

Application for Third Amendment to  
Siting Certificate for Hog Creek Wind Farm LLC  
Hardin County, Ohio

Hog Creek I Wind Farm

Case No. 16-1422-EL-BGA

*For submittal to*

Ohio Power Siting Board  
Columbus, Ohio  
June 22, 2016



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June 22, 2016

Ms. Barcy McNeal  
Administration/Docketing  
Ohio Power Siting Board  
180 East Broad Street, 11<sup>th</sup> Floor  
Columbus, Ohio 43215-3793

**Re: Hog Creek Wind Farm LLC,  
Case No. 16-1422-EL-BGA**

Dear Ms. McNeal:

Enclosed for filing in the above-referenced case is a copy of the Application of Hog Creek Wind Farm LLC for a Second Amendment to its Certificate of Environmental Compatibility granted August 29, 2011 in Case No. 09-277-EL-BGN for Hog Creek Wind Farm I. In addition, we have provided Staff of the Ohio Power Siting Board ("Board") ten disks and five hard copies of the Application. Pursuant to Ohio Administrative Code Rule 4906-3-11(B), the Applicant makes the following declarations:

**Name of Applicant:** Hog Creek Wind Farm LLC  
An affiliate of Renewable Energy  
Systems Americas Inc.  
330 2nd Avenue South, Suite 820  
Minneapolis, MN 55401

**Name/Location of  
Proposed Facility:** Hog Creek Wind Farm I  
Washington Township  
Hardin County, Ohio

**Authorized Representative**  
**Technical:** Mason Sorenson  
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**Notarized Statement:**

See Attached Affidavit of Hardin Wind Energy LLC

Sincerely on behalf of,  
HARDIN WIND ENERGY LLC



Sally W. Bloomfield

Enclosure

**BEFORE  
THE OHIO POWER SITING BOARD**


In the Matter of the Application of **HOG CREEK**           )  
**WIND FARM, LLC** for a Third Amendment to its        )  
Certificate to Install and Operate a Wind-Powered     )  
Electric Generation Facility in Hardin County, Ohio    )     Case No. 16-1422-EL-BGA

AFFIDAVIT OF THE SOLE MEMBER OF HOG CREEK WIND FARM, LLC

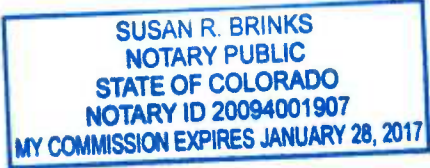
STATE OF COLORADO           :  
  :    SS  
COUNTY OF BROOMFIELD     :

I, Brian Evans, being duly sworn and cautioned, state that I am over 18 years of age and competent to testify to the matters stated in this affidavit and further state the following based upon my personal knowledge:

1. I am the President of RES America Developments Inc., the sole member of Hog Creek Wind Farm, LLC.
2. I have reviewed Hog Creek Wind Farm, LLC's Application for a Third Amendment to its Certificate of Environmental Compatibility and Public Need for the Hog Creek Wind Farm I project.
3. To the best of my knowledge, information and belief, the information and materials contained in the above-referenced Application are true and accurate.
4. To the best of my knowledge, information and belief, the above-referenced Application is complete.

  
\_\_\_\_\_  
Brian Evans, President

Sworn to before and signed in my presence this 22nd day of June 2016.



  
\_\_\_\_\_  
Notary Public

[SEAL]

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**LIST OF EXHIBITS FOR COMBINED PROJECT**

- Exhibit 1 Vestas Turbine Specifications
- Exhibit 2 Raptor Nest Survey Report, Spring 2016
- Exhibit 3 Photo Simulations
- Exhibit 4 Vestas Wind Turbine Safety Manual
- Exhibit 5 Noise Analysis
- Exhibit 6 Ice Throw and Blade Shear Study
- Exhibit 7 Shadow Flicker Study
- Exhibit 8 Telecommunications Studies and NTIA Coordination
- Exhibit 9 DoD Preliminary Screening Tool
- Exhibit 10 Obstruction Evaluation Analysis
- Exhibit 11 Road Use Agreement

**ACRONYMS AND ABBREVIATIONS**

AEP Ohio	American Electric Power Ohio (the interconnected utility)
the Applicant	Hog Creek Wind Farm LLC
the Application	the Application for a Certificate of Environmental Compatibility and Public Need for Hog Creek I Wind Farm filed on August 14, 2009
the Certificate	a certificate issued by the OPSB on March 22, 2010 permitting the construction of a 47.5 and 48.6 MW wind farm consisting of 19 to 27 wind turbines in Hardin County, Ohio
the Combined Project	Hog Creek I Wind Farm and Hog Creek II Wind Farm
the Combined Project Area	the areas of Hog Creek I Wind Farm and Hog Creek II Wind Farm originally certified in the Application
dB	decibel
dBA	A-weighted decibel
DoD	Department of Defense
E911	Enhanced 911
EIA	Energy Information Administration
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
the First Amendment	the first amendment to the Application for Hog Creek I Wind Farm filed on February 11, 2011
GE	General Electric
GW	gigawatt
ICSA	Interconnection Construction Service Agreement
ISA	Interconnection Service Agreement
JWGL	JW Great Lakes Wind LLC
kV	kilovolt
kW	kilowatt
MW	megawatt
NPDES	National Pollution Discharge Elimination System
NTIA	National Telecommunications and Information Administration
O&M	operations and maintenance
ODNR	Ohio Department of Natural Resources
OPSB	Ohio Power Siting Board
ORC	Ohio Revised Code
PILOT	payment in lieu of taxes



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PJM	PJM Interconnect, LLC (the interconnected independent system operator)
the Project	Hog Creek I Wind Farm
PTC	Production Tax Credit
RES Americas	Renewable Energy Systems Americas Inc.
the Second Amendment	the second amendment to the Application for Hog Creek I Wind Farm filed on October 26, 2011
the Third Amendment	this third amendment to the Application for Hog Creek I Wind Farm
USFWS	United States Fish and Wildlife Service
Vestas V110	Vestas Model V110 2.2 MW
WCFZ	Worst Case Fresnel Zone

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**4906-17-02 Project Summary and Facility Overview**

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**APPLICANT UPDATE AND GENERAL PROCEDURAL INFORMATION**

Hog Creek Wind Farm, LLC (the Applicant), an affiliate of Renewable Energy Systems Americas Inc. (RES Americas)<sup>1</sup> is certified to construct the Hog Creek I Wind Farm (the Project), a wind-powered electric generation facility to be located in Hardin County, Ohio. The Applicant is aware that the new Ohio Power Siting Board (OPSB) rules are in effect, but inasmuch as the Application for a Certificate of Environmental Compatibility and Public Need (the Application), to which this amendment (the Third Amendment) refers was filed under the rules in existence before December 11, 2015, this Third Amendment application tracks the designations of the older rules. The Applicant believes that it has addressed the substantive changes in the new rules.

**PROJECT CERTIFICATION HISTORY**

The original Application was filed on August 14, 2009, Case No. 09-277-EL-BGN, by JW Great Lakes Wind LLC (JWGL). The Application was supplemented in October 2009. On March 22, 2010, the OPSB issued an Opinion, Order and Certificate (the Certificate) for the construction of a 47.5 to 48.6 megawatt (MW) wind farm consisting of 19 to 27 wind turbines in Hardin County, Ohio.

On June 8, 2010, in the same case, in accordance with Ohio Revised Code (ORC) Section 4906.04, JWGL and the Applicant filed a joint application to transfer the certificate from JWGL to the Applicant, the Project entity. On July 15, 2010, the OPSB authorized the transfer of the

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<sup>1</sup> See letter dated April 28, 2016 notifying the Ohio Power Siting Board of RES Americas' acquisition of the Hog Creek Farm entities.

Certificate, and all the rights and obligations under the Certificate from JWGL to Hog Creek Wind Farm, LLC.

On February 11, 2011, an amendment for the Project in Case No. 11-757-EL-BGA (First Amendment) was filed; the OPSB approved the First Amendment application on July 27, 2011. Approval of the First Amendment permitted the Applicant to use the Vestas V100 and General Electric (GE) 1.6-100 turbines resulting in 31 turbines with a total nameplate capacity of 49.6 MW, and to revise the Project boundary in the north central area that was increased by approximately 1,000 linear feet in order to include two additional parcels that were under lease.

On October 26, 2011, another amendment was filed under Case No 11-5542-EL-BGA (Second Amendment), which the OPSB approved on November 28, 2011. Approval of the Second Amendment authorized the Applicant to use the Nordex N100 and REpower MM100 turbines, resulting in 19 to 31 turbines with an aggregate capacity of 46.8 to 52.5 MW, depending on the model used. Subsequently, on March 9, 2015, the OPSB extended the term of the Certificate to March 22, 2018.

The Applicant seeks to further amend the Certificate through this Third Amendment, which seeks to: eliminate the turbine optionality, selecting a layout for only the Vestas Model V110 2.2 MW (Vestas V110), which is the updated version of the Vestas 100 (which was approved in the First Amendment); adjust turbine locations as necessary to address applicable setbacks due to Ohio state law changes; and adjust access road and underground electric connection locations accordingly. Furthermore, the Third Amendment includes a request to merge this Project's Certificate with the approvals associated with the adjacent and related Hog Creek II Wind Farm (for which the most recent amendment was issued under Case No. 11-5543-EL-BGA on November 28, 2011). A separate amendment, making the same request, has also

been filed for the Hog Creek II Wind Farm. The Project and the Hog Creek II Wind Farm, two currently approved projects, are herein collectively referred to as the Combined Project, and the Combined Project is what will be collectively addressed in the Third Amendment. Under the Combined Project, the Third Amendment would result in a slight decrease in the total nameplate capacity of the combined Certificates from 70.9 MW to 66 MW.

#### **(A) PROJECT SUMMARY AND OVERVIEW**

The Applicant proposes to build the Combined Project using the Vestas Model V110 2.2 MW (Vestas V100) turbine. This turbine is a technology update of the Vestas V100, approved in the First Amendment. In Table 03-2, the Applicant compares the characteristics of the Vestas V110 to the Vestas V100, as well as to the two turbine models (Nordex N100 and REpower MM100) approved in the Second Amendment. With the new proposed turbine model, the total capacity of the Combined Project will not exceed 66 MW, and the total number of turbines in the originally certificated area (the Combined Project Area) will be reduced.

Map 02-1 illustrates the proposed Combined Project layout and previously permitted turbine locations; Map 02-2 provides a more detailed map book of the Combined Project layout.

##### **(1) Statement of General Purpose of the Facility**

No change. Please refer to the original Application.

##### **(2) Description of the Proposed Facility**

The Applicant proposes a new layout for the Combined Project to accommodate selection of a single updated turbine model and the current Ohio setback requirements. The Combined Project Area and participating landowners are substantially the same. This Third Amendment provides layout and turbine model information for the Combined Project.

**(3) Description of the Project Area Selection Process**

No change from the original Application; similar factors continue to inform the current adjustments to the Combined Project layout.

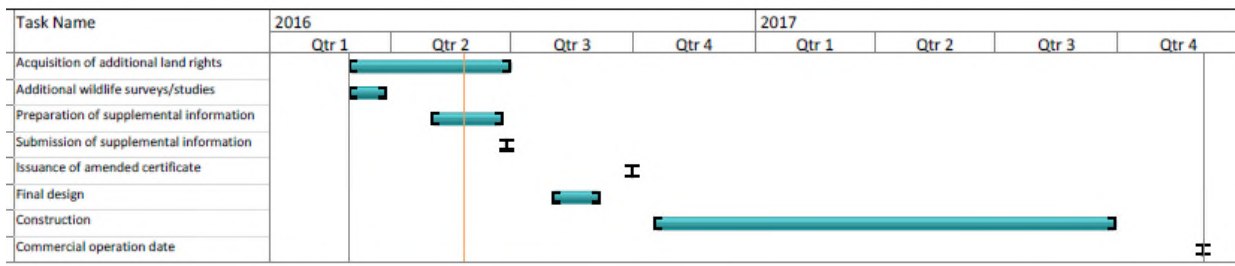
**(4) Principal Site-Related Environmental and Socioeconomic Considerations of Sites**

No material changes in type and level of impact. To the extent that wetlands, wildlife species, and cultural resources studies have been updated to specifically address the adjusted layout, they are described in the relevant sections, with documentation also attached to the Third Amendment application as exhibits.

**(5) Project Schedule**

A new Combined Project schedule is provided as Figure 02-1.

**Figure 02-1 Project Schedule**



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**4906-17-03 Project Description in Detail**

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**(A) PROJECT DESCRIPTION AND SCHEDULE****(1) For its purposed project area and any alternative project area:**

- (a) *Type(s) of Turbines or, if a specific model of turbine has not yet been selected, the potential type(s), estimated number of turbines, annual capacity factor, hours of annual generation, and the project developer to be utilized for construction and operation of the facility, if different than the applicant.***

The Applicant is proposing to build the Combined Project using the layout reflected in Map 02-1 and Map 02-2, which will accommodate 30 Vestas V110 turbines.

- (b) *Land Area Requirements or, for off-shore projects, the off-shore boundaries, the construction impact area in acres and the basis of how such estimate was calculated, and the size of the permanent project area in acres.***

The estimated area required during construction and operations, respectively, for the Combined Project is summarized in Table 03-1. As was the case in the original Application, the temporary construction disturbance area will be greater than the permanent disturbance area required for operation of the Combined Project.

**Table 03-1. Estimated Area To Be Disturbed**

Facility Component	Area of Temporary Disturbance	Area of Permanent Disturbance	Quantity	Total Temporary Disturbance	Total Permanent Disturbance
Turbine foundation	200 ft radius around turbine, or 2.9 ac <sup>a</sup>	0.25 ac <sup>b</sup>	30 <sup>c</sup>	87.0 ac	7.5 ac
Access roads, including access with crane walk	68 ft	20 ft	57,095 ft	89.0 ac	26.2 ac
Crane walk in conjunction with cable not in conjunction with roadway	70 ft	N/A, removed	21,889 ft	35.2 ac	0.0 ac
Crane walk not in conjunction with underground cabling	60 ft	N/A, removed	5,159 ft	7.10	0.0 ac
Underground cabling not in conjunction with crane walk	40 ft	N/A, buried	47,103 ft	43.3 ac	0.0 ac
Project substation	5 ac	3 ac	1	5.0 ac	3.0 ac
O&M building	3 ac	2 ac	1	3.0 ac	2.0 ac
Laydown/Staging Area	8 ac	N/A, removed	1	8.0 ac	0.0 ac
<b>TOTAL</b>				<b>277.6 ac</b>	<b>38.7 ac</b>
Average per wind turbine				9.3 ac	1.3 ac
Total previously permitted for Combined Project (based on 36 Repower MM100 turbines)				247.8 ac	47.6 ac

a – Includes area for foundation excavation, turbine laydown/assembly, crane pad, and turbine erection. Conservative estimate.

b – Includes permanent turbine base and crane pad area.

c – A total of 30 Vestas V110 2.2 MW turbines was assumed in this estimate.

**(2) Description of the major equipment including, but not limited to, the footprint of the turbine, the height of the turbine measured from the tower’s base, excluding a subsurface foundation, and the blade length.**

Because the previously approved turbine models are no longer available or represent old technology, they are no longer under consideration. The similarities and differences between the three most recently approved turbine models and the Vestas V110 model proposed in this Application are summarized in Table 03-2. It should be noted that the Vestas V110 turbine has the same maximum tip height as the previously

approved Vestas V100, Nordex N100, and Repower MM100 turbines. See Exhibit 1 for further information on the technical specifications for the Vestas V110 turbine model.

**Table 03-2. Turbine Specifications Comparison**

<b>Turbine Model</b>	<b>Vestas V-100</b>	<b>Nordex N100</b>	<b>REpower MM100</b>	<b>Vestas V-110, 2.2 MW</b>
OPSB Status	Approved (First Amendment)	Approved (Second Amendment)	Approved (Second Amendment)	Proposed (Third Amendment)
Rotor Diameter	100 meters	100 meters	100 meters	110 meters
Hub Height	95 meters	100 meters	100 meters	95 meters
Tip Height	150 meters	150 meters	150 meters	150 meters
Maximum Generation	1.8 MW	2.5 MW	1.8 MW	2.2 MW
Wind Speed at Cut-In	3.0 m/s	3.0 m/s	3.0 m/s	3.5 m/s
Wind Speed at Rated Power	12.0 m/s	13.0 m/s	11.5 m/s	11.0 m/s
Wind Speed at Cut-Out	20.0 m/s	25.0 m/s	20.0 m/s	22.0 m/s



**(3) Brief description of any new transmission line(s) required for the proposed project.**

No material change has occurred to this section since the First Amendment. The Combined Project is planned to be interconnected to American Electric Power Ohio's (AEP Ohio) 69-kilovolt (kV) system at via a tap to the existing Ada-Dunkirk 69-kV transmission line at the Combined Project's substation. The Combined Project substation will be adjacent to an AEP Ohio-owned switchyard where the existing 69-kV line will be rerouted into the switchyard to connect the Combined Project. This arrangement will not require any new transmission lines to be built, and will allow the Applicant to build the majority of the Combined Project and AEP Ohio infrastructure, pending discussions with AEP Ohio. The Applicant has executed an Interconnection Service Agreement (ISA) and Interconnection Construction Service Agreement (ICSA) with PJM Interconnect, LLC (PJM). PJM and AEP Ohio are preparing to re-study the Combined Project based on the change in wind turbine technology; the results of the re-study are expected in summer 2016.

**(B) DETAILED PROJECT SCHEDULE**

**(1) Schedule**

Figure 02-1 provides the Combined Project schedule bar chart.

**(a) *Acquisition of Land and Land Rights***

Acquisition of all land rights, specifically associated with the newly required setback waivers, was completed in June 2016.

**(b) *Wildlife Surveys/Studies***

No material change, except the updated information that appears in Section 4906-17-08 of this Third Amendment. A raptor nest survey was completed in the spring of 2016 (Exhibit 2).

**(c) *Preparation of the Application***

This Third Amendment was prepared from April to June, 2016.

**(d) *Submittal of the Application for Certificate***

This Third Amendment is being submitted in June 2016.

**(e) *Issuance of the Certificate***

The Certificate for the Project was issued on March 22, 2010, and amended July 25, 2011 and November 28, 2011. Approval of the Third Amendment is being sought by September 2016 in order to support commencement of construction of the Combined Project in 2016.

**(f) *Preparation of the Final Design***

Final design to support commencement of construction in 2016 would begin during the third quarter of 2016.

**(g) *Construction of the Facility***

Construction of the Combined Project is scheduled to begin in the fourth quarter of 2016 in order for the Combined Project to qualify for 100 percent of the Production Tax Credit (PTC). The specific construction schedule will be finalized upon receipt of a revised interconnection schedule.

**(h) *Placement of the facility in service***

It is anticipated that the Combined Project will begin commercial operation once installation and testing is completed. The Combined Project is scheduled to begin commercial operation in the fourth quarter of 2017.

**(2) Delays**

Critical delays have the potential to adversely affect the completion of the Combined Project. The OPSB Third Amendment approval is a critical step and is important for the Combined Project to receive in time to begin construction in 2016. The Applicant is hopeful the Third Amendment can be approved in 3 to 5 months from submission. The Applicant will do everything it can to facilitate the OPSB's review process, but also recognizes the busy docket with which the OPSB must work.

Other potential delays have not changed from the original Application.

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## 4906-17-04 Project Area Alternatives Analysis

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### (A) SITE SELECTION STUDY

#### (1) The applicant shall provide the following:

- (a) *A description of the study area or geographic boundaries selected, including the rationale for the selection.*

No change. Please refer to the original Application.

- (b) *A map of suitable scale which includes the study area and which depicts the general project areas which were evaluated.*

No change, Please refer to the original Application.

- (c) *A comprehensive list and description of all qualitative and quantitative siting criteria, factors or constraints utilized by the applicant, including any evaluation criteria or weighting values assigned to each.*

No change. Please refer to the original Application.

- (d) *A description of the process by which the applicant utilized the siting criteria to determine the proposed project area and any proposed alternative project area site(s).*

No change. Please refer to the original Application.

- (e) *A description of the project area sites selected for evaluation, their final ranking, and the factors and rationale used by the applicant for selecting the proposed project area site and any proposed alternative project area site(s).*

No change from the original Application; following selection of the Project location, additional refinements have occurred, as addressed in the Application and amendments.

- (2) **The applicant shall provide one copy of any constraint map showing setbacks from residences, property lines, and public rights of way.**

An updated map of these constraints for the Combined Project is provided as Map 04-1.

**(B) PROJECT AREA SUMMARY TABLE**

No change. Please refer to the original Application.

**(C) PROJECT AREA SELECTION ATTACHMENT**

No change. Please refer to the original Application.

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**4906-17-05 Technical Data**

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**(A) PROJECT AREA**

**(1) Geography and Topography. Map(s) of 1:24,000 scale containing a five-mile radius from the proposed facility and showing the following features:**

**(a) *The proposed facility***

See Map 02-2.

**(b) *Major population centers and geographic boundaries***

No change. Please refer to the original Application.

**(c) *Major transportation routes and utility corridors***

No change. Please refer to the original Application.

**(d) *Bodies of water which may be directly affected by the proposed facility***

No change. Please refer to the original Application.

**(e) *Topographic contours***

No change. Please refer to the original Application.

**(f) *Major institutions, parks, and recreational areas***

No change. Please refer to the original Application.

**(g) *Residential, commercial, and industrial buildings and installations***

No change. Please refer to the original Application.

**(h) *Air transportation facilities, existing or proposed***

No change. Please refer to the original Application.

- (2) **An Aerial Photograph containing a one-mile radius from the proposed facility, indicating the located of the proposed facility in relation to surface features.**

See Map 02-1.

- (3) **A map(s) of 1:12,000 scale of the project area site, showing the following features: (a) Topographic contours; (b) Existing vegetative cover; (c) Land use and classifications; (d) Individual structures and installations; (e) Surface bodies of water; (f) Water and gas wells; (g) Vegetative cover that may be removed during construction.**

Map 02-3 illustrates these features within the Combined Project Area and for the updated Combined Project layout.

- (4) **Geology and Seismology**

- (a) *Describe the suitability of the Site Geology and plans to remedy any inadequacies*

No change. Please refer to the original Application.

- (b) *Describe the suitability of the soil for grading, compaction, and draining, and describe plans to remedy any inadequacies*

No change. Please refer to the original Application.

- (5) **Hydrology and Wind**

- (a) *Provide the natural and the man-affect water budgets, including the ten-year mean and critical (lowest seven-day flow in ten years) surface flows*

*and the mean and extreme water table during the past ten years for each body of water likely to be directly affected by the proposed facility.*

No change. Please refer to the original Application.

- (b) *Provide an analysis of the prospects of floods and high winds for the project area, including the probability of occurrences and likely consequences of various flood stages and wind velocities, and describe plans to mitigate any likely adverse consequences. Identify any portion of the proposed facility to be located in a one hundred-year flood plain area.*

Map 05-1 illustrates the updated floodplain mapping near the Combined Project Area; no floodplains are mapped within the Combined Project Area.

- (c) *Provide exiting maps of aquifers which may be directly affected by the proposed facility.*

No change, although Map 05-2 illustrates the aquifers within the Combined Project Area.

## **(B) LAYOUT AND CONSTRUCTION**

### **(1) Project Area Site Activities.**

No change from the original Application, with the exception of the estimated disturbance areas for the Combined Project components listed in Table 05-1 below. In particular, a much wider temporary disturbance area for access roads is being proposed in order to account for wider but more gradual drainage ditches, which allow for more farmable surface area after construction is complete.



**Table 05-1. Comparison of Previously Permitted and Proposed Disturbance Assumptions**

Facility Component	Assumptions in Previous Applications		Proposed Assumptions	
	Temporary Construction Disturbance	Permanent Operation Disturbance	Temporary Construction Disturbance	Permanent Operation Disturbance
Access roads	36 feet	16 feet	68 feet	20 feet
Crane walks	N/A; not discussed in original Application.	N/A; not discussed in original Application.	60 feet	0 feet
Underground cabling	13 feet	0 feet	40 feet	0 feet
Substation	3 acres	1 acres	5 acres	3 acres
O&M building	2 acres	0.2 acre	3 acres	2 acres
Laydown/staging area	5 acres	0 acre	8 acres	0 acre

**(2) Layout**

See Map 02-1.

**(a) *Wind-powered electric generation turbines***

Turbine setbacks are based on the maximum structure height of 150 meters, which is the same tip height as previously approved turbine models.

**(b) *Transformers and collection lines***

Refer to Map 02-1 showing the proposed collection line configurations based on the proposed Combined Project turbine layout. Underground cabling will be buried a minimum of 48 inches to allow farming to continue once construction is complete.

**(c) *Construction laydown area(s)***

The purpose remains the same as discussed in the original Application, but the size of the area required has increased to 8 acres rather than the 5 acres identified in the original Application.

**(d) *Transmission lines***

No change, as the point of interconnection to the electric utility grid will be a tap-in along the existing 69-kV Ada-Dunkirk transmission line. Please refer to the First Amendment.

**(e) *Substations***

No change. Please refer to Map 05-1 in the First Amendment application and Map 02-1 in this Third Amendment.

**(f) *Transportation facilities and access roads***

The original Application identified a 36-foot temporary width and 16-foot permanent width. Given updates in turbine technology, road width requirements have increased. In addition, a wider temporary disturbance area is planned in order to allow for wider but shallower ditches to allow for a greater farmable area once construction is complete. A total temporary width 68 feet is currently proposed, of which 20 feet will be retained for permanent access, including 2-foot shoulders on either side.

For turning radii (approaching from 90 degrees), an internal radius of 190 feet (rather than 120 feet in the original Application) can be assumed. This will be a temporary disturbance during construction only.

**(g) *Security facilities***

No change. Please refer to the original Application.

**(h) *Grade elevations where modified during construction***

No change. Please refer to the original Application.

(i) ***Other pertinent installations***

No change. Please refer to the original Application.

(3) **Structures**

(a) ***Estimated Overall Dimensions***

The proposed Vestas V110 turbine model has a rotor diameter of 110 meters (360.9 feet). Tower height for this turbine will be 95 meters (311.7 feet). Tip height will be 150 meters (492.1 feet), which is the same tip height as previously approved in the Second Amendment.

Towers for the proposed turbine model will be approximately 15 feet wide at their base, which has not changed from the original Application.

The Combined Project substation is estimated to cover an area of approximately 3 acres for the Combined Project, and will be designed according to PJM and AEP Ohio requirements.

As reflected in the original Application, the operations and maintenance (O&M) facility for the Combined Project is not expected to exceed approximately 6,000 square feet. An existing structure may be utilized for this purpose; otherwise, a new facility will be constructed, the location for which will be chosen during final design.

(b) ***Construction Materials***

No change. Please refer to the original Application.

(c) ***Color and Texture Effacing Surfaces***

No change. Please refer to the original Application.

(d) ***Photographic Interpretation or Artist's Pictorial Sketches of the proposed facility from public vantage points within five miles of the proposed facility***

To demonstrate how the proposed Combined Project turbines will appear within the study area from a variety of distances and locations, six representative photo simulations were prepared. Visual simulations were created from photos taken in the field on June 7, 2016 using a Canon EOS Digital Rebel Camera at a focal length of 28 mm and a camera height of 1.8 m above the ground. Photograph locations were selected from important vantage points in and around the Combined Project Area. Field conditions were partly cloudy with no rain or haze.

Visual simulations of turbines were created using the WindFarm Program (V. 4.2, ReSoft, Ltd.) using specifications for a Vestas V110 2.2 MW wind turbine. The simulations and photo location map are included as Exhibit 3. These simulations do not include views from all potentially affected locations, but instead provide representative examples from different distances, elevations, and cover conditions.

(e) ***Any Unusual Features***

No change. Please refer to the original Application.

(4) **Plans for Construction**

No change. Please refer to the original Application.

(5) **Future Plans**

No change. Please refer to the original Application.

**(C) EQUIPMENT****(1) Wind-Powered Electric Generation Equipment**

No change, with the exception of the steel tubular tower, which will be 95 meters (312 feet) in height. The Vestas V110 turbines will also include the turbine transformer in the nacelle. Further turbine specifications can be found in in Exhibit 1.

**(2) Safety Equipment****(a) *All Proposed Major Public Safety Equipment***

No material change. Please refer to the original Application, and Exhibit 4 of this Third Amendment for the safety manual for the proposed turbine model.

**(b) *The Reliability of the Equipment***

No change, with the exception of the reliability of the proposed turbine model. Vestas is in the top five leading companies for total turbines installed in the United States, and in overall MW of capacity installed. The proposed turbine model is designed to have a lifespan exceeding 20 years, and is certified as meeting international design standards. Reliability of the Vestas turbines has given them a respected reputation with financiers in the United States market.

**(c) *Turbine Manufacturer's Safety Standards and Safety Manual***

The safety manual for the Vestas turbine is attached as Exhibit 4.

**(3) Any Other Major Equipment not discussed in paragraphs (C)(2)(a) to (C)(2)(c) of this rule.**

No change. Please refer to the original Application.

**(D) REGIONAL ELECTRIC POWER SYSTEM INTERCONNECTION**

No change. Please refer to the Second Amendment.

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**4906-17-06 Financial Data**

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**(A) OWNERSHIP STATUS**

The Combined Project is owned by Hog Creek Wind Farm, LLC a wholly owned subsidiary of RES Americas. As one of the top renewable energy companies in the world, RES Americas has been developing, engineering, constructing, and operating renewable energy projects since 1997. RES Americas and its affiliates have developed and/or built over 9 gigawatts (GW) of renewable energy capacity worldwide, have an asset management portfolio exceeding 1 GW, and are active in a range of energy technologies including onshore wind, solar, energy storage, transmission, and demand side management.

RES Americas was originally formed as part of the Sir Robert McAlpine group, a family-owned British firm with 145 years of experience in construction and engineering. The international headquarters remains in the United Kingdom, with RES Americas active in the United States since 1997, in the Canadian renewable energy market since 2003, and the Chilean market since 2010.

RES Americas specializes in engineering, procurement, and construction and balance of plant/balance of site construction services. RES Americas built the company's first North American wind energy project in 1999, and joined the North American solar energy market in 2010 with construction of their first solar farm. The company continued to expand their innovative offerings with their first energy storage project in 2014, and has now become one of the North American energy market's leading providers of energy storage solutions. RES Americas constructed its first major transmission line project in 2013.

**(B) CAPITAL AND INTANGIBLE COSTS****(1) Capital and intangible cost estimates**

Based on the Applicant's experience and knowledge of current wind energy market pricing, capital and intangible costs, the Applicant anticipates between \$1,400 and \$1,700 per installed kilowatt (kW) for the Combined Project, compared to between \$2,106 and \$2,325 per installed kW estimated in the original Application.

**(2) Compare the total costs per kilowatt with the applicant's similar facilities, and explain any substantial differences**

The Applicant does not anticipate total costs for the Combined Project to vary significantly from regional or United States trends.

**(3) Present worth and annualized capital costs**

The capital costs outlined above include all planning, development, design, engineering, construction, and equipment procurement. Additionally, cost projections include those intangible components such as financing, legal, and insurance. The Applicant anticipates that the costs denoted above will be incurred within 12 to 18 months of the start of construction. Consequently, the present worth analysis is essentially the same as the costs presented above in Section 4906-17-06(B)(1) of this Third Amendment.

**(C) OPERATION AND MAINTENANCE EXPENSES****(1) Annual operation and maintenance expenses**

Annual O&M expenses for the Combined Project, escalating at inflation, are estimated to start at approximately \$3 million.



**(2) Compare the total operation and maintenance cost per kilowatt with applicant's similar facilities and explain any substantial differences**

To date, RES Americas, of which the Applicant is an affiliate, has constructed approximately 8,000 MW of wind energy capacity in the United States and Canada. The annual O&M cost during the initial two years of operation for these wind projects is between 14 and 20 cents per MW hour of production. The Applicant does not expect O&M costs for the Combined Project to vary substantially from those for other wind farms in the United States.

**(3) Present worth and annualized expenditures for operation and maintenance costs**

The present value of the O&M expenses over 20 years discounted at 8 percent is between \$38 million and \$40 million for the Combined Project.

**(D) COST ESTIMATE FOR DELAYS**

Similar to the original Application, if the delay occurs in the permitting stage, the losses are directly related to the time value of money resulting from the delayed start in the timing of revenue payments. This is estimated to be about \$600,000 to \$800,000 per month prior to discounting to the present value for the Combined Project.

Should the delay occur during the course of construction, the cost of delay would mainly include, in addition to the delay in the anticipated revenue stream (see below), the loss of construction days. The costs associated with idle crews and equipment could be relatively significant, possibly \$3 million to 4 million per month for the Combined Project. Furthermore,

the added cost incurred in the construction financing due to any material delay in the Combined Project timeline could be particularly costly.

The Applicant desires the option to begin construction in 2016 to take advantage of the extended PTC. Any delay that would disallow construction beginning in 2016 threatens the cost-competitiveness of the Combined Project. If material delays prevented the Combined Project from commencing construction in 2016, the cost of delay is estimated to be approximately \$10 million to 15 million for the Combined Project due to the decrease in the PTC credit beginning in 2017.

Revenue losses due to delays of the in-service date, assuming a power purchase price comparable with regional electricity prices (and including the value of Renewable Energy Credits), would be on the order of \$700,000 for an average month for the Combined Project. Individual months will vary according to time of year and forecasted production.

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**4906-17-07 Environmental Data**

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**(A) GENERAL**

No change. Please refer to the original Application.

**(B) AIR**

No change, with the exception of the anticipated emission offsets. The United States Environmental Protection Agency (EPA) does not list Hardin County as being in a nonattainment area for any air pollutants. Wind turbines generate electricity without releasing emissions or pollutants into the atmosphere.

According to the United States Energy Information Administration (EIA), the primary fuel for electricity generation in Ohio is coal.<sup>2</sup> Assuming production from the Combined Project is between 174,119 and 200,880 MW-hours per year, and would replace electricity generated by a coal-fired power plant, the Combined Project could annually offset up to approximately 532 tons of sulfur dioxide, 161 tons of nitrogen oxide, and 162,110 tons of carbon dioxide, or 10,640 tons of sulfur dioxide, 3,220 tons of nitrogen oxide, and 3,242,200 tons of carbon dioxide over a 20-year lifetime.<sup>3</sup>

**(1) Preconstruction****(a) *Submit available information concerning the ambient air quality of the proposed project area site and any proposed alternative site(s)***

No material change since the original Application.

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<sup>2</sup> EIA 2016a. Ohio Profile Analysis. Available online at <http://www.eia.gov/state/analysis.cfm?sid=OH>, accessed May 2016.

<sup>3</sup> EIA 2016b. Ohio Electricity Profile 2014. Available online at <http://www.eia.gov/electricity/state/ohio/>, accessed May 2016.

(b) *Applicable federal and/or Ohio new source performance standards*

No material change since the original Application.

(c) *List of all required permits*

No change since the original Application.

(d) *Compliance plans*

No change since the original Application.

(2) **Construction**

No change since the original Application.

(C) **WATER**

Although there is no material change since the original Application was filed, construction of the Combined Project will result in the addition of some additional acreage that would be temporarily disturbed during construction, but the permanent disturbance area is estimated to be less than previously proposed or permitted due to fewer turbines. Turbine tower bases, crane pads, access roads, and the substation will add a maximum of approximately 39 acres of impervious surface to the approximately 5,492-acre Combined Project Area, almost all of which is in agricultural crop production. No significant changes in the rate or volume of stormwater runoff are anticipated. Appropriate stormwater management features and documentation will be implemented for the Combined Project.

(1) **Preconstruction**

No change since the original Application, other than compliance with the most recent National Pollutant Discharge Elimination System (NPDES) Construction Water

General Permit, Ohio EPA Permit No. OHC000004. Wetland or stream crossings will still be less than 120 feet wide and permitted under a Nationwide 12 permit.

**(2) Construction**

**(a) *Describe the schedule for receipt of the national pollution discharge elimination system permit***

No change since the original Application, other than compliance with the most recent NPDES Construction Water General Permit, as noted above.

**(b) *Estimate the quality and quantity of aquatic discharges from the project area site clearing and construction operations, including run-off and siltation from dredging, filling, and construction of shore side facilities***

No change since the original Application, other than the Combined Project Area acreage and impervious area acreage, as noted above.

**(c) *Describe any plans to mitigate the above effects in accordance with current federal and Ohio regulations***

No change. Please refer to the original Application.

**(d) *Describe any changes in flow patterns and erosion due to project area site clearing and grading operations***

No change. Please refer to the original Application.

**(3) Operation**

*(a) Provide a quantitative flow diagram or description for water and waterborne wastes resulting from run-off from soil and other surfaces at the proposed project area(s)*

No material change. Please refer to the original Application.

*(b) Describe how the proposed facility incorporates maximum feasible water conservation practices considering available technology and the nature and economics of the various alternatives.*

No change. Please refer to the original Application.

**(D) SOLID WASTE****(1) Preconstruction**

*(a) Nature and amount of debris and solid waste on the project area site.*

No change. Please refer to the original Application.

*(b) Describe any plans to deal with such wastes.*

No change. Please refer to the original Application.

**(2) Construction**

*(a) Nature and amount of debris and other solid waste generated.*

No change. Please refer to the original Application.

*(b) Proposed method of storage and disposal of these wastes.*

No change. Please refer to the original Application.

**(3) Operation**

**(a) *Amount, nature and composition of solid wastes generated***

No change. Please refer to the original Application.

**(b) *Describe proposed methods of storage, treatment, transportation, and disposal of these wastes***

No change. Please refer to the original Application.

**(4) Licenses and permits**

No change. Please refer to the original Application.

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**4906-17-08 Social and Ecological Data**

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**(A) HEALTH AND SAFETY**

- (1) Demographic. The applicant shall provide existing and ten-year project population estimates for communities within five miles of the proposed project area site(s).**

No material changes since the original Application, although the demographic data has been updated to reference more current data. The Combined Project Area is located within agricultural land in northwestern Hardin County, Ohio. It is a rural agricultural county with a population density of 68.1 persons per square mile, compared to the state average of 282.3 persons per square mile (Census 2010). Table 08-1 shows the 2000 and 2010 population and 2020 projected population for the communities within 5 miles of the Project Area. Population projections for 2020 are only available to the county level. The data indicates that there was population increase at the county level from 2000 to 2010. There was also a small increase in population in Ada Village and Delaware Township; however, the remaining villages and townships within 5 miles of the Combined Project Area show a decline in population from 2000 to 2010. The population in Hancock County is projected to increase, whereas the population in Hardin County is projected to decrease.



**Table 08-1. Population, Population Estimate, and Population Projections**

<b>Government Unit</b>	<b>2000 Population Census</b>	<b>2010 Population Census<sup>4</sup></b>	<b>2014 Population Estimate<sup>5</sup></b>	<b>2020 Population Projection</b>	<b>2025 Population Projection</b>
Hardin County	31,945	32,058	31,796	31,740	31,490
Blanchard Township	1,640	1,533	1,518	---	---
Dunkirk Village	952	875	866	---	---
Cessna Township	519	494	491	---	---
Liberty Township	7,149	7,712	7,566	---	---
Ada Village	5,582	5,952	5,832	---	---
Marion Township	2,449	2,440	2,407	---	---
Pleasant Township	8,608	8,338	8,318	---	---
Washington Township	787	729	719	---	---
Hancock County	71,295	74,782	75,337	75,330	75,620
Delaware Township	1,229	1,285	1,293	---	---
Madison Township	2,156	844	859	---	---
Orange Township	1,290	1,348	1,360	---	---
Van Buren Township	943	915	920	---	---

**(2) Noise****(a) Describe the Construction Noise Levels expected at the nearest property boundary****(i) Dynamiting activities.**

No change. Please refer to the original Application.

**(ii) Operation of earth moving equipment.**

No change. Please refer to the original Application.

<sup>4</sup> Ohio Department of Development, Policy Research and Strategic Planning Office. 2011. Population and Household Counts for Governmental Units: 2010, 2000, 1990. August, 2011. Available online at <https://development.ohio.gov/files/research/P1005.pdf>, accessed May 2016.

<sup>5</sup> Ohio Department of Development, Policy Research and Strategic Planning Office. 2011. 2014 Population Estimates by County, City, Village and Township. May, 2015. Available online at <https://development.ohio.gov/files/research/P5027.pdf>, accessed May 2016.

***(iii) Driving of piles.***

No change. Please refer to the original Application.

***(iv) Erection of structures.***

No change. Please refer to the original Application.

***(v) Truck, traffic.***

No change. Please refer to the original Application.

***(vi) Installation of equipment.***

No change. Please refer to the original Application.

- (b) *For each turbine, evaluate and describe the Operational Noise Levels expected at the property boundary closest to that turbine, under both day and nighttime conditions***

There has been no material change to the ambient noise in the Combined Project Area since the ambient noise survey was completed for the Combined Project in 2010. Please refer to Exhibit 08-1 in the First Amendment application.

In June 2016, updated noise modeling was conducted to estimate the anticipated noise levels for the Combined Project (Exhibit 5). CadnaA 4.2 was used to develop anticipated sound levels in and around the Combined Project Area due to the addition of the proposed turbines. The same software was used to develop anticipated noise levels at all noise sensitive areas in and around the Combined Project Area.

The modeling was conducted using the following assumptions:

- Based on the ambient noise survey, the assumed compliance limit is 54 A-weighted decibels (dBA) at all receptors. (average ambient + 5 dB as presented to OPSB previously)
- Receptor height: 1.5 meters above ground level
- The turbine modeled was the Vestas V110
- 10 meters per second worst case Spectrum scaled to 106.1 dBA and +2 decibels (dB) uncertainty added (108.1 dBA total)
- Transformer sound contribution was included in the simulation

According to this analysis, the highest modeled sound level of the Combined Project at any occupied receptor in the vicinity of the Combined Project Area was 45.9 dBA, assuming all turbines operating at full capacity. See Exhibit 5 for additional details.

(c) ***Indicate the location of any noise-sensitive areas within one mile of the proposed facility***

See Map 04-1 for all of the residences within 1 mile of the proposed Combined Project turbines.

(d) ***Describe equipment and procedures to mitigate the effects of noise emissions from the proposed facility during construction and operation***

No change, with the exception that excessive operational noise has been avoided by siting turbines at least 500 meters (1,640.4 feet) from all residences, and at least 1,125 feet plus one blade length from non-participating property lines, unless a setback waiver has been granted.

**(3) Water**

No change. Please refer to the original Application.

**(4) Ice Throw**

During freezing weather conditions, ice can accumulate on wind turbine blades and may be “thrown” from the machines due to the mechanical force of the rotating blades. Falling ice fragments may pose a risk to individuals, vehicles, or structures around the turbines during freezing weather. Ice throw modelling was conducted for the Combined Project (Exhibit 6). The ice throw modelling used a statistical simulation developed by DNV GL in conjunction with the Finnish Meteorological Institute and Deutsches Windenergie-Institut. Inputs used meteorological data from a met mast located within the Combined Project Area. Results indicated a typical (90%) throw range of 0 m to 165 m from the turbine.

**(5) Blade Shear**

A blade shear study was conducted for the Combined Project (Exhibit 6). Blade failure is a rare event. Using current industry data, a conservative estimate for wind turbine blade failure is 0.0002 turbines per year, or one blade failure every 5,000 years for any given turbine.

**(6) Shadow Flicker**

To identify potential shadow flicker impacts from the Combined Project, the Applicant commissioned DNV GL to conduct a realistic scenario modeling study (Exhibit 7). All occupied residences in the Combined Project Area and within 10 tip heights of a turbine (1,500 meters, or 4,921 feet) were included in the analysis. Taking

into account cloud cover and wind direction at this particular site, the highest predicted shadow flicker at a residence was 21 hours per year. Table 08-2 summarizes the shadow flicker modeling results. See Exhibit 7 for further information.

**Table 08-2. Predicted Shadow Flicker Impacts from the Combined Project**

Predicted Shadow Flicker (Hours/Year)	Number of Residences	Percent of Total Residences
0	89	58
1-10	41	27
11-20	23	15
21-30	1	Less than 1
Total	154	100

If shadow flicker impacts become an annoyance for residences in the vicinity of the Combined Project, the Applicant will discuss mitigation techniques, including but not limited to purchasing blinds or awnings for windows.

With respect to roads, the shadow flicker maps in Exhibit 7 illustrate potential shadow flicker hours in some locations within the Combined Project Area. However, because primary road users are mobile (typically in a motorized vehicle), any Combined Project-related shadow flicker experienced by these users would be a small fraction of that experienced by a stationary receptor.

## **(B) ECOLOGICAL IMPACT**

No change in introductory language information since the original Application.

### **(1) Project Area Site Information**

- (a) *Map of 1:24,000 scale containing a half-mile radius from the proposed facilities, showing the following: (i) the proposed project area boundary; (ii) undeveloped or abandoned land such as wood lots, wetlands, or vacant*

***fields; and (iii) recreational areas, parks, wildlife areas, nature preserves, and other conservation areas***

Updated boundaries for the Combined Project are shown in Map 02-2 illustrating the above features to the extent they are present. As was documented in the original Application, no recreational areas, parks, wildlife areas, nature preserves or conservation areas exist within a half-mile radius, and none exist within a 5-mile radius.<sup>6</sup>

**(b) *Results of a survey of the vegetation within the facility boundary and within a quarter-mile distance from the facility boundary***

No material change since the original Application. According to the National Land Cover Dataset, the vegetation in the Combined Project Area consists primarily of cultivated crops (93 percent). A field visit in June 2016 confirmed that the Combined Project Area primarily consists of agricultural land, and that, much like in the original Application, the following four vegetation types that are found include: agricultural fields currently producing corn and soybeans; drainage ditches; weedy vegetation along public roads; and woodlots.

**(c) *Results of a survey of the animal life within the facility boundary and within a quarter-mile distance from the facility boundary***

No change. Please refer to the original Application.

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<sup>6</sup> Information has been updated to reflect the new requirement for a 5-mile radius (rather than the 0.5-mile previously presented).

**(d) *Summary of any studies which have been made by or for the applicant addressing the ecological impact of the proposed facility***

Avian surveys were completed in May 2010 for the Combined Project. Northern harrier nesting surveys were completed in 2009 and 2010. Raptor migration rates were low.

In lieu of completing acoustic bat surveys, in 2009 the Project was the first to sign an agreement with Ohio Department of Natural Resources (ODNR) committing to feathering turbine blades in winds up to 4.0 meters per second from dusk to dawn, annually from July 1 to October 31, for the life of the Project.

In September 2009, the United States Fish and Wildlife Service (USFWS or Service) issued a letter to OPSB stating the Project has “worked collaboratively with the Service to address potential wildlife, habitat, and natural resources issues...”, that no suitable habitat for Indiana bat habitat is present, and “we do not believe the site poses a substantial threat to migratory birds or their habitat, though a limited amount of mortality to migratory birds should be expected to occur.” In February 2010, ODNR provided a letter stating the Project at the proposed location “poses a minimum threat to Ohio’s wildlife resources.”

More recently, raptor nest surveys were completed in March 2016 and exceeded ODNR recommendations for nest surveys. No eagle nests were observed. The surveyors identified 9 active red-tailed hawk nests, 5 inactive buteo nests, and 1 great horned owl nest.

In April 2016, USFWS agreed that the Combined Project Area lacks suitable habitat for bats, and a mist-net survey is not recommended, although Indiana bats may migrate through the Combined Project Area. USFWS agreed that no further wildlife surveys are needed.

**(e) *Provide a list of major species from the surveys of biota***

No change, except for the addition of one threatened or endangered species, the northern long-eared bat (*Myotis septentrionalis*). The northern long-eared bat was listed as threatened under the Endangered Species Act in 2015 due to declines caused by white-nose syndrome. The USFWS issued a 4(d) rule on January 14, 2016 that exempted take of northern long-eared bats at operational wind-energy facilities. The 4(d) rule ensures that private landowners, state agencies and others are not unduly burdened by regulations that do not further the conservation of a species. The species is found in dense forest stands and chooses maternity roosts beneath exfoliating bark and in tree cavities. It relies upon caves and underground mines for hibernation. No habitat for this species was noted in the Combined Project Area.



**(2) Construction**

- (a) *Estimate the impact of construction on the areas shown in response to paragraph (B)(1)(a) of this rule*

No material change since the original Application. The Applicant estimates that construction will disturb approximately 280 acres of the total 5,492 ac of land within the Combined Project Area, of which nearly all is crop land.

- (b) *Estimate the impact of construction on the major species listed under paragraph (B)(1)(e) of this rule*

No change since the original Application.

- (c) *Describe the procedures to be utilized to avoid, minimize, and mitigate both the short- and long-term impacts due to construction*

No change. Please refer to the original Application.

**(3) Operation**

- (d) *Estimate the impact of operation on the areas shown in response to paragraph (B)(1)(a) of this rule*

Estimated temporary and permanent disturbance impacts are provided in Table 03-1. No impacts are anticipated to wood lots, wetlands, recreational areas, parks, wildlife areas, nature preserves, or other conservation areas.

- (e) *Estimate the impact of operation on the major species listed under paragraph (B)(1)(e) of this rule*

No change, with the exception of the addition of the northern long-eared bat, discussed above. It is possible that this species may migrate through the Combined Project Area in spring and fall.

- (f) *Describe the procedures to be utilized to avoid, minimize, and mitigate both the short- and long-term impacts of operation*

No change since the original Application. The Applicant affirms its plan to design, construct, and operate the Combined Project using practices to avoid or minimize impacts to birds and bats and will document these practices developed in consultation with the ODNR in coordination with the USFWS.

- (g) *Describe any plans for Post-construction Monitoring of Wildlife Impacts*

No change since the original Application.

**(C) ECONOMICS, LAND USE AND COMMUNITY DEVELOPMENT**

No change in introductory language information since the original Application.

**(1) Land Uses**

- (a) *Map of 1:24,000 scale indicated general land uses, depicted as areas on the map, within a five-mile radius of the facility, including such users as residential and urban, manufacturing and commercial, mining, recreational transport, utilities, water and wetlands, forest and woodland, and pasture and cropland*

See Map 02-2.

- (b) *Number of Residential Structures within one thousand feet of the boundary of the proposed facility, and residential structures for which the nearest edge of the structure is within one hundred feet of the boundary of the proposed facility*

A total of 62 residences are located within the Combined Project Area. Based on review of aerial photography, county plat maps, and field verification, there are eight residences within 100 feet of the proposed Combined Project boundary, and an additional 114 residences within 1,000 feet of the boundary of the Combined Project Area.

All turbines have been sited a minimum of 500 meters (1,640.4 feet) from the nearest residence within or adjacent to the Combined Project Area. No wind energy facilities will be located within 100 feet of a residence, with the exception of the temporary laydown area.

- (c) *Describe potential locations for Wind Turbine Structures in relation to the property lines and the habitable residential structures, consistent with no less than the following minimum requirements:*

- (i) *The distance from a wind turbine base to the property line of the wind farm property shall be at least one and one-tenth times the total height of the turbine structure as measured from its tower's base (excluding the subsurface foundation) to the type of its highest blade.*

The Combined Project complies with Ohio Revised Code Section 4906.20(B)(1)(a) and Ohio Administrative Code Rule 4906-4-08(C)(2)(b), which requires a setback of 1,125 feet from the tip of the nearest blade at 90 degrees to the property line of the nearest adjacent property.

- (ii) *The wind turbine shall be at least seven hundred fifty feet in horizontal distance from the tip of the turbine's nearest blade at ninety degrees to the exterior of the nearest habitable residential structure, if any, located on adjacent property at the time of the certification application.*

The amendment to Ohio Revised Code 4906.20 and Ohio Administrative Code Rule 4906-4-08 (C) (2) (b) supersedes the previous setback based on distance to residences.

- (iii) *Minimum setbacks may be waived in the event all owners of property adjacent to the turbine agrees to such waiver pursuant to rule 496-1-03 of Administrative Code.*

Map 04-1 illustrates the parcels for which setback waivers were obtained.

- (d) *Estimate the impact of the proposed facility on the above land uses within a one-mile radius.*

Except for the fact that the Combined Project will use fewer turbine sites than those previously approved which will lessen overall impacts, no change. Please refer to the original Application.

(e) ***Identify structures that will be removed or relocated.***

No change. Please refer to the original Application.

(f) ***Describe formally adopted plans for future use of the site and surrounding lands for anything other than the proposed facility.***

No change. Please refer to the original Application.

(g) ***Describe the applicant's plans for concurrent or secondary uses of the project area.***

No change. Please refer to the original Application.

(2) **Economics**

(a) ***Estimated Payroll***

This information has been updated for the Combined Project. Construction of the proposed Combined Project will employ a total workforce of approximately 66 to 133 employees over a 9 to 12 month time period. The estimated payroll for local construction workers is anticipated to be approximately \$2.7 million to 3.3 million.

The Applicant anticipates the need for 3 to 5 full time employees during the operational phase of the Combined Project. Employment will consist of administrative, technical, and management staff. Assuming an average salary across the employees of \$50,000, the Applicant estimates total operational payroll

of \$150,000 to \$250,000 per year, or \$3 million to \$5 million for the 20-year Combined Project lifetime.

**(b) *Construction and Operations Employment***

This information has been updated for the Combined Project. The Applicant expects that the construction of the proposed Combined Project will employ 1 to 2 jobs per MW during the approximately 6 to 8 month construction period. This results in approximately 66 to 133 construction-related jobs. Combined Project construction will involve workers with specialized skills in the areas of turbine assembly, turbine engineering, excavation, large crane operation, and high voltage electricity. The Applicant is open to sourcing local/regional jobs, the extent of which will depend on the availability of qualified workers. Examples of local/regional workers are truck drivers, carpenters, equipment operators, laborers, and electricians. Local contractors may also be utilized, including concrete/stone providers, drainage tile repair, and others.

Once construction is complete and the Combined Project is fully operational, the Applicant expects there to be 3 to 5 full time employees for operations and maintenance, including 1 to 2 administrative/customer service staff, 1 to 2 technician(s), and an operations manager. These employees will be expected to reside locally in order to operate and maintain on a daily basis. Depending on the availability of qualified candidates, one lead technician may be required from outside the region due to the necessary experience for this job. Other employees can be from the local area.

(c) ***Estimate the increase in county, township, city, and school district tax revenue accruing from the facility***

This information has been updated for the Combined Project. Ohio Revised Code 5727.75 allows Ohio wind energy facilities to enter into payment in lieu of taxes (PILOT) agreements. On January 21, 2016 Hardin County Commissioners passed a resolution rescinding a prior resolution of October 5, 2010 that had made Hardin County an Alternative Energy Zone. Because of the rescission, this Combined Project will be subject to approval of Hardin County on an individual basis, once the Combined Project has been completed. The maximum PILOT payment is \$9,000 per MW of installed capacity, which would result in the Combined Project making PILOT payments to Hardin County, which includes all the local jurisdictions, of an estimated \$594,000 each year.

(d) ***Estimate the Economic Impact of the proposed facility on local commercial and industrial activities***

Of the total installed capital cost for the Combined Project, approximately 80 percent is estimated to be for equipment and services sources outside of the State of Ohio, the vast majority of which is for turbine procurement. The remaining 20 percent represents expenditures for equipment, materials, services, and labor used during construction and sources within Ohio. Construction of the proposed Combined Project will employ a total workforce of approximately 66 to 133 employees over a 9 to 12 month time period. The estimated payroll for local



construction workers is anticipated to be approximately \$2.7 million to 3.3 million.

The Applicant anticipates the need for 3 to 5 full time employees during the operational phase of the Combined Project. Employment will consist of administrative, technical, and management staff. Assuming an average salary across the employees of \$50,000, the Applicant estimates total operational payroll as \$150,000 to \$250,000 per year, or \$3 million to \$5 million for the 20-year Combined Project lifetime.

The Applicant expects that the construction of the proposed Combined Project will result in one to two jobs per MW during the approximately 6 to 8 month construction period. This results in approximately 66 to 133 construction-related jobs. Combined Project construction will involve workers with specialized skills in the areas of turbine assembly, turbine engineering, excavation, large crane operation, and high voltage electricity. The Applicant is open to sourcing local/regional jobs, the extent of which will depend on the availability of qualified workers. Examples of local/regional workers are truck drivers, carpenters, equipment operators, laborers, and electricians. Local contractors may also be utilized, including concrete/stone providers, drainage tile repair, and others.

The operations staff will be expected to reside locally in order to operate and maintain on a daily basis. Depending on the availability of qualified candidates, one lead technician may be required from outside the region due to the necessary experience for this job. Other employees can be from the local area.

The Applicant will compensate landowners for wind energy generation facilities on their property on an annual basis, escalating each year according to the Consumer Price Index. Based on the contractual terms and utilizing an 8 percent discount rate, the Net Present Value of the lease costs is projected to be about \$4.3 million over the course of the 20-year Combined Project life. For landowners who live locally, the additional income will spur local commercial and industrial activity and provide some safety measure against fluctuating commodity prices.

**(3) Public Services and Facilities**

No change. Please refer to the original Application.

**(4) Impact on Regional Development**

**(a) *Housing, commercial and industrial development, and transportation system development***

No material change since the original Application other than the slight adjustment in staffing, as discussed above.

**(b) *Compatibility with regional development plans***

No change since the original Application.

**(D) CULTURAL IMPACT**

No change to introductory information.

**(1) Registered landmarks of historic, religious, archeological, scenic, natural, or other cultural significance within five miles of the proposed facility**

No change to existing cultural resources within 5 miles of the proposed Combined Project Area since the original Application. Note that the original Application identified two documented sites for avoidance; the Combined Project turbines will be located even further from these previously identified resources.

The Combined Project layout, although having different locations for the turbines and associated elements due to the change in setback requirements, will be located in the same general area as the prior approved layouts. The Applicant has consulted with the Ohio Historic Preservation Office, and will implement a survey in July 2016 that will focus on subsurface investigation of areas of new impact that are located within areas previously determined to have higher levels of archaeological sensitivity, with confirmatory samples taken in the areas of low archaeological sensitivity. The results of this study will be submitted to the OPSB and to the Ohio Historic Preservation Office for review.

**(2) Estimate the impact of the proposed facility on the preservation and continued meaningfulness of these landmarks and describe plans to mitigate any adverse impact**

No change. The two previously documented sites recommended for avoidance will continue to be avoided by the current Combined Project layout. In addition, in the memorandum of understanding (MOU) dated August 2012 between the Applicant and the Ohio Historic Preservation Office, the Applicant committed to contributing financial

support to the Hardin County Historical Museums, Inc. The MOU also includes a commitment to consult with the Ohio Historic Preservation Office in the unanticipated event additional cultural resources are encountered during construction, and suspend work in the vicinity pending a determination of appropriate actions.

- (3) Landmarks to be considered for the purposed of paragraphs (D)(1) and (D)(2) of this rule are those districts, sites, buildings, structures, and objects which are recognized by, registered with, or identified as eligible for registration by the national registry of natural landmarks, the Ohio historical society, or the Ohio Department of Natural Resources**

No change. Please refer to the original Application.

- (4) Existing and formally adopted land and water recreation areas within five miles of the proposed facility**

No change. Please refer to the original Application.

- (5) Description of recreation areas within one mile of the proposed project area in terms of their proximity to population centers, uniqueness, topography, vegetation, hydrology, and wildlife: estimate the impact of the proposed facility on the identified recreation areas and describe plans to avoid, minimize, or mitigate any adverse impact**

No change. Please refer to the original Application.

- (6) Describe measures that will be taken to minimize any adverse visual impacts created by the facility, including, but not limited to, project area location, lighting, and facility coloration**

No change. Please refer to the original Application.

**(E) PUBLIC RESPONSIBILITY**

**(1) Program for Public Interaction**

Since all of the meetings that have happened since the beginning of the Project (as detailed in the original Application), once the Applicant acquired the Combined Project, a local consultant was hired who has deep ties with the landowner community. He has been meeting with landowners, adjacent landowners, and local community members. In addition, in April 2016, a landowner dinner was hosted in Ada, Ohio.

Once the Combined Project is operational, the Applicant will maintain a staffed O&M facility within the Combined Project Area. O&M facility staff will be available during regular business hours and accommodate, to the extent possible, scheduled visits from landowners, neighbors, governmental employees, visitors, etc. The O&M staff will be accessible via office telephones, mobile telephones, e-mail and facsimile.

It is also customary for wind farms to host annual open houses so the public can ask questions and express opinions about wind farms. Wind farms often also participate in community activities such as ground fairs and charitable and sporting events. It is likely the O&M staff will continue with such a tradition to the extent possible within their work schedule.

**(2) Insurance or Other Corporate Programs**

No change. Please refer to the original Application.

**(3) Evaluate and describe the potential for the facility to interfere with radio and TV reception and, if warranted, describe measures that will be taken to minimize interference**

The Applicant hired Comsearch to conduct a microwave study, AM-FM radio study, TV reception study, and a land mobile and emergency services report for the Combined Project Area (Exhibit 8). The study area for which Comsearch conducted the studies encompasses the Combine Project turbine locations.

The microwave report focuses on the potential impacts of wind turbines on licensed non-federal government microwave networks. The obstruction analysis was performed using Comsearch's proprietary microwave database. The analysis reported 10 microwave paths intersecting the study area. Comsearch calculated a Worst Case Fresnel Zone (WCFZ) for the 10 microwave paths. The WCVZ radius is further calculated to determine a buffer zone for the microwave paths. The Applicant designed the Combined Project turbine layout to avoid impacts to the microwave paths.

Comsearch identified 6 AM stations and 20 FM stations within 30 kilometers of the study area. Because the closest AM station is more than 20 kilometers from the Combined Project Area, no impacts are anticipated. The nearest FM station is more than 5.3 kilometers from the Combined Project Area, and no impacts are anticipated.

Comsearch identified 19 database records for TV stations within approximately 75 kilometers of the Combined Project Area; of these, only 12 are currently licensed and operating. Nine of these are low-power stations with limited range, and the remaining 3 stations are full-power stations. The three full-power stations and three low-power

stations that overlap with the Combined Project Area may have reception disrupted by the proposed Combined Project turbines where there is clear line-of-sight to a turbine but not the station. However, based on the low number of full-power stations in the area, it is likely that cable service and direct broadcast satellite service are the more common modes of TV service delivery; both of these modes are unaffected by wind turbines. In the unlikely event that area residences experience TV signal disruption from the Combined Project, a high-gain directional antenna may be installed as mitigation.

Comsearch performed a search for the following types of land mobile and emergency services frequencies: land mobile radio systems, commercial Enhanced 911 (E911) operators, police, fire, emergency medical services, emergency management, hospitals, public works, transportation and other state, county, and municipal agencies. Four site-based licenses for land mobile and emergency service sites were identified in the study area. A total of 23 area-wide licenses for public safety entities were found. Seven mobile phone carriers with E911 capabilities have licenses in Hardin County. No disruption to these communications networks are anticipated from operation of the Combined Project. Wind turbines were sited at least 77.5 meters from land mobile fixed-based stations to avoid any possible impacts to communications services provided by these stations.

- (4) Evaluate and describe the potential for the facility to interfere with military radar systems and, if warrants, describe measures that will be taken to minimize interference**

To evaluate potential impacts on military radar, the Applicant used the Department of Defense (DoD) preliminary screening tool through the Federal Aviation Administration (FAA) website. This tool enables developers to obtain a preliminary review of potential impacts to long range radars, military training routes, and special use airspace. This tool displays a map with the study area and any nearby military airspace or long range radars.

The Applicant provided coordinates for the corners of the Combined Project Area. The tool marked the study area as yellow, indicating that impacts to Air Defense and Homeland Security radars are likely and an aeronautical study is required. The tool indicated that no impacts to military airspace are likely (Exhibit 9).

The Applicant has also voluntarily submitted information about the Facility to the National Telecommunications and Information Administration (NTIA). The NTIA serves as a clearinghouse for federal agency review of wind energy facilities with respect to communication systems. On behalf of the Applicant, Comsearch sent a notification letter to NTIA on May 18, 2016 (Exhibit 8), and expects a response by July 18, 2016. If any concerns are raised, appropriate mitigation options will be considered by the Applicant.

Capitol Airspace Group conducted an airspace and obstruction evaluation analysis for the Combined Project in April 2016 (Exhibit 10). The analysis concluded that aboveground level clearance in the northern quarter and southeastern portion of the Combined Project Area would be up to 657 feet; the remaining portions of the Combined Project Area would have above ground level clearance of more than 657 feet.



Due to the height of the turbines, the Applicant has filed a Notice of Proposed Construction or Alteration for each turbine with the FAA Obstruction Evaluation/Airport Airspace Analysis office. The Applicant understands that a Determination of No Hazard must be issued by the FAA for each turbine prior to erection of the turbine.

- (5) Evaluate and describe the anticipated impact to roads and bridges associated with construction vehicle and equipment delivery. Describe measures that will be taken to repair roads and bridges to at least the condition present prior to the project**

No change, except a Road Use Agreement has been executed with Hardin County.  
See Exhibit 11.

- (6) Describe the plan for Decommissioning the proposed facility, including a discussion of any financial arrangements designed to assure the requisite financial resources**

No change. Please refer to the original Application.

**(F) AGRICULTURAL DISTRICT IMPACT**

- (1) Separately identify of a map(s) of 1:24,000 scale all agricultural land and all agricultural district land located within the proposed project area boundaries, where such land is existing, at least sixty days prior to submission of the application**

No material change; the Combined Project Area contains approximately 785 acres (15 parcels) of registered agricultural district land. Based on the proposed layout for the

Combined Project, one turbine will be located on registered agricultural district land. See Map 08-1.

**(2) Provide, for all land identified under paragraph (F)(1) of this rule, the following:**

**(a) *A quantification of the acreage impacts, and an evaluation of the impact of the construction, operation, and maintenance of the proposed facility on the following agricultural practices within the propose facility boundaries:***

**(i) *Field operations (i.e., plowing, planting, cultivating, spraying, harvesting, etc.).***

No change other than those noted on Table 03-1, which summarizes the temporary and permanent area disturbances expected for the Combined Project.

**(vii) *Irrigation.***

No change since the original Application.

**(viii) *Field Drainage systems.***

No change since the original Application.

**(3) Provide, for all agricultural land identified under paragraph (F)(1) of this rule, an evaluation of the impact of the construction and maintenance of the proposed facility on the viability as agricultural land of any land so identified.**

No change since the original Application.

**CERTIFICATE OF SERVICE**

I hereby certify that the foregoing Application for Third Amendment was served upon the parties of record from Case Nos. 09-277-EL-BGN, 11-757-EL-BGA and 11-5542-EL-BGA via electronic mail this 22<sup>nd</sup> day of June 2016.



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Summary: Application of Hog Creek Wind Farm LLC for Third Amendment to Certificate electronically filed by Teresa Orahood on behalf of Sally W. Bloomfield