

## EXHIBIT A



June 26, 2018

Mr. Matt Marsh  
Environmental Manager  
Western Area Power Administration – Upper Great Plains Region  
2900 4th Avenue North  
Billings, MT 59101-1266

Re: Willow Creek EA – Layout Update

Dear Mr. Marsh:

On January 4, 2014, Wind Quarry, LLC (“**Wind Quarry**”) submitted an interconnection request to the Western Area Power Administration (“**WAPA**”) to connect its proposed Willow Creek Wind Energy Facility (the “**Project**”), a 103.5-megawatt (“**MW**”) nameplate capacity wind energy facility in Butte County, South Dakota, to WAPA’s Maurine to Rapid City 115-kilovolt (“**kV**”) transmission line. Interconnection would be at a new switchyard to be constructed by WAPA and located within the Project Area.

In accordance with the National Environmental Policy Act (“**NEPA**”) and other applicable environmental regulations, WAPA prepared an Environmental Assessment (“**EA**”) entitled *Willow Creek Wind Energy Facility Draft Environmental Assessment* (“**DOE/EA-2016**”) to consider the interconnection request and analyze the potential environmental impacts of Wind Quarry’s proposed Project. The EA identified no significant impacts to environmental resources resulting from either WAPA’s Federal action or Wind Quarry’s proposed Project. On November 10, 2016, WAPA issued a Finding of No Significant Impact (“**FONSI**”) and approved the Final EA.

In May 2017, Pattern Renewables 2 LP (“**Pattern**”) acquired the Project from Wind Quarry. Since the acquisition, Pattern has continued development activities on the Project, including refinement of the Project layout. Pattern is proposing changes to the Project layout from what was analyzed in the EA, approved in November 2016. Proposed changes include fewer, larger turbines; a revised electrical collection system layout; a new operations and maintenance building location; and a revised access road layout. For clarity, Pattern is not proposing to change the turbine locations from the originally approved 45 turbine locations. The purpose of this letter is to provide WAPA with information to evaluate the proposed layout changes and review the layout for compliance with the requirements of the EA.

The following sections describe the proposed changes to the Project layout and summarize the changes that would occur to each environmental resource evaluated in the original EA.

### **PROJECT LAYOUT CHANGES**

In the EA, Wind Quarry proposed to install approximately 45 Siemens 2.3-108 turbines. The EA indicated in Section 2.1.1.1 that:



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*Alternate wind turbine models may be considered for the Project. As turbine technology advances, manufacturers discontinue turbine models and release new ones. Other factors, such as cost and availability at the time of ordering, may dictate final selection of a turbine manufacturer and model. It is anticipated that the specifications for alternate models would be similar to the proposed turbine model and that the turbine layout would not be significantly affected should an alternate model be selected.*

Currently, Pattern is evaluating four different turbine types for the Project and is proposing to install one of the following three turbine combination scenarios:

1. 44 Turbine Layout: 31 GE 2.3-116 turbines and 13 GE 2.5-127 turbines
2. 42 Turbine Layout: 7 GE 2.3-116 turbines and 35 GE 2.5-127 turbines
3. 38 Turbine Layout: 7 Siemens 2.415-108 turbines and 31 Siemens 2.75-129 turbines

In 2016, Pattern purchased a certain amount of wind turbines from several different manufacturers in order to potentially qualify a variety of wind projects, with commercial operations dates of 2020 or before, for 100 percent of the Federal Production Tax Credit (“PTC”). These PTC turbines may represent anywhere from 5 to 70 percent of the overall nameplate capacity of the Project, with the remaining balance of the Project rated capacity to utilize larger turbines of a different model from the same manufacturer.

Pattern is in the process of making decisions on the most appropriate allocation of these turbines and the combinations of turbine models that prove to be the best decision for the overall success of the Project, including environmental impact and local siting considerations. Because of advancements in turbine technology and cost, using larger turbines allows Pattern to reduce the number of turbines needed to achieve the same overall Project rated capacity.

Specifications for the four proposed turbine models, as compared to the Siemens 2.3-108 turbine model presented in the EA, are provided for reference in Table 1.

As mentioned, under any of the three proposed turbine combination scenarios, turbines would be located at the same locations as presented in the EA. However, because of the larger rated capacity of the individual turbines, fewer turbine locations would be utilized (38, 42, or 44 turbine locations depending on the scenario) to achieve approximately the same overall Project rated capacity. The figures in Appendix A show the Project layout under each of the three scenarios, as compared to the original 45-turbine layout.

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**Table 1: Wind Turbine Characteristics**

	<b>Siemens 2.3-108 (presented in EA)</b>	<b>GE 2.3-116</b>	<b>GE 2.5-127</b>	<b>Siemens 2.415-108<sup>a</sup></b>	<b>Siemens 2.75-129</b>
Rated output (megawatts)	2.3	2.3	2.52	2.415	2.75
Hub height (feet)	262	262	291	262	285
Rotor diameter (feet)	354	381	417	354	426
Total height (feet)	440	453	499	440	498
Cut-in wind speed (miles per hour) <sup>b</sup>	7 to 9	7 to 8	6 to 7	7 to 9	7
Rated capacity wind speed (miles per hour) <sup>c</sup>	25 to 27	23 to 25	25 to 26	25 to 27	25 to 27
Cut-out wind speed (miles per hour) <sup>d</sup>	56	72 <sup>e</sup>	67	56	51
Maximum 3-second gust wind speed (miles per hour) <sup>f</sup>	133	112	112	133	133
Rotor speed (revolutions per minute)	6 to 16	8 to 15.7	8 to 15.7	6 to 16	5.5 to 12.5

(a) Siemens 2.415-108 is the Siemens 2.3-108 turbine with the ability to boost production at certain wind speeds from 2.3 MW to 2.415 MW

(b) Cut-in wind speed = wind speed at which turbine begins operation

(c) Rated capacity wind speed = wind speed at which turbine reaches its rated capacity

(d) Cut-out wind speed (600 second average) = wind speed above which turbine shuts down operation

(e) Turbine de-rates to 1.2 MW above 49 mph and then cuts out above 72 mph

(f) Maximum 3-second gust wind speed – wind speed up to which turbine is designed to withstand

In addition to the proposed changes in turbine type, Pattern is proposing a revised electrical collection line and access road layout. The collection and road layouts differ slightly under each scenario, as shown on the figures in Appendix A. Two figures are included for each scenario – one showing access roads and one showing the collection lines. A breakdown of temporary and permanent disturbance under each of the three proposed scenarios, as compared to the original 45-turbine layout, is included in Appendix B.



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Finally, Pattern is proposing to move the operations and maintenance building location from the north end of the Project to the south end to be closer to Highway 212 and provide simpler access to the employees of the wind farm.

### **COMPARISON OF ENVIRONMENTAL IMPACTS**

Potential impacts of the three Project layout scenarios have been identified for each environmental resource evaluated in the original EA. The potential impacts of each scenario, as compared to the impacts for the layout presented in the EA, are summarized in Table 2.

Pattern conducted the following studies to evaluate the impacts of each proposed scenario:

- Stream and wetland delineations for the revised access road and collection system layouts were conducted in January and April 2018 by FMG Engineering, Inc., the same consultant that conducted surveys for the original layout. All delineated streams and wetlands are avoided by Project infrastructure and will be avoided during construction and operation of the Project under all three proposed scenarios.
- Predicted sound levels from wind turbine operation were modeled for the three proposed scenarios in April 2018 by Burns & McDonnell, the same consultant that conducted noise modeling for the original turbine layout. Only two residences are expected to have sound impacts. Predicted sound levels at the nearest residence, a participating landowner, would be within the range of typical sound levels for rural areas (33 to 47 dBA) under all scenarios. Predicted sound levels at the other residence would not exceed 29.7 dBA under any of the proposed scenarios.
- Cultural resources surveys for the revised access road and collection system layouts were conducted in December 2017 and April 2018 by Quality Services, Inc., the same consultant that conducted surveys for the original layout (see Appendix C). An historic period cultural resource, site 39BU0554, was discovered during pedestrian survey of the proposed collector line reroutes. The site is recommended not eligible for the National Register of Historic Places (NRHP), and Quality Services, Inc. recommends a finding of no historic properties affected for the collector line reroutes. No cultural resource sites were discovered during the pedestrian survey of the proposed access road reroutes.
- In order to compare potential impacts to avian and bat species from the different turbine scenarios, Burns & McDonnell conducted a desktop analysis to compare the total rotor swept areas for each scenario. Based on the rotor diameters presented in Table 1, the original 45-turbine layout would result in 411,471 square meters of rotor swept areas for the Project as a whole. By comparison, the total rotor swept areas would be 493,289 square meters for the 44-turbine layout, 518,221 square meters for the 42-turbine layout, and 474,495 square meters for the 38-turbine layout. If it is assumed that the risk of avian and bat mortality increases as the total rotor swept area increases, then the risk of avian and bat



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mortality could increase under the 44-turbine, 42-turbine, and 38-turbine scenarios, as compared to the original 45-turbine layout. However, there is not a direct one-to-one correlation between the increase in rotor swept area and the increase in avian and bat mortality. Other site conditions impact avian and bat mortality rates as well.

Rotor speeds may also affect avian and bat mortality risk, with faster moving blades potentially posing a greater risk. Based on the rotor speeds presented in Table 1, the 44-turbine and 42-turbine scenarios would have similar rotor speeds as the original 45-turbine layout, and therefore would have a similar risk of impacts to avian and bat species related to rotor speeds. The 38-turbine layout would have lower rotor speeds compared to the 45-turbine layout, and therefore would have a lower risk of avian and bat mortality related to rotor speeds. The rotor swept areas would also increase in elevation slightly under the 44, 42 and 38 turbine scenarios, as shown in Table 1. This may alter the risk to avian species, dependent upon their flight characteristics, with a potential slight reduction in impacts to low-flying, ground nesting birds and a potential slight increase in impacts to higher flying species.

Finally, since bats are more active in low wind conditions, lower cut-in speeds have the potential to result in greater bat mortality risk. Based on the cut-in speeds presented in Table 1, the three proposed scenarios would all have similar cut-in speeds as the original 45-turbine layout, and, therefore, risk to bat species related to cut-in speeds would be similar for all scenarios. Also, Willow Creek Wind commits to feathering blades below cut-in-speed for any turbine model selected, which has shown to significantly reduce bat mortalities.



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**Table 2: Comparison of Project Layout Impacts**

<b>Resources</b>	<b>45-Turbine Layout (presented in EA)</b>	<b>44-Turbine Layout</b>	<b>42-Turbine Layout</b>	<b>38-Turbine Layout</b>
Land Cover and Land Use	Approximately 331 acres of temporary loss and 109 acres of long-term loss of agricultural land. Of the 45 proposed wind turbines, 29 would be constructed in rangeland, 3 in cropland/hayland, and 13 in CRP lands.	Approximately 368 acres of temporary loss and 109 acres of long-term loss of agricultural land. Of the 44 proposed wind turbines, 28 would be constructed in rangeland, 3 in cropland/hayland, and 13 in CRP lands.	Approximately 361 acres of temporary loss and 107 acres of long-term loss of agricultural land. Of the 42 proposed wind turbines, 27 would be constructed in rangeland, 3 in cropland/hayland, and 12 in CRP lands.	Approximately 332 acres of temporary loss and 98 acres of long-term loss of agricultural land. Of the 38 proposed wind turbines, 24 would be constructed in rangeland, 3 in cropland/hayland, and 11 in CRP lands.
Geologic Setting and Soil Resources	Approximately 331 acres of temporary soil disturbance and 109 acres of soil surface permanently removed.  Turbine locations and access roads avoid areas with slopes exceeding 15 percent.	Approximately 368 acres of temporary soil disturbance and 109 acres of soil surface permanently removed.  Turbine locations and access roads avoid areas with slopes exceeding 15 percent.	Approximately 361 acres of temporary soil disturbance and 107 acres of soil surface permanently removed.  Turbine locations and access roads avoid areas with slopes exceeding 15 percent.	Approximately 332 acres of temporary soil disturbance and 98 acres of soil surface permanently removed.  Turbine locations and access roads avoid areas with slopes exceeding 15 percent.
Water Resources	Turbines, access roads, and collector system	Streams and wetlands were delineated for the	Streams and wetlands were field delineated for	Streams and wetlands were field delineated for





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<b>Resources</b>	<b>45-Turbine Layout (presented in EA)</b>	<b>44-Turbine Layout</b>	<b>42-Turbine Layout</b>	<b>38-Turbine Layout</b>
	<p>avoid streams and wetlands.</p> <p>Approximately 331 acres of temporary soil disturbance; BMPs would be implemented to control erosion and sedimentation.</p>	<p>revised layout in January and April 2018. Revised road layout avoids streams and wetlands. Revised collection layout will bore underneath streams and wetlands with no impact.</p> <p>Approximately 368 acres of temporary soil disturbance; BMPs would be implemented to control erosion and sedimentation.</p>	<p>the revised layout in April 2018. Revised road layout avoids streams and wetlands. Revised collection layout will bore underneath streams and wetlands with no impact.</p> <p>Approximately 361 acres of temporary soil disturbance; BMPs would be implemented to control erosion and sedimentation.</p>	<p>the revised layout in April 2018. Revised road layout avoids streams and wetlands. Revised collection layout will bore underneath streams and wetlands with no impact.</p> <p>Approximately 332 acres of temporary soil disturbance; BMPs would be implemented to control erosion and sedimentation.</p>
Air Quality and Climate	<p>Short-term air emissions from construction activities.</p> <p>Project could avoid 4 to 24 percent of air emissions from</p>	<p>Short-term air emissions from construction activities.</p> <p>Project could avoid 4 to 24 percent of air emissions from</p>	<p>Short-term air emissions from construction activities.</p> <p>Project could avoid 4 to 24 percent of air emissions from</p>	<p>Short-term air emissions from construction activities.</p> <p>Project could avoid 4 to 24 percent of air emissions from</p>



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<b>Resources</b>	<b>45-Turbine Layout (presented in EA)</b>	<b>44-Turbine Layout</b>	<b>42-Turbine Layout</b>	<b>38-Turbine Layout</b>
	displaced fossil-fueled power generation.	displaced fossil-fueled power generation.	displaced fossil-fueled power generation.	displaced fossil-fueled power generation.
Noise Impacts	Predicted sound level at nearest residence to a turbine is 43.3 dBA, within the range of typical sound levels for rural areas (33 to 47 dBA).	Predicted sound levels from operation of the GE 2.3-116 and GE 2.5-127 turbines were modeled in April 2018. Only two residences expected to have sound impacts. Predicted sound level at nearest residence (a participating landowner) is 46.9 dBA, within the range of typical sound levels for rural areas. Predicted sound level at the other residence is 27.9 dBA.	Predicted sound levels from operation of the GE 2.3-116 and GE 2.5-127 turbines were modeled in April 2018. Only two residences expected to have sound impacts. Predicted sound level at nearest residence (a participating landowner) is 46.9 dBA, within the range of typical sound levels for rural areas. Predicted sound level at the other residence is 29.7 dBA.	Predicted sound levels from operation of the Siemens 2.415-108 and Siemens 2.75-129 turbines were modeled in April 2018. Only two residences expected to have sound impacts. Predicted sound level at nearest residence (a participating landowner) is 44.2 dBA, within the range of typical sound levels for rural areas. Predicted sound level at the other residence is 26.5 dBA.
Ecological Resources	Approximately 331 acres of temporary disturbance and 109 acres of permanent	Approximately 368 acres of temporary disturbance and 109 acres of permanent	Approximately 361 acres of temporary disturbance and 107 acres of permanent	Approximately 332 acres of temporary disturbance and 98 acres of permanent



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Resources	45-Turbine Layout (presented in EA)	44-Turbine Layout	42-Turbine Layout	38-Turbine Layout
	<p>disturbance to vegetation.</p> <p>BBCS would be implemented to reduce risk of impacts to birds and bats.</p> <p>Project <b>may affect, but is not likely to adversely effect</b>, the whooping crane and northern long-eared bat. Conservation measures in the Programmatic BA and NLB PBO would be implemented.</p>	<p>disturbance to vegetation.</p> <p>BBCS would be implemented to reduce risk of impacts to birds and bats.</p> <p>Project <b>may affect, but is not likely to adversely effect</b>, the whooping crane and northern long-eared bat. Conservation measures in the Programmatic BA and NLB PBO would be implemented.</p>	<p>disturbance to vegetation.</p> <p>BBCS would be implemented to reduce risk of impacts to birds and bats.</p> <p>Project <b>may affect, but is not likely to adversely effect</b>, the whooping crane and northern long-eared bat. Conservation measures in the Programmatic BA and NLB PBO would be implemented.</p>	<p>disturbance to vegetation.</p> <p>BBCS would be implemented to reduce risk of impacts to birds and bats.</p> <p>Project <b>may affect, but is not likely to adversely effect</b>, the whooping crane and northern long-eared bat. Conservation measures in the Programmatic BA and NLB PBO would be implemented.</p>
Visual Resources	<p>Introduction of vertical lines of 45 wind turbines into the generally horizontal landscape.</p> <p>Visual impacts to scenic resources not</p>	<p>Introduction of vertical lines of 44 wind turbines into the generally horizontal landscape.</p> <p>Visual impacts to scenic resources not</p>	<p>Introduction of vertical lines of 42 wind turbines into the generally horizontal landscape.</p> <p>Visual impacts to scenic resources not</p>	<p>Introduction of vertical lines of 38 wind turbines into the generally horizontal landscape.</p> <p>Visual impacts to scenic resources not</p>



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<b>Resources</b>	<b>45-Turbine Layout (presented in EA)</b>	<b>44-Turbine Layout</b>	<b>42-Turbine Layout</b>	<b>38-Turbine Layout</b>
	anticipated. Nearest proposed turbine to Belle Fourche NWR is 20 miles, and nearest proposed turbine to Bear Butte is 26 miles.	anticipated. Nearest proposed turbine to Belle Fourche NWR is 20 miles, and nearest proposed turbine to Bear Butte is 26 miles.	anticipated. Nearest proposed turbine to Belle Fourche NWR is 20 miles, and nearest proposed turbine to Bear Butte is 26 miles.	anticipated. Nearest proposed turbine to Belle Fourche NWR is 20 miles, and nearest proposed turbine to Bear Butte is 26 miles.
Paleontological Resources	BMPs and conservation measures would be implemented to minimize potential paleontological resources impacts.	BMPs and conservation measures would be implemented to minimize potential paleontological resources impacts.	BMPs and conservation measures would be implemented to minimize potential paleontological resources impacts.	BMPs and conservation measures would be implemented to minimize potential paleontological resources impacts.
Cultural Resources	Project avoids NRHP-eligible and unevaluated properties.  Notification and protection protocols would be followed if unanticipated cultural resources are found during construction.	Cultural resources surveys were conducted for the revised layout in December 2017 and April 2018. An historic period cultural resource, site 39BU0554, was discovered during pedestrian survey of the proposed collector line reroutes. The site is	Cultural resources surveys were conducted for the revised layout in December 2017 and April 2018. An historic period cultural resource, site 39BU0554, was discovered during pedestrian survey of the proposed collector line reroutes. The site is	Cultural resources surveys were conducted for the revised layout in December 2017 and April 2018. An historic period cultural resource, site 39BU0554, was discovered during pedestrian survey of the proposed collector line reroutes. It is



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Resources	45-Turbine Layout (presented in EA)	44-Turbine Layout	42-Turbine Layout	38-Turbine Layout
	Project would have <b>no adverse effect</b> on historic resources.	recommended not eligible for the NRHP, and Quality Services, Inc. recommends a finding of no historic properties affected for the collector line reroutes. No cultural sites were discovered during the pedestrian survey of the proposed access road reroutes.  Notification and protection protocols would be followed if unanticipated cultural resources are found during construction.	recommended not eligible for the NRHP, and Quality Services, Inc. recommends a finding of no historic properties affected for the collector line reroutes. No cultural sites were discovered during the pedestrian survey of the proposed access road reroutes.  Notification and protection protocols would be followed if unanticipated cultural resources are found during construction.	recommended not eligible for the NRHP, and Quality Services, Inc. recommends a finding of no historic properties affected for the collector line reroutes. No cultural sites were discovered during the pedestrian survey of the proposed access road reroutes.  Notification and protection protocols would be followed if unanticipated cultural resources are found during construction.
Socioeconomics	Project would result in short-term and long-term positive economic impacts from job creation, project	Project would result in short-term and long-term positive economic impacts from job creation, project	Project would result in short-term and long-term positive economic impacts from job creation, project	Project would result in short-term and long-term positive economic impacts from job creation, project



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<b>Resources</b>	<b>45-Turbine Layout (presented in EA)</b>	<b>44-Turbine Layout</b>	<b>42-Turbine Layout</b>	<b>38-Turbine Layout</b>
	expenditures, lease payments, and tax revenue.	expenditures, lease payments, and tax revenue.	expenditures, lease payments, and tax revenue.	expenditures, lease payments, and tax revenue.
Environmental Justice	No disproportionately high and adverse human health or environmental effects are expected.	No disproportionately high and adverse human health or environmental effects are expected.	No disproportionately high and adverse human health or environmental effects are expected.	No disproportionately high and adverse human health or environmental effects are expected.



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## CONCLUSION

As shown in the disturbance estimate tables in Appendix B, the permanent disturbance acreages for all three proposed scenarios are equal to or less than the disturbance acreage for the previously permitted 45-turbine scenario. Due to the re-designed electrical collection system creating new instances where the collection system does not overlap with the access roads, the total temporary disturbance acreage is moderately increased in the three proposed scenarios. As shown in Table 2, the environmental effects from construction and operation of the Project under any of the three proposed scenarios would be consistent with the those analyzed in the EA. Pattern would implement the BMPs and conservation measures in the EA to avoid and minimize impacts to environmental resources.

Pattern anticipates making a final decision on the Project design in 2018 but desires to submit this memo to WAPA now in order to have confidence in the ability to proceed with the proposed layout changes under any of the three scenarios. Please contact me at (303) 474-2229 or James Madson at (415) 670-5110 if you have any questions or need further information to conduct your evaluation.

Sincerely,

A handwritten signature in blue ink, appearing to read "Jennifer Bell".

Jennifer Bell  
Senior Environmental Scientist  
Burns & McDonnell

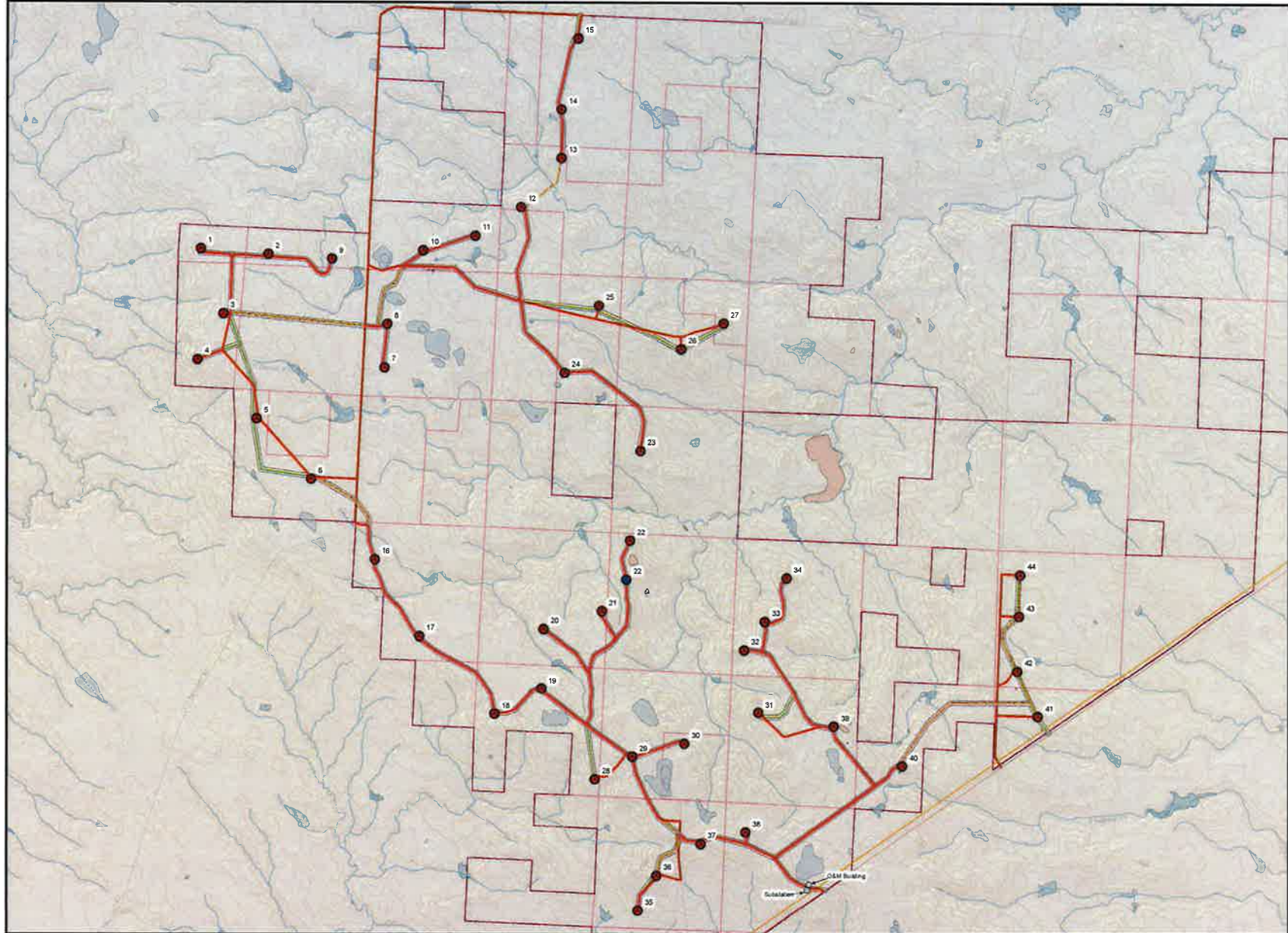
## Attachments:

- Appendix A - Figures
- Appendix B - Disturbance Areas
- Appendix C - Level III Cultural Resources Inventory Reports

cc: James Madson, Project Development Manager, Pattern Development  
Allen Wynn, Environmental and Natural Resources Manager, Pattern Development

## **APPENDIX A - FIGURES**



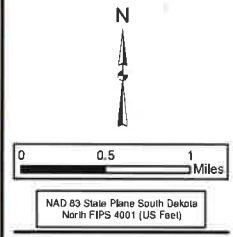


**WILLOW CREEK  
WIND PROJECT**  
BUTTE COUNTY, SOUTH DAKOTA

Rev.	Date	Description	By
01	04/15/18	ROAD LAYOUT OPTIONS - 44/45	UW

**Pattern**  
1201 LOUISIANA ST. #3200,  
HOUSTON, TX 77002

- Legend**
- 44 WTG Layout
  - 45 WTG Layout
  - Proposed Substation
  - Proposed O&M Building
  - Alpena Road - 44 WTG - Proposed (135,556 LF)
  - Alpena Road - 45 WTG - Permitted (145,264 LF)
  - Crane Path - MDR-1 (33,613 LF)
  - Existing Transmission Line
  - Permitted Corridor - 200ft
  - Public Road - Gravel (55,827 LF)
  - Archaeological Sites
  - NWQ Flow Lines
  - NWQ Wetlands
  - Land Parcels
  - Project Boundary Lines



PRELIMINARY  
NOT FOR CONSTRUCTION

**Ulteig** 4285 Lexington Avenue North  
St. Paul, Minnesota, 55126  
Phone: 651.415.3800  
Fax: 651.415.3440  
www.ulteg.com

Reviewed By: P. PEBLER  
Design By: P. PEBLER  
Drawn By: C. SIMALADEN  
Project Number: 18-00076

ROAD LAYOUT OPTIONS  
44 / 45 WTG LAYOUTS

DWG. #:  
WCW-CVL-001

REVISION:  
0A



# WILLOW CREEK WIND PROJECT BUTTE COUNTY, SOUTH DAKOTA

Rev. Date Description By  
00 04/18/18 COLLECTION OPTIONS - 44/45 UO



1201 LOUISIANA ST., #3200,  
HOUSTON, TX 77002

**Legend**

- 44 WTG Layout
- 45 WTG Layout
- Proposed Substation
- Proposed O&M Building
- Collection Header - 44 WTG - Proposed (12" HDPE)
- Collection Header - 45 WTG - Permitted (15" 4521P)
- Existing Transmission Line
- Permitted Collection Corridor - 200'
- Archaeological Sites
- MQZ File Lines
- NAD Wellbore
- Land Parcels
- Project Boundary Lines



0 0.5 1  
Miles

NAD 83 State Plane South Dakota  
North FIPS 4011 (US Feet)

PRELIMINARY  
NOT FOR CONSTRUCTION

**Ulteig**  
4285 Lexington Avenue North  
St. Paul, Minnesota, 55126  
Phone: 651.415.3600  
Fax: 651.415.3440  
www.ulteig.com

Design By  
Drawn By  
Reviewed By  
Project Number

R. PERLER  
R. PERLER  
C. SAMALADEN  
18-0078

COLLECTION OPTIONS  
44 / 45 WTG LAYOUTS

DWG.#: REVISION:  
WCW-CVL-002 0A

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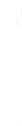
# WILLOW CREEK WIND PROJECT BUTTE COUNTY, SOUTH DAKOTA

Rev. Date Description By  
24 5/25/18 ROAD LAYOUT OPTIONS - 42-45 WGT



1201 LOUISIANA ST., #3200,  
HOUSTON, TX 77002

Legend	
●	42 WGT Layout
●	45 WGT Layout
■	Proposed Substation
■	Proposed O&M Building
—	Access Road - 42 WGT - Proposed (132,318 LF)
—	Access Road - 45 WGT - Permitted (145,264 LF)
—	Crane Path - MOB 1 (10,813 LF)
—	Easement Transmission Line
—	Permitted Corridor - 200ft
—	Public Road - Gravel (20,927 LF)
—	Archaeological Sites
—	NAD Flow Lines
—	NW Wetlands
—	Land Parcels
—	Project Boundary Lines



0 0.5 1  
Miles

NAD 83 State Plane South Dakota  
North FIPS 4001 (US Feet)

PRELIMINARY  
NOT FOR CONSTRUCTION

**Ulteig**  
4285 Lexington Avenue North  
St. Paul, Minnesota, 55126  
Phone: 651.415.3800  
Fax: 651.415.3440  
www.ulteig.com

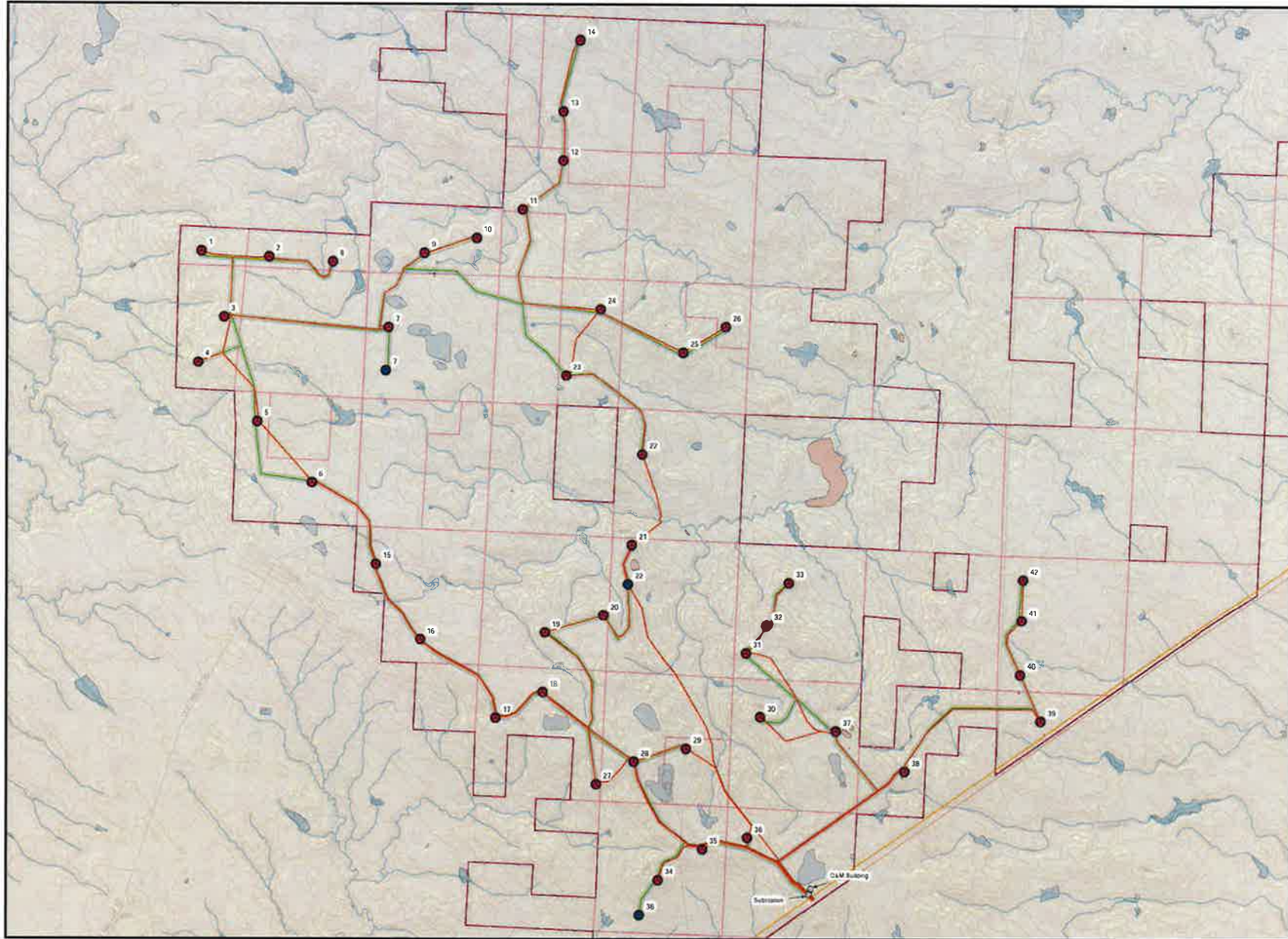
Design By: P. PEBLER  
Drawn By: P. PEBLER  
Reviewed By: C. SMALADEN  
Project Number: 18.00078

ROAD LAYOUT OPTIONS  
42 / 45 WGT LAYOUTS

DWG #: WCW-CVI-001  
REVISION: 0A

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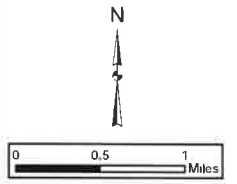
# WILLOW CREEK WIND PROJECT BUTTE COUNTY, SOUTH DAKOTA

Rev.	Date	Description	By
0A	05/18/18	COLLECTION OPTIONS - 42/45	U/L



1201 LOUISIANA ST., #3200,  
HOUSTON, TX 77002

Legend	
<span style="color: red;">●</span>	42 WTG Layout
<span style="color: green;">●</span>	45 WTG Layout
<span style="color: blue;">●</span>	Proposed Substation
<span style="color: blue;">■</span>	Proposed O&M Building
<span style="color: red;">—</span>	Collection Paddles - 42 WTG - Proposed (150' x 150')
<span style="color: green;">—</span>	Collection Paddles - 45 WTG - Proposed (150' x 150')
<span style="color: blue;">—</span>	Existing Transmission Line
<span style="color: orange;">—</span>	Proposed Collection Corridor - 200'
<span style="color: brown;">—</span>	Archaeological Sites
<span style="color: blue;">—</span>	WFO Flow Lines
<span style="color: blue;">—</span>	WFO Windbreaks
<span style="color: red;">—</span>	Local Roads
<span style="color: red;">—</span>	Project Boundary Lines



NAD 83 State Plane South Dakota  
North FIPS 4001 (US Feet)

PRELIMINARY  
NOT FOR CONSTRUCTION

**Ulteig**  
4285 Leavitt Avenue North  
St. Paul, Minnesota, 55126  
Phone: 651.415.3800  
Fax: 651.415.3440  
www.ulteig.com

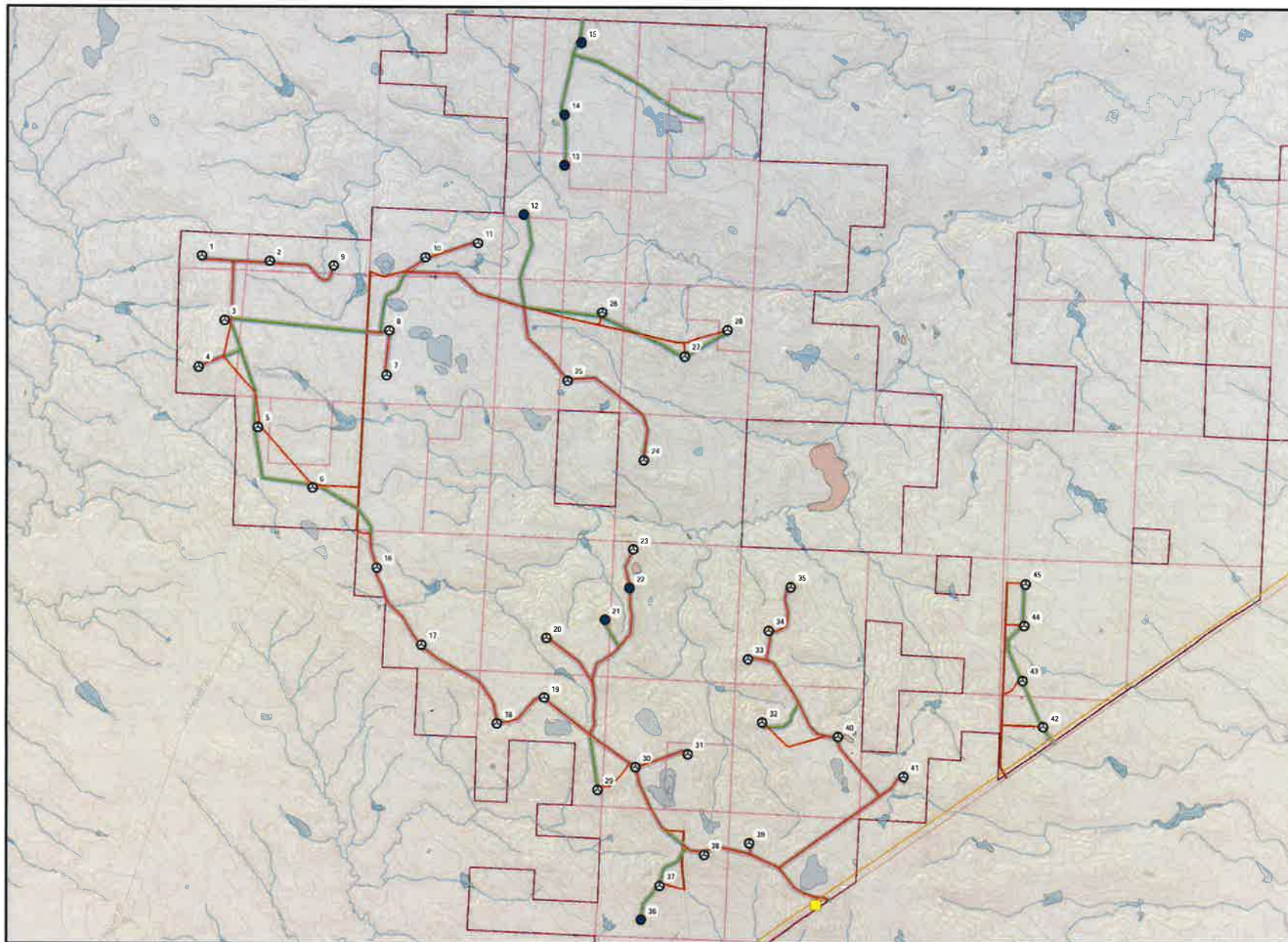
Author: R. V. V.	P. PEBLER
Design By: P. PEBLER	P. PEBLER
Reviewed By: C. SMALADEN	C. SMALADEN
Project Number: 18-00076	18-00076

COLLECTION OPTIONS  
42 / 45 WTG LAYOUTS

DWG #: **WCW-CVL-002** REVISION: **0A**

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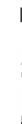
# WILLOW CREEK WIND PROJECT BUTTE COUNTY, SOUTH DAKOTA

Rev. Date Description By  
08-22-18 ROAD LAYOUT OPTIONS ULR



1201 LOUISIANA ST., #3200,  
HOUSTON, TX 77002

Legend	
	30 WTG Layout
	45 WTG Layout
	Proposed Substation Location
	Access Road - 30 WTG - Proposed (121,434 LF)
	Access Road - 45 WTG - Proposed (151,223 LF)
	Permitted Road Corridor - 3200'
	Public Road - Gravel (20,927 LF)
	Existing Transmission Line
	Archaeological Sites
	NHD Flow Lines
	NHD Wetlands
	Land Parcels
	Project Boundary Lines



0 0.5 1 Miles

NAD 83 State Plane South Dakota  
North FIPS 4001 (US Feet)

PRELIMINARY  
NOT FOR CONSTRUCTION

**Ulteig** 4285 Lexington Avenue North  
St. Paul, Minnesota, 55126  
Phone: 651.415.3800  
Fax: 651.415.3440  
www.ulteig.com

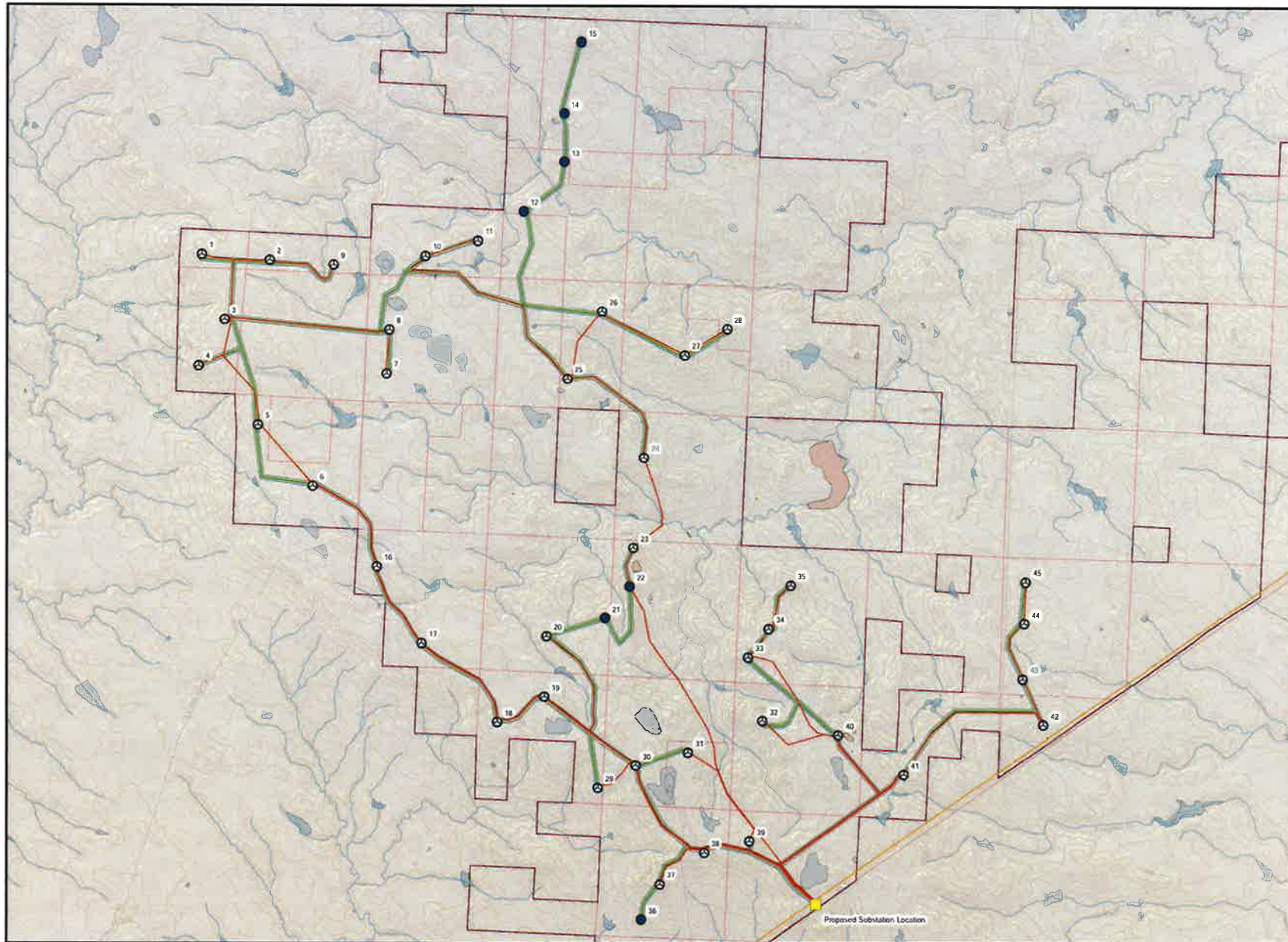
Design By: P. PEBLER  
Drawn By: P. PEBLER  
Reviewed By: C. SMALJADEN  
Project Number: 18.03079

ROAD LAYOUT OPTIONS

DWG #: **WCW-CVL-001** REVISION: **0B**

G:\2018\18.00075\GIS\Civil\MXD\WCW\_Road\_Options\_REV08\_2\_09\_18.mxd



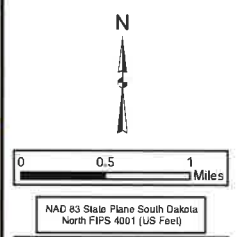


**WILLOW CREEK  
WIND PROJECT**  
BUTTE COUNTY, SOUTH DAKOTA

Rev.	Date	Description	By
01	08/18/18	COLLECTION LAYOUT OPTIONS	UW

**Pattern**  
1201 LOUISIANA ST., #3200,  
HOUSTON, TX 77002

- Legend**
- 28 WTG Layout
  - 45 WTG Layout
  - Proposed Substation Location
  - Collection Feeder - 33 WTG - Proposed (351,828 LF)
  - Collection Feeder - 45 WTG - Permitted (162,431 LF)
  - Permitted Collection Corridor - 200 ft
  - Existing Transmission Line
  - Archeological Sites
  - NAD Flow Lines
  - Local Roads
  - Project Boundary Lines



**PRELIMINARY  
NOT FOR CONSTRUCTION**

**Ulteig** 4285 Lexington Avenue North  
St. Paul, Minnesota, 55126  
Phone: 651.415.3800  
Fax: 651.415.3440  
www.ulteig.com

Design By: A. BATHER  
Drawn By: P. PEBLER  
Reviewed By: C. SMITH/LADEN  
Project Number: 16.00076

**COLLECTION LAYOUT  
OPTIONS**

DWG #: **WCW-CVL-002** REVISION: **0B**



## **APPENDIX B - DISTURBANCE AREAS**

45 WTG Layout - EA Design				
Temporary Disturbance				
	Number/Length of Facility	Temporary disturbance area (or width for linear facilities)	Temporary disturbance area (acres)	Assumptions / Basis for Calculation
Turbines	45	262 ft X 262 ft	71	262 ft by 262 ft construction disturbance area per turbine
Collector Lines	139,646 feet	10 feet	11	10 ft wide feeder trenching; some is shared with road disturbance
O&M Facility	1	11,500 sq. ft.	0.3	11,500 sq. ft. construction disturbance area for O&M building and parking
Access Roads	137,247 feet	66 feet	207	66 ft construction disturbance width
Willow Creek Substation	1	69,000 sq. ft.	2	69,000 sq. ft. construction disturbance area for substation
Met Towers	4	420 sq. ft.	0.04	Four temporary towers; 420 sq. ft. disturbance footprint for each tower
Laydown/stockpile/batchplant	1	1,742,400 sq. ft.	40	One 40 acre yard required for Project Area
Crane Walk	137,247 feet	20 feet	0	Assume within road disturbance
Total Temporary Disturbance Area (acres)			331.34	

Permanent Disturbance				
	Number/Length of Facility	Permanent disturbance area (or width for linear facilities)	Permanent disturbance area (acres)	Assumptions / Basis for Calculation
Turbines	45	66 ft x 66 ft	4.5	60 ft by 60 ft construction disturbance area per turbine
Collector Lines	139,646 feet	0	0	Feeder trenching will be reseeded and there will be no permanent disturbance
O&M Facility	1	10,000 sq. ft.	0.2	Includes O&M building and parking
Access Roads	137,247 feet	33 feet	103	Estimated average road width of 33 ft
Willow Creek Substation	1	60,000 square feet	1	300 ft by 200 ft substation footprint
Met Towers	2	420 sq. ft.	0.02	Two permanent towers; 420 sq. ft. disturbance footprint for each tower
Total Permanent Disturbance Area (acres)			108.72	

44 WTG Layout - Proposed Design				
Temporary Disturbance				
	Number/Length of Facility	Temporary disturbance area (or width for linear facilities)	Temporary disturbance area (acres)	Assumptions / Basis for Calculation
Turbines	44	262 ft X 262 ft	69	262 ft by 262 ft construction disturbance area per turbine
Collector Lines	212,266 LF	10 ft	48.75	10 ft wide feeder trenching; some is shared with road disturbance
O&M Facility	1	11,500 sq. ft.	0.3	11,500 sq. ft. construction disturbance area for O&M building and parking
Access Roads	135,668 LF	66 ft	205.5	66 ft construction disturbance width
Willow Creek Substation	1	69,000 sq. ft.	2	69,000 sq. ft. construction disturbance area for substation
Met Towers	4	420 sq. ft.	0.04	Four temporary towers; 420 sq. ft. disturbance footprint for each tower
Laydown/stockpile/batchplant	1	1,742,400 sq. ft.	40	One 40 acre yard required for Project Area
Crane Walk	2,677 LF	36 ft	2.25	Quantity shown for crane walk outside of road disturbance alignment or permitted corridor.
Total Temporary Disturbance Area (acres)			367.84	

Permanent Disturbance				
	Number/Length of Facility	Permanent disturbance area (or width for linear facilities)	Permanent disturbance area (acres)	Assumptions / Basis for Calculation
Turbines	44	66 ft X 66 ft	4.4	60 ft by 60 ft construction disturbance area per turbine
Collector Lines	212,266 LF	0 ft	0	Feeder trenching will be reseeded and there will be no permanent disturbance
O&M Facility	1	10,000 sq. ft.	0.2	Includes O&M building and parking
Access Roads	135,668 LF	33 ft	102.75	Estimated average road width of 33 ft
Willow Creek Substation	1	69,000 sq. ft.	2	300 ft by 200 ft substation footprint
Met Towers	4	420 sq. ft.	0.04	Two permanent towers; 420 sq. ft. disturbance footprint for each tower
Total Permanent Disturbance Area (acres)			109.39	

42 WTG Layout - Proposed Design				
Temporary Disturbance				
	Number/Length of Facility	Temporary disturbance area (or width for linear facilities)	Temporary disturbance area (acres)	Assumptions / Basis for Calculation
Turbines	42	262 ft X 262 ft	66	262 ft by 262 ft construction disturbance area per turbine
Collector Lines	216,210 LF	10 ft	49.5	10 ft wide feeder trenching; some is shared with road disturbance
O&M Facility	1	11,500 sq. ft.	0.3	11,500 sq. ft. construction disturbance area for O&M building and parking
Access Roads	132,359 LF	66 ft	200.5	66 ft construction disturbance width
Willow Creek Substation	1	69,000 sq. ft.	2	69,000 sq. ft. construction disturbance area for substation
Met Towers	4	420 sq. ft.	0.04	Four temporary towers; 420 sq. ft. disturbance footprint for each tower
Laydown/stockpile/batchplant	1	1,742,400 sq. ft.	40	One 40 acre yard required for Project Area
Crane Walk	2,677 LF	36ft	2.25	Quantity shown for crane walk outside of road disturbance alignment or permitted corridor.
Total Temporary Disturbance Area (acres)			360.59	

Permanent Disturbance				
	Number/Length of Facility	Permanent disturbance area (or width for linear facilities)	Permanent disturbance area (acres)	Assumptions / Basis for Calculation
Turbines	42	66 ft X 66 ft	4.2	60 ft by 60 ft construction disturbance area per turbine
Collector Lines	144,724 LF	0 ft	0	Feeder trenching will be reseeded and there will be no permanent disturbance
O&M Facility	1	10,000 sq. ft.	0.2	Includes O&M building and parking
Access Roads	132,359 LF	33 ft	100.25	Estimated average road width of 33 ft
Willow Creek Substation	1	69,000 sq. ft.	2	300 ft by 200 ft substation footprint
Met Towers	4	420 sq. ft.	0.04	Two permanent towers; 420 sq. ft. disturbance footprint for each tower
Total Permanent Disturbance Area (acres)			106.69	

38 WTG Layout - Proposed Design				
Temporary Disturbance				
	Number/Length of Facility	Temporary disturbance area (or width for linear facilities)	Temporary disturbance area (acres)	Assumptions / Basis for Calculation
Turbines	38	262 ft X 262 ft	60	262 ft by 262 ft construction disturbance area per turbine
Collector Lines	201,039 LF	10 ft	46	10 ft wide feeder trenching; some is shared with road disturbance
O&M Facility	1	11,500 sq. ft.	0.3	11,500 sq. ft. construction disturbance area for O&M building and parking
Access Roads	121,434 LF	66 ft	184	66 ft construction disturbance width
Willow Creek Substation	1	69,000 sq. ft.	2	69,000 sq. ft. construction disturbance area for substation
Met Towers	4	420 sq. ft.	0.04	Four temporary towers; 420 sq. ft. disturbance footprint for each tower
Laydown/stockpile/batchplant	1	1,742,400 sq. ft.	40	One 40 acre yard required for Project Area
Crane Walk	121,434 LF	20 ft	0	Assume within road disturbance
Total Temporary Disturbance Area (acres)			332.34	

Permanent Disturbance				
	Number/Length of Facility	Permanent disturbance area (or width for linear facilities)	Permanent disturbance area (acres)	Assumptions / Basis for Calculation
Turbines	38	66 ft X 66 ft	3.8	60 ft by 60 ft construction disturbance area per turbine
Collector Lines	201,039 LF	0 ft	0	Feeder trenching will be reseeded and there will be no permanent disturbance
O&M Facility	1	10,000 sq. ft.	0.2	Includes O&M building and parking
Access Roads	121,434 LF	33 ft	92	Estimated average road width of 33 ft
Willow Creek Substation	1	69,000 sq. ft.	2	300 ft by 200 ft substation footprint
Met Towers	4	420 sq. ft.	0.04	Two permanent towers; 420 sq. ft. disturbance footprint for each tower
Total Permanent Disturbance Area (acres)			98.04	

## **APPENDIX C - LEVEL III CULTURAL RESOURCES INVENTORY REPORTS**



(submitted under separate cover)