

Attachment C

Environmental Effects Monitoring Plan for Wildlife and Wildlife Habitat

Ministry of Natural Resources
Confirmation Letter
Dated: July 31, 2012

**Ministry of
Natural Resources**

Renewable Energy Operations Team
P.O. Box 7000
300 Water Street
4th Floor, South Tower
Peterborough, Ontario K9J 8M5

**Ministère des
Richesses naturelles**



July 31, 2012
Suncor Energy Products Inc.
150 6th Avenue SW
Calgary AB
T2P 3E3

RE: Natural Heritage Section of the EEMP for Suncor Energy Adelaide Wind Power Project

Dear Christopher Scott:

MNR has reviewed the Natural Heritage section of the Environmental Effects Monitoring Plan (EEMP) for the Suncor Energy Adelaide Wind Power Project located within the Municipality of Adelaide Metcalfe, County of Middlesex, Ontario submitted July 27, 2012.

This letter confirms that the EEMP was prepared in respect of birds and bats in accordance with the Ministry of Natural Resources:

- *Birds and Bird Habitats: Guidelines for Wind Power Projects (2011)*
- *Bats and Bat Habitats: Guidelines for Wind Power Projects (2011)*

Post-construction monitoring for the Suncor Energy Adelaide Wind Power Project will also include the following if the results of the pre-construction monitoring surveys deem the natural features significant:

- waterfowl nesting area (Features 6 and 20)
- amphibian breeding habitat woodland (Features 6 and 20)
- amphibian breeding habitat wetland (Feature 16)
- marsh bird breeding habitat (Features 6, 16 and 20)
- shrub/early successional bird breeding habitat (Feature 13)

MNR expects the information contained in the natural heritage section of the EEMP to be considered in MOE'S Renewable Energy Approval decision, and if approved, be implemented by the applicant.

If you have any questions please contact me at amy.cameron@ontario.ca or 705-875-7481.

Sincerely,

A handwritten signature in blue ink that reads "Amy Cameron".

Amy Cameron
Coordinator
Renewable Energy Operations Team
Southern Region, MNR

cc. Heather Riddell, Renewable Energy Planning Ecologist

cc. Mitch Wilson, Aylmer District Manager, MNR
cc. Narren Santos, Environmental Assessment and Approvals Branch, MOE
cc. Zeljko Romic, Environmental Assessment and Approvals Branch, MOE
cc. Mark Kozak, Environmental Scientist, Stantec

Environmental Effects for
Wildlife Monitoring Plan
July 2012



SUNCOR ENERGY
ADELAIDE WIND ENERGY PROJECT
ENVIRONMENTAL EFFECTS MONITORING PLAN
FOR WILDLIFE

File No.: 160960710
July 2012

Prepared for:

Suncor Energy Products Inc.
150 6th Avenue SW
Calgary AB T2P 3E3

Prepared by:

Stantec Consulting Ltd.
Suite 1 - 70 Southgate Drive
Guelph ON N1G 4P5

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1.0 Introduction

1.1 PROJECT OVERVIEW

Suncor Energy Products Inc. (“Suncor”) is proposing to develop the Suncor Energy Adelaide Wind Power Project (the Project) within the Municipality of Adelaide Metcalfe, County of Middlesex, Ontario. The proposed Project Location for this report includes all parts of the land in, on or over which the Project is proposed.

It is envisioned that the proposed Project may include up to 28 wind turbines with an estimated total nameplate capacity of up to 40 MW. The number of turbines will be dependent upon final selection of make and model of the wind turbine most appropriate for the proposed Project. The proposed Project would also include access roads, meteorological tower, electrical collector lines, and a substation which would connect the Project with the provincial high voltage transmission system via an existing transmission line that runs through the Project Boundary. Temporary components during construction may include storage and staging areas at the turbine locations, crane pads or mats, staging areas along access roads, delivery truck turnaround areas, and a central laydown area.

1.2 REPORT REQUIREMENTS

This Environmental Effects Monitoring Plan (EEMP), which includes the Post-Construction Monitoring Plan is one component of the REA application for the Project, and has been prepared in accordance with O. Reg. 359/09, the Ontario Ministry of Natural Resources’ (MNR’s) *Approval and Permitting Requirements Document for Renewable Energy Projects* (September 2009), the MOE’s *Technical Guide to Renewable Energy Approvals*, MNR’s *Bats and Bat Habitats: Guidelines for Wind Power Projects* (July 2011) and MNR’s *Birds and Bird Habitats: Guidelines for Wind Power Projects* (December 2011).

As discussed in the Project’s **Natural Heritage Assessment and Environmental Impact Study (NHA/EIS)**, primary data were collected through bird and wildlife baseline studies in the Project Boundary. These data were augmented with secondary data from published and unpublished sources to generate a dataset from which to assess the potential effects of the Project.

The potential environmental effects to wildlife and wildlife habitat and associated mitigation measures, based upon this dataset, ornithological advice, and professional opinion, among other factors, are provided in **Section 5** of the NHA/EIS and summarized in **Table 1.1, Appendix A** of this EEMP. Additionally, wildlife and wildlife habitat post-construction monitoring commitments are summarized in **Section 5.3** of the NHA/EIS. These commitments provide the first step of confirming the predictions of the EIS and provide the basis from which actions contained in the EEMP may stem.

The purpose of this EEMP is to outline post-construction monitoring survey requirements for a three year period to address potential negative environmental effects for birds and bats, to assess the effectiveness of the proposed mitigation measures and to verify compliance of the Project with applicable provincial and federal legislation and guidelines. This monitoring plan provides details on the post-construction wildlife monitoring program for mortality monitoring of birds and bats and habitat disturbance monitoring for woodland area-sensitive breeding birds. It also identifies potential habitat disturbance monitoring activities for waterfowl nesting areas, marsh bird breeding habitat, shrub/early successional bird breeding habitat and amphibian woodland and wetland breeding habitat should habitat use studies to be conducted by Suncor result in features identified within 120 m of turbines in the **NHA/EIS** being considered significant wildlife habitat. Post-construction mortality monitoring should begin on May 1st of the year that the wind power project is fully operational. If full project commissioning is delayed, post-construction monitoring of a partially completed project should not be delayed for longer than 1 year. If the project is constructed in phases mortality monitoring for each phase should coincide with the commencement of operation of that phase.

2.0 Post-Construction Monitoring Program

2.1 PURPOSE AND TIMING

The purpose of the wildlife post-construction monitoring program is to identify performance objectives, assess the effectiveness of the proposed mitigation measures and to identify contingency measures that will be implemented if performance objectives cannot be met. Furthermore, any unanticipated potentially significant adverse environmental effects discovered during the post-construction monitoring program will be mitigated as described in **Section 3.0**. Post-construction monitoring for wildlife and wildlife habitat recommended in the **NHA/EIS** includes the following:

- *Bird and Bat Mortality monitoring*: twice weekly (3-4 day intervals) mortality monitoring at a minimum of 10 turbines (or 30% of turbines) beginning May 1 to October 31. Weekly monitoring for raptors at the 10 turbines will continue until November 30. Monitoring of all 28 turbines for raptor fatalities will take place once monthly from May through November. Monitoring will be conducted for a period of three years. Searcher efficiency and carcass removal trials will be conducted each year according to current guidance documents.

2.2 PRIMARY DATA COLLECTION

To the extent possible, the same field personnel who carried out the pre-construction baseline studies will carry out the post-construction monitoring work to assist in standardizing the datasets. Wherever possible, a complete 50 m radius from each turbine base will be searched and data collection will be conducted by field personnel skilled at identifying birds and bats by sight. All carcasses found will be photographed and recorded/labelled with the following information; species, sex, date, time, location (UTM coordinates), carcass condition, searcher, injuries, ground cover, and distance and direction to nearest turbine.

Field data collection sheets will also include weather conditions such as wind speed and precipitation, ground cover visibility class, the estimated number of days since death, and condition of each carcass collected.

Although all reasonable effort will be made to conduct surveys as scheduled, surveys will not be conducted if weather (e.g. lightning, severe fog) presents safety concerns. Weather conditions will be noted when surveys were not conducted as scheduled, and every attempt will be made to complete the missed survey(s) as soon as possible.

The detailed monitoring methods, including duration, frequency and survey locations are discussed in the following sections.

The 10 turbines will be selected to provide representative coverage of the habitats and layout of the Project Boundary and will exclude any turbines where vegetation cover precludes searches (i.e. Visibility Classes 3 and 4 [MNR, 2011a]). MNR will be consulted to select the 10 turbines for post-construction monitoring. Where possible, the ground cover around turbines should be maintained at a low level in order to facilitate more accurate bird and bat mortality surveys. The search area of each turbine will be mapped into visibility classes according to the following table:

Table 1: Ground Cover Visibility Classes (Ministry of Natural Resources, 2011)

% Vegetation Cover	Vegetation Height	Visibility Class
≥90% bare ground	≤15%cm tall	Class 1 (Easy)
≥25% bare ground	≤15cm tall	Class 2 (Moderate)
≤25% bare ground	≤25% >30cm tall	Class 3 (Difficult)
Little or no bare ground	≥25% >30cm tall	Class 4 (Very Difficult)

Portion Area Searched

Most birds and bats will fall within 50 m of the turbine base (MNR 2011a) and therefore this distance represents the maximum recommended search area. This value will be used to determine the portion of area searched (P_s). When the entire 50 m radius search area is searched, P_s will equal 100%. If portions of the 50 m radius search area are impossible or futile to search due to site conditions, P_s will be adjusted accordingly based on the searchers' ongoing estimates of the proportion of the search area that was physically searched. If feasible, a GPS will be used to delineate the search area and calculate the P_s .

The area searched will be determined for each turbine by mapping searchable areas on a grid (by visibility class) and counting the number of searched grid cells within 50 m. A map of the actual search area for each turbine searched and a description of areas deemed to be unsearchable due to vegetation height, type, slope, active cultivation, etc., will be provided in the mortality report and maps of the varying search areas will be made available to review agencies. The aggregate area of those cells will be divided by the total area within a 50 m radius circle to determine the percent area searched for that turbine (P_{s_x} , where x is the turbine number).

$$P_{s_x} = \frac{\text{actual area searched}}{\pi r^2}$$

The overall P_s for the facility will be calculated as the average of P_{s_1} through $P_{s_{28}}$.

Observed fatalities will be photographed, and the species, GPS coordinates, substrate, carcass conditions, possible injuries, sex (if possible) and distance and direction to the nearest turbine will be recorded along with the date, time and searcher. This approach to mortality monitoring will facilitate any potential correlation between mortality occurrences, turbine location, habitat/land use features, weather conditions and season.

Carcass Removal Trials

Levels of carcass scavenging must be determined through carcass removal trials. In these trials, carcasses are planted around the wind turbines and monitored until they disappear or have completely decomposed (generally 2 weeks). Carcass removal trials will be conducted once a month (May-Oct) and will involve a minimum of 10 bird and bat carcasses as fresh as possible, with bat carcasses making up at least one third of the carcass removal trials and birds comprising another third, if available, or dark-coloured poultry chicks. If available, at least one raptor carcass will be used for some trials.

Marked test carcasses will be placed out singly at turbines and distributed across the Project Boundary before dusk using gloves and boots to avoid imparting human smell. These trials involve the distribution of carcasses in different substrate/habitat types and visibility classes being searched, at known locations at each wind turbine generator, followed by monitoring every 3-4 days in conjunction with carcass searches, checking to determine the rate of removal. The average carcass removal time is a factor in determining the estimated bird and bat mortality. Carcass removal trials are designed to correct for carcasses that are removed by predators before the search period. Proportions of carcasses remaining after each search interval are pooled to calculate the overall scavenger correction factor:

$$S_c = \frac{n_{\text{visit1}} + n_{\text{visit2}} + n_{\text{visit3}} + n_{\text{visit4}}}{n_{\text{visit0}} + n_{\text{visit1}} + n_{\text{visit2}} + n_{\text{visit3}}} \text{ where}$$

S_c is the proportion of carcasses not removed by scavengers over the search period

n_{visit0} is the total number of carcasses placed

n_{visit1} – n_{visit4} are the numbers of carcasses remaining on visits 1 through 4

Corrected Mortality Estimates

In addition to total bird and bat mortalities observed, estimated mortality rates will also consider the results of searcher efficiency, carcass removal trials and portion area searched. There are numerous published and unpublished approaches to incorporating these corrective factors into an overall assessment of total bird and bat mortality. The minimum estimated mortality will be calculated as follows:

$$C = c / (S_{e0} \times S_c \times P_s), \text{ where}$$

C is the corrected number of bird or bat fatalities

c is the number of carcasses found

S_{e0} is the weighted proportion of carcasses expected to be found by searchers (overall searcher efficiency)

S_c is the proportion of carcasses not removed by scavengers over the search period

P_s is the portion of the area searched.

Searcher Efficiency Trials

Searcher efficiency trials require a known number of discreetly marked carcasses to be placed around a wind turbine. Searchers examine the wind turbine area, and the number of carcasses that they find is compared to the number of carcasses placed. Searcher efficiency trials will typically be conducted once in each of spring, summer and fall, but will be repeated if searchers change during the year. Searcher efficiency trials are designed to correct for carcasses that may be overlooked by surveyors during the survey periods. Searcher efficiency trials involve a “tester” that places bird and bat carcasses under turbines prior to the standard carcass searches to test the searcher’s detection rate. Each trial will consist of a minimum of 10 carcasses per searcher, per visibility class, per season and will coincide with the regular weekly carcass searches. No more than 3 trial carcasses would be placed at any one time. Trial carcasses will be placed randomly within the search area and the location will be recorded (UTM coordinates) to ensure easy retrieval by the “tester” at the end of the trial day. Trial carcasses will be marked with a unique identifying mark and should be as fresh as possible, with bat carcasses making up at least one third of the carcass removal trials and birds comprising another third, if available, or small brown mammals or dark-coloured poultry chicks.

Searcher efficiency (Se) is calculated for each searcher as follows:

$$Se = \frac{\text{number of test carcasses found}}{\text{number of test carcasses placed} - \text{number of test carcasses scavenged}}$$

A weighted average, or “overall Se”, will be calculated to account for varying survey effort between searchers. The overall Se will be calculated as follows:

$$Se_0 = Se_1(n_1/T) + Se_2(n_2/T) + Se_3(n_3/T) + Se_4(n_4/T)$$

where: **Se₀** is the overall searcher efficiency;
Se₁–Se₄ are individual searcher efficiency ratings;
n₁ – n₄ are number of turbines searched by each searcher
T is the total number of turbines searched by all searchers.

2.2.1 Bird Mortality Monitoring

Background

Data from wind projects currently operating in Ontario and around the world indicates that very low numbers of bird fatalities occur as result of wind power projects (MNR 2011a). Data from Ontario and the United States indicates that approximately two birds per year are killed by individual turbines, which is very low compared to other existing sources of human caused avian mortality (MNR 2011a). Birds can be killed through collisions with turbine blades and towers, guy wires, meteorological towers and maintenance vehicles. Mortality rates and patterns are affected by density and behavior of birds found in the area, the presence of landscape features such as ridges, valleys, peninsulas and shorelines and weather conditions.

Monitoring

Post-construction bird mortality monitoring surveys may identify specific species, specific periods of high bird mortality or specific turbines/turbine groups linked to bird mortality. This information can be used to established protocols for operational mitigation and inform adaptive management. Bird mortality monitoring will be conducted according to MNR's *Birds and Bird Habitats: Guidelines for Wind Power Projects* (MNR, 2011a). **Table 1.2, Appendix A** of this EEMP summarizes the post-construction wildlife monitoring program for mortality monitoring of birds.

Mortality monitoring at 10 turbines (which is in excess of 30% of the total number of turbines contained within the Project) with minimally-vegetated ground cover (i.e., Visibility Classes 1 and 2 [MNR, 2011a]) within a 50 m radius using transects spaced 5.0 -6.0 m apart starting from the base of the wind turbine will be conducted twice-weekly (3-4 day intervals) beginning May 1 to October 31. Monitoring for raptors will continue at the 10 turbines until November 30. Monitoring of all 28 turbines for raptor fatalities will take place once monthly from May 1 through November 30. This will occur for a three year period.

Bird carcasses in good condition may be collected and stored in a freezer for future use in searcher efficiency and/or carcass removal trials. Searchers handling bird carcasses will take reasonable precautions (e.g. gloves, tools etc.) to protect their personal health. Bird carcasses will be placed in heavy-duty plastic bags and transported that day to a freezer, where they will be stored until required for the trials.

Authorization under the *Migratory Bird Convention Act, 1994* ("MBCA") will be required for handling carcasses of migratory birds. Likewise, carcasses of threatened or endangered species are covered under the *Endangered Species Act, 2007* ("ESA") or the federal *Species at Risk Act* ("SARA") and raptor carcasses are covered under the *Fish and Wildlife Conservation Act* ("FWCA"). Suncor and its agents will consult with the Ministry of Natural Resources ("MNR") and the Canadian Wildlife Service ("CWS") prior to commencing the field program to ensure

proper permits and/or procedure are in place to collect, possess and utilize wildlife carcasses for scientific purposes.

Other permits, approvals, authorizations, etc., are not likely to be required from the MNR or Environment Canada ("EC") to permit the monitoring activities contemplated in this Plan.

2.2.2 Bat Mortality Monitoring

Background

Bat mortality has been documented at wind power facilities in a variety of habitats across North America. Nearly every monitored wind power facility in the United States and Canada has reported bat mortality with minimum annual mortality varying from < 1 to 50 bat fatalities/turbine/year (MNR 2006). The majority of bat fatalities at wind power facilities occur in the late summer and fall, and the long-distance migratory bats (i.e., Hoary Bat, Eastern Red Bat, Silver-haired Bat) appear to be most vulnerable to collisions with moving turbine blades. Specific factors causing bat mortality and affecting species vulnerability to wind turbine mortality remain unclear, although recent evidence from Alberta suggests that air pressure differences in the blade vortices may contribute to bat mortality. Ontario specific data are relatively sparse at this time.

Monitoring

In Ontario, the post-construction monitoring season for bats is based on bat activity patterns, covering spring activity through fall swarming and migration and is consistent with the post-construction monitoring season for birds; thus occurring from May 1- October 31. Bat mortality monitoring will be conducted according to MNR's *Bats and Bat Habitats: Guidelines for Wind Power Projects* (2011b). In general, the mortality monitoring requirements for bats will be captured in conjunction with bird mortality monitoring, as described in **Section 2.2.1. Table 1.2, Appendix A** of this EEMP summarizes the post-construction wildlife monitoring program for mortality monitoring of bats.

- Bat mortality monitoring will be conducted twice-weekly (3-4 day intervals) within minimally-vegetated portions (i.e., Visibility Classes 1 and 2 [MNR, 2011b]) of a 50 m search area radius from the base of 10 turbines beginning May 1 to October 31st for a three-year period in accordance with MNR guidelines. This time period includes the core season when resident and migratory bats are active. Bat mortality monitoring will be conducted in conjunction with other monitoring activities (birds) for efficiency.
- Searcher efficiency trials will be conducted seasonally and carcass removal trials will be conducted monthly between May 1 and October 31st. Searcher efficiency and carcass removal rates are known to be more variable for bats than for birds throughout the year and depending on habitat (in part due to the relative size of the species).

As with birds, trial carcasses will be discreetly marked so they can be identified as study carcasses. Each trial will consist of a minimum of 10 carcasses per searcher per visibility class (for searcher efficiency trials) or per trial (for scavenger removal trials). At least one-third of the trial carcasses should be bats.

Bat carcasses in good condition may be collected and stored in a freezer for future use in searcher efficiency and/or scavenger removal trials. Searchers handling bat carcasses will take reasonable precautions (e.g., gloves, tools etc.) to protect their personal health. All searchers will ensure they have updated rabies pre-exposure vaccinations. Biological material will be disposed of in a way to ensure that it does not pose a public or environmental health risk and in accordance with any applicable federal, provincial, and municipal laws.

2.2.3 Woodland Area-Sensitive Breeding Bird Surveys

Woodland habitat in Features 1, 8, 11 and 20, located within 120 m of the Project Location, were considered significant wildlife habitat for woodland area-sensitive breeding birds, as described in **Sections 4.2.3.3 and 5.2.3.5** of the **NHA/EIS**. As Features 8 and 20 are located within 120 m of Turbines 22 and 9, respectively, a post-construction point count-based study will be implemented to assess any actual disturbance effects to woodland area-sensitive breeding bird species in these features. **Table 1.2, Appendix A** of this EEMP summarizes the post-construction wildlife monitoring program for habitat disturbance monitoring of woodland area-sensitive breeding birds.

Four pre-construction point count stations in woodland habitat will be established and surveyed during the pre-construction surveys. Two stations will be located in each of Features 8 and 20, with one station located within 120 m of the turbine, and the other station located approximately 200 m from the turbine and used as 'control' sites. Each of the surveys will include a ten-minute point count at each location, conducted during the breeding season (May 1 to July 31), for a minimum of three years. Each station should be surveyed a minimum of 3 times: once early in the season; once in mid-season; and, once later in the season with at least 10 days between surveys at a particular station. Point counts must be performed in the early morning, between dawn (one half hour before sunrise) and about 4 hours after sunrise. Surveys in late June and early July should usually be completed within 3 hours of sunrise. Surveys should be performed when the wind speed is 3 or less on the Beaufort scale and when there is no precipitation unless it is a light drizzle. Breeding pair density is a standard measure that will be used to compare among years or between control (> 120 m) and impact sites (< 120 m).

The woodland species observed will be compared to pre-construction conditions. Particular attention should be paid to those species identified as woodland area-sensitive indicator species as per the draft SWH Ecoregion 7E Criterion Schedule (MNR, 2012), including: Yellow-bellied Sapsucker, Red-breasted Nuthatch, Veery, Blue-headed Vireo, Northern Parula, Black-throated Green Warbler, Blackburnian Warbler, Black-throated Blue Warbler, Ovenbird, Scarlet Tanager, Winter Wren and Pileated Woodpecker; and, Special Concern species Cerulean Warbler and Canada Warbler.

MNR, along with the proponent and other relevant agencies, will collectively review the results of the post-construction monitoring to determine if an ecologically significant disturbance/avoidance effect is occurring, and whether such an effect is attributable to the wind turbines and not external factors. These discussions will determine if and when contingency

measures will be undertaken. The best available science and information should be considered when determining appropriate mitigation.

2.2.4 Habitat Use Studies and Additional Habitat Disturbance Monitoring

2.2.4.1 Habitat Use Studies

As per the requirements of Appendix D of the *Natural Heritage Assessment Guide for Renewable Energy Projects* (MNR, 2011a), habitat use studies must be undertaken to determine the actual use of the habitat prior to any construction activities occurring within 120 m of the habitat. In **Section 5.2** of the **NHA/EIS**, Suncor committed to undertake habitat use studies due to the location of proposed turbines within 120 m of candidate significant wildlife habitat for waterfowl nesting areas, marsh bird breeding habitat, shrub/early successional breeding bird habitat, amphibian woodland breeding habitat and amphibian wetland breeding habitat. Methodologies for undertaking the habitat use studies for candidate Significant Wildlife Habitat are described in the following sections.

Waterfowl nesting areas

As per the requirements of Appendix D of the *Natural Heritage Assessment Guide for Renewable Energy Projects* (MNR, 2011a), due to the location of proposed turbines within 120 m of Features 6 and 20, the proponent must commit to undertaking studies to determine the actual use of the habitat prior to any construction activities occurring within 120 m of the habitat.

Habitat use studies will be conducted according to “*Bird and Bird Habitats: Guidelines for Wind Power Projects*” (MNR, 2011c) and will include nesting studies to be completed during the breeding season (April-June). Specifically, nesting studies will consist of point counts at stations established in Features 6 and 20. Point counts will be performed in the early morning, between dawn (one half hour before sunrise) and about 4 hours after sunrise. Each station will be surveyed a minimum of 3 times, conducted early in the season, mid-season and later in the season, with at least 10 days between surveys at a particular station. Point counts should be performed when there is as little wind as possible (i.e., wind speeds should be 3 or less on the Beaufort scale) and should begin as early as possible in the morning (but not earlier than one half-hour before local sunrise), when the wind is generally calm so that windy conditions that may arise later in the morning can be avoided. Point counts should not be conducted if it is raining unless precipitation is not more than a light drizzle.

At each station, the surveyor will observe for ten minutes, recording all species seen or heard (including waterfowl), along with an estimate of the number of individuals of each species and the highest level of breeding evidence observed for each observation. Surveyors will estimate the distance to each bird using a scale of 0–50 m, 50–100 m and further than 100 m. Birds that move during the survey will be recorded in the closest distance category that they entered during the survey. Data that will be reported are the number of birds of each species detected in each distance band. Birds that fly over without stopping should be recorded separately as “fly-overs”. Additional information that will be recorded on the appropriate data forms include:

- Weather conditions (temperature, wind speed (on a Beaufort scale), % cloud cover, and presence of any precipitation should be recorded).
- Date and time of day.
- GPS coordinates of the point location.
- Name of the observer doing field work.

Given the size and characteristics of the waterfowl nesting areas in Features 6 and 20, it is anticipated that the habitats could potentially support some of the indicator waterfowl species identified in the Draft Significant Wildlife Habitat Ecoregion 7E Criterion Schedule, including: Black Duck, Wood Duck and Mallard.

Marsh bird breeding habitat

As per the requirements of Appendix D of the *Natural Heritage Assessment Guide for Renewable Energy Projects* (MNR, 2011a), due to the location of a proposed turbines within 120 m of Features 6, 16 and 20, the proponent must commit to undertaking studies to determine the actual use of the habitat prior to any construction activities occurring within 120 m of the habitat. Habitat use studies will be conducted according to *“Bird and Bird Habitats: Guidelines for Wind Power Projects”* (MNR, 2011c) and will include breeding surveys in May/June when marsh bird species are actively nesting in wetland habitats. Specifically, nesting studies will consist of point counts at stations established in Features 6, 16 and 20. Point counts will be performed in the early morning, between dawn (one half hour before sunrise) and about 4 hours after sunrise. Each station will be surveyed a minimum of 3 times, conducted early in the season, mid-season and later in the season, with at least 10 days between surveys at a particular station. Point counts should be performed when there is as little wind as possible (i.e., wind speeds should be 3 or less on the Beaufort scale) and should begin as early as possible in the morning (but not earlier than one half-hour before local sunrise), when the wind is generally calm so that windy conditions that may arise later in the morning can be avoided. Point counts should not be conducted if it is raining unless precipitation is not more than a light drizzle.

At each station, the surveyor will observe for ten minutes, recording all species seen or heard (including waterfowl), along with an estimate of the number of individuals of each species and the highest level of breeding evidence observed for each observation. Surveyors will estimate the distance to each bird using a scale of 0–50 m, 50–100 m and further than 100 m. Birds that move during the survey will be recorded in the closest distance category that they entered during the survey. Data that will be reported are the number of birds of each species detected in each distance band. Birds that fly over without stopping should be recorded separately as “fly-overs”. Additional information that will be recorded on the appropriate data forms include:

- Weather conditions (temperature, wind speed (on a Beaufort scale), % cloud cover, and presence of any precipitation should be recorded).

- Date and time of day.
- GPS coordinates of the point location.
- Name of the observer doing field work.

Given the size and characteristics of Features 6, 16 and 20, it is anticipated that the habitats could potentially support some of the indicator marsh bird species identified in the Draft Significant Wildlife Habitat Ecoregion 7E Criterion Schedule, including: Virginia Rail, Sora and Sedge Wren in Feature 16; and, Green Heron in Features 6 and 20.

Shrub/early successional bird breeding habitat

As per the requirements of Appendix D of the *Natural Heritage Assessment Guide for Renewable Energy Projects* (MNR, 2011a), due to the location of a proposed turbine within 120 m of Feature 13, the proponent must commit to undertaking studies to determine the actual use of the habitat prior to any construction activities occurring within 120 m of the habitat. Habitat use studies will be conducted according to *“Bird and Bird Habitats: Guidelines for Wind Power Projects”* (MNR, 2011c) and will include breeding surveys in spring and early summer (May-June) when birds are singing and defending their territories. Specifically, nesting studies will consist of point counts at stations established in Feature 13. Point counts will be performed in the early morning, between dawn (one half hour before sunrise) and about 4 hours after sunrise. Each station will be surveyed a minimum of 3 times, conducted early in the season, mid-season and later in the season, with at least 10 days between surveys at a particular station. Point counts should be performed when there is as little wind as possible (i.e., wind speeds should be 3 or less on the Beaufort scale) and should begin as early as possible in the morning (but not earlier than one half-hour before local sunrise), when the wind is generally calm so that windy conditions that may arise later in the morning can be avoided. Point counts should not be conducted if it is raining unless precipitation is not more than a light drizzle.

At each station, the surveyor will observe for ten minutes, recording all species seen or heard (including waterfowl), along with an estimate of the number of individuals of each species and the highest level of breeding evidence observed for each observation. Surveyors will estimate the distance to each bird using a scale of 0–50 m, 50–100 m and further than 100 m. Birds that move during the survey will be recorded in the closest distance category that they entered during the survey. Data that will be reported are the number of birds of each species detected in each distance band. Birds that fly over without stopping should be recorded separately as “fly-overs”. Additional information that will be recorded on the appropriate data forms include:

- Weather conditions (temperature, wind speed (on a Beaufort scale), % cloud cover, and presence of any precipitation should be recorded).
- Date and time of day.
- GPS coordinates of the point location.

- Name of the observer doing field work.

Given the size and characteristics of the habitat in Feature 13, it is anticipated that the habitats could potentially support some of the indicator shrub/early successional breeding bird species identified in the Draft Significant Wildlife Habitat Ecoregion 7E Criterion Schedule, including: Brown Thrasher, Black-billed Cuckoo, Eastern Towhee, Willow Flycatcher or Yellow-breasted Chat.

Amphibian woodland breeding habitat

As per the requirements of Appendix D of the *Natural Heritage Assessment Guide for Renewable Energy Projects* (MNR, 2011a), due to the location of proposed access roads within 120 m of Features 6 and 20, the proponent must commit to undertaking studies to determine the actual use of the habitat prior to any construction activities occurring within 120 m of the habitats.

Habitat use surveys will be conducted according to the Marsh Monitoring Program, or “MMP” (BSC, 2003) protocol for breeding amphibians. According to the protocols set out in the MMP, three separate surveys will be completed for breeding amphibians. Based on the location of the Project Boundary (i.e., between the 43rd and 47th parallels), the first survey window is generally recognized as April 15 – 30, or when night-time air temperatures are consistently above 5°C. The second survey window is generally recognized as May 15 – 30, or when night-time air temperatures are consistently above 10°C. The third survey window is generally recognized as June 15 – 30, or when night-time air temperatures are consistently above 17°C. Surveys are time sensitive (conducted half an hour after sunset) as well as weather dependent. Surveys during the second and third windows will be repeated at the stations established during the first survey. Data will be recorded on Amphibian Call Survey Observation Forms.

Given the size and characteristics of the ponds in Features 6 and 20 and the historic ranges of frog species in the Project Boundary, it is anticipated that the habitats could potentially support some of the indicator amphibian species identified in the Draft Significant Wildlife Habitat Ecoregion 7E Criterion Schedule, including: Gray Treefrog; Spring Peeper; Western Chorus Frog; and, Wood Frog.

Amphibian wetland breeding habitat

As per the requirements of Appendix D of the *Natural Heritage Assessment Guide for Renewable Energy Projects* (MNR, 2011a), due to the location of a proposed access road within 120 m of Feature 16, the proponent must commit to undertaking studies to determine the actual use of the habitat prior to any construction activities occurring within 120 m of the habitat.

Habitat use surveys will be conducted according to the Marsh Monitoring Program, or “MMP” (BSC, 2003) protocol for breeding amphibians. According to the protocols set out in the MMP, three separate surveys to be completed for breeding amphibians. Based on the location of the Project Boundary (i.e., between the 43rd and 47th parallels), the first survey window is generally

recognized as April 15 – 30, or when night-time air temperatures are consistently above 5°C. The second survey window is generally recognized as May 15 – 30, or when night-time air temperatures are consistently above 10°C. The third survey window is generally recognized as June 15 – 30, or when night-time air temperatures are consistently above 17°C. Surveys are time sensitive (conducted half an hour after sunset) as well as weather dependent. Surveys during the second and third windows will be repeated at the stations established during the first survey. Data will be recorded on Amphibian Call Survey Observation Forms.

Given the size and characteristics of the ponds in Feature 16 and the historic ranges of frog species in the Project Boundary, it is anticipated that the habitats could potentially support some of the indicator amphibian species identified in the Draft Significant Wildlife Habitat Ecoregion 7E Criterion Schedule, including: American Toad, Western Chorus Frog and Northern Leopard Frog.

2.2.4.2 Additional Habitat Disturbance Monitoring

Should the results of the habitat use studies result in the determination that these habitats are considered significant (as determined by Suncor or their agents and confirmed by MNR), the monitoring plan will be expanded to include additional post-construction habitat disturbance monitoring. If a determination of significance is made, the results of the habitat use studies will constitute the baseline for habitat disturbance monitoring. Methodologies implemented in undertaking the habitat use studies will be replicated during habitat disturbance monitoring, and undertaken as per the schedule presented in **Table 1.2, Appendix A**. If required, post-construction habitat disturbance monitoring will take place for a minimum of three (3) years for: waterfowl nesting areas; marsh bird breeding habitat; and, shrub/early successional breeding bird habitat, and one (1) year for: amphibian woodland breeding habitat; and, amphibian wetland breeding habitat.

2.3 Reporting and Review of Results

Annual post-construction monitoring reports will summarize and analyze the results of all wildlife surveys. Reports will be submitted to the MOE and MNR within three months of the conclusion of the November mortality monitoring.

The monitoring program will be reassessed by MNR and Suncor at the end of each monitoring year. Pending the reassessment results, the program methods, frequencies, and duration may be reasonably modified to better reflect the findings.

3.0 Adaptive Management Program

The adaptive management program described in this section outlines performance objectives, and contingency measures that will be implemented should the performance objectives not be met.

Contingency plans address immediate mitigation actions necessary in case of a significant bird or bat mortality event, or if mitigation actions fail. Contingency measures may include an adaptive management approach. An adaptive management program allows mitigation measures to be implemented in the event that unanticipated potentially significant adverse environmental effects are observed. Potentially significant adverse effects will be assessed through review of the annual report.

The following sections describe the procedures for notifications, reporting, and adaptive management for mortality and disturbance effects monitoring.

3.1 MORTALITY MONITORING

All bird and bat mortality will be reported in the annual report submission. Mortality rate is expressed as the number of fatalities per turbine per year (e.g., from May 1 to November 30). Mortality of priority species in Bird Conservation Region (“BCR”) 13 and mortality of all species of conservation concern, such as raptors, marsh breeding birds, woodland area-sensitive breeding birds and shrub/early successional breeding bird species will be highlighted in the annual post-construction monitoring reports. A threshold approach will be used to identify and mitigate significant bird and bat mortality (potential negative environmental effects) resulting from the operation of wind turbines.

3.1.1 Birds

Post-construction mitigation, including operational controls, will be considered if annual mortality of birds exceeds any of the following thresholds defined by the MNR (2011a):

- 14 birds/turbine/year at individual turbines or turbine groups;
- 0.2 raptors/turbine/year (all raptors) across a wind power project; or
- 0.1 raptors of provincial conservation concern/turbine/year across a wind power project.

Or if bird mortality during a single mortality monitoring survey exceeds:

- 10 or more birds at any one turbine; or
- 33 or more birds (including raptors) at multiple turbines.

Mortality levels maintained below these thresholds are considered unlikely to affect bird populations (MNR 2011a).

Any and all observed mortality of species at risk (i.e., a species listed as Endangered, Threatened or Special Concern under Schedule 1 of the federal SARA or a species listed on the Species at Risk in Ontario list as Extirpated, Endangered, Threatened, or Special Concern under the provincial ESA) that occurs will be reported within 48 hours to MNR.

If with due consideration of seasonal abundance and species composition, annual mortality levels at turbines located outside 120 m of bird significant wildlife habitat (SWH) exceed the thresholds noted above, two years of subsequent scoped mortality and cause and effects monitoring will be conducted. Following scoped monitoring, post-construction mitigation (e.g., operational mitigation) and effectiveness monitoring may be required at individual turbines where a mortality effect has been identified or significant annual mortality persists (MNR 2011a).

If significant annual mortality persists, or occurs at turbines located within 120 m of bird SWH, immediate post-construction mitigation (including operational mitigation), as identified in the Environmental Impact Study, and 3 years of effectiveness monitoring may be required. Avoidance-disturbance effects monitoring will also be required. MNR will be engaged to initiate an appropriate response plan as set out in the MNR's Bird Guidelines (2011a). The response plan would include an analysis of the species, timing and distribution of fatalities to determine potential risk factors leading to mortality. The analysis may include an evaluation of the mortality data and/or behavioral studies to better refine when and where species are most at risk of collision. The results of this analysis will be used to develop operational mitigation measures, which will include the following

- Periodic shut-down of select turbines at specific times of year, when mortality risks to the affected bird species is particularly high (i.e., migration)¹
- Blade feathering at specific times of year, when mortality risks to the affected bird species is particularly high (i.e., migration)
- Or alternate plan agreed to between Suncor and MNR

3.1.2 Bats

Operational mitigation is required where annual post-construction mortality monitoring exceeds 10 bats/turbine/year (MNR, 2011).

This threshold of 10 bats/turbine/year has been determined based on bat mortality reported at wind power projects in Ontario and comparison with jurisdictions across North America.

¹ MNR 2011a

Operational mitigation to be implemented includes changing the wind turbine cut-in speed to 5.5 m/s (measured at hub height) or feathering of wind turbine blades when wind speeds are below 5.5 m/s.

The majority of bat mortalities from wind turbine operations occur during fall migration. Where post-construction monitoring indicates that annual bat mortality threshold of 10/bats/turbine/year has been exceeded, operational monitoring will be implemented across the wind power project from sunset to sunrise, from July 15-September 30 and will continue for the duration of the project. If site specific monitoring indicates a shifted peak mortality period (due to higher latitude projects), operational mitigation may be shifted to match the peak mortality, with mitigation maintained for a minimum of 10 weeks. Any shift in the operational mitigation period to match peak mortality will be determined in consultation with the MNR. Where post-construction mitigation is applied, an additional 3 years of effectiveness monitoring is required, as set out in the MNR's Bat Guidelines (2011).

3.1.3 Contingency Plan

3.1.3.1 Contingency Plan for Mass Mortality of Birds

To date, there have been no recorded events of mass mortality of birds at wind farms in Ontario. The various post-construction monitoring projects in Ontario typically record between 0 to 2 bird fatalities at individual turbines during any one survey, with only a single record of 3 birds fatalities observed at one turbine during a single visit (Friesen, 2011). As such, the risk of a mass mortality event for birds is anticipated to be very low.

In the event of a mass mortality event, defined as 10 or more bird fatalities at any one turbine, or 33 or more bird fatalities (including raptors) at multiple turbines on a single survey, the following steps will be implemented:

1. MNR will be notified of the event within 48 hours and will be provided with any available details (e.g. species, number and distribution of turbines involved).
2. An emergency search of all turbines in the Project will be conducted as soon as feasibly possible to determine the extent and the distribution of the mortality event.
3. An analysis of the results of the emergency search will be completed to identify potential risk factors (e.g., weather conditions, proximity to natural heritage features) leading to the mortality event.
4. Based on the risk factors identified, additional mitigation and scoped monitoring recommendations will be developed in conjunction with MNR with the goal of avoiding future mortality events.

3.1.3.2 Contingency Plan for Continued Significant Bat Mortality

Additional mitigation measures may be implemented in the event of continued significant bat mortality (i.e., more than 10 bats/turbine/year) after the mitigation measures outlined in Section 3.1.2 have been implemented. Should the cut-in speed mitigation be implemented and the bat mortality thresholds continue to be exceeded, Suncor will work with the MNR to determine additional mitigation and scoped monitoring requirements.

4.0 Best Management Practices

Suncor will include the following best management practices as part of the post-construction monitoring program (as outlined in MNR, 2011a and 2011b).

4.1 DATA MANAGEMENT

All pre- and post-construction data, collected in accordance with MNR guidance and reported to the MOE, will be submitted to the joint Canadian Wildlife Service – Canadian Wind Energy Association – Bird Studies Canada – Ontario Ministry of Natural Resources Wind Power and Birds Monitoring Database.

4.2 WHITE-NOSE SYNDROME

Carcasses of the following species found during bat mortality searches may be sent to the Canadian Cooperative Wildlife Health Centre for analysis of White-nose Syndrome and should not be used in carcass removal or searcher efficiency trials:

- Northern Long-eared Bat (*Myotis septentrionalis*)
- Little Brown Bat (*Myotis lucifugus*)
- Small-footed Bat (*Myotis leibii*)
- Tri-coloured Bat/Eastern Pipistrelle (*Perimyotis subflavus*)
- Big Brown Bat (*Eptesicus fuscus*)

4.3 BAT TISSUE SAMPLES

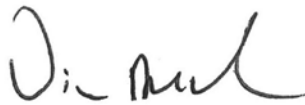
Tissue samples from bat carcasses may be used in a number of DNA analyses to provide insight into population size and structure, as well as the geographic origin migrants. Suncor will contact the local MNR office prior to disposing bat carcasses, to determine if this type of research is occurring in the area.

5.0 Closure

This Environmental Effects Monitoring Plan for the Suncor Energy Adelaide Wind Power Project has been prepared in accordance with O. Reg. 359/09, s. 23.1, the MNR's *Approval and Permitting Requirements Document for Renewable Energy Projects* (September 2009), the MOE's *Technical Guide to Renewable Energy Approvals*, MNR's *Bats and Bat Habitats: Guidelines for Wind Power Projects* (July 2011) and MNR's *Birds and Bird Habitats: Guidelines for Wind Power Projects* (December 2011).

Stantec Consulting Ltd. prepared this Environmental Effects Monitoring Plan for Suncor Energy Products Inc. for the Suncor Energy Adelaide Wind Power Project. Suncor is committed to implementing the appropriate protection and mitigation measures as they apply to the construction and operation of the proposed Project.

Respectfully submitted,
STANTEC CONSULTING LTD



Vince Deschamps
Senior Environmental Planner



Mark Kozak
Senior Project Manager

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Table 1.2: Summary of Environmental Effects Monitoring Plan for Operation of the Suncor Adelaide Wind Energy Project

Potential Negative Effect	Mitigation Strategy	Performance Objective	Monitoring Plan					Contingency Measures
			Methods	Location	Frequency	Rationale	Reporting	
Mortality Monitoring for Birds and Bats								
Direct mortality to birds through turbine collisions	Post-construction mortality monitoring program	Maintain mortality below thresholds	<p>Post-construction monitoring of mortality rates; carcass searches</p> <p>Methods are outlined in detail in this Environmental Effects Monitoring Plan</p>	<p>At 10 turbines (all birds) and 28 turbines (raptors)</p> <p>MNR will be consulted to determine location of turbines to be monitored.</p>	<p>Conducted twice-weekly (3-4 day intervals) at 10 turbines from May 1-October 31. Weekly monitoring for raptors will continue until November 30.</p> <p>Monitoring of all 28 turbines for raptor fatalities once a month from May 1-November 30.</p> <p>Monitoring to be conducted for three years.</p>	Bird and Bird Habitats: Guidelines for Wind Power Projects, 2011	<p>Annual Report will be submitted to MNR with the following anticipated dates:</p> <p>February 2015 February 2016 February 2017</p>	<p>Post-construction mitigation, including operational controls, will be considered if annual mortality of birds exceeds any of the following thresholds defined by the MNR (2011a):</p> <ul style="list-style-type: none"> 14 birds/turbine/year at individual turbines or turbine groups; 0.2 raptors/turbine/year (all raptors) across a wind power project; or 0.1 raptors of provincial conservation concern/turbine/year across a wind power project. <p>Or if bird mortality during a single mortality monitoring survey exceeds:</p> <ul style="list-style-type: none"> 10 or more birds at any one turbine; or 33 or more birds (including raptors) at multiple turbines. <p>Mitigation may include operational controls, such as periodic shut-down on select turbines or blade feathering at specific times of the year, or alternate plan agreed to by Suncor/MNR.</p> <p>MNR will be consulted on contingency measures to be implemented.</p>
Direct mortality to bats through turbine collisions	Post-construction mortality monitoring program	Maintain mortality below thresholds	<p>Post-construction monitoring of mortality rates; carcass searches</p> <p>Methods are outlined in detail in this Environmental Effects Monitoring Plan</p>	<p>At 10 turbines</p> <p>MNR will be consulted to determine location of turbines to be monitored.</p>	<p>Conducted twice-weekly (3-4 day intervals) at 10 turbines from May 1-October 31.</p> <p>Monitoring to be conducted for three years.</p>	Bats and Bat Habitats: Guidelines for Wind Power Projects, 2011	<p>Annual Report will be submitted to MNR with the following anticipated dates:</p> <p>February 2015 February 2016 February 2017</p>	<p>Operational mitigation is required where annual post-construction mortality monitoring exceeds 10bats/turbine/year (MNR, 2011).</p> <p>Mitigation may include operational controls, such as periodic shut-down on select turbines or blade feathering at specific times of the year, or alternate plan agreed to by Suncor/MNR.</p> <p>MNR will be consulted on contingency measures to be implemented.</p>
Disturbance Monitoring for Birds								
Disturbance to waterfowl nesting areas during operation	Post-construction Disturbance Monitoring Program	MNR, along with the proponent and other relevant agencies, will	Point count survey and area searches using pre-	In Features 6 or 20, if they are determined	Three times during the spring breeding season	Breeding pair density is a standard measure	Annual Report will be submitted	Should performance objectives not be met:

Table 1.2: Summary of Environmental Effects Monitoring Plan for Operation of the Suncor Adelaide Wind Energy Project

Potential Negative Effect	Mitigation Strategy	Performance Objective	Monitoring Plan				Contingency Measures	
			Methods	Location	Frequency	Rationale		Reporting
(Feature 6 and 20)	<p>The breeding density of nesting waterfowl (combined and individual), within the habitat, will be monitored and compared to pre-construction conditions.</p> <p>In addition to density, the waterfowl nesting observed should be monitored and compared to pre-construction conditions. Particular attention should be paid to those species identified as waterfowl nesting area indicator species as per the draft SWH Ecoregion 7E Criterion Schedule (MNR, 2012), including: American Black Duck, Northern Pintail, Northern Shoveler, Gadwall, Blue-winged Teal, Green-winged Teal, Wood Duck, Hooded Merganser and Mallard.</p>	collectively review the results of the post-construction monitoring to determine if an ecologically significant disturbance/avoidance effect to nesting waterfowl is occurring, and whether such effect is attributed to the wind turbines and not external factors. These discussions will determine whether contingency measures will be undertaken.	<p>construction methods.</p> <p>Paired point counts extending from the base of wind turbine generators located within 120 m of waterfowl nesting areas with an equal number of paired point counts located more than 120 m from wind turbine generators in waterfowl nesting areas (i.e., control sites)</p> <p>Methods are outlined in detail in this Environmental Effects Monitoring Plan</p>	to be significant as a result of habitat use studies.*	(April-June), with at least 10 days between surveys, annually for three years.	that can be compared among years or between control/impact sites.	to MNR with the following anticipated dates: February 2015 February 2016 February 2017	<ul style="list-style-type: none"> Compare declines to population trends noted through province or continent-wide breeding bird surveys develop additional studies to determine extent of disturbance effect investigate habitat management means to increase breeding density <p>Additional monitoring and/or mitigation may be required where post-construction monitoring identifies ecologically significant disturbance/avoidance effects associated with waterfowl nesting areas. Mitigation techniques may include (but are not limited to) operational controls, such as periodic shut-down and/or blade feathering. Results will be reviewed collectively by the proponent, MNR and other relevant agencies to determine if and when additional monitoring and/or mitigation is required. The best available science and information should be considered when determining appropriate mitigation.</p> <p>MNR will be consulted on contingency measures to be implemented.</p>
Disturbance to marsh breeding bird species during operation (Features 6, 16 and 20)	<p>Post-construction Disturbance Monitoring Program</p> <p>The breeding density of marsh species (combined and individual), within the habitat, will be monitored and compared to pre-construction conditions.</p> <p>In addition to density, the marsh breeding species observed should be monitored and compared to pre-construction conditions. Particular attention should be paid to those species identified as marsh breeding</p>	MNR, along with the proponent and other relevant agencies, will collectively review the results of the post-construction monitoring to determine if an ecologically significant disturbance/avoidance effect to marsh breeding birds is occurring, and whether such effect is attributed to the wind turbines and not external factors. These discussions will determine whether contingency measures will be undertaken.	<p>Point count survey and area searches using pre-construction methods.</p> <p>Paired point counts extending from the base of wind turbine generators located within 120 m of marsh habitat with an equal number of paired point counts located more than 120 m from wind turbine generators in marsh habitat (i.e., control sites).</p> <p>Methods are outlined in detail in this Environmental Effects Monitoring Plan</p>	In Features 6, 16 or 20, if they are determined to be significant as a result of habitat use studies.*	Three times during the spring breeding season (May-June), with at least 10 days between surveys, annually for three years.	Breeding pair density is a standard measure that can be compared among years or between control/impact sites	Annual Report will be submitted to MNR with the following anticipated dates: February 2015 February 2016 February 2017	<p>Should performance objectives not be met:</p> <ul style="list-style-type: none"> Compare declines to population trends noted through province or continent-wide breeding bird surveys develop additional studies to determine extent of disturbance effect investigate habitat management means to increase breeding density <p>Additional monitoring and/or mitigation may be required where post-construction monitoring</p>

Table 1.2: Summary of Environmental Effects Monitoring Plan for Operation of the Suncor Adelaide Wind Energy Project

Potential Negative Effect	Mitigation Strategy	Performance Objective	Monitoring Plan					Contingency Measures
			Methods	Location	Frequency	Rationale	Reporting	
	habitat indicator species as per the draft SWH Ecoregion 7E Criterion Schedule (MNR, 2012), including: American Bittern, Virginia Rail, Sora, Common Moorhen, American Coot, Pied-billed Grebe, Marsh Wren, Sedge Wren, Common Loon, Green Heron, Trumpeter Swan; and, Special Concern species including Black Tern and Yellow Rail.							identifies ecologically significant disturbance/avoidance effects associated with marsh breeding bird habitat. Mitigation techniques may include (but are not limited to) operational controls, such as periodic shut-down and/or blade feathering. Results will be reviewed collectively by the proponent, MNR and other relevant agencies to determine if and when additional monitoring and/or mitigation is required. The best available science and information should be considered when determining appropriate mitigation. MNR will be consulted on contingency measures to be implemented.
Disturbance to woodland area-sensitive breeding bird species during operation (Features 8 and 20)	<p>Post-construction Disturbance Monitoring Program</p> <p>The breeding density of woodland area-sensitive species (combined and individual), within the habitat, will be monitored and compared to pre-construction conditions.</p> <p>In addition to density, the woodland area-sensitive species observed should be monitored and compared to pre-construction conditions. Particular attention should be paid to those species identified as woodland area-sensitive indicator species as per the draft SWH Ecoregion 7E Criterion Schedule (MNR, 2012), including: Yellow-bellied Sapsucker, Red-breasted Nuthatch, Veery, Blue-headed Vireo, Northern Parula, Black-throated Green Warbler, Blackburnian Warbler, Black-throated Blue Warbler, Ovenbird, Scarlet Tanager, Winter Wren and Pileated Woodpecker; and, Special Concern species Cerulean Warbler and</p>	MNR, along with the proponent and other relevant agencies, will collectively review the results of the post-construction monitoring to determine if an ecologically significant disturbance/avoidance effect to woodland area-sensitive breeding birds is occurring, and whether such effect is attributed to the wind turbines and not external factors. These discussions will determine whether contingency measures will be undertaken.	<p>Point count survey and area searches using pre-construction methods.</p> <p>Paired point counts extending from the base of wind turbine generators located within 120 m of woodland area-sensitive habitat with an equal number of paired point counts located more than 120 m from wind turbine generators in woodland area-sensitive habitat (i.e., control sites).</p> <p>Methods are outlined in detail in this Environmental Effects Monitoring Plan</p>	In Features 8 and 20, as they are located within 120 m of Turbine 22 and 9, respectively.	Three times during the spring breeding season (May-June), with at least 10 days between surveys, annually for three years.	Breeding pair density is a standard measure that can be compared among years or between control/impact sites	<p>Annual Report will be submitted to MNR with the following anticipated dates: February 2015 February 2016 February 2017</p>	<p>Should performance objectives not be met:</p> <ul style="list-style-type: none"> Compare declines to population trends noted through province or continent-wide breeding bird surveys develop additional studies to determine extent of disturbance effect investigate habitat management means to increase breeding density <p>Additional monitoring and/or mitigation may be required where post-construction monitoring identifies ecologically significant disturbance/avoidance effects associated with woodland area-sensitive breeding bird habitat. Mitigation techniques may include (but are not limited to) operational controls, such as periodic shut-down and/or blade feathering. Results will be reviewed collectively by the proponent, MNR and other relevant agencies to determine if and when additional monitoring and/or mitigation is required. The best available science and information</p>

Table 1.2: Summary of Environmental Effects Monitoring Plan for Operation of the Suncor Adelaide Wind Energy Project

Potential Negative Effect	Mitigation Strategy	Performance Objective	Monitoring Plan					Contingency Measures
			Methods	Location	Frequency	Rationale	Reporting	
	Canada Warbler.							<p>should be considered when determining appropriate mitigation.</p> <p>MNR will be consulted on contingency measures to be implemented.</p>
Disturbance to shrub/early successional breeding bird species during operation (Feature 13)	<p>Post-construction Disturbance Monitoring Program</p> <p>The breeding density of shrubland species (combined and individual), within the habitat, will be monitored and compared to pre-construction conditions.</p> <p>In addition to density, the shrub/early successional species observed should be monitored and compared to pre-construction conditions. Particular attention should be paid to those species identified as shrub/early successional indicator species as per the draft SWH Ecoregion 7E Criterion Schedule (MNR, 2012), including: Brown Thrasher, Clay-coloured Sparrow, Field Sparrow, Black-billed Cuckoo, Eastern Towhee and Willow Flycatcher; and, Special Concern species including Yellow-breasted Chat and Golden-winged Warbler.</p>	<p>MNR, along with the proponent and other relevant agencies, will collectively review the results of the post-construction monitoring to determine if an ecologically significant disturbance/avoidance effect to shrub/early successional breeding birds is occurring, and whether such effect is attributed to the wind turbines and not external factors. These discussions will determine whether contingency measures will be undertaken.</p>	<p>Point count survey and area searches using pre-construction methods.</p> <p>Paired point counts extending from the base of wind turbine generators located within 120 m of shrub/early successional habitat with an equal number of paired point counts located more than 120 m from wind turbine generators in shrub/early successional habitat (i.e., control sites).</p> <p>Methods are outlined in detail in this Environmental Effects Monitoring Plan.</p>	In Feature 13, if it is determined to be significant as a result of habitat use studies.*	Three times during the spring breeding season (May-June), with at least 10 days between surveys, annually for three years.	Breeding pair density is a standard measure that can be compared among years or between control/impact sites	<p>Annual Report will be submitted to MNR with the following anticipated dates: February 2015 February 2016 February 2017</p>	<p>Should performance objectives not be met:</p> <ul style="list-style-type: none"> Compare declines to population trends noted through province or continent-wide breeding bird surveys develop additional studies to determine extent of disturbance effect investigate habitat management means to increase breeding density <p>Additional monitoring and/or mitigation may be required where post-construction monitoring identifies ecologically significant disturbance/avoidance effects associated with shrub/early successional breeding bird habitat. Mitigation techniques may include (but are not limited to) operational controls, such as periodic shut-down and/or blade feathering. Results will be reviewed collectively by the proponent, MNR and other relevant agencies to determine if and when additional monitoring and/or mitigation is required. The best available science and information should be considered when determining appropriate mitigation.</p> <p>MNR will be consulted on contingency measures to be implemented.</p>
Disturbance Monitoring for Amphibians								
Disturbance to amphibian woodland breeding habitat during operation (Features 6 and 20)	<p>Post-construction Disturbance Monitoring Program</p> <p>The breeding density of woodland species (combined</p>	<p>MNR, along with the proponent and other relevant agencies, will collectively review the results of the post-construction monitoring to determine if an ecologically</p>	<p>Call count surveys using pre-construction methods, based on Marsh Monitoring Program protocol.</p>	2 count stations (one within 120m of project location and one more than 120m) in each of Features 6	Once in each of April 1-15, May 1-15 and June 1-15, for one year post-construction.	Presence of calling amphibians in significant wildlife habitat (with consideration for pre-	Report will be submitted to MNR with the following anticipated date:	Where post-construction monitoring identifies ecologically significant disturbance effects to amphibians the proponent, MNR and other relevant agencies will

Table 1.2: Summary of Environmental Effects Monitoring Plan for Operation of the Suncor Adelaide Wind Energy Project

Potential Negative Effect	Mitigation Strategy	Performance Objective	Monitoring Plan					Contingency Measures
			Methods	Location	Frequency	Rationale	Reporting	
	<p>and individual), within the habitat, will be monitored and compared to pre-construction conditions.</p> <p>In addition to density, the species observed should be monitored and compared to pre-construction conditions. Particular attention should be paid to those species identified as amphibian breeding habitat (woodland) indicator species as per the draft SWH Ecoregion 7E Criterion Schedule (MNR, 2012), including: Gray Treefrog; Spring Peeper; Western Chorus Frog; and, Wood Frog.</p>	<p>significant disturbance/avoidance effect to woodland breeding amphibians is occurring, and whether such effect is attributed to the access roads and not external factors. These discussions will determine whether contingency measures will be undertaken.</p>	<p>Methods are outlined in detail in this Environmental Effects Monitoring Plan.</p>	<p>and 20, if they are determined to be significant as a result of habitat use studies.*</p>		<p>construction species presence) – specialized habitat for wildlife within 120 m of project location.</p>	<p>February 2015</p>	<p>determine if and when additional monitoring and/or mitigation is required and work together to develop a contingency plan. The best available science and information should be considered when determining appropriate mitigation.</p>
<p>Disturbance to amphibian wetland breeding habitat during operation (Feature 16)</p>	<p>Post-construction Disturbance Monitoring Program</p> <p>The breeding density of wetland species (combined and individual), within the habitat, will be monitored and compared to pre-construction conditions.</p> <p>In addition to density, the species observed should be monitored and compared to pre-construction conditions. Particular attention should be paid to those species identified as amphibian breeding habitat (wetland) indicator species as per the draft SWH Ecoregion 7E Criterion Schedule (MNR, 2012), including: American Toad; Gray Treefrog; Western Chorus Frog; Northern Leopard Frog; Pickerel Frog; Green Frog; Mink Frog; and, Bull Frog.</p>	<p>MNR, along with the proponent and other relevant agencies, will collectively review the results of the post-construction monitoring to determine if an ecologically significant disturbance/avoidance effect to wetland breeding amphibians is occurring, and whether such effect is attributed to the access roads and not external factors. These discussions will determine whether contingency measures will be undertaken.</p>	<p>Call count surveys using pre-construction methods, based on Marsh Monitoring Program protocol.</p> <p>Methods are outlined in detail in this Environmental Effects Monitoring Plan.</p>	<p>2 count stations (one within 120m of project location and one more than 120m) in Feature 16, if it is determined to be significant as a result of habitat use studies.*</p>	<p>Once in each of April 1-15, May 1-15 and June 1-15, for one year post-construction.</p>	<p>Presence of calling amphibians in significant wildlife habitat (with consideration for pre-construction species presence) – specialized habitat for wildlife within 120 m of project location.</p>	<p>Report will be submitted to MNR with the following anticipated date: February 2015</p>	<p>Where post-construction monitoring identifies ecologically significant disturbance effects to amphibians the proponent, MNR and other relevant agencies will determine if and when additional monitoring and/or mitigation is required and work together to develop a contingency plan. The best available science and information should be considered when determining appropriate mitigation.</p>

* 3 years of post-construction monitoring is required for the habitats that are determined to be significant through habitat use studies/pre-construction monitoring surveys, with the exception of significant amphibian woodland and wetland breeding habitats, which require 1 year post-construction monitoring.