CONESTOGO WIND, LP

Conestogo Wind Farm

Revised Construction Plan Report

October 12, 2011

GENIVAR

Project No. MA-09-213-00-MA

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1. Construction Plan Report

NextEra Energy Canada, ULC is proposing a single Class 4 Wind Facility consisting of nine 2.3 MW wind turbines and one 2.22 MW turbine for a nameplate capacity of 22.92 MW in the area of Arthur, Ontario to convert wind energy into electricity to be fed into the Hydro One grid. The defined study area, presented as Figure 1, covers approximately 2400 ha south of Arthur and west of Alma.

The major components of the projects are as follows:

- → Nine Siemens SWT 2.3-101 wind turbines
- → One Siemens SWT 2.22-101 Wind Turbines
- → Pad mount 690 V/ 34.5 kV step up transformers located at or near the base of each turbine
- → Buried 34.5 kV electrical collector system, and ancillaries
- → Buried and overhead 44 kV electrical lines
- → A transformer substation to connect to the Hydro One distribution system
- → Turbine access roads
- → Temporary staging areas for erection of wind turbines
- → 2 meteorological towers

The location of the equipment can be seen in Figure 2.

This report will detail the construction activities, the duration of these activities, any potential environmental effects and proposed mitigation measures to be applied to the potential environmental effects.

2. Construction Details

The work will meet or exceed all local regulations and standards (such as the Ontario Electrical Safety Code, Ontario Building Code, etc.). The proposed turbines and associated infrastructure are presented in Figure 2.

2.1 Surveying and Geotechnical Study Activities

Surveys will be required to locate the turbines, crane pads, access roads, electrical lines and the substation. Crews will drive light trucks to reach sites primarily using existing roads. They will then walk the site for the surveying and mark the locations using stakes. For the wind farm site, the surveys will typically take 1 to 2 days per property.

Existing buried infrastructure located on public property will be located using the Ontario One Call service and buried infrastructure located on private property will be located by private contractors prior to construction or geotechnical sampling and updated throughout construction, as required.

Geotechnical sampling will also be required.

Any archaeological sites, as identified in the Archaeological Assessments undertaken (Appendix E), will be clearly marked off with signage and appropriate setbacks. All personnel working on or entering the construction area will be instructed to avoid these identified areas.

Materials Brought On Site: None

Construction Equipment Used: Typically a truck mounted drill rig visits the sampling locations, drills the survey hole and collects geotechnical information. It is possible that a track-mounted rig will be required.

The drilling will emit minor amounts of noise and will be limited to daylight hours. No chemicals other than fuel will be used.

Timing: These activities will take place prior to construction and do not depend on seasonality. Preference is to complete this activity in the winter to minimize crop disruption. This operation typically uses two operators and requires 1-2 hours per site.

Material Generated: Some drill cuttings (composed of soil) will be generated and will be disposed of on site by scattering in the vicinity of the borehole.

2.2 Roads and Land Clearing

No permanent paved roads will need to be constructed for the turbines. Municipal and provincial roads will be used for transportation of equipment to the construction sites. Minor modifications may be required to some of the existing roads (for example, widen the turning radius, upgrade culverts) for equipment transportation. Portions of Sideroad 17 between Sixteenth Line and Fourteenth Line will need to be upgraded. This will involve the widening of the road to 11 m. Any road damages will be repaired and any road improvements will be left in place.

On-site access to the turbines will require approximately 4 km of new access roads (see Figure 2). Following completion of the construction phase, the access roads will be used for maintenance activities (i.e., inspection of the turbines) at the turbines for the duration of the project. Typically these will be 11 m wide during the construction phase for access by the large cranes (with an additional 2 m clearance on each side for travel), and afterwards reduced to 6 m wide during the operating phase. The road length will be different for each turbine according to its location.

The construction of the road typically requires excavation of the top soil layer and addition of a layer of compacted material to a typical thickness of 300 to 600 mm (depending upon site specific geotechnical conditions). Clean granular material (typically “A” or “B” gravel) will be brought to the site on an as need basis and will not be stockpiled onsite. The topsoil will be kept and re-used on site.

Temporary crane paths will also be constructed. These will be 11 m wide and constructed as the other roads described above. Once the construction activities have been completed, the granular base will be removed and distributed to the landowners, if desired, or removed from the site and disposed of in an approved and appropriate manner. The disturbed area will have the topsoil replaced from stockpiled material and will be reseeded in consultation with the landowner.

Materials Brought On Site: Granular material for road construction, some steel culverts.

Construction Equipment Used: Equipment will include—at a minimum—trucks, graders, and bulldozers. The trucks and graders will be driven to the site and the bulldozers will be brought via trailers. All will be temporarily stored at the Temporary Construction Laydown Area (Figure 3). The construction will emit minor amounts of noise and dust. No chemicals other than fuel will be used. Road dust will be controlled with water, as necessary.

Timing: This will preferentially be completed in late spring or summer to take advantage of typically drier weather. If necessary, this can be completed in the spring or fall, depending on the amount of rainfall. The access road to each turbine will typically require one to three days of construction time.

Material Generated: Some top soil will need to be stripped; however this will be disposed of or re-used on site.

2.3 Construction Laydown Area

A 10 acre fenced site will be constructed for the temporary storage of construction material (no turbine components). The location of this facility is shown in Figure 3. The topsoil at the Construction Laydown Area will be removed and approximately 600 mm of clean compacted crushed gravel will be imported on an as needed basis. The excavated topsoil will be re-used on site as feasible.

Materials Brought On Site: Granular material as required to maintain a stable base.

Construction Equipment Used: Equipment will include - at a minimum - cars, trucks, graders, and bulldozers. The cars, trucks and graders will be driven to the site and the bulldozers will be brought via trailers. The construction will emit minor amounts of noise and dust. No chemicals other than fuel will be used.

Timing: This will preferentially be completed in late spring or summer to take advantage of typically drier weather. If necessary, this can be completed in the spring or fall, depending on the amount of rainfall.

Material Generated: Some top soil will need to be stripped; however this will be disposed of or re-used on site.

Temporary Uses of Land: The construction lay down area will be limited to the 10 acre parcel shown on Figure 3. It is currently used as farmland and is relatively flat. The topsoil will be removed and stored onsite and gravel will be laid down. After the construction of the project is completed, the gravel will be removed, or re-used by the landowner, and the topsoil will be replaced from the stockpile. It is anticipated that this area will be restored after approximately 6 months.

2.4 Turbine Site and Crane Pad Construction

Prior to construction, the construction area will need to be cleared and grubbed. In order to provide sufficient area for the lay-down of the wind turbine components and its assembly, a 101 m diameter area around the wind turbine must be cleared (see Figure 5) levelled and be accessible during the construction phase. The topsoil is typically removed and some engineered fill material may need to be added depending upon site specific geotechnical conditions. Where the site laydown areas are close to watercourses, erosion control measures will be used.

During clearing or excavation activities if any significant archaeological resources are found to be in conflict with the proposed facilities, then consideration will be given to modifying the location of the construction. This will be determined in consultation with the Ministry of Tourism & Culture, archaeologists and Aboriginal communities, where applicable.

Crane pads will be constructed at the same time as the road and will be adjacent to the turbine location. The crane pads will typically be 15 m x 35 m in size. The topsoil at the crane pad will be removed and approximately 600 mm of clean compacted crushed gravel will be imported on an as needed basis. The excavated topsoil will be re-used on site as feasible. Once the turbine erection is complete, the crane pad will be removed and will be restored to prior use.

Materials Brought On Site: Granular material as required to maintain a stable base.

Construction Equipment Used: Equipment will include—at a minimum—trucks, graders, and bulldozers. The trucks and graders will be driven to the site and the bulldozers will be brought via trailers. The construction will emit minor amounts of noise and dust. No chemicals other than fuel will be used.

Timing: This will preferentially be completed in late spring or summer to take advantage of typically drier weather. If necessary, this can be completed in the spring or fall, depending on the amount of rainfall.

Material Generated: Some top soil will need to be stripped; however this will be disposed of or re-used on site.

Temporary Uses of Land: The construction lay down area will be limited to the 101 m diameter parcel surrounding each turbine as shown on Figures 3 and 4. The lands surrounding each turbine are currently used as farmland and are relatively flat. The topsoil will be removed and stored onsite and gravel will be laid down. After the construction of the project is completed the gravel will be removed, or re-used by the landowner, and the topsoil will be replaced from the stockpile. It is anticipated that this area will be restored after approximately 1 month.

2.5 Delivery of Equipment

Equipment will be delivered by truck and trailer as needed throughout the construction phase and stored at temporary lay-down sites surrounding each turbine (see Figure 5). These deliveries will occur during normal construction hours, typically 8 am to 5 pm and may include weekends. A traffic management plan will be developed using MTO Book 7 standards.

2.6 Turbine Foundations

A backhoe will be used to excavate an area approximately 3 m deep x 20 m x 20 m with the material being stockpiled for future backfilling. Stockpiled material will have topsoil and subsoil separated out and surplus excavated material will be removed from the site for disposal in an approved manner. The foundation, with an approximate footprint of 200 m^2, will be constructed using a wooden frame and poured concrete reinforced with steel rebar to provide strength. After construction the foundation will be backfilled using the stockpiled material and the surface will be landscaped for drainage. The only surface evidence of the foundation will be a small protrusion of concrete to which the tower is attached. Land will be able to be cultivated within a few meters of the turbine. An environmental monitor will be on-site during foundation excavation.

Materials Brought On Site: Concrete (30-40 loads), rebar and wood.

Construction Equipment Used: Typical construction equipment, on a per turbine basis, will include:

- Excavator for removing material;
- Flatbed trucks (4-6) for delivery of rebar, turbine mounting assembly and forms;
- Truck mounted crane or rough terrain forklift for unloading and placement of rebar and forms;
- Concrete trucks for delivery of concrete
- Construction trucks (3-4 vehicles with multiple visits); and
- Dozer, loader and trucks to backfill and compact foundation and remove surplus excavated materials

The trucks will be driven to the site and the bulldozers and excavator will be brought via trailers. The construction will emit minor amounts of noise and dust. No chemicals other than fuel will be used.

Timing: This will preferentially be completed in late spring or summer to take advantage of typically drier weather. If necessary, this can be completed in the spring or fall, depending on the amount of rainfall.

Material Generated: Some wood waste will be generated from the wood used to construct the foundation. This will be removed from the site and recycled. Spent welding rods may also be generated which will be disposed of as hazardous waste by a licensed contractor. Excavated subsoil will be removed from the site and disposed of in an appropriate manner.

2.7 Wind Turbine Assembly and Installation

Ten turbines are to be constructed, each with an 80 m hub height and 101 m rotor diameter. Turbine components will arrive on-site using flat bed and other trucks and will be temporarily stored on-site in the immediate vicinity of the base prior to assembly. Typically two cranes will be used to install the turbines. The larger crane is usually crawler type with a capacity of 400 tonnes or larger, and is used for the higher lifts. The nacelle, at approximately 82 tonnes, is the heaviest lift and the rotor, with a diameter of approximately 101 m, is the most challenging lift.

Clearing and grubbing will be required as described in section 2.2. The erection cranes and crew will follow the foundation crew and erect the wind turbines once the foundations are completed and the concrete has set. This will typically be in five lifts (three for the towers, one for the nacelle and one for the rotor) over a period of 2-3 days. The lower tower sections may be installed several days before the upper

tower sections and the turbine to optimize installation sequence. The lower tower section will also include electrical and communications equipment. Total turbine assembly and installation will typically require 4-5 days at each turbine site. Fifteen to twenty people may be required at the site during the turbine installation; they will be transported using light duty vehicles.

The larger track mounted crane can move from turbine site to turbine site however it will need to be disassembled to move it across roadways and to move it to and from the project site.

Packing frames for the turbine components are returned to the turbine vendor. Following commissioning, the surrounding area will be returned to normal agricultural use.

Materials Brought On Site: Steel towers, turbines, nacelles and blades

Construction Equipment Used: One large track mounted crane (approx. 200 tonnes) and one smaller truck mounted crane will typically be used. The track mounted crane will be delivered to the site by flatbed trailers and assembled onsite. The construction will emit minor amounts of noise and dust. No chemicals other than fuel will be used.

Timing: This will preferentially be completed in late spring or summer to take advantage of typically drier weather. If necessary, this can be completed in the spring, fall or winter depending on the weather. Total assembly time will be 4-5 days per turbine.

Material Generated: Some packing material waste will be generated. The recyclable material will be separated from the non-recyclable material onsite. Both streams of waste will be removed by a licensed sub-contractor. Spent welding rods may also be generated which will be disposed of as hazardous waste by a licensed contractor.

2.8 Electrical Collector System

The electrical collector system will consist of pad mounted transformers and underground cabling for use on private property.

Pad mount transformers (690 to 34.5 kV): A concrete transformer pad will be installed at each turbine at the same time as the turbine base installation. The construction will consist of excavation, soil storage, installation of buried electrical grounding grid, installation of the concrete pad, installation of the transformer, and electrical connections. Transformer installation and cabling between the turbine and transformer is expected to take three days per turbine. Flatbed trucks will be used to transport the equipment to site, and a truck-mounted crane will likely be used for the installation.

Underground Cabling: 34.5 kV power cables and fibre optics lines (for communications) will be direct buried from each turbine to the collection system. The excavated soil will be stored temporarily and then reused as backfill. Power conductors will be approximately 0.9 m below grade and the location will be marked. The requirements for the underground cabling have been discussed with the landowners and are acceptable to them. It is anticipated that farming practices will not be affected by the underground cabling due to the depth of the cables and location of the cable beneath the access roads.

Materials Brought On Site: Electrical cabling.

Construction Equipment Used: A truck mounted crane, flatbed trailers and trenching equipment will typically be used. The trenching equipment will be delivered to the site by a flatbed trailer. The construction will emit minor amounts of noise and dust. No chemicals other than fuel will be used.

Timing: This will preferentially be completed in late spring or summer to take advantage of typically drier weather. If necessary, this can be completed in the spring, fall or winter depending on the weather.

Material Generated: Some packing material waste will be generated. The recyclable material will be separated from the non-recyclable material onsite. Both streams of waste will be removed by a licensed sub-contractor.

2.9 Horizontal Directional Drilling

In the specific case noted in the Environmental Impact Assessment Report, an electrical cable will need to be installed using horizontal drilling to minimize impacts on the watercourses. Erosion control devices will be installed at the drill location and drill cuttings will be collected and removed from the site for disposal in an approved and appropriate manner.

An entrance and exit pit will be excavated on either side of the obstacle to be bored under. The directional drilling equipment is then set up at the entrance pit and a drill bit attached to rod segments which is advanced until it reaches the exit pit. A slurry of bentonite and/or polymer is mixed with water and is injected into the hole while drilling to help stabilize the bore hole and reduce friction. Once the drill bit has reached the exit pit the drill bit is removed and a “reamer” is attached and pulled back through the hole to enlarge the bore by 120-150%. The electrical cable will then be installed through the hole.

Materials Brought On Site: Electrical cabling, bentonite slurry and possibly drilling sand.

Construction Equipment Used: Typical equipment will include a directional drilling rig and 2-3 support trucks to carry drilling rods, drilling supplies and cable. The directional drilling equipment will be delivered to the site by a flatbed trailer. The construction will emit minor amounts of noise. No chemicals other than fuel and inert bentonite will be used.

Timing: This will preferentially be completed in late spring or summer to take advantage of typically drier weather. If necessary, this can be completed in the spring, fall or winter depending on the weather.

Material Generated: Some packing material waste will be generated. The recyclable material will be separated from the non-recyclable material onsite. Both streams of waste will be removed by a licensed sub-contractor.

2.10 Substation

The electrical substation for the wind farm will be located on private property on the west side of Sideroad 17 south of Sixteenth Line. The substation equipment will include an isolation switch, a circuit breaker, a step-up power transformer (34.5 to 44 kV), switch gear, instrument transformers, grounding and metering equipment. It will be surrounded by a chain link fence with a locked gate to permit authorized entry and required signage. Substation grounding will meet the Ontario Electrical Safety Code. The substation area will be gravelled with clean material imported to the site on an as needed basis and sloped to facilitate drainage. A secondary containment system, consisting of a 0.25 m high concrete berm, will be installed around the transformer in the event of an oil leak to prevent any soil contamination.

During the construction of the substation, topsoil and sub-soils will be stripped and stockpiled separately. Stripped topsoil and sub-soil will be replaced in the temporary storage facility area and topsoil stripped from the substation area will be distributed on other project properties.

Materials Brought On Site: Gravel, an isolation switch, a circuit breaker, a step-up power transformer (34.5 to 44 kV), switch gear, instrument transformers, grounding and metering equipment, insulators, transformer oil and electrical cabling.

Construction Equipment Used: A truck mounted crane, flatbed trailers and a bulldozer. The bulldozer will be delivered to the site by a flatbed trailer. The construction will emit minor amounts of noise and dust. No chemicals other than fuel and transformer oil will be used.

Timing: This will preferentially be completed in late spring or summer to take advantage of typically drier weather. If necessary, this can be completed in the spring, fall or winter depending on the weather.

Material Generated: Some packing material waste will be generated. The recyclable material will be separated from the non-recyclable material onsite. Both streams of waste will be removed by a licensed sub-contractor.

2.11 Electrical Transmission Line

A 44 kV line will be utilized to connect the transformer to the Hydro One and will be a combination of above ground (using standard poles within municipal road right-of-ways) and buried cable, see Figure 2. The proposed routing of the line is shown in Figure 2. Some portions of the system may be joint use poles (i.e. carrying electrical lines for the project as well as existing Hydro-One lines).

Installation of Poles: Holes are typically augured in the ground using a truck mounted auger device. The poles are then inserted using special cranes to a typical depth of 1 to 2 m below grade. The poles are then "dressed" (made ready to accept conductors) using a boom truck. Typically, one crew will install the poles and one crew will dress them. Twelve to sixteen poles can be installed and dressed in one day. Once the poles are in place and dressed, cables are strung in place using boom trucks and special cable reel trucks. In the case of shared lines, the new 34.5 kV lines will be first strung in place, and then the existing lines will be moved over by Hydro One. Finally, the existing poles are removed. Typically, there is minimal interruption to traffic during the installation of these lines.

Where the cable is to be buried the underground cabling: 44 kV power cables will be direct buried or directionally drilled depending on the preferences of the Township of Mapleton and the GRCA. For direct buried cables the excavated soil will be stored temporarily and then reused as backfill. Power conductors will be approximately 0.9 m below grade and the location will be marked. Directionally drilled cables would be installed as described in Section 2.9. The requirements for the underground cabling is being discussed with the Township of Mapleton.

Materials Brought On Site: Wooden hydro poles and electrical cabling.

Construction Equipment Used: A truck mounted crane, flatbed trailers and a truck with auger to install the poles will typically be used. The construction will emit minor amounts of noise and dust. No chemicals other than fuel will be used.

Timing: This will preferentially be completed in late spring or summer to take advantage of typically drier weather. If necessary, this can be completed in the spring, fall or winter depending on the weather.

Material Generated: Some packing material waste will be generated. The recyclable material will be separated from the non-recyclable material onsite. Both streams of waste will be removed by a licensed sub-contractor.

2.12 Permanent Meteorological Towers

Two permanent meteorological towers are proposed for the Conestogo Wind Energy Centre, with the locations shown in Figures 3 and 4. These will be a monopole structure 50 m in height. The tower will be erected using winches and secured with 4 guy wires tied off to anchors or a small monopole foundation. No significant soil or vegetation disturbance is anticipated.

Materials Brought On Site: Monopole type meteorological tower, guy wires and anchors.

Construction Equipment Used: 2-3 support trucks, one with a winch. The construction will emit minor amounts of noise and dust. No chemicals other than fuel will be used.

Timing: This will preferentially be completed in late spring or summer to take advantage of typically drier weather. If necessary, this can be completed in the spring, fall or winter depending on the weather.

Material Generated: Some packing material waste will be generated. The recyclable material will be separated from the non-recyclable material onsite. Both streams of waste will be removed by a licensed sub-contractor.

2.13 Clean-up and Reclamation

Waste and debris generated during the construction activities will be collected and disposed of at an approved facility. All reasonable efforts will be made to minimize waste generated and to recycle materials, including returning packaging material to suppliers for reuse/recycling. During construction

industry best practices for spill prevention will be utilized. In the unlikely event of a minor spill this will be cleaned up immediately and any impacted soils will be removed from site and disposed of at an approved and appropriate facility. At the conclusion of construction, vehicles and construction equipment will be removed from the site.

Stripped soil will be replaced and re-contoured in the construction areas and disturbed areas will be re-seeded, as appropriate. Erosion control equipment will be removed once inspections have determined that the threat of erosion has diminished to the original land use level or lower.

High voltage warning signs will be installed at the transformer substation and elsewhere, as appropriate.

2.14 Turbine Commissioning

Turbine commissioning will occur once the wind turbines and substation are fully installed and Hydro One is ready to accept grid interconnection. The commissioning activities will consist of testing and inspection of electrical, mechanical and communications systems.

A load bank system will be used in the commissioning of the turbine generators. This will consist of two (2) - 1500 kW generators which will be located temporarily at the substation. The generators will be used for approximately 1 week for 12 hours a day during the commissioning phase. As the generators will be leased and only on site for a short period of time, they will come with a mobile Certificate of Approval issued to the generator owner.

Materials Brought On Site: Gearbox oil, lubricating grease, 2 – 1500 kW generators.

Construction Equipment Used: 3-4 support trucks. The generators will emit minor amounts of noise and dust. Chemicals to be used may include: gearbox oil, lubricants, diesel fuel for the generators and some paint.

Timing: This will preferentially be completed in late spring or summer to take advantage of typically drier weather. If necessary, this can be completed in the spring, fall or winter depending on the weather. The generators will be run for approximately 1 week for 12 hours a day during the commissioning phase

Material Generated: Some packing material waste will be generated. The recyclable material will be separated from the non-recyclable material onsite. Both streams of waste will be removed by a licensed sub-contractor.

3. Location and Timing of Construction

The construction activities will generally be located in two areas.

1. Transportation of equipment to the site will utilize public roadways; and
2. Construction on leased lands. Portions of the leased lands will be utilized for access roads, electrical collector system, crane paths and wind turbine locations as seen on Figure 3.

3.1 Schedule

Construction activities will commence once all necessary permits (REA, building permits, etc) have been obtained and the weather conditions are conducive to construction. The following table outlines the duration of time each activity typically takes per turbine plus an estimate of the total time to complete each task. Construction tasks will overlap as foundations can be started once one or more access roads have been built, turbines can be installed once one or more foundations have been installed and the concrete has set. The construction of the electrical collector system and the substation can be constructed while the foundations are being built and the turbines are being installed.

Table 2-1: Duration of Construction Activities

Activity	Typical Duration per Turbine	Total Duration	Location and Notes
Surveying	<1 day	2 days	Activity areas include: turbine laydown, access road/crane path, construction laydown and collection system areas.
Clearing of land and access road construction	1-3 days	18 days	Activity areas include: turbine laydown, access road/crane path and construction laydown areas.
Turbine Site and Crane Pad Construction	2-4 Days	1 month	Activity areas include: turbine laydown, access road/crane path areas. Activities concurrent with access road construction
Turbine Foundation	3-4 Days (excluding curing time)		
Turbine Assembly and Installation	4-5 Days	1 month	Activity areas include: turbine laydown, access road/crane path areas. Activities concurrent with foundation construction
Installation of electrical collector system	2 weeks		Activity areas include: turbine laydown, access road/crane path, collector system areas Activities run concurrent with foundation construction and turbine installation
Substation installation and connection to distribution grid	1 month		Activity areas include: construction laydown area, transformer sub-station and transmission line areas including portions of Sideroad 17, 16th Line and Sideroad 18 Activities run concurrent with electrical collector system construction
Clean up and reclamation	Activity areas include all areas disturbed by construction areas. Activities run concurrent with construction activities		
Turbine commissioning	1-3 days	2 weeks	Activity areas include: turbine laydown, access road/crane path

Activity	Typical Duration per Turbine	Total Duration	Location and Notes
			construction laydown area, and transformer sub-station areas

4. Potential Environmental Effects and Mitigative Measures

4.1 Archaeological Resources

Construction of the Conestogo Wind Energy Centre will result in the installation of 10 turbines, one transformer sub-station, a temporary construction laydown yard and access roads and crane paths. As such, construction has the potential to disturb archaeological resources, should they exist on the site. A preliminary desktop (Stage 1) Archaeological study has been completed with the following major findings:

- There are no recorded archaeological sites in the subject area;
- There are no protected properties or heritage resources in the vicinity of the site; and
- The study area contains numerous watercourses and has a history of extensive agricultural use; therefore a Stage 2 field survey is recommended.

A field (Stage 2) archaeological survey is partially completed with the results presented in Appendix E. Two find sites, a pre-contact aboriginal find site and one historic period archaeological site were identified during the survey and the facility design was altered to avoid these sites. Further Stage 2 work will be conducted on the remainder of the lands which will be disturbed prior to construction. Should any archaeological resources be found the facility may be altered to avoid these sites or the find sites will be excavated in accordance with the Ministry of Culture Guidelines. After completion of these activities, the construction, operation and decommissioning of the proposed wind farm is not anticipated to have any impact on Heritage and Archaeological Resources.

4.2 Destruction of Vegetation and Habitat

The Conestogo Wind Energy Centre was designed to minimize impacts to vegetation and habitat. Some vegetation could be removed for the construction of the crane paths, however this will be restored and re-seeded with native plants once the crane paths are removed.

4.3 Dust and Noise

Some minor construction noise and dust will be generated during the construction phase. Construction noise will typically be engine noise from trucks and cranes used for the delivery of material and the erection of the turbine towers, nacelle and blades. As much as practical, this will be limited to daylight hours. Dust will be controlled with water, as necessary.

4.4 Stormwater Runoff Impacts

No impacts are anticipated from stormwater runoff. As noted above, very little vegetation will be removed and the original contours of the land will be restored after construction. No impervious surface treatments are planned and any activities near water bodies will have mitigation measures put into place as described in the Environmental Impact Study Report.

4.5 Impacts on Water Bodies

Potential impacts due to the construction of roads and the installation of the directionally drilled cable may include increased sedimentation, damage to fish habitat and/or loss of riparian vegetation. Details of the

impacts and proposed mitigation measures are included in the *Environmental Impact Study Report* and the *Records Review and Natural Heritage Evaluation Ontario Regulation 359/09* (Appendix B) and summarized below in Table 4-1. After implementation of these mitigation measures, no net impacts are anticipated.

Table 4-1: Potential Environmental Impacts to Water Bodies and Mitigation Measures

Project Component	Potential Environmental Impacts	Construction Measures to Address Potential Environmental Impacts
Turbine 1	Hydrological: Sedimentation, disruption of hydrological function.	○ Light duty sedimentation fencing installed around work area during construction will prevent sedimentation from run-off. ○ Regular inspection of sedimentation fencing during construction will ensure proper function of sediment control measures ○ Re-seeding of crops and/or vegetation will stabilize soil after construction ○ Re-contouring of land after construction will ensure no changes to hydrological function
Turbine 8	Hydrological: Sedimentation. Fish Habitat: Low potential	○ Construction area to be clearly marked and staked to reduce footprint impacts ○ Sediment control, light duty sedimentation fencing with hay bales during construction will prevent sedimentation from run-off ○ Regular inspection of sedimentation fencing during construction will ensure proper function of sediment control measures ○ Re-seeding of crops and/or vegetation will stabilize soil after construction ○ Re-contouring of land after construction will ensure no changes to hydrological function
Underground electrical cable between Turbines 8 and 3	Hydrological: Sedimentation, disruption of hydrological function. Fish Habitat: High potential Vegetation: Some vegetation will be removed for access road construction	○ Cable to be installed using directional drilling ○ Follow directional drilling procedures noted in section 1.2.2 ○ Maintain an Emergency Frac-out Response and Contingency Plan as described in section 1.2.2
Turbine 4	Hydrological: Sedimentation. Fish Habitat: Low potential	○ Construction area to be clearly marked and staked to reduce footprint impacts ○ Sediment control, light duty sedimentation fencing with hay bales during construction will prevent sedimentation from run-off ○ Regular inspection of sedimentation fencing during construction will ensure proper function of sediment control measures ○ Re-seeding of crops and/or vegetation will stabilize soil after construction ○ Re-contouring of land after construction will ensure no changes to hydrological function
Access Road along Sideroad 17 to	Hydrological: Sedimentation, disruption of hydrological function.	○ Construction of roads to be completed in the dry season to minimize sedimentation and disruption of hydrologic function ○ Sediment control, light duty sedimentation fencing with hay bales where

Project Component	Potential Environmental Impacts	Construction Measures to Address Potential Environmental Impacts
Sixteenth Line	Fish Habitat: High potential Vegetation: Some vegetation will be removed for access road construction	drainage is towards creek. ○ Regular inspection of sedimentation fencing during construction will ensure proper function of sediment control measures ○ Minimize riparian vegetation loss and re-place any vegetation damaged by construction
Access road for turbines 7 and 8	Hydrological: Sedimentation. Fish Habitat: Low potential Vegetation: None	○ Construction area to be clearly marked and staked to reduce footprint impacts ○ Sediment control, light duty sedimentation fencing with hay bales where drainage is towards creek.
Underground electrical line running from turbine 8 to turbine 9	Hydrological: Sedimentation. Fish Habitat: Low potential Vegetation: None	○ Construction area to be clearly marked and staked to reduce footprint impacts ○ Sediment control, light duty sedimentation fencing with hay bales where drainage is towards creek.
Transmission line along 16th Line and Sideroad 18	Hydrological: Sedimentation. Fish Habitat: High potential Vegetation: None	○ Implement and erosion and sediment control plan as noted in Section 1.2.1 of the Revised Environmental Impact Assessment Report. ○ Schedule grading o avoid times of high runoff volumes (spring and fall). ○ Store any stockpiled materials and refueling materials away from the feature to prevent substances from inadvertently entering the feature. ○ Keep sediment and erosion control measures in place until disturbed areas have been stabilized.

4.6 Water Takings

No water takings are planned for this project.

4.7 Fuels Spills

It is possible that fuel spills could occur during construction. All equipment operators will be trained to avoid spills and to respond to spills should they occur. No re-fueling will be permitted within 120 m of a water body. Should a spill occur the following protocol will be implemented:

1. Spill response kits kept onsite will be used to contain the spill;
2. The NextEra representative will be notified;
3. If the spill is of sufficient quantity, the MOE Spill Action Center will be notified;
4. An environmental contractor will be brought in to remove any excess fuel and impacted soils; and
5. An environmental consultant will be retained to ensure that all impacted soil and groundwater has been properly removed and the site returned to pre-spill condition.

4.8 Potential Impacts by Activity

Potential impacts related to construction activities are presented below.

4.8.1 Surveying and Siting Operations

Environmental Component Potentially Affected	Wildlife and Birds, Terrain & Vegetation
Potential Impacts	Sensory disturbance of wildlife and birds due to presence of survey crew walking on sites (fields) and drill rig for sampling. Vehicles will drive on the fields to complete surveys and geotechnical sampling. As well, bore holes will be drilled for the geotechnical sampling. These activities will impact the vegetation and terrain on-site.
Mitigation Measures	Crew will drive on existing roads (where available) to reach sites and then primarily walk the sites for surveying. Survey activities will be scheduled to minimize impact during breeding periods for wildlife and birds. Potential sensory disturbance of wildlife will be limited by the low number of people involved in this activity and the brief period (1-2 days per property) over which the activity will be conducted. The geotechnical drill rig will drive on existing roads (where available) to reach sites and then drive on-site along the proposed access road paths during dry periods to minimize impact to vegetation and terrain for geotechnical sampling. The impacts will be minimal due to the short time frame (1-2 hours per site) that the drill rig will be on-site.
Residual Impacts	Surveying and geotechnical sampling will result in no residual impacts.

4.8.2 Road and Lands Clearing

Environmental	Terrain, Agricultural Use, Surface Watercourses, Wildlife and Birds

Component Affected	
Potential Impacts	Sensory disturbance of wildlife and birds due to construction. Clearing and grubbing and soil excavation for on-site access roads and laying of gravel base will cause disturbance to the terrain. The access roads will remain for project life. Municipal and provincial roads may be damaged during use. Impacts to surface water features from construction of on-site access roads to the turbines. Impacts to significant woodlots or wildlife habitat from construction of on-site access roads to the turbines. There are 4 turbine locations (turbines 4, 7, 8 and 9) where the mapping indicates the location of roads and/or turbines may be within 120 m of a significant woodlot, significant wetland, watercourse or significant wildlife habitat.
Mitigation Measures	The least environmentally sensitive routes have been selected to minimize road construction and modification impacts. Truck traffic will be limited to approved roads and on-site access roads, where possible. Site clearing and grubbing will be kept to a minimum area on-site by staking and marking off the areas that define limits of the work to be done, excavated soil will be re-used on-site where feasible, or disposed of in a proper facility off-site. The crane pads will be removed following turbine installation with tilling (if desired by the owner) and re-seeding of crops. Any damage to municipal roads will be repaired and the road returned to its previous condition. No permanent paved roads will need to be constructed for the turbines. Municipal and provincial roads will be used for transportation of equipment to the construction sites. Minor modifications may be required to some of the existing roads (for example, widen the turning radius) for equipment transportation. Portions of Sideroad 17 between Sixteenth Line and Fourteenth Line will need to be upgraded. This will involve the widening of the road to 11 m wide. Any road damages will be repaired. Any road improvements will be left in place.
Residual Impacts	None anticipated

4.8.3 Construction Laydown Area

Environmental Component Affected	Terrain, Agricultural Use, Wildlife and Birds
Potential Impacts	Clearing and grubbing and soil compacting for construction of the Construction Laydown Area will also affect agricultural use of the lands during construction phase. Sensory disturbance of wildlife and birds due to construction.
Mitigation Measures	The proposed location is more than 120 m from a woodlot or watercourse. The Construction Laydown Area will be removed following the completion of construction with tilling (if desired by the owner) and re-seeding of crops.
Residual Impacts	None anticipated

4.8.4 Turbine Site and Crane Pad Construction

Environmental Component Affected	Terrain, Agricultural Use, Wildlife and Birds
Potential Impacts	Clearing and grubbing and soil compacting for construction of crane pads will also affect agricultural use of the lands during construction phase. Sensory disturbance of wildlife and birds due to construction. Impacts to significant woodlots or wildlife habitat from construction of on-site access roads to the turbines. There are 4 turbine locations (turbines 4, 7, 8 and 9) where the mapping indicates the location of roads and/or turbines may be within 120 m of a significant woodlot, significant wetland, watercourse or significant wildlife habitat.
Mitigation Measures	Site clearing and grubbing will be kept to a minimum area on-site by staking and marking off the areas that define limits of the work to be done, excavated soil will be re-used on-site where feasible, or disposed of in a proper facility off-site. Light duty sedimentation fencing will be installed around work area during construction, where appropriate. The crane pads will be removed following turbine installation with tilling (if desired by the owner) and re-seeding of crops.
Residual Impacts	None anticipated

4.8.5 Delivery of Equipment

Environmental Component Affected	Local Public and Traffic Patterns, Vegetation
Potential Impacts	Potential short term lane and/or road closures on local roads to provide room for trucks to deliver project components. Short term increase in truck traffic during construction period. Disturbance to vegetation in some areas for delivery of the hydro poles.
Mitigation Measures	Delivery of equipment will be coordinated with local traffic patterns. Highway 6 and main county roads will be utilized as much as possible to reduce impact to local residents since these roads were designed for truck traffic and higher traffic volumes. Area of disturbance will be minimized and mitigated as appropriate through re-vegetation with native plants and/or re-seeding of crops similar to previous year's crop.
Residual Impacts	None anticipated

4.8.6 Turbine Foundation Construction

Environmental Component Affected	Terrain and Agricultural Land Use, Unknown Archaeological Resources,
Potential Impacts	Impacts to significant woodlots or wildlife habitat from construction of on-site access roads to the turbines. There are 3 turbine locations (turbines 4, 7 and

9) where the mapping indicates the location of roads and/or turbines may be within 120 m of a significant woodlot, wetland or wildlife habitat.

Increased potential for soil erosion due to necessary surficial disturbance by cranes, trucks and other heavy equipment used to excavate and pour foundations. For a few turbines, the size of the foundation may be increased to suit local geotechnical data which will result in a greater area of excavation.

There will be a significant amount of on-site traffic (vehicle and heavy equipment) involved in the construction of the foundations. Equipment will move through agricultural fields to reach turbine sites and/or short distances along local roads to the next property.

No known archaeological resources are present at turbine sites. However, during excavation archaeological resources may be discovered.

Mitigation Measures

Any area of surficial disturbance will be re-contoured, with stockpiled material removed during excavation, to match original landscape. Cropland sites will be covered with stockpiled topsoil for reseeding during the following planting season with similar crops to previous year. Areas that define the limits of the work will be staked and marked.

The excavated area will be covered with topsoil leaving only a small protrusion of concrete to which the tower is attached. Land can then be re-cultivated within a few meters of the turbine in the following season, minimizing impact on agricultural land use. Light duty sedimentation fencing will be installed around work area during construction, where appropriate.

Equipment movement on-site will be limited to specified travel areas (the area that will also be used as the access road) to minimize impacts on agricultural land use. Noise and dust control measures will be utilized where required for the construction period.

During excavation activities if any archaeological resources are found to be in conflict with the proposed facilities, excavation activities will be halted and the issues assessed with consideration given to modifying the siting of the turbine. This will be determined in consultation with Ministry of Culture and archaeologists, where applicable.

Residual Impacts

No residual impacts are anticipated, unless unknown archaeological resources are discovered during construction activities. Since the turbines are located on agricultural lands that have been cultivated for many years, re-vegetation or planting of crops in subsequent years on disturbed areas will mitigate potential impacts related to erosion and loss of agricultural lands.

4.8.7 Wind Turbine Assembly and Installation

Environmental Component Affected

Wildlife and Birds (Species at Risk), Terrain and Sensitive/Significant Environmental Features, Local Residents

Potential Impacts

Turbine assembly and installation will typically cause surficial disturbance at each turbine site including a small area of crop removal from clearing and grubbing.

Delivery of equipment and assembly of turbines could result in impacts on drains in existing agricultural fields.

Impacts to significant woodlots or wildlife habitat from construction of on-site access roads to the turbines. There are 4 turbine locations (turbines 4, 7, 8 and 9) where the mapping indicates the location of roads and/or turbines may be within 120 m of a significant woodlot, significant wetland, watercourse or significant wildlife habitat.

Dust and noise from construction activities could disturb local residents for the duration of the construction period.

Mitigation Measures

Turbine assembly and installation will typically cause surficial disturbance at each turbine site and this will be minimized through the use of on-site access roads and defined crane pad areas. Turbine assembly and installation will not be scheduled during critical wildlife life cycle periods (i.e., breeding and nesting).

Any field drains that are impacted by turbine delivery or assembly will be replaced or repaired with supervision from the landowner.

No woodlot, wetlands, or significant wildlife habitat will be disturbed during turbine assembly.

Construction period is of short duration and conducted during the daylight hours to minimize impact on residents living in nearby houses.

Residual Impacts

Turbine assembly and installation will result in no residual impacts.

4.8.8 Electrical Collector System

Environmental Component Affected

Vegetation and Terrain, Wildlife and Birds

Potential Impacts

Terrain disturbance will be minimized by making trenches beneath or adjacent to the on-site access roads to and between the turbines. This could impact drains in existing agricultural fields.

Impacts to significant woodlots or wildlife habitat from construction of on-site access roads and electrical lines to the turbines. There are 4 turbine locations (turbines 4, 7, 8 and 9) where the mapping indicates the location of roads and/or turbines may be within 120 m of a significant woodlot, significant wetland, watercourse or significant wildlife habitat.

Mitigation Measures

Damage to tile drainage will be mitigated through the replacement of affected tiles under supervision of the landowner.

Avoiding vegetation clearing during the core bird breeding season which occurs between May 1st and June 23rd will minimize impacts to the main wildlife corridors within these areas.

The installation of electrical collector lines under the watercourse will be done using horizontal directional drilling and no impacts are anticipated on the one water feature crossed by the collector system.

Residual Impacts

No residual impacts are anticipated.

4.8.9 Horizontal Directional Drilling

Environmental Component Affected	Vegetation and Terrain and Watercourses
Potential Impacts	Terrain disturbance will be minimal and limited to the entrance and exit pit areas. There is the potential to disturb unknown agricultural drains. Erosion or the improper storage or disposal of drilling fluids or cuttings has the potential to increase the erosion risk or impact watercourses. The drilling fluids used are chemically inert and do not pose a risk to ground or surface water quality.
Mitigation Measures	All drilling will be conducted by licensed drillers and all drilling activities will be completed in accordance with *Regulation 903 under Ontario Water Resources Act, R.S.O. 1990.* Damage to tile drainage will be mitigated through the replacement of affected tiles under supervision of the landowner. All entrance and exit pits will be located more than 30 m from any watercourse. Drill cuttings will be collected as they are generated and placed in a soil bin or bag for offsite disposal. Erosion control devices will be placed between the drill pits and any watercourses. Directional drilling procedures noted in section 1.2.2 of the *Revised Environmental Impact Assessment Report* will be followed and an Emergency Frac-out Response and Contingency Plan will be maintained.
Residual Impacts	No residual impacts are anticipated.

4.8.10 Substation Construction

Environmental Component Affected	Terrain and Agricultural Land Use, Public Safety
Potential Impacts	Construction of the substation will be on existing agricultural lands and will result in loss of some agricultural land. Terrain disturbances from site preparation and grading and excavation. The electrical substation could potentially have public safety issues due to the presence of high voltage equipment.
Mitigation Measures	The substation requires only a small area and has been designed to be in an already disturbed area (construction laydown area) so agricultural activities on the remainder of the property could continue following construction. To ensure protection of the public, the substation will have a perimeter fence with only authorized personnel wearing proper safety equipment permitted within. All electrical design will meet Ontario Electrical Safety Code requirements.
Residual Impacts	While there will be a slight decline in the agricultural land use in the area during the life of the project, no residual impacts are anticipated.