Large Filing Separator Sheet

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Supplemental Appendix J

Shadow Flicker Assessment

Supplemental Appendix J

Shadow Flicker Assessment

EAPC
WIND ENERGY

Final Report
Trishe Wind Energy
Shadow Flicker Study
Haviland, Ohio

July 28,

2016

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Revision History

Revision No.	Revision Purpose	Date	Revised By
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Executive Summary

EAPC was hired by Starwood Energy Group to provide estimates of the shadow flicker potential for a proposed wind turbine layout, using five different turbine configurations, for the Trishe Wind Energy project in northwestern Ohio. Locations of area dwellings and a wind turbine layout were provided to EAPC by the client. A windPRO model was built combining digital elevation data with the information supplied to generate a shadow flicker model for the site. The resulting model was then used to perform shadow flicker calculations for the area. Based on the shadow flicker calculation, a site-wide realistic shadow flicker map was produced and an evaluation of the shadow flicker at all 266 area dwellings within one mile of any proposed turbine location was performed.

The 266 dwellings were represented in the model by omni-directional shadow receptors that simulate a 1 m x 1 m window 1 m above ground level. Reductions based on turbine operational time, turbine operational direction, and sunshine probabilities were used to calculate a realistic number of hours of shadow flicker to be expected at each shadow receptor. No obstacles were used so that shadow flicker reductions due to interference from trees and structures were not included.

The evaluation of the five separate arrays using different turbine models (GE 2.3-116 80 m hub height, GE 2.30116 94 m hub height, V110-2.0 80 m hub height, V110-2.0 95 m hub height, and V126-3.45 87 m hub height) produced varying results based on the individual turbine hub heights and rotor diameters. Modeling only the existing turbines within the vicinity of the town of Haviland resulted in five receptors (SR089, SR091, SR099, SR109, and SR114) registering more than 30 hours per year (real case). Three turbines installed at the Haviland Plastic Products are the contributors to these five receptors. Taking into consideration the new proposed turbines resulted in a minuscule increase (less than five more additional minutes a year) at these five receptors for all five arrays evaluated.

Throughout the study area, the shadow flicker is anticipated to be less than 30 hours per year (real case) for all other dwellings supplied by the client (excluding the five dwellings affected by the existing turbines) for the V110-2.0 80 m hub height, and V110-2.0 95 m hub height turbine layouts. For the GE 2.3-116 80 m hub height layout, one receptor (SR051,) was above 30 hours per year (real case). Three receptors (SR001, SR197 and SR211) were over 30 hours per year (real case) for the GE 2.3-116 94 m hub height layout. For the V126-3.45 87 m hub height layout, nine receptors (SR001, SR033, SR034, SR037, SR051, SR174, SR197, SR201 and SR211) are anticipated to have realistic shadow flicker above 30 hours per year.

1. INTRODUCTION

Starwood Energy Group hired EAPC to conduct a shadow flicker analysis for a 60 wind turbine layout located in northwestern Ohio near the town of Haviland. Five separate turbine arrays, all of which share the same 60 turbine locations, were assessed using five turbine configurations; the GE 2.3-116 with hub heights of 80 m and 94 m, the Vestas V110-2.0 with hub heights of 80 m and 95 m, and the Vestas V126-3.45 with a hub height of 87 m. Coordinates for 266 dwellings which could potentially experience shadow flicker from the proposed wind farm were also supplied.

2. BACKGROUND

Shadow flicker from wind turbines occurs when rotating wind turbine blades move between the sun and the observer. Shadow flicker is generally experienced in areas near wind turbines where the distance between the observer and wind turbine blade is short enough that shadow has not been significantly diffused by the atmosphere. When the blades rotate, this shadow creates a pulsating effect, known as shadow flicker. If the blade's shadow is passing over the window of a building, it will have the effect of increasing and decreasing the light intensity in the room at a low frequency in the range of 0.5 to 1.2 Hz, hence the term "flicker". This flickering effect can also be experienced outdoors, but the effect is typically less intense, and becomes less intense when farther from the wind turbine causing the flicker. The moving shadow of a wind turbine blade on the ground is similar to the effect one experiences when driving on a road when there are shadows cast across the road by an adjacent row of trees.

This flickering effect is most noticeable within approximately 1,000 meters of the turbine, and becomes more and more diffused as the distance increases. There are no uniform standards defining what distance from the turbine is regarded as an acceptable limit beyond which, the shadow flicker is considered to be insignificant. The same applies to the number of hours of flickering that is deemed to be acceptable.

Shadow flicker is typically greatest in the winter months when the angle of the sun is lower and casts longer shadows. The effect is also more pronounced around sunrise and sunset when the sun is near the horizon and the shadows are longer. A number of factors influence the amount of shadow flicker on the shadow receptors (simulated windows). One consideration is the environment around the shadow receptor. Obstacles such as terrain, trees or buildings between the wind turbine and the receptor can significantly reduce or eliminate shadow flicker effects. Deciduous trees may block the shadow flickering effect to some degree, depending on the tree density, species present and time of year. Deciduous trees can lead to a reduction of shadow flicker during the summer when the trees are bearing leaves. However, during the winter months, these trees are without their

leaves and their impact on shadow flicker is not as significant. Coniferous trees tend to provide shading year round. For this study, no credit was taken for any potential shading effects from any type of trees or other obstacles that would reduce the number of shadow flickering hours at the structures.

Another consideration is the time of day when shadow flicker occurs. For example, a factory or office building would not be significantly affected if all the shadow flicker impact occurred before or after business hours whereas, it may be more acceptable for private homes to experience the shadow flickering during working hours when family members may be at work or school.

The climate also needs be considered when assessing shadow flicker. In areas with a significant amount of overcast weather, there would be less shadow flicker. Also, if the wind is not blowing, the turbines would not be operational and therefore not creating shadow flickering.

3. *Study Methodology*

This shadow flicker analysis was performed utilizing windPRO, a sophisticated wind modeling software program. windPRO has the ability to calculate detailed shadow flicker maps across an entire area of interest or at site-specific locations using shadow receptors.

Shadow maps which indicate when and where the shadows will be cast and for how long, are generated using windPRO, calculating the shadow flicker in varying user-defined resolutions. Standard resolution was used for this study and represents shadow flicker being calculated every three minutes of every day over the period of an entire year over a grid with a 20 m by 20 m resolution.

In addition to generating a shadow flicker map, the amount of shadow flicker that may occur at a specific point can be calculated more precisely by placing a shadow receptor at the location of interest and essentially "recording" the shadow flicker that occurs as the relative sunrise to sunset motion of the sun is simulated throughout an entire year.

The point-specific shadow flicker calculation is run at a higher resolution as compared to the shadow flicker map calculation to include the highest precision possible within windPRO. Shadow flicker at each shadow receptor location is calculated every minute of every day for an entire year. Shadow receptors can be configured to represent an omni-directional window of a specific size at a specific point (greenhouse mode) or a window facing a single direction of a specific size at a specific point (single direction mode). The shadow receptors used in this analysis were configured as greenhouse-mode receptors representing a 1 m x 1 m window

located 1 m above ground level. This represents more of a "worst-case" scenario and thus will produce more conservative results.

As a part of the calculation method, windPRO must determine whether or not a turbine will be visible at the receptor locations. It does this by performing a preliminary Zones of Visual Influence (ZVI) calculation, utilizing 10 m grid spacing. If a particular turbine is not visible within the 10 m x 10 m area that the shadow receptor is contained within, then that turbine is not included in the shadow flicker calculation for that receptor.

The maximum distance limit for which shadow flicker should be counted was set to 1,500 meters. Any shadow flicker contributions from turbines within this distance limit are added to the total for each receptor.

The inputs for the windPRO shadow flicker calculation include the following:

- Turbine Coordinates
- Turbine Specifications
- Shadow Receptor Coordinates
- Monthly Sunshine Probabilities
- Joint Wind Speed and Direction Frequency Distribution
- USGS Digital Elevation Model (DEM) (height contour data)
- Existing Turbines

A description of each input variable and how they affect the shadow flicker calculation are included below.

Turbine Coordinates: The location of a wind turbine in relation to a shadow receptor is one of the most important factors in determining shadow flicker impacts. A line-of-site is required for shadow flicker to occur. The intensity of the shadow flicker is dependent upon the distance from the wind turbine and weather conditions. The coordinates and elevations of the wind turbines used in this study are included in Appendix A.

Turbine Specifications: A wind turbine's total height and rotor diameter will be included in the windPRO shadow flicker model. The taller the wind turbine, the more likely shadow flicker could have an impact on local shadow receptors as the ability to clear obstacles (such as hills or trees) is greater. The larger the rotor diameter is, the wider the area where shadows will be cast. Also included with the turbine specifications are the cut-in and cut-out wind speeds within which the wind turbine is operational. If the wind speed is below the cut-in threshold or above the cut-out threshold, the turbine rotor will not be spinning and thus shadow flicker will not occur. The specifications of the three wind turbine models used in this study are included in Table 1 below.

Table 1: Trishe Wind Turbine Specifications.

Trishe - Shadow Modeled Turbine Specifications					
Manufacturer	Model	Hub Height (m)	Rotor Diameter (m)	Cut-In Wind Speed (m/s)	Cut-Out Wind Speed (m/s)
General Electric (GE)	GE 2.3-116	80 & 94	116	3	22
Vestas	V110-2.0	80 & 95	110	3	20
Vestas	V126-3.45	87	126	3	22.5

Shadow Receptor Coordinates: As with the wind turbine coordinates, the elevation, distance and orientation of a shadow receptor in relation to the wind turbines and the sun are the main factors in determining the impact of shadow flicker. EAPC was provided with coordinates for 266 structures found to be located within one mile of the proposed wind turbine locations. The coordinates of the shadow receptors used in this study are included in Appendix B.

Monthly Sunshine Probabilities: windPRO calculates sunrise and sunset times to determine the total annual hours of daylight for the modeled area. To further refine the shadow flicker calculations, the monthly probability of sunshine is included to account for cloud cover. The greater the probability of cloud cover, the less of an impact from shadow flicker. The monthly sunshine probabilities for many of the larger cities across the United States are available from the National Climatic Data Center (NCDC). For this study, 52 years of monthly sunshine probability data were retrieved for Fort Wayne, Indiana to create the long-term representative monthly sunshine probabilities. The long-term representative monthly average sunshine probabilities are presented in Table 2.

Table 2: Fort Wayne, Indiana monthly sunshine probabilities.

Fort Wayne, Indiana Monthly Sunshine Probabilities (1966-2007)												
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Sunshine %	46%	51%	55%	60%	68%	74%	75%	74%	68%	62%	42%	38%
retrieved from: http://www.ncdc.gov/oa/climate/online/ccd/avgsun.html												

Joint Wind Speed and Direction Frequency Distribution: A set of long-term corrected wind distributions generated from an on-site meteorological mast was provided by the client to represent the annual wind speed and direction distribution for the project site for the three proposed turbine hub heights. The 95 m wind distribution is included in Table 3. This data was used to estimate the probable number of operational hours for the wind turbines from each of the 12 wind direction sectors. During operation, the wind turbine rotors will always be

assumed to face into the wind and automatically orient themselves as the wind direction changes. Shadow flicker can only occur when the blades are turning and the wind turbine rotor is between the sun and the receptor. Shadow flicker is most significant when the rotor is facing the sun.

Table 3: Trishe Wind Energy Project 95 m Weibull Distribution

Sector #	Sector Direction	A-parameter	k-parameter	Frequency	Wind Speed
		[m/s]		*[%]*	*[m/s]*
0	N	7.076	2.5711	5.129	6.283
1	NNE	6.611	2.2101	5.699	5.855
2	ENE	7.895	2.8174	8.339	7.032
3	E	7.219	2.8505	6.609	6.432
4	ESE	6.823	2.2866	4.549	6.045
5	SSE	7.662	2.4427	5.579	6.795
6	S	9.798	3.0500	9.369	8.756
7	SSW	9.653	3.0502	12.498	8.626
8	WSW	9.365	2.5660	13.489	8.315
9	W	9.141	2.5237	12.159	8.113
10	WNW	8.110	2.7241	9.539	7.215
11	NNW	7.462	2.6944	7.039	6.636
All		8.432	2.5257	100	7.484

USGS Digital Elevation Model (DEM) (height contour data): For this study, 3 m USGS National Elevation Database (NED) DEM's were used to construct 3-foot interval height contour lines for the windPRO shadow flicker model. The height contour information is important to the shadow flicker calculation since it allows the model to place the wind turbines and the shadow receptors at the correct elevations. The height contour lines also allow the model to include the topography of the site when calculating the zones of visual influence surrounding the wind turbine and shadow receptor locations. A map of the project area which includes the height contour lines is included in Appendix C.

The actual calculation of potential shadow flicker at a given shadow receptor is carried out by simulating the environment near the wind turbines and the shadow receptors. The position of the sun relative to the turbine rotor disk and the resulting shadow is calculated in time steps of one minute throughout an entire year. If the shadow of the rotor disk (which in the calculation is assumed solid) at any time casts a shadow on a receptor window, then this step will be registered as one minute of shadow flicker. The calculation also requires that the sun must be at least 3.0° above the horizon in order to register shadow flicker.

The sun's path with respect to each wind turbine location is calculated by the software to determine the paths of shadows cast for every minute of every day over a full year. The turbine runtime and direction are calculated from the site's long-term wind speed and direction distribution. Finally, the effects of cloud cover are calculated using long-term reference data (monthly sunshine probability) to arrive at the projected annual flicker time at each receptor.

Existing Turbines: The proposed Trishe project is in the vicinity of several operational wind farms. In particular, three wind turbines installed at the Haviland Plastic Product facility contribute shadow flicker to dwellings within one mile of the proposed turbines. Existing turbines were used in the shadow calculation to evaluate the cumulative shadow from both the proposed and existing turbines. Only existing turbines within 1,500 m of any dwelling used in the analysis would be able to contribute to the shadow. Specifics regarding the existing turbines such as turbine model, hub height, rotor diameter and location were assembled from various sources and are presented in Appendices G, H, and I.

4. *Site Overview*

The area of interest is located in Paulding County near the town of Haviland in northwestern Ohio. The region surrounding the town of Haviland is shown in Appendix C. The surrounding terrain is characterized by the Upper Great Lakes Plain with a relatively small change in elevation across the project site. The regions vegetation is comprised primarily of agricultural land. The area also contains several wind energy projects currently in operation with 209 turbines in operation.

5. *Results of Analysis*

The term "realistic " as used in this report means that turbine operational hours and direction as well as local sunshine probabilities have been factored in, but no blocking or shading effects due to trees or structures have been accounted for. This means that the "realistic" estimates are still inherently conservative values.

A total of 266 residential structures within project vicinity were analyzed and standard resolution shadow flicker maps and individual maps focused on groups of shadow receptors were generated for each turbine array. The standard resolution shadow flicker maps are included in Appendices D, E, F, G and H for the GE and Vestas layouts respectively.

The 266 shadow receptors were then modeled as greenhouse-mode receptors and the estimated shadow flicker was calculated using a 1,500 meter distance limit. Table 4 contains the shadow flicker distribution of the 266 residential structures within one mile of any turbine location along with a breakdown of how many are non-participating.

Table 4: Residential structures realistic shadow flicker distribution

Realistic Shadow Flicker (hrs/year)	Only Existing WTGs		GE 2.3-116 80		GE 2.3-116 94		V110-2.0 80		V110-2.0 95		V126-3.45 87	
	# of struct.	# non-part.	# of struct.	# non-part.	# of struct.	# non-part.	# of struct.	# non-part.	# of struct.	# non-part.	# of struct.	# non-part.
0	177	161	55	53	54	52	55	53	54	52	54	52
0 to 5	5	5	37	34	32	29	39	35	36	33	32	29
5 to 10	14	14	45	41	38	36	44	41	40	37	31	29
10 to 15	35	35	51	49	56	53	59	56	58	54	60	57
15 to 20	13	13	30	27	34	31	30	28	28	27	32	30
20 to 25	11	11	29	28	27	26	24	23	30	1	25	23
25 to 30	6	6	13	12	17	16	10	9	15	13	18	17
30+ *	5	5	6	6	8	8	5	5	5	5	14	13

* includes the 5 receptors affected by existing wind turbines

A complete summary table detailing the shadow receptor locations, participation status and number of realistic shadow flicker hours per year can be found in Appendix B. In addition, windPRO shadow flicker reports for each turbine array including tabular calendar output can be found in Appendices I, J, K, L and M for the GE and Vestas layouts respectively.

Modeling only the existing turbines within the vicinity of the town of Haviland resulted in five receptors (SR089, SR091, SR099, SR109, and SR114) to be above 30 hours per year (real case). Three turbines installed at the Haviland Plastic Products are the contributors to these five receptors. Taking into consideration the new proposed turbines result in minuscule increase (less than five more additional minutes a year) at these five receptors for all five arrays evaluated.

Throughout the study area, the shadow flicker is anticipated to be less than 30 hours per year (real case) for all other dwellings supplied by the client (excluding the five dwellings affected by the existing turbines) for the V110-2.0 80 m hub height, and V110-2.0 95 m hub height turbine layouts. For the GE 2.3-116 80 m hub height layout, one receptor (SR051) was above 30 hours per year (real case). Three receptors (SR001, SR197 and SR211) were over 30 hours per year (real case) for the GE 2.3-116 94 m hub height layout. For the V126-3.45 87 m hub height layout, nine receptors

(SR001, SR033, SR034, SR037, SR051, SR174, SR197, SR201 and SR211) are anticipated to have realistic shadow flicker above 30 hours per year.

6. *CONCLUSIONS*

The conservative results of this study indicate that, of the five wind turbine model scenarios and 266 receptors modeled for each scenario, no additional dwellings measure 30 hours or more per year of realistic shadow flicker for the V110-2.0 80 m hub height and V110-2.0 95 m hub height layouts. For the other three layouts that resulted in additional dwellings to potentially be above 30 hours per year, selective turbine locations could reduce the flicker impact below the arbitrary 30 hour level.

The shadow flicker impact on the receptors was calculated from turbines (proposed and existing) within 1,500 meters with reductions due to turbine operational time, turbine operational direction and sunshine probabilities included. This shadow flicker analysis is based on a number of conservative assumptions including:

- No credit was taken for the blocking effects of trees or buildings.
- The receptors were omni-directional rather than modeling specific facades of buildings.

The overall effect of using these conservative assumptions indicate that realistically, the number of hours of shadow flicker that would be observed will be less than those predicted by this study.

Appendix A: Wind Turbine Coordinates

Trishe
Original 60 Turbine Layout
UTM NAD83 Zone 16

WTG	Easting (m)	Northing (m)	Elevation AMSL (m)
T-01	696,668	4,548,602	225.9
T-02	696,817	4,547,956	225.7
T-03	696,943	4,547,397	225.6
T-04	697,177	4,546,909	225.9
T-05	697,300	4,546,314	226.2
T-06	698,739	4,546,309	224.9
T-07	698,962	4,545,949	224.9
T-08	697,754	4,545,638	225.9
T-09	698,227	4,544,753	225.9
T-10	698,839	4,544,509	225.9
ALT-11	698,042	4,544,087	225.9
ALT-12	698,976	4,543,785	225.9
T-13	699,680	4,547,432	224.5
T-14	700,128	4,547,318	224.5
T-15	699,753	4,546,236	224.7
T-16	699,716	4,545,481	225.8
T-17	700,502	4,545,090	224.8
T-18	699,744	4,544,815	224.9
T-19	700,160	4,544,166	225.4
T-20	701,716	4,547,138	223.2
T-21	701,744	4,546,242	223.1
T-22	701,906	4,545,841	224
T-23	702,182	4,545,548	223.4
T-24	701,279	4,544,643	224.5
T-25	701,570	4,544,238	224.2
T-26	702,975	4,546,749	223.1
T-27	703,012	4,546,208	223.1
T-28	703,044	4,545,690	223.1
T-29	702,656	4,544,842	223.9
T-30	704,930	4,547,952	221.4
T-31	705,384	4,547,334	221.4
T-32	704,560	4,546,286	223.1
T-33	704,805	4,545,969	222.6
T-34	705,244	4,545,709	222.2
ALT-35	706,291	4,547,240	221.5
T-36	706,204	4,546,022	222.2
T-37	706,434	4,545,698	222.2
ALT-38	706,404	4,545,100	221.7
T-39	706,754	4,544,865	221.3
T-40	707,063	4,544,570	222.2
T-41	707,954	4,548,071	221.3

Trishe
Original 60 Turbine Layout
UTM NAD83 Zone 16
continued

WTG	Easting (m)	Northing (m)	Elevation AMSL (m)
T-42	708,307	4,547,850	221.3
T-43	708,588	4,547,541	221.3
T-44	708,294	4,546,778	221.3
T-45	708,065	4,545,930	220.6
T-46	707,794	4,544,862	221.3
T-47	708,102	4,544,534	221
T-48	708,940	4,549,726	220.4
T-49	709,392	4,549,461	220.4
T-50	709,872	4,549,300	219.9
ALT-51	710,212	4,549,026	219.8
T-52	709,044	4,546,423	220.9
T-53	709,287	4,546,176	220.7
T-54	709,826	4,546,077	220.4
T-55	710,265	4,545,918	220.3
ALT-56	709,083	4,545,103	221.3
ALT-57	709,536	4,544,987	221.3
ALT-58	710,754	4,548,367	220.1
ALT-59	711,314	4,548,261	219.8
ALT-60	711,851	4,548,187	219.5

Appendix B: Realistic Shadow Hours for all WTG models

Trishe
Real case shadow flicker results at dwellings within one mile of project WTGs
Results using GE 2.3-116 - 80 m hub height WTGs
UTM NAD83 Zone 16

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR001	Participating	698,744.57	4,545,112.68	225.5	28:40
SR002	Participating	699,298.46	4,546,726.65	225.9	13:48
SR003	Participating	699,301.86	4,546,754.01	225.9	12:48
SR004	Participating	703,086.59	4,545,268.49	223.2	22:41
SR005	Participating	704,003.39	4,545,425.77	224.0	8:49
SR006	Participating	704,071.02	4,545,560.59	223.7	17:12
SR007	Participating	705,592.02	4,546,368.09	222.2	19:31
SR008	Participating	706,097.61	4,543,811.86	222.2	0:00
SR009	Participating	706,489.96	4,547,056.16	221.3	3:23
SR010	Participating	707,928.43	4,545,490.20	221.3	3:43
SR011	Participating	708,806.34	4,549,116.26	221.2	15:09
SR012	Participating	709,213.00	4,548,680.10	220.4	6:43
SR013	Participating	709,341.83	4,547,064.81	221.0	2:46
SR014	Participating	709,885.92	4,545,522.25	220.4	5:07
SR015	Participating	710,271.28	4,545,476.10	220.4	9:21
SR016	Participating	710,602.44	4,543,936.70	221.3	0:00
SR017	Non-Participating	695,186.59	4,548,251.33	226.8	0:00
SR018	Non-Participating	695,760.28	4,548,926.46	226.8	3:46
SR019	Non-Participating	695,808.07	4,547,726.92	226.8	6:15
SR020	Non-Participating	695,824.91	4,547,168.69	226.8	4:21
SR021	Non-Participating	695,874.00	4,545,766.03	227.2	0:00
SR022	Non-Participating	695,885.09	4,546,923.68	227.7	7:35
SR023	Non-Participating	695,902.29	4,546,804.55	226.8	8:19
SR024	Non-Participating	695,938.06	4,546,431.33	227.6	4:14
SR025	Non-Participating	696,005.56	4,549,917.66	225.9	0:00
SR026	Non-Participating	696,365.20	4,545,125.23	226.8	1:54
SR027	Non-Participating	696,368.60	4,548,361.94	225.9	7:56
SR028	Non-Participating	696,556.39	4,545,126.76	226.8	3:39
SR029	Non-Participating	696,667.38	4,545,120.58	226.8	6:44
SR030	Non-Participating	696,703.55	4,548,301.27	225.9	0:00
SR031	Non-Participating	696,755.33	4,549,937.84	225.9	0:00
SR032	Non-Participating	696,811.12	4,549,917.46	225.9	0:00
SR033	Non-Participating	696,945.42	4,545,072.53	225.9	1:28
SR034	Non-Participating	697,170.58	4,548,362.18	225.3	26:10
SR035	Non-Participating	697,298.67	4,543,542.41	227.7	0:00
SR036	Non-Participating	697,421.18	4,547,425.00	225.9	20:50
SR037	Non-Participating	697,424.16	4,548,308.01	225.5	27:50
SR038	Non-Participating	697,485.28	4,547,881.96	224.9	20:35
SR039	Non-Participating	697,497.30	4,547,574.88	224.9	15:34

Trishe
Real case shadow flicker results at dwellings within one mile of project WTGs
Results using GE 2.3-116 - 80 m hub height WTGs
UTM NAD83 Zone 16
continued

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR040	Non-Participating	697,538.49	4,549,916.74	224.9	0:00
SR041	Non-Participating	697,548.62	4,544,285.20	226.4	16:39
SR042	Non-Participating	697,619.61	4,545,937.82	225.9	9:24
SR043	Non-Participating	697,652.94	4,543,291.49	226.8	2:15
SR044	Non-Participating	697,668.11	4,542,788.38	225.9	12:19
SR045	Non-Participating	697,676.55	4,542,916.56	225.9	14:53
SR046	Non-Participating	697,835.84	4,545,087.83	224.9	18:26
SR047	Non-Participating	697,899.23	4,545,073.49	225.9	18:55
SR048	Non-Participating	697,972.15	4,545,147.25	225.6	3:44
SR049	Non-Participating	698,073.70	4,546,766.85	225.9	20:27
SR050	Non-Participating	698,231.65	4,545,165.80	225.9	0:00
SR051	Non-Participating	698,444.51	4,543,541.40	225.8	30:58
SR052	Non-Participating	699,022.98	4,548,762.79	224.9	0:00
SR053	Non-Participating	699,037.98	4,548,032.30	224.9	3:10
SR054	Non-Participating	699,055.68	4,547,371.38	224.9	15:29
SR055	Non-Participating	699,106.44	4,548,187.36	224.9	0:00
SR056	Non-Participating	699,106.95	4,548,145.96	224.9	0:00
SR057	Non-Participating	699,124.05	4,545,417.01	224.9	22:50
SR058	Non-Participating	699,177.97	4,546,810.51	225.9	9:51
SR059	Non-Participating	699,188.02	4,543,004.14	226.8	10:08
SR060	Non-Participating	699,903.38	4,548,459.46	224.0	0:00
SR061	Non-Participating	699,920.65	4,545,167.32	225.0	15:34
SR062	Non-Participating	699,959.80	4,548,463.60	224.0	0:00
SR063	Non-Participating	700,048.74	4,546,790.26	224.9	4:14
SR064	Non-Participating	700,235.46	4,543,616.25	225.9	8:38
SR065	Non-Participating	700,657.32	4,546,871.74	224.0	11:37
SR066	Non-Participating	700,720.42	4,546,100.38	224.0	13:15
SR067	Non-Participating	700,764.10	4,546,477.36	223.5	8:23
SR068	Non-Participating	700,784.06	4,546,267.12	224.0	13:02
SR069	Non-Participating	700,784.63	4,546,310.99	224.0	12:07
SR070	Non-Participating	700,793.63	4,546,372.80	224.1	9:59
SR071	Non-Participating	700,798.05	4,546,777.67	224.1	13:33
SR072	Non-Participating	700,820.84	4,546,199.06	223.8	12:40
SR073	Non-Participating	700,841.02	4,544,096.00	224.9	20:22
SR074	Non-Participating	700,975.33	4,545,259.12	224.9	24:13
SR075	Non-Participating	701,377.68	4,546,903.57	223.9	2:44
SR076	Non-Participating	701,397.52	4,543,594.09	225.2	13:04
SR077	Non-Participating	701,461.92	4,548,269.14	223.1	0:00

Trishe
Real case shadow flicker results at dwellings within one mile of project WTGs
Results using GE 2.3-116 - 80 m hub height WTGs
UTM NAD83 Zone 16
continued

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR078	Non-Participating	701,561.73	4,545,222.39	224.0	23:27
SR079	Non-Participating	701,595.95	4,546,597.08	224.0	2:29
SR080	Non-Participating	702,254.51	4,548,552.87	223.1	0:00
SR081	Non-Participating	702,265.87	4,547,989.86	222.2	0:00
SR082	Non-Participating	702,286.05	4,547,732.71	222.2	0:00
SR083	Non-Participating	702,310.85	4,547,172.99	222.4	22:07
SR084	Non-Participating	702,344.51	4,548,293.72	223.1	0:00
SR085	Non-Participating	702,349.50	4,547,669.05	223.1	8:31
SR086	Non-Participating	702,378.73	4,547,007.92	223.1	22:34
SR087	Non-Participating	702,382.40	4,547,288.40	223.1	9:43
SR088	Non-Participating	702,387.74	4,547,366.38	223.1	8:24
SR089	Non-Participating	702,391.15	4,543,688.61	224.1	37:46
SR090	Non-Participating	702,396.29	4,547,775.91	223.1	1:42
SR091	Non-Participating	702,428.21	4,543,681.02	224.0	33:23
SR092	Non-Participating	703,038.85	4,543,649.53	224.0	6:10
SR093	Non-Participating	703,100.85	4,543,665.81	224.0	8:59
SR094	Non-Participating	703,128.33	4,543,661.74	224.0	12:08
SR095	Non-Participating	703,145.39	4,543,664.91	224.0	12:41
SR096	Non-Participating	703,215.45	4,543,502.46	224.7	16:05
SR097	Non-Participating	703,249.67	4,543,604.95	224.3	13:06
SR098	Non-Participating	703,293.24	4,543,954.65	224.0	22:09
SR099	Non-Participating	703,302.76	4,543,800.26	224.0	40:59
SR100	Non-Participating	703,302.85	4,543,543.79	224.0	10:54
SR101	Non-Participating	703,317.07	4,543,587.78	224.0	9:56
SR102	Non-Participating	703,320.71	4,543,495.83	224.0	12:02
SR103	Non-Participating	703,327.98	4,543,445.23	224.0	11:49
SR104	Non-Participating	703,354.14	4,543,861.87	224.0	21:12
SR105	Non-Participating	703,356.34	4,543,901.07	224.0	18:59
SR106	Non-Participating	703,357.09	4,543,638.38	224.0	16:52
SR107	Non-Participating	703,362.05	4,543,499.47	224.0	10:55
SR108	Non-Participating	703,362.71	4,543,449.53	224.0	10:50
SR109	Non-Participating	703,363.88	4,543,772.48	224.0	40:11
SR110	Non-Participating	703,378.92	4,543,544.12	224.0	9:56
SR111	Non-Participating	703,383.55	4,543,587.11	224.0	8:29
SR112	Non-Participating	703,386.31	4,544,011.17	224.0	14:32
SR113	Non-Participating	703,388.49	4,543,874.08	224.0	18:48
SR114	Non-Participating	703,394.41	4,543,672.13	224.0	30:37
SR115	Non-Participating	703,396.69	4,543,968.44	224.0	14:48

Trishe
Real case shadow flicker results at dwellings within one mile of project WTGs
Results using GE 2.3-116 - 80 m hub height WTGs
UTM NAD83 Zone 16
continued

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR116	Non-Participating	703,400.39	4,543,854.24	224.0	21:19
SR117	Non-Participating	703,401.98	4,543,908.21	224.0	15:43
SR118	Non-Participating	703,404.38	4,543,607.62	224.0	13:46
SR119	Non-Participating	703,416.66	4,543,492.52	224.0	9:38
SR120	Non-Participating	703,421.91	4,543,543.13	224.0	8:16
SR121	Non-Participating	703,446.43	4,543,870.90	224.0	18:40
SR122	Non-Participating	703,451.13	4,544,009.10	224.0	11:51
SR123	Non-Participating	703,451.59	4,543,962.58	224.0	12:30
SR124	Non-Participating	703,451.99	4,543,773.67	224.0	26:52
SR125	Non-Participating	703,453.33	4,543,808.71	224.0	24:28
SR126	Non-Participating	703,453.86	4,543,916.66	224.0	13:58
SR127	Non-Participating	703,454.37	4,543,755.81	224.0	26:53
SR128	Non-Participating	703,459.93	4,543,722.47	224.0	29:55
SR129	Non-Participating	703,460.94	4,543,587.44	224.0	14:27
SR130	Non-Participating	703,462.26	4,543,490.21	224.0	8:29
SR131	Non-Participating	703,462.27	4,543,546.27	224.0	6:38
SR132	Non-Participating	703,466.34	4,543,652.40	224.0	28:47
SR133	Non-Participating	703,470.26	4,548,518.70	222.2	0:00
SR134	Non-Participating	703,472.63	4,543,833.60	224.0	21:37
SR135	Non-Participating	703,475.01	4,543,775.26	224.0	23:28
SR136	Non-Participating	703,487.31	4,543,780.02	224.0	21:56
SR137	Non-Participating	703,489.69	4,543,713.34	224.0	26:57
SR138	Non-Participating	703,491.68	4,543,735.97	224.0	23:11
SR139	Non-Participating	703,492.07	4,544,013.78	224.0	10:29
SR140	Non-Participating	703,495.25	4,543,957.03	224.0	10:53
SR141	Non-Participating	703,496.03	4,543,648.66	224.0	28:31
SR142	Non-Participating	703,501.20	4,543,874.48	224.0	17:47
SR143	Non-Participating	703,503.19	4,543,905.43	224.0	15:15
SR144	Non-Participating	703,505.96	4,543,827.25	224.0	20:11
SR145	Non-Participating	703,510.33	4,543,735.57	224.0	21:08
SR146	Non-Participating	703,512.59	4,543,789.48	224.0	19:17
SR147	Non-Participating	703,512.71	4,543,712.95	224.0	23:13
SR148	Non-Participating	703,526.51	4,546,983.41	223.1	16:05
SR149	Non-Participating	703,539.30	4,543,928.05	224.0	13:40
SR150	Non-Participating	703,543.67	4,544,006.24	224.0	9:03
SR151	Non-Participating	703,550.41	4,543,716.52	224.0	18:48
SR152	Non-Participating	703,553.99	4,543,736.36	224.0	17:29
SR153	Non-Participating	703,571.84	4,543,782.40	224.0	15:15

Trishe
Real case shadow flicker results at dwellings within one mile of project WTGs
Results using GE 2.3-116 - 80 m hub height WTGs
UTM NAD83 Zone 16
continued

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR154	Non-Participating	703,587.72	4,543,724.06	224.0	15:52
SR155	Non-Participating	703,592.09	4,543,916.55	224.0	14:02
SR156	Non-Participating	703,597.24	4,543,772.88	224.0	14:03
SR157	Non-Participating	703,602.01	4,543,857.41	224.0	13:48
SR158	Non-Participating	703,603.59	4,543,957.03	224.0	12:01
SR159	Non-Participating	703,603.99	4,543,875.67	224.0	14:19
SR160	Non-Participating	703,609.15	4,543,814.55	224.0	13:06
SR161	Non-Participating	703,609.55	4,543,831.22	224.0	13:08
SR162	Non-Participating	703,642.52	4,543,934.17	224.0	12:28
SR163	Non-Participating	703,644.62	4,543,782.87	224.0	11:53
SR164	Non-Participating	703,650.09	4,543,677.23	224.0	14:06
SR165	Non-Participating	703,657.69	4,543,882.72	224.0	11:17
SR166	Non-Participating	703,662.33	4,543,725.25	224.0	12:12
SR167	Non-Participating	703,692.88	4,548,546.18	222.2	1:25
SR168	Non-Participating	703,717.44	4,543,736.16	224.0	10:03
SR169	Non-Participating	703,763.93	4,543,734.78	224.0	8:51
SR170	Non-Participating	703,804.17	4,543,735.68	224.0	7:51
SR171	Non-Participating	703,854.85	4,548,727.86	222.2	1:59
SR172	Non-Participating	703,886.13	4,548,244.38	222.2	2:37
SR173	Non-Participating	703,911.56	4,547,434.86	222.2	16:21
SR174	Non-Participating	703,961.14	4,546,478.09	223.1	25:32
SR175	Non-Participating	703,966.37	4,548,772.12	221.8	0:00
SR176	Non-Participating	703,974.82	4,548,682.35	222.2	1:14
SR177	Non-Participating	703,990.33	4,545,165.76	223.7	5:40
SR178	Non-Participating	704,025.19	4,544,227.82	223.3	4:04
SR179	Non-Participating	704,028.21	4,544,125.12	223.6	3:41
SR180	Non-Participating	704,033.61	4,546,900.87	223.1	8:16
SR181	Non-Participating	704,253.43	4,549,279.81	220.4	0:00
SR182	Non-Participating	704,303.94	4,549,330.32	221.3	0:00
SR183	Non-Participating	704,388.12	4,548,593.69	222.2	0:00
SR184	Non-Participating	704,480.95	4,544,551.15	223.1	0:00
SR185	Non-Participating	704,700.62	4,548,606.71	221.3	0:00
SR186	Non-Participating	704,836.36	4,546,938.71	222.2	1:18
SR187	Non-Participating	704,969.67	4,548,620.66	221.3	0:00
SR188	Non-Participating	705,031.78	4,545,386.00	223.1	8:59
SR189	Non-Participating	705,325.82	4,545,327.44	222.4	6:18
SR190	Non-Participating	705,414.06	4,547,017.61	222.2	8:57
SR191	Non-Participating	705,440.38	4,549,183.51	221.3	0:00

Trishe
Real case shadow flicker results at dwellings within one mile of project WTGs
Results using GE 2.3-116 - 80 m hub height WTGs
UTM NAD83 Zone 16
continued

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR192	Non-Participating	705,510.86	4,548,530.84	221.3	1:33
SR193	Non-Participating	705,554.68	4,547,023.56	222.2	15:13
SR194	Non-Participating	705,563.82	4,548,652.85	220.5	0:00
SR195	Non-Participating	705,596.36	4,543,727.29	223.1	0:00
SR196	Non-Participating	705,606.09	4,547,969.86	221.5	9:40
SR197	Non-Participating	705,608.38	4,547,733.41	222.2	25:45
SR198	Non-Participating	705,616.08	4,545,290.54	222.2	22:46
SR199	Non-Participating	705,629.62	4,546,733.38	222.2	2:35
SR200	Non-Participating	705,671.29	4,548,634.19	220.4	1:14
SR201	Non-Participating	705,680.54	4,545,337.27	222.2	26:44
SR202	Non-Participating	705,797.47	4,543,719.94	222.2	0:00
SR203	Non-Participating	705,840.72	4,548,674.62	220.8	4:16
SR204	Non-Participating	705,857.64	4,548,635.15	221.3	4:58
SR205	Non-Participating	706,001.42	4,548,590.23	221.3	2:19
SR206	Non-Participating	706,081.18	4,548,643.06	221.3	1:51
SR207	Non-Participating	706,284.81	4,543,726.91	222.2	4:50
SR208	Non-Participating	706,657.79	4,547,053.86	221.4	20:54
SR209	Non-Participating	706,731.29	4,548,682.68	221.3	1:29
SR210	Non-Participating	706,897.44	4,543,814.55	222.2	2:16
SR211	Non-Participating	706,949.83	4,545,366.22	222.2	27:06
SR212	Non-Participating	707,123.89	4,548,694.36	220.2	3:54
SR213	Non-Participating	707,130.00	4,548,947.18	220.4	0:00
SR214	Non-Participating	707,203.97	4,548,818.65	220.4	0:00
SR215	Non-Participating	707,204.92	4,546,610.38	221.3	7:10
SR216	Non-Participating	707,233.47	4,546,018.82	221.3	14:22
SR217	Non-Participating	707,246.08	4,548,009.77	221.3	16:41
SR218	Non-Participating	707,252.38	4,547,892.77	221.3	20:03
SR219	Non-Participating	707,292.96	4,543,750.47	222.2	0:00
SR220	Non-Participating	707,313.99	4,543,113.68	222.2	14:34
SR221	Non-Participating	707,315.82	4,543,177.80	222.2	7:25
SR222	Non-Participating	707,357.52	4,543,598.44	222.2	0:00
SR223	Non-Participating	707,586.77	4,546,997.22	221.3	17:07
SR224	Non-Participating	707,825.54	4,547,075.26	221.3	23:06
SR225	Non-Participating	708,297.76	4,545,478.92	221.7	5:52
SR226	Non-Participating	708,362.37	4,548,647.66	221.3	0:00
SR227	Non-Participating	708,371.03	4,545,481.25	221.9	7:43
SR228	Non-Participating	708,452.91	4,545,483.23	222.2	16:12
SR229	Non-Participating	708,471.32	4,543,873.64	222.5	0:00

Trishe
Real case shadow flicker results at dwellings within one mile of project WTGs
Results using GE 2.3-116 - 80 m hub height WTGs
UTM NAD83 Zone 16
continued

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR230	Non-Participating	708,752.54	4,550,677.91	219.5	0:00
SR231	Non-Participating	708,752.72	4,545,488.25	222.2	20:14
SR232	Non-Participating	708,765.77	4,543,808.29	222.2	0:00
SR233	Non-Participating	708,814.59	4,546,774.89	221.3	22:05
SR234	Non-Participating	708,893.23	4,544,471.70	222.2	11:35
SR235	Non-Participating	708,913.52	4,545,495.96	222.1	14:57
SR236	Non-Participating	708,913.52	4,545,495.96	222.1	14:57
SR237	Non-Participating	708,913.78	4,543,812.89	222.2	0:00
SR238	Non-Participating	708,915.19	4,545,845.43	221.3	13:21
SR239	Non-Participating	708,915.23	4,543,231.49	222.2	3:50
SR240	Non-Participating	708,950.19	4,544,630.82	221.8	15:38
SR241	Non-Participating	708,972.43	4,544,295.72	222.2	12:00
SR242	Non-Participating	708,980.19	4,543,690.26	222.2	0:00
SR243	Non-Participating	709,014.39	4,547,120.99	221.3	6:52
SR244	Non-Participating	709,416.55	4,548,671.84	220.4	21:29
SR245	Non-Participating	709,597.52	4,543,899.83	222.2	0:00
SR246	Non-Participating	709,840.48	4,547,075.31	220.9	8:25
SR247	Non-Participating	709,883.73	4,550,315.95	219.5	3:34
SR248	Non-Participating	710,102.25	4,543,907.01	221.4	0:00
SR249	Non-Participating	710,372.00	4,548,770.02	220.4	7:45
SR250	Non-Participating	710,373.30	4,550,673.03	219.5	0:00
SR251	Non-Participating	710,443.44	4,546,266.05	219.8	15:22
SR252	Non-Participating	710,488.16	4,546,863.03	220.4	1:35
SR253	Non-Participating	710,493.90	4,544,684.59	221.3	6:07
SR254	Non-Participating	710,522.90	4,543,863.94	221.3	0:00
SR255	Non-Participating	710,526.00	4,544,020.83	221.3	0:00
SR256	Non-Participating	710,530.99	4,543,731.95	221.3	0:00
SR257	Non-Participating	710,976.11	4,548,812.77	220.4	22:24
SR258	Non-Participating	711,149.14	4,545,493.49	220.4	8:17
SR259	Non-Participating	711,293.72	4,545,569.87	220.4	5:14
SR260	Non-Participating	711,421.48	4,548,740.89	219.5	10:35
SR261	Non-Participating	711,976.37	4,546,977.31	219.5	0:00
SR262	Non-Participating	712,043.24	4,547,215.83	219.8	0:00
SR263	Non-Participating	712,259.66	4,547,224.14	219.5	0:00
SR264	Non-Participating	712,583.13	4,547,255.09	219.5	0:00
SR265	Non-Participating	712,651.06	4,547,258.83	219.5	0:00
SR266	Non-Participating	712,927.08	4,547,191.66	219.5	0:00

Trishe

Real case shadow flicker results at dwellings within one mile of project WTGs

Results using GE 2.3-116 - 94 m hub height WTGs

UTM NAD83 Zone 16

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR001	Participating	698,744.57	4,545,112.68	225.5	31:03
SR002	Participating	699,298.46	4,546,726.65	225.9	15:32
SR003	Participating	699,301.86	4,546,754.01	225.9	14:09
SR004	Participating	703,086.59	4,545,268.49	223.2	27:03
SR005	Participating	704,003.39	4,545,425.77	224.0	10:49
SR006	Participating	704,071.02	4,545,560.59	223.7	18:47
SR007	Participating	705,592.02	4,546,368.09	222.2	22:07
SR008	Participating	706,097.61	4,543,811.86	222.2	0:00
SR009	Participating	706,489.96	4,547,056.16	221.3	4:10
SR010	Participating	707,928.43	4,545,490.20	221.3	4:33
SR011	Participating	708,806.34	4,549,116.26	221.2	15:11
SR012	Participating	709,213.00	4,548,680.10	220.4	8:14
SR013	Participating	709,341.83	4,547,064.81	221.0	3:17
SR014	Participating	709,885.92	4,545,522.25	220.4	5:51
SR015	Participating	710,271.28	4,545,476.10	220.4	10:16
SR016	Participating	710,602.44	4,543,936.70	221.3	0:00
SR017	Non-Participating	695,186.59	4,548,251.33	226.8	0:00
SR018	Non-Participating	695,760.28	4,548,926.46	226.8	4:21
SR019	Non-Participating	695,808.07	4,547,726.92	226.8	7:24
SR020	Non-Participating	695,824.91	4,547,168.69	226.8	5:17
SR021	Non-Participating	695,874.00	4,545,766.03	227.2	0:00
SR022	Non-Participating	695,885.09	4,546,923.68	227.7	9:42
SR023	Non-Participating	695,902.29	4,546,804.55	226.8	9:34
SR024	Non-Participating	695,938.06	4,546,431.33	227.6	5:22
SR025	Non-Participating	696,005.56	4,549,917.66	225.9	0:00
SR026	Non-Participating	696,365.20	4,545,125.23	226.8	2:29
SR027	Non-Participating	696,368.60	4,548,361.94	225.9	10:00
SR028	Non-Participating	696,556.39	4,545,126.76	226.8	4:40
SR029	Non-Participating	696,667.38	4,545,120.58	226.8	9:40
SR030	Non-Participating	696,703.55	4,548,301.27	225.9	0:00
SR031	Non-Participating	696,755.33	4,549,937.84	225.9	0:00
SR032	Non-Participating	696,811.12	4,549,917.46	225.9	0:00
SR033	Non-Participating	696,945.42	4,545,072.53	225.9	1:49
SR034	Non-Participating	697,170.58	4,548,362.18	225.3	27:28
SR035	Non-Participating	697,298.67	4,543,542.41	227.7	0:00
SR036	Non-Participating	697,421.18	4,547,425.00	225.9	21:24
SR037	Non-Participating	697,424.16	4,548,308.01	225.5	29:43
SR038	Non-Participating	697,485.28	4,547,881.96	224.9	23:29
SR039	Non-Participating	697,497.30	4,547,574.88	224.9	14:46

Trishe

Real case shadow flicker results at dwellings within one mile of project WTGs

Results using GE 2.3-116 - 94 m hub height WTGs

UTM NAD83 Zone 16

continued

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR040	Non-Participating	697,538.49	4,549,916.74	224.9	0:00
SR041	Non-Participating	697,548.62	4,544,285.20	226.4	17:19
SR042	Non-Participating	697,619.61	4,545,937.82	225.9	17:55
SR043	Non-Participating	697,652.94	4,543,291.49	226.8	2:54
SR044	Non-Participating	697,668.11	4,542,788.38	225.9	12:20
SR045	Non-Participating	697,676.55	4,542,916.56	225.9	14:54
SR046	Non-Participating	697,835.84	4,545,087.83	224.9	20:52
SR047	Non-Participating	697,899.23	4,545,073.49	225.9	22:10
SR048	Non-Participating	697,972.15	4,545,147.25	225.6	4:32
SR049	Non-Participating	698,073.70	4,546,766.85	225.9	23:05
SR050	Non-Participating	698,231.65	4,545,165.80	225.9	0:00
SR051	Non-Participating	698,444.51	4,543,541.40	225.8	29:34
SR052	Non-Participating	699,022.98	4,548,762.79	224.9	0:00
SR053	Non-Participating	699,037.98	4,548,032.30	224.9	3:50
SR054	Non-Participating	699,055.68	4,547,371.38	224.9	17:00
SR055	Non-Participating	699,106.44	4,548,187.36	224.9	0:00
SR056	Non-Participating	699,106.95	4,548,145.96	224.9	0:00
SR057	Non-Participating	699,124.05	4,545,417.01	224.9	25:27
SR058	Non-Participating	699,177.97	4,546,810.51	225.9	13:30
SR059	Non-Participating	699,188.02	4,543,004.14	226.8	10:08
SR060	Non-Participating	699,903.38	4,548,459.46	224.0	0:00
SR061	Non-Participating	699,920.65	4,545,167.32	225.0	23:08
SR062	Non-Participating	699,959.80	4,548,463.60	224.0	0:00
SR063	Non-Participating	700,048.74	4,546,790.26	224.9	5:21
SR064	Non-Participating	700,235.46	4,543,616.25	225.9	10:07
SR065	Non-Participating	700,657.32	4,546,871.74	224.0	13:31
SR066	Non-Participating	700,720.42	4,546,100.38	224.0	15:45
SR067	Non-Participating	700,764.10	4,546,477.36	223.5	9:49
SR068	Non-Participating	700,784.06	4,546,267.12	224.0	15:28
SR069	Non-Participating	700,784.63	4,546,310.99	224.0	14:37
SR070	Non-Participating	700,793.63	4,546,372.80	224.1	12:20
SR071	Non-Participating	700,798.05	4,546,777.67	224.1	16:07
SR072	Non-Participating	700,820.84	4,546,199.06	223.8	15:00
SR073	Non-Participating	700,841.02	4,544,096.00	224.9	22:39
SR074	Non-Participating	700,975.33	4,545,259.12	224.9	25:54
SR075	Non-Participating	701,377.68	4,546,903.57	223.9	3:28
SR076	Non-Participating	701,397.52	4,543,594.09	225.2	13:59
SR077	Non-Participating	701,461.92	4,548,269.14	223.1	0:00

Trishe
Real case shadow flicker results at dwellings within one mile of project WTGs
Results using GE 2.3-116 - 94 m hub height WTGs
UTM NAD83 Zone 16
continued

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR078	Non-Participating	701,561.73	4,545,222.39	224.0	24:32
SR079	Non-Participating	701,595.95	4,546,597.08	224.0	3:10
SR080	Non-Participating	702,254.51	4,548,552.87	223.1	0:00
SR081	Non-Participating	702,265.87	4,547,989.86	222.2	0:00
SR082	Non-Participating	702,286.05	4,547,732.71	222.2	1:30
SR083	Non-Participating	702,310.85	4,547,172.99	222.4	23:45
SR084	Non-Participating	702,344.51	4,548,293.72	223.1	0:00
SR085	Non-Participating	702,349.50	4,547,669.05	223.1	9:42
SR086	Non-Participating	702,378.73	4,547,007.92	223.1	24:39
SR087	Non-Participating	702,382.40	4,547,288.40	223.1	12:10
SR088	Non-Participating	702,387.74	4,547,366.38	223.1	9:10
SR089	Non-Participating	702,391.15	4,543,688.61	224.1	37:50
SR090	Non-Participating	702,396.29	4,547,775.91	223.1	3:13
SR091	Non-Participating	702,428.21	4,543,681.02	224.0	33:26
SR092	Non-Participating	703,038.85	4,543,649.53	224.0	6:10
SR093	Non-Participating	703,100.85	4,543,665.81	224.0	8:59
SR094	Non-Participating	703,128.33	4,543,661.74	224.0	12:09
SR095	Non-Participating	703,145.39	4,543,664.91	224.0	12:42
SR096	Non-Participating	703,215.45	4,543,502.46	224.7	16:07
SR097	Non-Participating	703,249.67	4,543,604.95	224.3	13:07
SR098	Non-Participating	703,293.24	4,543,954.65	224.0	22:11
SR099	Non-Participating	703,302.76	4,543,800.26	224.0	41:02
SR100	Non-Participating	703,302.85	4,543,543.79	224.0	10:55
SR101	Non-Participating	703,317.07	4,543,587.78	224.0	9:57
SR102	Non-Participating	703,320.71	4,543,495.83	224.0	12:03
SR103	Non-Participating	703,327.98	4,543,445.23	224.0	11:50
SR104	Non-Participating	703,354.14	4,543,861.87	224.0	21:14
SR105	Non-Participating	703,356.34	4,543,901.07	224.0	19:00
SR106	Non-Participating	703,357.09	4,543,638.38	224.0	16:54
SR107	Non-Participating	703,362.05	4,543,499.47	224.0	10:56
SR108	Non-Participating	703,362.71	4,543,449.53	224.0	10:51
SR109	Non-Participating	703,363.88	4,543,772.48	224.0	40:14
SR110	Non-Participating	703,378.92	4,543,544.12	224.0	9:57
SR111	Non-Participating	703,383.55	4,543,587.11	224.0	8:30
SR112	Non-Participating	703,386.31	4,544,011.17	224.0	14:33
SR113	Non-Participating	703,388.49	4,543,874.08	224.0	18:50
SR114	Non-Participating	703,394.41	4,543,672.13	224.0	30:39
SR115	Non-Participating	703,396.69	4,543,968.44	224.0	14:49

Trishe
Real case shadow flicker results at dwellings within one mile of project WTGs
Results using GE 2.3-116 - 94 m hub height WTGs
UTM NAD83 Zone 16
continued

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR116	Non-Participating	703,400.39	4,543,854.24	224.0	21:21
SR117	Non-Participating	703,401.98	4,543,908.21	224.0	15:45
SR118	Non-Participating	703,404.38	4,543,607.62	224.0	13:47
SR119	Non-Participating	703,416.66	4,543,492.52	224.0	9:39
SR120	Non-Participating	703,421.91	4,543,543.13	224.0	8:17
SR121	Non-Participating	703,446.43	4,543,870.90	224.0	18:42
SR122	Non-Participating	703,451.13	4,544,009.10	224.0	11:52
SR123	Non-Participating	703,451.59	4,543,962.58	224.0	12:31
SR124	Non-Participating	703,451.99	4,543,773.67	224.0	26:55
SR125	Non-Participating	703,453.33	4,543,808.71	224.0	24:30
SR126	Non-Participating	703,453.86	4,543,916.66	224.0	13:59
SR127	Non-Participating	703,454.37	4,543,755.81	224.0	26:56
SR128	Non-Participating	703,459.93	4,543,722.47	224.0	29:58
SR129	Non-Participating	703,460.94	4,543,587.44	224.0	14:29
SR130	Non-Participating	703,462.26	4,543,490.21	224.0	8:30
SR131	Non-Participating	703,462.27	4,543,546.27	224.0	6:39
SR132	Non-Participating	703,466.34	4,543,652.40	224.0	28:49
SR133	Non-Participating	703,470.26	4,548,518.70	222.2	0:00
SR134	Non-Participating	703,472.63	4,543,833.60	224.0	21:38
SR135	Non-Participating	703,475.01	4,543,775.26	224.0	23:30
SR136	Non-Participating	703,487.31	4,543,780.02	224.0	21:58
SR137	Non-Participating	703,489.69	4,543,713.34	224.0	26:59
SR138	Non-Participating	703,491.68	4,543,735.97	224.0	23:13
SR139	Non-Participating	703,492.07	4,544,013.78	224.0	10:30
SR140	Non-Participating	703,495.25	4,543,957.03	224.0	10:54
SR141	Non-Participating	703,496.03	4,543,648.66	224.0	28:33
SR142	Non-Participating	703,501.20	4,543,874.48	224.0	17:48
SR143	Non-Participating	703,503.19	4,543,905.43	224.0	15:17
SR144	Non-Participating	703,505.96	4,543,827.25	224.0	20:13
SR145	Non-Participating	703,510.33	4,543,735.57	224.0	21:09
SR146	Non-Participating	703,512.59	4,543,789.48	224.0	19:19
SR147	Non-Participating	703,512.71	4,543,712.95	224.0	23:15
SR148	Non-Participating	703,526.51	4,546,983.41	223.1	17:26
SR149	Non-Participating	703,539.30	4,543,928.05	224.0	13:41
SR150	Non-Participating	703,543.67	4,544,006.24	224.0	9:04
SR151	Non-Participating	703,550.41	4,543,716.52	224.0	18:50
SR152	Non-Participating	703,553.99	4,543,736.36	224.0	17:31
SR153	Non-Participating	703,571.84	4,543,782.40	224.0	15:16

Trishe
Real case shadow flicker results at dwellings within one mile of project WTGs
Results using GE 2.3-116 - 94 m hub height WTGs
UTM NAD83 Zone 16
continued

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR154	Non-Participating	703,587.72	4,543,724.06	224.0	15:53
SR155	Non-Participating	703,592.09	4,543,916.55	224.0	14:03
SR156	Non-Participating	703,597.24	4,543,772.88	224.0	14:04
SR157	Non-Participating	703,602.01	4,543,857.41	224.0	13:49
SR158	Non-Participating	703,603.59	4,543,957.03	224.0	12:02
SR159	Non-Participating	703,603.99	4,543,875.67	224.0	14:20
SR160	Non-Participating	703,609.15	4,543,814.55	224.0	13:07
SR161	Non-Participating	703,609.55	4,543,831.22	224.0	13:09
SR162	Non-Participating	703,642.52	4,543,934.17	224.0	12:29
SR163	Non-Participating	703,644.62	4,543,782.87	224.0	11:54
SR164	Non-Participating	703,650.09	4,543,677.23	224.0	14:08
SR165	Non-Participating	703,657.69	4,543,882.72	224.0	11:18
SR166	Non-Participating	703,662.33	4,543,725.25	224.0	12:13
SR167	Non-Participating	703,692.88	4,548,546.18	222.2	1:43
SR168	Non-Participating	703,717.44	4,543,736.16	224.0	10:04
SR169	Non-Participating	703,763.93	4,543,734.78	224.0	8:52
SR170	Non-Participating	703,804.17	4,543,735.68	224.0	7:51
SR171	Non-Participating	703,854.85	4,548,727.86	222.2	2:41
SR172	Non-Participating	703,886.13	4,548,244.38	222.2	3:06
SR173	Non-Participating	703,911.56	4,547,434.86	222.2	18:42
SR174	Non-Participating	703,961.14	4,546,478.09	223.1	29:17
SR175	Non-Participating	703,966.37	4,548,772.12	221.8	0:00
SR176	Non-Participating	703,974.82	4,548,682.35	222.2	2:03
SR177	Non-Participating	703,990.33	4,545,165.76	223.7	6:51
SR178	Non-Participating	704,025.19	4,544,227.82	223.3	4:04
SR179	Non-Participating	704,028.21	4,544,125.12	223.6	3:41
SR180	Non-Participating	704,033.61	4,546,900.87	223.1	9:58
SR181	Non-Participating	704,253.43	4,549,279.81	220.4	0:00
SR182	Non-Participating	704,303.94	4,549,330.32	221.3	0:00
SR183	Non-Participating	704,388.12	4,548,593.69	222.2	0:00
SR184	Non-Participating	704,480.95	4,544,551.15	223.1	0:00
SR185	Non-Participating	704,700.62	4,548,606.71	221.3	0:00
SR186	Non-Participating	704,836.36	4,546,938.71	222.2	1:42
SR187	Non-Participating	704,969.67	4,548,620.66	221.3	0:00
SR188	Non-Participating	705,031.78	4,545,386.00	223.1	10:40
SR189	Non-Participating	705,325.82	4,545,327.44	222.4	7:37
SR190	Non-Participating	705,414.06	4,547,017.61	222.2	11:00
SR191	Non-Participating	705,440.38	4,549,183.51	221.3	0:00

Trishe
Real case shadow flicker results at dwellings within one mile of project WTGs
Results using GE 2.3-116 - 94 m hub height WTGs
UTM NAD83 Zone 16
continued

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR192	Non-Participating	705,510.86	4,548,530.84	221.3	3:25
SR193	Non-Participating	705,554.68	4,547,023.56	222.2	17:36
SR194	Non-Participating	705,563.82	4,548,652.85	220.5	0:00
SR195	Non-Participating	705,596.36	4,543,727.29	223.1	0:00
SR196	Non-Participating	705,606.09	4,547,969.86	221.5	10:35
SR197	Non-Participating	705,608.38	4,547,733.41	222.2	30:54
SR198	Non-Participating	705,616.08	4,545,290.54	222.2	24:40
SR199	Non-Participating	705,629.62	4,546,733.38	222.2	3:39
SR200	Non-Participating	705,671.29	4,548,634.19	220.4	2:38
SR201	Non-Participating	705,680.54	4,545,337.27	222.2	28:39
SR202	Non-Participating	705,797.47	4,543,719.94	222.2	0:00
SR203	Non-Participating	705,840.72	4,548,674.62	220.8	5:13
SR204	Non-Participating	705,857.64	4,548,635.15	221.3	5:51
SR205	Non-Participating	706,001.42	4,548,590.23	221.3	2:49
SR206	Non-Participating	706,081.18	4,548,643.06	221.3	2:18
SR207	Non-Participating	706,284.81	4,543,726.91	222.2	4:51
SR208	Non-Participating	706,657.79	4,547,053.86	221.4	14:11
SR209	Non-Participating	706,731.29	4,548,682.68	221.3	1:50
SR210	Non-Participating	706,897.44	4,543,814.55	222.2	2:36
SR211	Non-Participating	706,949.83	4,545,366.22	222.2	30:25
SR212	Non-Participating	707,123.89	4,548,694.36	220.2	5:01
SR213	Non-Participating	707,130.00	4,548,947.18	220.4	0:00
SR214	Non-Participating	707,203.97	4,548,818.65	220.4	0:00
SR215	Non-Participating	707,204.92	4,546,610.38	221.3	9:22
SR216	Non-Participating	707,233.47	4,546,018.82	221.3	16:24
SR217	Non-Participating	707,246.08	4,548,009.77	221.3	19:21
SR218	Non-Participating	707,252.38	4,547,892.77	221.3	22:53
SR219	Non-Participating	707,292.96	4,543,750.47	222.2	0:00
SR220	Non-Participating	707,313.99	4,543,113.68	222.2	14:35
SR221	Non-Participating	707,315.82	4,543,177.80	222.2	7:26
SR222	Non-Participating	707,357.52	4,543,598.44	222.2	0:00
SR223	Non-Participating	707,586.77	4,546,997.22	221.3	19:05
SR224	Non-Participating	707,825.54	4,547,075.26	221.3	23:45
SR225	Non-Participating	708,297.76	4,545,478.92	221.7	6:49
SR226	Non-Participating	708,362.37	4,548,647.66	221.3	0:00
SR227	Non-Participating	708,371.03	4,545,481.25	221.9	8:49
SR228	Non-Participating	708,452.91	4,545,483.23	222.2	19:18
SR229	Non-Participating	708,471.32	4,543,873.64	222.5	0:00

Trishe
Real case shadow flicker results at dwellings within one mile of project WTGs
Results using GE 2.3-116 - 94 m hub height WTGs
UTM NAD83 Zone 16
continued

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR230	Non-Participating	708,752.54	4,550,677.91	219.5	0:00
SR231	Non-Participating	708,752.72	4,545,488.25	222.2	25:52
SR232	Non-Participating	708,765.77	4,543,808.29	222.2	0:00
SR233	Non-Participating	708,814.59	4,546,774.89	221.3	28:30
SR234	Non-Participating	708,893.23	4,544,471.70	222.2	13:38
SR235	Non-Participating	708,913.52	4,545,495.96	222.1	17:12
SR236	Non-Participating	708,913.52	4,545,495.96	222.1	17:12
SR237	Non-Participating	708,913.78	4,543,812.89	222.2	0:00
SR238	Non-Participating	708,915.19	4,545,845.43	221.3	15:37
SR239	Non-Participating	708,915.23	4,543,231.49	222.2	3:50
SR240	Non-Participating	708,950.19	4,544,630.82	221.8	15:34
SR241	Non-Participating	708,972.43	4,544,295.72	222.2	13:54
SR242	Non-Participating	708,980.19	4,543,690.26	222.2	0:00
SR243	Non-Participating	709,014.39	4,547,120.99	221.3	7:39
SR244	Non-Participating	709,416.55	4,548,671.84	220.4	24:35
SR245	Non-Participating	709,597.52	4,543,899.83	222.2	0:00
SR246	Non-Participating	709,840.48	4,547,075.31	220.9	10:25
SR247	Non-Participating	709,883.73	4,550,315.95	219.5	4:06
SR248	Non-Participating	710,102.25	4,543,907.01	221.4	0:00
SR249	Non-Participating	710,372.00	4,548,770.02	220.4	11:02
SR250	Non-Participating	710,373.30	4,550,673.03	219.5	0:00
SR251	Non-Participating	710,443.44	4,546,266.05	219.8	23:29
SR252	Non-Participating	710,488.16	4,546,863.03	220.4	1:58
SR253	Non-Participating	710,493.90	4,544,684.59	221.3	7:24
SR254	Non-Participating	710,522.90	4,543,863.94	221.3	0:00
SR255	Non-Participating	710,526.00	4,544,020.83	221.3	0:00
SR256	Non-Participating	710,530.99	4,543,731.95	221.3	0:00
SR257	Non-Participating	710,976.11	4,548,812.77	220.4	26:02
SR258	Non-Participating	711,149.14	4,545,493.49	220.4	9:05
SR259	Non-Participating	711,293.72	4,545,569.87	220.4	6:26
SR260	Non-Participating	711,421.48	4,548,740.89	219.5	11:57
SR261	Non-Participating	711,976.37	4,546,977.31	219.5	0:00
SR262	Non-Participating	712,043.24	4,547,215.83	219.8	0:00
SR263	Non-Participating	712,259.66	4,547,224.14	219.5	0:00
SR264	Non-Participating	712,583.13	4,547,255.09	219.5	0:00
SR265	Non-Participating	712,651.06	4,547,258.83	219.5	0:00
SR266	Non-Participating	712,927.08	4,547,191.66	219.5	0:00

Trishe
Real case shadow flicker results at dwellings within one mile of project WTGs
Results using Vestas V110 2.0-80 m hub height WTGs
UTM NAD83 Zone 16

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR001	Participating	698,744.57	4,545,112.68	225.5	26:29
SR002	Participating	699,298.46	4,546,726.65	225.9	12:56
SR003	Participating	699,301.86	4,546,754.01	225.9	11:56
SR004	Participating	703,086.59	4,545,268.49	223.2	20:45
SR005	Participating	704,003.39	4,545,425.77	224.0	8:02
SR006	Participating	704,071.02	4,545,560.59	223.7	16:01
SR007	Participating	705,592.02	4,546,368.09	222.2	17:35
SR008	Participating	706,097.61	4,543,811.86	222.2	0:00
SR009	Participating	706,489.96	4,547,056.16	221.3	3:06
SR010	Participating	707,928.43	4,545,490.20	221.3	3:22
SR011	Participating	708,806.34	4,549,116.26	221.2	13:47
SR012	Participating	709,213.00	4,548,680.10	220.4	6:06
SR013	Participating	709,341.83	4,547,064.81	221.0	2:30
SR014	Participating	709,885.92	4,545,522.25	220.4	4:41
SR015	Participating	710,271.28	4,545,476.10	220.4	8:28
SR016	Participating	710,602.44	4,543,936.70	221.3	0:00
SR017	Non-Participating	695,186.59	4,548,251.33	226.8	0:00
SR018	Non-Participating	695,760.28	4,548,926.46	226.8	3:27
SR019	Non-Participating	695,808.07	4,547,726.92	226.8	5:40
SR020	Non-Participating	695,824.91	4,547,168.69	226.8	3:56
SR021	Non-Participating	695,874.00	4,545,766.03	227.2	0:00
SR022	Non-Participating	695,885.09	4,546,923.68	227.7	6:49
SR023	Non-Participating	695,902.29	4,546,804.55	226.8	7:44
SR024	Non-Participating	695,938.06	4,546,431.33	227.6	3:49
SR025	Non-Participating	696,005.56	4,549,917.66	225.9	0:00
SR026	Non-Participating	696,365.20	4,545,125.23	226.8	1:42
SR027	Non-Participating	696,368.60	4,548,361.94	225.9	7:03
SR028	Non-Participating	696,556.39	4,545,126.76	226.8	3:17
SR029	Non-Participating	696,667.38	4,545,120.58	226.8	5:57
SR030	Non-Participating	696,703.55	4,548,301.27	225.9	0:00
SR031	Non-Participating	696,755.33	4,549,937.84	225.9	0:00
SR032	Non-Participating	696,811.12	4,549,917.46	225.9	0:00
SR033	Non-Participating	696,945.42	4,545,072.53	225.9	1:19
SR034	Non-Participating	697,170.58	4,548,362.18	225.3	23:54
SR035	Non-Participating	697,298.67	4,543,542.41	227.7	0:00
SR036	Non-Participating	697,421.18	4,547,425.00	225.9	18:53
SR037	Non-Participating	697,424.16	4,548,308.01	225.5	25:48
SR038	Non-Participating	697,485.28	4,547,881.96	224.9	18:54
SR039	Non-Participating	697,497.30	4,547,574.88	224.9	13:56

Trishe
Real case shadow flicker results at dwellings within one mile of project WTGs
Results using Vestas V110 2.0-80 m hub height WTGs
UTM NAD83 Zone 16
continued

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR040	Non-Participating	697,538.49	4,549,916.74	224.9	0:00
SR041	Non-Participating	697,548.62	4,544,285.20	226.4	15:15
SR042	Non-Participating	697,619.61	4,545,937.82	225.9	6:59
SR043	Non-Participating	697,652.94	4,543,291.49	226.8	2:01
SR044	Non-Participating	697,668.11	4,542,788.38	225.9	12:19
SR045	Non-Participating	697,676.55	4,542,916.56	225.9	14:53
SR046	Non-Participating	697,835.84	4,545,087.83	224.9	16:59
SR047	Non-Participating	697,899.23	4,545,073.49	225.9	17:15
SR048	Non-Participating	697,972.15	4,545,147.25	225.6	3:20
SR049	Non-Participating	698,073.70	4,546,766.85	225.9	18:46
SR050	Non-Participating	698,231.65	4,545,165.80	225.9	0:00
SR051	Non-Participating	698,444.51	4,543,541.40	225.8	29:09
SR052	Non-Participating	699,022.98	4,548,762.79	224.9	0:00
SR053	Non-Participating	699,037.98	4,548,032.30	224.9	2:56
SR054	Non-Participating	699,055.68	4,547,371.38	224.9	14:11
SR055	Non-Participating	699,106.44	4,548,187.36	224.9	0:00
SR056	Non-Participating	699,106.95	4,548,145.96	224.9	0:00
SR057	Non-Participating	699,124.05	4,545,417.01	224.9	20:50
SR058	Non-Participating	699,177.97	4,546,810.51	225.9	9:08
SR059	Non-Participating	699,188.02	4,543,004.14	226.8	10:08
SR060	Non-Participating	699,903.38	4,548,459.46	224.0	0:00
SR061	Non-Participating	699,920.65	4,545,167.32	225.0	14:13
SR062	Non-Participating	699,959.80	4,548,463.60	224.0	0:00
SR063	Non-Participating	700,048.74	4,546,790.26	224.9	3:51
SR064	Non-Participating	700,235.46	4,543,616.25	225.9	8:08
SR065	Non-Participating	700,657.32	4,546,871.74	224.0	10:37
SR066	Non-Participating	700,720.42	4,546,100.38	224.0	12:07
SR067	Non-Participating	700,764.10	4,546,477.36	223.5	7:35
SR068	Non-Participating	700,784.06	4,546,267.12	224.0	11:56
SR069	Non-Participating	700,784.63	4,546,310.99	224.0	11:11
SR070	Non-Participating	700,793.63	4,546,372.80	224.1	8:56
SR071	Non-Participating	700,798.05	4,546,777.67	224.1	12:18
SR072	Non-Participating	700,820.84	4,546,199.06	223.8	11:34
SR073	Non-Participating	700,841.02	4,544,096.00	224.9	18:38
SR074	Non-Participating	700,975.33	4,545,259.12	224.9	21:58
SR075	Non-Participating	701,377.68	4,546,903.57	223.9	2:26
SR076	Non-Participating	701,397.52	4,543,594.09	225.2	12:45
SR077	Non-Participating	701,461.92	4,548,269.14	223.1	0:00

Trishe
Real case shadow flicker results at dwellings within one mile of project WTGs
Results using Vestas V110 2.0-80 m hub height WTGs
UTM NAD83 Zone 16
continued

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR078	Non-Participating	701,561.73	4,545,222.39	224.0	22:12
SR079	Non-Participating	701,595.95	4,546,597.08	224.0	2:12
SR080	Non-Participating	702,254.51	4,548,552.87	223.1	0:00
SR081	Non-Participating	702,265.87	4,547,989.86	222.2	0:00
SR082	Non-Participating	702,286.05	4,547,732.71	222.2	0:00
SR083	Non-Participating	702,310.85	4,547,172.99	222.4	20:24
SR084	Non-Participating	702,344.51	4,548,293.72	223.1	0:00
SR085	Non-Participating	702,349.50	4,547,669.05	223.1	7:48
SR086	Non-Participating	702,378.73	4,547,007.92	223.1	20:37
SR087	Non-Participating	702,382.40	4,547,288.40	223.1	8:36
SR088	Non-Participating	702,387.74	4,547,366.38	223.1	7:43
SR089	Non-Participating	702,391.15	4,543,688.61	224.1	37:46
SR090	Non-Participating	702,396.29	4,547,775.91	223.1	1:11
SR091	Non-Participating	702,428.21	4,543,681.02	224.0	33:23
SR092	Non-Participating	703,038.85	4,543,649.53	224.0	6:10
SR093	Non-Participating	703,100.85	4,543,665.81	224.0	8:59
SR094	Non-Participating	703,128.33	4,543,661.74	224.0	12:08
SR095	Non-Participating	703,145.39	4,543,664.91	224.0	12:41
SR096	Non-Participating	703,215.45	4,543,502.46	224.7	16:05
SR097	Non-Participating	703,249.67	4,543,604.95	224.3	13:06
SR098	Non-Participating	703,293.24	4,543,954.65	224.0	22:09
SR099	Non-Participating	703,302.76	4,543,800.26	224.0	40:58
SR100	Non-Participating	703,302.85	4,543,543.79	224.0	10:54
SR101	Non-Participating	703,317.07	4,543,587.78	224.0	9:56
SR102	Non-Participating	703,320.71	4,543,495.83	224.0	12:02
SR103	Non-Participating	703,327.98	4,543,445.23	224.0	11:49
SR104	Non-Participating	703,354.14	4,543,861.87	224.0	21:12
SR105	Non-Participating	703,356.34	4,543,901.07	224.0	18:59
SR106	Non-Participating	703,357.09	4,543,638.38	224.0	16:52
SR107	Non-Participating	703,362.05	4,543,499.47	224.0	10:55
SR108	Non-Participating	703,362.71	4,543,449.53	224.0	10:50
SR109	Non-Participating	703,363.88	4,543,772.48	224.0	40:11
SR110	Non-Participating	703,378.92	4,543,544.12	224.0	9:56
SR111	Non-Participating	703,383.55	4,543,587.11	224.0	8:29
SR112	Non-Participating	703,386.31	4,544,011.17	224.0	14:32
SR113	Non-Participating	703,388.49	4,543,874.08	224.0	18:48
SR114	Non-Participating	703,394.41	4,543,672.13	224.0	30:37
SR115	Non-Participating	703,396.69	4,543,968.44	224.0	14:48

Trishe
Real case shadow flicker results at dwellings within one mile of project WTGs
Results using Vestas V110 2.0-80 m hub height WTGs
UTM NAD83 Zone 16
continued

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR116	Non-Participating	703,400.39	4,543,854.24	224.0	21:19
SR117	Non-Participating	703,401.98	4,543,908.21	224.0	15:43
SR118	Non-Participating	703,404.38	4,543,607.62	224.0	13:46
SR119	Non-Participating	703,416.66	4,543,492.52	224.0	9:38
SR120	Non-Participating	703,421.91	4,543,543.13	224.0	8:16
SR121	Non-Participating	703,446.43	4,543,870.90	224.0	18:40
SR122	Non-Participating	703,451.13	4,544,009.10	224.0	11:51
SR123	Non-Participating	703,451.59	4,543,962.58	224.0	12:30
SR124	Non-Participating	703,451.99	4,543,773.67	224.0	26:52
SR125	Non-Participating	703,453.33	4,543,808.71	224.0	24:28
SR126	Non-Participating	703,453.86	4,543,916.66	224.0	13:58
SR127	Non-Participating	703,454.37	4,543,755.81	224.0	26:53
SR128	Non-Participating	703,459.93	4,543,722.47	224.0	29:55
SR129	Non-Participating	703,460.94	4,543,587.44	224.0	14:27
SR130	Non-Participating	703,462.26	4,543,490.21	224.0	8:29
SR131	Non-Participating	703,462.27	4,543,546.27	224.0	6:38
SR132	Non-Participating	703,466.34	4,543,652.40	224.0	28:47
SR133	Non-Participating	703,470.26	4,548,518.70	222.2	0:00
SR134	Non-Participating	703,472.63	4,543,833.60	224.0	21:37
SR135	Non-Participating	703,475.01	4,543,775.26	224.0	23:27
SR136	Non-Participating	703,487.31	4,543,780.02	224.0	21:56
SR137	Non-Participating	703,489.69	4,543,713.34	224.0	26:57
SR138	Non-Participating	703,491.68	4,543,735.97	224.0	23:11
SR139	Non-Participating	703,492.07	4,544,013.78	224.0	10:29
SR140	Non-Participating	703,495.25	4,543,957.03	224.0	10:53
SR141	Non-Participating	703,496.03	4,543,648.66	224.0	28:31
SR142	Non-Participating	703,501.20	4,543,874.48	224.0	17:47
SR143	Non-Participating	703,503.19	4,543,905.43	224.0	15:15
SR144	Non-Participating	703,505.96	4,543,827.25	224.0	20:11
SR145	Non-Participating	703,510.33	4,543,735.57	224.0	21:08
SR146	Non-Participating	703,512.59	4,543,789.48	224.0	19:17
SR147	Non-Participating	703,512.71	4,543,712.95	224.0	23:13
SR148	Non-Participating	703,526.51	4,546,983.41	223.1	14:51
SR149	Non-Participating	703,539.30	4,543,928.05	224.0	13:40
SR150	Non-Participating	703,543.67	4,544,006.24	224.0	9:03
SR151	Non-Participating	703,550.41	4,543,716.52	224.0	18:48
SR152	Non-Participating	703,553.99	4,543,736.36	224.0	17:29
SR153	Non-Participating	703,571.84	4,543,782.40	224.0	15:15

Trishe
Real case shadow flicker results at dwellings within one mile of project WTGs
Results using Vestas V110 2.0-80 m hub height WTGs
UTM NAD83 Zone 16
continued

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR154	Non-Participating	703,587.72	4,543,724.06	224.0	15:52
SR155	Non-Participating	703,592.09	4,543,916.55	224.0	14:02
SR156	Non-Participating	703,597.24	4,543,772.88	224.0	14:03
SR157	Non-Participating	703,602.01	4,543,857.41	224.0	13:48
SR158	Non-Participating	703,603.59	4,543,957.03	224.0	12:01
SR159	Non-Participating	703,603.99	4,543,875.67	224.0	14:19
SR160	Non-Participating	703,609.15	4,543,814.55	224.0	13:06
SR161	Non-Participating	703,609.55	4,543,831.22	224.0	13:08
SR162	Non-Participating	703,642.52	4,543,934.17	224.0	12:28
SR163	Non-Participating	703,644.62	4,543,782.87	224.0	11:53
SR164	Non-Participating	703,650.09	4,543,677.23	224.0	14:06
SR165	Non-Participating	703,657.69	4,543,882.72	224.0	11:17
SR166	Non-Participating	703,662.33	4,543,725.25	224.0	12:12
SR167	Non-Participating	703,692.88	4,548,546.18	222.2	1:16
SR168	Non-Participating	703,717.44	4,543,736.16	224.0	10:03
SR169	Non-Participating	703,763.93	4,543,734.78	224.0	8:51
SR170	Non-Participating	703,804.17	4,543,735.68	224.0	7:51
SR171	Non-Participating	703,854.85	4,548,727.86	222.2	1:46
SR172	Non-Participating	703,886.13	4,548,244.38	222.2	2:24
SR173	Non-Participating	703,911.56	4,547,434.86	222.2	15:16
SR174	Non-Participating	703,961.14	4,546,478.09	223.1	23:13
SR175	Non-Participating	703,966.37	4,548,772.12	221.8	0:00
SR176	Non-Participating	703,974.82	4,548,682.35	222.2	0:57
SR177	Non-Participating	703,990.33	4,545,165.76	223.7	5:03
SR178	Non-Participating	704,025.19	4,544,227.82	223.3	4:04
SR179	Non-Participating	704,028.21	4,544,125.12	223.6	3:41
SR180	Non-Participating	704,033.61	4,546,900.87	223.1	7:29
SR181	Non-Participating	704,253.43	4,549,279.81	220.4	0:00
SR182	Non-Participating	704,303.94	4,549,330.32	221.3	0:00
SR183	Non-Participating	704,388.12	4,548,593.69	222.2	0:00
SR184	Non-Participating	704,480.95	4,544,551.15	223.1	0:00
SR185	Non-Participating	704,700.62	4,548,606.71	221.3	0:00
SR186	Non-Participating	704,836.36	4,546,938.71	222.2	1:09
SR187	Non-Participating	704,969.67	4,548,620.66	221.3	0:00
SR188	Non-Participating	705,031.78	4,545,386.00	223.1	8:26
SR189	Non-Participating	705,325.82	4,545,327.44	222.4	5:45
SR190	Non-Participating	705,414.06	4,547,017.61	222.2	7:59
SR191	Non-Participating	705,440.38	4,549,183.51	221.3	0:00

Trishe
Real case shadow flicker results at dwellings within one mile of project WTGs
Results using Vestas V110 2.0-80 m hub height WTGs
UTM NAD83 Zone 16
continued

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR192	Non-Participating	705,510.86	4,548,530.84	221.3	1:00
SR193	Non-Participating	705,554.68	4,547,023.56	222.2	13:54
SR194	Non-Participating	705,563.82	4,548,652.85	220.5	0:00
SR195	Non-Participating	705,596.36	4,543,727.29	223.1	0:00
SR196	Non-Participating	705,606.09	4,547,969.86	221.5	8:53
SR197	Non-Participating	705,608.38	4,547,733.41	222.2	23:00
SR198	Non-Participating	705,616.08	4,545,290.54	222.2	21:19
SR199	Non-Participating	705,629.62	4,546,733.38	222.2	2:21
SR200	Non-Participating	705,671.29	4,548,634.19	220.4	0:48
SR201	Non-Participating	705,680.54	4,545,337.27	222.2	25:08
SR202	Non-Participating	705,797.47	4,543,719.94	222.2	0:00
SR203	Non-Participating	705,840.72	4,548,674.62	220.8	3:58
SR204	Non-Participating	705,857.64	4,548,635.15	221.3	4:37
SR205	Non-Participating	706,001.42	4,548,590.23	221.3	2:08
SR206	Non-Participating	706,081.18	4,548,643.06	221.3	1:41
SR207	Non-Participating	706,284.81	4,543,726.91	222.2	4:50
SR208	Non-Participating	706,657.79	4,547,053.86	221.4	18:18
SR209	Non-Participating	706,731.29	4,548,682.68	221.3	1:21
SR210	Non-Participating	706,897.44	4,543,814.55	222.2	2:06
SR211	Non-Participating	706,949.83	4,545,366.22	222.2	24:50
SR212	Non-Participating	707,123.89	4,548,694.36	220.2	3:33
SR213	Non-Participating	707,130.00	4,548,947.18	220.4	0:00
SR214	Non-Participating	707,203.97	4,548,818.65	220.4	0:00
SR215	Non-Participating	707,204.92	4,546,610.38	221.3	6:23
SR216	Non-Participating	707,233.47	4,546,018.82	221.3	13:16
SR217	Non-Participating	707,246.08	4,548,009.77	221.3	15:10
SR218	Non-Participating	707,252.38	4,547,892.77	221.3	18:16
SR219	Non-Participating	707,292.96	4,543,750.47	222.2	0:00
SR220	Non-Participating	707,313.99	4,543,113.68	222.2	14:34
SR221	Non-Participating	707,315.82	4,543,177.80	222.2	7:25
SR222	Non-Participating	707,357.52	4,543,598.44	222.2	0:00
SR223	Non-Participating	707,586.77	4,546,997.22	221.3	15:59
SR224	Non-Participating	707,825.54	4,547,075.26	221.3	21:23
SR225	Non-Participating	708,297.76	4,545,478.92	221.7	5:27
SR226	Non-Participating	708,362.37	4,548,647.66	221.3	0:00
SR227	Non-Participating	708,371.03	4,545,481.25	221.9	7:12
SR228	Non-Participating	708,452.91	4,545,483.23	222.2	14:37
SR229	Non-Participating	708,471.32	4,543,873.64	222.5	0:00

Trishe
Real case shadow flicker results at dwellings within one mile of project WTGs
Results using Vestas V110 2.0-80 m hub height WTGs
UTM NAD83 Zone 16
continued

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR230	Non-Participating	708,752.54	4,550,677.91	219.5	0:00
SR231	Non-Participating	708,752.72	4,545,488.25	222.2	18:12
SR232	Non-Participating	708,765.77	4,543,808.29	222.2	0:00
SR233	Non-Participating	708,814.59	4,546,774.89	221.3	19:31
SR234	Non-Participating	708,893.23	4,544,471.70	222.2	10:33
SR235	Non-Participating	708,913.52	4,545,495.96	222.1	13:26
SR236	Non-Participating	708,913.52	4,545,495.96	222.1	13:26
SR237	Non-Participating	708,913.78	4,543,812.89	222.2	0:00
SR238	Non-Participating	708,915.19	4,545,845.43	221.3	12:12
SR239	Non-Participating	708,915.23	4,543,231.49	222.2	3:50
SR240	Non-Participating	708,950.19	4,544,630.82	221.8	14:08
SR241	Non-Participating	708,972.43	4,544,295.72	222.2	11:06
SR242	Non-Participating	708,980.19	4,543,690.26	222.2	0:00
SR243	Non-Participating	709,014.39	4,547,120.99	221.3	6:19
SR244	Non-Participating	709,416.55	4,548,671.84	220.4	19:35
SR245	Non-Participating	709,597.52	4,543,899.83	222.2	0:00
SR246	Non-Participating	709,840.48	4,547,075.31	220.9	7:38
SR247	Non-Participating	709,883.73	4,550,315.95	219.5	3:15
SR248	Non-Participating	710,102.25	4,543,907.01	221.4	0:00
SR249	Non-Participating	710,372.00	4,548,770.02	220.4	6:35
SR250	Non-Participating	710,373.30	4,550,673.03	219.5	0:00
SR251	Non-Participating	710,443.44	4,546,266.05	219.8	12:49
SR252	Non-Participating	710,488.16	4,546,863.03	220.4	1:25
SR253	Non-Participating	710,493.90	4,544,684.59	221.3	5:33
SR254	Non-Participating	710,522.90	4,543,863.94	221.3	0:00
SR255	Non-Participating	710,526.00	4,544,020.83	221.3	0:00
SR256	Non-Participating	710,530.99	4,543,731.95	221.3	0:00
SR257	Non-Participating	710,976.11	4,548,812.77	220.4	20:38
SR258	Non-Participating	711,149.14	4,545,493.49	220.4	7:54
SR259	Non-Participating	711,293.72	4,545,569.87	220.4	4:44
SR260	Non-Participating	711,421.48	4,548,740.89	219.5	9:36
SR261	Non-Participating	711,976.37	4,546,977.31	219.5	0:00
SR262	Non-Participating	712,043.24	4,547,215.83	219.8	0:00
SR263	Non-Participating	712,259.66	4,547,224.14	219.5	0:00
SR264	Non-Participating	712,583.13	4,547,255.09	219.5	0:00
SR265	Non-Participating	712,651.06	4,547,258.83	219.5	0:00
SR266	Non-Participating	712,927.08	4,547,191.66	219.5	0:00

Trishe
Real case shadow flicker results at dwellings within one mile of project WTGs
Results using Vestas V110 2.0-95 m hub height WTGs
UTM NAD83 Zone 16

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR001	Participating	698,744.57	4,545,112.68	225.5	27:15
SR002	Participating	699,298.46	4,546,726.65	225.9	14:09
SR003	Participating	699,301.86	4,546,754.01	225.9	13:10
SR004	Participating	703,086.59	4,545,268.49	223.2	25:12
SR005	Participating	704,003.39	4,545,425.77	224.0	10:00
SR006	Participating	704,071.02	4,545,560.59	223.7	17:36
SR007	Participating	705,592.02	4,546,368.09	222.2	20:03
SR008	Participating	706,097.61	4,543,811.86	222.2	0:00
SR009	Participating	706,489.96	4,547,056.16	221.3	3:52
SR010	Participating	707,928.43	4,545,490.20	221.3	4:14
SR011	Participating	708,806.34	4,549,116.26	221.2	13:07
SR012	Participating	709,213.00	4,548,680.10	220.4	7:34
SR013	Participating	709,341.83	4,547,064.81	221.0	3:02
SR014	Participating	709,885.92	4,545,522.25	220.4	5:24
SR015	Participating	710,271.28	4,545,476.10	220.4	9:24
SR016	Participating	710,602.44	4,543,936.70	221.3	0:00
SR017	Non-Participating	695,186.59	4,548,251.33	226.8	0:00
SR018	Non-Participating	695,760.28	4,548,926.46	226.8	4:01
SR019	Non-Participating	695,808.07	4,547,726.92	226.8	6:54
SR020	Non-Participating	695,824.91	4,547,168.69	226.8	4:57
SR021	Non-Participating	695,874.00	4,545,766.03	227.2	0:00
SR022	Non-Participating	695,885.09	4,546,923.68	227.7	8:55
SR023	Non-Participating	695,902.29	4,546,804.55	226.8	8:59
SR024	Non-Participating	695,938.06	4,546,431.33	227.6	4:58
SR025	Non-Participating	696,005.56	4,549,917.66	225.9	0:00
SR026	Non-Participating	696,365.20	4,545,125.23	226.8	2:18
SR027	Non-Participating	696,368.60	4,548,361.94	225.9	9:15
SR028	Non-Participating	696,556.39	4,545,126.76	226.8	4:17
SR029	Non-Participating	696,667.38	4,545,120.58	226.8	8:39
SR030	Non-Participating	696,703.55	4,548,301.27	225.9	0:00
SR031	Non-Participating	696,755.33	4,549,937.84	225.9	0:00
SR032	Non-Participating	696,811.12	4,549,917.46	225.9	0:00
SR033	Non-Participating	696,945.42	4,545,072.53	225.9	1:41
SR034	Non-Participating	697,170.58	4,548,362.18	225.3	24:11
SR035	Non-Participating	697,298.67	4,543,542.41	227.7	0:00
SR036	Non-Participating	697,421.18	4,547,425.00	225.9	19:14
SR037	Non-Participating	697,424.16	4,548,308.01	225.5	27:35
SR038	Non-Participating	697,485.28	4,547,881.96	224.9	21:33
SR039	Non-Participating	697,497.30	4,547,574.88	224.9	12:02

Trishe
Real case shadow flicker results at dwellings within one mile of project WTGs
Results using Vestas V110 2.0-95 m hub height WTGs
UTM NAD83 Zone 16
continued

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR040	Non-Participating	697,538.49	4,549,916.74	224.9	0:00
SR041	Non-Participating	697,548.62	4,544,285.20	226.4	15:45
SR042	Non-Participating	697,619.61	4,545,937.82	225.9	15:52
SR043	Non-Participating	697,652.94	4,543,291.49	226.8	2:43
SR044	Non-Participating	697,668.11	4,542,788.38	225.9	12:20
SR045	Non-Participating	697,676.55	4,542,916.56	225.9	14:54
SR046	Non-Participating	697,835.84	4,545,087.83	224.9	19:25
SR047	Non-Participating	697,899.23	4,545,073.49	225.9	20:27
SR048	Non-Participating	697,972.15	4,545,147.25	225.6	4:14
SR049	Non-Participating	698,073.70	4,546,766.85	225.9	21:14
SR050	Non-Participating	698,231.65	4,545,165.80	225.9	0:00
SR051	Non-Participating	698,444.51	4,543,541.40	225.8	27:10
SR052	Non-Participating	699,022.98	4,548,762.79	224.9	0:00
SR053	Non-Participating	699,037.98	4,548,032.30	224.9	3:37
SR054	Non-Participating	699,055.68	4,547,371.38	224.9	15:24
SR055	Non-Participating	699,106.44	4,548,187.36	224.9	0:00
SR056	Non-Participating	699,106.95	4,548,145.96	224.9	0:00
SR057	Non-Participating	699,124.05	4,545,417.01	224.9	23:19
SR058	Non-Participating	699,177.97	4,546,810.51	225.9	12:28
SR059	Non-Participating	699,188.02	4,543,004.14	226.8	10:08
SR060	Non-Participating	699,903.38	4,548,459.46	224.0	0:00
SR061	Non-Participating	699,920.65	4,545,167.32	225.0	20:21
SR062	Non-Participating	699,959.80	4,548,463.60	224.0	0:00
SR063	Non-Participating	700,048.74	4,546,790.26	224.9	5:02
SR064	Non-Participating	700,235.46	4,543,616.25	225.9	9:39
SR065	Non-Participating	700,657.32	4,546,871.74	224.0	12:33
SR066	Non-Participating	700,720.42	4,546,100.38	224.0	14:29
SR067	Non-Participating	700,764.10	4,546,477.36	223.5	9:02
SR068	Non-Participating	700,784.06	4,546,267.12	224.0	14:20
SR069	Non-Participating	700,784.63	4,546,310.99	224.0	13:31
SR070	Non-Participating	700,793.63	4,546,372.80	224.1	11:17
SR071	Non-Participating	700,798.05	4,546,777.67	224.1	14:57
SR072	Non-Participating	700,820.84	4,546,199.06	223.8	13:52
SR073	Non-Participating	700,841.02	4,544,096.00	224.9	20:33
SR074	Non-Participating	700,975.33	4,545,259.12	224.9	23:32
SR075	Non-Participating	701,377.68	4,546,903.57	223.9	3:12
SR076	Non-Participating	701,397.52	4,543,594.09	225.2	13:43
SR077	Non-Participating	701,461.92	4,548,269.14	223.1	0:00

Trishe
Real case shadow flicker results at dwellings within one mile of project WTGs
Results using Vestas V110 2.0-95 m hub height WTGs
UTM NAD83 Zone 16
continued

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR078	Non-Participating	701,561.73	4,545,222.39	224.0	22:33
SR079	Non-Participating	701,595.95	4,546,597.08	224.0	2:56
SR080	Non-Participating	702,254.51	4,548,552.87	223.1	0:00
SR081	Non-Participating	702,265.87	4,547,989.86	222.2	0:00
SR082	Non-Participating	702,286.05	4,547,732.71	222.2	1:05
SR083	Non-Participating	702,310.85	4,547,172.99	222.4	21:45
SR084	Non-Participating	702,344.51	4,548,293.72	223.1	0:00
SR085	Non-Participating	702,349.50	4,547,669.05	223.1	9:00
SR086	Non-Participating	702,378.73	4,547,007.92	223.1	22:19
SR087	Non-Participating	702,382.40	4,547,288.40	223.1	10:49
SR088	Non-Participating	702,387.74	4,547,366.38	223.1	8:18
SR089	Non-Participating	702,391.15	4,543,688.61	224.1	37:49
SR090	Non-Participating	702,396.29	4,547,775.91	223.1	2:46
SR091	Non-Participating	702,428.21	4,543,681.02	224.0	33:25
SR092	Non-Participating	703,038.85	4,543,649.53	224.0	6:10
SR093	Non-Participating	703,100.85	4,543,665.81	224.0	8:59
SR094	Non-Participating	703,128.33	4,543,661.74	224.0	12:08
SR095	Non-Participating	703,145.39	4,543,664.91	224.0	12:42
SR096	Non-Participating	703,215.45	4,543,502.46	224.7	16:07
SR097	Non-Participating	703,249.67	4,543,604.95	224.3	13:07
SR098	Non-Participating	703,293.24	4,543,954.65	224.0	22:11
SR099	Non-Participating	703,302.76	4,543,800.26	224.0	41:02
SR100	Non-Participating	703,302.85	4,543,543.79	224.0	10:55
SR101	Non-Participating	703,317.07	4,543,587.78	224.0	9:57
SR102	Non-Participating	703,320.71	4,543,495.83	224.0	12:03
SR103	Non-Participating	703,327.98	4,543,445.23	224.0	11:50
SR104	Non-Participating	703,354.14	4,543,861.87	224.0	21:14
SR105	Non-Participating	703,356.34	4,543,901.07	224.0	19:00
SR106	Non-Participating	703,357.09	4,543,638.38	224.0	16:53
SR107	Non-Participating	703,362.05	4,543,499.47	224.0	10:56
SR108	Non-Participating	703,362.71	4,543,449.53	224.0	10:50
SR109	Non-Participating	703,363.88	4,543,772.48	224.0	40:14
SR110	Non-Participating	703,378.92	4,543,544.12	224.0	9:56
SR111	Non-Participating	703,383.55	4,543,587.11	224.0	8:30
SR112	Non-Participating	703,386.31	4,544,011.17	224.0	14:33
SR113	Non-Participating	703,388.49	4,543,874.08	224.0	18:50
SR114	Non-Participating	703,394.41	4,543,672.13	224.0	30:39
SR115	Non-Participating	703,396.69	4,543,968.44	224.0	14:49

Trishe
Real case shadow flicker results at dwellings within one mile of project WTGs
Results using Vestas V110 2.0-95 m hub height WTGs
UTM NAD83 Zone 16
continued

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR116	Non-Participating	703,400.39	4,543,854.24	224.0	21:21
SR117	Non-Participating	703,401.98	4,543,908.21	224.0	15:45
SR118	Non-Participating	703,404.38	4,543,607.62	224.0	13:47
SR119	Non-Participating	703,416.66	4,543,492.52	224.0	9:39
SR120	Non-Participating	703,421.91	4,543,543.13	224.0	8:17
SR121	Non-Participating	703,446.43	4,543,870.90	224.0	18:42
SR122	Non-Participating	703,451.13	4,544,009.10	224.0	11:52
SR123	Non-Participating	703,451.59	4,543,962.58	224.0	12:31
SR124	Non-Participating	703,451.99	4,543,773.67	224.0	26:54
SR125	Non-Participating	703,453.33	4,543,808.71	224.0	24:29
SR126	Non-Participating	703,453.86	4,543,916.66	224.0	13:59
SR127	Non-Participating	703,454.37	4,543,755.81	224.0	26:55
SR128	Non-Participating	703,459.93	4,543,722.47	224.0	29:57
SR129	Non-Participating	703,460.94	4,543,587.44	224.0	14:28
SR130	Non-Participating	703,462.26	4,543,490.21	224.0	8:30
SR131	Non-Participating	703,462.27	4,543,546.27	224.0	6:39
SR132	Non-Participating	703,466.34	4,543,652.40	224.0	28:49
SR133	Non-Participating	703,470.26	4,548,518.70	222.2	0:00
SR134	Non-Participating	703,472.63	4,543,833.60	224.0	21:38
SR135	Non-Participating	703,475.01	4,543,775.26	224.0	23:29
SR136	Non-Participating	703,487.31	4,543,780.02	224.0	21:58
SR137	Non-Participating	703,489.69	4,543,713.34	224.0	26:59
SR138	Non-Participating	703,491.68	4,543,735.97	224.0	23:13
SR139	Non-Participating	703,492.07	4,544,013.78	224.0	10:30
SR140	Non-Participating	703,495.25	4,543,957.03	224.0	10:54
SR141	Non-Participating	703,496.03	4,543,648.66	224.0	28:33
SR142	Non-Participating	703,501.20	4,543,874.48	224.0	17:48
SR143	Non-Participating	703,503.19	4,543,905.43	224.0	15:16
SR144	Non-Participating	703,505.96	4,543,827.25	224.0	20:12
SR145	Non-Participating	703,510.33	4,543,735.57	224.0	21:09
SR146	Non-Participating	703,512.59	4,543,789.48	224.0	19:19
SR147	Non-Participating	703,512.71	4,543,712.95	224.0	23:15
SR148	Non-Participating	703,526.51	4,546,983.41	223.1	15:54
SR149	Non-Participating	703,539.30	4,543,928.05	224.0	13:41
SR150	Non-Participating	703,543.67	4,544,006.24	224.0	9:04
SR151	Non-Participating	703,550.41	4,543,716.52	224.0	18:50
SR152	Non-Participating	703,553.99	4,543,736.36	224.0	17:31
SR153	Non-Participating	703,571.84	4,543,782.40	224.0	15:16

Trishe
Real case shadow flicker results at dwellings within one mile of project WTGs
Results using Vestas V110 2.0-95 m hub height WTGs
UTM NAD83 Zone 16
continued

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR154	Non-Participating	703,587.72	4,543,724.06	224.0	15:53
SR155	Non-Participating	703,592.09	4,543,916.55	224.0	14:03
SR156	Non-Participating	703,597.24	4,543,772.88	224.0	14:04
SR157	Non-Participating	703,602.01	4,543,857.41	224.0	13:49
SR158	Non-Participating	703,603.59	4,543,957.03	224.0	12:02
SR159	Non-Participating	703,603.99	4,543,875.67	224.0	14:20
SR160	Non-Participating	703,609.15	4,543,814.55	224.0	13:07
SR161	Non-Participating	703,609.55	4,543,831.22	224.0	13:09
SR162	Non-Participating	703,642.52	4,543,934.17	224.0	12:29
SR163	Non-Participating	703,644.62	4,543,782.87	224.0	11:54
SR164	Non-Participating	703,650.09	4,543,677.23	224.0	14:07
SR165	Non-Participating	703,657.69	4,543,882.72	224.0	11:17
SR166	Non-Participating	703,662.33	4,543,725.25	224.0	12:13
SR167	Non-Participating	703,692.88	4,548,546.18	222.2	1:37
SR168	Non-Participating	703,717.44	4,543,736.16	224.0	10:04
SR169	Non-Participating	703,763.93	4,543,734.78	224.0	8:51
SR170	Non-Participating	703,804.17	4,543,735.68	224.0	7:51
SR171	Non-Participating	703,854.85	4,548,727.86	222.2	2:27
SR172	Non-Participating	703,886.13	4,548,244.38	222.2	2:51
SR173	Non-Participating	703,911.56	4,547,434.86	222.2	17:43
SR174	Non-Participating	703,961.14	4,546,478.09	223.1	26:32
SR175	Non-Participating	703,966.37	4,548,772.12	221.8	0:00
SR176	Non-Participating	703,974.82	4,548,682.35	222.2	1:50
SR177	Non-Participating	703,990.33	4,545,165.76	223.7	6:03
SR178	Non-Participating	704,025.19	4,544,227.82	223.3	4:04
SR179	Non-Participating	704,028.21	4,544,125.12	223.6	3:41
SR180	Non-Participating	704,033.61	4,546,900.87	223.1	9:11
SR181	Non-Participating	704,253.43	4,549,279.81	220.4	0:00
SR182	Non-Participating	704,303.94	4,549,330.32	221.3	0:00
SR183	Non-Participating	704,388.12	4,548,593.69	222.2	0:00
SR184	Non-Participating	704,480.95	4,544,551.15	223.1	0:00
SR185	Non-Participating	704,700.62	4,548,606.71	221.3	0:00
SR186	Non-Participating	704,836.36	4,546,938.71	222.2	1:34
SR187	Non-Participating	704,969.67	4,548,620.66	221.3	0:00
SR188	Non-Participating	705,031.78	4,545,386.00	223.1	10:10
SR189	Non-Participating	705,325.82	4,545,327.44	222.4	7:03
SR190	Non-Participating	705,414.06	4,547,017.61	222.2	10:05
SR191	Non-Participating	705,440.38	4,549,183.51	221.3	0:00

Trishe
Real case shadow flicker results at dwellings within one mile of project WTGs
Results using Vestas V110 2.0-95 m hub height WTGs
UTM NAD83 Zone 16
continued

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR192	Non-Participating	705,510.86	4,548,530.84	221.3	2:58
SR193	Non-Participating	705,554.68	4,547,023.56	222.2	16:13
SR194	Non-Participating	705,563.82	4,548,652.85	220.5	0:00
SR195	Non-Participating	705,596.36	4,543,727.29	223.1	0:00
SR196	Non-Participating	705,606.09	4,547,969.86	221.5	9:39
SR197	Non-Participating	705,608.38	4,547,733.41	222.2	28:20
SR198	Non-Participating	705,616.08	4,545,290.54	222.2	23:06
SR199	Non-Participating	705,629.62	4,546,733.38	222.2	3:09
SR200	Non-Participating	705,671.29	4,548,634.19	220.4	2:16
SR201	Non-Participating	705,680.54	4,545,337.27	222.2	26:54
SR202	Non-Participating	705,797.47	4,543,719.94	222.2	0:00
SR203	Non-Participating	705,840.72	4,548,674.62	220.8	4:55
SR204	Non-Participating	705,857.64	4,548,635.15	221.3	5:32
SR205	Non-Participating	706,001.42	4,548,590.23	221.3	2:36
SR206	Non-Participating	706,081.18	4,548,643.06	221.3	2:11
SR207	Non-Participating	706,284.81	4,543,726.91	222.2	4:51
SR208	Non-Participating	706,657.79	4,547,053.86	221.4	10:34
SR209	Non-Participating	706,731.29	4,548,682.68	221.3	1:43
SR210	Non-Participating	706,897.44	4,543,814.55	222.2	2:21
SR211	Non-Participating	706,949.83	4,545,366.22	222.2	28:01
SR212	Non-Participating	707,123.89	4,548,694.36	220.2	4:42
SR213	Non-Participating	707,130.00	4,548,947.18	220.4	0:00
SR214	Non-Participating	707,203.97	4,548,818.65	220.4	0:00
SR215	Non-Participating	707,204.92	4,546,610.38	221.3	8:26
SR216	Non-Participating	707,233.47	4,546,018.82	221.3	15:10
SR217	Non-Participating	707,246.08	4,548,009.77	221.3	17:47
SR218	Non-Participating	707,252.38	4,547,892.77	221.3	21:00
SR219	Non-Participating	707,292.96	4,543,750.47	222.2	0:00
SR220	Non-Participating	707,313.99	4,543,113.68	222.2	14:35
SR221	Non-Participating	707,315.82	4,543,177.80	222.2	7:26
SR222	Non-Participating	707,357.52	4,543,598.44	222.2	0:00
SR223	Non-Participating	707,586.77	4,546,997.22	221.3	17:50
SR224	Non-Participating	707,825.54	4,547,075.26	221.3	21:05
SR225	Non-Participating	708,297.76	4,545,478.92	221.7	6:26
SR226	Non-Participating	708,362.37	4,548,647.66	221.3	0:00
SR227	Non-Participating	708,371.03	4,545,481.25	221.9	8:12
SR228	Non-Participating	708,452.91	4,545,483.23	222.2	17:21
SR229	Non-Participating	708,471.32	4,543,873.64	222.5	0:00

Trishe
Real case shadow flicker results at dwellings within one mile of project WTGs
Results using Vestas V110 2.0-95 m hub height WTGs
UTM NAD83 Zone 16
continued

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR230	Non-Participating	708,752.54	4,550,677.91	219.5	0:00
SR231	Non-Participating	708,752.72	4,545,488.25	222.2	23:59
SR232	Non-Participating	708,765.77	4,543,808.29	222.2	0:00
SR233	Non-Participating	708,814.59	4,546,774.89	221.3	25:25
SR234	Non-Participating	708,893.23	4,544,471.70	222.2	12:35
SR235	Non-Participating	708,913.52	4,545,495.96	222.1	15:33
SR236	Non-Participating	708,913.52	4,545,495.96	222.1	15:33
SR237	Non-Participating	708,913.78	4,543,812.89	222.2	0:00
SR238	Non-Participating	708,915.19	4,545,845.43	221.3	14:30
SR239	Non-Participating	708,915.23	4,543,231.49	222.2	3:50
SR240	Non-Participating	708,950.19	4,544,630.82	221.8	13:05
SR241	Non-Participating	708,972.43	4,544,295.72	222.2	13:05
SR242	Non-Participating	708,980.19	4,543,690.26	222.2	0:00
SR243	Non-Participating	709,014.39	4,547,120.99	221.3	7:01
SR244	Non-Participating	709,416.55	4,548,671.84	220.4	22:57
SR245	Non-Participating	709,597.52	4,543,899.83	222.2	0:00
SR246	Non-Participating	709,840.48	4,547,075.31	220.9	9:39
SR247	Non-Participating	709,883.73	4,550,315.95	219.5	3:47
SR248	Non-Participating	710,102.25	4,543,907.01	221.4	0:00
SR249	Non-Participating	710,372.00	4,548,770.02	220.4	9:59
SR250	Non-Participating	710,373.30	4,550,673.03	219.5	0:00
SR251	Non-Participating	710,443.44	4,546,266.05	219.8	20:45
SR252	Non-Participating	710,488.16	4,546,863.03	220.4	1:50
SR253	Non-Participating	710,493.90	4,544,684.59	221.3	6:51
SR254	Non-Participating	710,522.90	4,543,863.94	221.3	0:00
SR255	Non-Participating	710,526.00	4,544,020.83	221.3	0:00
SR256	Non-Participating	710,530.99	4,543,731.95	221.3	0:00
SR257	Non-Participating	710,976.11	4,548,812.77	220.4	24:14
SR258	Non-Participating	711,149.14	4,545,493.49	220.4	8:48
SR259	Non-Participating	711,293.72	4,545,569.87	220.4	5:55
SR260	Non-Participating	711,421.48	4,548,740.89	219.5	10:58
SR261	Non-Participating	711,976.37	4,546,977.31	219.5	0:00
SR262	Non-Participating	712,043.24	4,547,215.83	219.8	0:00
SR263	Non-Participating	712,259.66	4,547,224.14	219.5	0:00
SR264	Non-Participating	712,583.13	4,547,255.09	219.5	0:00
SR265	Non-Participating	712,651.06	4,547,258.83	219.5	0:00
SR266	Non-Participating	712,927.08	4,547,191.66	219.5	0:00

Trishe

Real case shadow flicker results at dwellings within one mile of project WTGs

Results using Vestas V126-3.45-87 m hub height WTGs

UTM NAD83 Zone 16

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR001	Participating	698,744.57	4,545,112.68	225.5	34:33
SR002	Participating	699,298.46	4,546,726.65	225.9	16:18
SR003	Participating	699,301.86	4,546,754.01	225.9	14:58
SR004	Participating	703,086.59	4,545,268.49	223.2	28:35
SR005	Participating	704,003.39	4,545,425.77	224.0	11:22
SR006	Participating	704,071.02	4,545,560.59	223.7	20:14
SR007	Participating	705,592.02	4,546,368.09	222.2	24:30
SR008	Participating	706,097.61	4,543,811.86	222.2	0:00
SR009	Participating	706,489.96	4,547,056.16	221.3	4:23
SR010	Participating	707,928.43	4,545,490.20	221.3	4:45
SR011	Participating	708,806.34	4,549,116.26	221.2	17:43
SR012	Participating	709,213.00	4,548,680.10	220.4	8:38
SR013	Participating	709,341.83	4,547,064.81	221.0	3:29
SR014	Participating	709,885.92	4,545,522.25	220.4	6:17
SR015	Participating	710,271.28	4,545,476.10	220.4	11:31
SR016	Participating	710,602.44	4,543,936.70	221.3	0:00
SR017	Non-Participating	695,186.59	4,548,251.33	226.8	0:00
SR018	Non-Participating	695,760.28	4,548,926.46	226.8	4:40
SR019	Non-Participating	695,808.07	4,547,726.92	226.8	7:54
SR020	Non-Participating	695,824.91	4,547,168.69	226.8	5:36
SR021	Non-Participating	695,874.00	4,545,766.03	227.2	0:00
SR022	Non-Participating	695,885.09	4,546,923.68	227.7	10:11
SR023	Non-Participating	695,902.29	4,546,804.55	226.8	10:03
SR024	Non-Participating	695,938.06	4,546,431.33	227.6	5:38
SR025	Non-Participating	696,005.56	4,549,917.66	225.9	0:00
SR026	Non-Participating	696,365.20	4,545,125.23	226.8	2:33
SR027	Non-Participating	696,368.60	4,548,361.94	225.9	10:30
SR028	Non-Participating	696,556.39	4,545,126.76	226.8	4:51
SR029	Non-Participating	696,667.38	4,545,120.58	226.8	10:08
SR030	Non-Participating	696,703.55	4,548,301.27	225.9	0:00
SR031	Non-Participating	696,755.33	4,549,937.84	225.9	0:00
SR032	Non-Participating	696,811.12	4,549,917.46	225.9	0:00
SR033	Non-Participating	696,945.42	4,545,072.53	225.9	1:54
SR034	Non-Participating	697,170.58	4,548,362.18	225.3	31:59
SR035	Non-Participating	697,298.67	4,543,542.41	227.7	0:00
SR036	Non-Participating	697,421.18	4,547,425.00	225.9	24:54
SR037	Non-Participating	697,424.16	4,548,308.01	225.5	32:22
SR038	Non-Participating	697,485.28	4,547,881.96	224.9	25:29
SR039	Non-Participating	697,497.30	4,547,574.88	224.9	18:42

Trishe
Real case shadow flicker results at dwellings within one mile of project WTGs
Results using Vestas V126-3.45-87 m hub height WTGs
UTM NAD83 Zone 16
continued

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR040	Non-Participating	697,538.49	4,549,916.74	224.9	0:00
SR041	Non-Participating	697,548.62	4,544,285.20	226.4	19:55
SR042	Non-Participating	697,619.61	4,545,937.82	225.9	18:02
SR043	Non-Participating	697,652.94	4,543,291.49	226.8	3:02
SR044	Non-Participating	697,668.11	4,542,788.38	225.9	12:20
SR045	Non-Participating	697,676.55	4,542,916.56	225.9	14:54
SR046	Non-Participating	697,835.84	4,545,087.83	224.9	22:22
SR047	Non-Participating	697,899.23	4,545,073.49	225.9	23:41
SR048	Non-Participating	697,972.15	4,545,147.25	225.6	4:48
SR049	Non-Participating	698,073.70	4,546,766.85	225.9	24:49
SR050	Non-Participating	698,231.65	4,545,165.80	225.9	0:00
SR051	Non-Participating	698,444.51	4,543,541.40	225.8	33:50
SR052	Non-Participating	699,022.98	4,548,762.79	224.9	0:00
SR053	Non-Participating	699,037.98	4,548,032.30	224.9	3:53
SR054	Non-Participating	699,055.68	4,547,371.38	224.9	18:49
SR055	Non-Participating	699,106.44	4,548,187.36	224.9	0:00
SR056	Non-Participating	699,106.95	4,548,145.96	224.9	0:00
SR057	Non-Participating	699,124.05	4,545,417.01	224.9	27:53
SR058	Non-Participating	699,177.97	4,546,810.51	225.9	13:48
SR059	Non-Participating	699,188.02	4,543,004.14	226.8	10:08
SR060	Non-Participating	699,903.38	4,548,459.46	224.0	0:00
SR061	Non-Participating	699,920.65	4,545,167.32	225.0	24:51
SR062	Non-Participating	699,959.80	4,548,463.60	224.0	0:00
SR063	Non-Participating	700,048.74	4,546,790.26	224.9	5:26
SR064	Non-Participating	700,235.46	4,543,616.25	225.9	10:20
SR065	Non-Participating	700,657.32	4,546,871.74	224.0	14:38
SR066	Non-Participating	700,720.42	4,546,100.38	224.0	16:44
SR067	Non-Participating	700,764.10	4,546,477.36	223.5	10:25
SR068	Non-Participating	700,784.06	4,546,267.12	224.0	16:14
SR069	Non-Participating	700,784.63	4,546,310.99	224.0	15:21
SR070	Non-Participating	700,793.63	4,546,372.80	224.1	13:05
SR071	Non-Participating	700,798.05	4,546,777.67	224.1	17:14
SR072	Non-Participating	700,820.84	4,546,199.06	223.8	15:55
SR073	Non-Participating	700,841.02	4,544,096.00	224.9	24:52
SR074	Non-Participating	700,975.33	4,545,259.12	224.9	29:25
SR075	Non-Participating	701,377.68	4,546,903.57	223.9	3:37
SR076	Non-Participating	701,397.52	4,543,594.09	225.2	14:02
SR077	Non-Participating	701,461.92	4,548,269.14	223.1	0:00

Trishe
Real case shadow flicker results at dwellings within one mile of project WTGs
Results using Vestas V126-3.45-87 m hub height WTGs
UTM NAD83 Zone 16
continued

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR078	Non-Participating	701,561.73	4,545,222.39	224.0	26:41
SR079	Non-Participating	701,595.95	4,546,597.08	224.0	3:16
SR080	Non-Participating	702,254.51	4,548,552.87	223.1	0:00
SR081	Non-Participating	702,265.87	4,547,989.86	222.2	0:00
SR082	Non-Participating	702,286.05	4,547,732.71	222.2	1:30
SR083	Non-Participating	702,310.85	4,547,172.99	222.4	26:19
SR084	Non-Participating	702,344.51	4,548,293.72	223.1	0:00
SR085	Non-Participating	702,349.50	4,547,669.05	223.1	10:23
SR086	Non-Participating	702,378.73	4,547,007.92	223.1	27:31
SR087	Non-Participating	702,382.40	4,547,288.40	223.1	13:14
SR088	Non-Participating	702,387.74	4,547,366.38	223.1	10:09
SR089	Non-Participating	702,391.15	4,543,688.61	224.1	37:48
SR090	Non-Participating	702,396.29	4,547,775.91	223.1	3:17
SR091	Non-Participating	702,428.21	4,543,681.02	224.0	33:24
SR092	Non-Participating	703,038.85	4,543,649.53	224.0	6:10
SR093	Non-Participating	703,100.85	4,543,665.81	224.0	8:59
SR094	Non-Participating	703,128.33	4,543,661.74	224.0	12:08
SR095	Non-Participating	703,145.39	4,543,664.91	224.0	12:42
SR096	Non-Participating	703,215.45	4,543,502.46	224.7	16:06
SR097	Non-Participating	703,249.67	4,543,604.95	224.3	13:06
SR098	Non-Participating	703,293.24	4,543,954.65	224.0	22:10
SR099	Non-Participating	703,302.76	4,543,800.26	224.0	41:00
SR100	Non-Participating	703,302.85	4,543,543.79	224.0	10:55
SR101	Non-Participating	703,317.07	4,543,587.78	224.0	9:56
SR102	Non-Participating	703,320.71	4,543,495.83	224.0	12:02
SR103	Non-Participating	703,327.98	4,543,445.23	224.0	11:49
SR104	Non-Participating	703,354.14	4,543,861.87	224.0	21:13
SR105	Non-Participating	703,356.34	4,543,901.07	224.0	19:00
SR106	Non-Participating	703,357.09	4,543,638.38	224.0	16:53
SR107	Non-Participating	703,362.05	4,543,499.47	224.0	10:56
SR108	Non-Participating	703,362.71	4,543,449.53	224.0	10:50
SR109	Non-Participating	703,363.88	4,543,772.48	224.0	40:13
SR110	Non-Participating	703,378.92	4,543,544.12	224.0	9:56
SR111	Non-Participating	703,383.55	4,543,587.11	224.0	8:30
SR112	Non-Participating	703,386.31	4,544,011.17	224.0	14:33
SR113	Non-Participating	703,388.49	4,543,874.08	224.0	18:49
SR114	Non-Participating	703,394.41	4,543,672.13	224.0	30:38
SR115	Non-Participating	703,396.69	4,543,968.44	224.0	14:49

Trishe
Real case shadow flicker results at dwellings within one mile of project WTGs
Results using Vestas V126-3.45-87 m hub height WTGs
UTM NAD83 Zone 16
continued

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR116	Non-Participating	703,400.39	4,543,854.24	224.0	21:20
SR117	Non-Participating	703,401.98	4,543,908.21	224.0	15:44
SR118	Non-Participating	703,404.38	4,543,607.62	224.0	13:46
SR119	Non-Participating	703,416.66	4,543,492.52	224.0	9:39
SR120	Non-Participating	703,421.91	4,543,543.13	224.0	8:16
SR121	Non-Participating	703,446.43	4,543,870.90	224.0	18:41
SR122	Non-Participating	703,451.13	4,544,009.10	224.0	11:52
SR123	Non-Participating	703,451.59	4,543,962.58	224.0	12:31
SR124	Non-Participating	703,451.99	4,543,773.67	224.0	26:53
SR125	Non-Participating	703,453.33	4,543,808.71	224.0	24:29
SR126	Non-Participating	703,453.86	4,543,916.66	224.0	13:59
SR127	Non-Participating	703,454.37	4,543,755.81	224.0	26:54
SR128	Non-Participating	703,459.93	4,543,722.47	224.0	29:56
SR129	Non-Participating	703,460.94	4,543,587.44	224.0	14:28
SR130	Non-Participating	703,462.26	4,543,490.21	224.0	8:29
SR131	Non-Participating	703,462.27	4,543,546.27	224.0	6:39
SR132	Non-Participating	703,466.34	4,543,652.40	224.0	28:48
SR133	Non-Participating	703,470.26	4,548,518.70	222.2	0:00
SR134	Non-Participating	703,472.63	4,543,833.60	224.0	21:38
SR135	Non-Participating	703,475.01	4,543,775.26	224.0	23:29
SR136	Non-Participating	703,487.31	4,543,780.02	224.0	21:57
SR137	Non-Participating	703,489.69	4,543,713.34	224.0	26:58
SR138	Non-Participating	703,491.68	4,543,735.97	224.0	23:12
SR139	Non-Participating	703,492.07	4,544,013.78	224.0	10:30
SR140	Non-Participating	703,495.25	4,543,957.03	224.0	10:53
SR141	Non-Participating	703,496.03	4,543,648.66	224.0	28:32
SR142	Non-Participating	703,501.20	4,543,874.48	224.0	17:48
SR143	Non-Participating	703,503.19	4,543,905.43	224.0	15:16
SR144	Non-Participating	703,505.96	4,543,827.25	224.0	20:12
SR145	Non-Participating	703,510.33	4,543,735.57	224.0	21:09
SR146	Non-Participating	703,512.59	4,543,789.48	224.0	19:18
SR147	Non-Participating	703,512.71	4,543,712.95	224.0	23:14
SR148	Non-Participating	703,526.51	4,546,983.41	223.1	19:20
SR149	Non-Participating	703,539.30	4,543,928.05	224.0	13:40
SR150	Non-Participating	703,543.67	4,544,006.24	224.0	9:03
SR151	Non-Participating	703,550.41	4,543,716.52	224.0	18:49
SR152	Non-Participating	703,553.99	4,543,736.36	224.0	17:30
SR153	Non-Participating	703,571.84	4,543,782.40	224.0	15:15

Trishe
Real case shadow flicker results at dwellings within one mile of project WTGs
Results using Vestas V126-3.45-87 m hub height WTGs
UTM NAD83 Zone 16
continued

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR154	Non-Participating	703,587.72	4,543,724.06	224.0	15:52
SR155	Non-Participating	703,592.09	4,543,916.55	224.0	14:02
SR156	Non-Participating	703,597.24	4,543,772.88	224.0	14:03
SR157	Non-Participating	703,602.01	4,543,857.41	224.0	13:48
SR158	Non-Participating	703,603.59	4,543,957.03	224.0	12:02
SR159	Non-Participating	703,603.99	4,543,875.67	224.0	14:20
SR160	Non-Participating	703,609.15	4,543,814.55	224.0	13:06
SR161	Non-Participating	703,609.55	4,543,831.22	224.0	13:08
SR162	Non-Participating	703,642.52	4,543,934.17	224.0	12:29
SR163	Non-Participating	703,644.62	4,543,782.87	224.0	11:53
SR164	Non-Participating	703,650.09	4,543,677.23	224.0	14:07
SR165	Non-Participating	703,657.69	4,543,882.72	224.0	11:17
SR166	Non-Participating	703,662.33	4,543,725.25	224.0	12:13
SR167	Non-Participating	703,692.88	4,548,546.18	222.2	1:48
SR168	Non-Participating	703,717.44	4,543,736.16	224.0	10:03
SR169	Non-Participating	703,763.93	4,543,734.78	224.0	8:51
SR170	Non-Participating	703,804.17	4,543,735.68	224.0	7:51
SR171	Non-Participating	703,854.85	4,548,727.86	222.2	2:47
SR172	Non-Participating	703,886.13	4,548,244.38	222.2	3:16
SR173	Non-Participating	703,911.56	4,547,434.86	222.2	19:26
SR174	Non-Participating	703,961.14	4,546,478.09	223.1	32:01
SR175	Non-Participating	703,966.37	4,548,772.12	221.8	0:00
SR176	Non-Participating	703,974.82	4,548,682.35	222.2	2:10
SR177	Non-Participating	703,990.33	4,545,165.76	223.7	7:37
SR178	Non-Participating	704,025.19	4,544,227.82	223.3	4:04
SR179	Non-Participating	704,028.21	4,544,125.12	223.6	3:41
SR180	Non-Participating	704,033.61	4,546,900.87	223.1	10:32
SR181	Non-Participating	704,253.43	4,549,279.81	220.4	0:00
SR182	Non-Participating	704,303.94	4,549,330.32	221.3	0:00
SR183	Non-Participating	704,388.12	4,548,593.69	222.2	0:00
SR184	Non-Participating	704,480.95	4,544,551.15	223.1	0:00
SR185	Non-Participating	704,700.62	4,548,606.71	221.3	0:00
SR186	Non-Participating	704,836.36	4,546,938.71	222.2	1:45
SR187	Non-Participating	704,969.67	4,548,620.66	221.3	0:00
SR188	Non-Participating	705,031.78	4,545,386.00	223.1	10:52
SR189	Non-Participating	705,325.82	4,545,327.44	222.4	8:01
SR190	Non-Participating	705,414.06	4,547,017.61	222.2	11:46
SR191	Non-Participating	705,440.38	4,549,183.51	221.3	0:00

Trishe
Real case shadow flicker results at dwellings within one mile of project WTGs
Results using Vestas V126-3.45-87 m hub height WTGs
UTM NAD83 Zone 16
continued

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR192	Non-Participating	705,510.86	4,548,530.84	221.3	3:31
SR193	Non-Participating	705,554.68	4,547,023.56	222.2	18:50
SR194	Non-Participating	705,563.82	4,548,652.85	220.5	0:00
SR195	Non-Participating	705,596.36	4,543,727.29	223.1	0:00
SR196	Non-Participating	705,606.09	4,547,969.86	221.5	11:45
SR197	Non-Participating	705,608.38	4,547,733.41	222.2	33:07
SR198	Non-Participating	705,616.08	4,545,290.54	222.2	26:15
SR199	Non-Participating	705,629.62	4,546,733.38	222.2	3:46
SR200	Non-Participating	705,671.29	4,548,634.19	220.4	2:39
SR201	Non-Participating	705,680.54	4,545,337.27	222.2	30:31
SR202	Non-Participating	705,797.47	4,543,719.94	222.2	0:00
SR203	Non-Participating	705,840.72	4,548,674.62	220.8	5:20
SR204	Non-Participating	705,857.64	4,548,635.15	221.3	5:59
SR205	Non-Participating	706,001.42	4,548,590.23	221.3	2:58
SR206	Non-Participating	706,081.18	4,548,643.06	221.3	2:26
SR207	Non-Participating	706,284.81	4,543,726.91	222.2	4:51
SR208	Non-Participating	706,657.79	4,547,053.86	221.4	23:20
SR209	Non-Participating	706,731.29	4,548,682.68	221.3	1:55
SR210	Non-Participating	706,897.44	4,543,814.55	222.2	2:48
SR211	Non-Participating	706,949.83	4,545,366.22	222.2	32:43
SR212	Non-Participating	707,123.89	4,548,694.36	220.2	5:07
SR213	Non-Participating	707,130.00	4,548,947.18	220.4	0:00
SR214	Non-Participating	707,203.97	4,548,818.65	220.4	0:00
SR215	Non-Participating	707,204.92	4,546,610.38	221.3	9:48
SR216	Non-Participating	707,233.47	4,546,018.82	221.3	17:46
SR217	Non-Participating	707,246.08	4,548,009.77	221.3	20:48
SR218	Non-Participating	707,252.38	4,547,892.77	221.3	24:56
SR219	Non-Participating	707,292.96	4,543,750.47	222.2	0:00
SR220	Non-Participating	707,313.99	4,543,113.68	222.2	14:34
SR221	Non-Participating	707,315.82	4,543,177.80	222.2	7:26
SR222	Non-Participating	707,357.52	4,543,598.44	222.2	0:00
SR223	Non-Participating	707,586.77	4,546,997.22	221.3	20:17
SR224	Non-Participating	707,825.54	4,547,075.26	221.3	26:49
SR225	Non-Participating	708,297.76	4,545,478.92	221.7	7:08
SR226	Non-Participating	708,362.37	4,548,647.66	221.3	0:00
SR227	Non-Participating	708,371.03	4,545,481.25	221.9	9:21
SR228	Non-Participating	708,452.91	4,545,483.23	222.2	20:49
SR229	Non-Participating	708,471.32	4,543,873.64	222.5	0:00

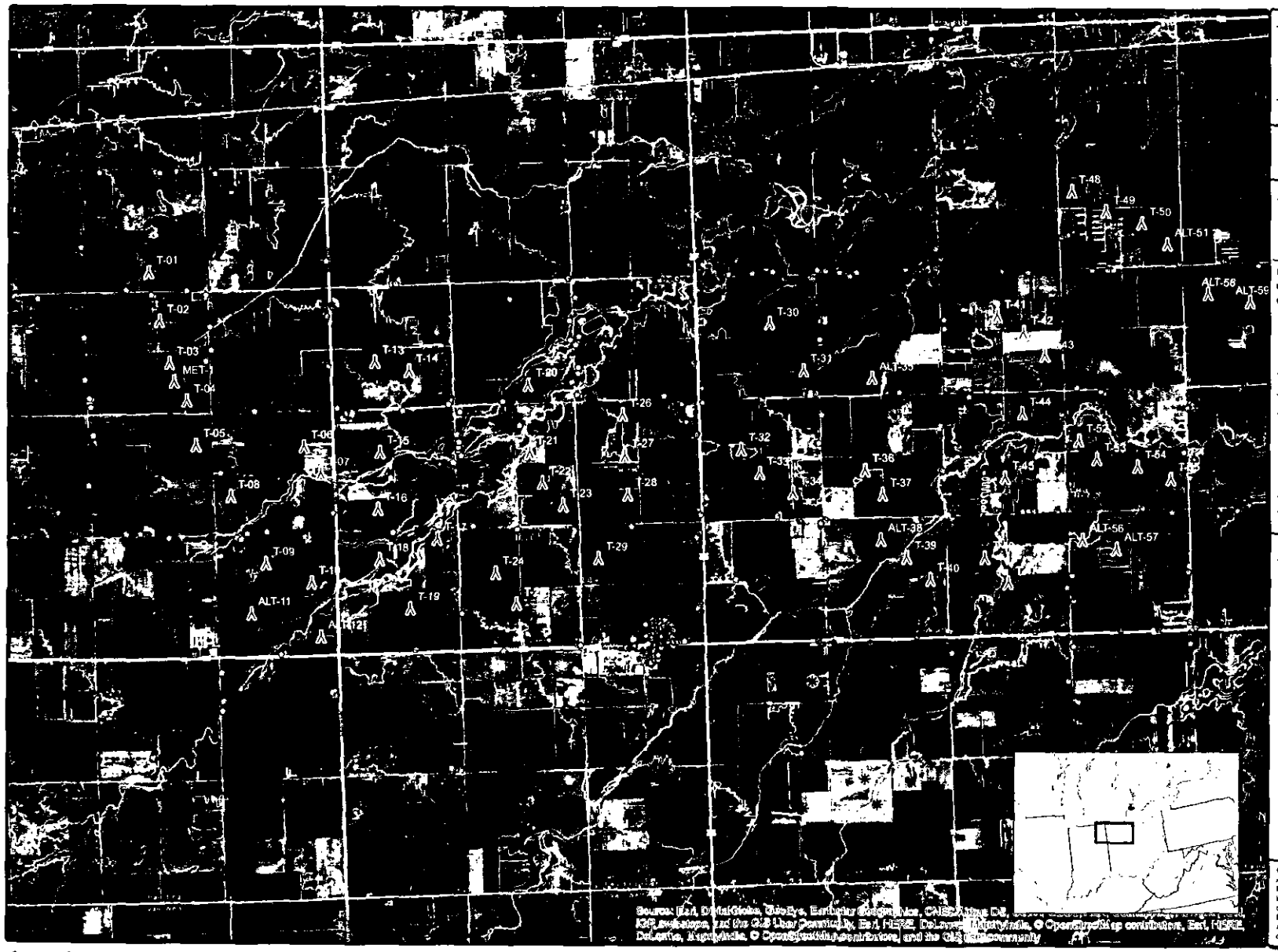
Trishe
Real case shadow flicker results at dwellings within one mile of project WTGs
Results using Vestas V126-3.45-87 m hub height WTGs
UTM NAD83 Zone 16
continued

Shadow Receptor #	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)
SR230	Non-Participating	708,752.54	4,550,677.91	219.5	0:00
SR231	Non-Participating	708,752.72	4,545,488.25	222.2	26:52
SR232	Non-Participating	708,765.77	4,543,808.29	222.2	0:00
SR233	Non-Participating	708,814.59	4,546,774.89	221.3	31:19
SR234	Non-Participating	708,893.23	4,544,471.70	222.2	14:35
SR235	Non-Participating	708,913.52	4,545,495.96	222.1	19:01
SR236	Non-Participating	708,913.52	4,545,495.96	222.1	19:01
SR237	Non-Participating	708,913.78	4,543,812.89	222.2	0:00
SR238	Non-Participating	708,915.19	4,545,845.43	221.3	16:42
SR239	Non-Participating	708,915.23	4,543,231.49	222.2	3:50
SR240	Non-Participating	708,950.19	4,544,630.82	221.8	18:42
SR241	Non-Participating	708,972.43	4,544,295.72	222.2	14:36
SR242	Non-Participating	708,980.19	4,543,690.26	222.2	0:00
SR243	Non-Participating	709,014.39	4,547,120.99	221.3	8:20
SR244	Non-Participating	709,416.55	4,548,671.84	220.4	25:57
SR245	Non-Participating	709,597.52	4,543,899.83	222.2	0:00
SR246	Non-Participating	709,840.48	4,547,075.31	220.9	10:50
SR247	Non-Participating	709,883.73	4,550,315.95	219.5	4:23
SR248	Non-Participating	710,102.25	4,543,907.01	221.4	0:00
SR249	Non-Participating	710,372.00	4,548,770.02	220.4	11:30
SR250	Non-Participating	710,373.30	4,550,673.03	219.5	0:00
SR251	Non-Participating	710,443.44	4,546,266.05	219.8	24:54
SR252	Non-Participating	710,488.16	4,546,863.03	220.4	2:03
SR253	Non-Participating	710,493.90	4,544,684.59	221.3	7:49
SR254	Non-Participating	710,522.90	4,543,863.94	221.3	0:00
SR255	Non-Participating	710,526.00	4,544,020.83	221.3	0:00
SR256	Non-Participating	710,530.99	4,543,731.95	221.3	0:00
SR257	Non-Participating	710,976.11	4,548,812.77	220.4	27:33
SR258	Non-Participating	711,149.14	4,545,493.49	220.4	9:21
SR259	Non-Participating	711,293.72	4,545,569.87	220.4	6:48
SR260	Non-Participating	711,421.48	4,548,740.89	219.5	13:03
SR261	Non-Participating	711,976.37	4,546,977.31	219.5	0:00
SR262	Non-Participating	712,043.24	4,547,215.83	219.8	0:00
SR263	Non-Participating	712,259.66	4,547,224.14	219.5	0:00
SR264	Non-Participating	712,583.13	4,547,255.09	219.5	0:00
SR265	Non-Participating	712,651.06	4,547,258.83	219.5	0:00
SR266	Non-Participating	712,927.08	4,547,191.66	219.5	0:00

Supplemental Appendix K

Shadow Flicker Maps

Appendix C: Trishe Wind Energy Project Site Overview



0 0.5 1 2 Miles

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Trishe
Site Layout Map

Client

Starwood Energy Group

Project Description

60 WTG Layout. Dwellings within one mile of proposed new turbines along with existing turbines.

Location: Paulding/Van Wert County, Ohio

Project #: 20161390

Issue Dates

#	Description	Date
1	Original	2016.07.29

Drawn By: JH *Checked By: JH*

Legend

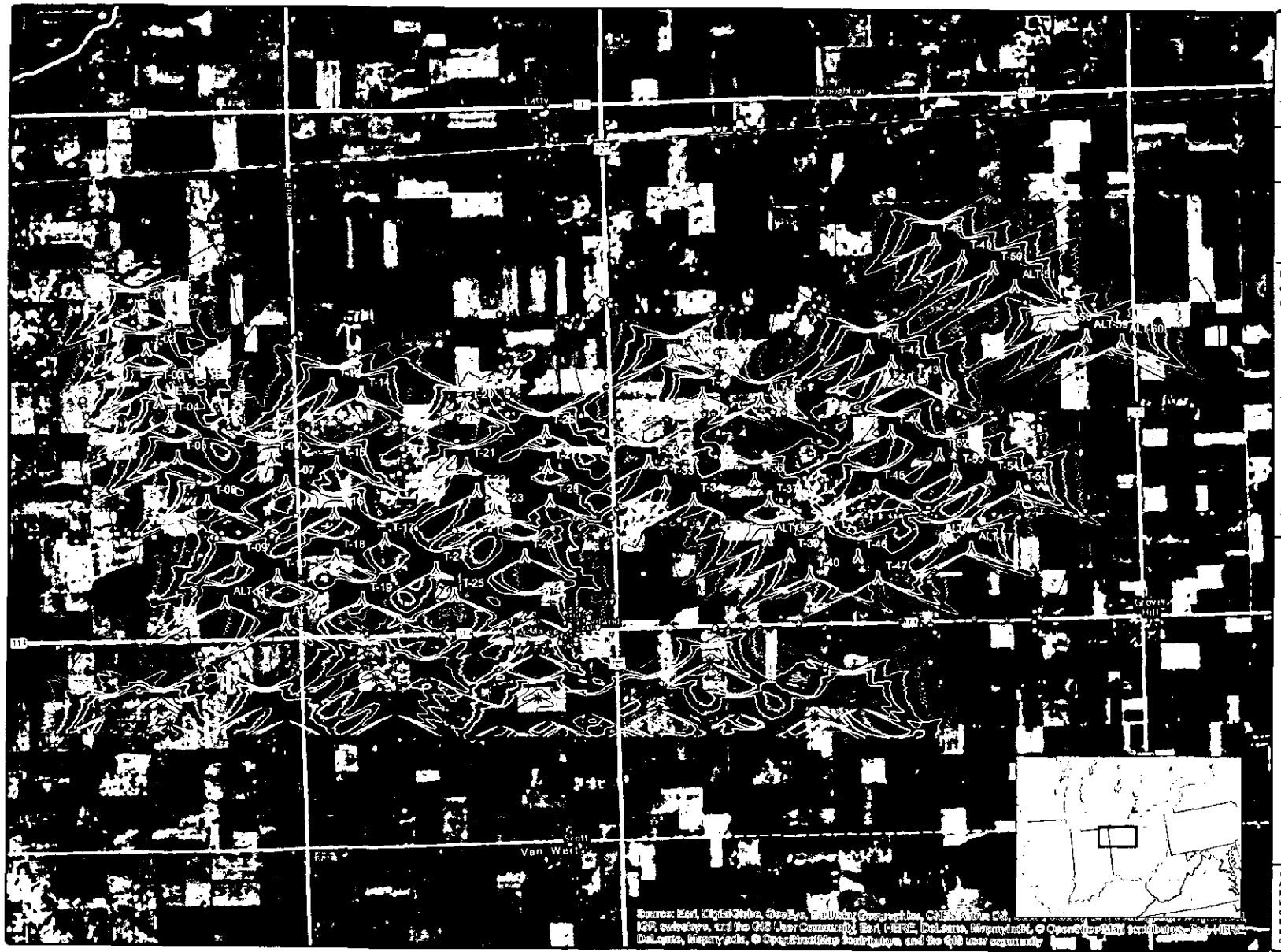
- Trishe 60 WTG Layout
- Existing WTGs
- Dwellings within 1 mile of proposed WTGs

3 ft Height Contour Lines
ft AMSL

- 771 - 780
- 761 - 770
- 751 - 760
- 741 - 750
- 731 - 740
- 721 - 730
- 711 - 720
- 701 - 710
- 691 - 700
- 3 - 690

N W E S

Appendix D: GE 2.3-116 80 m Hub Height Shadow Flicker Map



0 0.5 1 2 Miles

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Trishe
GE 2.3-116 80 m HH
Realistic Case Shadow Flicker

Client

Starwood Energy Group

Project Description

60 WTG Layout. Dwellings within one mile of proposed new turbines along with existing turbines.

Location: Paulding/Van Wert County, Ohio

Project #: 20161390

Issue Dates

#	Description	Date
1	Orginal	2016.07.29

Drawn By: JH | Checked By: JH

Legend

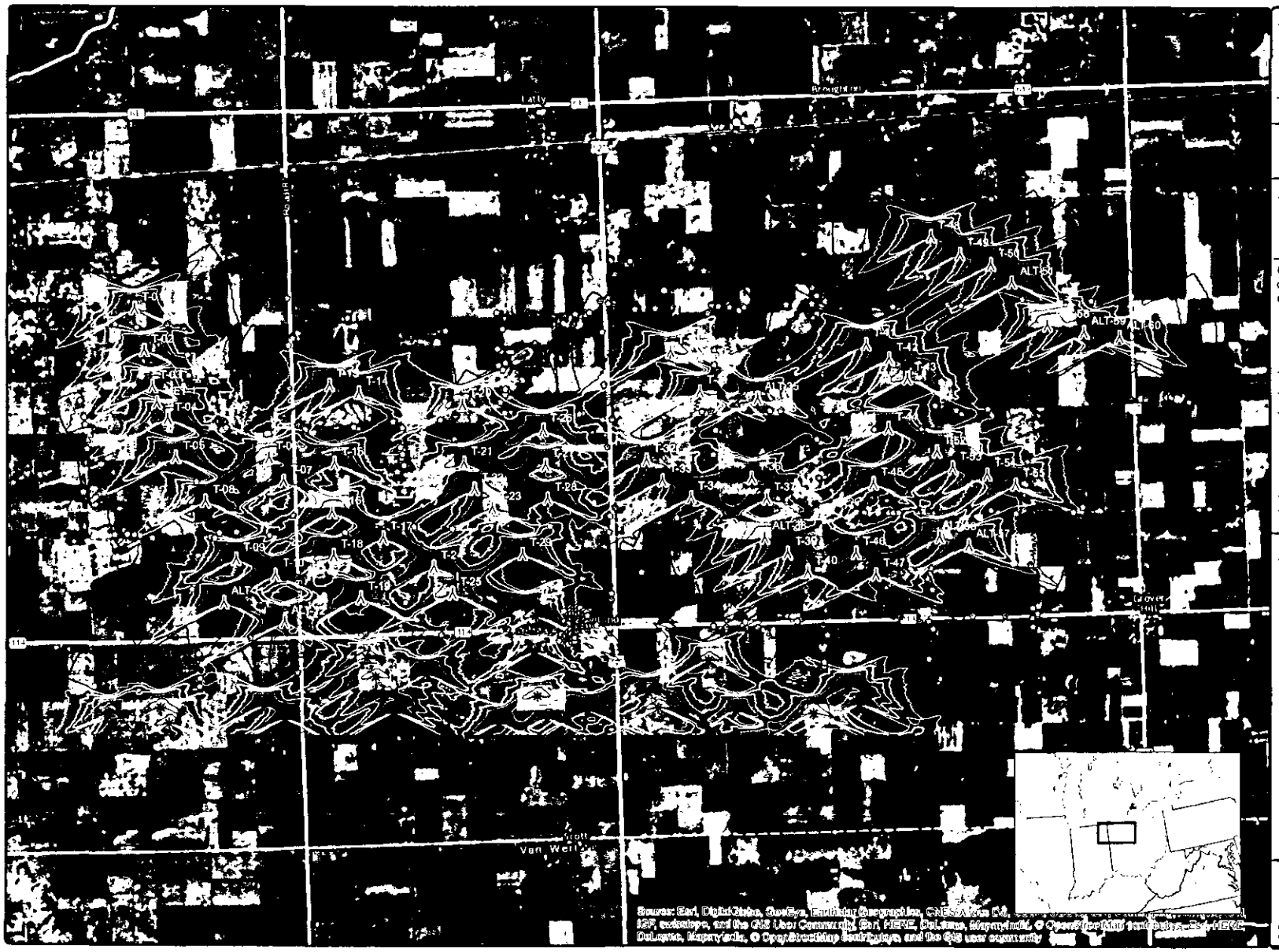
- Trishe 60 WTG Layout
- Existing WTGs
- Dwellings within 1 mile of proposed WTGs

Shadow Flicker (hrs/yr)

- 0
- 5
- 10
- 20
- 30
- 50
- 100

N W E S

Appendix E: GE 2.3-116 94 m Hub Height Shadow Flicker Map



0 0.5 1 2 Miles

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Trishe
GE 2.3-116 94 m HH
Realistic Case Shadow Flicker

Client

Starwood Energy Group

Project Description

60 WTG Layout. Dwellings within one mile of proposed new turbines along with existing turbines.

Location: Paulding/Van Wert County, Ohio

Project #. 20161390

Issue Dates

#	Description	Date
1	Original	2016.07.29

Drawn By: JH *Checked By: JH*

Legend

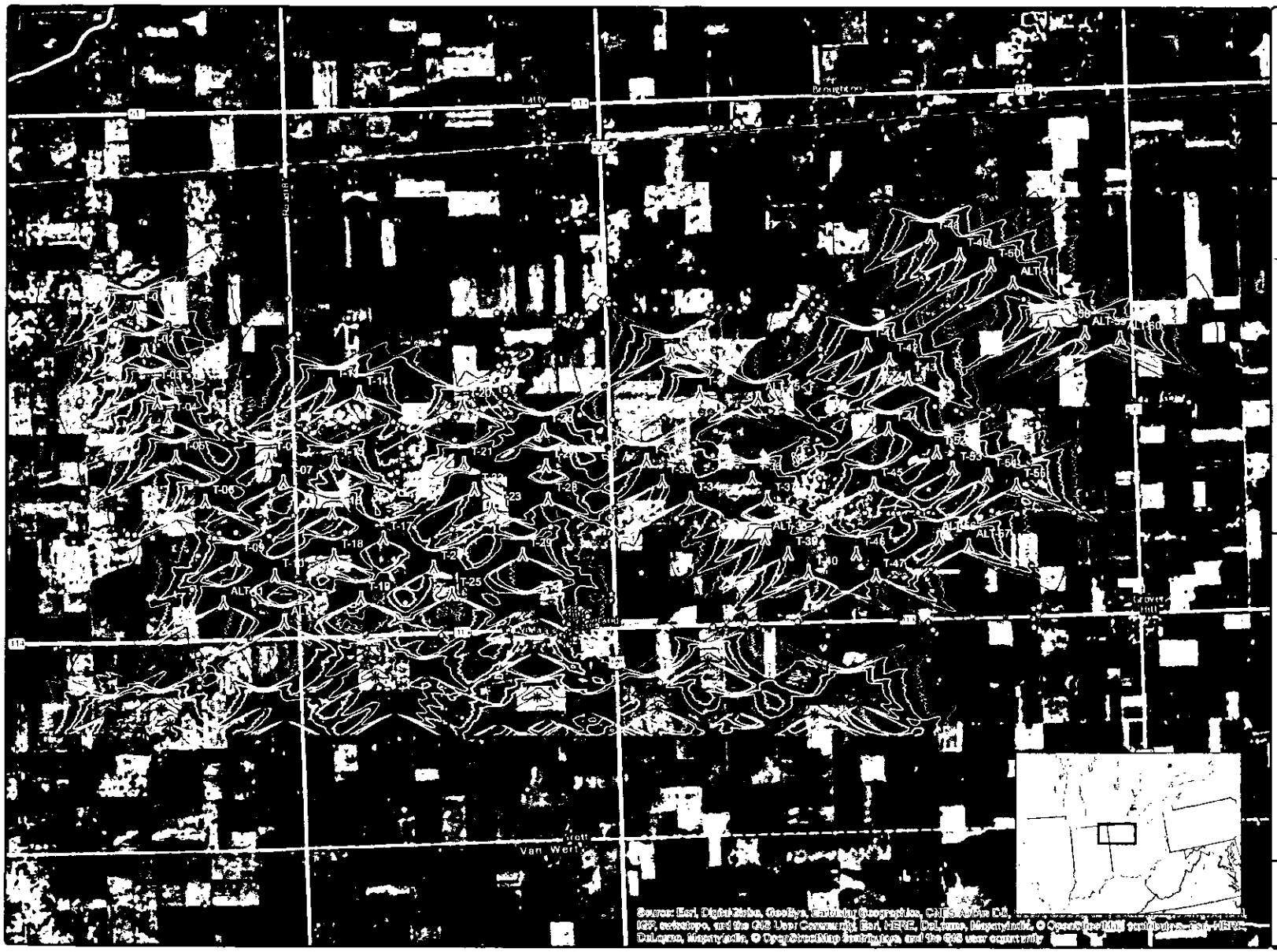
- Trishe 60 WTG Layout
- Existing WTGs
- Dwellings within 1 mile of proposed WTGs

Shadow Flicker (hrs/yr)

- 0
- 5
- 10
- 20
- 30
- 50
- 100

N W E S

Appendix F: Vestas V110-2.0 80 m Hub Height Shadow Flicker Map



0 0.5 1 2 Miles

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Trishe
Vestas V110-2.0 80 m HH
Realistic Case Shadow Flicker

Client

Starwood Energy Group

Project Description

60 WTG Layout. Dwellings within one mile of proposed new turbines along with existing turbines.

Location: Paulding/Van Wert County, Ohio

Project #: 20161390

Issue Dates

#	Description	Date
1	Original	2016.07.29

Drawn By: JH | Checked By: JH

Legend

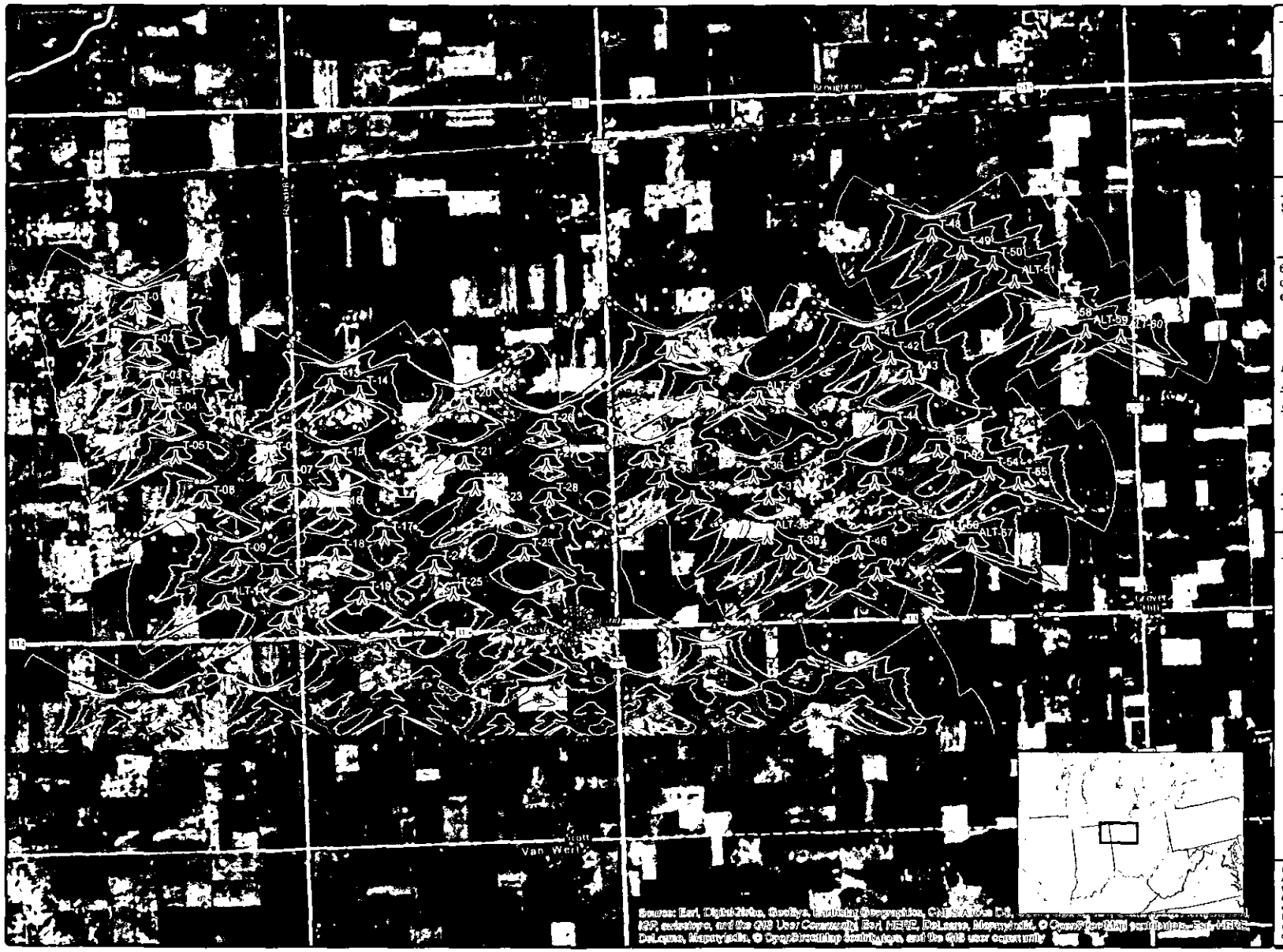
- Trishe 60 WTG Layout
- Existing WTGs
- Dwellings within 1 mile of proposed WTGs

Shadow Flicker (hrs/yr)

- 0
- 5
- 10
- 20
- 30
- 50
- 100

N W E S

Appendix G: Vestas V110-2.0 95 m Hub Height Shadow Flicker Map



0 0.5 1 2 Miles

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Trishe
Vestas V110-2.0 95 m HH
Realistic Case Shadow Flicker

Client

Starwood Energy Group

Project Description

60 WTG Layout. Dwellings within one mile of proposed new turbines along with existing turbines.

Location: Paulding/Van Wert County, Ohio

Project #: 20161390

Issue Dates

#	Description	Date
1	Original	2016.07.29

Drawn By: JH *Checked By:* JH

Legend

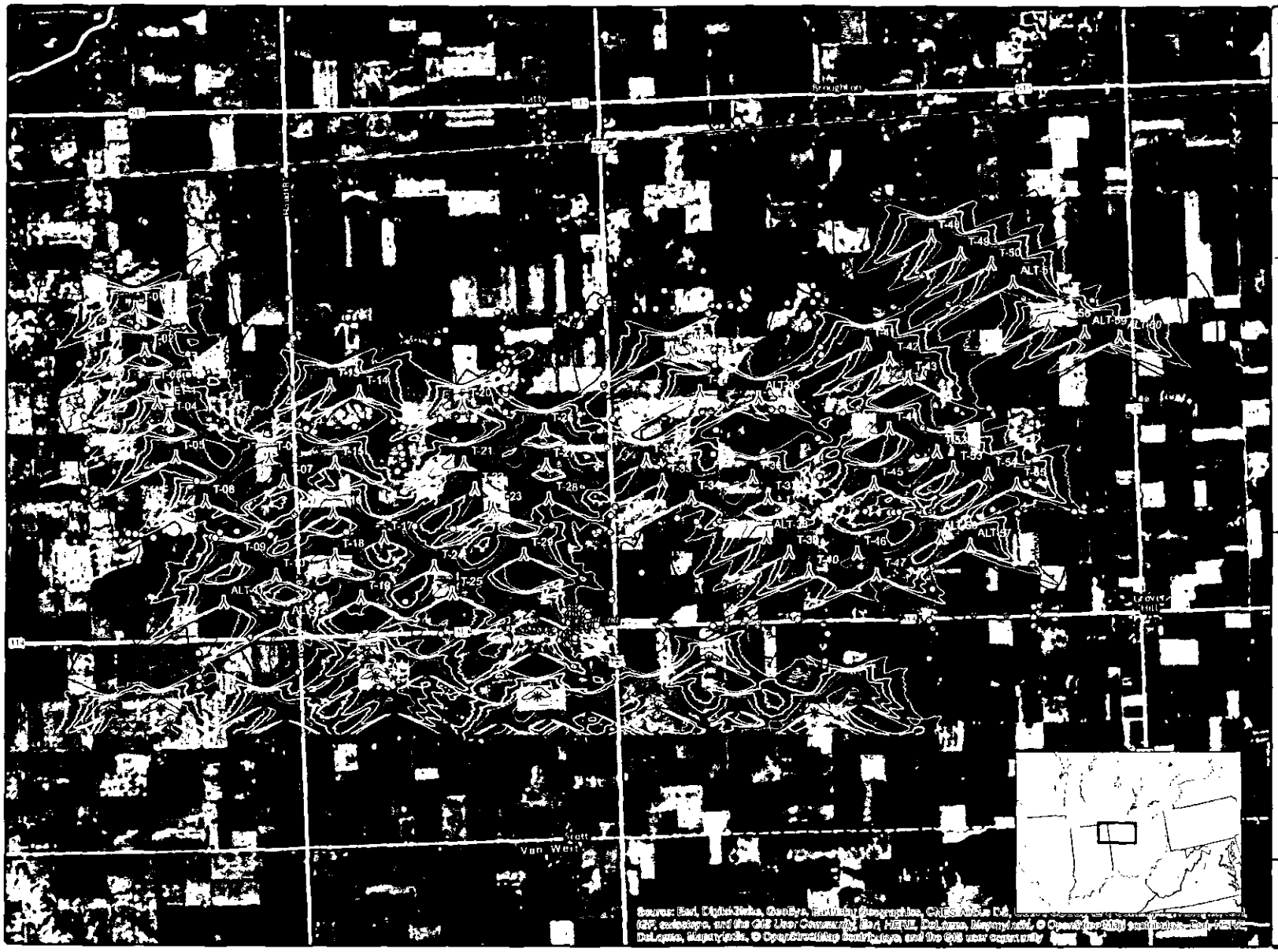
- Trishe 60 WTG Layout
- Existing WTGs
- Dwellings within 1 mile of proposed WTGs

Shadow Flicker (hrs/yr)

- 0
- 5
- 10
- 20
- 30
- 50
- 100

N W E S

Appendix H: Vestas V126-3.45 87 m Hub Height Shadow Flicker Map



0 0.5 1 2 Miles

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Trishe
Vestas V126-3.45 87 m HH
Realistic Case Shadow Flicker

Client

Starwood Energy Group

Project Description

60 WTG Layout. Dwellings within one mile of proposed new turbines along with existing turbines.

Location: Paulding/Van Wert County, Ohio

Project #: 20161390

Issue Dates

#	Description	Date
1	Original	2016.07.29

Drawn By: JH | Checked By: JH

Legend

- Trishe 60 WTG Layout
- Existing WTGs
- Dwellings within 1 mile of proposed WTGs

Shadow Flicker (hrs/yr)

- 0
- 5
- 10
- 20
- 30
- 50
- 100

N W E S

The remaining 2,270 pages contain detailed calculations, which will be provided upon request.

Supplemental Appendix S

Visual Impact Assessment

VISUAL IMPACT ASSESSMENT REPORT

Northwest Ohio Wind Energy Project

Paulding County, Ohio
Case No. 13-197-EL-BGN

Prepared for

Trishe Wind Ohio, LLC

c/o Starwood Energy Group Global, Inc.
591 W. Putnam Avenue
Greenwich, CT 06830

July 2016

CH2M HILL
1000 Wilshire Boulevard
Suite 2100
Los Angeles, CA 90017

Contents

Acronyms and Abbreviations

3D	three-dimensional
AEP	American Electric Power
Certificate	Certificate of Environmental Compatibility and Public Need
FAA	Federal Aviation Administration
kV	kilovolt(s)
mm	millimeter(s)
MW	megawatts
O&M	operations and maintenance
OPSB	Ohio Power Siting Board
POI	point of interconnection
Report	Visual Impact Assessment Report
Starwood	Starwood Energy Group, Inc.
TWO	Trishe Wind Ohio, LLC

1 Introduction

Trishe Wind Ohio, LLC (TWO), a Limited Liability Company, proposes to construct up to 100 megawatts (MW) in nameplate capacity of wind-powered energy generation in portions of Blue Creek and Latty Townships and the Village of Haviland in Paulding County, in northwestern Ohio. Starwood Energy Group, Inc. (Starwood) is the sole owner of TWO.

The proposed Facility is located within an approximate 21,000-acre area (Project area) in Blue Creek and Latty townships and the Village of Haviland, in Paulding County, Ohio. The Project area was selected based primarily upon the wind resource, transmission access, land availability, community support, site accessibility, and minimal environmental, ecological, and agricultural impact risk.

This Visual Impact Assessment Report (Report) summarizes the methodology and results of the visual assessments conducted in the Project area. These assessments were completed to provide an understanding of the Facility's appearance and its potential visual effects.

This assessment supports TWO's submittal to the Ohio Power Siting Board (OPSB)

(Case No. 13-197-EL-BGN) for an amended Certificate of Environmental Compatibility and Public Need (Certificate), in accordance with Chapter 4906-17 of the Ohio Administrative Code, Application Filing Requirements for Wind-Powered Electric Generating Facilities.

The Appendix contains an overview map of the visual impact assessment locations and eight figures, which for each of the eight viewpoints selected for analysis, presents a photo that documents the existing visual conditions and a photo simulation that depicts the view as it would appear after the proposed project has been developed.

2 Project Description

The Project area is located within Paulding County, Ohio, and encompasses approximately 21,000 acres in Blue Creek and Latty townships and the Village of Haviland. The Project lies in the south-central portion of Paulding County, approximately 6.0 miles south of the Village of Paulding. The Project area stretches generally in an east to west direction, from Route 637 just north of the Village of Grover Hill to an area between Road 87 (Briceton Road) and the Village of Payne.

This Project would include the following:

- Up to 60 wind-powered turbine generators[1];
- A 34.5 kilovolt (kV) electrical collection system using underground collection lines;
- A voltage step-up facility;
- A temporary staging and construction laydown area;
- Gravel access roads;
- A temporary concrete batch plant; and
- An operation and maintenance (O&M) building.

The Facility would interconnect to an existing 138 kV American Electric Power (AEP) transmission line, which runs through the southern part of the Project area. The point of interconnection (POI) is at the existing AEP Haviland substation, just south of Haviland, Ohio. Interconnection would be secured through an interconnection agreement with PJM Interconnection. Voltage from the 34.5 kV underground electrical collection system would be stepped up to 138 kV at a step-up transformer facility immediately adjacent to the Haviland substation, avoiding the need for an overhead interconnection transmission line.

The wind turbine model used in the study to provide the basis for evaluating the project's visual effects is the Vestas V126. The hub height of these three-bladed turbines is 87 meters (285 feet), and the rotor diameter is 126 meters (413 feet). Each blade is 62 meters long (203 feet). The nacelle length for each turbine is 13 meters (43 feet). The total height to blade tip is approximately 150 meters (492 feet). This turbine model is the tallest of the three turbine models being considered for use in this project, so it provides for a worst-case assessment of the project's potential visual effects. Depiction of the Vestas V126 model at all 60 turbine locations also provides for a worst-case assessment of visual impacts because this turbine model has a nameplate capacity rating of 3.45 MW. Given this megawatt rating, if this turbine model were selected, turbines would need to be installed at only 29 of the 50 turbine locations to achieve the project's target of 100 MW of generating capacity.

[1] The proposed Facility would have up to 60 turbines for a maximum potential output of 100 MW. Specific locations for turbines and other related Facility components are identified within the OPSB Certificate application.

3 Visual Impact Assessment Methodology

To provide an understanding of the Facility's appearance and its potential effects on representative views in the Project area, photo simulations were prepared for views from eight distinct viewpoints. The locations of these viewpoints are indicated on Figure 1 (Viewpoint Assessment Locations) in the Appendix of this Report. These viewpoints were selected through a process that included review of area maps on which the proposed locations of the turbines and other Facility features had been plotted, review of Google Earth™ mapping service aerial photographs, prior field investigations, and consultation with OPSB staff. Eight viewpoints were selected to provide for a range of views at different viewing distances and in a range of representative viewing contexts.

Figures 2 through 9 in the Appendix present the existing view from each viewpoint, along with a photo simulation that depicts the views as they would appear with the Facility in place. These images were prepared through a process that entailed photo documentation of the views from each of the viewpoints using a single lens reflex digital camera set to take photos equivalent to those taken with a 35 millimeter (mm) camera using a 50 mm focal length. For locations where wider viewing angles were required, two or more individual 50 mm frames were spliced together to create a panoramic view. For each view, computer modeling and rendering techniques were used to produce the simulated images. Existing topographic and site data provided the basis for developing an initial digital model. Facility engineers provided site plans and digital data for the proposed facilities. These were used to create three-dimensional (3D) digital models of the turbines. These models were then combined with the digital site model to produce a complete computer model of the proposed Facility.

For each simulation viewpoint, each viewer location was digitized from topographic maps and scaled from aerial photographs using five feet as the assumed viewer eye level. Computer "wire frame" perspective plots were then overlaid on the photographs of the views from the simulation viewpoints to verify scale and viewpoint location. Digital visual simulation images were produced as a next step based on computer renderings of the 3D model combined with high-resolution digital versions of the base photographs. The results provide an accurate and realistic depiction of how the turbines would appear in the view.

4 Visual Impact Assessment Results

This review of the potential visual effects of the Project begins with assessment of the Project's effects on the more distant views and then proceeds to evaluate the effects on views that are in closer proximity to the turbines. Viewpoints 1 through 3 represent views from points located approximately 1.5 to 2.5 miles from the edge of the Project area. Viewpoints located more than 3 miles from the proposed turbines were not selected for analysis because observations of the existing wind turbines in the nearby Blue Creek wind farm indicated that at a distance of 3.0 to 3.5 miles, many of these turbines blend into the sky and at this distance and are difficult to distinguish. At Viewpoint 1 (Figure 2), which is located approximately 2.8 miles from the closest turbine, there is a generally open view toward the western portion of the Project area. However, during the summer, the views toward the distant Project turbines would be substantially screened by cornfields in the foreground. When the corn is not present, the turbines would be visible as relatively small features along the distant horizon, and would be seen in the context of the existing turbines of the Blue Creek wind facility, which are readily visible in the foreground and middle ground. Consequently, the level of apparent visual change brought about by the Project in this view would be very low. At Viewpoints 2 and 3, there are entirely open views toward the Project area (Figures 3 and 4). Although many of the turbines would be visible in these views, existing woodlots would screen the lower portions of the structures. In addition, because of the viewing distances (1.5 miles to the closest turbine in the case of Viewpoint 2, and 1.7 miles in the case of Viewpoint 3), the turbines would appear to be in scale with the other elements of the view.

Viewpoint 4 is a mid-range view from Welcome Park in Grover Hill (Figure 5). In this view, existing woodlots screen lower portions of some turbines, and because of distance and a limited silhouette against the sky, the turbines appear to be in scale with other elements of the view. Additionally, mature crops in the field shown in the foreground (during non-fallow seasons) would further limit the views of turbines. Viewpoint 5 is a view from in front of the Haviland Post Office (Figure 6). In this view, the proposed turbines would be completely screened by structures and vegetation in the near foreground. The only turbine visible in this view is an existing turbine located just to the west of the viewpoint. The conditions visible in this view are typical of the conditions in views from other communities in the Project area, where the presence of structures and trees in the foreground of views from within these communities can be expected to substantially, if not completely screen views toward Project turbines located in surrounding agricultural lands.

In closer views, the turbines would be more visually prominent, and could have more of an effect on the character and composition of the landscape. In Viewpoints 6 and 7 (Figures 7 and 8), the turbines would be prominently visible in the open landscape (the nearest turbines being located approximately 0.5 mile from the viewpoint). However, they would not represent a complete change in the visual character of these views in that they would be seen in the context of the numerous existing turbines that are currently exist in the background zones of these views. In Viewpoint 8 (Figure B-8), which is a view from Highway 114 west of Haviland, the closest turbine seen in this view would be located approximately 0.3 mile away. In this view, although the turbines would be readily visible and, the closest turbine would appear large in scale, the proposed turbines would be generally in scale with existing turbines located to the south. However, because the foreground of this view is completely open and because one of the turbines is relatively close to the viewpoint, the nearby turbine along with the more distant turbines seen in the middleground would dominate the view.

Table 4-1. Summary of Viewpoints (Presented in Decreasing Distance)

View Type	Viewpoint (Figure)	Discussion
Distant	Viewpoint 1 (Figure 2)	A generally open view toward the western portion of the Project area. During the summer, the views toward the distant Project turbines would be substantially screened by cornfields in the foreground. When the corn is not present, the turbines would be visible as relatively small features along the distant horizon, and would be seen in the context of the existing turbines of the Blue Creek wind facility, which are readily visible in the foreground and middle ground.
	Viewpoint 2 (Figure 3)	Turbines would be visible as smaller, more distant elements that are visible in breaks and above the tree line.
	Viewpoint 3 (Figure 4)	Intervening trees would partially hide the turbines and the turbines would appear to be in scale with the other elements of the landscape.
Mid-Range	Viewpoint 4 (Figure 5)	Turbines would be visible along the horizon in this wide-open vista. There is potential for visual screening during growing seasons when crop rotation results in planting occurring in the field visible in the foreground. Because of their distance, the turbines would appear to be generally in scale with the other elements of their landscape setting.
	Viewpoint 5 (Figure 6)	The closest turbines would be located approximately 0.8 mile from the viewpoint. Because of the screening provided by the structures and mature vegetation in the foreground zone of this view, none of the Project turbines would be visible, and thus there would be no visual change.
Close Range	Viewpoint 6 (Figure 7)	The closest turbines would be located approximately 0.4 mile from the viewpoint. Because the foreground zone of this view is completely open, the turbines would be fully visible, and would become important elements in the overall landscape composition. It is important to note that in terms of context, these turbines would be seen in conjunction with the existing Blue Creek turbines to the south.
	Viewpoint 7 (Figure 8)	The closest turbines in this view would be located approximately 0.4 mile away. The turbines would be readily visible and large in scale, and would become important elements in the overall landscape composition, extending the pattern created by the existing Blue Creek turbines to the south and west.
	Viewpoint 8 (Figure 9)	The closest turbine in this view would be located approximately 0.3 mile from the viewpoint, and it and the more distant turbines that would be visible in the middleground would dominate the view.

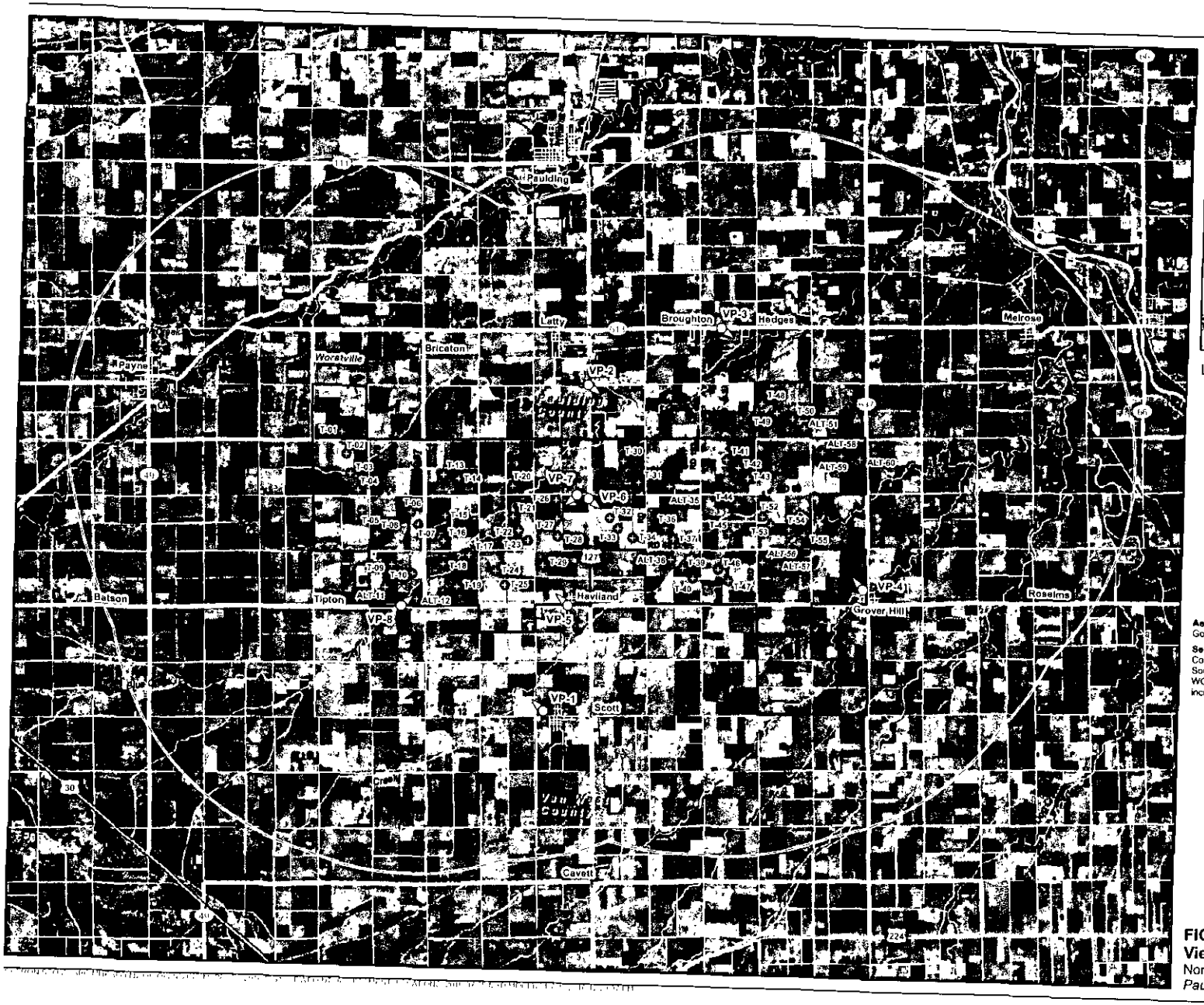
5 Conclusions and Recommendations

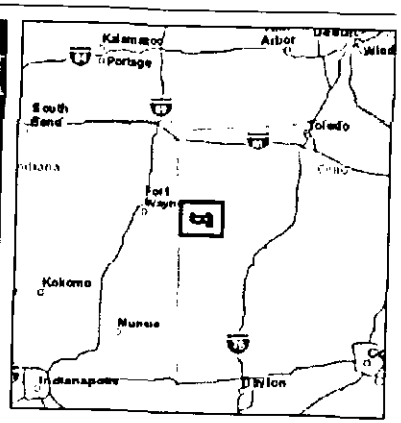
To maximize the visual integration of the proposed Facility into the overall pattern of the Project area landscape, TWO would incorporate best management practices related to Facility appearance, as has been done for the existing facilities bordering the current Project area to the south and west. The following measures would be incorporated into Facility design to ensure an attractive appearance and good integration into its landscape setting:

- Wind turbine towers, nacelles, and rotors are locally uniform and conform to high standards of industrial design to present a trim, uncluttered, aesthetic appearance.
- The proposed turbines would not be used as structures for mounting commercial advertising, and conspicuous lettering or corporate logos identifying the Facility owner or the equipment manufacturer would not appear on the sides of the nacelles.
- The towers, nacelles, and rotors would be painted with low-reflectivity, neutral gray, white, or off-white finishes to be consistent with Federal Aviation Administration (FAA) daytime safety marking requirements, while at the same time, minimizing the reflectivity that can call attention to structures in the landscape, and minimizing contrast with the sky backdrop.
- Neutral gray, white, off-white, or earth tone finishes for the small cabinets containing pad-mounted equipment that might be located at the base of each turbine, to help the cabinets blend into the surrounding ground plane.
- Restriction of exterior lighting on the turbines to the aviation warning lights required by FAA, which would be kept to the minimum required number and intensity to meet FAA standards.
- Placement of the Facility's electrical collection system underground, to the extent practicable, minimizing the system's visual impacts.
- The exterior surfaces of the O&M building would be painted with low-reflectivity finishes using an appropriate color scheme that would maximize the building's visual integration into the surrounding landscape.
- The O&M building and its parking area would be appropriately landscaped to make these facilities look attractive and to visually integrate them into the landscape setting.
- Restriction of outdoor night lighting at the O&M building to the minimum required for safety and security; sensors and switches would be used to keep lighting turned off when not required, and all lights would be hooded and directed to minimize backscatter and offsite light trespass.

The numerous existing turbines and other aboveground structures located in the immediate vicinity of the Project area are a large component of the existing landscape composition. Construction of the proposed Project would not result in a cumulative detrimental effect to the landscape composition of this largely rural area.

Appendix A
Visual Impact Assessment Locations, Existing Visual Conditions, and Photo Simulations





LEGEND

- Proposed Turbine Location
- Project Boundary
- 5-Mile Radius From Turbines
- Viewpoint Location

Aerial Source:
Google Earth, dated 4/13/2016

Service Layer Credits:
Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

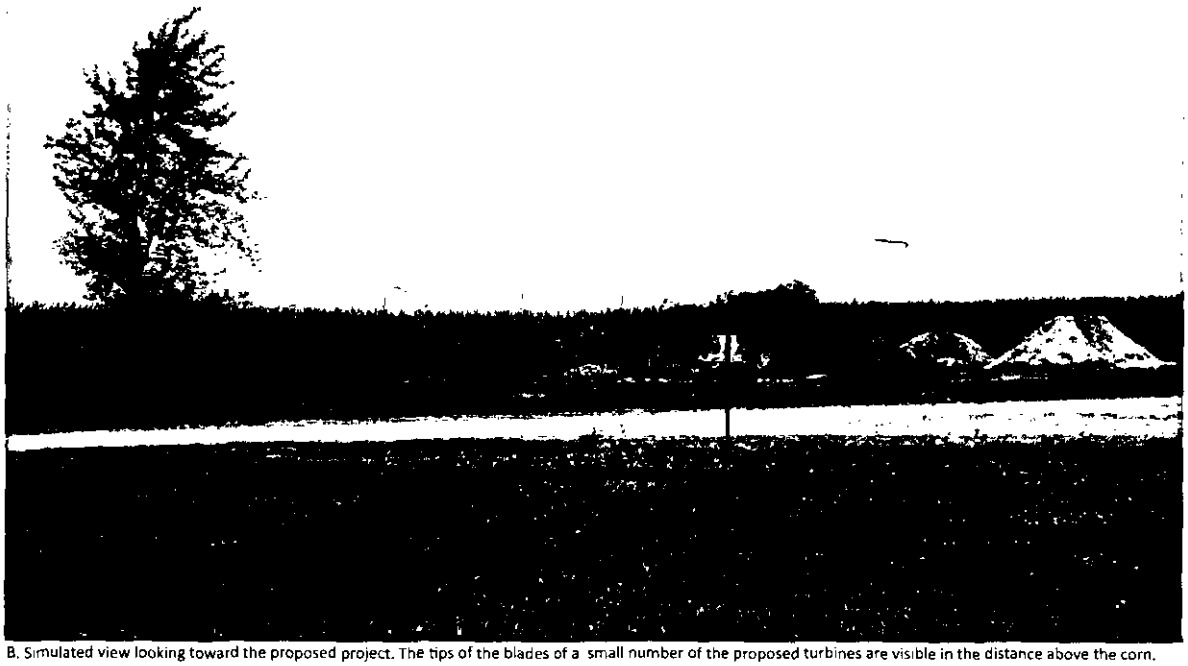
N

0 0.5 1 2
Miles

FIGURE 1
Viewpoint Assessment Locations
Northwest Ohio Wind Energy Project
Paulding County, Ohio

ch2m:

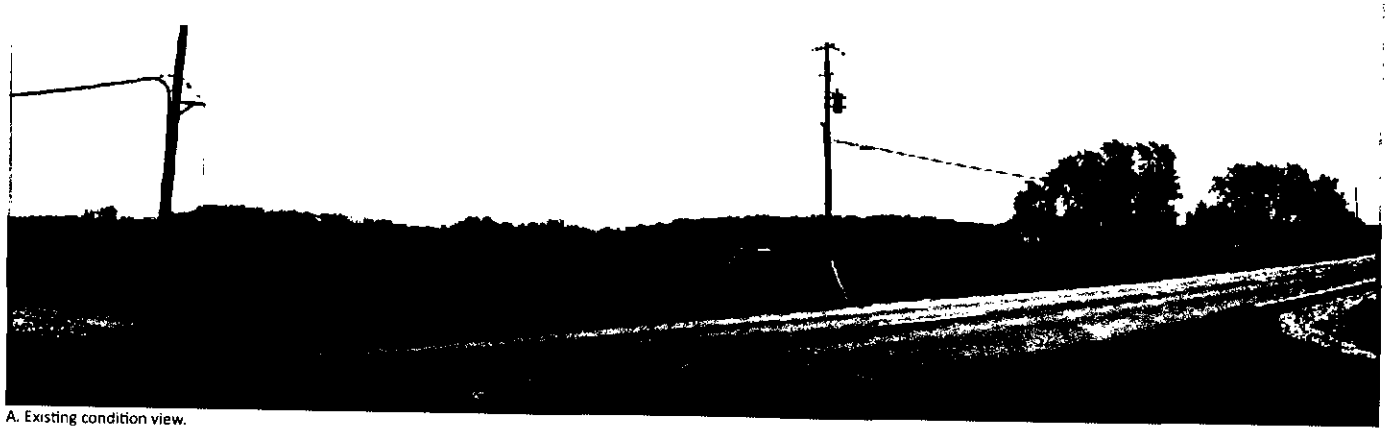
A. Existing condition view.



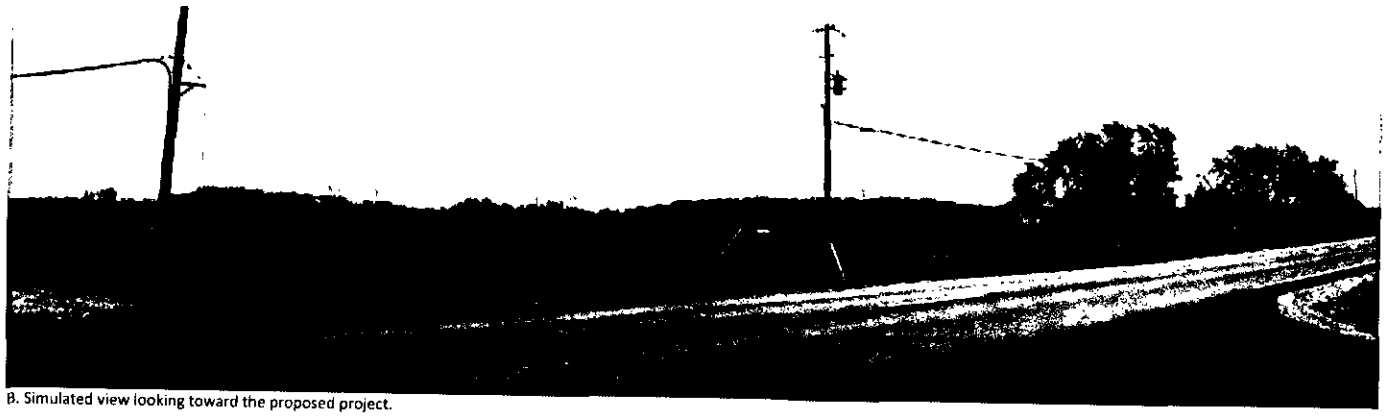
B. Simulated view looking toward the proposed project. The tips of the blades of a small number of the proposed turbines are visible in the distance above the corn.

Figure 2
Viewpoint 1
View Looking Northwest from Bresler Park
along Route 114 in the Village of Scott
Northwest Ohio Wind Energy Project
Paulding County, Ohio

ch2m:



A. Existing condition view.



B. Simulated view looking toward the proposed project.

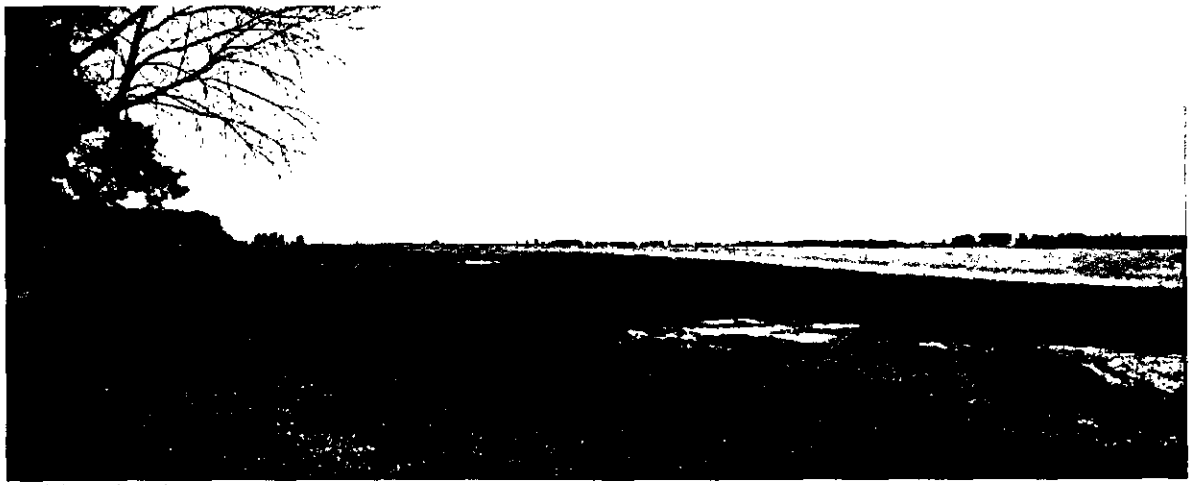
Figure 3
Viewpoint 2
View Looking Southeast from Route 127 at Road 82
Northwest Ohio Wind Energy Project
Paulding County, Ohio

A. Existing condition view.

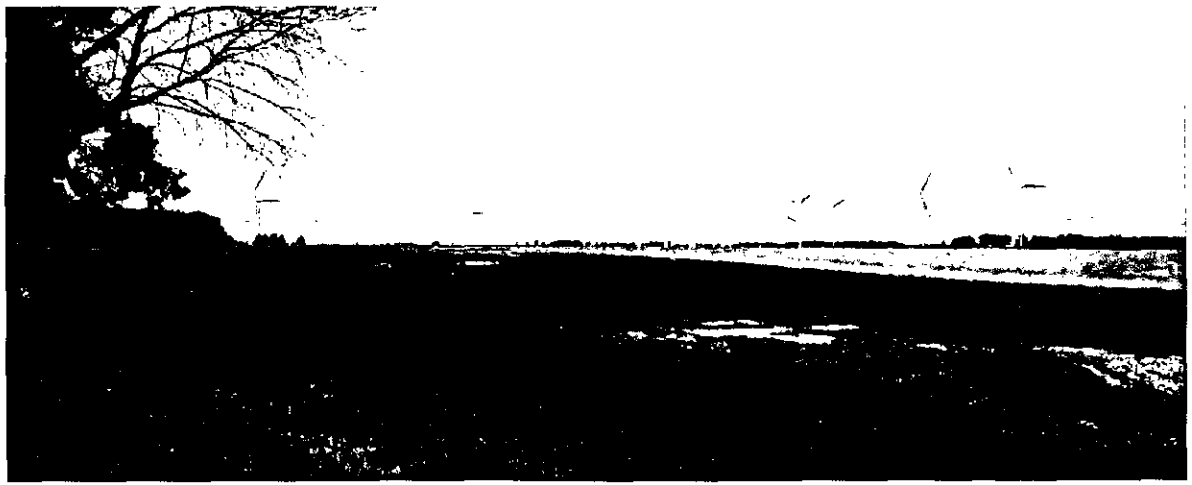
B. Simulated view looking toward the proposed project.

Figure 4
Viewpoint 3
View Looking Southeast from Next to the Hardware/ Convenience Store Along Highway 613 in Broughton
Northwest Ohio Wind Energy Project
Paulding County, Ohio

ch2m:



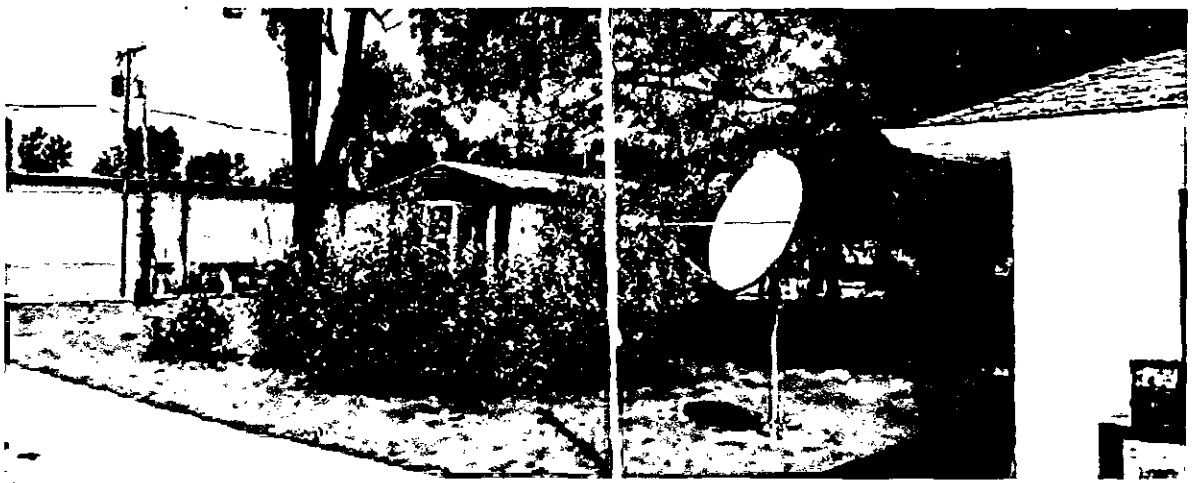
A. Existing condition view.



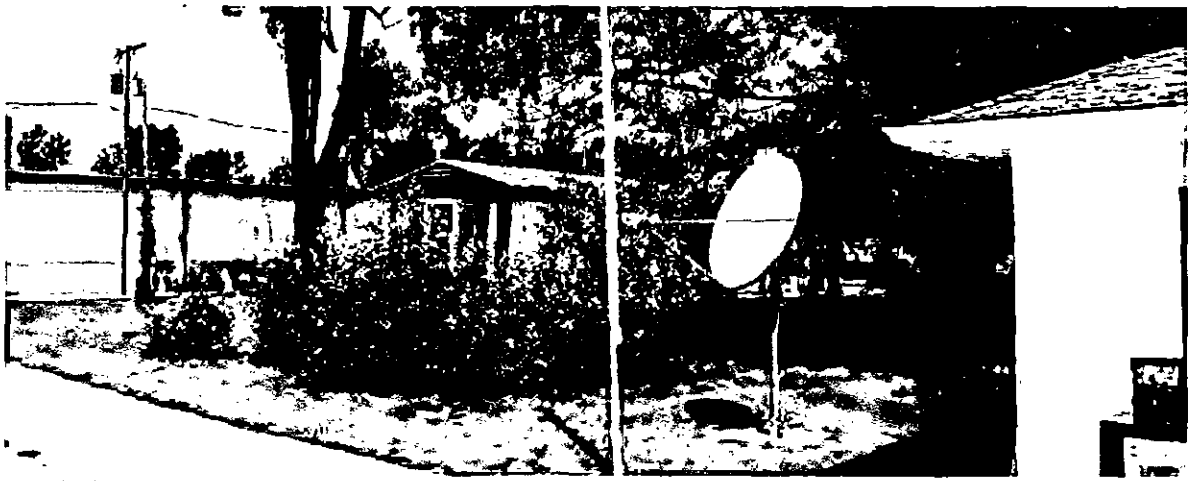
B. Simulated view looking toward the proposed project.

Figure 5
Viewpoint 4
View Looking Northwest from Welcome Park Along Highway 637 in the Village of Grover Hill
Northwest Ohio Wind Energy Project
Paulding County, Ohio

ch2m:



A. Existing condition view.

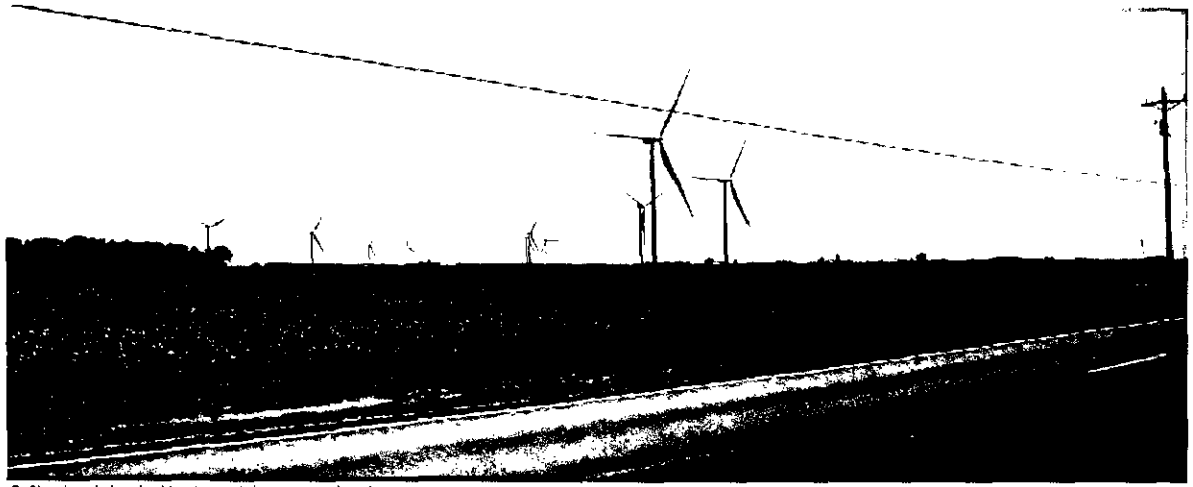


B. Simulated view looking toward the proposed project. The turbines that will be located to the northeast of this viewpoint will be screened from view by the building in the view's foreground and thus will not be visible.

Figure 6
Viewpoint 5
View Looking Northwest from the Haviland Post Office along Highway 114 in the Village of Haviland
Northwest Ohio Wind Energy Project
Paulding County, Ohio

ch2m:

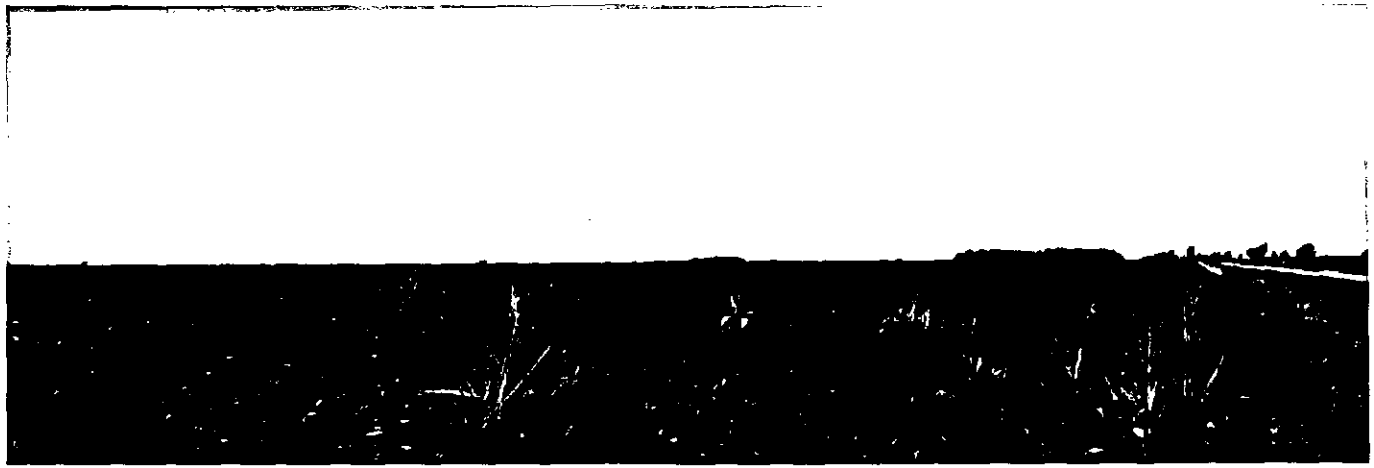
A. Existing condition view.



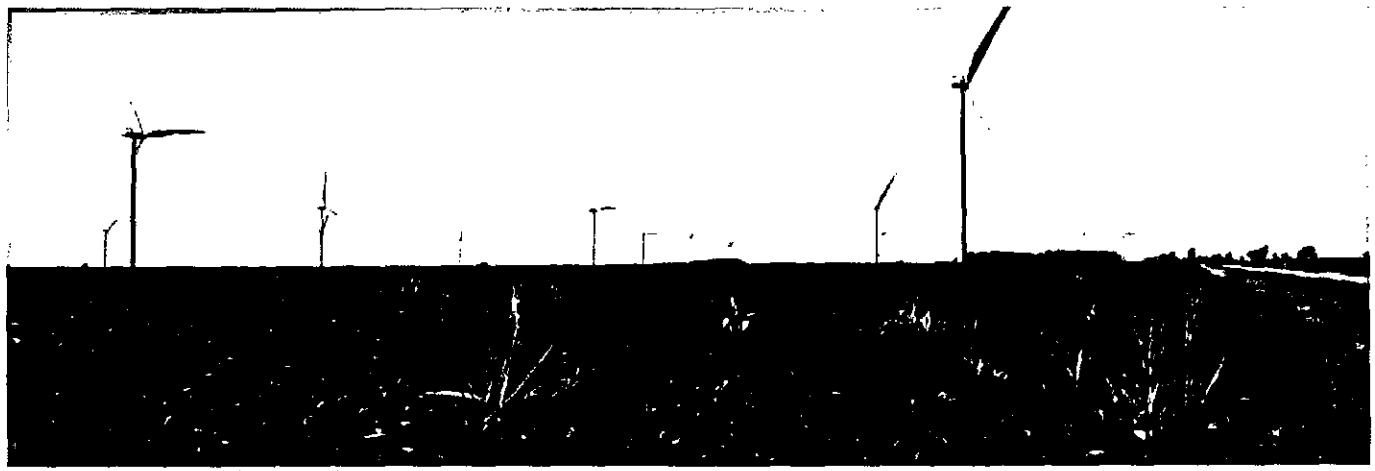
B. Simulated view looking toward the proposed project.

Figure 7
Viewpoint 6
View Looking Southeast from US Route 127 in front of the Wayne Trace Jr./Sr. High School
Northwest Ohio Wind Energy Project
Paulding County, Ohio

ch2m:



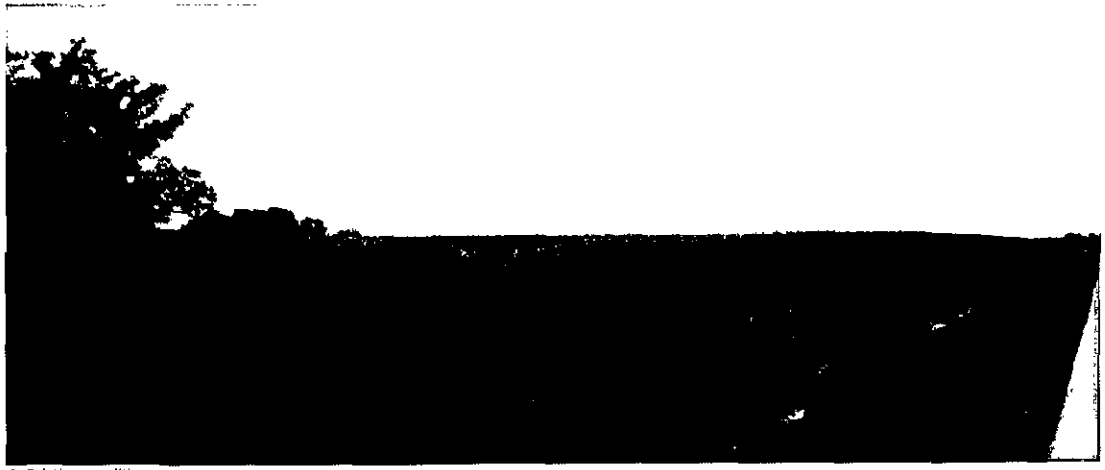
A. Existing condition view.



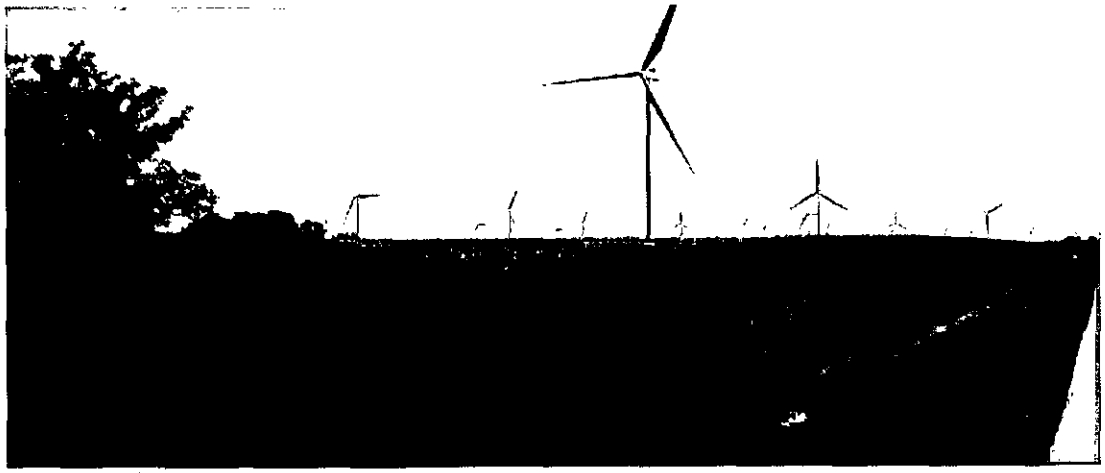
B. Simulated view looking toward the proposed project.

Figure 8
Viewpoint 7
View Looking Southwest from Road 60 west of the Wayne Trace Jr./Sr. High School Football Field
Northwest Ohio Wind Energy Project
Paulding County, Ohio

ch2m:



A. Existing condition view.



B. Simulated view looking toward the proposed project.

Figure 9
Viewpoint 8
View Looking Northeast from Highway 114 between Road 79 and Road 87
Northwest Ohio Wind Energy Project
Paulding County, Ohio

ch2m:

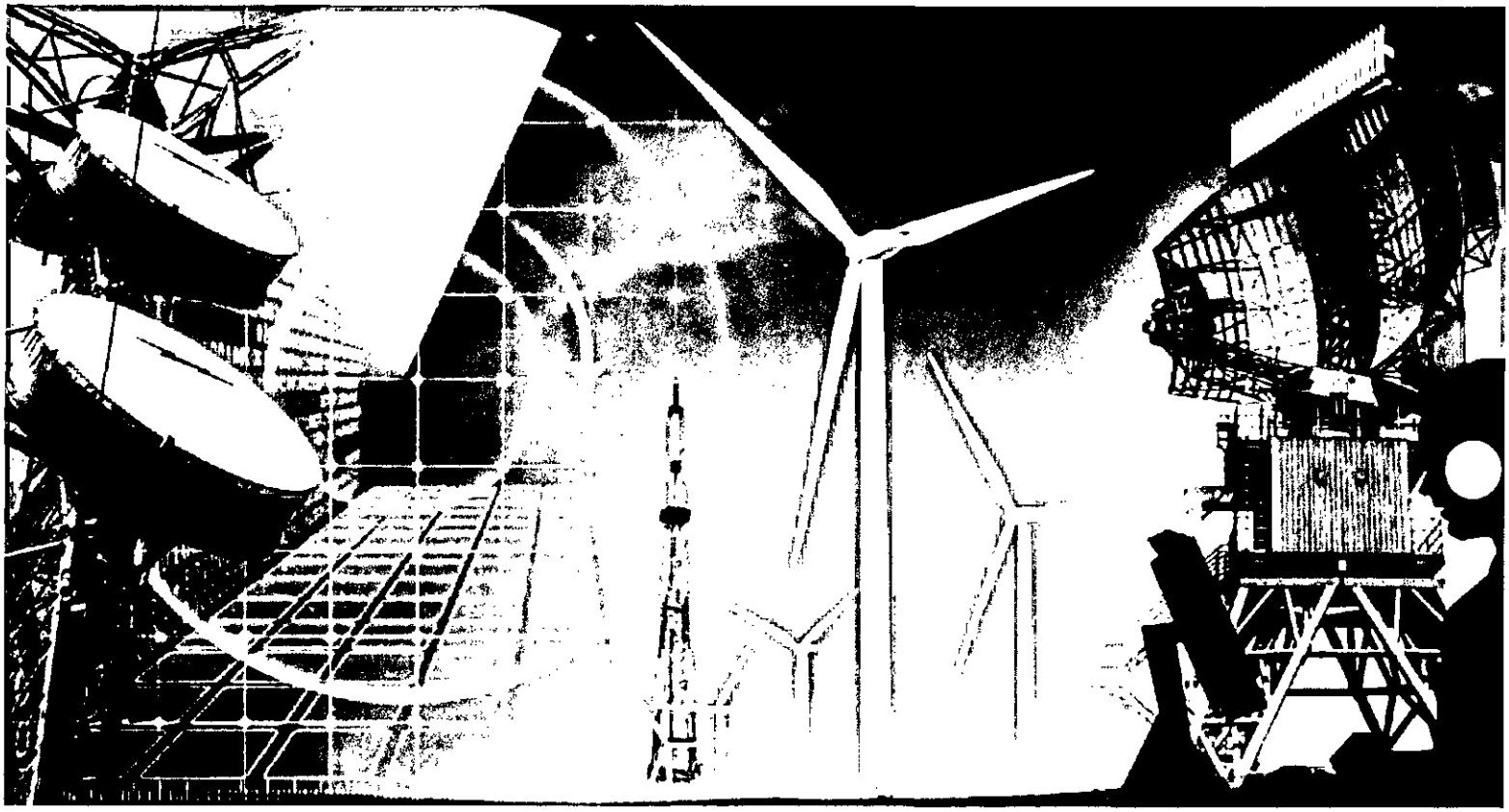
Supplement Appendix T

Microwave Study

Wind Power GeoPlanner™

Microwave Study

Trishe Wind Ohio



Prepared on Behalf of
Starwood Energy Group
Global

August 2, 2016

COMSEARCH
A CommScope Company

Table of Contents

1. Introduction

Microwave bands that may be affected by the installation of wind turbine facilities operate over a wide frequency range (900 MHz – 23 GHz). Comsearch has developed and maintains comprehensive technical databases containing information on licensed microwave networks throughout the United States. These systems are the telecommunication backbone of the country, providing long-distance and local telephone service, backhaul for cellular and personal communication service, data interconnects for mainframe computers and the Internet, network controls for utilities and railroads, and various video services. This report focuses on the potential impact of wind turbines on licensed, proposed and applied non-federal government microwave systems.

2. Project Overview

Project Information

Name: Trishe Wind Ohio
County: Paulding
State: Ohio

Number of Turbines: 60
Max Blade Diameter[1]: 126 meters
Hub Height: 80 - 96 meters

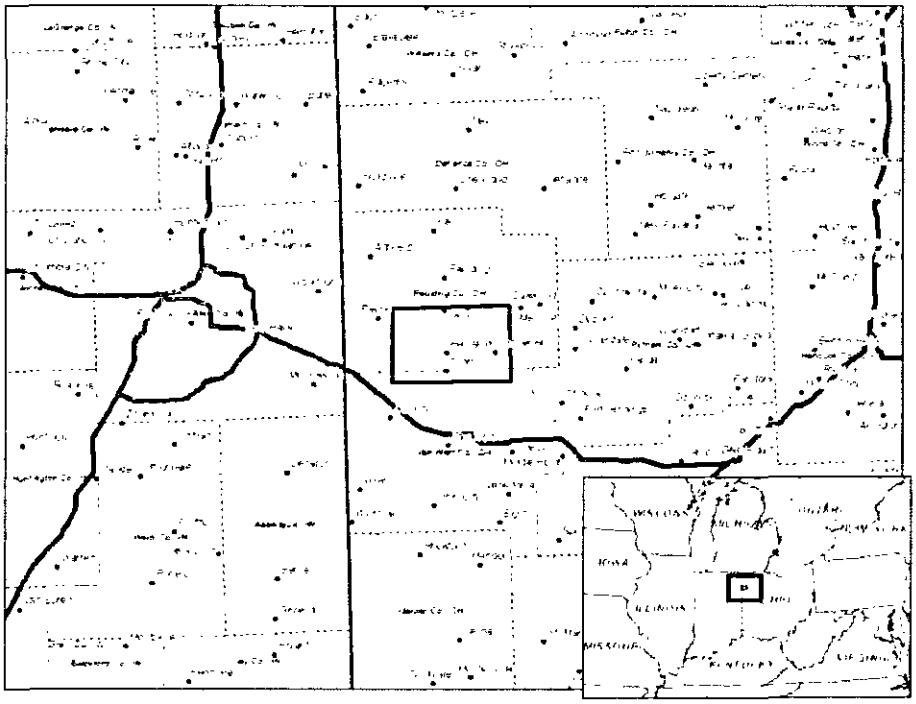


Figure 1: Area of Interest

[1] The turbine model is TBD. This study is based on the worst case scenario.

3. Fresnel Zone Analysis

Methodology

Our obstruction analysis was performed using Comsearch's proprietary microwave database, which contains all non-government licensed, proposed and applied paths from 0.9 - 23 GHz[2]. First, we determined all microwave paths that intersect the area of interest[3] and listed them in Table 1. These paths and the area of interest that encompasses the planned turbine locations are shown in Figure 2.

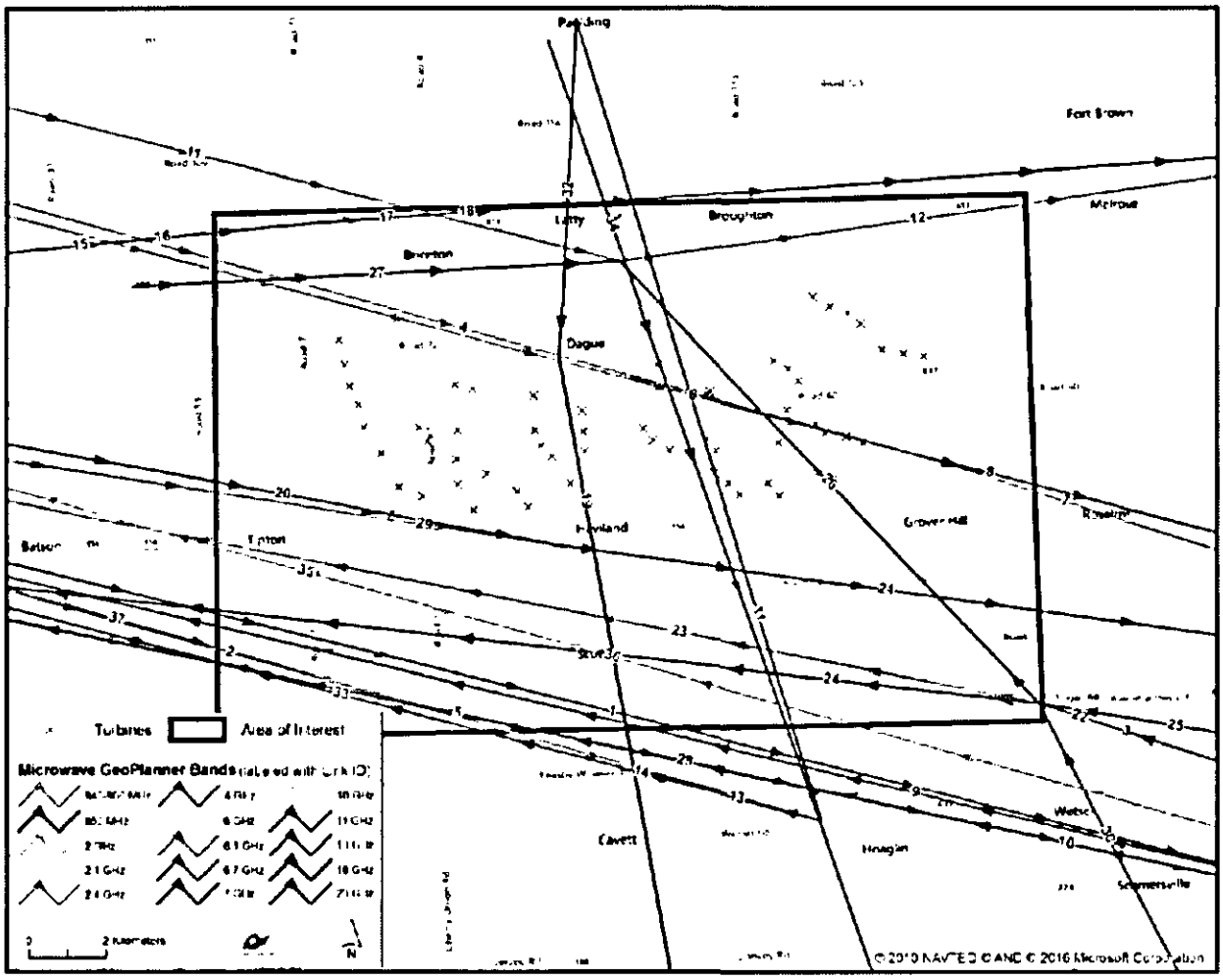


Figure 2: Microwave Paths that Intersect the Area of Interest

[2] Please note that this analysis does not include unlicensed microwave paths or federal government paths that are not registered with the FCC.

[3] We use FCC-licensed coordinates to determine which paths intersect the area of interest. It is possible that as-built coordinates may differ slightly from those on the FCC license.

ID	Status	Callsign 1	Callsign 2	Band	Path Length (km)	Licensee
1	Proposed	1029441	1225294	Upper 6 GHz	77.87	Torellco LLC
2	Proposed	1034986	1013766	Lower 6 GHz	59.90	Webline Holdings LLC
3	Proposed	ADA	WETSEL	Upper 6 GHz	60.24	ECW Wireless, LLC
4	Proposed	ATC42132	FCC12661	Lower 6 GHz	34.68	Fort Wayne Communications Group Company
5	Proposed	CCI87269	ATC50782	Lower 6 GHz	49.37	Fundamental Broadcasting LLC
6	Proposed	FCC12164	FCC12661	Lower 6 GHz	35.92	Fort Wayne Communications Group Company
7	Proposed	FCC12661	FCC12887	Lower 6 GHz	39.99	Fort Wayne Communications Group Company
8	Proposed	FCC12661	SITA2235	Upper 6 GHz	30.64	Fort Wayne Communications Group Company
9	Proposed	FTJENNIN	FORTWAYN	Upper 6 GHz	76.99	ECW Wireless, LLC
10	Proposed	FTJENNIN	TOWNLEY	Upper 6 GHz	49.32	ECW Wireless, LLC
11	Proposed	GTPIN-52	OH03415-	Lower 6 GHz	54.80	Wireless Internetwork LLC
12	Proposed	OH03415-	CCI87204	Lower 6 GHz	56.25	Wireless Internetwork LLC
13	Proposed	VANWERT	FTWAYNE	Lower 6 GHz	57.94	ECW Wireless, LLC
14	Proposed	VANWERT	WQPF726	Upper 6 GHz	57.94	ECW Wireless, LLC
15	Licensed	WAZ563	WAZ596	Lower 6 GHz	31.42	Norfolk Southern Railway
16	Licensed	WAZ563	WAZ596	Upper 6 GHz	31.42	Norfolk Southern Railway
17	Licensed	WAZ596	WBB735	Lower 6 GHz	38.51	Norfolk Southern Railway
18	Licensed	WAZ596	WBB735	Upper 6 GHz	38.51	Norfolk Southern Railway
19	Licensed	WLD621	RXONLY	950 MHz	21.00	First Family Broadcasting, Inc.
20	Licensed	WQON426	WQON427	Upper 6 GHz	51.69	Fort Wayne Communications Group Company
21	Licensed	WQON427	WQON424	Upper 6 GHz	39.37	Fort Wayne Communications Group Company
22	Licensed	WQOV246	WQOV248	Upper 6 GHz	60.24	World Class Wireless, LLC
23	Proposed	WQOV248	EDGERTON	Lower 6 GHz	31.09	ECW Wireless, LLC
24	Licensed	WQOV248	WQOS750	11 GHz	35.35	World Class Wireless, LLC
25	Licensed	WQPA629	WQOV248	11 GHz	16.31	World Class Wireless, LLC
26	Licensed	WQRX775	WQRY695	11 GHz	15.85	Sprint Spectrum L.P.
27	Licensed	WQRY696	WQRY695	11 GHz	12.61	Sprintcom, Inc
28	Licensed	WQSA894	WQSA779	Lower 6 GHz	49.37	Argos Engineering, LLC
29	Licensed	WQSD967	WQSD966	Lower 6 GHz	49.79	Torellco LLC
30	Licensed	WQTB516	WQRX775	11 GHz	16.56	Sprint Spectrum L.P.
31	Applied	WQTX715	WQTX717	11 GHz	21.79	MetaLINK Technologies, Inc.
32	Licensed	WQTX717	WQWF235	11 GHz	8.85	MetaLINK Technologies, Inc.
33	Licensed	WQUL511	WQUL808	Lower 6 GHz	57.94	Torellco LLC
34	Licensed	WQUU748	WQUT739	11 GHz	30.27	Agile Network Builders LLC
35	Licensed	WQWD687	RXONLY	2.4 GHz	84.41	Waterleaf International LLC
36	Licensed	WQWF483	WQWF484	4 GHz	84.41	Waterleaf International LLC
37	Licensed	WQXC632	WQUL808	Lower 6 GHz	59.99	Torellco LLC

Table 1: Summary of Microwave Paths that Intersect the Area of Interest

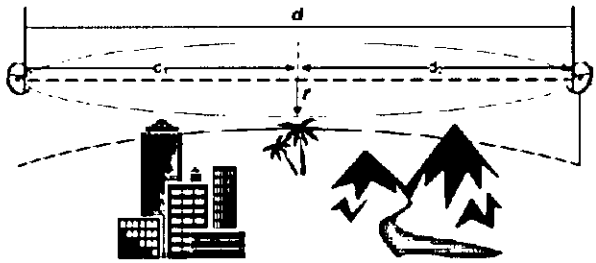
(See enclosed mw_geopl.xlsx for more information and GP_dict_matrix_description.xls for detailed field descriptions)

Verification of Coordinate Accuracy

It is possible that as-built coordinates may differ from those on the FCC license. For this project, path IDs 4, 6, 20, 26, 29, 31 and 34 cross within close proximity of the proposed turbines and the tower locations for these paths will have a critical impact on the result. Therefore, we verified these locations using aerial photography. Some of the towers were found to be slightly off and were moved to their locations based on the aerial photos[4].

Next, we calculated a Fresnel Zone for each path based on the following formula:

$$r \cong 17.3\sqrt{\frac{n}{F_{GHz}}\left(\frac{d_1 d_2}{d_1 + d_2}\right)}$$



Where,

r	=	Fresnel Zone radius at a specific point in the microwave path, meters
n	=	Fresnel Zone number, 1
F_{GHz}	=	Frequency of microwave system, GHz
d_1	=	Distance from antenna 1 to a specific point in the microwave path, kilometers
d_2	=	Distance from antenna 2 to a specific point in the microwave path, kilometers

In general, this is the area where the planned wind turbines should be avoided, if possible. A depiction of the Fresnel Zones for each microwave path listed can be found in Figure 3, and is also included in the enclosed shapefiles[5,6].

[4] See enclosed mw_geopl.shp and mw_geopl_fcc.shp for details.

[5] The ESRI® shapefiles enclosed are in NAD 83 UTM Zone 16 projected coordinate system.

[6] Comsearch makes no warranty as to the accuracy of the data included in this report beyond the date of the report. The data provided in this report is governed by Comsearch's data license notification and agreement located at http://www.comsearch.com/files/data_license.pdf.

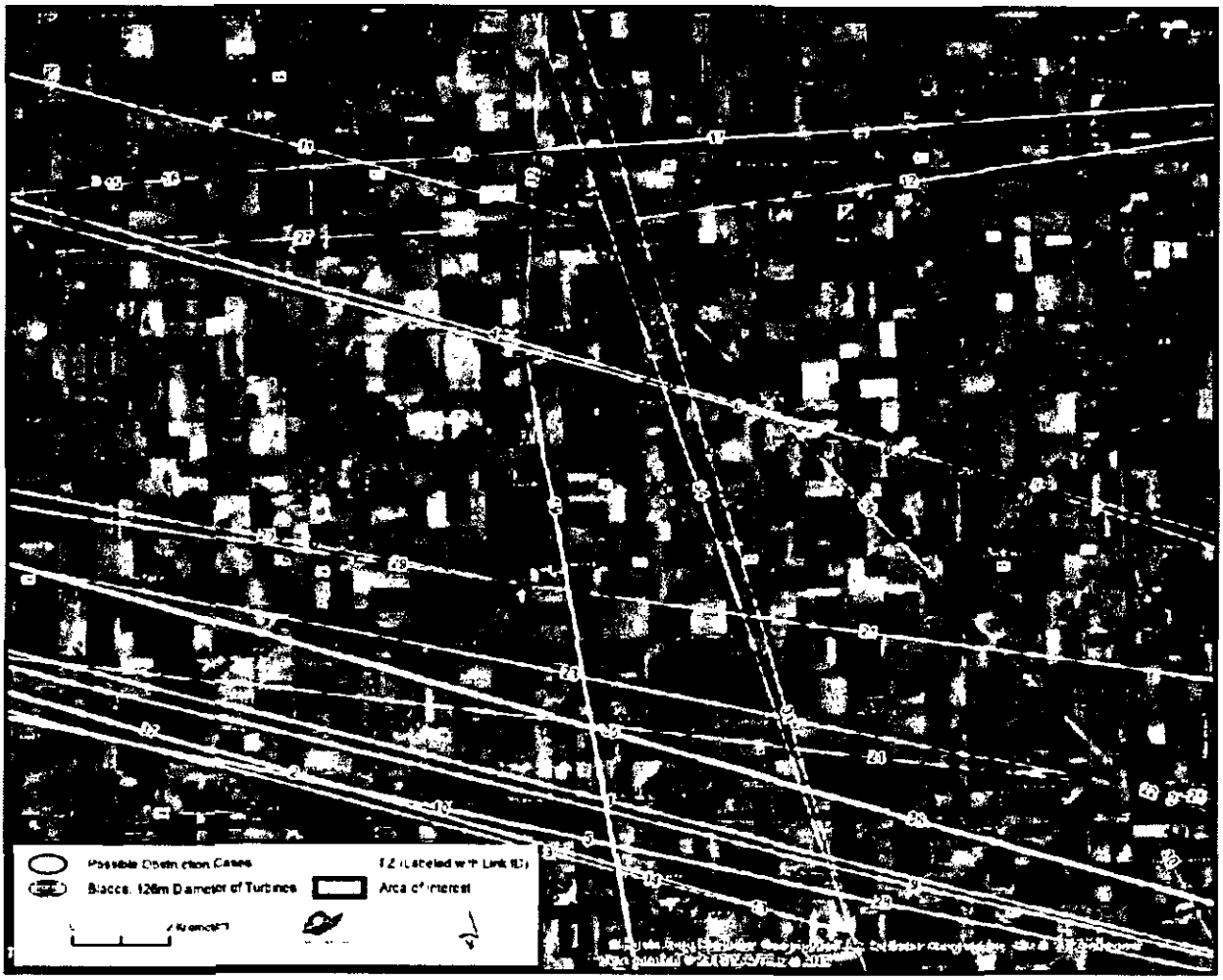


Figure 3: Fresnel Zones in the Area of Interest

Discussion of Potential Two Dimensional Obstructions

Total Microwave Paths	Paths with Affected Fresnel Zones	Total Turbines	Turbines intersecting the Fresnel Zones
37	7	60	10

Table 2: Two Dimensional Fresnel Zone Analysis Result

For this project, 60 turbines were considered in the analysis, each with a maximum blade diameter of 126 meters and turbine hub height of 80 to 96 meters. Of those turbines, 10 were found to intersect the Fresnel Zones of seven microwave paths. Figure 4 and Figure 7 contain a detailed depiction of the potential obstruction scenarios and Table 3 contains a summary of the affected turbines. A cross sectional analysis was performed in Section 4 to determine the diagonal clearance value for these cases.

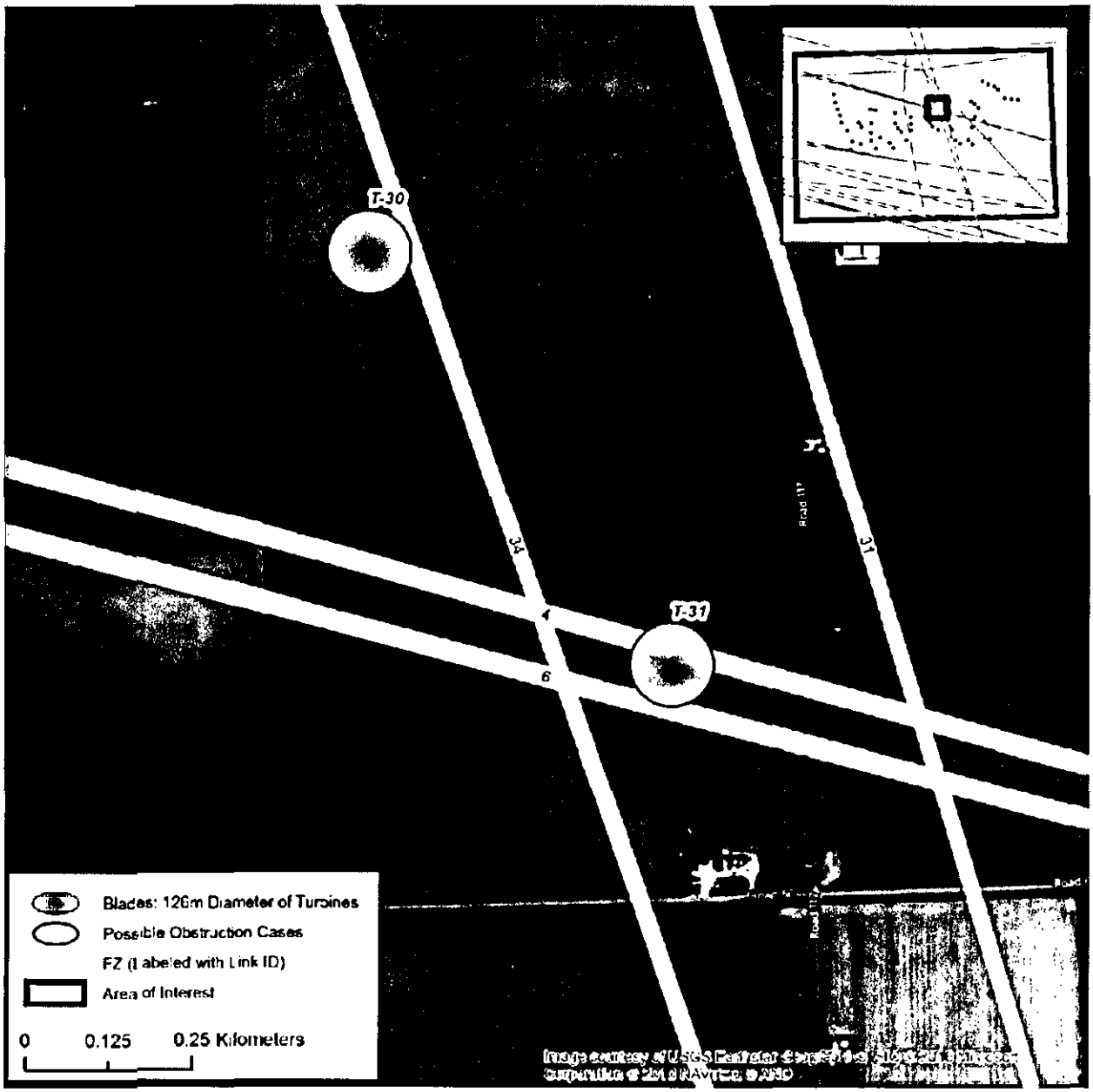


Figure 4: Potential Obstruction Cases
(Turbine T-30 and T-31)

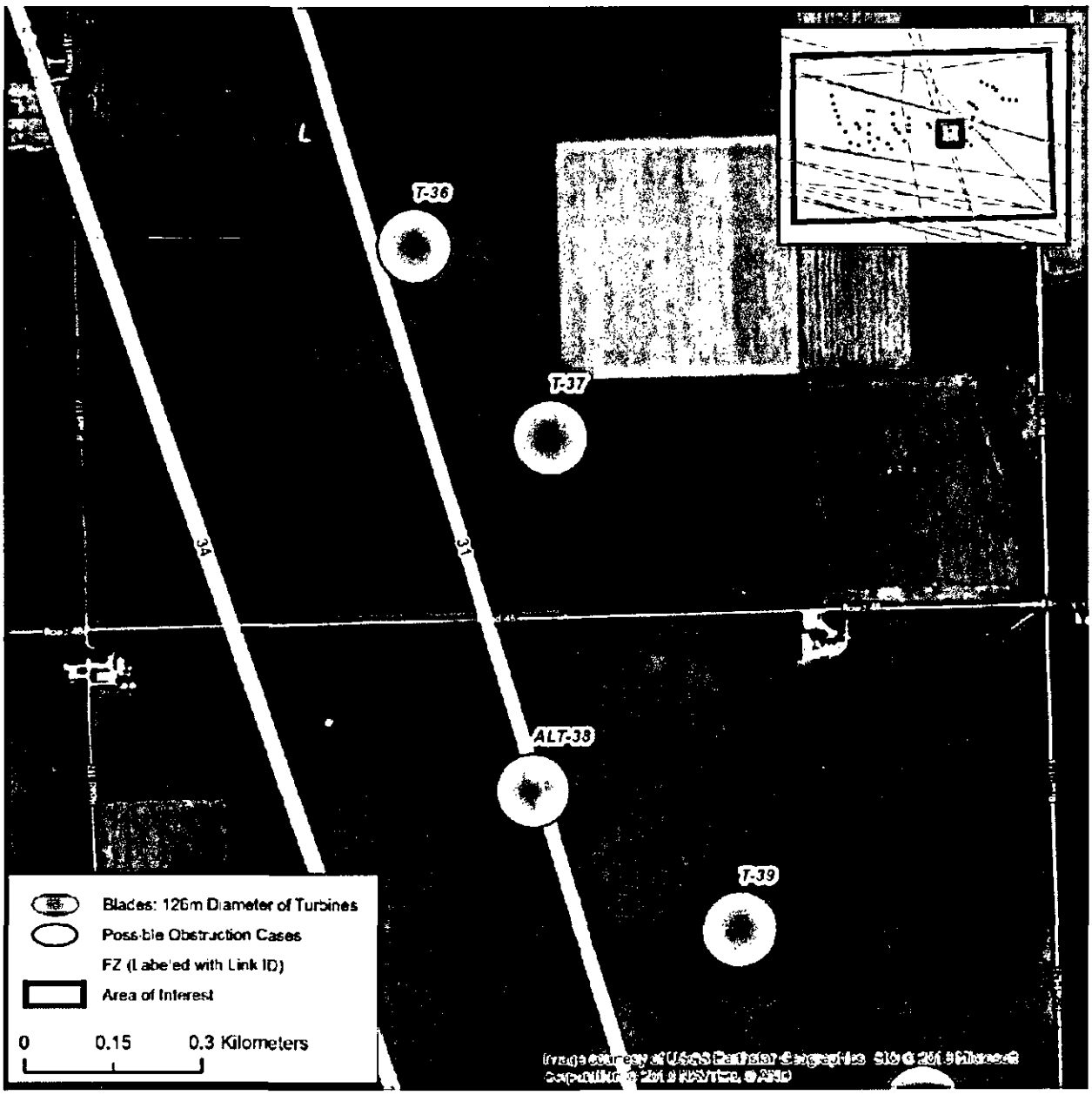


Figure 5: Potential Obstruction Cases
(Turbine T-36 and ALT-38)

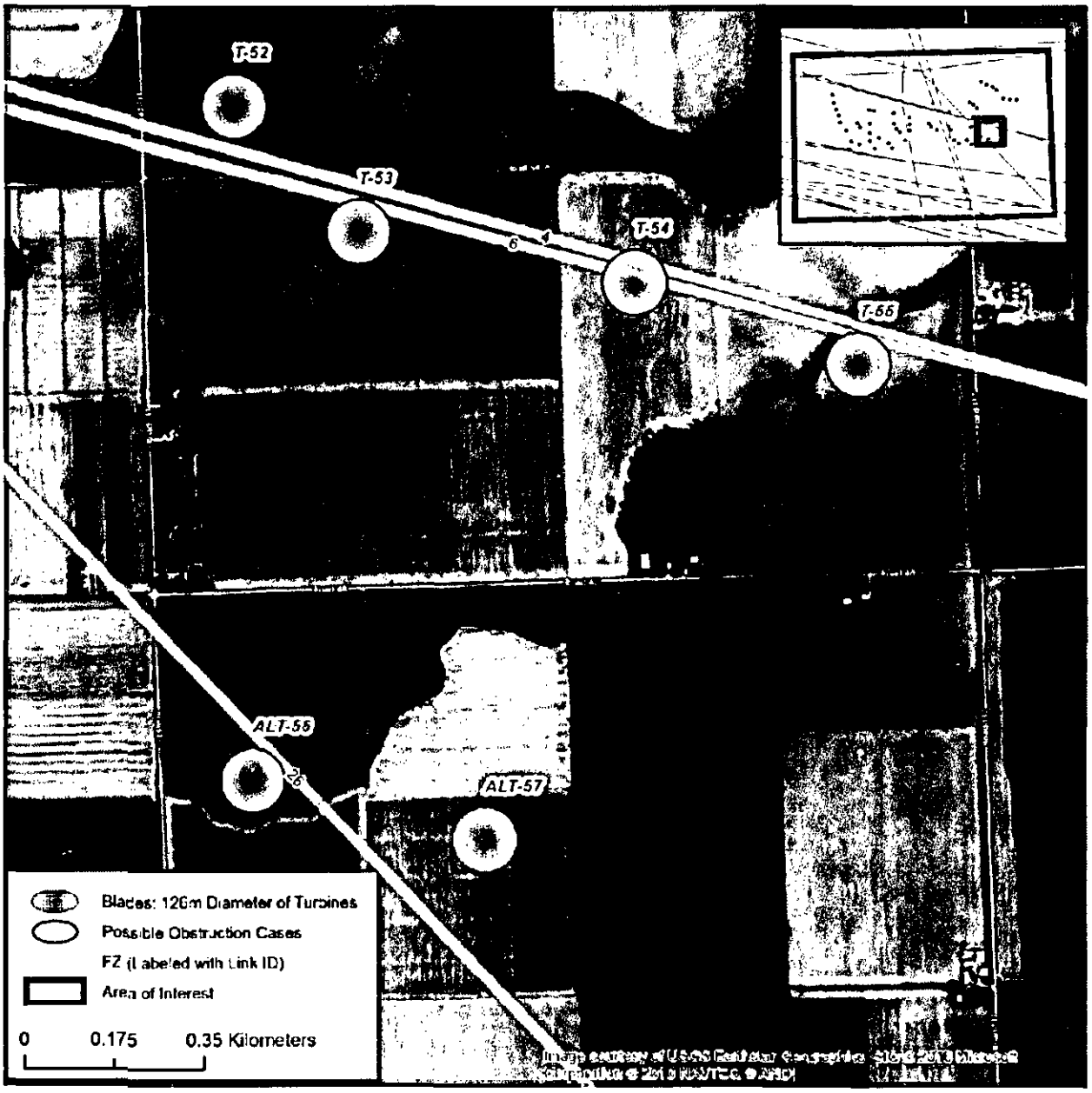


Figure 6: Potential Obstruction Cases
(Turbine T-53, T-54, T-55 and ALT-56)

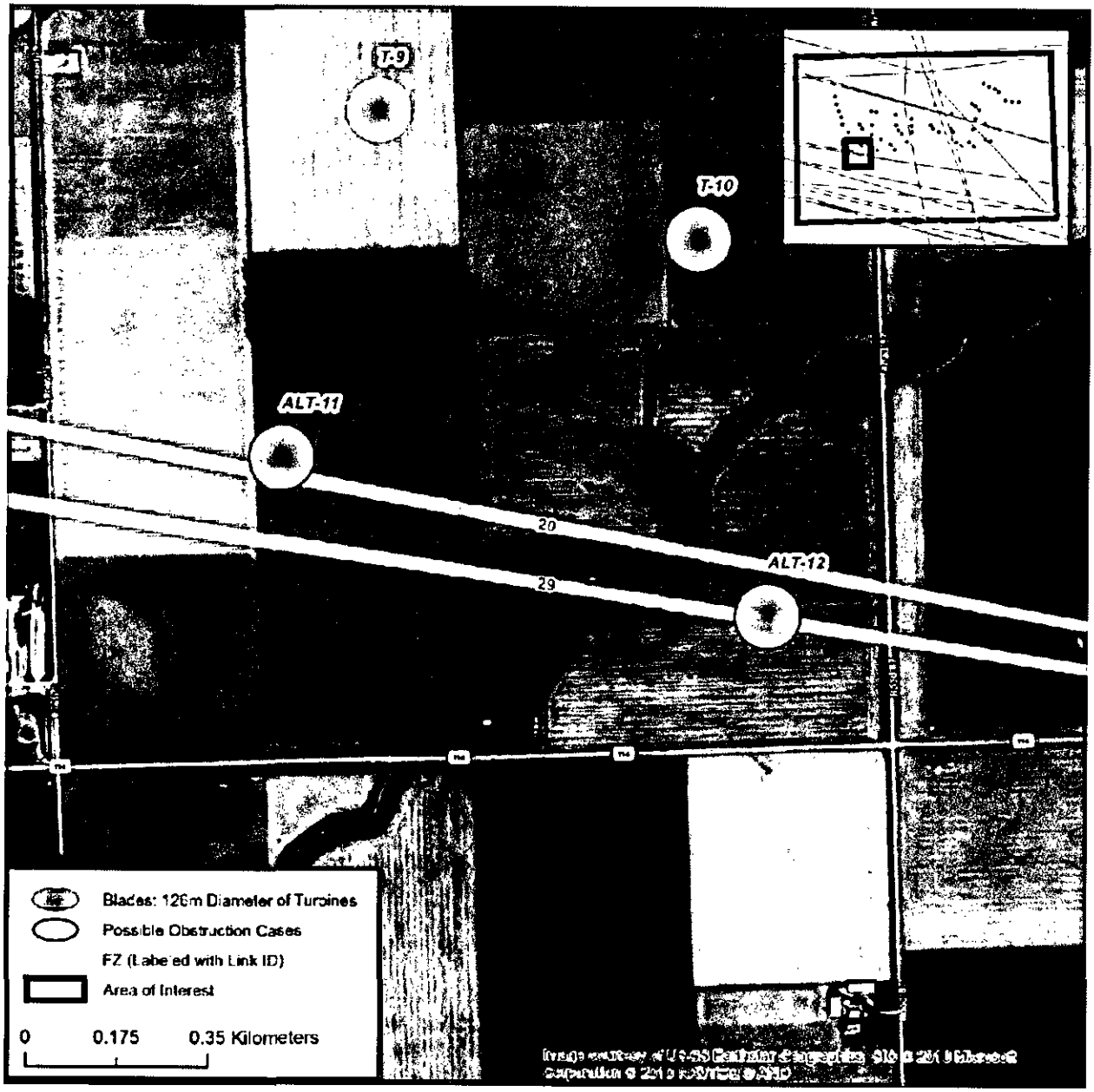


Figure 7: Potential Obstruction Cases
(Turbine ALT-11 and ALT-12)

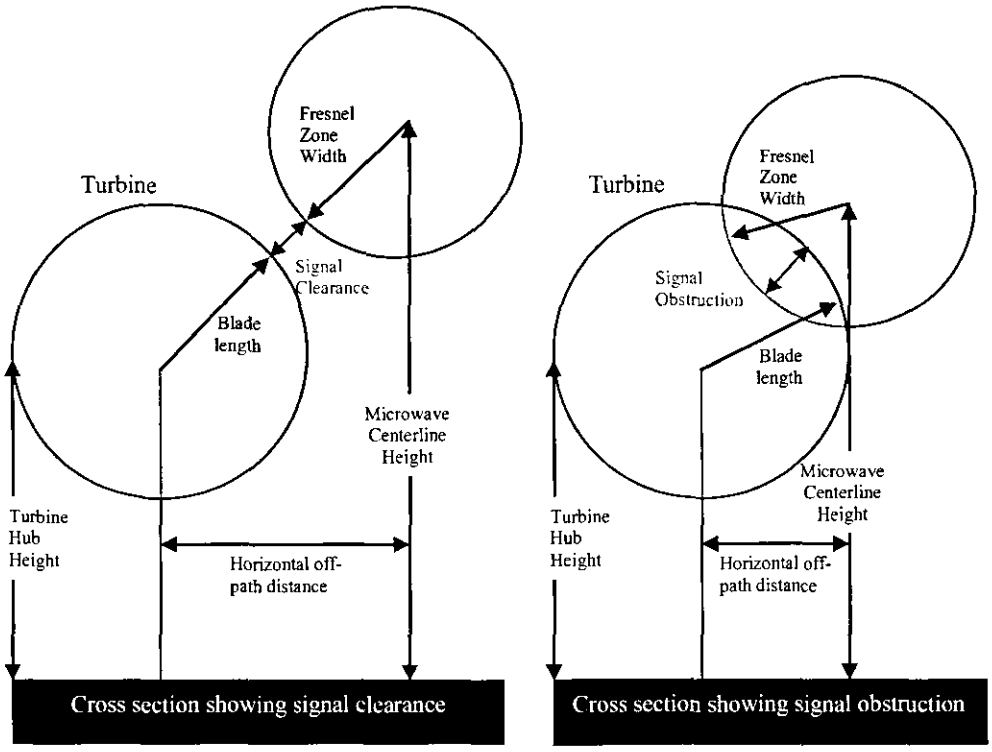
Affected Microwave Path ID	Fresnel Zone Width at Turbine Location (m)	Turbine ID	Latitude (NAD83)	Longitude (NAD83)	Horizontal off-path Distance (m)	Distance along the path from site 1 (km)	Horizontal Clearance (m)
4	16.03	T-31	41.05133698	-84.55610799	22.11	28.16	-56.92
4	9.36	T-54	41.03889803	-84.50372857	39.61	32.77	-32.75
6	16.09	T-31	41.05133698	-84.55610799	65.62	29.39	-13.46
6	10.54	T-53	41.03992665	-84.51010154	56.03	33.46	-17.51
6	9.37	T-54	41.03889803	-84.50372857	13.90	34.01	-58.47
6	8.20	T-55	41.03735162	-84.49855550	55.46	34.47	-15.74
20	13.38	ALT-11	41.02393325	-84.64444141	33.02	47.31	-43.36
26	10.28	ALT-56	41.03032337	-84.51288360	64.46	8.28	-8.82
29	12.40	ALT-12	41.02098480	-84.63343618	5.51	46.38	-69.89
31	11.95	ALT-38	41.03098042	-84.54472177	9.36	9.42	-65.59
31	12.05	T-36	41.03932252	-84.54679397	68.71	10.36	-6.34
34	12.95	T-30	41.05701400	-84.56129243	63.92	8.89	-12.03

Table 3: Turbines that Intersect Fresnel Zones

4. Cross Sectional Analysis

Our Fresnel Zone analysis in the previous section identified 12 potential obstruction cases that need to be further examined from a cross sectional perspective. The cases that will be analyzed in this section can be found in Table 3.

Our cross sectional analysis calculates the precise height and width of 100% of the first Fresnel Zone at the turbine location based on the antenna heights of the two link endpoints and the earth curvature bulge at the specific turbine location. The horizontal off-path distance was calculated in the previous section and the turbine hub height and blade length were provided by the client. The cross sectional analysis uses these values to calculate the clearance between the blades and the microwave Fresnel Zone as shown in the two diagrams below.



The results of the cross sectional calculations can be seen in Table 4 below. It shows negative clearance values indicating obstruction of the Fresnel zones and positive values indicating clearance of the Fresnel zones.

Microwave Path ID	Fresnel Zone Width at Turbine Location (m)	Microwave Centerline Height at Turbine Location (m)	Turbine ID	Hub Height[7] (m)	Blade Length (m)	Cross Sectional Clearance (m)
4	16.03	62.45	T-31	80	63	-50.80
4	9.36	72.05	T-54	80	63	-31.96
6	16.09	66.87	T-31	80	63	-12.16
6	10.54	72.27	T-53	80	63	-16.97
6	9.37	73.34	T-54	80	63	-56.96
6	8.20	74.33	T-55	80	63	-15.45
20	13.38	64.47	ALT-11	80	63	-39.89
26	10.28	74.67	ALT-56	80	63	-8.60
29	12.40	63.71	ALT-12	80	63	-58.20
31	11.95	50.76	ALT-38	80	63	-44.25
31	12.05	47.99	T-36	80	63	0.75
34	12.95	59.66	T-30	80	63	-8.88

Table 4: Cross Sectional Analysis Results

5. Conclusion

Our study identified 37 microwave paths intersecting the Trishe Wind Ohio project area. The Fresnel Zones for these microwave paths were calculated and mapped. Ten turbines were found to intersect the two dimensional Fresnel Zones of seven microwave paths. Based on the cross sectional analysis, it was determined that nine of them may obstruct these seven microwave paths and potentially cause signal degradation.

6. Contact

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[7] Because the turbine hubs are higher than the microwave centerlines, the minimum hub height is used to calculate the clearance for the worst case scenario.

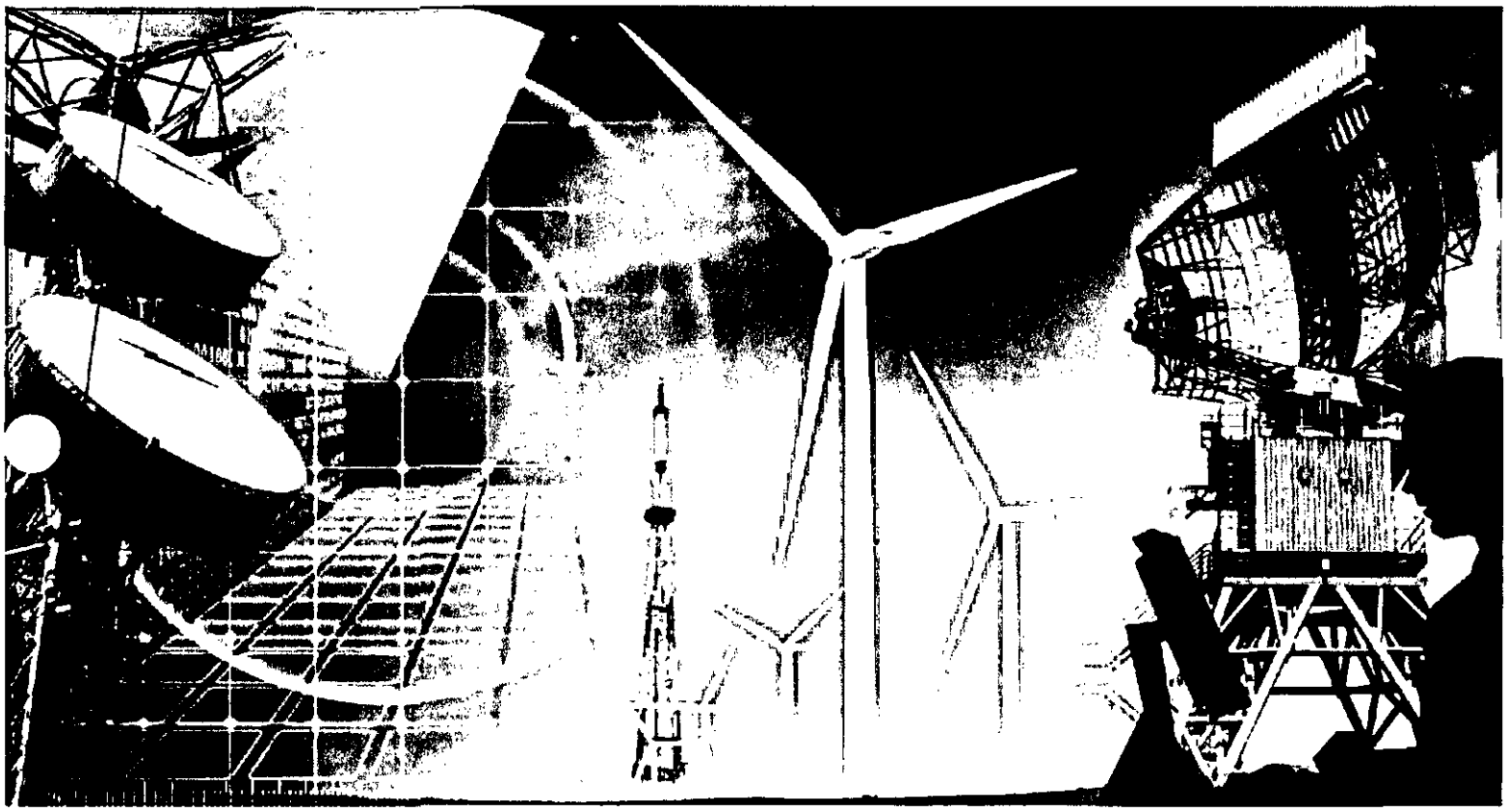
Supplemental Appendix T

Mobile Phone Carrier Report

Wind Power GeoPlanner™

Mobile Phone Carrier Report

Trishe Wind Ohio



Prepared on Behalf of
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Global

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COMSEARCH
A CommScope Company

Table of Contents

1. Introduction

Comsearch has developed and maintains comprehensive technical databases containing information on licensed mobile phone carriers across the US. Mobile phone carriers operate in multiple frequency bands and are often referred to as Advanced Wireless Service (AWS), Personal Communication Service (PCS), 700 MHz Band, Wireless Communications Service (WCS), and Cellular. They hold licenses on an area-wide basis which are typically comprised of several counties.

This report focuses on the potential impact of wind turbines on mobile phone operations in and around the project area. Comsearch provides additional wind energy services, a description of which is available upon request.

2. Summary of Results

Methodology

Our mobile phone analysis was performed using Comsearch's proprietary carrier database, which is derived from a variety of sources including the Federal Communications Commission (FCC). Since mobile phone market boundaries differ from service to service, we disaggregated the carriers' licensed areas down to the county level. Then we compiled a list of all mobile phone carriers in the main counties that intersect the area of interest. The area of interest was defined by the client and encompasses the planned turbine locations. A depiction of the wind project area and counties appears below.

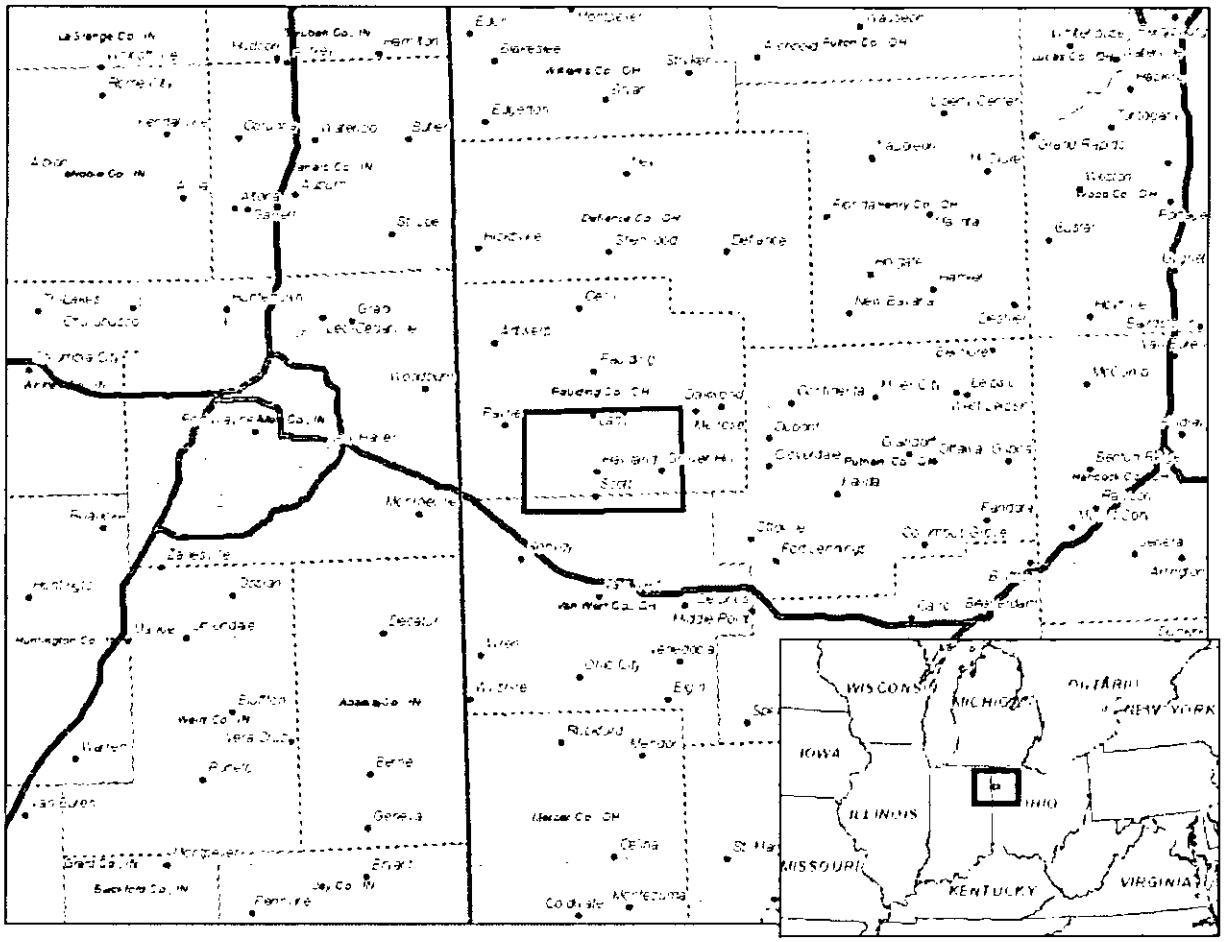

Figure 1: Counties that intersect the Area of Interest

Results
The Trishe Wind Ohio Project is located in Paulding County, Ohio. We have identified the type of service, channel block, market ID and FCC callsign for each carrier in the county of interest. A description of the various service types and geographic market areas is below with a summary table on the following page.

AWS
AWS licensees won their spectrum in an auction that started in August 2006. The licensees are authorized by 734 Cellular Market Areas (CMA) for Block A, 176 Economic Areas (BEA) for Blocks B and C, and 12 Regional Economic Area Groupings (REAG) for Blocks D, E and F. This spectrum at 1.7 and 2.1 GHz was allocated for mobile broadband and advanced wireless services. Partitioning and leases are permitted in the band.

Cellular
Licensees are authorized by Metropolitan and Rural Statistical Areas, also known as CMAs. Unserved areas can be covered by licensees other than the original A or B block licensee. To determine the most realistic coverage, we compiled the Cellular Geographic Service Areas (CGSA) from the 32 dBu contours defined by Part 22.911(a) of the FCC rules. Mobile services are provided at 800 MHz and partitioning and leases are permitted in the band.

PCS
There have been nine auctions for this band, with the last one being held in August 2008. Licensees are authorized by 51 Major Trading Areas (MTA) for Blocks A and B, 493 Basic Trading Areas (BTA) for Blocks C through F, and 176 Economic Areas (EA) for Block G. This band has been heavily partitioned and disaggregated both by counties and by smaller polygons within counties (known as undefined areas or partial counties). The 1.9 GHz PCS carriers provide mobile services and leases are permitted in the band.

700 MHz Band
Originally used for analog television broadcasting, this band consists of an upper and lower band, each having its own set of frequency blocks. There have been three auctions in this band with the last one (Auction 73) being held in 2008 and mobile phone carriers eventually winning licenses for Blocks A, B, and C of the Lower 700 MHz band and Block C of the Upper 700 MHz band. Licensees are authorized by 176 Economic Areas (EA) for Lower Block A, 734 Cellular Market Areas (CMA) for Lower Blocks B and C, and 12 Regional Economic Area Groupings (REAG) for Upper Block C. Partitioning and leases are permitted in the band.

WCS
Mobile services provided in the 2.3 GHz band occupy frequency blocks above and below the spectrum allocated for Satellite Digital Audio Radio Service (SDARS) from 2320 MHz to 2345 MHz. WCS licensees are authorized by 52 Major Economic Areas (MEA) for Blocks A and B and 12 Regional Economic Area Groupings (REAG) for Blocks C and D. Partitioning and leases are permitted in the band.

Service[1]	Mobile Phone Carrier	Channel Block	County	ST	Market ID	Callsign
AWS	AT&T	A	Paulding	OH	CMA585	WQKI626
AWS	T-Mobile	B	Paulding	OH	BEA056	WQGA948
AWS	AT&T	C	Paulding	OH	BEA056	WQGV774
AWS	Verizon Wireless	D	Paulding	OH	REA003	WQPW449
AWS	Verizon Wireless	E	Paulding	OH	REA003	WQPZ950
AWS	Verizon Wireless	F	Paulding	OH	REA003	WQGA717
CELL	AT&T	A	Paulding	OH	CMA585	KNKN854
CELL	Verizon Wireless	B	Paulding	OH	CMA585	KNKQ259
PCS	AT&T	A	Paulding	OH	MTA003	KNLF206
PCS	Verizon Wireless	B	Paulding	OH	MTA003	KNLF207
PCS	Sprint Nextel	B	Paulding	OH	MTA003	WQRJ905
PCS	T-Mobile	C	Paulding	OH	BTA155	WPOJ843
PCS	Sprint Nextel	D	Paulding	OH	BTA155	KNLH522
PCS	AT&T	E	Paulding	OH	BTA155	WPOJ708
PCS	T-Mobile	F	Paulding	OH	BTA155	KNLF972
PCS	Sprint Nextel	G	Paulding	OH	BEA056	WQKT270
700	Cavalier Wireless	A	Paulding	OH	BEA056	WQIZ404
700	AT&T	B	Paulding	OH	CMA585	WQJU680
700	AT&T	C	Paulding	OH	CMA585	WPZA227
700	Verizon Wireless	C	Paulding	OH	REA003	WQJQ691
700	AT&T	D	Paulding	OH	EAG704	WPZA238
700	DISH Network	E	Paulding	OH	BEA056	WQJY996
WCS	AT&T	A	Paulding	OH	MEA016	KNLB304
WCS	AT&T	B	Paulding	OH	MEA016	KNLB278
WCS	AT&T	C	Paulding	OH	REA003	WPQL632
WCS	AT&T	D	Paulding	OH	REA003	KNLB325

Table 1: Mobile Phone Carriers in the Area of Interest

[1] AWS: Advanced Wireless Service at 1.7/2.1 GHz
CELL: Cellular Service at 800 MHz
PCS: Personal Communication Service at 1.9 GHz
700 MHz: Commercial Mobile Phone at 700 MHz
WCS: Wireless Communication Service at 2.3 GHz

FCC-Licensed Sites

For competitive and confidentiality reasons, most mobile phone carriers' individual sites are not licensed with the FCC. However, in the cellular band, if a base station extends the existing Cellular Geographic Service Area (CGSA), then it must be recorded with the FCC. No FCC-Licensed cellular sites were identified within the Trishe Wind Ohio area of interest.

Impact Assessment and Distance Setback Requirements

The cellular mobile phone signal propagation is typically not affected by physical structures because the beam widths of the radiated signal from the base stations and mobile units are very wide and the wavelength of the signal is long enough to wrap around objects such as wind turbine towers and blades. In addition, the cellular network consists of multiple base stations that are designed so that if the connection cannot be made to one base station it will shift to adjacent base stations to make the connection. This enables cellular mobile telephone systems to provide coverage in areas that are congested with physical structures such as downtown urban areas. Areas containing wind turbines have less of a coverage issue than urban areas, so the wind turbines presence does not require any special setback for signal obstruction consideration other than physical clearance of the blades. From an electromagnetic interference standpoint, the emissions from the wind turbines, which are specified by the FCC, should be taken into account to ensure they will not interfere with the base stations or the mobile units. Part 15 of the FCC regulations covers the emissions from unintentional radiating devices, such as wind turbines. The field strength limits for the emissions from unintentional radiators is given in paragraph 15.109 of Part 15 of the FCC rules. The emission limits are stated for a distance of 3 meters or approximately 10 feet and are shown below.

Radiated Emission Limits at 3 Meters

Frequency of Emission (MHz)	Field Strength (microVolts/meter)
30 – 88	100
88 – 216	150
216 – 960	200
> 960	500

From these limits and the receiver sensitivity of the cellular base stations and mobile units we can determine a setback requirement for wind turbines and cellular system. The typical sensitivity of mobile units is -90 dBm ($1X10^{-12}$ Watts) and the typical sensitivity of base stations is -93 dBm ($5X10^{-13}$ Watts). The gain of mobile unit antennas are -10dB or 0.1 and the gain of base station antennas are 17 dB or 50. The effective area (A) of the mobile unit and base station antennas are determined from the following formula.

$$A = G^*\lambda^2 / 4^*\pi$$

Where,
G = Antenna Gain, number
λ = Wavelength, 0.353 meters
π = 3.14

This gives us an effective area for the mobile unit antenna of $9.9X10^{-4}$ meter^2 and the effective area for the base station antenna of 0.496 meter^2. Using the typical receiver sensitivities of the mobile and base units above, we can determine their power flux density (P_D) from the following formula:

$$P_D = S/A$$

Where S is defined as the sensitivity for Mobile Unit or for the Base Station expressed in Watts

To calculate the electric field strength (E) we use the following formula:

$$E = (P_D * 377)^{1/2}$$

So for the mobile unit, P_D = $1.01X10^{-9}$ Watts/meter^2 and E = 617 microVolts/meter. And, for the base station unit, P_D= $1.008X10^{-12}$ Watts/meter^2 and E= 19.4 microVolts/meter.

These results show that the mobile units' sensitivity expressed as field strength is above the level allowed as an emission for the wind turbines at a distance of 3 meters. Therefore, no setback for the use of a mobile unit is needed beyond 3 meters. Since the base station has field strength sensitivity below the allowed emission level of the wind turbines a setback distance is needed to ensure that the base stations will not be affected. The field strength of the emission is inversely proportional to separation distance in meters. To determine the setback distance to reduce the field strength to 19.4 microVolts/meter the following formula is used.

D = (500 MicroVolts/meter)*(3 meters) / 19.4 MicroVolts/meter

Where,
D = Setback Distance for Base Station to avoid interference, meters

Thus the setback distance for the cellular tower base station from the wind turbines should be 77.3 meters or greater.

Summary

The telephone communications in the mobile phone carrier bands are typically unaffected by the presence of the wind turbines and we do not anticipate any significant harmful effect to mobile phone services in the Trishe Wind Ohio project area. Mobile phone systems are designed with multiple base transmitter stations covering a specific area. Since mobile telephone signals are designed with overlap between adjacent base transmitter sites in order to provide handoff between cells, any signal blockage caused by the wind turbines does not materially degrade the reception because the end user may be receiving from multiple transmitter locations. For example, if a particular turbine attenuates the signal reception into a mobile phone, the phone may receive an alternate signal from a different transmit location, resulting in no disruption in

service. Mobile phone systems that are implemented in urban areas near large structures and buildings often have to combat even more problematic signal attenuation and reflection conditions than rural areas containing a wind energy turbine facility.

For the cellular towers located within the project area, no setback distance is required from an interference standpoint other than physical clearance of the blades. From an electromagnetic standpoint, a setback distance of 77.3 meters should be used to meet FCC emission requirements.

In the unlikely event that a mobile phone carrier believes their coverage has been compromised by the presence of the wind energy facility, they have many options to improve their signal coverage to the area through optimization of a nearby base transmitter or even adding a new sector or cell site. Utility towers, meteorological towers or even the turbine towers within the wind project area can serve as the platform for a base transmit site or cell enhancer.

3. Contact Us

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