APPENDIX J:

ENVIRONMENTAL MONITORING PLAN

Jacques Whitford

1.0 ENVIRONMENTAL MONITORING PLAN

Suncor is committed to conducting monitoring activities to address any residual environmental effects and uncertainty. It is not anticipated that the Ripley Wind Power Project will have residual negative effects on the natural or socio-economic environment however, an environmental management plan and environmental protection plan has been developed to address issues that are expected to be a concern or have been noted to be a concern. If any other issues arise a protocol will be developed and mitigation measures completed.

1.1 Purpose of the Environmental Management Plan

This Environmental Management Plan (EMP) provides the environmental protection measures and environmental monitoring plans for activities associated with the operation of the Ripley Wind Power Project. The purpose of the EMP is to:

- manage the environmental aspects of the Project;
- outline responsibility for environmental management under the EMP;
- facilitate implementation of environmental assessment and permitting commitments to minimize and manage potential environmental effects;
- document environmental concerns and appropriate environmental protection measures;
- provide concise and clear instructions regarding procedures for protecting the environment and how to mitigate environmental effects;
- use as a reference document for personnel when planning and/or conducting specific activities; and,
- communicate changes in the program through a revision process.

1.1.1 Responsibilities

It is the responsibility of the Operations Manager to maintain the EMP. The Operations Manager is defined as the person responsible for the overseeing the operations of the Ripley Wind Power Project. The responsibilities of the Operations Manager are outlined below.

1.1.1.1 Operations Manager

The Operations Manager will be responsible to:

- ensure implementation of the EMP and its maintenance;
- comply with all environmental assessment commitments, environmental permit requirements and applicable legislation;
- review and approve EMP revision requests;
- conduct a review a yearly review of the EMP;
- have regulatory authorities review changes of a substantive nature;

- document control;
- issuance of revisions;
- be the primary contact for regulatory authorities with regard to plan implementation and compliance issues;
- ensure that all contractors and sub-contractors are aware of and comply with all the requirements of the EMP; and,
- ensure that all employees are aware of their environmental responsibilities under the EMP and have the appropriate training to fulfil those requirements.

1.1.1.2 All Operator and Contractor Personnel

All contractors and their sub-contractors shall:

- familiarize themselves and their personnel with the EMP;
- provide training to introduce and explain the EMP for all current personnel, and future personnel arriving on the site, including sub-contractors, tradesmen and suppliers;
- distribute copies of the EMP to appropriate personnel;
- ensure revisions are distributed;
- keep their copy of the EMP current and ensure all revisions are entered on a revision control record;
- familiarize themselves and their personnel with the revisions;
- recommend changes to improve the EMP; and,
- comply with all requirements of the EMP, including all environmental assessment and permit conditions, and all applicable legislation.

In the event that the EMP presents a conflict with a requirement, term or condition of relevant acts, regulations, permits or control orders, those regulatory requirements shall take precedence.

1.1.2 Training Requirements

The Operations Manager will ensure that all Project personnel (including contractors and subcontractors) are aware of the requirements of the EMP and ensure that proper training or instruction of individuals is provided in the following areas.

- All Project personnel will be made aware of their responsibilities under the EMP.
- Hazardous materials and POLs (Petroleum, Oils and Lubricants) will be used only by personnel who are trained and qualified in the handling of these materials, and only in accordance with manufacturer's instructions and government regulations. The Workplace Hazardous Materials Information System (WHMIS) program will be implemented and all employees involved with hazardous materials will be appropriately trained. Training is the responsibility of the Contractor.
- Where possible, all workers will receive a brief environmental orientation from the Operations Manager or his designate prior to initiating work at the site.
- It will be ensured that personnel are trained in the use of on-site fire fighting equipment (i.e., fire extinguishers) and that locations of such equipment will be known to all personnel.

1.2 ENVIRONMENTAL PROTECTION MEASURES

1.2.1 Environmental Protection Plan for Construction

An environmental protection plan (EPP) for the construction phase of the Project will be prepared by Suncor. The EPP will comprise:

- environmental protection measures for routine activities associated with the construction of the Project;
- environmental contingency procedures in the event of an erosion control failure, fuel and hazardous material spill, fire and/or encounter of archaeological and heritage resources;
- environmental monitoring, inspection and reporting requirements;
- list of applicable permits, approvals and authorizations; and,
- key contact list.

The EPP will:

- ensure that the Suncor's commitments to minimize environmental effects in general, and specific regulatory requirements, will be met;
- provide concise and clear instructions regarding procedures for protecting the environment and archaeological resources, and minimizing potential adverse environmental effects;
- document environmental concerns and describe appropriate protection measures associated with Project construction;
- provide a reference document for planning and/or conducting specific activities that may have an effect on the environment;
- function as a training aid for environmental education and orientation;
- communicate changes in the program through a revision process; and,
- provide a reference to applicable permits, approvals and authorizations.

The EPP will be an assistant plan to the EMP.

1.2.2 Environmental Protection Procedures for Operation

1.2.2.1 Equipment Maintenance Activities

The facilities (turbine, transmission line and transformer) require regular maintenance inspection by trained technicians. Tree branches touching, or near, a transmission line can conduct electricity and are a potential hazard for transmission line failure, fire or electrical shock to persons nearby. The following protection procedures are intended to minimize the potential environmental effects from routine maintenance activities.

(a) Turbine will be inspected by trained technicians according to the manufacturer's schedule and specifications.

(b) The use, handling and disposal of oils, lubricants and other hazardous materials will follow the procedures outlined in Sections 6.3.

(c) All maintenance waste will be handled in accordance with relevant provincial and federal requirements.

(d) A Fuel and Hazardous Material Spill Contingency Plan has been developed (Section 4.1). Designated personnel will be trained in the procedures and responsibilities outlined in the Contingency Plan.

(e) Vegetation clearing along the transmission lines will be restricted to removal of vegetation that poses a potential hazard for transmission line failure, fire or electrical shock to persons nearby.

1.2.2.2 Petroleum, Oils and Lubricants (POL) Storage, Handling and Disposal

The following protection procedures are intended to minimize the potential for any POL spills on soil, vegetation, surface water, and groundwater.

Storage of POLs

(a) The transport of fuel will be conducted in compliance with the Transportation of Dangerous Goods Act. Deliveries of POLs to the site will be conducted by qualified companies only.

(b) Fuel storage will be undertaken in compliance with applicable provincial and federal regulations, codes and guidelines. Gasoline, diesel or other fuels will be stored on level terrain. It is expected that only a small quantity of fuel may be stored on site.

(c) Oils and lubricants are to be stored on level terrain, at least 100 m from any waterbody.

(d) No POL storage will occur in sensitive areas (e.g., near wetlands, watercourses or wells).

(e) Fire extinguishers will be located near POL storage areas.

(f) Smoking will not be permitted within 10 m of any POL storage area.

Equipment Fuelling

(a) When refuelling equipment, operators will:

- use leak free containers and, where applicable, reinforced rip and puncture proof hoses and nozzles;
- be in attendance for the duration of the procedure; and
- seal all storage container outlets except the outlet currently in use.

(b) Fuelling must be done at least 30 m from a waterbody.

(c) The Contractor will make regular inspections of hydraulic and fuel systems on machinery and leaks will be repaired immediately.

(d) Servicing of equipment will not be allowed within 100 m of a watercourse or drainage ditch.

(e) Fuelling attendants will be trained in the requirements under the Fuel and Hazardous Material Spills Contingency Plan in Section 4.1 of this EMP.

POL Waste Disposal

(a) Waste oils and lubricants will be retained in a closed container and disposed of in an approved manner, and waste solvents and oils will be stored separately.

(b) All used oil and petroleum products, when required, will be removed and disposed of in an acceptable manner in accordance with government regulations, and requirements. Waste oil will be collected separately and offered for recycling or stored for collection by an appropriate special waste collection and disposal company.

(c) Greasy or oily rags or materials subject to spontaneous combustion will be deposited, and kept, in an appropriate receptacle. This material will be removed from the work site on a regular basis and will be disposed of in an approved existing waste disposal facility.

1.2.2.3 Hazardous Material Storage, Handling and Disposal

(a) Hazardous materials will be handled only by personnel who are trained and qualified in the handling of these materials, and only in accordance with manufacturer's instructions and government regulations. The WHMIS program will be implemented in accordance with the Ontario Occupational Health and Safety Act and Regulations. All employees involved with hazardous materials will be appropriately trained.

(b) Hazardous Materials will be stored and handled in accordance with applicable provincial and federal regulations, codes, and guidelines.

(c) Hazardous material containers will be properly labelled in compliance with the requirements of the WHMIS.

(d) Material Safety Data Sheets (MSDS) will be available for all hazardous materials in use or stored on-site.

(e) All reasonable precautions will be implemented to prevent the spillage and release of hazardous materials to the environment.

(f) A Fuel and Hazardous Material Spill Contingency Plan has been developed (Section 5.1). Designated personnel will be trained in the procedures and responsibilities outlined in the Contingency Plan.

(g) All hazardous materials will be removed and disposed of in an acceptable manner in accordance with government regulations and requirements.

(h) Contaminated materials will be separated from uncontaminated materials and disposed of at approved waste disposal facilities.

1.3 ENVIRONMENTAL MONITORING

1.3.1 Sound

1.3.1.1 Objective

The Ripley Wind Power Project will emit sound. The environmental assessment concluded, based on modelling and manufacturer's data that these emissions will not exceed the MOE guideline of 40 dBA at the nearest residential receptors. The environmental assessment predictions will be verified by conducting ambient sound pressure level monitoring. The purpose of the sound monitoring program is to verify environmental assessment predictions and confirm that mitigation measures are not required.

1.3.1.2 Methods

An accurate characterization of ambient sound pressure levels at residential receptors should be based on measurements of the relationship between ambient sound pressure levels and wind speed. This is due to the nature of sound emissions from wind turbine generators (i.e, the wind turbine generators only operate and produce sound emissions when there is wind, which generates an additional amount of background masking sound).

Ambient sound pressure levels will be continuously measured at selected residential receptors over a consecutive 2-week period using a Type 1 Sound Level Meter with data logging capabilities. Wind speed and wind direction data will also be simultaneously collected. The measured ambient sound pressure levels will be reported as 10 minute equivalent (Leq) sound levels and the wind speed/direction data will be reported as corresponding 10 minute averages. The sound and wind data will then be combined to produce a plot of background ambient sound pressure levels versus wind speed. Using the regression line from a statistical analysis of the background sound level data, the relationship between background ambient sound pressure levels and wind speed will be determined.

Within a year of the Ripley Wind Power Project going into service, a second sound monitoring event will be conducted. This will be used to verify compliance with applicable noise guidelines, to assess the changes in ambient sound pressure level due associated with the operation of the wind turbine generator, and to verify the predicted ambient sound pressure levels at the nearest residential receptor. This monitoring event will be conducted using an identical methodology to that used in the characterization of background conditions. The resulting data plot and correlation of ambient sound pressure level with wind speed will then be compared with the background sound pressure levels to verify earlier predictions and confirm the effectiveness of mitigation. These data will provide Kensington-area sound data for future planning.

1.3.1.3 Timing

Ambient sound pressure levels will be measured at selected residential receptors over a 2-week period prior to operation of the wind turbine. Within one year of the wind turbine generator going into service, a second monitoring event will be conducted.

1.3.1.4 Response-Action Plan

In the event that the measured ambient sound pressure levels at the site exceed the applicable guidelines or if complaints are reported about sound emissions from the Ripley Wind Power Project, the issue will be documented and an investigation into the source of the sound emissions will be conducted. This investigation will consist of first verifying that the sound emissions causing the exceedance or complaint are originating from the facility and under what conditions they may be occuring. If it is determined that the sound emissions from the facility are responsible for the exceedance or complaint, further action will be taken to identify the sound emission source (for example specific maintenance activities, or accelerated wear of turbine components such as generator or bearings). Appropriate remedial actions to mitigate the sound emissions will be developed and implemented.

In the event that the unacceptable (e.g., exceeding applicable guidelines) sound emission is related to accelerated wear, the appropriate maintenance and repair will be done, and the facility maintenance schedule will be revised to account for this and minimise the potential for a reoccurrence.

In the event of any valid complaints or measured exceedances of applicable guidelines, a report shall be filed with the MOE with the particulars of the concern, the suspected source, and any remedial actions taken or to be taken to resolve the concern.

1.3.2 Shadow Flicker

1.3.2.1 Objective

The purpose of this monitoring program is to document shadow flicker, if a complaint related to shadow flicker is received. It is expected that the effects of shadow flicker on potential receptors will be limited, and less then the required limit of 30 hours per year.

Shadow flicker caused by wind turbines is defined as alternating changes in light intensity caused by the moving blade casting shadows on a stationary object.

1.3.2.2 Methods

A registry will be established to record complaints of shadow flicker caused by the turbine. When a complaint of shadow flicker is received from a receptor located within 1,000 m of the turbine, shadow flicker will be monitored from that receptor using photographs, and/or video recording at the appropriate time of day and year. Monitoring will be conducted at sunset and/or sunrise, when the sun is low on the horizon and most likely to produce shadow flicker for a receptor. The nearest residents to the east and west of the turbine will also be interviewed to collect anecdotal information on shadow flicker.

1.3.2.3 Timing

Shadow flicker will be monitored as required during operation of the turbine. When monitoring is required, it will be conducted once during the summer and once during the winter.

1.3.2.4 Response-Action Plan

When a complaint or complaints of shadow flicker are received from a receptor located within 1,000 m of the turbine, shadow flicker will be monitored from that receptor. Information collected from the shadow flicker monitoring will be used for future planning of wind turbine locations, if required.

1.3.3 Birds

1.3.3.1 Objective

The purpose of the bird monitoring program is to verify that operation of the Project does not have a substantial environmental effect on bird usage or mortality in the vicinity of the wind turbines. The specific goals of the bird monitoring program are to collect information on:

- the species and number of birds using and moving through the area;
- bird movement patterns in the Primary Study Area;
- bird activities within the Primary Study Area; and,
- bird mortality in the vicinity of the turbine.

Data on bird abundance and usage of the turbine site will be gathered and documented during the spring and fall migration periods, before and after construction of the turbine. Bird mortality will be documented following construction of the turbine.

1.3.3.2 Methods

Bird Use and Abundance

Surveys will be conducted within the Primary Study Area and a reference location. The reference site will be established in the same habitat type as the Primary Study Area, ideally in a setting where habitat types are unlikely to be disturbed over the course of the monitoring program.

Bird surveys will be stratified by habitat to account for variation associated with habitat type. A number of examples of each habitat type would be sampled to provide an indication of variability in bird abundance. Habitats would be surveyed at designated sampling points where 20-minute point counts would be made of birds observed or heard within a radius of 100 m. Sampling points will be established within a 500 m radius of the turbine location.

During each survey event, the observer will record information on the number and species or major bird group (e.g., gull, duck, songbird), as well as the behaviour (i.e., flying, foraging, perching). When observations are made of flying birds, the general direction and an estimate of flight height category will be recorded. Other data that will be recorded include date, location, weather conditions (particularly visibility) and survey period.

As weather tends to influence pulses of migration (e.g., strong southerly winds in spring) and visibility, a daily weather log will be kept and surveys will only be conducted during suitable observation conditions. For example, surveys will not be conducted on days with heavy fog or rain.

Survey times will concentrate on early morning and early evening, as these are typically active periods for birds.

Baseline pre-construction monitoring of bird usage will be conducted prior to completion of construction of the wind turbine. Monitoring will be conducted in the spring and fall of 2005. One breeding bird survey will be done at the turbine and reference locations during June 2005.

Post-construction monitoring of bird usage will be conducted after the wind turbine becomes operational. Scheduling of the post-construction monitoring will be similar to that of the pre-construction monitoring. Monitoring will be conducted in the fall of 2006 and in the spring of 2007. One fall survey will be conducted prior to November 30, 2006. One spring survey will be conducted between mid-March and late April 2007. One breeding bird survey will be conducted at the turbine and reference locations in June 2007.

Bird Mortality

Monitoring for bird mortality will be conducted around the turbine sites only. A search area having a 50 m radius will be established at the turbine sites and will be centred around the turbines.

The search area will be searched in a methodical fashion using a series of transects extending from the turbine base out to the end of the radius. Transects will be located radially from the turbine base in the following directions: N, NNE, NE, ENE, E, ESE, SE, SSE, S, SSW, SW, WSW, W, WNW, NW and NNW. Each transect will be walked at a rate of 45-60 m/min searching both sides of the transect, and will be conducted early in the morning to reduce the potential for scavengers to remove carcasses. Bird carcasses that cannot be positively identified in the field will be recorded, bagged, labelled, frozen and submitted to an ornithologist, or other qualified individual, or identification. Wherever possible, the cause of death will be determined by visual assessment of the carcass.

Data recorded during each search will include search location, location relative to the turbine, species, carcass condition and weather conditions for the period between searches. When species cannot be identified due to decay or scavenging, information such as relative size or species group (e.g., gull, duck, songbird) will be recorded, if possible.

Bird mortality will require correction for scavenger removal of carcasses and field observation abilities of surveyors. Scavenger removal of carcasses will be determined by placing fresh bird carcasses of varying sizes in known locations at the reference site and monitoring them daily. Carcasses used will be readily available (e.g., roadkill, carcasses from wildlife control projects, chickens, pigeons or quail). Additionally, trials will be conducted at the reference site with all surveyors to assess observer bias. This will entail the placing of carcasses within the search area without the surveyors knowledge, and assessing the surveyor's ability to find the carcass. The results of these carcass removal and observer bias trials will be used to extrapolate from the empirical results of the carcass monitoring and derive an estimate of total carcass numbers.

Under the Migratory Birds Convention Act, a permit is required for the collection of a migratory bird, feathers or parts of a migratory bird that is dead or alive. Prior to the bird mortality monitoring, a permit will be obtained to collect the carcasses. All conditions of permit will be followed during the bird mortality monitoring.

Monitoring of bird mortality will be conducted after construction of the turbine during spring and fall migration and twice during the summer months.

1.3.3.3 Response-Action Plan

If changes in bird habitat use is observed at the turbine sites, the bird monitoring may be extended or revised, on consultation with the MOE. Information collected from the bird monitoring will be used for future planning of wind turbine locations, if required, and possibly to develop further mitigation, if warranted. If required, additional mitigation will be based on the current technology and methodologies available at the time, which may include such elements as alteration of lighting or operational changes.

The monitoring results will be reviewed and provided to the MOE. Monitoring would not be continued beyond the first year unless the results indicate that it would be warranted. The report on the monitoring results would make recommendations on continuation of the program for consideration by MOE.

1.3.4 Bats

1.3.4.1 Objective

The purpose of bat mortality monitoring will be to verify that operation of the Project does not have a substantial environmental effect. The specific goal of the bat monitoring program is to collect information on bat mortality, if any, in the vicinity of the turbines following construction of the turbines.

1.3.4.2 Methods

Monitoring for bat mortality will be conducted using similar methods as bird mortality monitoring and will be completed at the turbine sites only. Search areas having a 50 m radius will be established at the turbine sites and will be centred around the turbines.

Each search area will be searched in a methodical fashion using a series of transects extending from the turbine base out to the end of the radius. Transects will be located radially from the turbine base in the following directions: N, NNE, NE, ENE, E, ESE, SE, SSE, S, SSW, SW, WSW, W, WNW, NW, NNW. Each transect will be walked at a rate of 45-60 m/min searching both sides of the transect, and will be conducted early in the morning to reduce the potential for scavengers to remove carcasses. Bat carcasses that are recovered will be recorded, bagged, labelled, frozen and submitted to a wildlife biologist for identification, if required. Wherever possible, the cause of death will be determined by visual assessment of the carcass.

Data recorded during each search will include search location, location of carcass relative to turbine, species, carcass condition and weather conditions for the period between searches.

1.3.4.3 Timing

Monitoring of bat mortality will be conducted after construction of the turbine during the late summer (August) and may be completed in conjunction with the bird mortality surveys during the first year of operation.

1.3.4.4 Response-Action Plan

Information collected from the bat monitoring will be used for future planning of wind turbine locations, if required and as applicable. Information collected would be used to develop further mitigation if warranted. If required, additional mitigation will be based on the current technology and methodologies available at the time.

1.3.5 Aesthetics and Visual Impacts

1.3.5.1 Objective

The purpose of monitoring aesthetics is to document the visual impact of the Ripley Wind Power Project and to provide data for future planning of wind turbine locations.

1.3.5.2 Methods

A registry will be established to record both negative and positive comments on the aesthetics and visual impact of the wind turbines. Media comment on the wind turbines will also be collected and documented. Photographs will be taken of the turbine locations from a minimum of two vantage points.

1.3.5.3 Timing

Photographs will be taken at least once after the turbines becomes operational. The comment registry will be maintained and media comment will be collected throughout the operation of the project.

1.3.5.4 Response-Action Plan

Information collected from the aesthetics and visual impact monitoring will be used for future planning of wind turbine locations, if required.

1.4 CONTINGENCY PROCEDURES

1.4.1 Fuel and Hazardous Material Spills

1.4.1.1 Overview

This Fuel and Hazardous Material Spills Contingency Plan presents a detailed response system to deal with accidents such as the release of petroleum, oils or lubricants (POLs) or other hazardous materials. The objectives of the Plan are to minimize the following:

- danger to persons;
- pollution of land and water;
- affected area; and,
- degree of disturbance during clean-up.

1.4.1.2 Environmental Concerns

Hazardous liquid products associated with operations, such as hydraulic fluids, lubricating oil, transformer oil, solvents, and anti-freeze will be used in relatively small quantities. These hazardous materials can be damaging to vegetation, soil, surface water, groundwater, wildlife, and aquatic organisms.

1.4.1.3 Personnel Training

Hazardous materials and POLs will be used only by personnel who are trained and qualified in the handling of these materials, and only in accordance with manufacturer's instructions and government regulations. The WHMIS program will be implemented and all employees involved with hazardous materials will be appropriately trained. Training of all personnel including sub-contractors, is the responsibility of the Contractor.

1.4.1.4 Prevention

Qualified personnel will conduct regular inspections of wind turbines and maintenance equipment for wear and tear, and leaks or damage to equipment.

1.4.1.5 Response Action Plan

(a) The individual who discovers the leak or spill must immediately attempt to stop and contain the leak or spill.

(b) Any spill or leak must be reported immediately to the Operations Manager.

(c) If a spill is greater than 5 litres or has the potential to enter a watercourse (i.e., within 30 m of a watercourse), work in the immediate area will be halted and the Operations Manager or designate will immediately report the spill to the MOE Spills Action Centre, 24 hour Report Line. A Spill Report Form will be filled out and will include:

- a description of the source, including the name of the owner or operator;
- the nature, extent, duration and environmental impact of the release;
- the cause or suspected cause of the release; and,
- any remedial action taken or to be taken to prevent a recurrence of the leak or spill.

(d) If a spill is less than 5 litres and are easily contained and cleaned up, with no potential to cause environmental damage, it does not need to be reported to the Spills Action Centre, but should be documented (see (e) below).)

(e) The site Contractor will have the full authority to take appropriate action without unnecessary delay. The Spill Report Form should be filled out immediately following the discovery of the spill or leak, by the Contractor, and forwarded to the Operations Manager. Spill Reports will be made available to the MOE upon request.

(f) The Contractor will assume the overall responsibility for coordinating the clean-up and maintaining this contingency plan current and up-to-date. The Contractor will, in consultation with the regulatory authorities (if warranted):

- deploy on-site personnel to contain the spilled material using a dyke, pit, or absorbent material;
- assess site conditions and environmental impact of various cleanup procedures;
- choose and implement an appropriate cleanup procedure;
- deploy on-site personnel to mobilize pumps and empty drums (or other appropriate storage) to the spill site;
- dispose of all contaminated debris, cleaning materials, and absorbents by placing in an approved disposal site; and,
- take all necessary precautions to ensure that the incident does not recur.

(g) In cases reported to the Spills Action Centre, a completed Spill Report Form will be sent to the MOE by the Operations Manager, as soon as possible, and no later than 30 days after the spill.

1.4.1.6 Spill Cleanup Resource List

During construction, the following resources will be available at an appropriate location in readiness to respond to accidental releases of fuels and/or hazardous materials.

(a) Absorbent materials (i.e., sorbent pads, Sorb-All, peat moss).

(b) Small equipment such as shovels, rakes, tool kit, sledgehammer, buckets, stakes, tarpaulins, one empty drum, and protective equipment.

(c) A contact list for spill response.