

**Appendix L**  
**Environmental Management Plan**

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***Greenwich Wind Farm  
Environmental Management and Protection Plan***



***DRAFT***

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## A. INTRODUCTION

This Environmental Management and Protection Plan is intended to identify key project environmental information, instructions and mitigation measures specific to the Greenwich Wind Farm Project (GWF or “the project”). It will ensure that the relevant permitting conditions, environmental mitigation and enhancement measures identified in the Environmental Screening Report (ESR), the consenting permitting conditions and requirements of any legal agreements (including landowner agreements) are established and implemented in the pre-construction, construction and subsequent operation and maintenance phase of the wind farm.

This Plan is applicable to Renewable Energy Systems (RES) employees working on the pre-construction, construction, and operation & maintenance phases of the Greenwich Wind Farm Project.

The plan will be adhered to, the relevant section completed and the document signed off, up issued and handed over to the relevant Manager (detailed below in brackets) at the end of the following stages:

- *Pre-construction (Development Project Manager DPM) – Issue 01*
- *Construction (Construction Project Manager CPM) – Issue 02*
- *Operation (Operations Manager OM/Wind Farm Owner) – Issue 03*

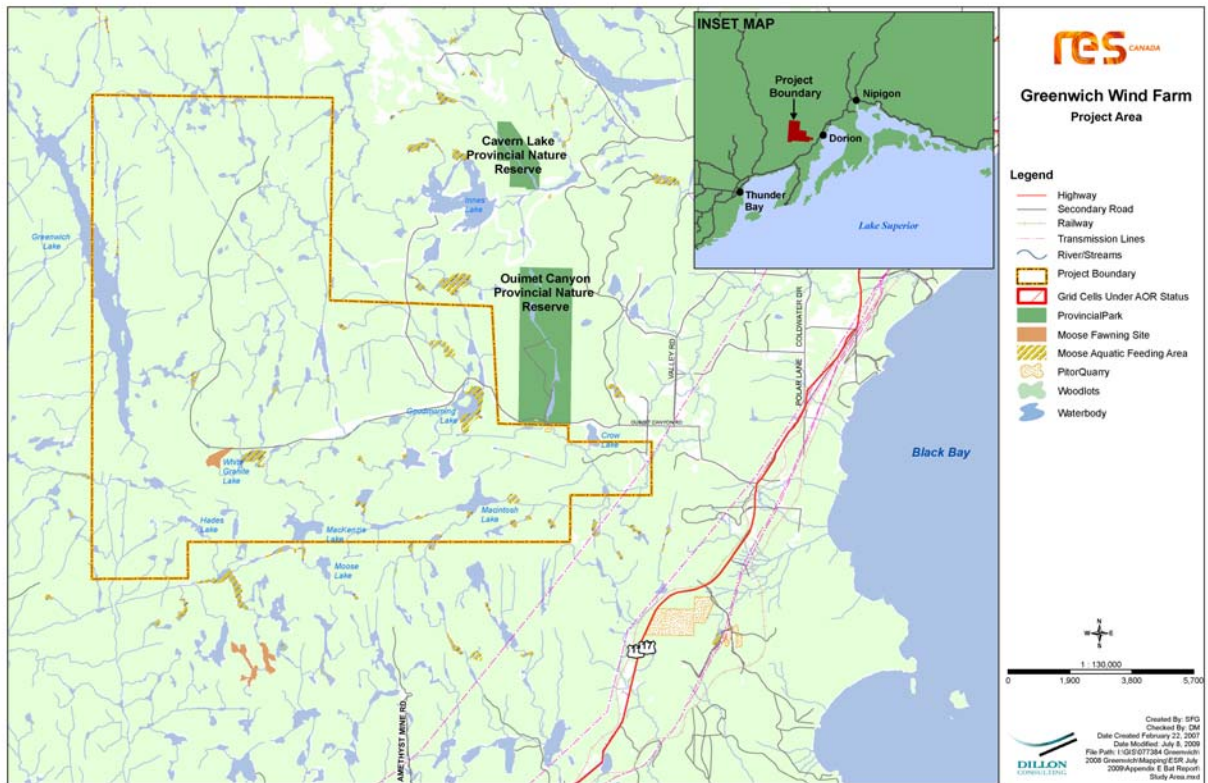
This document also provides general guidance to RES’s subcontractors on environmentally safe working procedures and standards for particular operations that are to be implemented during the construction phase of this wind project. Separate related plans, in a similar format, have been developed and prepared by RES for:

- *Emergency Response*
- *Fire Prevention & Mitigation*
- *Health & Safety*
- *Site Security*
- *Construction Management*
- *Stormwater Pollution Prevention (SWPPP)*

## B. PROJECT DESCRIPTION

RES is proposing to construct and develop the GWF to generate electricity in Northern Ontario. The project is located approximately 75 kilometers northeast of Thunder Bay and lies partially within the Township of Dorion and partially on MNR-administered unorganized territory, in the district of Thunder Bay, Ontario (see **Figure 1**). The wind farm is expected to consist of up to 72 wind turbines that will generate 165.6 megawatt (MW) of electricity. In addition to the turbines, the project will require a 10.7 km 230 kV power transmission line (double circuit) be constructed to the east of the study area in order to connect the GWF to the provincial grid system, approximately 10 km away.

**Figure 1:  
Project Location**



The project components include:

- Wind turbines;
- Pad mount 600 V / 34.5 kV step up transformers (located at or near the base of each turbine);
- 34.5 kV collection system to link the wind turbines to the substation (while these lines are expected to be primarily above ground, there may be sections of the line where buried cables would be preferable. This would be determined in the final design for the project);
- Substation (to step up the electric output from 34.5 kV to 230 kV);
- A 10.7 km, 230 kV double circuit transmission line;
- A switching station at the point of connection with the provincial grid;
- Turbine access roads;
- Two meteorological towers (one at the western end and one at the northern end of the wind farm which are already installed and operating);
- Staging areas for assembly of wind turbines, only during construction; and



- *Batch plant (less than 1 MW in size) for the manufacture of concrete (only during construction and only if concrete cannot be sourced from a local supplier).*

The wind turbine generators will be mounted on tubular steel towers and include an overhead and underground gathering system, construction of substation and interconnection switchyard and site roads and crane pads. Construction is anticipated to take approximately 18 to 24 months.

The turbine towers are a tapered tube with an internal ladder giving access to the nacelle. The turbine controller unit sits inside the tower base at ground level. Each turbine will have an adjacent pad mount transformer.

### **C. EMPLOYMENT & AUTHORITY OF ENVIRONMENTAL MONITOR**

RES will appoint an Environmental Monitor (EM) to observe all aspects of site construction work throughout the construction phase of the project. The EM will ensure that RES's own environmental management system, as presented in section **D. Environmental Monitoring**, is being observed and will ensure compliance with all site permits and mitigation measures required by local, provincial or national law or the Contract.

**Reporting:** The EM will report on a weekly basis with respect to any environmental problems identified or discovered as well as corrective actions taken to resolve the problem. In the event of a noncompliance issue, the EM will work directly with those contractors and individuals involved to correct the violation. Weekly reports to be prepared and sent to RES and will include:

- *Period covered by the report;*
- *Construction Activities observed;*
- *Compliance with applicable SCA conditions; and,*
- *Details of any corrective action that becomes necessary.*

The EM will co-ordinate activities with the Archaeological Monitor who will be working in accordance with the requirements of the "Cultural Resources Construction Monitoring and Construction Plan".

**Stop Work Criteria:** The EM will have authority to stop work in the location of the non-compliance and/or stop the activity causing the non-compliance, until such time as satisfactory measures are taken to stop continuing non-compliance. The following are considered "stop work" criteria:

- *Failure of best industry practices which result in off-site sedimentation that violates water quality standards of the state.*
- *The failure of pollution prevention control measures designed to prevent the discharge of hazardous substances or oil in storm water discharges from the site which causes a release to the environment.*
- *The presence of unidentified hazardous materials as evidenced by significant soil staining, odor, or oil in ground water.*
- *Failure to take corrective action within an acceptable time period following a non-compliance with Applicable permits & legislation, the Site Certification Agreement or restrictions in respect of*



*archaeologically sensitive areas.*

In the event of any work stoppage or in response to any emergency situation the EM must promptly inform the RES site management, and any appropriate local authorities, either by phone or in person with facsimile (fax) confirmation as required. The EM shall observe implementation of the corrective actions to determine whether and when compliance is achieved. As soon as compliance is achieved the EM shall withdraw the stop-work notice.

#### **D. ENVIRONMENTAL MONITORING**

To aid all parties involved, an environmental checklist has been created (**Appendix 1**). This covers all environmental risks commonly experienced during wind project construction. It is vital that this checklist is reviewed to ensure that all environmental risks for this particular project location are included.

The following sections refer to the numbered checklist and provide minimum requirements to address each environmental hazard.

#### **E. OBJECTIVES AND PHILOSOPHY**

RES is recognized as one of the top renewable energy companies. RES has been developing, constructing, owning, and operating renewable energy projects since 1997. RES encompass all the necessary expertise to create renewable energy projects; ranging from wind and solar farms and in the near future biomass and energy storage. Our in-house expertise ensures a smooth transition, from one phase to the next, that budgeted costs are met, and the project is completed on time.

RES is also deeply involved in the research and development opportunities of other forms of renewable energy, which will play a larger role in meeting future energy needs. Currently, RES is developing commercial-scale solar projects in several states. From development to project design, through civil and electrical engineering, to construction and project operations, RES delivers quality and reliability.

This Environmental Management and Protection Plan (EMP) has been developed by RES and Dillon Consulting Limited (Dillon) to provide the required protection measures for the activities associated with the construction, maintenance and operation phases of the Greenwich Wind Farm, and as such, these are long term initiatives. The purpose of the EMP is to further expand on the environmental protection and management measures that were committed to in the RES Canada GWF ESR.

This EMP forms an integral component of all construction work to be done on this project. The purpose of the EMP is to:

- *Ensure that all commitments to minimize environmental effects in general, and specific regulatory requirements, will be met;*



- *Provide concise and clear instructions regarding measures 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; and,*
- *Communicate changes in the program through a revision process.*

Through field directives and advice offered by trained and experienced personnel, all users of the EMP will apply appropriate environmental protection practices. The EMP is a standalone document that provides guidance for the implementation of sound environmental protection practices, though it can be read in conjunction with other environmental regulatory documents such as the ESR for the Project (Dillon 2009) as well as other approval applications (e.g., Building Permit) for further detail and background.

#### **F. A LIVING PLAN**

RES recognizes the importance of the EMP and its execution during all phases of the project. Many of the commitments and construction measures discussed in the plan are done so with the latest information and with best industry practices. RES realizes that during the construction, operation and maintenance of the project new and innovative techniques may be developed which are more beneficial to the protection of the natural environment. In addition, the plan recognizes the potential to discover undocumented environmentally sensitive areas. Section 5.0 provides some additional details on our approach.

As such, RES will encourage the investigation and use of these new techniques should they improve upon the ones discussed in the following EMP. This *Living* approach to the EMP will ensure that these new techniques can be used to improve our performance and to further mitigate any potential impacts to the natural environment.

## 1.0 ENVIRONMENTAL PROTECTION AND CONSTRUCTION MEASURES

Site development and road construction projects require a variety of construction practices to complete the work. Potential environmental interactions related to these construction practices are identified in this section. Environmental management measures, designed to reduce potential for environmental effects, are included within each subsection. General environmental protection measures are listed below.

### 1.1 General Measures

- *RES will be providing safety training and an environmental introduction to all employees that will work on the site.*
- *Environmentally sensitive areas will be staked out prior to work operations so that these areas are protected.*
- *Work will comply with conditions outlined in the Approval-to-Proceed and any associated permits/approvals.*
- *A Buffer Zone will be maintained on each side of a wetland/watercourse.*
- *Work conducted in the vicinity of wetlands/watercourses will be conducted in a manner which ensures that erosion and sedimentation of wetlands/watercourses is minimized.*
- *Erodible soils will not remain exposed for longer than absolutely necessary. In areas where extensive erosion occurs (e.g., along steep slopes) or in environmentally sensitive areas, an active re-vegetation program will be implemented as soon as possible following disturbance to ensure rapid re-vegetation.*
- *Appropriate erosion control measures will be installed prior to conducting the work. Work will be completed as soon as possible, and will be suspended during and immediately after intense rainstorms and during periods of high runoff.*
- *The area of disturbance will be limited to that which is absolutely necessary to conduct the work.*
- *Necessary means will be undertaken to ensure that work does not intrude on property outside the project boundary. This may include staking out private property prior to work operations.*

Activity-specific environmental protection measures are provided in the following subsections.

### 1.2 Vegetation Clearing and Disposal

#### *Outline of Procedure*

Vegetation clearing consists of the removal and disposal of all trees, shrubs, fallen timber, logs and other surface litter within the work area as directed and designated by the plans/drawings or the Environmental Monitor. Vegetation clearing may be required prior to the removal of soil during site development and/or road construction.

### *Principal Environmental Concerns*

Cut vegetation piled near or in a watercourse could degrade aquatic habitat or obstruct fish passage. Other potential environmental effects include altering wildlife habitat. Over-cutting exposes remaining trees to an increased risk of blow down. Removal of forest or hedgerow vegetation can result in wind stress, desiccation, and increased soil erosion.

### *Environmental Management Measures*

The potential for effects on wildlife and wildlife habitat from vegetation clearing and disposal has largely been addressed through turbine placement. Mitigation measures to be implemented were discussed with Ministry of Natural Resources (MNR) staff. Setbacks were generally adopted from the Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales - Draft (OMNR November 2008). Prior to the release of the Stand and Site Guide more restrictive setbacks were in place for Moose Aquatic Feeding Areas and Moose Calving Areas. These more restrictive setbacks come from the Operational Prescriptions for Areas of Concern for the Lakehead Forest Management Plan – 14 as directed by previous MNR technical documents also replaced by the Stand and Site Guide. These more restrictive setbacks have been retained in the guidance below. In the case of bats, no setbacks are provided for bat foraging habitats. Therefore, recommended setbacks identified below were developed based on site specific studies for bats. The Potential Peregrine Falcon Nest setback has been applied to Good Morning Lake site only. Mitigation measures are detailed in the ESR for the GWF.

In addition to the proposed mitigation measures implemented during the siting of turbines, additional recommendations are proposed in the ESR to ensure compliance with the Migratory Birds Convention Act, 1994. For the proposed undertaking, the constraints identified preclude the placement of wind turbines and where possible, the development of any associated infrastructure. If necessary, associated infrastructure or equipment encroachment into these constraint areas will follow the Standards and Guidelines identified in the Stand and Site Guide. In addition to the environmental protection measures described above, the following protection measures will minimize the potential environmental effects of vegetation clearing and disposal.

- *Clearing will be minimized to that necessary to construct and operate four turbines, install collector lines and transmission lines and implement access roads.*
- *Best efforts will be made to schedule clearing of non-agricultural land outside of the sensitive bird breeding and nesting season (May 1 to August 31).*
- *Hedgerows will be left intact, where possible.*
- *Slash and any other construction material or debris will not be permitted to enter any watercourse.*
- *Slash will be piled outside the buffer zone of a wetland or watercourse (i.e., greater than 30 m from a wetland or watercourse) for subsequent chipping and disposal. In cases where maintaining a 30 m buffer around watercourses would interfere with the landowner's agricultural operations, temporary storage of slash may occur within the 30 m buffer but not within 10 m of a watercourse.*
- *Slash will not be burned.*

### 1.3 Ditching

#### *Outline of Procedure*

Ditching consists of excavation and grading to construct a new ditch or to re-establish an existing, deteriorated ditch. Ditching is undertaken to affect drainage and to correct deficiencies such as erosion, non-conformity in grade and restrictive vegetative growth that impedes drainage.

#### *Principal Environmental Concerns*

Where ditching is undertaken, potential runoff of sediment-laden water could result in effects on water quality, aquatic ecosystems or other environmentally sensitive areas.

#### *Environmental Management Measures*

In addition to the general environmental protection measures described above, the following protection measures will minimize the potential environmental effects of ditching:

- *Ditching will proceed in the upslope direction.*
- *Trapezoidal ditches result in less erosion of the ditch bottom and will be installed where space requirements allow. In cases where the available right-of-way is insufficient in width to achieve the desired cross-section, the alternative V-bottom ditch will be constructed.*
- *Where ditching takes place near a watercourse, no ditching will be done within 30 m of the watercourse. Vegetation located in this 30 m buffer area acts to filter any sediment laden runoff water prior to entering the watercourse.*
- *Within 48 hours of doing ditching work, or as directed by the Environmental Monitor, all exposed soils will be either seeded with non-invasive, herbaceous, native species or receive straw/hay mulch application.*
- *Ditching will not be done prior to May 1 or after September 30, unless approved by a permit.*
- *If ditching prior to June 1 or after September 30, mulch or an erosion control blanket (i.e., jute mat, erosion control mat) must be applied overtop of the seed.*
- *If seeding is not possible due to lateness of the season, the exposed soils will be completely covered for “overwintering” with either mulch or an erosion control blanket.*
- *Erosion control material will be removed during the following spring, and the area will be prepared for seeding.*
- *The Environmental Monitor will direct additional seeding or erosion control requirements within this 30 m zone, as appropriate.*
- *A check dam will be installed at the end of the ditch where it meets the Buffer Zone or other environmentally sensitive area. Additional erosion control structures will be installed further up the ditch as required or as directed by the Environmental Monitor.*
- *Natural drainage will be maintained whenever practical.*

- *Ditches will be directed into surrounding vegetation where possible, or a sediment collection pond, rather than emptying into a natural wetland/watercourse.*
- *Depending on the erosion potential or to ensure stabilization, the ditch may be hay mulched, hand seeded, hydro seeded or lined with an erosion control mat (i.e., jute mat and/or vegetative erosion control blanket).*
- *Rip-rap or an erosion control blanket designed for high flows will be used to line the bottom of ditches that have steep grades and/or excessive erosion as directed by the Environmental Monitor.*
- *Petroleum, septic wastes or otherwise contaminated material encountered in the ditch will be reported to the Environmental Monitor and to the Emergency Response.*

#### **1.4 Grubbing, Stripping, and Excavation**

##### *Outline of Procedure*

Grubbing refers to the removal of all stumps, roots, root mat and other debris, while stripping refers to the removal of topsoil. Materials excavation refers to the excavation of all other soil materials as included in earthworks, preparation of roadbed, site development, trenches, drains, borrow from adjacent land or pits, intersections, private entrances and other similar works.

##### *Principal Environmental Concerns*

The principal concern associated with these activities is the potential for erosion due to exposed soil areas and the associated sediment-laden runoff effects on water quality, aquatic ecosystems and environmentally sensitive areas.

##### *Environmental Management Measures*

In addition to the general environmental protection measures described above, the following protection measures will minimize the potential environmental effects of grubbing, stripping, and excavation:

- *Erosion control measures are to be in place prior to any grubbing activities if site conditions warrant or as directed by the Environmental Monitor.*
- *Topsoil and excavated overburden and bedrock will be stored in separate stockpiles for later use during rehabilitation.*
- *Dewatering of excavated areas will make use of measures to minimize and control the release of sediment laden water through the use of filtration through erosion control devices, settling ponds, straw bales, geotextiles or other devices as necessary.*
- *Water from dewatering will not be permitted to directly enter a watercourse or wetland.*
- *Care will be taken during excavation activities as there is potential for disturbing a decommissioned landfill present in the Study Area.*
- *Watercourse culvert crossing as required for access roads for the nine turbine locations will span the watercourses in accordance with previous practices by the Municipality.*

## **1.5 Disposal of Excavated Waste Materials**

### *Outline of Procedure*

Waste materials are generated during excavations involved with site development and road construction practices.

### *Principal Environmental Concerns*

The principal concern associated with this activity is the potential for erosion of disposed materials and the associated sediment-laden runoff effects on water quality, aquatic ecosystems and environmentally sensitive areas.

### *Environmental Protection Measures*

In addition to the general environmental protection measures described above, the following protection measures will minimize the potential environmental effects of the disposal of excavated waste materials. It is important to note that, once material is deemed to be waste material, it may become the property of the Contractor or other party. Where this occurs, these same protective measures are recommended to be followed by the user of the material once removed from the site:

- *If the excavated waste material is to remain in one disposal location for extended periods of time, appropriate protection measures will be taken such as stabilization of the material and/or perimeter sediment control.*
- *Excavated waste materials will not be disposed of in an environmentally sensitive area or in the Buffer Zone of a watercourse/wetland.*
- *Excavated materials will largely be used on original clearing sites, where appropriate.*

## **1.6 Infilling and Grading**

### *Outline of Procedure*

Infilling consists of placing soil and/or rock for site development and construction purposes. This includes preparation and construction of roadbeds, embankments, and slopes. Placing material in depressions to level them off helps to minimize ponding. Grading consists of shaping the unpaved road or site surface and is used to stabilize a surface, improve surface drainage and to provide for runoff in a controlled manner.

### *Principal Environmental Concerns*

The principal concern associated with these activities is the potential for erosion due to exposed soil areas and the associated sediment-laden runoff effects on water quality, aquatic ecosystems and environmentally sensitive areas.

### *Environmental Management Measures*

In addition to the general environmental protection measures described above, the following protection measures will minimize the potential environmental effects of infilling and grading:

- *When grassed areas are encountered during grading, every effort will be made to leave such grassed areas intact.*
- *Areas where little or no vegetation exists can be graded after a light rain when the surface is in an optimum state for compaction, but not after heavy rains which promote runoff conditions.*
- *Where possible, a berm will not be left at the edge of the road. Grading unpaved roads often results in the creation of a windrow along the edge of the road by the grader blade. The windrow will be collected and re-used in construction or properly disposed of off-site. In cases where this is not possible, diversions will be installed in the windrow at locations outside of Buffer Zones or environmentally sensitive areas, to allow surface water to drain into a ditch or vegetated area.*
- *The elevation of the in filled or graded area will be maintained higher than the ditch it is draining into.*

### **1.7 Culvert Installation and Stabilization**

#### *Outline of Procedure*

Culvert construction will include the installation of a steel, concrete or plastic culvert, backfilling around the culvert, construction of the roadbed, and stabilization of culvert inlets and outlets.

#### *Principal Environmental Concerns*

The principal concerns associated with culvert installation and stabilization include the potential erosion of material around the culvert, sedimentation of the water, alteration of the hydraulic regime leading to streambed or bank scouring, and disruption of fish habitat and migration patterns.

Access roads will be approximately 10 m wide to accommodate maintenance vehicles and heavy equipment for larger repairs/replacements. The excavation of earth and some blasting of rock are expected to be required for the construction of the turbine access roads. It will be necessary to cross several watercourses (about 11) with the turbine access roads. Further, improvements to 10 existing road crossings may be required. The number and location of the crossings is to be confirmed based on additional planned field work. Access road culverts, comprised of various diameters, are to be constructed across the various watercourses in order to accommodate vehicular access and construction traffic across the watercourse while maintaining unimpeded flow within the watercourse. The type of crossings and the mitigation measures will be developed in consultation with the appropriate governing bodies.

It is expected that no navigable waterways will be traversed, although an official determination by Transport Canada will be sought during the detailed engineering stage of the project.

### *Environmental Management Measures*

The majority of road crossings over small to medium watercourses will be handled by installing an appropriately-sized culvert by open cutting creek/drain beds to install at an acceptable elevation to ensure proper fluvial function and fish passage. Conversely, electrical wires are generally suspended and installed over aquatic features. Few net effects will remain after appropriate mitigation measures have been implemented. These effects are considered minor and can generally be compensated through the implementation of basic restoration activities to replace what was lost (e.g., riparian plantings, reseeding, substrate enhancement/replacement etc).

For more detailed information on environmental mitigation and protection appropriate to these types of watercourse crossings, the DFO Operational Statements for “*Overhead Line Construction*” and “*Isolated or Dry Open-Cut Stream Crossings*” should be consulted.

The majority of the sampled streams have been identified to be of high sensitivity given the current condition of the existing habitat (e.g., good riffle/run/pool sequencing, natural morphology, and hydraulic connectivity). To minimize or prevent impacts to direct fish habitat, implementation of the mitigation measures listed above would be required to prevent the occurrence of Harmful Alteration, Disruption or Destruction (HADD) in the vicinity of these stations.

The Lakehead Region Conservation Authority and/or DFO, depending on the crossing location and the nature of impact on fish habitat, will be consulted with regarding the need for approval under the federal *Fisheries Act*. Additional field work at each crossing location is planned to confirm its aquatic habitat sensitivity and to assist in the development of the mitigation plan and additional approval requirements. Any potential impacts on fish habitat from access road crossings or aboveground transmission lines for the proposed turbine locations should be mitigated. When the harmful alteration, disruption or destruction (HADD) of fish habitat cannot be avoided, an Authorization will be required from DFO and fish habitat compensation measures may need to be implemented.

Where there is the potential for effects to watercourses including drains from the construction of the turbines and watercourse crossings, the following will be taken into consideration:

- the *Ontario MOE Stormwater Management Planning and Design Manual* (2003);
- the *Ontario Provincial Standards and Specifications (OPSS 182, 518 & 577)*;
- the *Ontario MOE Stormwater Pollution Prevention Handbook (Part I)*; and the *Part II – Pollution Prevention and Flow Reduction Measures Fact Sheets*; the *Ontario MNR Guidelines on Erosion Control for Urban Construction Sites* (1989) and,
- the *MNR Technical Guidelines- Erosion and Sediment Control* (1989).

To provide source controls and minimize adverse impacts, the following drainage mitigation will be followed:

- *Minimize disturbance of existing vegetation outside ditching and grassed slopes where regrading is required;*
- *Minimize time exposure of un-vegetated soils;*
- *Maximize length of overland flow through to points where storm water leaves the site;*
- *Complete an erosion assessment on all new and existing ditches to determine the need for additional erosion protection;*
- *Top of bank barriers (e.g. silt fencing) are to be put in place for any construction activity that is in proximity to watercourses;*
- *Where ditch regrading is required, where appropriate, utilize flat bottom ditches in lieu of ‘V’ ditches to reduce velocities and erosion potential, promote peak flow attenuation and provide short-term storm water storage.*
- *Use of in-line erosion control measures such as erosion blanket, rip rap, straw bale, rock flow checks and vegetated buffers, thereby mitigating high flow velocities and excessive erosion/sedimentation;*
- *Stream banks are to be stabilized and restored to their pre-construction condition immediately following construction activity. This is particularly important in erosion prone areas such as steep sloped stream banks;*
- *Each watercourse crossing is to be assessed in advance and the most appropriate mitigative measures determined. Alternative watercourse crossing locations should be considered if the proposed crossing location appears to be particularly sensitive to erosion;*
- *Any stockpiled materials are to be stored and stabilized away from watercourses;*
- *Ensure all materials placed within the flood line are clean and free of silt and clay size particles. All materials must meet applicable regulations governing placement of fill in water bodies;*
- *Ensure that all materials and equipment used for the purpose of site preparation and the completion of any work is operated and stored in a manner that prevents any deleterious substance from entering the water;*
- *Refuelling and handling of potential hazardous substances are to be done away from watercourses;*
- *Sediment and erosion control measures are to be left in place until all disturbed areas have been stabilized;*
- *The sediment control plan be designed and implemented to mitigate impacts associated with construction of the project - to prevent suspended sediment, mud, debris, fill, rock dust, etc. from entering downstream watercourses. Areas disturbed by work must be minimized. Silt fences/curtains, sediment traps, check dams must be installed as appropriate;*
- *Measures are to be in place to minimize mud tracking by construction vehicles, and to ensure timely cleanup of any tracked mud, dirt and debris along local roads and areas outside of the immediate work area where the above sediment controls would not be in place;*
- *Work is to be suspended if excessive flows of sediment discharges occur, and, any appropriate action should be immediately taken to reduce sediment loading;*
- *If it is necessary to de-water foundation excavations, prior to its discharge to a watercourse, the water is to be discharged to a settling pond, filter bag, or vegetated buffer strip of adequate size, to filter out suspended sediment;*
- *Temporary mitigation measures are to be installed prior to commencement of any site clearing, grubbing, excavation, filling or grading works and maintained on regular basis, prior to and after*

*runoff events. Any accumulated materials are to be cleaned out during maintenance and prior to their removal. All disturbed areas on land to be restored to natural conditions should be re-vegetated as soon as conditions allow preventing erosion, and restoring habitat functions. Land based measures must not be removed until vegetation has been re-established to a sufficient degree (or surface soils stabilized using other measures) so as to provide adequate erosion protection to disturbed work areas; and*

- *Timbers spaced to allow water flow and then covered with mats will be used for wet water crossings. This process will not hinder or block natural water flow.*

In addition to the general environmental protection measures described above, the following protection measures will minimize the potential environmental effects of culvert installation and stabilization:

- *Culverts will be installed parallel to the watercourse, and located along a section of the watercourse that is straight and of uniform gradient.*
- *Culvert size and design will be based on peak flows, and will allow for sufficient depth of flow and appropriate water velocities for fish passage.*
- *Fill slopes will be stabilized to ensure that roadbed materials do not enter the watercourses.*
- *Gabions, rip rap, or rocks of sufficient size to prevent erosion, will be placed around culvert inlets and outlets.*
- *Gabions, rip rap, filter fabric, or rocks used for stabilization will completely cover road fill, gravel and other unstabilized materials around culvert inlets and outlets.*
- *Stabilization material will be clean and non erodible.*

In addition a Stormwater Management Plan will be developed in consultation with the MOE.

## **1.8 Installation of Underground Cables**

### *Outline of Procedure*

Electrical distribution lines connecting the wind turbines to the substation will be overhead until within 100 m (or some suitable distance) of the turbine whereby an overhead to underground terminal pole will be placed and the underground electrical lines will be placed in trenches approximately 1 m deep and covered with fill. Water crossings will be accomplished by overhead poles.

### *Principal Environmental Concerns*

The principal concern associated with the installation of underground cables is the potential for erosion due to exposed soil areas and the effects of sediment-laden runoff on surface water quality. Water crossings also have the potential to disturb fish habitat and affect water quality and stream hydraulics.

### *Environmental Management Measures*

In addition to the general environmental protection measures described above, the following protection measures will provide the erosion control measures for streamside activities:

- *Any excavation or grading during the construction of the site will be conducted in a manner that ensures the minimum amount of disturbance necessary.*
- *Access roads will be used, where possible, for all equipment, including cable reels, line trucks, and tensioning equipment.*
- *Erosion and sedimentation control measures will be in place prior to any grubbing activity.*
- *In extremely erodible areas, hay or straw mulch will be used as required for protection.*
- *Silt or sediment control fences will consist of woven synthetic fiber fabric attached to wooden posts.*
- *Silt fences will not be used in watercourses.*
- *Where a vegetation buffer between erodible slopes and water bodies is less than 15 m, an engineered silt fence will be constructed to control silt runoff and the silt fence will be placed along the down gradient perimeter of the construction area.*
- *Replanting will occur upon completion of cable-laying operations to maintain bank stabilization.*

## **1.9 Handling, Storage, and Use of Aggregate Materials**

### *Outline of Procedure*

Handling of aggregate materials is required for the foundation construction of each turbine. Outdoor storage piles are often used in operations that use minerals in aggregate form, largely due to the need for frequent material transfers.

### *Principal Environmental Concerns*

The principal concern associated with these activities is the potential for erosion due to exposed soil areas and the associated sediment-laden runoff effects on water quality, aquatic ecosystems and environmentally sensitive areas. Storage piles can be left uncovered and dust emissions may occur from disturbances to the piles. Handling, storage, and use of aggregate materials can result in any of the following environmental impacts:

- *Cross-contamination can occur if adjacent aggregate stockpiles are allowed to overlap.*
- *Underlying soil may be disturbed with the use of a front-end loader for moving aggregates from a stockpile.*
- *Mixing of aggregates can result from dumping the wrong size aggregate in a bin or pile.*
- *Leaves and other contaminants may also fall into the stockpile.*
- *Leakage can occur through or around bulkheads in storage bins.*
- *Vegetation may grow in the stockpile if left alone and unused for an extended period of time.*
- *Soil admixing, compaction, and stoniness can occur as a result of grading, heavy traffic, and excavation activities.*

### *Environmental Management Measures*

These measures apply to the handling, storage and use of aggregate material. The following conditions apply:

- *Aggregate will not be stored within the buffer zone of a wetland or watercourse (i.e., aggregate will not be stored within 30 m of a wetland or watercourse). In circumstances where landowners will not permit the use of alternate locations the buffer zone will be reduced to a minimum of 10 m.*
- *All sand, aggregate, soil, or other materials in place or in stockpiles must be contained to prevent materials from producing dusty conditions and from cross contamination, as determined necessary by the Environmental Monitor.*
- *Sand and soil stockpiles will be bermed and sloped (and seeded with non-invasive, herbaceous, native species, if abandoned) to minimize runoff. If stockpiles are not needed immediately, temporary erosion and sediment control devices will be installed and regularly maintained.*
- *Stripping of topsoil separately from the subsoil, approximately 10-15 cm, will occur to minimize the potential for soil admixing.*
- *Soil compaction will be avoided by limiting the traffic flow on access roads.*
- *Stoniness will be avoided by removing any noticeable stone concentration to an approved location.*

#### **1.10 Concrete Pouring Operations**

##### *Outline of Procedure*

Concrete will be required to construct the foundations of the turbines, approximately 15-17 m in diameter, and 1-1.5 m thick. This section contains measures to minimize adverse effects that may result from concrete pouring activities.

##### *Principal Environmental Concerns*

Liquid wastes from uncontrolled release of wash water which may contain hazardous materials such as cement, concrete additives and form oil. This wash water may be harmful to fish. Cement is alkaline and wash water from spoiled concrete or from the cleaning of the mixer trucks and pipe delivery systems can be expected to have high pH and high total suspended solids (TSS) concentration. Similarly, spoiled concrete or wash water would contain additives and agents, some of which are toxic to aquatic species. Aggregates, particularly the finer sand fractions, washed from spoiled concrete or discharged in water to the environment may result in direct fish and wildlife mortality and/or habitat destruction.

##### *Environmental Management Measures*

The following measures are intended to minimize the potential for wash water and uncured concrete to

enter water bodies:

- *Form oil may be used sparingly to allow forms to separate from concrete following curing.*
- *Only the chutes of concrete trucks will require on-site cleaning of wet concrete to permit their storage for transport. The volume of water used and extent of washing will be kept to a minimum.*
- *Washing of chutes on-site will occur at a designated location that will permit containment of the wash water in a settling pond away from any subsurface drains, streams or storm drains. If such a system cannot be located on-site, then the wash area should permit containment of the wash water so that it can be disposed of off-site at the ready mix plant. Where concrete washout is done, the wash out pits will have an impervious lining. Once the concrete has hardened it will be treated as normal construction waste.*
- *Washing of the drum at the end of a day's delivery will occur at the ready-mix concrete plant.*
- *No chemicals will be used in the washing of concrete trucks or forms on-site.*
- *In the event that water from the wash water containment area requires release to the environment, the effluent will be tested prior to release for parameters related to any concrete additives used in the production of the ready mix concrete (e.g., total hydrocarbons, sodium hydroxide), pH, TSS and will meet the limits specified by the Ontario Ministry of Natural Resources (OMNR). Suspended solids concentrations within effluent released will not exceed 25 mg/L (monthly average) or 50 ml/L (grab sample) above background.*
- *If concrete is mixed on site, drainage from the concrete production area and aggregate storage area, and wash water from the cleaning of batch plant mixers, mixer trucks, conveyors, and pipe delivery systems will be directed to a settling pond for control and treatment, as appropriate. Effluent will be treated as appropriate before release to receiving waters, or alternatively, effluent will be recycled for reuse after treatment. Solids which accumulate in a settling pond will be removed on a regular basis to ensure the settling pond remains effective.*

### **1.11 Surveying**

#### *Outline of Procedure*

Surveying includes gathering all the information required for the design and identification of a property or the right-of-way of a specific section of road. This includes cutting centerline and cross-section offsets of sufficient width to provide a clear line of sight for survey equipment and access to the site for soils testing equipment.

#### *Principal Environmental Concerns*

Disturbance to terrestrial and watercourse/wetland habitats and species are the primary environmental concerns associated with surveying.

#### *Environmental Management Measures*

In addition to the general environmental protection measures described above, the following protection measures will minimize the potential environmental effects of surveying:

- *The cutting of survey lines will be kept to a minimum. Where possible, alternate areas not requiring cut lines will be used.*
- *Whenever possible, cutting lines to the boundary between treed and open areas will be avoided.*
- *Survey lines will be limited in width to that which is absolutely necessary for line of sight and not more than 1.5 m.*
- *As required, trees and shrubs will be cut no more than 300 mm above the ground.*
- *All trees not exactly on survey lines will be left standing and trees partly on line will be notched (notch not to exceed 1/3 tree diameter) instead of removal, to allow sighting.*
- *Trees will be felled in a way that damage to standing trees adjacent to the survey line is minimized. Trees will be felled away from and not into or over a wetland/watercourse.*
- *Slash will not be placed or left in wetlands/watercourses. Any debris material removed from a wetland/watercourse and adjacent areas will be disposed of, or placed in a manner such that it cannot enter a wetland/watercourse.*
- *Felled trees having a top diameter of 8 cm or more will be cut in lengths and piled for reuse as merchantable timber. Non-merchantable timber will be chipped and spread outside the buffer zone of a wetland or watercourse (i.e., greater than 30 m from a wetland or watercourse). In circumstances where landowners will not permit the use of alternate locations the buffer zone will be reduced to a minimum of 10 m.*
- *When surveying construction layouts, areas that will be cleared do not require strict adherence to the above, except trees, shrubs and areas to be saved or left natural as noted on the plans or marked in the field.*
- *Vehicles will yield the right-of-way to wildlife and no attempt to harass or disturb wildlife will be made by any person.*
- *There will be no cutting in areas designated as environmentally sensitive by the Environmental Monitor.*
- *ATVs will remain within the right-of-way except as approved by the Environmental Monitor.*
- *No heavy equipment or motorized vehicles will enter the areas designated as environmentally sensitive by the Environmental Monitor.*
- *The extent of activities in environmentally sensitive areas will be minimized, including the restriction of walking to established walking paths if available.*
- *Petroleum products will be handled, stored, and disposed of in a manner that will minimize the potential for spills.*
- *Fuelling of equipment will not occur within the Buffer Zone of a watercourse/wetland or other environmentally sensitive areas.*

### **1.12 Equipment Movement**

#### *Outline of Procedure*

A variety of equipment is required to complete the many components of site development and road

construction.

### *Principal Environmental Concerns*

The environmental concerns associated with equipment movement are the potential impacts on aquatic ecosystems and water quality, as well as disturbance to environmentally sensitive areas.

### *Environmental Management Measures*

In addition to the general environmental protection measures described above, the following protection measures will minimize the potential environmental effects of equipment movement:

- *Imported equipment will be thoroughly cleaned before it arrives into Ontario in order to prevent the introduction of exotic plant species.*
- *Equipment and vehicles will only operate on cleared right-of-ways or areas designated for construction activities in the Plans/Drawings.*
- *Routine maintenance of machinery will be performed off-site as much as possible. Some heavy equipment, such as the cranes, will be maintained on-site due to the challenges involved in moving the equipment.*
- *The Contractor will make daily inspections of hydraulic and fuel systems on machinery, and leaks will be repaired immediately. All leaks will be reported to the Environmental Monitor and the Construction Manager.*
- *Construction equipment will not enter Buffer Zones of wetlands/watercourses or environmentally sensitive areas.*
- *If there is soil (not rock) in the lay-down areas used for storage of turbine parts adjacent to the turbine foundations, the soil will be aerated and loosened after use to counteract the compaction caused by the equipment. The vegetation will be allowed to return to a natural state.*
- *Erosion control measures will be monitored during construction activities within the right-of-way and any areas associated with Project construction activities. Where damage to these erosion control measures is observed, they will be promptly repaired to prevent siltation of wetlands/watercourses or other environmentally sensitive areas.*

## **2.0 ENVIRONMENTAL PROTECTION MEASURES - TURBINE MAINTENANCE ACTIVITIES**

### **2.1 Structure Maintenance and Cleaning**

#### *Outline of Procedure*

Repair and replacement of damaged or deteriorated superstructure and substructure components are undertaken as required to ensure their structural integrity. Cleaning is undertaken to prevent the accumulation of dirt and debris which may restrict normal movement on the structure and/or retain moisture or chemicals, leading to structural component deterioration. Potential activities could include cleaning, lubrication, and painting.

#### *Principal Environmental Concerns*

There is concern for aquatic species due to direct mortality and loss of aquatic habitat. The primary concern is the release of materials and siltation into the aquatic environment such as abrasives and protective coatings. Lubrication materials may contain petroleum compounds, which are potentially toxic to aquatic species.

#### *Environmental Management Measures*

In addition to the general environmental protection measures described in Section 3.0, the following protection measures will minimize the potential environmental effects of structure maintenance and cleaning:

- *All waste generated in the removal of damaged and deteriorated components will be collected for proper disposal.*
- *All materials, where possible, will be reused. Non-salvageable materials will be disposed of at a provincially approved location.*
- *All necessary precautions will be taken to prevent discharge or loss of any harmful material or substance into a watercourse.*
- *All empty containers of paint, solvents, and cleaners will be disposed of in an appropriate manner at a provincially approved location.*
- *If sandblasting is required, it will be done in an off-site maintenance shop.*
- *If on-site sandblasting is necessary, screens or traps will enclose the area to be sandblasted. Sandblasting will be performed over a surface which allows the sand or residue to be collected upon completion of sandblasting (i.e. plastic or plywood).*
- *Sandblasting will not be performed in high wind conditions.*
- *Sensitive features (i.e. rare plants, watercourses, environmentally sensitive habitats) identified during construction will be protected during maintenance activities.*

## **2.2 Road Maintenance**

### **2.2.1 Grading**

#### *Outline of Procedure*

Grading is used to reshape unpaved roads to maintain a proper crown and remove ruts, potholes and washboard conditions. Grading helps to maintain proper drainage and keeps road surfaces stable.

#### *Principal Environmental Concerns*

Grading loosens the top of the exposed road, leaving more potential for erosion of the surface. If not conducted properly, grading can inhibit controlled drainage of runoff. Dust is generated during grading processes.

#### *Environmental Management Measures*

Grading measures as outlined earlier in this EMP will be implemented.

### **2.2.2 Ditch Maintenance and Shouldering**

#### *Outline of Procedure*

Ditching is undertaken to affect drainage of the roadbed and to correct deficiencies such as erosion; nonconformity in grade, line, or cross section of ditch; water ponding on road; and restrictive vegetative growth that impedes drainage of the roadbed.

#### *Principal Environmental Concerns*

The principal concern associated with these activities is the potential for erosion due to exposed soil areas and the associated sediment-laden runoff effects on water quality, aquatic ecosystems and environmentally sensitive areas.

#### *Environmental Management Measures*

In addition to the general environmental protection measures described earlier in this EMP, the following protection measures will minimize the potential environmental effects of ditch maintenance and shouldering:

- *A Buffer Zone will be maintained between the end of ditching and all wetlands/watercourses.*
- *A check dam will be maintained at the end of the ditch (where the ditch meets the Buffer Zone). Additional erosion control structures will be installed further up the ditch as required.*

- *Natural drainage will be maintained whenever practical.*
- *Sediment deposited in the ditch will be removed when it reduces the capacity of the channel. Removed material and sediment will be disposed of at a location outside the Buffer Zone of a wetland/watercourse or other environmentally sensitive area, and such that it cannot wash into a wetland/watercourse.*
- *Suitable material will be used when needed to fill in washouts, depressions, and the like on foreslopes or backslopes. To ensure stabilization, the ditch may be hay mulched, hand seeded, hydroseeded or lined with jute matting, depending on the erosion potential.*
- *Petroleum contaminated material encountered in the ditch will be reported to the Environmental Monitor and the Construction Manager.*
- *Sensitive features (i.e. rare plants, watercourses, environmentally sensitive habitats) identified during construction will be protected during maintenance activities.*

### **2.2.3 Surfacing**

#### *Outline of Procedure*

For the purposes of this EMP, surfacing refers to the placement of aggregate on an unsealed road surface for stabilization or to restore grades, and to shape shoulders.

#### *Principal Environmental Concerns*

When handling and placing aggregate, there is potential for sedimentation of the aquatic environment and for dust impacts on air quality.

#### *Environmental Management Measures*

In addition to the general environmental protection measures, the following protection measures will minimize the potential environmental effects of surfacing:

- *Any aggregate placement will be conducted in such a manner to ensure road surface drainage flows from the centre of the surface to the drainage control structures (i.e., ditching), as appropriate.*
- *Any aggregate materials placed must be compacted to reduce moisture penetration.*
- *As required, dust will be controlled.*
- *Sensitive features (i.e. rare plants, watercourses, environmentally sensitive habitats) identified during construction will be protected during maintenance activities.*

### **2.3 Snow Removal**

#### *Outline of Procedure*

Snow removal and application of sand and/or de-icing agents (i.e., salt) may be required during the winter



months to maintain safe conditions for maintenance activities.

#### *Principal Environmental Concerns*

Excessive salt use can cause saline runoff into watercourses. Excessive sand use can contribute to sediment-laden runoff into watercourses and may cause blockages in drainage structures.

#### *Environmental Management Measures*

In addition to the general environmental protection measures described earlier in this EMP, the following protection measures will minimize the potential environmental effects of Snow Removal, Sanding and De-icing.

- *A professional service provider will be used for snow and ice removal on roads. The Municipality will stipulate that the contractor follow the Best Management Practices as described in Environment Canada’s “Best Management Practices for Salt Use on Private Roads, Parking Lots and Sidewalks.”*
- *The use of sand, salt and combinations thereof, will be minimized to that which is necessary to ensure the safety of the maintenance staff. Sand application will be the primary means of maintaining safe driving conditions. Salt will only be used as necessary.*
- *Prior to salt application, as much snow as possible will be removed from the road through plowing.*
- *Salt application will be targeted to areas requiring treatment in order to minimize the volume of salt used and the amount of salt lost to adjacent areas.*
- *Snow removed from access roads and site surfaces will not be dumped within the Buffer Zone of a watercourse/wetland or other environmentally sensitive area.*



### **3.0 SPECIFIC ENVIRONMENTAL PROTECTION MEASURES**

#### **3.1 Erosion Control**

It will be necessary to cross several watercourses with the turbine access roads and electrical lines. It will be necessary to install culverts so as to not obstruct the flow of water from access road construction. There is also the potential for the movement of construction equipment across the water courses and erosion effects from construction activity in the vicinity of surface water (e.g. to construct the 230 kV transmission line). These temporary disturbances may include downstream sediment transport and bed and bank disturbance and will be minimized as much as possible. The selection of the appropriate crossing techniques and culvert design will be determined in consultation with the Lakehead Region Conservation Authority (CA) and the MNR. For the portions of the project with Dorion Township (where the CA has jurisdiction), it is expected that permits will be required from the CA under the “Regulation of Development, Interference with Wetlands, and Alterations to Shorelines and Watercourses” (Reg. 180/06) and a Work Permit from MNR. For areas outside of the Cal’s jurisdiction, it is expected that the MNR would advise on issues relating to surface water protection.

Access roads will be approximately 10 m wide to accommodate maintenance vehicles and heavy equipment for larger repairs/replacements. The excavation of earth and some blasting of rock are expected to be required for the construction of the turbine access roads. It will be necessary to cross several watercourses (about 11) with the turbine access roads. Further, improvements to 10 existing road crossings may be required. The number and location of the crossings is to be confirmed based on additional planned field work. Access road culverts, comprised of various diameters, are to be constructed across the various watercourses in order to accommodate vehicular access and construction traffic across the watercourse while maintaining unimpeded flow within the watercourse. The type of crossings and the mitigation measures will be developed in consultation with the appropriate governing bodies.

It is expected that no navigable waterways will be traversed, although an official determination by Transport Canada will be sought during the detailed engineering stage of the project.

#### *Mitigation Measures*

*Timing:* Attempts will be made to construct new crossings and improve existing drain crossings when the ditch is dry. Construction windows for these crossings would be after the spring runoff when the ditch goes dry (and when the weather forecast is precipitation free for several days prior to culvert installation, or before March 15<sup>th</sup> or after June 30<sup>th</sup> in drains with standing water. For ditches which have standing water at the time of construction, instream sediment control will be installed prior to any construction equipment initiating work. These features should be removed immediately following completion of all instream or streambank disturbance, including installation of the culvert and revetment. Vegetation removal should be kept to a minimum to provide bank stability following culvert installation.



*Sediment:* Adequate sediment and erosion control during construction along with re-vegetation of disturbed areas will be necessary to avoid potential effects of construction to downstream habitat. Sediment and erosion control systems should be maintained repaired and not removed until the site is suitably stabilized.

*Equipment:* All equipment for culvert installation should arrive on site in a clean condition and maintained to prevent fluid leaks (gas, oil, lubricants, hydraulic fluids). All equipment should operate on the land with minimal disturbance to the ditch banks. Refueling, servicing, equipment maintenance and associated materials for equipment operation should be stored away from the ditch bank with appropriate containment systems in the event of accidental spills.

*Placement:* Culverts should be embedded in the substrate, a minimum 10% embedment of the pipe diameter below the drain bottom, to ensure there is no loss of habitat through the culvert section. The culvert will eventually silt into match upstream and downstream grades. In an open water course setting, culverts will provide refuge in low flow and cover from predators for any of the resident fish population.

*Approvals:* All drains and drain crossings are also regulated by the Lakehead Region Conservation Authority (LRCA). Construction of any physical structure including turbines, servicing maintenance roads for access will require a permit from the LRCA. Also, any work within waterways that contain fish habitat or potential fish habitat will require a letter of advice notifying the Department of Fisheries and Oceans when work is to be initiated and completed. New or expanded culvert crossings will need approval from the Drainage Superintendent to ensure the new length is incorporated into the Drainage Engineer's report.

#### *Outline of Procedure*

During construction, site preparation work and use of heavy construction vehicles at the site will result in exposed solids, susceptible to erosion. Control of erosion and potential sedimentation of receiving water bodies is one of the most critical environmental management concerns for this Project. Erosion control is first priority in preventing these impacts. The amount and duration of exposed soil will be kept to a minimum. Erosion control methods will be applied where there is the potential for erosion due to rain, flowing water, steep slopes, and highly erodible soils. Preventing erosion at the source reduces the amount of sediment that needs to be managed by downstream sediment control measures. It is also important that sediment controls are in place to prevent sediment from leaving the site.

#### *Principal Environmental Concerns*

Exposed soil will result from site preparation activities such as clearing, grubbing, grading and ditching. Precipitation, flowing water, steep slopes, or highly erodible soils will increase the potential for erosion. The principal environmental concern is the associated sediment-laden runoff and the resulting effects on water quality, aquatic ecosystems and environmentally sensitive areas such as wetlands.

### *Environmental Management Measures*

In addition to the general environmental protection measures described earlier in this EMP, the following protection measures will provide the erosion control measures.

#### **General**

- *Any excavation or grading during the construction of the site will be conducted in a manner that ensures the minimum amount of disturbance necessary. These activities will also use erosion control measures, if site conditions warrant (e.g., highly erodible soils, steep slopes).*
- *Where a vegetation buffer between erodible slopes and water bodies is less than 15 m, or where construction areas are immediately up gradient of adjacent properties, an engineered silt fence will be constructed to control silt runoff and placed along the down gradient perimeter of the construction area.*
- *Sediment-laden water resulting from dust control measures will be collected by erosion control measures in place on-site such as sediment control fences and check dams.*

#### **Structures/Products**

- *Silt or sediment control fences will consist of woven synthetic fibre fabric attached to wooden posts.*
- *Erosion control structures or check dams will be constructed in accordance with Ontario Provincial Standards for Roads and Public Works in partnership with the Ontario Ministry of Transportation (MTO).*
- *In extremely erodible areas, hay or straw mulch will be used as required for protection.*
- *Erosion and sedimentation control measures will be in place prior to any grubbing activity.*
- *Erosion control structures will be installed as directed by the Environmental Monitor, Site Supervisor or Construction Manager.*
- *Silt fences will not be used to control sedimentation within a ditch or watercourse.*
- *Where erosion control within a drainage ditch is required, geotextile wrapped straw bales will be installed to provide a check dam and prevent downstream sedimentation. Some rock fill or rip rap may be installed of the downstream side of the check dam to secure the structure during heavy rainfall events.*

#### **Maintenance**

- *The Contractor will maintain the erosion control structures in a functional condition as long as necessary to contain sediment from run-off, from time of installation until a sufficient vegetative cover growth (>90% cover) has been established.*
- *All erosion control structures and sediment control fences will be inspected before, during and following each rainfall event and at least daily during periods of prolonged rainfall. Any damage arising from major storm events will be repaired as soon as possible to the satisfaction of the Site Supervisor.*



- Retained sediment will be removed when it has accumulated to a level of half the height of the fence/barrier and disposed at least 30 m away from any wetland or watercourse in a manner that prevents it from entering a wetland or watercourse. In circumstances where landowners will not permit the use of alternate locations the buffer zone will be reduced to a minimum of 10 m.

### 3.2 Air Quality and Dust Control

#### Outline of Procedure

The construction phase of the Project consists mainly of heavy construction work. There can be significant dust generation that may have a substantial temporary impact on local air quality. Dust emissions often vary substantially on a daily basis at construction-sites depending on the level of activity, the specific operations, and the prevailing meteorological conditions. In addition, to a lesser degree emissions during construction will be associated with combustion gases from heavy vehicles, which produce particulate-containing exhaust consisting of a variety of contaminants. The typical contaminants associated with construction activities include carbon monoxide (CO), nitrogen oxides (NO<sub>x</sub>), carbon (CO<sub>2</sub>), hydrocarbons (HC), total suspended particulate (TSP), and fine and respirable particulates (PM<sub>10</sub> and PM<sub>2.5</sub>).

#### Principal Environmental Concerns

The on-site construction activities could impact ambient air quality due to vehicular emissions (see **Appendix A**). There are a variety of activities that can lead to the generation of contaminant emissions, primarily of particulate matter, on the construction-site. The primary potential sources include exhaust gas emissions due to incomplete combustion from diesel compression engine, road dust, wind erosion on storage piles, material handling, material transport; and truck loading / truck unloading. There are also emissions of combustion gases and products of incomplete combustion from the exhaust of on-site vehicles and equipment. The table below shows typical output ranges of emissions from diesel engines, depending on the age and technology of the engines.

**Typical Emissions from Diesel Engines (Nett Technologies)**

CO vppm	HC vppm	PM vppm	NO <sub>x</sub> vppm	SO <sub>2</sub> vppm
5 - 1,500	20 - 400	0.1    0.25	50 - 2,500	10 - 150

#### Environmental Management Measures

The following measures will be implemented, to the extent possible, to control air emissions from construction activities:

- Use well-maintained heavy equipment and machinery, preferably fitted with muffler/exhaust system baffles, engine covers;



- *Motorized equipment should meet design specifications for emission controls and conform to provincial Drive Clean standards where appropriate;*
- *Comply with operating specifications for heavy equipment and machinery;*
- *Minimize operation and idling of gas-powered equipment and vehicles, in particular, during smog advisories – this is to be strictly monitored;*
- *Minimize vehicular traffic on exposed soils and stabilize high traffic areas with clean gravel surface layer or other suitable cover material;*
- *Minimize mud tracking by construction vehicles along access routes and areas outside of the immediate work site, and ensure timely cleanup of any tracked mud, dirt and debris;*
- *Cover or otherwise contain loose construction materials that have potential to release airborne particulates during transport, installation or removal; and*
- *Spray water to minimize the release of dust from gravel and exposed soils. Use environmentally-friendly chemical dust suppressants (e.g. Petro-Canada’s Dust Suppressant Fluid 65 [DSF65]) only where necessary on problem areas.*

### **3.3 Noise Control**

#### *Outline of Procedure*

Noise generated at the site during construction activities, will be largely attributable to operation of heavy construction vehicles as well as activities associated with turbine assembly and site preparation. This section contains measures to minimize noise emissions that may result from construction activities.

#### *Principal Environmental Concerns*

The construction phase of the proposed wind farm has the potential to be a noise source, contributing to the ambient acoustic environment of the region. This noise is mainly produced from the operation of construction equipment and vehicular activity. Construction activities will result in noise emissions in the surrounding environment. Noise associated with operation of heavy equipment will be in the range of 80-90 dBA at the source. Unmitigated, these noise emissions can disturb wildlife and may also interfere with the enjoyment of property for residents in the area.

#### *Environmental Management Measures*

The following measures will be implemented, to the extent possible, to control noise from construction activities:

- *All site activities will be carefully planned and performed in such a manner that noise is minimized.*
- *The frequency and/or duration of noise producing activities will be minimized wherever possible.*
- *All heavy construction equipment will be maintained in accordance with the manufacturer’s specifications and equipped with appropriate mufflers and other noise control equipment to minimize noise where appropriate.*



- *Vehicle traffic, construction activities, and heavy equipment operation on-site will be limited to hours of 0730 hrs to Sunset, Monday to Friday, except in extraordinary circumstances.*
- *Contractors will comply with the restrictions on hours of work for the site as determined by any applicable bylaws.*
- *All Project vehicles will be properly maintained and muffled to reduce noise emissions.*
- *The Contractor will ensure idling of construction vehicles is limited.*
- *The routing of truck traffic through residential areas will be controlled during the maximum period of activity.*
- *If complaints arise due to noise from truck traffic, acceptable alternate routing may be evaluated by the Contractor and the Municipality and implemented accordingly.*

### **3.4 Lighting Control**

#### *Outline of Procedure*

Lights may be associated with equipment operation requirements and general lighting of work areas.

#### *Principal Environmental Concerns*

Excessive light emissions may cause a public disturbance in the vicinity of the project area, particularly during regular public off-work hours. Some lighting can also affect migratory paths of birds and lead to increased bird mortalities.

#### *Environmental Management Measures*

- *Minimum amount of aviation lighting required by Transport Canada (TC) should be used, and TC should be consulted to see if white strobe lights with a minimum number of flashes per minute can be used.*
- *Strong lights, such as sodium vapor lights which are often used for security at substation buildings, should be avoided or shielded.*
- *Lights will be positioned such that the direction of light is opposite to that of any residential areas.*
- *Where nuisance to local residents is an issue, scheduling of specific activities may be directed by the Environmental Monitor.*
- *Area lighting will be positioned and directed so as not to cause glare to approaching traffic.*
- *Lighting will be directed toward the ground wherever possible.*

#### **4.0 ENVIRONMENTAL PROTECTION MEASURES - MATERIALS, EQUIPMENT, FACILITIES**

##### **4.1 Petroleum, Oils, Lubricants, and Other Hazardous Materials**

###### *Outline of Procedure*

A variety of potentially hazardous materials will be in use or stored for construction and maintenance activities for the proposed wind farm. Potentially hazardous materials routinely used include: *POLs, hydraulic fluids, acetylene, paints and solvents*. The procedures and requirements of the WHMIS program will be in place to protect employees and are generally applicable to the protection of the environment. These WHMIS procedures and requirements reinforce the proper handling, storage, and control of hazardous or toxic materials thereby reducing the potential for accidental release and consequent potential environmental effects.

###### *Principal Environmental Concerns*

The major concern regarding the use of these substances is their uncontrolled release to the environment through accidental spillage, and subsequent adverse effects on terrestrial, aquatic and marine habitat and species, soil, groundwater quality and human health and safety. The following protection measures are intended to minimize the potential for any POL spills on soil, vegetation, surface water, and groundwater.

###### *Storage of Petroleum, Oil, Lubricant and Chemical Handling*

All necessary precautions to prevent and minimize the spillage, misplacement or loss of fuels and other hazardous materials shall be taken. All Acts and Regulations pertaining to special substances shall be followed. Fuels and oils will be managed per provincial requirements. In the event of a spill of hazardous materials, clean-up procedures will be undertaken as per provincial protocols and legislation as governed by the *Environmental Protection Act and the Ontario Water Resources Act*.

The delivery, storage, use and disposal of these hazardous materials will be handled only by trained personnel in accordance with government laws and regulations. The following precautions will be taken in handling POLs and chemicals:

- *The transport of fuel will be conducted in compliance with the Transportation of Dangerous Goods Act.*
- *Mobile fuelling trucks will be used to minimize the requirements for onsite storage of POLs.*
- *Diesel fuel and gasoline may be stored on site in limited quantities. Drums as required for one day's use will be on site, and drums will be delivered on a daily basis. Fuel drums will be stored upright on a deck with drip trays for the collection of spilled substances.*
- *Where possible, vehicle maintenance will be performed off site, at a nearby commercial fuelling station, in order to minimize the amount of lubricants and oils stored on site. On-site POL storage will*



*be in a ventilated, lockable steel container. The container will be equipped with galvanized steel drip trays for the collection of spilled substances.*

- *The on-site POL storage container shall be located on level terrain, at least 100 m from any water body or wetland.*
- *Spill decks will be used for transferring products to smaller containers.*
- *No POL storage will occur in sensitive areas (e.g., near wetlands, watercourses or wells).*
- *Fire extinguishers and a spill kits will be located near POL storage areas.*
- *POL storage areas will be identified by signs, and “No Smoking” signs will be displayed at all POL storage sites and refueling areas.*
- *Smoking will not be permitted within 50 m of any POL storage area. On-site signage will indicate the location of smoking areas.*

*POL and Chemical Handling Measures*

- Equipment used will be mechanically sound with no oil or gas leaks. The Contractor shall undertake frequent inspection of equipment and repair leaks immediately.
- Fuelling, storage and servicing of vehicles and construction equipment is not allowed within 30 m of a watercourse, drainage ditch, areas with a high water table, or exposed and shallow bedrock.
- Spill clean-up materials shall be accessible and maintained in the areas of fuel and chemical storage. Any spilled fuel or lubricants shall be promptly cleaned up and disposed of in accordance with Ontario MOE requirements (MOE Spills Action Centre - 1-800-268-6060).
- No equipment shall be washed within 30 m of a watercourse.
- All tanks shall be protected from collision damage by the use of snow fencing to alert operators, or by the placement of barriers to impede equipment movement near the tank.
- Handling and fuelling practices shall ensure that contamination of groundwater will not occur.
- Fuel storage areas and transfer lines shall be clearly marked or barricaded to prevent damage from vehicles.
- If drums are stored on their sides, the drums shall be stored so that the bungs are in the 9" and 3" position, on level ground and prevented from rolling.
- Drum storage areas shall be marked or fenced with temporary fence to avoid impacts.
- Day-use quantities can be stored upright or on the side as required. Drip pans lined with absorbent pads shall be used beneath taps.
- All stained soil resulting from the use of chemicals or fuels shall be cleaned-up and disposed of prior to leaving the work area.
- Waste oils and lubricants will be retained in a closed container, and disposed of in an environmentally acceptable manner.

*Equipment Fuelling*

Only equipment that is not easily transported will be refueled on site. All other vehicles and equipment will be refueled at a commercial fuelling station:

When refueling equipment, operators will:

- *Use designated fuelling locations;*
- *Use drips trays;*
- *Use leak free containers and 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.*

Fuelling must be done at least 30 m from a wetland or water body. The Construction Manager will make daily inspections of hydraulic and fuel systems on machinery and leaks will be repaired immediately. All leaks will be reported to the MOE Spills Action Centre (1-800-268-6060). Servicing of equipment will not be allowed within 100 m of a wetland, watercourse or drainage ditch. Fuelling attendants will be trained in the requirements under the Fuel and Hazardous Material Spills Contingency Plan in this EMP.

#### *POL Waste Disposal*

- *Waste POLs will be stored in a ventilated, lockable steel container. The container will be equipped with galvanized steel drip trays for the collection of spilled substances.*
- *Waste solvents and oils will be stored separately.*
- *All used oil and petroleum products will be removed as required 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.*
- *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.*
- *POL waste disposal will be the responsibility of the Contractor.*

#### *Spills Response*

Various lubricants, oils and fuels will be required during the operations period. Although unlikely, any leakage of oils from the turbines would be captured within the containment system. Spills response activities during the operations will be governed by this EMP. Legislation of relevance to spills management and response include:

- *Environmental Protection Act;*
- *Fisheries Act;*
- *Gasoline Handling Act;*
- *Ontario Pesticides Act;*
- *Ontario Water Resources Act; and,*
- *Transportation of Dangerous Goods Act.*

Federal and Provincial legislation place the responsibility for spill prevention and mitigation on the owner or controller of products or materials that can be spilled. Spills are defined under these Acts, as, but not limited to:

- *Spills from containers including drums and tanks;*
- *Spills resulting from breaks in hydraulic or transfer hoses or piping; and*
- *Spills resulting from traffic accidents and fire fighting.*



In accordance with these Acts, RES Canada has an obligation to:

- *Prevent, eliminate or remediate an adverse affect resulting from a spill; and*
- *Report the spill to RES Canada and the Ontario MOE (Spills Action Centre; Tel: 1-800-268-6060).*

RES and its contractors shall reduce the likelihood of spills by implementing effective spill prevention measures such as the careful handling and proper storage of the products in use. In the event of a spill, the procedures detailed below shall be followed to facilitate a quick response.

<i>Spills Response Measures</i>
<ul style="list-style-type: none"><li>▪ The individual who discovers a leak or spill shall immediately attempt to stop and contain the release.</li><li>▪ Any spill or leak shall be reported immediately to RES.</li><li>▪ RES shall immediately report the release to the MOE Spills Action Centre (1-800-268-6060).</li><li>▪ RES will have the authority to take appropriate action without unnecessary delay.</li><li>▪ RES shall assume the overall responsibility of coordinating a cleanup and maintaining this contingency plan current and up-to-date. RES shall, in consultation with regulatory authorities:<ul style="list-style-type: none"><li>○ Deploy on-site personnel to contain the spilled material using a dyke, pit, absorbent material or booms, as appropriate;</li><li>○ Assess site conditions and environmental impact of various clean up procedures;</li><li>○ Choose and implement appropriate clean up procedure;</li><li>○ Deploy on-site personnel to mobilize pumps and empty drums (or other appropriate storage) to the spill site;</li><li>○ Apply absorbents as necessary;</li><li>○ Dispose of contaminate debris, cleaning materials, and absorbents by placing in an approved disposal site; and,</li><li>○ Take all necessary precautions to ensure that the incident does not reoccur.</li></ul></li><li>▪ RES shall submit a written report to appropriate regulatory authorities as required by applicable legislation.</li><li>▪ In order to respond to accidental releases, the following resources shall be made available on-site in an appropriate location to allow for immediate use:<ul style="list-style-type: none"><li>○ Absorbent material (i.e., sorbent pads, Sorb-All, vermiculite); and</li><li>○ Protective equipment, shovels, rakes, al tool kit, buckets and drums, stakes and tarpaulins.</li></ul></li></ul>

## 4.2 Solid Waste Disposal

### *Outline of Procedure*

During site preparation, construction, and maintenance, solid waste will be generated. Waste streams have been provisionally classified as domestic waste, paper, card board, wood and scrap steel and metals. This section contains measures for waste minimization, recycling and disposal.

### *Principal Environmental Concerns*

Solid waste if not properly controlled and disposed of, can be unsightly and cause human safety and health concerns. Uncontrolled hazardous waste can contaminate soils, surface and groundwater, and can be toxic to vegetation, fish and wildlife if ingested in sufficient quantities.

### *Environmental Management Measures*

The following protection measures will minimize the potential environmental effects of solid waste disposal:

- *Waste produced during the construction of the Greenwich Wind Farm will be sorted as per the requirements of the Ontario “Waste Watch” Program.*
- *Domestic waste from temporary office quarters will be gathered on a regular basis and stored in closed containers until recycled or disposed of as per the requirements of the Ontario Waste Watch Program.*
- *Food waste will be stored in a manner that ensures wildlife will not be attracted and will be removed from the site on a daily basis.*
- *On-site temporary disposal areas for surplus material will be designated and will be located a minimum of 30 m from a wetland or watercourse. In circumstances where landowners will not permit the use of alternate locations the buffer zone will be reduced to a minimum of 10 m. RES is aware of the following points and will be incorporated into the on-site waste plan:*
  - *Subject waste must not be stored for a period exceeding 24 months unless an application for a C of A has been submitted. (s. 17.2 (2) of O. Reg. 347), and*
  - *The first time that subject waste is stored on site for more than 90 days, a notice must be given to the Regional Director within five business days after the 90th day of storage (s. 17.2 (3) of O. Reg. 347).*
- *The Contractor will, with the prior approval of the Site Supervisor, designate and use areas for the transfer and limited temporary storage of hazardous materials and special wastes. These sites will be properly labeled and appropriately controlled, and will be located a minimum of 30 m from a wetland or watercourse.*
- *All surplus materials, rubbish, waste materials, and construction debris will be removed from the site upon completion of construction of the Project.*
- *All waste will be handled in accordance with relevant provincial and federal requirements.*



- *Waste material will not be dumped on-site. In such case as waste materials are inadvertently dumped, the Construction Manager (or designate) will immediately act to have the dumped material cleaned up and removed.*
- *No waste or debris will be permitted to enter any watercourse.*
- *Only material approved by the Environmental Monitor and the Site Supervisor will be disposed of or reused onsite (e.g., clean fill materials).*
- *Run-off from a disposal/storage area will not be allowed to enter a watercourse.*

#### **4.3 Sewage Disposal**

##### *Outline of Procedure*

Work area facilities for personnel will have sewage collection systems that will comprise temporary toilet and washing facilities or hook-ups to permanent facilities.

##### *Principal Environmental Concerns*

In most cases, it is not feasible to install permanent sewage treatment facilities at work sites. Employees will require toilet and washing facilities. The release of untreated sewage is a concern to human health, drinking water quality, and freshwater and marine ecosystems.

##### *Environmental Management Measures*

The following protection measures will minimize the potential environmental effects of sewage disposal:

- *Temporary or permanent facilities will be developed in compliance with Ontario's Environmental Protection Act to ensure that sewage effluent is not released untreated to the environment.*

##### **Temporary Sewage Disposal**

- *During the initial stages of site development and where it is not feasible to install sewage treatment facilities, portable and/or temporary toilets and wash cars will be developed with holding tanks.*
- *The holding tanks will be pumped and emptied at the treatment facilities, as required.*

##### **Permanent Sewage Disposal**

- *Where sewage facilities are required, developments will proceed, in accordance with*
- *Ontario's Environmental Protection Act, for a temporary or permanent sewage collection and treatment system (if required).*

#### **4.4 Fire Prevention**

RES understands that the project has the potential to cause forest fires during vegetation clearing phases. In



In addition, the project should have in place a mechanism to deal with forest fires during the operational phase of the project. As such, the following measures will be taken:

- *RES and the EM will require full awareness of the Forest Fire Prevention Act (FFPA).*
- *RES will devise a Low Complexity Burn Plan and a Fire Prevention Plan and have it signed off by Fire Management Headquarters.*
- *All heavy equipment is required to have the appropriate fire extinguishers as per FFPA.*
- *If/when power saws are utilized, appropriate fire extinguishers will be present and saws will be started at a distance from re-fueling areas as per the FFPA.*
- *Plan for disposal of debris from land clearing*
- *Machinery will be maintenance on a daily basis and all debris will be cleared from equipment.*
- *The Harvesting contractor selected by RES will be responsible for the Modifying Industry Operations Protocol (daily call in).*
- *RES will ensure that appropriate fire suppression equipment is on site at all times.*

## 5.0 CONTINGENCY PLANS FOR UNPLANNED EVENTS

### 5.1 Emergency Response Plan

#### *Employee Training Program*

RES will develop an operations training program to ensure personnel receive appropriate training in relation to operation and maintenance programs, environmental, health, and safety procedures, and emergency response plan. Training will cover issues such as:

- *Accident reporting;*
- *Chemical and hazardous materials handling;*
- *Fall and arrest protection;*
- *Eye, ears, head, hands, feet, and body protective equipment;*
- *First aid training and equipment;*
- *Equipment operation and hazards;*
- *Fire prevention and response;*
- *Lockout and tag out procedures;*
- *Scaffolds and ladders;*
- *Fire preparedness and response;*
- *Natural disasters (i.e., extreme weather events);*
- *Hazardous materials and spill response;*
- *Medical emergencies; and*
- *Rescue procedures.*
- *Accident and near miss reporting*

Training should begin as initial staff is hired during the pre-operational mobilization period. There should also be on-going training for personnel as well as specific training sessions for new hires.

### 5.2 Discovery of Undocumented Sensitive Areas

RES understands that during the course of construction activities, sensitive areas may be encountered which were not previously documented. As such, the following measures will be taken:

- *The EM will be notified of the location.*
- *The EM will have authority to stop work in the location of the sensitive area until such time as satisfactory measures are taken to document the area with the assistance of a biologist.*
- *The sensitive area will be documented and contact will be made with the MNR.*
- *Should the area prove to be sensitive in consultation with officials at the MNR, steps will be taken by the EM to revise construction procedures in the area and to mitigate any potential impacts.*

### 5.3 Erosion Control Failure

#### *Outline of Procedure*

Control of erosion and potential sedimentation of receiving water bodies is one of the most critical environmental management concerns for this Project. Erosion control methods will be applied where there is the potential for erosion due to rain, flowing water, steep slopes and highly erodible soils. This program contains measures to prevent failure of erosion control structures.

#### *Principal Environmental Concerns*

The principal environmental concern is the associated sediment-laden runoff and the resulting effects on water quality, aquatic ecosystems and environmentally sensitive areas such as wetlands.

#### *Environmental Management Measures*

The following measures will be implemented to minimize the potential environmental effects in the event of erosion control failure.

#### **Prevention:**

- *Erosion control measures will be implemented as described earlier in this EMP, or as deemed necessary by the Construction Manager.*
- *Supplies for any emergency response will be on hand at all times. This may include, but not be limited to, straw bales, filter fabric and silt curtains.*

#### **Emergency Response Action Plan:**

- *If siltation of the nearby watercourses is observed, notify the Construction Manager and identify the source of the siltation. Siltation indicates preventative measures have been ineffective.*
- *Suspend any construction operations contributing to the problem.*
- *Isolate, contain, and control the source using measures such as straw bales or brush mats. Erosion control structures will be fixed immediately.*
- *If the release has affected, or has the potential to affect, a sensitive area (i.e., a wetland or watercourse), the Site Supervisor will contact and consult with the appropriate regulatory authorities (e.g., OMNR, Fisheries and Oceans Canada) as required for notification and planning.*
- *To ensure that erosion and sediment control measures are in effective working order, their condition will be monitored periodically and prior to, during, and following storm events.*
- *Accumulated sediment will be removed once it reaches a depth of one-half the effective height of the control measure or a depth of 300 mm immediately upstream of the control measure.*
- *For all erosion control measures, accumulated sediment will be removed as necessary to perform maintenance repairs.*

- *Accumulated sediment will be removed immediately prior to the removal of control measures.*
- *The sediment removed will be deposited in an area that is approved by the Construction Manager and will not result in erosion and runoff into a watercourse.*

#### **5.4 Fuel and Hazardous Materials Spills**

##### *Outline of Procedure*

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

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

##### *Principal Environmental Concerns*

The day-to-day operations of construction equipment, machinery and vehicles, as well as the transfer of fuel from storage containers to these, offer the potential for fuel spills. Other hazardous material products include hydraulic fluids, lubricating oil, solvents, anti-freeze, and paint. Fuels and other hazardous materials can be damaging to vegetation, soil, surface water, groundwater, human health, wildlife and aquatic organisms. Please see **Appendix 2** for the required arrangement for a static refueling point.

##### *Environmental Management Measures*

#### **Prevention of Fuel and Hazardous Materials Spills**

The following measures will be implemented to minimize the potential environmental effects in the event of a fuel or hazardous material spill:

- *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 trained in the use of safety equipment, spill prevention equipment and emergency response procedures.*
- *Hazardous materials will be stored and handled in accordance with applicable provincial and federal regulations, codes and guidelines.*



- *Storage of hazardous materials will not occur in environmentally sensitive areas, such as wetlands or watercourses. Hazardous material containers will be properly labeled in compliance with the requirements of WHMIS.*
- *Material Safety Data Sheets (MSDS) will be available for all hazardous materials in use or stored on-site.*
- *A Fuel and Hazardous Material Spill Contingency Plan has been developed below.*
- *Designated personnel will be trained in the procedures and responsibilities outlined in the Contingency Plan.*
- *All hazardous materials will be removed and disposed of in an acceptable manner in accordance with government regulations and requirements. Hazardous materials may be removed from the site by an appropriate special waste collection and disposal company.*
- *Contaminated materials will be separated from uncontaminated materials and disposed of at approved waste disposal facilities.*
- *Reduce the need for hazardous substances by substituting for less harmful ones.*
- *Incorporate appropriate preventative and response measures and construction practices.*
- *Providing environmental awareness training to contractors and workers involved in the Project. Training will include the handling, clean-up, reporting and disposal of contaminated material.*
- *Maintaining appropriate spill response equipment in a readily accessible location.*
- *Reporting all spills to applicable authorities (e.g., 24-hour emergency reporting system at the MOE Spills Action Centre (1-800-268-6060)).*
- *The inspection of equipment (e.g., construction vehicles, exhaust systems) by the site personnel to ensure that vehicles with obvious fuel or oil leaks do not enter the project area.*

Best management practices prescribe the presence of spill kits on location and on the vehicles. Spill management procedures as outlined in the contingency plan will be followed when a spill occurs. Spill kits are mandatory on site. Any discharge will be cleaned immediately and authorities notified (e.g. OMNR, Department of Fisheries and Oceans). A Spill Response Plan will be submitted for review by MOE prior to construction.

### **Contingency and Response Plan**

- *If it is safe to do so, the individual who discovers the leak or spill will immediately attempt to stop and contain the leak or spill.*
- *Any spill or leak must be reported immediately to the Construction Manager.*
- *The Construction Manager will immediately report the spill to the MOE Spills Action Centre 24-hour Report Line (1-800-268-6060).*
- *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;*
  - *any remedial action taken or to be taken to prevent a recurrence of the leak or spill;*



- *The site Contractor will have the full authority to take appropriate action without unnecessary delay. The Spill Report Form will be filled out immediately following the discovery of the spill or leak, by the Contractor, and forwarded to the Environmental Monitor; Spill Reports will be made available to the OMNR upon request; and,*
  - *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; and,*
  - *The Contractor, with approval by the Environmental Monitor, will send a completed Spill Report Form to the OMNR, as soon as possible, and no later than 30 days after the spill.*

### **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:

- *Absorbent materials (i.e., sorbent pads, Sorb-All, peat moss);*
- *Small equipment such as shovels, rakes, tool kit, sledgehammer, buckets, stakes, tarpaulins, one empty drum, and protective equipment; and,*
- *Refer to the contact list of this EMP which contains the spill response information.*

## **5.5 Archaeological and Heritage Resources**

### *Outline of Procedure*

Archaeological/heritage resources are defined as known archaeological sites, designated historic sites, and heritage structures. These resources are considered important as they are recognized by the Province and form part of a collective body of information used to understand and define the Provincial heritage.

The geographical extent of any adverse effects will be the entire resource and adjacent areas associated with heritage resources that occur within the Project footprint. The magnitude of construction effects on unknown heritage resources will be high, as clearing and excavation activities will expose the resource. This



effect will be immediate and irreversible. If unknown resources are encountered during either the construction or operation phase, they will be affected, and effects will be site-specific. However, the potential for significant loss of knowledge would be minimized through the initiation of a contingency plan for affected resources.

In addition to these resources, although much less likely, there is the potential for human remains to be encountered during construction. This plan will guide the Municipality and/or their contractors and subcontractors in how to respond in the event that a potential archaeological resource is encountered during construction activities.

#### *Principal Environmental Concerns*

These features represent a valuable cultural resource, and uncontrolled disturbance could result in loss of or damage to these resources and the information represented by them.

#### *Environmental Management Measures*

The following measures will be implemented to minimize the potential environmental or cultural effects in the event of the discovery of heritage resources

#### **Preventing Archaeological and Heritage Resource Encounters**

- *All areas containing known historic or archaeological resources will be avoided where possible, and will be flagged or otherwise clearly marked to indicate that the area has elevated archaeological potential and /or significance.*
- *All mechanized vehicles/equipment will remain within the existing site roads except where required for clearing and other construction activities. Vehicles and equipment will avoid areas marked as having elevated archaeological potential.*

#### **Contingency and Response Plan**

- *All work will cease in the immediate area of the discovery until such time as the Environmental Monitor, having consulted with provincial authorities, advises those involved as to the disposition of the discovery and authorizes a resumption of the work.*
- *Archaeological materials encountered will be reported to the Environmental Monitor with the following information:*
  - *nature of activity resulting in the discovery;*
  - *nature of the material discovered;*
  - *the precise location of the find; and*
  - *names of persons witnessing the discovery.*



All heritage resources, including archaeological objects and sites of archaeological or historical interest or significance discovered on the site, will be deemed to be the property of the Crown and will not be disturbed. All precautions will be taken to prevent employees or other persons from removing any artifacts or damaging sites, as personnel may be held liable by prosecution for all contraventions. All human remains will be reported directly to the Royal Canadian Mounted Police (RCMP).

## **5.6 Wildlife Encounters**

### *Outline of Procedure*

This program contains measures to minimize interactions that Municipality and Contractor personnel may have with wildlife during Project construction.

### *Principal Environmental Concerns*

Encounters with wildlife may result in distress for both the animal and the employee. Serious injury could result to site workers in some instances. Threats to personnel include encounters with wildlife especially animals with young and rabid animals. Bites from any animals are potentially dangerous. Wildlife encounters have the potential to distress animals to the point of altering feeding and breeding behavior. Physical injury or death to wildlife could also occur.

### *Environmental Management Measures*

#### **Personnel Training**

Personnel will be advised of the appropriate measures to use in the event of a wildlife encounter. Personnel will be instructed in the correct and sanitary method of garbage disposal in designated disposal locations; this will minimize wildlife encounters.

#### **Prevention**

The following waste disposal recommendations will minimize the attraction of wildlife:

- *Keep work area clean of food scraps and garbage.*
- *Transport waste to an approved landfill on a regular basis.*

#### **Contingency and Response Plan**

- *All personnel will report the presence of wildlife to the Construction Manager.*
- *When wildlife sightings are reported to the Construction Manager, the Construction Manager will initiate any reasonable action to reduce the chance of disruption or injury.*

- *Should disruption or injury to the wildlife occur, the Construction Manager will contact the on-call Conservation Officer.*
- *In the case of wildlife encounters in sensitive areas, and for consultation on appropriate action to be taken for any encounter, the Construction Manager will contact the on-call Conservation Officer.*
- *No attempt to harass wildlife will be made by any person at the work site.*
- *Equipment and vehicles will yield the right-of-way to wildlife.*
- *If dead animals are encountered (including birds or bats), they will be removed and disposed of, as soon as possible, in consultation with the local Provincial Wildlife Officer (or, in the case of a pet, the Ontario Humane Society). All handling of bird carcasses will be in accordance with the MBCA salvage permit. If Species at Risk (SAR) species carcasses are found they will be sent to the Ontario Region Canadian Wildlife Service (CWS) office with suitable permitting as advised by the Canadian Wildlife Service.*
- *In the case of encounters with injured or diseased wildlife at the work site (including birds or bats), the Construction Manager will contact the on-call Conservation Officer. No attempt will be made to harass the animal, and no person at the work site will come into direct contact with the animal.*
- *If an injured or dead bird or bat is encountered, the following information will be recorded: date and time it was found, injury sustained (if identifiable), cause of injury (if known), and species. This information will be kept on file with the Municipality for incorporation into the post-construction bird monitoring program.*

## **5.7 Fires**

### *Outline of Procedure*

Activities related to construction could result in a fire that could spread to the surrounding area. Alternatively, a fire started off-site could spread into the Project area. This Contingency Plan contains measures for fire prevention as well as response action plans.

### *Principal Environmental Concerns*

Fires could result in terrestrial habitat alteration, and direct mortality of wildlife. Fire fighting chemicals and spilled materials could enter aquatic habitat and adversely affect biota and habitat. Fires also have the potential to adversely affect air quality and could pose risks to human health and safety.

### *Environmental Management Measures*

The following measures will be implemented to minimize the potential for causing a fire and the potential environmental effects in the event of a fire.

### **Personnel Training**

All persons working on the site will be trained in the use of on-site firefighting equipment, fire prevention and response.

### **Prevention**

- *All flammable waste will be disposed of on a regular basis.*
- *There will be no smoking within 50 m of flammable product storage or usage. Areas for disposal of smoking material will be clearly posted.*
- *Firefighting equipment, sufficient to suit on-site fire hazards, will be maintained in proper condition and to the manufacturer's standards.*
- *RES will follow Ontario's Prescribed Burn Policy and will develop a Low Complexity Burn Plan as well as a Fire Prevention Plan. These plans will detail mitigation and emergency measures in the case of forest fires.*

### **Contingency and Response Plan**

- *Notify nearby personnel.*
- *On-site personnel will take immediate steps to extinguish the fire using appropriate equipment.*
- *Notify the Environmental Monitor and Construction Manager.*
- *If the fire cannot be contained, contact the Fire Department at 9-1-1.*
- *In case of related medical emergencies, emergency medical assistance will be requested from 9-1-1.*

### **Decommissioning Program**

The design life of the wind turbines is estimated to be approximately 20 years, but it is possible that the turbines could continue to operate at the same location after the design life either through major turbine overhauls or with the replacement of the turbines with newer models.

Should decommissioning become necessary, RES Canada would follow the standard industry accepted practices in effect at that time. Such practices include the removal of facilities, recycling of suitable materials (e.g., metal and parts), reuse of components and equipment in other facilities, conversion of buildings to other uses, and/or rehabilitation of the site areas. This would include the removal of the turbines bases to a depth of approximately 1 m and backfilling with a final layer of top soil. Similarly, access road base material would be removed and the areas returned to their former state (e.g., agriculture or natural habitat).

### **Health and Safety Plan**

The Project has been designed and will be constructed, operated and decommissioned using applicable standards and industry best practices. Equipment will be inspected regularly and maintained to prevent any potential health or safety issues.



Accidents and malfunctions with short-term impacts may occur. More serious impacts are considered to be highly unlikely.

## **6.0 ENVIRONMENTAL INSPECTION AND MONITORING**

### **6.1 Bird Monitoring Program Overview and Mitigation Measures**

The following is a summary of the bird monitoring program and mitigation measures for the GWF. Additional information is provided in the ESR and Appendix K to the ESR.

- *The potential for effects on wildlife and wildlife habitat has largely been addressed through turbine placement. Mitigation measures to be implemented are detailed in the ESR.*
- *A management plan will be developed for any construction activities within 2 km of any potential nesting habitat. The management plan should include identification of nesting and feeding habitats, minimum setbacks, timing restrictions for construction, and monitoring requirements.*
- *Potential nesting habitat will be monitored as part of the post-construction avian monitoring plan as presented in Appendix K.*
- *Due to the high numbers of common loons and likely presence of a flyway through the study area, a monitoring program will be implemented to track the impact to this species.*
- *Monitoring of BCR 8 species in the study area will be implemented to assess the impact to this group.*
- *If construction does take place during the core breeding season (May 1 to August 15), it is recommended that a qualified biologist will conduct nest searches in areas to be cleared (e.g. watercourse crossing) and identify nests, which require protection until young have fledged. Based on this nest search an appropriate buffer will be provided for each nest based on an initial determination by the biologist on site.*

### **6.2 Bat Monitoring Program Overview and Mitigation Measures**

The MNR bat guideline document indicates that at least two years of post-construction monitoring will be required from May through September. RES Canada will enter into discussions with the MNR regarding the need for post-construction mortality monitoring for bats for this project. The details of the proposed monitoring plan are presented in Appendix K of the ESR.

### **6.3 Post-Construction Monitoring for the Greenwich Wind Farm**

RES Canada will consult with Environment Canada/CWS and the Ontario MNR regarding the scope of the post construction avian (bird and bat) mortality monitoring. A post construction monitoring plan has been prepared and is presented in Appendix K of the ESR. The monitoring will be undertaken after various low (good) and high-risk (poor) weather conditions have occurred in the area (i.e. clear sky or low fog). Turbines will be sampled as soon as is reasonable after a target weather condition has passed through the area. This sampling of target weather conditions will be conducted on a seasonal basis in an attempt to model any difference in mortality rate during a particular weather event.



### **Terrestrial Habitat/Wildlife**

A Species at Risk Interaction Plan for during the construction period will be developed to ensure that any interactions with Gray Fox den sites or Caribou individuals are appropriately mitigated. It is unlikely that either species will be encountered. The MNR will be consulted with in the development of this plan.

Replanted and reclaimed areas will be inspected one year after their planting to ensure that they are established.

### **Aquatic Habitat/Surface Water**

It is expected that monitoring activities relating to aquatic habitat will be confirmed through the ongoing permitting process with the Lakehead CA and DFO. The monitoring of aquatic habitat will occur at different levels. During construction, RES will ensure that the watercourse is crossed in an appropriate manner and that committed mitigation measures (e.g. erosion/sediment control) are being implemented and are effective. Some water quality sampling may be undertaken to ensure the effectiveness of the implemented measures. Weather conditions will be monitored to ensure that watercourses are being crossed at appropriate times so as to avoid in-water works during high flow events as much as possible.

Site rehabilitation measures such as vegetation plantings in the riparian zone and fish habitat compensation measures (if required) will be monitored to ensure that they have been implemented correctly and inspected after the following year spring melt period. Corrective action will be taken should the rehab works not be effective.

All culverts will also be inspected on a frequent basis during construction to ensure that they are conveying water flow and not resulting in upstream flooding (either through blockage from debris or because of their under sizing).

Accidental spills could also affect habitat. RES will be required to ensure that should a spill of a hazardous material occur (e.g. fuel), that the spill would be quickly responded to as per the requirements of the Spills Contingency Plan.

### **Noise and Dust Disturbance Effects**

During the construction period, there is the potential for disturbance effects such as noise and dust, particularly along the local roads to access the project site. It is expected that standard construction practices will minimize these effects as much as possible. RES Canada will advertise in the community a contact number should residents wish to voice a complaint regarding the construction process and/or to obtain more information. RES Canada will respond to these calls and address the problem.



### **Roads**

The use of local roads by the construction equipment has the potential to affect the road bed/condition. The roads will be returned to their preconstruction condition. The roads will be monitored after heavy rain events during the construction period and road repairs made if required. This will include new access points and roadside drain crossings.

### **Community Liaison and Follow-up**

RES will provide information releases to the community if new issues arise or if the community has specific concerns. Company representative contact information will be available to the public to address concerns and questions during operations. Stakeholder consultation and communications activities going forward will include:

- *Project update bulletin or bulletins as required, mailed or hand-delivered to keep area residents apprised of the progress of construction, dates and timings of any traffic disruptions connected with the project and any other matters that may affect or be of interest to area residents and other project stakeholders;*
- *Newspaper notices regarding traffic disruptions and construction timings of interest;*
- *Personal consultations as requested or if warranted by project activity;*
- *Meetings with municipal and other local and provincial government authorities;*
- *RES will hold another community public information centre to present the final proposed project infrastructure and transmission line route; and*
- *Ongoing consultations and meetings with local stakeholders.*



**7.0 KEY CONTACT LIST**

The following section lists key organizations and/or individuals that may be contacted during emergency situations and regarding regulatory issues, followed by the Project Contact List. This list will be posted in the base of each turbine, and it will be carried by maintenance personnel during the operation phase of the project.

Agency	Area	Phone Number
<b>Emergency Contacts</b>		
Ambulance/Police/Fire/Rescue		<b>9-1-1</b>
RCMP		<b>9-1-1</b>
<b>Regulatory and Municipal Contacts</b>		
Ontario Ministry of Environment	Thunder Bay Regional Environmental Assessment Coordinator	(807) 475-1205
Township of Shuniah	Eric Collingwood	(807) 683-4543
Township of Dorion	Linda Tolmonen	(807) 857-2289
Ministry of Transportation Ontario (MTO)	Northwestern Region	(807) 473-2000
Association of Worker’s Compensation Board of Canada	Customer Liaison Officer	(905) 542-3633
Department of Fisheries and Oceans	Area Habitat Coordinator	(807) 346-8118
Environment Canada (EC) / Canadian Wildlife Service (CWS)	Bird / Bat Conservation Officer	(819) 997-2800
Ministry of Natural Resources (OMNR)	Thunder Bay District	(807) 475-1471
Lakehead Region Conservation Authority	Lakehead Region	807-344-5857
<b>Environmental Emergencies and Spills</b>		
Local Hospital with Emergency Services	Thunder Bay Regional Health Sciences Centre	(807) 648-6000
MOE Spills Action Centre	24-hour Report Line	1-800-268-6060
<b>Project Contacts</b>		
Development Manager	Stephen Cookson	514-525-2113 x 226
Environmental Monitor	To Be Decided (TBD)	TBD
Site Supervisor	TBD	TBD
Construction Manager	TBD	TBD



**APPENDIX 1:  
 ENVIRONMENTAL CHECKLIST - LLER-1**

Project Number:		Project Name:			
<b>Environmental checklist</b>					
<b>Originated by:</b>					
Name		Organisation	Date		
<b>1</b>	<b>Existing Conditions</b>		<b>Y</b>	<b>N</b>	<b>N/A</b>
1.1	Are areas of contaminated land being protected/remediated properly?				
1.2	Are all underground services identified and excavation permits used?				
1.3	Have existing storage tanks been checked and safely emptied?				
1.4	Is the site reasonably protected from vandalism and dumping?				
1.5	Are procedures in place to prevent fires on site?				
1.6	Are all survey monuments protected?				
1.7	Are existing communication lines protected?				
1.8	Are land improvements further than 500 yards from water tanks?				
1.9	Is Archaeological Monitoring being carried out in accordance with the requirements of the "Cultural Resources Construction Monitoring and Construction Plan"				
<b>2</b>	<b>Site Drainage</b>				
2.1	Is surface and foul water drainage independent and identified?				
2.2	Is there sufficient surface water drainage?				
2.3	Are pad sites rehabilitated for drainage?				
<b>3</b>	<b>Deliveries</b>				
3.1	Are material deliveries being correctly supervised?				
<b>4</b>	<b>Storage</b>				
4.1	Are all static fuel and oil storage units located in suitable bunds?				
4.2	Are all fuel bowsers banded or double-skinned?				
4.3	Are all fuel bowsers secured in sensible locations?				



4.4	Is all subcontractors work, plant and materials secure?			
4.5	Are all chemicals stored in accordance with the material data sheets?			
4.6	Is fuel delivery manual and are all valves locked when not in use?			
4.7	Do all tanks display their contents and other warning notices?			
4.8	Is a competent contractor removing all storage tanks off site?			
<b>5</b>	<b>Waste Management</b>			
5.1	Is waste being stored in designated areas away from watercourses?			
5.2	Are all skips on site covered and being replaced when full?			
5.3	Is all waste being disposed of quickly and correctly?			
5.4	Is “special waste” being identified and disposed of correctly?			
5.5	Are copies of consignment notes being kept in the job book?			
5.6	Are all fuel/oil leaks properly removed?			
5.7	Has sewage been properly disposed in portable toilets?			
<b>6</b>	<b>Earthworks</b>			
6.1	Does excavation drainage prevent silty water reaching watercourses?			
6.2	Are temporary stockpiles protected from silt/dust loss?			
6.3	Are roads being kept free of excess mud or dust?			
6.4	If silty water exists is it being treated prior to meeting a watercourse?			
6.5	Are excavated and demolition materials being re-used?			
6.6	Are all blasting activities being adequately controlled?			
6.7	Are the requirements of the SWPPP being followed?			
6.8	Are the requirements of the Pollutants Discharge Elimination Systems permits being followed?			
6.9	Are the requirements of the Temporary Air Quality permits being met?			
<b>7</b>	<b>Plant</b>			
7.1	Is refueling of plant taking place in a clean and controlled way?			
7.2	Does all site plant appear to be in good condition and free from leaks?			
7.3	Is plant servicing taking place over a well-maintained drip-tray?			



7.4	Are plant operators aware of the sites environmental responsibilities?			
<b>8</b>	<b>Concrete</b>			
8.1	Are concrete trucks washing out in the agreed locations?			
8.2	Is cement or mortar being allowed to enter watercourses?			
8.3	Is site batching in accordance with the agreed method statement and permits?			
8.4	Are the requirements of the sand and gravel permit being met?			
<b>9</b>	<b>Emergencies</b>			
9.1	Is site personnel trained and able to perform emergency procedures?			
9.2	Are the relevant environmental emergency numbers widely posted?			
9.3	Are there adequate fire precautions in operation?			
9.4	Has Owner been notified of any Emergencies within 24hrs?			
<b>10</b>	<b>Wildlife</b>			
10.1	Is wildlife protected from becoming trapped/injured in the works?			
<b>11</b>	<b>Site Restoration and Reclamation</b>			
11.1	Are areas disturbed by construction being kept to a minimum?			
11.2	Has a site reclamation plan been agreed for all construction facilities?			
11.3	<i>Are there measures to stop introduction and spread of noxious plants?</i>			
11.4	<i>Has the use of pesticides complied with Applicable laws?</i>			
<b>12</b>	<b>Installation</b>			
12.1	<i>Are all leaks being promptly repaired?</i>			
12.2	<i>Has all work met proper requirements?</i>			
<b>13</b>	<b>Final Job Book</b>			
13.1	Is the Job Book being developed during the construction period?			
<b>14</b>	<b>Personnel Reprimands</b>			
14.1	Has personnel been reprimanded for failure to comply with above?			

**N.B. If the answer to any of the questions on the previous page are “No” then please confirm what further preventative measures will be taken to prevent any environmental problems from occurring. Should any environmental concerns specific to the site not be covered in the above document please**



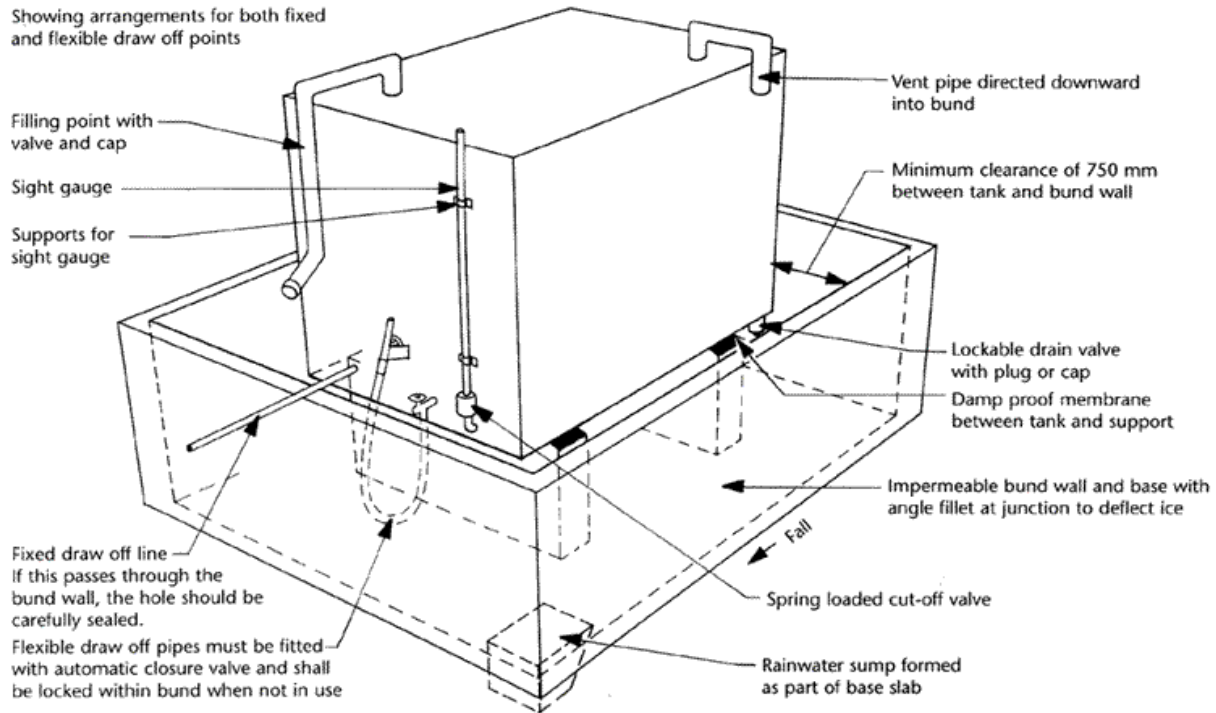
**detail the steps necessary to mitigate possible problems, below.**

**APPENDIX 2:  
FUEL AND OIL STORAGE (STATIC REFUELING POINT)**

The required arrangement for a static refueling point is shown below:

**BUNDED OIL TANK**

Showing arrangements for both fixed and flexible draw off points



Bund design for storage tanks of up to 25m<sup>3</sup> capacity can be found in a report produced by the Construction Industry Research and Information Association (CIRIA):

CIRIA Report 163 "Construction of bunds for oil storage tanks" ISBN 0 86017 468 9



**APPENDIX 3:  
SUMMARY OF EMERGENCY SERVICES**

(to be developed prior to Construction)