COLLEGIATE WIND COMPETITION 2021

SITING HARDWARE REVIEW



## SITING PROJECT DEVELOPMENT

TEAM LEAD: BRITTANY TAGA

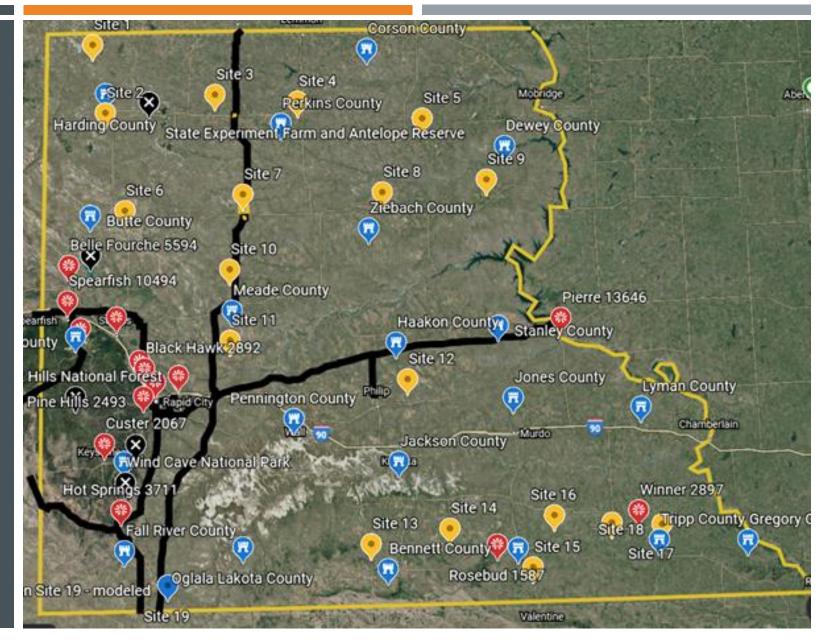
NAVEEN VIDANAGE, AARON ZEEK, STANLEY KENNEDY AND NATALIE MCDONALD



## IDENTIFICATION OF PARAMETERS PROSPECTION

### Process for selection

- High Voltage Transmission lines
- County and Local Ordinances
- Blackout Areas
- Wind Resource
- Transportation



### Stanley Kennedy CWC, 2/9/2021, Page 3

## IDENTIFICATION OF PARAMETERS

Localize and set parameters for Meade County. Will Reapply for Perkins.

### WECS (Wind Energy Conversion System) ORDINANCE 32

#### ARTICLE 1 PURPOSE

#### PURPOSE

The purpose of the Ordinance is to provide for the construction and permitting of small residential, rural and commercial wind energy conversion system WECS facility in the unincorporated areas of Meade County, subject to reasonable conditions that will protect the public health and safety.

## IDENTIFICATION OF PARAMETERS (TURBINE)

4	A	В	C	D	E	F	G	Н	1
1									
2	Distance Factor=	8	3						
3									
4	Unstaggered								
5	turbine	vendor	Power (Per Turbine) Nu	umber of turbines rot	or diameter (m) Di	istance Factor Are	ea/turbine (m^2)	Area/turbine (acres)	Area total (acres)
6	V117-4.2 MW	Vestas	4.2	24	117	8	876096	216.4803558	5
7	V162-6.0MW	Vestas	6	17	162	8	1679616	415.0274277	70
8	V150-4.2MW	Vestas	4.2	24	150	8	1440000	355.8191253	8
9	V150- 6.0 MW	Vestas	6	17	150	8	1440000	355.8191253	6
10	V155- 3.3 MW	Vestas	3.3	31	155	8	1537600	379.9357549	11
11	V120- 2.2MW	Vestas	2.2	46	120	8	921600	227.7242402	10
12	5.3-158	Genral Electrics	5.3	19	158	8	1597696	394.785273	75
13	5.5-158	Genral Electrics	5.5	19	158	8	1597696	394.785273	7
14	6.0-164	General Elecrice	6	17	164	8	1721344	425.3382753	7.
15									
16	Staggered								
17	turbine	vendor	Power (Per Turbine) Nu	umber of turbines rot	or diameter (m) Di	istance Factor Are	ea/turbine (m^2)	Area/turbine (acres)	Area total (acres)
8	V117-4.2 MW	Vestas	4.2	24	117	8	758721.4	187.5	4
19	V162-6.0MW	Vestas	6	17	162	8	1454590.1	359.4	6
20	V150-4.2MW	Vestas	4.2	24	150	8	1247076.6	308.1	7
21	V150- 6.0 MW	Vestas	6	17	150	8	1247076.6	308.1	5
22	V155- 3.3 MW	Vestas	3.3	31	155	8	1331600.7	329.0	10
23	V120- 2.2MW	Vestas	2.2	46	120	8	798129.0	197.2	9
24	5.3-158	Genral Electrics	5.3	19	158	8	1383645.3	341.9	6
	5.5-158	Genral Electrics	5.5	19	158	8	1383645.3	341.9	6
25	6.0-164	General Elecrice	6	17	164	8	1490727.6	368.4	6.
25									
26									
26									
26 27 28									



- Landowner: David and Janet Paul
- Approx. Acreage: 5,457ac
- Transmission Line Owner: Western Area
  Power Administration (Upper Great Plains Region)
- Voltage: 230kV

Figure 1: Displaying boundary location in yellow and transmission line in black

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Figure 2: Bison Substation

- Owner: Grand Electric Coop
- Location: Bison South Dakota (Perkins County)

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Figure 3: Maurine Substation

- Landowner: Price, Garold R & Karen Sue
- Location: Maurine South Dakota (Meade County)

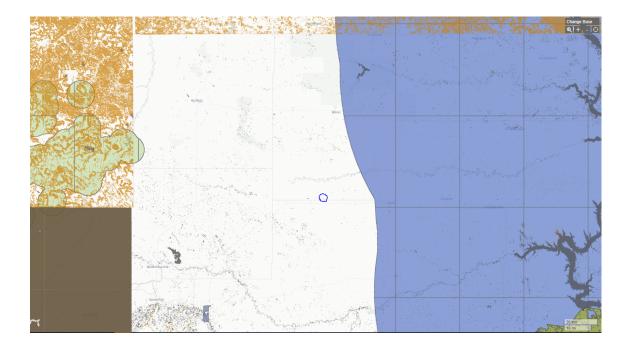


Figure 4: Approx. location is blue circle other areas are locations of sensitive bird species

### Justification For Site Location:

- 1. One Landowner (easier logistics for lease agreement)
- 2. Enough acreage for at least 100MW
- 3. Good wind resource
- 4. Located next to transmission line
- 5. May be able to use existing substations (further research necessary)
- 6. Minor environmental and species concern

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## CURRENT STATE OF PHYSICAL DESIGN

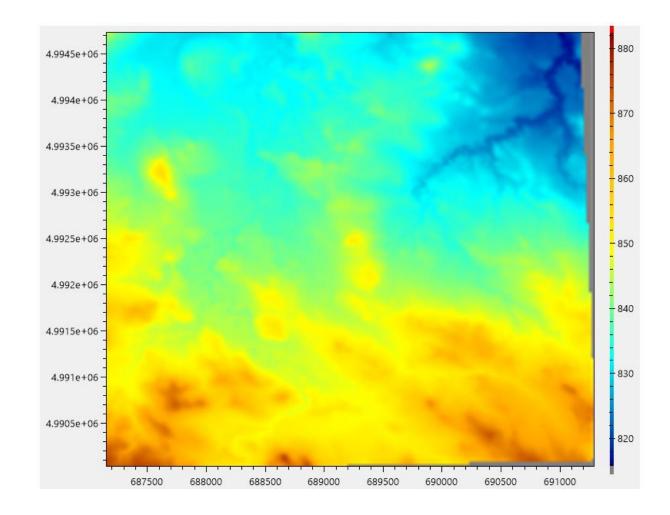


Figure 5: Land Roughness Data of Final Site

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### LAND ROUGHNESS DATA

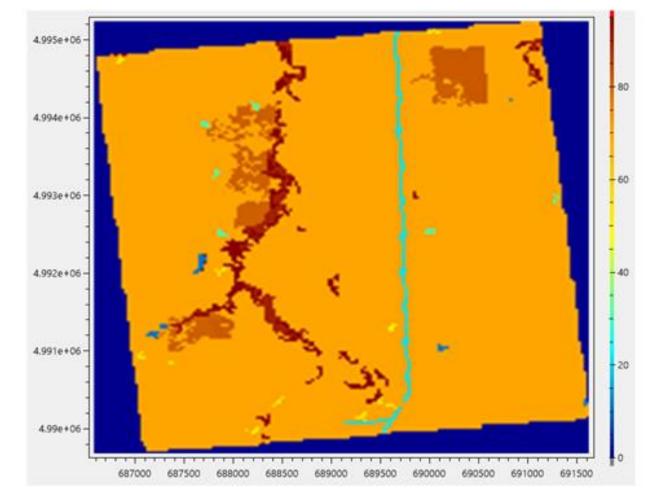


Figure 6: Continuum Land Roughness Simulation

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## PROGRESS

- Continuum software problems being solved
  - Team is currently simulating final site
  - Currently working through tutorials
  - Catching up team members on Continuum
  - Working through Continuum bugs
- County ordinances and policies are being evaluated
- Currently reaching out to multiple corporations for more information regarding siting
- Finances are being secured
- Land being secured
  - Trying to contact landowner
  - Creating a lease document

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## JOBS AND ECONOMIC DEVELOPMENT IMPACT (JEDI) MODEL

- Estimate economic development impacts from wind power generation projects
- Default information can be used to run a basic impacts analysis using wind industry averages
- Inputs:
  - Construction materials and labor costs
  - Turbine, tower, and blade costs and local contact information
  - Utility interconnection, engineering, land easements, and permitting costs
  - Annual operation and maintenance costs
  - Tax, land lease, and financing parameters

## BALANCE OF SYSTEM (BOS) COSTS

- Cost for Project
  - \$24,305,942
- Cost per kW
  - **\$268**

#### Balance of System Costs

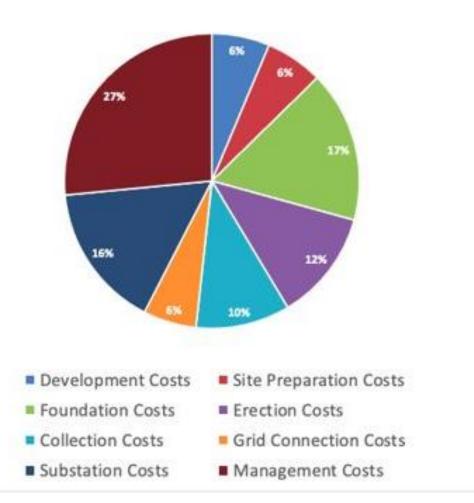


Figure 7: Balance of Systems Pie Chart

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## INSURANCE

### Chubb

- 25 years of experience in the renewable and alternative energy industry
- Tailors products and services to our needs to manage risks

### GCube

- 25+ years insuring renewables
- 95% of claims paid within 30 days
- \$300 million onshore property capacity
- \$35 million liability capacity

### SolarInsure

- 15+ years experience in insuring alternative energy companies
- Insurance capacity \$550 million per project
- Deductibles beginning at \$20,000 and up to \$1 million

### SCHEDULE

CWC Project Development

SIMPLE GANTT CHART by Vertexol2.com

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orthern Arizona Univ	ABIN		Mon, 1	/11/2021																										
		Project Start: Display Week:	1		Jan 11, 2021	Jan 18, 202		Jan 25, 2021	Feb 1, 2021		1,2021	Feb 15, 2021	Feb 22,	Mar 1, 2021	Mar 8, 2021		r 15, 2021	Mar 22,		Mar 29, 202		Apr 5, 202			12,2021		Apr 19, 2021		Apr 26, 2021	
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ndowner	Aaron	50%	2/1/21	2/19/21													++++	++++			++++			++++		++++			_	
	141.41		1/25/21														++++	++++											_	
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tinumm	Brittany	28%	1/11/21																											
am the software			1/11/21																											
adel test run		35%	1/31/21																		++++		++++	++++		++++	++++			
adel site location			2/28/21				++++																++++	++++	+++	+++	+++			
terpanet nesults			4/1/21	5/1/21																										
aine Selection		91%	1/11/21														++++	++++												
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ntact companies		95%		2/10/21																				++++						
plement turbine			2/10/21	2/12/21																				++++						
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ak 4			date	date																										
uk S			date	date																										
inces	Tearn	10%	3/1/21	3/31/21																										
urance	Natalie	50%	3/1/21	3/7/21																										
	Natalie	20%	3/1/21	5/1/21																										
im the software	Natalie	100%	3/1/21	3/7/21																										
del test run	Natalie	75%	3/7/21	3/14/21																										
adel site location	Natalle and Stanley		3/14/21	4/1/21																										
nterpret results	Natalie and Stanley		4/1/21	5/1/21																										

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# THANK YOU