

## **Pre-Construction Investigation Protocols**

The following studies were not completed at the time the permit application is being submitted. A description of each study is included below and the results will be made available when complete.

### **1. Spring Avian Surveys**

The purpose of the spring avian survey is to obtain quantitative documentation of spring migration use of the Ashtabula III Project Area. Up to nine avian observation points will be tentatively selected based on the current proposed project layout. The locations will be selected during an initial site visit to ensure that all land uses and habitat types are included within the survey points. Beginning in mid-March, the spring avian survey will consist of 13 weekly surveys.

For each survey, a qualified wildlife biologist will conduct point counts for 20 minutes each. If evident during the field survey, more specific information on habitats, especially areas that appear to be attractive to birds, will be documented.

#### **Survey Setup/Initial Survey**

During the initial survey, observation points will be confirmed, and the first weekly survey will be conducted. This initial site survey will serve as the first of the proposed 13 weekly avian surveys. The UTM coordinates of each nest will be recorded with a GPS so that it can easily be found for future monitoring, without approaching closely and disturbing birds if they are present, and the location of each nest will be plotted on a field map of the Project Area.

#### **Weekly Spring Survey**

After the initial site survey and habitat assessment, 12 additional surveys will be conducted, at approximately weekly intervals, from mid-March through early June. The order in which avian observation points are surveyed will be varied so that roughly equal numbers of surveys at each point are conducted during the morning and afternoon.

#### **Raptor Nest Surveys**

During the spring survey, the field biologists will document raptor stick nests that are observed. A one-mile buffer on all sides of the project area will also be surveyed for raptors. Data on nest condition, size, nest tree species, approximate height of nest in tree, and (if the information is available) proximity to turbine arrays will be recorded. All nests found during the surveys will be mapped using a Global Positioning System (GPS) and entered into a GIS database. Additional information on use will be obtained while the observer is conducting the point count surveys in the Project Area. Detailed information will be collected for each nest identified within and adjacent to the project area. Results will be incorporated into the Spring Avian Report.

#### **Prairie Grouse Lek Surveys**

Because of the concern that grouse avoid tall structures, federal and state wildlife agencies have regularly expressed concern about the locations of wind turbines with respect to grouse leks. To determine if the Project Area is used by sharp-tailed grouse, sharp-tailed grouse lek surveys will be conducted following methods developed by the North Dakota Game and Fish Department. Lek censuses will be conducted on the ground between late March and early May 2010 from one half

hour before sunrise to two hours after sunrise. A minimum of 3 lek surveys will be conducted in the project area.

Surveys for leks will be conducted by driving country roads throughout the area identified as potential lek habitat. When conducting lek surveys, the observer will stop every half mile and listen for at least 5 minutes for cackling sounds of male sharp-tailed grouse. On a calm morning, sharp-tailed grouse males may be heard at a distance of up to a  $\frac{3}{4}$  mile. Listening stops will not be conducted when winds exceed 10 mph or if there is any type of precipitation event. If a lek is located and is visible, the biologist will observe the lek for 10 minutes to count the number of males and females. If displaying sharp-tailed grouse are heard, but the lek is not visible, the biologist will attempt to pinpoint the location by driving country roads and stopping periodically to listen for the lek. The biologist will try to obtain a count of males and females at each active lek on three (3) separate occasions. The results of the lek survey will be included in the spring avian report.

### **Avian Survey Report**

The data will be analyzed and a report will be prepared summarizing the results of the spring avian surveys. The report will include tabulations of the average number of birds observed per 20-minute survey period; frequency of occurrence (proportion of point counts in which each species was observed); proportion of birds observed flying within the rotor swept area of the proposed turbine type(s); a risk index by species and group (comprised of average use multiplied by the proportion of birds flying within the rotor swept area); and a list of sensitive and listed species observed during the study. The number of raptors and special-status birds (and other wildlife species) incidentally observed while the observer is traveling between survey points will also be recorded and included in the report.

## **2. Native Prairie Survey**

The purpose of this task is to identify the habitat types using land cover analysis and locate areas of native prairie within the Ashtabula III Project Area. A series of maps will be created with geographic information system (GIS) data obtained from internet resources and the proportion of land covers in the Project Area will be calculated. Field validation of land cover types and surveys for native prairie plants will be conducted in areas identified from the land cover maps after June 15, 2009. This native prairie survey will allow for an assessment of the extent of grassland (both tame and native) within the Project Area and will also have direct application to determining the range and level of effort of a potential prairie grouse lek survey that may be necessary.

Upon receipt of the land cover maps, a range ecologist will use available roads to access the edge of each identified area within the Project Area. Areas that cannot be seen via the existing roads will be walked if owner permission has been obtained by NextEra Energy. The range ecologist will follow previously established tasks/protocol d for conducting and completing native prairie field surveys and evaluating quality of native prairie remnants, particularly in relation to potential Dakota Skipper butterfly habitat. From these data, the proportion of parcels correctly classified on the land cover maps and the location and acreage of native prairie will be calculated. After the field validation of the land cover types are conducted, GIS technicians will produce a final Project Area native prairie map.

One report will be prepared summarizing the results of the land cover analysis and field surveys. The report will include tabulations of the number of acres occupied by each land cover type, the proportion of each cover type on the landscape, and the location and acreage of native prairie.

### **3. Wetland Delineation**

The objective of this task is to map wetlands and water features to avoid and minimize impacts to these features.

#### Subtask – Micrositing Assistance

Once NextEra Energy has a preliminary turbine array for the Project, one wetlands biologist will join the NextEra Energy team in conducting an initial micrositing visit. The micrositing trip is useful in confirming the feasibility of preliminary turbine locations.

#### Subtask – Wetland Delineation

Once NextEra Energy has designed a complete preliminary project layout, a wetland delineation will be conducted of the proposed Project Area. This task includes a desktop analysis, a field visit to delineate features, and the preparation of a report. Off-site (Desktop) determination methods will first be used to identify probable locations of wetlands and waterbodies, while on-site methods will be employed to verify wetland identifications and gather information to support the initial assessment of probable jurisdictional determinations. The desktop analysis of wetlands will include assessment of U.S Fish and Wildlife (USFWS) National Wetlands Inventory (NWI) Maps and wetland easements that are present in the proposed project area (if provided by USFWS).

Wetlands within the project area will be delineated using the methods described in the 1987 USACE Wetland Delineation Manual and the recently issued Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region ERDC/EL TR-08-12. USACE jurisdiction will be evaluated using the methodologies prescribed in the USACE JD Form Instruction Guidebook, including the December 2, 2008, Corps/EPA revised Rapanos guidance.

Areas of Investigation (AOI) to be included in wetland survey:

- Turbine Locations: 250-foot radius
- Private Access Roads and Underground Electrical Cable: 250-foot wide area (125 feet either side of centerline)
- Public Access Roads: 66-foot wide area (33 feet either side of centerline)
- Lay down yard substation and operations and maintenance building sites

The wetland boundaries will be marked at 50- to 75-foot intervals (depending on the line of sight) and pin flags or stakes numbered sequentially. The presence of hydric soils will be verified by a certified North Dakota soil classifier.

The results will be used to estimate total project related impacts to wetlands and waterbodies, provide an opinion of federal jurisdiction and offer alternatives to project design and activities to avoid and minimize impacts to jurisdictional areas. A map of these areas will be produced to help further microsite Project facilities and avoid unnecessary wetland impacts.

A formal wetland delineation report, suitable for submittal to the USACE, will be prepared and will detail the findings of the review and field investigation. Information included in this report will include: a description of the project areas including figures and acreage calculations, soil and vegetation conditions, an assessment of the jurisdictional status based on field observations of hydrologic, vegetative conditions, and soil conditions, including wetland delineation data sheets. This report will focus on those wetlands which may be impacted by the proposed array, access roads, laydown areas, other project features and transmission line. The report and accompanying maps will be provided electronically to NextEra Energy.

#### **4. Cultural Resources Inventory**

The objective of this task is to conduct a Cultural Resources Inventory, including a Class I site and manuscript file search at the State Historical Society of North Dakota. The file search will identify any cultural resources that have been recorded or any cultural resource inventories that have been conducted in the project area and the surrounding one mile radius.

This task also includes a Class III Pedestrian Survey of: up to 140 5-acre turbine locations (133 turbine locations and up to seven alternates); approximately 20 miles of transmission line (with a 250-foot wide corridor); and 30 acres for the electrical substation, operation and maintenance facilities, and the construction laydown site. Associated access roads and below ground electrical collection system cabling (locations not identified) will also need to be surveyed, (with a 250-foot wide corridor). A report will be written following the completion of the field work, to be submitted to the North Dakota State Historic Preservation Office (NDSHPO).

#### **5. Acoustic Assessment**

The objective of this analysis is to provide a screening level acoustic analysis of the wind turbines in the context of the Project in preparation for a scheduled public hearing including the evaluation of the potential for adverse environmental/health impacts to local residents. Based on a preliminary review of applicable noise regulations, there are no local, county, or State level ordinances that specify numerical limits. Therefore, the scope of work will include research and identification of candidate noise guidelines to provide a defensible means of determining compliance.

A screening level acoustic analysis of the wind turbines in the context of the Project site will be conducted, employing the most recent version of Datakustic GmbH's CadnaA, the computer aided noise abatement program (v 3.7.123). CadnaA is a comprehensive 3-dimensional acoustic software model that conforms to the international standard ISO 9613.2 "Attenuation of Sound During Propagation Outdoors." The industry standard CadnaA acoustic modeling software is widely used by sound engineers due to its adaptability to describe complex acoustic scenarios. The engineering methods specified in these standards consist of 1/1 octave band algorithms and will be adjusted to account for site specific ground, topography, and meteorological conditions and employing the latest proven wind turbine acoustic propagation modeling techniques. Wind turbine generator (WTG) source sound power and 1/1 octave band center frequency data for the selected WTG models for each project will be used per the latest specifications available from the manufacturer.

Acoustic modeling will be completed for three conditions at wind speeds ranging from WTG operating at cut-in to full rotational thereby providing the full range of expected future acoustic conditions:

**1. *Cut-In:* WTG at cut-in wind speed at hub height.**

Though WTGs generate less noise under these conditions, annoyance can potentially be higher due to the lower ambient levels and increased audibility;

**2. *Maximum:* WTG at full rotational wind speed at hub height.**

This scenario represents the worst case in terms of noise generation during normal operating conditions. Above full rotational speeds the noise generated by Project WTGs should remain somewhat constant while ambient levels continue to increase due to wind generated noise. For this analysis, acoustic modeling will be limited to downwind propagation conditions at the worst case WTG blade rotational speed in terms of noise generation per specifications; and

**3. *Maximum w/Anomalous Meteorological:* WTG at full rotational wind speed at hub height.**

This scenario considers anomalous meteorological conditions, including effects of low level jet streams and atmospheric inversions which are conducive to long range sound propagation. While such cases occur relatively infrequently, this model will account these rare conditions to determine worst-case sound levels across the acoustic study area.

WTG acoustic modeling is oftentimes iterative in nature and is done during the initial design phase of the project as a tool to modify turbine layouts with the goal of avoiding the potential for adverse community noise impacts and to ensure regulatory compliance. In contrast to conventional power plants, the only time to incorporate noise abatement into a wind turbine project is during this design and layout phase. Once operational there is minimal opportunity available to further mitigate. Following Project review, Tetra Tech has budgeted for the modeling and analysis for up to one additional modeling iteration (inclusive of cut-in and full rotational speeds) to address changes to the wind turbine layout, equipment, regulatory impact criteria applied, acoustic propagation standards, meteorological or atmospheric assumptions, incorporating the results of the optional baseline survey or other design/analyses changes that may effect results (or a single combination of the multiples as identified above).

The results of the acoustic modeling analysis will be presented in color-coded broadband A-weighted decibel (dBA) isopleths projected onto scaled aerial photographs or United States Geological Survey (USGS) topographic mapping at a height of 1.52 meters above grade (approximate height of the ears or a standing person).

The results will be summarized, including a regulatory criteria overview, a description of the acoustic modeling methodology, presenting modeling results in relation to the applicable criteria, and overall analysis conclusions. This information will be compiled into a separate noise impact assessment (NIA) document as a supporting study for the Project permitting application.

## **6. Shadow Flicker Study**

A shadow flicker impact study will be conducted to determine potential impacts on sensitive receptors (houses) located in the vicinity of the Project. Tetra Tech will perform this assessment using the WindPro software package. Shadows cast by the moving turbine blades will be assessed for all wind turbines located within 1.5 km of each receptor. WindPro will be used to calculate the annual hours and minutes of shadow impact for each of the sensitive receptors. The analysis will be based on worst case conditions for shadow flicker (full sunlight and blades perpendicular to incoming sunlight) to conservatively estimate the potential amount of shadow impact hours for a year. In addition, a less conservative (more realistic) shadow flicker assessment will be incorporated into the analysis if on-site meteorological data is made available (a minimum of one year of data is required). This assessment considers the relative frequency the turbine blades are moving (non-calm hours), the frequency the blades are oriented in particular direction, and the historical percentage of sunshine hours in the Project Area.

A report which describes the analysis methodology and results will be prepared. The report will include a table which describes WindPro predicted “expected” shadow flicker impacts, along with figures which describe the receptors and turbines evaluated in the study, as well as, the general shadow flicker impact areas in and around the wind farm. The impact area map will define shadow flicker impact contour line in hours per year (including 30/40/50 hrs/yr).