Technical Memo

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To: Daniel Wolf, Executive Secretary, Minnesota Public Utilities Commission

From: Mike Rutledge, Fagen Engineering

Copy: Amy Denz, Wenck Associates, Inc.

Date: March 22, 2018

Subject: Palmer's Creek Wind Farm Site Permit Application Amendment
Docket No. IP-6979/WS-17-265

Dear Mr. Wolf,

Due to recent design changes to the project layout, Palmer's Creek Wind Farm, LLC. is providing information and revisions for the previously completed Site Permit Application (Application). Project layout changes include shifting four of the 18 proposed wind turbine generators (WTGs) and minor shifts to associated collector lines, access roads, and temporary crane paths. The four turbines were shifted based on recommendations from the Minnesota Department of Natural Resources (DNR) to locate the turbines further from the Minnesota River Valley as an avoidance and minimization measure for avian species, such as eagles and other raptors. The DNR recommended moving the turbines an additional 200 to 300 feet away from the Minnesota River Valley. The WTG location shifts are summarized in Table 1. The four WTGs were shifted north between approximately 430 and 690 feet. This moved each of the WTGs approximately 260 to 360 feet further from the Minnesota River.

Table 1: Project Layout Changes

Turbine	Proposed Shift North	Proposed Shift From Minnesota River
WTG-5	690 feet	260 feet perpendicular to river
WTG-9	430 feet	360 feet perpendicular to river
WTG-10	565 feet	300 feet perpendicular to river
WTG-12	450 feet	280 feet perpendicular to river

Introduction

The Application and associated documents have been reviewed and re-evaluated to determine potential project impacts and mitigation changes due to the project layout changes. The following documentation will describe the section in the Application that will be amended to reflect changes in project impacts or mitigation due to the project layout changes. If the project layout changes do not change the overall impact or mitigation for a particular topic/resource, "No changes" is denoted for that section of the Application. Other documents that were reviewed and revised due to the project layout changes are provided as part of this submittal to the Department of Commerce (DOC) and include the following:

- Appendix B - Noise Study
- Appendix D - Shadow Flicker Study
- Appendix E - Microwave Beam Study

- Appendix H - Wildlife Assessment and Field Studies Report (also revised per DNR comments)
- Appendix J - Avian Bat Protection Plan (ABPP) (also revised per DNR comments)
- Appendix K - Phase I Reconnaissance Survey (Archaeology Report) (pending field survey and revised report)
- Native Prairie Protection Plan (drafted since the Application was deemed complete)

Site Permit Application Amendment – Updated Sections

In addition to the revised reports/appendices, Figures 2 – 4 and 6 – 10 were revised with the new project layout. The figures and reports were used to evaluate potential project impact changes. Sections 1.0 – 5.0 of the Application were reviewed and did not require revisions beyond figure changes. Application Sections 8.0 through 11.0 will not result in changes from moving the WTGs and associated infrastructure, and therefore the focus of this memorandum is Section 6.0-7.0, which discusses potential project impacts and mitigation.

Section 6.0 – Wind Rights

There are no proposed changes to wind rights associated with the changed project layout. All turbines are still sited on leased land and the current leasehold is sufficient to accommodate the Project, required buffers, and turbine placement flexibility as needed to avoid natural resources, homes, and other sensitive features.

Section 7.1 – Socioeconomics

No changes.

Section 7.2 – Land-Based Economics

No changes.

Section 7.3 – Recreation and Tourism

The proposed shift of WTG-5 will move the turbine approximately 690 feet north and further north of the Spartan WMA, a DNR managed wildlife area. The proposed shift of WTG-9 will move the turbine 429 feet north, away from the Spartan WMA. Both turbines will be visible from Spartan WMA depending on a viewer's vantage point, vegetation, and topography. Moving WTGs 5, 9, 10, and 12 will increase their distance from the Minnesota River, which is a known migratory flyway of birds and waterfowl, and a designated State Wild and Scenic River. Overall, the WTG shifts are beneficial in avoiding and minimizing impacts to migratory and other avian species.

Section 7.4 – Land Use

As noted in Section 7.4.1.2, three conservation easements through the Conservation Reserve Enhancement Program (CREP) are located in the project area. The proposed shift will not result in any impacts to CREP land. Additionally, shifting of the WTGs will move the WTGs further from the river and will not result in impacts to the Minnesota River Management District (Section 7.4.1.1).

Section 7.5 – Noise

A noise study was completed for the previous and current project layout. As part of this study the existing sound levels in the project area were monitored to determine ambient sound levels (background sound) as a baseline of comparison for modeled turbine

operation noise levels. With a few exceptions, the existing sound levels at most sites are below Minnesota standards for daytime and nighttime L10 and L50 values. The existing sound levels were monitored in the project area. Existing ambient sound levels met or exceeded State daytime noise standards at one of the three locations and met or exceeded nighttime noise standards at two of the three locations.

The revised noise study modeled the turbines using the worst-case noise output from each turbine relative to receptors. The resultant noise produced is below 50 dBA at distances greater than approximately 500 feet. None of the modeled receptors indicate a cumulative impact from the turbines greater than 45.1 dBA. The largest noise increase (change in noise level) possible within the model was 20.1 dBA at Receptor 32 (R32) if the existing hourly Leq is 25 dBA. This means that in exceptionally quiet hours, the model shows turbine noise is very noticeable. However, the model is based on maximum output from the turbines which is associated with high wind speeds. In this condition, ambient noise from the wind will be much higher. When looking at the wind speed data collected at monitoring site M1 (closest to R32), wind speeds were less than 3 mph during the quietest measured Leq values (<30 dBA). Typically, these wind speeds would be below the cut-in wind speed (6.7 mph or 3 m/s) required for turbine operation. When higher wind speeds of 8-9 miles per hour were examined, the background Leq noise was approximately 45-50 dBA. This wind speed is below conditions that would produce maximum turbine noise. Even when maximum noise output is added to a background Leq noise of 45 dBA, the difference is calculated to be 3.1 dBA, which is just slightly greater than increases in noise that are perceptible to the human ear (3.0 dBA). When background noise reaches the 50 dBA limit set by the MPCA for nighttime L50, the worst-case impact from the turbines (R32) increases total noise by 1.2 dBA. This noise produced by the turbines at this point should be indistinguishable from the background noise conditions.

In Minnesota, the MPCA State Noise Standards (L50) restrict noise levels to 60 dBA during the daytime and 50 dBA during the nighttime. The analysis indicates that construction of the Palmer's Creek Wind Farm project will not have an impact of 60 dBA or greater on any modeled receptor, nor will the cumulative impact on any receptor exceed 60 dBA when assuming a 35 dBA, 40 dBA, 45 dBA, 50 dBA, or 55 dBA background sound level. During the daytime, and only with a background sound level already approaching or exceeding the 60 dBA threshold would the cumulative sound level (background and wind turbine sound) exceed 60 dBA. The same is true for the nighttime threshold; only with a background sound level already approaching or exceeding the 50 dBA threshold would the cumulative sound level exceed 50 dBA. In the case of either daytime or nighttime exceedance with background noise approaching MPCA limits for daytime and nighttime L50, the impact of the turbines would be indistinguishable from background noise levels.

Section 7.6 – Visual

As stated in the Application Section 7.6.2.1, WTG-5, WTG-9, WTG-10, and WTG-12 will be located near the eastern river bluff and could be visible from the Minnesota River depending on vantage point and tree canopy. These WTGs have all been shifted farther north away from the river corridor and will likely reduce visibility from vantage points along the river. Section 7.6.2.2 addresses distances between nearest residences and WTG locations. Table 2 compares the information from the Application to the new WTG

locations. Three of the turbines are shifted closer to a residence; one is shifted further away. All maintain a minimum of 1,000 feet from each residence.

Table 2: WTG Distance To Residences

WTG	Nearest Residence	Distance from Residence (Previous)	Distance from Residence (Shifted)	Direction from Residence
WTG-5	31	2,000 feet	1,500	SSW
WTG-9	37	2,800 feet	2,445	NW
WTG-10	39	4,000 feet	4,385 feet	SE
WTG-12	39	1,600 feet	1,275 feet	NNE

As stated in the introduction, Appendix D – Shadow Flicker Study was updated due to changes to the project layout. The conservative results of this study indicate that of the 49 receptors modeled, 10 modeled zero shadow flicker across all scenarios (consistent with previous study); 16 modeled 30 or more hours per year theoretical worst case with 80m HH (reduced by one from previous study); 18 modeled 30 hours or per year theoretical worst case with 80m + 90m HH (increased by two from previous study); 18 modeled 30 hours or per year theoretical worst case with 80m + 94m HH (consistent with previous study); 4 receptors modeled over 30 hours per year under realistic conditions for 80mHH, 80mHH + 90m HH, and 80m + 94m HH (increased by three from previous study). Assumptions for both studies were the same.

Section 7.7 – Public Services and Infrastructure

No changes.

Section 7.8 – Public Health and Safety

No changes.

Section 7.9 – Hazardous Materials

No changes.

Section 7.10 – Soils and Topography

No changes. The four new WTG locations are still within agricultural land and will result in approximately the same volume of soil disturbance. Collector lines will still be bored where needed to avoid grasslands as identified in the Native Prairie Protection Plan.

Section 7.11 – Groundwater Resources

No changes.

Section 7.12 – Surface Water and Floodplain Resources

No changes. No new surface water or floodplain impacts are proposed as a result of shifting the four WTGs.

Section 7.13 – Wetlands

No changes. There are no new wetland or watercourse impacts proposed as a result of shifting the four WTGs.

Section 7.14 – Vegetation

No changes. Land cover type in the four new WTG locations is cultivated crops, consistent with the former locations. Collector lines were also shifted and will avoid grassland impacts between WTG 12 and WTG 13 using directional boring. Please refer to the Native Prairie Protection Plan for greater detail.

Section 7.15 – Wildlife

Agency consultation with the DNR and USFWS indicated that the project was located in close proximity to the Sween and Spartan Wildlife Management Areas (WMA) and encouraged the Applicant to move select turbines further from the WMAs to avoid potential wildlife impacts. The project site is located within the Minnesota River Flyway, a travel corridor for migratory bird species. WTG-5, WTG-9, WTG-10, and WTG-12 have been shifted further from the Minnesota River corridor as a result of recommendation from the DNR to reduce potential avian impacts. Movement of the four turbines will increase their distance from known migratory bird habitat including the Minnesota River Flyway and the Upper Minnesota River Valley Important Bird Area (IBA), and riparian areas. The WTG location shift is intended to reduce potential wildlife and avian impacts and mortality.

As per correspondence with USFWS in June 2017, the Applicant will perform additional bald eagle surveys in 2018. These surveys will provide additional data on bald eagles within proximity to the project and evaluate the potential impact to bald eagles relative to the project with consideration of the four new WTG locations.

In addition to avian wildlife, a total of six bat species were documented during the 2015 and 2016 bat surveys, three of which are a state species of concern. Bat habitat includes infrastructure or dead and dying trees with cavities or loose bark for roosting and maternity habitat. Riparian corridors, including the Minnesota River within the project area, serve as foraging habitat. Shifting turbines WTG-5, WTG-9, WTG-10, and WTG-12 further from the Minnesota River riparian corridor and potential bat habitat will help avoid and minimize the potential impacts and mortality to bat species.

All proposed wildlife conservation measures and best management practices (BMPs) will still be applied as stated in the original application.

Section 7.16 – Rare and Unique Natural Resources

The Minnesota River corridor and associated habitats within the project area contains significant unique natural resources. It contains several Minnesota Biological Survey sites of biodiversity significance and DNR native prairie communities. A query of the DNR Natural Heritage Information System (NHIS) indicated the presence of Ecologically Significant Areas: Prairie Core Area (Upper Minnesota River Valley); MBS sites of moderate biodiversity including Dry Hill Prairie remnants (native prairie), and Silver Maple – (Virginia Creeper) Floodplain Forest (rare wetland). Additionally, it identified documented bald eagle nests just beyond the project area.

Shifting of WTG-5, WTG-9, WTG-10, and WTG-12 will not change impacts to these resources. The project is not anticipated to have direct impacts to any rare or natural plant communities. The Applicant proposes to continue state threatened, endangered, or special concern species surveys through 2018, including bald eagle surveys as

recommended by the DNR and USFWS. Eagle nests will be identified and avoided, as feasible.

The Applicant will continue to correspond with the DNR regarding the Native Prairie Protection Plan and Avian and Bat Protection Plan to ensure successful mitigation measures.

Section 7.17 – Cultural and Archaeological Resources

Shifting of WTG-5 will increase the avoidance distance from a known surveyed archaeological feature, labeled 21CP9 in the Cultural Resources report. Two additional sites were identified near WTG-9 and WTG-12 (21CP77 and 21CP78), both of which will increase in avoidance distance by shifting the WTG-9 and WTG-12 access roads. However, both of these recorded features were ranked as "no avoidance necessary" under Section 7.17.3, Mitigative Measures. During project construction and operation activities, Palmer's Creek will physically avoid NRHP-eligible properties and unevaluated properties, which are being treated as eligible for purpose of this project. Tribal monitors will be onsite during soil disturbance activities. If cultural resources were to be found during construction activities, all work would cease at that location and the notification and cultural best management protocols identified would be followed. As such, the project is not anticipated to adversely affect historic resources.