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September 21, 2017

Ms. Barcy F. McNeal, Secretary Ohio Power Siting Board Docketing Division 180 East Broad Street, 11<sup>th</sup> Floor Columbus, OH 43215

Re: Case Nos. 13-197-EL-BGN, 16-1687-EL-BGA, and 17-1099-EL-BGA

Trishe Wind Ohio, LLC

Notification of Compliance with Condition 3 of the Supplement – Construction and

**Maintenance Access Plan** 

Dear Ms. McNeal:

Trishe Wind Ohio, LLC ("Applicant") is certified to construct a wind-powered electric generation facility in Paulding County, Ohio ("Project"), in accordance with the December 16, 2013 Opinion, Order, and Certificate ("Certificate") issued by the Ohio Power Siting Board ("OPSB"). The Certificate is subject to the 40 conditions set forth in the December 16, 2013 Order, as well as the 26 conditions set forth in the October 1, 2013 Supplement to the original application ("Supplement").

Condition 3 of the Supplement requires Applicant to submit to OPSB staff for review and acceptance a construction and maintenance access plan based on final plans for the facility, access roads, and the types of equipment to be used. The Applicant is providing this letter to notify the OPSB that the Applicant has developed and completed the construction and maintenance access plan, which is attached hereto. Accordingly, Condition 3 of the Supplement is satisfied, at this time.

We are available, at your convenience, to answer any questions you may have.

Respectfully submitted,

/s/ William V. Vorys

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# Northwest Ohio Wind Farm

Trishe Wind Ohio, LLC



Construction and Maintenance Access Plan 09-21-2017

## **Site Deployment**

WCI Construction mobilized key team member to the Northwest Ohio site in September 2017 to begin start up activities to prepare for material and equipment deliveries and to over-see the civil construction planned for the winter. The first steps in the deployment will include the activities:

- Lay down and office yard
- Pre-construction utility:
  - Electric power
  - Water/Sewer
  - Phones
  - Internet and data support systems
- Set-up site services:
  - Portable Toilets
  - Dumpsters
  - Local vendor accounts
  - Fuel accounts
  - Hiring of local work-force.

## **Beginning the Construction Process**

The summary schedule, Exhibit C, highlights the anticipated construction start date of October 2. The general systematic flow of construction processes that will occur on the NorthWest Ohio site are as outlined below.

- Site survey and construction staking
- Lay down yard construction
- Turbine access road construction and erection area grading.
- Foundation excavation, mud mat installation, foundation rebar, anchor bolt and conduit installation, concrete pouring and backfilling.
- Crane pad construction.
- Turbine receiving, staging, erection, mechanical completion and tower wiring.
- Collection system trenching and cable installation
- Junction Box installation
- Padmount Transformer installation and Medium Voltage Terminations
- Low Voltage Cable installation and Termination at Pad Mount Transformers
- Collection System Testing
- Substation Site Grading
- Substation underground, foundations, conduit, cable trench and grounding installation.
- Substation above ground, structural steel, equipment, insulators, buss and lightning Protection installation.
- Control House and substation equipment installation
- Power and control wiring and terminations
- Testing and Commissioning of equipment and systems.

The following information will explain the general overview of the construction process that will be performed on the Northwest Ohio site.

## **Sensitive Resource Impacts**

The engineer of record for the Northwest Ohio project sited wetlands, sensitive plants, and endangered species within the project boundaries. The wetland areas are shown on the construction drawings. Careful consideration was given to avoid these areas during site layout and construction. Sensitive Resource areas will be delineated and marked off through various methods including silt fence, snow fence, earthen berms, or other options. The only impacts to wetland designated areas will be at the intersection of the county or township road and the private turbine access road. Properly sized culverts will be installed to ensure water flow is not impacted and slope protection will be installed as designed to prevent erosion of the slopes. All access roads will avoid streams and wooded areas for construction.

The collection system will be buried and is designed to limit impact to the wooded areas whenever possible. The project consists primarily of agricultural land which improves our ability to avoid these areas. Since the collection system is a continuous feature, avoiding all impacts onsite are not possible. The project will bore under existing streams and wooded areas to avoid impact.

## **Laydown Yard Construction**

The Northwest Ohio project will require up to ten acres of laydown area be constructed that will be the central location for all subcontractor modular trailers, craft parking, site delivery headquarters, central storage of materials and equipment and the primary location for on-site orientation of environmental and site safety training. The lay down area will be one of the first areas constructed for the Northwest Ohio Project.

The laydown area will be cleared and graded to the appropriate size, compacted and a base of gravel for parking area and office trailers will be installed to allow for a safe environment for the office complex to be installed, employee travel and material receiving and inventory holding. All improvements will be removed after project completion and the laydown area restored to its previous condition.

## **Existing Road Maintenance, Upgrades and Radius Improvements**

Prior to construction, video documentation will be recorded to identify the pre-construction condition of existing roads and used to ensure that all are restored to their original condition. Traffic flow on existing roads will be minimized as much as is practicable.

WCI's construction team will work very closely with the Township and County local officials to ensure that the perimeter and on-site public roads are maintained in a condition that provides for safe and efficient travel to the general public and construction personnel. During construction, general dust abatement control measures will be implemented to moderate the impact of the project on the public.

## **Constructing Access Roads General Overview**

Turbine access roads will be constructed to allow safe ingress and egress to each turbine location for construction and ultimately operation and maintenance access once construction of the project has been completed. During construction access, roads will provide a stable surface for heavy equipment and personnel to travel to each turbine location. The access roads will be constructed following the design guidelines and testing procedures specified in the construction drawings.

Survey crews will stake the access roads center line and easements, along with the center of the turbine location and 175' radius offsets around the turbine location to be cleared to allow for a safe and stable work area for crews. Heavy equipment will be utilized to construct the access road to the turbine location. This work will be performed utilizing bulldozer, excavators, haul trucks, loaders and graders to strip the top soil and clear any obstacles. Clearing and grubbing is the removal and clearing of the first layer of topsoil and vegetation down to a depth of 4". New permanent access roads will be constructed be cement stabilization of the soil to a depth of 12". This stabilized base will be proof rolled to ensure its stability and a 4" aggregate surface applied to the roadway. A roller/compactor compacts the access road to reach the specified level of compaction. These specified compaction levels will be checked following the required site-specific procedures.

## **Access Road Rock Installation**

Rock will be delivered and dumped with either a traditional end dump or a belly dump rig. Additional equipment to spread rock can include graders, dozers, loaders and roller/compactors.



**Gravel Compaction Process** 

The type of rock required per the drawings and specifications will be verified upon delivery of material to ensure compatibility with project requirements.

# **Public Road Radius Improvements**

Temporary radii will be constructed in the public road right of way to facilitate delivery of the turbine components. Installation will follow the construction specifications to ensure safe travel for the delivery trucks. The temporary radii will be blocked off while not in use to ensure safety for the traveling public. Once turbine deliveries are complete the radii will be removed and the disturbed areas will be restored to their original condition.

## **Foundations**

Once the access roads are installed and turbine site location is cleared the excavation of turbine foundations can begin. Construction of foundations for wind turbine generators includes numerous sequential steps. The excavation will take place utilizing a large excavator, Cat 345 or similar, and a laborer to assist in checking the bottom of the excavation.





**Excavation of Foundation** 

Leveling the bottom of foundation excavation

The next step in the sequence after the excavation is complete is to pour the mud mat over the bottom of the excavation. The mud mat's primary purposes are to stabilize the moisture content in the sub-base and provide a solid surface for reinforcing steel ("rebar") placement.

Rebar delivery trucks will arrive on site during foundation construction and these trucks will be directed to each site for unloading and staging of the rebar material that is specified in the design materials for each foundation. The rebar mats and turbine anchor bolt cage are placed on the mud mat. The base mat is the first to be set into place. With the base mat in place, a partially assembled bolt cage is lowered on top of the base mat. The remaining portion of the bolt cage is then assembled and leveled. The top mat is then assembled around the bolt cage. During the process, a Quality Assurance representative will check and verify the rebar has been installed correctly and meets the design specifications. Once the rebar is complete and inspected the foundation conduit is installed to allow ingress and egress of collector cable and ground wire once the base is poured. The final step is the installation of the foundation ground ring around the circumference of the base of the foundation. Again, a Quality Assurance representative will inspect and verify the conduits and ground rings meet the design specification.



Laying out Base Mat Rebar



Top mat being assembled



Base Mat rebar installed with bolt cage



Completed foundation rebar ready to pour

After final inspections and completion of project specific documentation, the approved base and pedestal are poured monolithically and inspections are completed before the foundation is backfilled. Backfill will usually take place between 24-48 hours after the concrete for the foundation has been poured. Concrete samples will be taken throughout the pour process for subsequent testing to ensure design strength is met.



Completed Spread Footing Base

## **Pre-Backfill Inspection of Completed Foundation**

Following the pour of the pedestal the entire foundation needs to be checked for cracks. Cracks need to be sealed so water does not penetrate and corrode the concrete and rebar. Either the Quality Assurance representative or the foundation engineering design firm will perform the examination of the foundation. Both quality assurance personnel will be looking for cracks that exceed approximately 0.3 mm. Typical repairs involve sealing the crack with an asphalt emulsion or similar product for smaller cracks, and for larger cracks routing or cleaning the crack, filling it with a grout, and then sealing with the asphalt emulsion or similar product. After the repairs are complete and checked by the Quality Assurance representative or the foundation engineering design firm, backfill can be completed after the crack repair products have cured according to the manufacturer's recommendations.

## **Foundation Backfill**

The final step in foundation construction will be the backfilling and compaction of the excavation around the foundation. The backfill will be completed in multiple lifts using native fill excavated from the foundation. No imported material will be required. The timing of back fill will vary a little due to the concrete mix design, temperature, and other weather factors. The foundation backfill requirements will dictate the backfilling procedure and testing protocol. Each lift will require density testing performed by a Nuclear Density Gauge or other means necessary to confirm backfill density. Typically, there will be two tests per lift.



**Testing Compaction Foundation Backfill** 

## **Collector Installation**

The Northwest Ohio Project collector systems will transport the power generated by (42) GE2.5 MW wind turbines. During the trenching operation topsoil will be removed in advance of the trenching operation. The trenching crew will install collector cable, grounding cable, fiber in inter-duct and cable marking tape in the trench in accordance with NESC code and/or landowner requirement, whichever is most stringent. This work will take place simultaneously with foundation construction. The box pad crews will install pad mount transformer box pads after the foundations are backfilled. During installation of the box pad, the designated area next to the turbine is excavated and the box pad is set in the excavated area. PVC conduit is run in the bottom of the box pad for ingress and egress of collector circuit cables and fiber inter-duct. Once the box pad is leveled and PVC conduits installed a 1000 lb. concrete slurry mix (aka flowable fill) is poured around the base to prevent the box pad from moving or settling latter. After the concrete slurry cures the base is back filled and compacted. The that the trenching crew can drop the required length of cable and fiber tails at the turbine upon arrival at the turbine site. Once the trenching crew drops the tails and continues, a separate crew will dig in the cables and fiber tails a short distance and installs the tails through the installed PVC conduits into the basement of the transformer box pad. The tails will be cut the cables to length and neatly coiled and placed in the basement of the box pad. The open ends of the cables will be sealed to protect moisture from getting into the cables until such time that the transformers are set and terminations can be made. Collector cable and fiber will be run in and out of each turbine to tie the entire system together on a circuit. All medium voltage terminations will occur at the individual pad mount transformers after they are set and the fiber splicing will be performed in each turbine. Collector grounds will be placed in accordance with the plans and specifications. Once a circuit is completely installed, backfilled, terminated and inspected, hold cards and locks are installed at each field electrical component. Very low frequency (VLF) testing will be performed on each circuit prior to energization to ensure no damage occurred to the cable or terminations during the construction phase of the project. Additionally, all fiber optics cable will be optical time domain reflectometer (OTDR) tested end to end to insure the turbine communication system is in proper working order. Once all the testing is complete and the substation is ready to be energized each circuit will be energized utilizing a step by step process to insure the safety of everyone involved and to protect equipment from being damaged. Energization of circuits will be

the first step in the process of commissioning the GE turbines, unless pre-commissioning with generators is planned by the Owner and/or GE.



**Collector Trenching Setup** 



**Collector Trenching Near Turbine** 



PVC Conduit Installed Entering Box Pad



Completed GE Box Pad Ready for Cable

## **Junction Box Installation**

Dependent up the design of the system and the length of the cable runs, the Project will require the installation of junction boxes. At the location of the junction box the trenching crew will have left the cables to be terminated coiled up above ground with heat shrink end caps on the ends of the cable to protect them from the environment until they can be terminated. The area of the junction box installation is excavated and filled with flowable fill, which helps to level and stabilize the junction box from settlement. The cables are placed where the box is being placed. The box is placed in the excavation over the cables, backfilled, and compacted. Two grounding rods are installed in the junction box basement. The cables are pulled out of the junction box cable window and cut to length. Slack is left in the cables and all cables are coiled in the

basement of the junction box in case maintenance is required later. A template is used for each cable to establish the correct length.





**Excavation for Junction Box Installation** 

Example of Three Way Junction Box Terminated

# **Collector System 34.5 kV Splices**

Although every effort is made to match reel length with a cable run sometimes it is necessary to splice to reels together to have enough cable to complete either a home run to the substation or a long run between turbines. All collector system cable will be spliced below ground, neutrals grounded and backfilled. The two ends to be spliced are left extended from the ground. The area is excavated, slopped and shored as required by OSHA rules and regulations. Only qualified electricians will be performing the splice work required and only after they have attended the 3M onsite training session.

The splicing process is a time consuming process that has to be completed in a clean, dust free environment. In many case tents are set up to protect the exposed cable during the splicing procedure from becoming contaminated. Cable splicing follows a very specific process that will ensure splicing will not fail later when the collector system is energized and under full electrical load.



Removal of Outer Sheath Exposing Neutrals



Stripping Semi-con Insulation



Crimping Splice Barrel Sleeve



Installing Inner Cold Shrink

## **Installation of Crane Pads**

Once the collector system has been installed and trench work and backfill has been completed around the turbine locations, crane pads will be constructed at each turbine location. Crane pads are a temporary stable area built for the cranes erecting the tower. The construction of the pads is in accordance with the Civil design documents and includes the compaction of native soil or the use of crane mats dependent on the bearing strength of the soil. Although the sequencing of the crane pads is dependent on other activities taking place on the project site the ideal time to install is after the collector has been installed and prior to turbine component delivery.

# **GE Turbine Delivery**

The turbine delivery to the site will be a coordinated effort between GE and the Owner.

# **Erection Process for the Northwest Ohio Project**

Setting the DTA
Setting the Tower Base and Lower Mid-Section
Setting the Tower Top-Section and Nacelle
Rotor Assembly
Rotor and Blade Erection
Mechanical Completion
Tower Wiring
Tower Erection Quality Assurance
Medium /Low Voltage Cable Terminations
Generator Alignment

# **Commissioning Assistance**

# Northwest Ohio Project 34.5/138 kV Substation

The Northwest Ohio Project will require one substation to be constructed to collect the power from four the 34.5 kV collection circuits and step the voltage up to 138 kV. The substation will include the following items:

#### Substation

- 34.5kV/138 kV Main Power Transformer
- HV Breakers
- HV Disconnect Switches
- MV Breakers
- MV Disconnect Switches
- Station Service Transformer (SST)
- Current Transformers
- Potential Transformers
- Revenue Metering
- Buss Work
- Buss Supports
- Control House

## **Civil Work Associated with Substation Construction**

The first step in the construction of the substation will be the cut and fill and grading of the site. The design grade will be used to drain water from the site and establish the room required to build substation foot prints.

## **Below Grade Layout and Construction**

Equipment foundation will be surveyed and excavated for the entire layout of the substation. As each excavation takes place bolt cages and rebar will be installed and any conduit required to be placed in the foundation per the design specification. The foundations will be poured and

concrete tested as further excavation takes place for the following days pours. The following day forms will be stripped and the foundations will be backfilled to sub grade. This process will continue until all foundations are completed.

## **Below Grade**

Once the back fill for all foundations is nearly complete the underground conduits, cable trench and ground grid will be installed throughout the substation and will be connected per the final design drawings and specifications.

#### **Above Grade Work**

The installation of the substation components includes; setting the steel structures, dead-end structures, static mast, 34.5 kV box structures, insulators and buss supports, rigid and string buss, HV and MV breakers, disconnect switches, CT's, PT's, CVT's, metering units, SST, grounding transformers, equipment terminal boxes, operator platforms, conduits, equipment grounding, lighting, substation fence and final rock cover.

## **Control House Installation**

The control house will be built according to the specifications. The control house will include: AC and DC power panels, HVAC system, back-up battery system, ATS, conduit and cable tray, fire protection, relay panels, SCADA panels, wind farm management system (WFMS), fiber patch panels, tele-com equipment and control house lighting and receptacles.

## **Substation Fence Installation**

The substation fence will be installed as soon as possible to secure equipment and prevent possible vandalism. The substation grounding grid will be connected to the fence posts and fence mesh. The fence is connected in series with the rest of the ground grid to keep the entire ground system on an equal potential. After the fence is installed the final grade material can be placed. We plan to bury the bottom portion of the fence; this prevents animals from digging under the fence.

## **Testing and Energization**

Each piece of equipment will be tested and commissioned before energization begins. Test and commission of the equipment shall be in accordance to the requirements of NETA (International Electrical Testing Association) verifying the installed equipment meets the design criteria and or manufacture test results.

Once the testing is complete within the substation confines, an energization procedure specific to the Northwest Ohio Project will be created to insure the safety and rigorous details are followed to insure a successful energization. The procedure will have guidelines for the switching process and a review section for all involved parties to review and sign off prior to the actual process beginning.

## O & M Building

The building construction will be built simultaneously with substation to meet project milestones and schedules as defined in the specifications and the CSA Exhibits.

WCI will construct fencing, aggregate parking and laydown, storm water drainage, sewer, water, electricity, telephone, pre-engineered metal building, slabs and foundations, interior office finishing, lighting, heating, ventilation and air conditioning and other systems required to have an operational and habitable building and area.

## Restoration

After consulting with the Owner and local officials all temporary improvements not required for permanent operation of the facility, including the laydown yard will have aggregate removed and will be restored to pre-existing conditions. All areas disturbed by construction will be seeded with an Ohio Department of Transportation approved seed mix unless otherwise directed by the engineer of record or landowner. Erosion control measures will be maintained and remain in place until coverage is established in accordance with the Storm Water Pollution Prevention Plan. If slopes exceed an angle in which it is unsafe to drill seed, a hydroseed application will be used. If stream banks are disturbed, the project will coordinate with the engineer of record to ensure additional measures are implemented to maintain bank stability until germination has taken hold.

This foregoing document was electronically filed with the Public Utilities

**Commission of Ohio Docketing Information System on** 

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Summary: Notification of Compliance with Condition 3 of the Supplement – Construction and Maintenance Access Plan electronically filed by Mr. William V Vorys on behalf of Trishe Wind Ohio, LLC