

COLLEGIATE  
WIND  
COMPETITION  
2021

SITING  
HARDWARE  
REVIEW





# SITING PROJECT DEVELOPMENT

TEAM LEAD: BRITTANY TAGA

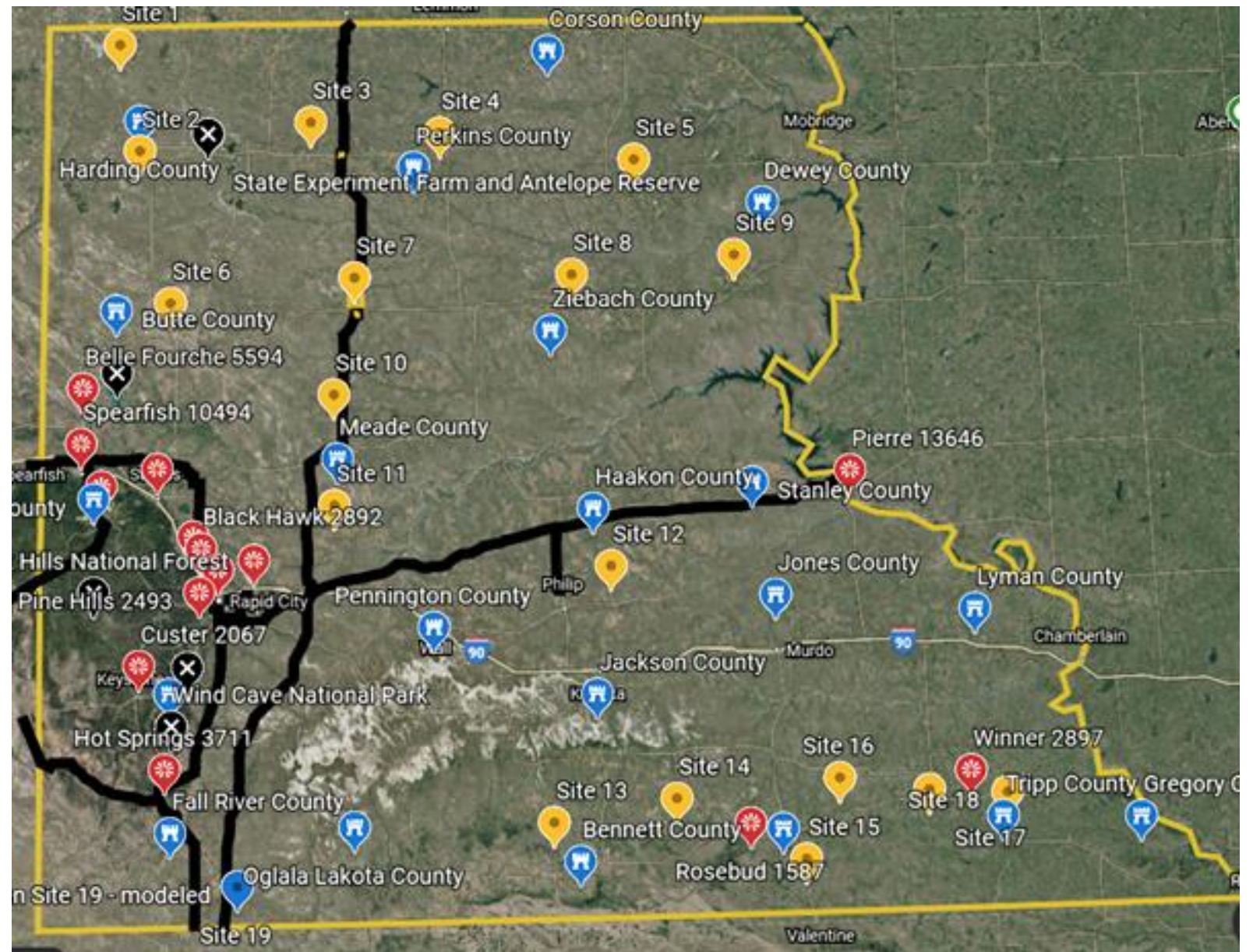
NAVEEN VIDANAGE, AARON ZEEK, STANLEY KENNEDY AND NATALIE MCDONALD



# IDENTIFICATION OF PARAMETERS PROSPECTION

Process for selection

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



# IDENTIFICATION OF PARAMETERS

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

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

### **ARTICLE 1 PURPOSE**

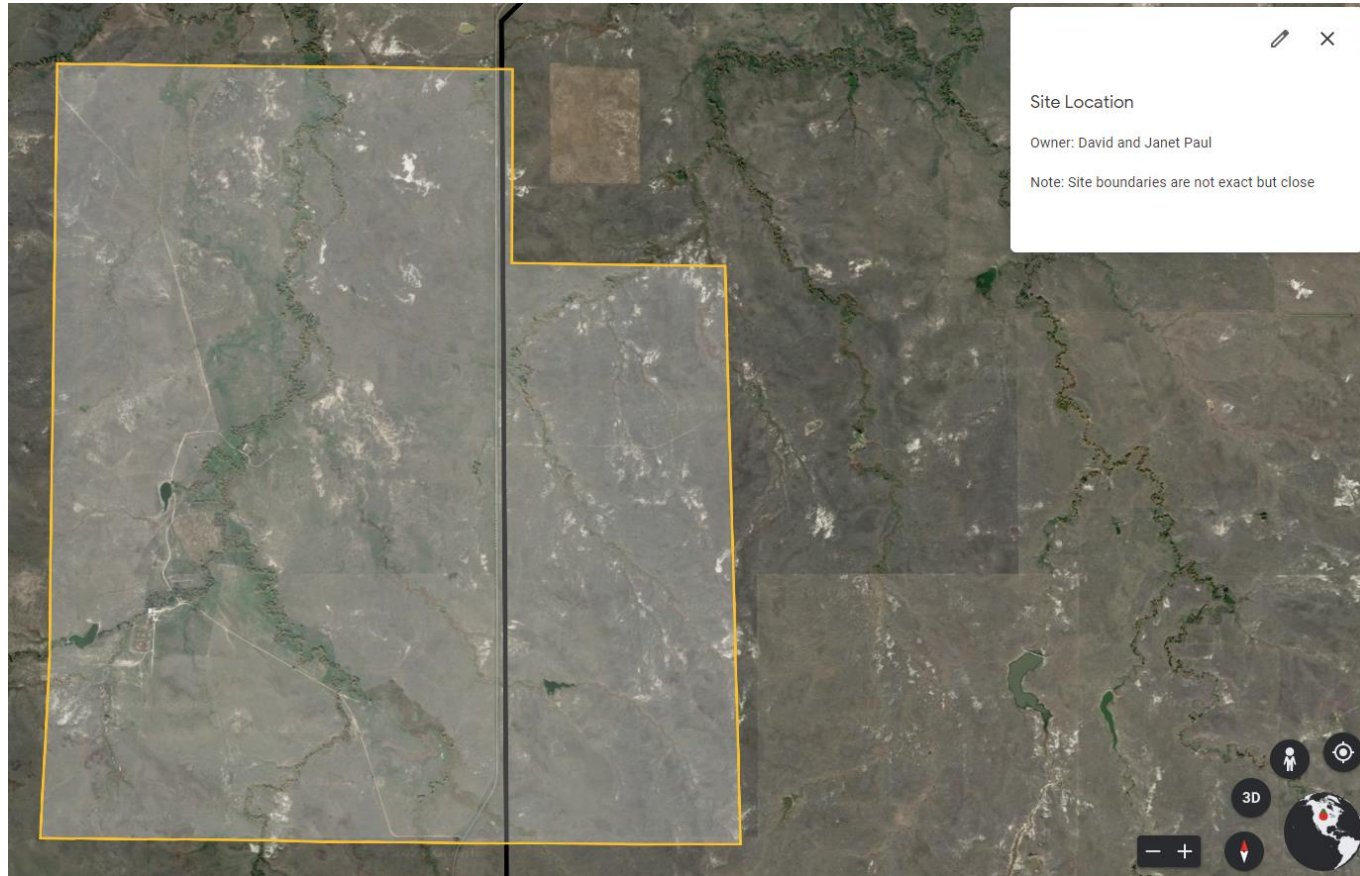
#### **PURPOSE**

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)

	A	B	C	D	E	F	G	H	I
1									
2	Distance Factor=	8							
3									
4	Unstaggered								
5	turbine	vendor	Power (Per Turbine)	Number of turbines	rotor diameter (m)	Distance Factor	Area/turbine (m^2)	Area/turbine (acres)	Area total (acres)
6	V117-4.2 MW	Vestas	4.2	24	117	8	876096	216.4803558	5196
7	V162-6.0MW	Vestas	6	17	162	8	1679616	415.0274277	7055
8	V150-4.2MW	Vestas	4.2	24	150	8	1440000	355.8191253	8540
9	V150- 6.0 MW	Vestas	6	17	150	8	1440000	355.8191253	6049
10	V155- 3.3 MW	Vestas	3.3	31	155	8	1537600	379.9357549	11778
11	V120- 2.2MW	Vestas	2.2	46	120	8	921600	227.7242402	10475
12	5.3-158	General Electrics	5.3	19	158	8	1597696	394.785273	7501
13	5.5-158	General Electrics	5.5	19	158	8	1597696	394.785273	7501
14	6.0-164	General Electrice	6	17	164	8	1721344	425.3382753	7231
15									
16	Staggered								
17	turbine	vendor	Power (Per Turbine)	Number of turbines	rotor diameter (m)	Distance Factor	Area/turbine (m^2)	Area/turbine (acres)	Area total (acres)
18	V117-4.2 MW	Vestas	4.2	24	117	8	758721.4	187.5	4499
19	V162-6.0MW	Vestas	6	17	162	8	1454590.1	359.4	6110
20	V150-4.2MW	Vestas	4.2	24	150	8	1247076.6	308.1	7396
21	V150- 6.0 MW	Vestas	6	17	150	8	1247076.6	308.1	5239
22	V155- 3.3 MW	Vestas	3.3	31	155	8	1331600.7	329.0	10200
23	V120- 2.2MW	Vestas	2.2	46	120	8	798129.0	197.2	9072
24	5.3-158	General Electrics	5.3	19	158	8	1383645.3	341.9	6496
25	5.5-158	General Electrics	5.5	19	158	8	1383645.3	341.9	6496
26	6.0-164	General Electrice	6	17	164	8	1490727.6	368.4	6262
27									
28									
29									
30									

# SITE LOCATION AND SELECTION PROCESS



- 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

# SITE LOCATION AND SELECTION PROCESS



Figure 2: Bison Substation

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

# SITE LOCATION AND SELECTION PROCESS



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

Figure 3: Maurine Substation



# SITE LOCATION AND SELECTION PROCESS

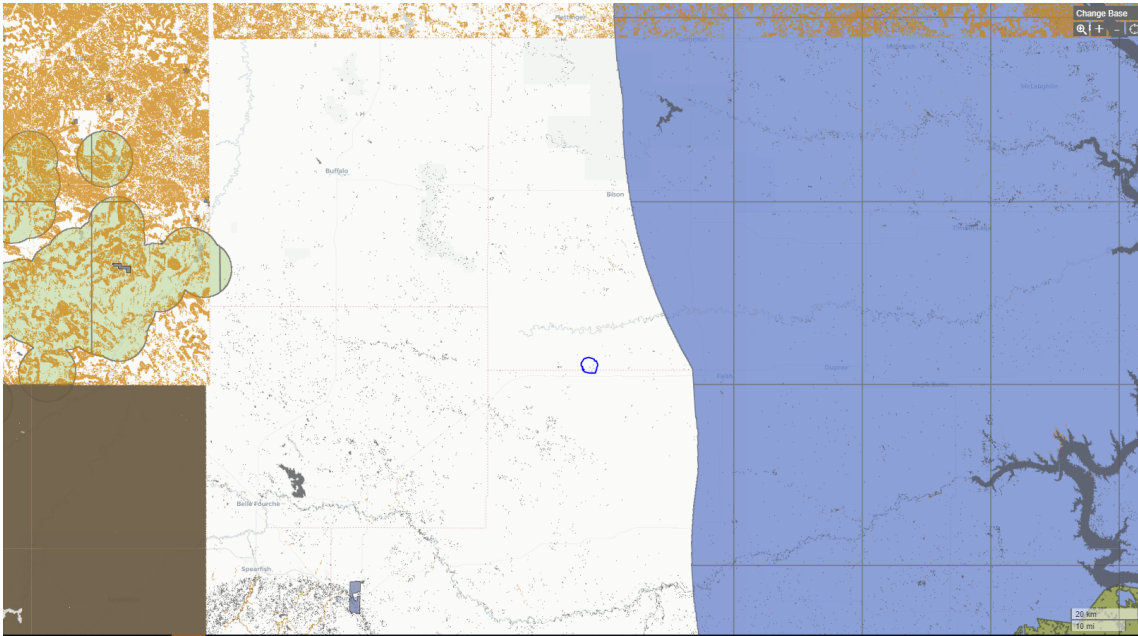


Figure 4: Approx. location is blue circle other areas are locations of sensitive bird species

## 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

# CURRENT STATE OF PHYSICAL DESIGN

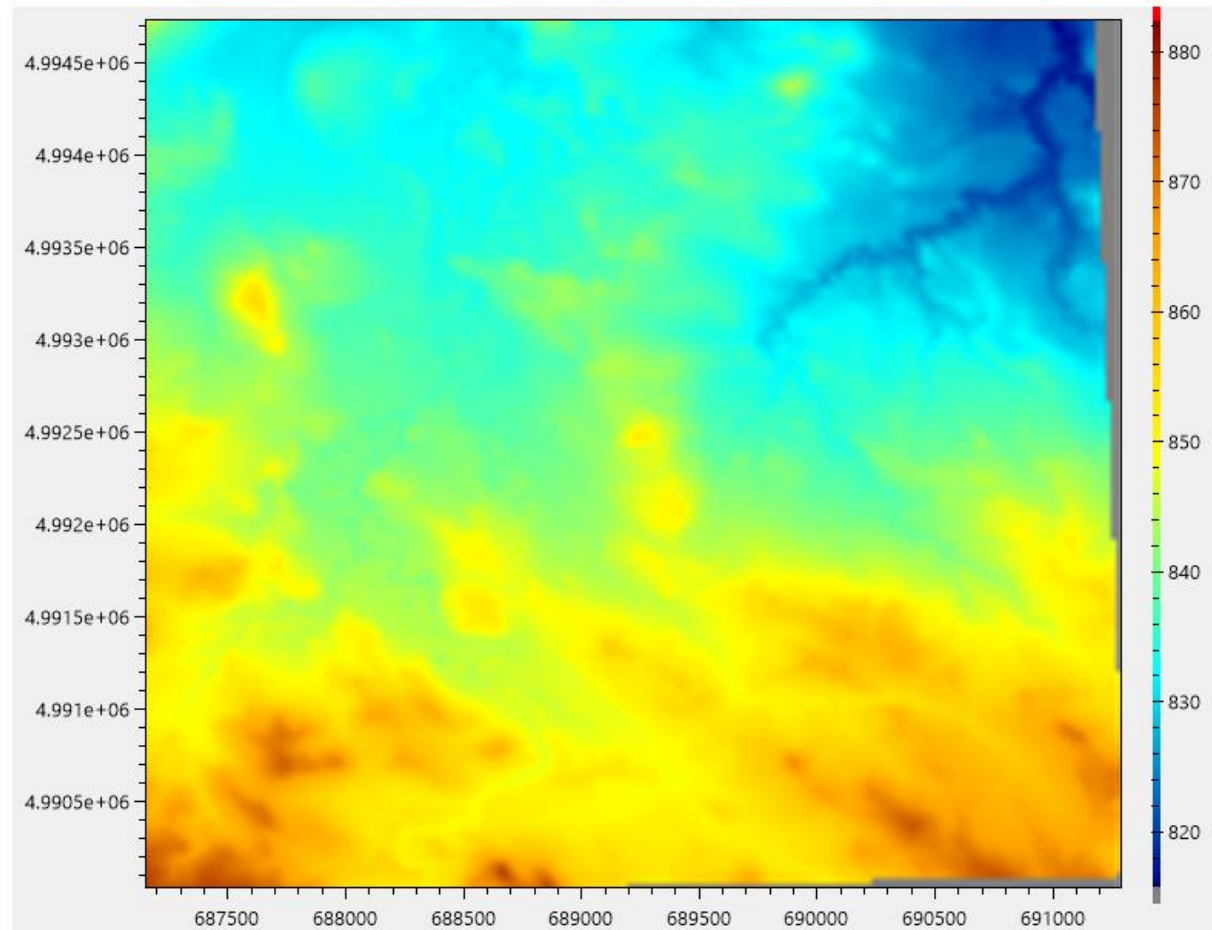


Figure 5: Land Roughness Data of Final Site

# LAND ROUGHNESS DATA

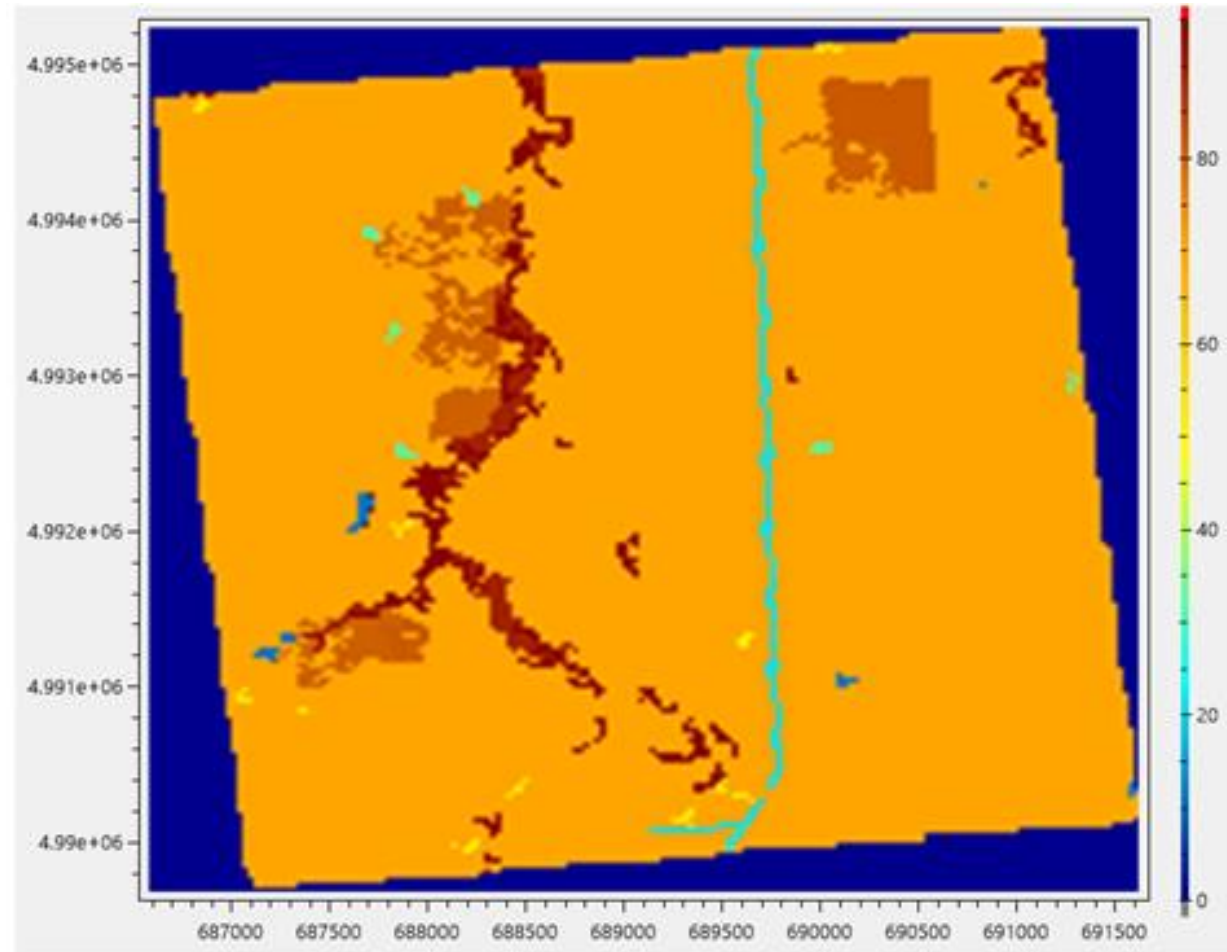


Figure 6: Continuum Land Roughness Simulation

# 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



# 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

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## BALANCE OF SYSTEM (BOS) COSTS

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

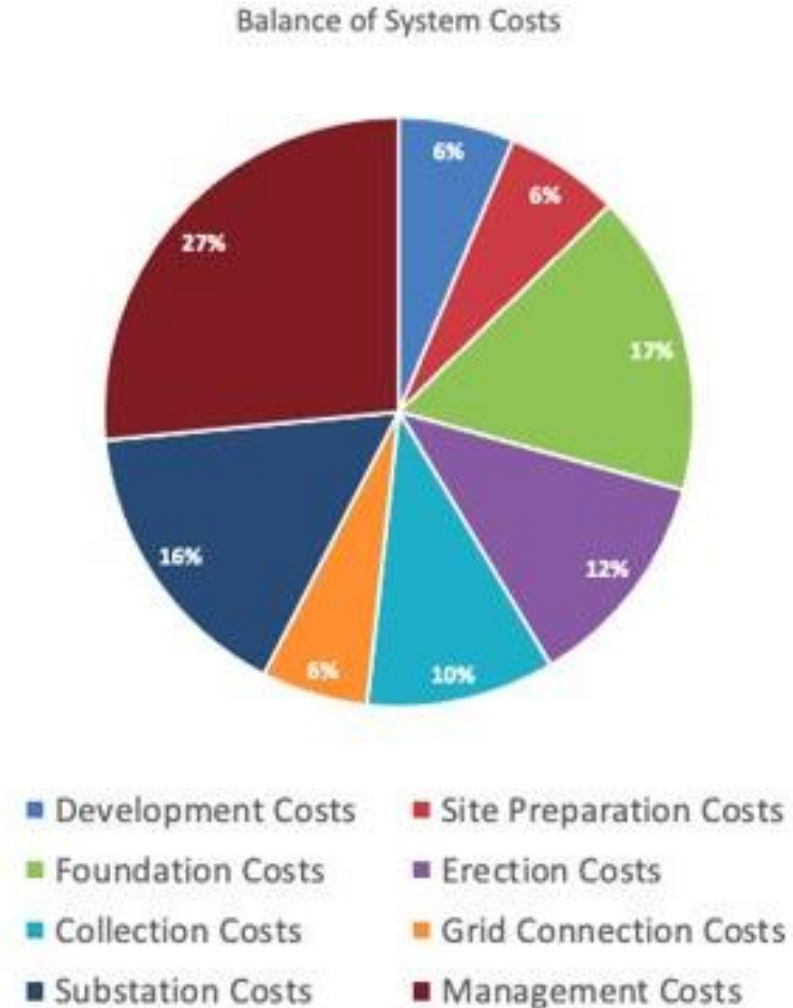


Figure 7: Balance of Systems Pie Chart

# 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

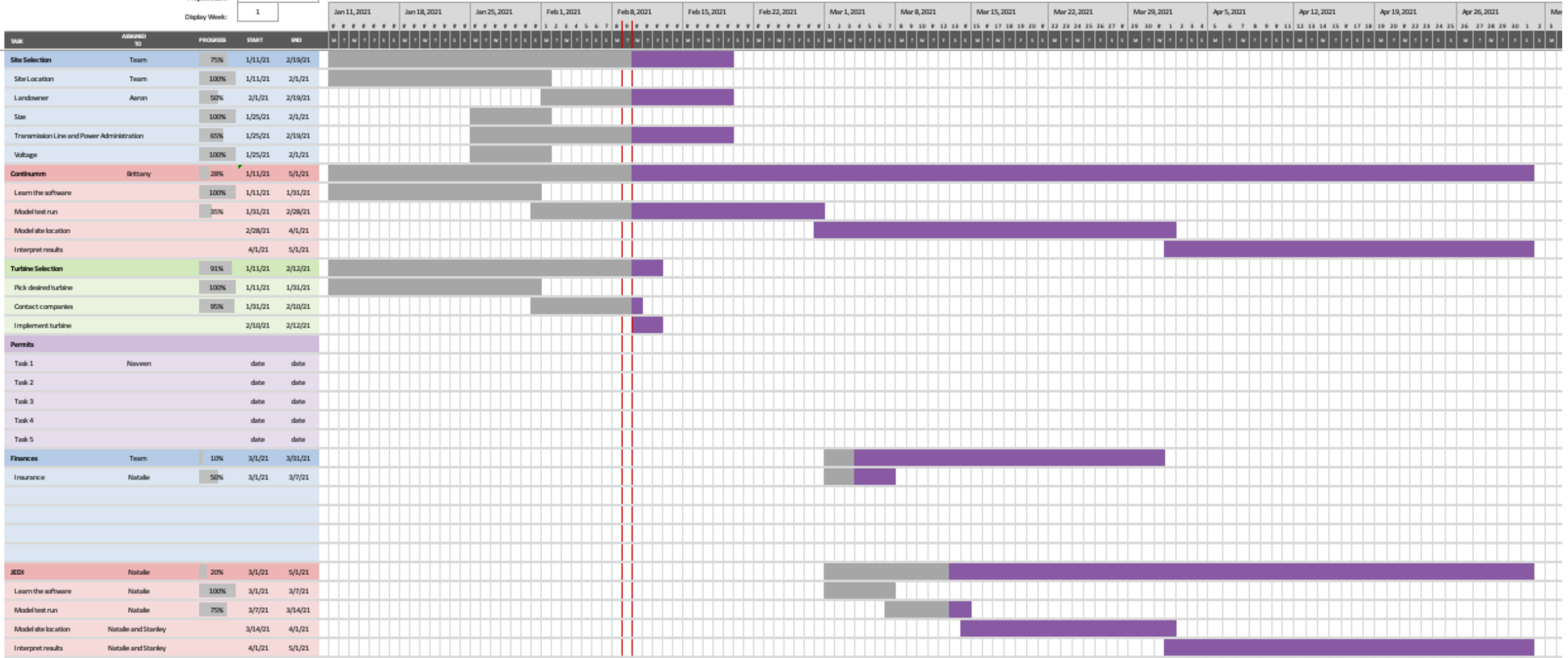
## CWC Project Development

Northern Arizona University

SIMPLE GANTT CHART by Verbo42.com  
<https://www.verbo42.com/Excel/Templates/simple-gantt-chart.html>

Project Start:

Display Week:





THANK YOU