes or Gulf of Mexico.

Another collision victim – a Yellow-shafted Flicker, found on a Baltimore street. Photo: Daniel J. Lebbin, ABC, October 2008

The glass walls of this atrium, coupled with night-time illumination, create an extreme collision hazard for birds. Photo courtesy of NYC Audubon

Night-migrating songbirds, already imperiled by habitat loss, are at double the risk, threatened both by illuminated buildings when they fly at night (see Appendix I) and by daytime glass collisions as they seek food and shelter.

Millions are thus at risk as they ascend and descend, flying through or stopping in or near populated areas. As city buildings grow in height, they become unseen obstacles by night and pose confusing reflections by day. Nocturnal migrants, after landing, make short, low flights near dawn, searching for feeding areas and running a gauntlet of glass in almost every habitat, from cities to suburbs, and increasingly, exurbs. When weather conditions cause night fliers to descend into the range of lighted structures, huge kills can occur around tall buildings. Urban sprawl is creating large areas lit all night that may be causing less obvious, more dispersed bird mortality.

Local Movements

Glass collisions by migrating songbirds are by far the best known, but mortality of other groups of birds is not insignificant. Fatalities from collisions have been reported for 19 of 42 raptor species in both urban and non-urban environments, with collisions being the leading known cause of death for four species in cities, including the Peregrine Falcon. Breeding birds encounter glass as they search for nest sites or food, patrol territories or home ranges, or flee predators. Mortality increases as inexperienced fledglings leave the nest and begin to fly on their own.

Collisions are the leading known cause of death in city-dwelling Peregrine Falcons. Photo: Peter LaTourrette

The mirrored glass of this office building reflects nature so perfectly that it is easy to see how birds mistake reflection for reality. Photo: Christine Sheppard, ABC

Reflections don't have to be of something attractive to trick birds – as they fly around real buildings in search of food, they may also try to fly around reflected buildings. Photo: Christine Sheppard, ABC

American Woodcock are often victims of collisions. This bird hit a window in Washington D.C. in March, 2011. Photo: Dariusz Zdziebkowski, ABC

APPENDIX III: EVALUATING COLLISION PROBLEMS - A TOOLKIT FOR BUILDING OWNERS

Often, only part of a building is responsible for causing most of the collisions. Evaluation and documentation can help develop a program of remediation targeting that area. This can be almost as effective as modifying the entire building, as well as being less expensive. Documentation of patterns of mortality and environmental features that may be contributing to collisions is essential. Operations personnel are often good sources of information as they may come across bird carcasses while performing regular maintenance activities. People who work near windows are often aware of birds hitting them. Initiating regular monitoring not only documents mortality patterns, but also provides a baseline for demonstrating improvement. The following questions can help guide the evaluation and documentation process by identifying features likely to cause collisions.

Seasonal Timing

Are collisions happening mostly during migration or fledging periods, in winter, or year round? If collisions happen only during a short time period, it may be possible to apply inexpensive, temporary solutions during that time and remove them for the rest of the year.

Some birds will attack their own reflections, especially in spring. This is not a true collision. Territorial males, especially American Robins and Cardinals, perceive their reflection as a rival male. They are unlikely to injure themselves, but temporarily blocking the offending window from the outside should resolve the problem.

Diurnal Timing

Are collisions happening at a particular time of day? The appearance of glass can change significantly with different light levels, direct or indirect illumination, and sun angles. It may be possible to simply use shades or shutters during critical times (see Appendix II).

Weather

Do collisions coincide with particular weather conditions, such as foggy or overcast days? Such collisions may be light-related. It may be possible to create an email notification system, asking building personnel to turn off lights when bad weather is forecast.

COMPARISON OF DIFFERENT RETROFIT OPTIONS

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

Robins are frequently killed by glass on buildings near meadows and lawns. Photo: Christine Sheppard, ABC, July 2009

The white stripes on this glass wall are an easy way to make a very dangerous area safe for birds. Photo: Hans Schmid

While patterns on the exterior surface of glass are most effective, blinds and curtains can help disrupt reflections. Partially open blinds, like those seen here, are most effective. Photo: Christine Sheppard, ABC

Location

Are there particular windows, groups of windows, or building facades that account for most collisions? It may be cost effective to modify only those sections of glass. Is glass located where birds fly between roosting or nesting and feeding sites? Are there areas where plants can be seen through glass – for example, an atrium, courtyard, or glazed passageway? Are there architectural or landscaping features that tend to direct birds towards glass? Examples might be a wall or rock outcropping, or a clear pathway bordered by dense vegetation. Solutions here might include using a screen or trellis to divert flight paths. Are there fruit trees, berry bushes, or other plants near windows that are likely to attract birds closer to glass? These windows should be a high priority for remediation. The glass itself can be modified, but it may also be possible to use live or inanimate landscaping elements, to block the view between food sources and windows.

Local Bird Populations

What birds are usually found in the area? Local bird groups or volunteers may be able to help characterize local and transitory bird populations, as well as the most likely routes for birds making short flights around the area.

Local bird-watchers can be a source of detailed information about local birds and their movements. Photo: Chip Miller

The Indigo Bunting is a common summer resident and migrant in the eastern United States. Photo: Barth Schorre

Research

Research on songbirds, the most numerous victims of collisions, has shown that horizontal spaces must be 2" or narrower, to deter the majority of birds. Vertical spaces must be 4" or narrower. This difference presumably has to do with the shape of a flying bird with outstretched wings. Within these guidelines, however, considerable variation is possible when devising bird-friendly patterns. We recommend that lines be at least ¼" wide, but it is not necessary that they be only vertical or horizontal. Contrast between pattern and background is important, however, be aware that the background – building interior, sky, vegetation – may change in appearance throughout the day. Effective patterns on the exterior surface of glass will combat reflection, transparency and passage effect. In the case of handrails or other applications viewed from both sides, patterns should be applied to both surfaces if birds can approach from either side.

This Barn Swallow flying sideways through a barn door perfectly illustrates the 2x4 rule. Photo: Keith Ringland.

The American Birding Association (www.aba.org/resources/birdclubs.html), Bird Watchers Digest (www.birdwatchersdigest.com/bwdsite/connect/birdclubs/clubfinder.php?sc=migrate), Audubon chapters (http://www.audubon.org/search-by-zip), and Birding.com (www.birding.com/organizations.asp) are good places to start finding such resources. Nearby universities, colleges, and museums may also be helpful.

There are many quick, easy, and cost-effective ways to deter collisions on a short term basis. Here, tape stripes, stenciled, and free hand patterns in tempera paint on home windows. Photo: Christine Sheppard, ABC

Madrid's Vallecas 51, designed by Somos Arquitectos, uses open-celled polycarbonate panels – a sustainable and recyclable skin that presents no threat to birds. Photo: Victor Tropchenko

APPENDIX IV: EXAMPLE POLICY

ORDINANCE

Sponsored by: [list names]

WHEREAS, birds provide valuable and important ecological services,

WHEREAS, [location] has recorded [ ] species of resident and migratory bird species,

WHEREAS, birding is a hobby enjoyed by 64 million Americans and generates more than $40 billion a year in economic activity in the United States,

WHEREAS, as many as one billion birds may be killed by collisions with windows every year in the United States,

WHEREAS, reducing light pollution has been shown to reduce bird deaths from collisions with windows,

WHEREAS, new buildings can be designed to reduce bird deaths from collisions without additional cost,

WHEREAS there exist strategies to mitigate collisions on existing buildings,

WHEREAS, bird-friendly practices often go hand-in-hand with energy efficiency improvements,

And **WHEREAS** [any additions specific to the particular location]

NOW, THEREFORE, BE IT ORDAINED, by [acting agency]

[title of legislation and other necessary language]

(a) In this section the term "Leadership in Energy and Environmental Design (LEED)" means a green building rating system promulgated by the United States Green Building Council (USGBC) that provides specific principles and practices, some mandatory but the majority discretionary, that may be applied during the design, construction, and operation phases, which enable the building to be awarded points from reaching present standards of environmental efficiency so that it may achieve LEED certification from the USGBC as a "green" building,

(b) [acting agency] does hereby order [acting department] to take the steps necessary to assure that all newly constructed buildings and all buildings scheduled for capital improvement are designed, built, and operated in accordance with the standards and requirements of the LEED Green Building Rating System Pilot Credit #55,

(c) The USGBC releases revised versions of the LEED Green Building Rating System on a regular basis; and [acting department] shall refer to the most current version of the LEED when beginning a new building construction permit project or renovation.

(d) New construction and major renovation projects shall incorporate bird-friendly building materials and design features, including, but not limited to, those recommended by the American Bird Conservancy Guidelines for Bird-friendly Design.

(e) [acting department] shall make existing buildings bird-friendly where practicable.

The U.S. Census Complex in Suitland, Maryland, designed by Skidmore, Owings, Merrill, features a *brise soleil* that shades the curtain wall. Wavy vertical fins of marine-grade, white oak reduce sun glare while eliminating glass reflections. Photo: Esther Langan

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The World Trade Center of New Orleans, designed by Edward Durrell Stone, uses a simple bird-friendly strategy – almost all windows have exterior shutters. Photo: Christine Sheppard, ABC

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The steel mesh enveloping Zurich's Cocoon in Switzerland, designed by Camenzind Evolution Ltd, provides privacy and protects birds, but still permits occupants to see out. Photo: Anton Volgger

External shades, as shown here on the Batson Building in Sacramento, California, designed by Sym Van der Ryn, are a simple and flexible strategy for reducing bird collisions, as well as controlling heat and light.
Photo courtesy of MechoShade

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Disclaimer

The Institute Arabe du Monde in Paris, France provides light to the building interior without using glass. Photo: Joseph Radko, Jr.

(BACK COVER) The Wexford Science and Technology Building in Philadelphia, designed by Zimmer, Gunsul, Frasca, uses opaque glass to provide light without glare, making it safe for birds. Photo courtesy of Walker Glass