EXHIBIT 8
Shadow Flicker Analysis Report

SHADOW FLICKER ASSESSMENT

COURTENAY WIND ENERGY PROJECT

STUTSMAN COUNTY, NORTH DAKOTA

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1. EXECUTIVE SUMMARY

1.1 INTRODUCTION

Courtenay Wind Farm, LLC is developing the Courtenay Wind Energy Project ('Project') in east-central North Dakota with a nameplate capacity of approximately 200 megawatts. Currently the Project is proposed to consist of between 100 and 133 turbines depending on the final model selected. To support the permitting of the Project at the North Dakota Public Services Commission, Geronimo Energy ('Geronimo') completed, on behalf of Courtenay Wind Farm, LLC, a shadow flicker analysis to estimate levels of flicker potentially associated with the operation of the Project.

1.2 DESCRIPTION OF SHADOW FLICKER AND MODELING

Rotating wind turbine blades may cast shadows during periods when the sun is shining and the turbine is operating. Such shadows may occasionally fall upon homes or other occupied structures (known as receptors) in and near the wind farm area. Expected shadow flicker impacts of the Project have been evaluated by the WindPRO software package, which incorporates the proposed turbine layout, 25 receptors identified by review of aerial imagery, and site-specific meteorological data.

1.3 SUMMARY OF FINDINGS

A conservative configuration of the WindPRO model predicted only 3 of the 25 receptors to exceed the industry standard threshold of 30 hours per year. Additional data regarding obstacles near these receptors was added to the model, and when this was added the model predicted these receptors to fall far below 30 hours per year.

2. SHADOW FLICKER – DEFINITION AND CHARACTERISTICS

Like any tall structure, wind turbines will cast a shadow when the sun is visible. As wind turbines rotate, a flickering or flashing effect may occur when the shadows of the rotating blades cause rapid changes in light intensity at stationary locations such as homes (referred to as receptors). This change in light intensity is known as shadow flicker. Shadow flicker at a receptor may occur only when the following four conditions are met:

- The sun is shining with no cloud cover present
- The turbine is operating
- The turbine blades are positioned on a line between the sun and the receptor
- The receptor is close enough to the turbine to distinguish the shadow created by the blades.

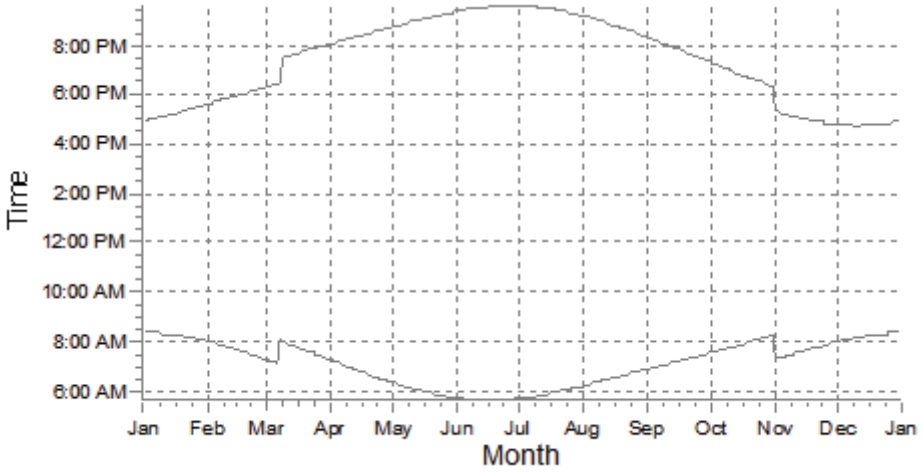
Shadow flicker intensity and frequency of occurrence at a given receptor are determined by several factors:

- **Cloud Cover and Visibility:** If the sun is obscured by clouds, the solar disk is not prominent enough to perceive shadow flicker. Similarly, atmospheric phenomena such as haze, fog, smoke which would limit visibility would also reduce the intensity of shadow flicker because it diffuses the light from the sun.
- **Local Topography:** Elevation differences between the receptor and the turbine location can either increase or decrease frequency of shadow flicker, compared to flat terrain. For example, a receptor may be shielded from the turbine by a prominent hill, wind break, or by other nearby buildings.
- **Wind Speed:** Shadow flicker will only occur if the turbine is operating, as discussed previously. Turbines are designed to operate above a specific wind speed (cut-in speed, generally 3 – 4 m/s for modern wind turbines) and below another specific wind speed (cut-out speed, ranges from 20 – 25 m/s for modern wind turbines).
- **Wind Direction:** Upwind wind turbines like those proposed at the Project seek to maximize energy production by orienting themselves with blades facing into the wind. The area affected by shadow flicker depends on the orientation of the plane of blade rotation relative to a line between the receptor and the sun. If the other conditions are such that shadow flicker is possible and the plane is close to parallel to the receptor-sun

line, the generation of flicker is negligible at the receptor. Alternatively, if the plane is close to perpendicular the generation of flicker at the receptor may be noticeable.

- **Maintenance:** It is occasionally necessary to shut down wind turbines for maintenance, during which time the turbine will not produce shadow flicker.

- **Sun Angle and Path:** On a given day, shadows cast by the sun are longest during the periods around sunrise and sunset and shortest during mid-day hours. Shadows are also longer in the summer than the winter, with the longest shadows occurring on the summer solstice and shortest shadows occurring on the winter solstice, as seen in the image below:



- **Position of Turbines Relative to Receptors:** The frequency of shadow flicker at a receptor decreases as the distance between the receptor and a wind turbine increases. The frequency is also affected by the location of a wind turbine relative to the receptor. For example, a wind turbine will never cast a shadow on a receptor located directly to its south, since it is never possible for the turbine to lie between the receptor and the sun. A receptor located to the west of the turbine, however, may experience shadow flicker during the early morning hours when the sun is in the eastern sky and low to the ground provided other conditions are met.

- **Distance from Turbines to Receptors:** It is generally accepted that shadow flicker from wind turbines is not perceptable beyond distances of 1500 meters (4921 feet), because the shadow is sufficiently diffuse that the shadow is not seen as a solid obstruction.

Currently, shadow flicker impacts are not regulated by state and federal law; however, a general practice across the wind industry is to site wind turbines such that fewer than 30 hours of shadow flicker are expected to occur at any receptor. The 30-hour threshold is an industry

standard goal which has been derived from a German court case in which it was determined that 30 hours of actual observed shadow flicker at a neighbor's property was tolerable [1].

3. SHADOW FLICKER MODELING

Computer models are frequently employed to predict the expected amount of shadow flicker at locations within or around a wind farm. One such model is built into EMD WindPRO 2.7.490, an industry standard software package for the design, assessment, and optimization of wind farms. The WindPRO SHADOW module incorporates the sun's position, topography of the wind farm site, locations of receptors, wind turbine specifications, and the observed wind direction distribution to calculate shadow positions and orientations at one-minute intervals for a calendar year.

3.1 MODEL INPUTS

The model runs included a total of 137 turbine locations using the turbine with the largest rotor – and therefore the greatest expected flicker impact – which is the Vestas V100-1.8. Such a configuration is conservative, as the Vestas V100-1.8 will only use 110 of these proposed positions, further reducing the impacts of shadow flicker. Figure 1 displays the locations of all 137 turbine positions within the wind farm area used in the initial model run as well as the receptor locations.

Geronimo assessed the wind turbine/receptor interaction in two model runs, the first model run had very conservative assumptions (including assuming that the receptors are transparent in all directions; hereafter this simulation will be referred to as the "greenhouse" model) and was used by Geronimo to identify receptors where more detailed analysis was required. The second run removed the greenhouse assumption and instead included significant amounts of site specific data, including actual obstacles and window positions, to determine if there were issues associated with the receptors identified in the first model run.

Possible receptor locations were identified from 2011 aerial imagery provided by the Farm Service Agency's (FSA) National Agricultural Imagery Program (NAIP). The locations were further refined by field visits to determine if the buildings were still occupiable and to identify any new buildings since the 2011 photo was taken. A total of 25 receptors were identified within 1500 meters (4921 feet) of the proposed wind turbines, as seen in Figure 1. Beyond a distance of 1500 meters, it is assumed that a viewer does not perceive the oscillation in sunlight as the size of the blade relative to the solar disk is too small.

Historical sunshine frequencies (in terms of mean sunlight hours per day) for each calendar month were provided by the WindPRO station database. The nearest site in the database to the Courtenay Wind Energy Project is at the National Weather Service (NWS) weather station at Bismarck, ND. Table 1 lists the average daily sunshine hours per month that were used in the flicker modeling.

Average Sunshine Hours Per Day											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4.92	5.13	7.45	8.03	10.2	11.21	11.69	10.36	8.68	5.69	4.02	3.69

Table 1 - Average Daily Sunshine Hours per Month at Bismarck, ND

Wind direction data collected by an on-site meteorological tower was used in the analysis. The wind direction observations were binned into twelve 30-degree sectors to determine the relative frequency of wind direction at the site. It was further assumed that there would be adequate wind to operate the turbines 100 percent of the time, a conservative assumption. Table 2 below shows the hourly distribution for the 12 sectors and their number of corresponding hours per direction on an annual basis that was used by the shadow flicker model.

Operating Hours by Direction													
Sector	1	2	3	4	5	6	7	8	9	10	11	12	Total
Frequency (%)	8.2	5.4	5.2	5.2	7.2	9.9	11.0	5.4	5.2	9.0	14.4	13.9	100
Hrs/Year	717	472	455	456	634	863	964	474	458	792	1260	1215	8760.0

Table 2 - Wind Turbine Operating Hours by Direction, Courtenay Wind Energy Project

Finally it was assumed that no shadows would be cast if the sun angle was less than 3 degrees above the horizon, since the depth of the atmospheric column at these angles substantially increases scattering of solar radiation and renders shadows, like those analyzed in this report, incoherent.

3.2 MODEL RESULTS

In the greenhouse model configuration, WindPRO calculated 3 receptors to have more than 30 hours of shadow flicker per year. One of these three receptors has been described as unoccupied and not currently livable by the landowner (see Appendix A). Figure 2 illustrates the distribution of shadow flicker across the project using the greenhouse configuration. Table 3 presents the predicted levels of shadow flicker at each of the 25 receptors.

Receptor ID	Status	Closest Turbine ID	Distance to Closest Turbine (feet)	Shadow Flicker (Greenhouse Mode, Hours / year)
E	Participating - Abandoned	88	1982.9	38.3
I	Participating	71	1863.9	36.4
K	Non-Participating	62	2126.8	34.8
U	Participating	69	1681.9	28.5
Y	Participating	17	1559.4	25.5
D	Participating	126	1861.5	24.4
Q	Non-Participating	21	1820.1	17.7
H	Participating	78	2258.9	12.8

Receptor ID	Status	Closest Turbine ID	Distance to Closest Turbine (feet)	Shadow Flicker (Greenhouse Mode, Hours / year)
B	Non-Participating	119	2389.8	12.5
O	Participating	24	2027.2	12.4
J	Participating	54	2028.0	12.4
G	Non-Participating	76	1857.7	10.8
N	Non-Participating	24	3212.1	9.9
M	Non-Participating	21	2512.9	8.8
F	Participating	111	2575.7	7.6
X	Non-Participating	130	1786.0	6.8
S	Non-Participating	32	3580.5	2.7
L	Non-Participating	21	4243.7	1.3
R	Non-Participating	32	4232.1	1.2
W	Participating	69	2047.2	1.1
V	Non-Participating	125	4838.6	0.9
A	Non-Participating	118	4394.4	0.0
C	Non-Participating	137	3302.2	0.0
P	Participating	4	2407.6	0.0
T	Non-Participating	83	4259.4	0.0

Table 3 - WindPRO Predicted Shadow Flicker Impacts - Greenhouse Mode

The greenhouse configuration of the model did not include shading by trees, hedgerows, or other obstacles which would reduce the occurrences of shadow flicker. Aerial imagery was examined and trees or other obstacles were digitized and imported to WindPRO to update the initial run. Additionally the homes were modeled not in “greenhouse” mode, but rather with a 1 meter x 1 meter window on each of the four walls to more accurately represent the true exposure conditions.

The landowner upon whose land Receptor E is located has provided a letter (see Appendix B) certifying that Receptor E is an unoccupied and unoccupiable dwelling, thus Receptor E was not included in the detailed study. Table 4 presents the predicted levels of shadow flicker at the two remaining receptors which exceeded 30 hours per year in the greenhouse configuration.

Receptor ID	Status	Closest Turbine ID	Distance to Closest Turbine (feet)	Shadow Flicker (Highest Window, Hours / year)
I	Participating	71	1863.9	4.1
K	Non-Participating	62	2126.8	9.2

Table 4 - WindPRO Predicted Shadow Flicker Impacts - Detailed Mode

Detailed flicker reports produced by WindPRO for both model configurations are provided in Appendix A.

4. CONCLUSION

An analysis of potential shadow flicker impacts from the Courtenay Wind Energy Project on nearby receptors indicates that the effects are expected to be minor and well within tolerances that do not present concerns for nuisance or health effects. Of the 25 receptors identified within the wind farm, only three were predicted by a very conservative model configuration to exceed a target of 30 hours per year. Incorporation of more specific receptor details based on review of aerial imagery and visits to the receptors of interest reduces the predicted shadow flicker occurrences to far below the 30 hour threshold. It is notable that there is no applicable federal, state, or local ordinance which specifies a maximum amount of shadow flicker.

Due to the conservative nature of the shadow flicker modeling, it is not expected that any of the receptors in the study area will experience significant impacts during operations. In the event that Courtenay Wind Farm, LLC receives complaints about flicker from the Project, impacts can be re-evaluated and mitigation measures will be taken if necessary. Such mitigation measures include but are not limited to planting of additional vegetation near receptors and installation of curtains or blinds in the windows of affected receptors.

REFERENCES

1. WindPower. 2003. Danish Wind Industry Association. Shadow Casting From Wind Turbines. http://guidedtour.windpower.org/en/tour/env/shadow/index.html. Accessed 20 June 2013.

FIGURES

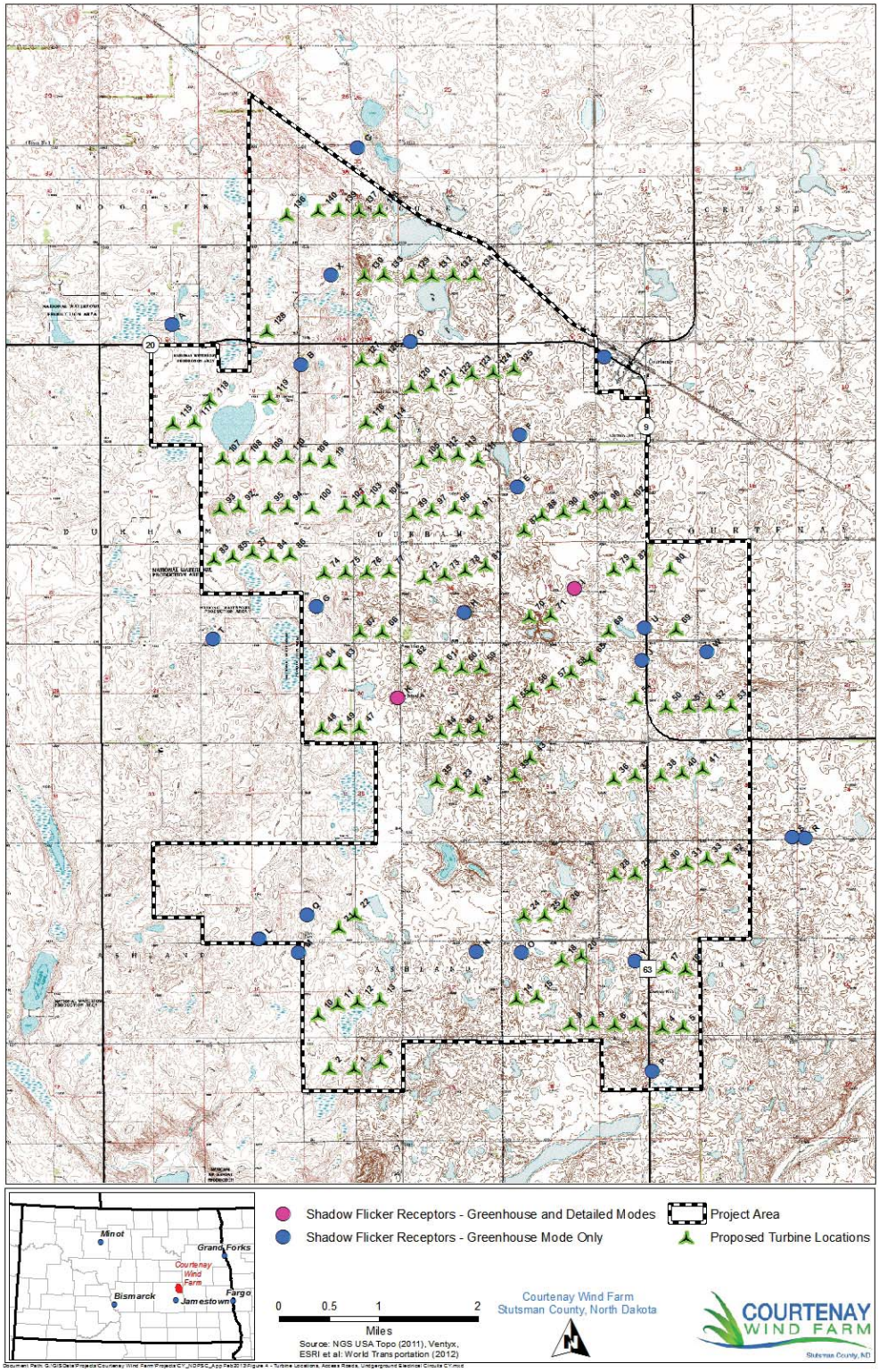


Figure 1 - Courtenay Wind Farm turbine layout and shadow flicker receptors

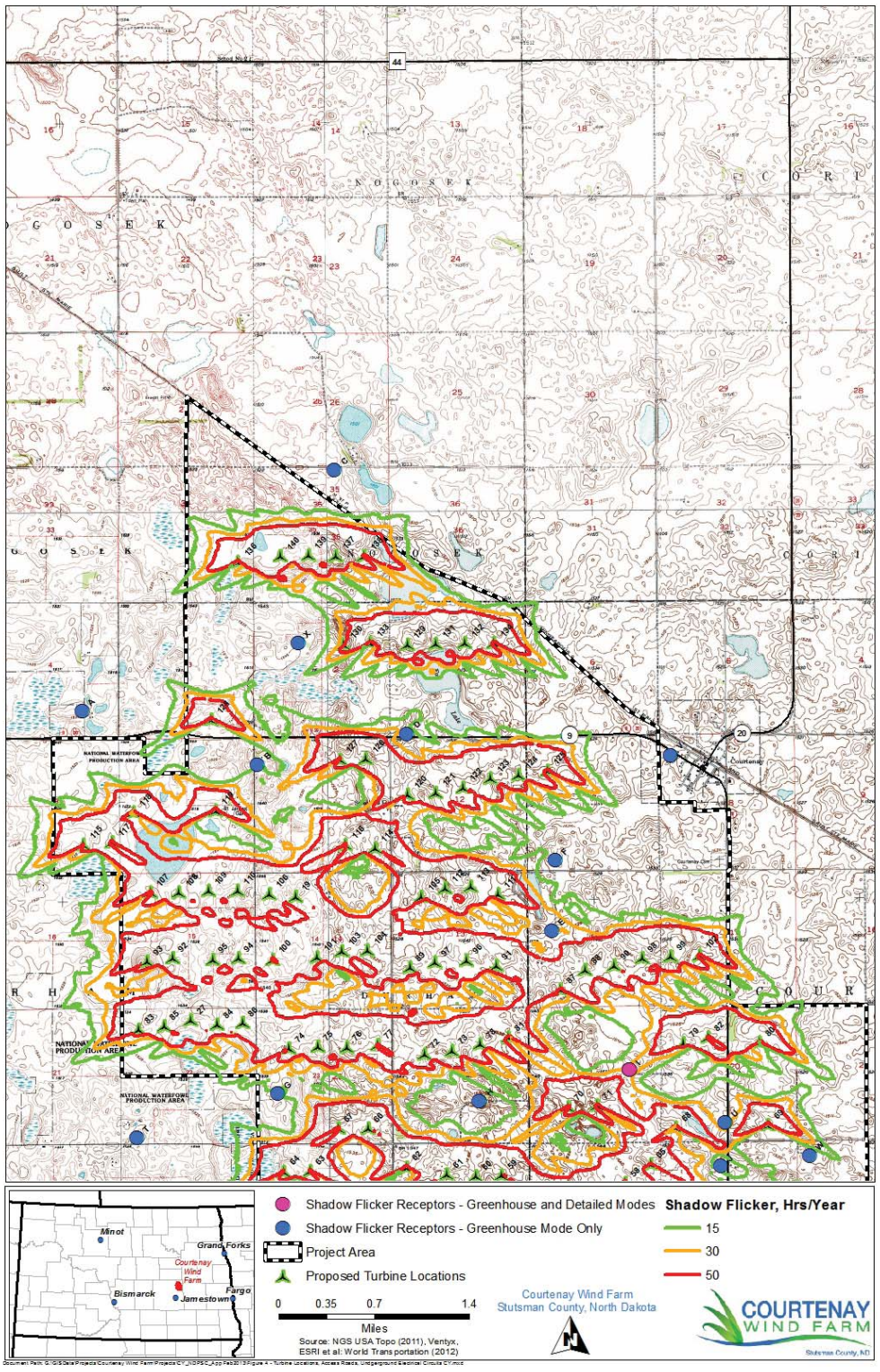


Figure 2 - WindPRO calculated shadow flicker impacts

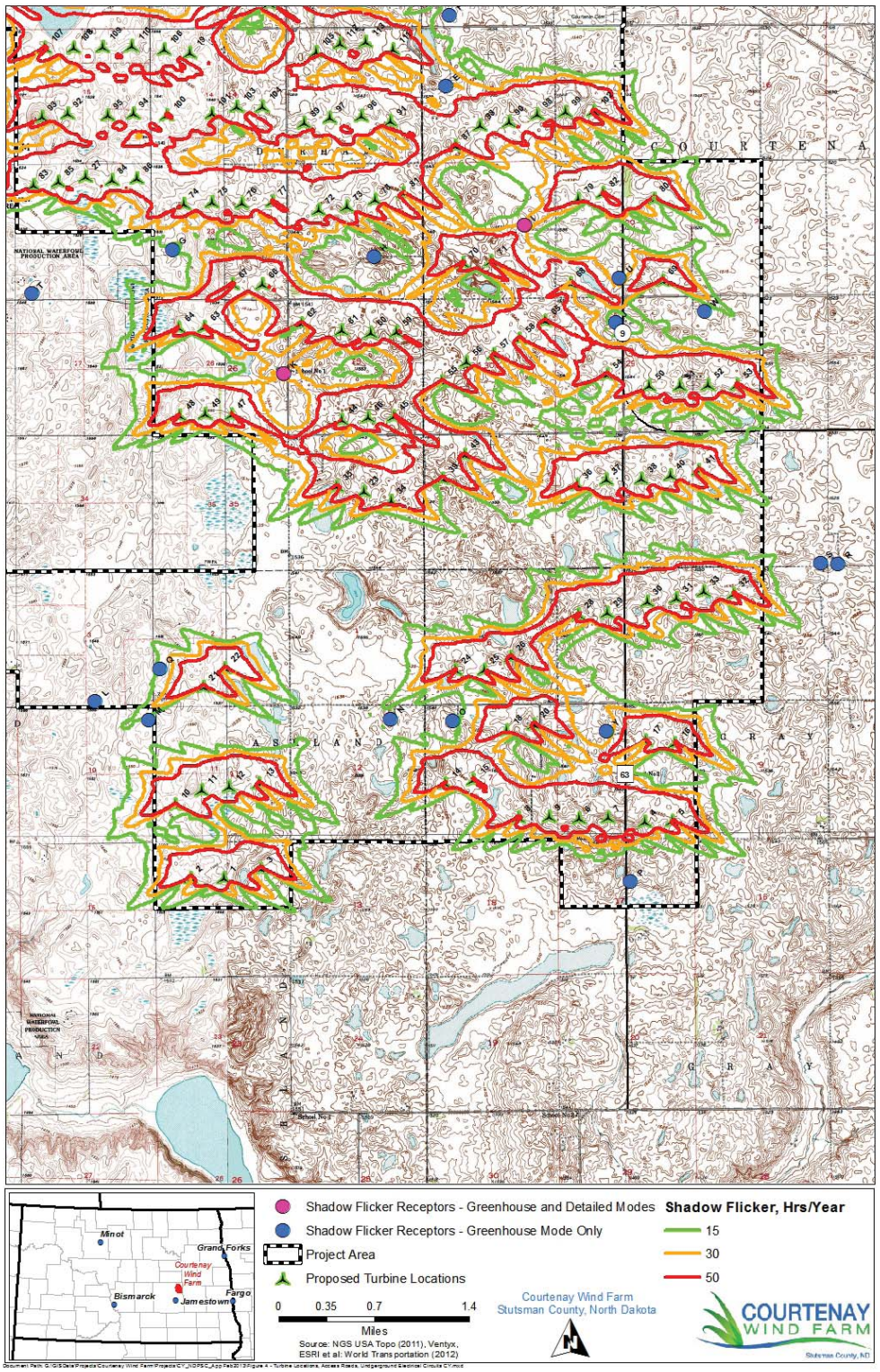


Figure 3 - WindPRO calculated shadow flicker impacts (cont.)

APPENDIX A. WINDPRO MODEL REPORTS

Project:
Courtenay

Description:
Courtenay Wind Farm

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Licensed user:
Geronimo Wind Energy
7650 Edinborough Way
US-EDINA, MN 55435
952 988 9000
Michael Morris / michael@geronimowind.com

Calculated:
6/26/2013 2:15 PM/2.7.490

SHADOW - Main Result

Assumptions for shadow calculations

Maximum distance for influence	1,500	m
Minimum sun height over horizon for influence	3	°
Day step for calculation	1	days
Time step for calculation	1	minutes

Sunshine probability S (Average daily sunshine hours) [BISMARCK]

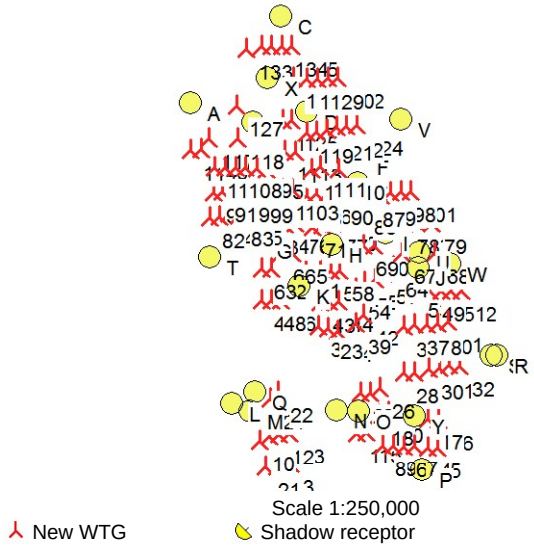
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4.92	5.13	7.45	8.03	10.20	11.21	11.69	10.35	8.68	5.69	4.02	3.69

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	472	455	456	634	863	964	474	458	792	1,260	1,215	8,760

Idle start wind speed: Cut in wind speed from power curve

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:
Height contours used: Height Contours: courtenay2.map (1)
Obstacles not used in calculation
Eye height: 1.5 m
Grid resolution: 10 m



WTGs

	UTM NAD83 Zone: 14 East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	RPM
	UTM NAD83 Zone: 14		[m]					[kW]	[m]	[m]	[RPM]
1	528,385	5,218,628	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
2	527,990	5,218,630	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
3	528,823	5,218,739	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
4	533,382	5,219,293	475.9	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
5	533,712	5,219,306	473.2	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
6	532,601	5,219,337	477.7	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
7	532,949	5,219,349	476.8	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
8	531,887	5,219,349	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
9	532,247	5,219,355	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
10	527,804	5,219,498	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
11	528,121	5,219,667	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
12	528,449	5,219,712	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
13	528,805	5,219,749	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
14	531,014	5,219,751	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
15	531,352	5,219,794	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
16	533,743	5,220,232	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
17	533,396	5,220,256	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
18	531,743	5,220,378	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
19	527,984	5,228,437	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
20	532,067	5,220,456	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
21	528,139	5,220,901	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
22	528,398	5,221,120	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
23	530,047	5,223,219	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
24	531,139	5,221,103	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
25	531,476	5,221,103	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
26	531,789	5,221,249	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
27	526,743	5,226,968	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
28	532,596	5,221,762	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
29	532,939	5,221,783	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
30	533,413	5,221,916	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2

To be continued on next page...

Project:
Courtenay

Description:
Courtenay Wind Farm

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Licensed user:
Geronimo Wind Energy
7650 Edinborough Way
US-EDINA, MN 55435
952 988 9000
Michael Morris / michael@geronimowind.com

Calculated:
6/26/2013 2:15 PM/2.7.490

SHADOW - Main Result

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	UTM NAD83 Zone: 14				WTG type						
	East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	RPM
	UTM NAD83 Zone: 14		[m]					[kW]	[m]	[m]	[RPM]
31	533,760	5,221,949	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
32	534,437	5,222,008	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
33	534,089	5,222,029	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
34	530,370	5,223,114	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
35	529,727	5,223,282	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
36	532,583	5,223,304	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
37	532,928	5,223,361	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
38	533,350	5,223,372	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
39	530,982	5,223,375	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
40	533,687	5,223,411	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
41	534,025	5,223,470	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
42	531,241	5,223,660	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
43	529,790	5,224,071	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
44	530,402	5,224,114	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
45	530,095	5,224,101	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
46	528,472	5,224,135	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
47	527,861	5,224,126	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
48	528,166	5,224,139	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
49	533,436	5,224,475	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
50	533,799	5,224,480	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
51	534,140	5,224,492	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
52	534,480	5,224,492	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
53	532,935	5,224,613	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
54	530,973	5,224,529	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
55	531,266	5,224,761	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
56	531,592	5,224,852	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
57	531,897	5,225,035	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
58	530,435	5,225,120	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
59	530,131	5,225,111	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
60	529,785	5,225,137	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
61	529,304	5,225,220	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
62	528,155	5,225,174	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
63	527,848	5,225,169	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
64	532,201	5,225,252	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
65	528,846	5,225,680	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
66	528,490	5,225,683	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
67	532,500	5,225,693	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
68	533,596	5,225,726	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
69	531,227	5,225,940	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
70	531,563	5,225,956	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
71	529,516	5,226,563	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
72	529,848	5,226,610	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
73	527,906	5,226,636	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
74	528,248	5,226,655	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
75	528,594	5,226,650	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
76	528,960	5,226,672	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
77	530,182	5,226,685	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
78	532,595	5,226,699	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
79	533,494	5,226,703	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
80	530,516	5,226,766	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
81	532,889	5,226,766	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
82	526,122	5,226,857	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
83	527,054	5,226,921	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
84	526,421	5,226,898	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2

To be continued on next page...

Project:
Courtenay

Description:
Courtenay Wind Farm

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6/26/2013 2:50 PM / 3

Licensed user:
Geronimo Wind Energy
7650 Edinborough Way
US-EDINA, MN 55435
952 988 9000
Michael Morris / michael@geronimowind.com

Calculated:
6/26/2013 2:15 PM/2.7.490

SHADOW - Main Result

...continued from previous page

	UTM NAD83 Zone: 14				WTG type						
	East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	RPM
	UTM NAD83 Zone: 14		[m]					[kW]	[m]	[m]	[RPM]
85	527,355	5,226,943	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
86	531,134	5,227,331	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
87	531,427	5,227,572	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
88	529,341	5,227,597	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
89	531,769	5,227,616	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
90	530,367	5,227,617	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
91	526,525	5,227,712	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
92	526,223	5,227,672	473.4	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
93	527,306	5,227,712	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
94	527,002	5,227,694	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
95	530,018	5,227,684	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
96	529,644	5,227,659	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
97	532,103	5,227,708	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
98	532,442	5,227,730	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
99	527,711	5,227,694	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
100	528,241	5,227,718	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
101	532,781	5,227,746	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
102	528,537	5,227,794	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
103	528,842	5,227,799	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
104	529,476	5,228,440	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
105	527,672	5,228,474	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
106	526,259	5,228,491	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
107	526,600	5,228,491	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
108	526,948	5,228,509	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
109	527,293	5,228,512	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
110	530,389	5,228,472	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
111	529,765	5,228,540	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
112	530,070	5,228,561	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
113	528,925	5,229,019	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
114	525,466	5,229,055	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
115	528,580	5,229,064	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
116	525,804	5,229,088	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
117	526,057	5,229,448	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
118	527,028	5,229,470	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
119	529,317	5,229,656	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
120	529,650	5,229,681	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
121	529,979	5,229,744	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
122	530,299	5,229,852	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
123	530,634	5,229,890	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
124	530,976	5,229,937	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
125	528,818	5,230,081	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
126	528,509	5,230,078	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
127	526,979	5,230,550	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
128	529,311	5,231,442	462.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
129	529,653	5,231,452	464.6	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
130	529,994	5,231,459	467.5	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
131	528,871	5,231,463	464.8	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
132	530,342	5,231,464	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
133	527,300	5,232,427	468.9	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
134	528,466	5,232,501	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
135	528,803	5,232,499	464.1	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
136	528,134	5,232,506	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
137	527,807	5,232,497	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2

Project: **Courtenay**

Description: Courtenay Wind Farm

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Licensed user:
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US-EDINA, MN 55435
952 988 9000
Michael Morris / michael@geronimowind.com

Calculated: 6/26/2013 2:15 PM/2.7.490

SHADOW - Main Result

Shadow receptor-Input

UTM NAD83 Zone: 14

No.	East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
A	525,448	5,230,641	470.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
B	527,529	5,229,999	470.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
C	528,444	5,233,508	460.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
D	529,306	5,230,370	468.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
E	531,027	5,228,025	470.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
F	531,067	5,228,868	470.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
G	527,776	5,226,085	470.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
H	530,166	5,225,996	470.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
I	531,953	5,226,370	470.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
J	533,042	5,225,222	470.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
K	529,091	5,224,607	470.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
L	526,858	5,220,718	475.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
M	527,492	5,220,490	470.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
N	530,363	5,220,505	470.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
O	531,101	5,220,486	470.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
P	533,213	5,218,579	470.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
Q	527,623	5,221,105	471.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R	535,682	5,222,347	470.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
S	535,471	5,222,358	470.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
T	526,104	5,225,559	470.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
U	533,083	5,225,741	470.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
V	532,440	5,230,119	470.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
W	534,095	5,225,352	470.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
X	528,014	5,231,449	470.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
Y	532,932	5,220,358	470.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"

Calculation Results

Shadow receptor

No.	Shadow, worst case: Shadow hours per year [h/year]	Shadow, worst case: Shadow days per year [days/year]	Shadow, worst case: Max shadow hours per day [h/day]	Shadow, expected values: Shadow hours per year [h/year]
A	0:00	0	0:00	0:00
B	42:59	90	0:50	12:30
C	0:00	0	0:00	0:00
D	77:59	135	1:06	24:21
E	105:12	246	0:59	38:16
F	25:45	81	0:31	7:34
G	28:41	112	0:30	10:49
H	34:31	152	0:23	12:48
I	112:35	230	0:44	36:24
J	32:35	143	0:28	12:24
K	97:33	234	0:59	34:48
L	3:17	20	0:14	1:20
M	23:03	99	0:20	8:50
N	24:16	129	0:19	9:54
O	28:25	57	0:45	12:26
P	0:00	0	0:00	0:00
Q	44:21	96	0:42	17:39
R	3:28	21	0:16	1:09
S	8:23	39	0:20	2:41
T	0:00	0	0:00	0:00
U	70:03	109	1:22	28:30

To be continued on next page...

Project:
Courtenay

Description:
Courtenay Wind Farm

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US-EDINA, MN 55435
952 988 9000
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Calculated:
6/26/2013 2:15 PM/2.7.490

SHADOW - Main Result

...continued from previous page

	Shadow, worst case			Shadow, expected values
No.	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow hours per year [h/year]
V	2:03	16	0:12	0:51
W	4:06	27	0:15	1:08
X	20:06	80	0:27	6:50
Y	58:25	102	0:59	25:29

Total amount of flickering on the shadow receptors caused by each WTG

No.	Name	Worst case [h/year]	Expected [h/year]
1	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1290)	0:00	0:00
2	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1291)	0:00	0:00
3	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1292)	0:00	0:00
4	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1293)	0:00	0:00
5	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1294)	0:00	0:00
6	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1295)	0:00	0:00
7	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1296)	0:00	0:00
8	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1297)	0:00	0:00
9	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1298)	0:00	0:00
10	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1299)	0:00	0:00
11	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1300)	0:00	0:00
12	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1301)	12:45	4:23
13	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1302)	0:00	0:00
14	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1303)	0:00	0:00
15	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1304)	8:08	2:53
16	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1305)	11:54	5:12
17	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1306)	38:31	16:41
18	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1307)	26:41	11:38
19	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1308)	0:00	0:00
20	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1309)	19:09	8:30
21	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1310)	43:59	17:12
22	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1311)	13:57	5:58
23	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1312)	0:00	0:00
24	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1313)	0:00	0:00
25	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1314)	13:26	5:38
26	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1315)	0:00	0:00
27	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1316)	0:00	0:00
28	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1317)	0:00	0:00
29	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1318)	0:00	0:00
30	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1319)	0:00	0:00
31	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1320)	0:00	0:00
32	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1321)	8:29	2:42
33	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1322)	2:22	0:49
34	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1323)	0:00	0:00
35	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1324)	0:00	0:00
36	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1325)	0:00	0:00
37	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1326)	0:00	0:00
38	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1327)	0:00	0:00
39	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1328)	0:00	0:00
40	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1329)	0:00	0:00
41	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1330)	0:00	0:00
42	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1331)	0:00	0:00
43	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1332)	22:44	7:06
44	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1333)	2:52	0:56
45	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1334)	6:37	2:04

To be continued on next page...

Project:
Courtenay

Description:
Courtenay Wind Farm

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6/26/2013 2:50 PM / 6

Licensed user:
Geronimo Wind Energy
7650 Edinborough Way
US-EDINA, MN 55435
952 988 9000
Michael Morris / michael@geronimowind.com

Calculated:
6/26/2013 2:15 PM/2.7.490

SHADOW - Main Result

...continued from previous page

No.	Name	Worst case [h/year]	Expected [h/year]
46	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1335)	25:52	7:56
47	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1336)	3:22	1:06
48	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1337)	7:57	2:31
49	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1338)	0:00	0:00
50	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1339)	8:53	2:51
51	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1340)	5:26	1:56
52	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1341)	0:00	0:00
53	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1342)	4:06	1:08
54	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1343)	0:00	0:00
55	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1344)	0:00	0:00
56	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1345)	1:57	0:39
57	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1346)	8:24	2:50
58	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1347)	3:27	1:27
59	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1348)	10:59	4:57
60	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1349)	0:00	0:00
61	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1350)	14:13	3:32
62	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1351)	8:24	4:20
63	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1352)	5:11	2:23
64	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1353)	20:42	7:32
65	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1354)	8:21	2:59
66	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1355)	15:49	5:33
67	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1356)	25:37	11:00
68	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1357)	34:28	14:51
69	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1358)	20:58	6:48
70	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1359)	53:02	13:49
71	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1360)	0:00	0:00
72	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1361)	0:00	0:00
73	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1362)	0:00	0:00
74	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1363)	0:00	0:00
75	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1364)	0:07	0:02
76	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1365)	17:56	8:39
77	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1366)	0:00	0:00
78	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1367)	37:41	15:50
79	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1368)	0:00	0:00
80	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1369)	2:27	1:07
81	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1370)	12:30	5:14
82	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1371)	0:00	0:00
83	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1372)	0:00	0:00
84	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1373)	0:00	0:00
85	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1374)	0:00	0:00
86	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1375)	0:00	0:00
87	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1376)	35:37	11:57
88	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1377)	0:00	0:00
89	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1378)	14:23	4:31
90	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1379)	18:33	5:38
91	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1380)	0:00	0:00
92	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1381)	0:00	0:00
93	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1382)	0:00	0:00
94	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1383)	0:00	0:00
95	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1384)	6:20	2:06
96	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1385)	2:23	0:52
97	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1386)	5:29	1:54
98	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1387)	2:21	0:54
99	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1388)	0:00	0:00
100	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1389)	0:00	0:00
101	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1390)	0:00	0:00

To be continued on next page...

Project:
Courtenay

Description:
Courtenay Wind Farm

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6/26/2013 2:50 PM / 7

Licensed user:
Geronimo Wind Energy
7650 Edinborough Way
US-EDINA, MN 55435
952 988 9000
Michael Morris / michael@geronimowind.com

Calculated:
6/26/2013 2:15 PM/2.7.490

SHADOW - Main Result

...continued from previous page

No.	Name	Worst case [h/year]	Expected [h/year]
102	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1391)	0:00	0:00
103	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1392)	0:00	0:00
104	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1393)	0:00	0:00
105	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1394)	0:00	0:00
106	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1395)	0:00	0:00
107	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1396)	0:00	0:00
108	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1397)	0:00	0:00
109	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1398)	0:00	0:00
110	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1399)	17:18	4:49
111	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1400)	7:28	3:18
112	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1401)	22:32	10:27
113	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1402)	0:00	0:00
114	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1403)	0:00	0:00
115	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1404)	7:29	1:58
116	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1405)	0:00	0:00
117	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1406)	0:00	0:00
118	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1407)	27:20	7:12
119	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1408)	0:00	0:00
120	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1409)	0:00	0:00
121	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1410)	22:16	7:28
122	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1411)	6:56	2:03
123	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1412)	2:53	0:53
124	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1413)	2:03	0:51
125	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1414)	37:32	11:35
126	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1415)	19:50	7:03
127	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1416)	9:31	2:23
128	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1417)	2:48	1:13
129	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1419)	0:00	0:00
130	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1420)	0:00	0:00
131	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1421)	10:28	4:29
132	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1422)	0:00	0:00
133	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1423)	0:00	0:00
134	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1424)	0:00	0:00
135	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1425)	0:00	0:00
136	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1426)	0:00	0:00
137	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1427)	0:00	0:00

Project:
Courtenay

Description:
Courtenay Wind Farm

Printed/Page
6/26/2013 2:54 PM / 1

Licensed user:
Geronimo Wind Energy
7650 Edinborough Way
US-EDINA, MN 55435
952 988 9000
Michael Morris / michael@geronimowind.com

Calculated:
6/26/2013 2:52 PM/2.7.490

SHADOW - Main Result

Assumptions for shadow calculations

Maximum distance for influence	1,500	m
Minimum sun height over horizon for influence	3	°
Day step for calculation	1	days
Time step for calculation	1	minutes

Sunshine probability S (Average daily sunshine hours) [BISMARCK]

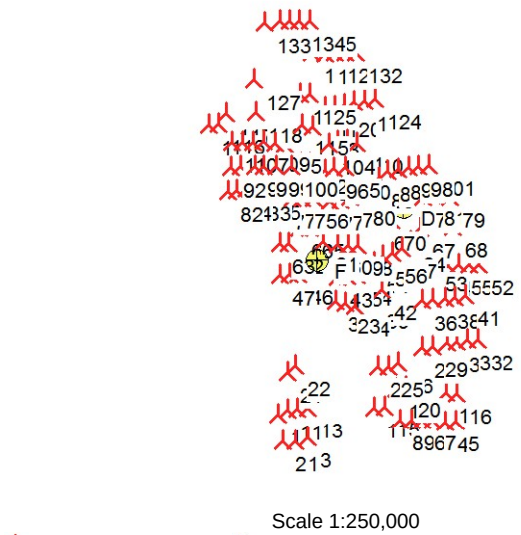
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4.92	5.13	7.45	8.03	10.20	11.21	11.69	10.35	8.68	5.69	4.02	3.69

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	472	455	456	634	863	964	474	458	792	1,260	1,215	8,760

Idle start wind speed: Cut in wind speed from power curve

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values.
A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:
Height contours used: Height Contours: courtenay2.map (1)
Area object(s) used in calculation:
Area object (ZVI): ZVI_REGIONS_courtenay_3.w2r (17)
Obstacles used in calculation
Eye height: 1.5 m
Grid resolution: 10 m



Scale 1:250,000

New WTG Shadow receptor

WTGs

	UTM NAD83 Zone: 14 East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	RPM
	UTM NAD83 Zone: 14		[m]					[kW]	[m]	[m]	[RPM]
1	528,385	5,218,628	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
2	527,990	5,218,630	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
3	528,823	5,218,739	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
4	533,382	5,219,293	475.9	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
5	533,712	5,219,306	473.2	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
6	532,601	5,219,337	477.7	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
7	532,949	5,219,349	476.8	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
8	531,887	5,219,349	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
9	532,247	5,219,355	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
10	527,804	5,219,498	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
11	528,121	5,219,667	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
12	528,449	5,219,712	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
13	528,805	5,219,749	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
14	531,014	5,219,751	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
15	531,352	5,219,794	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
16	533,743	5,220,232	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
17	533,396	5,220,256	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
18	531,743	5,220,378	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
19	527,984	5,228,437	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
20	532,067	5,220,456	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
21	528,139	5,220,901	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
22	528,398	5,221,120	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
23	530,047	5,223,219	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
24	531,139	5,221,103	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
25	531,476	5,221,103	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
26	531,789	5,221,249	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
27	526,743	5,226,968	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
28	532,596	5,221,762	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2

To be continued on next page...

Project:
Courtenay

Description:
Courtenay Wind Farm

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6/26/2013 2:54 PM / 2

Licensed user:
Geronimo Wind Energy
7650 Edinborough Way
US-EDINA, MN 55435
952 988 9000
Michael Morris / michael@geronimowind.com

Calculated:
6/26/2013 2:52 PM/2.7.490

SHADOW - Main Result

...continued from previous page

	UTM NAD83 Zone: 14 East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	RPM
	UTM NAD83 Zone: 14		[m]					[kW]	[m]	[m]	[RPM]
29	532,939	5,221,783	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
30	533,413	5,221,916	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
31	533,760	5,221,949	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
32	534,437	5,222,008	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
33	534,089	5,222,029	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
34	530,370	5,223,114	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
35	529,727	5,223,282	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
36	532,583	5,223,304	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
37	532,928	5,223,361	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
38	533,350	5,223,372	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
39	530,982	5,223,375	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
40	533,687	5,223,411	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
41	534,025	5,223,470	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
42	531,241	5,223,660	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
43	529,790	5,224,071	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
44	530,402	5,224,114	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
45	530,095	5,224,101	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
46	528,472	5,224,135	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
47	527,861	5,224,126	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
48	528,166	5,224,139	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
49	533,436	5,224,475	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
50	533,799	5,224,480	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
51	534,140	5,224,492	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
52	534,480	5,224,492	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
53	532,935	5,224,613	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
54	530,973	5,224,529	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
55	531,266	5,224,761	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
56	531,592	5,224,852	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
57	531,897	5,225,035	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
58	530,435	5,225,120	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
59	530,131	5,225,111	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
60	529,785	5,225,137	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
61	529,304	5,225,220	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
62	528,155	5,225,174	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
63	527,848	5,225,169	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
64	532,201	5,225,252	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
65	528,846	5,225,680	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
66	528,490	5,225,683	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
67	532,500	5,225,693	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
68	533,596	5,225,726	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
69	531,227	5,225,940	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
70	531,563	5,225,956	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
71	529,516	5,226,563	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
72	529,848	5,226,610	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
73	527,906	5,226,636	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
74	528,248	5,226,655	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
75	528,594	5,226,650	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
76	528,960	5,226,672	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
77	530,182	5,226,685	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
78	532,595	5,226,699	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
79	533,494	5,226,703	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
80	530,516	5,226,766	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
81	532,889	5,226,766	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
82	526,122	5,226,857	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2

To be continued on next page...

Project:
Courtenay

Description:
Courtenay Wind Farm

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6/26/2013 2:54 PM / 3

Licensed user:
Geronimo Wind Energy
7650 Edinborough Way
US-EDINA, MN 55435
952 988 9000
Michael Morris / michael@geronimowind.com

Calculated:
6/26/2013 2:52 PM/2.7.490

SHADOW - Main Result

...continued from previous page

	UTM NAD83 Zone: 14				WTG type						
	East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	RPM
	UTM NAD83 Zone: 14		[m]					[kW]	[m]	[m]	[RPM]
83	527,054	5,226,921	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
84	526,421	5,226,898	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
85	527,355	5,226,943	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
86	531,134	5,227,331	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
87	531,427	5,227,572	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
88	529,341	5,227,597	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
89	531,769	5,227,616	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
90	530,367	5,227,617	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
91	526,525	5,227,712	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
92	526,223	5,227,672	473.4	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
93	527,306	5,227,712	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
94	527,002	5,227,694	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
95	530,018	5,227,684	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
96	529,644	5,227,659	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
97	532,103	5,227,708	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
98	532,442	5,227,730	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
99	527,711	5,227,694	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
100	528,241	5,227,718	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
101	532,781	5,227,746	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
102	528,537	5,227,794	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
103	528,842	5,227,799	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
104	529,476	5,228,440	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
105	527,672	5,228,474	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
106	526,259	5,228,491	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
107	526,600	5,228,491	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
108	526,948	5,228,509	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
109	527,293	5,228,512	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
110	530,389	5,228,472	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
111	529,765	5,228,540	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
112	530,070	5,228,561	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
113	528,925	5,229,019	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
114	525,466	5,229,055	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
115	528,580	5,229,064	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
116	525,804	5,229,088	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
117	526,057	5,229,448	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
118	527,028	5,229,470	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
119	529,317	5,229,656	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
120	529,650	5,229,681	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
121	529,979	5,229,744	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
122	530,299	5,229,852	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
123	530,634	5,229,890	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
124	530,976	5,229,937	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
125	528,818	5,230,081	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
126	528,509	5,230,078	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
127	526,979	5,230,550	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
128	529,311	5,231,442	462.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
129	529,653	5,231,452	464.6	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
130	529,994	5,231,459	467.5	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
131	528,871	5,231,463	464.8	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
132	530,342	5,231,464	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
133	527,300	5,232,427	468.9	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
134	528,466	5,232,501	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
135	528,803	5,232,499	464.1	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2
136	528,134	5,232,506	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2

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Project: **Courtenay**
Description: Courtenay Wind Farm
Printed/Page: 6/26/2013 2:54 PM / 4
Licensed user:
Geronimo Wind Energy
7650 Edinborough Way
US-EDINA, MN 55435
952 988 9000
Michael Morris / michael@geronimowind.com
Calculated: 6/26/2013 2:52 PM/2.7.490

SHADOW - Main Result

...continued from previous page

	UTM NAD83 Zone: 14 East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	RPM
	UTM NAD83 Zone: 14		[m]					[kW]	[m]	[m]	[RPM]
137	527,807	5,232,497	470.0	VESTAS V100-1.8Gri...	Yes	VESTAS	V100-1.8GridStreamer-1,800	1,800	100.0	80.0	15.2

Shadow receptor-Input

No.	UTM NAD83 Zone: 14 East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
A	531,953	5,226,370	470.0	1.0	1.0	1.0	0.0	90.0	Fixed direction
B	531,953	5,226,370	470.0	1.0	1.0	1.0	-90.0	90.0	Fixed direction
C	531,953	5,226,370	470.0	1.0	1.0	1.0	90.0	90.0	Fixed direction
D	531,953	5,226,370	470.0	1.0	1.0	1.0	-180.0	90.0	Fixed direction
E	529,091	5,224,607	470.0	1.0	1.0	1.0	0.0	90.0	Fixed direction
F	529,091	5,224,607	470.0	1.0	1.0	1.0	90.0	90.0	Fixed direction
G	529,091	5,224,607	470.0	1.0	1.0	1.0	-90.0	90.0	Fixed direction
H	529,091	5,224,607	470.0	1.0	1.0	1.0	-180.0	90.0	Fixed direction

Calculation Results

Shadow receptor

No.	Shadow, worst case Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow, expected values Shadow hours per year [h/year]
A	14:36	44	0:29	4:02
B	0:00	0	0:00	0:00
C	14:48	46	0:29	4:05
D	0:00	0	0:00	0:00
E	33:37	101	0:32	9:13
F	33:43	101	0:32	9:15
G	0:00	0	0:00	0:00
H	0:00	0	0:00	0:00

Total amount of flickering on the shadow receptors caused by each WTG

No.	Name	Worst case [h/year]	Expected [h/year]
1	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1290)	0:00	0:00
2	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1291)	0:00	0:00
3	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1292)	0:00	0:00
4	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1293)	0:00	0:00
5	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1294)	0:00	0:00
6	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1295)	0:00	0:00
7	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1296)	0:00	0:00
8	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1297)	0:00	0:00
9	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1298)	0:00	0:00
10	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1299)	0:00	0:00
11	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1300)	0:00	0:00
12	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1301)	0:00	0:00
13	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1302)	0:00	0:00
14	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1303)	0:00	0:00
15	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1304)	0:00	0:00
16	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1305)	0:00	0:00
17	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1306)	0:00	0:00

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Project:
Courtenay

Description:
Courtenay Wind Farm

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6/26/2013 2:54 PM / 5

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US-EDINA, MN 55435
952 988 9000
Michael Morris / michael@geronimowind.com

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6/26/2013 2:52 PM/2.7.490

SHADOW - Main Result

...continued from previous page

No.	Name	Worst case [h/year]	Expected [h/year]
18	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1307)	0:00	0:00
19	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1308)	0:00	0:00
20	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1309)	0:00	0:00
21	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1310)	0:00	0:00
22	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1311)	0:00	0:00
23	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1312)	0:00	0:00
24	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1313)	0:00	0:00
25	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1314)	0:00	0:00
26	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1315)	0:00	0:00
27	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1316)	0:00	0:00
28	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1317)	0:00	0:00
29	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1318)	0:00	0:00
30	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1319)	0:00	0:00
31	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1320)	0:00	0:00
32	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1321)	0:00	0:00
33	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1322)	0:00	0:00
34	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1323)	0:00	0:00
35	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1324)	0:00	0:00
36	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1325)	0:00	0:00
37	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1326)	0:00	0:00
38	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1327)	0:00	0:00
39	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1328)	0:00	0:00
40	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1329)	0:00	0:00
41	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1330)	0:00	0:00
42	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1331)	0:00	0:00
43	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1332)	0:00	0:00
44	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1333)	0:00	0:00
45	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1334)	0:00	0:00
46	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1335)	25:43	6:57
47	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1336)	0:00	0:00
48	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1337)	8:00	2:17
49	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1338)	0:00	0:00
50	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1339)	0:00	0:00
51	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1340)	0:00	0:00
52	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1341)	0:00	0:00
53	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1342)	0:00	0:00
54	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1343)	0:00	0:00
55	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1344)	0:00	0:00
56	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1345)	0:00	0:00
57	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1346)	0:00	0:00
58	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1347)	0:00	0:00
59	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1348)	0:00	0:00
60	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1349)	0:00	0:00
61	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1350)	0:00	0:00
62	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1351)	0:00	0:00
63	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1352)	0:00	0:00
64	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1353)	0:00	0:00
65	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1354)	0:00	0:00
66	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1355)	0:00	0:00
67	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1356)	0:00	0:00
68	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1357)	0:00	0:00
69	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1358)	14:46	4:04
70	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1359)	0:00	0:00
71	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1360)	0:00	0:00
72	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1361)	0:00	0:00
73	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1362)	0:00	0:00

To be continued on next page...

Project:
Courtenay

Description:
Courtenay Wind Farm

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Licensed user:
Geronimo Wind Energy
7650 Edinborough Way
US-EDINA, MN 55435
952 988 9000
Michael Morris / michael@geronimowind.com

Calculated:
6/26/2013 2:52 PM/2.7.490

SHADOW - Main Result

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No.	Name	Worst case [h/year]	Expected [h/year]
74	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1363)	0:00	0:00
75	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1364)	0:00	0:00
76	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1365)	0:00	0:00
77	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1366)	0:00	0:00
78	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1367)	0:00	0:00
79	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1368)	0:00	0:00
80	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1369)	0:00	0:00
81	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1370)	0:00	0:00
82	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1371)	0:00	0:00
83	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1372)	0:00	0:00
84	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1373)	0:00	0:00
85	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1374)	0:00	0:00
86	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1375)	0:00	0:00
87	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1376)	0:00	0:00
88	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1377)	0:00	0:00
89	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1378)	0:00	0:00
90	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1379)	0:00	0:00
91	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1380)	0:00	0:00
92	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1381)	0:00	0:00
93	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1382)	0:00	0:00
94	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1383)	0:00	0:00
95	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1384)	0:00	0:00
96	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1385)	0:00	0:00
97	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1386)	0:00	0:00
98	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1387)	0:00	0:00
99	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1388)	0:00	0:00
100	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1389)	0:00	0:00
101	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1390)	0:00	0:00
102	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1391)	0:00	0:00
103	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1392)	0:00	0:00
104	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1393)	0:00	0:00
105	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1394)	0:00	0:00
106	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1395)	0:00	0:00
107	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1396)	0:00	0:00
108	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1397)	0:00	0:00
109	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1398)	0:00	0:00
110	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1399)	0:00	0:00
111	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1400)	0:00	0:00
112	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1401)	0:00	0:00
113	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1402)	0:00	0:00
114	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1403)	0:00	0:00
115	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1404)	0:00	0:00
116	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1405)	0:00	0:00
117	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1406)	0:00	0:00
118	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1407)	0:00	0:00
119	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1408)	0:00	0:00
120	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1409)	0:00	0:00
121	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1410)	0:00	0:00
122	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1411)	0:00	0:00
123	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1412)	0:00	0:00
124	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1413)	0:00	0:00
125	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1414)	0:00	0:00
126	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1415)	0:00	0:00
127	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1416)	0:00	0:00
128	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1417)	0:00	0:00
129	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1419)	0:00	0:00

To be continued on next page...

Project:
Courtenay

Description:
Courtenay Wind Farm

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6/26/2013 2:54 PM / 7

Licensed user:
Geronimo Wind Energy
7650 Edinborough Way
US-EDINA, MN 55435
952 988 9000
Michael Morris / michael@geronimowind.com

Calculated:
6/26/2013 2:52 PM/2.7.490

SHADOW - Main Result

...continued from previous page

No.	Name	Worst case [h/year]	Expected [h/year]
130	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1420)	0:00	0:00
131	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1421)	0:00	0:00
132	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1422)	0:00	0:00
133	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1423)	0:00	0:00
134	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1424)	0:00	0:00
135	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1425)	0:00	0:00
136	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1426)	0:00	0:00
137	VESTAS V100-1.8GridStreamer 1800 100.0 !O! hub: 80.0 m (1427)	0:00	0:00

APPENDIX B. LETTER FROM DAVID AND CLAUDIA SOUPIR (RECEPTOR E)

June 27, 2013
115 1 St. W
Courtenay, AB
T5N 2G6

Sir:

I am writing to state that the residence we own in the NE W½ of section 18, Township 143, Range 62 is unoccupied, not currently livable, and we don't intend to maintain it for habitation or allow it to be lived in.

Sincerely,
Claudia Soupir
Darold Soupir

APPENDIX C. PHOTOS OF RECEPTOR I

Figure 4 - Photo of Receptor I, facing north from driveway.

Figure 5 - Photo of Receptor I facing east from building site on west edge of property.

Figure 6 - Photo of Receptor I facing north from 16th Street SE

APPENDIX D. PHOTOS OF RECEPTOR K

Figure 7 – Photo of Receptor K facing north from SE 17th Street

Figure 8 - Photo of Receptor K facing east from neighboring farm field

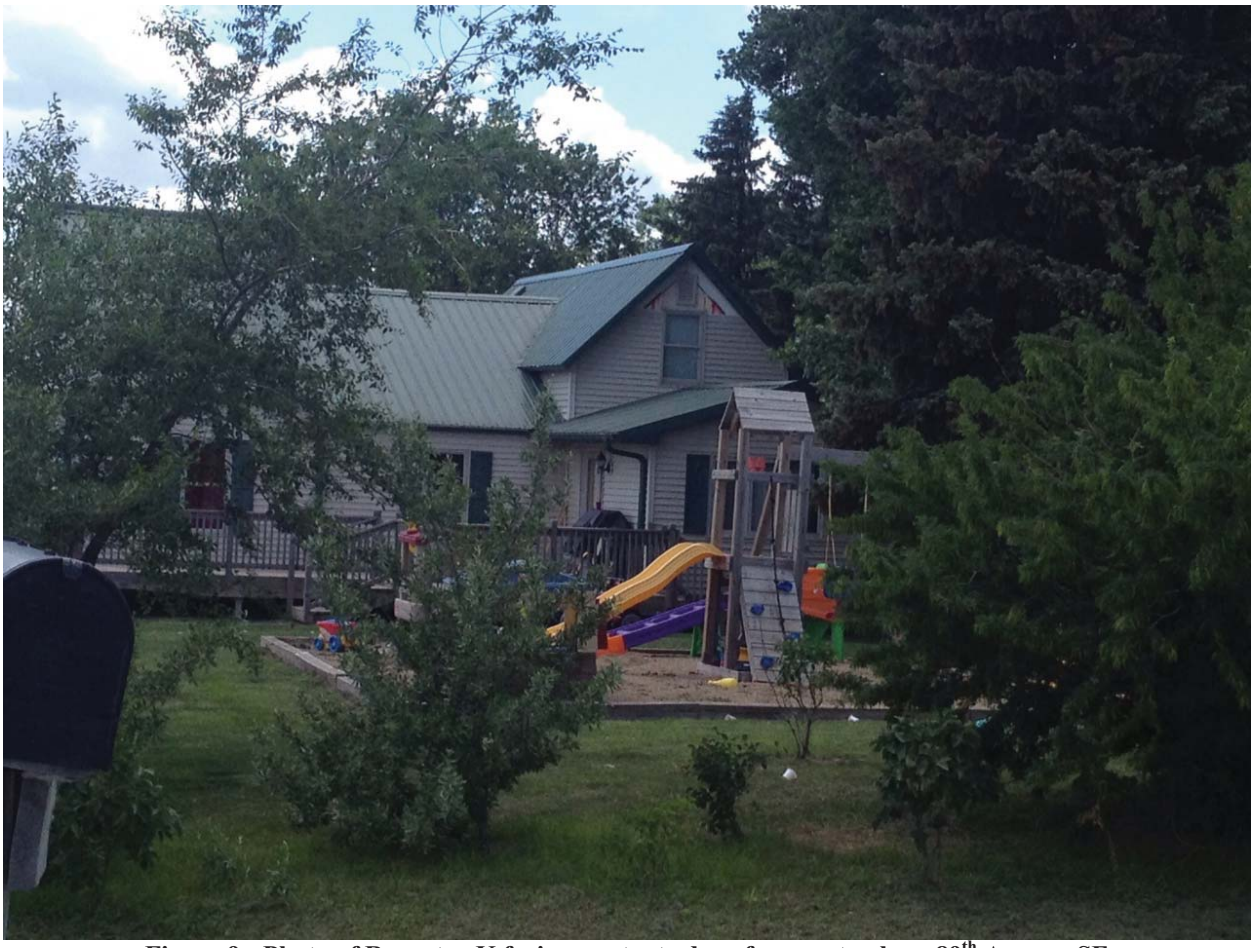

Figure 9 - Photo of Receptor K facing west, at edge of property along 89th Avenue SE

END OF DOCUMENT