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File No: 4194-82/2

June 15, 2007

Ms. Debra Myles
Panel Manager
Whites Point Quarry and Marine Terminal Project – Joint Review Panel
c/o Canadian Environmental Assessment Agency
160 Elgin Street
Ottawa, ON K1A 0H3

Dear Ms. Myles:

RE: Whites Point Quarry and Marine Terminal Written Submission **EAS #2002-395**

Please find attached Environment Canada's written submission on environmental assessment documentation for the Whites Point Quarry and Marine Terminal. As indicated in our letter of June 12, the Environment Canada presentation at the public hearings will be based on this submission.

If you have any questions, do not hesitate to contact Kevin Blair at 902-426-6892, or email kevin.blair@ec.gc.ca) who is coordinating the Department's participation in the panel review.

Yours truly,

Original signed by:

Maria Dober
A/Regional Director
Environmental Protection Operations Directorate
Atlantic

Attachment

cc J. Abraham
K. Moir
B. Jeffrey
K. Blair
MT Grant

Canada

Whites Point Quarry and Marine Terminal Project

Environment Canada's Written Submission to the Joint Review Panel

JUNE 15, 2007

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Introduction

Since the joint panel review of the proposed Whites Point Quarry and Marine Terminal (the "Project") commenced, Environment Canada has participated as an expert federal authority. In this capacity, Environment Canada has contributed specialist information and data related to the Department's mandate. Specifically, Environment Canada provided comments on the draft *Guidelines for the Preparation of the Environmental Impact Statement* (the "Guidelines") in January 2005 and provided comments on the Environmental Impact Statement (the "EIS") in August 2006.

In responding to Environment Canada and other panel review participants reviewing the EIS, Bilcon of Nova Scotia Corporation (the "Proponent") submitted additional information which has been posted on the Canadian Environmental Assessment Registry. The joint review panel (the "Panel") has specifically requested Environment Canada to comment on the adequacy of the Proponent's responses to departmental comments on the EIS. The Panel has also requested the Department to present its views on environmental effects associated with the Project.

This submission is based on matters directly related to the Department's mandate. The Environment Canada mandate is determined by the statutes assigned to it by Parliament through the Minister, including the *Department of Environment Act,* R.S.C. 1985, c. E-10, the *Canadian Environmental Protection Act, 1999,* S.C. 1999, c. 33, the *Species at Risk Act,* S.C. 2002, c. 29, the *Migratory Birds Convention Act, 1994,* S.C. 1994, c. 22, and the *Fisheries Act*, R.S.C. 1985, c. F-14, (sections 34-42.1).

In the Environment Canada review of the EIS, further clarification or elaboration on certain issues was requested. The Department also identified several publications and other information sources that could be helpful to the Proponent in responding to the Guidelines. In its responses, the Proponent has acknowledged the information supplied by Environment Canada and provided some clarification or elaboration on how it intends to plan and manage the Project.

In this submission, Environment Canada comments are focussed on outstanding matters related to climate, wildlife and environment quality issues. For each of these issues, an Environment Canada perspective on the adequacy of the information provided by the Proponent is offered, and next step actions that could be taken to manage potential adverse environmental effects are recommended.

Effects of the Environment on the Project

Mandate

Environment Canada has expertise on climatological conditions that is relevant to the panel review. In a coastal marine environment, important factors to be considered in assessing effects of the environment on a project include wind, precipitation, fog, wave action, and storm surge. The extremes and variability of these factors, and the influence of climate change, merit particular attention in minimizing the risk of accidents and malfunctions which can have consequences for valued ecosystem components such as wildlife and environmental quality.

Weather Constraints on Blasting

Based on the Guidelines, it is the responsibility of the Proponent to ensure the implications of climate conditions for the Project are considered (subsections 9.1.4, 10.1.4). Environment Canada

understands that "…no blasting will be permitted if there is a thermal atmospheric inversion or a low cloud cover or fog conditions" (EIS, subsection 9.1.9.1). However, based on an analysis by Environment Canada[1], the Proponent may be underestimating the number of days when weather conditions will not allow blasting (Responses, subsection 9.1.1, pp. 4-6). In July, it is likely that blasting will not be possible for approximately 26% of the time. For June and August, it is likely that blasting would not be possible for approximately 23% of the time.

The duration of Instrument Flight Rule ("IFR") episodes at Yarmouth for the same time period was also analyzed. In July, there were 176 episodes when IFR conditions persisted for more than 24 hours. The longest episode of IFR conditions occurred in June when such conditions persisted for 157 hours. Sea fog will usually burn or lift during the morning period. At times, lifted fog (low cloud) can be quite persistent. Low cloud may be an indication that an inversion is still present, especially during the summer period. Inversions can persist when visibility has increased to more than one kilometer, especially when low cloud is present. Importantly, strong, low level inversions can exist with little or no cloud and good visibility.

The Proponent cites information from David Phillips' book *The Climates of Canada* published in 1990 (Responses, subsection 9.1.1, p. 2). More recent information on fog is available in the 1961-1990 normals found online at:

www.climate.weatheroffice.ec.gc.ca/climate_normals/index_1961_1990_e.html.

Environmental Design and Operation Considerations for Sediment Retention Ponds

Based on the Guidelines, it is the responsibility of the Proponent to provide sufficient Project details that would allow an understanding of potential environmental effects (subsection 7.3) and to ensure the implications of climate conditions for the Project are considered (subsections 9.1.4, 10.1.4). It is recognized that detailed design often extends beyond the environmental assessment phase; however, this design work should reflect a careful consideration of environmental factors if the risks of accidents and malfunctions to valued ecosystem components are to be minimized.

Sediment retention ponds are recognized in the EIS as an important means of protecting water quality. However, their reliability in fulfilling this function effectively is dependent on proper design and operation. The following specific design and operation considerations related to climate conditions are highlighted based on the information presented by the Proponent:

- The 24-hour 100-year return period is reported by the Proponent as 124.6 mm in the "Surface Water Information Survey" (Responses, subsection 12.0), as derived from the Environment Canada Intensity-Duration-Frequency ("IDF") tables and curves. However, the IDF tables are based only on 25 years of data (1971-1996). In using the much longer daily rainfall dataset (1870-2006), Environment Canada has calculated a return period value of 149.7 mm. Accordingly, a 24-hour 100-year return period value of 149.7 mm should be used as applicable. The 5-day 100-year return period amount of 191 mm identified by the Proponent is appropriate, as it has been calculated using the longer daily rainfall dataset.

- In the EIS, the Proponent indicated that sediment retention ponds would be designed to accommodate probable maximum precipitation ("PMP") events. However, a PMP analysis is not

[1] The Environment Canada analysis is based on hourly cloud ceiling and visibility data for Yarmouth for the period 1953-2007 and assumes "Instrument Flight Rule conditions" (i.e., visibility < 1/2 mile and/or ceiling < 1000 feet) are used as the decision threshold for allowing blasting to proceed.

reflected in the information submitted to date. The extreme rainfall threshold to which the ponds are to be designed should be confirmed.

- The Proponent has indicated that drawdown of sediment retention pond water would begin at least 72 hours prior to a forecast major storm (Responses to Panel Information Requests - February 27, 2007 #1b). For its part, Environment Canada does not provide a 72-hour warning window. Warnings are only issued 12 to 24 hours ahead of a predicted event and a worded forecast for rainfall amounts is issued no more than 48 hours in advance.

- The Proponent has committed to a weekly inspection of the sediment retention ponds (Responses, subsection 3.5, Table 2, p. 12). However, occurrence of storm events is another important consideration in preparing an inspection plan.

> **Recommendation 1**: **The Proponent is encouraged to consider appropriate climatological factors and best available data in finalizing sediment retention pond design, and to take steps that would help ensure built structures remain effective during and after storm events. In this regard, the Proponent is further encouraged to ensure that the inspection plan for sediment retention ponds takes storm events into consideration.**

Sea-Level Rise and Implications for Project Planning and Design

Based on the Guidelines, it is the responsibility of the Proponent to characterize climate conditions including climate variability and trends for consideration in assessing potential effects on the Project (subsection 9.1.4). The Proponent has indicated that "…predictions for sea level rise by 2100 have now been reduced by one half" (Responses, subsection 9.1.1, p. 8). This statement is inaccurate and could mislead Project planning and design efforts. The recently released *Intergovernmental Panel on Climate Change ("IPCC") Working Group I Full Report* includes a consideration of six emission scenario 'markers' and an update of the global range for sea level rise by 2100. These updated projections reflect current scientific knowledge and an understanding that thermal expansion and land ice melt are likely the dominant factors leading to sea level rise.

Based on the most recent work of the IPCC, Environment Canada has adopted 40 cm as the average sea level rise to be expected by 2100 and to be considered in the planning and design of projects in Atlantic Canada. While Environment Canada had previously assumed a 50 cm average, this change of 10 cm does not imply a significant lessening of risk to coastal infrastructure. Given the 50 year lifetime of the Project, it would be reasonable to assume a sea level rise of 20 cm on average – half of the projected value for the year 2100. Thermal expansion rates are expected to increase as the century progresses.

As noted in the Environment Canada review of the EIS, projected sea level rise should be coupled with a best estimate of crustal subsidence over the next century. The current best estimate is approximately 20 cm by 2100, or about 10 cm by 2050. As a result, by 2050, climate change induced sea level rise and crustal subsidence could combine for a total relative sea level rise of approximately 30 cm.

> **Recommendation 2: The Proponent is encouraged to incorporate a total relative sea level rise of approximately 30 cm by 2050 into Project planning and design.**

Meteorological and Oceanographic Conditions and Implications for Project Design and Operation

Based on the Guidelines, it is the responsibility of the Proponent to describe ocean currents, waves, winds and tides at the Project site (subsection 9.1.2.2) and how extreme climatic conditions could affect marine terminal structural integrity and loading operations (subsection 10.1.2). The Proponent has described a reasonable procedure for developing a detailed analysis of the marine environment (Revised Project Description, pp. 150-153). Overall, however, the Proponent appears to suggest that oceanographic conditions at the Project site do not pose any particular engineering challenges for the design and operation of the proposed docking facility (Responses to Panel Information Requests - February 27, 2007, #2). Information available to Environment Canada suggests these conditions could pose considerable difficulty. The Department has conducted a preliminary analysis of the frequency distribution of wave heights in the Bay of Fundy and wind speeds at coastal stations, which may be helpful to a fuller understanding of this issue.

Preliminary Environment Canada Analysis

Wind and wave frequency data from an AES40 hindcast grid point in the middle of the Bay of Fundy were provided by the Proponent (Responses, subsection 7.0, pp. 28-29). These show that significant wave heights[2] in the area reach and exceed 2 m approximately 17% of the time annually. It is understood that a typical operating limit for ships berthing and loading at the marine terminal may be approximately 1.5 m significant wave height (considering wave height alone). Environment Canada analysis of wave data from the same grid point for the combined months of December, January, and February – when waves are generally highest - showed significant wave height over 1.5 m, 2 m, and 2.5 m for 55%, 35%, and 21% of the time, respectively. Peak significant wave height was 9.6 m.

Over the combined winter months of December, January, and February, the hindcast wave period exceeded 8 seconds 30% of the time, and exceeded 10 seconds 12% of the time. It is understood that these longer wave periods would amplify the wave response movement of panamax-sized ships.

The grid point used for the analysis of waves is further from the coast line than the coastal infrastructure associated with the Project. As recognized by the Proponent, a reduction factor for waves moving from the deep water to the 18 m depth of the mooring dolphins should be estimated (Responses, subsection 7.0, p. 28). Importantly, however, the reduction would be less than at locations with a longer approach over shallower water or shoals, resulting in waves that could retain much of their original energy at the location of the mooring dolphins.

The Brier Island wind data for the winter months (i.e., December, January, February) of 1994-2007, reveal that winds exceeding 20, 25, 30, and 35 knots occurred 33%, 17%, 8%, and 3% of the time, respectively. Winds during winter months are predominantly from the W, NW, and N directions from which there would be no sheltering of the marine terminal offered by land.

The Proponent has indicated that a decision on whether a ship can safely approach the terminal, load, and return to the shipping lanes is strictly one for the ship master (Responses, subsection 7.0, p. 27). However, based on Environment Canada's preliminary analysis of wind and waves alone, the Project planning stage should allow for an investigation of site conditions as they pertain to environmental operating limits (e.g., winds, waves, currents, tides, storm surges) for the proposed

[2] "Significant wave height" is the average of the highest one-third of observed wave heights.

marine terminal. An analysis of available information would reveal the potential frequency with which operating thresholds could be exceeded at the Project location, and highlight implications for Project design and operation as well as efforts to reduce the risk of environmental emergencies.

The following specific design and operation considerations related to climate conditions are highlighted based on the information presented by the Proponent:

- The Proponent has described how it plans to use the AES40 wave hindcast database for North Atlantic wave conditions (Revised Project Description, p. 150). For simulation of wave growth in the Bay of Fundy alone, the intent is to use a 2D spectral wave model, WAVAD, driven by hourly wind data from a single station. However, better results may be obtained through the use of the MSC50 wind and wave hindcast database described by Swail *et al.* (2006)[3]. The MSC50 hindcast improves upon the strengths of the AES40 dataset in several ways including higher temporal and spatial resolution, a larger model domain, inclusion of shallow water wave physics, and inclusion of additional wind information in the development of the wind fields. Transformation of deep water wave values using STWAVE, as described by the Proponent, is appropriate.

- MSC50 wind and wave hindcast data are available for a grid point closer to the proposed Project site than the point in the middle of the Bay of Fundy used by the Proponent. These data are freely available from the Marine Environmental Data Service (MEDS) of Fisheries and Oceans Canada. Extremal analysis results are available at: [http://www.oceanweather.net/MSC50WaveAtlas/].

- The United States National Data Buoy Service provides online archived hourly wind and wave observations from moored buoys near the entrance to the Bay of Fundy beginning in 2003-2004 [http://www.ndbc.noaa.gov/maps/northeast_hist.shtml] and MEDS provides data from the Gannet Rock buoy, ID 44131, July 1996-Feb 1997 only).

- The Proponent has indicated that the frequency and track of extratropical storms will be considered in the environmental design criteria (Responses to Panel Information Requests - February 27, 2007, #2, p. 7). Tropical cyclones, and tropical cyclones transitioning to extratropical cyclones, should be included in such a consideration.

- The Proponent referred briefly to the Groundhog Day Storm of February 2, 1976 by mentioning the peak winds at Yarmouth (EIS, subsection 9.1.7.2, p. 60). This storm caused extensive damage to coastal infrastructure along southern New Brunswick and southwestern Nova Scotia, as a result of hurricane force winds and very high waves riding on a storm surge of more than 1 m near high tide.

- Hourly observations from Brier Island began in 1994, not in 2005 as indicated by the Proponent (Responses, subsection 9.1.1, p. 3). These data would be valuable to development of the wind climatology for the Project location.

[3] Swail, V.R., Cardone, V.J., Fertguson, M., Gummerz, D.J., Harris, E.L., Orelup, E.A., Cox, A.T. 2006. The MSC50 Wind and Wave Reanalysis. *Proceedings of the 9th International Workshop on Wave Hindcasting and Forecasting*, September 25-29, 2006, Victoria, BC [Available online at www.waveworkshop.org/9thWaves].

- Information on sea level and storm surge is available from the Centre for Marine Environmental Prediction website at Dalhousie University, which includes output from an operational storm surge model. This information is available online at http://eero.ocean.dal.ca:8080/cmep_ca and shows sea levels from tide gauge data, forecast storm surge, and actual storm surge (sea level minus tidal component) at individual locations.

Recommendation 3: The Proponent is encouraged to conduct further analysis of environmental conditions expected at the Project site that includes a consideration of appropriate climatological factors and best available data, and to identify any important implications for design and operation of coastal infrastructure.

Wildlife and Wildlife Habitats

Mandate

The conservation of migratory birds is the joint responsibility of the countries these birds visit during the breeding, migration, and non-breeding seasons. Environment Canada is responsible for delivering on Canada's obligations for the conservation of migratory birds through administration of the *Migratory Birds Convention Act, 1994* ("MBCA") and the associated regulations. Migratory birds protected by the MBCA generally include all seabirds except cormorants and pelicans, all waterfowl, all shorebirds, and most landbirds (birds with principally terrestrial life cycles). Most of these birds are specifically named in the Environment Canada publication, *Birds Protected in Canada under the Migratory Birds Convention Act*, Canadian Wildlife Service Occasional Paper No. 1. The MBCA applies directly to the protection of migratory birds, and their nests and eggs while habitats are generally managed under the authority of provincial or territorial governments.

Environment Canada, Fisheries and Oceans Canada and Parks Canada Agency share responsibility for the protection and recovery of species listed under the *Species at Risk Act* ("SARA"). Parks Canada Agency is responsible for species, including aquatic species, occurring in or on federal lands as defined in subsection 2(1) of the *Parks Canada Agency Act* (e.g., national parks and national historic sites); Fisheries and Oceans Canada is responsible for aquatic species; Environment Canada is responsible for all other species, including migratory birds, listed under SARA. The general prohibitions of SARA (sections 32 and 33) apply on all federal lands, and apply to aquatic species and a species of bird protected under the MBCA wherever they occur.

The *Federal Policy on Wetland Conservation* recognizes the importance of wetland conservation and promotes a goal of no-net-loss of wetland functions. In support of this goal, the Policy and related implementation guidance identify the importance of planning, siting and designing a project in a manner that avoids or minimizes effects on wetland habitats. Environment Canada plays a leadership role in advising federal government departments on implementation of the Policy.

Proposed Environmental Preservation Zone for Species of Conservation Concern

Based on the information submitted by the Proponent, Environment Canada has not identified any specific concerns related to the effects of the Project on SARA-listed species for which the Department has a responsibility. However, the consideration of potential adverse effects on all rare or imperiled species in Canada (e.g., species of conservation concern) is recognized by

Environment Canada to be a best practice approach to environmental assessment.[4] In this regard, Environment Canada supports the Nova Scotia Department of Natural Resources in its recommendation (Responses, subsection 9.2.1, p. 37) that the Proponent enhance its efforts to protect rare plants by expanding the proposed buffer zone and increasing the monitoring effort.

Forest Habitats for Migratory Birds

In the Environment Canada review of the EIS, information related to potential impacts on migratory bird forest habitat was requested. Overall, Environment Canada is satisfied with the Proponent's responses, which include an accounting of the likely loss of such habitat and a discussion of some management options.

Biophysical Survey Reports

Environment Canada understands that additional biophysical survey reports (e.g., for Lepidoptera surveys) were prepared in 2006 in support of the environmental assessment (Responses, subsection 9.2.1, p. 23). Further biophysical survey work will likely be conducted should the Project be allowed to proceed. Under those circumstances, it will be important that access to this information be provided to Environment Canada so that the Department can continue to assist as an expert federal authority and affirm legislative requirements as applicable.

> **Recommendation 4: The Proponent should submit the 2006 biophysical survey reports to Environment Canada. The Proponent should also commit to providing the Department with any additional reports regarding the pre- or post-construction survey and monitoring work that is conducted for birds, wetlands and terrestrial species in accordance with the environmental assessment outcome.**

Protecting Migratory Birds

General Prohibitions

The MBCA and regulations administered by Environment Canada include the following specific prohibitions:

- Under section 6 of the *Migratory Birds Regulations*, it is forbidden to disturb, destroy or take a nest or egg of a migratory bird; or to be in possession of a live migratory bird, or its carcass, skin, nest or egg, except under authority of a permit. [Under the *Migratory Birds Regulations*, no permits can be issued for the incidental take of migratory birds caused by an economic development activity such as the Project].
- Section 5.1 of the MBCA sets out the following prohibitions related to deposit of substances harmful to migratory birds:

  (1) No person or vessel shall deposit a substance that is harmful to migratory birds, or permit such a substance to be deposited, in waters or an area frequented by migratory birds or in a place from which the substance may enter such waters or such an area.

  (2) No person or vessel shall deposit a substance or permit a substance to be deposited in any place if the substance, in combination with one or more substances, results in

[4] Canadian Wildlife Service. 2004. Environmental Assessment Best Practice Guide for Wildlife at Risk in Canada, Gatineau, Quebec. pp. 63 (available on-line at www.cws-scf.ec.gc.ca/publications/eval/index_e.cfm)

> a substance — in waters or an area frequented by migratory birds or in a place from which it may enter such waters or such an area — that is harmful to migratory birds.

The Proponent has described several Project activities that could have adverse effects on migratory birds, and their nests and eggs, and which must be managed in a manner that allows compliance with the MBCA and regulations.

Vegetation Clearing

The Proponent proposes to conduct nest surveys if vegetation clearing is required during the nesting season (Responses, subsection 11.0, Table 2, p. 78). However, the usefulness of such an approach is questionable. Adult birds generally avoid approaching their nests in a manner that would attract predators to their eggs or chicks, making it difficult to locate nests in vegetation. The amount of habitat to be searched would also limit the success of surveys intended to locate active nests.

In fulfilling its responsibility for compliance with the MBCA, the Proponent should take the following points into consideration:

- The breeding season for most birds within the Project area occurs between May 1st and August 31st; however, some species protected under the MBCA nest outside this timeframe.
- While most bird species construct nests in trees and shrubs, several species of birds nest at ground level (e.g., Common Nighthawk, Killdeer), and some species may nest in burrows in stockpiles of soil or the banks of pits (e.g., Bank Swallows).

One method frequently used to minimize the risk of destroying bird nests consists of avoiding certain activities, such as vegetation clearing, during the nesting period for migratory birds in the region. Beyond this provision, risk of impacting active nests or birds caring for pre-fledged chicks can be minimized by measures such as the establishment of vegetated buffer zones around nests, and minimization of activities in the immediate area until nesting is complete and chicks have naturally migrated from the area. It is incumbent on the Proponent to identify the best approach to complying with the MBCA based on the circumstances.

Blasting

Large numbers of waterfowl, and significant numbers of waterbirds, such as Common Loons, Red-necked Grebes, and Black Guillemots, were observed in coastal waters during winter field work. In the absence of guidelines for blasting activities on land and protection of waterbirds, the Proponent proposes the use of a guideline for pinnipeds (e.g., seals) (Responses, subsection 9.2.1, Table 2). Based on this approach, if waterbirds are sighted within 170 m of the blast site, the blast coordinator would be notified and detonation would not take place until birds had moved out of the 170 m radius.

It is not clear whether the Proponent intends to apply the 170 m guideline when waterbirds are present or if the Proponent also intends to protect waterfowl and shorebirds in this same manner. It is also not clear whether the Proponent intends to implement the guideline on a year-round basis.

> **Recommendation 5: The Proponent should implement, on a year-round basis, an appropriate blasting guideline for the protection of all groups of migratory birds using the coast and, in consultation with Environment Canada, design a monitoring program that allows for detection of potential adverse effects and implementation of timely**

adaptive management actions. Adaptive management actions could include revisions to the guidelines.

Lighting

Bird collisions at lit and floodlit structures are a known problem. For example, several municipalities have implemented voluntary programs which encourage people to turn off lights in tall buildings so as to reduce bird injuries and mortalities.

In Atlantic Canada, nocturnal migrants and night-flying seabirds are the birds most at risk of attraction to lights. Attraction to lights may result in collision with lit structures or their support structures, or with other birds. Disoriented birds are prone to circling a light source and may deplete their energy reserves and either die of exhaustion or drop to the ground where they are at risk of depredation. Stranding on vessels is also of concern.

Environment Canada agrees with the Proponent's proposal to use sensor-activated lighting for security purposes. However, reliance on the quarry operation schedule (e.g., from 6 am to 10 pm) as mitigation for potential effects of lights on birds will not likely be adequate. For most of the year, night lighting would be required for early morning hours and in the evening. In addition, the Proponent has indicated the possibility of vessel loading at night (Responses, subsection 9.2.1, p. 31).

In implementing steps to reduce potential adverse interactions with migratory birds, and to comply with the MBCA and regulations made under the Act, the Proponent should take the following best management practices into consideration as applicable (with further details in Appendix 1):

- Only the minimum amount of pilot warning and obstruction avoidance lighting should be used.
- Only strobe lights should be used on tall structures at night, at the minimum intensity and minimum number of flashes per minute (longest duration between flashes) allowable by Transport Canada.
- Only the minimum number of lights should be used as possible and the use of solid-burning or slow-pulsing red warning lights at night should be avoided.
- The time of operation of exterior decorative lights, such as spotlights and floodlights, should be minimized or avoided in cases where such lights are only intended to highlight features of buildings, or to illuminate an entire building. Especially on humid, foggy or rainy nights, the glow of such lights can draw birds from considerable distances. In the interest of protecting birds, it would be best if these lights were turned off, at least during the migratory season, when the risk to birds is greatest.
- Task lighting, as well as lighting for the safety of the employees, should be shielded to shine down and only to where it is needed, without compromising safety. Road and parking lot lighting should also be shielded so that little light escapes skyward and rather falls where it is required.

The Proponent intends to test the effectiveness of mitigation measures by conducting monitoring for a period of one year in the vicinity of Project structures during bird migration periods and quarry operations. Specifically, monitoring would be conducted on a monthly basis early in the morning after a night of inclement weather. Any bird mortality would be recorded, and adaptive management procedures would be implemented as necessary (Responses, subsection 9.2.1, p. 32).

While Environment Canada agrees that a follow-up program is important to management of this issue, the monthly monitoring as proposed would be of limited value because many bird carcasses would likely be scavenged before they are detected. An intense monitoring effort (e.g., daily monitoring for a shorter period) concentrated during peak spring and fall migration, and including monitoring on mornings following inclement weather, would provide greater assurance that appropriate management measures are in place[5].

Recommendation 6: The Proponent should prepare a detailed plan for minimizing potential adverse interactions between birds and lighting that includes a detailed avian collision monitoring program designed in consultation with Environment Canada. The monitoring program should concentrate survey efforts on peak spring and fall migration periods, as well as mornings following inclement weather, so as to facilitate the timely detection of adverse effects and implementation of appropriate adaptive management actions. The Department should be provided with monitoring results in a timely manner, but should be immediately advised (within 24 hours) of any collisions involving a single species at risk or large numbers of birds (>10).

Accidents and Malfunctions

The risk and significance of uncontrolled releases of hazardous materials interacting with waters and areas frequented by migratory birds, have not been adequately considered in information provided by the Proponent. In the case of hydrocarbons, even a small spill could be significant if it reaches avian species at risk, sensitive habitats, or large numbers of birds.

Recommendation 7: The Proponent should develop a spill response plan that addresses spills that may result in oiling of birds and/or sensitive habitats. The plan should include specific measures for keeping birds away from a spill, for dealing with accidents where birds are oiled and/or sensitive habitats are contaminated, and for handling oiled birds (e.g., captured and cleaned, captured and euthanized).

Water Quality

Mandate

Pollution prevention and control provisions of the *Fisheries Act* are administered and enforced by Environment Canada. Section 36(3) of the *Fisheries Act* prohibits the deposit of deleterious substances into waters frequented by fish.

Environment Canada also administers the MBCA. Subsection 5.1(1) of the MBCA prohibits persons from depositing harmful substances in waters or areas frequented by migratory birds.

The Proponent has described several activities that could result in the release of contaminants to water. It is the responsibility of the Proponent to ensure that activities are managed so as to prevent the release of substances deleterious to fish or harmful to migratory birds.

[5] Additional information on monitoring involving bird carcass searches is provided in the guidance document *Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds* (available online at http://www.cws-scf.ec.gc.ca/publications/eval/prot/index_e.cfm). Although this guidance was developed specifically for monitoring at wind energy facilities, the information on carcass searching may be helpful in the preparation of a detailed monitoring plan for the Project.

Blasting Residues

Based on the Guidelines, it is the responsibility of the Proponent to describe Project activities, such as blasting, and to assess any potential adverse effects on water quality (e.g., subsections 7.8 and 10.1.2.3). In the Environment Canada review of the EIS, information was requested that would allow a better understanding of how residues from blasting activities could enter surface waters (e.g., nitrates, fuel oil) and adversely affect water quality upon which fish and migratory birds are dependent. The following specific information requests remain outstanding:

- Identify the amount of residue expected from blasting, the anticipated nitrate levels in surface water runoff, and the potential to affect the pH of water or trophic status in the sediment retention ponds.
- Identify potential blasting residues that could be present in any discharges and how they will be managed taking into account opportunities to reduce residues at source (i.e., pollution prevention).

Recommendation 8: In satisfying Guidelines direction on assessing effects on water quality, the Proponent should submit the requested information on blasting residues, potential interactions with the aquatic environment, and the proposed management measures so that potential adverse effects can be better understood and appropriate mitigation and follow-up monitoring measures identified.

Provisions for Verifying Compliance and Need for Adaptive Management Actions

Based on the Guidelines, it was the responsibility of the Proponent to provide information on monitoring (subsection 12.4). This information is required for each valued ecosystem component that could be adversely affected by the Project including water quality. In its review of the EIS, Environment Canada encouraged the Proponent to design a monitoring program with thresholds that would allow verification of compliance with subsection 36(3) of the *Fisheries Act* and subsection 5.1(1) of the MBCA and the timely implementation of adaptive management measures as necessary.

While the Proponent has offered some new information on provisions for managing stormwater, wastewater and marine-related drilling activities, it is incomplete. For example, the following uncertainties are noted in relation to provisions for management of wastewater and marine-related drilling:

- In terms of wastewater management, the Proponent has indicated that detection of copper concentrations of 4.8 ug/L or greater in effluent will trigger a review of the effectiveness of the wastewater management system and implementation of appropriate follow-up actions (Responses, subsection 3.5, Table 2, p. 12). The rationale for selecting this action threshold is unclear.

- In terms of marine-drilling activities, the Proponent has proposed a monthly turbidity monitoring program, and has indicated that marine-related drilling would be halted if turbidity should increase by 8 nephelometric turbidity units (NTU) (Responses, subsection 3.5, Table 2, pp. 9-10). It is unlikely that monitoring on a monthly basis would allow timely detection of water quality changes and implementation of appropriate adaptive management actions. The rationale for selecting an 8 NTU action threshold is unclear.

Recommendation 9: The Proponent should prepare a water quality monitoring program that includes a rationale for identified action thresholds and a sampling schedule that

allows for timely detection of water quality changes and implementation of appropriate adaptive management actions.

Air Quality

Mandate

The Proponent has described several activities that would emit contaminants to air. At this time, Environment Canada does not regulate emissions related to the Project. However, through the Canadian Council of Ministers of the Environment (CCME), the Department does cooperate with its provincial and territorial counterparts in investigating applicable best available technology and best management practices, and in setting national standards for certain substances. For example, the Continuous-Improvement and Keeping-Clean-Areas-Clean principles of the CCME *Canada-Wide Standards for Particulate Matter and Ozone* are pertinent to the proposed Project, which is located in an area that is relatively pristine in terms of air quality conditions.

Emission Estimates and Reduction Opportunities

In its responses, the Proponent has satisfactorily addressed many of the Environment Canada information requests related to the assessment of potential effects on air quality, and the Department is prepared to support the provincial government in its authority to assure implementation of the identified mitigation and monitoring measures. However, certain matters remain outstanding. Based on subsection 10.1.5 of the Guidelines, it is the responsibility of the Proponent to identify Project activities and components which would be sources of air emissions, and for each emission of concern, to provide estimates including quantity, timing and duration. Estimates of contaminant emissions from certain Project sources, such as heavy equipment and bulk carriers, have not yet been provided.

The Proponent has indicated that the expected emissions resulting from the Project will be lower than other similar quarry operations given that quarried material will be transported by bulk marine carriers rather than by trucks (Responses, subsection 9.1.6, p. 19). This observation provides some useful context, but is not a substitute for emissions estimates and a consideration of emissions reduction opportunities in manner consistent with Guidelines direction.

As it stands, it is not expected that engine emissions (e.g., from equipment operation and vessel traffic) related to the Project would contribute significantly to air quality issues, however, both Environment Canada and the international community recognize that the marine sector is an increasing contributor to air emissions. The provision for engine emission estimates for these sources is important to a full accounting of potential adverse effects, and is consistent with investigations of the contribution of marine emissions elsewhere in Atlantic Canada and in North America as a whole.

Recommendation 10: **In satisfying Guidelines direction on the assessment of effects on air quality, the Proponent is encouraged to provide engine emission estimates for all Project sources influencing air quality, including heavy equipment and vessel traffic.**

Summary

In this submission, Environment Canada has identified issues related to the departmental mandate and offered recommendations that merit further attention in the planning and management of the Project. In Environment Canada's opinion, the Proponent should be in a position to address the recommendations as part of a mitigation and follow-up monitoring strategy. The Proponent is advised, however, that it is ultimately responsible for compliance with legislation administered by Environment Canada.

Appendix 1

Bird-Friendly Buildings: Best Management Practices for Tall Structures

Bird-Friendly Buildings: Best Management Practices for Tall Structures

Across the world, including here in Canada, breeding birds of all kinds are threatened by the effects of human activities – environmental pollution, permanent habitat loss, climate change. We in Canada are fortunate to have areas that remain relatively wild and continue to provide great habitat for breeding birds. Most of our birds migrate south each fall, so we share them and responsibility for their survival with many other countries.

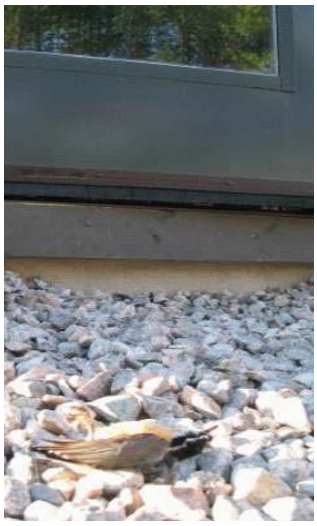
The owl that left this image from the oil of its feathers hit the window hard enough to set off the motion alarms inside the building. Photo © Becky Pocock, Saskatoon *StarPhoenix*.

During migration, either south in the fall or north in the spring, many thousands of birds accidentally fly into structures that people have placed on the landscape. This is a relatively new threat, and it is increasing rapidly as communication and energy networks, roads, and urban areas expand.

White-throated Sparrows are one of the most common victims of tall Toronto buildings. Photo © Dan Busby.

How Big is the Problem? In only the central few blocks of downtown Toronto, volunteers with the Fatal Light Awareness Program (FLAP) have salvaged 27,413 birds over 12 years. This is not the total number of birds killed, but simply those that have been found and recorded. Across Canada, in urban, rural, and remote areas, birds collide with radio, cell phone and television towers, office buildings, smoke stacks, lighthouses, greenhouses, oil refineries, wind turbines, residential homes and cottages, suspension bridges, power distribution lines, wire fences, and many more structures.

How serious is the problem? Already many bird species are experiencing long-term population declines, for a variety of reasons. Across North America, between 500 million and more than one billion birds die annually due to non-natural causes. About two-thirds of these deaths are due to collisions with the infrastructure of modern life; *that's at least a million per day*.



This Red-breasted Nuthatch saw reflected trees, not the window. Photo © Jacques Bouvier.

The number of these threats is increasingly rapidly. Towers with lights are erected further from urban centres than ever before. Mirrored glass has become a common form of building sheathing. The power network is spreading to feed growing demand. All these developments mean that any new designs, retrofits, and modifications to current structures that take into account the potential effects on birds will be of real benefit. Any change that reduces the potential for bird strikes is a positive change.

Which birds are killed? Songbirds tend to be the most common victims. Because they migrate at night and have evolved to navigate by the moon and stars, songbirds can be easily confused by lights on the ground or on a structure. During the day they may fly into windows while they're getting food for their young. Shorebirds, geese, and ducks are generally at lesser risk, because they migrate mostly by day, but they are at risk during daily flights in or near wetlands. Raptors are most at risk during the day. They can collide with structures placed on or near hunting grounds – ridges, open areas, and hills. They may also collide with buildings in cities, possibly because they are attracted there by the urban food sources.

In New York, the 2004 memorial of the September 11, 2001 terrorist attack vividly showed the attractiveness of light to birds. The specks are all birds trapped in the light columns. Photo © WowImages / Sharon Smith.

Why can't birds simply avoid these threats? Birds have evolved in the natural landscape over many thousands of years. They simply haven't had time to adapt to the rapid changes in the landscape over the past 50 years.

The lure of light ... Birds use the moon and stars to navigate and are confused by other bright lights. They fly towards them, and, like moths, are trapped in their glow. By daybreak, those that haven't collided with the lighted structure or fallen to the ground from exhaustion may recover and fly on.

... and glass. Birds don't recognize glass as a barrier – clear glass looks like sky, and reflections mimic their natural environment. Mirrored glass or metal is especially hazardous because it is highly reflective.

What can be done? The Canadian Wildlife Service has developed this booklet to alert property managers to the potential dangers that structures under their control may pose to migratory birds and to offer guidance to minimize those dangers. We hope that the Government of Canada will implement these recommendations and promote bird-friendly management choices to influence other sectors within Canada. Let us lead by example.

Five Bird-Friendly Best Management Practices

1 **Interior lights** – Birds fly towards the glow of internal lights left on overnight and collide with buildings. Those not killed may fall to the ground but not get away because of confusion caused by ground-level lights in the area. Or, while on the ground, they may be killed by scavengers such as squirrels, cats, or gulls.

An **immediate solution** is to turn off all interior lights at night, especially during the migratory seasons (March to May, and August to October, depending on where you are). Doing so will result in a dramatic reduction in bird kills. The city of Chicago has had extremely good responses from building managers to its "Lights Out" program, which encourages them to turn out all building lights (interior and exterior) during the migratory season. Just turning the lights off a few weeks each year at a building that was responsible for the deaths of an average of 1,500 birds per year (from all causes) has reduced that figure to 300. Interior shades can also reduce or eliminate light loss at night. If staff members need 24-hour access, motion-activated lights or task lights also reduce the risk to birds.

Chicago, lights on, lights off. Estimated number of birds saved annually: 10,000. Photo © Eric Fogleman.

Side benefit: by having its lights turned off at night, one Toronto office tower saved $200,000 in energy costs and reduced its CO_2 output by 2,400 tonnes!

For **new structures**, ensure that lights in rooms with exterior windows can be individually turned on and off by their occupants. In open-concept office buildings, install task lighting that can be turned off by individuals. Master switches for overhead

lights are also good: cleaning staff can light up a floor on arrival and extinguish the lights when they leave. Timers that turn lights off automatically after working hours are effective; limited safety lighting that is much less bright (and uses less power) can be left on after hours.

2 **Exterior lights** – Antenna towers, smoke stacks, radar towers, buildings (including offices), suspension bridges, oil refineries, etc., all usually have some form of exterior lighting. Many lights either shine directly up into the sky, or, like parking lot lights, street lights, or safety lights, are so bright and numerous that their glow extends into the sky. These can disrupt birds' migratory abilities and make it difficult for owls and other nocturnal animals to hunt.

Navigation lights are needed so that low flying aircraft do not collide with tall structures. Unfortunately, some types of navigation lights are very confusing for night-flying birds. A **solution** is to change the lights from incandescent to strobes – evidence indicates that strobes lights are less confusing to birds. Also, many lights are significantly brighter than regulation standards and many structures do not actually require lights. Consult the Canadian Aviation Regulations from Transport Canada to find out whether the tall structures under your control require navigation lights; if so, change incandescent lights to strobes of the lowest intensity, number, and flash frequency permissible.

Remove or restrict the time of operation of exterior **decorative lights** such as spotlights and floodlights whose function is to highlight features of buildings, or to illuminate an entire building. Especially on humid, foggy or rainy nights, their glow can draw birds from far away. It would be best for the birds if these lights were turned off, at least during the migratory season, when the risk to birds is greatest.

These lights are illuminating a landmark building, but it is four in the morning – the tourists aren't there to see it. They could be turned off. Photo © Martin Damus.

Oil refineries and many other **industrial complexes** have lights all along their structures. Part of the reason is to ensure the safety of aircraft (see solutions above), part is for the safety of the workers who must walk along the catwalks and exterior parts of the structure, and some lights can certainly be classified as decorative lighting. Lighting for the safety of the employees can be shielded to shine down and only to where it is needed, without compromising safety. In many instances, reducing glare from lights actually increases safety.

Suspension bridge, **monument**, and **smokestack** lighting is mostly decorative lighting and navigation lights. These can be eliminated or modified as described above. **Street and parking lot lighting** can be shielded so that little escapes into the sky and it falls where it is required. Properly directed lighting is safer, too, because less glare means better visibility for both drivers and pedestrians.

3 **Mirrored and plate glass windows** – Reflections of the sky or surrounding vegetation can be deadly to birds: when familiar objects are reflected in a window, birds do not recognize the window as a barrier. Clear glass is just as deadly because birds can't see it.

A **short-term solution** is to hang vertical strips of plastic or metal foil in front of the windows, spaced not more than five centimetres apart. Suspending discarded compact discs is also effective, but affixing the commonly-used hawk silhouettes to the glass is, unfortunately, not. These solutions are not very attractive, however, and they need to be maintained and replaced on a frequent basis due to wear. Really only practical on the lowest floors of a house or similar structure, they are best applied at high risk windows: picture windows, windows with nearby exterior trees, or windows that have been responsible for the deaths of birds before.

Opaque film in an attractive bird-repellent pattern. Photo © FLAP.

The best available **retrofit solution** is to apply a non-reflecting window film, such as those used for advertising on glass, to the entire window surface. While still leaving a view of the outdoors, the film eliminates reflections and immediately solves the collision problem. It also greatly reduces summer heat accumulation. Cut into patterns, non-reflecting window film can be an architectural accent (opaque films have been used this way – see picture opposite). Visit the Fatal Light Awareness Program website for details (www.flap.org).

When **constructing new buildings**, reduce or eliminate mirrored glass, not only for the birds: glassed buildings are proving to be very costly consumers of energy for cooling. Etched glass may be a workable compromise. Etched patterns are as effective as cut films in making glass visible to birds, they allow interesting patterns and designs, and they reduce overheating from the sun. Opaque or non-reflective films have the benefit of being available in many colours and may be patterned to order. Research is progressing into ultra-violet coatings that are completely transparent to humans eyes, but not to birds. We hope that these come to market soon.

4 **Guy wires** – A thin tower – by itself a minimal threat to birds – is many more times likely to intercept birds if it has guy wires. With bright lights that confuse birds, tall towers have been responsible for the deaths of several thousands in only one night.

Guy wires increase the volume of sky a tower intercepts. Photo © Martin Damus

Existing guyed towers near water bodies can be **retrofitted** with bird diverters (coloured balls, discs or flapping devices) on the wires to warn birds of their presence during the day. Those that carry navigation lights can be assessed as to whether the lights are required by Transport Canada. If they are, ensure that the lights are of reasonable intensity. Consider removing or reducing the intensity of light as allowable, and replace incandescent lights with strobes.

New towers that require lighting for navigational safety should be freestanding (unguyed) wherever possible. Every tower in an area important to birds should also be unguyed. Lights should closely follow Transport Canada minimum standards, and should not be incandescent.

5 **Power lines** – depending on voltage carried and line configuration, a power line can kill birds that fly into it during the day or night or electrocute birds that land on it. In western Canada, damaging ground fires have been caused by birds that have caught fire after being electrocuted.

Options for **solutions** are best discussed with an expert. Often simply reconfiguring the way in which the lines are attached to the poles so that sources of ground are kept far from sources of current is sufficient to prevent electrocution. Lines can also be buried, which solves the collision problem as well as the electrocution problem. Bird diverters can reduce bird deaths. See the booklets put out by BirdLife International *"Caution: Electrocution!"* and *"Protecting Birds on Powerlines"* that are listed in the references under "NABU".

This pylon has served as a successful nest support for this eagle for many years. Photo © Martin Damus.

Other documents are: Avian Power Line Interaction Committee's *Mitigating Bird Collisions with Power Lines: The State of the Art in 1994*, and its *Suggested Practices for Raptor Protection on Power Lines*. See the reference list for details on how to obtain these.

The beautiful Ovenbird is a common victim of glass windows. Photo © Biodôme de Montréal.

Why care, why spend the money?

Sometimes bird-friendly design is more expensive than conventional design and sometimes it leads to perceived inconveniences, but not always. We are entering an age where the public insists on an accounting of the total cost, and not just the monetary cost of management choices. Certification also may require that potential environmental effects be factored into management plans. Bird-friendly property management shows concern for the environment and can provide good public relations.

There are also socio-ethical arguments for conserving of birds, based on global stewardship, empathy for other life, and morality – all valid reasons – but perhaps the most concrete reason is that birds are an incredibly important part of the ecology of the Earth. Along with pollinating some plants, birds are ravenous insectivores. They reduce the intensity and frequency of insect outbreak intensity, and they help farmers and foresters control plant pests. Birds that eat fruit disperse the seeds, helping spread the plants. Other birds consume rodents, rabbits and carrion; many play a significant role in the succession of plant species in all terrestrial environments. Birds from all these groups have been killed at tall structures. We cannot predict what the future will be like when one, two, or more species are lost; let's act now so that we do all we can to ensure survival of the birds that are left.

Acknowledgments

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Sources used to write this brochure and suggestions for further reading

Papers and reports:

1. Brewster, W. 1886. Bird Migration: Part 1 - Observations of nocturnal bird flights at the lighthouse at Point Lepreaux [sic], Bay of Fundy, New Brunswick. *Memoirs Nuttall Ornithology Club* 1: 1-22.
2. Erickson, W.P, G.D. Johnson, and D.P. Young Jr. In Press. A Summary and Comparison of Bird Mortality from Anthropogenic Causes with an Emphasis on Collisions. In: *Bird Conservation Implementation and Integration in the Americas: Proceedings of the Third International Partners in Flight Conference 2002* (C.J. Ralph and T.D. Rich, eds.). U.S.D.A. Forest Service, General Technical report PSW-GTR-191, Albany, CA.
3. Klem, D. Jr. 1990. Collisions between birds and windows: mortality and prevention. *The Journal of Field Ornithology* 61(1): 120-128. www.birdscreen.com/Klem_AFO_Collisions1990.pdf.
4. Manville, A.M. In Press. Bird strikes and electrocutions at power lines, communication towers, and wind turbines: state of the art and state of the science b next steps toward mitigation. In: *Bird Conservation Implementation and Integration in the Americas: Proceedings of the Third International Partners in Flight Conference 2002* (C.J. Ralph and T.D. Rich, eds.). U.S.D.A. Forest Service, General Technical report PSW-GTR-191, Albany, CA.
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6. Deutschlander, M.E., J.B. Phillips, and S.C. Borland. 1999. The case for light-dependent magnetic orientation in animals. *The Journal of Experimental Biology*, 202: 891-908.
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Another view of the windows with the applied cut film. Photo © FLAP.

Electronic publications or information resources (compiled 2005):

1. FLAP: Fatal Light Awareness Program, a good source of data, resources, and volunteer opportunities: www.flap.org
2. FLAP's report titled *Effect of Light Reduction on Collision of Migratory Birds* can be found at: www.flap.org/new/ELRCMB_BFB.pdf
3. FLAP's Bird-Friendly Building Program: www.flap.org/new/bfb_steps.htm
4. Chicago's "Lights Out" program: www.lightsout.audubon.org
5. Aviation safety lighting: CAR 621.19 "Standards Obstruction Markings", to obtain it consult your regional office of Transport Canada, Civil Aviation, or see: www.tc.gc.ca/CivilAviation/Regserv/ Affairs/cars/PART6/Standards/ Standard621.htm
6. NABU. No date. *Caution: Electrocution! Suggested practices for bird protection on power lines*. NABU Bundesverband, Bonn.www.nabu.de/vogelschutz/ caution_electrocution.pdf
7. NABU. No date. *Protecting birds on powerlines: a practical guide on the risks to birds from electricity transmission facilities and how to minimise any such adverse effects.* Available from: http://www.birdsandpowerlines.org/Protecting_birds_on_powerlines.pdf
8. Avian Power Line Interaction Committee (APLIC). 1994. *Mitigating Bird Collisions with Power Lines: The State of the Art in 1994*. Edison Electric Institute, Washington, D.C., 78 pp Copies can be obtained via the Internet at: www.eei.org/ resources/pubcat/enviro/, or by calling 1-800 334-5453.
9. Avian Power Line Interaction Committee (APLIC). 1996. *Suggested Practices for Raptor Protection on Power Lines*. Edison Electric Institute/Raptor Research Foundation, Washington, D.C., 128 pp. For copies: www.eei.org/resources/ pubcat/enviro/, or phone 1-800/334-5453.
10. Interim guidelines to avoid and minimize wildlife impacts from wind turbines: www.fws.gov/r9dhcbfa/wind.pdf (United States Fish and Wildlife Service).
11. Service interim guidelines for recommendations on communication tower siting, construction, operation, and decommissioning: migratorybirds.fws.gov/issues/towers/comtow.html (United States Fish and Wildlife Service).
12. USFWS tower kill information: migratorybirds.fws.gov/issues/towers/towers.htm
13. Bird Conservation Network – more information on bird-window collisions and solutions: www.bcnbirds.org/window_files/WindowCollisionFactSheet.pdf

A Hermit Thrush killed by collision with a house window. Photo © Jacques Bouvier.

14. Ideas on how to reduce bird strikes: www.birdmonitors.net/Dr.Klem1.html
15. Lincoln, Frederick C., Steven R. Peterson, and John L. Zimmerman. 1998. Migration of birds. U.S. Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. Circular 16. Jamestown, ND. See the Northern Prairie Wildlife Research Center Home Page for an electronic version: www.npwrc.usgs.gov/ resource/othrdata/migratio/migratio.htm (Version 02APR2002).
16. Effects of excess light on humans and nature: www.muskokaheritage.org/ecology-night/speakers.asp

NOTE: *Under the Migratory Birds Convention Act, it is illegal to disturb or damage the nest of a migratory bird without a permit. Check for nests before engaging in new construction, reconstruction or building cleaning. If they are present, or you think they may be present, contact your regional Canadian Wildlife Service office.*