Exhibit DD

Specific Standards for Wind Facilities

Nolin Hills Wind Power Project
January 2022

Prepared for

Capital Power
RESPONSIBLE ENERGY FOR TOMORROW

d/b/a Nolin Hills Wind, LLC

Prepared by

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Acronyms and Abbreviations

APLIC	Avian Power Line Interaction Committee
Applicant	Nolin Hills Wind, LLC
ASC	Application for Site Certificate
BESS	battery energy storage system
BPA	Bonneville Power Administration
EFSC or Council	Energy Facility Siting Council
FAA	Federal Aviation Administration
kV	kilovolts
NESC	National Electrical Safety Code
O&M	operations and maintenance
OAR	Oregon Administrative Rules
Project	Nolin Hills Wind Power Project
SCADA	Supervisory Control and Data Acquisition
UEC	Umatilla Electric Cooperative

1.0 Introduction

Exhibit DD provides information for the Nolin Hills Wind Power Project (Project) as required to meet the submittal requirements in Oregon Administrative Rule (OAR) 345-021-0010(1)(dd) paragraphs (A) and (C). Paragraph (B) does not apply because the Project does not include a surface facility related to underground gas storage reservoirs.

OAR 345-021-0010(1)(dd)

(dd) Exhibit DD. If the proposed facility is a facility for which the Council has adopted specific standards, information about the facility providing evidence to support findings by the Council as required by the following rules:

(A) For wind energy facilities, OAR 345-024-0010 and 345-024-0015; and

(C) For any transmission line under Council jurisdiction, OAR 345-024-0090.

This exhibit demonstrates compliance with the approval standards in OAR 345-024-0010, OAR 345-024-0015, and OAR 345-024-0090.

2.0 Analysis Area

In accordance with Section IV of the Project Order, the Analysis Area for Exhibit DD is the Site Boundary. The Site Boundary is defined in detail in Exhibits B and C.

3.0 Public Health and Safety

OAR 345-024-0010 Public Health and Safety Standards for Wind Energy Facilities

To issue a site certificate for a proposed wind energy facility, the Council must find that the applicant:

3.1 Public Access Restrictions

OAR 345-024-0010(1) Can design, construct and operate the facility to exclude members of the public from close proximity to the turbine blades and electrical equipment.

Public access to Project facilities will be minimal to none. All Project facilities will be located on private lands; therefore, public access is already restricted and limited. Access roads developed or improved for the purposes of Project construction and operation will be gated and locked, as necessary, when not actively in use. Should the Project site be accessed without permission, design features of the Project components will limit the accessibility of the Project facilities to the public and are designed to prevent tampering with Project equipment. The wind turbines can be accessed only through a steel door that will be kept locked except during maintenance. The wind turbine models under consideration are designed to have a minimum ground-to-blade clearance of 36.5 feet. The Operations and Maintenance (O&M) Building will be in a fenced area, and the building will be locked when not occupied. The Project O&M Building, substations, solar array, battery energy storage system (BESS), and construction yards will be within fenced enclosures, either enclosed individually or within the larger solar siting area fence line (see Exhibit B). The solar array enclosure will have at least two gates allowing for emergency vehicle access. The BESS will be enclosed in locked steel containers. The 230-kilovolt (kV) transmission line(s) will utilize overhead poles that inhibit climbing. The staging area will be signed as "Private, No Trespassing" with on-site security staff.

The Project has also been designed around substantial setbacks that further limit public access to the turbines, solar array, and associated electrical components. The Project uses a minimum setback of 110 percent of the maximum blade tip height from public roads; this both limits public access and prevents harm to members of the public in the highly unlikely event of a catastrophic failure (e.g., fall-down) of a turbine. County-required setbacks are analyzed in detail in Exhibit K of this Application for Site Certificate (ASC).

With these restrictions, design features, and setbacks, the only persons who will come in close proximity to the turbines, solar array, or electrical equipment will be employees of the Project, or the landowners on whose property the Project is located. Landowners will not be in close proximity to the turbine blades, given the 36 feet or greater of ground-to-blade clearance of the considered turbine models.

3.2 Structural and Equipment Safety

> *OAR 345-024-0010(2) Can design, construct and operate the facility to preclude structural failure of the tower or blades that could endanger the public safety and to have adequate safety devices and testing procedures designed to warn of impending failure and to minimize the consequences of such failure.*

Prevention of structural failure of wind turbines includes designing, engineering, and constructing the Project to meet or exceed all current applicable standards. This includes avoiding dangers to human safety related and nonseismic hazards in many ways, including conducting site-specific geotechnical evaluations for the facilities to inform design and construction. Exhibit H provides information on structural codes and standards that will be followed in Project design.

During operation, a rigorous inspection program of the turbine foundations as well as the BESS (monthly) will be maintained. In addition, the Supervisory Control and Data Acquisition (SCADA) system (described in Exhibit B) acts as the "nerve center" of the Project by connecting individual turbines, solar strings, BESS, substation(s), and meteorological towers to a central computer housed in the O&M Building. The SCADA system allows each component of the Project to be monitored for activity in present time. If an issue arises with a turbine or solar string, it alerts the O&M staff so that the component can be shut down to minimize consequences of failure and potential safety risks.

In addition, as noted above, the Project is designed to maintain substantial setbacks such that, in the highly unlikely event of a catastrophic failure, the collapsed turbine or thrown blades could not impact public roads or nonparticipating property owners.

Failure of turbine components and turbine foundations is extremely rare. It is primarily addressed and avoided through careful selection of turbine and foundation characteristics based on site-specific geotechnical conditions as described in Exhibit H, and careful construction methods by experienced professionals to ensure the turbine is installed in accordance with best safety practice. Once the turbines have been safely installed, continued safe operation depends on monitoring how the structures respond to design or unusual stresses, such as rotational, axial, torsion, bending, and vibration stresses. Turbines and their foundations are regularly inspected during monthly operating rounds and regular annual turbine maintenance activities. Operating rounds consist of a visual assessment of turbine foundations and the materials connecting the turbine to the foundation, as well as observation of SCADA data that provide insight into how the turbine structural components are withstanding the stresses applied to them. Annual turbine maintenance includes inspections on turbine components, lubrications and replacement of worn parts as necessary

In the event an anomaly is observed, the engineering team is advised, and further inspection may be carried out by subject matter experts to determine the root cause and recommend action to rectify the issue.

Structural failure of tower and blades is also rare and very unlikely, but it can happen. When it does occur, it is most often relatively soon after construction. Tower failure early in the life cycle of a facility most commonly occurs due to faulty construction, material defects, or improper design (Ma et al. 2018). These causes of failure are mitigated through careful material selection from reliable vendors, construction by experienced contractors, and design by reliable and experienced engineers, all of which are described elsewhere in this application (see e.g. Exhibit D). Testing of materials during and after the construction process verifies proper installation. Failure of turbines during normal operation is uncommon but when it does occur, according to the literature it is most often due to improper maintenance or early material degradation (Ma et al. 2018). These failure factors are avoided through proper training and oversight of operational staff, and verified through routine inspections. Wind tower collapse also can occur during extreme conditions, such as typhoons, hurricanes, or earthquakes. Finally, fires can be caused by mechanical or electrical factors or by lightning strikes. Electrical concerns are identified by the SCADA system during operation and mechanical factors are identified during inspections.

Turbine towers and blades are regularly inspected during annual turbine maintenance activities. These inspections include all turbine related components for irregular wear and may be supplemented with further repair as needed.

In the event an anomaly is observed by the SCADA system or during an inspection, original equipment manufacturer (i.e., OEM) engineering is advised, and further inspection may be carried out by subject matter experts to determine root cause and resulting action required to rectify the issue.

4.0 Cumulative Effects

OAR 345-024-0015 Cumulative Effects Standard for Wind Energy Facilities

To issue a site certificate for a proposed wind energy facility, the Council must find that the applicant can design and construct the facility to reduce cumulative adverse environmental effects in the vicinity by practicable measures including, but not limited to, the following:

This standard is focused on the wind generation portion of the facility. In order to fully describe impacts, all components of the Project are included in the discussion below, including related or supporting facilities to the wind generation as well as the solar arrays and battery energy storage system.

4.1 Access Roads

OAR 345-024-0015(1) Using existing roads to provide access to the facility site, or if new roads are needed, minimizing the amount of land used for new roads and locating them to reduce adverse environmental impacts.

Nolin Hills Wind, LLC (the Applicant) will utilize existing private roads and farm access tracks to the greatest extent practicable for providing access to the wind turbines, solar array and other Project facilities. During Project construction and operation, existing interstate, state, and county roads will be used to access the Project area. Some existing private roads will be improved, while in some areas new access roads will be required to provide access to turbine and solar string locations. The total mileage of the site access roads for the wind layout will be approximately 62 miles, of which about 43 miles will be new permanent access roads and 19 miles will be temporary improvements to existing roads. An additional approximately 18 miles of new permanent access roads will be constructed to access the solar array and BESS within the permanent solar siting area fence line as noted earlier. Where new access roads are needed, they are sited to limit the overall impacts of the Project to soils, habitat, and agricultural practices. For example, new access roads are generally sited along the edges of farm fields to limit disruptions to plowing patterns. Roads are placed within the fields when the alternative will be an impact to sensitive habitat. Through an iterative design process, some access roads have been re-routed or eliminated entirely to avoid impacts to wetlands, streams, Category 1 habitat, and archaeological and culturally significant features. In areas of sensitive habitat, primarily shrub-steppe vegetation, the temporary impact corridor was narrowed to 50 feet to minimize Project disturbance.

All newly constructed and improved site access roads will be graded and graveled to meet load requirements for heavy construction equipment, as necessary. Most site access roads will be initially constructed to be wider than needed for operations, to accommodate the large equipment needed for construction. Following turbine construction, the site access roads will be narrowed for use during O&M. The additional disturbed width required during construction will be restored following the completion of construction by removing gravel surfacing, restoring appropriate contours with erosion and stormwater control best management practices (see Exhibit I), decompacting as needed, and revegetating the area appropriately.

4.2 Electrical Lines

OAR 345-024-0015(2) Using underground transmission lines and combining transmission routes.

The total length of underground collector line construction trenches[1] connecting the wind energy transformers to the Project substations will be up to approximately 89 miles (up to 239 miles of conductor cable, respectively); overhead collector lines will total an estimated 9.1 miles. Within the solar array, the length of underground collector line construction will total up to approximately 55 miles (up to 144 miles of conductor cable), with up to 10 percent of the line constructed overhead. The proposed transmission line will follow one of two possible routes to connect with the regional grid, leading from the northern Project substation to either the existing Umatilla Electric Cooperative (UEC) Cottonwood Substation or proposed Bonneville Power Administration (BPA) Stanfield Substation. The UEC Cottonwood route will be approximately 25.3 miles in total length, while the BPA Stanfield route will be approximately 5 miles in length. Where possible, 230-kV lines will be placed along or adjacent to existing overhead transmission lines. These options are discussed below in Sections 4.2.1, 4.2.2, and 4.2.3. All collector and transmission lines will be constructed according to National Electrical Safety Code (NESC) standards.

4.2.1 Underground Collector Lines

The Project will require approximately 89 miles of underground collector line trenches for the wind turbines and 55 miles for the solar array. Installation of the underground electrical collector lines will have temporary impacts to soils, habitat, wildlife, and agricultural practices. The collector lines will typically run in narrow trenches no less than 3 feet deep in tilled ground installed below grade. For the purposes of the ASC, the Applicant assumes a temporary impact corridor approximately 35 feet wide for the buried collector lines outside of the solar siting area. Most of the collector lines will be placed within or adjacent to access roads to minimize additional disturbance. In cases in which underground collector lines cross agricultural fields, the collector lines may be placed deeper to prevent damage to the lines by agricultural activities including deep tillage; however, the lines will not be deep enough to affect groundwater resources. In situations in which soils and underlying geology will make burying the collector lines to a depth of 3 feet impractical, the collector lines may be buried at a depth of less than 3 feet but still be in accordance with NESC standards.

4.2.2 Overhead Collector Lines

Some of the collector lines may be installed overhead in situations where a buried cable would be infeasible, such as for long "home run" stretches, and at stream or canyon crossings. In such

[1] As multiple lines are laid together, the total length of trenches is less than the length of underground 34.5-kV conductor cable buried.

instances, overhead collector lines will be supported by a wooden structure. Each support pole will be buried up to approximately 12 feet in the ground and will extend to a height of up to approximately 100 feet above ground, depending on the terrain. There will be permanent impacts only in the locations of the support poles for the overhead collector lines. The structures will be spaced approximately 150 to 300 feet apart, depending on specific site conditions. Aside from the pole footprints, there will be no permanent impacts associated with the collector line corridor aboveground. Temporary impacts from collector line construction will be restored and revegetated following construction. A total of up to 9.1 miles of overhead collector lines will be installed for the wind turbines and 5.5 miles for the solar array.

4.2.3 Overhead Transmission Lines

The Applicant anticipates that the Project will connect to the BPA transmission system via new and upgraded UEC transmission lines from the northern Project substation to the existing UEC Cottonwood Substation (24.9 miles total), or via a new overhead 230-kV transmission line to the proposed BPA Stanfield Substation north of the Umatilla River (4.5 miles total). From the Cottonwood Substation, an existing UEC 230-kV transmission line with capacity for the additional power generated by the Project would carry that power north to BPA's McNary Substation. Additionally, a single circuit 230-kV transmission line supported by H-frame or monopole structures (or other form as-needed for specialized locations) will run between the two collector substations (6.8 miles total).

Following the UEC Cottonwood route, the Project would tie in to the regional electric grid via a 230-kV transmission line leading from the proposed northern Project substation and extending to the existing UEC Cottonwood Substation. From the northern Project substation to the corner of White House Road and County Road 1348, the UEC Cottonwood route will consist of approximately 8.4 miles of new transmission corridor and construction. From the corner of White House Road and County Road 1348 to the UEC Butter Creek Substation, an approximately 9.6-mile portion of the UEC Cottonwood route would replace an existing 12.47-kV distribution line with the proposed 230-kV transmission line with 12.47-kV underbuilt distribution. Continuing from the UEC Butter Creek Substation, an existing 115-kV UEC transmission line would be upgraded to incorporate a 230-kV line to carry power generated by the Project approximately another 7.3 miles north to the UEC Cottonwood Substation. The upgrade would consist of replacing the existing support poles with new structures that can support restringing the existing 115-kV transmission line and adding a 230-kV transmission line (double circuit). After the Cottonwood Substation, power from the Project would be transmitted over an existing 230-kV line north to the BPA McNary Substation.

The alternate BPA Stanfield route would require a new overhead 230-kV transmission line that would extend from the proposed northern Project substation to the proposed BPA Stanfield Substation. The Stanfield route leads north following County Road 1350 from the northern Project substation, then turns northwest parallel to an existing high-voltage transmission line (to be sited outside of BPA's existing right-of-way). Approximately 1.5 miles upriver from the community of Nolin, the transmission line would span the Umatilla River and continue in parallel with the existing transmission line to the Stanfield Substation. A total of approximately 3.0 miles of this line would run parallel to the existing BPA line. This route as described is based on indicative information received to date from BPA regarding the planned Stanfield Substation and is therefore subject to change as BPA's process of developing that facility proceeds.

The design and route of the transmission lines have been chosen to minimize impacts to resources. The transmission lines will be constructed to Avian Power Line Interaction Committee (APLIC) standards. APLIC recommended measures are intended to protect raptors and other large birds from accidental electrocution and are sufficient to protect even the largest birds that may try to roost on the Project 230-kV transmission line. The wooden or non-reflective steel monopole construction will further reduce the lines' visibility compared to steel lattice construction.

4.3 Substations

OAR 345-024-0015 (3) Connecting the facility to existing substations, or if new substations are needed, minimizing the number of new substations.

The Applicant proposes to construct up to two on-site collector substations (the solar array will connect to the adjacent northern substation) to increase the voltage from the 34.5-kV collection system to 230 kV, for transmission through the proposed overhead transmission lines. Power will be transmitted from the southern substation via a new overhead 230-kV transmission line to the northern substation. From the northern substation, the Project will either directly connect to the regional grid via UEC transmission lines that will be constructed, owned, and operated by UEC, or the Applicant will construct a new 230-kV transmission line to the proposed BPA Stanfield Substation.

The proposed northern Project substation would connect to the existing UEC Butter Creek Substation and then to the existing Cottonwood Substation. From Cottonwood, power from the Project would be transmitted over an existing 230-kV line north to BPA's existing McNary Substation. The alternate route via the BPA Stanfield Substation would require a new 230-kV line to connect to the proposed northern Project substation. No existing substations are available to connect along this route.

4.4 Avian and Wildlife Impact Minimization

OAR 345-024-0015 (4) Designing the facility to reduce the risk of injury to raptors or other vulnerable wildlife in areas near turbines or electrical equipment.

The Project has been sited and designed to minimize impacts to raptors and other wildlife, as well as wildlife habitat, as described in Exhibits P and Q of this ASC. The Project has been sited in areas dominated by agricultural use and along existing roads where feasible, and impacts to habitat used by protected species have been avoided and minimized to the extent possible, to reduce the risk of injury to vulnerable wildlife including raptors. Based on the results of surveys, the Applicant sited Project facilities to avoid all impacts to wetlands and Category 1 habitat, and to minimize impacts to other habitats including Category 2 habitat (see Exhibit P). The Project layout was redesigned in order to avoid Washington ground squirrel colonies that were identified during field surveys; Washington ground squirrels are state endangered and are prey for some raptor species. Based on consultation with the Oregon Department of Fish and Wildlife, voluntary, conservative turbine setbacks from the rim of Alkali Canyon were applied to reduce the potential for impacts to raptors using the area. The Applicant applied a voluntary 0.25-mile turbine setback from nests of state sensitive raptors to minimize collision risk and nesting disturbance, and sited turbines away from areas of relatively higher raptor use as identified during avian and eagle use surveys at the Project. Other design aspects of the Project that will minimize impacts to wildlife habitat include the use of a largely underground electrical collection system; use of hooded, down-shielded lighting; the application of APLIC design standards for the transmission lines; and the use of freestanding, non-guyed turbines and permanent met towers.

Additional measures to avoid and minimize impacts to wildlife will be implemented during Project construction. These include raptor nest and Washington ground squirrel monitoring and seasonal construction timing restrictions; having on-site environmental monitors during construction; implementing a Project-specific worker environmental training program; observing low speed limits; and initiating revegetation as soon as practicable. Additional measures are described in Exhibits P and Q.

Finally, the Applicant will provide mitigation for unavoidable impacts to wildlife habitat as outlined in the Draft Habitat Mitigation Plan and monitor bird and bat fatalities, raptor nests, and Washington ground squirrel colonies as described in the Draft Wildlife Monitoring Plan (Attachments P-3 and P-5, respectively, of Exhibit P). The avoidance and minimization measures and the proposed mitigation and monitoring measures together limit the impacts to wildlife as feasible, and compensate for those unavoidable impacts as mandated by the Energy Facility Siting Council (EFSC or Council) approval standards, in compliance with the ODFW Habitat Mitigation Policy.

4.5 Visual Impacts Minimization

> *OAR 345-024-0015 (5) Designing the components of the facility to minimize adverse visual features.*

Visual impacts of the Project are primarily related to views of the turbines and, to a lesser degree, other facilities, such as the 230-kV transmission line, solar array and BESS, site access roads, O&M Building, and substations. The O&M Building, substations, solar array and BESS will not represent significant visual structures within the Site Boundary in the context of taller transmission lines and substantially taller and more visible wind turbines. Exhibit R provides a detailed analysis of aesthetic changes to the project vicinity resulting from project construction and operation.

Due to the size of modern wind turbines, opportunities and measures to effectively reduce visual impacts of the Project are limited. However, the Applicant has or will utilize a number of design, engineering, and other measures to reduce visual impacts to the extent practicable. The Applicant has sited the Project in a remote area of Umatilla County and designed the turbine and solar arrays such that it will have minimal visual impacts to the nearest towns of Pendleton, Pilot Rock, Hermiston, Stanfield, Umatilla, Irrigon, and Echo. The location of the Project is such that, where it may be visible from other cities or developed areas in the vicinity, it will be at a background viewing distance of over 5 miles so it will not dominate the viewshed. There are two important scenic resources identified in the area located approximately 6 to 7 miles away. The routes and design for the transmission line alternatives have also been chosen in part to minimize the lines' visibility.

Additional measures that the Applicant will employ to minimize visual impacts of the Project, include:

- The wind turbines and towers will be painted in a uniform matte-finish neutral white or light gray;
- The support poles for the transmission line will be wood or non-reflective steel (e.g., self-weathering steel) to blend with the surroundings;
- The O&M Building will be designed and constructed to be generally consistent with the character of agricultural buildings used by farmers or ranchers in the area, and the buildings finished in a neutral color to blend with the surrounding landscape;
- Substation structures will be finished in neutral colors to blend with the surrounding landscape;
- Lighting will be kept to a minimum necessary, and designed to prevent offsite glare;
- Solar module crystalline cells will be housed within antireflective glass panels to prevent glare;
- No advertising or commercial signage is to be displayed on any part of the facility;
- Vegetation clearing and ground disturbance will be limited to the minimum area necessary to safely and efficiently install the Project equipment;
- Access roads and other areas of ground disturbance will be watered during construction, as needed, to avoid the generation of airborne dust; and
- Temporary impact areas will be restored and revegetated as soon as practicable following completion of construction.

4.6 Lighting

> *OAR 345-024-0015 (6) Using the minimum lighting necessary for safety and security purposes and using techniques to prevent casting glare from the site, except as otherwise required by the Federal Aviation Administration or the Oregon Department of Aviation.*

The effects of Project lighting will be minimal. Lighting for the Project will consist of the minimum necessary for safety purposes. Lights at the O&M Building, solar array, BESS, and substations will be downward-shielded and aimed inward to the site to avoid casting glare offsite. These lights will not typically be on at night; instead they will utilize motion-sensor switches to provide lighting only when needed.

Lighting of the turbines will consist of the minimum required by Federal Aviation Administration (FAA) regulations. The turbines will be marked and lighted according to FAA standards (FAA Advisory Circular 70/7460-1L), but no other lighting will be used on the turbines. FAA standards call for painting the turbines and towers white or light gray, making them visible to pilots from the air. Flashing red aviation lighting will be mounted atop turbines. Under current FAA standards, all of the lights will be programmed to flash in unison, allowing the entire Project to be perceived as a single unit by pilots flying at night. The specific location, operation, and type of aviation lighting system will be determined in consultation with FAA prior to commencing operation of the Project. FAA lighting may also be installed on the met towers, depending on the overall lighting scheme for the Project, to be determined prior to operation and in consultation with FAA.

The Applicant will base the final lighting design on FAA recommendations.

5.0 Site Standards for Transmission Lines

OAR 345-024-0090 Siting Standards for Transmission Lines

To issue a site certificate for a facility that includes any transmission line under Council jurisdiction, the Council must find that the applicant:

(1) Can design, construct and operate the proposed transmission line so that alternating current electric fields do not exceed 9 kV per meter at one meter above the ground surface in areas accessible to the public;

(2) Can design, construct and operate the proposed transmission line so that induced currents resulting from the transmission line and related or supporting facilities will be as low as reasonably achievable.

Although the 230-kV and 34.5-kV electrical lines do not constitute energy facilities under EFSC jurisdiction because they do not cross more than one city or county, they are related or supporting facilities to the wind energy project which is under Council jurisdiction. Exhibit AA of this application demonstrates compliance with the Siting Standard of OAR 345-024-0090. Specifically, Exhibit AA demonstrates that the proposed transmission line will generate alternating current electric fields that will not exceed 4.26 kV per meter at one meter above ground surface, which is substantially lower than the 9 kV per meter required by the standard (see Exhibit AA, Section 2). With the maximum electrical field being lower than the 9-kV/m standard set forth in OAR 345-024-0090(1), no mitigation or monitoring programs are proposed.

6.0 Conclusions

The evidence provided in this exhibit demonstrates that the Applicant will construct and operate the Project in compliance with siting, public health and safety, and cumulative effect Council standards as they relate to wind facilities and transmission lines.

7.0 References

Ma, Y, P. Martinez-Vazquez, and C. Baniotopoulos. 2018. Wind turbine tower collapse cases: a historical overview. *Proceedings of the Institution of Civil Engineers – Structures and Buildings* 172 (8): 547-555. https://doi.org/10.1680/jstbu.17.00167

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