

# Shadow Flicker Report

Horse Creek Wind Farm  
Jefferson County, New York

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## TABLE OF CONTENTS

1.0	PROJECT OVERVIEW .....	1
2.0	INTRODUCTION .....	1
3.0	METHODS.....	2
4.0	RESULTS .....	4
5.0	DISCUSSION .....	5
6.0	REFERENCES.....	11

## LIST OF TABLES

Table 1.	Shadow Flicker Summary for Receptors Predicted to Receive >10 hours/year: Gamesa G-90 .....	5
Table 2.	Shadow Flicker Summary for Receptors Predicted to Receive >10 hours/year: Gamesa G-97 .....	7
Table 3.	Shadow Flicker Summary for Receptors Predicted to Receive >30 hours/year: Gamesa G-90 .....	9
Table 4.	Shadow Flicker Summary for Receptors Predicted to Receive >30 hours/year: Gamesa G-97 .....	10

## LIST OF FIGURES

- Figure 1: Regional Project Location
- Figure 2: Proposed Project Layout

## LIST OF ATTACHMENTS

- Attachment A: Wind Rose and Sunshine Data
- Attachment B.1: Projected Shadow Flicker Map – Gamesa G-90
- Attachment B.2: Projected Shadow Flicker Map – Gamesa G-97
- Attachment C.1: WindPRO Overview Reports and Calendars – Gamesa G-90 (on enclosed CD)
- Attachment C.2: WindPRO Overview Reports and Calendars – Gamesa G-97 (on enclosed CD)

## 1.0 PROJECT OVERVIEW

Atlantic Wind, LLC, a wholly-owned subsidiary of Iberdrola Renewables (the Applicant) is proposing to develop a wind-powered electric generating facility in Jefferson County, New York (Figure 1). The Horse Creek Wind Farm (the Project) is anticipated to include 48 turbines, with a total generating capacity of approximately 96 megawatts (MW). Two turbine models are under consideration for this Project; the Gamesa G-90 (90 meter rotor on a 100 meter tower) and the Gamesa G-97 (97 meter rotor on a 90 meter tower). The Project also includes associated support facilities, such as access roads, underground and overhead electrical lines, and an Operations and Maintenance building.

The Project site (land under lease by the Applicant) consists of approximately 9,450 acres in the Town of Clayton in New York. This area is located approximately 15 miles northwest of the City of Watertown, and five miles southeast of the Village of Clayton. The Project site is roughly bounded by Killbuck Ridge Road to the north, County Route 125 to the south, Depauville Road at Vanalstyne Road to the west and Herbretch Road and Wilder Road to the east.

The Project site consists of a mix of active and reverting agricultural land, woodlots (including conifer plantations) and wetlands, with elevations in the range of 280 to 470 feet above mean sea level (amsl). The area surrounding the Project is primarily undeveloped, with widely scattered rural residences. Areas of more concentrated settlement occur in the hamlets of Depauville and LaFargeville located immediately west and northeast of the Project site, respectively.

## 2.0 INTRODUCTION

Shadow flicker refers to the moving shadows that an operating wind turbine casts over an identified receptor at times of the day when the sun is directly behind the turbine rotor from a receptor's position. Shadow flicker is most pronounced in northern latitudes during winter months because of the lower angle of the sun in the winter sky. However, it is possible to encounter shadow flicker anywhere for brief periods after sunrise and before sunset (U.S. Department of the Interior, 2005). During intervals of sunshine, wind turbine generators will cast a shadow on surrounding areas as the rotor blades pass in front of the sun, causing a flickering effect while the rotor is in motion. Shadow flicker does not occur when fog or clouds obscure the sun, or when turbines are not operating.

The distance between a wind turbine and a potential shadow flicker receptor affects the intensity of the shadows cast by the blades, and therefore the intensity of flickering. Shadows cast close to a turbine will be more intense, distinct, and focused. This is because a greater proportion of the sun's disc is intermittently blocked by the turbine (BERR, 2009). Obstacles such as terrain, vegetation, and/or buildings occurring between receptors and wind turbines may

significantly reduce or eliminate shadow flicker effects. At distances beyond 10 rotor diameters, shadow flicker effects are essentially undetectable (U.S. Department of the Interior, 2005; BERR, 2009).

The location and duration of shadow flicker can be predicted quite accurately using computer modeling programs and input data defining a "worst-case" scenario. A worst-case scenario would occur only when there are no clouds or fog, wind conditions allow continuous turbine operation, and the turbine rotor is continuously perpendicular to the sun, and positioned between the receptor and the sun. However, this worst case is not what would actually occur, as turbines are not in continuous operation, are not always aligned perpendicular to the sun, and are not always standing between the receptor and the sun. In addition, sunlight intensity and duration vary daily and seasonally, and obstacles that block shadows (terrain, vegetation, and buildings) exist in the landscape. The shadow flicker analysis conducted for the Horse Creek Wind Farm assumed continuous turbine operation and no obstacles to block shadows. Local sunshine and wind data were used to predict rotor alignment and the percent of daylight hours when shadows could be cast. The analysis also evaluated the potential impact of two different turbine models; the Gamesa (G-90 90 meter rotor on a 100 meter tower) and the Gamesa G-97 (97 meter rotor on a 90 meter tower).

There are no schools, hospitals, libraries, golf courses, parks, registered historic sites, scenic byways, scenic rivers or other sensitive public resources within 1,000 meters (approximately 10 rotor diameters) of any proposed turbine site. Therefore, receptors evaluated in this analysis are restricted to residential structures. Shadow flicker effects on receptors are expressed in terms of predicted frequency (hours per year). Effects are not expressed in terms of qualitative or quantitative health-related impacts, as blade pass frequencies for modern commercial-scale wind turbines are so low they are considered harmless. According to the British Epilepsy Association (2007), approximately five percent of individuals with epilepsy have sensitivity to light, and most people with photosensitive epilepsy are sensitive to flickering around 16-25 Hz (Hertz or Hz = 1 flash per second), although some people may be sensitive to rates as low as 3 Hz and as high as 60 Hz. Newer wind turbines are usually built to operate at a frequency of 1 Hz or less. There is no evidence that wind turbines operating at this frequency can trigger seizures (British Epilepsy Association, 2007). The primary concern with shadow flicker is the annoyance it could cause for adjacent homeowners.

### **3.0 METHODS**

edr Companies (edr) conducted a shadow-flicker modeling analysis for the proposed Horse Creek Wind Farm using *WindPRO 2.7 Basis* software (WindPRO), and associated shadow module, which is a widely accepted modeling software package developed specifically for the design and evaluation of wind power projects. Input variables and assumptions used for shadow flicker modeling calculations for the proposed Project include:

- Latitude and longitude coordinates of 48 proposed wind turbine sites (provided by the Applicant).
- Latitude and longitude coordinates for 392 residential structures located within 1,000 meters of a proposed turbine (provided by the Applicant).
- USGS 1:24,000 topographic mapping and USGS digital elevation model (DEM).
- The rotor diameter and hub height for the Gamesa G-90 wind turbine and the Gamesa G-97 wind turbine.
- Annual wind rose data depicted in Table 1 of Attachment A (to determine the directional frequency of rotor orientation throughout the year).
- The average monthly percent of available sunshine values (see Table 2 of Attachment A).
- No allowance was made for wind being below or above generation speeds. Blades are assumed to be moving during all daylight hours.
- It is assumed that there is no shadow impact when the sun's elevation is less than 3 degrees above the horizon (due to the scattering effect of the atmosphere on low angle sunlight).
- It is assumed that there is no shadow impact when less than 20 percent of the sun is masked by the rotor blades because this is not enough masking to create a detectable shadow.
- The possible screening effect of trees and buildings adjacent to the receptors are not taken into consideration in the analysis. In addition, the number and/or orientation of windows in residential structures was not taken into consideration in the analysis.

Shadow isolines (i.e., contours indicating total number of hours of shadowing per average year) were calculated for both turbine models based on the data and assumptions outlined above, using a 10-meter by 10 meter grid from the USGS DEM. These isolines define the theoretical number of hours per year that shadow flicker would occur at any given location within a 1,000-meter radius of all proposed turbines (see Attachments B.1 and B.2). As mentioned previously, shadow intensity diminishes as the distance between turbines and receptors increases, and at distances beyond 10 rotor diameters<sup>1</sup> shadow flicker effects are essentially undetectable (U.S. Department of the Interior, 2005; BERR, 2009). Therefore, the analysis presented herein is expected to be an inclusive projection of the shadow flicker effects of the proposed Horse Creek Wind Farm.

The model calculations include the cumulative sum of shadow hours for all turbines. This omni-directional approach reports total shadow-flicker results at a receptor regardless of the presence or orientation of windows at the receptor residence (i.e., it assumes shadows from all directions can be perceived at a residence, which may or may not be

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<sup>1</sup>In the case of the Gamesa G-90 turbine, 10 rotor diameters results in a maximum area of potential effect of 900 meters (2,953 feet). In the case of the G-97 this distance is 970 meters (3,186 feet).

true). A receptor in the model is defined as a one square meter area, one meter above ground level; actual house dimensions are not taken into consideration.

## 4.0 RESULTS

Output from the model includes the following information:

- Calculated shadow-flicker time (hours per year) for both turbine models at each of the 392 residential structures (receptors) within 1,000 meters of a proposed turbine site.
- Tabulated and plotted time of day that receptors are predicted to receive shadow flicker.
- Maps showing turbine locations, identified shadow-flicker receptors, and projected shadow-flicker frequency (hours per year).

All of these data are presented in the overview reports and calendars included in Attachments C.1 and C.2.

A summary of the projected shadow flicker at each of the inventoried receptors is presented below:

### Gamesa G-90 (90 meter rotor on 100 meter tower):

- 238 (61%) will experience no shadow flicker,
- 2 (1%) may be affected by >1 hour/year,
- 78 (20%) may be affected 1-10 hours/year,
- 54 (14%) may be affected 10-20 hours/year,
- 15 (4%) may be affected 20-30 hours/year,
- 5 (1%) may be affected by more than 30 hours/year (none by more than 37 hours/year).

### Gamesa G-97 (97 meter rotor diameter on 90 meter tower):

- 237 (60%) will experience no shadow flicker,
- 1 (>1%) may be affected by >1 hour/year,
- 71 (18%) may be affected 1-10 hours/year,
- 56 (14%) may be affected 10-20 hours/year,
- 17 (4%) may be affected 20-30 hours/year,
- 10 (3%) may be affected by more than 30 hours/year, (none by more than 42 hours/year).

## 5.0 DISCUSSION

As described above, this analysis focuses on residential receptors within 1,000 meters of proposed turbine sites, since there are no other types of sensitive receptors within this area, and shadow flicker effects area essentially undetectable beyond that distance. Tables 1 and 2 provide data for each inventoried residential structure with the potential to experience shadow flicker greater than 10 hours per year. Tables 3 and 4 provide data for receptors that the analysis predicts could experience greater than 30 hours of shadow flicker per year.

**Table 1. Shadow Flicker Summary for Receptors Predicted to Receive >10 hours/year: Gamesa G-90**

Receptor ID	Shadow days per year	Max Hrs/Day (hh:mm/day)	Predicted hh:mm:ss/year
R-7	59	0:45	10:18
R-165	107	0:46	10:20
R-22	66	1:24	10:22
R-4	74	0:45	10:25
R-166	109	0:30	10:26
R-77	106	0:54	10:31
R-127	130	0:37	10:42
R-161	84	0:38	10:45
R-38	59	0:47	11:24
R-405	89	0:34	11:24
R-126	88	0:26	11:27
R-46	90	0:37	11:35
R-73	104	0:38	11:42
R-53	93	0:41	11:56
R-120	127	0:32	12:01
R-107	91	0:40	12:03
R-410	105	0:37	12:17
R-105	81	0:53	12:27
R-35	66	0:48	12:39
R-117	120	0:33	12:40
R-121	150	0:30	12:41
R-151	101	0:53	13:19
R-403	86	1:22	13:29
R-76	96	0:42	13:42
R-78	108	0:41	13:51
R-5	86	0:51	14:00
R-112	141	0:33	14:15
R-48	102	0:41	14:16
R-18	133	0:34	14:35
R-409	135	0:52	14:35
R-193	95	1:08	14:41
R-168	125	0:33	14:44
R-111	125	0:32	14:52
R-192	88	1:03	14:52

Receptor ID	Shadow days per year	Max Hrs/Day (hh:mm/day)	Predicted hh:mm:ss/year
R-319	64	0:41	14:57
R-36	85	0:49	15:32
R-84	99	0:55	15:33
R-15	89	0:40	15:36
R-52	116	0:40	15:38
R-51	121	0:40	15:39
R-47	116	0:42	16:04
R-45	144	0:38	16:06
R-87	114	0:55	16:09
R-83	98	0:55	16:18
R-89	104	0:53	16:18
R-169	114	0:51	16:19
R-184	135	0:40	16:51
R-44	154	0:36	17:11
R-163	120	0:52	17:25
R-14	83	0:48	17:34
R-42	84	0:49	18:17
R-74	152	0:56	18:43
R-106	145	0:52	19:19
R-128	161	0:33	19:52
R-93	154	0:32	20:02
R-167	173	0:49	20:09
R-54	96	0:47	20:14
R-402	133	0:36	20:28
R-113	184	0:42	20:38
R-88	179	0:42	21:33
R-182	122	0:52	21:44
R-85	155	0:36	22:46
R-116	195	0:33	23:32
R-139	182	0:35	23:59
R-79	190	0:36	26:54:00
R-147	148	0:40	27:03:00
R-132	130	1:13	28:27:00
R-6	148	0:50	28:30:00
R-19	161	0:51	29:02:00
R-190	202	1:15	31:29:00
R-115	225	0:34	31:40:00
R-137	118	1:14	31:46:00
R-124	224	0:39	32:23:00
R-242	110	1:24	36:55:00

Refer to Figure 2 for a graphic illustration of relevant project receptors.



Table 2. Shadow Flicker Summary for Receptors Predicted to Receive >10 hours/year: Gamesa G-97

Receptor ID	Shadow days per year	Max Hrs/Day (hh:mm/day)	Predicted hh:mm:ss/year
R-4	70	0:48	10:13
R-119	87	0:37	10:32
R-183	89	0:39	10:34
R-243	73	0:49	10:40
R-100	100	0:43	10:43
R-166	104	0:32	10:59
R-179	92	0:34	11:05
R-59	92	0:36	11:14
R-68	75	0:34	11:25
R-123	94	0:41	11:26
R-73	102	0:39	11:48
R-165	112	0:50	11:58
R-7	65	0:49	12:09
R-161	91	0:40	12:19
R-141	111	0:38	12:24
R-191	88	0:30	12:47
R-403	82	1:23	12:49
R-410	104	0:38	12:51
R-405	92	0:36	12:54
R-41	68	0:46	13:05
R-46	97	0:41	13:25
R-126	95	0:28	13:47
R-107	97	0:43	13:54
R-121	157	0:33	13:57
R-105	88	0:56	14:15
R-127	151	0:40	14:35
R-35	71	0:53	14:35
R-117	131	0:35	14:38
R-120	141	0:35	14:44
R-151	104	0:56	14:56
R-53	110	0:45	15:08
R-168	105	0:35	15:20
R-48	111	0:44	16:19
R-18	148	0:36	16:26
R-111	134	0:34	16:52
R-192	93	1:08	16:54
R-38	73	0:56	17:01
R-193	102	1:13	17:05
R-87	114	0:59	17:14
R-76	109	0:46	17:19
R-36	87	0:53	17:24
R-84	102	0:59	17:30
R-51	125	0:43	17:36

Receptor ID	Shadow days per year	Max Hrs/Day (hh:mm/day)	Predicted hh:mm:ss/year
R-5	108	0:55	17:53
R-15	96	0:42	17:57
R-409	171	0:57	17:58
R-47	122	0:45	18:16
R-52	127	0:43	18:28
R-83	105	1:00	18:44
R-44	155	0:39	18:47
R-169	124	0:55	19:01
R-163	126	0:55	19:02
R-184	144	0:43	19:05
R-45	164	0:41	19:09
R-78	128	0:43	19:43
R-319	74	0:47	19:59
R-106	145	0:56	20:15
R-74	153	1:01	20:24
R-89	119	0:58	21:05
R-112	184	0:36	21:13
R-14	92	0:52	21:20
R-93	158	0:34	21:33
R-128	165	0:36	21:38
R-113	188	0:43	21:40
R-42	94	0:53	22:12
R-88	181	0:46	23:18
R-54	104	0:51	23:30
R-167	189	0:51	24:03:00
R-85	150	0:44	24:20:00
R-402	149	0:38	24:27:00
R-182	128	0:58	24:38:00
R-139	173	0:38	24:39:00
R-116	195	0:35	25:08:00
R-79	195	0:39	30:37:00
R-147	161	0:43	30:55:00
R-132	136	1:19	32:22:00
R-6	161	0:54	32:53:00
R-19	170	0:55	33:09:00
R-137	126	1:17	34:16:00
R-115	237	0:37	34:50:00
R-124	235	0:42	36:49:00
R-190	226	1:21	37:25:00
R-242	119	1:26	41:40:00

Refer to Figure 2 for a graphic illustration of relevant project receptors.

No consistent national, state, county, or local standards exist for allowable frequency or duration of shadow flicker from wind turbines at the proposed Project site. In general, quantified limits on shadow flicker are uncommon in the United States (USDOE, 2010). However, standards developed by some states and countries provide guidance in this

regard. A model wind ordinance prepared by the North Carolina Wind Working Group in 2008 suggests a limit of 30 hours per year at any occupied building on a non-participating landowner's property (NCWWG, 2008). The Ohio Power Siting Board has also used 30 annual hours of shadow flicker as a threshold of acceptability in reviewing commercial wind power projects (OPSB, 2008). Additionally, international guidelines from Europe and Australia have suggested 30 hours of shadow flicker per year as the threshold of significant impact, or the point at which shadow flicker is commonly perceived as an annoyance (NRCCEIWEP, 2007). For example, guidelines for wind power development in the State of Victoria, Australia specify that shadow flicker may not exceed 30 hours per year at any dwelling in the surrounding area (Sustainable Energy Authority Victoria, 2003). Accordingly, a threshold of 30 shadow flicker hours per year was used in this analysis to evaluate the significance of this impact on area residences. Thirty hours per year equates to approximately 0.7% of the total daylight hours in a year at the latitude and longitude of the Project site. As indicated above, using the Gamesa G-90, 5 of the 392 inventoried receptors are predicted to exceed the threshold of 30 hours of shadow flicker per year. Using the Gamesa G-97, 10 of the 392 inventoried receptors are predicted to receive in excess of 30 hours of shadow flicker per year. Tables 3 and 4 provides additional detail regarding those receptors projected to experience greater than 30 hours per year<sup>2</sup> for both turbine models. Also refer to Attachment C, which contains reports and graphical calendars produced by WindPRO that indicate the specific times of year and day when these (and other) receptors are anticipated to receive shadow flicker effects from specific turbines.

**Table 3. Shadow Flicker Summary for Receptors Predicted to Receive >30 hours/year: Gamesa G-90**

Receptor ID	Property Owner	Predicted Shadow Flicker (hh:mm/year)	Turbines Contributing Shadow Flicker	Approximate Times of Day Receptor Potentially Affected by Flicker <sup>1</sup>
R-137	Aric P Quencer	31:46:00	41, 48,	6:45PM - 8:30 PM
R-115	Stewart Wayne Peters	31:40:00	02, 01, 16, 15	6:00AM - 7:30AM 3:00PM - 6:15 PM
R-124	Edward Martindale	32:23:00	01, 15, 16, 14	6:00AM - 8:15AM 3:15PM - 4:15 PM
R-190	Michael T Murdie (leased)	31:29:00	06, 41, 48, 05, 04	7:15AM - 8:45AM 3:00PM - 8:00PM
R-242	Philip H. Scott (leased)	36:55:00	41, 48	6:30PM - 8:30 PM

Refer to Figure 2 for a graphic illustration of relevant project receptors in relation to turbines.

<sup>2</sup>The times of day and duration of shadow flicker experienced by each receptor will vary throughout the calendar year based on the position of the sun in the sky and the direction of prevailing winds. The times of day presented in Tables 1-4 represent the full range of times during which each receptor could potentially experience shadow flicker throughout the year; however, no receptors will experience shadow flicker every day during all those hours. See Attachment C for detailed calendars that illustrate the specific times of year and day that each receptor may experience shadow flicker.

**Table 4. Shadow Flicker Summary for Receptors Predicted to Receive >30 hours/year: Gamesa G-97**

Receptor ID	Property Owner	Predicted Shadow Flicker (hh:mm/year)	Turbines Contributing Shadow Flicker	Approximate Times of Day Receptor Potentially Affected by Flicker <sup>1</sup>
R-79	Steven F Dorr	30:37:00	07, 24	6:15AM - 7:15AM 3:30PM - 4:30 PM
R-147	Robert Shultz (leased)	30:55:00	18, 29	6:00AM - 7:15AM 3:30PM - 5:30 PM
R-132	Lyle H Wilkie	32:22:00	06, 05, 41	6:30AM - 7:30AM 6:45PM - 8:30 PM
R-6	Patricia A Patchen Living Trust (leased)	32:53:00	55, 54	7:30AM - 8:30AM 7:00PM - 8:00 PM
R-19	Donna J Patchen (leased)	33:09:00	55, 54	7:15AM - 8:15AM 7:15PM - 8:00 PM
R-137	Aric P Quencer	34:16:00	41, 48,	6:45PM - 8:30 PM
R-115	Stewart Wayne Peters	34:50:00	02, 01, 16, 15	6:00AM - 8:00AM 3:00PM - 6:00 PM
R-124	Edward Martindale	36:49:00	01, 15, 16, 14	6:00AM - 8:15AM 3:15PM - 4:15 PM
R-190	Michael T Murdie (leased)	37:25:00	06, 41, 48, 05, 04	7:15AM - 8:45AM 3:00PM - 8:00PM
R-242	Philip H. Scott (leased)	41:40:00	41, 48	6:30PM - 8:30 PM

Refer to Figure 2 for a graphic illustration of relevant project receptors in relation to turbines.

As previously noted, these calculations do not take into account the screening effects associated with existing site-specific features, including vegetation, unidentified terrain, and/or buildings. Further, this analysis assumes that there are windows on every side of the identified structures and that the turbine rotor is continuously in motion. Given these conservative assumptions, the predicted shadow flicker frequency represents a “worst-case” scenario, and almost certainly overstates the actual frequency of shadow flicker that would be experienced at any given receptor location. In addition, many of the modeled shadow flicker hours are expected to be of low intensity, as they would occur during the early morning or late afternoon hours when the sun is low in the sky. As the sun sinks below the horizon, more of its light is scattered by the atmosphere, which has the effect of dampening its brightness and therefore its ability to cast dark shadows.

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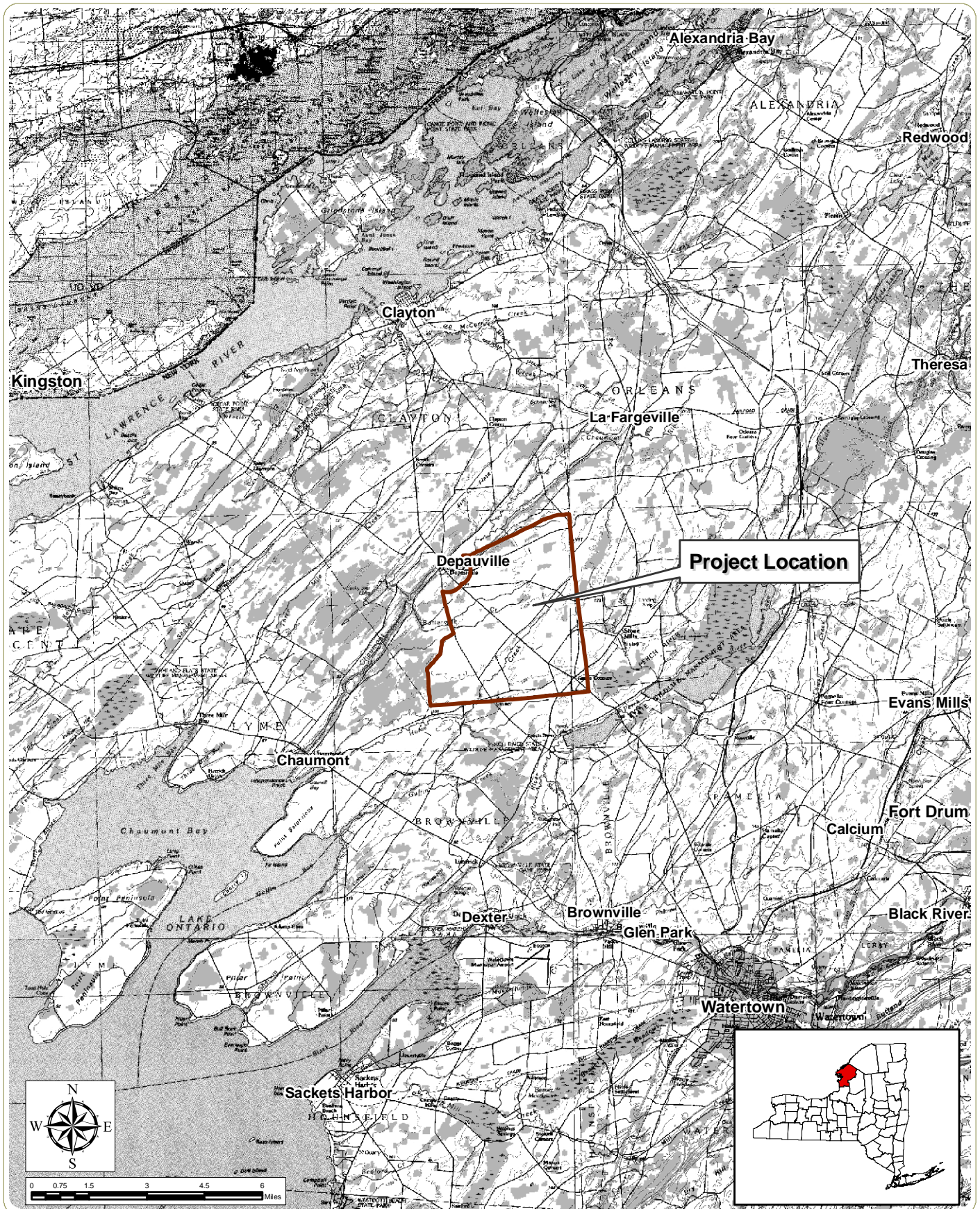
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## Figures

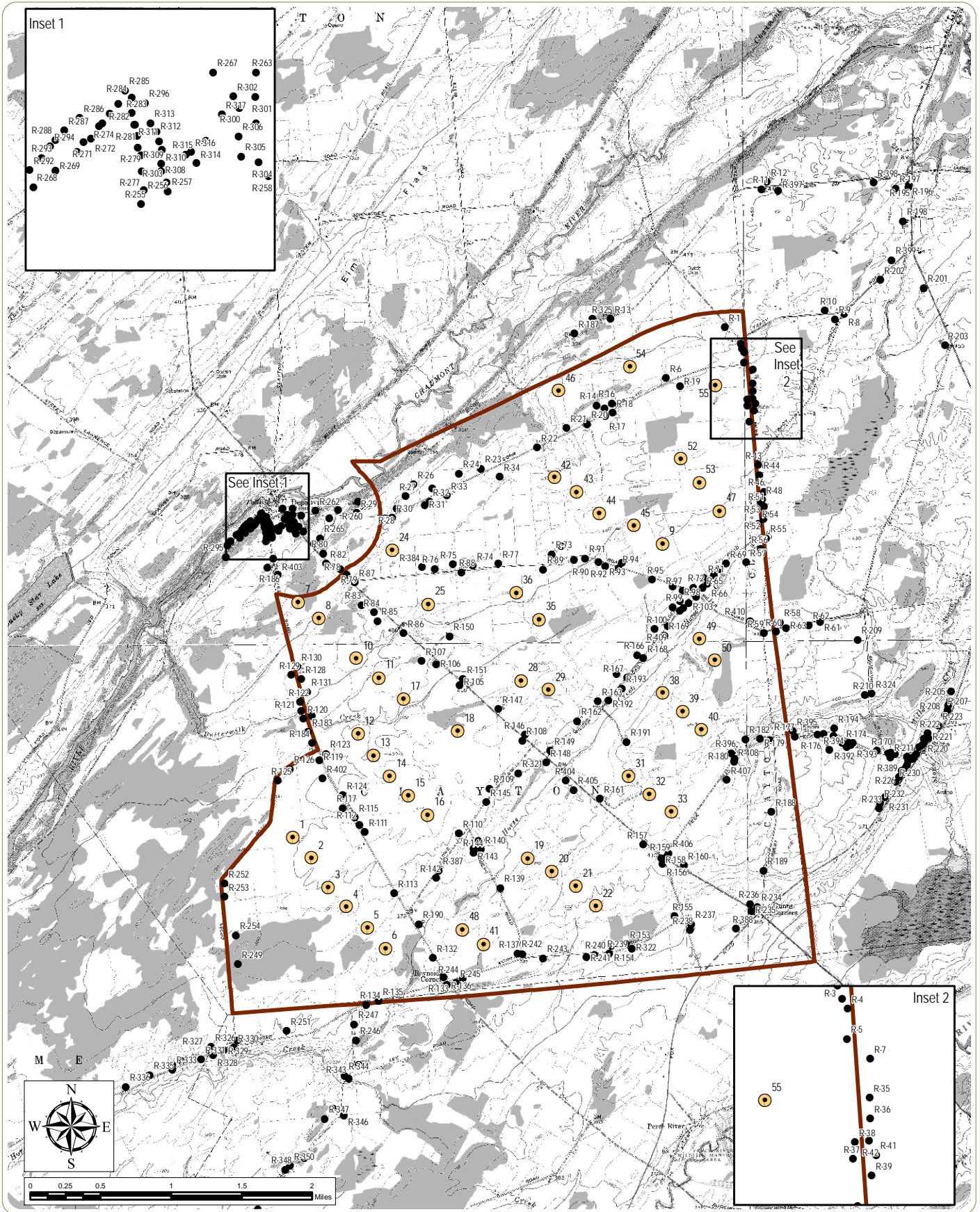


**Horse Creek Wind Farm**  
 Town of Clayton - Jefferson County, New York

Figure 1: Regional Project Location  
 Shadow Flicker Analysis  
 March 31, 2011

Notes: Base Map: USGS 1:100,000 Cape Vincent, Gouverneur, Pulaski and Watertown Quadrangles.





**Horse Creek Wind Farm**  
Town of Clayton - Jefferson County, New York

Figure 2: Proposed Project Layout  
Shadow Flicker Analysis  
March 31, 2011

Notes: Base Map: USGS 1:24,000 Brownville, Clayton, Dexter and LaFargeville Quadrangles.

- Receptor
- Wind Turbine
- ▭ Project Area





## **Attachment A**

Wind Rose & Sunshine Data

Table 1. Wind Rose Data (adapted from HC wind energy rose provided by Scott McDonald at Iberdrola).

Windrose Data (used to determine rotor orientation)									
Sector	N	NNE	NE	ENE	E	ESE	SE	SSE	
Frequency	5.00	7.40	810	5.20	3.40	2.70	2.20	3.10	
Hours of Operation	438	648	710	456	298	237	193	272	

Sector	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
Frequency	7.20	12.00	13.50	11.50	7.70	4.90	2.80	3.30	100.00
Hours of Operation	631	1,051	1,181	1,005	675	429	245	289	8,760

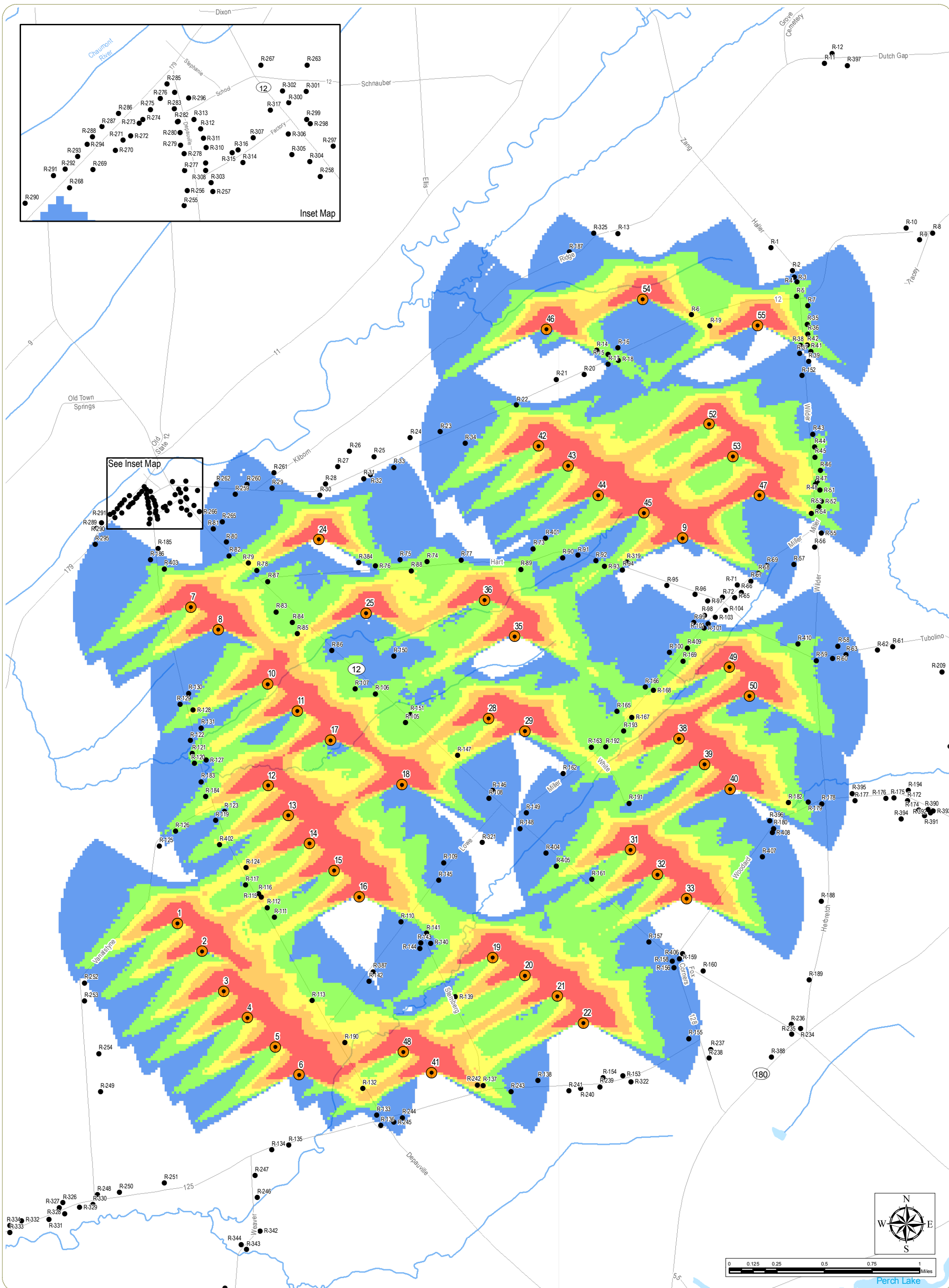
Table 2. Sunshine Probability Data (obtained from Comparative climatic data for 2009 page 72 - Syracuse Weather Station).

Sunshine Probability												
Month	JAN	FEB	MAR	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
% of Sunshine	0.33	0.39	0.47	0.49	0.55	0.59	0.63	0.59	0.54	0.44	0.27	0.25

## **Attachment B.1**

Projected Shadow Flicker Map

Gamesa G-90

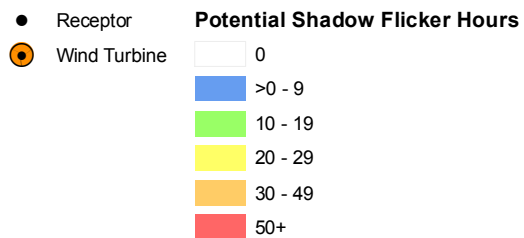


**Horse Creek Wind Farm**  
Town of Clayton - Jefferson County, New York

**Attachment B.1**  
**Shadow Flicker Map - Gamesa G90 Turbine**

March 31, 2011

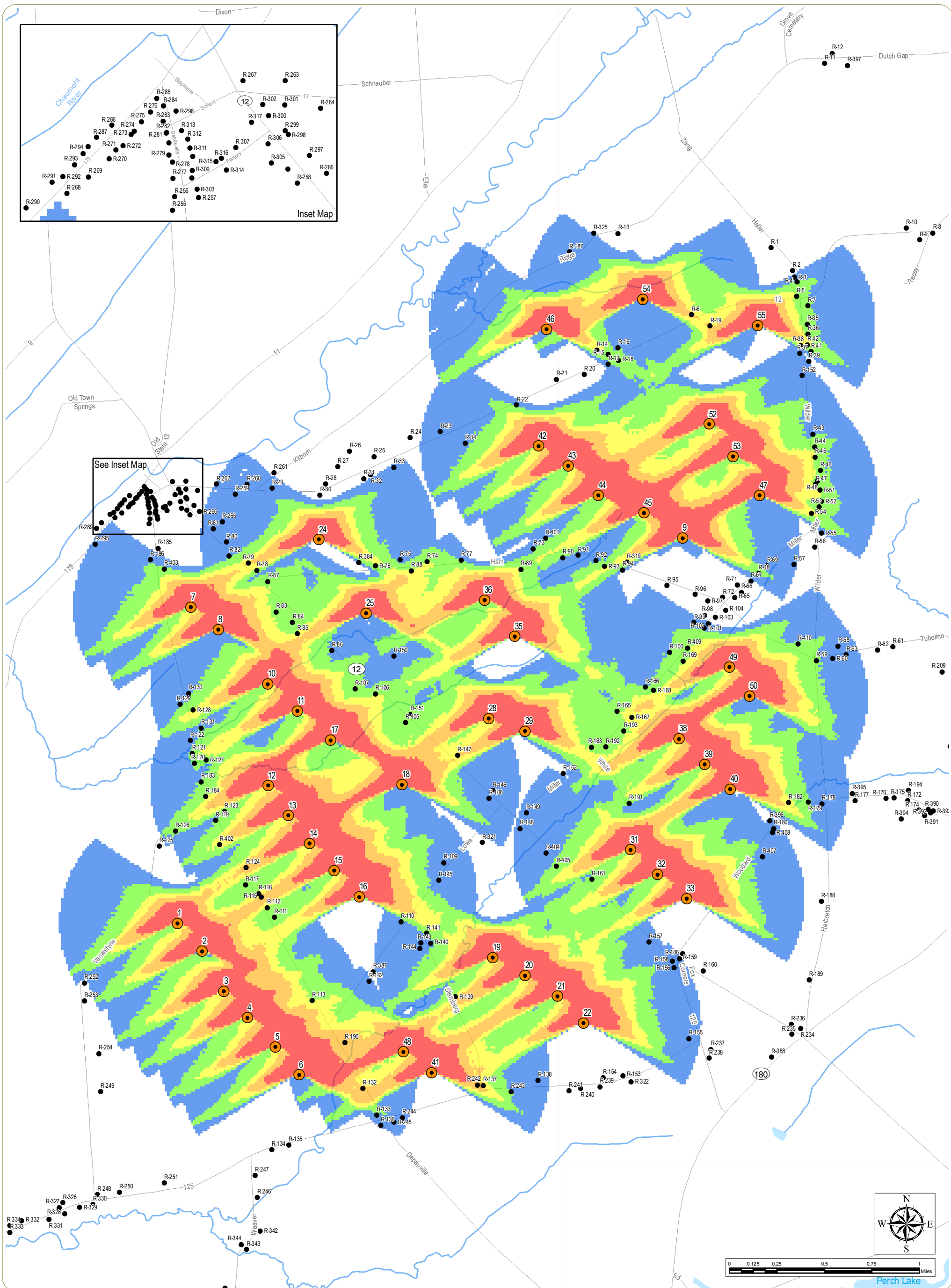
Notes: Base Map: ESRI StreetMap North America, 2008.



## **Attachment B.2**

Projected Shadow Flicker Map

Gamesa G-97

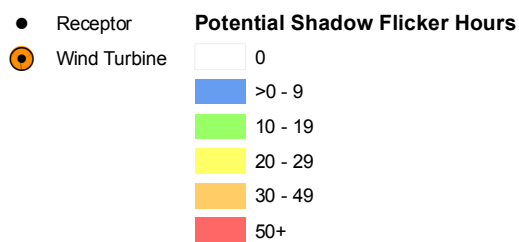


**Horse Creek Wind Farm**  
Town of Clayton - Jefferson County, New York

**Attachment B.2**  
**Shadow Flicker Map - Gamesa G97 Turbine**

March 31, 2011

Notes: Base Map: ESRI StreetMap North America, 2008.



**On Enclosed CD:**

**Attachment C.1**

WindPRO Overview Reports  
WindPRO Graphical Calendars  
WindPRO Tabular Calendars  
Gamesa G-90

And

**Attachment C.2**

WindPRO Overview Reports  
WindPRO Graphical Calendars  
WindPRO Tabular Calendars  
Gamesa G-97

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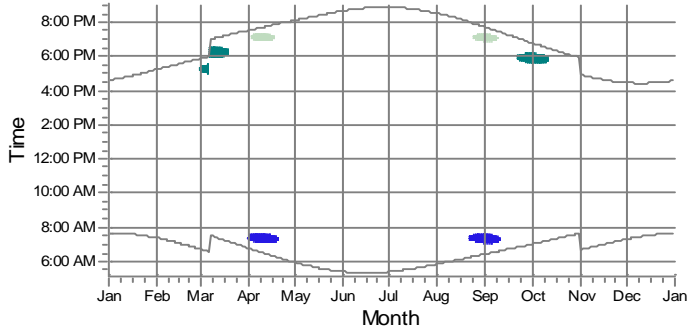
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3/18/2011 3:22 PM/2.7.453

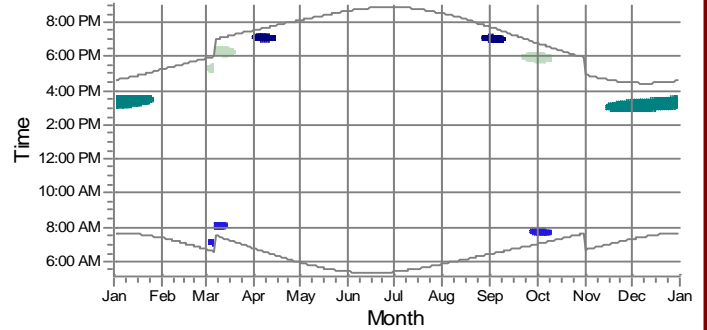
## SHADOW - Calendar, graphical

Calculation: 05030 SFA Gamesa G90\_R2

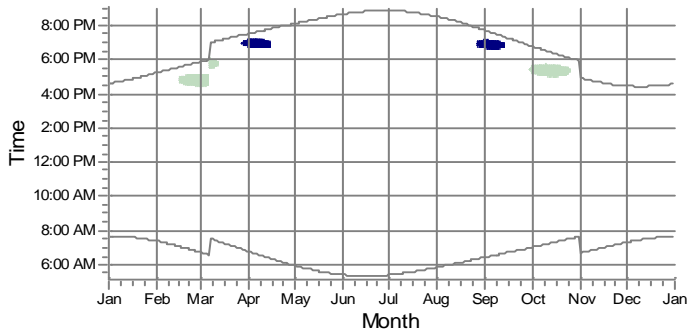
R-105: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (61)



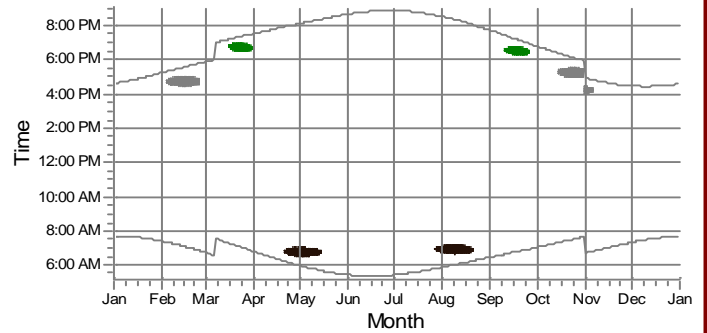
R-106: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (62)



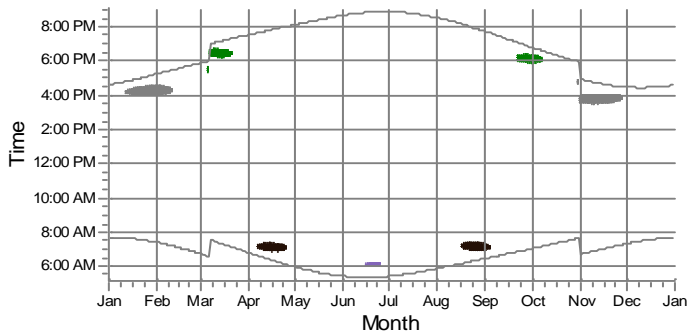
R-107: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (315)



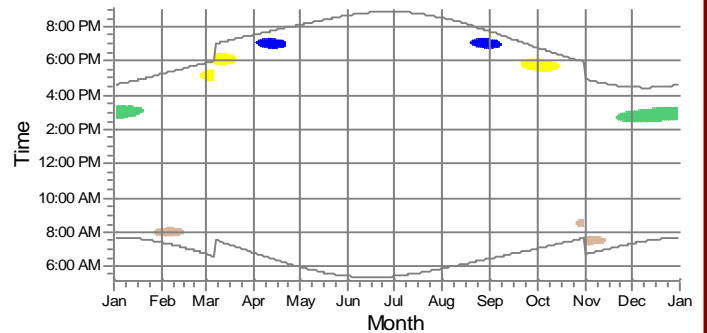
R-111: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (366)



R-112: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (365)



R-113: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (327)



WTGs

- |  |  |   |   |
|--|--|---|---|
| 01: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (1) | 02: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (4) | 11: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (15) | 15: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (38) |
| 04: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (2) | 17: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (6) | 48: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (19) | 16: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (39) |
| 03: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (3) | 10: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (7) | 05: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (32) | 28: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (42) |



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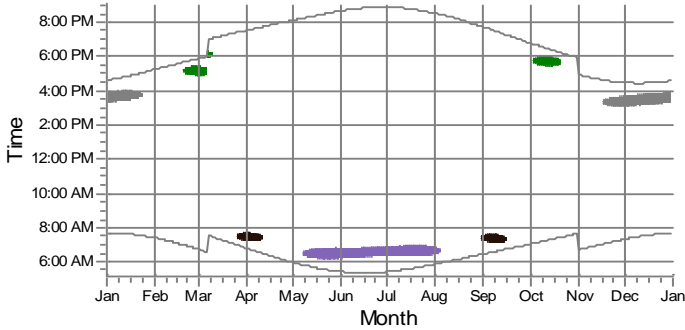
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3/18/2011 3:22 PM/2.7.453

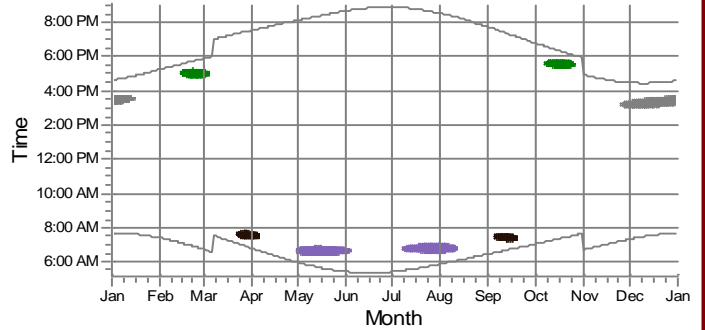
## SHADOW - Calendar, graphical

Calculation: 05030 SFA Gamesa G90\_R2

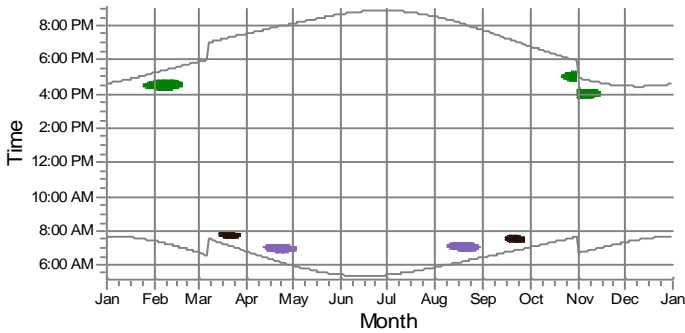
R-115: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (388)



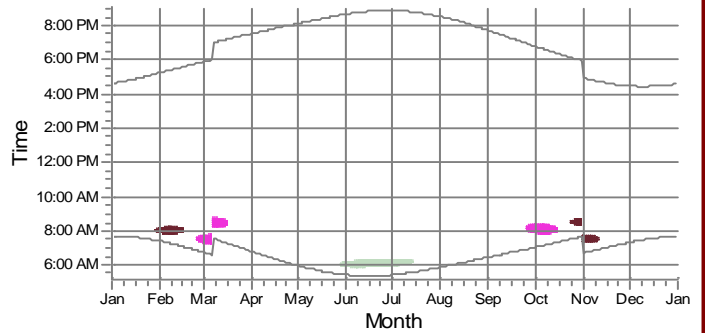
R-116: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (63)



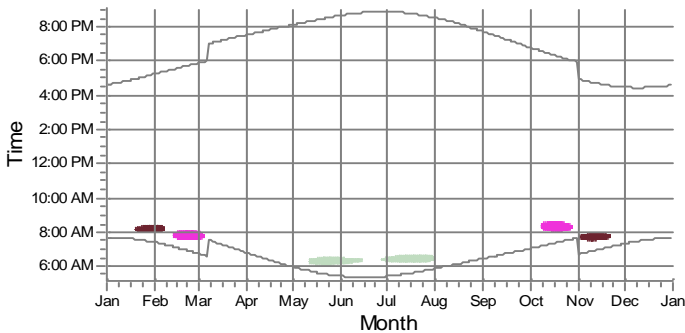
R-117: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (364)



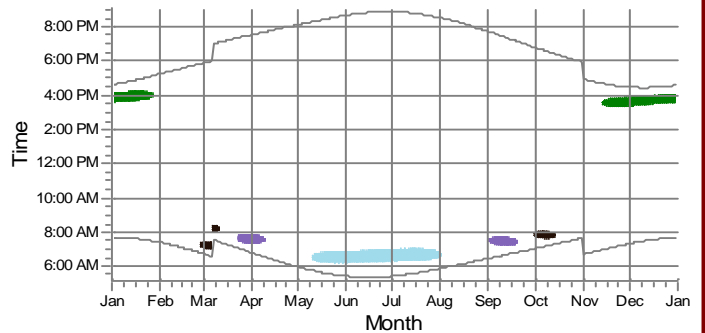
R-120: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (334)











R-121: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (64)



R-124: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (66)



WTGs

- |  |   |   |   |
|--|---|---|---|
|  01: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (1) |  11: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (15) |  13: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (36) |  15: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (38) |
|  02: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (4) |  12: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (35) |  14: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (37) |  16: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (39) |

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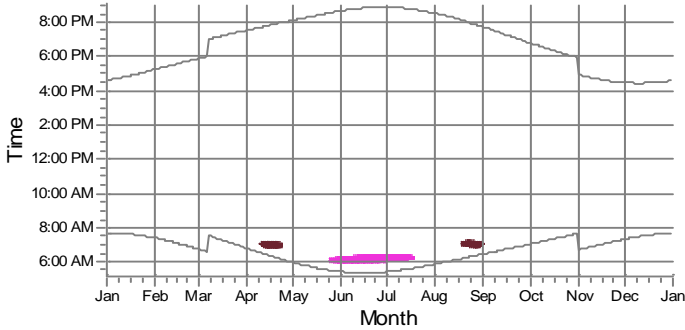
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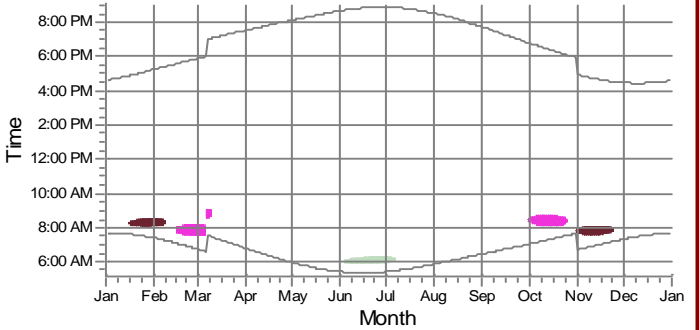
## SHADOW - Calendar, graphical

Calculation: 05030 SFA Gamesa G90\_R2

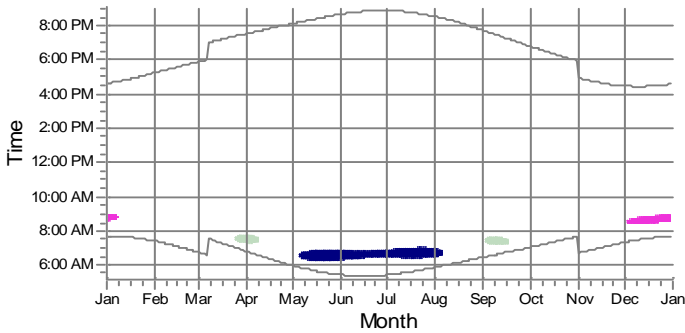
R-126: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (331)



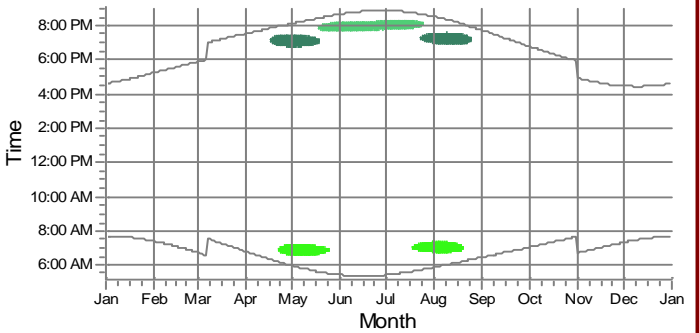
R-127: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (67)



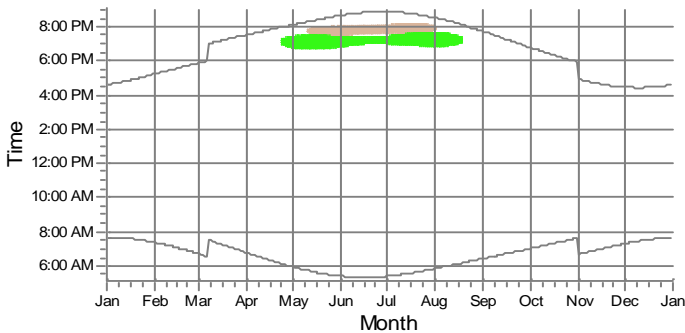
R-128: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (68)



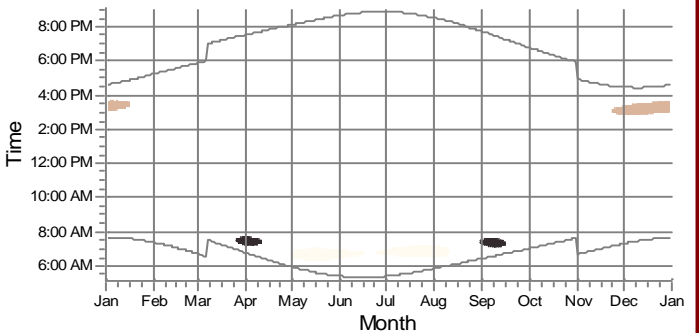
R-132: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (71)













R-137: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (76)



R-139: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (78)



WTGs

 10: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (7)	 48: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (19)	 06: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (33)	 21: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (40)
 11: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (15)	 41: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (20)	 12: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (35)	
 20: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (17)	 05: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (32)	 13: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (36)	

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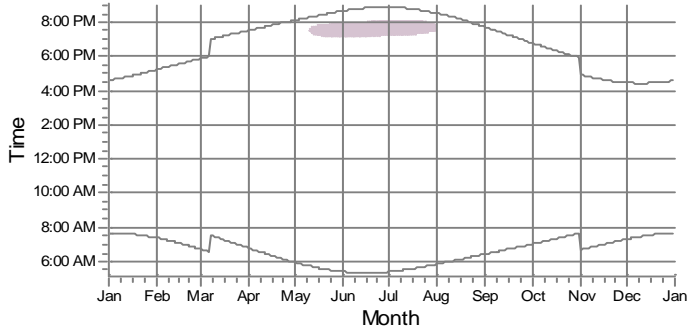
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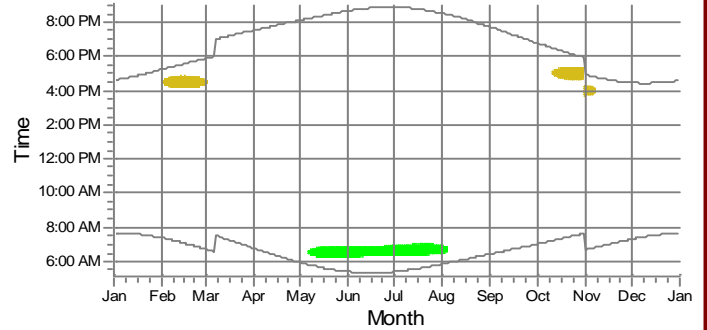
## SHADOW - Calendar, graphical

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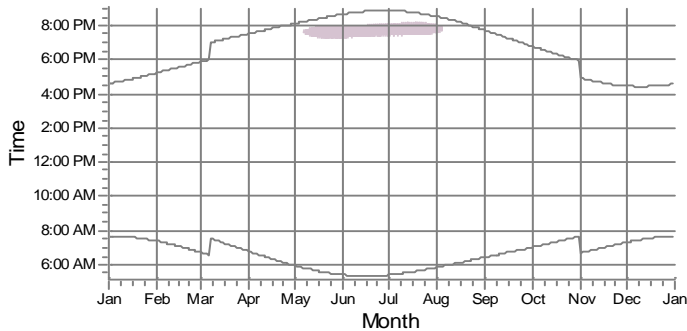
R-14: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (11)



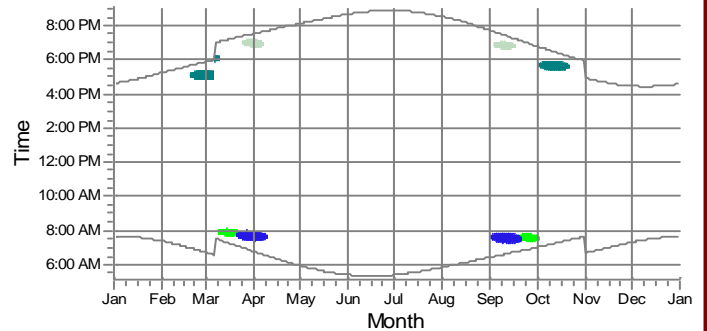
R-147: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (83)



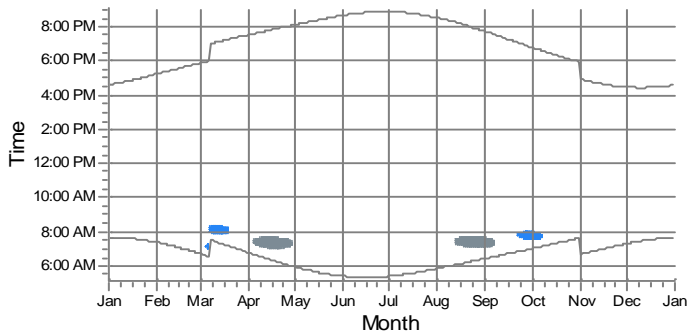
R-15: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (12)



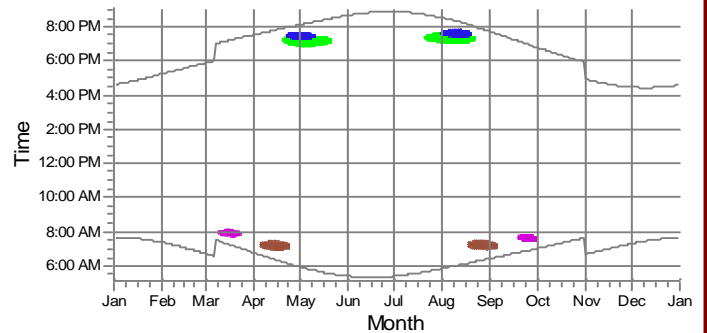
R-151: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (316)












R-161: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (321)



R-163: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (382)



WTGs

 17: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (6)	 46: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (27)	 32: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (44)	 39: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (47)
 29: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (9)	 18: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (34)	 33: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (45)	
 11: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (15)	 28: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (42)	 38: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (46)	

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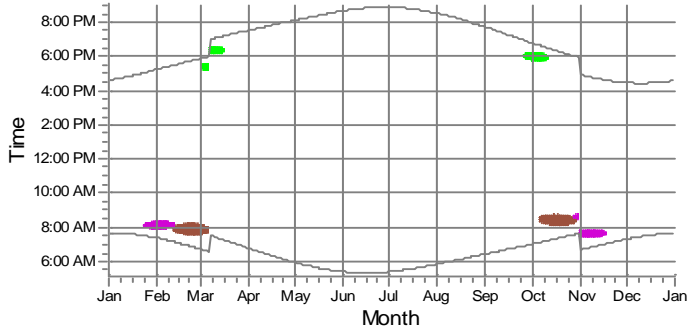
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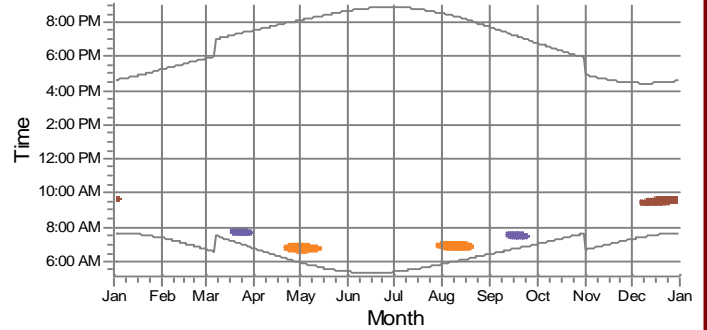
## SHADOW - Calendar, graphical

Calculation: 05030 SFA Gamesa G90\_R2

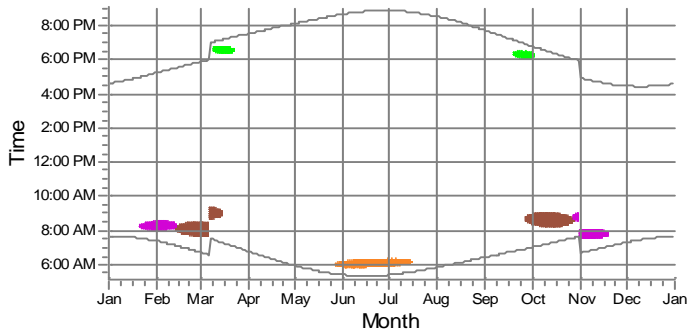
R-165: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (92)



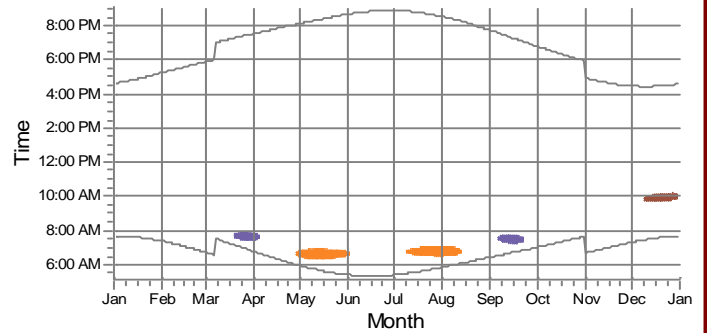
R-166: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (93)



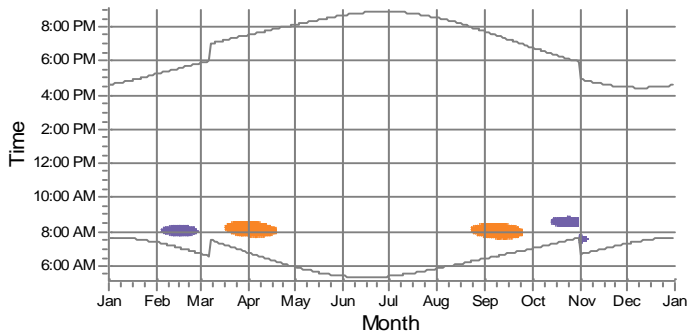
R-167: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (94)



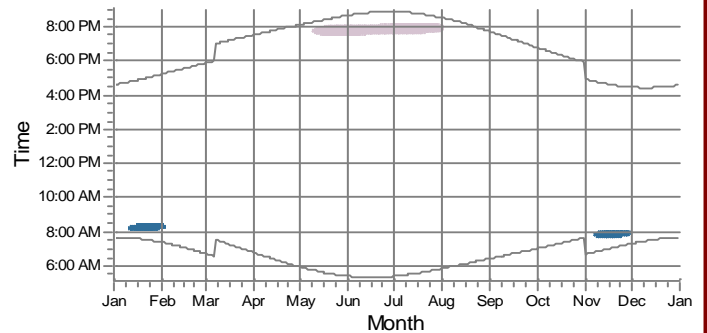
R-168: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (95)










R-169: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (384)



R-18: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (15)



WTGs

- |   |   |   |   |
|---|---|---|---|
|  29: GAMESA G90/2000 2000 90.0 IOI hub: 100.0 m (9)  |  49: GAMESA G90/2000 2000 90.0 IOI hub: 100.0 m (25) |  38: GAMESA G90/2000 2000 90.0 IOI hub: 100.0 m (46) |  50: GAMESA G90/2000 2000 90.0 IOI hub: 100.0 m (50) |
|  52: GAMESA G90/2000 2000 90.0 IOI hub: 100.0 m (24) |  46: GAMESA G90/2000 2000 90.0 IOI hub: 100.0 m (27) |  39: GAMESA G90/2000 2000 90.0 IOI hub: 100.0 m (47) |   |

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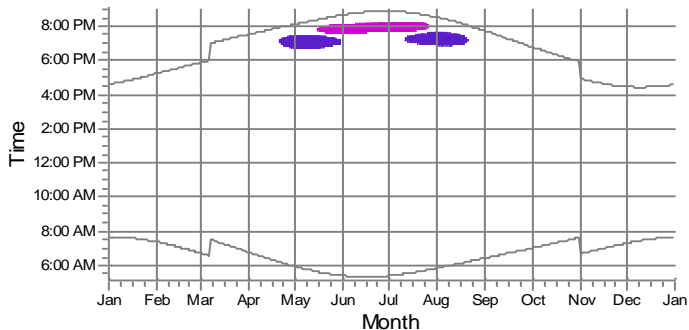
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3/18/2011 3:22 PM/2.7.453

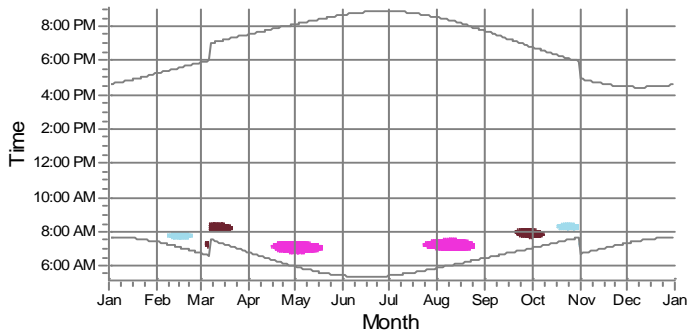
## SHADOW - Calendar, graphical

Calculation: 05030 SFA Gamesa G90\_R2

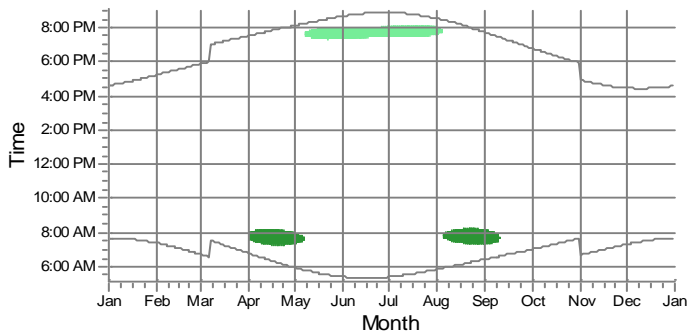
R-182: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (103)



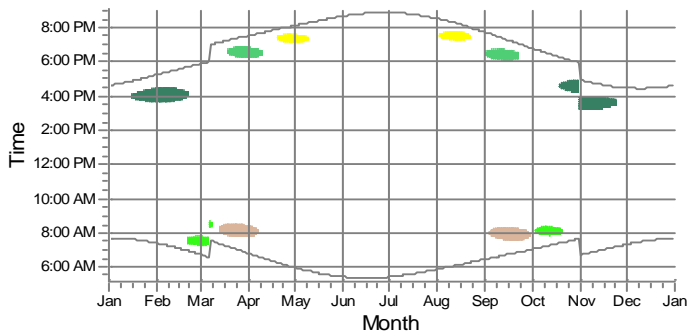
R-184: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (104)



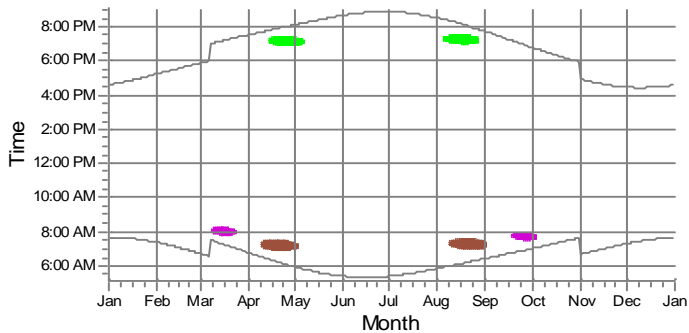
R-19: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (16)



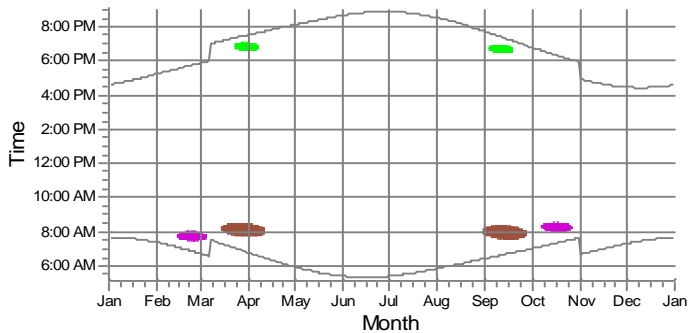
R-190: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (110)

















R-192: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (111)



R-193: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (112)



WTGs

- |   |   |   |   |
|---|---|---|---|
|  04: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (2)  |  54: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (28) |  12: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (35) |  39: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (47) |
|  29: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (9)  |  55: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (29) |  13: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (36) |  40: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (48) |
|  48: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (19) |  05: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (32) |  14: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (37) |   |
|  41: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (20) |  06: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (33) |  38: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (46) |   |

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05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:53 PM / 7

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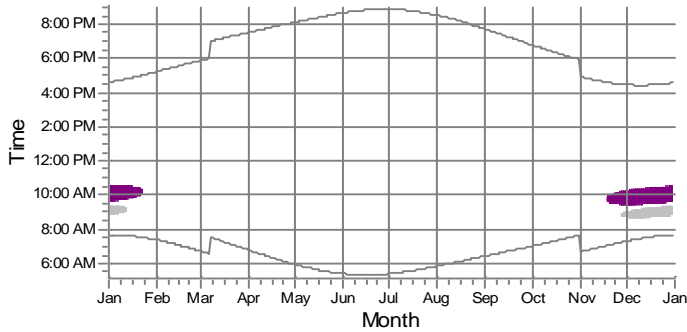
Calculated:

3/18/2011 3:22 PM/2.7.453

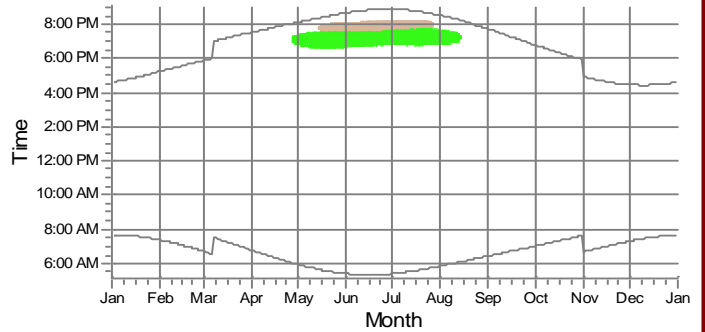
## SHADOW - Calendar, graphical

Calculation: 05030 SFA Gamesa G90\_R2

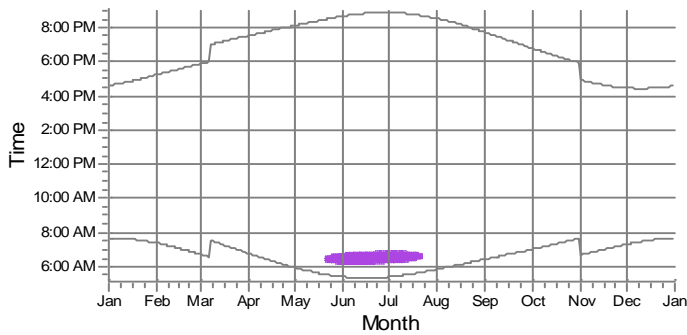
R-22: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (279)



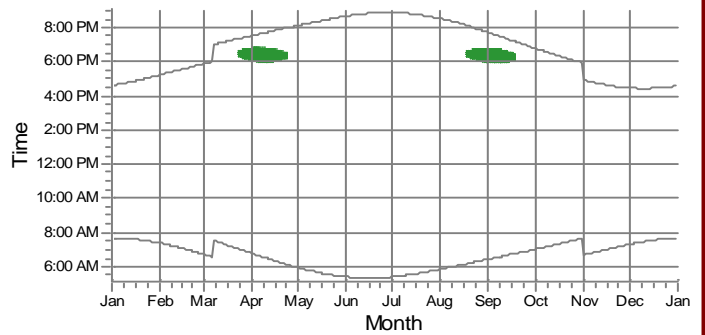
R-242: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (147)



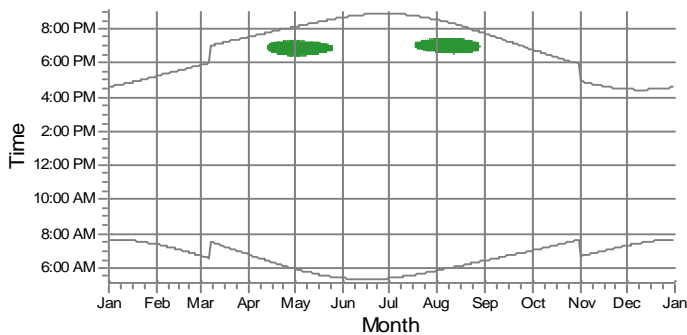
R-319: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (216)



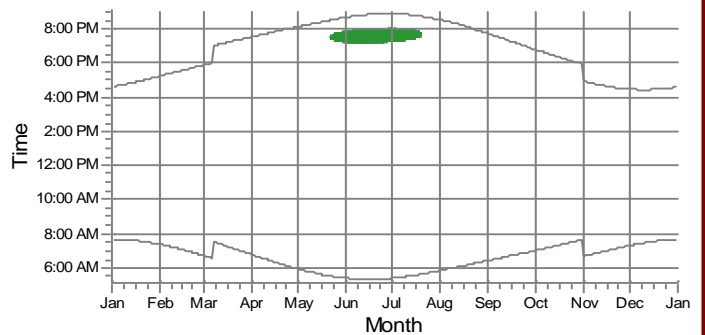
R-35: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (357)









R-36: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (24)



R-38: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (356)



WTGs

- |   |   |   |
|---|---|---|
|  42: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (11) |  48: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (19) |  55: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (29) |
|  43: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (12) |  41: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (20) |  09: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (49) |

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05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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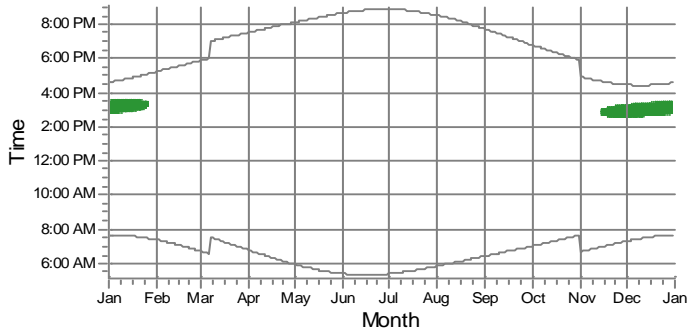
Calculated:

3/18/2011 3:22 PM/2.7.453

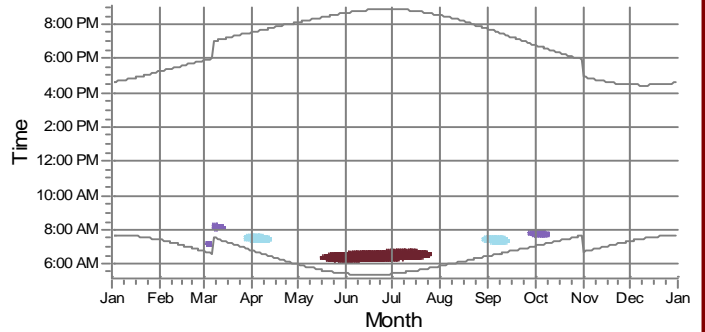
## SHADOW - Calendar, graphical

Calculation: 05030 SFA Gamesa G90\_R2

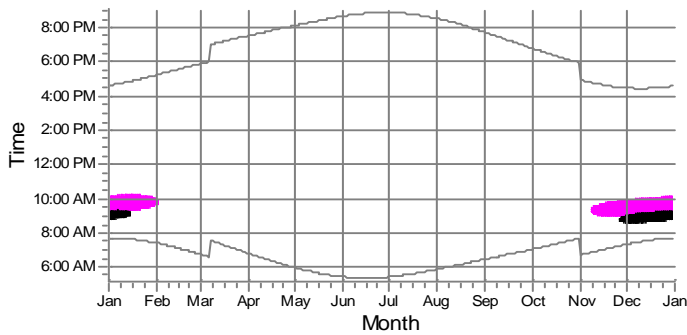
R-4: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (4)



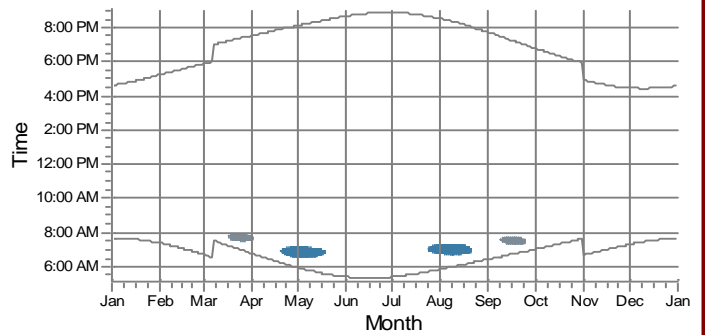
R-402: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (302)



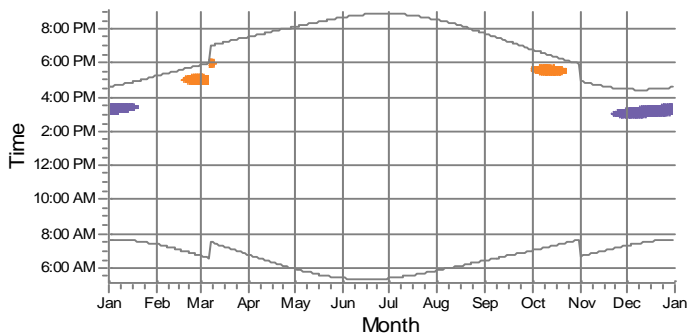
R-403: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (303)



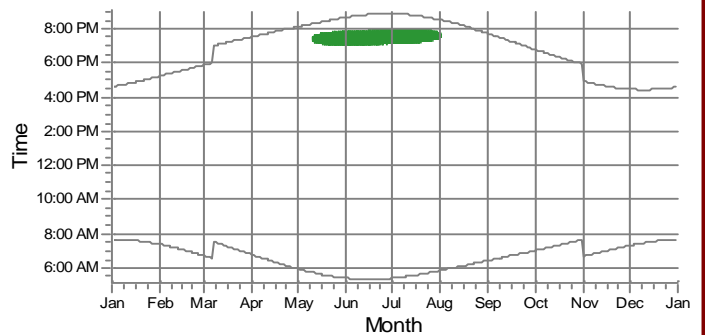
R-405: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (305)













R-410: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (309)



R-42: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (27)



WTGs

- |   |   |   |   |
|---|---|---|---|
|  07: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (5)  |  55: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (29) |  15: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (38) |  50: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (50) |
|  08: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (14) |  13: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (36) |  31: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (43) |   |
|  49: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (25) |  14: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (37) |  32: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (44) |   |

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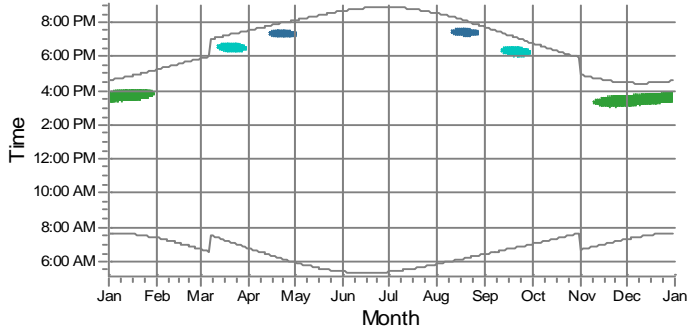
Calculated:

3/18/2011 3:22 PM/2.7.453

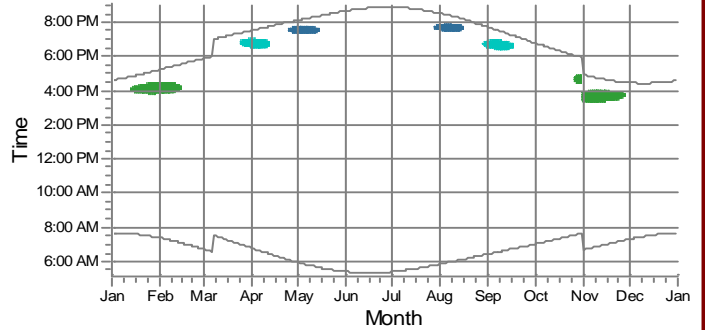
## SHADOW - Calendar, graphical

Calculation: 05030 SFA Gamesa G90\_R2

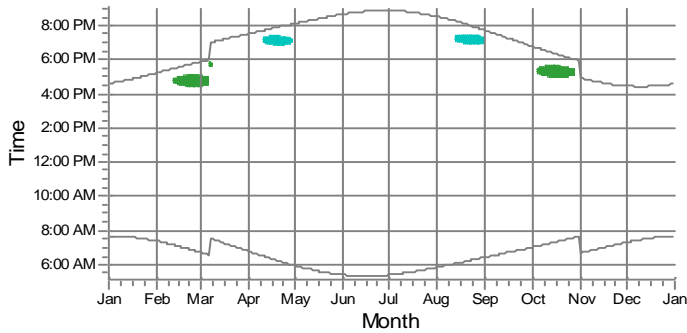
R-44: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (353)



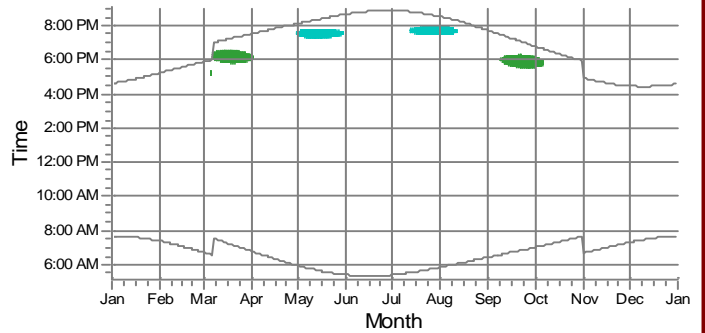
R-45: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (29)



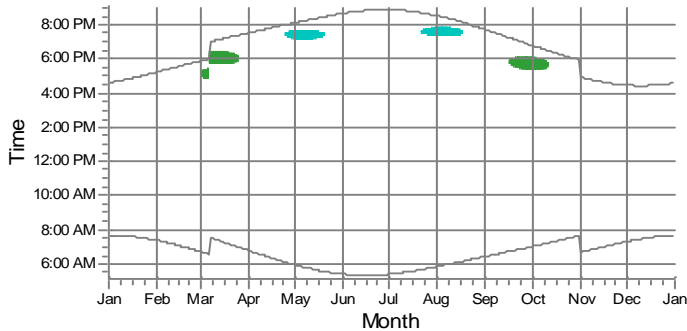
R-46: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (30)



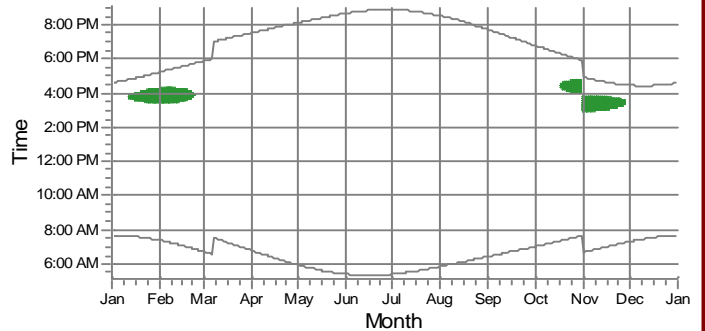
R-47: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (31)



R-48: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (352)



R-5: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (5)



WTGs

47: GAMESA G90/2000 2000 90.0 IOI hub: 100.0 m (22)    53: GAMESA G90/2000 2000 90.0 IOI hub: 100.0 m (23)    52: GAMESA G90/2000 2000 90.0 IOI hub: 100.0 m (24)    55: GAMESA G90/2000 2000 90.0 IOI hub: 100.0 m (25)



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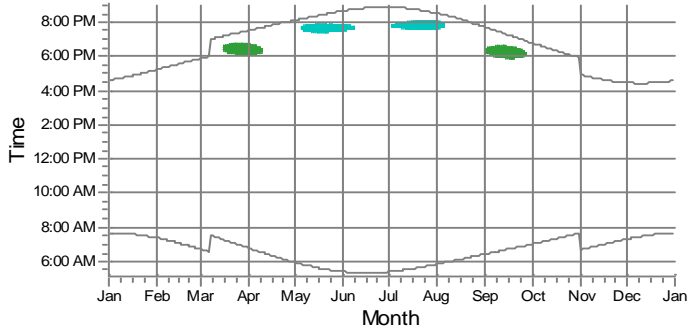
Calculated:

3/18/2011 3:22 PM/2.7.453

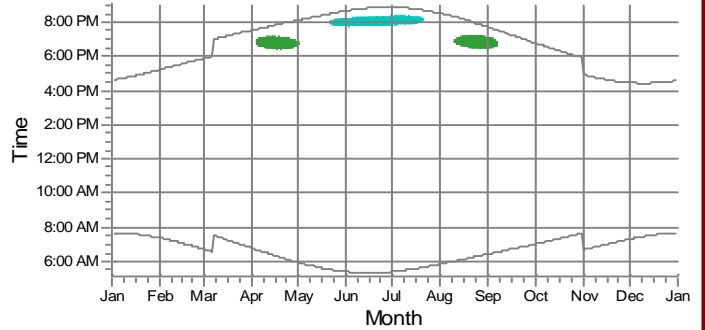
## SHADOW - Calendar, graphical

Calculation: 05030 SFA Gamesa G90\_R2

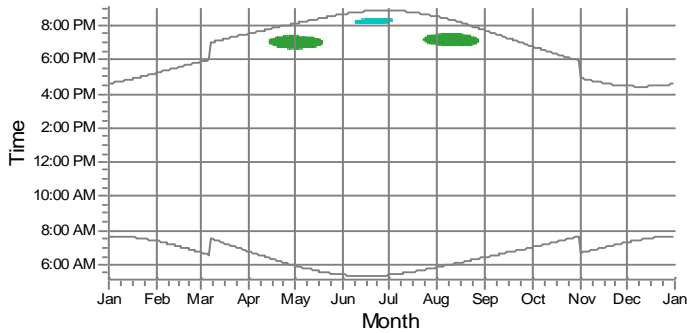
R-51: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (32)



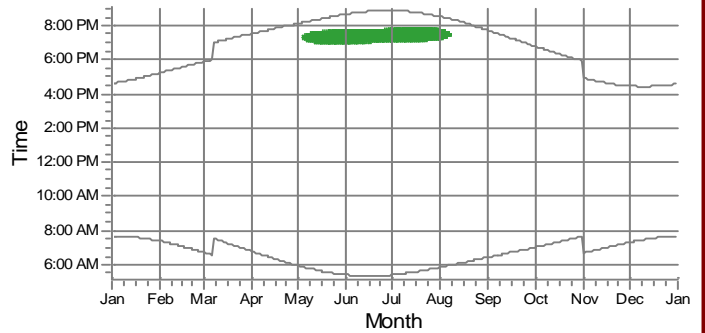
R-52: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (33)



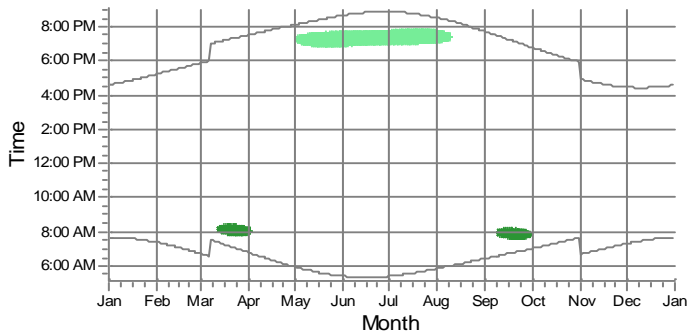
R-53: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (34)



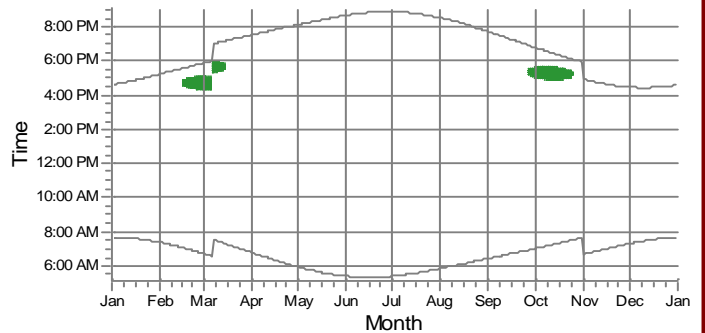
R-54: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (35)



R-6: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (359)



R-7: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (6)



WTGs

47: GAMESA G90/2000 2000 90.0 IOI hub: 100.0 m (22)    53: GAMESA G90/2000 2000 90.0 IOI hub: 100.0 m (23)    54: GAMESA G90/2000 2000 90.0 IOI hub: 100.0 m (28)    55: GAMESA G90/2000 2000 90.0 IOI hub: 100.0 m (29)

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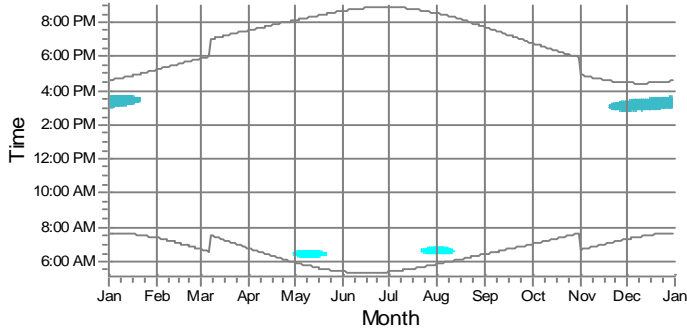
Calculated:

3/18/2011 3:22 PM/2.7.453

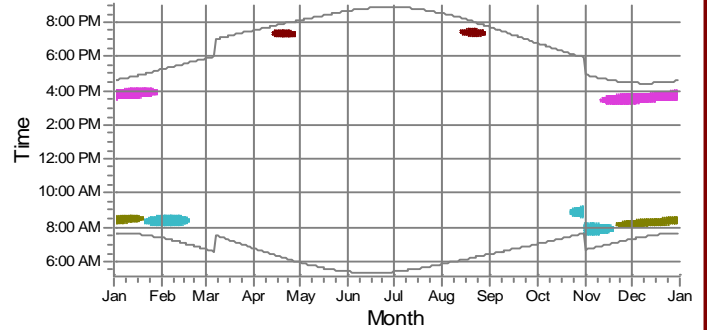
## SHADOW - Calendar, graphical

Calculation: 05030 SFA Gamesa G90\_R2

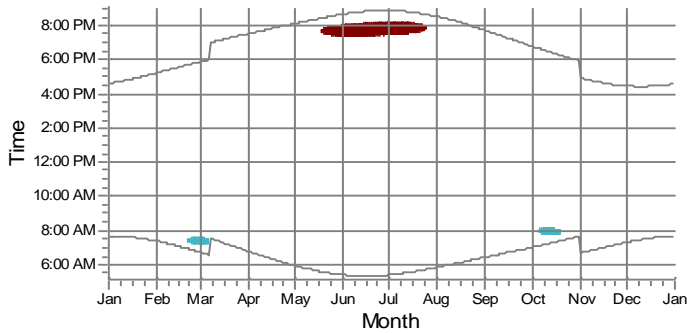
R-73: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (340)



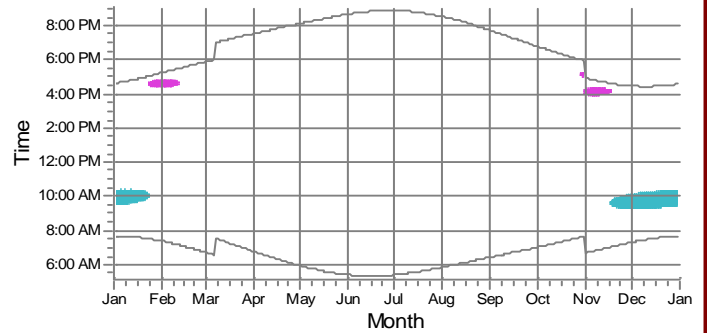
R-74: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (338)



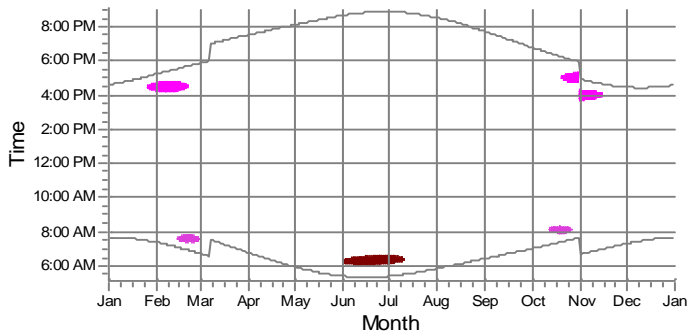
R-76: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (282)



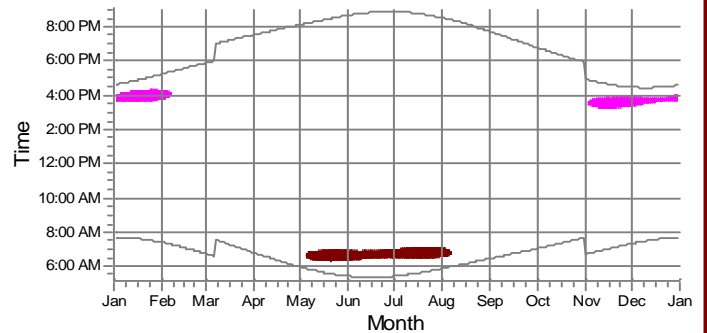
R-77: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (339)









R-78: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (46)



R-79: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (47)



WTGs

- |  |   |   |
|--|---|---|
|  07: GAMESA G90/2000 2000 90.0 IOI hub: 100.0 m (5) |  35: GAMESA G90/2000 2000 90.0 IOI hub: 100.0 m (10) |  36: GAMESA G90/2000 2000 90.0 IOI hub: 100.0 m (21) |
|  24: GAMESA G90/2000 2000 90.0 IOI hub: 100.0 m (8) |  45: GAMESA G90/2000 2000 90.0 IOI hub: 100.0 m (13) |  25: GAMESA G90/2000 2000 90.0 IOI hub: 100.0 m (41) |

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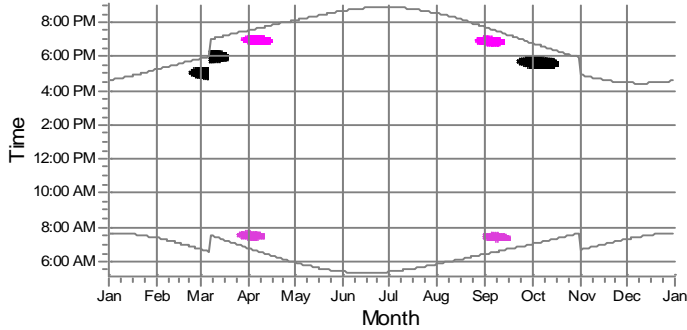
Calculated:

3/18/2011 3:22 PM/2.7.453

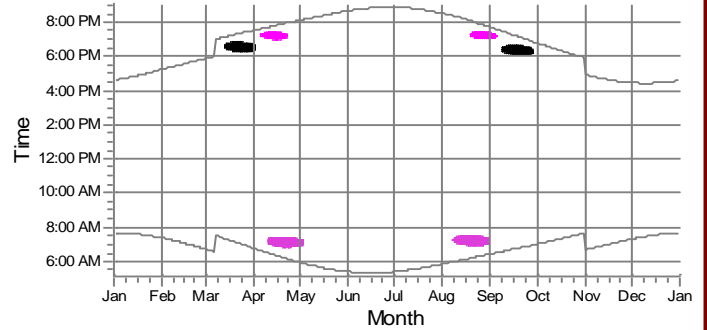
## SHADOW - Calendar, graphical

Calculation: 05030 SFA Gamesa G90\_R2

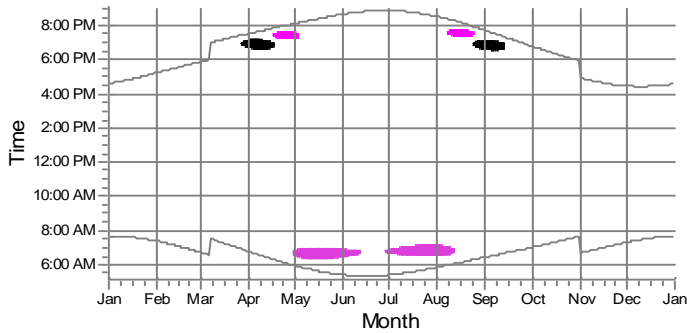
R-83: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (49)



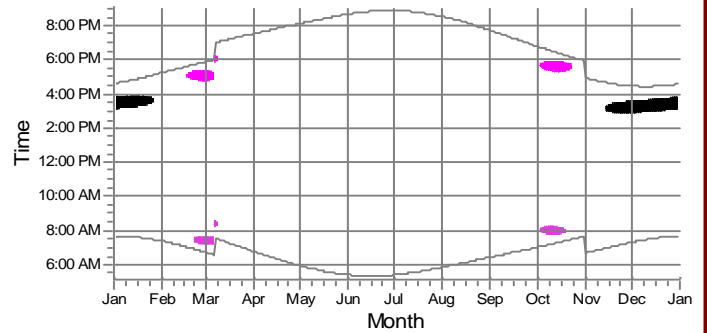
R-84: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (50)



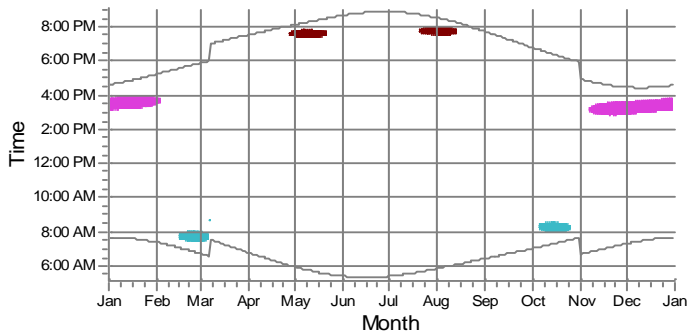
R-85: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (51)



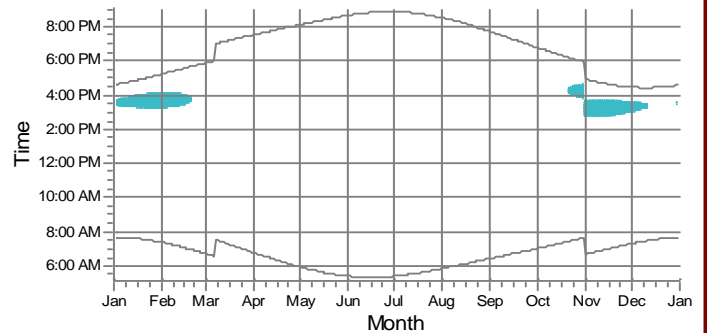
R-87: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (313)



R-88: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (337)



R-89: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (52)



WTGs

- |   |   |  |
|---|---|--|
| <p>07: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (5)</p> <p>24: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (8)</p> | <p>08: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (14)</p> <p>36: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (21)</p> | <p>25: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (41)</p> |
|---|---|--|

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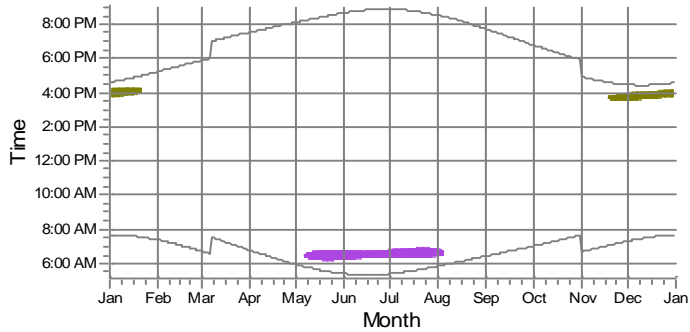
Calculated:

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## SHADOW - Calendar, graphical

Calculation: 05030 SFA Gamesa G90\_R2

R-93: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (55)



WTGs

35: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (10) 09: GAMESA G90/2000 2000 90.0 IO! hub: 100.0 m (49)

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Calculated:

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## SHADOW - Main Result

Calculation: 05030 SFA Gamesa G90\_R2

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.33	0.39	0.47	0.49	0.55	0.59	0.63	0.59	0.54	0.44	0.27	0.25

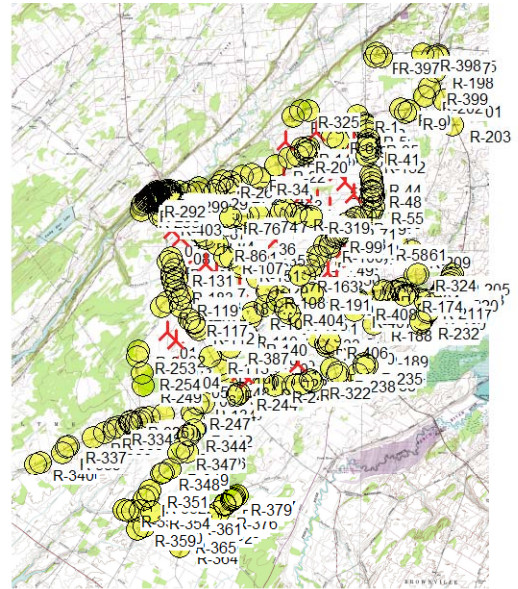
Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW
438	648	710	456	298	237	193	272	631	1,051	1,182	1,006

W	WNW	NW	NNW	Sum
675	429	245	289	8,760

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

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:  
 Height contours used: Height Contours: 05030 generated contours 5m.wpo (1)  
 Obstacles not used in calculation  
 Eye height: 1.5 m  
 Grid resolution: 10 m



Scale 1:200,000

New WTG

Shadow receptor

### WTGs

UTM NAD83 Zone: 18				Row data/Description	WTG type		Power, rated [kW]	Rotor diameter [m]	Hub height [m]	RPM [RPM]
East	North	Z	Valid		Manufact.	Type-generator				
UTM NAD83 Zone: 18				[m]						
01	414,816	4,884,096	121.2	GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7
02	415,026	4,883,858	122.0	GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7
03	415,209	4,883,518	120.0	GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7
04	415,410	4,883,294	118.9	GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7
05	415,646	4,883,048	116.6	GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7
06	415,848	4,882,809	113.7	GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7
07	414,931	4,886,777	115.7	GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7
08	415,162	4,886,587	117.7	GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7
09	419,101	4,887,364	135.0	GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7
10	415,582	4,886,125	120.6	GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7
11	415,834	4,885,896	124.8	GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7
12	415,584	4,885,262	121.2	GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7
13	415,757	4,885,011	123.8	GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7
14	415,937	4,884,771	125.0	GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7
15	416,144	4,884,544	125.0	GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7
16	416,360	4,884,320	125.0	GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7
17	416,114	4,885,649	125.0	GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7
18	416,722	4,885,273	125.0	GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7
19	417,491	4,883,804	116.7	GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7
20	417,765	4,883,652	121.0	GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7
21	418,039	4,883,476	122.4	GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7
22	418,260	4,883,247	119.1	GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7
24	416,015	4,887,350	125.0	GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7
25	416,417	4,886,728	125.1	GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7

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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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## SHADOW - Main Result

Calculation: 05030 SFA Gamesa G90\_R2

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UTM NAD83 Zone: 18				WTG type							
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	RPM [RPM]	
UTM NAD83 Zone: 18				[m]							
28	417,458	4,885,833	125.4 GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7		
29	417,766	4,885,724	125.1 GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7		
31	418,662	4,884,720	122.6 GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7		
32	418,890	4,884,509	125.0 GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7		
33	419,138	4,884,303	125.0 GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7		
35	417,678	4,886,530	128.3 GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7		
36	417,420	4,886,838	128.9 GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7		
38	419,070	4,885,660	125.0 GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7		
39	419,289	4,885,444	128.7 GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7		
40	419,504	4,885,234	127.0 GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7		
41	416,973	4,882,831	115.0 GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7		
42	417,879	4,888,143	130.4 GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7		
43	418,132	4,887,976	132.2 GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7		
44	418,387	4,887,724	134.3 GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7		
45	418,773	4,887,578	135.0 GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7		
46	417,947	4,889,134	125.7 GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7		
47	419,755	4,887,724	135.0 GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7		
48	416,734	4,883,006	115.0 GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7		
49	419,499	4,886,268	125.7 GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7		
50	419,670	4,886,024	130.0 GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7		
52	419,325	4,888,329	139.2 GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7		
53	419,531	4,888,056	137.8 GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7		
54	418,764	4,889,390	132.7 GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7		
55	419,740	4,889,165	140.0 GAMESA G90/2000 2000 90.0 !...Yes	GAMESA	G90/2000-2,000	2,000	90.0	100.0	16.7		

## Shadow receptor-Input

UTM NAD83 Zone: 18									Direction mode	
No.	East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode	
			[m]	[m]	[m]	[m]	[°]	[°]		
R-1	419,854	4,889,824	136.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-10	420,999	4,889,991	140.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-100	418,993	4,886,393	126.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-101	419,285	4,886,597	127.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-102	419,320	4,886,635	127.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-103	419,381	4,886,687	127.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-104	419,469	4,886,750	126.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-105	416,752	4,885,796	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-106	416,495	4,886,042	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-107	416,323	4,886,083	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-108	417,460	4,885,155	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-109	417,077	4,884,610	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-11	420,305	4,891,388	135.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-110	416,712	4,884,105	121.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-111	415,639	4,884,146	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-112	415,579	4,884,227	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-113	415,959	4,883,438	119.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-115	415,528	4,884,314	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-116	415,506	4,884,346	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-117	415,394	4,884,420	124.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"	

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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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## SHADOW - Main Result

Calculation: 05030 SFA Gamesa G90\_R2

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UTM NAD83 Zone: 18

No.	East	North	Z	Width	Height	Height	Degrees from	Slope of	Direction mode
				[m]	[m]	a.g.l.	south cw	window	
			[m]	[m]	[m]	[m]	[°]	[°]	
R-119	415,139	4,884,966	120.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-12	420,369	4,891,475	135.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-120	414,962	4,885,449	116.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-121	414,940	4,885,534	116.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-122	414,928	4,885,643	116.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-123	415,215	4,885,044	120.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-124	415,400	4,884,567	124.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-125	414,663	4,884,749	117.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-126	414,799	4,884,875	118.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-127	415,061	4,885,479	117.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-128	414,949	4,885,905	116.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-129	414,840	4,885,952	115.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-13	418,554	4,889,946	125.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-130	414,910	4,886,045	115.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-131	415,018	4,885,752	117.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-132	416,388	4,882,693	111.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-133	416,506	4,882,467	110.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-134	415,617	4,882,173	107.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-135	415,762	4,882,212	106.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-136	416,542	4,882,379	110.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-137	417,411	4,882,718	115.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-138	417,876	4,882,761	111.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-139	417,176	4,883,474	115.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-14	418,373	4,888,957	132.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-140	416,965	4,883,922	115.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-141	416,929	4,884,008	117.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-142	416,443	4,883,603	116.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-143	416,881	4,883,927	116.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-144	416,875	4,883,880	115.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-145	417,032	4,884,460	123.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-146	417,490	4,885,220	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-147	417,192	4,885,518	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-148	417,724	4,884,898	118.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-149	417,778	4,885,033	120.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-15	418,469	4,888,921	134.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-150	416,652	4,886,360	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-151	416,792	4,885,867	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-152	420,115	4,888,740	140.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-153	418,595	4,882,803	110.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-154	418,428	4,882,785	110.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-155	419,156	4,883,116	109.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-156	419,028	4,883,715	123.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-157	418,815	4,883,934	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-158	419,013	4,883,775	123.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-159	419,074	4,883,795	124.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-16	418,554	4,888,975	135.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-160	419,277	4,883,689	121.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-161	418,331	4,884,469	123.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-162	418,087	4,885,363	120.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-163	418,330	4,885,587	122.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-165	418,547	4,885,894	125.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"

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## SHADOW - Main Result

Calculation: 05030 SFA Gamesa G90\_R2

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UTM NAD83 Zone: 18

No.	East	North	Z	Width	Height	Height	Degrees from	Slope of	Direction mode
				[m]	[m]	a.g.l.	south cw	window	
			[m]	[m]	[m]	[m]	[°]	[°]	
R-166	418,786	4,886,099	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-167	418,671	4,885,845	121.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-168	418,854	4,886,072	124.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-169	419,106	4,886,319	123.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-17	418,471	4,888,836	135.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-170	421,503	4,884,959	116.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-171	421,440	4,884,927	119.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-172	421,010	4,885,135	115.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-174	421,106	4,885,053	116.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-175	420,898	4,885,159	116.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-176	420,829	4,885,153	117.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-177	420,565	4,885,134	118.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-178	420,282	4,885,107	119.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-179	420,169	4,885,123	115.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-18	418,559	4,888,869	135.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-180	419,876	4,884,899	123.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-182	420,002	4,885,117	119.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-183	415,017	4,885,295	118.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-184	415,056	4,885,167	119.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-185	414,654	4,887,276	107.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-186	414,588	4,887,179	108.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-187	418,141	4,889,788	117.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-188	420,280	4,884,282	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-189	420,175	4,883,616	119.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-19	419,335	4,889,160	136.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-190	416,238	4,883,081	113.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-191	418,648	4,885,111	122.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-192	418,451	4,885,590	120.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-193	418,602	4,885,726	120.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-194	421,017	4,885,223	115.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-195	421,980	4,891,436	130.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-196	421,982	4,891,380	130.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-197	421,840	4,891,370	131.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-198	421,914	4,890,992	130.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-2	420,034	4,889,630	139.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-20	418,268	4,888,749	134.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-201	422,137	4,890,230	135.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-202	421,643	4,890,330	134.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-203	422,369	4,889,567	136.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-204	422,361	4,885,613	115.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-205	422,350	4,885,518	118.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-206	422,328	4,885,466	117.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-207	422,313	4,885,400	117.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-208	422,281	4,885,347	116.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-209	421,303	4,886,229	121.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-21	418,031	4,888,708	129.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-210	421,372	4,885,596	116.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-211	421,647	4,884,879	111.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-212	421,629	4,884,925	111.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-213	421,661	4,884,931	110.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-214	421,904	4,884,857	110.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"

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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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## SHADOW - Main Result

Calculation: 05030 SFA Gamesa G90\_R2

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UTM NAD83 Zone: 18

No.	East	North	Z	Width	Height	Height	Degrees from	Slope of	Direction mode
			[m]	[m]	[m]	a.g.l.	south cw	window	
			[m]	[m]	[m]	[m]	[°]	[°]	
R-215	421,924	4,884,887	108.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-216	421,947	4,884,910	106.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-217	421,982	4,884,988	105.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-218	422,016	4,885,010	105.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-219	422,043	4,885,043	108.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-22	417,693	4,888,489	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-220	422,039	4,885,083	110.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-221	422,088	4,885,095	114.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-222	422,081	4,885,146	115.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-223	422,205	4,885,232	116.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-224	421,841	4,884,887	108.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-225	421,703	4,884,916	110.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-226	421,778	4,884,723	110.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-227	421,853	4,884,835	110.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-228	421,837	4,884,785	110.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-229	421,820	4,884,753	110.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-23	417,046	4,888,265	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-230	421,703	4,884,602	114.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-231	421,582	4,884,427	114.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-232	421,524	4,884,356	113.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-233	421,509	4,884,299	113.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-234	420,103	4,883,203	110.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-235	420,030	4,883,151	110.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-236	420,022	4,883,237	110.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-237	419,341	4,883,023	110.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-238	419,326	4,882,950	110.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-239	418,400	4,882,707	110.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-24	416,791	4,888,213	124.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-240	418,236	4,882,693	110.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-241	418,139	4,882,672	110.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-242	417,359	4,882,723	115.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-243	417,648	4,882,664	112.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-244	416,725	4,882,446	112.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-245	416,654	4,882,406	110.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-246	415,493	4,881,768	100.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-247	415,475	4,881,955	103.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-248	414,136	4,881,795	105.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-249	414,163	4,882,664	112.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-25	416,483	4,888,054	122.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-250	414,323	4,881,811	105.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-251	414,704	4,881,891	105.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-252	414,029	4,883,588	117.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-253	414,026	4,883,435	117.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-254	414,150	4,882,990	115.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-255	414,577	4,887,486	103.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-256	414,584	4,887,524	102.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-257	414,649	4,887,521	102.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-258	414,923	4,887,561	100.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-259	415,307	4,887,732	104.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-26	416,276	4,888,099	119.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-260	415,406	4,887,817	100.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"

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## SHADOW - Main Result

Calculation: 05030 SFA Gamesa G90\_R2

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UTM NAD83 Zone: 18

No.	East	North	Z	Width	Height	Height	Degrees from	Slope of	Direction mode
			[m]	[m]	[m]	a.g.l.	south cw	window	
						[m]	[°]	[°]	
R-261	415,634	4,887,916	106.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-262	415,146	4,887,819	89.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-263	414,889	4,887,845	90.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-264	414,988	4,887,768	91.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-265	415,198	4,887,501	108.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-266	415,004	4,887,588	97.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-267	414,773	4,887,845	90.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-268	414,284	4,887,533	91.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-269	414,344	4,887,578	90.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-27	416,176	4,887,967	120.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-270	414,401	4,887,628	90.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-271	414,421	4,887,653	90.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-272	414,440	4,887,664	91.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-273	414,462	4,887,697	89.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-274	414,471	4,887,706	89.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-275	414,491	4,887,731	88.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-276	414,515	4,887,759	88.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-277	414,578	4,887,575	100.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-278	414,576	4,887,619	100.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-279	414,567	4,887,639	98.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-28	416,073	4,887,822	122.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-280	414,566	4,887,672	96.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-281	414,559	4,887,701	93.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-282	414,561	4,887,702	94.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-283	414,551	4,887,733	90.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-284	414,552	4,887,775	88.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-285	414,533	4,887,796	87.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-286	414,409	4,887,721	87.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-287	414,367	4,887,687	87.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-288	414,343	4,887,662	87.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-289	414,131	4,887,444	90.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-29	415,620	4,887,785	111.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-290	414,171	4,887,492	88.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-291	414,244	4,887,564	88.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-292	414,273	4,887,579	88.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-293	414,305	4,887,612	87.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-294	414,329	4,887,643	86.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-295	414,117	4,887,308	100.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-296	414,587	4,887,761	89.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-297	414,956	4,887,637	98.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-298	414,898	4,887,695	98.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-299	414,889	4,887,706	98.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-3	420,052	4,889,577	139.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-30	416,024	4,887,724	123.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-300	414,843	4,887,748	95.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-301	414,888	4,887,777	93.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-302	414,827	4,887,778	93.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-303	414,645	4,887,545	102.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-304	414,897	4,887,599	100.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-305	414,850	4,887,616	100.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-306	414,842	4,887,670	100.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"

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## SHADOW - Main Result

Calculation: 05030 SFA Gamesa G90\_R2

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UTM NAD83 Zone: 18

No.	East	North	Z	Width	Height	Height	Degrees from	Slope of	Direction mode
			[m]	[m]	[m]	a.g.l.	south cw	window	
			[m]	[m]	[m]	[m]	[°]	[°]	
R-307	414,753	4,887,659	99.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-308	414,631	4,887,575	101.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-309	414,631	4,887,595	100.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-31	416,395	4,887,865	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-310	414,633	4,887,634	98.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-311	414,625	4,887,658	97.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-312	414,619	4,887,682	96.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-313	414,601	4,887,706	95.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-314	414,727	4,887,597	100.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-315	414,698	4,887,621	100.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-316	414,713	4,887,629	100.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-317	414,796	4,887,730	95.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-319	418,630	4,887,159	132.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-32	416,455	4,887,901	124.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-321	417,402	4,884,778	122.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-322	418,664	4,882,751	109.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-324	421,448	4,885,607	115.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-325	418,346	4,889,948	118.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-326	413,843	4,881,723	101.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-327	413,814	4,881,684	100.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-328	413,859	4,881,631	100.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-329	413,985	4,881,685	100.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-33	416,652	4,887,961	125.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-330	414,101	4,881,709	101.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-331	413,725	4,881,584	96.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-332	413,494	4,881,570	95.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-333	413,394	4,881,471	94.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-334	413,394	4,881,529	95.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-335	413,135	4,881,420	95.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-336	412,855	4,881,290	94.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-337	412,167	4,881,068	93.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-338	412,124	4,881,023	93.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-339	412,021	4,880,890	92.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-34	417,257	4,888,166	125.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-340	411,313	4,880,580	93.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-341	411,436	4,880,631	94.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-342	415,517	4,881,486	100.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-343	415,401	4,881,326	100.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-344	415,355	4,881,370	99.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-345	415,219	4,880,999	102.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-346	415,344	4,880,914	102.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-347	415,119	4,880,878	102.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-348	414,658	4,880,310	100.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-349	414,883	4,880,439	101.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-35	420,161	4,889,178	140.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-350	414,711	4,880,349	100.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-351	414,338	4,879,859	98.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-352	414,287	4,879,708	98.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-353	414,205	4,879,635	98.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-354	414,407	4,879,285	99.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-355	414,080	4,879,316	95.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"

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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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## SHADOW - Main Result

Calculation: 05030 SFA Gamesa G90\_R2

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UTM NAD83 Zone: 18

No.	East	North	Z	Width	Height	Height	Degrees from	Slope of	Direction mode
			[m]	[m]	[m]	a.g.l.	south cw	window	
						[m]	[°]	[°]	
R-356	413,882	4,879,323	95.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-357	413,769	4,879,318	94.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-358	413,656	4,879,336	92.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-359	414,027	4,878,839	95.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-36	420,164	4,889,093	140.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-360	414,184	4,878,923	95.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-361	415,225	4,879,144	100.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-362	414,903	4,879,208	100.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-363	415,080	4,878,870	100.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-364	415,131	4,878,377	100.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-365	415,080	4,878,671	100.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-366	415,135	4,878,716	100.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-367	415,143	4,878,661	100.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-368	415,294	4,878,995	101.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-369	415,413	4,878,945	101.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-37	420,096	4,888,928	140.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-370	415,493	4,879,007	102.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-371	415,654	4,879,018	103.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-372	415,530	4,878,907	102.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-373	415,722	4,879,066	103.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-374	415,876	4,879,152	103.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-375	415,956	4,879,200	104.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-376	416,184	4,879,292	105.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-377	416,674	4,879,725	105.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-378	416,592	4,879,694	105.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-379	416,560	4,879,665	105.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-38	420,103	4,888,997	140.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-380	416,528	4,879,630	105.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-381	416,501	4,879,606	105.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-382	416,343	4,879,503	105.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-383	416,330	4,879,471	105.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-384	416,356	4,887,153	125.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-387	416,475	4,883,682	117.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-388	419,856	4,882,958	110.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-389	421,747	4,884,650	112.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-39	420,172	4,888,860	140.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-390	421,185	4,885,058	117.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-391	421,157	4,885,008	118.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-392	421,205	4,885,030	118.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-393	421,228	4,885,045	118.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-394	420,957	4,884,977	117.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-395	420,542	4,885,196	116.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-396	419,841	4,884,962	124.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-397	420,499	4,891,372	135.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-398	421,584	4,891,442	135.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-399	421,773	4,890,558	131.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-4	420,073	4,889,536	140.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-401	417,940	4,887,361	131.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-402	415,174	4,884,761	122.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-403	414,705	4,887,100	110.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-404	417,946	4,884,689	115.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"

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05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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**SHADOW - Main Result****Calculation:** 05030 SFA Gamesa G90\_R2

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UTM NAD83 Zone: 18

No.	East	North	Z	Width	Height	Height	Degrees from	Slope of	Direction mode
				[m]	[m]	a.g.l.	south cw	window	
			[m]	[m]	[m]	[m]	[°]	[°]	
R-405	418,032	4,884,578	119.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-406	419,101	4,883,835	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-407	419,780	4,884,657	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-408	419,865	4,884,865	123.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-409	419,144	4,886,429	125.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-41	420,190	4,888,944	140.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-410	420,081	4,886,464	130.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-42	420,159	4,889,001	140.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-43	420,208	4,888,243	135.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-44	420,223	4,888,135	135.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-45	420,226	4,888,049	135.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-46	420,270	4,887,937	134.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-47	420,232	4,887,817	134.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-48	420,245	4,887,846	134.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-5	420,070	4,889,414	140.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-51	420,267	4,887,772	134.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-52	420,279	4,887,677	133.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-53	420,260	4,887,626	133.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-54	420,194	4,887,572	132.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-55	420,279	4,887,404	130.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-56	420,221	4,887,285	130.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-57	420,045	4,887,138	129.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-58	420,422	4,886,445	130.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-59	420,238	4,886,322	130.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-6	419,178	4,889,255	135.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-60	420,374	4,886,341	130.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-61	420,884	4,886,439	127.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-62	420,754	4,886,410	129.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-63	420,491	4,886,373	130.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-65	419,544	4,886,857	127.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-66	419,601	4,886,903	127.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-67	419,682	4,886,997	127.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-68	419,745	4,887,064	127.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-69	419,818	4,887,128	128.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-7	420,166	4,889,334	140.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-71	419,566	4,886,963	129.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-72	419,442	4,886,858	130.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-73	417,835	4,887,270	130.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-74	416,934	4,887,161	127.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-75	416,706	4,887,178	126.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-76	416,496	4,887,128	125.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-77	417,223	4,887,177	128.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-78	415,488	4,887,088	118.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-79	415,417	4,887,151	117.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-8	421,226	4,889,951	137.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-80	415,230	4,887,327	112.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-81	415,121	4,887,441	107.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-82	415,255	4,887,212	115.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-83	415,654	4,886,733	123.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-84	415,792	4,886,646	124.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-85	415,833	4,886,551	124.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"

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**SHADOW - Main Result**

Calculation: 05030 SFA Gamesa G90\_R2

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UTM NAD83 Zone: 18

No.	East	North	Z	Width	Height	Height	Degrees from	Slope of	Direction mode
			[m]	[m]	[m]	a.g.l.	south cw	window	
			[m]	[m]	[m]	[m]	[°]	[°]	
R-86	416,125	4,886,406	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-87	415,583	4,886,993	120.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-88	416,800	4,887,085	127.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-89	417,730	4,887,095	130.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-9	421,113	4,889,891	138.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-90	418,085	4,887,196	131.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-91	418,213	4,887,217	132.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-92	418,367	4,887,168	132.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-93	418,438	4,887,121	132.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-94	418,593	4,887,092	132.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-95	418,969	4,886,958	132.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-96	419,208	4,886,881	131.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-97	419,317	4,886,828	130.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-98	419,287	4,886,708	129.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-99	419,198	4,886,645	129.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"

**Calculation Results**

Shadow receptor

Shadow, worst case

Shadow, expected values

No.	Shadow hours	Shadow days	Max shadow	Shadow hours
	per year	per year	hours per day	per year
	[h/year]	[days/year]	[h/day]	[h/year]
R-1	0:00	0	0:00	0:00
R-10	0:00	0	0:00	0:00
R-100	40:33	91	0:39	9:12
R-101	58:38	76	0:56	8:57
R-102	22:26	42	0:40	3:30
R-103	0:00	0	0:00	0:00
R-104	0:00	0	0:00	0:00
R-105	41:07	81	0:53	12:28
R-106	76:30	145	0:52	19:19
R-107	40:33	91	0:40	12:03
R-108	14:53	40	0:29	4:15
R-109	21:32	66	0:28	6:18
R-11	0:00	0	0:00	0:00
R-110	11:14	34	0:25	2:24
R-111	47:02	125	0:32	14:52
R-112	51:23	141	0:33	14:15
R-113	82:21	184	0:42	20:38
R-115	99:49	225	0:34	31:41
R-116	76:10	195	0:33	23:32
R-117	43:37	120	0:33	12:40
R-119	31:34	80	0:34	9:13
R-12	0:00	0	0:00	0:00
R-120	43:10	127	0:32	12:01
R-121	47:07	150	0:30	12:41
R-122	27:37	82	0:28	6:54
R-123	37:21	86	0:38	9:52
R-124	101:26	224	0:39	32:24
R-125	0:00	0	0:00	0:00

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**SHADOW - Main Result****Calculation:** 05030 SFA Gamesa G90\_R2

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No.	Shadow, worst case		Max shadow hours per day [h/day]	Shadow, expected values
	Shadow hours per year [h/year]	Shadow days per year [days/year]		Shadow hours per year [h/year]
R-126	29:13	88	0:26	11:27
R-127	47:23	130	0:37	10:42
R-128	60:28	161	0:33	19:52
R-129	24:22	73	0:29	8:07
R-13	0:00	0	0:00	0:00
R-130	26:21	72	0:31	8:06
R-131	45:47	117	0:30	8:49
R-132	89:27	130	1:13	28:28
R-133	21:56	54	0:29	6:34
R-134	0:00	0	0:00	0:00
R-135	0:00	0	0:00	0:00
R-136	0:00	0	0:00	0:00
R-137	105:02	118	1:14	31:46
R-138	9:17	30	0:23	2:41
R-139	74:08	182	0:35	24:00
R-14	57:51	83	0:48	17:34
R-140	33:51	75	0:38	8:18
R-141	36:00	94	0:35	8:45
R-142	16:18	56	0:23	3:32
R-143	26:35	67	0:33	6:31
R-144	27:01	72	0:33	7:05
R-145	24:48	71	0:31	7:21
R-146	12:50	36	0:28	3:45
R-147	76:00	148	0:40	27:03
R-148	7:55	28	0:22	1:59
R-149	8:46	30	0:23	1:54
R-15	51:27	89	0:40	15:36
R-150	24:18	52	0:45	4:31
R-151	46:18	101	0:53	13:19
R-152	11:54	38	0:24	2:57
R-153	0:00	0	0:00	0:00
R-154	0:00	0	0:00	0:00
R-155	9:57	32	0:24	2:51
R-156	14:03	45	0:25	3:07
R-157	13:12	42	0:25	2:58
R-158	18:43	62	0:24	4:03
R-159	14:27	52	0:22	3:08
R-16	25:35	58	0:35	7:26
R-160	0:00	0	0:00	0:00
R-161	36:05	84	0:38	10:45
R-162	0:14	5	0:03	0:01
R-163	58:40	120	0:52	17:25
R-165	47:41	107	0:46	10:20
R-166	38:00	109	0:30	10:26
R-167	80:21	173	0:49	20:09
R-168	45:54	125	0:33	14:45
R-169	64:28	114	0:51	16:19
R-17	24:51	76	0:27	5:55
R-170	0:00	0	0:00	0:00
R-171	0:00	0	0:00	0:00
R-172	0:00	0	0:00	0:00

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**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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## SHADOW - Main Result

**Calculation:** 05030 SFA Gamesa G90\_R2

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No.	Shadow, worst case		Max shadow hours per day [h/day]	Shadow, expected values
	Shadow hours per year [h/year]	Shadow days per year [days/year]		Shadow hours per year [h/year]
R-174	0:00	0	0:00	0:00
R-175	0:00	0	0:00	0:00
R-176	0:00	0	0:00	0:00
R-177	0:00	0	0:00	0:00
R-178	13:38	39	0:27	3:54
R-179	33:35	90	0:32	9:50
R-18	55:59	133	0:34	14:36
R-180	21:55	62	0:24	4:33
R-182	72:42	122	0:52	21:44
R-183	34:34	82	0:36	9:06
R-184	56:28	135	0:40	16:51
R-185	0:00	0	0:00	0:00
R-186	54:37	74	0:57	8:03
R-187	17:23	46	0:29	2:53
R-188	0:00	0	0:00	0:00
R-189	0:00	0	0:00	0:00
R-19	93:41	161	0:51	29:02
R-190	115:22	202	1:15	31:30
R-191	22:59	72	0:25	8:40
R-192	49:49	88	1:03	14:52
R-193	55:48	95	1:08	14:41
R-194	0:00	0	0:00	0:00
R-195	0:00	0	0:00	0:00
R-196	0:00	0	0:00	0:00
R-197	0:00	0	0:00	0:00
R-198	0:00	0	0:00	0:00
R-2	0:00	0	0:00	0:00
R-20	0:00	0	0:00	0:00
R-201	0:00	0	0:00	0:00
R-202	0:00	0	0:00	0:00
R-203	0:00	0	0:00	0:00
R-204	0:00	0	0:00	0:00
R-205	0:00	0	0:00	0:00
R-206	0:00	0	0:00	0:00
R-207	0:00	0	0:00	0:00
R-208	0:00	0	0:00	0:00
R-209	0:00	0	0:00	0:00
R-21	0:00	0	0:00	0:00
R-210	0:00	0	0:00	0:00
R-211	0:00	0	0:00	0:00
R-212	0:00	0	0:00	0:00
R-213	0:00	0	0:00	0:00
R-214	0:00	0	0:00	0:00
R-215	0:00	0	0:00	0:00
R-216	0:00	0	0:00	0:00
R-217	0:00	0	0:00	0:00
R-218	0:00	0	0:00	0:00
R-219	0:00	0	0:00	0:00
R-22	67:05	66	1:24	10:22
R-220	0:00	0	0:00	0:00
R-221	0:00	0	0:00	0:00

To be continued on next page...



Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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**SHADOW - Main Result****Calculation:** 05030 SFA Gamesa G90\_R2

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No.	Shadow, worst case		Max shadow hours per day [h/day]	Shadow, expected values
	Shadow hours per year [h/year]	Shadow days per year [days/year]		Shadow hours per year [h/year]
R-222	0:00	0	0:00	0:00
R-223	0:00	0	0:00	0:00
R-224	0:00	0	0:00	0:00
R-225	0:00	0	0:00	0:00
R-226	0:00	0	0:00	0:00
R-227	0:00	0	0:00	0:00
R-228	0:00	0	0:00	0:00
R-229	0:00	0	0:00	0:00
R-23	10:04	31	0:25	2:42
R-230	0:00	0	0:00	0:00
R-231	0:00	0	0:00	0:00
R-232	0:00	0	0:00	0:00
R-233	0:00	0	0:00	0:00
R-234	0:00	0	0:00	0:00
R-235	0:00	0	0:00	0:00
R-236	0:00	0	0:00	0:00
R-237	0:00	0	0:00	0:00
R-238	0:00	0	0:00	0:00
R-239	0:00	0	0:00	0:00
R-24	0:00	0	0:00	0:00
R-240	0:00	0	0:00	0:00
R-241	0:00	0	0:00	0:00
R-242	121:29	110	1:24	36:55
R-243	33:08	70	0:47	9:41
R-244	16:22	55	0:23	4:54
R-245	23:48	64	0:25	7:08
R-246	0:00	0	0:00	0:00
R-247	0:00	0	0:00	0:00
R-248	0:00	0	0:00	0:00
R-249	0:00	0	0:00	0:00
R-25	0:00	0	0:00	0:00
R-250	0:00	0	0:00	0:00
R-251	0:00	0	0:00	0:00
R-252	0:00	0	0:00	0:00
R-253	0:00	0	0:00	0:00
R-254	0:00	0	0:00	0:00
R-255	0:00	0	0:00	0:00
R-256	0:00	0	0:00	0:00
R-257	0:00	0	0:00	0:00
R-258	0:00	0	0:00	0:00
R-259	13:16	39	0:27	2:34
R-26	0:00	0	0:00	0:00
R-260	19:41	54	0:29	3:00
R-261	0:00	0	0:00	0:00
R-262	8:52	32	0:22	1:41
R-263	0:00	0	0:00	0:00
R-264	0:00	0	0:00	0:00
R-265	10:18	31	0:25	2:40
R-266	0:00	0	0:00	0:00
R-267	0:00	0	0:00	0:00
R-268	0:00	0	0:00	0:00

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**SHADOW - Main Result****Calculation:** 05030 SFA Gamesa G90\_R2

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No.	Shadow, worst case		Max shadow hours per day [h/day]	Shadow, expected values
	Shadow hours per year [h/year]	Shadow days per year [days/year]		Shadow hours per year [h/year]
R-269	0:00	0	0:00	0:00
R-27	0:00	0	0:00	0:00
R-270	0:00	0	0:00	0:00
R-271	0:00	0	0:00	0:00
R-272	0:00	0	0:00	0:00
R-273	0:00	0	0:00	0:00
R-274	0:00	0	0:00	0:00
R-275	0:00	0	0:00	0:00
R-276	0:00	0	0:00	0:00
R-277	0:00	0	0:00	0:00
R-278	0:00	0	0:00	0:00
R-279	0:00	0	0:00	0:00
R-28	0:00	0	0:00	0:00
R-280	0:00	0	0:00	0:00
R-281	0:00	0	0:00	0:00
R-282	0:00	0	0:00	0:00
R-283	0:00	0	0:00	0:00
R-284	0:00	0	0:00	0:00
R-285	0:00	0	0:00	0:00
R-286	0:00	0	0:00	0:00
R-287	0:00	0	0:00	0:00
R-288	0:00	0	0:00	0:00
R-289	0:00	0	0:00	0:00
R-29	41:19	74	0:38	6:07
R-290	0:00	0	0:00	0:00
R-291	0:00	0	0:00	0:00
R-292	0:00	0	0:00	0:00
R-293	0:00	0	0:00	0:00
R-294	0:00	0	0:00	0:00
R-295	11:31	40	0:23	1:44
R-296	0:00	0	0:00	0:00
R-297	0:00	0	0:00	0:00
R-298	0:00	0	0:00	0:00
R-299	0:00	0	0:00	0:00
R-3	25:30	50	0:38	5:19
R-30	0:00	0	0:00	0:00
R-300	0:00	0	0:00	0:00
R-301	0:00	0	0:00	0:00
R-302	0:00	0	0:00	0:00
R-303	0:00	0	0:00	0:00
R-304	0:00	0	0:00	0:00
R-305	0:00	0	0:00	0:00
R-306	0:00	0	0:00	0:00
R-307	0:00	0	0:00	0:00
R-308	0:00	0	0:00	0:00
R-309	0:00	0	0:00	0:00
R-31	0:00	0	0:00	0:00
R-310	0:00	0	0:00	0:00
R-311	0:00	0	0:00	0:00
R-312	0:00	0	0:00	0:00
R-313	0:00	0	0:00	0:00

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**SHADOW - Main Result****Calculation:** 05030 SFA Gamesa G90\_R2

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No.	Shadow, worst case		Max shadow hours per day [h/day]	Shadow, expected values
	Shadow hours per year [h/year]	Shadow days per year [days/year]		Shadow hours per year [h/year]
R-314	0:00	0	0:00	0:00
R-315	0:00	0	0:00	0:00
R-316	0:00	0	0:00	0:00
R-317	0:00	0	0:00	0:00
R-319	36:08	64	0:41	14:57
R-32	0:00	0	0:00	0:00
R-321	0:00	0	0:00	0:00
R-322	0:00	0	0:00	0:00
R-324	0:00	0	0:00	0:00
R-325	3:13	18	0:14	0:25
R-326	0:00	0	0:00	0:00
R-327	0:00	0	0:00	0:00
R-328	0:00	0	0:00	0:00
R-329	0:00	0	0:00	0:00
R-33	10:58	38	0:22	2:12
R-330	0:00	0	0:00	0:00
R-331	0:00	0	0:00	0:00
R-332	0:00	0	0:00	0:00
R-333	0:00	0	0:00	0:00
R-334	0:00	0	0:00	0:00
R-335	0:00	0	0:00	0:00
R-336	0:00	0	0:00	0:00
R-337	0:00	0	0:00	0:00
R-338	0:00	0	0:00	0:00
R-339	0:00	0	0:00	0:00
R-34	27:55	74	0:34	7:44
R-340	0:00	0	0:00	0:00
R-341	0:00	0	0:00	0:00
R-342	0:00	0	0:00	0:00
R-343	0:00	0	0:00	0:00
R-344	0:00	0	0:00	0:00
R-345	0:00	0	0:00	0:00
R-346	0:00	0	0:00	0:00
R-347	0:00	0	0:00	0:00
R-348	0:00	0	0:00	0:00
R-349	0:00	0	0:00	0:00
R-35	41:03	66	0:48	12:39
R-350	0:00	0	0:00	0:00
R-351	0:00	0	0:00	0:00
R-352	0:00	0	0:00	0:00
R-353	0:00	0	0:00	0:00
R-354	0:00	0	0:00	0:00
R-355	0:00	0	0:00	0:00
R-356	0:00	0	0:00	0:00
R-357	0:00	0	0:00	0:00
R-358	0:00	0	0:00	0:00
R-359	0:00	0	0:00	0:00
R-36	52:17	85	0:49	15:33
R-360	0:00	0	0:00	0:00
R-361	0:00	0	0:00	0:00
R-362	0:00	0	0:00	0:00

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**SHADOW - Main Result****Calculation:** 05030 SFA Gamesa G90\_R2

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No.	Shadow, worst case		Max shadow hours per day [h/day]	Shadow, expected values
	Shadow hours per year [h/year]	Shadow days per year [days/year]		Shadow hours per year [h/year]
R-363	0:00	0	0:00	0:00
R-364	0:00	0	0:00	0:00
R-365	0:00	0	0:00	0:00
R-366	0:00	0	0:00	0:00
R-367	0:00	0	0:00	0:00
R-368	0:00	0	0:00	0:00
R-369	0:00	0	0:00	0:00
R-37	21:49	66	0:23	4:32
R-370	0:00	0	0:00	0:00
R-371	0:00	0	0:00	0:00
R-372	0:00	0	0:00	0:00
R-373	0:00	0	0:00	0:00
R-374	0:00	0	0:00	0:00
R-375	0:00	0	0:00	0:00
R-376	0:00	0	0:00	0:00
R-377	0:00	0	0:00	0:00
R-378	0:00	0	0:00	0:00
R-379	0:00	0	0:00	0:00
R-38	37:43	59	0:47	11:24
R-380	0:00	0	0:00	0:00
R-381	0:00	0	0:00	0:00
R-382	0:00	0	0:00	0:00
R-383	0:00	0	0:00	0:00
R-384	0:00	0	0:00	0:00
R-387	0:00	0	0:00	0:00
R-388	0:00	0	0:00	0:00
R-389	0:00	0	0:00	0:00
R-39	11:59	42	0:22	2:38
R-390	0:00	0	0:00	0:00
R-391	0:00	0	0:00	0:00
R-392	0:00	0	0:00	0:00
R-393	0:00	0	0:00	0:00
R-394	0:00	0	0:00	0:00
R-395	0:00	0	0:00	0:00
R-396	8:15	32	0:19	1:37
R-397	0:00	0	0:00	0:00
R-398	0:00	0	0:00	0:00
R-399	0:00	0	0:00	0:00
R-4	48:24	74	0:45	10:25
R-401	31:10	88	0:28	8:48
R-402	56:39	133	0:36	20:29
R-403	89:18	86	1:22	13:29
R-404	22:47	68	0:29	6:36
R-405	34:09	89	0:34	11:25
R-406	0:00	0	0:00	0:00
R-407	26:09	76	0:30	7:03
R-408	24:17	70	0:25	5:05
R-409	73:37	135	0:52	14:36
R-41	30:26	57	0:40	9:09
R-410	49:52	105	0:37	12:17
R-42	60:01	84	0:49	18:17

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05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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**SHADOW - Main Result****Calculation:** 05030 SFA Gamesa G90\_R2

...continued from previous page

No.	Shadow, worst case		Max shadow hours per day [h/day]	Shadow, expected values
	Shadow hours per year [h/year]	Shadow days per year [days/year]		Shadow hours per year [h/year]
R-43	33:03	101	0:30	9:08
R-44	67:26	154	0:36	17:11
R-45	59:04	144	0:38	16:06
R-46	39:17	90	0:37	11:35
R-47	52:23	116	0:42	16:04
R-48	46:43	102	0:41	14:17
R-5	55:07	86	0:51	14:00
R-51	51:05	121	0:40	15:39
R-52	52:16	116	0:40	15:38
R-53	41:03	93	0:41	11:56
R-54	66:22	96	0:47	20:15
R-55	0:00	0	0:00	0:00
R-56	0:00	0	0:00	0:00
R-57	9:43	34	0:22	2:44
R-58	21:34	70	0:25	5:35
R-59	34:13	86	0:33	9:46
R-6	96:01	148	0:50	28:31
R-60	23:12	68	0:28	6:45
R-61	0:00	0	0:00	0:00
R-62	0:00	0	0:00	0:00
R-63	17:35	61	0:24	5:07
R-65	0:00	0	0:00	0:00
R-66	0:00	0	0:00	0:00
R-67	0:00	0	0:00	0:00
R-68	31:13	68	0:32	9:25
R-69	21:14	58	0:29	6:21
R-7	34:08	59	0:45	10:18
R-71	0:00	0	0:00	0:00
R-72	0:00	0	0:00	0:00
R-73	44:28	104	0:38	11:43
R-74	96:14	152	0:56	18:44
R-75	32:13	86	0:30	8:08
R-76	47:24	96	0:42	13:42
R-77	62:04	106	0:54	10:31
R-78	45:36	108	0:41	13:51
R-79	84:43	190	0:36	26:54
R-8	0:00	0	0:00	0:00
R-80	12:20	36	0:26	3:47
R-81	8:56	30	0:23	2:29
R-82	31:19	81	0:31	8:44
R-83	54:23	98	0:55	16:18
R-84	49:45	99	0:55	15:33
R-85	65:53	155	0:36	22:46
R-86	31:21	83	0:35	8:45
R-87	67:37	114	0:55	16:09
R-88	88:04	179	0:42	21:33
R-89	66:54	104	0:53	16:18
R-9	0:00	0	0:00	0:00
R-90	21:14	68	0:29	6:10
R-91	22:09	71	0:25	6:39
R-92	27:57	87	0:29	8:53

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**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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## SHADOW - Main Result

Calculation: 05030 SFA Gamesa G90\_R2

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No.	Shadow, worst case			Shadow, expected values
	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow hours per year [h/year]
R-93	59:52	154	0:32	20:02
R-94	4:45	22	0:16	1:59
R-95	0:00	0	0:00	0:00
R-96	0:00	0	0:00	0:00
R-97	0:00	0	0:00	0:00
R-98	0:00	0	0:00	0:00
R-99	42:51	68	0:46	6:22

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

No.	Name	Worst case [h/year]	Expected [h/year]
01	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (1)	97:14	25:01
02	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (4)	83:49	19:17
03	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (3)	13:46	4:00
04	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (2)	35:03	10:25
05	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (32)	98:32	25:06
06	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (33)	112:21	32:13
07	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (5)	234:50	48:10
08	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (14)	140:54	34:05
09	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (49)	135:51	47:20
10	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (7)	112:52	38:18
11	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (15)	150:40	48:26
12	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (35)	168:57	43:45
13	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (36)	140:41	41:10
14	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (37)	90:34	29:58
15	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (38)	109:04	38:02
16	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (39)	98:24	29:58
17	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (6)	71:38	17:35
18	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (34)	54:42	15:34
19	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (16)	61:01	15:06
20	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (17)	66:19	21:18
21	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (40)	23:14	5:57
22	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (18)	39:27	9:20
24	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (8)	263:24	73:08
25	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (41)	169:53	46:34
28	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (42)	61:48	16:32
29	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (9)	119:57	40:02
31	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (43)	56:16	17:17
32	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (44)	51:57	15:30
33	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (45)	61:31	13:58
35	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (10)	51:12	10:01
36	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (21)	219:55	45:52
38	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (46)	116:01	28:30
39	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (47)	102:54	27:37
40	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (48)	64:48	19:29
41	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (20)	147:33	44:11
42	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (11)	77:05	15:43
43	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (12)	27:28	4:59
44	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (26)	0:00	0:00
45	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (13)	27:10	10:21

To be continued on next page...

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/18/2011 3:47 PM / 19

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Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Main Result****Calculation:** 05030 SFA Gamesa G90\_R2

...continued from previous page

No.	Name	Worst case [h/year]	Expected [h/year]
46	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (27)	100:59	30:19
47	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (22)	271:18	75:39
48	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (19)	111:14	29:16
49	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (25)	297:29	75:01
50	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (50)	130:43	28:26
52	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (24)	100:33	22:41
53	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (23)	124:50	37:10
54	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (28)	116:35	32:32
55	GAMESA G90/2000 2000 90.0 !O! hub: 100.0 m (29)	376:16	106:02

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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Calculated:

3/18/2011 3:22 PM/2.7.453

### SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-105 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (61)

#### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December	
1	07:40 16:36	07:23 17:14	06:43 17:52	6 17:10 (17) 18:47	07:19 (28) 05:57	05:25 20:40	05:25 20:31	05:52 20:31	06:27 19:42	07:03 (28) 19:14 (11)	07:01 18:47	17:35 (17) 16:40	06:40 07:19
2	07:40 16:37	07:22 17:15	06:41 17:53	14 17:07 (17) 19:32	3 07:22 (28) 05:56	20:40 05:24	20:52 05:53	20:30 05:53	06:28 19:40	07:02 (28) 19:13 (11)	07:03 18:45	17:35 (17) 16:42	07:20 07:20
3	07:40 16:38	07:21 17:17	06:40 17:55	19 17:04 (17) 19:33	14 07:12 (28) 05:54	20:40 05:24	20:52 05:54	20:30 05:54	06:29 19:38	07:02 (28) 19:12 (11)	07:04 18:43	17:34 (17) 16:53	07:21 16:27
4	07:40 16:39	07:20 17:18	06:38 17:56	22 17:02 (17) 19:35	18 07:23 (28) 05:53	20:40 05:23	20:52 05:55	20:29 05:55	06:30 19:37	07:02 (28) 19:10 (11)	07:05 18:41	17:34 (17) 16:52	07:22 16:27
5	07:40 16:40	07:19 17:19	06:36 17:57	25 17:00 (17) 19:36	33 07:08 (28) 05:52	20:40 05:23	20:52 05:56	20:26 05:56	06:31 19:35	07:02 (28) 19:10 (11)	07:06 18:40	17:34 (17) 16:50	07:23 16:27
6	07:40 16:41	07:17 17:21	06:34 17:59	28 16:59 (17) 19:37	39 07:06 (28) 05:50	20:40 05:22	20:52 05:57	20:26 05:57	06:33 19:33	07:02 (28) 19:09 (11)	07:07 18:38	17:34 (17) 16:49	07:24 16:26
7	07:40 16:42	07:16 17:22	06:33 18:00	29 16:58 (17) 19:38	44 07:05 (28) 05:49	20:40 05:22	20:52 05:58	20:26 05:58	06:34 19:31	07:03 (28) 19:07 (11)	07:09 18:36	17:35 (17) 16:48	07:25 16:26
8	07:40 16:43	07:15 17:24	06:33 18:01	30 16:57 (17) 19:39	47 07:04 (28) 05:48	20:40 05:22	20:52 05:59	20:26 05:59	06:35 19:29	07:03 (28) 19:05 (11)	07:10 18:34	17:35 (17) 16:47	07:26 16:26
9	07:39 16:44	07:14 17:25	06:32 18:02	31 16:56 (17) 19:40	50 07:03 (28) 05:47	20:40 05:22	20:52 06:01	20:26 06:01	06:36 19:28	07:05 (28) 19:00 (11)	07:11 18:32	17:36 (17) 16:45	07:27 16:26
10	07:39 16:45	07:12 17:26	06:32 18:04	31 16:55 (17) 19:41	53 07:02 (28) 05:46	20:40 05:21	20:52 06:02	20:26 06:02	06:37 19:26	07:06 (28) 19:00 (11)	07:12 18:31	17:37 (17) 16:44	07:28 16:26
11	07:39 16:47	07:11 17:28	06:26 18:05	32 16:54 (17) 19:42	52 07:03 (28) 05:44	20:40 05:21	20:52 06:03	20:26 06:03	06:38 19:24	07:11 (28) 19:07 (11)	07:14 18:29	17:39 (17) 16:43	07:29 16:26
12	07:38 16:48	07:09 17:29	06:24 18:06	31 16:53 (17) 19:43	51 07:03 (28) 05:43	20:40 05:21	20:52 06:04	20:26 06:04	06:39 19:22	07:15 (28) 19:07 (11)	07:17 18:27	17:41 (17) 16:55	07:30 16:26
13	07:38 16:49	07:08 17:31	06:22 18:08	30 16:52 (17) 19:44	50 07:03 (28) 05:41	20:40 05:21	20:52 06:05	20:26 06:05	06:41 19:20	07:16 (28) 19:06 (11)	07:16 18:25	17:41 (17) 16:41	07:31 16:26
14	07:38 16:50	07:07 17:32	06:20 18:09	30 16:51 (17) 19:45	48 07:03 (28) 05:40	20:40 05:21	20:52 06:06	20:26 06:06	06:42 19:18	07:17 (28) 19:05 (11)	07:17 18:24	17:42 (17) 16:58	07:32 16:26
15	07:37 16:51	07:05 17:33	06:18 18:10	29 16:50 (17) 19:46	44 07:04 (28) 05:39	20:40 05:21	20:52 06:07	20:26 06:07	06:43 19:17	07:18 (28) 19:04 (11)	07:18 18:22	17:43 (17) 16:59	07:33 16:27
16	07:37 16:53	07:04 17:35	06:17 18:11	27 16:49 (17) 19:47	41 07:04 (28) 05:38	20:40 05:21	20:52 06:08	20:26 06:08	06:44 19:15	07:20 (28) 19:03 (11)	07:20 18:20	17:44 (17) 16:38	07:34 16:27
17	07:36 16:54	07:02 17:36	06:15 18:13	25 16:48 (17) 19:48	35 07:04 (28) 05:37	20:40 05:21	20:52 06:10	20:26 06:10	06:45 19:13	07:21 (28) 19:02 (11)	07:21 18:19	17:45 (17) 16:37	07:35 16:27
18	07:35 16:55	07:01 17:37	06:13 18:14	22 16:47 (17) 19:49	27 07:06 (28) 05:36	20:40 05:21	20:52 06:11	20:26 06:11	06:46 19:11	07:22 (28) 19:01 (11)	07:22 18:17	17:46 (17) 16:33	07:36 16:27
19	07:35 16:56	06:59 17:39	06:11 18:15	19 16:46 (17) 19:50	17 07:07 (28) 05:35	20:40 05:21	20:52 06:12	20:26 06:12	06:47 19:09	07:24 (28) 19:00 (11)	07:24 18:15	17:47 (17) 16:35	07:37 16:28
20	07:34 16:58	06:58 17:40	06:09 18:16	14 16:45 (17) 19:51	12 07:08 (28) 05:34	20:40 05:21	20:52 06:13	20:26 06:13	06:49 19:07	07:25 (28) 19:00 (11)	07:25 18:14	17:48 (17) 16:34	07:38 16:28
21	07:33 16:59	06:56 17:41	06:07 18:17	14 16:44 (17) 19:52	12 07:21 (28) 05:33	20:40 05:21	20:52 06:14	20:26 06:14	06:50 19:05	07:26 (28) 19:00 (11)	07:26 18:12	17:49 (17) 16:34	07:39 16:29
22	07:33 17:00	06:55 17:43	06:06 18:19	14 16:43 (17) 19:53	12 07:22 (28) 05:32	20:40 05:21	20:52 06:15	20:26 06:15	06:51 19:05	07:27 (28) 19:00 (11)	07:27 18:11	17:50 (17) 16:33	07:40 16:29
23	07:32 17:02	06:53 17:44	06:04 18:20	14 16:42 (17) 19:54	12 07:23 (28) 05:31	20:40 05:21	20:52 06:16	20:26 06:16	06:52 19:05	07:28 (28) 19:00 (11)	07:28 18:10	17:51 (17) 16:32	07:41 16:30
24	07:31 17:03	06:51 17:45	06:02 18:21	14 16:41 (17) 19:55	12 07:24 (28) 05:30	20:40 05:21	20:52 06:17	20:26 06:17	06:53 19:05	07:29 (28) 19:00 (11)	07:29 18:09	17:52 (17) 16:31	07:42 16:30
25	07:30 17:04	06:50 17:47	06:00 18:22	14 16:40 (17) 19:56	12 07:25 (28) 05:29	20:40 05:21	20:52 06:18	20:26 06:18	06:54 19:05	07:30 (28) 19:00 (11)	07:30 18:08	17:53 (17) 16:31	07:43 16:31
26	07:29 17:06	06:48 17:48	06:58 18:24	14 16:39 (17) 19:57	12 07:26 (28) 05:28	20:40 05:21	20:52 06:19	20:26 06:19	06:56 19:05	07:31 (28) 19:00 (11)	07:31 18:07	17:54 (17) 16:31	07:44 16:32
27	07:28 17:07	06:46 17:49	06:56 18:25	14 16:38 (17) 19:58	12 07:27 (28) 05:27	20:40 05:21	20:52 06:20	20:26 06:20	06:57 19:05	07:32 (28) 19:00 (11)	07:32 18:06	17:55 (17) 16:31	07:45 16:32
28	07:27 17:08	06:45 17:51	06:55 18:26	14 16:37 (17) 19:59	12 07:28 (28) 05:26	20:40 05:21	20:52 06:21	20:26 06:21	06:58 19:05	07:33 (28) 19:00 (11)	07:33 18:05	17:56 (17) 16:31	07:46 16:33
29	07:26 17:10	06:44 17:52	06:54 18:27	14 16:36 (17) 19:59	12 07:29 (28) 05:25	20:40 05:21	20:52 06:22	20:26 06:22	06:59 19:05	07:34 (28) 19:00 (11)	07:34 18:04	17:57 (17) 16:31	07:47 16:34
30	07:25 17:11	06:43 17:53	06:53 18:28	14 16:35 (17) 19:59	12 07:30 (28) 05:24	20:40 05:21	20:52 06:23	20:26 06:23	06:59 19:05	07:35 (28) 19:00 (11)	07:35 18:03	17:58 (17) 16:31	07:48 16:34
31	07:24 17:12	06:42 17:54	06:52 18:29	14 16:34 (17) 19:59	12 07:31 (28) 05:23	20:40 05:21	20:52 06:24	20:26 06:24	06:59 19:05	07:36 (28) 19:00 (11)	07:36 18:02	17:59 (17) 16:31	07:49 16:35
Potential sun hours	288	293	369	403	457	463	469	434	376	600	313	290	277
Total, worst case			494	729				331	600		313		
Sun reduction			0.47	0.49				0.59	0.54		0.44		
Oper. time red.			1.00	1.00				1.00	1.00		1.00		
Wind dir. red.			0.63	0.58				0.58	0.59		0.63		
Total reduction			0.30	0.28				0.34	0.32		0.28		
Total, real			148	207				113	193		88		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker
			(WTG causing flicker last time)



Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 2

Licensed user:

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Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-106 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (62)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36 41	14:55 (17) 15:36 (17)	07:23 17:14	06:43 17:52		
2	07:40 16:37 40	14:56 (17) 15:36 (17)	07:22 17:15	06:41 17:53	8 17:12 (11) 17:20 (11)	06:46 19:32
3	07:40 16:38 41	14:56 (17) 15:37 (17)	07:21 17:17	06:40 17:55	16 17:08 (11) 17:24 (11)	06:44 19:33
4	07:40 16:39 40	14:57 (17) 15:37 (17)	07:20 17:18	06:38 17:56	31 06:59 (28) 17:25 (11)	06:42 19:35
5	07:40 16:40 41	14:57 (17) 15:38 (17)	07:19 17:19	06:36 17:57	37 06:57 (28) 17:26 (11)	06:40 19:36
6	07:40 16:41 40	14:58 (17) 15:38 (17)	07:17 17:21	06:34 17:59	42 06:56 (28) 17:28 (11)	06:38 19:37
7	07:40 16:42 40	14:58 (17) 15:38 (17)	07:16 17:22	06:33 18:00	48 06:54 (28) 17:29 (11)	06:37 19:38
8	07:40 16:43 41	14:58 (17) 15:39 (17)	07:15 17:24	07:31 19:01	50 07:53 (28) 18:29 (11)	06:35 19:39
9	07:39 16:44 40	14:59 (17) 15:39 (17)	07:14 17:25	07:29 19:02	51 07:53 (28) 18:29 (11)	06:33 19:41
10	07:39 16:45 40	14:59 (17) 15:39 (17)	07:12 17:26	07:27 19:04	51 07:53 (28) 18:30 (11)	06:31 19:42
11	07:39 16:46 40	15:00 (17) 15:40 (17)	07:11 17:28	07:26 19:05	52 07:53 (28) 18:30 (11)	06:30 19:43
12	07:38 16:48 39	15:01 (17) 15:40 (17)	07:09 17:29	07:24 19:06	50 07:53 (28) 18:29 (11)	06:28 19:44
13	07:38 16:49 39	15:01 (17) 15:40 (17)	07:08 17:31	07:22 19:08	49 07:53 (28) 18:28 (11)	06:26 19:46
14	07:38 16:50 37	15:03 (17) 15:40 (17)	07:07 17:32	07:20 19:09	46 07:54 (28) 18:28 (11)	06:24 19:47
15	07:37 16:51 37	15:03 (17) 15:40 (17)	07:05 17:33	07:18 19:10	42 07:55 (28) 18:27 (11)	06:23 19:48
16	07:37 16:53 37	15:03 (17) 15:40 (17)	07:04 17:35	07:17 19:11	35 07:58 (28) 18:27 (11)	06:21 19:49
17	07:36 16:54 35	15:05 (17) 15:40 (17)	07:02 17:36	07:15 19:13	25 18:00 (11) 18:25 (11)	06:19 19:50
18	07:35 16:55 35	15:05 (17) 15:40 (17)	07:01 17:37	07:13 19:14	22 18:01 (11) 18:23 (11)	06:18 19:52
19	07:35 16:56 33	15:06 (17) 15:39 (17)	06:59 17:39	07:11 19:15	18 18:03 (11) 18:21 (11)	06:16 19:53
20	07:34 16:58 32	15:08 (17) 15:40 (17)	06:58 17:40	07:09 19:16	13 18:05 (11) 18:18 (11)	06:14 19:54
21	07:33 16:59 30	15:09 (17) 15:39 (17)	06:56 17:41	07:07 19:17	4 18:09 (11) 18:13 (11)	06:13 19:55
22	07:33 17:00 28	15:10 (17) 15:38 (17)	06:55 17:43	07:06 19:19		06:11 19:57
23	07:32 17:02 26	15:11 (17) 15:37 (17)	06:53 17:44	07:04 19:20		06:09 19:58
24	07:31 17:03 23	15:13 (17) 15:36 (17)	06:51 17:45	07:02 19:21		06:08 19:59
25	07:30 17:04 20	15:15 (17) 15:35 (17)	06:50 17:47	07:00 19:22		06:06 20:00
26	07:29 17:06 16	15:17 (17) 15:33 (17)	06:48 17:48	06:58 19:24		06:05 20:00
27	07:28 17:07 10	15:20 (17) 15:30 (17)	06:46 17:49	06:57 19:25		06:03 20:01
28	07:27 17:08		06:45 17:51	06:55 19:26		06:02 20:03
29	07:26 17:10			06:53 19:27		06:00 20:04
30	07:25 17:11			06:51 19:29		05:59 20:05
31	07:24 17:12			06:49 19:30		05:57 20:05
Potential sun hours	288	293	369	403	457	463
Total, worst case	921		690	274		
Sun reduction	0.33		0.47	0.49		
Oper. time red.	1.00		1.00	1.00		
Wind dir. red.	0.76		0.59	0.55		
Total reduction	0.26		0.29	0.28		
Total, real	241		200	77		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 3

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Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-106 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (62)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25 20:52	05:52 20:31	06:27 19:42	18:50 (10) 19:11 (10)	07:01 18:47	07:32 (28) 16:56
2	05:25 20:52	05:53 20:30	06:28 19:40	18:49 (10) 19:11 (10)	07:03 18:45	07:32 (28) 16:54
3	05:26 20:52	05:54 20:29	06:29 19:39	18:48 (10) 19:11 (10)	07:04 18:43	07:31 (28) 16:53
4	05:26 20:51	05:55 20:27	06:30 19:37	18:47 (10) 19:10 (10)	07:05 18:41	07:30 (28) 16:52
5	05:27 20:51	05:56 20:26	06:31 19:35	18:47 (10) 19:10 (10)	07:06 18:40	07:30 (28) 16:50
6	05:28 20:51	05:57 20:25	06:33 19:33	18:47 (10) 19:09 (10)	07:07 18:38	07:30 (28) 16:49
7	05:28 20:51	05:58 20:23	06:34 19:31	18:47 (10) 19:08 (10)	07:09 18:36	07:31 (28) 16:48
8	05:29 20:50	05:59 20:22	06:35 19:29	18:48 (10) 19:06 (10)	07:10 18:34	07:32 (28) 16:47
9	05:30 20:50	06:01 20:21	06:36 19:28	18:48 (10) 19:04 (10)	07:11 18:32	07:33 (28) 16:45
10	05:31 20:49	06:02 20:19	06:37 19:26	18:50 (10) 19:02 (10)	07:12 18:31	07:35 (28) 16:44
11	05:31 20:49	06:03 20:18	06:38 19:24	18:54 (10) 19:00 (10)	07:14 18:29	17:44 (11) 16:43
12	05:32 20:48	06:04 20:16	06:39 19:22	07:15 18:27	06:55 16:42	07:30 16:26
13	05:33 20:48	06:05 20:15	06:41 19:20	07:16 18:25	06:56 16:41	07:31 16:26
14	05:34 20:47	06:06 20:13	06:42 19:18	07:17 18:24	06:58 16:40	07:32 16:26
15	05:35 20:47	06:07 20:12	06:43 19:17	07:18 18:22	06:59 16:39	14:53 (17) 16:27
16	05:36 20:46	06:08 20:10	06:44 19:15	07:20 18:20	07:00 16:38	14:50 (17) 16:27
17	05:36 20:45	06:10 20:09	06:45 19:13	07:21 18:19	07:02 16:37	14:49 (17) 16:27
18	05:37 20:45	06:11 20:07	06:46 19:11	07:22 18:17	07:03 16:36	14:47 (17) 16:27
19	05:38 20:44	06:12 20:06	06:47 19:09	07:24 18:15	07:04 16:35	14:46 (17) 16:28
20	05:39 20:43	06:13 20:04	06:49 19:07	07:25 18:14	07:06 16:34	14:45 (17) 16:28
21	05:40 20:42	06:14 20:03	06:50 19:05	07:26 18:12	07:07 16:34	14:44 (17) 16:29
22	05:41 20:41	06:15 20:01	06:51 19:04	07:27 18:11	07:08 16:33	14:44 (17) 16:29
23	05:42 20:40	06:17 19:58	06:52 19:02	17:50 (11) 18:09	07:29 16:32	15:16 (17) 16:30
24	05:43 20:40	06:18 19:56	06:53 19:00	17:47 (11) 18:07	07:30 16:31	14:42 (17) 16:30
25	05:44 20:39	06:19 19:54	06:54 18:58	17:44 (11) 18:05	07:31 16:31	14:43 (17) 16:31
26	05:45 20:38	06:20 19:53	06:56 18:56	17:43 (11) 18:07	07:33 16:30	14:42 (17) 16:32
27	05:46 20:37	06:21 19:51	18:59 (10) 06:57	07:41 (28) 18:08	07:34 16:30	14:42 (17) 16:32
28	05:47 20:35	06:22 19:49	18:55 (10) 12 19:07 (10)	06:58 18:52	07:35 (28) 18:01	07:35 16:29
29	05:48 20:34	06:23 19:47	18:53 (10) 15 19:08 (10)	06:59 18:51	07:36 (28) 18:00	07:36 16:29
30	05:49 20:33	06:25 19:46	18:51 (10) 18 19:09 (10)	07:00 18:49	07:37 (28) 17:58	07:37 16:28
31	05:51 20:32	06:26 19:44	18:50 (10) 20 19:10 (10)	07:39 17:57	07:39 16:28	07:40 16:35
Potential sun hours	469	434	376	342	290	277
Total, worst case		70	444	460	476	1255
Sun reduction		0.59	0.54	0.44	0.27	0.25
Oper. time red.		1.00	1.00	1.00	1.00	1.00
Wind dir. red.		0.55	0.58	0.59	0.76	0.76
Total reduction		0.34	0.33	0.27	0.21	0.20
Total, real		24	145	123	102	248

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 4

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-107 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (315)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36	07:23 17:14	06:43 17:52	16:25 (11) 17:05 (11)	06:47 19:31	18:44 (10) 20:06
2	07:40 16:37	07:22 17:15	06:41 17:53	16:26 (11) 17:05 (11)	06:46 19:32	18:42 (10) 20:07
3	07:40 16:38	07:21 17:17	06:40 17:55	16:26 (11) 17:04 (11)	06:44 19:33	18:41 (10) 20:09
4	07:40 16:39	07:20 17:18	06:38 17:56	16:26 (11) 17:04 (11)	06:42 19:35	18:40 (10) 20:10
5	07:40 16:40	07:19 17:19	06:36 17:57	16:26 (11) 17:03 (11)	06:40 19:36	18:39 (10) 20:11
6	07:40 16:41	07:17 17:21	06:34 17:59	16:27 (11) 17:03 (11)	06:38 19:37	18:39 (10) 20:12
7	07:40 16:42	07:16 17:22	06:33 18:00	16:27 (11) 17:01 (11)	06:37 19:38	18:38 (10) 20:13
8	07:40 16:43	07:15 17:24	06:31 19:01	17:28 (11) 18:00 (11)	06:35 19:40	18:39 (10) 20:15
9	07:39 16:44	07:14 17:25	07:29 19:02	17:29 (11) 17:58 (11)	06:33 19:41	18:38 (10) 20:16
10	07:39 16:45	07:12 17:26	07:27 19:04	17:31 (11) 17:58 (11)	06:31 19:42	18:38 (10) 20:17
11	07:39 16:47	07:11 17:28	07:26 19:05	17:32 (11) 17:55 (11)	06:30 19:43	18:38 (10) 20:18
12	07:38 16:48	07:10 17:29	07:24 19:06	17:34 (11) 17:53 (11)	06:28 19:44	18:39 (10) 20:19
13	07:38 16:49	07:08 17:31	07:22 19:08	17:38 (11) 17:48 (11)	06:26 19:46	18:40 (10) 20:20
14	07:38 16:50	07:07 17:32	07:20 19:09	06:24 19:47	06:24 19:48	18:41 (10) 20:21
15	07:37 16:51	07:05 17:33	07:18 19:10	06:23 19:48	06:23 19:48	18:43 (10) 20:22
16	07:37 16:53	07:04 17:35	16:42 (11) 16:52 (11)	07:17 19:11	06:21 19:49	18:45 (10) 20:23
17	07:36 16:54	07:02 17:36	16:38 (11) 16:55 (11)	07:15 19:13	06:19 19:50	18:55 (10) 20:24
18	07:35 16:55	07:01 17:37	16:36 (11) 16:58 (11)	07:13 19:14	06:18 19:52	05:36 20:25
19	07:35 16:56	06:59 17:39	16:33 (11) 16:59 (11)	07:11 19:15	06:16 19:53	05:35 20:26
20	07:34 16:58	06:58 17:40	16:31 (11) 17:00 (11)	07:09 19:16	06:14 19:54	05:34 20:27
21	07:33 16:59	06:56 17:41	16:31 (11) 17:02 (11)	07:08 19:17	06:13 19:55	05:33 20:28
22	07:33 17:00	06:55 17:43	16:29 (11) 17:03 (11)	07:06 19:19	06:11 19:57	05:32 20:30
23	07:32 17:02	06:53 17:44	16:29 (11) 17:04 (11)	07:04 19:20	06:09 19:58	05:31 20:31
24	07:31 17:03	06:51 17:45	16:28 (11) 17:04 (11)	07:02 19:21	06:08 19:59	05:30 20:32
25	07:30 17:04	06:50 17:47	16:27 (11) 17:04 (11)	07:00 19:22	06:06 20:00	05:30 20:33
26	07:29 17:06	06:48 17:48	16:27 (11) 17:05 (11)	06:58 19:24	06:05 20:00	05:29 20:34
27	07:28 17:07	06:46 17:49	16:26 (11) 17:05 (11)	06:57 19:25	06:03 20:01	05:28 20:35
28	07:27 17:08	06:45 17:51	16:26 (11) 17:05 (11)	06:55 19:26	06:02 20:03	05:27 20:36
29	07:26 17:10		06:53 19:27	18:54 (10) 19:27	06:00 20:04	05:27 20:37
30	07:25 17:11		06:51 19:29	18:48 (10) 19:02 (10)	05:59 20:05	05:26 20:38
31	07:24 17:12		06:49 19:30	18:46 (10) 19:03 (10)	05:59 20:05	05:25 20:39
Potential sun hours	288	293	369	403	457	463
Total, worst case		393	436	378		
Sun reduction		0.39	0.47	0.49		
Oper. time red.		1.00	1.00	1.00		
Wind dir. red.		0.68	0.67	0.56		
Total reduction		0.27	0.32	0.28		
Total, real		105	138	105		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 5

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-107 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (315)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25 20:52	05:52 20:31	06:27 19:42	18:38 (10) 18:47	07:01 17:14 (11)	06:40 16:56
2	05:25 20:52	05:53 20:30	06:28 19:40	18:37 (10) 18:45	07:03 17:12 (11)	16:28 16:27
3	05:26 20:52	05:54 20:29	06:29 19:39	18:36 (10) 18:43	07:04 17:09 (11)	16:27 16:27
4	05:26 20:51	05:55 20:27	06:30 19:37	18:36 (10) 19:03 (10)	07:05 18:41	16:27 16:27
5	05:27 20:51	05:56 20:26	06:31 19:35	18:35 (10) 19:03 (10)	07:06 18:40	16:27 16:27
6	05:28 20:51	05:57 20:25	06:33 19:33	18:35 (10) 19:03 (10)	07:07 18:38	16:27 16:26
7	05:28 20:51	05:58 20:23	06:34 19:31	18:34 (10) 19:02 (10)	07:09 18:36	16:26 16:26
8	05:29 20:50	05:59 20:22	06:35 19:29	18:34 (10) 19:01 (10)	07:10 18:34	16:26 16:26
9	05:30 20:50	06:01 20:21	06:36 19:28	18:34 (10) 19:00 (10)	07:11 18:32	16:26 16:26
10	05:31 20:49	06:02 20:19	06:37 19:26	18:35 (10) 18:58 (10)	07:12 18:31	16:26 16:26
11	05:31 20:49	06:03 20:18	06:38 19:24	18:37 (10) 18:58 (10)	07:14 18:29	16:26 16:26
12	05:32 20:48	06:04 20:16	06:39 19:22	18:38 (10) 18:56 (10)	07:15 18:27	16:26 16:26
13	05:33 20:48	06:05 20:15	06:41 19:20	18:39 (10) 18:53 (10)	07:16 18:25	16:26 16:26
14	05:34 20:47	06:06 20:13	06:42 19:18	18:43 (10) 18:49 (10)	07:17 18:24	16:26 16:26
15	05:35 20:47	06:07 20:12	06:43 19:17	07:18 18:22	16:59 (11) 17:37 (11)	16:26 16:27
16	05:36 20:46	06:09 20:10	06:44 19:15	07:20 18:20	16:58 (11) 17:37 (11)	16:27 16:27
17	05:36 20:45	06:10 20:09	06:45 19:13	07:21 18:19	16:58 (11) 17:36 (11)	16:27 16:27
18	05:37 20:45	06:11 20:07	06:46 19:11	07:22 18:17	16:59 (11) 17:36 (11)	16:27 16:27
19	05:38 20:44	06:12 20:06	06:47 19:09	07:24 18:15	17:00 (11) 17:34 (11)	16:27 16:28
20	05:39 20:43	06:13 20:04	06:49 19:07	07:25 18:14	17:00 (11) 17:33 (11)	16:28 16:28
21	05:40 20:42	06:14 20:03	06:50 19:05	07:26 18:12	17:02 (11) 17:32 (11)	16:28 16:29
22	05:41 20:41	06:15 20:01	06:51 19:04	07:27 18:11	17:02 (11) 17:30 (11)	16:29 16:29
23	05:42 20:40	06:17 19:58	06:52 19:02	07:29 18:09	17:04 (11) 17:29 (11)	16:29 16:30
24	05:43 20:40	06:18 19:56	06:53 19:00	07:30 18:07	17:06 (11) 17:27 (11)	16:30 16:30
25	05:44 20:39	06:19 19:54	06:54 18:58	07:31 18:06	17:08 (11) 17:24 (11)	16:30 16:31
26	05:45 20:38	06:20 19:53	06:56 18:56	07:33 18:04	17:13 (11) 17:20 (11)	16:31 16:32
27	05:46 20:37	06:21 19:51	06:57 18:57 (10)	07:34 18:03	07:14 16:30	16:32 16:32
28	05:47 20:35	06:22 19:49	06:58 18:59 (10)	07:35 18:01	07:16 16:29	16:33 16:33
29	05:48 20:34	06:23 19:47	06:59 19:01 (10)	07:36 18:51	07:17 18:00	16:34 16:34
30	05:49 20:33	06:25 19:46	07:00 19:02 (10)	17:21 (11) 17:25 (11)	07:38 17:58	16:34 16:34
31	05:51 20:32	06:26 19:44	18:38 (10) 19:02 (10)	07:39 17:57	16:28 17:13 (11)	16:34 16:35
Potential sun hours	469	434	376	342	290	277
Total, worst case		90	331	805		
Sun reduction		0.59	0.54	0.44		
Oper. time red.		1.00	1.00	1.00		
Wind dir. red.		0.56	0.57	0.68		
Total reduction		0.34	0.31	0.30		
Total, real		30	102	243		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 6

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-111 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (366)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:37	07:23 17:14	06:43 17:52	06:47 19:31	18:34 (01) 18:41 (01)	05:57 20:06
2	07:40 16:37	07:22 17:15	06:41 17:53	06:46 19:32	05:56 20:07	29 06:57 (16) 20:40
3	07:40 16:38	07:21 17:17	06:40 17:55	06:44 19:33	05:54 20:09	29 06:57 (16) 20:40
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:35	05:53 20:10	28 06:56 (16) 20:41
5	07:40 16:40	07:19 17:19	16:35 (02) 16:36 (02)	06:36 19:36	05:52 20:11	29 06:57 (16) 20:43
6	07:40 16:41	07:17 17:21	16:33 (02) 16:49 (02)	06:34 17:59	05:50 19:37	29 06:57 (16) 20:43
7	07:40 16:42	07:16 17:22	16:30 (02) 16:50 (02)	06:33 18:00	05:49 19:38	27 06:55 (16) 20:44
8	07:40 16:43	07:15 17:24	16:29 (02) 16:52 (02)	07:31 19:01	06:35 19:40	27 06:55 (16) 20:44
9	07:39 16:44	07:14 17:25	16:29 (02) 16:53 (02)	07:29 19:02	06:33 19:41	26 06:55 (16) 20:45
10	07:39 16:46	07:12 17:26	16:27 (02) 16:54 (02)	07:27 19:04	06:31 19:42	26 06:55 (16) 20:45
11	07:39 16:47	07:11 17:28	16:27 (02) 16:55 (02)	07:26 19:05	06:30 19:43	23 06:53 (16) 20:46
12	07:38 16:48	07:10 17:29	16:27 (02) 16:56 (02)	07:24 19:06	06:28 19:44	23 06:53 (16) 20:46
13	07:38 16:49	07:08 17:31	16:26 (02) 16:56 (02)	07:22 19:08	06:26 19:46	19 06:51 (16) 20:47
14	07:38 16:50	07:07 17:32	16:26 (02) 16:57 (02)	07:20 19:09	06:24 19:47	17 06:50 (16) 20:48
15	07:37 16:51	07:05 17:33	16:25 (02) 16:56 (02)	07:18 19:10	06:23 19:48	13 06:48 (16) 20:49
16	07:37 16:53	07:04 17:35	16:26 (02) 16:57 (02)	07:17 19:11	06:21 19:49	9 06:46 (16) 20:49
17	07:36 16:54	07:02 17:36	16:25 (02) 16:56 (02)	07:15 19:13	18:38 (01) 18:47 (01)	06:19 19:50
18	07:35 16:55	07:01 17:37	16:26 (02) 16:57 (02)	07:13 19:14	18:34 (01) 18:50 (01)	06:18 19:52
19	07:35 16:56	06:59 17:39	16:26 (02) 16:56 (02)	07:11 19:15	18:32 (01) 18:51 (01)	06:16 19:53
20	07:34 16:58	06:58 17:40	16:26 (02) 16:55 (02)	07:09 19:16	18:31 (01) 18:52 (01)	06:14 19:54
21	07:33 16:59	06:56 17:41	16:27 (02) 16:55 (02)	07:08 19:18	18:29 (01) 18:52 (01)	06:13 19:55
22	07:33 17:00	06:55 17:43	16:28 (02) 16:53 (02)	07:06 19:19	18:29 (01) 18:53 (01)	06:11 19:57
23	07:32 17:02	06:53 17:44	16:30 (02) 16:53 (02)	07:04 19:20	18:28 (01) 18:53 (01)	06:09 19:58
24	07:31 17:03	06:51 17:46	16:31 (02) 16:51 (02)	07:02 19:21	18:28 (01) 18:53 (01)	06:08 19:59
25	07:30 17:04	06:50 17:47	16:32 (02) 16:48 (02)	07:00 19:22	18:27 (01) 18:52 (01)	06:06 20:00
26	07:29 17:06	06:48 17:48	16:36 (02) 16:46 (02)	06:58 19:24	18:27 (01) 18:52 (01)	06:05 20:00
27	07:28 17:07	06:46 17:50	06:57 19:25	06:03 19:24	18:27 (01) 18:51 (01)	06:03 20:01
28	07:27 17:08	06:45 17:51	06:55 19:26	06:02 19:23	18:28 (01) 18:51 (01)	06:02 20:03
29	07:26 17:10	06:45 17:51	06:53 19:27	06:00 19:20	18:29 (01) 18:49 (01)	06:00 20:04
30	07:25 17:11	06:45 17:51	06:51 19:29	05:59 19:17	18:30 (01) 18:47 (01)	05:59 20:05
31	07:24 17:13	06:45 17:51	06:49 19:30	05:58 19:14	18:31 (01) 18:45 (01)	05:58 20:05
Potential sun hours	288	293	369	403	457	463
Total, worst case		544	310	200	350	
Sun reduction		0.39	0.47	0.49	0.55	
Oper. time red.		1.00	1.00	1.00	1.00	
Wind dir. red.		0.70	0.60	0.64	0.64	
Total reduction		0.27	0.28	0.31	0.35	
Total, real		149	88	63	124	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 7

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2 Shadow receptor: R-111 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (366)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25	05:52	06:42 (16)	06:27	07:02	06:40
	20:52	20:31	20	07:02 (16)	19:42	18:47
2	05:25	05:53	06:41 (16)	06:28	07:03	06:42
	20:52	20:30	22	07:03 (16)	19:40	18:45
3	05:26	05:54	06:40 (16)	06:29	07:04	06:43
	20:52	20:29	24	07:04 (16)	19:39	18:43
4	05:27	05:55	06:39 (16)	06:30	07:05	06:44
	20:51	20:27	25	07:04 (16)	19:37	18:41
5	05:27	05:56	06:38 (16)	06:32	07:06	06:46
	20:51	20:26	27	07:05 (16)	19:35	18:40
6	05:28	05:57	06:38 (16)	06:33	07:07	06:47
	20:51	20:25	27	07:05 (16)	19:33	18:38
7	05:29	05:58	06:37 (16)	06:34	07:09	06:48
	20:51	20:23	28	07:05 (16)	19:31	18:36
8	05:29	05:59	06:37 (16)	06:35	07:10	06:50
	20:50	20:22	28	07:05 (16)	19:29	18:34
9	05:30	06:01	06:36 (16)	06:36	07:11	06:51
	20:50	20:21	29	07:05 (16)	19:28	18:33
10	05:31	06:02	06:37 (16)	06:37	07:12	06:52
	20:49	20:19	29	07:06 (16)	19:26	18:31
11	05:31	06:03	06:37 (16)	06:38	18:28 (01)	07:14
	20:49	20:18	29	07:06 (16)	19:24	18:34 (01)
12	05:32	06:04	06:37 (16)	06:40	18:24 (01)	07:15
	20:48	20:16	28	07:05 (16)	19:22	18:37 (01)
13	05:33	06:05	06:37 (16)	06:41	18:21 (01)	07:16
	20:48	20:15	28	07:05 (16)	19:20	18:38 (01)
14	05:34	06:06	06:37 (16)	06:42	18:19 (01)	07:17
	20:47	20:13	27	07:04 (16)	19:18	18:39 (01)
15	05:35	06:07	06:37 (16)	06:43	18:18 (01)	07:19
	20:47	20:12	27	07:04 (16)	19:17	18:40 (01)
16	05:36	06:09	06:38 (16)	06:44	18:16 (01)	07:20
	20:46	20:10	25	07:03 (16)	19:15	18:40 (01)
17	05:37	06:10	06:38 (16)	06:45	18:15 (01)	07:21
	20:45	20:09	23	07:01 (16)	19:13	18:40 (01)
18	05:37	06:11	06:39 (16)	06:46	18:15 (01)	07:22
	20:45	20:07	21	07:00 (16)	19:11	18:40 (01)
19	05:38	06:12	06:40 (16)	06:48	18:15 (01)	07:24
	20:44	20:06	18	06:58 (16)	19:09	18:40 (01)
20	05:39	06:13	06:42 (16)	06:49	18:15 (01)	07:25
	20:43	20:04	14	06:56 (16)	19:07	18:40 (01)
21	05:40	06:14	06:46 (16)	06:50	18:14 (01)	07:26
	20:42	20:03	7	06:53 (16)	19:05	18:39 (01)
22	05:41	06:15		06:51	18:14 (01)	07:27
	20:41	20:01		19:04	18:38 (01)	18:11
23	05:42	06:17		06:52	18:15 (01)	07:29
	20:40	19:58		19:02	18:36 (01)	18:09
24	05:43	06:18		06:53	18:15 (01)	07:30
	20:39	19:56		19:00	18:35 (01)	18:07
25	05:44	06:19		06:54	18:16 (01)	07:31
	20:39	19:54		18:58	18:33 (01)	18:06
26	05:45	06:20		06:56	18:19 (01)	07:33
	20:38	19:53		18:56	18:31 (01)	18:04
27	05:46	06:21		06:57	07:34	16:55 (02)
	20:37	19:51		18:54	18:03	17:26 (02)
28	05:47	06:22		06:58	07:35	16:55 (02)
	20:35	2	06:53 (16)	19:49	18:01	30
29	05:48	06:23		06:59	07:36	16:56 (02)
	20:34	10	06:57 (16)	19:47	18:00	30
30	05:50	06:25		07:00	07:38	16:56 (02)
	20:33	14	06:59 (16)	19:46	17:59	29
31	05:51	06:26		07:00	07:39	16:57 (02)
	20:32	18	07:01 (16)	19:44	17:57	28
Potential sun hours	469	434	376	342	290	277
Total, worst case	44	506	321	431	116	
Sun reduction	0.63	0.59	0.54	0.44	0.27	
Oper. time red.	1.00	1.00	1.00	1.00	1.00	
Wind dir. red.	0.64	0.64	0.60	0.70	0.70	
Total reduction	0.40	0.38	0.32	0.31	0.19	
Total, real	18	192	104	133	22	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 8

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-112 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (365)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40	07:23	15:56 (02) 06:43	06:47	05:57	05:25
	16:37	17:14	33 16:29 (02) 17:52	19:31	20:06	20:40
2	07:40	07:22	15:57 (02) 06:41	06:46	05:56	05:24
	16:37	17:15	32 16:29 (02) 17:53	19:32	20:07	20:40
3	07:40	07:21	15:58 (02) 06:40	06:44	05:54	05:24
	16:38	17:17	31 16:29 (02) 17:55	19:33	20:09	20:41
4	07:40	07:20	15:58 (02) 06:38	06:42	05:53	05:23
	16:39	17:18	30 16:28 (02) 17:56	19:35	20:10	20:42
5	07:40	07:19	15:59 (02) 06:36	06:40	05:52	05:23
	16:40	17:19	28 16:27 (02) 17:57	19:36	20:11	20:43
6	07:40	07:17	16:00 (02) 06:34	17:21 (01) 06:38	05:50	05:23
	16:41	17:21	27 16:27 (02) 17:59	11 17:32 (01) 19:37	20:12	20:44
7	07:40	07:16	16:00 (02) 06:33	17:18 (01) 06:37	05:49	05:22
	16:42	17:22	26 16:26 (02) 18:00	16 17:34 (01) 19:38	20:13	20:44
8	07:40	07:15	16:02 (02) 07:31	18:16 (01) 06:35	07:02 (16) 05:48	05:22
	16:43	17:24	23 16:25 (02) 19:01	19 18:35 (01) 19:40	8 07:10 (16) 20:15	20:45
9	07:39	07:14	16:04 (02) 07:29	18:14 (01) 06:33	06:58 (16) 05:46	05:22
	16:44	17:25	20 16:24 (02) 19:02	22 18:36 (01) 19:41	14 07:12 (16) 20:16	20:46
10	07:39	07:12	16:05 (02) 07:27	18:14 (01) 06:31	06:56 (16) 05:45	05:21
	16:46	17:26	16 16:21 (02) 19:04	24 18:38 (01) 19:42	18 07:14 (16) 20:17	20:46
11	07:39	07:11	16:09 (02) 07:26	18:13 (01) 06:30	06:55 (16) 05:44	05:21
	16:47	17:28	10 16:19 (02) 19:05	25 18:38 (01) 19:43	21 07:16 (16) 20:18	20:47
12	07:38	07:10	07:24	18:12 (01) 06:28	06:53 (16) 05:43	05:21
	16:48	17:29	19:06	26 18:38 (01) 19:44	23 07:16 (16) 20:19	20:48
13	07:38	16:03 (02) 07:08	07:22	18:11 (01) 06:26	06:52 (16) 05:41	05:21
	16:49	8 16:11 (02) 17:31	19:08	27 18:38 (01) 19:46	24 07:16 (16) 20:20	20:48
14	07:38	16:02 (02) 07:07	07:20	18:11 (01) 06:24	06:51 (16) 05:40	05:21
	16:50	12 16:14 (02) 17:32	19:09	26 18:37 (01) 19:47	25 07:16 (16) 20:21	20:49
15	07:37	16:00 (02) 07:05	07:18	18:10 (01) 06:23	06:51 (16) 05:39	05:21
	16:51	15 16:15 (02) 17:33	19:10	27 18:37 (01) 19:48	26 07:17 (16) 20:23	20:49
16	07:37	15:59 (02) 07:04	07:17	18:11 (01) 06:21	06:50 (16) 05:38	05:21
	16:53	18 16:17 (02) 17:35	19:11	26 18:37 (01) 19:49	27 07:17 (16) 20:24	20:49
17	07:36	15:59 (02) 07:02	07:15	18:11 (01) 06:19	06:49 (16) 05:37	05:21
	16:54	20 16:19 (02) 17:36	19:13	25 18:36 (01) 19:50	27 07:16 (16) 20:25	3 06:04 (15)
18	07:35	15:58 (02) 07:01	07:13	18:12 (01) 06:18	06:50 (16) 05:36	05:21
	16:55	22 16:20 (02) 17:37	19:14	23 18:35 (01) 19:52	26 07:16 (16) 20:26	5 06:05 (15)
19	07:35	15:57 (02) 06:59	07:11	18:12 (01) 06:16	06:50 (16) 05:35	05:21
	16:56	24 16:21 (02) 17:39	19:15	21 18:33 (01) 19:53	25 07:15 (16) 20:27	6 06:06 (15)
20	07:34	15:57 (02) 06:58	07:09	18:13 (01) 06:14	06:49 (16) 05:34	05:21
	16:58	26 16:23 (02) 17:40	19:16	18 18:31 (01) 19:54	25 07:14 (16) 20:28	6 06:06 (15)
21	07:33	15:57 (02) 06:56	07:08	18:15 (01) 06:13	06:50 (16) 05:33	05:21
	16:59	26 16:23 (02) 17:42	19:18	14 18:29 (01) 19:55	24 07:14 (16) 20:29	6 06:06 (15)
22	07:33	15:56 (02) 06:55	07:06	18:19 (01) 06:11	06:51 (16) 05:32	05:21
	17:00	28 16:24 (02) 17:43	19:19	7 18:26 (01) 19:57	22 07:13 (16) 20:30	6 06:07 (15)
23	07:32	15:56 (02) 06:53	07:04	06:09	06:52 (16) 05:31	05:22
	17:02	29 16:25 (02) 17:44	19:20	19:58	20 07:12 (16) 20:31	6 06:07 (15)
24	07:31	15:55 (02) 06:51	07:02	06:08	06:53 (16) 05:30	05:22
	17:03	31 16:26 (02) 17:46	19:21	19:59	17 07:10 (16) 20:32	6 06:07 (15)
25	07:30	15:55 (02) 06:50	07:00	06:06	06:55 (16) 05:30	05:22
	17:04	31 16:26 (02) 17:47	19:22	20:00	13 07:08 (16) 20:33	4 06:02 (15)
26	07:29	15:55 (02) 06:48	06:58	06:05	06:57 (16) 05:29	05:23
	17:06	32 16:27 (02) 17:48	19:24	20:00	8 07:05 (16) 20:34	20:52
27	07:28	15:55 (02) 06:46	06:57	06:03	05:28	05:23
	17:07	32 16:27 (02) 17:50	19:25	20:01	20:35	20:52
28	07:27	15:55 (02) 06:45	06:55	06:02	05:27	05:23
	17:08	33 16:28 (02) 17:51	19:26	20:03	20:36	20:52
29	07:26	15:55 (02)	06:53	06:00	05:27	05:24
	17:10	33 16:28 (02)	19:27	20:04	20:37	20:52
30	07:25	15:56 (02)	06:51	05:59	05:26	05:24
	17:11	32 16:28 (02)	19:29	20:05	20:38	20:52
31	07:24	15:56 (02)	06:49		05:25	
	17:13	32 16:28 (02)	19:30		20:39	
Potential sun hours	288	293	369	403	457	463
Total, worst case	484	276	357	393		48
Sun reduction	0.33	0.39	0.47	0.49		0.59
Oper. time red.	1.00	1.00	1.00	1.00		1.00
Wind dir. red.	0.73	0.73	0.62	0.61		0.71
Total reduction	0.24	0.29	0.30	0.30		0.43
Total, real	118	80	106	120		21

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 9

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-112 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (365)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25 20:52	05:52 20:31	06:27 19:42	06:54 (16) 18:47	07:02 18:17 (01)	06:40 16:56
2	05:25 20:52	05:53 20:30	06:28 19:40	06:55 (16) 18:45	07:03 18:17 (01)	06:42 16:54
3	05:26 20:52	05:54 20:29	06:29 19:39	06:56 (16) 18:43	07:04 18:16 (01)	06:43 16:53
4	05:27 20:51	05:55 20:27	06:30 19:37	06:59 (16) 18:41	07:05 18:14 (01)	06:44 16:52
5	05:27 20:51	05:56 20:26	06:32 19:35	07:06 18:40	07:06 18:13 (01)	06:46 16:50
6	05:28 20:51	05:57 20:25	06:33 19:33	07:07 18:38	07:07 18:11 (01)	06:47 16:49
7	05:29 20:51	05:58 20:23	06:34 19:31	07:09 18:36	07:09 18:09 (01)	06:48 16:48
8	05:29 20:50	05:59 20:22	06:35 19:29	07:10 18:34	07:10 18:05 (01)	06:50 16:47
9	05:30 20:50	06:01 20:21	06:36 19:28	07:11 18:33	06:51 16:45	15:27 (02) 15:59 (02)
10	05:31 20:49	06:02 20:19	06:37 19:26	07:12 18:31	06:52 16:44	15:27 (02) 16:00 (02)
11	05:31 20:49	06:03 20:18	06:38 19:24	07:14 18:29	06:54 16:43	15:27 (02) 15:59 (02)
12	05:32 20:48	06:04 20:16	06:40 19:22	07:15 18:27	06:55 16:42	15:28 (02) 16:00 (02)
13	05:33 20:48	06:05 20:15	06:41 19:20	07:16 18:26	06:56 16:41	15:27 (02) 16:00 (02)
14	05:34 20:47	06:06 20:13	06:42 19:18	07:17 18:24	06:58 16:40	15:28 (02) 16:00 (02)
15	05:35 20:47	06:07 20:12	06:43 19:17	07:19 18:22	06:59 16:39	15:28 (02) 16:00 (02)
16	05:36 20:46	06:09 20:10	06:44 19:15	07:20 18:20	07:00 16:38	15:28 (02) 16:00 (02)
17	05:37 20:45	06:10 20:09	07:03 (16) 19:13	06:45 18:19	07:21 16:37	15:29 (02) 16:00 (02)
18	05:37 20:45	06:11 20:07	07:12 (16) 19:11	06:46 18:17	07:22 16:36	15:29 (02) 15:59 (02)
19	05:38 20:44	06:12 20:06	06:58 (16) 19:09	06:48 18:15	07:24 16:35	15:31 (02) 16:00 (02)
20	05:39 20:43	06:13 20:04	06:56 (16) 19:07	06:49 18:14	07:25 16:34	15:31 (02) 15:59 (02)
21	05:40 20:42	06:14 20:03	06:56 (16) 19:05	06:50 18:12	07:26 16:34	15:32 (02) 15:58 (02)
22	05:41 20:41	06:15 20:01	06:55 (16) 19:04	06:51 18:01 (01)	07:27 18:11	15:33 (02) 15:59 (02)
23	05:42 20:40	06:17 19:58	06:54 (16) 19:02	06:52 18:15 (01)	07:29 18:09	15:34 (02) 15:58 (02)
24	05:43 20:39	06:18 19:56	06:53 (16) 19:00	06:53 17:56 (01)	07:30 18:07	15:35 (02) 15:57 (02)
25	05:44 20:39	06:19 19:54	06:53 (16) 18:58	06:54 17:55 (01)	07:31 18:06	15:37 (02) 15:57 (02)
26	05:45 20:38	06:20 19:53	06:52 (16) 18:56	06:56 17:54 (01)	07:33 18:18 (01)	15:38 (02) 15:56 (02)
27	05:46 20:37	06:21 19:51	06:52 (16) 18:54	06:57 17:53 (01)	07:34 18:18 (01)	15:39 (02) 15:55 (02)
28	05:47 20:35	06:22 19:49	06:52 (16) 18:52	06:58 17:52 (01)	07:35 18:18 (01)	15:41 (02) 15:53 (02)
29	05:48 20:34	06:23 19:47	06:52 (16) 18:51	06:59 17:51 (01)	07:36 18:18 (01)	15:44 (02) 15:52 (02)
30	05:50 20:33	06:25 19:46	06:52 (16) 18:49	07:00 17:51 (01)	07:38 18:17 (01)	07:40 16:28
31	05:51 20:32	06:26 19:44	06:53 (16) 18:48	07:39 17:57	16:38 (02) 16:49 (02)	07:40 16:35
Potential sun hours	469	434	376	342	290	277
Total, worst case		338	261	172	754	
Sun reduction		0.59	0.54	0.44	0.27	
Oper. time red.		1.00	1.00	1.00	1.00	
Wind dir. red.		0.61	0.62	0.63	0.73	
Total reduction		0.37	0.34	0.28	0.20	
Total, real		124	89	48	151	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-113 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (327)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:37	14:34 (05) 15:15 (05)	07:23 08:07 (48)	06:43 17:52		05:57 20:06
2	07:40 16:37	14:35 (05) 15:15 (05)	07:22 08:08 (48)	06:41 17:53		05:56 20:40
3	07:40 16:38	14:35 (05) 15:15 (05)	07:21 08:08 (48)	06:40 17:55		05:54 20:41
4	07:40 16:39	14:36 (05) 15:15 (05)	07:20 08:08 (48)	06:38 17:56		05:53 20:42
5	07:40 16:40	14:37 (05) 15:16 (05)	07:19 08:09 (48)	06:36 17:57	5	18:58 (03) 19:03 (03)
6	07:40 16:41	14:38 (05) 15:16 (05)	07:19 08:10 (48)	06:34 17:59	14	18:51 (03) 19:07 (03)
7	07:40 16:42	14:38 (05) 15:15 (05)	07:16 08:09 (48)	06:33 18:00	17	18:50 (03) 19:10 (03)
8	07:39 16:43	14:39 (05) 15:16 (05)	07:15 08:09 (48)	07:31 19:01	20	18:48 (03) 19:11 (03)
9	07:39 16:44	14:41 (05) 15:16 (05)	07:14 08:09 (48)	07:29 19:02	23	18:46 (03) 19:11 (03)
10	07:39 16:46	14:41 (05) 15:15 (05)	07:12 08:08 (48)	07:27 19:04	25	18:45 (03) 19:11 (03)
11	07:39 16:47	14:42 (05) 15:16 (05)	07:11 08:08 (48)	07:26 19:05	26	18:45 (03) 19:12 (03)
12	07:38 16:48	14:44 (05) 15:16 (05)	07:09 08:07 (48)	07:24 19:06	27	18:44 (03) 19:12 (03)
13	07:38 16:49	14:44 (05) 15:15 (05)	07:08 08:06 (48)	07:22 19:08	28	18:44 (03) 19:12 (03)
14	07:38 16:50	14:46 (05) 15:15 (05)	07:07 08:04 (48)	07:20 19:09	28	18:43 (03) 19:11 (03)
15	07:37 16:51	14:47 (05) 15:14 (05)	07:05 08:01 (48)	07:18 19:10	28	18:44 (03) 19:11 (03)
16	07:37 16:53	14:49 (05) 15:13 (05)	07:04 19:11	07:17 19:11	26	18:44 (03) 19:10 (03)
17	07:36 16:54	14:51 (05) 15:12 (05)	07:02 19:13	07:15 19:13	26	18:44 (03) 19:09 (03)
18	07:35 16:55	14:53 (05) 15:11 (05)	07:01 19:14	07:13 19:14	25	18:45 (03) 19:09 (03)
19	07:35 16:56	14:55 (05) 15:09 (05)	06:59 19:15	07:11 19:15	24	18:45 (03) 19:07 (03)
20	07:34 16:58	15:01 (05) 15:05 (05)	06:58 19:16	07:09 19:16	22	18:46 (03) 19:05 (03)
21	07:33 16:59	15:05 (05) 17:40	07:08 19:16	07:08 19:16	19	18:48 (03) 19:05 (03)
22	07:33 17:00	06:56 17:43	07:08 19:18	07:08 19:18	16	18:48 (03) 18:50 (03)
23	07:32 17:02	06:53 17:44	07:06 19:19	06:11 19:19	11	05:32 19:01 (03)
24	07:31 17:03	06:51 17:46	07:02 19:21	06:08 19:19		05:31 20:32
25	07:30 17:04	06:50 17:47	07:00 19:22	06:06 20:00		05:30 20:33
26	07:29 17:06	06:48 17:48	06:58 19:24	06:05 20:00		05:29 20:34
27	07:28 17:07	06:46 17:49	06:57 17:01 (04) 19:25	06:03 20:01		05:28 20:35
28	07:27 17:08	06:45 07:51 (48) 17:51	06:55 16:57 (04) 19:26	06:02 19:26		05:27 20:36
29	07:26 17:10	06:44 08:02 (48)	06:53 19:27	06:00 20:04		05:27 20:37
30	07:25 17:11	06:43 07:48 (48)	06:51 19:29	05:59 20:05		05:26 20:38
31	07:24 17:13	06:42 08:05 (48)	06:49 19:30	05:58 19:30		05:25 20:39
Potential sun hours	288	293	369	403	457	463
Total, worst case	670	337	628	411		
Sun reduction	0.33	0.39	0.47	0.49		
Oper. time red.	1.00	1.00	1.00	1.00		
Wind dir. red.	0.75	0.51	0.64	0.55		
Total reduction	0.25	0.20	0.31	0.28		
Total, real	170	69	196	114		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 11

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-113 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (327)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December	
1	05:25	05:52	06:27	18:44 (03) 07:01	17:24 (04) 06:40	07:15 (48) 07:19	14:24 (05)
	20:52	20:31	19:42	27 19:11 (03) 18:47	36 18:00 (04) 16:56	23 07:38 (48) 16:28	34 14:58 (05)
2	05:25	05:53	06:28	18:44 (03) 07:03	17:24 (04) 06:42	07:15 (48) 07:20	14:24 (05)
	20:52	20:30	19:40	26 19:10 (03) 18:45	36 18:00 (04) 16:54	23 07:38 (48) 16:28	34 14:58 (05)
3	05:26	05:54	06:29	18:44 (03) 07:04	17:24 (04) 06:43	07:15 (48) 07:21	14:24 (05)
	20:52	20:28	19:39	25 19:09 (03) 18:43	36 18:00 (04) 16:53	24 07:39 (48) 16:27	35 14:59 (05)
4	05:27	05:55	06:30	18:45 (03) 07:05	17:23 (04) 06:44	07:14 (48) 07:22	14:23 (05)
	20:51	20:27	19:37	23 19:08 (03) 18:41	36 17:59 (04) 16:52	25 07:39 (48) 16:27	37 15:00 (05)
5	05:27	05:56	06:31	18:46 (03) 07:06	17:23 (04) 06:46	07:15 (48) 07:23	14:23 (05)
	20:51	20:26	19:35	20 19:06 (03) 18:40	36 17:59 (04) 16:50	24 07:39 (48) 16:27	37 15:00 (05)
6	05:28	05:57	06:33	18:47 (03) 07:07	17:23 (04) 06:47	07:15 (48) 07:24	14:24 (05)
	20:51	20:25	19:33	17 19:04 (03) 18:38	35 17:58 (04) 16:49	24 07:39 (48) 16:27	38 15:02 (05)
7	05:29	05:58	06:34	18:48 (03) 07:09	17:23 (04) 06:48	07:16 (48) 07:25	14:24 (05)
	20:51	20:23	19:31	14 19:02 (03) 18:36	35 17:58 (04) 16:48	23 07:39 (48) 16:26	39 15:03 (05)
8	05:29	05:59	06:35	18:52 (03) 07:10	17:23 (04) 06:50	07:16 (48) 07:26	14:24 (05)
	20:50	20:22	19:29	5 18:57 (03) 18:34	34 17:57 (04) 16:47	22 07:38 (48) 16:26	39 15:03 (05)
9	05:30	06:01	06:36	07:11	17:24 (04) 06:51	07:16 (48) 07:27	14:25 (05)
	20:50	20:21	19:28	18:33	31 17:55 (04) 16:45	21 07:37 (48) 16:26	39 15:04 (05)
10	05:31	06:02	06:37	07:12	17:24 (04) 06:52	07:17 (48) 07:28	14:24 (05)
	20:49	20:19	19:26	18:31	30 17:54 (04) 16:44	20 07:37 (48) 16:26	40 15:04 (05)
11	05:31	06:03	06:38	07:14	17:26 (04) 06:54	07:18 (48) 07:29	14:24 (05)
	20:49	20:18	19:24	18:29	27 17:53 (04) 16:43	18 07:36 (48) 16:26	41 15:05 (05)
12	05:32	06:04	06:39	07:15	17:27 (04) 06:55	07:20 (48) 07:30	14:25 (05)
	20:48	20:16	19:22	18:27	24 17:51 (04) 16:42	16 07:36 (48) 16:26	40 15:05 (05)
13	05:33	06:05	06:41	07:16	17:28 (04) 06:56	07:21 (48) 07:31	14:25 (05)
	20:48	20:15	19:20	18:26	20 17:48 (04) 16:41	13 07:34 (48) 16:26	41 15:06 (05)
14	05:34	06:06	06:42	07:17	17:31 (04) 06:58	07:24 (48) 07:32	14:25 (05)
	20:47	20:13	19:18	18:24	15 17:46 (04) 16:40	8 07:32 (48) 16:27	42 15:07 (05)
15	05:35	06:07	06:43	07:18	17:37 (04) 06:59	07:32	14:26 (05)
	20:47	20:12	19:17	18:22	3 17:40 (04) 16:39	16:27	42 15:08 (05)
16	05:36	06:09	06:44	07:20	07:00	07:33	14:26 (05)
	20:46	20:10	19:15	18:20	16:38	16:27	41 15:07 (05)
17	05:37	06:10	06:45	07:21	07:02	07:34	14:26 (05)
	20:45	20:09	19:13	18:19	16:37	16:27	42 15:08 (05)
18	05:37	06:11	06:46	07:22	07:03	07:34	14:27 (05)
	20:45	20:07	19:11	18:17	16:36	16:28	42 15:09 (05)
19	05:38	06:12	06:48	07:24	07:04	07:35	14:27 (05)
	20:44	20:06	19:09	18:15	16:35	16:28	42 15:09 (05)
20	05:39	06:13	18:59 (03) 06:49	07:25	07:06	07:36	14:28 (05)
	20:43	20:04	3 19:02 (03) 19:07	18:14	16:34	16:28	42 15:10 (05)
21	05:40	06:14	18:55 (03) 06:50	07:26	07:07	07:36	14:28 (05)
	20:42	20:02	12 18:07 (03) 19:05	18:12	16:34	16:29	42 15:10 (05)
22	05:41	06:15	18:53 (03) 06:51	07:27	07:08	07:37	14:29 (05)
	20:41	20:01	16 19:09 (03) 19:04	10 17:51 (04) 18:11	16:33	4 14:41 (05) 16:29	42 15:11 (05)
23	05:42	06:17	18:51 (03) 06:52	07:29	07:09	14:32 (05) 07:37	14:29 (05)
	20:40	19:58	19 19:10 (03) 19:02	17 17:54 (04) 18:09	16:32	13 14:45 (05) 16:30	42 15:11 (05)
24	05:43	06:18	18:49 (03) 06:53	07:30	07:11	14:30 (05) 07:38	14:30 (05)
	20:39	19:56	22 19:12 (03) 19:00	22 17:56 (04) 18:07	16:32	18 14:48 (05) 16:30	42 15:12 (05)
25	05:44	06:19	18:48 (03) 06:54	07:31	07:12	14:29 (05) 07:38	14:30 (05)
	20:38	19:54	24 19:12 (03) 18:58	25 17:57 (04) 18:06	16:31	21 14:50 (05) 16:31	42 15:12 (05)
26	05:45	06:20	18:47 (03) 06:56	07:33	07:13	14:28 (05) 07:39	14:30 (05)
	20:38	19:52	25 19:12 (03) 18:56	28 17:59 (04) 18:04	16:30	24 14:52 (05) 16:32	42 15:12 (05)
27	05:46	06:21	18:46 (03) 06:57	07:34	08:22 (48) 07:14	14:26 (05) 07:39	14:31 (05)
	20:36	19:51	26 19:12 (03) 18:54	30 17:59 (04) 18:03	10 08:32 (48) 16:30	27 14:53 (05) 16:32	41 15:12 (05)
28	05:47	06:22	18:45 (03) 06:58	07:35	08:19 (48) 07:15	14:25 (05) 07:39	14:32 (05)
	20:35	19:49	27 19:12 (03) 18:52	33 18:00 (04) 18:01	15 08:34 (48) 16:29	29 14:54 (05) 16:33	42 15:14 (05)
29	05:48	06:23	18:44 (03) 06:59	07:36	08:18 (48) 07:17	14:26 (05) 07:39	14:32 (05)
	20:34	19:47	28 19:12 (03) 18:51	34 18:00 (04) 18:00	18 08:36 (48) 16:29	30 14:56 (05) 16:34	42 15:14 (05)
30	05:50	06:25	18:44 (03) 07:00	07:38	08:17 (48) 07:18	14:25 (05) 07:40	14:33 (05)
	20:33	19:46	28 19:12 (03) 18:49	35 18:00 (04) 17:59	19 08:36 (48) 16:28	32 14:57 (05) 16:35	41 15:14 (05)
31	05:51	06:26	18:44 (03) 07:01	07:39	08:16 (48) 07:19	07:40	14:33 (05)
	20:32	19:44	28 19:12 (03) 18:48	17:57	22 08:38 (48) 07:17	16:35	41 15:14 (05)
Potential sun hours	469	434	376	342	290	277	
Total, worst case		258	391	518	482	1246	
Sun reduction		0.59	0.54	0.44	0.27	0.25	
Oper. time red.		1.00	1.00	1.00	1.00	1.00	
Wind dir. red.		0.55	0.61	0.62	0.61	0.77	
Total reduction		0.33	0.34	0.28	0.17	0.20	
Total, real		86	132	146	81	246	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker
			(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 12

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-115 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (388)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June				
1	07:40 16:37	15:17 (02) 15:50 (02)	07:23 17:14	06:43 17:52	16:51 (01) 17:19 (01)	06:47 19:31	07:12 (16) 20:06	05:57 20:40	05:25 20:40	06:10 (15) 06:42 (15)
2	07:40 16:37	15:18 (02) 15:51 (02)	07:22 17:15	06:41 17:53	16:52 (01) 17:20 (01)	06:46 19:32	07:11 (16) 20:07	05:56 20:40	05:24 20:40	06:09 (15) 06:42 (15)
3	07:40 16:38	15:18 (02) 15:51 (02)	07:21 17:17	06:40 17:55	16:52 (01) 17:19 (01)	06:44 19:33	07:12 (16) 20:09	05:54 20:41	05:24 20:41	06:10 (15) 06:42 (15)
4	07:40 16:39	15:19 (02) 15:52 (02)	07:20 17:18	06:38 17:56	16:52 (01) 17:18 (01)	06:42 19:35	07:11 (16) 20:10	05:53 20:42	05:23 20:42	06:11 (15) 06:42 (15)
5	07:40 16:40	15:19 (02) 15:52 (02)	07:19 17:19	06:36 17:57	16:52 (01) 17:17 (01)	06:40 19:36	07:11 (16) 20:11	05:52 20:43	05:23 20:43	06:11 (15) 06:42 (15)
6	07:40 16:41	15:20 (02) 15:53 (02)	07:17 17:21	06:34 17:59	16:53 (01) 17:17 (01)	06:38 19:37	07:11 (16) 20:12	05:50 20:44	05:23 20:44	06:11 (15) 06:42 (15)
7	07:40 16:42	15:20 (02) 15:53 (02)	07:16 17:22	06:33 18:00	16:54 (01) 17:16 (01)	06:37 19:38	07:12 (16) 20:13	05:49 20:44	05:22 20:44	06:12 (15) 06:42 (15)
8	07:40 16:43	15:20 (02) 15:53 (02)	07:15 17:24	06:31 19:01	17:55 (01) 18:14 (01)	06:35 19:40	07:12 (16) 20:15	05:48 20:45	05:22 20:45	06:12 (15) 06:42 (15)
9	07:39 16:44	15:21 (02) 15:54 (02)	07:14 17:25	07:29 19:03	17:57 (01) 18:11 (01)	06:33 19:41	07:12 (16) 20:16	05:46 20:46	05:22 20:46	06:12 (15) 06:42 (15)
10	07:39 16:46	15:21 (02) 15:53 (02)	07:12 17:26	07:27 19:04	18:01 (01) 18:08 (01)	06:31 19:42	07:13 (16) 20:17	05:45 20:47	05:21 20:46	06:13 (15) 06:42 (15)
11	07:39 16:47	15:22 (02) 15:54 (02)	07:11 17:28	07:26 19:05	06:30 19:43	06:30 19:42	07:16 (16) 20:18	05:44 20:48	05:21 20:47	06:13 (15) 06:42 (15)
12	07:38 16:48	15:23 (02) 15:54 (02)	07:10 17:29	07:24 19:06	06:28 19:44	06:28 19:44	07:27 (16) 20:18	05:43 20:49	05:21 20:48	06:14 (15) 06:42 (15)
13	07:38 16:49	15:23 (02) 15:54 (02)	07:08 17:31	07:22 19:08	06:26 19:46	06:26 19:46	05:41 20:20	05:21 20:48	05:21 20:48	06:14 (15) 06:42 (15)
14	07:38 16:50	15:25 (02) 15:55 (02)	07:07 17:32	07:20 19:09	06:24 19:47	06:24 19:47	05:40 20:21	05:21 20:49	05:21 20:49	06:15 (15) 06:42 (15)
15	07:37 16:51	15:25 (02) 15:55 (02)	07:05 17:33	07:18 19:09	06:23 19:48	06:23 19:48	05:39 20:23	05:21 20:49	05:21 20:49	06:15 (15) 06:43 (15)
16	07:37 16:53	15:25 (02) 15:54 (02)	07:04 17:35	07:17 19:11	06:21 19:49	06:21 19:49	05:38 20:24	05:21 20:49	05:21 20:49	06:15 (15) 06:43 (15)
17	07:36 16:54	15:27 (02) 15:54 (02)	07:02 17:36	07:15 19:13	06:19 19:50	06:19 19:50	05:37 20:25	05:21 20:50	05:21 20:50	06:15 (15) 06:43 (15)
18	07:35 16:55	15:28 (02) 15:54 (02)	07:01 17:37	07:13 19:14	06:18 19:52	06:18 19:52	05:36 20:26	05:21 20:50	05:21 20:50	06:16 (15) 06:43 (15)
19	07:35 16:56	15:28 (02) 15:53 (02)	06:59 17:39	07:11 19:15	06:16 19:53	06:16 19:53	05:35 20:27	05:21 20:51	05:21 20:51	06:16 (15) 06:43 (15)
20	07:34 16:58	15:30 (02) 15:53 (02)	06:58 17:40	07:09 19:16	06:14 19:54	06:14 19:54	05:34 20:28	05:21 20:51	05:21 20:51	06:16 (15) 06:43 (15)
21	07:33 16:59	15:32 (02) 15:52 (02)	06:56 17:42	07:08 19:18	06:13 19:55	06:13 19:55	05:33 20:29	05:21 20:51	05:21 20:51	06:16 (15) 06:43 (15)
22	07:33 17:00	15:33 (02) 15:51 (02)	06:55 17:43	07:06 19:19	06:11 19:57	06:11 19:57	05:32 20:30	05:21 20:51	05:21 20:51	06:17 (15) 06:44 (15)
23	07:32 17:02	15:35 (02) 15:49 (02)	06:53 17:44	07:04 19:20	06:09 19:58	06:09 19:58	05:31 20:31	05:22 20:52	05:22 20:52	06:17 (15) 06:44 (15)
24	07:31 17:03	15:38 (02) 15:47 (02)	06:51 17:46	07:02 19:21	06:08 19:59	06:08 19:59	05:30 20:32	05:22 20:52	05:22 20:52	06:17 (15) 06:44 (15)
25	07:30 17:04	06:50 17:47	06:50 17:47	07:00 19:22	06:06 20:00	06:06 20:00	05:30 20:33	05:22 20:52	05:22 20:52	06:17 (15) 06:44 (15)
26	07:29 17:06	06:48 17:48	06:48 17:48	06:58 19:24	06:05 20:00	06:05 20:00	05:29 20:34	05:23 20:52	05:23 20:52	06:17 (15) 06:45 (15)
27	07:28 17:07	06:46 17:50	06:46 17:50	06:57 19:25	06:03 20:01	06:03 20:01	05:28 20:35	05:23 20:52	05:23 20:52	06:17 (15) 06:45 (15)
28	07:27 17:08	06:45 17:51	06:45 17:51	06:55 19:26	06:02 20:03	06:02 20:03	05:27 20:36	05:23 20:52	05:23 20:52	06:18 (15) 06:45 (15)
29	07:26 17:10	06:45 17:51	06:45 17:51	06:53 19:26	06:00 20:04	06:00 20:04	05:27 20:37	05:24 20:52	05:24 20:52	06:17 (15) 06:45 (15)
30	07:25 17:11	06:45 17:51	06:45 17:51	06:51 19:29	05:59 20:05	05:59 20:05	05:26 20:38	05:24 20:52	05:24 20:52	06:17 (15) 06:45 (15)
31	07:24 17:13	06:45 17:51	06:45 17:51	06:49 19:30	05:59 20:05	05:59 20:05	05:25 20:39	05:24 20:52	05:24 20:52	06:17 (15) 06:45 (15)
Potential sun hours	288	293	369	403	457	463				860
Total, worst case	672	181	304	235	663	860				5.9
Sun reduction	0.33	0.39	0.47	0.49	0.55	0.59				1.00
Oper. time red.	1.00	1.00	1.00	1.00	1.00	1.00				0.68
Wind dir. red.	0.76	0.66	0.64	0.58	0.68	0.68				0.41
Total reduction	0.25	0.26	0.30	0.29	0.38	0.41				
Total, real	170	47	93	68	251	349				

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 13

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-115 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (388)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25 20:52	06:17 (15) 20:31	05:52 21 06:25 (15) 19:42	06:27 11 07:15 (16) 18:47	07:02 16:56	07:19 15:04 (02) 16:28
2	05:25 20:52	06:18 (15) 20:30	05:53 18 06:26 (15) 19:40	06:28 16 07:12 (16) 18:45	07:03 16:54	07:20 15:04 (02) 16:28
3	05:26 20:52	06:17 (15) 20:29	05:54 14 06:24 (15) 19:39	06:29 18 07:11 (16) 18:43	07:04 16:53	07:21 15:04 (02) 16:27
4	05:27 20:51	06:18 (15) 20:27	05:55 7 06:31 (15) 19:37	06:30 21 07:30 (16) 18:41	07:05 11 17:36 (01) 16:52	07:22 15:04 (02) 16:27
5	05:27 20:51	06:17 (15) 20:26	05:56 19:35	06:32 22 07:30 (16) 18:40	07:06 16 17:49 (01) 16:50	07:23 15:06 (02) 16:27
6	05:28 20:51	06:18 (15) 20:25	05:57 19:33	06:33 23 07:30 (16) 18:38	07:07 20 17:51 (01) 16:49	07:24 15:06 (02) 16:27
7	05:29 20:51	06:18 (15) 20:23	05:58 19:31	06:34 24 07:30 (16) 18:36	07:09 22 17:52 (01) 16:48	07:25 15:06 (02) 16:26
8	05:29 20:50	06:17 (15) 20:22	05:59 19:29	06:35 25 07:30 (16) 18:34	07:10 25 17:53 (01) 16:47	07:26 15:07 (02) 16:26
9	05:30 20:50	06:17 (15) 20:21	06:01 19:28	06:36 25 07:30 (16) 18:33	07:11 26 17:53 (01) 16:45	07:27 15:07 (02) 16:26
10	05:31 20:49	06:18 (15) 20:19	06:02 19:26	06:37 25 07:30 (16) 18:31	07:12 27 17:53 (01) 16:44	07:28 15:08 (02) 16:26
11	05:31 20:49	06:17 (15) 20:18	06:03 19:24	06:38 24 07:29 (16) 18:29	07:14 28 17:54 (01) 16:43	07:29 15:07 (02) 16:26
12	05:32 20:48	06:17 (15) 20:16	06:04 19:22	06:40 23 07:28 (16) 18:27	07:15 28 17:55 (01) 16:42	07:30 15:08 (02) 16:26
13	05:33 20:48	06:17 (15) 20:15	06:05 19:20	06:41 21 07:27 (16) 18:26	07:16 28 17:53 (01) 16:41	07:31 15:08 (02) 16:26
14	05:34 20:47	06:18 (15) 20:13	06:06 19:18	06:42 18 07:25 (16) 18:24	07:17 28 17:53 (01) 16:40	07:32 15:09 (02) 16:27
15	05:35 20:47	06:18 (15) 20:12	06:07 19:17	06:43 15 07:23 (16) 18:22	07:19 27 17:52 (01) 16:39	07:33 15:10 (02) 16:27
16	05:36 20:46	06:18 (15) 20:10	06:09 19:15	06:44 10 07:20 (16) 18:20	07:20 26 17:51 (01) 16:38	07:33 15:10 (02) 16:27
17	05:37 20:45	06:17 (15) 20:09	06:10 19:13	06:45 19:12	07:21 24 17:50 (01) 16:37	07:34 15:11 (02) 16:27
18	05:37 20:45	06:18 (15) 20:07	06:11 19:11	06:46 18:17	07:22 22 17:49 (01) 16:36	07:35 15:12 (02) 16:28
19	05:38 20:44	06:18 (15) 20:06	06:12 19:09	06:48 18:15	07:24 19 17:47 (01) 16:35	07:36 15:12 (02) 16:28
20	05:39 20:43	06:18 (15) 20:04	06:13 19:07	06:49 18:14	07:25 16 17:45 (01) 16:34	07:37 15:12 (02) 16:28
21	05:40 20:42	06:18 (15) 20:03	06:14 19:05	06:50 18:12	07:26 11 17:43 (01) 16:34	07:38 15:12 (02) 16:29
22	05:41 20:41	06:19 (15) 20:01	06:15 19:04	06:51 18:11	07:27 22 16:33 16:32	07:37 15:13 (02) 16:29
23	05:42 20:40	06:19 (15) 19:58	06:17 19:02	06:52 18:09	07:29 24 16:32 16:32	07:37 15:13 (02) 16:30
24	05:43 20:40	06:19 (15) 19:56	06:18 19:00	06:53 18:07	07:30 26 16:32 16:32	07:38 15:14 (02) 16:30
25	05:44 20:39	06:20 (15) 19:54	06:19 18:58	06:54 18:06	07:31 27 16:31 16:31	07:38 15:14 (02) 16:31
26	05:45 20:38	06:20 (15) 19:53	06:20 18:56	06:56 18:04	07:32 29 16:30 16:30	07:39 15:14 (02) 16:32
27	05:46 20:37	06:21 (15) 19:51	06:21 18:54	06:57 18:03	07:33 29 16:30 16:30	07:39 15:15 (02) 16:32
28	05:47 20:35	06:21 (15) 19:49	06:22 18:52	06:58 18:01	07:34 30 16:29 16:29	07:39 15:16 (02) 16:33
29	05:48 20:34	06:22 (15) 19:47	06:23 18:51	06:59 18:00	07:35 31 16:29 16:29	07:39 15:16 (02) 16:34
30	05:50 20:33	06:23 (15) 19:46	06:25 18:49	07:00 17:59	07:36 31 16:28 16:28	07:40 15:16 (02) 16:35
31	05:51 20:32	06:24 (15) 19:44	06:26 19:44	07:01 17:57	07:37 290	07:40 15:17 (02) 16:35
Potential sun hours	469	434	376	342	290	277
Total, worst case	959	60	321	404	310	1020
Sun reduction	0.63	0.59	0.54	0.44	0.27	0.25
Oper. time red.	1.00	1.00	1.00	1.00	1.00	1.00
Wind dir. red.	0.68	0.68	0.58	0.66	0.76	0.76
Total reduction	0.43	0.41	0.32	0.29	0.21	0.19
Total, real	416	24	103	119	64	196

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 14

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-116 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (63)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June								
1	07:40 16:37	15:08 (02) 15:37 (02)	07:23 17:14	06:43 17:52	16:45 (01) 17:09 (01)	06:47 19:31	23	07:18 (16) 07:41 (16)	05:57 20:06	11	06:29 (15) 06:40 (15)	05:25 20:40	16	06:27 (15) 06:43 (15)
2	07:40 16:37	15:08 (02) 15:37 (02)	07:22 17:15	06:41 17:53	16:46 (01) 17:09 (01)	06:46 19:32	23	07:17 (16) 07:40 (16)	05:56 20:07	16	06:27 (15) 06:43 (15)	05:24 20:40	14	06:27 (15) 06:41 (15)
3	07:40 16:38	15:09 (02) 15:38 (02)	07:21 17:17	06:40 17:55	16:47 (01) 17:07 (01)	06:44 19:33	23	07:19 (16) 07:40 (16)	05:54 20:09	16	06:24 (15) 06:44 (15)	05:24 20:41	12	06:29 (15) 06:41 (15)
4	07:40 16:39	15:10 (02) 15:38 (02)	07:20 17:18	06:38 17:56	16:49 (01) 17:05 (01)	06:42 19:35	21	07:19 (16) 07:39 (16)	05:53 20:10	20	06:23 (15) 06:45 (15)	05:23 20:42	9	06:31 (15) 06:40 (15)
5	07:40 16:40	15:11 (02) 15:38 (02)	07:19 17:19	06:36 17:57	16:51 (01) 17:01 (01)	06:40 19:36	20	07:20 (16) 07:37 (16)	05:52 20:11	22	06:22 (15) 06:47 (15)	05:23 20:43	4	06:33 (15) 06:37 (15)
6	07:40 16:41	15:12 (02) 15:38 (02)	07:17 17:21	06:34 17:59	17:01 (01)	19:36	17	07:21 (16) 07:34 (16)	05:50 20:12	25	06:20 (15) 06:47 (15)	05:23 20:44		
7	07:40 16:42	15:12 (02) 15:38 (02)	07:16 17:22	06:33 18:00	17:02 (01)	19:37	13	07:25 (16) 07:31 (16)	05:49 20:13	27	06:20 (15) 06:48 (15)	05:22 20:44		
8	07:40 16:43	15:13 (02) 15:38 (02)	07:15 17:24	06:31 19:01	17:03 (01)	19:38	6	07:31 (16)	05:48	28	06:19 (15)	05:22		
9	07:39 16:44	15:14 (02) 15:38 (02)	07:14 17:25	06:29 19:03	17:04 (01)	19:39			20:15	30	06:49 (15)	20:45		
10	07:39 16:46	15:15 (02) 15:37 (02)	07:12 17:26	06:27 19:04	17:05 (01)	19:40			05:46		06:19 (15)	05:22		
11	07:39 16:47	15:16 (02) 15:37 (02)	07:11 17:28	06:26 19:05	17:06 (01)	19:41			05:44	31	06:49 (15)	20:46		
12	07:38 16:48	15:18 (02) 15:37 (02)	07:10 17:29	06:24 19:06	17:07 (01)	19:42			05:43	32	06:49 (15)	20:47		
13	07:38 16:49	15:19 (02) 15:36 (02)	07:08 17:31	06:22 19:08	17:08 (01)	19:43			05:41	33	06:49 (15)	20:48		
14	07:38 16:50	15:21 (02) 15:36 (02)	07:07 17:32	06:20 19:09	17:09 (01)	19:44			05:40		06:17 (15)	05:21		
15	07:37 16:51	15:23 (02) 15:34 (02)	07:05 17:33	06:18 19:10	16:54 (01) 17:03 (01)	19:45			05:39	33	06:50 (15)	20:49		
16	07:37 16:53	15:27 (02) 15:30 (02)	07:04 17:35	06:17 19:11	16:51 (01) 17:06 (01)	19:46			05:38	33	06:50 (15)	20:49		
17	07:36 16:54	15:30 (02) 17:36	07:02 17:37	06:15 19:13	16:49 (01) 17:08 (01)	19:47			05:37	33	06:50 (15)	20:49		
18	07:35 16:55	17:01 17:37	07:01 17:37	06:13 19:14	16:48 (01) 17:10 (01)	19:48			05:36	33	06:50 (15)	20:50		
19	07:35 16:56	06:59 17:39	06:59 17:39	06:11 19:15	16:46 (01) 17:10 (01)	19:49			05:35	31	06:49 (15)	20:50		
20	07:34 16:58	06:58 17:40	06:58 17:40	06:09 19:16	16:45 (01) 17:11 (01)	19:50			05:34	31	06:49 (15)	20:51		
21	07:33 16:59	06:56 17:42	06:56 17:42	06:08 19:18	16:45 (01) 17:12 (01)	19:51			05:33	31	06:48 (15)	20:51		
22	07:33 17:00	06:55 17:43	06:55 17:43	06:06 19:19	16:44 (01) 17:12 (01)	19:52			05:32	30	06:48 (15)	20:51		
23	07:32 17:02	06:53 17:44	06:53 17:44	06:04 19:20	16:44 (01) 17:13 (01)	19:53			05:31	29	06:48 (15)	20:51		
24	07:31 17:03	06:51 17:46	06:51 17:46	06:02 19:21	16:44 (01) 17:12 (01)	19:54			05:30	28	06:48 (15)	20:52		
25	07:30 17:04	06:50 17:47	06:50 17:47	06:00 19:22	16:43 (01) 17:12 (01)	19:55			05:29	28	06:48 (15)	20:52		
26	07:29 17:06	06:48 17:48	06:48 17:48	05:58 19:23	16:44 (01) 17:12 (01)	19:56			05:28	27	06:47 (15)	20:52		
27	07:28 17:07	06:46 17:50	06:46 17:50	05:57 19:24	16:44 (01) 17:11 (01)	19:57			05:27	25	06:46 (15)	20:52		
28	07:27 17:08	06:45 17:51	06:45 17:51	05:55 19:25	16:44 (01) 17:11 (01)	19:58			05:26	24	06:46 (15)	20:52		
29	07:26 17:10			05:53 19:26	16:44 (01) 17:10 (01)	19:59			05:25	22	06:45 (15)	20:52		
30	07:25 17:11			05:51 19:27	16:44 (01) 17:10 (01)	20:00			05:24	22	06:45 (15)	20:52		
31	07:24 17:13			05:49 19:28	16:44 (01) 17:10 (01)	20:01			05:23	21	06:45 (15)	20:52		
Potential sun hours	288	293	369	403	457	463			835		55			
Total, worst case	351	337	272	123	835	55			1.00		0.66			
Sun reduction	0.33	0.39	0.47	0.49	0.55	0.59			0.66		0.40			
Oper. time red.	1.00	1.00	1.00	1.00	1.00	1.00			0.66		0.37			
Wind dir. red.	0.76	0.67	0.61	0.57	0.66	0.66			0.37		0.40			
Total reduction	0.26	0.27	0.29	0.29	0.37	0.40								
Total, real	90	90	79	35	309	22								

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 15

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-116 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (63)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25	05:52	06:28 (15)	06:27	07:02	06:40
	20:52	20:31	32 07:00 (15)	19:42	18:47	16:56
2	05:25	05:53	06:28 (15)	06:28	07:03	06:42
	20:52	20:30	32 07:00 (15)	19:40	18:45	16:54
3	05:26	05:54	06:28 (15)	06:29	07:04	06:43
	20:52	20:29	31 06:59 (15)	19:39	18:43	16:53
4	05:27	05:55	06:29 (15)	06:30	07:05	06:44
	20:51	20:27	30 06:59 (15)	19:37	18:41	16:52
5	05:27	05:56	06:29 (15)	06:32	07:22 (16)	07:06
	20:51	20:26	29 06:58 (15)	19:35	5 07:27 (16)	18:40
6	05:28	05:57	06:30 (15)	06:33	07:18 (16)	07:07
	20:51	20:25	27 06:57 (15)	19:33	12 07:30 (16)	18:38
7	05:29	05:58	06:30 (15)	06:34	07:15 (16)	07:09
	20:51	20:23	26 06:56 (15)	19:31	17 07:32 (16)	18:36
8	05:29	06:38 (15)	05:59	06:35	07:13 (16)	07:10
	20:50	7 06:45 (15)	20:22	24 06:55 (15)	19:29	20 07:33 (16)
9	05:30	06:37 (15)	06:01	06:36	07:12 (16)	07:11
	20:50	10 06:47 (15)	20:21	22 06:54 (15)	19:28	21 07:33 (16)
10	05:31	06:36 (15)	06:02	06:37	07:12 (16)	07:12
	20:49	13 06:49 (15)	20:19	19 06:53 (15)	19:26	22 07:34 (16)
11	05:31	06:34 (15)	06:03	06:38	07:11 (16)	07:14
	20:49	16 06:50 (15)	20:18	15 06:51 (15)	19:24	23 07:34 (16)
12	05:32	06:34 (15)	06:04	06:40	07:10 (16)	07:15
	20:48	17 06:51 (15)	20:16	8 06:47 (15)	19:22	24 07:34 (16)
13	05:33	06:33 (15)	06:05	06:41	07:09 (16)	07:16
	20:48	19 06:52 (15)	20:15	19:20	25 07:34 (16)	18:26
14	05:34	06:33 (15)	06:06	06:42	07:09 (16)	07:17
	20:47	20 06:53 (15)	20:13	19:18	24 07:33 (16)	18:24
15	05:35	06:32 (15)	06:07	06:43	07:09 (16)	07:19
	20:47	22 06:54 (15)	20:12	19:17	23 07:32 (16)	18:22
16	05:36	06:32 (15)	06:09	06:44	07:09 (16)	07:20
	20:46	23 06:55 (15)	20:10	19:15	22 07:31 (16)	18:20
17	05:37	06:30 (15)	06:10	06:45	07:09 (16)	07:21
	20:45	25 06:55 (15)	20:09	19:13	21 07:30 (16)	18:19
18	05:37	06:30 (15)	06:11	06:46	07:10 (16)	07:22
	20:45	26 06:56 (15)	20:07	19:11	18 07:28 (16)	18:17
19	05:38	06:30 (15)	06:12	06:48	07:12 (16)	07:24
	20:44	27 06:57 (15)	20:06	19:09	15 07:27 (16)	18:15
20	05:39	06:29 (15)	06:13	06:49	07:14 (16)	07:25
	20:43	28 06:57 (15)	20:04	19:07	10 07:24 (16)	18:14
21	05:40	06:29 (15)	06:14	06:50	07:16 (16)	07:26
	20:42	29 06:58 (15)	20:03	19:05	18:12	26 17:42 (01)
22	05:41	06:29 (15)	06:15	06:51	07:27	17:16 (01)
	20:41	30 06:59 (15)	20:01	19:04	18:11	25 17:41 (01)
23	05:42	06:29 (15)	06:17	06:52	07:29	17:17 (01)
	20:40	30 06:59 (15)	19:58	19:02	18:09	24 17:41 (01)
24	05:43	06:28 (15)	06:18	06:53	07:30	17:18 (01)
	20:40	32 07:00 (15)	19:56	19:00	18:07	21 17:39 (01)
25	05:44	06:28 (15)	06:19	06:54	07:31	17:19 (01)
	20:39	32 07:00 (15)	19:54	18:58	18:06	18 17:37 (01)
26	05:45	06:28 (15)	06:20	06:56	07:33	17:22 (01)
	20:38	32 07:00 (15)	19:53	18:56	18:04	13 17:35 (01)
27	05:46	06:28 (15)	06:21	06:57	07:34	17:25 (01)
	20:37	32 07:00 (15)	19:51	18:54	18:03	6 17:31 (01)
28	05:47	06:28 (15)	06:22	06:58	07:35	07:16
	20:35	32 07:00 (15)	19:49	18:52	18:01	15 15:15 (02)
29	05:48	06:28 (15)	06:23	06:59	07:36	07:17
	20:34	32 07:00 (15)	19:47	18:51	18:00	16:29 17 15:17 (02)
30	05:50	06:28 (15)	06:25	07:00	07:38	07:18
	20:33	32 07:00 (15)	19:46	18:49	17:59	16:28 19 15:18 (02)
31	05:51	06:28 (15)	06:26	07:01	07:39	07:40
	20:32	32 07:00 (15)	19:44	18:48	17:57	16:35 30 15:37 (02)
Potential sun hours	469	434	376	342	290	277
Total, worst case	598	295	302	433	65	904
Sun reduction	0.63	0.59	0.54	0.44	0.27	0.25
Oper. time red.	1.00	1.00	1.00	1.00	1.00	1.00
Wind dir. red.	0.66	0.66	0.57	0.67	0.76	0.76
Total reduction	0.42	0.40	0.32	0.30	0.21	0.19
Total, real	254	117	95	131	14	176

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 16

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-117 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (364)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:37	07:23 17:14	16:14 (01) 16:40 (01)	06:43 17:52	06:47 19:31	05:57 20:06
2	07:40 16:37	07:22 17:15	16:13 (01) 16:41 (01)	06:41 17:53	06:46 19:32	05:56 20:07
3	07:40 16:38	07:21 17:17	16:13 (01) 16:42 (01)	06:40 17:55	06:44 19:33	05:54 20:09
4	07:40 16:39	07:20 17:18	16:12 (01) 16:42 (01)	06:38 17:56	06:42 19:35	05:53 20:10
5	07:40 16:40	07:19 17:19	16:12 (01) 16:43 (01)	06:36 17:57	06:40 19:36	05:52 20:11
6	07:40 16:41	07:17 17:21	16:12 (01) 16:44 (01)	06:34 17:59	06:38 19:37	05:50 20:12
7	07:40 16:42	07:16 17:22	16:11 (01) 16:43 (01)	06:33 18:00	06:37 19:38	05:49 20:13
8	07:40 16:43	07:15 17:24	16:12 (01) 16:44 (01)	06:31 19:01	06:35 19:40	05:48 20:15
9	07:39 16:44	07:14 17:25	16:12 (01) 16:44 (01)	06:29 19:03	06:33 19:41	05:46 20:16
10	07:39 16:46	07:12 17:26	16:12 (01) 16:44 (01)	06:27 19:04	06:31 19:42	05:45 20:17
11	07:39 16:47	07:11 17:28	16:12 (01) 16:44 (01)	06:26 19:05	06:30 19:43	05:44 20:18
12	07:38 16:48	07:10 17:30	16:13 (01) 16:44 (01)	06:24 19:06	06:28 19:44	05:43 20:19
13	07:38 16:49	07:08 17:31	16:13 (01) 16:43 (01)	06:22 19:08	06:26 19:46	05:41 20:20
14	07:38 16:50	07:07 17:32	16:15 (01) 16:43 (01)	06:20 19:09	06:24 19:47	05:40 20:21
15	07:37 16:51	07:05 17:33	16:15 (01) 16:41 (01)	06:18 19:10	06:23 19:48	05:39 20:22
16	07:37 16:53	07:04 17:35	16:17 (01) 16:40 (01)	06:16 19:11	06:21 19:49	05:38 20:23
17	07:36 16:54	07:02 17:36	16:18 (01) 16:39 (01)	06:14 19:13	06:19 19:50	05:37 20:24
18	07:35 16:55	07:01 17:37	16:20 (01) 16:37 (01)	06:12 19:14	06:18 19:52	05:36 20:25
19	07:35 16:56	06:59 17:39	16:22 (01) 16:34 (01)	06:11 19:15	06:16 19:53	05:35 20:26
20	07:34 16:58	06:58 17:40	07:09 19:16	06:10 19:16	06:14 19:54	05:34 20:27
21	07:33 16:59	06:56 17:42	07:08 19:18	06:09 19:18	06:13 19:55	05:33 20:28
22	07:33 17:00	06:55 17:43	07:06 19:19	06:08 19:21	06:11 19:57	05:32 20:29
23	07:32 17:02	06:53 17:44	07:04 19:20	06:07 19:21	06:09 19:58	05:31 20:30
24	07:31 17:03	06:51 17:46	07:02 19:21	06:06 19:22	06:08 19:59	05:30 20:31
25	07:30 17:04	06:50 17:47	07:00 19:22	06:05 19:23	06:06 20:00	05:29 20:32
26	07:29 17:06	16:22 (01) 16:28 (01)	06:48 17:48	06:05 19:24	06:05 20:00	05:29 20:33
27	07:28 17:07	16:19 (01) 16:32 (01)	06:46 17:50	06:03 19:25	06:03 20:01	05:28 20:34
28	07:27 17:08	16:17 (01) 16:34 (01)	06:45 17:51	06:02 19:26	06:02 20:03	05:27 20:35
29	07:26 17:10	16:16 (01) 16:36 (01)	06:43 17:52	06:00 19:27	06:00 20:04	05:27 20:36
30	07:25 17:11	16:15 (01) 16:38 (01)	06:41 17:53	05:59 19:29	05:59 20:05	05:26 20:37
31	07:24 17:13	16:14 (01) 16:39 (01)	06:40 17:54	05:58 19:30	05:58 20:06	05:25 20:38
Potential sun hours	288	293	369	403	457	463
Total, worst case	104	524	229	408	39	
Sun reduction	0.33	0.39	0.47	0.49	0.55	
Oper. time red.	1.00	1.00	1.00	1.00	1.00	
Wind dir. red.	0.71	0.71	0.55	0.62	0.62	
Total reduction	0.24	0.28	0.26	0.31	0.35	
Total, real	25	148	60	126	13	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 17

Licensed user:

EDR

217 Montgomery St.

US-SYRACUSE, NY 13202

(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2 Shadow receptor: R-117 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (364)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
 438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
 Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25	05:52	06:27	07:02	06:40	15:41 (01) 07:19
	20:52	20:31	19:42	18:47	16:56	32 16:13 (01) 16:28
2	05:25	05:53	06:28	07:03	06:42	15:41 (01) 07:20
	20:52	20:30	19:40	18:45	16:54	32 16:13 (01) 16:28
3	05:26	05:54	06:29	07:04	06:43	15:41 (01) 07:21
	20:52	20:29	19:39	18:43	16:53	33 16:14 (01) 16:27
4	05:27	05:55	06:30	07:05	06:44	15:41 (01) 07:22
	20:51	20:27	19:37	18:41	16:52	32 16:13 (01) 16:27
5	05:27	05:56	06:32	07:06	06:46	15:42 (01) 07:23
	20:51	20:26	19:35	18:40	16:50	31 16:13 (01) 16:27
6	05:28	05:57	06:33	07:08	06:47	15:42 (01) 07:24
	20:51	20:25	19:33	18:38	16:49	31 16:13 (01) 16:27
7	05:29	05:58	06:34	07:09	06:48	15:43 (01) 07:25
	20:51	20:23	19:31	18:36	16:48	30 16:13 (01) 16:26
8	05:29	05:59	06:35	07:10	06:50	15:43 (01) 07:26
	20:50	20:22	19:29	18:34	16:47	29 16:12 (01) 16:26
9	05:30	06:01	06:36	07:11	06:51	15:43 (01) 07:27
	20:50	20:21	19:28	18:33	16:45	28 16:11 (01) 16:26
10	05:31	06:02	06:58 (15) 06:37	07:12	06:52	15:45 (01) 07:28
	20:49	20:19	10 07:08 (15) 19:26	18:31	16:44	26 16:11 (01) 16:26
11	05:31	06:03	06:55 (15) 06:38	07:14	06:54	15:45 (01) 07:29
	20:49	20:18	15 07:10 (15) 19:24	18:29	16:43	25 16:10 (01) 16:26
12	05:32	06:04	06:53 (15) 06:40	07:15	06:55	15:47 (01) 07:30
	20:48	20:16	18 07:11 (15) 19:22	18:27	16:42	23 16:10 (01) 16:26
13	05:33	06:05	06:52 (15) 06:41	07:16	06:56	15:48 (01) 07:31
	20:48	20:15	20 07:12 (15) 19:20	18:26	16:41	20 16:08 (01) 16:26
14	05:34	06:06	06:51 (15) 06:42	07:17	06:58	15:50 (01) 07:32
	20:47	20:13	22 07:13 (15) 19:18	18:24	16:40	17 16:07 (01) 16:27
15	05:35	06:07	06:50 (15) 06:43	07:19	06:59	15:52 (01) 07:32
	20:47	20:12	24 07:14 (15) 19:17	18:22	16:39	13 16:05 (01) 16:27
16	05:36	06:09	06:49 (15) 06:44	07:24 (16) 07:20	07:00	15:55 (01) 07:33
	20:46	20:10	25 07:14 (15) 19:15	11 07:35 (16) 18:20	16:38	6 16:01 (01) 16:27
17	05:37	06:10	06:48 (15) 06:45	07:22 (16) 07:21	07:02	07:34
	20:45	20:09	26 07:14 (15) 19:13	14 07:36 (16) 18:19	16:37	16:27
18	05:37	06:11	06:47 (15) 06:46	07:20 (16) 07:22	07:03	07:35
	20:45	20:07	27 07:14 (15) 19:11	17 07:37 (16) 18:17	16:36	16:28
19	05:38	06:12	06:47 (15) 06:48	07:19 (16) 07:24	07:04	07:35
	20:44	20:06	27 07:14 (15) 19:09	20 07:39 (16) 18:15	16:35	16:28
20	05:39	06:13	06:46 (15) 06:49	07:18 (16) 07:25	07:06	07:36
	20:43	20:04	28 07:14 (15) 19:07	21 07:39 (16) 18:14	16:35	16:28
21	05:40	06:14	06:47 (15) 06:50	07:17 (16) 07:26	07:07	07:36
	20:42	20:03	28 07:15 (15) 19:05	22 07:39 (16) 18:12	16:34	16:29
22	05:41	06:15	06:47 (15) 06:51	07:17 (16) 07:27	16:57 (01) 07:08	07:37
	20:41	20:01	27 07:14 (15) 19:04	21 07:38 (16) 18:11	3 17:00 (01) 16:33	16:29
23	05:42	06:17	06:47 (15) 06:52	07:16 (16) 07:29	16:52 (01) 07:09	07:37
	20:40	19:58	27 07:14 (15) 19:02	22 07:38 (16) 18:09	13 17:05 (01) 16:32	16:30
24	05:43	06:18	06:47 (15) 06:53	07:16 (16) 07:30	16:49 (01) 07:11	07:38
	20:40	19:56	26 07:13 (15) 19:00	21 07:37 (16) 18:07	18 17:07 (01) 16:32	16:30
25	05:44	06:19	06:47 (15) 06:54	07:16 (16) 07:31	16:47 (01) 07:12	07:38
	20:39	19:54	25 07:12 (15) 18:58	20 07:36 (16) 18:06	22 17:09 (01) 16:31	16:31
26	05:45	06:20	06:48 (15) 06:56	07:18 (16) 07:33	16:46 (01) 07:13	07:39
	20:38	19:53	22 07:10 (15) 18:56	17 07:35 (16) 18:04	24 17:10 (01) 16:30	16:32
27	05:46	06:21	06:49 (15) 06:57	07:19 (16) 07:34	16:44 (01) 07:14	07:39
	20:37	19:51	20 07:09 (15) 18:54	14 07:33 (16) 18:03	27 17:11 (01) 16:30	16:32
28	05:47	06:22	06:50 (15) 06:58	07:20 (16) 07:35	16:43 (01) 07:16	07:39
	20:35	19:49	17 07:07 (15) 18:52	10 07:30 (16) 18:01	28 17:11 (01) 16:29	16:33
29	05:48	06:23	06:52 (15) 06:59	07:37	16:43 (01) 07:17	07:39
	20:34	19:47	12 07:04 (15) 18:51	07:38	30 17:13 (01) 16:29	16:34
30	05:50	06:25	06:57 (15) 07:00	07:38	16:42 (01) 07:18	07:40
	20:33	19:46	2 06:58 (15) 18:49	17:59	31 17:13 (01) 16:28	16:35
31	05:51	06:26		07:39	16:42 (01) 07:19	07:40
	20:32	19:44		17:57	31 17:13 (01) 16:28	16:35
Potential sun hours	469	434	376	342	290	277
Total, worst case		448	230	227	408	
Sun reduction		0.59	0.54	0.44	0.27	
Oper. time red.		1.00	1.00	1.00	1.00	
Wind dir. red.		0.62	0.55	0.71	0.71	
Total reduction		0.37	0.30	0.32	0.20	
Total, real		166	70	73	80	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker
			(WTG causing flicker last time)



Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 18

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-120 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (334)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	
1	07:40 16:36	07:23 17:14	07:50 (13) 08:04 (13)	06:43 17:52	07:15 (12) 07:39 (12)	06:47 19:31	05:57 20:06
2	07:40 16:37	07:22 17:15	07:49 (13) 08:06 (13)	06:41 17:53	07:14 (12) 07:40 (12)	06:46 19:32	05:56 20:07
3	07:40 16:38	07:21 17:17	07:48 (13) 08:07 (13)	06:40 17:55	07:13 (12) 07:41 (12)	06:44 19:33	05:54 20:09
4	07:40 16:39	07:20 17:18	07:47 (13) 08:08 (13)	06:38 17:56	07:12 (12) 07:41 (12)	06:42 19:35	05:53 20:10
5	07:40 16:40	07:19 17:19	07:47 (13) 08:09 (13)	06:36 17:57	07:12 (12) 07:42 (12)	06:40 19:36	05:52 20:11
6	07:40 16:41	07:17 17:21	07:47 (13) 08:09 (13)	06:35 17:59	07:11 (12) 07:42 (12)	06:38 19:37	05:50 20:12
7	07:40 16:42	07:16 17:22	07:46 (13) 08:09 (13)	06:33 18:00	07:10 (12) 07:42 (12)	06:37 19:38	05:49 20:13
8	07:40 16:43	07:15 17:24	07:46 (13) 08:10 (13)	07:31 19:01	08:10 (12) 08:41 (12)	06:35 19:40	05:48 20:15
9	07:39 16:44	07:14 17:25	07:46 (13) 08:10 (13)	07:29 19:03	08:09 (12) 08:41 (12)	06:33 19:41	05:46 20:16
10	07:39 16:46	07:12 17:26	07:46 (13) 08:09 (13)	07:27 19:04	08:10 (12) 08:41 (12)	06:31 19:42	05:45 20:17
11	07:39 16:47	07:11 17:28	07:47 (13) 08:09 (13)	07:26 19:05	08:10 (12) 08:40 (12)	06:30 19:43	05:44 20:18
12	07:38 16:48	07:10 17:29	07:48 (13) 08:09 (13)	07:24 19:06	08:10 (12) 08:39 (12)	06:28 19:44	05:43 20:19
13	07:38 16:49	07:08 17:31	07:48 (13) 08:08 (13)	07:22 19:08	08:11 (12) 08:38 (12)	06:26 19:46	05:41 20:20
14	07:38 16:50	07:07 17:32	07:49 (13) 08:07 (13)	07:20 19:09	08:11 (12) 08:36 (12)	06:24 19:47	05:40 20:21
15	07:37 16:51	07:05 17:33	07:50 (13) 08:06 (13)	07:18 19:10	08:13 (12) 08:35 (12)	06:23 19:48	05:39 20:23
16	07:37 16:53	07:04 17:35	07:53 (13) 08:04 (13)	07:17 19:11	08:15 (12) 08:33 (12)	06:21 19:49	05:38 20:24
17	07:36 16:54	07:02 17:36	07:57 (13) 07:59 (13)	07:15 19:13	08:17 (12) 08:29 (12)	06:19 19:51	05:37 20:25
18	07:35 16:55	07:01 17:37	07:01 19:14	07:13 19:15	06:18 19:52	05:36 20:26	05:36 20:50
19	07:35 16:56	06:59 17:39	06:59 19:15	07:11 19:16	06:16 19:53	05:35 20:27	05:35 20:51
20	07:34 16:58	06:58 17:40	06:58 19:16	07:09 19:17	06:14 19:54	05:34 20:28	05:34 20:51
21	07:33 16:59	06:56 17:42	06:56 19:18	07:08 19:18	06:13 19:55	05:33 20:29	05:33 20:51
22	07:33 17:00	06:55 17:43	06:55 19:19	07:06 19:19	06:11 19:57	05:32 20:30	05:32 20:52
23	07:32 17:02	06:53 17:44	06:53 19:20	07:04 19:20	06:09 19:58	05:31 20:31	05:22 20:52
24	07:31 17:03	06:51 17:46	06:51 19:21	07:02 19:21	06:08 19:59	05:30 20:32	05:22 20:52
25	07:30 17:04	06:50 17:47	06:50 19:22	07:00 19:22	06:06 20:00	05:30 20:33	05:22 20:52
26	07:29 17:06	06:48 17:48	06:48 19:23	06:58 19:24	06:05 20:00	05:29 20:34	05:23 20:52
27	07:28 17:07	06:46 17:50	06:46 19:24	06:57 19:25	06:03 20:01	05:28 20:35	05:23 20:52
28	07:27 17:08	06:45 17:51	06:45 19:25	06:55 19:26	06:02 20:03	05:27 20:36	05:23 20:52
29	07:26 17:10		06:53 19:27	06:53 19:27	06:00 20:04	05:27 20:37	05:24 20:52
30	07:25 17:11	07:55 (13) 08:02 (13)	06:51 19:28	06:51 19:29	05:59 20:05	05:26 20:38	05:53 (11) 06:04 (11)
31	07:24 17:13	07:52 (13) 08:02 (13)	06:49 19:30	06:49 19:30	05:25 20:39	05:25 20:39	05:52 (11) 06:05 (11)
Potential sun hours	288	293	369	403	457	463	621
Total, worst case	13	367	457	32	621		
Sun reduction	0.33	0.39	0.47	0.55	0.59		
Oper. time red.	1.00	1.00	1.00	1.00	1.00		
Wind dir. red.	0.50	0.50	0.52	0.71	0.71		
Total reduction	0.16	0.19	0.24	0.35	0.38		0.40
Total, real	2	69	108	12	251		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 19

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-120 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (334)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December			
1	05:25	05:54 (11)	05:52	06:27	07:02	07:49 (12)	06:41	07:16 (13)	07:19
	20:52	21 06:15 (11)	20:31	19:42	18:47	28 08:17 (12)	16:56	23 07:39 (13)	16:28
2	05:25	05:55 (11)	05:53	06:28	07:03	07:49 (12)	06:42	07:16 (13)	07:20
	20:52	21 06:16 (11)	20:30	19:40	18:45	30 08:19 (12)	16:54	24 07:40 (13)	16:28
3	05:26	05:55 (11)	05:54	06:29	07:04	07:48 (12)	06:43	07:16 (13)	07:21
	20:52	20 06:15 (11)	20:29	19:39	18:43	31 08:19 (12)	16:53	23 07:39 (13)	16:27
4	05:27	05:55 (11)	05:55	06:30	07:05	07:47 (12)	06:45	07:16 (13)	07:22
	20:52	21 06:16 (11)	20:27	19:37	18:42	31 08:18 (12)	16:52	23 07:39 (13)	16:27
5	05:27	05:55 (11)	05:56	06:32	07:06	07:46 (12)	06:46	07:16 (13)	07:23
	20:51	20 06:15 (11)	20:26	19:35	18:40	32 08:18 (12)	16:50	23 07:39 (13)	16:27
6	05:28	05:56 (11)	05:57	06:33	07:08	07:47 (12)	06:47	07:17 (13)	07:24
	20:51	20 06:16 (11)	20:25	19:33	18:38	32 08:19 (12)	16:49	21 07:38 (13)	16:27
7	05:29	05:57 (11)	05:58	06:34	07:09	07:46 (12)	06:49	07:18 (13)	07:25
	20:51	19 06:16 (11)	20:23	19:31	18:36	32 08:18 (12)	16:48	20 07:38 (13)	16:26
8	05:29	05:57 (11)	05:59	06:35	07:10	07:46 (12)	06:50	07:18 (13)	07:26
	20:50	18 06:15 (11)	20:22	19:30	18:34	31 08:17 (12)	16:47	19 07:37 (13)	16:26
9	05:30	05:58 (11)	06:01	06:36	07:11	07:46 (12)	06:51	07:20 (13)	07:27
	20:50	17 06:15 (11)	20:21	19:28	18:33	30 08:16 (12)	16:45	17 07:37 (13)	16:26
10	05:31	05:59 (11)	06:02	06:37	07:12	07:46 (12)	06:53	07:21 (13)	07:28
	20:49	16 06:15 (11)	20:19	19:26	18:31	29 08:15 (12)	16:44	14 07:35 (13)	16:26
11	05:31	05:59 (11)	06:03	06:38	07:14	07:47 (12)	06:54	07:23 (13)	07:29
	20:49	15 06:14 (11)	20:18	19:24	18:29	28 08:15 (12)	16:43	10 07:33 (13)	16:26
12	05:32	06:00 (11)	06:04	06:40	07:15	07:48 (12)	06:55	07:27 (13)	07:30
	20:48	13 06:13 (11)	20:16	19:22	18:27	25 08:13 (12)	16:42	2 07:29 (13)	16:26
13	05:33	06:01 (11)	06:05	06:41	07:16	07:49 (12)	06:56		07:31
	20:48	12 06:13 (11)	20:15	19:20	18:26	22 08:11 (12)	16:41		16:26
14	05:34	06:03 (11)	06:06	06:42	07:17	07:51 (12)	06:58		07:32
	20:47	9 06:12 (11)	20:13	19:18	18:24	19 08:10 (12)	16:40		16:27
15	05:35	06:05 (11)	06:07	06:43	07:19	07:53 (12)	06:59		07:32
	20:47	5 06:10 (11)	20:12	19:17	18:22	14 08:07 (12)	16:39		16:27
16	05:36		06:09	06:44	07:20	07:57 (12)	07:00		07:33
	20:46		20:10	19:15	18:20	5 08:02 (12)	16:38		16:27
17	05:37		06:10	06:45	07:21		07:02		07:34
	20:45		20:09	19:13	18:19		16:37		16:27
18	05:37		06:11	06:46	07:22		07:03		07:35
	20:45		20:07	19:11	18:17		16:36		16:28
19	05:38		06:12	06:48	07:24		07:04		07:35
	20:44		20:06	19:09	18:15		16:35		16:28
20	05:39		06:13	06:49	07:25		07:06		07:36
	20:43		20:04	19:07	18:14		16:34		16:28
21	05:40		06:14	06:50	07:26		07:07		07:36
	20:42		20:03	19:05	18:12		16:34		16:29
22	05:41		06:15	06:51	07:27		07:08		07:37
	20:41		20:01	19:04	18:11		16:33		16:29
23	05:42		06:17	06:52	07:29		07:09		07:37
	20:40		19:58	19:02	18:09		16:32		16:30
24	05:43		06:18	06:53	07:30		07:11		07:38
	20:40		19:56	19:00	18:07		16:32		16:30
25	05:44		06:19	06:54	07:31		07:12		07:38
	20:39		19:54	18:58	18:06	6 08:30 (13)	16:31		16:31
26	05:45		06:20	06:56	07:33		08:22 (13)	07:13	07:39
	20:38		19:53	18:56	18:04	12 08:34 (13)	16:30		16:32
27	05:46		06:21	06:57	07:34		08:20 (13)	07:14	07:39
	20:37		19:51	18:54	18:03	16 08:36 (13)	16:30		16:32
28	05:47		06:22	06:58	07:35		08:18 (13)	07:16	07:39
	20:36		19:49	18:52	18:01	18 08:36 (13)	16:29		16:33
29	05:48		06:24	06:59	07:37		08:17 (13)	07:17	07:39
	20:34		19:47	18:51	18:00	21 08:38 (13)	16:29		16:34
30	05:50		06:25	07:00	07:38		08:16 (13)	07:18	07:40
	20:33		19:46	18:49	17:59	22 08:38 (13)	16:28		16:35
31	05:51		06:26		07:39		08:16 (13)		07:40
	20:32		19:44		17:57	23 08:39 (13)			16:35
Potential sun hours	469	434	376	342		290			277
Total, worst case	247		97		537		219		
Sun reduction	0.63		0.54		0.44		0.27		
Oper. time red.	1.00		1.00		1.00		1.00		
Wind dir. red.	0.71		0.52		0.51		0.50		
Total reduction	0.43		0.27		0.22		0.13		
Total, real	107		26		117		29		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 20

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-121 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (64)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36	07:23 17:14	07:57 (13) 08:19 (13)	06:43 17:52	07:30 (12) 19:31	05:57 20:06
2	07:40 16:37	07:22 17:15	07:57 (13) 08:19 (13)	06:41 17:53	07:32 (12) 19:32	05:56 20:07
3	07:40 16:38	07:21 17:17	07:58 (13) 08:19 (13)	06:40 17:55	07:33 (12) 19:33	05:54 20:09
4	07:40 16:39	07:20 17:18	07:58 (13) 08:18 (13)	06:38 17:56	07:35 (12) 19:35	05:53 20:10
5	07:40 16:40	07:19 17:19	08:00 (13) 08:17 (13)	06:36 17:57	07:39 (12) 19:36	05:52 20:11
6	07:40 16:41	07:17 17:21	08:01 (13) 08:16 (13)	06:35 17:59	07:47 (12) 19:37	05:50 20:12
7	07:40 16:42	07:16 17:22	08:02 (13) 08:14 (13)	06:33 18:00	06:37 19:38	05:49 20:13
8	07:40 16:43	07:15 17:24	08:06 (13) 08:11 (13)	07:31 19:01	06:35 19:40	05:48 20:15
9	07:39 16:44	07:14 17:25	08:11 (13) 07:29	19:01 19:29	06:33 19:41	05:46 20:16
10	07:39 16:45	07:12 17:26	07:27 19:04	19:27 19:42	06:31 20:17	05:45 20:17
11	07:39 16:46	07:11 17:27	07:26 19:05	19:43 19:43	06:30 20:18	05:44 20:18
12	07:38 16:47	07:10 17:28	07:24 19:06	19:44 19:44	06:28 20:19	05:43 20:19
13	07:38 16:48	07:08 17:29	07:22 19:07	19:45 19:45	06:26 20:20	05:41 20:20
14	07:38 16:49	07:07 17:30	07:20 19:08	19:46 19:46	06:24 20:21	05:40 20:21
15	07:37 16:50	07:05 17:31	07:18 19:09	19:47 19:47	06:22 20:22	05:39 20:22
16	07:37 16:51	07:04 17:32	07:17 19:10	19:48 19:48	06:21 20:23	05:38 20:23
17	07:36 16:52	07:02 17:33	07:15 19:11	19:49 19:49	06:19 20:24	05:37 20:24
18	07:35 16:53	07:01 17:34	07:13 19:12	19:50 19:50	06:18 20:25	05:36 20:25
19	07:35 16:54	06:59 17:35	07:11 19:13	19:51 19:51	06:16 20:26	05:35 20:26
20	07:34 16:55	06:59 17:36	07:11 19:14	19:52 19:52	06:16 20:27	05:35 20:27
21	07:33 16:56	06:58 17:37	07:10 19:15	19:53 19:53	06:14 20:28	05:34 20:28
22	07:33 16:57	06:56 17:38	07:08 19:16	19:54 19:54	06:13 20:29	05:33 20:29
23	07:32 16:58	06:55 17:39	07:06 19:17	19:55 19:55	06:11 20:30	05:32 20:30
24	07:31 16:59	06:54 17:40	07:04 19:18	19:56 19:56	06:09 20:31	05:31 20:31
25	07:30 17:00	06:53 17:41	07:02 19:19	19:57 19:57	06:07 20:32	05:30 20:32
26	07:29 17:01	06:52 17:42	07:00 19:20	19:58 19:58	06:05 20:33	05:29 20:33
27	07:28 17:02	06:51 17:43	06:58 19:21	19:59 19:59	06:03 20:34	05:28 20:34
28	07:27 17:03	06:50 17:44	06:56 19:22	20:00 20:00	06:01 20:35	05:27 20:35
29	07:26 17:04	06:49 17:45	06:54 19:23	20:01 20:01	06:00 20:36	05:26 20:36
30	07:25 17:05	06:48 17:46	06:52 19:24	20:02 20:02	06:00 20:37	05:25 20:37
31	07:24 17:06	06:47 17:47	06:50 19:25	20:03 20:03	06:00 20:38	05:25 20:38
Potential sun hours	288	293	369	403	457	463
Total, worst case	215	517	91	400	202	
Sun reduction	0.33	0.39	0.47	0.55	0.59	
Oper. time red.	1.00	1.00	1.00	1.00	1.00	
Wind dir. red.	0.49	0.50	0.51	0.68	0.68	
Total reduction	0.15	0.19	0.23	0.36	0.39	
Total, real	33	98	21	145	79	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 21

Licensed user:

**EDR**

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US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-121 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (64)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25 20:52	06:16 (11) 20:31	06:21 (11) 06:27 (11)	06:27 19:42	07:02 18:47	06:41 16:56
2	05:25 20:52	06:16 (11) 20:30	06:28 19:40	06:28 18:45	07:03 18:45	06:42 16:54
3	05:26 20:52	06:15 (11) 20:29	06:29 19:39	06:29 18:43	07:04 18:43	06:43 16:53
4	05:27 20:52	06:15 (11) 20:27	06:30 19:37	06:30 18:42	07:05 18:42	06:45 16:52
5	05:27 20:51	06:14 (11) 20:26	06:32 19:35	06:32 18:40	07:06 18:40	06:46 16:50
6	05:28 20:51	06:14 (11) 20:25	06:33 19:33	06:33 18:38	07:08 18:38	06:47 16:49
7	05:29 20:51	06:14 (11) 20:23	06:34 19:31	06:34 18:36	07:09 18:36	06:49 16:48
8	05:29 20:50	06:13 (11) 20:22	06:35 19:30	06:35 18:34	07:10 18:34	06:50 16:47
9	05:30 20:50	06:13 (11) 20:21	06:36 19:28	06:36 18:33	07:11 18:33	06:51 16:45
10	05:31 20:49	06:13 (11) 20:19	06:37 19:26	06:37 18:31	07:12 18:31	06:53 16:44
11	05:31 20:49	06:12 (11) 20:18	06:38 19:24	06:38 18:29	07:14 18:29	06:54 16:43
12	05:32 20:48	06:12 (11) 20:16	06:40 19:22	06:40 18:27	07:15 18:27	06:55 16:42
13	05:33 20:48	06:12 (11) 20:15	06:41 19:20	06:41 18:26	07:16 18:26	06:56 16:41
14	05:34 20:47	06:12 (11) 20:14	06:42 19:18	06:42 18:24	07:17 18:24	06:58 16:40
15	05:35 20:47	06:12 (11) 20:12	06:43 19:17	06:43 18:22	07:19 18:22	06:59 16:39
16	05:36 20:46	06:13 (11) 20:10	06:44 19:15	06:44 18:20	07:20 18:20	07:00 16:38
17	05:37 20:45	06:12 (11) 20:09	06:45 19:13	06:45 18:19	07:21 18:19	07:02 16:37
18	05:37 20:45	06:12 (11) 20:07	06:46 19:11	06:46 18:17	07:22 18:17	07:03 16:36
19	05:38 20:44	06:12 (11) 20:06	06:48 19:09	06:48 18:15	07:24 18:15	07:04 16:35
20	05:39 20:43	06:12 (11) 20:04	06:49 19:07	06:49 18:13	07:25 18:13	07:06 16:34
21	05:40 20:42	06:12 (11) 20:03	06:50 19:05	06:50 18:12	07:26 18:12	07:07 16:34
22	05:41 20:41	06:12 (11) 20:01	06:51 19:04	06:51 18:11	07:27 18:11	07:08 16:33
23	05:42 20:40	06:13 (11) 19:58	06:52 19:02	06:52 18:09	07:29 18:09	07:09 16:32
24	05:43 20:40	06:13 (11) 19:56	06:53 19:00	06:53 18:07	07:30 18:07	07:11 16:31
25	05:44 20:39	06:13 (11) 19:54	06:54 18:58	06:54 18:06	07:31 18:06	07:12 16:31
26	05:45 20:38	06:14 (11) 19:53	06:56 18:56	06:56 18:04	07:33 18:04	07:13 16:30
27	05:46 20:37	06:14 (11) 19:51	06:57 18:54	06:57 18:03	07:34 18:03	07:14 16:30
28	05:47 20:36	06:15 (11) 19:49	06:58 18:52	06:58 18:01	07:35 18:01	07:16 16:29
29	05:48 20:34	06:16 (11) 19:47	06:59 18:51	06:59 18:00	07:37 18:00	07:17 16:29
30	05:50 20:33	06:17 (11) 19:46	07:00 18:49	07:00 17:59	07:38 17:59	07:18 16:28
31	05:51 20:32	06:18 (11) 19:44	07:01 18:47	07:01 17:57	07:39 17:57	07:19 16:28
Potential sun hours	469	434	376	342	290	277
Total, worst case	571	6	474	351		
Sun reduction	0.63	0.59	0.44	0.27		
Oper. time red.	1.00	1.00	1.00	1.00		
Wind dir. red.	0.68	0.68	0.51	0.49		
Total reduction	0.42	0.39	0.22	0.13		
Total, real	237	2	102	44		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 22

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-124 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (66)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40	15:34 (01) 07:23	06:43	07:04 (16) 06:47	07:18 (15) 05:57	05:25 06:10 (14)
2	07:40	15:34 (01) 07:22	06:41	07:03 (16) 06:46	07:18 (15) 05:56	05:24 06:09 (14)
3	07:40	15:34 (01) 07:21	06:40	07:01 (16) 06:44	07:19 (15) 05:54	05:24 06:10 (14)
4	07:40	15:35 (01) 07:20	06:38	07:00 (16) 06:42	07:19 (15) 05:53	05:23 06:10 (14)
5	07:40	15:35 (01) 07:19	06:36	07:00 (16) 06:40	07:19 (15) 05:52	05:23 06:10 (14)
6	07:40	15:36 (01) 07:17	06:34	07:00 (16) 06:38	07:19 (15) 05:50	05:23 06:11 (14)
7	07:40	15:35 (01) 07:16	06:33	07:00 (16) 06:37	07:21 (15) 05:49	05:22 06:11 (14)
8	07:40	15:36 (01) 07:15	06:31	07:00 (16) 06:35	07:22 (15) 05:48	05:22 06:11 (14)
9	07:39	15:36 (01) 07:14	06:29	08:00 (16) 06:33	07:23 (15) 05:46	05:22 06:11 (14)
10	07:39	15:36 (01) 07:12	06:27	08:01 (16) 06:31	07:27 (15) 05:45	05:21 06:11 (14)
11	07:39	15:37 (01) 07:11	06:26	08:02 (16) 06:30	07:32 (15) 05:44	05:21 06:12 (14)
12	07:38	15:38 (01) 07:10	06:25	08:04 (16) 06:28	08:02 (16) 06:30	05:21 06:12 (14)
13	07:38	15:37 (01) 07:08	06:22	08:16 (16) 06:26	08:16 (16) 06:24	05:21 06:13 (14)
14	07:38	15:38 (01) 07:07	06:20	08:18 (16) 06:24	08:18 (16) 06:22	05:21 06:13 (14)
15	07:37	15:38 (01) 07:05	06:18	08:18 (16) 06:23	08:18 (16) 06:21	05:21 06:13 (14)
16	07:37	15:39 (01) 07:04	06:17	08:19 (16) 06:21	08:19 (16) 06:20	05:21 06:13 (14)
17	07:36	15:40 (01) 07:02	06:15	08:19 (16) 06:19	08:19 (16) 06:18	05:21 06:13 (14)
18	07:35	15:40 (01) 07:01	06:13	08:19 (16) 06:18	08:19 (16) 06:17	05:21 06:13 (14)
19	07:35	15:40 (01) 06:59	06:11	08:19 (16) 06:16	08:19 (16) 06:15	05:21 06:13 (14)
20	07:34	15:42 (01) 06:58	06:09	08:19 (16) 06:14	08:19 (16) 06:13	05:21 06:13 (14)
21	07:33	15:42 (01) 06:56	06:08	08:19 (16) 06:13	08:19 (16) 06:12	05:21 06:13 (14)
22	07:33	15:43 (01) 06:55	06:06	08:19 (16) 06:11	08:19 (16) 06:10	05:21 06:13 (14)
23	07:32	15:44 (01) 06:53	06:04	08:19 (16) 06:09	08:19 (16) 06:08	05:21 06:13 (14)
24	07:31	15:45 (01) 06:51	06:02	08:19 (16) 06:07	08:19 (16) 06:06	05:21 06:13 (14)
25	07:30	15:46 (01) 06:50	06:00	08:19 (16) 06:06	08:19 (16) 06:05	05:21 06:13 (14)
26	07:29	15:48 (01) 06:48	06:58	08:19 (16) 06:05	08:19 (16) 06:04	05:21 06:13 (14)
27	07:28	15:50 (01) 06:46	06:57	08:19 (16) 06:03	08:19 (16) 06:02	05:21 06:13 (14)
28	07:27	16:03 (01) 07:50	07:50 (16) 06:55	08:19 (16) 06:01	08:19 (16) 06:00	05:21 06:13 (14)
29	07:26	16:01 (01) 07:51	07:51 (16) 06:53	08:19 (16) 06:00	08:19 (16) 05:59	05:21 06:13 (14)
30	07:25		06:51	08:19 (16) 05:59	08:19 (16) 05:58	05:21 06:13 (14)
31	07:24		06:49	08:19 (16) 05:57	08:19 (16) 05:56	05:21 06:13 (14)
Potential sun hours	288	293	369	403	457	463
Total, worst case	726	11	389	214	655	1126
Sun reduction	0.33	0.39	0.47	0.49	0.55	0.59
Oper. time red.	1.00	1.00	1.00	1.00	1.00	1.00
Wind dir. red.	0.75	0.52	0.54	0.57	0.68	0.68
Total reduction	0.25	0.20	0.26	0.28	0.38	0.41
Total, real	181	2	101	61	248	457

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 23

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-124 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (66)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25 20:52	06:16 (14) 06:54 (14)	05:52 20:31	06:31 (14) 06:45 (14)	06:27 19:42	07:02 18:47
2	05:25 20:52	06:17 (14) 06:54 (14)	05:53 20:30	06:35 (14) 06:42 (14)	06:28 19:40	07:03 18:45
3	05:26 20:52	06:16 (14) 06:54 (14)	05:54 20:29	06:35 (14) 06:29	06:29 19:39	07:04 18:43
4	05:27 20:51	06:17 (14) 06:55 (14)	05:55 20:27	06:30 19:37	06:30 19:37	07:05 18:41
5	05:27 20:51	06:16 (14) 06:54 (14)	05:56 20:26	06:32 19:35	06:32 19:35	07:06 18:40
6	05:28 20:51	06:17 (14) 06:55 (14)	05:57 20:25	06:33 19:33	06:33 19:33	07:08 18:38
7	05:29 20:51	06:17 (14) 06:56 (14)	05:58 20:23	06:34 19:31	06:34 19:31	07:09 18:36
8	05:29 20:50	06:17 (14) 06:55 (14)	05:59 20:22	06:35 19:29	06:35 19:29	07:10 18:34
9	05:30 20:50	06:17 (14) 06:56 (14)	06:01 20:21	06:36 19:28	06:36 19:28	07:11 18:33
10	05:31 20:49	06:18 (14) 06:56 (14)	06:02 20:19	06:37 19:26	06:37 19:26	07:12 18:31
11	05:31 20:49	06:17 (14) 06:55 (14)	06:03 20:18	06:38 19:24	06:38 19:24	07:14 18:29
12	05:32 20:48	06:17 (14) 06:56 (14)	06:04 20:16	06:40 19:22	06:40 19:22	07:15 18:27
13	05:33 20:48	06:18 (14) 06:56 (14)	06:05 20:15	06:41 19:20	06:41 19:20	07:16 18:26
14	05:34 20:47	06:18 (14) 06:56 (14)	06:06 20:13	06:42 19:18	06:42 19:18	07:17 18:24
15	05:35 20:47	06:19 (14) 06:57 (14)	06:07 20:12	06:43 19:17	06:43 19:17	07:19 18:22
16	05:36 20:46	06:19 (14) 06:57 (14)	06:09 20:10	06:44 19:15	06:44 19:15	07:20 18:20
17	05:37 20:45	06:18 (14) 06:56 (14)	06:10 20:09	06:45 19:13	06:45 19:13	07:21 18:19
18	05:37 20:45	06:19 (14) 06:56 (14)	06:11 20:07	06:46 19:11	06:46 19:11	07:22 18:17
19	05:38 20:44	06:19 (14) 06:56 (14)	06:12 20:06	06:48 19:09	06:48 19:09	07:24 18:15
20	05:39 20:43	06:20 (14) 06:56 (14)	06:13 20:04	06:49 19:07	06:49 19:07	07:25 18:14
21	05:40 20:42	06:20 (14) 06:56 (14)	06:14 20:03	06:50 19:05	06:50 19:05	07:26 18:12
22	05:41 20:41	06:21 (14) 06:55 (14)	06:15 20:01	06:51 19:04	06:51 19:04	07:27 18:11
23	05:42 20:40	06:21 (14) 06:55 (14)	06:17 19:58	06:52 19:02	06:52 19:02	07:29 18:09
24	05:43 20:40	06:22 (14) 06:55 (14)	06:18 19:56	06:53 19:00	06:53 19:00	07:30 18:07
25	05:44 20:39	06:22 (14) 06:54 (14)	06:19 19:54	06:54 18:58	06:54 18:58	07:31 18:06
26	05:45 20:38	06:23 (14) 06:53 (14)	06:20 19:53	06:56 18:56	06:56 18:56	07:33 18:04
27	05:46 20:37	06:24 (14) 06:53 (14)	06:21 19:51	06:57 18:54	06:57 18:54	07:34 18:03
28	05:47 20:35	06:25 (14) 06:52 (14)	06:22 19:49	06:58 18:52	06:58 18:52	07:35 18:01
29	05:48 20:34	06:26 (14) 06:51 (14)	06:23 19:47	06:59 18:51	06:59 18:51	07:37 18:00
30	05:50 20:33	06:27 (14) 06:49 (14)	06:25 19:46	07:00 18:49	07:00 18:49	07:38 17:59
31	05:51 20:32	06:29 (14) 06:48 (14)	06:26 19:44	07:01 18:48	07:01 18:48	07:39 17:57
Potential sun hours	469	434	376	342	290	277
Total, worst case	1079	21	399	227	414	825
Sun reduction	0.63	0.59	0.54	0.44	0.27	0.25
Oper. time red.	1.00	1.00	1.00	1.00	1.00	1.00
Wind dir. red.	0.68	0.68	0.57	0.52	0.75	0.75
Total reduction	0.43	0.41	0.31	0.23	0.20	0.19
Total, real	468	9	125	52	85	156

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 24

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-126 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (331)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40	07:23	06:43	06:47	05:57	05:25
	16:37	17:14	17:52	19:31	20:06	20:40
2	07:40	07:22	06:41	06:46	05:56	05:24
	16:37	17:15	17:53	19:32	20:07	20:41
3	07:40	07:21	06:40	06:44	05:54	05:24
	16:38	17:17	17:55	19:33	20:09	20:41
4	07:40	07:20	06:38	06:42	05:53	05:23
	16:39	17:18	17:56	19:35	20:10	20:42
5	07:40	07:19	06:36	06:40	05:52	05:23
	16:40	17:20	17:57	19:36	20:11	20:43
6	07:40	07:17	06:35	06:38	05:50	05:23
	16:41	17:21	17:59	19:37	20:12	20:44
7	07:40	07:16	06:33	06:37	05:49	05:22
	16:42	17:22	18:00	19:38	20:13	20:44
8	07:40	07:15	07:31	06:35	05:48	05:22
	16:43	17:24	19:01	19:40	20:15	20:45
9	07:39	07:14	07:29	06:33	05:46	05:22
	16:44	17:25	19:03	19:41	20:16	20:46
10	07:39	07:12	07:27	06:31	06:56 (13)	05:45
	16:46	17:26	19:04	19:42	4 07:00 (13)	20:17
11	07:39	07:11	07:26	06:30	06:53 (13)	05:44
	16:47	17:28	19:05	19:43	12 07:05 (13)	20:18
12	07:38	07:10	07:24	06:28	06:51 (13)	05:43
	16:48	17:29	19:06	19:44	15 07:06 (13)	20:19
13	07:38	07:08	07:22	06:26	06:49 (13)	05:41
	16:49	17:31	19:08	19:46	18 07:07 (13)	20:20
14	07:38	07:07	07:20	06:24	06:47 (13)	05:40
	16:50	17:32	19:09	19:47	20 07:07 (13)	20:21
15	07:37	07:05	07:19	06:23	06:47 (13)	05:39
	16:51	17:33	19:10	19:48	21 07:08 (13)	20:23
16	07:37	07:04	07:17	06:21	06:46 (13)	05:38
	16:53	17:35	19:11	19:49	22 07:08 (13)	20:24
17	07:36	07:02	07:15	06:19	06:45 (13)	05:37
	16:54	17:36	19:13	19:51	22 07:07 (13)	20:25
18	07:35	07:01	07:13	06:18	06:46 (13)	05:36
	16:55	17:37	19:14	19:52	22 07:08 (13)	20:26
19	07:35	06:59	07:11	06:16	06:45 (13)	05:35
	16:56	17:39	19:15	19:53	22 07:07 (13)	20:27
20	07:34	06:58	07:09	06:14	06:46 (13)	05:34
	16:58	17:40	19:16	19:54	21 07:07 (13)	20:28
21	07:33	06:56	07:08	06:13	06:46 (13)	05:33
	16:59	17:42	19:18	19:55	19 07:05 (13)	20:29
22	07:33	06:55	07:06	06:11	06:46 (13)	05:32
	17:00	17:43	19:19	19:57	18 07:04 (13)	20:30
23	07:32	06:53	07:04	06:09	06:48 (13)	05:31
	17:02	17:44	19:20	19:58	15 07:03 (13)	20:31
24	07:31	06:51	07:02	06:08	06:49 (13)	05:30
	17:03	17:46	19:21	19:59	12 07:01 (13)	20:32
25	07:30	06:50	07:00	06:06	06:52 (13)	05:30
	17:04	17:47	19:22	20:00	6 06:58 (13)	20:33
26	07:29	06:48	06:58	06:05	05:29	7 06:05 (12)
	17:06	17:48	19:24	20:00	20:34	05:56 (12)
27	07:28	06:46	06:57	06:03	05:28	11 06:07 (12)
	17:07	17:50	19:25	20:01	20:35	05:56 (12)
28	07:27	06:45	06:55	06:02	05:27	13 06:09 (12)
	17:08	17:51	19:26	20:03	20:36	05:54 (12)
29	07:26		06:53	06:00	05:27	16 06:10 (12)
	17:10		19:27	20:04	20:37	05:54 (12)
30	07:25		06:51	05:59	05:26	17 06:11 (12)
	17:11		19:29	20:05	20:38	05:53 (12)
31	07:24		06:49		05:25	19 06:12 (12)
	17:13		19:30		20:39	05:52 (12)
Potential sun hours	288	293	369	403	457	463
Total, worst case				269	103	746
Sun reduction				0.49	0.55	0.59
Oper. time red.				1.00	1.00	1.00
Wind dir. red.				0.61	0.70	0.70
Total reduction				0.30	0.39	0.41
Total, real				81	40	309

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 25

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2 Shadow receptor: R-126 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (331)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25	05:56 (12)	05:52	06:27	06:52 (13)	07:02
	25	06:21 (12)	20:31	19:42	11 07:03 (13)	18:47
2	05:25	05:57 (12)	05:53	06:28	06:56 (13)	07:03
	25	06:22 (12)	20:30	19:40	3 06:59 (13)	18:45
3	05:26	05:57 (12)	05:54	06:29	07:04	06:43
	24	06:21 (12)	20:29	19:39	18:43	16:53
4	05:27	05:57 (12)	05:55	06:30	07:05	06:45
	25	06:22 (12)	20:27	19:37	18:42	16:52
5	05:27	05:57 (12)	05:56	06:32	07:06	06:46
	24	06:21 (12)	20:26	19:35	18:40	16:50
6	05:28	05:58 (12)	05:57	06:33	07:08	06:47
	24	06:22 (12)	20:25	19:33	18:38	16:49
7	05:29	05:58 (12)	05:58	06:34	07:09	06:49
	24	06:22 (12)	20:23	19:31	18:36	16:48
8	05:29	05:58 (12)	06:00	06:35	07:10	06:50
	23	06:21 (12)	20:22	19:30	18:34	16:47
9	05:30	05:59 (12)	06:01	06:36	07:11	06:51
	22	06:21 (12)	20:21	19:28	18:33	16:45
10	05:31	06:00 (12)	06:02	06:37	07:12	06:53
	21	06:21 (12)	20:19	19:26	18:31	16:44
11	05:31	05:59 (12)	06:03	06:38	07:14	06:54
	21	06:20 (12)	20:18	19:24	18:29	16:43
12	05:32	06:00 (12)	06:04	06:40	07:15	06:55
	20	06:20 (12)	20:16	19:22	18:27	16:42
13	05:33	06:01 (12)	06:05	06:41	07:16	06:56
	19	06:20 (12)	20:15	19:20	18:26	16:41
14	05:34	06:02 (12)	06:06	06:42	07:17	06:58
	18	06:20 (12)	20:13	19:18	18:24	16:40
15	05:35	06:03 (12)	06:07	06:43	07:19	06:59
	16	06:19 (12)	20:12	19:17	18:22	16:39
16	05:36	06:04 (12)	06:09	06:44	07:20	07:00
	15	06:19 (12)	20:10	19:15	18:20	16:38
17	05:37	06:05 (12)	06:10	06:45	07:21	07:02
	12	06:17 (12)	20:09	19:13	18:19	16:37
18	05:37	06:07 (12)	06:11	06:46	07:22	07:03
	8	06:15 (12)	20:07	7 07:04 (13)	19:11	18:17
19	05:38	06:11 (12)	06:12	06:54 (13)	06:48	07:24
	2	06:12 (12)	20:06	13 07:07 (13)	19:09	18:15
20	05:39	06:13	06:53 (13)	06:49	07:25	07:06
	20	06:13	06:53 (13)	06:49	07:25	07:06
21	05:40	06:14	06:52 (13)	06:50	07:26	07:07
	18	06:14	06:52 (13)	06:50	07:26	07:07
22	05:41	06:15	06:51 (13)	06:51	07:27	07:08
	19	06:15	06:51 (13)	06:51	07:27	07:08
23	05:42	06:17	06:50 (13)	06:52	07:29	07:09
	20	06:17	06:50 (13)	06:52	07:29	07:09
24	05:43	06:18	06:49 (13)	06:53	07:30	07:11
	20	06:18	06:49 (13)	06:53	07:30	07:11
25	05:44	06:19	06:49 (13)	06:55	07:31	07:12
	19	06:19	06:49 (13)	06:55	07:31	07:12
26	05:45	06:20	06:48 (13)	06:56	07:33	07:13
	18	06:20	06:48 (13)	06:56	07:33	07:13
27	05:46	06:21	06:48 (13)	06:57	07:34	07:14
	17	06:21	06:48 (13)	06:57	07:34	07:14
28	05:47	06:22	06:48 (13)	06:58	07:35	07:16
	16	06:22	06:48 (13)	06:58	07:35	07:16
29	05:48	06:24	06:48 (13)	06:59	07:37	07:17
	15	06:24	06:48 (13)	06:59	07:37	07:17
30	05:50	06:25	06:49 (13)	07:00	07:38	07:18
	14	06:25	06:49 (13)	07:00	07:38	07:18
31	05:51	06:26	06:51 (13)	07:01	07:39	07:19
	13	06:26	06:51 (13)	07:01	07:39	07:19
Potential sun hours	469	434	376	342	290	277
Total, worst case	368	253	14			
Sun reduction	0.63	0.59	0.54			
Oper. time red.	1.00	1.00	1.00			
Wind dir. red.	0.70	0.61	0.61			
Total reduction	0.44	0.36	0.33			
Total, real	163	91	5			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)



Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 26

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-127 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (67)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June		
1	07:40 16:36	07:23 17:14	08:02 (13) 08:27 (13)	06:43 17:52	07:29 (12) 08:05 (12)	06:47 19:31	05:57 20:06	05:25 20:40
2	07:40 16:37	07:22 17:15	08:02 (13) 08:27 (13)	06:41 17:53	07:29 (12) 08:05 (12)	06:46 19:32	05:56 20:07	05:24 20:41
3	07:40 16:38	07:21 17:17	08:03 (13) 08:27 (13)	06:40 17:55	07:29 (12) 08:04 (12)	06:44 19:33	05:54 20:09	05:24 20:41
4	07:40 16:39	07:20 17:18	08:03 (13) 08:26 (13)	06:38 17:56	07:29 (12) 08:03 (12)	06:42 19:35	05:53 20:10	05:23 20:42
5	07:40 16:40	07:19 17:19	08:04 (13) 08:25 (13)	06:36 17:57	07:30 (12) 08:03 (12)	06:40 19:36	05:52 20:11	05:23 20:43
6	07:40 16:41	07:17 17:21	08:06 (13) 08:25 (13)	06:35 17:59	07:31 (12) 08:02 (12)	06:38 19:37	05:50 20:12	05:23 20:44
7	07:40 16:42	07:16 17:22	08:06 (13) 08:23 (13)	06:33 18:00	07:31 (12) 08:00 (12)	06:37 19:38	05:49 20:13	05:22 20:44
8	07:40 16:43	07:15 17:24	08:09 (13) 08:21 (13)	07:31 19:01	08:32 (12) 08:58 (12)	06:35 19:40	05:48 20:15	05:22 20:45
9	07:39 16:44	07:14 17:25	08:12 (13) 08:18 (13)	07:29 19:03	08:33 (12) 08:56 (12)	06:33 19:41	05:46 20:16	05:22 20:46
10	07:39 16:46	07:12 17:26	07:27 19:04	06:31 19:05	08:36 (12) 08:55 (12)	06:31 19:42	05:45 20:17	05:21 20:46
11	07:39 16:47	07:11 17:28	07:26 19:05	06:30 19:06	08:39 (12) 08:51 (12)	06:30 19:43	05:44 20:18	05:21 20:47
12	07:38 16:48	07:10 17:29	07:24 19:06	06:28 19:07	06:28 19:44	05:43 20:19	05:21 20:48	05:21 20:48
13	07:38 16:49	07:08 17:31	07:22 19:08	06:26 19:09	06:26 19:46	05:41 20:20	05:21 20:48	05:21 20:48
14	07:38 16:50	07:07 17:32	07:20 19:09	06:24 19:10	06:24 19:47	05:40 20:21	05:21 20:49	05:21 20:49
15	07:37 16:51	07:05 17:33	07:18 19:10	06:23 19:11	06:23 19:48	05:39 20:22	05:21 20:49	05:21 20:49
16	07:37 16:53	07:04 17:35	07:17 19:11	06:21 19:12	06:21 19:49	05:38 20:24	05:21 20:50	05:21 20:50
17	07:36 16:54	08:09 (13) 08:12 (13)	07:02 17:36	07:15 19:13	06:19 19:51	05:37 20:25	05:21 20:50	05:21 20:50
18	07:35 16:55	08:06 (13) 08:16 (13)	07:01 17:37	07:13 19:14	06:18 19:52	05:36 20:26	05:21 20:50	05:21 20:50
19	07:35 16:56	08:04 (13) 08:17 (13)	06:59 17:39	07:11 19:15	06:16 19:53	05:35 20:27	05:21 20:51	05:21 20:51
20	07:34 16:58	08:04 (13) 08:20 (13)	06:58 17:40	07:09 19:16	06:14 19:54	05:34 20:28	05:21 20:51	05:21 20:51
21	07:33 16:59	08:03 (13) 08:21 (13)	06:56 17:42	07:08 19:18	06:13 19:55	05:33 20:29	05:21 20:51	05:21 20:51
22	07:33 17:00	08:02 (13) 08:22 (13)	06:55 17:43	07:06 19:19	06:11 19:57	05:32 20:30	05:21 20:52	05:21 20:52
23	07:32 17:02	08:02 (13) 08:23 (13)	06:53 17:44	07:04 19:20	06:09 19:58	05:31 20:31	05:22 20:52	05:22 20:52
24	07:31 17:03	08:01 (13) 08:24 (13)	06:51 17:46	07:02 19:21	06:08 19:59	05:30 20:32	05:22 20:52	05:22 20:52
25	07:30 17:04	08:01 (13) 08:24 (13)	06:50 17:47	07:00 19:22	06:06 20:00	05:30 20:33	05:22 20:52	05:22 20:52
26	07:29 17:06	08:01 (13) 08:25 (13)	06:48 17:48	06:58 19:24	06:05 20:00	05:29 20:34	05:23 20:52	05:53 (11) 06:11 (11)
27	07:28 17:07	08:00 (13) 08:26 (13)	06:46 17:50	06:57 19:25	06:03 20:01	05:28 20:35	05:23 20:52	05:53 (11) 06:11 (11)
28	07:27 17:08	08:00 (13) 08:26 (13)	06:45 17:51	06:55 19:26	06:02 20:03	05:27 20:36	05:23 20:52	05:54 (11) 06:11 (11)
29	07:26 17:10	08:01 (13) 08:26 (13)	06:53 19:27	06:53 19:27	06:00 20:04	05:27 20:37	05:24 20:52	05:54 (11) 06:11 (11)
30	07:25 17:11	08:01 (13) 08:27 (13)	06:51 19:29	06:51 19:29	05:59 20:05	05:26 20:38	05:24 20:52	05:54 (11) 06:10 (11)
31	07:24 17:13	08:01 (13) 08:27 (13)	06:49 19:30	06:49 19:30	05:57 20:39	05:25 20:39	05:24 20:39	05:54 (11) 20:39
Potential sun hours	288	293	369	403	457	463		419
Total, worst case	300	548	314					0.59
Sun reduction	0.33	0.39	0.47					1.00
Oper. time red.	1.00	1.00	1.00					0.71
Wind dir. red.	0.48	0.50	0.51					0.41
Total reduction	0.15	0.19	0.23					
Total, real	46	104	73					170

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 27

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-127 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (67)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25	05:55 (11)	05:52	06:27	07:02	06:41
	20:52	16 06:11 (11)	20:31	19:42	18:47	16:56
2	05:25	05:56 (11)	05:53	06:28	07:03	08:20 (12)
	20:52	15 06:11 (11)	20:30	19:40	18:45	7 08:27 (12)
3	05:26	05:56 (11)	05:54	06:29	07:04	08:15 (12)
	20:52	14 06:10 (11)	20:29	19:39	18:43	16 08:31 (12)
4	05:27	05:57 (11)	05:55	06:30	07:05	08:12 (12)
	20:52	13 06:10 (11)	20:27	19:37	18:42	21 08:33 (12)
5	05:27	05:58 (11)	05:56	06:32	07:06	08:10 (12)
	20:51	11 06:09 (11)	20:26	19:35	18:40	24 08:34 (12)
6	05:28	05:59 (11)	05:57	06:33	07:08	08:09 (12)
	20:51	10 06:09 (11)	20:25	19:33	18:38	27 08:36 (12)
7	05:28	06:01 (11)	05:58	06:34	07:09	08:07 (12)
	20:51	7 06:08 (11)	20:23	19:31	18:36	30 08:37 (12)
8	05:29		05:59	06:35	07:10	08:06 (12)
	20:50		20:22	19:30	18:34	32 08:38 (12)
9	05:30		06:01	06:36	07:11	08:04 (12)
	20:50		20:21	19:28	18:33	34 08:38 (12)
10	05:31		06:02	06:37	07:12	08:03 (12)
	20:49		20:19	19:26	18:31	35 08:38 (12)
11	05:31		06:03	06:38	07:14	08:03 (12)
	20:49		20:18	19:24	18:29	36 08:39 (12)
12	05:32		06:04	06:40	07:15	08:03 (12)
	20:48		20:16	19:22	18:27	36 08:39 (12)
13	05:33		06:05	06:41	07:16	08:02 (12)
	20:48		20:15	19:20	18:26	36 08:38 (12)
14	05:34		06:06	06:42	07:17	08:02 (12)
	20:47		20:13	19:18	18:24	37 08:39 (12)
15	05:35		06:07	06:43	07:19	08:02 (12)
	20:47		20:12	19:17	18:22	36 08:38 (12)
16	05:36		06:09	06:44	07:20	08:02 (12)
	20:46		20:10	19:15	18:20	36 08:38 (12)
17	05:37		06:10	06:45	07:21	08:03 (12)
	20:45		20:09	19:13	18:19	35 08:38 (12)
18	05:37		06:11	06:46	07:22	08:03 (12)
	20:45		20:07	19:11	18:17	34 08:37 (12)
19	05:38		06:12	06:48	07:24	08:03 (12)
	20:44		20:06	19:09	18:15	33 08:36 (12)
20	05:39		06:13	06:49	07:25	08:03 (12)
	20:43		20:04	19:07	18:14	31 08:34 (12)
21	05:40		06:14	06:50	07:26	08:04 (12)
	20:42		20:03	19:05	18:12	30 08:34 (12)
22	05:41		06:15	06:51	07:27	08:05 (12)
	20:41		20:01	19:04	18:11	27 08:32 (12)
23	05:42		06:17	06:52	07:29	08:07 (12)
	20:40		19:58	19:02	18:09	24 08:31 (12)
24	05:43		06:18	06:53	07:30	08:09 (12)
	20:40		19:56	19:00	18:07	20 08:29 (12)
25	05:44		06:19	06:54	07:31	08:11 (12)
	20:39		19:54	18:58	18:06	15 08:26 (12)
26	05:45		06:20	06:56	07:33	08:16 (12)
	20:38		19:53	18:56	18:04	6 08:22 (12)
27	05:46		06:21	06:57	07:34	07:14
	20:37		19:51	18:54	18:03	16:30
28	05:47		06:22	06:58	07:35	07:16
	20:36		19:49	18:52	18:01	16:29
29	05:48		06:23	06:59	07:37	07:17
	20:34		19:47	18:51	18:00	16:29
30	05:50		06:25	07:00	07:38	07:18
	20:33		19:46	18:49	17:59	16:28
31	05:51		06:26		07:39	
	20:32		19:44		17:57	
Potential sun hours	469	434	376	342	290	277
Total, worst case	86			698	478	
Sun reduction	0.63			0.44	0.27	
Oper. time red.	1.00			1.00	1.00	
Wind dir. red.	0.71			0.51	0.48	
Total reduction	0.43			0.22	0.13	
Total, real	37			152	60	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 28

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-128 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (68)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June			
1	07:40 16:36	08:32 (12) 08:50 (12)	07:23 17:14	06:43 17:52	06:47 19:31	07:16 (11) 07:39 (11)	05:57 20:06	05:25 20:40	06:16 (10) 06:45 (10)
2	07:40 16:37	08:33 (12) 08:51 (12)	07:22 17:15	06:41 17:53	06:46 19:32	07:15 (11) 07:39 (11)	05:56 20:07	05:24 20:41	06:16 (10) 06:44 (10)
3	07:40 16:38	08:34 (12) 08:51 (12)	07:21 17:17	06:40 17:55	06:44 19:33	07:16 (11) 07:39 (11)	05:54 20:09	05:24 20:41	06:16 (10) 06:44 (10)
4	07:40 16:39	08:35 (12) 08:51 (12)	07:20 17:18	06:38 17:56	06:42 19:35	07:15 (11) 07:38 (11)	05:53 20:10	05:23 20:42	06:17 (10) 06:45 (10)
5	07:40 16:40	08:36 (12) 08:51 (12)	07:19 17:19	06:36 17:57	06:40 19:36	07:15 (11) 07:37 (11)	05:52 20:11	05:23 20:43	06:17 (10) 06:44 (10)
6	07:40 16:41	08:38 (12) 08:50 (12)	07:17 17:21	06:35 17:59	06:38 19:37	07:16 (11) 07:36 (11)	05:50 20:12	05:23 20:44	06:18 (10) 06:44 (10)
7	07:40 16:42	08:39 (12) 08:50 (12)	07:16 17:22	06:33 18:00	06:37 19:38	07:17 (11) 07:35 (11)	05:49 20:13	05:22 20:44	06:19 (10) 06:44 (10)
8	07:40 16:43	08:40 (12) 08:48 (12)	07:15 17:24	06:31 19:01	06:35 19:40	07:18 (11) 07:33 (11)	05:48 20:15	05:22 20:45	06:19 (10) 06:43 (10)
9	07:39 16:44	08:44 (12) 08:46 (12)	07:14 17:25	06:29 19:03	06:33 19:41	07:20 (11) 07:30 (11)	05:46 20:16	05:22 20:46	06:19 (10) 06:43 (10)
10	07:39 16:46	07:12 17:26	07:27 19:04	06:27 19:42	06:31 20:17	05:45 23	05:21 20:46	06:20 (10) 23	06:20 (10) 06:43 (10)
11	07:39 16:47	07:11 17:28	07:26 19:05	06:26 19:43	06:30 20:18	05:44 25	05:21 20:47	06:21 (10) 22	06:21 (10) 06:43 (10)
12	07:38 16:48	07:10 17:29	07:24 19:06	06:28 19:44	06:28 20:19	05:43 26	05:21 20:48	06:21 (10) 22	06:21 (10) 06:43 (10)
13	07:38 16:49	07:08 17:31	07:22 19:08	06:26 19:46	06:26 20:20	05:41 28	05:21 20:48	06:22 (10) 21	06:22 (10) 06:43 (10)
14	07:38 16:50	07:07 17:32	07:20 19:09	06:24 19:47	06:24 20:22	05:40 30	05:21 20:49	06:22 (10) 21	06:22 (10) 06:43 (10)
15	07:37 16:51	07:05 17:33	07:18 19:10	06:23 19:48	06:23 20:23	05:39 30	05:21 20:49	06:23 (10) 20	06:23 (10) 06:43 (10)
16	07:37 16:53	07:04 17:35	07:17 19:11	06:21 19:49	06:21 20:24	05:38 31	05:21 20:50	06:23 (10) 20	06:23 (10) 06:43 (10)
17	07:36 16:54	07:02 17:36	07:15 19:13	06:19 19:51	06:19 20:25	05:37 32	05:21 20:50	06:23 (10) 20	06:23 (10) 06:43 (10)
18	07:35 16:55	07:01 17:37	07:13 19:14	06:18 19:52	06:18 20:26	05:36 32	05:21 20:50	06:24 (10) 19	06:24 (10) 06:43 (10)
19	07:35 16:56	06:59 17:39	07:11 19:15	06:16 19:53	06:16 20:27	05:35 32	05:21 20:51	06:24 (10) 19	06:24 (10) 06:43 (10)
20	07:34 16:58	06:58 17:40	07:09 19:16	06:14 19:54	06:14 20:28	05:34 32	05:21 20:51	06:24 (10) 19	06:24 (10) 06:43 (10)
21	07:33 16:59	06:56 17:42	07:08 19:18	06:13 19:55	06:13 20:29	05:33 32	05:21 20:51	06:24 (10) 19	06:24 (10) 06:43 (10)
22	07:33 17:00	06:55 17:43	07:06 19:19	06:11 19:57	06:11 20:30	05:32 33	05:21 20:52	06:25 (10) 19	06:25 (10) 06:44 (10)
23	07:32 17:02	06:53 17:44	07:04 19:20	06:09 19:58	06:09 20:31	05:31 33	05:22 20:52	06:25 (10) 19	06:25 (10) 06:44 (10)
24	07:31 17:03	06:51 17:46	07:02 19:21	06:08 19:59	06:08 20:32	05:30 33	05:22 20:52	06:25 (10) 19	06:25 (10) 06:44 (10)
25	07:30 17:04	06:50 17:47	07:00 19:22	06:06 20:00	06:06 20:33	05:30 32	05:22 20:52	06:25 (10) 19	06:25 (10) 06:44 (10)
26	07:29 17:06	06:48 17:48	06:58 19:24	06:05 20:00	06:05 20:34	05:29 32	05:23 20:52	06:25 (10) 20	06:25 (10) 06:45 (10)
27	07:28 17:07	06:46 17:50	06:57 19:25	06:03 20:01	06:03 20:35	05:28 32	05:23 20:52	06:25 (10) 20	06:25 (10) 06:45 (10)
28	07:27 17:08	06:45 17:51	06:55 19:26	06:02 20:03	06:02 20:36	05:27 31	05:23 20:52	06:25 (10) 21	06:25 (10) 06:46 (10)
29	07:26 17:10	06:45 19:26	06:53 19:27	06:00 20:04	06:00 20:37	05:27 31	05:24 20:52	06:25 (10) 21	06:25 (10) 06:46 (10)
30	07:25 17:11	06:51 19:29	07:18 (11) 21	05:59 20:05	05:59 20:38	05:26 30	05:24 20:52	06:24 (10) 22	06:24 (10) 06:46 (10)
31	07:24 17:13	06:49 19:30	07:16 (11) 23	05:57 20:06	05:57 20:39	05:25 30	05:24 20:52	06:24 (10) 22	06:24 (10) 06:46 (10)
Potential sun hours	288	293	369	403	457	463			
Total, worst case	117		105	178	726	664			
Sun reduction	0.33		0.47	0.49	0.55	0.59			
Oper. time red.	1.00		1.00	1.00	1.00	1.00			
Wind dir. red.	0.52		0.58	0.58	0.67	0.67			
Total reduction	0.17		0.27	0.28	0.36	0.39			
Total, real	20		28	49	262	257			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 29

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-128 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (68)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25 20:52	06:25 (10) 20:31	05:52 19:42	06:27 (10) 19:42	07:02 18:47	06:41 16:56
2	05:25 20:52	06:25 (10) 20:30	05:53 19:40	06:27 (10) 19:40	07:03 18:45	06:42 16:54
3	05:26 20:52	06:25 (10) 20:29	05:54 19:39	06:28 (10) 19:39	07:04 18:43	06:43 16:53
4	05:27 20:52	06:25 (10) 20:27	05:55 19:37	06:30 (10) 19:37	07:05 18:42	06:45 16:52
5	05:27 20:51	06:24 (10) 20:26	05:56 19:35	06:31 (10) 19:35	07:06 18:40	06:46 16:50
6	05:28 20:51	06:24 (10) 20:25	05:57 19:33	06:33 (10) 19:33	07:08 18:38	06:47 16:49
7	05:28 20:51	06:24 (10) 20:23	05:58 19:31	06:34 (10) 19:31	07:09 18:36	06:49 16:48
8	05:29 20:50	06:24 (10) 20:22	05:59 19:30	06:35 (10) 19:30	07:10 18:34	06:50 16:47
9	05:30 20:50	06:24 (10) 20:21	06:01 19:28	06:36 (10) 19:28	07:11 18:33	06:51 16:46
10	05:31 20:49	06:24 (10) 20:19	06:02 19:26	06:37 (10) 19:26	07:12 18:31	06:53 16:44
11	05:31 20:49	06:23 (10) 20:18	06:03 19:24	06:38 (10) 19:24	07:14 18:29	06:54 16:43
12	05:32 20:49	06:23 (10) 20:16	06:04 19:22	06:40 (10) 19:22	07:15 18:27	06:55 16:42
13	05:33 20:48	06:23 (10) 20:15	06:05 19:20	06:41 (10) 19:20	07:16 18:26	06:57 16:41
14	05:34 20:47	06:23 (10) 20:14	06:06 19:18	06:42 (10) 19:18	07:17 18:24	06:58 16:40
15	05:35 20:47	06:23 (10) 20:12	06:07 19:17	06:43 (10) 19:17	07:19 18:22	06:59 16:39
16	05:36 20:46	06:23 (10) 20:10	06:09 19:15	06:44 (10) 19:15	07:20 18:20	07:00 16:38
17	05:37 20:45	06:22 (10) 20:09	06:10 19:13	06:45 (10) 19:13	07:21 18:19	07:02 16:37
18	05:37 20:45	06:23 (10) 20:07	06:11 19:11	06:46 (10) 19:11	07:22 18:17	07:03 16:36
19	05:38 20:44	06:23 (10) 20:06	06:12 19:09	06:48 (10) 19:09	07:24 18:15	07:04 16:35
20	05:39 20:43	06:23 (10) 20:04	06:13 19:07	06:49 (10) 19:07	07:25 18:14	07:06 16:34
21	05:40 20:42	06:23 (10) 20:03	06:14 19:05	06:50 (10) 19:05	07:26 18:12	07:07 16:33
22	05:41 20:41	06:23 (10) 20:01	06:15 19:04	06:51 (10) 19:04	07:27 18:11	07:08 16:33
23	05:42 20:41	06:23 (10) 19:58	06:17 19:02	06:52 (10) 19:02	07:29 18:09	07:09 16:32
24	05:43 20:40	06:23 (10) 19:56	06:18 19:00	06:53 (10) 19:00	07:30 18:07	07:11 16:32
25	05:44 20:39	06:24 (10) 19:54	06:19 18:58	06:54 (10) 18:58	07:31 18:06	07:12 16:31
26	05:45 20:38	06:24 (10) 19:53	06:20 18:56	06:55 (10) 18:56	07:33 18:04	07:13 16:30
27	05:46 20:37	06:24 (10) 19:51	06:21 18:54	06:57 (10) 18:54	07:34 18:03	07:14 16:30
28	05:47 20:36	06:24 (10) 19:49	06:22 18:52	06:58 (10) 18:52	07:35 18:01	07:16 16:29
29	05:48 20:34	06:25 (10) 19:47	06:23 18:51	06:59 (10) 18:51	07:37 18:00	07:17 16:29
30	05:50 20:33	06:25 (10) 19:46	06:25 18:49	07:00 (10) 18:49	07:38 17:59	07:18 16:28
31	05:51 20:32	06:26 (10) 19:44	06:26 18:47	07:01 (10) 18:47	07:39 17:57	07:19 16:35
Potential sun hours	469	434	376	342	290	277
Total, worst case	908	119	283			528
Sun reduction	0.63	0.59	0.54			0.25
Oper. time red.	1.00	1.00	1.00			1.00
Wind dir. red.	0.67	0.67	0.58			0.52
Total reduction	0.41	0.39	0.31			0.13
Total, real	376	46	87			67

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 30

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-132 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (71)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December				
1	07:40	07:23	06:43	06:47	05:57	06:33 (41)	05:25	19:38 (05)	05:25	19:44 (05)	06:52	06:42 (41)	06:27	07:01	06:40	07:19
2	16:37	17:14	17:52	19:31	20:06	19:21 (06)	20:40	27	20:05 (05)	20:52	19:27 (06)	19:42	18:47	18:56	16:28	16:28
3	07:40	07:22	06:41	06:46	05:56	06:33 (41)	05:24	19:38 (05)	05:25	19:44 (05)	06:53	06:42 (41)	06:28	07:03	06:42	07:20
4	16:37	17:15	17:53	19:32	20:07	19:22 (06)	20:40	26	20:04 (05)	20:52	19:28 (06)	19:40	18:45	18:54	16:28	16:28
5	07:40	07:21	06:40	06:44	05:54	06:32 (41)	05:24	19:38 (05)	05:26	19:44 (05)	06:54	06:41 (41)	06:29	07:04	06:43	07:21
6	16:38	17:17	17:55	19:33	20:09	19:21 (06)	20:41	27	20:05 (05)	20:52	19:29 (06)	19:38	18:43	18:53	16:27	16:27
7	07:40	07:20	06:38	06:42	05:53	06:32 (41)	05:23	19:39 (05)	05:27	19:45 (05)	06:55	06:41 (41)	06:30	07:05	06:44	07:22
8	16:39	17:18	17:56	19:35	20:10	19:21 (06)	20:42	27	20:06 (05)	20:51	19:29 (06)	19:37	18:41	18:52	16:27	16:27
9	07:40	07:19	06:36	06:40	05:52	06:32 (41)	05:23	19:38 (05)	05:27	19:44 (05)	06:56	06:41 (41)	06:31	07:06	06:46	07:23
10	16:41	17:19	17:57	19:36	20:11	19:21 (06)	20:43	27	20:05 (05)	20:51	19:29 (06)	19:35	18:40	18:50	16:27	16:27
11	07:40	07:17	06:34	06:38	05:50	06:31 (41)	05:23	19:39 (05)	05:28	19:45 (05)	06:57	06:41 (41)	06:33	07:07	06:47	07:24
12	16:41	17:21	17:59	19:37	20:12	19:20 (06)	20:44	27	20:06 (05)	20:51	19:30 (06)	19:33	18:38	18:49	16:27	16:27
13	07:40	07:16	06:33	06:37	05:49	06:31 (41)	05:22	19:39 (05)	05:29	19:45 (05)	06:58	06:41 (41)	06:34	07:09	06:48	07:25
14	16:42	17:22	18:00	19:38	20:13	19:20 (06)	20:44	27	20:06 (05)	20:51	19:30 (06)	19:31	18:36	18:48	16:26	16:26
15	07:39	07:15	06:31	06:35	05:48	06:31 (41)	05:22	19:38 (05)	05:29	19:45 (05)	06:59	06:41 (41)	06:35	07:10	06:50	07:26
16	16:43	17:24	18:01	19:39	20:14	19:20 (06)	20:45	28	20:06 (05)	20:50	19:30 (06)	19:29	18:34	18:47	16:26	16:26
17	07:39	07:14	06:29	06:33	05:46	06:32 (41)	05:22	19:39 (05)	05:30	19:45 (05)	06:01	06:41 (41)	06:36	07:11	06:51	07:27
18	16:44	17:25	18:02	19:41	20:16	19:19 (06)	20:46	27	20:06 (05)	20:50	19:30 (06)	19:28	18:33	18:45	16:26	16:26
19	07:39	07:12	06:27	06:31	05:45	06:31 (41)	05:21	19:39 (05)	05:31	19:46 (05)	06:02	06:42 (41)	06:37	07:12	06:52	07:28
20	16:46	17:26	18:04	19:42	20:17	19:18 (06)	20:46	27	20:06 (05)	20:49	19:31 (06)	19:26	18:31	18:44	16:26	16:26
21	07:39	07:11	06:26	06:30	05:44	06:31 (41)	05:21	19:40 (05)	05:31	19:45 (05)	06:03	06:42 (41)	06:38	07:14	06:54	07:29
22	16:47	17:28	18:05	19:43	20:18	19:17 (06)	20:47	27	20:07 (05)	20:49	19:30 (06)	19:24	18:29	18:43	16:26	16:26
23	07:38	07:09	06:24	06:28	05:43	06:32 (41)	05:21	19:40 (05)	05:32	19:46 (05)	06:04	06:42 (41)	06:39	07:15	06:55	07:30
24	16:48	17:29	18:06	19:44	20:19	19:17 (06)	20:47	27	20:07 (05)	20:48	19:30 (06)	19:22	18:27	18:42	16:26	16:26
25	07:38	07:08	06:22	06:26	05:41	06:32 (41)	05:21	19:40 (05)	05:33	19:46 (05)	06:05	06:43 (41)	06:41	07:16	06:56	07:31
26	16:49	17:31	18:08	19:46	20:20	19:16 (06)	20:48	27	20:07 (05)	20:48	19:30 (06)	19:20	18:26	18:41	16:26	16:26
27	07:37	07:07	06:20	06:24	05:40	06:33 (41)	05:21	19:41 (05)	05:34	19:47 (05)	06:06	06:43 (41)	06:42	07:17	06:58	07:32
28	16:50	17:32	18:09	19:47	20:21	19:15 (06)	20:48	27	20:08 (05)	20:47	19:29 (06)	19:18	18:24	18:40	16:27	16:27
29	07:37	07:05	06:18	06:23	05:39	06:33 (41)	05:21	19:41 (05)	05:35	19:47 (05)	06:07	06:44 (41)	06:43	07:18	06:59	07:32
30	16:51	17:33	18:10	19:48	20:22	19:14 (06)	20:49	27	20:08 (05)	20:47	19:29 (06)	19:17	18:22	18:39	16:27	16:27
31	07:36	07:04	06:17	06:21	05:38	06:34 (41)	05:21	19:41 (05)	05:36	19:48 (05)	06:09	06:45 (41)	06:44	07:20	07:00	07:33
32	16:53	17:35	18:11	19:49	20:24	19:13 (06)	20:49	27	20:08 (05)	20:46	19:28 (06)	19:15	18:20	18:38	16:27	16:27
33	07:36	07:02	06:15	06:19	05:37	06:35 (41)	05:21	19:41 (05)	05:37	19:48 (05)	06:10	06:46 (41)	06:45	07:21	07:02	07:34
34	16:54	17:36	18:13	19:50	20:25	19:11 (06)	20:50	27	20:08 (05)	20:45	19:27 (06)	19:13	18:19	18:37	16:27	16:27
35	07:35	07:01	06:13	06:18	05:36	06:35 (41)	05:21	19:41 (05)	05:37	19:48 (05)	06:11	06:47 (41)	06:46	07:22	07:03	07:34
36	16:55	17:37	18:14	19:52	20:26	19:10 (06)	20:50	27	20:08 (05)	20:44	19:26 (06)	19:11	18:17	18:36	16:28	16:28
37	07:35	06:59	07:11	06:16	05:35	06:36 (41)	05:21	19:42 (05)	05:38	06:54 (41)	06:12	06:49 (41)	06:47	07:23	07:04	07:35
38	16:56	17:39	18:15	19:53	20:27	19:15 (06)	20:51	26	20:08 (05)	20:44	19:25 (06)	19:09	18:15	18:35	16:28	16:28
39	07:34	06:58	07:09	06:14	05:34	06:37 (41)	05:21	19:42 (05)	05:39	06:52 (41)	06:13	06:54 (41)	06:49	07:25	07:06	07:36
40	16:58	17:40	18:16	19:54	20:28	19:16 (06)	20:51	26	20:08 (05)	20:43	19:24 (06)	19:07	18:14	18:34	16:28	16:28
41	07:33	06:56	07:07	06:13	05:33	06:38 (41)	05:21	19:42 (05)	05:40	06:50 (41)	06:14	18:25 (06)	18:50	07:26	07:07	07:36
42	16:59	17:41	18:17	19:55	20:29	19:18 (06)	20:51	26	20:08 (05)	20:42	19:25 (06)	19:05	18:12	18:34	16:29	16:29
43	07:33	06:54	07:06	06:11	05:32	06:39 (41)	05:22	19:43 (05)	05:41	06:49 (41)	06:15	18:56 (06)	19:51	07:27	07:08	07:37
44	17:00	17:43	18:19	19:56	20:30	19:19 (06)	20:51	26	20:09 (05)	20:41	19:26 (06)	19:04	18:11	18:33	16:29	16:29
45	07:32	06:53	07:04	06:09	05:31	06:41 (41)	05:22	19:43 (05)	05:42	06:48 (41)	06:17	18:58 (06)	19:52	07:29	07:09	07:37
46	17:02	17:44	18:20	19:58	20:32	19:19 (06)	20:51	26	20:09 (05)	20:40	19:27 (06)	19:02	18:09	18:32	16:30	16:30
47	07:31	06:51	07:02	06:08	05:30	06:43 (41)	05:22	19:42 (05)	05:43	06:47 (41)	06:18	19:00 (06)	19:53	07:30	07:11	07:38
48	17:03	17:45	18:21	19:59	20:33	19:19 (06)	20:52	27	20:09 (05)	20:39	19:26 (06)	19:00	18:07	18:32	16:30	16:30
49	07:30	06:50	07:00	06:06	05:30	06:47 (41)	05:22	19:42 (05)	05:44	06:46 (41)	06:19	19:03 (06)	19:54	07:31	07:12	07:38
50	17:04	17:47	18:22	19:59	20:33	19:19 (06)	20:52	27	20:09 (05)	20:38	19:24 (06)	19:02	18:08	18:33	16:31	16:31
51	07:29	06:48	06:58	06:05	05:29	19:38 (05)	05:23	19:43 (05)	05:45	06:45 (41)	06:20	18:56	19:52	07:32	07:13	07:38
52	17:06	17:48	18:24	20:00	20:34	19:20 (06)	20:52	27	20:10 (05)	20:37	19:21 (06)	19:52	18:56	18:04	16:30	16:32
53	07:28	06:46	06:57	06:03	05:28	19:39 (05)	05:23	19:43 (05)	05:46	06:45 (41)	06:21	18:57	19:57	07:34	07:14	07:39
54	17:07	17:49	18:25	20:01	20:35	19:21 (06)	20:52	27	20:10 (05)	20:36	19:22 (06)	19:51	18:54	18:03	16:30	16:32
55	07:27	06:45	06:55	06:02	05:27	19:38 (05)	05:23	19:44 (05)	05:47	06:44 (41)	06:22	18:58	19:58	07:35	07:15	07:39
56	17:08	17:51	18:26	20:02	20:36	19:21 (06)	20:52	27	20:11 (05)	20:35	19:24 (06)	19:49	18:52	18:01	16:29	16:33
57	07:26	06:53	06:00	06:35 (41)	05:27	19:39 (05)	05:24	19:43 (05)	05:48	06:44 (41)	06:23	18:59	19:59	07:36	07:17	07:39
58	17:10	17:52	18:27	20:03	20:37	19:22 (06)	20:52	27	20:10 (05)	20:34	19:25 (06)	19:47	18:51	18:00	16:29	16:34
59	07:25	06:51	06:59	06:34 (41)	05:26	19:38 (05)	05:24	19:44 (05)	05:50	06:43 (41)	06:25	18:59	19:59	07:38	07:18	07:40
60	17:11	17:53	18:28	20:04	20:38	19:22 (06)	20:52	27	20:11 (05)	20:33	19:26 (06)	19:46	18:49	17:59	16:28	16:35
61	07:24	06:49	06:57	06:32 (41)	05:25	19:38 (05)	05:25	19:44 (05)	05:51	06:43 (41)	06:26	18:59	19:59	07:39	07:19	07:40
62	17:13	17:55	18:30	20:06	2											

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 31

Licensed user:

**EDR**  
 217 Montgomery St.  
 US-SYRACUSE, NY 13202  
 (315) 471 0688  
 Steve Curtis, scurtis@edrpc.com  
 Calculated:  
 3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

Calculation: 05030 SFA Gamesa G90\_R2 Shadow receptor: R-137 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (76)

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
 438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
 Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:40	07:23	06:43	06:47	05:57	18:44 (41) 05:25	18:47 (41) 05:25	18:58 (41) 05:52	18:49 (41) 06:27	07:01	06:40	07:19
2	16:36	17:14	17:52	19:31	20:06	19:22 (41) 20:39	19:57 (48) 20:52	20:01 (48) 20:31	19:57 (48) 19:42	18:47	16:56	16:28
3	07:40	07:22	06:41	06:46	05:56	18:43 (41) 05:24	18:47 (41) 05:25	18:57 (41) 05:53	18:49 (41) 06:28	07:03	06:42	07:20
4	16:37	17:15	17:53	19:32	20:07	19:23 (41) 20:40	19:57 (48) 20:52	20:01 (48) 20:30	19:53 (48) 19:40	18:45	16:54	16:28
5	07:40	07:21	06:40	06:44	05:54	18:42 (41) 05:24	18:48 (41) 05:26	18:57 (41) 05:54	18:49 (41) 06:29	07:04	06:43	07:21
6	16:38	17:17	17:55	19:33	20:08	19:23 (41) 20:41	19:57 (48) 20:52	20:02 (48) 20:28	19:36 (41) 19:38	18:43	16:53	16:27
7	07:40	07:20	06:38	06:42	05:53	18:41 (41) 05:23	18:49 (41) 05:27	18:57 (41) 05:55	18:49 (41) 06:30	07:05	06:44	07:22
8	16:39	17:18	17:56	19:35	20:10	19:24 (41) 20:42	19:57 (48) 20:51	20:03 (48) 20:27	19:35 (41) 19:37	18:41	16:52	16:27
9	07:40	07:19	06:36	06:40	05:52	18:41 (41) 05:23	18:49 (41) 05:27	18:56 (41) 05:56	18:49 (41) 06:31	07:06	06:46	07:23
10	16:40	17:19	17:57	19:36	20:11	19:25 (41) 20:43	19:57 (48) 20:51	20:03 (48) 20:26	19:35 (41) 19:35	18:40	16:50	16:27
11	07:40	07:17	06:34	06:38	05:50	18:40 (41) 05:23	18:50 (41) 05:28	18:56 (41) 05:57	18:49 (41) 06:33	07:07	06:47	07:24
12	16:41	17:21	17:59	19:37	20:12	19:24 (41) 20:43	19:57 (48) 20:51	20:03 (48) 20:25	19:34 (41) 19:33	18:38	16:49	16:26
13	07:40	07:16	06:33	06:37	05:49	18:40 (41) 05:22	18:51 (41) 05:28	18:56 (41) 05:58	18:49 (41) 06:34	07:09	06:48	07:25
14	16:42	17:22	18:00	19:38	20:13	19:25 (41) 20:44	19:57 (48) 20:50	20:04 (48) 20:23	19:34 (41) 19:31	18:36	16:48	16:26
15	07:39	07:15	06:31	06:35	05:48	18:39 (41) 05:22	18:51 (41) 05:29	18:55 (41) 05:59	18:50 (41) 06:35	07:10	06:50	07:26
16	16:43	17:24	18:01	19:39	20:14	19:25 (41) 20:45	19:57 (48) 20:50	20:04 (48) 20:22	19:32 (41) 19:29	18:34	16:47	16:26
17	07:39	07:13	06:29	06:33	05:46	18:39 (41) 05:22	18:52 (41) 05:30	18:55 (41) 06:01	18:50 (41) 06:36	07:11	06:51	07:27
18	16:44	17:25	18:02	19:41	20:16	19:26 (41) 20:46	19:57 (48) 20:50	20:04 (48) 20:21	19:32 (41) 19:28	18:32	16:45	16:26
19	07:39	07:12	06:27	06:31	05:45	18:38 (41) 05:21	18:53 (41) 05:31	18:55 (41) 06:02	18:52 (41) 06:37	07:12	06:52	07:28
20	16:46	17:26	18:04	19:42	20:17	19:25 (41) 20:46	19:57 (48) 20:49	20:05 (48) 20:19	19:32 (41) 19:26	18:31	16:44	16:26
21	07:39	07:11	06:26	06:30	05:44	18:38 (41) 05:21	18:54 (41) 05:31	18:54 (41) 06:03	18:52 (41) 06:38	07:13	06:54	07:29
22	16:47	17:28	18:05	19:43	20:18	19:45 (48) 20:47	19:57 (48) 20:49	20:04 (48) 20:18	19:31 (41) 19:24	18:29	16:43	16:26
23	07:38	07:09	06:24	06:28	05:43	18:38 (41) 05:21	18:54 (41) 05:32	18:54 (41) 06:04	18:53 (41) 06:39	07:15	06:55	07:30
24	16:48	17:29	18:06	19:44	20:19	19:48 (48) 20:47	19:57 (48) 20:48	20:05 (48) 20:16	19:30 (41) 19:22	18:27	16:42	16:26
25	07:38	07:08	06:22	06:26	05:41	18:39 (41) 05:21	18:55 (41) 05:33	18:54 (41) 06:05	18:53 (41) 06:41	07:16	06:56	07:31
26	16:49	17:31	18:07	19:45	20:20	19:49 (48) 20:48	19:57 (48) 20:48	20:05 (48) 20:15	19:29 (41) 19:20	18:25	16:41	16:26
27	07:37	07:07	06:24	06:28	05:40	18:39 (41) 05:21	18:56 (41) 05:34	18:54 (41) 06:06	18:54 (41) 06:42	07:17	06:58	07:31
28	16:50	17:32	18:09	19:47	20:21	19:51 (48) 20:48	19:58 (48) 20:47	20:06 (48) 20:13	19:27 (41) 19:18	18:24	16:40	16:27
29	07:37	07:05	06:18	06:23	05:39	18:39 (41) 05:21	18:56 (41) 05:35	18:53 (41) 06:07	18:56 (41) 06:43	07:18	06:59	07:32
30	16:51	17:33	18:10	19:48	20:22	19:52 (48) 20:49	19:58 (48) 20:47	20:06 (48) 20:12	19:26 (41) 19:16	18:22	16:39	16:27
31	07:36	07:04	06:17	06:21	05:38	18:39 (41) 05:21	18:57 (41) 05:36	18:52 (41) 06:09	18:57 (41) 06:44	07:20	07:00	07:33
32	16:53	17:35	18:11	19:49	20:24	19:53 (48) 20:49	19:58 (48) 20:46	20:05 (48) 20:10	19:24 (41) 19:15	18:20	16:38	16:27
33	07:36	07:02	06:15	06:19	05:37	18:39 (41) 05:21	18:57 (41) 05:36	18:52 (41) 06:10	18:59 (41) 06:45	07:21	07:02	07:34
34	16:54	17:36	18:12	19:50	20:25	19:54 (48) 20:50	19:58 (48) 20:45	20:06 (48) 20:09	19:21 (41) 19:13	18:19	16:37	16:27
35	07:35	07:01	06:13	06:18	05:36	18:39 (41) 05:21	18:58 (41) 05:37	18:52 (41) 06:11	19:01 (41) 06:46	07:22	07:03	07:34
36	16:55	17:37	18:14	19:52	20:26	19:54 (48) 20:50	19:58 (48) 20:44	20:06 (48) 20:07	19:18 (41) 19:11	18:17	16:36	16:28
37	07:35	06:59	06:11	06:16	05:35	18:40 (41) 05:21	18:58 (41) 05:38	18:51 (41) 06:12	19:06 (41) 06:47	07:23	07:04	07:35
38	16:56	17:39	18:15	19:53	20:27	19:55 (48) 20:50	19:58 (48) 20:44	20:06 (48) 20:06	19:13 (41) 19:09	18:15	16:35	16:28
39	07:34	06:58	06:09	06:14	05:34	18:40 (41) 05:21	18:58 (41) 05:39	18:51 (41) 06:13	19:09	07:25	07:05	07:36
40	16:58	17:40	18:16	19:54	20:28	19:55 (48) 20:51	19:58 (48) 20:43	20:06 (48) 20:04	19:07	18:14	16:34	16:28
41	07:33	06:56	06:07	06:13	05:33	18:40 (41) 05:21	18:58 (41) 05:40	18:51 (41) 06:14	19:05	07:26	07:07	07:36
42	16:59	17:41	18:17	19:55	20:29	19:55 (48) 20:51	19:58 (48) 20:42	20:06 (48) 20:02	19:05	18:12	16:34	16:29
43	07:33	06:54	06:06	06:11	05:32	18:40 (41) 05:21	18:58 (41) 05:41	18:51 (41) 06:15	19:01	07:27	07:08	07:37
44	17:00	17:43	18:19	19:56	20:30	19:55 (48) 20:51	19:58 (48) 20:41	20:06 (48) 20:01	19:03	18:11	16:33	16:29
45	07:32	06:53	06:04	06:09	05:31	18:42 (41) 05:22	18:59 (41) 05:42	18:50 (41) 06:17	19:02	07:29	07:09	07:37
46	17:02	17:44	18:20	19:58	20:31	19:56 (48) 20:52	19:59 (48) 20:40	20:06 (48) 19:57	19:02	18:09	16:32	16:30
47	07:31	06:51	06:02	06:08	05:30	18:42 (41) 05:22	18:59 (41) 05:43	18:50 (41) 06:18	19:06 (41) 06:48	07:30	07:11	07:38
48	17:03	17:45	18:21	19:59	20:32	19:56 (48) 20:52	19:59 (48) 20:39	20:05 (48) 19:56	19:00	18:07	16:32	16:30
49	07:30	06:50	06:00	06:06	05:30	18:42 (41) 05:22	18:58 (41) 05:44	18:50 (41) 06:19	19:04	07:31	07:12	07:38
50	17:04	17:47	18:22	20:00	20:33	19:56 (48) 20:52	19:59 (48) 20:38	20:05 (48) 19:54	18:58	18:06	16:31	16:31
51	07:29	06:48	06:58	06:05	05:29	18:42 (41) 05:23	18:59 (41) 05:45	18:50 (41) 06:20	19:06	07:32	07:13	07:38
52	17:06	17:48	18:24	20:00	20:34	19:56 (48) 20:52	19:58 (41) 20:37	20:04 (48) 19:52	18:56	18:04	16:30	16:32
53	07:28	06:46	06:56	06:03	05:28	18:40 (41) 05:23	18:59 (41) 05:46	18:50 (41) 06:21	19:07	07:34	07:14	07:39
54	17:07	17:49	18:25	20:01	20:35	19:57 (48) 20:52	19:58 (41) 20:36	20:04 (48) 19:51	18:54	18:03	16:30	16:32
55	07:27	06:45	06:55	06:02	05:27	18:48 (41) 05:27	18:59 (41) 05:47	18:49 (41) 06:22	19:06	07:35	07:15	07:39
56	17:08	17:51	18:26	20:02	20:36	19:57 (48) 20:52	19:57 (48) 20:35	20:03 (48) 19:49	18:52	18:01	16:29	16:33
57	07:26	06:53	06:00	06:04	05:27	18:44 (41) 05:24	18:58 (41) 05:48	18:49 (41) 06:23	19:05	07:36	07:17	07:39
58	17:10	17:52	18:27	20:03	20:37	19:56 (48) 20:52	19:56 (48) 20:34	20:02 (48) 19:47	18:51	18:00	16:29	16:34
59	07:25	06:51	06:59	06:04	05:26	18:45 (41) 05:24	18:58 (41) 05:49	18:49 (41) 06:25	19:00	07:38	07:18	07:39
60	17:11	17:53	18:28	20:05	20:39	19:57 (48) 20:52	19:57 (48) 20:33	20:01 (48) 19:46	18:49	17:58	16:28	16:35
61	07:24	06:49	06:57	06:01	05:25	18:45 (41) 05:24	18:59 (41) 05:51	18:49 (41) 06:26	19:03	07:39	07:20	07:40
62	17:12	17:54	18:29	20:06	20:40	19:57 (48) 20:52	19:57 (48) 20:32	20:02 (48) 19:44	18:49	17:57	16:28	16:35
Potential sun hours	289	293	369	403	457	463	469	434	376	342	290	277
Total, worst case				177	1884	1502	2028	711				
Sun reduction				0.49	0.55	0.59	0.63	0.59				
Oper. time red.				1.00	1.00	1.00	1.00	1.00				
Wind dir. red.				0.52	0.51	0.51	0.51	0.52				
Total reduction				0.25	0.28	0.30	0.32	0.31				
Total, real				45	534	455	656	217				

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 32

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
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Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-139 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (78)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36	15:01 (48) 15:32 (48)	07:23 17:14	06:43 17:52	06:47 19:31	07:14 (21) 20:06
2	07:40 16:37	15:01 (48) 15:33 (48)	07:22 17:15	06:41 17:53	06:46 19:32	07:13 (21) 20:07
3	07:40 16:38	15:02 (48) 15:33 (48)	07:21 17:17	06:40 17:55	06:44 19:33	07:13 (21) 20:08
4	07:40 16:39	15:03 (48) 15:34 (48)	07:20 17:18	06:38 17:56	06:42 19:35	07:13 (21) 20:10
5	07:40 16:40	15:04 (48) 15:34 (48)	07:19 17:19	06:36 17:57	06:40 19:36	07:12 (21) 20:11
6	07:40 16:41	15:05 (48) 15:34 (48)	07:17 17:19	06:34 17:59	06:38 19:37	07:12 (21) 20:12
7	07:40 16:42	15:05 (48) 15:33 (48)	07:16 17:22	06:33 18:00	06:37 19:38	07:12 (21) 20:13
8	07:39 16:43	15:06 (48) 15:33 (48)	07:15 17:24	07:31 19:01	06:35 19:39	07:14 (21) 20:14
9	07:39 16:44	15:07 (48) 15:34 (48)	07:13 17:25	07:29 19:02	06:33 19:41	07:14 (21) 20:16
10	07:39 16:46	15:08 (48) 15:33 (48)	07:12 17:26	07:27 19:04	06:31 19:42	07:16 (21) 20:17
11	07:39 16:47	15:09 (48) 15:33 (48)	07:11 17:28	07:26 19:05	06:30 19:43	07:18 (21) 20:18
12	07:38 16:48	15:10 (48) 15:32 (48)	07:09 17:29	07:24 19:06	06:28 19:44	07:18 (21) 20:19
13	07:38 16:49	15:12 (48) 15:32 (48)	07:08 17:31	07:22 19:07	06:26 19:46	05:41 20:20
14	07:37 16:50	15:13 (48) 15:31 (48)	07:07 17:32	07:20 19:09	06:24 19:47	05:40 20:21
15	07:37 16:51	15:15 (48) 15:31 (48)	07:05 17:33	07:18 19:10	06:23 19:48	05:39 20:22
16	07:36 16:53	15:17 (48) 15:29 (48)	07:04 17:35	07:17 19:11	06:21 19:49	05:38 20:24
17	07:36 16:54	15:21 (48) 15:26 (48)	07:02 17:36	07:15 19:12	06:19 19:50	05:37 20:25
18	07:35 16:55	15:26 (48) 17:37	07:01 19:14	07:13 19:15	06:18 19:52	05:36 20:26
19	07:35 16:56	06:59 17:39	07:11 19:15	07:11 19:16	06:16 19:53	05:35 20:27
20	07:34 16:58	06:58 17:40	07:09 19:16	07:09 19:16	06:14 19:54	05:34 20:28
21	07:33 16:59	06:56 17:41	07:07 19:17	07:07 19:17	06:13 19:55	05:33 20:29
22	07:33 17:00	06:54 17:43	07:06 19:19	07:06 19:19	06:11 19:56	05:32 20:30
23	07:32 17:02	06:53 17:44	07:04 19:20	07:04 19:20	06:09 19:58	05:31 20:31
24	07:31 17:03	06:51 17:45	07:02 19:21	07:02 19:21	06:08 19:59	05:30 20:32
25	07:30 17:04	06:50 17:47	07:00 19:22	07:00 20:00	06:06 20:00	05:30 20:33
26	07:29 17:06	06:48 17:48	06:58 19:24	06:58 20:00	06:05 20:00	05:29 20:34
27	07:28 17:07	06:46 17:49	06:56 19:25	06:56 20:01	06:03 20:01	05:28 20:35
28	07:27 17:08	06:45 17:51	06:55 19:26	06:55 20:02	06:02 20:02	05:27 20:36
29	07:26 17:10	06:53 19:27	06:53 20:04	06:53 20:04	06:00 20:04	05:27 20:37
30	07:25 17:11	06:51 19:28	06:51 20:05	06:51 20:05	05:59 20:05	05:26 20:38
31	07:24 17:12	06:49 19:30	06:49 20:05	06:49 20:05	05:59 20:05	05:25 20:39
Potential sun hours	288	293	369	403	457	463
Total, worst case	407		77	223	917	309
Sun reduction	0.33		0.47	0.49	0.55	0.59
Oper. time red.	1.00		1.00	1.00	1.00	1.00
Wind dir. red.	0.76		0.58	0.58	0.66	0.66
Total reduction	0.26		0.28	0.29	0.37	0.40
Total, real	105		22	65	340	123

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 33

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217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2 Shadow receptor: R-139 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (78)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December										
1	05:25	06:39 (20)	05:52	06:32 (20)	06:27	07:18 (21)	07:01	06:40	07:19	14:51 (48)						
	20:52	13	06:52 (20)	20:31	34	07:06 (20)	19:42	8	07:26 (21)	18:47	16:56	16:28	24	15:15 (48)		
2	05:25	06:38 (20)	05:53	06:32 (20)	06:28	07:15 (21)	07:03	06:42	07:20	14:51 (48)						
	20:52	14	06:52 (20)	20:30	33	07:05 (20)	19:40	13	07:28 (21)	18:45	16:54	16:27	25	15:16 (48)		
3	05:26	06:38 (20)	05:54	06:33 (20)	06:29	07:13 (21)	07:04	06:43	07:21	14:50 (48)						
	20:52	16	06:54 (20)	20:28	32	07:05 (20)	19:38	17	07:30 (21)	18:43	16:53	16:27	27	15:17 (48)		
4	05:27	06:38 (20)	05:55	06:33 (20)	06:30	07:11 (21)	07:05	06:44	07:22	14:50 (48)						
	20:51	17	06:55 (20)	20:27	31	07:04 (20)	19:37	20	07:31 (21)	18:41	16:52	16:27	27	15:17 (48)		
5	05:27	06:37 (20)	05:56	06:34 (20)	06:31	07:10 (21)	07:06	06:46	07:23	14:50 (48)						
	20:51	18	06:55 (20)	20:26	29	07:03 (20)	19:35	21	07:31 (21)	18:40	16:50	16:27	28	15:18 (48)		
6	05:28	06:37 (20)	05:57	06:35 (20)	06:33	07:08 (21)	07:07	06:47	07:24	14:50 (48)						
	20:51	19	06:56 (20)	20:25	27	07:02 (20)	19:33	23	07:31 (21)	18:38	16:49	16:26	29	15:19 (48)		
7	05:28	06:37 (20)	05:58	06:35 (20)	06:34	07:08 (21)	07:09	06:48	07:25	14:51 (48)						
	20:51	20	06:57 (20)	20:23	26	07:01 (20)	19:31	23	07:31 (21)	18:36	16:48	16:26	30	15:21 (48)		
8	05:29	06:36 (20)	05:59	06:36 (20)	06:35	07:07 (21)	07:10	06:50	07:26	14:51 (48)						
	20:50	22	06:58 (20)	20:22	24	07:00 (20)	19:29	24	07:31 (21)	18:34	16:47	16:26	30	15:21 (48)		
9	05:30	06:35 (20)	06:01	06:38 (20)	06:36	07:06 (21)	07:11	06:51	07:27	14:50 (48)						
	20:50	24	06:59 (20)	20:21	20	06:58 (20)	19:28	25	07:31 (21)	18:32	16:45	16:26	31	15:21 (48)		
10	05:31	06:35 (20)	06:02	06:40 (20)	06:37	07:06 (21)	07:12	06:52	07:28	14:50 (48)						
	20:49	25	07:00 (20)	20:19	17	06:57 (20)	19:26	24	07:30 (21)	18:31	16:44	16:26	32	15:22 (48)		
11	05:31	06:34 (20)	06:03	06:43 (20)	06:38	07:07 (21)	07:13	06:54	07:29	14:51 (48)						
	20:49	26	07:00 (20)	20:18	11	06:54 (20)	19:24	23	07:30 (21)	18:29	16:43	16:26	31	15:22 (48)		
12	05:32	06:34 (20)	06:04	06:43 (20)	06:39	07:07 (21)	07:15	06:55	07:30	14:51 (48)						
	20:48	26	07:00 (20)	20:16	19	06:52 (20)	19:22	22	07:29 (21)	18:27	16:42	16:26	32	15:23 (48)		
13	05:33	06:34 (20)	06:05	06:44 (20)	06:41	07:08 (21)	07:16	06:56	07:31	14:52 (48)						
	20:48	27	07:01 (20)	20:15	19	06:51 (20)	19:20	20	07:28 (21)	18:25	16:41	16:26	32	15:24 (48)		
14	05:34	06:34 (20)	06:06	06:44 (20)	06:42	07:08 (21)	07:17	06:58	07:32	14:52 (48)						
	20:47	28	07:02 (20)	20:13	19	06:50 (20)	19:18	18	07:26 (21)	18:24	16:40	16:27	33	15:25 (48)		
15	05:35	06:34 (20)	06:07	06:44 (20)	06:43	07:10 (21)	07:18	06:59	07:32	14:53 (48)						
	20:47	29	07:03 (20)	20:12	19	06:49 (20)	19:16	14	07:24 (21)	18:22	16:39	16:27	33	15:26 (48)		
16	05:36	06:32 (20)	06:09	06:44 (20)	06:44	07:12 (21)	07:20	07:00	07:33	14:52 (48)						
	20:46	31	07:03 (20)	20:10	19	06:48 (20)	19:15	8	07:20 (21)	18:20	16:38	16:27	33	15:25 (48)		
17	05:36	06:32 (20)	06:10	06:45 (20)	06:45	07:21 (21)	07:21	07:02	07:34	14:53 (48)						
	20:45	31	07:03 (20)	20:09	19	06:47 (20)	19:13	18	07:19 (21)	18:19	16:37	16:27	33	15:26 (48)		
18	05:37	06:32 (20)	06:11	06:46 (20)	06:46	07:22 (21)	07:22	07:03	07:34	14:54 (48)						
	20:44	32	07:04 (20)	20:07	19	06:46 (20)	19:11	18	07:18 (21)	18:17	16:36	16:27	33	15:27 (48)		
19	05:38	06:32 (20)	06:12	06:47 (20)	06:47	07:23 (21)	07:23	07:04	07:35	14:54 (48)						
	20:44	33	07:05 (20)	20:06	19	06:45 (20)	19:09	18	07:17 (21)	18:15	16:35	16:28	33	15:27 (48)		
20	05:39	06:32 (20)	06:13	06:48 (20)	06:49	07:25 (21)	07:25	07:05	07:36	14:55 (48)						
	20:43	33	07:05 (20)	20:04	19	06:44 (20)	19:07	18	07:16 (21)	18:14	16:34	16:28	33	15:28 (48)		
21	05:40	06:32 (20)	06:14	06:49 (20)	06:50	07:26 (21)	07:26	07:07	07:36	14:54 (48)						
	20:42	33	07:05 (20)	20:02	19	06:43 (20)	19:05	18	07:15 (21)	18:12	16:34	16:29	34	15:28 (48)		
22	05:41	06:32 (20)	06:15	06:50 (20)	06:51	07:27 (21)	07:27	07:08	07:37	14:55 (48)						
	20:41	34	07:06 (20)	20:01	19	06:42 (20)	19:03	18	07:14 (21)	18:11	16:33	16:29	34	15:29 (48)		
23	05:42	06:32 (20)	06:17	06:51 (20)	06:52	07:29 (21)	07:29	07:09	07:37	14:56 (48)						
	20:40	34	07:06 (20)	19:57	19	06:41 (20)	19:02	18	07:13 (21)	18:09	16:32	16:30	33	15:29 (48)		
24	05:43	06:32 (20)	06:18	06:52 (20)	06:53	07:30 (21)	07:30	07:11	07:38	14:57 (48)						
	20:39	34	07:06 (20)	19:56	19	06:40 (20)	19:00	18	07:12 (21)	18:07	16:31	16:30	33	15:30 (48)		
25	05:44	06:32 (20)	06:19	06:53 (20)	06:54	07:31 (21)	07:31	07:12	07:38	14:57 (48)						
	20:38	35	07:07 (20)	19:54	18	06:39 (20)	18:58	18	07:11 (21)	18:06	16:31	5	15:04 (48)	16:31	33	15:30 (48)
26	05:45	06:32 (20)	06:20	06:54 (20)	06:56	07:32 (21)	07:32	07:13	07:38	14:57 (48)						
	20:37	35	07:07 (20)	19:52	18	06:38 (20)	18:56	18	07:10 (21)	18:04	16:30	12	15:08 (48)	16:32	33	15:30 (48)
27	05:46	06:32 (20)	06:21	06:55 (20)	06:57	07:33 (21)	07:34	07:14	07:39	14:57 (48)						
	20:36	35	07:07 (20)	19:51	18	06:37 (20)	18:54	18	07:09 (21)	18:03	16:30	16	15:10 (48)	16:32	33	15:30 (48)
28	05:47	06:32 (20)	06:22	06:56 (20)	06:58	07:35 (21)	07:35	07:15	07:39	14:59 (48)						
	20:35	35	07:07 (20)	19:49	18	06:36 (20)	18:52	18	07:08 (21)	18:01	16:29	18	15:11 (48)	16:33	32	15:31 (48)
29	05:48	06:32 (20)	06:23	06:57 (20)	06:59	07:36 (21)	07:36	07:17	07:39	14:59 (48)						
	20:34	35	07:07 (20)	19:47	18	06:35 (20)	18:51	18	07:07 (21)	18:00	16:29	20	15:13 (48)	16:34	33	15:32 (48)
30	05:49	06:32 (20)	06:25	06:58 (20)	07:00	07:38 (21)	07:38	07:18	07:40	14:59 (48)						
	20:33	35	07:07 (20)	19:46	18	06:34 (20)	18:49	18	07:06 (21)	17:58	16:28	22	15:14 (48)	16:35	33	15:32 (48)
31	05:51	06:32 (20)	06:26	06:59 (20)	07:01	07:39 (21)	07:39	07:19	07:40	15:00 (48)						
	20:32	34	07:06 (20)	19:44	17	06:33 (20)	18:47	17	07:05 (21)	17:57	16:27	16	15:15 (48)	16:35	32	15:32 (48)
Potential sun hours	469	434	376	342	290	277										
Total, worst case	863	284	303	93	972											
Sun reduction	0.63	0.59	0.54	0.27	0.25											
Oper. time red.	1.00	1.00	1.00	1.00	1.00											
Wind dir. red.	0.66	0.66	0.58	0.76	0.76											
Total reduction	0.42	0.40	0.32	0.21	0.20											
Total, real	366	113	97	20	190											

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)



Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 34

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

### SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-14 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (11)

#### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	05:57 20:06	05:25 20:40	19:07 (46) 05:25	05:51 20:31	19:32 (46) 19:45 (46)	06:27 07:01	07:01 06:40	06:40 07:19
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	05:56 20:07	05:24 20:40	19:06 (46) 19:53 (46)	05:25 20:52	19:12 (46) 20:00 (46)	06:28 19:40	07:03 18:45	06:42 16:54
3	07:40 16:38	07:21 17:16	06:40 17:55	06:44 19:33	05:54 20:09	05:24 20:41	19:07 (46) 19:54 (46)	05:26 20:52	19:12 (46) 20:00 (46)	06:29 19:38	07:04 18:43	06:43 16:53
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:35	05:53 20:10	05:23 20:42	19:06 (46) 19:53 (46)	05:26 20:51	19:12 (46) 20:00 (46)	06:30 19:37	07:05 18:41	06:44 16:51
5	07:40 16:40	07:19 17:19	06:36 17:57	06:40 19:36	05:51 20:11	05:23 20:43	19:06 (46) 19:54 (46)	05:27 20:51	19:13 (46) 20:00 (46)	06:31 19:35	07:06 18:40	06:46 16:50
6	07:40 16:41	07:17 17:21	06:34 17:58	06:38 19:37	05:50 20:12	05:22 20:44	19:07 (46) 19:55 (46)	05:28 20:51	19:13 (46) 20:01 (46)	06:32 19:33	07:07 18:38	06:47 16:49
7	07:40 16:42	07:16 17:22	06:33 18:00	06:36 19:38	05:49 20:13	05:22 20:44	19:06 (46) 19:54 (46)	05:28 20:51	19:13 (46) 20:00 (46)	06:34 19:31	07:09 18:36	06:48 16:48
8	07:40 16:43	07:15 17:23	06:32 18:01	06:35 19:39	05:47 20:14	05:22 20:45	19:07 (46) 19:55 (46)	05:29 20:50	19:13 (46) 20:01 (46)	06:35 19:29	07:10 18:34	06:50 16:46
9	07:39 16:44	07:14 17:25	06:29 18:02	06:33 19:41	05:46 20:16	05:21 20:46	19:07 (46) 19:55 (46)	05:30 20:50	19:14 (46) 20:01 (46)	06:00 19:28	06:51 18:32	07:27 16:45
10	07:39 16:45	07:12 17:26	06:27 18:04	06:31 19:42	05:45 20:17	05:21 20:46	19:07 (46) 19:55 (46)	05:30 20:50	19:14 (46) 20:00 (46)	06:02 19:28	07:12 18:32	06:52 16:45
11	07:39 16:46	07:11 17:28	06:26 18:05	06:29 19:43	05:44 20:18	05:21 20:46	19:08 (46) 19:56 (46)	05:31 20:49	19:14 (46) 20:01 (46)	06:03 19:24	07:13 18:31	06:54 16:44
12	07:38 16:48	07:09 17:29	06:24 18:06	06:28 19:44	05:42 20:19	05:21 20:46	19:07 (46) 19:55 (46)	05:32 20:48	19:14 (46) 20:01 (46)	06:04 19:22	07:15 18:27	06:55 16:42
13	07:38 16:49	07:08 17:30	06:22 18:07	06:26 19:45	05:41 20:20	05:21 20:46	19:08 (46) 19:55 (46)	05:33 20:48	19:15 (46) 20:01 (46)	06:05 19:20	07:16 18:25	06:56 16:41
14	07:38 16:50	07:07 17:32	06:20 18:09	06:24 19:47	05:40 20:21	05:21 20:46	19:08 (46) 19:56 (46)	05:34 20:47	19:15 (46) 20:01 (46)	06:06 19:18	07:17 18:24	06:58 16:40
15	07:37 16:51	07:05 17:33	06:18 18:10	06:22 19:48	05:39 20:23	05:21 20:46	19:08 (46) 19:56 (46)	05:34 20:47	19:15 (46) 20:00 (46)	06:07 19:16	07:18 18:22	06:59 16:39
16	07:37 16:52	07:04 17:35	06:17 18:11	06:21 19:49	05:38 20:24	05:21 20:46	19:08 (46) 19:56 (46)	05:35 20:46	19:15 (46) 20:00 (46)	06:08 19:15	07:20 18:20	07:00 16:38
17	07:36 16:54	07:02 17:36	06:15 18:12	06:19 19:50	05:37 20:25	05:21 20:46	19:08 (46) 19:56 (46)	05:36 20:45	19:16 (46) 20:00 (46)	06:09 19:13	07:21 18:19	07:02 16:37
18	07:35 16:55	07:01 17:37	06:13 18:14	06:17 19:52	05:36 20:26	05:21 20:46	19:09 (46) 19:57 (46)	05:37 20:45	19:16 (46) 20:00 (46)	06:11 19:11	07:22 18:17	07:03 16:36
19	07:35 16:56	06:59 17:39	06:11 18:15	06:16 19:53	05:35 20:27	05:21 20:46	19:09 (46) 19:57 (46)	05:38 20:44	19:17 (46) 20:00 (46)	06:12 19:09	07:23 18:15	07:04 16:35
20	07:34 16:57	06:58 17:40	06:09 18:16	06:14 19:54	05:34 20:28	05:21 20:46	19:09 (46) 19:58 (46)	05:21 20:43	19:18 (46) 19:59 (46)	06:13 19:07	07:25 18:14	07:06 16:34
21	07:33 16:59	06:56 17:41	06:07 18:17	06:12 19:55	05:33 20:29	05:21 20:46	19:09 (46) 19:58 (46)	05:40 20:42	19:18 (46) 19:58 (46)	06:14 19:05	07:26 18:12	07:07 16:33
22	07:33 17:00	06:54 17:43	06:06 18:19	06:11 19:56	05:32 20:30	05:21 20:46	19:08 (46) 19:48 (46)	05:41 20:51	19:19 (46) 19:59 (46)	06:15 20:01	07:27 18:10	07:08 16:33
23	07:32 17:01	06:53 17:44	06:04 18:20	06:09 19:58	05:31 20:31	05:21 20:46	19:07 (46) 19:49 (46)	05:21 20:52	19:20 (46) 19:58 (46)	06:16 19:02	07:29 18:09	07:09 16:32
24	07:31 17:03	06:51 17:45	06:02 18:21	06:08 19:59	05:30 20:32	05:21 20:46	19:08 (46) 19:50 (46)	05:22 20:52	19:20 (46) 19:57 (46)	06:18 19:56	07:30 18:07	07:11 16:31
25	07:30 17:04	06:50 17:47	06:00 18:22	06:06 20:00	05:29 20:33	05:21 20:46	19:07 (46) 19:50 (46)	05:22 20:52	19:21 (46) 19:57 (46)	06:19 19:54	07:31 18:06	07:12 16:31
26	07:29 17:05	06:48 17:48	06:58 18:24	06:05 20:00	05:29 20:34	05:21 20:46	19:08 (46) 19:50 (46)	05:22 20:52	19:22 (46) 19:56 (46)	06:20 19:52	07:32 18:04	07:13 16:30
27	07:28 17:07	06:46 17:49	06:56 18:25	06:03 20:01	05:28 20:35	05:21 20:46	19:07 (46) 19:52 (46)	05:23 20:52	19:23 (46) 19:55 (46)	06:21 19:51	07:34 18:03	07:14 16:29
28	07:27 17:08	06:45 17:51	06:55 18:26	06:01 20:03	05:27 20:36	05:21 20:46	19:07 (46) 19:52 (46)	05:23 20:52	19:24 (46) 19:54 (46)	06:22 19:49	07:35 18:01	07:16 16:29
29	07:26 17:10	06:45 17:52	06:55 18:27	06:01 20:04	05:26 20:37	05:21 20:46	19:06 (46) 19:52 (46)	05:24 20:52	19:26 (46) 19:52 (46)	06:23 19:47	07:36 18:00	07:17 16:28
30	07:25 17:11	06:45 17:53	06:55 18:28	06:01 20:05	05:26 20:38	05:21 20:46	19:07 (46) 19:52 (46)	05:24 20:52	19:27 (46) 19:50 (46)	06:24 19:46	07:38 17:58	07:18 16:28
31	07:24 17:12	06:45 17:54	06:55 18:29	06:01 20:06	05:26 20:39	05:21 20:46	19:07 (46) 19:52 (46)	05:24 20:52	19:29 (46) 19:44	06:26 19:44	07:39 17:57	07:40 16:35
Potential sun hours	288	293	369	403	457	463	469	434	376	341	290	277
Total, worst case					743	1435	1280	13				
Sun reduction					0.55	0.59	0.63	0.59				
Oper. time red.					1.00	1.00	1.00	1.00				
Wind dir. red.					0.51	0.51	0.51	0.51				
Total reduction					0.28	0.30	0.32	0.30				
Total, real					208	432	411	4				

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 35

Licensed user:

EDR

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US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

### SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-147 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (83)

#### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36	07:23 17:14	06:43 17:52	16:18 (18) 16:33 (18)	06:47 19:31	05:57 20:06
2	07:40 16:37	07:22 17:15	16:24 (18) 17:53	16:25 (18) 16:28 (18)	06:46 19:32	05:56 20:07
3	07:40 16:38	07:21 17:17	16:18 (18) 17:55	16:28 (18) 16:32 (18)	06:44 19:33	05:54 20:09
4	07:40 16:39	07:20 17:18	16:16 (18) 17:56	16:32 (18) 16:35 (18)	06:42 19:35	05:53 20:10
5	07:40 16:40	07:19 17:19	16:15 (18) 17:57	16:35 (18) 16:38 (18)	06:40 19:36	05:51 20:11
6	07:40 16:41	07:17 17:21	16:13 (18) 17:59	16:38 (18) 16:41 (18)	06:38 19:37	05:50 20:12
7	07:40 16:42	07:16 17:22	16:12 (18) 18:00	16:41 (18) 16:44 (18)	06:37 19:38	05:49 20:13
8	07:40 16:43	07:15 17:24	16:11 (18) 19:01	16:44 (18) 16:47 (18)	06:35 19:39	05:47 20:14
9	07:39 16:44	07:14 17:25	16:10 (18) 19:02	16:47 (18) 16:50 (18)	06:33 19:41	05:46 20:16
10	07:39 16:45	07:12 17:26	16:09 (18) 19:03	16:50 (18) 16:53 (18)	06:31 19:42	05:45 20:17
11	07:39 16:47	07:11 17:28	16:09 (18) 19:04	16:53 (18) 16:56 (18)	06:30 19:43	05:44 20:18
12	07:38 16:48	07:09 17:29	16:08 (18) 19:06	16:56 (18) 16:59 (18)	06:28 19:44	05:43 20:19
13	07:38 16:49	07:08 17:30	16:08 (18) 19:07	17:02 (18) 17:05 (18)	06:26 19:46	05:41 20:20
14	07:38 16:50	07:07 17:32	16:08 (18) 19:09	17:08 (18) 17:11 (18)	06:24 19:47	05:40 20:21
15	07:37 16:51	07:05 17:33	16:07 (18) 19:10	17:14 (18) 17:17 (18)	06:23 19:48	05:39 20:22
16	07:37 16:53	07:04 17:35	16:07 (18) 19:11	17:20 (18) 17:23 (18)	06:21 19:49	05:38 20:23
17	07:36 16:54	07:02 17:36	16:07 (18) 19:12	17:26 (18) 17:29 (18)	06:19 19:50	05:37 20:24
18	07:35 16:55	07:01 17:37	16:07 (18) 19:13	17:32 (18) 17:35 (18)	06:18 19:51	05:36 20:25
19	07:35 16:56	06:59 17:39	16:07 (18) 19:14	17:38 (18) 17:41 (18)	06:16 19:52	05:35 20:26
20	07:34 16:58	06:58 17:40	16:07 (18) 19:15	17:44 (18) 17:47 (18)	06:14 19:53	05:34 20:27
21	07:33 16:59	06:56 17:41	16:07 (18) 19:16	17:50 (18) 17:53 (18)	06:13 19:54	05:33 20:28
22	07:33 17:00	06:54 17:43	16:08 (18) 19:17	17:56 (18) 17:59 (18)	06:11 19:55	05:32 20:29
23	07:32 17:02	06:53 17:44	16:09 (18) 19:18	18:02 (18) 18:05 (18)	06:11 19:56	05:32 20:30
24	07:31 17:03	06:51 17:45	16:09 (18) 19:19	18:08 (18) 18:11 (18)	06:09 19:57	05:31 20:31
25	07:30 17:04	06:50 17:47	16:43 (18) 19:20	18:14 (18) 18:17 (18)	06:08 19:58	05:30 20:32
26	07:29 17:06	06:48 17:48	16:10 (18) 19:21	18:18 (18) 18:21 (18)	06:06 19:59	05:29 20:33
27	07:28 17:07	06:46 17:49	16:11 (18) 19:22	18:22 (18) 18:25 (18)	06:05 20:00	05:29 20:34
28	07:27 17:08	06:45 17:51	16:12 (18) 19:23	18:26 (18) 18:29 (18)	06:04 20:01	05:28 20:35
29	07:26 17:10		16:14 (18) 19:24	18:30 (18) 18:33 (18)	06:03 20:02	05:28 20:36
30	07:25 17:11		16:14 (18) 19:25	18:34 (18) 18:37 (18)	06:02 20:03	05:27 20:37
31	07:24 17:12		16:16 (18) 19:26	18:38 (18) 18:41 (18)	06:02 20:04	05:27 20:38
Potential sun hours	288	293	369	403	457	463
Total, worst case		846	18		757	930
Sun reduction		0.39	0.47		0.55	0.59
Oper. time red.		1.00	1.00		1.00	1.00
Wind dir. red.		0.71	0.71		0.67	0.67
Total reduction		0.28	0.33		0.37	0.40
Total, real		235	6		282	371

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 36

Licensed user:

EDR

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US-SYRACUSE, NY 13202

(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2 Shadow receptor: R-147 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (83)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
 438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
 Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25 20:52	06:21 (29) 20:31	05:52 25	06:27 (29) 19:42	07:01 18:47	06:40 16:56
2	05:25 20:52	06:20 (29) 20:30	05:53 23	06:28 (29) 19:40	07:03 18:45	34 16:13 (18)
3	05:26 20:52	06:20 (29) 20:28	05:54 20	06:29 (29) 19:38	07:04 18:43	33 16:12 (18)
4	05:26 20:51	06:21 (29) 20:27	05:55 16	06:31 (29) 19:37	07:05 18:41	31 16:12 (18)
5	05:27 20:51	06:20 (29) 20:26	05:56 11	06:34 (29) 19:35	07:06 18:40	29 16:10 (18)
6	05:28 20:51	06:21 (29) 20:25	05:57 11	06:33 (29) 19:33	07:07 18:38	26 16:09 (18)
7	05:28 20:51	06:20 (29) 20:23	05:58 11	06:34 (29) 19:31	07:09 18:36	22 16:07 (18)
8	05:29 20:50	06:20 (29) 20:22	05:59 11	06:35 (29) 19:29	07:10 18:34	19 16:06 (18)
9	05:30 20:50	06:21 (29) 20:21	06:00 11	06:36 (29) 19:28	07:11 18:32	13 16:03 (18)
10	05:31 20:49	06:21 (29) 20:19	06:02 11	06:37 (29) 19:26	07:12 18:31	13 16:03 (18)
11	05:31 20:49	06:20 (29) 20:18	06:03 11	06:38 (29) 19:24	07:13 18:29	13 16:03 (18)
12	05:32 20:48	06:20 (29) 20:16	06:04 11	06:39 (29) 19:22	07:15 18:27	11 16:54 (18)
13	05:33 20:48	06:21 (29) 20:15	06:05 11	06:41 (29) 19:20	07:16 18:25	18 17:05 (18)
14	05:34 20:47	06:21 (29) 20:13	06:06 11	06:42 (29) 19:18	07:17 18:24	23 17:08 (18)
15	05:35 20:47	06:21 (29) 20:12	06:07 11	06:43 (29) 19:17	07:18 18:22	26 17:10 (18)
16	05:36 20:46	06:20 (29) 20:10	06:08 11	06:44 (29) 19:15	07:20 18:20	29 17:13 (18)
17	05:36 20:45	06:20 (29) 20:09	06:10 11	06:45 (29) 19:13	07:21 18:19	32 17:14 (18)
18	05:37 20:45	06:21 (29) 20:07	06:11 11	06:46 (29) 19:11	07:22 18:17	34 17:15 (18)
19	05:38 20:44	06:21 (29) 20:06	06:12 11	06:47 (29) 19:09	07:23 18:15	35 17:15 (18)
20	05:39 20:43	06:21 (29) 20:04	06:13 11	06:49 (29) 19:07	07:25 18:14	36 17:15 (18)
21	05:40 20:42	06:21 (29) 20:02	06:14 11	06:50 (29) 19:05	07:26 18:12	37 17:16 (18)
22	05:41 20:41	06:22 (29) 20:01	06:15 11	06:51 (29) 19:03	07:27 18:11	38 17:16 (18)
23	05:42 20:40	06:22 (29) 19:58	06:16 11	06:52 (29) 19:02	07:29 18:09	39 17:16 (18)
24	05:43 20:39	06:22 (29) 19:56	06:18 11	06:53 (29) 19:00	07:30 18:07	40 17:17 (18)
25	05:44 20:38	06:23 (29) 19:54	06:19 11	06:54 (29) 18:58	07:31 18:06	39 17:16 (18)
26	05:45 20:38	06:23 (29) 19:52	06:20 11	06:56 (29) 18:56	07:32 18:04	40 17:17 (18)
27	05:46 20:36	06:23 (29) 19:51	06:21 11	06:57 (29) 18:54	07:34 18:03	39 17:16 (18)
28	05:47 20:35	06:24 (29) 19:49	06:22 11	06:58 (29) 18:52	07:35 18:01	38 17:15 (18)
29	05:48 20:34	06:24 (29) 19:47	06:23 11	06:59 (29) 18:51	07:36 18:00	38 17:15 (18)
30	05:49 20:33	06:25 (29) 19:46	06:25 11	07:00 (29) 18:49	07:38 17:58	37 17:14 (18)
31	05:50 20:32	06:26 (29) 19:44	06:26 11	07:01 (29) 17:57	07:39 17:57	35 17:14 (18)
Potential sun hours	469	434		376	342	290
Total, worst case	1043	95		664	664	207
Sun reduction	0.63	0.59		0.44	0.44	0.27
Oper. time red.	1.00	1.00		1.00	1.00	1.00
Wind dir. red.	0.67	0.67		0.71	0.71	0.71
Total reduction	0.43	0.40		0.31	0.31	0.19
Total, real	445	38		208	208	40

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 37

Licensed user:

**EDR**

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-15 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (12)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	05:57 20:06	05:25 20:40	19:16 (46) 05:25	05:51 20:31	19:33 (46) 06:27	07:01 18:47	06:40 16:55	07:19 16:28
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	05:56 20:07	05:24 20:40	19:16 (46) 05:25	05:53 20:30	19:34 (46) 06:28	07:03 18:45	06:42 16:54	07:20 16:27
3	07:40 16:38	07:21 17:16	06:40 17:55	06:44 19:33	05:54 20:09	05:24 20:41	19:17 (46) 05:26	05:54 20:29	19:36 (46) 06:29	07:04 18:43	06:43 16:53	07:21 16:27
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:35	05:53 20:10	05:23 20:42	19:16 (46) 05:26	05:55 20:27	19:38 (46) 06:30	07:05 18:41	06:44 16:51	07:22 16:27
5	07:40 16:40	07:19 17:19	06:36 17:57	06:40 19:36	05:51 20:11	05:23 20:43	19:17 (46) 05:27	05:56 20:26	19:23 (46) 06:31	07:06 18:40	06:46 16:50	07:23 16:26
6	07:40 16:41	07:17 17:21	06:34 17:58	06:38 19:37	05:50 20:12	05:22 20:44	19:18 (46) 05:28	05:57 20:25	19:24 (46) 06:32	07:07 18:38	06:47 16:49	07:24 16:26
7	07:40 16:42	07:16 17:22	06:33 18:00	06:36 19:38	05:49 20:13	05:22 20:44	19:17 (46) 05:28	05:58 20:23	19:23 (46) 06:34	07:09 18:36	06:48 16:48	07:25 16:26
8	07:40 16:43	07:15 17:23	06:31 19:01	06:35 19:39	05:47 20:14	05:22 20:45	19:18 (46) 05:29	05:59 20:22	19:24 (46) 06:35	07:10 18:34	06:50 16:46	07:26 16:26
9	07:39 16:44	07:14 17:25	06:29 19:02	06:33 19:39	05:46 20:16	05:21 20:46	19:18 (46) 05:30	06:00 20:21	19:24 (46) 06:36	07:11 18:32	06:51 16:45	07:27 16:26
10	07:39 16:45	07:12 17:26	06:27 19:04	06:31 19:42	05:45 20:17	05:21 20:46	19:19 (46) 05:30	06:01 20:19	19:23 (46) 06:37	07:12 18:31	06:52 16:44	07:28 16:26
11	07:39 16:46	07:11 17:28	06:26 19:05	06:29 19:43	05:44 20:18	05:21 20:47	19:19 (46) 05:31	06:03 20:18	19:24 (46) 06:38	07:13 18:29	06:54 16:43	07:29 16:26
12	07:38 16:48	07:09 17:29	06:25 19:06	06:28 19:44	05:42 20:19	05:21 20:48	19:19 (46) 05:32	06:04 20:16	19:24 (46) 06:39	07:15 18:27	06:55 16:42	07:30 16:26
13	07:38 16:49	07:08 17:30	06:22 19:07	06:26 19:46	05:41 20:20	05:21 20:48	19:21 (46) 05:33	06:05 20:15	19:24 (46) 06:40	07:16 18:25	06:56 16:41	07:31 16:26
14	07:38 16:50	07:07 17:32	06:20 19:09	06:24 19:47	05:40 20:21	05:21 20:49	19:20 (46) 05:34	06:06 20:13	19:25 (46) 06:41	07:17 18:24	06:58 16:40	07:32 16:26
15	07:37 16:51	07:05 17:33	06:18 19:10	06:22 19:48	05:39 20:23	05:21 20:49	19:19 (46) 05:34	06:07 20:12	19:24 (46) 06:42	07:18 18:22	06:59 16:39	07:33 16:26
16	07:37 16:52	07:04 17:34	06:17 19:11	06:21 19:49	05:38 20:24	05:20 20:50	19:18 (46) 05:35	06:08 20:10	19:24 (46) 06:43	07:20 18:20	07:00 16:38	07:33 16:27
17	07:36 16:54	07:02 17:36	06:15 19:12	06:19 19:50	05:37 20:25	05:21 20:50	19:17 (46) 05:36	06:09 20:09	19:24 (46) 06:44	07:21 18:19	07:02 16:37	07:34 16:27
18	07:35 16:55	07:01 17:37	06:13 19:14	06:17 19:52	05:36 20:26	05:21 20:50	19:17 (46) 05:37	06:11 20:07	19:25 (46) 06:45	07:22 18:17	07:03 16:36	07:35 16:27
19	07:35 16:56	06:59 17:39	06:11 19:15	06:16 19:53	05:35 20:27	05:21 20:51	19:16 (46) 05:38	06:12 20:06	19:25 (46) 06:46	07:23 18:15	07:04 16:35	07:35 16:28
20	07:34 16:57	06:58 17:40	06:09 19:16	06:14 19:54	05:34 20:28	05:21 20:51	19:16 (46) 05:39	06:13 20:04	19:25 (46) 06:47	07:25 18:14	07:06 16:34	07:36 16:28
21	07:33 16:59	06:56 17:41	06:07 19:17	06:12 19:55	05:33 20:29	05:21 20:51	19:16 (46) 05:40	06:14 20:02	19:26 (46) 06:48	07:26 18:12	07:07 16:33	07:36 16:29
22	07:33 17:00	06:54 17:43	06:06 19:19	06:11 19:56	05:32 20:30	05:21 20:51	19:15 (46) 05:41	06:15 20:01	19:26 (46) 06:49	07:27 18:10	07:08 16:33	07:37 16:29
23	07:32 17:01	06:53 17:44	06:04 19:20	06:09 19:58	05:31 20:31	05:21 20:52	19:15 (46) 05:42	06:16 20:03	19:26 (46) 06:50	07:29 18:09	07:09 16:32	07:37 16:30
24	07:31 17:03	06:51 17:45	06:02 19:21	06:08 19:59	05:30 20:32	05:22 20:52	19:16 (46) 05:43	06:18 20:03	19:27 (46) 06:51	07:30 18:07	07:11 16:31	07:38 16:30
25	07:30 17:04	06:50 17:47	06:00 19:22	06:06 20:00	05:29 20:33	05:22 20:52	19:15 (46) 05:44	06:19 20:04	19:27 (46) 06:52	07:31 18:06	07:12 16:31	07:38 16:31
26	07:29 17:05	06:48 17:48	06:58 19:24	06:05 20:00	05:29 20:34	05:22 20:52	19:15 (46) 05:45	06:20 20:05	19:28 (46) 06:53	07:32 18:04	07:13 16:30	07:39 16:31
27	07:28 17:07	06:46 17:49	06:56 19:25	06:03 20:01	05:28 20:35	05:22 20:52	19:16 (46) 05:46	06:21 20:06	19:28 (46) 06:54	07:34 18:03	07:14 16:29	07:39 16:32
28	07:27 17:08	06:45 17:51	06:55 19:26	06:01 20:03	05:27 20:36	05:22 20:52	19:15 (46) 05:47	06:22 20:07	19:29 (46) 06:55	07:35 18:01	07:16 16:29	07:39 16:33
29	07:26 17:10	06:45 17:51	06:55 19:26	06:01 20:03	05:27 20:36	05:22 20:52	19:15 (46) 05:48	06:23 20:08	19:30 (46) 06:56	07:36 18:00	07:17 16:28	07:39 16:33
30	07:25 17:11	06:45 17:51	06:55 19:26	06:01 20:03	05:27 20:36	05:22 20:52	19:15 (46) 05:48	06:23 20:08	19:30 (46) 06:56	07:36 18:00	07:17 16:28	07:39 16:33
31	07:24 17:12	06:45 17:51	06:55 19:26	06:01 20:03	05:27 20:36	05:22 20:52	19:15 (46) 05:48	06:23 20:08	19:30 (46) 06:56	07:36 18:00	07:17 16:28	07:39 16:33
Potential sun hours	288	293	369	403	457	463	469	434	376	341	290	277
Total, worst case					772	1103	1138	74				
Sun reduction					0.55	0.59	0.63	0.59				
Oper. time red.					1.00	1.00	1.00	1.00				
Wind dir. red.					0.51	0.51	0.51	0.51				
Total reduction					0.28	0.30	0.32	0.30				
Total, real					217	332	366	22				

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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Licensed user:

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US-SYRACUSE, NY 13202  
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Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

### SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-151 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (316)

#### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December	
1	07:40 16:36	07:23 17:14	06:43 17:52	16:47 (17) 19:31	06:47 19:05 (11)	05:57 20:06	05:25 20:40	05:25 20:52	05:52 20:51	06:27 19:42	07:01 18:47	07:23 (29) 16:40	07:19 16:28
2	07:40 16:37	07:22 17:15	06:41 17:53	16:47 (17) 19:32	06:41 19:04 (11)	05:56 20:07	05:24 20:40	05:25 20:52	05:53 20:30	06:28 19:40	07:03 18:45	07:25 (29) 16:42	07:20 16:27
3	07:40 16:38	07:21 17:17	06:40 17:55	16:47 (17) 19:33	06:44 19:05 (11)	05:54 20:09	05:24 20:41	05:26 20:52	05:54 20:29	06:29 19:38	07:04 18:43	07:27 (29) 16:43	07:21 16:27
4	07:40 16:39	07:20 17:18	06:38 17:56	16:47 (17) 19:35	06:42 19:04 (11)	05:53 20:10	05:23 20:42	05:26 20:51	05:55 20:27	06:30 19:37	07:05 18:41	07:28 (17) 16:52	07:23 16:27
5	07:40 16:40	07:19 17:19	06:36 17:57	16:47 (17) 19:36	06:40 19:02 (11)	05:51 20:11	05:23 20:43	05:27 20:51	05:56 20:26	06:31 19:35	07:06 18:40	07:29 (17) 16:50	07:23 16:27
6	07:40 16:41	07:17 17:21	06:34 17:59	16:49 (17) 19:37	06:38 19:01 (11)	05:50 20:12	05:22 20:44	05:28 20:52	05:57 20:25	06:33 19:33	07:07 18:38	07:30 (17) 16:49	07:24 16:26
7	07:40 16:42	07:16 17:22	06:33 18:00	16:49 (17) 19:38	06:37 19:02 (11)	05:49 20:13	05:22 20:44	05:28 20:51	05:58 20:23	06:34 19:31	07:09 18:36	07:31 (17) 16:48	07:25 16:26
8	07:40 16:43	07:15 17:24	06:31 19:01	17:51 (17) 19:39	06:35 18:57 (11)	05:48 20:14	05:22 20:45	05:29 20:50	05:59 20:22	06:35 19:29	07:10 18:34	07:32 (17) 16:47	07:26 16:26
9	07:39 16:44	07:14 17:25	07:29 19:02	17:52 (17) 19:41	06:33 18:08 (17)	05:46 19:41	05:22 20:46	05:30 20:50	06:01 20:21	06:36 19:28	07:11 18:32	07:33 (17) 16:45	07:29 16:26
10	07:39 16:45	07:12 17:26	07:27 19:04	17:56 (17) 19:42	06:31 18:06 (17)	05:45 19:42	05:21 20:46	05:31 20:49	06:02 20:19	06:37 19:26	07:12 18:31	07:34 (17) 16:44	07:28 16:26
11	07:39 16:47	07:11 17:28	07:26 19:05	17:57 (29) 19:43	06:30 18:58 (11)	05:44 19:43	05:21 20:47	05:31 20:49	06:03 20:18	06:38 19:24	07:14 18:29	07:35 (17) 16:43	07:29 16:26
12	07:38 16:48	07:09 17:29	07:24 19:06	17:59 (29) 19:44	06:28 18:59 (11)	05:43 19:44	05:21 20:47	05:32 20:48	06:04 20:16	06:39 19:22	07:15 18:25	07:36 (17) 16:42	07:30 16:26
13	07:38 16:49	07:08 17:31	07:22 19:08	17:59 (29) 19:46	06:26 18:58 (11)	05:41 19:46	05:21 20:48	05:33 20:48	06:05 20:15	06:41 19:20	07:16 18:25	07:37 (17) 16:41	07:31 16:26
14	07:38 16:50	07:07 17:32	07:20 19:09	17:59 (29) 19:47	06:24 18:59 (11)	05:40 19:47	05:21 20:49	05:34 20:49	06:06 20:13	06:42 19:18	07:17 18:24	07:38 (17) 16:40	07:32 16:26
15	07:37 16:51	07:05 17:33	07:18 19:10	17:59 (29) 19:48	06:23 18:59 (11)	05:39 19:48	05:21 20:49	05:35 20:49	06:07 20:12	06:43 19:17	07:18 18:22	07:39 (17) 16:39	07:32 16:27
16	07:37 16:53	07:04 17:35	07:17 19:11	17:59 (29) 19:49	06:21 18:59 (11)	05:38 19:49	05:21 20:46	05:36 20:46	06:08 20:10	06:44 19:15	07:19 18:20	07:40 (17) 16:38	07:33 16:27
17	07:36 16:54	07:02 17:36	07:15 19:13	17:59 (29) 19:50	06:19 18:59 (11)	05:37 19:50	05:21 20:45	05:36 20:45	06:10 20:09	06:45 19:13	07:21 18:19	07:41 (17) 16:37	07:34 16:27
18	07:35 16:55	07:01 17:37	07:13 19:14	17:59 (29) 19:52	06:18 18:59 (11)	05:36 19:52	05:21 20:45	05:37 20:45	06:11 20:07	06:46 19:11	07:22 18:17	07:42 (17) 16:36	07:35 16:27
19	07:35 16:56	06:59 17:39	07:11 19:15	17:59 (29) 19:53	06:16 18:59 (11)	05:35 19:53	05:21 20:44	05:38 20:44	06:12 20:06	06:47 19:09	07:23 18:15	07:43 (17) 16:35	07:35 16:28
20	07:34 16:58	06:58 17:40	07:09 19:16	17:59 (29) 19:54	06:14 18:59 (11)	05:34 19:54	05:21 20:43	05:39 20:43	06:13 20:04	06:49 19:07	07:25 18:14	07:44 (17) 16:34	07:36 16:28
21	07:33 16:59	06:56 17:41	07:07 19:17	17:59 (29) 19:55	06:13 18:59 (11)	05:33 19:55	05:21 20:42	05:40 20:42	06:14 20:02	06:50 19:05	07:26 18:12	07:45 (17) 16:34	07:37 16:29
22	07:33 17:00	06:55 17:43	07:06 19:19	17:59 (29) 19:56	06:11 18:59 (11)	05:32 19:56	05:21 20:41	05:41 20:41	06:15 20:01	06:51 19:04	07:27 18:11	07:46 (17) 16:33	07:37 16:29
23	07:32 17:02	06:53 17:44	07:04 19:20	17:59 (29) 19:58	06:09 18:59 (11)	05:31 19:58	05:22 20:40	05:42 20:40	06:17 19:58	06:52 19:02	07:29 18:09	07:47 (17) 16:32	07:37 16:30
24	07:31 17:03	06:51 17:45	07:02 19:21	17:59 (29) 19:59	06:08 18:59 (11)	05:30 19:59	05:22 20:39	05:43 20:39	06:18 19:56	06:53 19:00	07:30 18:07	07:48 (17) 16:31	07:37 16:30
25	07:30 17:04	06:50 17:47	07:00 19:22	17:59 (29) 20:00	06:06 18:59 (11)	05:30 20:00	05:22 20:39	05:44 20:39	06:19 19:54	06:54 18:58	07:31 18:06	07:49 (17) 16:31	07:38 16:31
26	07:29 17:06	06:48 17:48	06:58 19:24	17:59 (29) 20:03	06:05 18:59 (11)	05:29 20:03	05:23 20:38	05:45 20:38	06:20 19:52	06:56 18:56	07:33 18:04	07:50 (17) 16:30	07:39 16:32
27	07:28 17:07	06:46 17:49	06:56 19:25	17:59 (29) 20:04	06:03 18:59 (11)	05:28 20:04	05:23 20:37	05:46 20:37	06:21 19:51	06:57 18:54	07:34 18:03	07:51 (17) 16:30	07:39 16:32
28	07:27 17:08	06:45 17:51	06:55 19:26	17:59 (29) 20:05	06:02 18:59 (11)	05:27 20:05	05:23 20:35	05:47 20:35	06:22 19:49	06:58 18:52	07:35 18:01	07:52 (17) 16:29	07:39 16:33
29	07:26 17:10	06:44 17:52	06:53 19:27	17:59 (29) 20:06	06:00 18:59 (11)	05:27 20:06	05:24 20:34	05:48 20:34	06:23 19:47	06:59 18:51	07:36 18:00	07:53 (17) 16:29	07:39 16:34
30	07:25 17:11	06:43 17:53	06:52 19:28	17:59 (29) 20:07	05:59 18:59 (11)	05:26 20:07	05:24 20:33	05:49 20:33	06:25 19:46	07:00 18:49	07:38 17:58	07:54 (17) 16:28	07:40 16:34
31	07:24 17:12	06:42 17:54	06:49 19:29	17:59 (29) 20:08	05:58 18:59 (11)	05:25 20:08	05:23 20:32	05:51 20:32	06:26 19:44	07:39 17:57	07:39 18:00	07:55 (17) 16:35	07:40 16:35
Potential sun hours	288	293	369	403	390	457	463	469	434	376	919	482	277
Total, worst case		203	784	390	448				919		482		
Sun reduction		0.39	0.47	0.49	0.54				0.54		0.44		
Oper. time red.		1.00	1.00	1.00	1.00				1.00		1.00		
Wind dir. red.		0.66	0.59	0.57	0.56				0.56		0.65		
Total reduction		0.26	0.28	0.28	0.31				0.31		0.29		
Total, real		53	218	109	280				280		139		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 39

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-161 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (321)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December	
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	05:57 20:06	05:25 20:39	05:25 20:52	05:52 20:31	06:27 19:42	07:03 (32) 18:47	07:01 25 07:31 (33)	06:40 16:28	07:19 16:28
2	07:40 16:37	07:22 17:15	06:41 17:53	06:46 19:32	05:56 20:07	05:24 20:40	05:25 20:52	05:53 20:30	06:28 19:40	31 07:05 (32) 18:45	07:03 (33) 25 07:55 (33)	06:42 16:27	07:20 16:27
3	07:40 16:38	07:21 17:17	06:40 17:55	06:44 19:33	05:54 20:08	05:24 20:41	05:26 20:28	05:54 20:28	06:29 19:38	29 07:34 (32) 18:43	07:04 24 07:55 (33)	06:43 16:27	07:21 16:27
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:35	05:53 20:10	05:23 20:42	05:26 20:51	05:55 20:27	06:30 19:37	27 07:33 (32) 18:41	07:05 23 07:54 (33)	06:44 16:27	07:22 16:27
5	07:40 16:40	07:19 17:57	06:36 17:57	06:40 19:36	05:51 20:11	05:23 20:43	05:27 20:51	05:56 20:26	06:31 19:35	22 07:30 (32) 18:40	07:06 21 07:53 (33)	06:46 16:27	07:23 16:27
6	07:40 16:41	07:17 17:59	06:34 17:59	06:38 19:37	05:50 20:12	05:22 20:43	05:28 20:51	05:57 20:25	06:33 19:33	19 07:29 (32) 18:38	07:07 19 07:51 (33)	06:47 16:28	07:24 16:28
7	07:40 16:42	07:16 17:22	06:33 18:00	06:37 19:38	05:49 20:13	05:22 20:44	05:28 20:50	05:58 20:23	06:34 19:31	12 07:12 (32) 18:36	07:09 15 07:50 (33)	06:48 16:28	07:25 16:28
8	07:39 16:43	07:15 17:24	06:31 19:01	06:35 19:39	05:47 20:14	05:22 20:45	05:29 20:50	05:59 20:22	06:35 19:29	07:10 18:34	9 07:46 (33)	06:50 16:27	07:26 16:26
9	07:39 16:44	07:13 17:25	06:29 19:02	06:33 19:41	05:46 20:16	05:22 20:46	05:30 20:50	06:00 20:21	06:36 19:28	07:11 18:32	06:51 16:45	07:27 16:26	07:27 16:26
10	07:39 16:45	07:12 17:26	06:27 19:04	06:31 19:42	05:45 20:17	05:21 20:46	05:31 20:49	06:02 20:19	06:37 19:26	07:12 18:31	06:52 16:44	07:28 16:26	07:28 16:26
11	07:39 16:47	07:11 17:28	06:26 19:05	06:29 19:43	05:44 20:18	05:21 20:47	05:31 20:49	06:03 20:18	06:38 19:24	07:13 18:29	06:54 16:43	07:29 16:26	07:29 16:26
12	07:38 16:48	07:09 17:29	06:24 19:06	06:28 19:44	05:42 20:19	05:21 20:47	05:32 20:48	06:04 20:16	06:39 19:22	07:15 18:27	06:55 16:42	07:30 16:26	07:30 16:26
13	07:38 16:49	07:08 17:30	06:22 19:07	06:26 19:45	05:41 20:20	05:21 20:48	05:33 20:48	06:05 20:15	06:41 19:20	07:16 18:25	06:56 16:41	07:31 16:26	07:31 16:26
14	07:37 16:50	07:07 17:32	06:20 19:09	06:24 19:47	05:40 20:21	05:21 20:48	05:34 20:47	06:06 20:13	06:42 19:18	07:17 18:24	06:58 16:40	07:32 16:26	07:32 16:26
15	07:37 16:51	07:05 17:33	06:18 19:10	06:23 19:48	05:39 20:22	05:21 20:49	05:35 20:47	06:07 20:12	06:43 19:16	07:18 18:22	06:59 16:39	07:33 16:27	07:33 16:27
16	07:36 16:53	07:04 17:35	06:17 19:11	06:21 19:49	05:38 20:24	05:21 20:49	05:35 20:46	06:08 20:10	06:44 19:15	07:19 18:20	07:00 16:38	07:34 16:27	07:34 16:27
17	07:36 16:54	07:02 17:36	06:15 19:12	06:19 19:50	05:37 20:25	05:21 20:50	05:36 20:45	06:10 20:09	06:45 19:13	07:21 18:19	07:02 16:37	07:34 16:27	07:34 16:27
18	07:35 16:55	07:01 17:37	06:13 19:14	06:17 19:52	05:36 20:26	05:21 20:50	05:37 20:44	06:11 20:07	06:46 19:11	07:22 18:17	07:03 16:36	07:34 16:27	07:34 16:27
19	07:35 16:56	06:59 17:39	06:11 19:15	06:16 19:53	05:35 20:27	05:21 20:50	05:38 20:44	06:12 20:06	06:47 19:09	07:23 18:15	07:04 16:35	07:35 16:28	07:35 16:28
20	07:34 16:58	06:58 17:40	06:09 19:16	06:14 19:54	05:34 20:28	05:21 20:51	05:39 20:43	06:13 20:04	06:49 19:07	07:25 18:14	07:05 16:34	07:36 16:28	07:36 16:28
21	07:33 16:59	06:56 17:41	06:07 19:17	06:13 19:55	05:33 20:29	05:21 20:51	05:40 20:42	06:14 20:02	06:50 19:05	07:26 18:12	07:07 16:34	07:37 16:29	07:37 16:29
22	07:33 17:00	06:54 17:43	06:06 19:19	06:11 19:56	05:32 20:30	05:21 20:51	05:41 20:41	06:15 20:01	06:51 19:03	07:27 18:10	07:08 16:33	07:38 16:29	07:38 16:29
23	07:32 17:01	06:53 17:44	06:04 19:20	06:09 19:58	05:31 20:31	05:22 20:52	05:42 20:40	06:16 20:02	06:52 19:02	07:29 18:09	07:09 16:32	07:39 16:30	07:39 16:30
24	07:31 17:03	06:51 17:45	06:02 19:21	06:08 19:59	05:30 20:32	05:22 20:52	05:43 20:39	06:18 20:02	06:53 19:00	07:30 18:07	07:11 16:31	07:40 16:30	07:40 16:30
25	07:30 17:04	06:50 17:47	06:00 19:22	06:06 20:00	05:29 20:33	05:22 20:52	05:44 20:38	06:19 20:04	06:54 19:00	07:31 18:06	07:12 16:31	07:41 16:31	07:41 16:31
26	07:29 17:06	06:48 17:48	05:58 19:24	06:05 20:00	05:28 20:34	05:23 20:52	05:45 20:37	06:20 20:04	06:55 19:00	07:32 18:04	07:13 16:30	07:42 16:31	07:42 16:31
27	07:28 17:07	06:46 17:49	05:56 19:25	06:03 20:01	05:28 20:35	05:23 20:52	05:46 20:36	06:21 20:04	06:57 19:00	07:33 18:03	07:14 16:30	07:43 16:32	07:43 16:32
28	07:27 17:08	06:45 17:51	05:55 19:26	06:02 20:02	05:27 20:36	05:23 20:52	05:47 20:35	06:22 20:04	06:58 19:00	07:34 18:03	07:15 16:29	07:44 16:33	07:44 16:33
29	07:26 17:10	06:44 17:52	05:54 19:27	06:00 20:04	05:26 20:37	05:24 20:52	05:48 20:34	06:23 20:04	06:59 19:00	07:35 18:00	07:17 16:29	07:45 16:34	07:45 16:34
30	07:25 17:11	06:43 17:53	05:53 19:28	05:59 20:05	05:26 20:38	05:24 20:52	05:49 20:33	06:24 20:04	07:00 19:00	07:36 18:00	07:18 16:28	07:46 16:35	07:46 16:35
31	07:24 17:12	06:42 17:54	05:52 19:29	05:58 20:06	05:25 20:39	05:25 20:53	05:50 20:32	06:26 20:04	07:03 19:00	07:37 18:00	07:19 16:28	07:47 16:36	07:47 16:36
Potential sun hours	288	293	369	403	457	463	469	434	376	342	290	277	
Total, worst case			312	761	0.47	0.49		598	333	161		0.44	
Sun reduction			0.47	0.49				0.59	0.54	0.44			
Oper. time red.			1.00	1.00				1.00	1.00	1.00			
Wind dir. red.			0.52	0.60				0.60	0.56	0.52			
Total reduction			0.24	0.29				0.35	0.30	0.23			
Total, real			76	223				211	100	37			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 40

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-163 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (382)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	05:57 20:06	18:50 (29) 20:40	
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	05:56 20:07	46 19:36 (28) 20:40	
3	07:40 16:38	07:21 17:17	06:40 17:55	06:44 19:33	05:54 20:08	47 19:36 (28) 20:41	
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:35	05:53 20:10	47 18:49 (29) 05:23 19:36 (28) 20:42	
5	07:40 16:40	07:19 17:19	06:36 17:57	06:40 19:36	05:51 20:11	45 18:49 (29) 05:23 19:34 (28) 20:43	
6	07:40 16:41	07:17 17:21	06:34 17:59	06:38 19:37	05:50 20:12	45 18:49 (29) 05:22 19:34 (28) 20:44	
7	07:40 16:42	07:16 17:22	06:33 18:00	06:37 19:38	07:04 (38) 07:17 (38)	05:49 20:13	45 18:49 (29) 05:22 19:34 (28) 20:44
8	07:39 16:43	07:15 17:23	06:31 19:01	06:35 19:39	07:02 (38) 07:19 (38)	05:47 20:14	43 18:50 (29) 05:22 19:33 (28) 20:45
9	07:39 16:44	07:13 17:25	06:29 19:02	06:33 19:41	07:00 (38) 07:21 (38)	05:46 20:16	42 18:49 (29) 05:21 19:31 (28) 20:46
10	07:39 16:45	07:12 17:26	06:27 19:04	06:31 19:42	06:58 (38) 07:21 (38)	05:45 20:17	40 18:50 (29) 05:21 19:30 (28) 20:46
11	07:39 16:47	07:11 17:28	06:26 19:05	06:29 19:43	06:57 (38) 07:22 (38)	05:44 20:18	38 18:50 (29) 05:21 19:28 (28) 20:47
12	07:38 16:48	07:09 17:29	06:24 19:06	06:28 19:44	06:57 (38) 07:23 (38)	05:42 20:19	32 18:51 (29) 05:21 19:23 (28) 20:47
13	07:38 16:49	07:08 17:30	06:22 19:07	06:26 19:45	06:55 (38) 07:23 (38)	05:41 20:20	31 18:52 (29) 05:21 19:23 (28) 20:48
14	07:37 16:50	07:07 17:32	06:20 19:09	06:24 19:47	06:53 (38) 07:22 (38)	05:40 20:21	30 18:52 (29) 05:21 19:22 (28) 20:48
15	07:37 16:51	07:05 17:33	06:18 19:10	06:23 19:48	06:53 (38) 07:23 (38)	05:39 20:22	29 18:53 (29) 05:21 19:22 (28) 20:49
16	07:36 16:52	07:04 17:35	06:17 19:11	06:21 19:49	06:54 (38) 07:22 (38)	05:38 20:24	27 18:54 (29) 05:21 19:21 (28) 20:49
17	07:36 16:54	07:02 17:36	06:15 19:12	06:19 19:50	06:54 (38) 07:22 (38)	05:37 20:25	25 18:55 (29) 05:21 19:20 (28) 20:50
18	07:35 16:55	07:01 17:37	06:13 19:14	06:17 19:52	06:54 (38) 07:22 (38)	05:36 20:26	23 18:56 (29) 05:21 19:19 (28) 20:50
19	07:35 16:56	06:59 17:39	06:11 19:15	06:16 19:53	06:54 (38) 07:21 (38)	05:35 20:27	21 18:57 (29) 05:21 19:18 (28) 20:51
20	07:34 16:58	06:58 17:40	06:09 19:16	06:14 19:54	06:54 (38) 07:19 (38)	05:34 20:28	17 18:59 (29) 05:21 19:16 (28) 20:51
21	07:33 16:59	06:56 17:41	06:07 19:17	06:13 19:55	06:55 (38) 19:15 (29)	05:33 20:29	14 19:00 (29) 05:21 19:14 (28) 20:51
22	07:33 17:00	06:54 17:43	06:06 19:19	06:11 19:56	06:56 (38) 19:17 (29)	05:32 20:30	9 19:03 (29) 05:21 19:12 (28) 20:51
23	07:32 17:01	06:53 17:44	06:04 19:20	06:09 19:58	06:57 (38) 19:30 (28)	05:31 20:31	05:22 20:52
24	07:31 17:03	06:51 17:45	06:02 19:21	06:08 19:59	06:58 (38) 19:32 (28)	05:30 20:32	05:22 20:52
25	07:30 17:04	06:50 17:47	06:00 19:22	06:06 20:00	07:01 (38) 19:34 (28)	05:29 20:33	05:22 20:52
26	07:29 17:06	06:48 17:48	06:58 19:24	06:05 20:00	18:54 (29) 19:34 (28)	05:29 20:34	05:22 20:52
27	07:28 17:07	06:46 17:49	06:56 19:25	06:03 20:01	18:53 (29) 19:36 (28)	05:28 20:35	05:23 20:52
28	07:27 17:08	06:45 17:51	06:55 19:26	06:02 20:02	18:52 (29) 19:36 (28)	05:27 20:36	05:23 20:52
29	07:26 17:10	06:45 19:27	06:55 19:27	06:00 20:04	18:51 (29) 19:36 (28)	05:27 20:37	05:24 20:52
30	07:25 17:11	06:45 19:28	06:55 19:28	06:00 20:05	18:50 (29) 19:36 (28)	05:26 20:38	05:24 20:52
31	07:24 17:12	06:45 19:30	06:49 19:30	06:00 20:05	05:25 20:39	05:25 20:39	05:24 20:52
Potential sun hours	288	293	369	403	457	463	
Total, worst case			228	783	743		
Sun reduction			0.47	0.49	0.55		
Oper. time red.			1.00	1.00	1.00		
Wind dir. red.			0.54	0.57	0.52		
Total reduction			0.25	0.28	0.28		
Total, real			57	217	212		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 41

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-163 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (382)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December							
1	05:25	05:52	19:01 (29)	06:27	06:56 (38)	07:01	07:25 (39)	06:40	07:19				
	20:52	20:31	35	19:36 (28)	19:42	25	07:21 (38)	18:47	15	07:40 (39)	16:56	16:28	
2	05:25	05:53	19:01 (29)	06:28	06:57 (38)	07:03	07:26 (39)	06:42	07:20				
	20:52	20:30	38	19:39 (28)	19:40	23	07:20 (38)	18:45	11	07:37 (39)	16:54	16:27	
3	05:26	05:54	19:00 (29)	06:29	06:58 (38)	07:04		06:43	07:21				
	20:52	20:28	41	19:41 (28)	19:38	21	07:19 (38)	18:43			16:53	16:27	
4	05:26	05:55	19:00 (29)	06:30	06:59 (38)	07:05		06:44	07:22				
	20:51	20:27	42	19:42 (28)	19:37	17	07:16 (38)	18:41			16:52	16:27	
5	05:27	05:56	18:59 (29)	06:31	07:01 (38)	07:06		06:46	07:23				
	20:51	20:26	44	19:43 (28)	19:35	13	07:14 (38)	18:40			16:50	16:27	
6	05:28	05:57	18:59 (29)	06:33		07:07		06:47	07:24				
	20:51	20:25	45	19:44 (28)	19:33		18:38		16:49	16:26			
7	05:28	05:58	18:58 (29)	06:34		07:09		06:48	07:25				
	20:51	20:23	46	19:44 (28)	19:31		18:36		16:48	16:26			
8	05:29	05:59	18:58 (29)	06:35		07:10		06:50	07:26				
	20:50	20:22	46	19:44 (28)	19:29		18:34		16:46	16:26			
9	05:30	06:00	18:58 (29)	06:36		07:11		06:51	07:27				
	20:50	20:21	46	19:44 (28)	19:28		18:32		16:45	16:26			
10	05:31	06:02	18:58 (29)	06:37		07:12		06:52	07:28				
	20:49	20:19	46	19:44 (28)	19:26		18:31		16:44	16:26			
11	05:31	06:03	18:58 (29)	06:38		07:13		06:54	07:29				
	20:49	20:18	46	19:44 (28)	19:24		18:29		16:43	16:26			
12	05:32	06:04	18:59 (29)	06:39		07:15		06:55	07:30				
	20:48	20:16	46	19:45 (28)	19:22		18:27		16:42	16:26			
13	05:33	06:05	18:59 (29)	06:41		07:16		06:56	07:31				
	20:48	20:15	46	19:45 (28)	19:20		18:25		16:41	16:26			
14	05:34	06:06	18:59 (29)	06:42		07:17		06:58	07:32				
	20:47	20:13	45	19:44 (28)	19:18		18:24		16:40	16:26			
15	05:35	06:07	19:00 (29)	06:43		07:18		06:59	07:32				
	20:47	20:12	43	19:43 (28)	19:16		18:22		16:39	16:27			
16	05:35	06:08	19:00 (29)	06:44		07:20		07:00	07:33				
	20:46	20:10	42	19:42 (28)	19:15		18:20		16:38	16:27			
17	05:36	06:10	19:01 (29)	06:45		07:21		07:02	07:34				
	20:45	20:09	40	19:41 (28)	19:13		18:19		16:37	16:27			
18	05:37	06:11	07:06 (38)	06:46		07:22		07:03	07:34				
	20:44	20:07	50	19:39 (28)	19:11		18:17		16:36	16:27			
19	05:38	06:12	07:04 (38)	06:47		07:23		07:04	07:35				
	20:44	20:06	50	19:37 (28)	19:09		18:15		16:35	16:28			
20	05:39	06:13	07:02 (38)	06:49		07:25		07:05	07:36				
	20:43	20:04	45	19:34 (28)	19:07	10	07:42 (39)	18:14		16:34	16:28		
21	05:40	19:16 (29)	06:14	07:00 (38)	06:50		07:29 (39)	07:26		07:07	07:36		
	20:42	4	19:20 (29)	20:02	38	19:22 (29)	19:05	14	07:43 (39)	18:12		16:34	16:29
22	05:41	19:12 (29)	06:15	07:00 (38)	06:51		07:27 (39)	07:27		07:08	07:37		
	20:41	12	19:24 (29)	20:01	33	19:19 (29)	19:03	17	07:44 (39)	18:10		16:33	16:29
23	05:42	19:10 (29)	06:16	06:59 (38)	06:52		07:26 (39)	07:29		07:09	07:37		
	20:40	16	19:26 (29)	19:57	25	07:24 (38)	19:02	19	07:45 (39)	18:09		16:32	16:30
24	05:43	19:09 (29)	06:18	06:58 (38)	06:53		07:25 (39)	07:30		07:11	07:38		
	20:39	18	19:27 (29)	19:56	27	07:25 (38)	19:00	20	07:45 (39)	18:07		16:31	16:30
25	05:44	19:07 (29)	06:19	06:57 (38)	06:54		07:24 (39)	07:31		07:12	07:38		
	20:38	22	19:29 (29)	19:54	28	07:25 (38)	18:58	21	07:45 (39)	18:06		16:31	16:31
26	05:45	19:06 (29)	06:20	06:57 (38)	06:55		07:23 (39)	07:32		07:13	07:38		
	20:37	24	19:30 (29)	19:52	28	07:25 (38)	18:56	22	07:45 (39)	18:04		16:30	16:31
27	05:46	19:05 (29)	06:21	06:56 (38)	06:57		07:24 (39)	07:34		07:14	07:39		
	20:36	26	19:31 (29)	19:51	28	07:24 (38)	18:54	21	07:45 (39)	18:03		16:30	16:32
28	05:47	19:04 (29)	06:22	06:56 (38)	06:58		07:23 (39)	07:35		07:15	07:39		
	20:35	28	19:32 (29)	19:49	28	07:24 (38)	18:52	21	07:44 (39)	18:01		16:29	16:33
29	05:48	19:03 (29)	06:23	06:56 (38)	06:59		07:24 (39)	07:36		07:17	07:39		
	20:34	30	19:33 (29)	19:47	27	07:23 (38)	18:50	19	07:43 (39)	18:00		16:29	16:34
30	05:49	19:03 (29)	06:24	06:55 (38)	07:00		07:24 (39)	07:38		07:18	07:40		
	20:33	30	19:33 (29)	19:45	28	07:23 (38)	18:49	17	07:41 (39)	17:58		16:28	16:34
31	05:50	19:02 (29)	06:26	06:56 (38)				07:39					07:40
	20:32	32	19:34 (29)	19:44	26	07:22 (38)		17:57					16:35
Potential sun hours	469	434		376		342		290		277			
Total, worst case	242		1198		300		26						
Sun reduction	0.63		0.59		0.54		0.44						
Oper. time red.	1.00		1.00		1.00		1.00						
Wind dir. red.	0.52		0.54		0.56		0.54						
Total reduction	0.33		0.32		0.30		0.24						
Total, real	79		384		91		6						

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)



Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 42

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2 Shadow receptor: R-165 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (92)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June		
1	07:40	07:23	07:53 (39)	06:43	07:33 (38)	06:47	05:57	05:25
	16:36	17:14	24 08:17 (39)	17:52	33 08:06 (38)	19:31	20:06	20:40
2	07:40	07:22	07:53 (39)	06:41	07:35 (38)	06:45	05:56	05:24
	16:37	17:15	24 08:17 (39)	17:53	43 17:26 (29)	19:32	20:07	20:40
3	07:40	07:21	07:52 (39)	06:40	07:35 (38)	06:44	05:54	05:24
	16:38	17:17	25 08:17 (39)	17:55	46 17:28 (29)	19:33	20:08	20:41
4	07:40	07:20	07:52 (39)	06:38	07:36 (38)	06:42	05:53	05:23
	16:39	17:18	25 08:17 (39)	17:56	46 17:29 (29)	19:35	20:10	20:42
5	07:40	07:19	07:53 (39)	06:36	07:37 (38)	06:40	05:51	05:23
	16:40	17:19	24 08:17 (39)	17:57	46 17:30 (29)	19:36	20:11	20:43
6	07:40	07:17	07:53 (39)	06:34	07:40 (38)	06:38	05:50	05:22
	16:41	17:21	25 08:18 (39)	17:58	42 17:31 (29)	19:37	20:12	20:44
7	07:40	07:16	07:53 (39)	06:33	07:42 (38)	06:37	05:49	05:22
	16:42	17:22	24 08:17 (39)	18:00	38 17:31 (29)	19:38	20:13	20:44
8	07:39	07:15	07:54 (39)	07:31	18:06 (29)	06:35	05:47	05:22
	16:43	17:23	22 08:16 (39)	19:01	25 18:31 (29)	19:39	20:14	20:45
9	07:39	07:13	07:55 (39)	07:29	18:05 (29)	06:33	05:46	05:21
	16:44	17:25	21 08:16 (39)	19:02	26 18:31 (29)	19:41	20:16	20:46
10	07:39	07:12	07:56 (39)	07:27	18:05 (29)	06:31	05:45	05:21
	16:45	17:26	18 08:14 (39)	19:04	26 18:31 (29)	19:42	20:17	20:46
11	07:39	07:11	07:58 (39)	07:26	18:06 (29)	06:29	05:44	05:21
	16:46	17:28	15 08:13 (39)	19:05	25 18:31 (29)	19:43	20:18	20:47
12	07:38	07:09	07:47 (38)	07:24	18:06 (29)	06:28	05:42	05:21
	16:48	17:29	21 08:11 (39)	19:06	24 18:30 (29)	19:44	20:19	20:47
13	07:38	07:08	07:44 (38)	07:22	18:06 (29)	06:26	05:41	05:21
	16:49	17:30	20 08:07 (39)	19:07	23 18:29 (29)	19:45	20:20	20:48
14	07:37	07:07	07:41 (38)	07:20	18:06 (29)	06:24	05:40	05:21
	16:50	17:32	21 08:02 (38)	19:09	22 18:28 (29)	19:47	20:21	20:48
15	07:37	07:05	07:40 (38)	07:18	18:07 (29)	06:23	05:39	05:21
	16:51	17:33	24 08:04 (38)	19:10	19 18:26 (29)	19:48	20:22	20:49
16	07:36	07:04	07:38 (38)	07:17	18:09 (29)	06:21	05:38	05:21
	16:52	17:35	27 08:05 (38)	19:11	16 18:25 (29)	19:49	20:24	20:49
17	07:36	07:02	07:37 (38)	07:15	18:12 (29)	06:19	05:37	05:21
	16:54	17:36	30 08:07 (38)	19:12	10 18:22 (29)	19:50	20:25	20:50
18	07:35	07:01	07:36 (38)	07:13	06:17	05:36	05:21	
	16:55	17:37	31 08:07 (38)	19:14	19:52	20:26	20:50	
19	07:35	06:59	07:35 (38)	07:11	06:16	05:35	05:21	
	16:56	17:39	33 08:08 (38)	19:15	19:53	20:27	20:51	
20	07:34	06:58	07:34 (38)	07:09	06:14	05:34	05:21	
	16:58	17:40	34 08:08 (38)	19:16	19:54	20:28	20:51	
21	07:33	06:56	07:34 (38)	07:07	06:13	05:33	05:21	
	16:59	17:41	35 08:09 (38)	19:17	19:55	20:29	20:51	
22	07:33	06:54	07:33 (38)	07:06	06:11	05:32	05:21	
	17:00	17:43	36 08:09 (38)	19:19	19:56	20:30	20:51	
23	07:32	06:53	07:33 (38)	07:04	06:09	05:31	05:22	
	17:01	17:44	36 08:09 (38)	19:20	19:58	20:31	20:52	
24	07:31	08:00 (39)	06:51	07:33 (38)	07:02	06:08	05:30	05:22
	17:03	6 08:06 (39)	17:45	37 08:10 (38)	19:21	19:59	20:32	20:52
25	07:30	07:57 (39)	06:50	07:33 (38)	07:00	06:06	05:29	05:22
	17:04	11 08:08 (39)	17:47	36 08:09 (38)	19:22	20:00	20:33	20:52
26	07:29	07:56 (39)	06:48	07:32 (38)	06:58	06:05	05:29	05:22
	17:05	14 08:10 (39)	17:48	36 08:08 (38)	19:24	20:00	20:34	20:52
27	07:28	07:55 (39)	06:46	07:33 (38)	06:56	06:03	05:28	05:23
	17:07	17 08:12 (39)	17:49	35 08:08 (38)	19:25	20:01	20:35	20:52
28	07:27	07:54 (39)	06:45	07:33 (38)	06:55	06:01	05:27	05:23
	17:08	19 08:13 (39)	17:51	35 08:08 (38)	19:26	20:02	20:36	20:52
29	07:26	07:53 (39)		06:53	06:00	05:27	05:24	
	17:10	21 08:14 (39)		19:27	20:04	20:37	20:52	
30	07:25	07:53 (39)		06:51	05:59	05:26	05:24	
	17:11	22 08:15 (39)		19:28	20:05	20:38	20:52	
31	07:24	07:53 (39)		06:49		05:25		
	17:12	23 08:16 (39)		19:30		20:39		
Potential sun hours	288	293	369	403	457	463		
Total, worst case	133	774	510					
Sun reduction	0.33	0.39	0.47					
Oper. time red.	1.00	1.00	1.00					
Wind dir. red.	0.49	0.50	0.59					
Total reduction	0.16	0.19	0.27					
Total, real	21	150	139					

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 43

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-165 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (92)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December				
1	05:25	05:52	06:27	07:01	17:44 (29)	06:40	07:25 (39)	07:19		
	20:52	20:31	19:42	18:47	25	18:09 (29)	16:56	19	07:44 (39)	16:28
2	05:25	05:53	06:28	07:03	17:43 (29)	06:42	07:24 (39)	07:20		
	20:52	20:30	19:40	18:45	26	18:09 (29)	16:54	21	07:45 (39)	16:27
3	05:26	05:54	06:29	07:04	17:43 (29)	06:43	07:24 (39)	07:21		
	20:52	20:28	19:38	18:43	26	18:09 (29)	16:53	22	07:46 (39)	16:27
4	05:26	05:55	06:30	07:05	17:43 (29)	06:44	07:23 (39)	07:22		
	20:51	20:27	19:37	18:41	26	18:09 (29)	16:51	23	07:46 (39)	16:27
5	05:27	05:56	06:31	07:06	17:42 (29)	06:46	07:23 (39)	07:23		
	20:51	20:26	19:35	18:40	26	18:08 (29)	16:50	24	07:47 (39)	16:27
6	05:28	05:57	06:32	07:07	08:20 (38)	06:47	07:23 (39)	07:24		
	20:51	20:25	19:33	18:38	35	18:07 (29)	16:49	24	07:47 (39)	16:26
7	05:28	05:58	06:34	07:09	08:17 (38)	06:48	07:23 (39)	07:25		
	20:51	20:23	19:31	18:36	41	18:07 (29)	16:48	25	07:48 (39)	16:26
8	05:29	05:59	06:35	07:10	08:14 (38)	06:50	07:23 (39)	07:26		
	20:50	20:22	19:29	18:34	45	18:06 (29)	16:46	25	07:48 (39)	16:26
9	05:30	06:00	06:36	07:11	08:12 (38)	06:51	07:23 (39)	07:27		
	20:50	20:21	19:28	18:32	46	18:05 (29)	16:45	24	07:47 (39)	16:26
10	05:30	06:02	06:37	07:12	08:10 (38)	06:52	07:24 (39)	07:28		
	20:49	20:19	19:26	18:31	46	18:03 (29)	16:44	24	07:48 (39)	16:26
11	05:31	06:03	06:38	07:13	08:09 (38)	06:54	07:24 (39)	07:29		
	20:49	20:18	19:24	18:29	44	18:01 (29)	16:43	23	07:47 (39)	16:26
12	05:32	06:04	06:39	07:15	08:08 (38)	06:55	07:25 (39)	07:30		
	20:48	20:16	19:22	18:27	41	17:58 (29)	16:42	22	07:47 (39)	16:26
13	05:33	06:05	06:40	07:16	08:06 (38)	06:56	07:25 (39)	07:31		
	20:48	20:15	19:20	18:25	34	08:40 (38)	16:41	21	07:46 (39)	16:26
14	05:34	06:06	06:42	07:17	08:05 (38)	06:58	07:26 (39)	07:32		
	20:47	20:13	19:18	18:24	35	08:40 (38)	16:40	19	07:45 (39)	16:26
15	05:35	06:07	06:43	07:18	08:06 (38)	06:59	07:28 (39)	07:32		
	20:47	20:12	19:16	18:22	35	08:41 (38)	16:39	17	07:45 (39)	16:27
16	05:35	06:08	06:44	07:20	08:05 (38)	07:00	07:29 (39)	07:33		
	20:46	20:10	19:15	18:20	36	08:41 (38)	16:38	14	07:43 (39)	16:27
17	05:36	06:10	06:45	07:21	08:04 (38)	07:02	07:31 (39)	07:34		
	20:45	20:09	19:13	18:19	36	08:40 (38)	16:37	11	07:42 (39)	16:27
18	05:37	06:11	06:46	07:22	08:05 (38)	07:03	07:34 (39)	07:34		
	20:44	20:07	19:11	18:17	36	08:41 (38)	16:36	5	07:39 (39)	16:27
19	05:38	06:12	06:47	07:23	08:04 (38)	07:04	07:35			
	20:44	20:06	19:09	18:15	36	08:40 (38)	16:35			16:28
20	05:39	06:13	06:49	07:25	08:04 (38)	07:05	07:36			
	20:43	20:04	19:07	18:14	36	08:40 (38)	16:34			16:28
21	05:40	06:14	06:50	07:26	08:05 (38)	07:07	07:36			
	20:42	20:02	19:05	18:12	35	08:40 (38)	16:34			16:29
22	05:41	06:15	06:51	07:27	08:05 (38)	07:08	07:37			
	20:41	20:01	19:03	18:10	34	08:39 (38)	16:33			16:29
23	05:42	06:16	06:52	07:29	08:05 (38)	07:09	07:37			
	20:40	19:57	19:02	18:09	33	08:38 (38)	16:32			16:30
24	05:43	06:18	06:53	07:30	08:06 (38)	07:11	07:38			
	20:39	19:56	19:00	18:07	31	08:37 (38)	16:31			16:30
25	05:44	06:19	06:54	07:31	08:07 (38)	07:12	07:38			
	20:38	19:54	18:58	18:06	29	08:36 (38)	16:31			16:31
26	05:45	06:20	06:55	17:55 (29)	07:32	08:09 (38)	07:13			07:38
	20:37	19:52	18:56	7	18:02 (29)	18:04	26	08:35 (38)	16:30	16:31
27	05:46	06:21	06:57	17:52 (29)	07:34	08:10 (38)	07:14			07:39
	20:36	19:51	18:54	14	18:06 (29)	18:03	23	08:33 (38)	16:30	16:32
28	05:47	06:22	06:58	17:49 (29)	07:35	08:11 (38)	07:15			07:39
	20:35	19:49	18:52	18	18:07 (29)	18:01	20	08:31 (38)	16:29	16:33
29	05:48	06:23	06:59	17:47 (29)	07:36	08:14 (38)	07:17			07:39
	20:34	19:47	18:50	21	18:08 (29)	18:00	21	08:38 (39)	16:29	16:34
30	05:49	06:24	07:00	17:46 (29)	07:38	08:18 (38)	07:18			07:40
	20:33	19:45	18:49	22	18:08 (29)	17:58	20	08:41 (39)	16:28	16:34
31	05:50	06:26		07:39		08:27 (39)				07:40
	20:32	19:44		17:57	16	08:43 (39)				16:35
Potential sun hours	469	434	376	342	290					277
Total, worst case			82	999	363					
Sun reduction			0.54	0.44	0.27					
Oper. time red.			1.00	1.00	1.00					
Wind dir. red.			0.63	0.54	0.49					
Total reduction			0.34	0.23	0.13					
Total, real			28	235	48					

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-166 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (93)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36	09:25 (38) 09:44 (38)	07:23 17:14	06:43 17:52	06:47 19:31	07:37 (50) 20:06
2	07:40 16:37	09:26 (38) 09:44 (38)	07:22 17:15	06:41 17:53	06:45 19:32	07:40 (50) 20:07
3	07:40 16:38	09:28 (38) 09:43 (38)	07:21 17:16	06:40 17:55	06:44 19:33	07:40 (50) 20:08
4	07:40 16:39	09:30 (38) 09:43 (38)	07:20 17:18	06:38 17:56	06:42 19:35	07:40 (50) 20:10
5	07:40 16:40	09:32 (38) 09:41 (38)	07:19 17:19	06:36 17:57	06:40 19:36	07:40 (50) 20:11
6	07:40 16:41	09:36 (38) 09:38 (38)	07:17 17:21	06:34 17:58	06:38 19:37	07:40 (50) 20:12
7	07:40 16:42	09:38 (38) 17:22	07:16 18:00	06:33 19:38	06:36 19:38	07:40 (50) 20:13
8	07:39 16:43	07:15 17:23	07:31 19:01	06:35 19:39	06:35 19:39	07:39 20:14
9	07:39 16:44	07:13 17:25	07:29 19:02	06:33 19:41	06:33 19:41	07:39 20:16
10	07:39 16:45	07:12 17:26	07:27 19:04	06:31 19:42	06:31 19:42	07:39 20:17
11	07:39 16:46	07:11 17:28	07:25 19:05	06:29 19:43	06:29 19:43	07:39 20:18
12	07:38 16:48	07:09 17:29	07:24 19:06	06:28 19:44	06:28 19:44	07:38 20:19
13	07:38 16:49	07:08 17:30	07:22 19:07	06:26 19:45	06:26 19:45	07:38 20:20
14	07:37 16:50	07:07 17:32	07:20 19:09	06:24 19:47	06:24 19:47	07:37 20:21
15	07:37 16:51	07:05 17:33	07:18 19:10	06:23 19:48	06:23 19:48	07:37 20:22
16	07:36 16:52	07:04 17:35	07:16 19:11	06:21 19:49	06:21 19:49	07:36 20:24
17	07:36 16:54	07:02 17:36	07:15 19:12	06:19 19:50	06:19 19:50	07:36 20:25
18	07:35 16:55	07:01 17:37	07:13 19:14	06:17 19:52	06:17 19:52	07:35 20:26
19	07:35 16:56	06:59 17:39	07:11 19:15	06:16 19:53	06:16 19:53	07:35 20:27
20	07:34 16:58	06:58 17:40	07:09 19:16	06:14 19:54	06:14 19:54	07:34 20:28
21	07:33 16:59	06:56 17:41	07:07 19:17	06:12 19:55	06:12 19:55	07:33 20:29
22	07:32 17:00	06:54 17:43	07:06 19:19	06:11 19:56	06:11 19:56	07:32 20:30
23	07:32 17:01	06:53 17:44	07:04 19:20	06:09 19:58	06:09 19:58	07:32 20:31
24	07:31 17:03	06:51 17:45	07:02 19:21	06:08 19:59	06:08 19:59	07:31 20:32
25	07:30 17:04	06:50 17:47	07:00 19:22	06:06 20:00	06:06 20:00	07:30 20:33
26	07:29 17:05	06:48 17:48	06:58 19:24	06:05 20:00	06:05 20:00	07:29 20:34
27	07:28 17:07	06:46 17:49	06:56 19:25	06:03 20:01	06:03 20:01	07:28 20:35
28	07:27 17:08	06:45 17:51	06:55 19:26	06:01 20:02	06:01 20:02	07:27 20:36
29	07:26 17:10	06:45 17:51	06:55 19:26	06:01 20:02	06:01 20:02	07:26 20:36
30	07:25 17:11	06:45 17:51	06:55 19:26	06:01 20:02	06:01 20:02	07:25 20:36
31	07:24 17:12	06:45 17:51	06:55 19:26	06:01 20:02	06:01 20:02	07:24 20:36
Potential sun hours	288	293	369	403	457	463
Total, worst case	76		268	211	347	
Sun reduction	0.33		0.47	0.49	0.55	
Oper. time red.	1.00		1.00	1.00	1.00	
Wind dir. red.	0.54		0.56	0.63	0.64	
Total reduction	0.18		0.26	0.31	0.34	
Total, real	13		69	65	119	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 45

Licensed user:

**EDR**

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US-SYRACUSE, NY 13202  
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Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-166 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (93)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1   05:25	05:51	06:44 (49)	06:27	07:01	06:40	07:19
20:52	20:31	19 07:03 (49)	19:42	18:47	16:56	16:28
2   05:25	05:53	06:42 (49)	06:28	07:03	06:42	07:20
20:52	20:30	22 07:04 (49)	19:40	18:45	16:54	16:27
3   05:26	05:54	06:41 (49)	06:29	07:04	06:43	07:21
20:52	20:28	24 07:05 (49)	19:38	18:43	16:53	16:27
4   05:26	05:55	06:41 (49)	06:30	07:05	06:44	07:22
20:51	20:27	24 07:05 (49)	19:37	18:41	16:51	16:27
5   05:27	05:56	06:40 (49)	06:31	07:06	06:46	07:23
20:51	20:26	26 07:06 (49)	19:35	18:40	16:50	16:27
6   05:28	05:57	06:39 (49)	06:32	07:07	06:47	07:24
20:51	20:25	27 07:06 (49)	19:33	18:38	16:49	16:26
7   05:28	05:58	06:39 (49)	06:34	07:09	06:48	07:25
20:51	20:23	28 07:07 (49)	19:31	18:36	16:48	16:26
8   05:29	05:59	06:38 (49)	06:35	07:10	06:50	07:26
20:50	20:22	29 07:07 (49)	19:29	18:34	16:46	16:26
9   05:30	06:00	06:38 (49)	06:36	07:11	06:51	07:27
20:50	20:21	29 07:07 (49)	19:28	18:32	16:45	16:26
10   05:30	06:02	06:37 (49)	06:37	07:12	06:52	07:28
20:49	20:19	30 07:07 (49)	19:26	18:31	16:44	16:26
11   05:31	06:03	06:37 (49)	06:38	07:13	06:54	07:29
20:49	20:18	29 07:06 (49)	19:24	18:29	16:43	16:26
12   05:32	06:04	06:38 (49)	06:39	07:26 (50)	07:15	06:55
20:48	20:16	29 07:07 (49)	19:22	11 07:37 (50)	18:27	16:42
13   05:33	06:05	06:38 (49)	06:40	07:23 (50)	07:16	06:56
20:48	20:15	29 07:07 (49)	19:20	15 07:38 (50)	18:25	16:41
14   05:34	06:06	06:38 (49)	06:42	07:21 (50)	07:17	06:58
20:47	20:13	28 07:06 (49)	19:18	18 07:39 (50)	18:24	16:40
15   05:35	06:07	06:38 (49)	06:43	07:20 (50)	07:18	06:59
20:47	20:12	27 07:05 (49)	19:16	20 07:40 (50)	18:22	16:39
16   05:35	06:08	06:39 (49)	06:44	07:18 (50)	07:20	07:00
20:46	20:10	25 07:04 (49)	19:15	22 07:40 (50)	18:20	16:38
17   05:36	06:10	06:39 (49)	06:45	07:17 (50)	07:21	07:02
20:45	20:09	24 07:03 (49)	19:13	23 07:40 (50)	18:19	16:37
18   05:37	06:11	06:40 (49)	06:46	07:17 (50)	07:22	07:03
20:44	20:07	22 07:02 (49)	19:11	23 07:40 (50)	18:17	16:36
19   05:38	06:12	06:41 (49)	06:47	07:16 (50)	07:23	07:04
20:44	20:06	19 07:00 (49)	19:09	23 07:39 (50)	18:15	16:35
20   05:39	06:13	06:42 (49)	06:49	07:17 (50)	07:25	07:05
20:43	20:04	16 06:58 (49)	19:07	23 07:40 (50)	18:14	16:34
21   05:40	06:14	06:45 (49)	06:50	07:17 (50)	07:26	07:07
20:42	20:02	10 06:55 (49)	19:05	22 07:39 (50)	18:12	16:33
22   05:41	06:15		06:51	07:17 (50)	07:27	07:08
20:41	20:01		19:03	21 07:38 (50)	18:10	16:33
23   05:42	06:16		06:52	07:17 (50)	07:29	07:09
20:40	19:57		19:02	19 07:36 (50)	18:09	16:32
24   05:43	06:18		06:53	07:18 (50)	07:30	07:11
20:39	19:56		19:00	16 07:34 (50)	18:07	16:31
25   05:44	06:19		06:54	07:20 (50)	07:31	07:12
20:38	19:54		18:58	12 07:32 (50)	18:06	16:31
26   05:45	06:20		06:55	07:23 (50)	07:32	07:13
20:37	19:52		18:56	5 07:28 (50)	18:04	16:30
27   05:46	06:21		06:57		07:34	07:14
20:36	19:51		18:54		18:03	16:30
28   05:47	06:22		06:58		07:35	07:15
20:35	19:49		18:52		18:01	16:29
29   05:48	06:49 (49)	06:23	06:59		07:36	07:17
20:34	9 06:58 (49)	19:47	18:50		18:00	16:29
30   05:49	06:47 (49)	06:24	07:00		07:38	07:18
20:33	13 07:00 (49)	19:45	18:49		17:58	16:28
31   05:50	06:45 (49)	06:26			07:39	07:40
20:32	17 07:02 (49)	19:44			17:57	16:35
Potential sun hours	469	434	376	342	290	277
Total, worst case	39	516	273			550
Sun reduction	0.63	0.59	0.54			0.25
Oper. time red.	1.00	1.00	1.00			1.00
Wind dir. red.	0.64	0.64	0.56			0.54
Total reduction	0.39	0.37	0.30			0.13
Total, real	15	191	81			74

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 46

Licensed user:

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(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-167 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (94)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	
1	07:40 16:36	07:23 17:14 28	08:00 (39) 08:28 (39) 17:52	06:43 46 08:24 (38) 19:31	06:47 20:06	05:57 16 06:07 (49)	
2	07:40 16:37	07:22 17:15 29	08:00 (39) 08:29 (39) 17:53	06:41 47 08:25 (38) 19:32	06:45 20:07	05:56 18 06:08 (49)	
3	07:40 16:38	07:21 17:17 29	07:59 (39) 08:28 (39) 17:55	06:40 46 08:24 (38) 19:33	06:44 20:08	05:54 19 06:09 (49)	
4	07:40 16:39	07:20 17:18 30	07:59 (39) 08:29 (39) 17:56	06:38 45 08:23 (38) 19:35	06:42 20:10	05:53 20 06:09 (49)	
5	07:40 16:40	07:19 17:19 29	08:00 (39) 08:29 (39) 17:57	06:36 44 08:22 (38) 19:36	06:40 20:11	05:51 20 06:10 (49)	
6	07:40 16:41	07:19 17:17 29	08:00 (39) 08:29 (39) 17:57	06:34 44 08:22 (38) 19:37	06:38 20:12	05:50 20 06:10 (49)	
7	07:40 16:42	07:16 17:22 28	08:00 (39) 08:28 (39) 18:00	06:33 42 08:21 (38) 19:38	06:36 20:13	05:49 21 06:10 (49)	
8	07:39 16:43	07:15 17:23 27	08:01 (39) 08:28 (39) 19:01	07:31 41 09:20 (38) 19:39	06:35 20:14	05:47 22 06:11 (49)	
9	07:39 16:44	07:13 17:25 26	08:02 (39) 08:28 (39) 19:02	07:29 40 09:19 (38) 19:41	06:33 20:16	05:46 22 06:11 (49)	
10	07:39 16:45	07:12 17:26 24	08:02 (39) 08:26 (39) 19:04	07:27 46 18:37 (29) 19:42	06:31 20:17	05:45 22 06:12 (49)	
11	07:39 16:46	07:11 17:28 22	08:04 (39) 08:26 (39) 19:05	07:26 49 18:40 (29) 19:43	06:29 20:18	05:44 22 06:12 (49)	
12	07:38 16:48	07:09 17:29 19	08:05 (39) 08:24 (39) 19:06	07:24 49 18:41 (29) 19:44	06:28 20:19	05:42 23 06:13 (49)	
13	07:38 16:49	07:08 17:30 15	08:07 (39) 08:22 (39) 19:07	07:22 47 18:42 (29) 19:45	06:26 20:20	05:41 23 06:12 (49)	
14	07:37 16:50	07:07 17:32 19	07:58 (38) 08:19 (39) 19:09	07:20 46 18:43 (29) 19:47	06:24 20:21	05:40 24 06:13 (49)	
15	07:37 16:51	07:05 17:33 18	07:54 (38) 08:12 (38) 19:10	07:18 40 18:43 (29) 19:48	06:23 20:22	05:39 24 06:13 (49)	
16	07:36 16:52	07:04 17:35 23	07:51 (38) 08:14 (38) 19:11	07:16 30 18:42 (29) 19:49	06:21 20:24	05:38 23 06:13 (49)	
17	07:36 16:54	07:02 17:36 28	07:49 (38) 08:17 (38) 19:12	07:15 23 18:43 (29) 19:50	06:19 20:25	05:37 23 06:14 (49)	
18	07:35 16:55	07:01 17:37 31	07:47 (38) 08:18 (38) 19:14	07:13 22 18:42 (29) 19:52	06:17 20:26	05:36 23 06:14 (49)	
19	07:35 16:56	06:59 17:39 34	07:46 (38) 08:20 (38) 19:15	07:11 21 18:41 (29) 19:53	06:16 20:27	05:35 24 06:15 (49)	
20	07:34 16:58	06:58 17:40 37	07:44 (38) 08:21 (38) 19:16	07:09 20 18:40 (29) 19:54	06:14 20:28	05:34 24 06:15 (49)	
21	07:33 16:59	06:56 17:41 39	07:43 (38) 08:22 (38) 19:17	07:07 18 18:39 (29) 19:55	06:12 20:29	05:33 24 06:15 (49)	
22	07:33 17:00	06:54 08:08 (39) 17:43	07:42 (38) 08:23 (39) 19:19	07:06 15 18:37 (29) 19:56	06:11 20:30	05:32 24 06:15 (49)	
23	07:32 17:01	06:53 08:06 (39) 17:44	07:41 (38) 08:23 (39) 19:20	07:04 10 18:25 (29) 19:58	06:09 20:31	05:31 24 06:16 (49)	
24	07:31 17:03	06:51 08:04 (39) 17:45	07:41 (38) 08:24 (38) 19:21	07:02 06:08 20:00	06:08 20:32	05:29 23 06:15 (49)	
25	07:30 17:04	06:50 08:03 (39) 17:47	07:40 (38) 08:21 (39) 17:47	07:00 20:00	06:06 20:33	05:28 23 06:15 (49)	
26	07:29 17:05	06:48 08:02 (39) 17:48	07:39 (38) 08:24 (38) 19:24	06:58 20:00	06:05 20:34	05:27 23 06:16 (49)	
27	07:28 17:07	06:46 08:01 (39) 17:49	07:39 (38) 08:25 (38) 19:25	06:56 20:01	06:03 20:35	05:26 23 06:16 (49)	
28	07:27 17:08	06:45 08:01 (39) 17:51	07:38 (38) 08:25 (39) 19:26	06:55 20:02	06:01 20:36	05:25 7 06:02 (49) 20:52	05:24 24 06:16 (49)
29	07:26 17:10	06:43 08:00 (39) 17:52	07:37 (38) 08:26 (39) 19:27	06:53 20:04	06:00 20:37	05:24 11 06:04 (49) 20:52	05:23 23 06:16 (49)
30	07:25 17:11	06:41 08:00 (39) 17:53	07:36 (38) 08:27 (39) 19:28	06:51 20:05	05:59 20:38	05:22 13 06:05 (49) 20:52	05:22 23 06:16 (49)
31	07:24 17:12	06:40 08:00 (39) 17:54	07:35 (38) 08:28 (39) 19:29	06:49 20:06	05:57 20:39	05:21 15 06:06 (49) 20:52	05:21 23 06:16 (49)
Potential sun hours	288	293	369	403	457	463	
Total, worst case	202	871	831	46	667		
Sun reduction	0.33	0.39	0.47	0.55	0.59		
Oper. time red.	1.00	1.00	1.00	1.00	1.00		
Wind dir. red.	0.49	0.50	0.54	0.71	0.71		
Total reduction	0.16	0.19	0.25	0.35	0.38		
Total, real	31	164	204	17	270		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 47

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-167 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (94)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25 23	05:54 (49) 06:17 (49)	05:52 20:31	06:27 19:42	07:01 18:47	08:22 (38) 16:40
2	05:25 22	05:54 (49) 06:16 (49)	05:53 20:30	06:28 19:40	07:03 18:45	08:20 (38) 16:54
3	05:26 23	05:54 (49) 06:17 (49)	05:54 20:28	06:29 19:38	07:04 18:43	08:19 (38) 16:43
4	05:26 22	05:54 (49) 06:16 (49)	05:55 20:27	06:30 19:37	07:05 18:41	08:17 (38) 16:51
5	05:27 21	05:55 (49) 06:16 (49)	05:56 20:26	06:31 19:35	07:06 18:40	08:16 (38) 16:50
6	05:28 21	05:56 (49) 06:17 (49)	05:57 20:25	06:32 19:33	07:07 18:38	08:15 (38) 16:49
7	05:28 20	05:56 (49) 06:16 (49)	05:58 20:23	06:34 19:31	07:09 18:36	08:14 (38) 16:48
8	05:29 20	05:56 (49) 06:16 (49)	05:59 20:22	06:35 19:29	07:10 18:34	08:13 (38) 16:46
9	05:30 19	05:57 (49) 06:16 (49)	06:00 20:21	06:36 19:28	07:11 18:32	08:13 (38) 16:45
10	05:30 18	05:58 (49) 06:16 (49)	06:02 20:19	06:37 19:26	07:12 18:31	08:12 (38) 16:44
11	05:31 17	05:58 (49) 06:15 (49)	06:03 20:18	06:38 19:24	07:13 18:29	08:12 (38) 16:43
12	05:32 16	05:59 (49) 06:15 (49)	06:04 20:16	06:39 19:22	07:15 18:27	08:12 (38) 16:42
13	05:33 14	06:00 (49) 06:14 (49)	06:05 20:15	06:40 19:20	07:16 18:25	08:11 (38) 16:41
14	05:34 12	06:02 (49) 06:14 (49)	06:06 20:13	06:42 19:18	07:17 18:24	08:11 (38) 16:40
15	05:35 9	06:02 (49) 06:11 (49)	06:07 20:12	06:43 19:16	07:18 18:22	08:11 (38) 16:39
16	05:35 4	06:05 (49) 06:09 (49)	06:08 20:10	06:44 19:15	07:20 18:20	08:11 (38) 16:38
17	05:36 20:45	06:09 (49) 20:09	06:10 19:13	06:45 19:13	07:21 18:19	08:11 (38) 16:37
18	05:37 20:44	06:11 20:07	06:46 19:11	06:46 19:11	07:22 18:17	08:12 (38) 16:36
19	05:38 20:44	06:12 20:06	06:47 19:09	06:47 19:09	07:23 18:15	08:13 (38) 16:35
20	05:39 20:43	06:13 20:04	06:49 19:07	18:12 (29) 9 18:21 (29)	07:25 18:14	08:13 (38) 16:34
21	05:40 20:42	06:14 20:02	06:50 19:05	18:09 (29) 14 18:23 (29)	07:26 18:12	08:14 (38) 16:34
22	05:41 20:41	06:15 20:01	06:51 19:03	18:07 (29) 17 18:24 (29)	07:27 18:10	08:15 (38) 16:33
23	05:42 20:40	06:16 19:57	06:52 19:02	18:05 (29) 20 18:25 (29)	07:29 18:09	08:16 (38) 16:32
24	05:43 20:39	06:18 19:56	06:53 19:00	18:04 (29) 21 18:25 (29)	07:30 18:07	08:18 (38) 16:31
25	05:44 20:38	06:19 19:54	06:54 18:58	18:03 (29) 22 18:25 (29)	07:31 18:06	08:19 (38) 16:31
26	05:45 20:37	06:20 19:52	06:55 18:56	18:02 (29) 22 18:24 (29)	07:32 18:04	08:22 (38) 16:30
27	05:46 20:36	06:21 19:51	06:57 18:54	18:02 (29) 23 18:25 (29)	07:34 18:03	08:24 (38) 16:30
28	05:47 20:35	06:22 19:49	06:58 18:52	08:31 (38) 37 18:24 (29)	07:35 18:01	08:30 (38) 16:29
29	05:48 20:34	06:23 19:47	06:59 18:50	08:27 (38) 43 18:23 (29)	07:36 18:00	08:36 (39) 16:29
30	05:49 20:33	06:24 19:45	07:00 18:49	08:24 (38) 47 18:22 (29)	07:38 17:58	08:34 (39) 16:28
31	05:50 20:32	06:26 19:44	07:00 18:48	07:39 17:57	08:33 (39) 23 08:56 (39)	07:18 16:28
Potential sun hours	469	434	376	342	290	277
Total, worst case	281		275		1168	480
Sun reduction	0.63		0.54		0.44	0.27
Oper. time red.	1.00		1.00		1.00	1.00
Wind dir. red.	0.71		0.59		0.51	0.49
Total reduction	0.43		0.31		0.22	0.13
Total, real	122		85		254	61

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 48

Licensed user:

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217 Montgomery St.  
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(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-168 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (95)

Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June				
1	07:40	09:52 (38)	07:23	06:43	06:47	07:25 (50)	05:57	06:28 (49)	05:25	06:31 (49)
	16:36	11 10:03 (38)	17:14	17:52	19:31	22 07:47 (50)	20:06	15 06:43 (49)	20:40	10 06:41 (49)
2	07:40	09:55 (38)	07:22	06:41	06:45	07:25 (50)	05:56	06:26 (49)	05:24	06:32 (49)
	16:37	6 10:01 (38)	17:15	17:53	19:32	21 07:46 (50)	20:07	19 06:45 (49)	20:40	7 06:39 (49)
3	07:40		07:21	06:40	06:44	07:26 (50)	05:54	06:24 (49)	05:24	
	16:38		17:16	17:55	19:33	18 07:44 (50)	20:08	22 06:46 (49)	20:41	
4	07:40		07:20	06:38	06:42	07:28 (50)	05:53	06:23 (49)	05:23	
	16:39		17:18	17:56	19:35	15 07:43 (50)	20:10	25 06:48 (49)	20:42	
5	07:40		07:19	06:36	06:40	07:30 (50)	05:51	06:22 (49)	05:23	
	16:40		17:19	17:57	19:36	10 07:40 (50)	20:11	26 06:48 (49)	20:43	
6	07:40		07:17	06:34	06:38		05:50	06:21 (49)	05:22	
	16:41		17:21	17:58	19:37		20:12	28 06:49 (49)	20:44	
7	07:40		07:16	06:33	06:36		05:49	06:21 (49)	05:22	
	16:42		17:22	18:00	19:38		20:13	29 06:50 (49)	20:44	
8	07:39		07:15	07:31	06:35		05:47	06:20 (49)	05:22	
	16:43		17:23	19:01	19:39		20:14	30 06:50 (49)	20:45	
9	07:39		07:13	07:29	06:33		05:46	06:19 (49)	05:21	
	16:44		17:25	19:02	19:41		20:16	31 06:50 (49)	20:46	
10	07:39		07:12	07:27	06:31		05:45	06:19 (49)	05:21	
	16:45		17:26	19:04	19:42		20:17	31 06:50 (49)	20:46	
11	07:39		07:11	07:25	06:29		05:44	06:19 (49)	05:21	
	16:46		17:28	19:05	19:43		20:18	32 06:51 (49)	20:47	
12	07:38		07:09	07:24	06:28		05:42	06:19 (49)	05:21	
	16:48		17:29	19:06	19:44		20:19	32 06:51 (49)	20:47	
13	07:38		07:08	07:22	06:26		05:41	06:19 (49)	05:21	
	16:49		17:30	19:07	19:45		20:20	32 06:51 (49)	20:48	
14	07:37		07:07	07:20	06:24		05:40	06:19 (49)	05:21	
	16:50		17:32	19:09	19:47		20:21	32 06:51 (49)	20:48	
15	07:37		07:05	07:18	06:23		05:39	06:19 (49)	05:21	
	16:51		17:33	19:10	19:48		20:22	32 06:51 (49)	20:49	
16	07:36		07:04	07:16	06:21		05:38	06:19 (49)	05:21	
	16:52		17:35	19:11	19:49		20:24	32 06:51 (49)	20:49	
17	07:36		07:02	07:15	06:19		05:37	06:19 (49)	05:21	
	16:54		17:36	19:12	19:50		20:25	32 06:51 (49)	20:50	
18	07:35		07:01	07:13	06:17		05:36	06:19 (49)	05:21	
	16:55		17:37	19:14	19:52		20:26	31 06:50 (49)	20:50	
19	07:35		06:59	07:11	06:16		05:35	06:20 (49)	05:21	
	16:56		17:39	19:15	19:53		20:27	30 06:50 (49)	20:51	
20	07:34		06:58	07:09	06:14		05:34	06:20 (49)	05:21	
	16:58		17:40	19:16	19:54		20:28	29 06:49 (49)	20:51	
21	07:33		06:56	07:07	06:12		05:33	06:20 (49)	05:21	
	16:59		17:41	19:17	11 07:45 (50)	19:55	20:29	29 06:49 (49)	20:51	
22	07:33		06:54	07:06	06:11		05:32	06:21 (49)	05:21	
	17:00		17:43	19:19	16 07:47 (50)	19:56	20:30	27 06:48 (49)	20:51	
23	07:32		06:53	07:04	06:09		05:31	06:21 (49)	05:22	
	17:01		17:44	19:20	19 07:49 (50)	19:58	20:31	27 06:48 (49)	20:52	
24	07:31		06:51	07:02	06:08		05:30	06:22 (49)	05:22	
	17:03		17:45	19:21	22 07:50 (50)	19:59	20:32	26 06:48 (49)	20:52	
25	07:30		06:50	07:00	06:06		05:29	06:23 (49)	05:22	
	17:04		17:47	19:22	23 07:50 (50)	20:00	20:33	24 06:47 (49)	20:52	
26	07:29		06:48	06:58	06:05		05:29	06:23 (49)	05:22	
	17:05		17:48	19:24	24 07:50 (50)	20:00	20:34	23 06:46 (49)	20:52	
27	07:28		06:46	06:56	06:03		05:28	06:25 (49)	05:23	
	17:07		17:49	19:25	25 07:50 (50)	20:01	20:35	21 06:46 (49)	20:52	
28	07:27		06:45	06:55	06:01		05:27	06:25 (49)	05:23	
	17:08		17:51	19:26	26 07:50 (50)	20:02	20:36	20 06:45 (49)	20:52	
29	07:26			06:53	06:00		05:26	06:26 (49)	05:24	
	17:10			19:27	25 07:50 (50)	20:04	20:37	18 06:44 (49)	20:52	
30	07:25			06:51	05:58		06:31 (49)	05:26	06:28 (49)	05:24
	17:11			19:28	24 07:49 (50)	20:05	9 06:40 (49)	20:38	16 06:44 (49)	20:52
31	07:24			06:49	05:57			05:25	06:29 (49)	
	17:12			19:30	24 07:49 (50)			20:39	13 06:42 (49)	
Potential sun hours	288	293	369	403	457	463				
Total, worst case	17		239	95	814	17				
Sun reduction	0.33		0.47	0.49	0.55	0.59				
Oper. time red.	1.00		1.00	1.00	1.00	1.00				
Wind dir. red.	0.58		0.56	0.57	0.66	0.66				
Total reduction	0.19		0.26	0.28	0.36	0.38				
Total, real	3		63	26	292	7				

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 49

Licensed user:

**EDR**

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US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-168 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (95)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December				
1	05:25	05:51	06:29 (49)	06:27	07:01	06:40	07:19			
	20:52	20:31	32 07:01 (49)	19:42	18:47	16:56	16:28			
2	05:25	05:53	06:29 (49)	06:28	07:03	06:42	07:20			
	20:52	20:30	32 07:01 (49)	19:40	18:45	16:54	16:27			
3	05:26	05:54	06:30 (49)	06:29	07:04	06:43	07:21			
	20:52	20:28	31 07:01 (49)	19:38	18:43	16:53	16:27			
4	05:26	05:55	06:30 (49)	06:30	07:05	06:44	07:22			
	20:51	20:27	30 07:00 (49)	19:37	18:41	16:51	16:27			
5	05:27	05:56	06:30 (49)	06:31	07:06	06:46	07:23			
	20:51	20:26	30 07:00 (49)	19:35	18:40	16:50	16:27			
6	05:28	05:57	06:30 (49)	06:32	07:07	06:47	07:24			
	20:51	20:25	29 06:59 (49)	19:33	18:38	16:49	16:26			
7	05:28	05:58	06:31 (49)	06:34	07:26 (50)	07:09	06:48	07:25		
	20:51	20:23	27 06:58 (49)	19:31	8 07:34 (50)	18:36	16:48	16:26		
8	05:29	05:59	06:32 (49)	06:35	07:22 (50)	07:10	06:50	07:26		
	20:50	20:22	25 06:57 (49)	19:29	15 07:37 (50)	18:34	16:46	16:26		
9	05:30	06:00	06:32 (49)	06:36	07:20 (50)	07:11	06:51	07:27		
	20:50	20:21	24 06:56 (49)	19:28	18 07:38 (50)	18:32	16:45	16:26		
10	05:30	06:41 (49)	06:02	06:37	07:18 (50)	07:12	06:52	07:28		
	20:49	4 06:45 (49)	20:19	22 06:55 (49)	19:26	21 07:39 (50)	18:31	16:44	16:26	6 09:50 (38)
11	05:31	06:39 (49)	06:03	06:38	07:17 (50)	07:13	06:54	07:29	09:43 (38)	
	20:49	9 06:48 (49)	20:18	18 06:53 (49)	19:24	22 07:39 (50)	18:29	16:43	16:26	10 09:53 (38)
12	05:32	06:37 (49)	06:04	06:39	07:17 (50)	07:15	06:55	07:30	09:42 (38)	
	20:48	13 06:50 (49)	20:16	13 06:51 (49)	19:22	24 07:41 (50)	18:27	16:42	16:26	13 09:55 (38)
13	05:33	06:37 (49)	06:05	06:40	07:16 (50)	07:16	06:56	07:31	09:41 (38)	
	20:48	14 06:51 (49)	20:15	6 06:47 (49)	19:20	25 07:41 (50)	18:25	16:41	16:26	16 09:57 (38)
14	05:34	06:36 (49)	06:06	06:42	07:15 (50)	07:17	06:58	07:32	09:41 (38)	
	20:47	17 06:53 (49)	20:13	19:18	25 07:40 (50)	18:24	16:40	16:26	17 09:58 (38)	
15	05:35	06:34 (49)	06:07	06:43	07:15 (50)	07:18	06:59	07:32	09:41 (38)	
	20:47	19 06:53 (49)	20:12	19:16	25 07:40 (50)	18:22	16:39	16:27	19 10:00 (38)	
16	05:35	06:34 (49)	06:08	06:44	07:14 (50)	07:20	07:00	07:33	09:41 (38)	
	20:46	20 06:54 (49)	20:10	19:15	25 07:39 (50)	18:20	16:38	16:27	19 10:00 (38)	
17	05:36	06:33 (49)	06:10	06:45	07:14 (50)	07:21	07:02	07:34	09:41 (38)	
	20:45	22 06:55 (49)	20:09	19:13	25 07:39 (50)	18:19	16:37	16:27	20 10:01 (38)	
18	05:37	06:33 (49)	06:11	06:46	07:14 (50)	07:22	07:03	07:34	09:41 (38)	
	20:44	23 06:56 (49)	20:07	19:11	24 07:38 (50)	18:17	16:36	16:27	21 10:02 (38)	
19	05:38	06:32 (49)	06:12	06:47	07:15 (50)	07:23	07:04	07:35	09:41 (38)	
	20:44	25 06:57 (49)	20:06	19:09	21 07:36 (50)	18:15	16:35	16:28	21 10:02 (38)	
20	05:39	06:32 (49)	06:13	06:49	07:16 (50)	07:25	07:05	07:36	09:42 (38)	
	20:43	26 06:58 (49)	20:04	19:07	20 07:36 (50)	18:14	16:34	16:28	21 10:03 (38)	
21	05:40	06:31 (49)	06:14	06:50	07:17 (50)	07:26	07:07	07:36	09:42 (38)	
	20:42	28 06:59 (49)	20:02	19:05	17 07:34 (50)	18:12	16:33	16:29	22 10:04 (38)	
22	05:41	06:31 (49)	06:15	06:51	07:19 (50)	07:27	07:08	07:37	09:43 (38)	
	20:41	28 06:59 (49)	20:01	19:03	12 07:31 (50)	18:10	16:33	16:29	22 10:05 (38)	
23	05:42	06:31 (49)	06:16	06:52	07:29	07:09	07:37	09:43 (38)		
	20:40	29 07:00 (49)	19:57	19:02	18:09	16:32	16:30	21 10:04 (38)		
24	05:43	06:30 (49)	06:18	06:53	07:30	07:11	07:38	09:44 (38)		
	20:39	30 07:00 (49)	19:56	19:00	18:07	16:31	16:30	21 10:05 (38)		
25	05:44	06:30 (49)	06:19	06:54	07:31	07:12	07:38	09:44 (38)		
	20:38	31 07:01 (49)	19:54	18:58	18:06	16:31	16:31	21 10:05 (38)		
26	05:45	06:30 (49)	06:20	06:55	07:32	07:13	07:38	09:45 (38)		
	20:37	31 07:01 (49)	19:52	18:56	18:04	16:30	16:31	20 10:05 (38)		
27	05:46	06:30 (49)	06:21	06:57	07:34	07:14	07:39	09:45 (38)		
	20:36	31 07:01 (49)	19:51	18:54	18:03	16:30	16:32	20 10:05 (38)		
28	05:47	06:29 (49)	06:22	06:58	07:35	07:15	07:39	09:47 (38)		
	20:35	32 07:01 (49)	19:49	18:52	18:01	16:29	16:33	19 10:06 (38)		
29	05:48	06:29 (49)	06:23	06:59	07:36	07:17	07:39	09:48 (38)		
	20:34	33 07:02 (49)	19:47	18:50	18:00	16:29	16:34	17 10:05 (38)		
30	05:49	06:29 (49)	06:24	07:00	07:38	07:18	07:40	09:49 (38)		
	20:33	33 07:02 (49)	19:45	18:49	17:58	16:28	16:34	16 10:05 (38)		
31	05:50	06:29 (49)	06:26	07:01	07:39	07:19	07:40	09:50 (38)		
	20:32	32 07:01 (49)	19:44	18:48	17:57	16:27	16:35	14 10:04 (38)		
Potential sun hours	469	434	376	342	290	277				
Total, worst case	530	319	327							396
Sun reduction	0.63	0.59	0.54							0.25
Oper. time red.	1.00	1.00	1.00							1.00
Wind dir. red.	0.66	0.66	0.56							0.58
Total reduction	0.41	0.38	0.30							0.14
Total, real	217	123	99							56

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 50

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-169 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (384)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	07:42 (49) 08:32 (49)	05:57 20:06
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	07:41 (49) 08:32 (49)	05:56 20:07
3	07:40 16:38	07:21 17:16	06:40 17:55	06:44 19:33	07:41 (49) 08:31 (49)	05:54 20:08
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:34	07:41 (49) 08:32 (49)	05:53 20:10
5	07:40 16:40	07:19 17:19	06:36 17:57	06:40 19:36	07:41 (49) 08:31 (49)	05:51 20:11
6	07:40 16:41	07:17 17:21	06:34 17:58	06:38 19:37	07:40 (49) 08:30 (49)	05:50 20:12
7	07:40 16:42	07:16 17:22	06:33 18:00	06:36 19:38	07:40 (49) 08:29 (49)	05:49 20:13
8	07:39 16:43	07:15 17:23	06:31 19:01	06:35 19:39	07:41 (49) 08:29 (49)	05:47 20:14
9	07:39 16:44	07:13 17:25	06:29 19:02	06:33 19:41	07:41 (49) 08:28 (49)	05:46 20:16
10	07:39 16:45	07:12 17:26	06:27 19:04	06:31 19:42	07:41 (49) 08:26 (49)	05:45 20:17
11	07:39 16:46	07:11 17:28	06:25 19:05	06:29 19:43	07:41 (49) 08:25 (49)	05:44 20:18
12	07:38 16:48	07:09 17:29	06:24 19:06	06:28 19:44	07:43 (49) 08:24 (49)	05:42 20:19
13	07:38 16:49	07:08 17:30	06:22 19:07	06:26 19:45	07:43 (49) 08:22 (49)	05:41 20:20
14	07:37 16:50	07:07 17:32	06:20 19:09	06:24 19:47	07:44 (49) 08:20 (49)	05:40 20:21
15	07:37 16:51	07:05 17:33	06:18 19:10	06:22 19:48	07:46 (49) 08:19 (49)	05:39 20:22
16	07:36 16:52	07:04 17:35	06:16 19:11	06:21 19:49	07:47 (49) 08:17 (49)	05:38 20:24
17	07:36 16:54	07:02 17:36	06:15 19:12	06:19 19:50	07:48 (49) 08:14 (49)	05:37 20:25
18	07:35 16:55	07:01 17:37	06:13 19:14	06:17 19:52	07:51 (49) 08:12 (49)	05:36 20:26
19	07:35 16:56	06:59 17:39	06:11 19:15	06:16 19:53	08:01 (49) 08:23 (49)	05:35 20:27
20	07:34 16:57	06:58 17:40	06:09 19:16	06:14 19:54	07:57 (49) 08:25 (49)	05:34 20:28
21	07:33 16:59	06:56 17:41	06:07 19:17	06:12 19:55	07:55 (49) 08:27 (49)	05:33 20:29
22	07:33 17:00	06:54 17:43	06:06 19:19	06:11 19:56	07:52 (49) 08:28 (49)	05:32 20:30
23	07:32 17:01	06:53 17:44	06:04 19:20	06:09 19:58	07:51 (49) 08:30 (49)	05:31 20:31
24	07:31 17:03	06:51 17:45	06:02 19:21	06:08 19:59	07:50 (49) 08:31 (49)	05:30 20:32
25	07:30 17:04	06:50 17:47	06:00 19:22	06:06 20:00	07:48 (49) 08:31 (49)	05:29 20:33
26	07:29 17:05	06:48 17:48	06:58 19:24	06:05 20:00	07:47 (49) 08:32 (49)	05:29 20:34
27	07:28 17:07	06:46 17:49	06:56 19:25	06:03 20:01	07:45 (49) 08:32 (49)	05:28 20:35
28	07:27 17:08	06:45 17:51	06:55 19:26	06:01 20:02	07:44 (49) 08:32 (49)	05:27 20:36
29	07:26 17:10	06:44 17:51	06:53 19:27	06:00 20:04	07:44 (49) 08:33 (49)	05:26 20:37
30	07:25 17:11	06:43 17:51	06:51 19:28	05:58 20:05	07:43 (49) 08:33 (49)	05:25 20:38
31	07:24 17:12	06:42 17:51	06:49 19:30	05:57 20:05	07:43 (49) 08:33 (49)	05:25 20:39
Potential sun hours	288	293	369	403	457	463
Total, worst case		605	544	776		
Sun reduction		0.39	0.47	0.49		
Oper. time red.		1.00	1.00	1.00		
Wind dir. red.		0.50	0.54	0.54		
Total reduction		0.19	0.25	0.26		
Total, real		117	138	205		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 51

Licensed user:

**EDR**

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US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-169 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (384)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25	05:51	06:27	07:40 (49)	07:01	06:40
	20:52	20:31	19:42	18:24 (49)	18:47	16:28
2	05:25	05:53	06:28	07:40 (49)	07:03	06:42
	20:52	20:30	19:40	18:25 (49)	18:45	16:54
3	05:26	05:54	06:29	07:39 (49)	07:04	06:43
	20:52	20:28	19:38	18:26 (49)	18:43	16:53
4	05:26	05:55	06:30	07:38 (49)	07:05	06:44
	20:51	20:27	19:37	18:26 (49)	18:41	16:51
5	05:27	05:56	06:31	07:37 (49)	07:06	06:46
	20:51	20:26	19:35	18:26 (49)	18:39	16:50
6	05:28	05:57	06:32	07:37 (49)	07:07	06:47
	20:51	20:25	19:33	18:26 (49)	18:38	16:49
7	05:28	05:58	06:34	07:36 (49)	07:09	06:48
	20:51	20:23	19:31	18:26 (49)	18:36	16:48
8	05:29	05:59	06:35	07:35 (49)	07:10	06:50
	20:50	20:22	19:29	18:26 (49)	18:34	16:46
9	05:30	06:00	06:36	07:35 (49)	07:11	06:51
	20:50	20:21	19:27	18:25 (49)	18:32	16:45
10	05:30	06:02	06:37	07:34 (49)	07:12	06:52
	20:49	20:19	19:26	18:25 (49)	18:31	16:44
11	05:31	06:03	06:38	07:34 (49)	07:13	06:54
	20:49	20:18	19:24	18:25 (49)	18:29	16:43
12	05:32	06:04	06:39	07:35 (49)	07:15	06:55
	20:48	20:16	19:22	18:25 (49)	18:27	16:42
13	05:33	06:05	06:40	07:34 (49)	07:16	06:56
	20:48	20:15	19:20	18:24 (49)	18:25	16:41
14	05:34	06:06	06:42	07:34 (49)	07:17	06:58
	20:47	20:13	19:18	18:23 (49)	18:24	16:40
15	05:35	06:07	06:43	07:34 (49)	07:18	06:59
	20:47	20:12	19:16	18:22 (49)	18:22	16:39
16	05:35	06:08	06:44	07:35 (49)	07:20	07:00
	20:46	20:10	19:15	18:21 (49)	18:20	16:38
17	05:36	06:10	06:45	07:35 (49)	07:21	07:02
	20:45	20:09	19:13	18:20 (49)	18:19	16:37
18	05:37	06:11	06:46	07:35 (49)	07:22	07:03
	20:44	20:07	19:11	18:19 (49)	18:17	16:36
19	05:38	06:12	06:47	07:36 (49)	07:23	07:04
	20:44	20:06	19:09	18:17 (49)	18:15	16:35
20	05:39	06:13	06:48	07:37 (49)	07:25	07:05
	20:43	20:04	19:07	18:16 (49)	18:14	16:34
21	05:40	06:14	06:50	07:38 (49)	07:26	07:07
	20:42	20:02	19:05	18:15 (49)	18:12	16:33
22	05:41	06:15	06:51	07:40 (49)	07:27	07:08
	20:41	20:01	19:03	18:13 (49)	18:10	16:33
23	05:42	06:16	06:52	07:41 (49)	07:29	07:09
	20:40	19:57	19:02	18:10 (49)	18:09	16:32
24	05:43	06:18	06:53	07:43 (49)	07:30	07:11
	20:39	19:56	19:00	18:07 (49)	18:07	16:31
25	05:44	06:19	06:54	07:46 (49)	07:31	07:12
	20:38	19:54	18:58	18:03 (49)	18:06	16:31
26	05:45	06:20	06:55		07:32	07:13
	20:37	19:52	18:56		18:04	16:30
27	05:46	06:21	06:57		07:34	07:14
	20:36	19:51	18:54		18:03	16:30
28	05:47	06:22	06:58		07:35	07:15
	20:35	19:49	18:52		18:01	16:29
29	05:48	06:23	06:59		07:36	07:17
	20:34	19:47	18:50		18:00	16:29
30	05:49	06:24	07:00		07:38	07:18
	20:33	19:45	18:49		17:58	16:28
31	05:50	06:26	07:42 (49)		07:39	07:40
	20:32	19:44	18:23 (49)		17:57	16:35
Potential sun hours	469	434	376	342	290	277
Total, worst case		246	1087	502	108	
Sun reduction		0.59	0.54	0.44	0.27	
Oper. time red.		1.00	1.00	1.00	1.00	
Wind dir. red.		0.54	0.54	0.50	0.50	
Total reduction		0.32	0.29	0.22	0.13	
Total, real		78	317	110	15	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 52

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-18 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (15)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36	07:23 17:14	08:08 (52) 08:24 (52)	06:43 17:52	06:47 19:31	05:57 20:06
2	07:40 16:37	07:22 17:15	08:10 (52) 08:23 (52)	06:41 17:53	06:45 19:32	05:56 20:07
3	07:40 16:38	07:21 17:16	08:12 (52) 08:19 (52)	06:40 17:55	06:44 19:33	05:54 20:09
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:35	05:53 20:10	05:23 20:42
5	07:40 16:40	07:19 17:19	06:36 17:57	06:40 19:36	05:51 20:11	05:23 20:43
6	07:40 16:41	07:17 17:21	06:34 17:58	06:38 19:37	05:50 20:12	05:22 20:44
7	07:40 16:42	07:16 17:22	06:33 18:00	06:36 19:38	05:49 20:13	05:22 20:44
8	07:40 16:43	07:15 17:23	07:31 19:01	06:35 19:39	05:47 20:14	05:22 20:45
9	07:39 16:44	07:14 17:25	07:29 19:02	06:33 19:41	05:46 20:16	05:21 20:46
10	07:39 16:45	07:12 17:26	07:27 19:04	06:31 19:42	05:45 20:17	05:21 20:46
11	07:39 16:46	08:07 (52) 08:13 (52)	07:11 17:28	07:26 19:05	06:29 19:43	05:44 20:18
12	07:38 16:48	08:06 (52) 08:16 (52)	07:09 17:29	07:24 19:06	06:28 19:44	05:42 20:19
13	07:38 16:49	08:04 (52) 08:17 (52)	07:08 17:30	07:22 19:07	06:26 19:46	05:41 20:20
14	07:38 16:50	08:04 (52) 08:19 (52)	07:07 17:32	07:20 19:09	06:24 19:47	05:40 20:21
15	07:37 16:51	08:03 (52) 08:20 (52)	07:05 17:33	07:18 19:10	06:22 19:48	05:39 20:23
16	07:37 16:52	08:03 (52) 08:20 (52)	07:04 17:34	07:17 19:11	06:21 19:49	05:38 20:24
17	07:36 16:53	08:03 (52) 08:22 (52)	07:02 17:36	07:15 19:12	06:19 19:50	05:37 20:25
18	07:35 16:54	08:02 (52) 08:23 (52)	07:01 17:37	07:13 19:14	06:17 19:52	05:36 20:26
19	07:35 16:55	08:02 (52) 08:23 (52)	06:59 17:39	07:11 19:15	06:16 19:53	05:35 20:27
20	07:34 16:56	08:03 (52) 08:25 (52)	06:58 17:40	07:09 19:16	06:14 19:54	05:34 20:28
21	07:33 16:57	08:02 (52) 08:25 (52)	06:56 17:41	07:07 19:17	06:12 19:55	05:33 20:29
22	07:33 17:00	08:02 (52) 08:25 (52)	06:54 17:43	07:06 19:19	06:11 19:56	05:32 20:30
23	07:32 17:01	08:02 (52) 08:26 (52)	06:53 17:44	07:04 19:20	06:09 19:58	05:31 20:31
24	07:31 17:03	08:02 (52) 08:26 (52)	06:51 17:45	07:02 19:21	06:08 19:59	05:30 20:32
25	07:30 17:04	08:03 (52) 08:26 (52)	06:50 17:47	07:00 19:22	06:06 20:00	05:29 20:33
26	07:29 17:05	08:03 (52) 08:26 (52)	06:48 17:48	06:58 19:24	06:05 20:00	05:29 20:34
27	07:28 17:07	08:03 (52) 08:26 (52)	06:46 17:49	06:56 19:25	06:03 20:01	05:28 20:35
28	07:27 17:08	08:04 (52) 08:26 (52)	06:45 17:51	06:55 19:26	06:01 20:03	05:27 20:36
29	07:26 17:10	08:05 (52) 08:26 (52)	06:45 17:51	06:53 19:27	06:00 20:04	05:26 20:37
30	07:25 17:11	08:06 (52) 08:25 (52)	06:45 17:51	06:51 19:28	05:58 20:05	05:26 20:38
31	07:24 17:12	08:07 (52) 08:25 (52)	06:45 17:51	06:49 19:30	05:25 20:39	05:25 20:40
Potential sun hours	288	293	369	403	457	463
Total, worst case	404	36			602	905
Sun reduction	0.33	0.39			0.55	0.59
Oper. time red.	1.00	1.00			1.00	1.00
Wind dir. red.	0.49	0.49			0.51	0.51
Total reduction	0.16	0.19			0.28	0.30
Total, real	65	7			168	270

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 53

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-18 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (15)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25 20:52	19:35 (46) 20:05 (46)	05:51 20:31	19:45 (46) 20:00 (46)	06:27 19:42	07:01 18:47
2	05:25 20:52	19:34 (46) 20:05 (46)	05:53 20:30	19:48 (46) 19:58 (46)	06:28 19:40	07:03 18:45
3	05:26 20:52	19:35 (46) 20:05 (46)	05:54 20:29	19:40 19:38	06:29 18:43	07:04 16:53
4	05:26 20:51	19:34 (46) 20:05 (46)	05:55 20:27	19:40 19:37	06:30 18:41	07:05 16:51
5	05:27 20:51	19:35 (46) 20:06 (46)	05:56 20:26	19:39 19:35	06:31 18:40	07:06 16:50
6	05:28 20:51	19:35 (46) 20:07 (46)	05:57 20:25	19:38 19:33	06:32 18:38	07:07 16:49
7	05:28 20:51	19:34 (46) 20:06 (46)	05:58 20:23	19:34 19:31	06:34 18:36	07:09 16:48
8	05:29 20:50	19:35 (46) 20:07 (46)	05:59 20:22	19:31 19:29	06:35 18:34	07:10 16:46
9	05:30 20:50	19:35 (46) 20:07 (46)	06:00 20:21	19:30 19:28	06:36 18:32	07:11 16:45
10	05:30 20:49	19:34 (46) 20:07 (46)	06:01 20:19	19:29 19:26	06:37 18:31	07:12 16:44
11	05:31 20:49	19:35 (46) 20:07 (46)	06:03 20:18	19:28 19:24	06:38 18:29	07:13 16:43
12	05:32 20:48	19:35 (46) 20:08 (46)	06:04 20:16	19:27 19:22	06:39 18:27	07:15 16:42
13	05:33 20:48	19:35 (46) 20:08 (46)	06:05 20:15	19:26 19:20	06:40 18:25	07:16 16:41
14	05:34 20:47	19:35 (46) 20:09 (46)	06:06 20:13	19:25 19:18	06:42 18:24	07:17 16:40
15	05:34 20:47	19:35 (46) 20:09 (46)	06:07 20:12	19:24 19:16	06:43 18:22	07:18 16:39
16	05:35 20:46	19:35 (46) 20:08 (46)	06:08 20:10	19:23 19:15	06:44 18:20	07:00 16:38
17	05:36 20:45	19:35 (46) 20:08 (46)	06:09 20:09	19:22 19:13	06:45 18:19	07:02 16:37
18	05:37 20:45	19:35 (46) 20:09 (46)	06:11 20:07	19:21 19:11	06:46 18:17	07:03 16:36
19	05:38 20:44	19:36 (46) 20:09 (46)	06:12 20:06	19:20 19:09	06:47 18:15	07:04 16:35
20	05:39 20:43	19:36 (46) 20:09 (46)	06:13 20:04	19:19 19:07	06:49 18:14	07:05 16:34
21	05:40 20:42	19:36 (46) 20:09 (46)	06:14 20:02	19:18 19:05	06:50 18:12	07:07 16:33
22	05:41 20:41	19:37 (46) 20:08 (46)	06:15 20:01	19:17 19:03	06:51 18:10	07:08 16:33
23	05:42 20:40	19:37 (46) 20:08 (46)	06:16 19:58	19:16 19:02	06:52 18:09	07:09 16:32
24	05:43 20:39	19:38 (46) 20:08 (46)	06:18 19:56	19:15 19:00	06:53 18:07	07:11 16:31
25	05:44 20:39	19:38 (46) 20:08 (46)	06:19 19:54	19:14 18:58	06:54 18:06	07:12 16:31
26	05:45 20:38	19:39 (46) 20:07 (46)	06:20 19:52	19:13 18:56	06:55 18:04	07:13 16:30
27	05:46 20:37	19:39 (46) 20:06 (46)	06:21 19:51	19:12 18:54	06:57 18:03	07:14 16:29
28	05:47 20:35	19:40 (46) 20:06 (46)	06:22 19:49	19:11 18:52	06:58 18:01	07:15 16:29
29	05:48 20:34	19:41 (46) 20:05 (46)	06:23 19:47	19:10 18:50	06:59 18:00	07:17 16:28
30	05:49 20:33	19:42 (46) 20:03 (46)	06:24 19:46	19:09 18:49	07:00 17:58	07:18 16:28
31	05:50 20:32	19:43 (46) 20:02 (46)	06:26 19:44	19:08 17:57	07:09 17:57	07:18 16:35
Potential sun hours	469	434	376	341	290	277
Total, worst case	945	25			436	6
Sun reduction	0.63	0.59			0.27	0.25
Oper. time red.	1.00	1.00			1.00	1.00
Wind dir. red.	0.51	0.51			0.49	0.49
Total reduction	0.32	0.30			0.13	0.12
Total, real	301	7			57	1

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 54

Licensed user:

**EDR**  
 217 Montgomery St.  
 US-SYRACUSE, NY 13202  
 (315) 471 0688  
 Steve Curtis, scurtis@edrpc.com  
 Calculated:  
 3/18/2011 3:22 PM/2.7.453

### SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2 Shadow receptor: R-182 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (103)

#### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
 438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
 Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:40	07:23	06:43	06:47	05:57	18:42 (40)	05:25	19:39 (39)	05:51	18:51 (40)	06:27	07:01
2	07:40	07:22	06:41	06:45	20:06	18:41 (40)	05:24	19:32 (39)	05:25	18:50 (40)	06:28	07:02
3	07:40	07:21	06:39	06:44	20:07	18:41 (40)	05:24	19:33 (39)	05:26	18:50 (40)	06:29	07:04
4	07:40	07:18	06:36	06:42	20:10	18:41 (40)	05:23	19:32 (39)	05:26	18:50 (40)	06:30	07:05
5	07:40	07:17	06:36	06:40	20:11	18:41 (40)	05:23	19:33 (39)	05:27	18:50 (40)	06:31	07:06
6	07:40	07:17	06:34	06:38	20:12	18:41 (40)	05:22	19:33 (39)	05:28	18:50 (40)	06:32	07:07
7	07:40	07:16	06:33	06:36	20:13	18:41 (40)	05:22	19:33 (39)	05:28	18:50 (40)	06:34	07:08
8	07:39	07:15	06:31	06:35	20:14	18:41 (40)	05:22	19:33 (39)	05:29	18:50 (40)	06:35	07:10
9	07:39	07:13	06:29	06:33	20:15	18:41 (40)	05:21	19:34 (39)	05:30	18:50 (40)	06:36	07:11
10	07:39	07:12	06:27	06:31	20:17	18:41 (40)	05:21	19:34 (39)	05:30	18:50 (40)	06:37	07:12
11	07:39	07:11	06:25	06:29	20:18	18:41 (40)	05:21	19:35 (39)	05:31	18:50 (40)	06:38	07:13
12	07:38	07:09	06:24	06:28	20:19	18:41 (40)	05:21	19:35 (39)	05:32	18:51 (40)	06:39	07:15
13	07:38	07:08	06:22	06:26	20:20	18:41 (40)	05:21	19:34 (39)	05:33	18:52 (40)	06:40	07:16
14	07:37	07:06	06:20	06:24	20:21	18:41 (40)	05:21	19:35 (39)	05:34	18:53 (40)	06:42	07:17
15	07:37	07:05	06:18	06:22	20:22	18:41 (40)	05:21	19:35 (39)	05:35	18:54 (40)	06:43	07:18
16	07:36	07:04	06:16	06:21	20:23	18:41 (40)	05:21	19:35 (39)	05:35	18:54 (40)	06:44	07:20
17	07:36	07:02	06:15	06:19	20:24	18:41 (40)	05:21	19:35 (39)	05:36	18:54 (40)	06:45	07:21
18	07:35	07:01	06:13	06:17	20:25	18:41 (40)	05:21	19:37 (39)	05:37	18:56 (40)	06:46	07:22
19	07:35	06:59	06:11	06:16	20:26	18:41 (40)	05:21	19:37 (39)	05:38	18:57 (40)	06:47	07:23
20	07:34	06:57	06:09	06:14	20:27	18:41 (40)	05:21	19:37 (39)	05:39	18:57 (40)	06:48	07:25
21	07:33	06:56	06:07	06:12	20:28	18:41 (40)	05:21	19:37 (39)	05:40	18:56 (40)	06:14	07:26
22	07:32	06:54	06:05	06:11	20:29	18:41 (40)	05:21	19:37 (39)	05:41	18:56 (40)	06:15	07:27
23	07:32	06:53	06:04	06:09	20:30	18:41 (40)	05:21	19:38 (39)	05:42	18:55 (40)	06:16	07:28
24	07:31	06:51	06:02	06:08	20:31	18:41 (40)	05:21	19:38 (39)	05:43	18:54 (40)	06:18	07:30
25	07:30	06:50	06:00	06:06	20:32	18:41 (40)	05:21	19:38 (39)	05:44	18:54 (40)	06:19	07:31
26	07:29	06:48	05:58	06:04	20:33	18:41 (40)	05:21	19:38 (39)	05:45	18:53 (40)	06:20	07:32
27	07:28	06:46	05:56	06:03	20:34	18:41 (40)	05:21	19:38 (39)	05:46	18:53 (40)	06:21	07:33
28	07:27	06:45	05:55	06:01	20:35	18:41 (40)	05:21	19:38 (39)	05:47	18:52 (40)	06:22	07:34
29	07:26	06:44	05:54	06:00	20:36	18:41 (40)	05:21	19:39 (39)	05:48	18:52 (40)	06:23	07:35
30	07:25	06:43	05:53	05:59	20:37	18:41 (40)	05:21	19:39 (39)	05:49	18:52 (40)	06:24	07:36
31	07:24	06:42	05:52	05:58	20:38	18:41 (40)	05:21	20:06 (39)	05:50	18:51 (40)	06:25	07:37
Potential sun hours	288	293	369	403	457	463	469	434	376	342	290	277
Total, worst case				238	1353	837	1218	716				
Sun reduction				0.49	0.55	0.59	0.63	0.59				
Oper. time red.				1.00	1.00	1.00	1.00	1.00				
Wind dir. red.				0.52	0.51	0.51	0.51	0.52				
Total reduction				0.25	0.28	0.30	0.32	0.31				
Total, real				60	383	250	392	219				

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 55

Licensed user:

**EDR**

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US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-184 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (104)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:37	07:23 17:14	06:43 17:52	06:47 19:31	05:57 20:06	06:42 (12) 20:40
2	07:40 16:37	07:22 17:15	06:41 17:53	06:46 19:32	05:56 20:07	39 07:21 (12) 20:41
3	07:40 16:38	07:21 17:17	06:40 17:55	06:44 19:33	05:54 20:09	39 07:21 (12) 20:41
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:35	05:53 20:10	39 07:20 (12) 20:42
5	07:40 16:40	07:19 17:19	06:36 17:57	07:08 (13) 07:18 (13) 19:36	05:52 20:11	38 07:20 (12) 20:43
6	07:40 16:41	07:17 17:21	06:35 17:59	07:05 (13) 07:20 (13) 19:37	05:50 20:12	38 07:19 (12) 20:44
7	07:40 16:42	07:16 17:22	06:33 18:00	07:02 (13) 07:22 (13) 19:38	05:49 20:13	37 07:19 (12) 20:44
8	07:40 16:43	07:15 17:24	06:31 19:01	08:00 (13) 08:23 (13) 19:40	05:48 20:15	37 07:19 (12) 20:45
9	07:39 16:44	07:14 17:25	07:40 (14) 07:46 (14) 19:03	07:59 (13) 08:24 (13) 19:41	05:46 20:16	35 07:18 (12) 20:46
10	07:39 16:46	07:12 17:26	07:36 (14) 07:48 (14) 19:04	07:58 (13) 08:25 (13) 19:42	05:45 20:17	34 07:17 (12) 20:46
11	07:39 16:47	07:11 17:28	07:35 (14) 07:50 (14) 19:05	07:57 (13) 08:25 (13) 19:43	05:44 20:18	32 07:16 (12) 20:47
12	07:38 16:48	07:10 17:29	07:34 (14) 07:52 (14) 19:06	07:57 (13) 08:25 (13) 19:44	05:43 20:19	31 07:15 (12) 20:48
13	07:38 16:49	07:08 17:31	07:33 (14) 07:52 (14) 19:08	07:56 (13) 08:25 (13) 19:46	05:41 20:20	29 07:14 (12) 20:48
14	07:38 16:50	07:07 17:32	07:33 (14) 07:53 (14) 19:09	07:55 (13) 08:24 (13) 19:47	05:40 20:21	28 07:14 (12) 20:49
15	07:37 16:51	07:05 17:33	07:32 (14) 07:53 (14) 19:10	07:56 (13) 08:25 (13) 19:48	05:39 20:22	24 07:12 (12) 20:49
16	07:37 16:53	07:04 17:35	07:32 (14) 07:54 (14) 19:11	07:56 (13) 08:24 (13) 19:49	05:38 20:24	22 07:11 (12) 20:50
17	07:36 16:54	07:02 17:36	07:32 (14) 07:54 (14) 19:13	07:56 (13) 08:23 (13) 19:50	07:02 (12) 07:06 (12) 20:25	20 07:10 (12) 20:50
18	07:35 16:55	07:01 17:37	07:32 (14) 07:54 (14) 19:14	07:56 (13) 08:21 (13) 19:52	06:57 (12) 07:12 (12) 20:26	16 07:08 (12) 20:50
19	07:35 16:56	06:59 17:39	07:32 (14) 07:53 (14) 19:15	07:57 (13) 08:20 (13) 19:53	06:53 (12) 07:14 (12) 20:27	11 07:05 (12) 20:51
20	07:34 16:58	06:58 17:40	07:32 (14) 07:52 (14) 19:16	07:58 (13) 08:18 (13) 19:54	06:52 (12) 07:16 (12) 20:28	20:51
21	07:33 16:59	06:56 17:42	07:34 (14) 07:51 (14) 19:18	07:59 (13) 08:16 (13) 19:55	06:49 (12) 07:17 (12) 20:29	20:51
22	07:33 17:00	06:55 17:43	07:34 (14) 07:50 (14) 19:19	08:02 (13) 08:13 (13) 19:57	06:47 (12) 07:18 (12) 20:30	05:21 20:52
23	07:32 17:02	06:53 17:44	07:37 (14) 07:48 (14) 19:20	06:09 19:58	06:47 (12) 07:19 (12) 20:31	05:21 20:52
24	07:31 17:03	06:51 17:46	07:40 (14) 07:44 (14) 19:21	06:08 19:59	06:45 (12) 07:19 (12) 20:32	05:22 20:52
25	07:30 17:04	06:50 17:47	07:00 19:22	06:06 20:00	06:45 (12) 07:20 (12) 20:33	05:22 20:52
26	07:29 17:06	06:48 17:48	06:58 19:24	06:05 20:00	06:44 (12) 07:20 (12) 20:34	05:23 20:52
27	07:28 17:07	06:46 17:50	06:57 19:25	06:03 20:01	06:43 (12) 07:21 (12) 20:35	05:23 20:52
28	07:27 17:08	06:45 17:51	06:55 19:26	06:02 20:03	06:42 (12) 07:21 (12) 20:36	05:23 20:52
29	07:26 17:10		06:53 19:27	06:00 20:04	06:42 (12) 07:21 (12) 20:37	05:24 20:52
30	07:25 17:11		06:51 19:29	05:59 20:05	06:41 (12) 07:21 (12) 20:38	05:24 20:52
31	07:24 17:13		06:49 19:30		05:25 20:39	
Potential sun hours	288	293	369	403	457	463
Total, worst case		266	414	416	588	
Sun reduction		0.39	0.47	0.49	0.55	
Oper. time red.		1.00	1.00	1.00	1.00	
Wind dir. red.		0.51	0.52	0.62	0.62	
Total reduction		0.20	0.24	0.30	0.34	
Total, real		52	100	125	198	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 56

Licensed user:

EDR

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US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2 Shadow receptor: R-184 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (104)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December			
1	05:25	05:52	06:55 (12)	06:27	07:02	07:35 (13)	06:41	07:06 (14)	07:19
	20:52	20:31	31 07:26 (12)	19:42	18:47	29 08:04 (13)	16:56	12 07:18 (14)	16:28
2	05:25	05:53	06:54 (12)	06:28	07:03	07:36 (13)	06:42	07:10 (14)	07:20
	20:52	20:30	33 07:27 (12)	19:40	18:45	28 08:04 (13)	16:54	5 07:15 (14)	16:28
3	05:26	05:54	06:53 (12)	06:29	07:04	07:36 (13)	06:43		07:21
	20:52	20:29	34 07:27 (12)	19:39	18:43	27 08:03 (13)	16:53		16:27
4	05:27	05:55	06:52 (12)	06:30	07:05	07:36 (13)	06:44		07:22
	20:52	20:27	36 07:28 (12)	19:37	18:42	26 08:02 (13)	16:52		16:27
5	05:27	05:56	06:52 (12)	06:32	07:06	07:36 (13)	06:46		07:23
	20:51	20:26	36 07:28 (12)	19:35	18:40	24 08:00 (13)	16:50		16:27
6	05:28	05:57	06:51 (12)	06:33	07:08	07:38 (13)	06:47		07:24
	20:51	20:25	38 07:29 (12)	19:33	18:38	21 07:59 (13)	16:49		16:27
7	05:29	05:58	06:51 (12)	06:34	07:09	07:39 (13)	06:48		07:25
	20:51	20:23	38 07:29 (12)	19:31	18:36	18 07:57 (13)	16:48		16:26
8	05:29	05:59	06:50 (12)	06:35	07:10	07:41 (13)	06:50		07:26
	20:50	20:22	39 07:29 (12)	19:30	18:34	13 07:54 (13)	16:47		16:26
9	05:30	06:01	06:50 (12)	06:36	07:11	07:45 (13)	06:51		07:27
	20:50	20:21	39 07:29 (12)	19:28	18:33	4 07:49 (13)	16:45		16:26
10	05:31	06:02	06:51 (12)	06:37	07:12		06:52		07:28
	20:49	20:19	39 07:30 (12)	19:26	18:31		16:44		16:26
11	05:31	06:03	06:50 (12)	06:38	07:14		06:54		07:29
	20:49	20:18	40 07:30 (12)	19:24	18:29		16:43		16:26
12	05:32	06:04	06:50 (12)	06:40	07:15		06:55		07:30
	20:48	20:16	40 07:30 (12)	19:22	18:27		16:42		16:26
13	05:33	06:05	06:50 (12)	06:41	07:16		06:56		07:31
	20:48	20:15	39 07:29 (12)	19:20	18:26		16:41		16:26
14	05:34	06:06	06:50 (12)	06:42	07:17		06:58		07:32
	20:47	20:13	39 07:29 (12)	19:18	18:24		16:40		16:27
15	05:35	06:07	06:50 (12)	06:43	07:19		06:59		07:32
	20:47	20:12	38 07:28 (12)	19:17	18:22		16:39		16:27
16	05:36	06:09	06:50 (12)	06:44	07:20		07:00		07:33
	20:46	20:10	38 07:28 (12)	19:15	18:20		16:38		16:27
17	05:37	06:10	06:50 (12)	06:45	07:21		07:02		07:34
	20:45	20:09	37 07:27 (12)	19:13	18:19		16:37		16:27
18	05:37	06:11	06:51 (12)	06:46	07:22		07:03		07:35
	20:45	20:07	35 07:26 (12)	19:11	18:17	7 08:10 (14)	16:36		16:28
19	05:38	06:12	06:51 (12)	06:48	07:24		07:04		07:35
	20:44	20:06	34 07:25 (12)	19:09	18:15	12 08:19 (14)	16:35		16:28
20	05:39	06:13	06:52 (12)	06:49	07:25		07:06		07:36
	20:43	20:04	32 07:24 (12)	19:07	18:14	17 08:21 (14)	16:35		16:28
21	05:40	06:14	06:53 (12)	06:50	07:26		07:07		07:36
	20:42	20:03	30 07:23 (12)	19:05	9 07:58 (13)	18 08:22 (14)	16:34		16:29
22	05:41	06:15	06:54 (12)	06:51	07:27		07:08		07:37
	20:41	20:01	28 07:22 (12)	19:04	15 07:45 (13)	20 08:03 (14)	16:33		16:29
23	05:42	06:17	06:56 (12)	06:52	07:29		07:09		07:37
	20:40	19:58	24 07:20 (12)	19:02	19 08:02 (13)	21 08:24 (14)	16:32		16:30
24	05:43	06:18	06:57 (12)	06:53	07:30		07:11		07:38
	20:40	7 07:14 (12)	19:56	20 07:17 (12)	19:00	22 08:03 (13)	18:07	21 08:23 (14)	16:32
25	05:44	06:19	07:00 (12)	06:54	07:31		07:12		07:38
	20:39	13 07:17 (12)	19:54	14 07:14 (12)	18:58	25 08:04 (13)	18:06	22 08:23 (14)	16:31
26	05:45	06:20	06:56	06:56	07:33		07:13		07:39
	20:38	17 07:19 (12)	19:53	18:56	26 08:05 (13)	18:04	22 08:24 (14)	16:30	16:32
27	05:46	06:21	06:57	06:57	07:34		07:14		07:39
	20:37	21 07:21 (12)	19:51	18:54	27 08:05 (13)	18:03	21 08:23 (14)	16:30	16:32
28	05:47	06:22	06:58	06:58	07:35		07:16		07:39
	20:36	23 07:22 (12)	19:49	18:52	28 08:05 (13)	18:01	21 08:22 (14)	16:29	16:33
29	05:48	06:24	06:59	06:59	07:37		07:17		07:39
	20:34	26 07:24 (12)	19:47	18:51	29 08:05 (13)	18:00	19 08:22 (14)	16:29	16:34
30	05:50	06:25	07:00	07:00	07:38		07:18		07:40
	20:33	28 07:25 (12)	19:46	18:49	29 08:04 (13)	17:59	17 08:20 (14)	16:28	16:35
31	05:51	06:26	07:01	07:01	07:39		07:19		07:40
	20:32	29 07:25 (12)	19:44		17:57	15 08:20 (14)			16:35
Potential sun hours	469	434	376	342	290	277			
Total, worst case	164	851	229	443	17				
Sun reduction	0.63	0.59	0.54	0.44	0.27				
Oper. time red.	1.00	1.00	1.00	1.00	1.00				
Wind dir. red.	0.62	0.62	0.52	0.51	0.51				
Total reduction	0.39	0.36	0.28	0.22	0.14				
Total, real	63	308	63	99	2				

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)		First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 57

Licensed user:

EDR

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(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-19 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (16)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	05:57 20:06	07:20 (55) 20:40
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	07:37 (55) 20:07	05:55 20:40
3	07:40 16:38	07:21 17:16	06:40 17:55	06:44 19:33	07:33 (55) 20:08	05:54 20:41
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:35	07:31 (55) 20:10	05:53 20:42
5	07:40 16:40	07:19 17:19	06:36 17:57	06:40 19:36	07:28 (55) 20:11	05:51 20:43
6	07:40 16:41	07:19 17:21	06:34 17:58	06:38 19:37	07:26 (55) 20:12	05:50 20:44
7	07:40 16:42	07:18 17:22	06:33 18:00	06:36 19:38	07:24 (55) 20:13	05:49 20:44
8	07:40 16:43	07:18 17:23	06:31 19:01	06:35 19:39	07:23 (55) 20:14	05:47 20:45
9	07:39 16:44	07:17 17:25	06:29 19:02	06:33 19:41	07:22 (55) 20:16	05:46 20:46
10	07:39 16:45	07:16 17:26	06:27 19:04	06:31 19:42	07:20 (55) 20:17	05:45 20:46
11	07:39 16:46	07:16 17:28	06:25 19:05	06:29 19:43	07:19 (55) 20:18	05:44 20:47
12	07:38 16:48	07:15 17:29	06:24 19:06	06:28 19:44	07:19 (55) 20:19	05:42 20:47
13	07:38 16:49	07:15 17:30	06:22 19:07	06:26 19:45	07:18 (55) 20:20	05:41 20:48
14	07:38 16:50	07:14 17:32	06:20 19:09	06:24 19:47	07:17 (55) 20:21	05:40 20:49
15	07:37 16:51	07:14 17:33	06:18 19:10	06:22 19:48	07:16 (55) 20:22	05:39 20:49
16	07:37 16:52	07:13 17:34	06:16 19:11	06:21 19:49	07:16 (55) 20:24	05:38 20:49
17	07:36 16:54	07:13 17:36	06:15 19:12	06:19 19:50	07:15 (55) 20:25	05:37 20:50
18	07:35 16:55	07:12 17:37	06:14 19:14	06:17 19:52	07:15 (55) 20:26	05:36 20:50
19	07:35 16:56	07:11 17:39	06:13 19:15	06:16 19:53	07:15 (55) 20:27	05:35 20:51
20	07:34 16:57	07:11 17:40	06:12 19:16	06:14 19:54	07:15 (55) 20:28	05:34 20:51
21	07:33 16:59	07:10 17:41	06:11 19:17	06:12 19:55	07:15 (55) 20:29	05:33 20:51
22	07:33 17:00	07:09 17:43	06:10 19:19	06:11 19:56	07:15 (55) 20:30	05:32 20:51
23	07:32 17:01	07:09 17:44	06:09 19:20	06:09 19:58	07:15 (55) 20:31	05:31 20:52
24	07:31 17:03	07:08 17:45	06:08 19:21	06:08 19:59	07:15 (55) 20:32	05:30 20:52
25	07:30 17:04	07:08 17:47	06:07 19:22	06:06 20:00	07:15 (55) 20:33	05:29 20:52
26	07:29 17:05	07:07 17:48	06:06 19:24	06:04 20:00	07:16 (55) 20:34	05:28 20:52
27	07:28 17:07	07:06 17:49	06:05 19:25	06:03 20:01	07:16 (55) 20:35	05:28 20:52
28	07:27 17:08	07:06 17:51	06:05 19:26	06:01 20:02	07:17 (55) 20:36	05:27 20:52
29	07:26 17:09	07:05 17:52	06:04 19:27	06:00 20:04	07:18 (55) 20:37	05:26 20:52
30	07:25 17:11	07:05 17:53	06:03 19:28	06:00 20:05	07:18 (55) 20:38	05:25 20:52
31	07:24 17:12	07:04 17:54	06:02 19:29	06:00 20:06	07:19 (55) 20:39	05:24 20:53
Potential sun hours	288	293	369	403	457	463
Total, worst case				1238	880	968
Sun reduction				0.49	0.55	0.59
Oper. time red.				1.00	1.00	1.00
Wind dir. red.				0.58	0.53	0.51
Total reduction				0.29	0.29	0.30
Total, real				356	255	293

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)



Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 58

Licensed user:

**EDR**

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(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-19 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (16)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December						
1	05:25	19:26 (54)	05:51	19:34 (54)	06:27	07:18 (65)	07:01	06:40	07:19			
	20:52	32	19:58 (54)	20:31	22	19:56 (54)	19:42	46	08:04 (65)	18:47	16:55	16:28
2	05:25	19:25 (54)	05:52	19:35 (54)	06:28	07:19 (65)	07:03	06:42	07:20			
	20:52	33	19:58 (54)	20:30	19	19:54 (54)	19:40	45	08:04 (65)	18:45	16:54	16:27
3	05:26	19:26 (54)	05:54	19:37 (54)	06:29	07:20 (65)	07:04	06:43	07:21			
	20:52	33	19:59 (54)	20:28	15	19:52 (54)	19:38	43	08:03 (65)	18:43	16:53	16:27
4	05:26	19:25 (54)	05:55	19:40 (54)	06:30	07:20 (65)	07:05	06:44	07:22			
	20:51	34	19:59 (54)	20:27	9	19:49 (54)	19:37	41	08:01 (65)	18:41	16:51	16:27
5	05:27	19:26 (54)	05:56		06:31	07:21 (65)	07:06	06:46	07:23			
	20:51	33	19:59 (54)	20:26		19:35	39	08:00 (65)	18:39	16:50	16:26	
6	05:27	19:26 (54)	05:57		07:39 (55)	06:32	07:22 (65)	07:07	06:47	07:24		
	20:51	34	20:00 (54)	20:25	14	07:53 (55)	19:33	36	07:58 (65)	18:38	16:49	16:26
7	05:28	19:25 (54)	05:58		07:36 (55)	06:34	07:23 (65)	07:09	06:48	07:25		
	20:51	35	20:00 (54)	20:23	19	07:55 (55)	19:31	33	07:56 (65)	18:36	16:48	16:26
8	05:29	19:26 (54)	05:59		07:34 (55)	06:35	07:25 (65)	07:10	06:50	07:26		
	20:50	34	20:00 (54)	20:22	24	07:58 (55)	19:29	29	07:54 (65)	18:34	16:46	16:26
9	05:30	19:26 (54)	06:00		07:32 (55)	06:36	07:27 (65)	07:11	06:51	07:27		
	20:50	35	20:01 (54)	20:21	27	07:59 (55)	19:28	24	07:51 (65)	18:32	16:45	16:26
10	05:30	19:25 (54)	06:01		07:30 (55)	06:37	07:29 (65)	07:12	06:52	07:28		
	20:49	35	20:00 (54)	20:19	31	08:01 (55)	19:26	18	07:47 (65)	18:31	16:44	16:26
11	05:31	19:26 (54)	06:03		07:28 (55)	06:38	07:36 (65)	07:13	06:54	07:29		
	20:49	35	20:01 (54)	20:18	34	08:02 (55)	19:24	3	07:39 (65)	18:29	16:43	16:26
12	05:32	19:26 (54)	06:04		07:27 (55)	06:39		07:15	06:55	07:30		
	20:48	35	20:01 (54)	20:16	36	08:03 (55)	19:22		18:27	16:42	16:26	
13	05:33	19:26 (54)	06:05		07:27 (55)	06:40		07:16	06:56	07:31		
	20:48	36	20:02 (54)	20:15	38	08:05 (55)	19:20		18:25	16:41	16:26	
14	05:34	19:26 (54)	06:06		07:25 (55)	06:42		07:17	06:58	07:32		
	20:47	36	20:02 (54)	20:13	41	08:06 (55)	19:18		18:24	16:40	16:26	
15	05:34	19:26 (54)	06:07		07:24 (55)	06:43		07:18	06:59	07:32		
	20:47	35	20:01 (54)	20:12	42	08:06 (55)	19:16		18:22	16:39	16:26	
16	05:35	19:26 (54)	06:08		07:23 (55)	06:44		07:20	07:00	07:33		
	20:46	36	20:02 (54)	20:10	44	08:07 (55)	19:15		18:20	16:38	16:27	
17	05:36	19:26 (54)	06:09		07:22 (55)	06:45		07:21	07:02	07:34		
	20:45	36	20:02 (54)	20:09	45	08:07 (55)	19:13		18:19	16:37	16:27	
18	05:37	19:26 (54)	06:11		07:22 (55)	06:46		07:22	07:03	07:34		
	20:45	36	20:02 (54)	20:07	46	08:08 (55)	19:11		18:17	16:36	16:27	
19	05:38	19:27 (54)	06:12		07:21 (55)	06:47		07:23	07:04	07:35		
	20:44	35	20:02 (54)	20:06	47	08:08 (55)	19:09		18:15	16:35	16:28	
20	05:39	19:27 (54)	06:13		07:20 (55)	06:48		07:25	07:06	07:36		
	20:43	35	20:02 (54)	20:04	48	08:08 (55)	19:07		18:14	16:34	16:28	
21	05:40	19:27 (54)	06:14		07:19 (55)	06:50		07:26	07:07	07:36		
	20:42	35	20:02 (54)	20:02	49	08:08 (55)	19:05		18:12	16:33	16:28	
22	05:41	19:27 (54)	06:15		07:19 (55)	06:51		07:27	07:08	07:37		
	20:41	35	20:02 (54)	20:01	49	08:08 (55)	19:03		18:10	16:33	16:29	
23	05:42	19:28 (54)	06:16		07:19 (55)	06:52		07:29	07:09	07:37		
	20:40	34	20:02 (54)	19:57	50	08:09 (55)	19:02		18:09	16:32	16:29	
24	05:43	19:28 (54)	06:17		07:19 (55)	06:53		07:30	07:11	07:38		
	20:39	34	20:02 (54)	19:56	50	08:09 (55)	19:00		18:07	16:31	16:30	
25	05:44	19:29 (54)	06:19		07:18 (55)	06:54		07:31	07:12	07:38		
	20:38	33	20:02 (54)	19:54	51	08:09 (55)	18:58		18:06	16:31	16:31	
26	05:45	19:29 (54)	06:20		07:18 (55)	06:55		07:32	07:13	07:39		
	20:37	32	20:01 (54)	19:52	50	08:08 (55)	18:56		18:04	16:30	16:31	
27	05:46	19:30 (54)	06:21		07:18 (55)	06:57		07:34	07:14	07:39		
	20:36	31	20:01 (54)	19:51	50	08:08 (55)	18:54		18:03	16:29	16:32	
28	05:47	19:30 (54)	06:22		07:18 (55)	06:58		07:35	07:15	07:39		
	20:35	30	20:00 (54)	19:49	49	08:07 (55)	18:52		18:01	16:29	16:33	
29	05:48	19:31 (54)	06:23		07:18 (55)	06:59		07:36	07:17	07:39		
	20:34	28	19:59 (54)	19:47	49	08:07 (55)	18:50		18:00	16:28	16:33	
30	05:49	19:32 (54)	06:24		07:18 (55)	07:00		07:38	07:18	07:40		
	20:33	26	19:58 (54)	19:45	48	08:06 (55)	18:49		17:58	16:28	16:34	
31	05:50	19:33 (54)	06:26		07:18 (55)			07:39		07:40		
	20:32	24	19:57 (54)	19:44	47	08:05 (55)		17:57		16:35		
Potential sun hours	469		434		376		341		290		277	
Total, worst case	1035		1143		357							
Sun reduction	0.63		0.59		0.54							
Oper. time red.	1.00		1.00		1.00							
Wind dir. red.	0.51		0.58		0.58							
Total reduction	0.32		0.34		0.32							
Total, real	334		392		113							

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 59

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-190 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (110)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 426 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	
1	07:40 16:37	07:23 17:14	15:38 (06) 16:21 (06)	06:43 17:52	07:15 (41) 06:47 19:31	07:44 (48) 05:57 19:06 (04)	05:25 20:40
2	07:40 16:37	07:22 17:15	15:39 (06) 16:22 (06)	06:41 17:53	07:15 (41) 06:46 19:32	07:44 (48) 05:56 19:07 (04)	05:24 20:40
3	07:40 16:38	07:21 17:17	15:38 (06) 16:21 (06)	06:40 17:55	07:15 (41) 06:44 19:33	07:46 (48) 05:54 19:07 (04)	05:24 20:41
4	07:40 16:39	07:20 17:18	15:38 (06) 16:22 (06)	06:38 17:56	07:15 (41) 06:42 19:35	07:46 (48) 05:53 19:30 (04)	05:23 20:42
5	07:40 16:40	07:19 17:19	15:38 (06) 16:22 (06)	06:36 17:57	07:15 (41) 06:40 19:36	07:47 (48) 05:52 19:08 (04)	05:23 20:43
6	07:40 16:41	07:17 17:21	15:39 (06) 16:23 (06)	06:34 17:59	07:17 (41) 06:38 19:37	07:49 (48) 05:50 19:28 (04)	05:23 20:44
7	07:40 16:42	07:16 17:22	15:38 (06) 16:22 (06)	06:33 18:00	07:18 (41) 06:37 19:38	07:51 (48) 05:49 19:27 (04)	05:22 20:44
8	07:39 16:43	07:15 17:24	15:39 (06) 16:23 (06)	07:31 19:01	08:19 (41) 06:35 19:39	07:55 (48) 05:48 18:39 (05)	05:22 20:45
9	07:39 16:44	07:14 17:25	15:39 (06) 16:23 (06)	07:29 19:02	08:21 (41) 06:33 19:41	18:18 (05) 05:46 18:36 (05)	05:22 20:46
10	07:39 16:46	07:12 17:26	15:39 (06) 16:22 (06)	07:27 19:04	08:31 (41) 06:31 19:42	18:20 (05) 05:45 18:33 (05)	05:21 20:46
11	07:39 16:47	07:11 17:28	15:40 (06) 16:22 (06)	07:26 19:05	06:30 19:43	05:44 20:18	05:21 20:47
12	07:38 16:48	07:09 17:29	15:40 (06) 16:21 (06)	07:24 19:06	06:28 19:44	05:43 20:19	05:21 20:47
13	07:38 16:49	07:08 17:31	15:41 (06) 16:21 (06)	07:22 19:08	06:26 19:46	05:41 20:20	05:21 20:48
14	07:37 16:50	07:07 17:32	15:42 (06) 16:21 (06)	07:20 19:09	08:01 (48) 06:24 19:47	05:40 20:21	05:21 20:48
15	07:37 16:51	07:05 17:33	15:43 (06) 16:19 (06)	07:18 19:10	08:15 (48) 06:23 19:48	05:39 20:22	05:21 20:49
16	07:36 16:53	07:04 17:35	15:44 (06) 16:19 (06)	07:17 19:11	07:56 (48) 06:21 19:49	05:38 20:23	05:21 20:49
17	07:36 16:54	15:51 (06) 07:02 17:36	15:45 (06) 16:17 (06)	07:15 19:13	07:53 (48) 06:19 19:50	05:37 20:24	05:21 20:50
18	07:35 16:55	15:48 (06) 07:01 17:37	15:46 (06) 16:15 (06)	07:13 19:14	08:22 (48) 06:18 19:52	05:36 20:25	05:21 20:50
19	07:35 16:56	15:46 (06) 06:59 17:39	15:49 (06) 16:14 (06)	07:11 19:15	07:50 (48) 06:16 19:53	05:35 20:26	05:21 20:51
20	07:34 16:58	15:46 (06) 06:58 17:40	15:51 (06) 16:11 (06)	07:09 19:16	07:48 (48) 06:14 19:54	05:34 20:28	05:21 20:51
21	07:33 16:59	15:44 (06) 06:56 17:41	07:24 (41) 16:09 (06)	07:08 19:17	07:47 (48) 06:13 19:55	19:16 (04) 05:33 19:25 (04)	05:21 20:51
22	07:33 17:00	15:43 (06) 06:55 17:43	07:21 (41) 16:09 (06)	07:06 19:19	07:47 (48) 06:11 19:56	19:13 (04) 05:32 19:27 (04)	05:21 20:51
23	07:32 17:02	16:11 (06) 06:53 17:44	07:19 (41) 16:13 (06)	07:04 19:20	07:46 (48) 06:09 19:58	18:44 (05) 05:31 19:29 (04)	05:22 20:52
24	07:31 17:03	16:13 (06) 06:51 17:47	07:19 (41) 16:14 (06)	07:02 19:21	07:45 (48) 06:08 19:59	18:45 (05) 05:30 19:09 (04)	05:22 20:52
25	07:30 17:04	16:15 (06) 06:50 17:48	07:18 (41) 16:15 (06)	07:00 19:22	07:44 (48) 06:06 20:00	18:46 (05) 05:29 19:31 (04)	05:22 20:52
26	07:29 17:06	16:16 (06) 06:48 17:48	07:16 (41) 16:16 (06)	06:58 19:24	07:44 (48) 06:05 20:00	18:47 (05) 05:28 19:31 (04)	05:23 20:52
27	07:28 17:07	16:18 (06) 06:46 17:49	07:16 (41) 16:17 (06)	06:57 19:25	07:43 (48) 06:03 20:01	18:48 (05) 05:27 19:32 (04)	05:23 20:52
28	07:27 17:08	16:19 (06) 06:45 17:51	07:15 (41) 16:18 (06)	06:55 19:26	07:44 (48) 06:02 20:02	18:49 (05) 05:26 19:31 (04)	05:23 20:52
29	07:26 17:10	16:20 (06) 06:44 17:52	07:15 (41) 16:19 (06)	06:54 19:27	07:44 (48) 06:00 20:03	18:50 (05) 05:25 19:32 (04)	05:24 20:52
30	07:25 17:11	16:21 (06) 06:43 17:53	07:15 (41) 16:20 (06)	06:53 19:28	07:44 (48) 05:59 20:04	18:51 (05) 05:24 19:33 (04)	05:24 20:52
31	07:24 17:13	16:22 (06) 06:42 17:54	07:15 (41) 16:21 (06)	06:52 19:29	07:44 (48) 05:58 20:05	18:52 (05) 05:23 19:34 (04)	05:24 20:52
Potential sun hours	289	293	369	403	457	463	
Total, worst case	455	963	1154	679	184		
Sun reduction	0.33	0.39	0.47	0.49	0.55		
Oper. time red.	1.00	1.00	1.00	1.00	1.00		
Wind dir. red.	0.73	0.69	0.55	0.55	0.52		
Total reduction	0.25	0.28	0.26	0.28	0.29		
Total, real	113	266	305	189	54		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 60

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-190 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (110)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25 20:52	05:52 20:31	06:27 19:42	07:01 18:47	06:40 16:56	15:09 (06) 16:28
2	05:25 20:52	05:53 20:30	06:28 19:40	18:19 (05) 18:32 (05)	07:03 18:45	15:08 (06) 16:28
3	05:26 20:52	05:54 20:28	19:24 (04) 19:32 (04)	06:29 19:38	13 18	18:32 (05) 18:43
4	05:27 20:51	05:55 20:27	19:22 (04) 19:34 (04)	06:30 19:37	32	18:36 (05) 18:41
5	05:27 20:51	05:56 20:26	19:20 (04) 19:36 (04)	06:31 19:35	43	18:37 (05) 18:40
6	05:28 20:51	05:57 20:25	19:19 (04) 19:37 (04)	06:33 19:33	50	18:38 (05) 18:38
7	05:29 20:51	05:58 20:23	19:18 (04) 19:38 (04)	06:34 19:31	56	18:38 (05) 18:36
8	05:29 20:50	05:59 20:22	19:17 (04) 19:38 (04)	06:35 19:29	60	18:38 (05) 18:34
9	05:30 20:50	06:01 20:21	19:16 (04) 19:39 (04)	06:36 19:28	64	18:38 (05) 18:33
10	05:31 20:49	06:02 20:19	19:16 (04) 19:40 (04)	06:37 19:26	68	18:38 (05) 18:31
11	05:31 20:49	06:03 20:18	19:16 (04) 19:40 (04)	06:38 19:24	70	18:39 (05) 18:29
12	05:32 20:48	06:04 20:16	19:15 (04) 19:40 (04)	06:39 19:22	72	18:39 (05) 18:27
13	05:33 20:48	06:05 20:15	19:15 (04) 19:40 (04)	06:41 19:20	72	18:38 (05) 18:26
14	05:34 20:47	06:06 20:13	19:15 (04) 19:39 (04)	06:42 19:18	75	18:38 (05) 18:24
15	05:35 20:47	06:07 20:12	19:14 (04) 19:39 (04)	06:43 19:17	74	18:37 (05) 18:22
16	05:36 20:46	06:09 20:10	19:14 (04) 19:38 (04)	06:44 19:15	73	18:36 (05) 18:20
17	05:37 20:45	06:10 20:09	19:15 (04) 19:38 (04)	06:45 19:13	73	18:35 (05) 18:19
18	05:37 20:45	06:11 20:07	19:15 (04) 19:37 (04)	06:46 19:11	71	18:34 (05) 18:17
19	05:38 20:44	06:12 20:06	19:16 (04) 19:35 (04)	06:47 19:09	69	18:33 (05) 18:15
20	05:39 20:43	06:13 20:04	19:17 (04) 19:34 (04)	06:49 19:07	67	18:32 (05) 18:14
21	05:40 20:42	06:14 20:02	19:19 (04) 19:33 (04)	06:50 19:05	62	18:32 (05) 18:12
22	05:41 20:41	06:15 20:01	19:21 (04) 19:30 (04)	06:51 19:04	57	18:27 (05) 18:11
23	05:42 20:40	06:17 19:58	19:20 (04) 19:02	06:52 19:02	50	18:23 (05) 18:09
24	05:43 20:39	06:18 19:56	19:02 19:00	06:53 19:00	34	18:07 (08) 18:07
25	05:44 20:38	06:19 19:54	19:02 18:58	06:54 18:58	33	18:06 (08) 18:06
26	05:45 20:37	06:20 19:52	18:56 18:56	06:56 18:56	30	18:05 (08) 18:04
27	05:46 20:36	06:21 19:51	18:54 18:54	06:57 18:54	27	18:03 (08) 18:03
28	05:47 20:35	06:22 19:49	18:52 18:52	06:58 18:52	22	18:00 (08) 18:01
29	05:48 20:34	06:23 19:47	18:51 18:51	06:59 18:51	17	18:00 (08) 18:00
30	05:50 20:33	06:25 19:46	18:49 18:49	07:00 18:49	6	18:00 (08) 17:59
31	05:51 20:32	06:26 19:44	18:48 18:48	07:01 18:48	4	18:00 (08) 17:57
Potential sun hours	469	434	376	342	290	277
Total, worst case		393	1458	742	894	
Sun reduction		0.59	0.54	0.44	0.27	
Oper. time red.		1.00	1.00	1.00	1.00	
Wind dir. red.		0.52	0.56	0.62	0.73	
Total reduction		0.31	0.31	0.28	0.20	
Total, real		123	452	208	181	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker
			(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 61

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-192 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (111)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	05:57 20:06	06:58 (38) 19:19 (29)	05:25 20:40
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	05:56 20:07	06:59 (38) 19:17 (29)	05:24 20:40
3	07:40 16:38	07:21 17:17	06:40 17:55	06:44 19:33	05:54 20:08	07:02 (38) 19:16 (29)	05:24 20:41
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:35	05:53 20:10	18:55 (29) 19:15 (29)	05:23 20:42
5	07:40 16:40	07:19 17:19	06:36 17:57	06:40 19:36	05:51 20:11	18:55 (29) 19:13 (29)	05:23 20:43
6	07:40 16:41	07:17 17:21	06:34 17:58	06:38 19:37	05:50 20:12	18:57 (29) 19:12 (29)	05:22 20:44
7	07:40 16:42	07:16 17:22	06:33 18:00	06:37 19:38	05:49 20:13	19:00 (29) 19:09 (29)	05:22 20:44
8	07:39 16:43	07:15 17:23	07:31 19:01	06:35 19:39	05:47 20:14		05:22 20:45
9	07:39 16:44	07:13 17:25	07:29 19:02	06:33 08:03 (39)	05:46 19:41		05:21 20:46
10	07:39 16:45	07:12 17:26	07:27 19:04	06:31 08:06 (39)	05:45 07:19 (38)	07:06 (38) 20:17	05:21 20:46
11	07:39 16:47	07:11 17:28	07:26 19:05	06:29 08:09 (39)	05:44 07:21 (38)	07:03 (38) 20:18	05:21 20:47
12	07:38 16:48	07:09 17:29	07:24 19:06	06:28 08:10 (39)	05:42 07:24 (38)	07:01 (38) 20:19	05:21 20:47
13	07:38 16:49	07:08 17:30	07:22 19:07	06:26 08:11 (39)	05:41 07:25 (38)	06:59 (38) 20:20	05:21 20:48
14	07:37 16:50	07:07 17:32	07:20 19:09	06:24 08:11 (39)	05:40 07:25 (38)	06:57 (38) 20:21	05:21 20:48
15	07:37 16:51	07:05 17:33	07:18 19:10	06:23 08:11 (39)	05:39 19:13 (29)	06:57 (38) 20:22	05:21 20:49
16	07:36 16:52	07:04 17:35	07:17 19:11	06:21 08:12 (39)	05:38 19:16 (29)	06:56 (38) 20:24	05:21 20:49
17	07:36 16:54	07:02 17:36	07:15 19:12	06:19 08:11 (39)	05:37 19:17 (29)	06:54 (38) 20:25	05:21 20:50
18	07:35 16:55	07:01 17:37	07:13 19:14	06:17 08:10 (39)	05:36 19:19 (29)	06:54 (38) 20:26	05:21 20:50
19	07:35 16:56	06:59 17:39	07:11 19:15	06:16 08:10 (39)	05:35 19:20 (29)	06:53 (38) 20:27	05:21 20:51
20	07:34 16:58	06:58 17:40	07:09 19:16	06:14 08:08 (39)	05:34 19:20 (29)	06:53 (38) 20:28	05:21 20:51
21	07:33 16:59	06:56 17:41	07:07 19:17	06:13 08:07 (39)	05:33 19:21 (29)	06:53 (38) 20:29	05:21 20:51
22	07:33 17:00	06:54 17:43	07:06 19:19	06:11 08:05 (39)	05:32 19:21 (29)	06:52 (38) 20:30	05:21 20:51
23	07:32 17:01	06:53 17:44	07:04 19:20	06:09 08:04 (39)	05:31 19:22 (29)	06:53 (38) 20:31	05:22 20:52
24	07:31 17:03	06:51 17:45	07:02 19:21	06:08 08:00 (39)	05:30 19:21 (29)	06:53 (38) 20:32	05:22 20:52
25	07:30 17:04	06:50 17:47	07:00 19:22	06:06 20:00	05:29 19:22 (29)	06:53 (38) 20:33	05:22 20:52
26	07:29 17:06	06:48 17:48	06:58 19:24	06:05 20:00	05:29 19:21 (29)	06:53 (38) 20:34	05:22 20:52
27	07:28 17:07	06:46 17:49	06:56 19:25	06:03 20:01	05:28 19:21 (29)	06:54 (38) 20:35	05:23 20:52
28	07:27 17:08	06:45 17:51	06:55 19:26	06:02 20:02	05:27 19:20 (29)	06:54 (38) 20:36	05:23 20:52
29	07:26 17:10		06:53 19:27	06:00 20:04	05:27 19:20 (29)	06:56 (38) 20:37	05:24 20:52
30	07:25 17:11		06:51 19:28	05:59 20:05	05:26 19:19 (29)	06:56 (38) 20:38	05:24 20:52
31	07:24 17:12		06:49 19:30		05:25 20:39		
Potential sun hours	288	293	369	403	457		463
Total, worst case			295	1011	182		
Sun reduction			0.47	0.49	0.55		
Oper. time red.			1.00	1.00	1.00		
Wind dir. red.			0.53	0.57	0.54		
Total reduction			0.25	0.28	0.30		
Total, real			73	283	54		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 62

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-192 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (111)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25 20:52	05:52 20:31	06:27 19:42	07:02 (38) 18:47	07:01 18:47	06:40 16:28
2	05:25 20:52	05:53 20:30	06:28 19:40	07:05 (38) 18:45	07:03 18:45	06:42 16:27
3	05:26 20:52	05:54 20:28	06:29 19:38	07:04 18:43	07:04 18:43	06:43 16:27
4	05:26 20:51	05:55 20:27	06:30 19:37	07:05 18:41	07:05 18:41	06:44 16:27
5	05:27 20:51	05:56 20:26	06:31 19:35	07:06 18:40	07:06 18:40	06:46 16:27
6	05:28 20:51	05:57 20:25	19:09 (29) 19:33	06:32 18:38	07:07 18:38	06:47 16:26
7	05:28 20:51	05:58 20:23	19:06 (29) 19:31	06:34 18:36	07:09 18:36	06:48 16:26
8	05:29 20:50	05:59 20:22	19:05 (29) 19:29	06:35 18:34	07:10 18:34	06:50 16:26
9	05:30 20:50	06:00 20:21	19:03 (29) 19:28	06:36 18:32	07:11 18:32	06:51 16:26
10	05:31 20:49	06:02 20:19	07:10 (38) 19:26	06:37 18:31	07:12 18:31	06:52 16:26
11	05:31 20:49	06:03 20:18	07:07 (38) 19:24	06:38 18:29	07:13 18:29	06:54 16:26
12	05:32 20:48	06:04 20:16	07:06 (38) 19:22	06:39 18:27	07:15 18:27	06:55 16:26
13	05:33 20:48	06:05 20:15	07:05 (38) 19:20	06:40 18:25	07:16 18:25	06:56 16:26
14	05:34 20:47	06:06 20:13	07:03 (38) 19:18	06:42 18:24	07:17 18:24	06:58 16:26
15	05:35 20:47	06:07 20:12	07:02 (38) 19:16	06:43 18:22	07:18 18:22	06:59 16:27
16	05:35 20:46	06:08 20:10	07:01 (38) 19:15	06:44 18:20	07:20 18:20	07:00 16:27
17	05:36 20:45	06:10 20:09	07:00 (38) 19:13	06:45 18:19	07:21 18:19	07:02 16:27
18	05:37 20:44	06:11 20:07	06:59 (38) 19:11	06:46 18:17	07:22 18:17	07:03 16:27
19	05:38 20:44	06:12 20:06	06:58 (38) 19:09	06:47 18:15	07:23 18:15	07:04 16:28
20	05:39 20:43	06:13 20:04	06:58 (38) 19:07	06:49 18:14	07:25 18:14	07:05 16:28
21	05:40 20:42	06:14 20:02	06:57 (38) 19:05	06:50 18:12	07:26 18:12	07:07 16:29
22	05:41 20:41	06:15 20:01	06:58 (38) 19:03	06:51 18:10	07:27 18:10	07:08 16:29
23	05:42 20:40	06:16 19:57	06:58 (38) 19:02	06:52 18:09	07:29 18:09	07:09 16:30
24	05:43 20:39	06:18 19:56	06:57 (38) 19:00	06:53 18:07	07:30 18:07	07:11 16:30
25	05:44 20:38	06:19 19:54	06:57 (38) 18:58	06:54 18:06	07:31 18:06	07:12 16:31
26	05:45 20:37	06:20 19:52	06:57 (38) 18:56	06:55 18:04	07:32 18:04	07:13 16:31
27	05:46 20:36	06:21 19:51	06:57 (38) 18:54	06:57 18:03	07:33 18:03	07:14 16:32
28	05:47 20:35	06:22 19:49	06:58 (38) 18:52	06:58 18:01	07:35 18:01	07:15 16:33
29	05:48 20:34	06:23 19:47	06:58 (38) 18:50	06:59 18:00	07:36 18:00	07:17 16:34
30	05:49 20:33	06:24 19:45	06:59 (38) 18:49	07:00 17:58	07:38 17:58	07:18 16:34
31	05:50 20:32	06:26 19:44	07:00 (38) 17:57	07:00 17:57	07:39 17:57	07:40 16:35
Potential sun hours	469	434	376	342	290	277
Total, worst case		1167	273	61		
Sun reduction		0.59	0.54	0.44		
Oper. time red.		1.00	1.00	1.00		
Wind dir. red.		0.57	0.54	0.53		
Total reduction		0.33	0.29	0.23		
Total, real		389	79	14		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 63

Licensed user:

EDR

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(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

### SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-193 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (112)

#### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June		
1	07:40 16:36	07:23 17:14	06:43 17:52	07:29 (39) 07:53 (39)	06:47 19:31	07:42 (38) 18:58 (29)	05:57 20:06	05:25 20:40
2	07:40 16:37	07:22 17:15	06:41 17:53	07:30 (39) 07:52 (39)	06:45 19:32	07:42 (38) 18:57 (29)	05:56 20:07	05:24 20:40
3	07:40 16:38	07:21 17:17	06:40 17:55	07:31 (39) 07:50 (39)	06:44 19:33	07:43 (38) 18:57 (29)	05:54 20:08	05:24 20:41
4	07:40 16:39	07:20 17:18	06:38 17:56	07:32 (39) 07:48 (39)	06:42 19:35	07:43 (38) 18:56 (29)	05:53 20:10	05:23 20:42
5	07:40 16:40	07:19 17:19	06:36 17:57	07:35 (39) 07:44 (39)	06:40 19:36	07:43 (38) 18:54 (29)	05:51 20:11	05:23 20:43
6	07:40 16:41	07:17 17:21	06:34 17:58	07:37 (39) 19:37	06:38 19:37	07:44 (38) 18:53 (29)	05:50 20:12	05:22 20:44
7	07:40 16:42	07:16 17:22	06:33 18:00	07:37 (39) 19:38	06:37 19:38	07:44 (38) 18:50 (29)	05:49 20:13	05:22 20:44
8	07:39 16:43	07:15 17:23	06:31 19:01	07:31 (39) 19:39	06:35 19:39	07:46 (38) 18:48 (29)	05:47 20:14	05:22 20:45
9	07:39 16:44	07:13 17:25	06:29 19:02	07:29 (39) 19:41	06:33 19:41	07:47 (38) 08:14 (38)	05:46 20:16	05:21 20:46
10	07:39 16:45	07:12 17:26	06:27 19:04	07:27 (39) 19:42	06:31 19:42	07:48 (38) 08:11 (38)	05:45 20:17	05:21 20:46
11	07:39 16:46	07:11 17:28	06:26 19:05	07:26 (39) 19:43	06:29 19:43	07:50 (38) 08:08 (38)	05:44 20:18	05:21 20:47
12	07:38 16:48	07:09 17:29	06:24 19:06	07:24 (39) 19:44	06:28 19:44	07:55 (38) 08:04 (38)	05:42 20:19	05:21 20:47
13	07:38 16:49	07:08 17:30	06:22 19:07	07:22 (39) 19:45	06:26 19:45	07:53 (38) 20:20	05:41 20:20	05:21 20:48
14	07:37 16:50	07:07 17:32	06:20 19:09	07:20 (39) 19:47	06:24 19:47	07:50 (38) 20:21	05:40 20:21	05:21 20:48
15	07:37 16:51	07:05 17:33	06:18 19:10	07:18 (39) 19:48	06:23 19:48	07:53 (38) 20:22	05:39 20:22	05:21 20:49
16	07:36 16:52	07:04 17:35	06:17 19:11	07:17 (39) 19:49	06:21 19:49	08:04 (38) 20:24	05:38 20:24	05:21 20:49
17	07:36 16:54	07:02 17:36	06:15 19:12	07:15 (39) 19:50	06:19 19:50	07:59 (38) 20:25	05:37 20:25	05:21 20:50
18	07:35 16:55	07:01 17:37	06:13 19:14	07:13 (39) 19:52	06:17 19:52	07:56 (38) 08:20 (38)	05:36 20:26	05:21 20:50
19	07:35 16:56	06:59 17:39	06:11 19:15	07:11 (39) 19:53	06:16 19:53	07:53 (38) 08:22 (38)	05:35 20:27	05:21 20:51
20	07:34 16:58	06:58 17:40	06:09 19:16	07:09 (39) 19:54	06:14 19:54	07:51 (38) 08:23 (38)	05:34 20:28	05:21 20:51
21	07:33 16:59	06:56 17:41	06:07 19:17	07:07 (39) 19:55	06:13 19:55	07:50 (38) 08:24 (38)	05:33 20:29	05:21 20:51
22	07:33 17:00	06:54 17:43	06:06 19:19	07:06 (39) 19:56	06:11 19:56	07:48 (38) 08:25 (38)	05:32 20:30	05:21 20:51
23	07:32 17:01	06:53 17:44	06:04 19:20	07:04 (39) 19:58	06:09 19:58	07:48 (38) 08:26 (38)	05:31 20:31	05:22 20:52
24	07:31 17:03	06:51 17:45	06:02 19:21	07:02 (39) 19:59	06:08 19:59	07:46 (38) 18:52 (29)	05:30 20:32	05:22 20:52
25	07:30 17:04	06:50 17:47	06:00 19:22	07:00 (39) 19:59	06:06 20:00	07:45 (38) 18:55 (29)	05:29 20:33	05:22 20:52
26	07:29 17:05	06:48 17:48	05:58 19:24	06:58 (39) 19:24	06:05 20:00	07:44 (38) 18:56 (29)	05:29 20:34	05:22 20:52
27	07:28 17:07	06:46 17:49	05:56 19:25	06:56 (39) 19:25	06:03 20:01	07:44 (38) 18:57 (29)	05:28 20:35	05:23 20:52
28	07:27 17:08	06:45 17:51	05:55 19:26	06:55 (39) 19:26	06:01 20:02	07:43 (38) 18:57 (29)	05:27 20:36	05:23 20:52
29	07:26 17:10	06:44 17:52	05:54 19:27	06:54 (39) 19:27	06:00 20:04	07:43 (38) 18:59 (29)	05:27 20:37	05:24 20:52
30	07:25 17:11	06:43 17:53	05:53 19:28	06:53 (39) 19:28	06:00 20:05	07:43 (38) 18:58 (29)	05:26 20:38	05:24 20:52
31	07:24 17:12	06:42 17:54	05:52 19:29	06:52 (39) 19:29	06:00 20:06	07:42 (38) 18:58 (29)	05:25 20:39	05:25 20:52
Potential sun hours	288	293	369	403	457	463		
Total, worst case		329	807	529				
Sun reduction		0.39	0.47	0.49				
Oper. time red.		1.00	1.00	1.00				
Wind dir. red.		0.51	0.54	0.55				
Total reduction		0.20	0.25	0.27				
Total, real		65	206	142				

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 64

Licensed user:

**EDR**

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US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-193 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (112)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25 20:52	05:52 20:31	06:27 19:42	07:49 (38) 18:07 (38)	07:01 18:47	06:40 16:28
2	05:25 20:52	05:53 20:30	06:28 19:40	07:47 (38) 18:10 (38)	07:03 18:45	06:42 16:27
3	05:26 20:52	05:54 20:28	06:29 19:38	07:45 (38) 18:12 (38)	07:04 18:43	06:43 16:27
4	05:26 20:51	05:55 20:27	06:30 19:37	07:43 (38) 18:45 (29)	07:05 18:41	06:44 16:27
5	05:27 20:51	05:56 20:26	06:31 19:35	07:41 (38) 18:47 (29)	07:06 18:40	06:46 16:27
6	05:28 20:51	05:57 20:25	06:32 19:33	07:40 (38) 18:49 (29)	07:07 18:38	06:47 16:26
7	05:28 20:51	05:58 20:23	06:34 19:31	07:38 (38) 18:49 (29)	07:09 18:36	06:48 16:26
8	05:29 20:50	05:59 20:22	06:35 19:29	07:37 (38) 18:50 (29)	07:10 18:34	06:50 16:26
9	05:30 20:50	06:00 20:21	06:36 19:28	07:36 (38) 18:50 (29)	07:11 18:32	06:51 16:26
10	05:30 20:49	06:02 20:19	06:37 19:26	07:35 (38) 18:50 (29)	07:12 18:31	06:52 16:26
11	05:31 20:49	06:03 20:18	06:38 19:24	07:34 (38) 18:50 (29)	07:13 18:29	06:54 16:26
12	05:32 20:48	06:04 20:16	06:39 19:22	07:33 (38) 18:50 (29)	07:15 18:27	06:55 16:26
13	05:33 20:48	06:05 20:15	06:40 19:20	07:34 (38) 18:50 (29)	07:16 18:25	06:56 16:26
14	05:34 20:47	06:06 20:13	06:42 19:18	07:33 (38) 18:49 (29)	07:17 18:24	06:58 16:26
15	05:35 20:47	06:07 20:12	06:43 19:16	07:33 (38) 18:48 (29)	07:18 18:22	06:59 16:27
16	05:35 20:46	06:08 20:10	06:44 19:15	07:33 (38) 18:46 (29)	07:20 18:20	07:00 16:27
17	05:36 20:45	06:10 20:09	06:45 19:13	07:33 (38) 18:45 (29)	07:21 18:19	07:02 16:27
18	05:37 20:44	06:11 20:07	06:46 19:11	07:33 (38) 18:43 (29)	07:22 18:17	07:03 16:27
19	05:38 20:44	06:12 20:06	06:47 19:09	07:33 (38) 18:40 (29)	07:23 18:15	07:04 16:28
20	05:39 20:43	06:13 20:04	06:49 19:07	07:34 (38) 18:38 (38)	07:25 18:14	07:05 16:28
21	05:40 20:42	06:14 20:02	06:50 19:05	07:34 (38) 18:34 (38)	07:26 18:12	07:07 16:29
22	05:41 20:41	06:15 20:01	06:51 19:03	07:35 (38) 18:30 (38)	07:27 18:10	07:08 16:29
23	05:42 20:40	06:16 19:57	06:52 19:02	07:35 (38) 18:08 (38)	07:29 18:09	07:09 16:30
24	05:43 20:39	06:18 19:56	06:53 19:00	07:36 (38) 18:06 (38)	07:30 18:07	07:11 16:30
25	05:44 20:38	06:19 19:54	06:54 18:58	07:38 (38) 18:04 (38)	07:31 18:06	07:12 16:31
26	05:45 20:37	06:20 19:52	06:55 18:56	07:40 (38) 18:01 (38)	07:32 18:04	07:13 16:31
27	05:46 20:36	06:21 19:51	06:57 18:54	07:44 (38) 18:00 (38)	07:34 18:03	07:14 16:32
28	05:47 20:35	06:22 19:49	06:58 18:52	07:35 18:01	07:35 18:01	07:15 16:33
29	05:48 20:34	06:23 19:47	06:59 18:50	07:36 18:00	07:36 18:00	07:17 16:34
30	05:49 20:33	06:24 19:45	07:00 18:49	07:38 17:58	07:38 17:58	07:18 16:34
31	05:50 20:32	06:26 19:44	07:02 18:48	07:39 17:57	07:39 17:57	07:19 16:35
Potential sun hours	469	434	376	342	290	277
Total, worst case		9	1254	420		
Sun reduction		0.59	0.54	0.44		
Oper. time red.		1.00	1.00	1.00		
Wind dir. red.		0.54	0.55	0.51		
Total reduction		0.32	0.30	0.22		
Total, real		3	371	94		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 65

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-22 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (279)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:40 16:36	08:48 (43) 10:27 (42)	07:23 17:14	06:43 17:52	06:47 19:31	05:57 20:06	05:25 20:40	05:25 20:52	05:51 20:31	06:27 19:42	07:01 18:47	06:40 16:56
2	07:40 16:37	08:49 (43) 10:28 (42)	07:22 17:15	06:41 17:53	06:46 19:32	05:56 20:07	05:24 20:41	05:25 20:52	05:53 20:30	06:28 19:40	07:03 18:45	06:42 16:54
3	07:40 16:38	08:50 (43) 10:28 (42)	07:21 17:17	06:40 17:55	06:44 19:33	05:54 20:09	05:24 20:41	05:26 20:52	05:54 20:29	06:29 19:38	07:04 18:43	06:43 16:53
4	07:40 16:39	08:51 (43) 10:28 (42)	07:20 17:18	06:38 17:56	06:42 19:35	05:53 20:10	05:23 20:42	05:26 20:51	05:55 20:27	06:30 19:37	07:05 18:41	06:44 16:51
5	07:40 16:40	08:52 (43) 10:28 (42)	07:19 17:19	06:36 17:57	06:40 19:36	05:51 20:11	05:23 20:43	05:27 20:51	05:56 20:26	06:31 19:35	07:06 18:40	06:46 16:50
6	07:40 16:41	08:53 (43) 10:29 (42)	07:17 17:21	06:34 17:59	06:38 19:37	05:50 20:12	05:22 20:44	05:28 20:51	05:57 20:25	06:33 19:33	07:07 18:38	06:47 16:49
7	07:40 16:42	08:53 (43) 10:29 (42)	07:16 17:22	06:33 18:00	06:37 19:38	05:49 20:13	05:22 20:44	05:28 20:51	05:58 20:23	06:34 19:31	07:09 18:36	06:48 16:48
8	07:40 16:43	08:54 (43) 10:29 (42)	07:15 17:23	06:31 18:01	06:35 19:39	05:47 20:15	05:22 20:45	05:29 20:50	05:59 20:22	06:35 19:29	07:10 18:34	06:50 16:46
9	07:39 16:44	08:56 (43) 10:29 (42)	07:14 17:25	06:29 18:02	06:33 19:41	05:46 20:16	05:21 20:46	05:30 20:50	06:00 20:21	06:36 19:28	07:11 18:32	06:51 16:45
10	07:39 16:45	08:57 (43) 10:28 (42)	07:12 17:26	06:27 18:04	06:31 19:42	05:45 20:17	05:21 20:46	05:30 20:49	06:02 20:19	06:37 19:26	07:12 18:31	06:52 16:44
11	07:39 16:46	08:59 (43) 10:28 (42)	07:11 17:28	06:26 18:05	06:29 19:43	05:44 20:18	05:21 20:47	05:31 20:49	06:03 20:18	06:38 19:24	07:13 18:29	06:54 16:43
12	07:38 16:48	09:01 (43) 10:28 (42)	07:09 17:29	06:24 18:06	06:28 19:44	05:42 20:19	05:21 20:48	05:32 20:48	06:04 20:16	06:39 19:22	07:15 18:27	06:55 16:42
13	07:38 16:49	09:03 (43) 10:27 (42)	07:08 17:30	06:22 18:07	06:26 19:46	05:41 20:20	05:21 20:48	05:33 20:48	06:05 20:15	06:41 19:20	07:16 18:25	06:56 16:41
14	07:38 16:50	09:04 (43) 10:27 (42)	07:07 17:32	06:20 18:09	06:24 19:47	05:40 20:21	05:21 20:49	05:34 20:47	06:06 20:13	06:42 19:18	07:17 18:24	06:58 16:40
15	07:37 16:51	09:07 (43) 10:27 (42)	07:05 17:33	06:18 18:10	06:23 19:48	05:39 20:23	05:21 20:49	05:35 20:47	06:07 20:12	06:43 19:16	07:18 18:22	06:59 16:39
16	07:37 16:52	09:08 (43) 10:26 (42)	07:04 17:35	06:17 18:11	06:21 19:49	05:38 20:24	05:21 20:50	05:35 20:46	06:08 20:10	06:44 19:15	07:20 18:20	07:00 16:38
17	07:36 16:54	09:09 (43) 10:26 (42)	07:02 17:36	06:15 18:12	06:19 19:50	05:37 20:25	05:21 20:50	05:36 20:45	06:10 20:09	06:45 19:13	07:21 18:19	07:02 16:37
18	07:35 16:55	09:11 (43) 10:26 (42)	07:01 17:37	06:13 18:14	06:17 19:52	05:36 20:26	05:21 20:50	05:37 20:45	06:11 20:07	06:46 19:11	07:22 18:17	07:03 16:36
19	07:35 16:56	09:12 (43) 10:25 (42)	06:59 17:39	06:11 18:15	06:16 19:53	05:35 20:27	05:21 20:51	05:38 20:44	06:12 20:06	06:47 19:09	07:23 18:15	07:04 16:35
20	07:34 16:58	09:14 (43) 10:25 (42)	06:58 17:40	06:09 18:16	06:14 19:54	05:34 20:28	05:21 20:51	05:39 20:43	06:13 20:04	06:49 19:07	07:25 18:14	07:06 16:34
21	07:33 16:59	09:16 (43) 10:25 (42)	06:56 17:41	06:07 18:17	06:13 19:55	05:33 20:29	05:21 20:51	05:40 20:42	06:14 20:02	06:50 19:05	07:26 18:12	07:07 16:33
22	07:33 17:00	09:18 (43) 10:25 (42)	06:55 17:43	06:06 18:19	06:11 19:56	05:32 20:30	05:21 20:51	05:41 20:41	06:15 20:01	06:51 19:03	07:27 18:10	07:08 16:33
23	07:32 17:01	09:20 (43) 10:25 (42)	06:53 17:44	06:04 18:20	06:09 19:58	05:31 20:31	05:21 20:52	05:42 20:40	06:16 19:58	06:52 19:02	07:29 18:09	07:09 16:32
24	07:31 17:03	09:22 (43) 10:25 (42)	06:51 17:45	06:03 18:21	06:08 19:59	05:30 20:32	05:22 20:52	05:43 20:40	06:18 19:56	06:53 19:00	07:30 18:07	07:11 16:31
25	07:30 17:04	09:24 (43) 10:25 (42)	06:50 17:47	06:06 18:22	06:06 19:22	05:29 20:33	05:22 20:52	05:44 20:39	06:19 19:54	06:54 18:58	07:31 18:06	07:12 16:31
26	07:29 17:05	09:26 (43) 10:25 (42)	06:48 17:48	06:05 18:24	06:05 19:24	05:29 20:34	05:22 20:52	05:45 20:38	06:20 19:52	06:56 18:56	07:33 18:04	07:13 16:30
27	07:28 17:07	09:28 (43) 10:25 (42)	06:46 17:49	06:06 18:25	06:03 19:25	05:28 20:35	05:23 20:52	05:46 20:37	06:21 19:51	06:57 18:54	07:34 18:03	07:14 16:30
28	07:27 17:08	09:30 (43) 10:25 (42)	06:45 17:51	06:05 18:26	06:01 19:26	05:27 20:36	05:23 20:52	05:47 20:35	06:22 19:49	06:58 18:52	07:35 18:01	07:16 16:29
29	07:26 17:10	09:32 (43) 10:25 (42)	06:45 17:52	06:05 18:27	06:00 19:27	05:26 20:37	05:24 20:52	05:48 20:34	06:23 19:47	06:59 18:50	07:36 18:00	07:17 16:29
30	07:25 17:11	09:34 (43) 10:25 (42)	06:45 17:53	06:05 18:28	05:59 19:28	05:26 20:38	05:24 20:52	05:49 20:33	06:24 19:46	07:00 18:49	07:38 17:58	07:18 16:28
31	07:24 17:12	09:36 (43) 10:25 (42)	06:44 17:54	06:04 18:29	06:04 19:29	05:25 20:39	05:23 20:52	05:50 20:32	06:26 19:44	07:39 17:57	07:40 17:57	07:19 16:35
Potential sun hours	288	293	369	403	457	463	469	434	376	341	290	277
Total, worst case	1195										407	2423
Sun reduction	0.33										0.27	0.25
Oper. time red.	1.00										1.00	1.00
Wind dir. red.	0.56										0.57	0.56
Total reduction	0.19										0.15	0.14
Total, real	222										63	338

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)



Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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Calculated:

3/18/2011 3:22 PM/2.7.453

SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2 Shadow receptor: R-242 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (147)

Assumptions for shadow calculations

Maximum distance for influence 1,000 m
Minimum sun height over horizon for influence 3 °
Day step for calculation 1 days
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760
Idle start wind speed: Cut in wind speed from power curve

Table with 12 columns for months (January to December) and rows for each day of the month, showing sunrise, sunset, and shadow data.

Table layout: For each day in each month the following matrix apply

Matrix with 5 columns: Day in month, Sun rise (hh:mm), Sun set (hh:mm), Minutes with flicker, First time (hh:mm) with flicker, Last time (hh:mm) with flicker, (WTG causing flicker first time), (WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-319 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (216)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	05:57 20:06	05:25 20:40	06:08 (09) 20:52	05:51 20:31	06:27 19:42	07:01 18:47	06:40 16:56	07:19 16:28
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	05:56 20:07	05:24 20:40	06:07 (09) 20:52	05:53 20:30	06:28 19:40	07:03 18:45	06:42 16:54	07:20 16:27
3	07:40 16:38	07:21 17:16	06:40 17:55	06:44 19:33	05:54 20:08	05:24 20:41	06:07 (09) 20:52	05:54 20:28	06:29 19:38	07:04 18:43	06:43 16:53	07:21 16:27
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:35	05:53 20:10	05:23 20:42	06:06 (09) 20:51	05:55 20:27	06:30 19:37	07:05 18:41	06:44 16:51	07:22 16:27
5	07:40 16:40	07:19 17:19	06:36 17:57	06:40 19:36	05:51 20:11	05:23 20:43	06:06 (09) 20:51	05:56 20:26	06:31 19:35	07:06 18:40	06:46 16:50	07:23 16:26
6	07:40 16:41	07:17 17:21	06:34 17:58	06:38 19:37	05:50 20:12	05:22 20:44	06:07 (09) 20:51	05:57 20:25	06:32 19:33	07:07 18:38	06:47 16:49	07:24 16:26
7	07:40 16:42	07:16 17:22	06:33 18:00	06:36 19:38	05:49 20:13	05:22 20:44	06:06 (09) 20:51	05:58 20:23	06:34 19:31	07:09 18:36	06:48 16:48	07:25 16:26
8	07:39 16:43	07:15 17:23	07:31 19:01	06:35 19:39	05:47 20:14	05:22 20:45	06:06 (09) 20:50	05:59 20:22	06:35 19:29	07:10 18:34	06:50 16:46	07:26 16:26
9	07:39 16:44	07:13 17:25	07:29 19:02	06:33 19:41	05:46 20:16	05:21 20:46	06:05 (09) 20:50	06:00 20:21	06:36 19:28	07:11 18:32	06:51 16:45	07:27 16:26
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11	07:39 16:46	07:11 17:28	07:26 19:05	06:29 19:43	05:44 20:18	05:21 20:47	06:06 (09) 20:49	06:03 20:18	06:38 19:24	07:13 18:29	06:54 16:43	07:29 16:26
12	07:38 16:48	07:09 17:29	07:24 19:06	06:28 19:44	05:42 20:19	05:21 20:47	06:07 (09) 20:48	06:04 20:16	06:39 19:22	07:15 18:27	06:55 16:42	07:30 16:26
13	07:38 16:49	07:08 17:30	07:22 19:07	06:26 19:45	05:41 20:20	05:21 20:48	06:06 (09) 20:48	06:05 20:15	06:40 19:20	07:16 18:25	06:56 16:41	07:31 16:26
14	07:37 16:50	07:07 17:32	07:20 19:09	06:24 19:47	05:40 20:21	05:21 20:49	06:06 (09) 20:47	06:06 20:23	06:42 19:18	07:17 18:24	06:58 16:40	07:32 16:26
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18	07:35 16:55	07:01 17:37	07:13 19:14	06:17 19:52	05:36 20:26	05:21 20:50	06:08 (09) 20:45	06:11 20:07	06:46 19:11	07:22 18:17	07:03 16:36	07:34 16:27
19	07:35 16:56	06:59 17:39	07:11 19:15	06:16 19:53	05:35 20:27	05:21 20:51	06:08 (09) 20:44	06:12 20:06	06:47 19:09	07:23 18:15	07:04 16:35	07:35 16:28
20	07:34 16:57	06:58 17:40	07:09 19:16	06:14 19:54	05:34 20:28	05:21 20:51	06:08 (09) 20:43	06:13 20:04	06:49 19:07	07:25 18:14	07:06 16:34	07:36 16:28
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Potential sun hours	288	293	369	403	457	463	469	434	376	342	290	277
Total, worst case					272	1191	705					
Sun reduction					0.55	0.59	0.63					
Oper. time red.					1.00	1.00	1.00					
Wind dir. red.					0.69	0.69	0.69					
Total reduction					0.38	0.41	0.44					
Total, real					104	486	307					

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-35 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (357)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December		
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	18:02 (55) 20:06	05:57 20:40	05:25 20:52	05:24 20:31	05:51 20:31	06:27 19:42	17:55 (55) 18:43 (55)	07:01 18:47	06:40 16:55	07:19 16:28
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	18:00 (55) 20:07	05:55 20:40	05:25 20:52	05:24 20:30	05:52 20:30	06:28 19:40	17:55 (55) 18:42 (55)	07:02 18:45	06:55 16:54	07:20 16:27
3	07:40 16:38	07:21 17:16	06:39 17:54	06:44 19:33	17:59 (55) 20:08	05:54 20:41	05:26 20:52	05:24 20:28	05:54 20:28	06:29 19:38	17:55 (55) 18:43 (55)	07:04 18:43	06:43 16:53	07:21 16:27
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:34	17:59 (55) 20:10	05:53 20:42	05:26 20:51	05:25 20:27	05:55 20:27	06:30 19:37	17:55 (55) 18:43 (55)	07:05 18:41	06:44 16:51	07:22 16:27
5	07:40 16:40	07:19 17:19	06:36 17:57	06:40 19:36	17:58 (55) 20:11	05:51 20:43	05:27 20:51	05:26 20:26	05:56 20:26	06:31 19:35	17:54 (55) 18:42 (55)	07:06 18:39	06:46 16:50	07:23 16:26
6	07:40 16:41	07:17 17:21	06:34 17:58	06:38 19:37	17:58 (55) 20:12	05:50 20:44	05:27 20:51	05:27 20:25	05:57 20:25	06:32 19:33	17:54 (55) 18:41 (55)	07:07 18:38	06:47 16:49	07:24 16:26
7	07:40 16:42	07:16 17:22	06:33 18:00	06:36 19:38	17:57 (55) 20:13	05:49 20:44	05:28 20:51	05:28 20:23	05:58 20:23	06:34 19:31	17:54 (55) 18:41 (55)	07:09 18:36	06:48 16:48	07:25 16:26
8	07:39 16:43	07:15 17:23	07:31 19:01	06:35 19:39	17:57 (55) 20:14	05:47 20:45	05:29 20:50	05:29 20:22	05:59 20:22	06:35 19:29	17:53 (55) 18:40 (55)	07:10 18:34	06:50 16:46	07:26 16:26
9	07:39 16:44	07:13 17:25	07:29 19:02	06:33 19:41	17:57 (55) 20:16	05:46 20:46	05:50 20:50	06:00 20:21	06:00 20:21	06:36 19:27	17:53 (55) 18:39 (55)	07:11 18:32	06:51 16:45	07:27 16:26
10	07:39 16:45	07:12 17:26	07:27 19:04	06:31 19:42	17:57 (55) 20:17	05:45 20:46	05:50 20:49	06:01 20:19	06:01 20:19	06:37 19:26	17:53 (55) 18:38 (55)	07:12 18:31	06:52 16:44	07:28 16:26
11	07:39 16:46	07:11 17:28	07:25 19:05	06:29 19:43	17:56 (55) 20:18	05:43 20:47	05:51 20:49	06:03 20:18	06:03 20:18	06:38 19:24	17:54 (55) 18:37 (55)	07:13 18:29	06:54 16:43	07:29 16:26
12	07:38 16:47	07:09 17:29	07:24 19:06	06:28 19:44	17:57 (55) 20:19	05:42 20:47	05:52 20:48	06:04 20:16	06:04 20:16	06:39 19:22	17:54 (55) 18:35 (55)	07:15 18:27	06:55 16:42	07:30 16:26
13	07:38 16:49	07:08 17:30	07:22 19:07	06:26 19:45	17:57 (55) 20:20	05:41 20:48	05:53 20:48	06:05 20:15	06:05 20:15	06:40 19:20	17:56 (55) 18:35 (55)	07:16 18:25	06:56 16:41	07:31 16:26
14	07:37 16:50	07:07 17:32	07:20 19:09	06:24 19:47	17:57 (55) 20:21	05:40 20:49	05:54 20:47	06:06 20:13	06:06 20:13	06:42 19:18	17:56 (55) 18:33 (55)	07:17 18:24	06:58 16:40	07:32 16:26
15	07:37 16:51	07:05 17:33	07:18 19:10	06:22 19:48	17:57 (55) 20:22	05:39 20:49	05:54 20:47	06:07 20:12	06:07 20:12	06:43 19:16	17:57 (55) 18:31 (55)	07:18 18:22	06:59 16:39	07:32 16:26
16	07:36 16:52	07:04 17:34	07:16 19:11	06:21 19:49	17:59 (55) 20:24	05:38 20:49	05:55 20:46	06:08 20:10	06:08 20:10	06:44 19:15	17:59 (55) 18:29 (55)	07:20 18:20	06:59 16:38	07:33 16:27
17	07:36 16:54	07:02 17:36	07:15 19:12	06:19 19:50	17:59 (55) 20:25	05:37 20:50	05:57 20:45	06:09 20:09	06:09 20:09	06:45 19:13	18:00 (55) 18:26 (55)	07:21 18:18	07:02 16:37	07:34 16:27
18	07:35 16:55	07:01 17:37	07:13 19:14	06:17 19:52	17:59 (55) 20:26	05:36 20:50	05:58 20:45	06:11 20:07	06:11 20:07	06:46 19:11	18:02 (55) 18:23 (55)	07:22 18:17	07:03 16:36	07:34 16:27
19	07:35 16:56	06:59 17:39	07:11 19:15	06:16 19:53	18:01 (55) 20:27	05:35 20:51	05:59 20:44	06:12 20:06	06:12 20:06	06:47 19:09	18:14 (55) 18:33 (55)	07:23 18:15	07:04 16:35	07:35 16:28
20	07:34 16:57	06:58 17:40	07:09 19:16	06:14 19:54	18:02 (55) 20:28	05:34 20:51	05:59 20:43	06:13 20:04	06:13 20:04	06:48 19:07	18:12 (55) 18:35 (55)	07:25 19:07	07:05 16:34	07:36 16:28
21	07:33 16:59	06:56 17:41	07:07 19:17	06:12 19:55	18:04 (55) 20:29	05:33 20:51	05:40 20:42	06:14 20:02	06:14 20:02	06:50 19:05	18:09 (55) 18:37 (55)	07:26 19:05	07:07 16:33	07:36 16:28
22	07:33 17:00	06:54 17:43	07:05 19:19	06:11 19:56	18:05 (55) 20:30	05:32 20:51	05:41 20:41	06:15 20:01	06:15 20:01	06:51 19:03	18:07 (55) 18:38 (55)	07:27 19:03	07:08 16:33	07:37 16:29
23	07:32 17:01	06:53 17:44	07:04 19:20	06:09 19:58	18:06 (55) 20:31	05:31 20:52	05:42 20:40	06:16 19:57	06:16 19:57	06:52 19:01	18:05 (55) 18:39 (55)	07:29 19:01	07:09 16:32	07:37 16:29
24	07:31 17:03	06:51 17:45	07:02 19:21	8 18:22 (55)	06:08 19:59	05:30 20:32	05:43 20:39	06:17 19:56	06:17 19:56	06:53 19:00	18:05 (55) 18:41 (55)	07:30 19:00	07:11 16:31	07:38 16:30
25	07:30 17:04	06:50 17:47	07:00 19:22	18:16 (55)	06:06 20:00	05:29 20:33	05:44 20:38	06:19 19:54	06:19 19:54	06:54 18:58	18:03 (55) 18:42 (55)	07:31 18:06	07:12 16:31	07:38 16:31
26	07:29 17:05	06:48 17:48	06:58 19:23	18:12 (55)	06:04 20:00	05:28 20:34	05:45 20:37	06:20 19:52	06:20 19:52	06:55 18:56	18:02 (55) 18:42 (55)	07:32 18:04	07:13 16:30	07:38 16:31
27	07:28 17:07	06:46 17:49	06:56 19:25	18:07 (55)	06:01 20:01	05:28 20:35	05:46 20:36	06:21 19:51	06:21 19:51	06:57 18:54	18:00 (55) 18:43 (55)	07:34 18:03	07:14 16:29	07:39 16:32
28	07:27 17:08	06:45 17:51	06:54 19:26	18:07 (55)	06:01 20:02	05:27 20:36	05:47 20:35	06:22 19:49	06:22 19:49	06:58 18:52	17:59 (55) 18:43 (55)	07:35 18:01	07:15 16:29	07:39 16:33
29	07:26 17:09	06:53 17:52	06:54 19:27	18:06 (55)	06:00 20:04	05:26 20:37	05:48 20:34	06:23 19:47	06:23 19:47	06:59 18:50	17:58 (55) 18:43 (55)	07:36 18:00	07:17 16:28	07:39 16:33
30	07:25 17:11	06:51 17:53	06:51 19:28	18:05 (55)	05:58 20:05	05:26 20:38	05:49 20:33	06:24 19:45	06:24 19:45	07:00 18:49	17:57 (55) 18:43 (55)	07:38 17:58	07:18 16:28	07:40 16:34
31	07:24 17:12	06:49 17:50	06:49 19:30	18:03 (55)	20:05	05:25 20:39	05:50 20:32	06:25 19:44	06:25 19:44	07:00 18:43 (55)	17:56 (55) 18:43 (55)	07:39 17:57	07:40 16:35	07:40 16:35
Potential sun hours	288	293	369	403	457	463	469	434	376	341	290	277		
Total, worst case			229	994				486	754					
Sun reduction			0.47	0.49				0.59	0.54					
Oper. time red.			1.00	1.00				1.00	1.00					
Wind dir. red.			0.59	0.59				0.59	0.59					
Total reduction			0.28	0.29				0.35	0.32					
Total, real			63	287				169	240					

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 69

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-36 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (24)

Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

Table with 12 columns for months (January-December) and multiple rows for days (1-31). Each cell contains time ranges and wind speed data. Summary rows at the bottom show 'Potential sun hours', 'Total, worst case', 'Sun reduction', 'Oper. time red.', 'Wind dir. red.', 'Total reduction', and 'Total, real'.

Table layout: For each day in each month the following matrix apply

Matrix with 5 columns: Day in month, Sun rise (hh:mm), Sun set (hh:mm), Minutes with flicker, First time (hh:mm) with flicker (WTG causing flicker first time), Last time (hh:mm) with flicker (WTG causing flicker last time).

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 70

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-38 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (356)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December	
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	05:57 20:06	05:25 20:40	19:10 (55) 20:52	05:24 20:52	19:12 (55) 20:31	06:27 19:42	07:01 18:47	06:40 16:55	07:19 16:28
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	05:55 20:07	05:24 20:40	19:09 (55) 20:52	05:25 20:52	19:12 (55) 20:30	06:28 19:40	07:02 18:45	06:42 16:54	07:20 16:27
3	07:40 16:38	07:21 17:16	06:39 17:54	06:44 19:33	05:54 20:08	05:23 20:41	19:09 (55) 20:52	05:26 20:52	19:12 (55) 20:30	06:29 19:38	07:04 18:43	06:43 16:53	07:21 16:27
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:34	05:53 20:10	05:23 20:42	19:08 (55) 20:51	05:26 20:51	19:12 (55) 20:27	06:30 19:37	07:05 18:41	06:44 16:51	07:22 16:27
5	07:40 16:40	07:19 17:19	06:36 17:57	06:40 19:36	05:51 20:11	05:23 20:43	19:08 (55) 20:51	05:27 20:51	19:13 (55) 20:26	06:31 19:35	07:06 18:39	06:46 16:50	07:23 16:26
6	07:40 16:41	07:17 17:21	06:34 17:58	06:38 19:37	05:50 20:12	05:22 20:44	19:08 (55) 20:51	05:27 20:51	19:14 (55) 20:25	06:32 19:33	07:07 18:38	06:47 16:49	07:24 16:26
7	07:40 16:42	07:16 17:22	06:33 18:00	06:36 19:38	05:49 20:13	05:22 20:44	19:07 (55) 20:51	05:28 20:51	19:14 (55) 20:23	06:34 19:31	07:09 18:36	06:48 16:48	07:25 16:26
8	07:39 16:43	07:15 17:23	07:31 19:01	06:35 19:39	05:47 20:14	05:22 20:45	19:07 (55) 20:50	05:29 20:50	19:15 (55) 20:22	06:35 19:29	07:10 18:34	06:50 16:46	07:26 16:26
9	07:39 16:44	07:13 17:25	07:29 19:02	06:33 19:41	05:46 20:16	05:21 20:46	19:07 (55) 20:50	05:30 20:50	19:16 (55) 20:21	06:36 19:27	07:11 18:32	06:51 16:45	07:27 16:26
10	07:39 16:45	07:12 17:26	07:27 19:04	06:31 19:42	05:45 20:17	05:21 20:46	19:07 (55) 20:49	05:30 20:49	19:16 (55) 20:19	06:37 19:26	07:12 18:31	06:52 16:44	07:28 16:26
11	07:39 16:46	07:11 17:28	07:25 19:05	06:29 19:43	05:43 20:18	05:21 20:47	19:08 (55) 20:49	05:31 20:49	19:17 (55) 20:18	06:38 19:24	07:13 18:29	06:54 16:43	07:29 16:26
12	07:38 16:47	07:09 17:29	07:24 19:06	06:28 19:44	05:42 20:19	05:21 20:47	19:07 (55) 20:48	05:32 20:48	19:18 (55) 20:16	06:39 19:22	07:15 18:27	06:55 16:42	07:30 16:26
13	07:38 16:49	07:08 17:30	07:22 19:07	06:26 19:45	05:41 20:20	05:21 20:48	19:07 (55) 20:48	05:33 20:48	19:19 (55) 20:15	06:40 19:20	07:16 18:25	06:56 16:41	07:31 16:26
14	07:37 16:50	07:07 17:32	07:20 19:09	06:24 19:47	05:40 20:21	05:20 20:49	19:07 (55) 20:47	05:34 20:47	19:19 (55) 20:13	06:42 19:18	07:17 18:24	06:58 16:40	07:32 16:26
15	07:37 16:51	07:05 17:33	07:18 19:10	06:22 19:48	05:39 20:22	05:20 20:49	19:07 (55) 20:47	05:34 20:47	19:21 (55) 20:12	06:43 19:16	07:18 18:22	06:59 16:39	07:32 16:26
16	07:36 16:52	07:04 17:34	07:16 19:11	06:21 19:49	05:38 20:24	05:20 20:49	19:07 (55) 20:46	05:35 20:46	19:22 (55) 20:10	06:44 19:15	07:20 18:20	07:00 16:38	07:33 16:27
17	07:36 16:54	07:02 17:36	07:15 19:12	06:19 19:50	05:37 20:25	05:20 20:50	19:07 (55) 20:45	05:36 20:45	19:24 (55) 20:09	06:45 19:13	07:21 18:18	07:02 16:37	07:34 16:27
18	07:35 16:55	07:01 17:37	07:13 19:14	06:17 19:52	05:36 20:26	05:20 20:50	19:07 (55) 20:45	05:37 20:45	19:25 (55) 20:07	06:46 19:11	07:22 18:17	07:03 16:36	07:34 16:27
19	07:35 16:56	06:59 17:39	07:11 19:15	06:16 19:53	05:35 20:27	05:21 20:51	19:08 (55) 20:44	05:38 20:44	19:28 (55) 20:06	06:47 19:09	07:23 18:15	07:04 16:35	07:35 16:28
20	07:34 16:57	06:58 17:40	07:09 19:16	06:14 19:54	05:34 20:28	05:21 20:51	19:08 (55) 20:43	05:39 20:43	19:30 (55) 20:04	06:48 19:07	07:25 18:14	07:05 16:34	07:36 16:28
21	07:33 16:59	06:56 17:41	07:07 19:17	06:12 19:55	05:33 20:29	05:21 20:51	19:08 (55) 20:42	05:40 20:42	19:43 (55) 20:02	06:50 19:05	07:26 18:12	07:07 16:33	07:36 16:28
22	07:33 17:00	06:54 17:43	07:05 19:19	06:11 19:56	05:32 20:30	05:21 20:51	19:08 (55) 20:41	05:41 20:41	06:15 19:03	06:51 18:10	07:27 18:10	07:08 16:33	07:37 16:29
23	07:32 17:01	06:53 17:44	07:04 19:20	06:09 19:58	05:31 20:31	9 19:22 (55) 05:21	19:08 (55) 20:52	05:42 20:40	06:16 19:57	06:52 19:01	07:29 18:09	07:09 16:32	07:37 16:29
24	07:31 17:03	06:51 17:45	07:02 19:21	06:08 19:59	05:30 20:32	16 19:19 (55) 05:22	19:09 (55) 20:52	05:43 20:39	06:17 19:56	06:53 19:00	07:30 18:07	07:11 16:31	07:38 16:30
25	07:30 17:04	06:50 17:47	07:00 19:22	06:06 20:00	05:29 20:33	20 19:17 (55) 05:22	19:09 (55) 20:52	05:44 20:38	06:19 19:54	06:54 18:58	07:31 18:06	07:12 16:31	07:38 16:31
26	07:29 17:05	06:48 17:48	06:58 19:23	06:04 20:00	05:28 20:34	24 19:15 (55) 05:22	19:09 (55) 20:52	05:45 20:37	06:20 19:52	06:55 18:56	07:32 18:04	07:13 16:30	07:38 16:31
27	07:28 17:07	06:46 17:49	06:56 19:25	06:03 20:01	05:28 20:35	27 19:13 (55) 05:23	19:10 (55) 20:52	05:46 20:36	06:21 19:51	06:57 18:54	07:34 18:03	07:14 16:29	07:39 16:32
28	07:27 17:08	06:45 17:51	06:54 19:26	06:01 20:02	05:27 20:36	29 19:13 (55) 05:23	19:10 (55) 20:52	05:47 20:35	06:22 19:49	06:58 18:52	07:35 18:01	07:15 16:29	07:39 16:33
29	07:26 17:09	06:45 19:27	06:53 20:04	06:00 20:37	05:26 20:32	32 19:11 (55) 05:24	19:09 (55) 20:52	05:48 20:34	06:23 19:47	06:59 18:50	07:36 18:00	07:17 16:28	07:39 16:33
30	07:25 17:11	06:45 19:28	06:51 20:05	05:58 20:38	05:26 20:33	33 19:11 (55) 05:24	19:09 (55) 20:52	05:49 20:33	06:24 19:45	07:00 18:49	07:38 17:58	07:18 16:28	07:40 16:34
31	07:24 17:12	06:49 19:30	06:49 20:39	05:25 20:39	05:25 20:35	35 19:10 (55) 19:45 (55)	05:50 20:32	05:50 20:32	06:26 19:44	07:39 17:57	07:40 16:35		
Potential sun hours	288	293	369	403	457	463	469	434	376	341	290	277	
Total, worst case					225	1340	698						
Sun reduction					0.55	0.59	0.63						
Oper. time red.					1.00	1.00	1.00						
Wind dir. red.					0.51	0.51	0.51						
Total reduction					0.28	0.30	0.32						
Total, real					63	400	222						

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 71

Licensed user:

**EDR**  
 217 Montgomery St.  
 US-SYRACUSE, NY 13202  
 (315) 471 0688  
 Steve Curtis, scurtis@edrpc.com  
 Calculated:  
 3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-4 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (4)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.33	0.39	0.47	0.49	0.55	0.59	0.63	0.59	0.54	0.44	0.27	0.25

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
438	648	710	456	298	237	193	272	631	1,051	1,182	1,006	675	429	245	289	8,760

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

	January	February	March	April	May	June	July	August	September	October	November	December		
1   07:40	14:43 (55)   07:23	06:43	06:47	05:57	05:25	05:24	05:51	06:27	07:01	06:40		07:19	14:30 (55)	
16:36   44	15:27 (55)   17:14	17:52	19:31	20:06	20:40	20:52	20:31	19:42	18:47	16:55		16:28	43	15:13 (55)
2   07:40	14:43 (55)   07:22	06:41	06:45	05:55	05:24	05:25	05:52	06:28	07:03	06:42		07:20	14:30 (55)	
16:37   45	15:28 (55)   17:15	17:53	19:32	20:07	20:40	20:52	20:30	19:40	18:45	16:54		16:27	43	15:13 (55)
3   07:40	14:44 (55)   07:21	06:39	06:44	05:54	05:23	05:26	05:54	06:29	07:04	06:43		07:21	14:30 (55)	
16:38   44	15:28 (55)   17:16	17:54	19:33	20:08	20:41	20:52	20:28	19:38	18:43	16:53		16:27	44	15:14 (55)
4   07:40	14:44 (55)   07:20	06:38	06:42	05:53	05:23	05:26	05:55	06:30	07:05	06:44		07:22	14:30 (55)	
16:39   45	15:29 (55)   17:18	17:56	19:34	20:10	20:42	20:51	20:27	19:37	18:41	16:51		16:27	44	15:14 (55)
5   07:40	14:45 (55)   07:19	06:36	06:40	05:51	05:23	05:27	05:56	06:31	07:06	06:46		07:23	14:32 (55)	
16:40   44	15:29 (55)   17:19	17:57	19:36	20:11	20:43	20:51	20:26	19:35	18:39	16:50		16:26	43	15:15 (55)
6   07:40	14:46 (55)   07:17	06:34	06:38	05:50	05:22	05:27	05:57	06:32	07:07	06:47		07:24	14:32 (55)	
16:41   44	15:30 (55)   17:21	17:58	19:37	20:12	20:44	20:51	20:25	19:33	18:38	16:49		16:26	44	15:16 (55)
7   07:40	14:46 (55)   07:16	06:33	06:36	05:49	05:22	05:28	05:58	06:34	07:09	06:48		07:25	14:32 (55)	
16:42   43	15:29 (55)   17:22	18:00	19:38	20:13	20:44	20:51	20:23	19:31	18:36	16:48		16:26	44	15:16 (55)
8   07:39	14:46 (55)   07:15	07:31	06:35	05:47	05:22	05:29	05:59	06:35	07:10	06:50		07:26	14:32 (55)	
16:43   44	15:30 (55)   17:23	19:01	19:39	20:14	20:45	20:50	20:22	19:29	18:34	16:46		16:26	45	15:17 (55)
9   07:39	14:47 (55)   07:13	07:29	06:33	05:46	05:21	05:30	06:00	06:36	07:11	06:51		07:27	14:33 (55)	
16:44   43	15:30 (55)   17:25	19:02	19:41	20:16	20:46	20:50	20:21	19:27	18:32	16:45		16:26	44	15:17 (55)
10   07:39	14:47 (55)   07:12	07:27	06:31	05:45	05:21	05:30	06:01	06:37	07:12	06:52		07:28	14:32 (55)	
16:45   43	15:30 (55)   17:26	19:04	19:42	20:17	20:46	20:49	20:19	19:26	18:31	16:44		16:26	45	15:17 (55)
11   07:39	14:48 (55)   07:11	07:25	06:29	05:43	05:21	05:31	06:03	06:38	07:13	06:54		07:29	14:33 (55)	
16:46   43	15:31 (55)   17:28	19:05	19:43	20:18	20:47	20:49	20:18	19:24	18:29	16:43		16:26	44	15:17 (55)
12   07:38	14:49 (55)   07:09	07:24	06:28	05:42	05:21	05:32	06:04	06:39	07:15	06:55		07:30	14:33 (55)	
16:47   42	15:31 (55)   17:29	19:06	19:44	20:19	20:47	20:48	20:16	19:22	18:27	16:42		16:26	45	15:18 (55)
13   07:38	14:50 (55)   07:08	07:22	06:26	05:41	05:21	05:33	06:05	06:40	07:16	06:56		07:31	14:34 (55)	
16:49   41	15:31 (55)   17:30	19:07	19:45	20:20	20:48	20:48	20:15	19:20	18:25	16:41		16:26	45	15:19 (55)
14   07:37	14:51 (55)   07:07	07:20	06:24	05:40	05:20	05:34	06:06	06:42	07:17	06:58		07:32	14:35 (55)	
16:50   40	15:31 (55)   17:32	19:09	19:47	20:21	20:49	20:47	20:13	19:18	18:24	16:40		16:26	44	15:19 (55)
15   07:37	14:51 (55)   07:05	07:18	06:22	05:39	05:20	05:34	06:07	06:43	07:18	06:59	14:41 (55)	07:32	14:35 (55)	
16:51   40	15:31 (55)   17:33	19:10	19:48	20:22	20:49	20:47	20:12	19:16	18:22	16:39	14:45 (55)	16:26	45	15:20 (55)
16   07:36	14:52 (55)   07:04	07:16	06:21	05:38	05:20	05:35	06:08	06:44	07:20	07:00	14:38 (55)	07:33	14:35 (55)	
16:52   39	15:31 (55)   17:34	19:11	19:49	20:24	20:49	20:46	20:10	19:15	18:20	16:38	14:57 (55)	16:27	45	15:20 (55)
17   07:36	14:53 (55)   07:02	07:15	06:19	05:37	05:20	05:36	06:09	06:45	07:21	07:02	14:37 (55)	07:34	14:36 (55)	
16:54   38	15:31 (55)   17:36	19:12	19:50	20:25	20:50	20:45	20:09	19:13	18:18	16:37	15:00 (55)	16:27	44	15:20 (55)
18   07:35	14:54 (55)   07:01	07:13	06:17	05:36	05:20	05:37	06:11	06:46	07:22	07:03	14:35 (55)	07:34	14:37 (55)	
16:55   37	15:31 (55)   17:37	19:14	19:52	20:26	20:50	20:45	20:07	19:11	18:17	16:36	15:01 (55)	16:27	44	15:21 (55)
19   07:35	14:54 (55)   06:59	07:11	06:16	05:35	05:21	05:38	06:12	06:47	07:23	07:04	14:35 (55)	07:35	14:36 (55)	
16:56   36	15:30 (55)   17:39	19:15	19:53	20:27	20:51	20:44	20:06	19:09	18:15	16:35	15:03 (55)	16:28	45	15:21 (55)
20   07:34	14:56 (55)   06:58	07:09	06:14	05:34	05:21	05:39	06:13	06:48	07:25	07:06	14:33 (55)	07:36	14:37 (55)	
16:57   34	15:30 (55)   17:40	19:16	19:54	20:28	20:51	20:43	20:04	19:07	18:14	16:34	15:04 (55)	16:28	45	15:22 (55)
21   07:33	14:57 (55)   06:56	07:07	06:12	05:33	05:21	05:40	06:14	06:50	07:26	07:07	14:32 (55)	07:36	14:37 (55)	
16:59   33	15:30 (55)   17:41	19:17	19:55	20:29	20:51	20:42	20:02	19:05	18:12	16:33	15:05 (55)	16:28	45	15:22 (55)
22   07:33	14:58 (55)   06:54	07:05	06:11	05:32	05:21	05:41	06:15	06:51	07:27	07:08	14:32 (55)	07:37	14:38 (55)	
17:00   31	15:29 (55)   17:43	19:19	19:56	20:30	20:51	20:41	20:01	19:03	18:10	16:33	15:07 (55)	16:29	45	15:23 (55)
23   07:32	15:00 (55)   06:53	07:04	06:09	05:31	05:21	05:42	06:16	06:52	07:29	07:09	14:31 (55)	07:37	14:38 (55)	
17:01   28	15:28 (55)   17:44	19:20	19:58	20:31	20:52	20:40	19:57	19:01	18:09	16:32	15:07 (55)	16:29	45	15:23 (55)
24   07:31	15:01 (55)   06:51	07:02	06:08	05:30	05:22	05:43	06:17	06:53	07:30	07:11	14:31 (55)	07:38	14:39 (55)	
17:03   26	15:27 (55)   17:45	19:21	19:59	20:32	20:52	20:39	19:56	19:00	18:07	16:31	15:08 (55)	16:30	45	15:24 (55)
25   07:30	15:03 (55)   06:50	07:00	06:06	05:29	05:22	05:44	06:19	06:54	07:31	07:12	14:31 (55)	07:38	14:39 (55)	
17:04   23	15:26 (55)   17:47	19:22	20:00	20:33	20:52	20:38	19:54	18:58	18:06	16:31	15:09 (55)	16:31	45	15:24 (55)
26   07:29	15:05 (55)   06:48	06:58	06:04	05:28	05:22	05:45	06:20	06:55	07:32	07:13	14:31 (55)	07:38	14:40 (55)	
17:05   19	15:24 (55)   17:48	19:23	20:00	20:34	20:52	20:37	19:52	18:56	18:04	16:30	15:10 (55)	16:31	44	15:24 (55)
27   07:28	15:08 (55)   06:46	06:56	06:03	05:28	05:23	05:46	06:21	06:57	07:34	07:14	14:30 (55)	07:39	14:41 (55)	
17:07   14	15:22 (55)   17:49	19:25	20:01	20:35	20:52	20:36	19:51	18:54	18:03	16:29	15:10 (55)	16:32	45	15:26 (55)
28   07:27	15:06 (55)   06:45	06:54	06:01	05:27	05:23	05:47	06:22	06:58	07:35	07:15	14:30 (55)	07:39	14:41 (55)	
17:08   11	15:23 (55)   17:51	19:26	20:02	20:36	20:52	20:35	19:49	18:52	18:01	16:29	15:11 (55)	16:33	45	15:26 (55)
29   07:26	15:04 (55)   06:44	06:53	06:00	05:26	05:23	05:48	06:23	06:59	07:36	07:17	14:31 (55)	07:39	14:41 (55)	
17:09   9	15:21 (55)   17:49	19:27	20:04	20:37	20:52	20:34	19:47	18:50	18:00	16:28	15:12 (55)	16:33	45	15:26 (55)
30   07:25	15:03 (55)   06:43	06:51	05:58	05:26	05:24	05:49	06:24	07:00	07:38	07:18	14:30 (55)	07:40	14:42 (55)	
17:11   5	15:19 (55)   17:49	19:28	20:05	20:38	20:52	20:33	19:45	18:49	17:58	16:28	15:12 (55)	16:34	44	

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 72

Licensed user:

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US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-402 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (302)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June		
1	07:40 16:37	07:23 17:14	06:43 17:52	06:47 19:31	07:14 (14) 23 07:37 (14)	05:57 20:06	05:25 20:40	06:03 (13) 33 06:36 (13)
2	07:40 16:37	07:22 17:15	06:41 17:53	06:46 19:32	07:13 (14) 25 07:38 (14)	05:56 20:07	05:24 20:41	06:02 (13) 34 06:36 (13)
3	07:40 16:38	07:21 17:17	06:40 17:55	06:44 19:33	07:13 (14) 26 07:39 (14)	05:54 20:09	05:24 20:41	06:03 (13) 34 06:37 (13)
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:35	07:12 (14) 27 07:39 (14)	05:53 20:10	05:23 20:42	06:03 (13) 34 06:37 (13)
5	07:40 16:40	07:19 17:19	06:36 17:57	06:40 19:36	07:11 (14) 27 07:38 (14)	05:52 20:11	05:23 20:43	06:02 (13) 35 06:37 (13)
6	07:40 16:41	07:17 17:21	06:34 17:59	06:38 19:37	07:10 (14) 28 07:38 (14)	05:50 20:12	05:23 20:44	06:03 (13) 35 06:38 (13)
7	07:40 16:42	07:16 17:22	06:33 18:00	06:37 19:38	07:11 (14) 27 07:38 (14)	05:49 20:13	05:22 20:44	06:03 (13) 35 06:38 (13)
8	07:40 16:43	07:15 17:24	06:31 19:01	06:35 19:40	07:11 (14) 26 07:37 (14)	05:48 20:15	05:22 20:45	06:03 (13) 35 06:38 (13)
9	07:39 16:44	07:14 17:25	06:29 19:03	06:33 19:41	07:11 (14) 25 07:36 (14)	05:46 20:16	05:22 20:46	06:03 (13) 35 06:38 (13)
10	07:39 16:46	07:12 17:26	06:27 19:04	06:31 19:42	07:11 (14) 24 07:35 (14)	05:45 20:17	05:21 20:46	06:03 (13) 35 06:38 (13)
11	07:39 16:47	07:11 17:28	06:26 19:05	06:30 19:43	07:12 (14) 22 07:34 (14)	05:44 20:18	05:21 20:47	06:04 (13) 35 06:39 (13)
12	07:38 16:48	07:10 17:29	06:24 19:06	06:28 19:44	07:13 (14) 19 07:32 (14)	05:43 20:19	05:21 20:48	06:04 (13) 35 06:39 (13)
13	07:38 16:49	07:08 17:31	06:22 19:08	06:26 19:46	07:14 (14) 16 07:30 (14)	05:41 20:20	05:21 20:48	06:04 (13) 35 06:39 (13)
14	07:38 16:50	07:07 17:32	06:20 19:09	06:24 19:47	07:16 (14) 11 07:27 (14)	05:40 20:21	05:21 20:49	06:04 (13) 36 06:40 (13)
15	07:37 16:51	07:05 17:33	06:18 19:10	06:23 19:48	07:15 (15) 05:39	06:23	05:21 20:49	06:05 (13) 35 06:40 (13)
16	07:37 16:53	07:04 17:35	06:17 19:11	06:21 19:49	07:15 (15) 05:38	06:21	05:21 20:50	06:05 (13) 35 06:40 (13)
17	07:36 16:54	07:02 17:36	06:15 19:13	06:19 19:50	07:15 (15) 6 06:21 (13)	06:19	05:21 20:50	06:05 (13) 35 06:40 (13)
18	07:35 16:55	07:01 17:37	06:13 19:14	06:18 19:52	07:15 (15) 12 06:24 (13)	06:18	05:21 20:50	06:05 (13) 35 06:40 (13)
19	07:35 16:56	06:59 17:39	06:11 19:15	06:16 19:53	07:15 (15) 16 06:26 (13)	06:16	05:21 20:51	06:05 (13) 35 06:40 (13)
20	07:34 16:58	06:58 17:40	06:09 19:16	06:14 19:54	07:15 (15) 20 06:28 (13)	06:14	05:21 20:51	06:05 (13) 35 06:40 (13)
21	07:33 16:59	06:56 17:42	06:08 19:18	06:13 19:55	07:15 (15) 22 06:29 (13)	06:13	05:21 20:51	06:05 (13) 35 06:40 (13)
22	07:33 17:00	06:55 17:43	06:06 19:19	06:11 19:57	07:15 (15) 24 06:30 (13)	06:11	05:21 20:51	06:06 (13) 35 06:41 (13)
23	07:32 17:02	06:53 17:44	06:04 19:20	06:09 19:58	07:15 (15) 26 06:32 (13)	06:09	05:22 20:52	06:06 (13) 35 06:41 (13)
24	07:31 17:03	06:51 17:46	06:02 19:21	06:08 19:59	07:15 (15) 27 06:32 (13)	06:09	05:22 20:52	06:06 (13) 35 06:41 (13)
25	07:30 17:04	06:50 17:47	06:00 19:22	06:06 20:00	07:15 (15) 29 06:33 (13)	06:06	05:22 20:52	06:06 (13) 35 06:41 (13)
26	07:29 17:06	06:48 17:48	06:58 19:24	06:05 20:00	07:15 (15) 30 06:33 (13)	06:05	05:23 20:52	06:07 (13) 35 06:42 (13)
27	07:28 17:07	06:46 17:50	06:57 19:25	06:03 20:01	07:15 (15) 30 06:34 (13)	06:03	05:23 20:52	06:07 (13) 35 06:42 (13)
28	07:27 17:08	06:45 17:51	06:55 19:26	06:02 20:03	07:15 (15) 31 06:34 (13)	06:02	05:23 20:52	06:07 (13) 36 06:43 (13)
29	07:26 17:10	06:53 19:27	06:53 19:27	06:00 20:04	07:15 (15) 32 06:35 (13)	06:00	05:24 20:52	06:07 (13) 36 06:43 (13)
30	07:25 17:11	06:51 19:29	06:51 19:29	06:59 20:05	07:15 (15) 32 06:35 (13)	06:59	05:24 20:52	06:08 (13) 35 06:43 (13)
31	07:24 17:13	06:49 19:30	06:49 19:30	06:58 20:05	07:15 (15) 33 06:35 (13)	06:58	05:24 20:52	06:08 (13) 35 06:43 (13)
Potential sun hours	288	293	369	403	457	463	1048	
Total, worst case			276	326	370	1048		
Sun reduction			0.47	0.49	0.55	0.59		
Oper. time red.			1.00	1.00	1.00	1.00		
Wind dir. red.			0.53	0.58	0.69	0.69		
Total reduction			0.25	0.28	0.38	0.40		
Total, real			68	93	139	423		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

Printed/Page

3/21/2011 3:39 PM / 73

Licensed user:

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-402 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (302)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25 20:52	06:08 (13) 06:43 (13)	05:52 20:31	06:27 19:42	07:11 (14) 07:33 (14)	07:02 18:47
2	05:25 20:52	06:08 (13) 06:44 (13)	05:53 20:30	06:28 19:40	07:10 (14) 07:34 (14)	07:03 18:45
3	05:26 20:52	06:08 (13) 06:43 (13)	05:54 20:29	06:29 19:39	07:09 (14) 07:34 (14)	07:04 18:43
4	05:27 20:51	06:09 (13) 06:44 (13)	05:55 20:27	06:30 19:37	07:08 (14) 07:34 (14)	07:05 18:41
5	05:27 20:51	06:08 (13) 06:43 (13)	05:56 20:26	06:32 19:35	07:07 (14) 07:34 (14)	07:06 18:40
6	05:28 20:51	06:09 (13) 06:44 (13)	05:57 20:25	06:33 19:33	07:07 (14) 07:34 (14)	07:08 18:38
7	05:29 20:51	06:10 (13) 06:44 (13)	05:58 20:23	06:34 19:31	07:06 (14) 07:33 (14)	07:09 18:36
8	05:29 20:50	06:09 (13) 06:44 (13)	05:59 20:22	06:35 19:30	07:06 (14) 07:33 (14)	07:10 18:34
9	05:30 20:50	06:10 (13) 06:44 (13)	06:01 20:21	06:36 19:28	07:06 (14) 07:32 (14)	07:11 18:33
10	05:31 20:49	06:10 (13) 06:44 (13)	06:02 20:19	06:37 19:26	07:07 (14) 07:32 (14)	07:12 18:31
11	05:31 20:49	06:10 (13) 06:43 (13)	06:03 20:18	06:38 19:24	07:07 (14) 07:31 (14)	07:14 18:29
12	05:32 20:48	06:10 (13) 06:44 (13)	06:04 20:16	06:40 19:22	07:08 (14) 07:29 (14)	07:15 18:27
13	05:33 20:48	06:11 (13) 06:44 (13)	06:05 20:15	06:41 19:20	07:09 (14) 07:27 (14)	07:16 18:26
14	05:34 20:47	06:12 (13) 06:44 (13)	06:06 20:13	06:42 19:18	07:10 (14) 07:25 (14)	07:17 18:24
15	05:35 20:47	06:12 (13) 06:44 (13)	06:07 20:12	06:43 19:17	07:13 (14) 07:21 (14)	07:19 18:22
16	05:36 20:46	06:13 (13) 06:44 (13)	06:09 20:10	06:44 19:15	07:20 18:20	07:20 18:20
17	05:37 20:45	06:13 (13) 06:43 (13)	06:10 20:09	06:45 19:13	07:21 18:19	07:21 18:19
18	05:37 20:45	06:13 (13) 06:42 (13)	06:11 20:07	06:46 19:11	07:22 18:17	07:22 18:17
19	05:38 20:44	06:14 (13) 06:42 (13)	06:12 20:06	06:48 19:09	07:24 18:15	07:24 18:15
20	05:39 20:43	06:15 (13) 06:41 (13)	06:13 20:04	06:49 19:07	07:25 18:14	07:25 18:14
21	05:40 20:42	06:16 (13) 06:41 (13)	06:14 20:03	06:50 19:05	07:26 18:12	07:26 18:12
22	05:41 20:41	06:17 (13) 06:40 (13)	06:15 20:01	06:51 19:04	07:27 18:11	07:27 18:11
23	05:42 20:40	06:18 (13) 06:39 (13)	06:17 19:58	06:52 19:02	07:29 18:09	07:29 18:09
24	05:43 20:40	06:19 (13) 06:38 (13)	06:18 19:56	06:53 19:00	07:30 18:07	07:30 18:07
25	05:44 20:39	06:21 (13) 06:36 (13)	06:19 19:54	06:54 18:58	07:31 18:06	07:31 18:06
26	05:45 20:38	06:24 (13) 06:34 (13)	06:20 19:53	06:56 18:56	07:33 18:04	07:33 18:04
27	05:46 20:37	06:21 (13) 06:33 (13)	06:18 19:51	06:57 18:54	07:34 18:03	07:34 18:03
28	05:47 20:36	06:22 (13) 06:32 (13)	06:17 19:49	06:58 18:52	07:35 18:01	07:35 18:01
29	05:48 20:34	06:24 (13) 06:31 (13)	06:16 19:47	06:59 18:51	07:37 (15) 07:30 (15)	07:37 18:00
30	05:50 20:33	06:25 (13) 06:30 (13)	06:14 19:46	07:00 18:49	07:35 (15) 07:31 (15)	07:38 17:59
31	05:51 20:32	06:26 (13) 06:29 (13)	06:13 19:44	07:00 19:42	07:35 (15) 07:32 (14)	07:39 17:57
Potential sun hours	469	434	376	342	290	277
Total, worst case	769	46	380	184		
Sun reduction	0.63	0.59	0.54	0.44		
Oper. time red.	1.00	1.00	1.00	1.00		
Wind dir. red.	0.69	0.58	0.58	0.52		
Total reduction	0.43	0.34	0.31	0.23		
Total, real	331	16	117	42		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)



Project: **05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

Printed/Page: 3/21/2011 3:39 PM / 74

Licensed user:  
**EDR**  
 217 Montgomery St.  
 US-SYRACUSE, NY 13202  
 (315) 471 0688  
 Steve Curtis, scurtis@edrpc.com  
 Calculated:  
 3/18/2011 3:22 PM/2.7.453

### SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2 Shadow receptor: R-403 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (303)

#### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
 438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
 Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December		
1	07:40 16:36	08:43 (08) 07:23	09:34 (07) 06:43	06:47	05:57	05:25	05:25	05:52	06:27	07:02	06:41	07:19	08:33 (08)	
2	07:40 16:37	08:43 (08) 07:22	09:38 (07) 06:41	06:46	05:56	05:24	05:25	05:53	06:28	07:03	06:42	07:20	08:33 (08)	
3	07:40 16:38	08:44 (08) 07:21	09:52 (07) 06:40	06:44	05:54	05:24	05:26	05:54	06:29	07:04	06:43	07:21	08:32 (08)	
4	07:40 16:39	08:45 (08) 07:20	07:19	06:38	05:53	05:23	05:27	05:55	06:30	07:05	06:45	07:22	08:33 (08)	
5	07:40 16:40	08:46 (08) 07:19	07:19	06:36	05:52	05:23	05:27	05:56	06:32	07:06	06:46	07:23	08:33 (08)	
6	07:40 16:41	08:47 (08) 07:18	07:18	06:35	05:50	05:23	05:28	05:57	06:33	07:08	06:47	07:25	08:33 (08)	
7	07:40 16:42	08:48 (08) 07:16	07:16	06:33	05:49	05:22	05:28	05:58	06:34	07:09	06:49	07:26	08:33 (08)	
8	07:40 16:43	08:48 (08) 07:15	07:15	06:31	05:48	05:22	05:29	05:59	06:35	07:10	06:50	07:26	08:33 (08)	
9	07:39 16:44	08:49 (08) 07:14	07:14	06:30	05:47	05:21	05:30	06:01	06:36	07:11	06:51	09:08 (07)	07:27	08:33 (08)
10	07:39 16:46	08:51 (08) 07:12	07:12	06:27	05:45	05:21	05:31	06:02	06:37	07:12	06:53	09:23 (07)	07:28	08:34 (08)
11	07:39 16:47	08:51 (08) 07:11	07:11	06:26	05:44	05:21	05:31	06:03	06:38	07:14	06:54	09:26 (07)	07:29	08:34 (08)
12	07:39 16:48	08:53 (08) 07:10	07:10	06:24	05:43	05:21	05:32	06:04	06:40	07:15	06:55	09:29 (07)	07:30	08:33 (08)
13	07:38 16:49	08:54 (08) 07:08	07:08	06:22	05:42	05:21	05:33	06:05	06:41	07:16	06:57	09:29 (07)	07:31	08:34 (08)
14	07:38 16:50	08:56 (08) 07:07	07:07	06:20	05:41	05:21	05:34	06:06	06:42	07:17	06:58	09:32 (07)	07:32	08:34 (08)
15	07:37 16:51	08:58 (08) 07:05	07:05	06:19	05:40	05:21	05:35	06:07	06:43	07:19	06:59	09:35 (07)	07:33	08:35 (08)
16	07:37 16:53	09:16 (07) 07:04	07:04	06:17	05:38	05:21	05:36	06:09	06:44	07:20	07:01	09:36 (07)	07:33	08:35 (08)
17	07:36 16:54	09:17 (07) 07:03	07:03	06:16	05:37	05:21	05:36	06:10	06:45	07:21	07:02	09:38 (07)	07:34	08:35 (08)
18	07:36 16:55	09:18 (07) 07:02	07:02	06:15	05:36	05:21	05:37	06:11	06:46	07:22	07:03	09:39 (07)	07:35	08:36 (08)
19	07:35 16:56	09:18 (07) 06:59	06:59	06:14	05:35	05:21	05:38	06:12	06:48	07:24	07:04	09:40 (07)	07:35	08:36 (08)
20	07:34 16:57	09:19 (07) 06:58	06:58	06:13	05:34	05:21	05:39	06:13	06:49	07:25	07:06	09:41 (07)	07:36	08:37 (08)
21	07:34 16:59	09:20 (07) 06:56	06:56	06:12	05:33	05:21	05:40	06:14	06:50	07:26	07:07	09:42 (07)	07:36	08:38 (08)
22	07:33 17:00	09:21 (07) 06:55	06:55	06:11	05:32	05:21	05:41	06:15	06:51	07:27	07:08	09:43 (07)	07:37	08:38 (08)
23	07:32 17:02	09:21 (07) 06:53	06:53	06:10	05:31	05:22	05:42	06:17	06:52	07:29	07:10	09:44 (07)	07:37	08:39 (08)
24	07:31 17:03	09:21 (07) 06:51	06:51	06:09	05:31	05:22	05:43	06:18	06:53	07:30	07:11	09:45 (07)	07:38	08:39 (08)
25	07:30 17:04	09:22 (07) 06:50	06:50	06:08	05:30	05:22	05:44	06:19	06:55	07:31	07:12	09:46 (07)	07:38	08:39 (08)
26	07:29 17:06	09:23 (07) 06:48	06:48	06:07	05:29	05:23	05:45	06:20	06:56	07:33	07:13	09:47 (07)	07:39	08:39 (08)
27	07:28 17:07	09:24 (07) 06:46	06:46	06:06	05:28	05:23	05:46	06:21	06:57	07:34	07:14	09:48 (07)	07:39	08:40 (08)
28	07:28 17:08	09:25 (07) 06:45	06:45	06:05	05:27	05:23	05:47	06:22	06:58	07:35	07:16	09:49 (07)	07:40	08:41 (08)
29	07:27 17:10	09:26 (07) 06:45	06:45	06:04	05:26	05:24	05:48	06:23	06:59	07:37	07:17	09:50 (07)	07:40	08:41 (08)
30	07:26 17:11	09:27 (07) 06:45	06:45	06:03	05:25	05:24	05:49	06:24	07:00	07:38	07:18	09:51 (07)	07:40	08:42 (08)
31	07:24 17:13	09:29 (07) 06:45	06:45	06:02	05:24	05:24	05:50	06:25	07:01	07:39	07:19	09:52 (07)	07:40	08:42 (08)
Potential sun hours	288	293	369	403	457	463	469	434	376	342	290	277	2490	
Total, worst case	1831	35									1002		2490	
Sun reduction	0.33	0.39									0.27		0.25	
Oper. time red.	1.00	1.00									1.00		1.00	
Wind dir. red.	0.54	0.54									0.54		0.53	
Total reduction	0.18	0.21									0.15		0.13	
Total, real	324	7									145		333	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 75

Licensed user:

**EDR**

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(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-405 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (305)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	07:32 (32) 05:57	06:33 (31) 05:25
2	07:40 16:37	07:22 17:15	06:41 17:53	06:46 19:32	07:45 (32) 20:06	07:06 (31) 20:40
3	07:40 16:38	07:21 17:17	06:40 17:55	06:44 19:33	07:35 (32) 05:56	06:32 (31) 05:24
4	07:40 16:39	07:21 17:18	06:40 17:56	06:44 19:35	07:41 (32) 20:07	07:05 (31) 20:40
5	07:40 16:40	07:19 17:19	06:36 17:57	06:40 19:36	05:54 20:08	06:32 (31) 05:24
6	07:40 16:41	07:17 17:21	06:34 17:59	06:38 19:37	05:51 20:11	07:05 (31) 20:43
7	07:40 16:42	07:16 17:22	06:33 18:00	06:37 19:38	05:49 20:13	06:32 (31) 05:22
8	07:39 16:43	07:15 17:24	06:31 19:01	06:35 19:39	05:47 20:14	07:05 (31) 20:44
9	07:39 16:44	07:13 17:25	06:29 19:02	06:33 19:41	05:46 20:16	06:33 (31) 05:22
10	07:39 16:45	07:12 17:26	06:27 19:04	06:31 19:42	05:45 20:17	07:04 (31) 20:45
11	07:39 16:47	07:11 17:28	06:26 19:05	06:29 19:43	05:44 20:18	06:33 (31) 05:21
12	07:38 16:48	07:09 17:29	06:24 19:06	06:28 19:44	05:43 20:19	07:02 (31) 20:47
13	07:38 16:49	07:08 17:30	06:22 19:07	06:26 19:45	05:41 20:20	06:35 (31) 05:21
14	07:37 16:50	07:07 17:32	06:20 19:09	06:24 19:47	05:40 20:21	07:01 (31) 20:48
15	07:37 16:51	07:05 17:33	06:18 19:10	06:23 19:48	05:39 20:22	06:38 (31) 05:21
16	07:36 16:53	07:04 17:35	06:17 19:11	06:21 19:49	05:38 20:24	06:59 (31) 20:49
17	07:36 16:54	07:02 17:36	06:15 19:12	06:19 19:50	05:37 20:25	06:40 (31) 05:21
18	07:35 16:55	07:01 17:37	06:13 19:14	06:17 19:52	05:36 20:26	06:56 (31) 20:50
19	07:35 16:56	06:59 17:39	07:11 19:15	07:46 (32) 19:52	06:16 20:27	06:42 (31) 05:21
20	07:34 16:58	06:58 17:39	07:09 19:16	07:36 (32) 19:53	06:16 20:28	06:51 (31) 20:51
21	07:33 16:59	06:56 17:41	07:07 19:17	07:51 (32) 19:54	06:14 20:29	05:34 05:21
22	07:33 17:00	06:54 17:43	07:06 19:19	07:32 (32) 19:55	06:50 (31) 05:33	06:53 (31) 20:29
23	07:32 17:02	06:53 17:44	07:04 19:20	07:52 (32) 19:56	06:44 (31) 05:32	06:44 (31) 05:32
24	07:31 17:03	06:51 17:45	07:02 19:21	07:31 (32) 19:56	06:42 (31) 05:31	06:57 (31) 20:30
25	07:30 17:04	06:50 17:47	07:00 19:22	06:09 19:58	07:00 (31) 20:31	06:42 (31) 05:31
26	07:29 17:06	06:48 17:48	06:58 19:24	06:08 19:58	07:03 (31) 20:33	07:00 (31) 20:31
27	07:28 17:07	06:46 17:49	06:56 19:25	06:08 19:59	06:39 (31) 05:30	07:03 (31) 20:33
28	07:27 17:08	06:45 17:51	06:55 19:26	06:07 19:59	07:01 (31) 20:32	06:38 (31) 05:29
29	07:26 17:10	06:45 17:51	06:55 19:27	06:06 19:59	06:38 (31) 05:29	07:03 (31) 20:33
30	07:25 17:11	06:45 17:51	06:55 19:28	06:05 19:59	06:36 (31) 05:28	07:03 (31) 20:33
31	07:24 17:12	06:45 17:51	06:55 19:29	06:04 19:59	06:35 (31) 05:27	07:05 (31) 20:35
Potential sun hours	288	293	369	403	457	463
Total, worst case			273	248	501	
Sun reduction			0.47	0.49	0.55	
Oper. time red.			1.00	1.00	1.00	
Wind dir. red.			0.56	0.63	0.63	
Total reduction			0.26	0.31	0.35	
Total, real			71	76	174	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 76

Licensed user:

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2 Shadow receptor: R-405 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (305)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December		
1	05:25	05:52	06:45 (31)	06:27	07:01	06:40	07:19	
	20:52	20:31	27 07:12 (31)	19:42	18:47	16:56	16:28	
2	05:25	05:53	06:44 (31)	06:28	07:03	06:42	07:20	
	20:52	20:30	29 07:13 (31)	19:40	18:45	16:54	16:27	
3	05:26	05:54	06:44 (31)	06:29	07:04	06:43	07:21	
	20:52	20:28	29 07:13 (31)	19:38	18:43	16:53	16:27	
4	05:26	05:55	06:43 (31)	06:30	07:05	06:44	07:22	
	20:51	20:27	31 07:14 (31)	19:37	18:41	16:52	16:27	
5	05:27	05:56	06:42 (31)	06:31	07:06	06:46	07:23	
	20:51	20:26	32 07:14 (31)	19:35	18:40	16:50	16:27	
6	05:28	05:57	06:42 (31)	06:33	07:07	06:47	07:24	
	20:51	20:25	32 07:14 (31)	19:33	18:38	16:49	16:26	
7	05:28	05:58	06:42 (31)	06:34	07:09	06:48	07:25	
	20:50	20:23	32 07:14 (31)	19:31	18:36	16:48	16:26	
8	05:29	05:59	06:41 (31)	06:35	07:10	06:50	07:26	
	20:50	20:22	33 07:14 (31)	19:29	18:34	16:47	16:26	
9	05:30	06:00	06:41 (31)	06:36	07:11	06:51	07:27	
	20:50	20:21	33 07:14 (31)	19:28	18:32	16:45	16:26	
10	05:31	06:02	06:41 (31)	06:37	07:12	06:52	07:28	
	20:49	20:19	33 07:14 (31)	19:26	4 07:33 (32)	18:31	16:44	16:26
11	05:31	06:03	06:42 (31)	06:38	07:13	06:54	07:29	
	20:49	20:18	33 07:15 (31)	19:24	12 07:37 (32)	18:29	16:43	16:26
12	05:32	06:04	06:42 (31)	06:39	07:15	06:55	07:30	
	20:48	20:16	32 07:14 (31)	19:22	16 07:39 (32)	18:27	16:42	16:26
13	05:33	06:05	06:42 (31)	06:41	07:16	06:56	07:31	
	20:48	20:15	32 07:14 (31)	19:20	19 07:40 (32)	18:25	16:41	16:26
14	05:34	06:06	06:42 (31)	06:42	07:17	06:58	07:32	
	20:47	20:13	31 07:13 (31)	19:18	21 07:41 (32)	18:24	16:40	16:26
15	05:35	06:07	06:42 (31)	06:43	07:18	06:59	07:32	
	20:47	20:12	30 07:12 (31)	19:16	23 07:41 (32)	18:22	16:39	16:27
16	05:36	06:08	06:43 (31)	06:44	07:18	07:00	07:33	
	20:46	20:10	28 07:11 (31)	19:15	23 07:41 (32)	18:20	16:38	16:27
17	05:36	06:10	06:44 (31)	06:45	07:17	07:02	07:34	
	20:45	20:09	26 07:10 (31)	19:13	24 07:41 (32)	18:19	16:37	16:27
18	05:37	06:11	06:44 (31)	06:46	07:16	07:03	07:34	
	20:44	20:07	24 07:08 (31)	19:11	24 07:40 (32)	18:17	16:36	16:27
19	05:38	06:12	06:45 (31)	06:47	07:16	07:04	07:35	
	20:44	20:06	22 07:07 (31)	19:09	24 07:40 (32)	18:15	16:35	16:28
20	05:39	06:13	06:47 (31)	06:49	07:17	07:05	07:36	
	20:43	20:04	18 07:05 (31)	19:07	23 07:40 (32)	18:14	16:34	16:28
21	05:40	06:14	06:49 (31)	06:50	07:17	07:07	07:36	
	20:42	20:02	13 07:02 (31)	19:05	22 07:39 (32)	18:12	16:34	16:29
22	05:41	06:15	06:51	06:51	07:17	07:08	07:37	
	20:41	20:01	19:03	20 07:37 (32)	18:10	16:33	16:29	
23	05:42	06:16	06:52	06:52	07:18	07:09	07:37	
	20:40	19:57	19:02	18 07:36 (32)	18:09	16:32	16:30	
24	05:43	06:18	06:53	06:53	07:19	07:11	07:38	
	20:39	19:56	19:00	14 07:33 (32)	18:07	16:31	16:30	
25	05:44	06:19	06:54	06:54	07:22	07:12	07:38	
	20:38	9 07:03 (31)	19:54	8 07:30 (32)	18:06	16:31	16:31	
26	05:45	06:52 (31)	06:20	06:56	07:32	07:13	07:38	
	20:37	14 07:06 (31)	19:52	18:56	18:04	16:30	16:31	
27	05:46	06:50 (31)	06:21	06:57	07:34	07:14	07:39	
	20:36	17 07:07 (31)	19:51	18:54	18:03	16:30	16:32	
28	05:47	06:49 (31)	06:22	06:58	07:35	07:15	07:39	
	20:35	20 07:09 (31)	19:49	18:52	18:01	16:29	16:33	
29	05:48	06:48 (31)	06:23	06:59	07:36	07:17	07:39	
	20:34	22 07:10 (31)	19:47	18:50	18:00	16:29	16:34	
30	05:49	06:47 (31)	06:25	07:00	07:38	07:18	07:39	
	20:33	24 07:11 (31)	19:45	18:49	17:58	16:28	16:34	
31	05:50	06:46 (31)	06:26	07:00	07:39	07:18	07:40	
	20:32	26 07:12 (31)	19:44	18:48	17:57	16:27	16:35	
Potential sun hours	469	434	376	342	290	277		
Total, worst case	132	600	295					
Sun reduction	0.63	0.59	0.54					
Oper. time red.	1.00	1.00	1.00					
Wind dir. red.	0.63	0.63	0.56					
Total reduction	0.40	0.37	0.30					
Total, real	52	223	89					

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 77

Licensed user:

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2 Shadow receptor: R-409 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (308)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36	07:23 17:14	08:16 (50) 08:46 (50)	06:43 17:52	07:38 (49) 19:31	05:57 20:06
2	07:40 16:37	07:22 17:15	08:17 (50) 08:46 (50)	06:41 17:53	07:38 (49) 19:32	05:56 20:07
3	07:40 16:38	07:21 17:16	08:17 (50) 08:44 (50)	06:40 17:55	07:38 (49) 19:33	05:54 20:08
4	07:40 16:39	07:20 17:18	08:18 (50) 08:44 (50)	06:38 17:56	07:37 (49) 19:34	05:53 20:10
5	07:40 16:40	07:19 17:19	08:20 (50) 08:43 (50)	06:36 17:57	07:37 (49) 19:36	05:51 20:11
6	07:40 16:41	07:17 17:21	08:22 (50) 08:42 (50)	06:34 17:58	07:37 (49) 19:37	05:50 20:12
7	07:40 16:42	08:19 (50) 08:27 (50)	07:16 17:22	08:23 (50) 18:00	06:33 19:38	05:49 20:13
8	07:39 16:43	08:18 (50) 08:29 (50)	07:15 17:23	08:26 (50) 19:01	07:31 19:39	05:47 20:14
9	07:39 16:44	08:17 (50) 08:32 (50)	07:13 17:25	07:29 19:02	06:33 19:41	05:46 20:16
10	07:39 16:45	08:16 (50) 08:32 (50)	07:12 17:26	07:27 19:04	06:31 19:42	05:45 20:17
11	07:39 16:46	08:16 (50) 08:34 (50)	07:11 17:28	07:25 19:05	06:29 19:43	05:44 20:18
12	07:38 16:48	08:15 (50) 08:35 (50)	07:09 17:29	07:24 19:06	06:28 19:44	05:42 20:19
13	07:38 16:49	08:15 (50) 08:37 (50)	07:08 17:30	07:22 19:07	06:26 19:45	05:41 20:20
14	07:37 16:50	08:14 (50) 08:37 (50)	07:07 17:32	07:20 19:09	06:24 19:47	05:40 20:21
15	07:37 16:51	08:14 (50) 08:39 (50)	07:05 17:33	08:02 (49) 19:10	07:18 19:48	05:39 20:22
16	07:36 16:52	08:13 (50) 08:40 (50)	07:04 17:34	07:56 (49) 19:11	07:16 19:49	05:38 20:24
17	07:36 16:54	08:14 (50) 08:41 (50)	07:02 17:36	07:53 (49) 19:12	07:15 19:50	05:37 20:25
18	07:35 16:55	08:13 (50) 08:42 (50)	07:01 17:37	07:50 (49) 19:13	07:13 19:51	05:36 20:26
19	07:35 16:56	08:13 (50) 08:43 (50)	06:59 17:39	07:49 (49) 19:14	07:11 19:52	05:35 20:27
20	07:34 16:57	08:13 (50) 08:44 (50)	06:58 17:40	07:47 (49) 19:15	07:09 19:53	05:34 20:28
21	07:33 16:59	08:13 (50) 08:44 (50)	06:56 17:41	07:46 (49) 19:16	07:07 19:54	05:33 20:29
22	07:33 17:00	08:13 (50) 08:45 (50)	06:54 17:43	07:44 (49) 19:17	07:06 19:55	05:32 20:30
23	07:32 17:01	08:13 (50) 08:45 (50)	06:53 17:44	07:43 (49) 19:18	07:04 19:56	05:31 20:31
24	07:31 17:03	08:13 (50) 08:45 (50)	06:51 17:45	07:42 (49) 19:19	07:02 19:57	05:29 20:32
25	07:30 17:04	08:13 (50) 08:46 (50)	06:50 17:47	07:41 (49) 19:20	07:00 19:58	05:29 20:33
26	07:29 17:05	08:13 (50) 08:46 (50)	06:48 17:48	07:40 (49) 19:21	06:58 19:59	05:29 20:34
27	07:28 17:07	08:13 (50) 08:46 (50)	06:46 17:49	07:40 (49) 19:22	06:56 19:59	05:28 20:35
28	07:27 17:08	08:14 (50) 08:46 (50)	06:45 17:51	07:39 (49) 19:23	06:55 19:59	05:27 20:36
29	07:26 17:10	08:14 (50) 08:46 (50)	06:45 17:51	07:39 (49) 19:23	06:55 19:59	05:27 20:36
30	07:25 17:11	08:15 (50) 08:46 (50)	06:45 17:51	07:39 (49) 19:23	06:55 19:59	05:27 20:36
31	07:24 17:12	08:15 (50) 08:46 (50)	06:45 17:51	07:39 (49) 19:23	06:55 19:59	05:27 20:36
Potential sun hours	288	293	369	403	457	463
Total, worst case	653	694	850			
Sun reduction	0.33	0.39	0.47			
Oper. time red.	1.00	1.00	1.00			
Wind dir. red.	0.50	0.50	0.51			
Total reduction	0.16	0.20	0.24			
Total, real	107	136	202			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 78

Licensed user:

**EDR**

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-409 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (308)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25 20:52	05:51 20:31	06:27 19:42	07:01 18:47	08:17 (49) 16:55	07:19 16:28
2	05:25 20:52	05:53 20:30	06:28 19:40	07:03 18:45	08:16 (49) 16:54	07:20 16:27
3	05:26 20:52	05:54 20:28	06:29 19:38	07:04 18:43	08:16 (49) 16:53	07:21 16:27
4	05:26 20:51	05:55 20:27	06:30 19:37	07:05 18:41	08:15 (49) 16:51	07:22 16:27
5	05:27 20:51	05:56 20:26	06:31 19:35	07:06 18:39	08:14 (49) 16:50	07:23 16:26
6	05:28 20:51	05:57 20:25	06:32 19:33	07:07 18:38	08:13 (49) 16:49	07:24 16:26
7	05:28 20:51	05:58 20:23	06:34 19:31	07:09 18:36	08:13 (49) 16:48	07:25 16:26
8	05:29 20:50	05:59 20:22	06:35 19:29	07:10 18:34	08:13 (49) 16:46	07:26 16:26
9	05:30 20:50	06:00 20:21	06:36 19:27	07:11 18:32	08:12 (49) 16:45	07:27 16:26
10	05:30 20:49	06:02 20:19	06:37 19:26	07:12 18:31	08:11 (49) 16:44	07:28 16:26
11	05:31 20:49	06:03 20:18	06:38 19:24	07:13 18:29	08:12 (49) 16:43	07:29 16:26
12	05:32 20:48	06:04 20:16	06:39 19:22	07:15 18:27	08:12 (49) 16:42	07:30 16:26
13	05:33 20:48	06:05 20:15	06:40 19:20	07:16 18:25	08:12 (49) 16:41	07:31 16:26
14	05:34 20:47	06:06 20:13	06:42 19:18	07:17 18:24	08:11 (49) 16:40	07:32 16:26
15	05:35 20:47	06:07 20:12	06:43 19:16	07:18 18:22	08:12 (49) 16:39	07:32 16:26
16	05:35 20:46	06:08 20:10	06:44 19:15	07:20 18:20	08:12 (49) 16:38	07:33 16:26
17	05:36 20:45	06:10 20:09	06:45 19:13	07:21 18:19	08:13 (49) 16:37	07:34 16:26
18	05:37 20:44	06:11 20:07	06:46 19:11	07:22 18:17	08:14 (49) 16:36	07:34 16:26
19	05:38 20:44	06:12 20:06	06:47 19:09	07:23 18:15	08:14 (49) 16:35	07:35 16:26
20	05:39 20:43	06:13 20:04	06:48 19:07	07:25 18:14	08:15 (49) 16:34	07:36 16:26
21	05:40 20:42	06:14 20:02	06:50 19:05	07:26 18:12	08:17 (49) 16:33	07:36 16:26
22	05:41 20:41	06:15 20:01	06:51 19:03	07:27 18:10	08:18 (49) 16:33	07:37 16:26
23	05:42 20:40	06:16 19:57	06:52 19:02	08:37 (49) 18:09	07:29 16:32	07:37 16:26
24	05:43 20:39	06:18 19:56	06:53 19:00	08:32 (49) 18:07	07:11 16:31	07:38 16:26
25	05:44 20:38	06:19 19:54	06:54 18:58	08:28 (49) 18:06	07:12 16:31	07:38 16:26
26	05:45 20:37	06:20 19:52	06:55 18:56	08:25 (49) 18:04	07:13 16:30	07:38 16:26
27	05:46 20:36	06:21 19:51	06:57 18:54	08:24 (49) 18:03	07:14 16:30	07:39 16:26
28	05:47 20:35	06:22 19:49	06:58 18:52	08:22 (49) 18:01	07:15 16:29	07:39 16:26
29	05:48 20:34	06:23 19:47	06:59 18:50	08:20 (49) 18:00	07:17 16:29	07:39 16:26
30	05:49 20:33	06:24 19:45	07:00 18:49	08:19 (49) 17:58	07:18 16:28	07:40 16:26
31	05:50 20:32	06:26 19:44		07:39 17:57		07:40 16:35
Potential sun hours	469	434	376	342	290	277
Total, worst case			238	1139	771	72
Sun reduction			0.54	0.44	0.27	0.25
Oper. time red.			1.00	1.00	1.00	1.00
Wind dir. red.			0.51	0.51	0.50	0.50
Total reduction			0.27	0.22	0.13	0.12
Total, real			65	253	103	9

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 79

Licensed user:

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(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2 Shadow receptor: R-410 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (309)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36 35	14:56 (50) 07:23 15:31 (50) 17:14	06:43 17:52 34	16:40 (49) 06:47 17:14 (49) 19:31	05:57 20:06	05:25 20:39
2	07:40 16:37 36	14:56 (50) 07:22 15:32 (50) 17:15	06:41 17:53 34	16:40 (49) 06:45 17:14 (49) 19:32	05:56 20:07	05:24 20:40
3	07:40 16:38 35	14:57 (50) 07:21 15:32 (50) 17:16	06:39 17:55 34	16:40 (49) 06:44 17:14 (49) 19:33	05:54 20:08	05:24 20:41
4	07:40 16:39 34	14:58 (50) 07:20 15:32 (50) 17:18	06:38 17:56 33	16:40 (49) 06:42 17:13 (49) 19:34	05:53 20:10	05:23 20:42
5	07:40 16:40 34	14:59 (50) 07:18 15:33 (50) 17:19	06:36 17:57 32	16:40 (49) 06:40 17:12 (49) 19:36	05:51 20:11	05:23 20:43
6	07:40 16:41 34	14:59 (50) 07:17 15:33 (50) 17:21	06:34 17:58 31	16:41 (49) 06:38 17:12 (49) 19:37	05:50 20:12	05:22 20:43
7	07:40 16:42 33	14:59 (50) 07:16 15:32 (50) 17:22	06:33 18:00 29	16:42 (49) 06:36 17:11 (49) 19:38	05:49 20:13	05:22 20:44
8	07:39 16:43 33	15:00 (50) 07:15 15:33 (50) 17:23	07:31 19:01 26	17:43 (49) 06:35 18:09 (49) 19:39	05:47 20:14	05:22 20:45
9	07:39 16:44 31	15:02 (50) 07:13 15:33 (50) 17:25	07:29 19:02 23	17:44 (49) 06:33 18:07 (49) 19:41	05:46 20:16	05:21 20:46
10	07:39 16:45 31	15:02 (50) 07:12 15:33 (50) 17:26	07:27 19:04 20	17:45 (49) 06:31 18:05 (49) 19:42	05:45 20:17	05:21 20:46
11	07:39 16:46 30	15:03 (50) 07:11 15:33 (50) 17:28	07:25 19:05 15	17:48 (49) 06:29 18:03 (49) 19:43	05:44 20:18	05:21 20:47
12	07:38 16:48 28	15:04 (50) 07:09 15:32 (50) 17:29	07:24 19:06 6	17:52 (49) 06:28 17:58 (49) 19:44	05:42 20:19	05:21 20:47
13	07:38 16:49 27	15:05 (50) 07:08 15:32 (50) 17:30	07:22 19:07	06:26 19:45	05:41 20:20	05:21 20:48
14	07:37 16:50 26	15:06 (50) 07:06 15:32 (50) 17:32	07:20 19:09	06:24 19:47	05:40 20:21	05:21 20:48
15	07:37 16:51 24	15:08 (50) 07:05 15:32 (50) 17:33	07:18 19:10	06:22 19:48	05:39 20:22	05:21 20:49
16	07:36 16:52 22	15:09 (50) 07:04 15:31 (50) 17:34	07:16 19:11	06:21 19:49	05:38 20:24	05:21 20:49
17	07:36 16:54 20	15:11 (50) 07:02 15:31 (50) 17:36	07:15 19:12	06:19 19:50	05:37 20:25	05:21 20:50
18	07:35 16:55 16	15:13 (50) 07:01 15:29 (50) 17:37	16:57 (49) 07:13 16:59 (49) 19:14	06:17 19:51	05:36 20:26	05:21 20:50
19	07:35 16:56 12	15:15 (50) 06:59 15:27 (50) 17:39	16:52 (49) 07:11 17:05 (49) 19:15	06:16 19:53	05:35 20:27	05:21 20:50
20	07:34 16:57 4	15:19 (50) 06:58 15:23 (50) 17:40	16:48 (49) 07:09 17:07 (49) 19:16	06:14 19:54	05:34 20:28	05:21 20:51
21	07:33 16:59	06:56 17:41 23	16:47 (49) 07:07 17:10 (49) 19:17	06:12 19:55	05:33 20:29	05:21 20:51
22	07:32 17:00	06:54 17:43 26	16:45 (49) 07:05 17:11 (49) 19:19	06:11 19:56	05:32 20:30	05:21 20:51
23	07:32 17:01	06:53 17:44 27	16:44 (49) 07:04 17:11 (49) 19:20	06:09 19:58	05:31 20:31	05:21 20:52
24	07:31 17:03	06:51 17:45 30	16:43 (49) 07:02 17:13 (49) 19:21	06:08 19:59	05:30 20:32	05:22 20:52
25	07:30 17:04	06:50 17:47 31	16:42 (49) 07:00 17:13 (49) 19:22	06:06 20:00	05:29 20:33	05:22 20:52
26	07:29 17:05	06:48 17:48 32	16:41 (49) 06:58 17:13 (49) 19:23	06:04 20:00	05:29 20:34	05:22 20:52
27	07:28 17:07	06:46 17:49 33	16:41 (49) 06:56 17:14 (49) 19:25	06:03 20:01	05:28 20:35	05:23 20:52
28	07:27 17:08	06:45 17:51 34	16:40 (49) 06:55 17:14 (49) 19:26	06:01 20:02	05:27 20:36	05:23 20:52
29	07:26 17:10		06:53 19:27	06:00 20:04	05:26 20:37	05:24 20:52
30	07:25 17:11		06:51 19:28	05:58 20:05	05:26 20:38	05:24 20:52
31	07:24 17:12		06:49 19:30		05:25 20:39	
Potential sun hours	288	293	369	403	457	463
Total, worst case	545	270	317			
Sun reduction	0.33	0.39	0.47			
Oper. time red.	1.00	1.00	1.00			
Wind dir. red.	0.76	0.67	0.67			
Total reduction	0.26	0.26	0.32			
Total, real	140	71	101			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 80

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**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-410 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (309)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25	05:51	06:27	07:01	06:40	07:19
	20:52	20:31	19:42	18:47	16:55	16:28
2	05:25	05:53	06:28	07:02	17:27 (49)	06:42
	20:52	20:30	19:40	18:45	12 17:39 (49)	16:54
3	05:26	05:54	06:29	07:04	17:25 (49)	06:43
	20:52	20:28	19:38	18:43	18 17:43 (49)	16:53
4	05:26	05:55	06:30	07:05	17:22 (49)	06:44
	20:51	20:27	19:37	18:41	22 17:44 (49)	16:51
5	05:27	05:56	06:31	07:06	17:20 (49)	06:46
	20:51	20:26	19:35	18:39	25 17:45 (49)	16:50
6	05:28	05:57	06:32	07:07	17:18 (49)	06:47
	20:51	20:25	19:33	18:38	28 17:46 (49)	16:49
7	05:28	05:58	06:34	07:08	17:18 (49)	06:48
	20:50	20:23	19:31	18:36	29 17:47 (49)	16:48
8	05:29	05:59	06:35	07:10	17:16 (49)	06:50
	20:50	20:22	19:29	18:34	31 17:47 (49)	16:46
9	05:30	06:00	06:36	07:11	17:15 (49)	06:51
	20:50	20:20	19:27	18:32	33 17:48 (49)	16:45
10	05:30	06:01	06:37	07:12	17:14 (49)	06:52
	20:49	20:19	19:26	18:31	33 17:47 (49)	16:44
11	05:31	06:03	06:38	07:13	17:14 (49)	06:54
	20:49	20:18	19:24	18:29	34 17:48 (49)	16:43
12	05:32	06:04	06:39	07:15	17:14 (49)	06:55
	20:48	20:16	19:22	18:27	34 17:48 (49)	16:42
13	05:33	06:05	06:40	07:16	17:13 (49)	06:56
	20:48	20:15	19:20	18:25	34 17:47 (49)	16:41
14	05:34	06:06	06:42	07:17	17:13 (49)	06:58
	20:47	20:13	19:18	18:24	33 17:46 (49)	16:40
15	05:34	06:07	06:43	07:18	17:14 (49)	06:59
	20:47	20:12	19:16	18:22	33 17:47 (49)	16:39
16	05:35	06:08	06:44	07:20	17:14 (49)	07:00
	20:46	20:10	19:15	18:20	32 17:46 (49)	16:38
17	05:36	06:09	06:45	07:21	17:14 (49)	07:02
	20:45	20:09	19:13	18:19	30 17:44 (49)	16:37
18	05:37	06:11	06:46	07:22	17:15 (49)	07:03
	20:44	20:07	19:11	18:17	29 17:44 (49)	16:36
19	05:38	06:12	06:47	07:23	17:15 (49)	07:04
	20:44	20:06	19:09	18:15	28 17:43 (49)	16:35
20	05:39	06:13	06:48	07:25	17:16 (49)	07:05
	20:43	20:04	19:07	18:14	25 17:41 (49)	16:34
21	05:40	06:14	06:50	07:26	17:18 (49)	07:07
	20:42	20:02	19:05	18:12	22 17:40 (49)	16:33
22	05:41	06:15	06:51	07:27	17:20 (49)	07:08
	20:41	20:01	19:03	18:10	17 17:37 (49)	16:33
23	05:42	06:16	06:52	07:28	17:22 (49)	07:09
	20:40	19:57	19:01	18:09	12 17:34 (49)	16:32
24	05:43	06:17	06:53	07:30	07:10	14:56 (50)
	20:39	19:56	19:00	18:07	16 15:00 (50)	16:29
25	05:44	06:19	06:54	07:31	07:12	14:52 (50)
	20:38	19:54	18:58	18:06	16:31	15:07 (50)
26	05:45	06:20	06:55	07:32	07:13	14:48 (50)
	20:37	19:52	18:56	18:04	22 15:10 (50)	16:31
27	05:46	06:21	06:57	07:34	07:14	14:47 (50)
	20:36	19:51	18:54	18:03	24 15:11 (50)	16:32
28	05:47	06:22	06:58	07:35	07:15	14:46 (50)
	20:35	19:49	18:52	18:01	26 15:12 (50)	16:33
29	05:48	06:23	06:59	07:36	07:17	14:46 (50)
	20:34	19:47	18:50	18:00	27 15:13 (50)	16:33
30	05:49	06:24	07:00	07:38	07:18	14:46 (50)
	20:33	19:45	18:49	17:58	28 15:14 (50)	16:34
31	05:50	06:26	07:03	07:39	07:40	14:45 (50)
	20:32	19:44	18:47	17:57	16:35	15:31 (50)
Potential sun hours	469	434	376	342	290	277
Total, worst case				594	178	1088
Sun reduction				0.44	0.27	0.25
Oper. time red.				1.00	1.00	1.00
Wind dir. red.				0.67	0.76	0.76
Total reduction				0.30	0.21	0.19
Total, real				177	37	211

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 81

Licensed user:

**EDR**

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-42 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (27)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December	
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	05:57 20:06	05:25 20:40	18:59 (55) 20:52	05:51 20:31	19:23 (55) 19:41 (55)	06:27 19:42	07:01 18:47	06:40 16:55	07:19 16:28
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	05:55 20:07	05:24 20:40	18:59 (55) 20:52	05:52 20:30	19:27 (55) 19:37 (55)	06:28 19:40	07:02 18:45	06:42 16:54	07:20 16:27
3	07:40 16:38	07:21 17:16	06:39 17:54	06:44 19:33	05:54 20:08	05:23 20:41	18:59 (55) 20:52	05:54 20:28	19:05 (55) 19:54 (55)	06:29 19:38	07:04 18:43	06:43 16:53	07:21 16:27
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:34	05:53 20:10	05:23 20:42	18:59 (55) 20:51	05:55 20:27	19:05 (55) 19:53 (55)	06:30 19:37	07:05 18:41	06:44 16:51	07:22 16:27
5	07:40 16:40	07:19 17:19	06:36 17:57	06:40 19:36	05:51 20:11	05:23 20:43	18:59 (55) 20:51	05:56 20:26	19:05 (55) 19:54 (55)	06:31 19:35	07:06 18:39	06:46 16:50	07:23 16:26
6	07:40 16:41	07:17 17:21	06:34 17:58	06:38 19:37	05:50 20:12	05:22 20:44	19:00 (55) 20:51	05:57 20:25	19:06 (55) 19:54 (55)	06:32 19:33	07:07 18:38	06:47 16:49	07:24 16:26
7	07:40 16:42	07:16 17:22	06:33 18:00	06:36 19:38	05:49 20:13	05:22 20:44	18:59 (55) 20:51	05:58 20:23	19:05 (55) 19:54 (55)	06:34 19:31	07:09 18:36	06:48 16:48	07:25 16:26
8	07:39 16:43	07:15 17:23	07:31 19:01	06:35 19:39	05:47 20:14	05:22 20:45	18:59 (55) 20:50	05:59 20:22	19:06 (55) 19:54 (55)	06:35 19:29	07:10 18:34	06:50 16:46	07:26 16:26
9	07:39 16:44	07:13 17:25	07:29 19:02	06:33 19:41	05:46 20:16	05:21 20:46	19:00 (55) 20:50	06:00 20:21	19:06 (55) 19:55 (55)	06:36 19:27	07:11 18:32	06:51 16:45	07:27 16:26
10	07:39 16:45	07:12 17:26	07:27 19:04	06:31 19:42	05:45 20:17	05:21 20:46	19:00 (55) 20:49	06:01 20:21	19:06 (55) 19:54 (55)	06:37 19:26	07:12 18:31	06:52 16:44	07:28 16:26
11	07:39 16:46	07:11 17:28	07:25 19:05	06:29 19:43	05:43 20:18	19:14 (55) 20:47	19:00 (55) 20:49	06:03 20:18	19:06 (55) 19:54 (55)	06:38 19:24	07:13 18:29	06:54 16:43	07:29 16:26
12	07:38 16:47	07:09 17:29	07:24 19:06	06:28 19:44	05:42 20:19	19:11 (55) 20:47	19:00 (55) 20:48	06:04 20:16	19:07 (55) 19:54 (55)	06:39 19:22	07:15 18:27	06:55 16:42	07:30 16:26
13	07:38 16:49	07:08 17:30	07:22 19:07	06:26 19:45	05:41 20:20	19:09 (55) 20:48	19:00 (55) 20:48	06:05 20:15	19:07 (55) 19:55 (55)	06:40 19:20	07:16 18:25	06:56 16:41	07:31 16:26
14	07:37 16:50	07:07 17:32	07:20 19:09	06:24 19:47	05:40 20:21	19:08 (55) 20:48	19:00 (55) 20:47	06:06 20:13	19:07 (55) 19:54 (55)	06:42 19:18	07:17 18:24	06:58 16:40	07:32 16:26
15	07:37 16:51	07:05 17:33	07:18 19:10	06:22 19:48	05:39 20:22	19:06 (55) 20:49	19:01 (55) 20:46	06:07 20:12	19:07 (55) 19:54 (55)	06:43 19:16	07:18 18:22	06:59 16:39	07:32 16:26
16	07:36 16:52	07:04 17:34	07:16 19:11	06:21 19:49	05:38 20:23	19:05 (55) 20:49	19:01 (55) 20:46	06:08 20:10	19:08 (55) 19:54 (55)	06:44 19:15	07:20 18:20	07:00 16:38	07:33 16:27
17	07:36 16:54	07:02 17:36	07:15 19:12	06:19 19:50	05:37 20:24	19:04 (55) 20:50	19:01 (55) 20:45	06:09 20:09	19:08 (55) 19:54 (55)	06:45 19:13	07:21 18:18	07:02 16:37	07:34 16:27
18	07:35 16:55	07:01 17:37	07:13 19:14	06:17 19:52	05:36 20:25	19:03 (55) 20:50	19:01 (55) 20:45	06:11 20:07	19:09 (55) 19:54 (55)	06:46 19:11	07:22 18:17	07:03 16:36	07:34 16:27
19	07:35 16:56	06:59 17:39	07:11 19:15	06:16 19:53	05:35 20:26	19:02 (55) 20:51	19:02 (55) 20:44	06:12 20:06	19:09 (55) 19:53 (55)	06:47 19:09	07:23 18:15	07:04 16:35	07:35 16:28
20	07:34 16:57	06:58 17:40	07:09 19:16	06:14 19:54	05:34 20:27	19:02 (55) 20:51	19:02 (55) 20:43	06:13 20:04	19:10 (55) 19:53 (55)	06:48 19:07	07:25 18:14	07:05 16:34	07:36 16:28
21	07:33 16:59	06:56 17:41	07:07 19:17	06:12 19:55	05:33 20:28	19:01 (55) 20:51	19:02 (55) 20:42	06:14 20:02	19:11 (55) 19:53 (55)	06:50 19:05	07:26 18:12	07:07 16:33	07:36 16:28
22	07:33 17:00	06:54 17:43	07:05 19:19	06:11 19:56	05:32 20:30	19:00 (55) 20:51	19:02 (55) 20:41	06:15 20:01	19:11 (55) 19:52 (55)	06:51 19:03	07:27 18:10	07:08 16:33	07:37 16:29
23	07:32 17:01	06:53 17:44	07:04 19:20	06:09 19:58	05:31 20:31	19:00 (55) 20:52	19:02 (55) 20:40	06:16 19:57	19:12 (55) 19:52 (55)	06:52 19:01	07:29 18:09	07:09 16:32	07:37 16:29
24	07:31 17:03	06:51 17:45	07:02 19:21	06:08 19:59	05:30 20:32	19:00 (55) 20:52	19:03 (55) 20:39	06:17 19:56	19:13 (55) 19:51 (55)	06:53 19:00	07:30 18:07	07:11 16:31	07:38 16:30
25	07:30 17:04	06:50 17:47	07:00 19:22	06:06 20:00	05:29 20:33	19:00 (55) 20:52	19:03 (55) 20:38	06:19 19:54	19:13 (55) 19:51 (55)	06:54 18:58	07:31 18:06	07:12 16:31	07:38 16:31
26	07:29 17:05	06:48 17:48	06:58 19:23	06:04 20:00	05:28 20:34	18:59 (55) 20:52	19:03 (55) 20:37	06:20 19:52	19:14 (55) 19:50 (55)	06:55 18:56	07:32 18:04	07:13 16:30	07:38 16:31
27	07:28 17:07	06:46 17:49	06:56 19:25	06:03 20:01	05:28 20:35	18:59 (55) 20:52	19:04 (55) 20:36	06:21 19:51	19:15 (55) 19:49 (55)	06:57 18:54	07:34 18:03	07:14 16:29	07:39 16:32
28	07:27 17:08	06:45 17:51	06:54 19:26	06:01 20:02	05:27 20:36	18:59 (55) 20:52	19:03 (55) 20:35	06:22 19:49	19:16 (55) 19:48 (55)	06:58 18:52	07:35 18:01	07:15 16:29	07:39 16:33
29	07:26 17:09	06:45 17:52	06:53 19:27	06:00 20:04	05:26 20:37	18:59 (55) 20:52	19:04 (55) 20:34	06:23 19:47	19:18 (55) 19:46 (55)	06:59 18:50	07:36 18:00	07:17 16:28	07:39 16:33
30	07:25 17:11	06:45 17:53	06:51 19:28	05:58 20:05	05:26 20:38	18:59 (55) 20:52	19:04 (55) 20:33	06:24 19:45	19:19 (55) 19:45 (55)	07:00 18:49	07:38 17:58	07:18 16:28	07:40 16:34
31	07:24 17:12	06:46 17:54	06:49 19:30	05:57 20:06	05:25 20:39	18:59 (55) 20:53	19:05 (55) 20:32	06:25 19:44	19:21 (55) 19:43 (55)	07:01 18:49	07:39 17:57	07:19 16:28	07:40 16:35
Potential sun hours	288	293	369	403	457	463	469	434	376	341	290	277	
Total, worst case					786	1464	1323	28					
Sun reduction					0.55	0.59	0.63	0.59					
Oper. time red.					1.00	1.00	1.00	1.00					
Wind dir. red.					0.51	0.51	0.51	0.51					
Total reduction					0.28	0.30	0.32	0.30					
Total, real					221	442	426	8					

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)



Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 82

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-44 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (353)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40	15:18 (47)	07:23	06:43	06:47	05:57
	16:36	33 15:51 (47)	17:14	17:52	19:31	20:06
2	07:40	15:18 (47)	07:22	06:41	06:45	05:55
	16:37	34 15:52 (47)	17:15	17:53	19:32	20:07
3	07:40	15:19 (47)	07:21	06:39	06:44	05:54
	16:38	33 15:52 (47)	17:16	17:54	19:33	20:08
4	07:40	15:19 (47)	07:20	06:38	06:42	05:53
	16:39	34 15:53 (47)	17:18	17:56	19:34	20:10
5	07:40	15:19 (47)	07:18	06:36	06:40	05:51
	16:40	35 15:54 (47)	17:19	17:57	19:36	20:11
6	07:40	15:20 (47)	07:17	06:34	06:38	05:50
	16:41	35 15:55 (47)	17:21	17:58	19:37	20:12
7	07:40	15:20 (47)	07:16	06:33	06:36	05:49
	16:42	34 15:54 (47)	17:22	18:00	19:38	20:13
8	07:39	15:20 (47)	07:15	07:31	06:35	05:47
	16:43	35 15:55 (47)	17:23	19:01	19:39	20:14
9	07:39	15:21 (47)	07:13	07:29	06:33	05:46
	16:44	35 15:56 (47)	17:25	19:02	19:41	20:16
10	07:39	15:20 (47)	07:12	07:27	06:31	05:45
	16:45	36 15:56 (47)	17:26	19:04	19:42	20:17
11	07:39	15:21 (47)	07:11	07:25	06:29	05:44
	16:46	36 15:57 (47)	17:28	19:05	19:43	20:18
12	07:38	15:22 (47)	07:09	07:24	06:28	05:42
	16:48	36 15:58 (47)	17:29	19:06	19:44	20:19
13	07:38	15:22 (47)	07:08	07:22	18:26 (53)	06:26
	16:49	35 15:57 (47)	17:30	19:07	8 18:34 (53)	19:45
14	07:37	15:22 (47)	07:07	07:20	18:22 (53)	06:24
	16:50	35 15:57 (47)	17:32	19:09	15 18:37 (53)	19:47
15	07:37	15:23 (47)	07:05	07:18	18:20 (53)	06:22
	16:51	35 15:58 (47)	17:33	19:10	19 18:39 (53)	19:48
16	07:36	15:23 (47)	07:04	07:16	18:18 (53)	06:21
	16:52	35 15:58 (47)	17:34	19:11	22 18:40 (53)	19:49
17	07:36	15:24 (47)	07:02	07:15	18:17 (53)	06:19
	16:54	35 15:59 (47)	17:36	19:12	25 18:42 (53)	19:50
18	07:35	15:24 (47)	07:01	07:13	18:16 (53)	06:17
	16:55	35 15:59 (47)	17:37	19:14	26 18:42 (53)	19:52
19	07:35	15:25 (47)	06:59	07:11	18:14 (53)	06:16
	16:56	34 15:59 (47)	17:39	19:15	28 18:42 (53)	19:53
20	07:34	15:26 (47)	06:58	07:09	18:14 (53)	06:14
	16:57	33 15:59 (47)	17:40	19:16	28 18:42 (53)	19:54
21	07:33	15:26 (47)	06:56	07:07	18:13 (53)	06:12
	16:59	33 15:59 (47)	17:41	19:17	29 18:42 (53)	19:55
22	07:33	15:27 (47)	06:54	07:05	18:12 (53)	06:11
	17:00	32 15:59 (47)	17:43	19:19	30 18:42 (53)	19:56
23	07:32	15:28 (47)	06:53	07:04	18:13 (53)	06:09
	17:01	30 15:58 (47)	17:44	19:20	29 18:42 (53)	19:58
24	07:31	15:29 (47)	06:51	07:02	18:13 (53)	06:08
	17:03	29 15:58 (47)	17:45	19:21	29 18:42 (53)	19:59
25	07:30	15:30 (47)	06:50	07:00	18:13 (53)	06:06
	17:04	27 15:57 (47)	17:47	19:22	28 18:41 (53)	20:00
26	07:29	15:31 (47)	06:48	06:58	18:13 (53)	06:04
	17:05	26 15:57 (47)	17:48	19:23	27 18:40 (53)	20:00
27	07:28	15:32 (47)	06:46	06:56	18:13 (53)	06:03
	17:07	24 15:56 (47)	17:49	19:25	25 18:38 (53)	20:01
28	07:27	15:34 (47)	06:45	06:54	18:14 (53)	06:01
	17:08	21 15:55 (47)	17:51	19:26	23 18:37 (53)	20:02
29	07:26	15:36 (47)	06:43	06:53	18:16 (53)	06:00
	17:09	18 15:54 (47)	17:52	19:27	20 18:36 (53)	20:04
30	07:25	15:38 (47)	06:41	06:51	18:18 (53)	05:58
	17:11	14 15:52 (47)	17:53	19:28	15 18:33 (53)	20:05
31	07:24	15:43 (47)	06:39	06:49	18:20 (53)	05:56
	17:12	4 15:47 (47)	17:54	19:30	10 18:30 (53)	20:06
Potential sun hours	288	293	369	403	457	463
Total, worst case	951		436	290		20
Sun reduction	0.33		0.47	0.49		0.55
Oper. time red.	1.00		1.00	1.00		1.00
Wind dir. red.	0.75		0.61	0.52		0.52
Total reduction	0.26		0.30	0.26		0.30
Total, real	246		130	77		6

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 83

Licensed user:

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-44 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (353)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December	
1	05:25 20:52	05:51 20:31	06:27 19:42	07:01 18:47	06:40 16:55	07:19 16:28	15:03 (47) 36 15:39 (47)
2	05:25 20:52	05:52 20:30	06:28 19:40	07:02 18:45	06:42 16:54	07:20 16:27	15:03 (47) 36 15:39 (47)
3	05:26 20:52	05:54 20:28	06:29 19:38	07:04 18:43	06:43 16:53	07:21 16:27	15:04 (47) 35 15:39 (47)
4	05:26 20:51	05:55 20:27	06:30 19:37	07:05 18:41	06:44 16:51	07:22 16:27	15:04 (47) 35 15:39 (47)
5	05:27 20:51	05:56 20:26	06:31 19:35	07:06 18:39	06:46 16:50	07:23 16:26	15:05 (47) 34 15:39 (47)
6	05:27 20:51	05:57 20:25	06:32 19:33	07:07 18:38	06:47 16:49	07:24 16:26	15:06 (47) 35 15:41 (47)
7	05:28 20:51	05:58 20:23	06:34 19:31	07:08 18:36	06:48 16:48	07:25 16:26	15:07 (47) 34 15:41 (47)
8	05:29 20:50	05:59 20:22	06:35 19:29	07:10 18:34	06:50 16:46	07:26 16:26	15:07 (47) 34 15:41 (47)
9	05:30 20:50	06:00 20:21	06:36 19:27	07:11 18:32	06:51 16:45	07:27 16:26	15:08 (47) 33 15:41 (47)
10	05:30 20:49	06:01 20:19	06:37 19:26	07:12 18:31	06:52 16:44	07:28 16:26	15:07 (47) 34 15:41 (47)
11	05:31 20:49	06:03 20:18	19:18 (52) 06:38 19:27 (52) 19:24	07:13 18:29	06:54 16:43	15:14 (47) 07:29 15:19 (47) 16:26	15:08 (47) 33 15:41 (47)
12	05:32 20:48	06:04 20:16	19:16 (52) 06:39 19:29 (52) 19:22	18:12 (53) 07:15 18:20 (53) 18:27	06:55 16:42	15:10 (47) 07:30 15:24 (47) 16:26	15:09 (47) 33 15:42 (47)
13	05:33 20:48	06:05 20:15	19:15 (52) 06:40 19:31 (52) 19:20	18:09 (53) 07:16 18:24 (53) 18:25	06:56 16:41	15:08 (47) 07:31 15:26 (47) 16:26	15:09 (47) 33 15:42 (47)
14	05:34 20:47	06:06 20:13	19:14 (52) 06:42 19:32 (52) 19:18	18:07 (53) 07:17 18:26 (53) 18:24	06:58 16:40	15:06 (47) 07:32 15:27 (47) 16:26	15:10 (47) 33 15:43 (47)
15	05:34 20:47	06:07 20:12	19:12 (52) 06:43 19:33 (52) 19:16	18:05 (53) 07:18 18:27 (53) 18:22	06:59 16:39	15:05 (47) 07:32 15:29 (47) 16:26	15:11 (47) 32 15:43 (47)
16	05:35 20:46	06:08 20:10	19:12 (52) 06:44 19:33 (52) 19:15	18:03 (53) 07:20 18:28 (53) 18:20	07:00 16:38	15:04 (47) 07:33 15:30 (47) 16:27	15:11 (47) 32 15:43 (47)
17	05:36 20:45	06:09 20:09	19:11 (52) 06:45 19:33 (52) 19:13	18:01 (53) 07:21 18:28 (53) 18:18	07:02 16:37	15:04 (47) 07:34 15:31 (47) 16:27	15:12 (47) 32 15:44 (47)
18	05:37 20:44	06:11 20:07	19:10 (52) 06:46 19:33 (52) 19:11	18:00 (53) 07:22 18:28 (53) 18:17	07:03 16:36	15:03 (47) 07:34 15:32 (47) 16:27	15:13 (47) 31 15:44 (47)
19	05:38 20:44	06:12 20:06	19:10 (52) 06:47 19:33 (52) 19:09	17:59 (53) 07:23 18:28 (53) 18:15	07:04 16:35	15:02 (47) 07:35 15:32 (47) 16:28	15:13 (47) 31 15:44 (47)
20	05:39 20:43	06:13 20:04	19:09 (52) 06:48 19:33 (52) 19:07	17:58 (53) 07:25 18:28 (53) 18:14	07:05 16:34	15:02 (47) 07:36 15:34 (47) 16:28	15:13 (47) 32 15:45 (47)
21	05:40 20:42	06:14 20:02	19:09 (52) 06:50 19:32 (52) 19:05	17:59 (53) 07:26 18:28 (53) 18:12	07:07 16:33	15:01 (47) 07:36 15:34 (47) 16:28	15:13 (47) 32 15:45 (47)
22	05:41 20:41	06:15 20:01	19:09 (52) 06:51 19:31 (52) 19:03	17:58 (53) 07:27 18:28 (53) 18:10	07:08 16:33	15:02 (47) 07:37 15:35 (47) 16:29	15:14 (47) 32 15:46 (47)
23	05:42 20:40	06:16 19:57	19:10 (52) 06:52 19:30 (52) 19:01	17:58 (53) 07:28 18:27 (53) 18:09	07:09 16:32	15:02 (47) 07:37 15:36 (47) 16:29	15:14 (47) 32 15:46 (47)
24	05:43 20:39	06:17 19:56	19:11 (52) 06:53 19:30 (52) 19:00	17:58 (53) 07:30 18:26 (53) 18:07	07:11 16:31	15:01 (47) 07:38 15:36 (47) 16:30	15:16 (47) 31 15:47 (47)
25	05:44 20:38	06:19 19:54	19:12 (52) 06:54 19:29 (52) 18:58	17:58 (53) 07:31 18:25 (53) 18:06	07:12 16:31	15:02 (47) 07:38 15:37 (47) 16:31	15:16 (47) 31 15:47 (47)
26	05:45 20:37	06:20 19:52	19:13 (52) 06:55 19:27 (52) 18:56	17:58 (53) 07:32 18:24 (53) 18:04	07:13 16:30	15:02 (47) 07:38 15:37 (47) 16:31	15:16 (47) 31 15:47 (47)
27	05:46 20:36	06:21 19:51	19:15 (52) 06:57 19:24 (52) 18:54	17:59 (53) 07:34 18:22 (53) 18:03	07:14 16:29	15:02 (47) 07:39 15:37 (47) 16:32	15:16 (47) 32 15:48 (47)
28	05:47 20:35	06:22 19:49	06:58 18:52	18:01 (53) 07:35 18:21 (53) 18:01	07:15 16:29	15:02 (47) 07:39 15:37 (47) 16:33	15:17 (47) 32 15:49 (47)
29	05:48 20:34	06:23 19:47	06:59 18:50	18:02 (53) 07:36 18:19 (53) 18:00	07:17 16:28	15:03 (47) 07:39 15:39 (47) 16:33	15:17 (47) 33 15:50 (47)
30	05:49 20:33	06:24 19:45	07:00 18:49	18:04 (53) 07:38 18:15 (53) 17:58	07:18 16:28	15:03 (47) 07:40 15:39 (47) 16:34	15:17 (47) 33 15:50 (47)
31	05:50 20:32	06:26 19:44	07:01 17:57	18:15 (53) 07:39 17:57	07:19 16:28	15:04 (47) 07:40 16:35	15:18 (47) 32 15:50 (47)
Potential sun hours	469	434	376	341	290	277	1019
Total, worst case		314	443		573		
Sun reduction		0.59	0.54		0.27		0.25
Oper. time red.		1.00	1.00		1.00		1.00
Wind dir. red.		0.52	0.61		0.75		0.75
Total reduction		0.32	0.34		0.21		0.20
Total, real		100	152		121		200

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 84

Licensed user:

EDR

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US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-45 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (29)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June			
1	07:40	07:23	15:47 (47)	06:43	06:47	18:29 (53)	05:57	19:19 (52)	05:25
	16:36	17:14	37 16:24 (47)	17:52	19:31	29 18:58 (53)	20:06	21 19:40 (52)	20:40
2	07:40	07:22	15:47 (47)	06:41	06:45	18:29 (53)	05:55	19:18 (52)	05:24
	16:37	17:15	38 16:25 (47)	17:53	19:32	29 18:58 (53)	20:07	22 19:40 (52)	20:40
3	07:40	07:21	15:47 (47)	06:39	06:44	18:28 (53)	05:54	19:18 (52)	05:24
	16:38	17:16	37 16:24 (47)	17:54	19:33	29 18:57 (53)	20:08	22 19:40 (52)	20:41
4	07:40	07:20	15:47 (47)	06:38	06:42	18:28 (53)	05:53	19:18 (52)	05:23
	16:39	17:18	37 16:24 (47)	17:56	19:34	30 18:58 (53)	20:10	23 19:41 (52)	20:42
5	07:40	07:18	15:48 (47)	06:36	06:40	18:28 (53)	05:51	19:17 (52)	05:23
	16:40	17:19	36 16:24 (47)	17:57	19:36	29 18:57 (53)	20:11	23 19:40 (52)	20:43
6	07:40	07:17	15:49 (47)	06:34	06:38	18:28 (53)	05:50	19:17 (52)	05:22
	16:41	17:21	35 16:24 (47)	17:58	19:37	29 18:57 (53)	20:12	23 19:40 (52)	20:44
7	07:40	07:16	15:49 (47)	06:33	06:36	18:28 (53)	05:49	19:18 (52)	05:22
	16:42	17:22	34 16:23 (47)	18:00	19:38	28 18:56 (53)	20:13	22 19:40 (52)	20:44
8	07:39	07:15	15:50 (47)	07:31	06:35	18:28 (53)	05:47	19:17 (52)	05:22
	16:43	17:23	33 16:23 (47)	19:01	19:39	27 18:55 (53)	20:14	22 19:39 (52)	20:45
9	07:39	07:13	15:51 (47)	07:29	06:33	18:29 (53)	05:46	19:18 (52)	05:21
	16:44	17:25	32 16:23 (47)	19:02	19:41	25 18:54 (53)	20:16	21 19:39 (52)	20:46
10	07:39	07:12	15:51 (47)	07:27	06:31	18:29 (53)	05:45	19:19 (52)	05:21
	16:45	17:26	30 16:21 (47)	19:04	19:42	24 18:53 (53)	20:17	19 19:38 (52)	20:46
11	07:39	07:11	15:53 (47)	07:25	06:29	18:30 (53)	05:44	19:19 (52)	05:21
	16:46	17:28	28 16:21 (47)	19:05	19:43	21 18:51 (53)	20:18	19 19:38 (52)	20:47
12	07:38	07:09	15:54 (47)	07:24	06:28	18:32 (53)	05:42	19:20 (52)	05:21
	16:48	17:29	25 16:19 (47)	19:06	19:44	18 18:50 (53)	20:19	17 19:37 (52)	20:47
13	07:38	07:08	15:56 (47)	07:22	06:26	18:34 (53)	05:41	19:22 (52)	05:21
	16:49	17:30	22 16:18 (47)	19:07	19:45	13 18:47 (53)	20:20	14 19:36 (52)	20:48
14	07:37	15:56 (47)	07:07	07:20	06:24		05:40	19:23 (52)	05:21
	16:50	8 16:04 (47)	17:32	19:09	19:47		20:21	11 19:34 (52)	20:48
15	07:37	15:54 (47)	07:05	07:18	06:22		05:39	19:26 (52)	05:20
	16:51	13 16:07 (47)	17:33	19:10	19:48		20:22	6 19:32 (52)	20:49
16	07:36	15:52 (47)	07:04	07:16	06:21		05:38		05:20
	16:52	17 16:09 (47)	17:34	19:11	19:49		20:24		20:49
17	07:36	15:52 (47)	07:02	07:15	06:19		05:37		05:20
	16:54	20 16:12 (47)	17:36	19:12	19:50		20:25		20:50
18	07:35	15:50 (47)	07:01	07:13	06:17		05:36		05:21
	16:55	23 16:13 (47)	17:37	19:14	19:51		20:26		20:50
19	07:35	15:49 (47)	06:59	07:11	06:16		05:35		05:21
	16:56	25 16:14 (47)	17:39	19:15	19:53		20:27		20:51
20	07:34	15:50 (47)	06:58	07:09	06:14		05:34		05:21
	16:57	26 16:16 (47)	17:40	19:16	19:54		20:28		20:51
21	07:33	15:49 (47)	06:56	07:07	06:12		05:33		05:21
	16:59	28 16:17 (47)	17:41	19:17	19:55		20:29		20:51
22	07:33	15:48 (47)	06:54	07:05	06:11		05:32		05:21
	17:00	30 16:18 (47)	17:43	19:19	19:56		20:30		20:51
23	07:32	15:48 (47)	06:53	07:04	06:09		05:31		05:21
	17:01	31 16:19 (47)	17:44	19:20	19:58		20:31		20:52
24	07:31	15:47 (47)	06:51	07:02	06:08		05:30		05:22
	17:03	33 16:20 (47)	17:45	19:21	19:59		20:32		20:52
25	07:30	15:47 (47)	06:50	07:00	06:06		05:29		05:22
	17:04	33 16:20 (47)	17:47	19:22	20:00		20:33		20:52
26	07:29	15:46 (47)	06:48	06:58	06:04	18:40 (53)	05:28		05:22
	17:05	35 16:21 (47)	17:48	19:23	11 18:51 (53)	20:00	4 19:32 (52)	20:34	20:52
27	07:28	15:46 (47)	06:46	06:56	06:03	18:37 (53)	05:28		05:23
	17:07	36 16:22 (47)	17:49	19:25	16 18:53 (53)	20:01	11 19:35 (52)	20:35	20:52
28	07:27	15:46 (47)	06:45	06:54	06:01	18:34 (53)	05:27		05:23
	17:08	36 16:22 (47)	17:51	19:26	21 18:55 (53)	20:02	15 19:37 (52)	20:36	20:52
29	07:26	15:46 (47)		06:53	06:00	18:33 (53)	05:26		05:24
	17:09	37 16:23 (47)		19:27	24 18:57 (53)	20:04	18 19:38 (52)	20:37	20:52
30	07:25	15:46 (47)		06:51	05:58	18:32 (53)	05:26		05:24
	17:11	37 16:23 (47)		19:28	25 18:57 (53)	20:05	20 19:39 (52)	20:38	20:52
31	07:24	15:47 (47)		06:49	05:55	18:31 (53)	05:25		
	17:12	37 16:24 (47)		19:30	27 18:58 (53)		20:39		
Potential sun hours	288	293	369	403	457		463		
Total, worst case	505	451	124	399	285				
Sun reduction	0.33	0.39	0.47	0.49	0.55				
Oper. time red.	1.00	1.00	1.00	1.00	1.00				
Wind dir. red.	0.73	0.73	0.58	0.57	0.52				
Total reduction	0.25	0.20	0.28	0.29	0.29				
Total, real	126	133	35	115	84				

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 85

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Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-45 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (29)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25	05:51	19:31 (52)	06:27	18:29 (53)	07:01
	20:52	20:31	17 19:48 (52)	19:42	21 18:50 (53)	18:47
2	05:25	05:52	19:30 (52)	06:28	18:27 (53)	07:02
	20:52	20:30	18 19:48 (52)	19:40	24 18:51 (53)	18:45
3	05:26	05:54	19:29 (52)	06:29	18:27 (53)	07:04
	20:52	20:28	20 19:49 (52)	19:38	25 18:52 (53)	18:43
4	05:26	05:55	19:28 (52)	06:30	18:26 (53)	07:05
	20:51	20:27	21 19:49 (52)	19:37	27 18:53 (53)	18:41
5	05:27	05:56	19:28 (52)	06:31	18:25 (53)	07:06
	20:51	20:26	22 19:50 (52)	19:35	28 18:53 (53)	18:39
6	05:27	05:57	19:27 (52)	06:32	18:24 (53)	07:07
	20:51	20:25	23 19:50 (52)	19:33	29 18:53 (53)	18:38
7	05:28	05:58	19:27 (52)	06:34	18:23 (53)	07:08
	20:51	20:23	23 19:50 (52)	19:31	30 18:53 (53)	18:36
8	05:29	05:59	19:27 (52)	06:35	18:22 (53)	07:10
	20:50	20:22	23 19:50 (52)	19:29	30 18:52 (53)	18:34
9	05:30	06:00	19:26 (52)	06:36	18:22 (53)	07:11
	20:50	20:21	23 19:49 (52)	19:27	30 18:52 (53)	18:32
10	05:30	06:01	19:26 (52)	06:37	18:22 (53)	07:12
	20:49	20:19	23 19:49 (52)	19:26	29 18:51 (53)	18:31
11	05:31	06:03	19:27 (52)	06:38	18:22 (53)	07:13
	20:49	20:18	21 19:48 (52)	19:24	28 18:50 (53)	18:29
12	05:32	06:04	19:27 (52)	06:39	18:22 (53)	07:15
	20:48	20:16	20 19:47 (52)	19:22	27 18:49 (53)	18:27
13	05:33	06:05	19:28 (52)	06:40	18:23 (53)	07:16
	20:48	20:15	19 19:47 (52)	19:20	26 18:49 (53)	18:25
14	05:34	06:06	19:29 (52)	06:42	18:24 (53)	07:17
	20:47	20:13	17 19:46 (52)	19:18	23 18:47 (53)	18:24
15	05:34	06:07	19:30 (52)	06:43	18:24 (53)	07:18
	20:47	20:12	15 19:45 (52)	19:16	21 18:45 (53)	18:22
16	05:35	06:08	19:32 (52)	06:44	18:26 (53)	07:20
	20:46	20:10	10 19:42 (52)	19:15	17 18:43 (53)	18:20
17	05:36	06:09	06:45	06:45	18:28 (53)	07:21
	20:45	20:09	19:13	12 18:40 (53)	18:18	18:17
18	05:37	06:11	06:46	07:22	07:22	18:18
	20:44	20:07	19:11	18:17	18:17	18:17
19	05:38	06:12	06:47	07:23	07:23	18:17
	20:44	20:06	19:09	18:15	18:15	18:15
20	05:39	06:13	06:48	07:25	07:25	18:15
	20:43	20:04	19:07	18:14	18:14	18:14
21	05:40	06:14	06:50	07:26	07:26	18:14
	20:42	20:02	19:05	18:12	18:12	18:12
22	05:41	06:15	06:51	07:27	07:27	18:12
	20:41	20:01	19:03	18:10	18:10	18:10
23	05:42	06:16	06:52	07:28	07:28	18:10
	20:40	19:57	19:01	18:09	18:09	18:09
24	05:43	06:17	06:53	07:30	07:30	18:09
	20:39	19:56	19:00	18:07	18:07	18:07
25	05:44	06:19	06:54	07:31	07:31	18:07
	20:38	19:54	18:58	18:06	18:06	18:06
26	05:45	06:20	06:55	07:32	07:32	18:06
	20:37	19:52	18:56	18:04	18:04	18:04
27	05:46	06:21	06:57	07:34	07:34	18:04
	20:36	19:51	18:54	18:03	13 16:30 (47)	07:14
28	05:47	06:22	06:58	07:35	07:35	18:03
	20:35	19:49	18:52	18:01	18 16:45 (47)	07:15
29	05:48	06:23	06:59	07:36	07:36	18:01
	20:34	8 19:35 (52)	19:47	2 18:42 (53)	18:00	23 16:48 (47)
30	05:49	06:24	07:00	07:38	07:38	18:00
	20:33	12 19:45 (52)	19:45	13 18:47 (53)	17:58	26 16:49 (47)
31	05:50	06:26	07:01	07:39	07:39	18:00
	20:32	15 19:32 (52)	19:44	18 18:49 (53)	17:57	29 16:50 (47)
Potential sun hours	469	434	376	341	290	277
Total, worst case	35	348	427	109	861	
Sun reduction	0.63	0.59	0.54	0.44	0.27	
Oper. time red.	1.00	1.00	1.00	1.00	1.00	
Wind dir. red.	0.52	0.52	0.58	0.73	0.73	
Total reduction	0.34	0.32	0.32	0.33	0.20	
Total, real	12	111	138	36	176	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 86

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-46 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (30)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36	07:23 17:14	06:43 17:52	16:24 (47) 17:00 (47)	06:47 19:31	05:57 20:06
2	07:40 16:37	07:22 17:15	06:41 17:53	16:26 (47) 17:00 (47)	06:45 19:32	05:55 20:07
3	07:40 16:38	07:21 17:16	06:39 17:54	16:26 (47) 16:58 (47)	06:44 19:33	05:54 20:08
4	07:40 16:39	07:20 17:18	06:38 17:56	16:27 (47) 16:57 (47)	06:42 19:34	05:53 20:10
5	07:40 16:40	07:18 17:19	06:36 17:57	16:27 (47) 16:56 (47)	06:40 19:36	05:51 20:11
6	07:40 16:41	07:17 17:21	06:34 17:58	16:29 (47) 16:55 (47)	06:38 19:37	05:50 20:12
7	07:40 16:42	07:16 17:22	06:33 18:00	16:31 (47) 16:52 (47)	06:36 19:38	05:49 20:13
8	07:39 16:43	07:15 17:23	07:31 19:01	17:33 (47) 17:49 (47)	06:35 19:39	05:47 20:14
9	07:39 16:44	07:13 17:25	07:29 19:02	17:37 (47) 17:45 (47)	06:33 19:41	05:46 20:16
10	07:39 16:45	07:12 17:26	07:27 19:04	06:31 19:42		05:45 20:17
11	07:39 16:46	07:11 17:28	07:25 19:05	06:29 19:43	19:00 (53) 19:11 (53)	05:44 20:18
12	07:38 16:48	07:09 17:29	07:24 19:06	06:28 19:44	18:58 (53) 19:14 (53)	05:42 20:19
13	07:38 16:49	07:08 17:30	16:38 (47) 16:49 (47)	07:22 19:07	06:26 19:45	18:56 (53) 19:16 (53)
14	07:37 16:50	07:07 17:32	16:34 (47) 16:52 (47)	07:20 19:09	06:24 19:47	18:54 (53) 19:16 (53)
15	07:37 16:51	07:05 17:33	16:32 (47) 16:55 (47)	07:18 19:10	06:22 19:48	18:52 (53) 19:17 (53)
16	07:36 16:52	07:04 17:34	16:30 (47) 16:56 (47)	07:16 19:11	06:21 19:49	18:52 (53) 19:18 (53)
17	07:36 16:54	07:02 17:36	16:29 (47) 16:58 (47)	07:15 19:12	06:19 19:50	18:51 (53) 19:18 (53)
18	07:35 16:55	07:01 17:37	16:28 (47) 16:58 (47)	07:13 19:14	06:17 19:51	18:50 (53) 19:18 (53)
19	07:35 16:56	06:59 17:39	16:27 (47) 17:00 (47)	07:11 19:15	06:16 19:53	18:50 (53) 19:18 (53)
20	07:34 16:57	06:58 17:40	16:26 (47) 17:00 (47)	07:09 19:16	06:14 19:54	18:49 (53) 19:18 (53)
21	07:33 16:59	06:56 17:41	16:26 (47) 17:01 (47)	07:07 19:17	06:12 19:55	18:50 (53) 19:18 (53)
22	07:32 17:00	06:54 17:43	16:25 (47) 17:01 (47)	07:05 19:19	06:11 19:56	18:50 (53) 19:17 (53)
23	07:32 17:01	06:53 17:44	16:24 (47) 17:01 (47)	07:04 19:20	06:09 19:58	18:49 (53) 19:16 (53)
24	07:31 17:03	06:51 17:45	16:25 (47) 17:02 (47)	07:02 19:21	06:08 19:59	18:50 (53) 19:16 (53)
25	07:30 17:04	06:50 17:47	16:24 (47) 17:01 (47)	07:00 19:22	06:06 20:00	18:50 (53) 19:15 (53)
26	07:29 17:05	06:48 17:48	16:24 (47) 17:01 (47)	06:58 19:23	06:04 20:00	18:51 (53) 19:14 (53)
27	07:28 17:07	06:46 17:49	16:25 (47) 17:01 (47)	06:56 19:25	06:03 20:01	18:52 (53) 19:12 (53)
28	07:27 17:08	06:45 17:51	16:24 (47) 17:01 (47)	06:54 19:26	06:01 20:02	18:54 (53) 19:11 (53)
29	07:26 17:09		06:53 19:27	06:00 20:04	18:55 (53) 19:09 (53)	05:26 20:37
30	07:25 17:11		06:51 19:28	05:58 20:05	18:58 (53) 19:06 (53)	05:26 20:38
31	07:24 17:12		06:49 19:30			05:25 20:39
Potential sun hours	288	293	369	403	457	463
Total, worst case		496	232	447		
Sun reduction		0.39	0.47	0.49		
Oper. time red.		1.00	1.00	1.00		
Wind dir. red.		0.69	0.69	0.53		
Total reduction		0.27	0.33	0.26		
Total, real		135	76	118		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker
			(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 87

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation:** 05030 SFA Gamesa G90\_R2Shadow receptor: R-46 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (30)

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25 20:52	05:51 20:31	06:27 19:42	18:59 (53) 19:10 (53)	07:01 18:47	06:40 16:55
2	05:25 20:52	05:52 20:30	06:28 19:40		07:02 18:45	06:42 16:54
3	05:26 20:52	05:54 20:28	06:29 19:38		07:04 18:43	06:43 16:53
4	05:26 20:51	05:55 20:27	06:30 19:37		07:05 18:41	06:44 16:51
5	05:27 20:51	05:56 20:26	06:31 19:35		07:06 18:39	17:11 (47) 17:25 (47)
6	05:27 20:51	05:57 20:25	06:32 19:33		07:07 18:38	14 17:08 (47) 17:27 (47)
7	05:28 20:50	05:58 20:23	06:34 19:31		07:08 18:36	19 17:06 (47) 17:30 (47)
8	05:29 20:50	05:59 20:22	06:35 19:29		07:10 18:34	24 17:04 (47) 17:31 (47)
9	05:30 20:50	06:00 20:21	06:36 19:27		07:11 18:32	27 17:02 (47) 17:31 (47)
10	05:30 20:49	06:01 20:19	06:37 19:26		07:12 18:31	29 17:00 (47) 17:32 (47)
11	05:31 20:49	06:03 20:18	06:38 19:24		07:13 18:29	32 17:00 (47) 17:33 (47)
12	05:32 20:48	06:04 20:16	06:39 19:22		07:15 18:27	33 16:59 (47) 17:33 (47)
13	05:33 20:48	06:05 20:15	19:06 (53) 19:16 (53)	06:40 19:20	07:16 18:25	34 16:58 (47) 17:33 (47)
14	05:34 20:47	06:06 20:13	19:03 (53) 19:18 (53)	06:42 19:18	07:17 18:24	35 16:57 (47) 17:33 (47)
15	05:34 20:47	06:07 20:12	19:01 (53) 19:19 (53)	06:43 19:16	07:18 18:22	36 16:57 (47) 17:34 (47)
16	05:35 20:46	06:08 20:10	18:59 (53) 19:20 (53)	06:44 19:15	07:20 18:20	37 16:56 (47) 17:33 (47)
17	05:36 20:45	06:09 20:09	18:58 (53) 19:21 (53)	06:45 19:13	07:21 18:18	37 16:56 (47) 17:33 (47)
18	05:37 20:44	06:11 20:07	18:57 (53) 19:21 (53)	06:46 19:11	07:22 18:17	37 16:56 (47) 17:33 (47)
19	05:38 20:44	06:12 20:06	18:56 (53) 19:22 (53)	06:47 19:09	07:23 18:15	36 16:56 (47) 17:32 (47)
20	05:39 20:43	06:13 20:04	18:55 (53) 19:22 (53)	06:48 19:07	07:25 18:14	35 16:56 (47) 17:31 (47)
21	05:40 20:42	06:14 20:02	18:54 (53) 19:22 (53)	06:50 19:05	07:26 18:12	34 16:57 (47) 17:31 (47)
22	05:41 20:41	06:15 20:01	18:54 (53) 19:22 (53)	06:51 19:03	07:27 18:10	33 16:57 (47) 17:30 (47)
23	05:42 20:40	06:16 19:57	18:53 (53) 19:21 (53)	06:52 19:01	07:28 18:09	32 16:57 (47) 17:29 (47)
24	05:43 20:39	06:17 19:56	18:54 (53) 19:22 (53)	06:53 19:00	07:30 18:07	30 16:59 (47) 17:29 (47)
25	05:44 20:38	06:19 19:54	18:54 (53) 19:21 (53)	06:54 18:58	07:31 18:06	28 16:59 (47) 17:27 (47)
26	05:45 20:37	06:20 19:52	18:54 (53) 19:21 (53)	06:55 18:56	07:32 18:04	25 17:00 (47) 17:25 (47)
27	05:46 20:36	06:21 19:51	18:54 (53) 19:20 (53)	06:57 18:54	07:34 18:03	22 17:02 (47) 17:24 (47)
28	05:47 20:35	06:22 19:49	18:54 (53) 19:19 (53)	06:58 18:52	07:35 18:01	17 17:04 (47) 17:21 (47)
29	05:48 20:34	06:23 19:47	18:55 (53) 19:17 (53)	06:59 18:50	07:36 18:00	10 17:08 (47) 17:18 (47)
30	05:49 20:33	06:24 19:45	18:56 (53) 19:15 (53)	07:00 18:49	07:38 17:58	07:18 16:28
31	05:50 20:32	06:26 19:44	18:57 (53) 19:13 (53)		07:39 17:57	07:40 16:35
Potential sun hours	469	434	376	341	290	277
Total, worst case		438	11	733		
Sun reduction		0.59	0.54	0.44		
Oper. time red.		1.00	1.00	1.00		
Wind dir. red.		0.53	0.53	0.69		
Total reduction		0.32	0.29	0.31		
Total, real		139	3	225		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 88

Licensed user:

**EDR**

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-47 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (31)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	17:55 (47) 20:06	19:26 (53) 20:40
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	17:59 (47) 20:07	19:22 (53) 20:40
3	07:40 16:38	07:21 17:16	06:39 17:54	06:44 19:33	18:06 (47) 20:08	19:35 (53) 20:41
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:34	05:54 20:10	19:20 (53) 20:42
5	07:40 16:40	07:18 17:19	06:36 17:57	06:40 19:36	05:51 20:11	19:37 (53) 20:43
6	07:40 16:41	07:17 17:21	06:34 17:58	06:38 19:37	05:50 20:12	19:39 (53) 20:43
7	07:40 16:42	07:16 17:22	06:33 18:00	17:04 (47) 19:38	06:36 20:13	19:16 (53) 20:44
8	07:39 16:43	07:15 17:23	07:31 19:01	18:00 (47) 19:39	06:35 20:14	19:15 (53) 20:45
9	07:39 16:44	07:13 17:25	07:29 19:02	18:19 (47) 19:41	06:33 20:16	19:14 (53) 20:46
10	07:39 16:45	07:12 17:26	07:27 19:04	17:54 (47) 19:42	06:31 20:17	19:14 (53) 20:46
11	07:39 16:46	07:11 17:28	07:25 19:05	17:53 (47) 19:43	06:29 20:18	19:14 (53) 20:47
12	07:38 16:48	07:09 17:29	07:24 19:06	17:52 (47) 19:44	06:28 20:19	19:14 (53) 20:47
13	07:38 16:49	07:08 17:30	07:22 19:07	17:50 (47) 19:45	06:26 20:20	19:14 (53) 20:48
14	07:37 16:50	07:07 17:32	07:20 19:09	17:49 (47) 19:47	06:24 20:21	19:14 (53) 20:48
15	07:37 16:51	07:05 17:33	07:18 19:10	17:48 (47) 19:48	06:22 20:22	19:14 (53) 20:49
16	07:36 16:52	07:04 17:34	07:16 19:11	17:47 (47) 19:49	06:21 20:24	19:14 (53) 20:49
17	07:36 16:54	07:02 17:36	07:15 19:12	17:47 (47) 19:50	06:19 20:25	19:14 (53) 20:50
18	07:35 16:55	07:01 17:37	07:13 19:14	17:46 (47) 19:51	06:17 20:26	19:15 (53) 20:50
19	07:35 16:56	06:59 17:39	07:11 19:15	17:46 (47) 19:53	06:16 20:27	19:15 (53) 20:51
20	07:34 16:57	06:58 17:40	07:09 19:16	17:45 (47) 19:54	06:14 20:28	19:15 (53) 20:51
21	07:33 16:59	06:56 17:41	07:07 19:17	17:45 (47) 19:55	06:12 20:29	19:16 (53) 20:51
22	07:32 17:00	06:54 17:43	07:05 19:19	17:45 (47) 19:56	06:11 20:30	19:16 (53) 20:51
23	07:32 17:01	06:53 17:44	07:04 19:20	17:46 (47) 19:58	06:09 20:31	19:16 (53) 20:52
24	07:31 17:03	06:51 17:45	07:02 19:21	17:46 (47) 19:59	06:08 20:32	19:18 (53) 20:52
25	07:30 17:04	06:50 17:47	07:00 19:22	17:46 (47) 20:00	06:06 20:33	19:19 (53) 20:52
26	07:29 17:05	06:48 17:48	06:58 19:23	17:46 (47) 20:01	06:04 20:34	19:19 (53) 20:52
27	07:28 17:07	06:46 17:49	06:56 19:25	17:47 (47) 20:02	06:03 20:35	19:20 (53) 20:52
28	07:27 17:08	06:45 17:51	06:54 19:26	17:47 (47) 20:02	06:01 20:36	19:22 (53) 20:52
29	07:26 17:09		06:53 19:27	17:49 (47) 20:04	06:00 20:37	19:23 (53) 20:52
30	07:25 17:11		06:51 19:28	17:51 (47) 20:05	05:58 20:38	19:25 (53) 20:52
31	07:24 17:12		06:49 19:30	17:52 (47) 20:05	05:57 20:39	19:27 (53) 20:52
Potential sun hours	288	293	369	403	457	463
Total, worst case			850	24	686	
Sun reduction			0.47	0.49	0.55	
Oper. time red.			1.00	1.00	1.00	
Wind dir. red.			0.62	0.62	0.51	
Total reduction			0.29	0.31	0.29	
Total, real			250	7	196	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 89

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-47 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (31)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December		
1	05:25	05:51	19:24 (53)	06:27	07:01	17:30 (47)	06:40	07:19
	20:52	20:31	19:53 (53)	19:42	18:47	35 18:05 (47)	16:55	16:28
2	05:25	05:52	19:24 (53)	06:28	07:02	17:31 (47)	06:42	07:20
	20:52	20:30	19:53 (53)	19:40	18:45	32 18:03 (47)	16:54	16:27
3	05:26	05:54	19:24 (53)	06:29	07:04	17:32 (47)	06:43	07:21
	20:52	20:28	19:53 (53)	19:38	18:43	30 18:02 (47)	16:53	16:27
4	05:26	05:55	19:25 (53)	06:30	07:05	17:34 (47)	06:44	07:22
	20:51	20:27	19:52 (53)	19:37	18:41	26 18:00 (47)	16:51	16:27
5	05:27	05:56	19:25 (53)	06:31	07:06	17:35 (47)	06:46	07:23
	20:51	20:26	19:52 (53)	19:35	18:39	22 17:57 (47)	16:50	16:26
6	05:27	05:57	19:25 (53)	06:32	07:07	17:38 (47)	06:47	07:24
	20:51	20:25	19:51 (53)	19:33	18:38	15 17:53 (47)	16:49	16:26
7	05:28	05:58	19:26 (53)	06:34	07:08	17:40 (47)	06:48	07:25
	20:50	20:23	19:50 (53)	19:31	18:36	14 17:51 (47)	16:48	16:26
8	05:29	05:59	19:27 (53)	06:35	07:10	17:42 (47)	06:49	07:26
	20:50	20:22	19:49 (53)	19:29	18:34	13 17:52 (47)	16:46	16:26
9	05:30	06:00	19:28 (53)	06:36	07:11	17:44 (47)	06:51	07:27
	20:50	20:21	19:47 (53)	19:27	18:32	12 17:53 (47)	16:45	16:26
10	05:30	06:01	19:29 (53)	06:37	17:53 (47)	07:12	06:52	07:28
	20:49	20:19	19:45 (53)	19:26	6 17:59 (47)	18:31	16:44	16:26
11	05:31	06:03	19:31 (53)	06:38	17:47 (47)	07:13	06:54	07:29
	20:49	20:18	19:43 (53)	19:24	16 18:03 (47)	18:29	16:43	16:26
12	05:32	06:04	19:35 (53)	06:39	17:44 (47)	07:15	06:55	07:30
	20:48	20:16	3 19:38 (53)	19:22	22 18:06 (47)	18:27	16:42	16:26
13	05:33	19:34 (53)	06:05	06:40	17:42 (47)	07:16	06:56	07:31
	20:48	8 19:42 (53)	20:15	19:20	26 18:08 (47)	18:25	16:41	16:26
14	05:34	19:33 (53)	06:06	06:42	17:40 (47)	07:17	06:58	07:32
	20:47	11 19:44 (53)	20:13	19:18	29 18:09 (47)	18:24	16:40	16:26
15	05:34	19:31 (53)	06:07	06:43	17:38 (47)	07:18	06:59	07:32
	20:47	13 19:44 (53)	20:12	19:16	32 18:10 (47)	18:22	16:39	16:26
16	05:35	19:30 (53)	06:08	06:44	17:36 (47)	07:20	07:00	07:33
	20:46	16 19:46 (53)	20:10	19:15	35 18:11 (47)	18:20	16:38	16:27
17	05:36	19:29 (53)	06:09	06:45	17:35 (47)	07:21	07:02	07:34
	20:45	18 19:47 (53)	20:09	19:13	36 18:11 (47)	18:18	16:37	16:27
18	05:37	19:28 (53)	06:11	06:46	17:33 (47)	07:22	07:03	07:34
	20:44	20 19:48 (53)	20:07	19:11	38 18:11 (47)	18:17	16:36	16:27
19	05:38	19:28 (53)	06:12	06:47	17:32 (47)	07:23	07:04	07:35
	20:44	21 19:49 (53)	20:06	19:09	39 18:11 (47)	18:15	16:35	16:28
20	05:39	19:27 (53)	06:13	06:48	17:31 (47)	07:25	07:05	07:36
	20:43	23 19:50 (53)	20:04	19:07	40 18:11 (47)	18:14	16:34	16:28
21	05:40	19:27 (53)	06:14	06:50	17:31 (47)	07:26	07:07	07:36
	20:42	24 19:51 (53)	20:02	19:05	41 18:12 (47)	18:12	16:33	16:28
22	05:41	19:26 (53)	06:15	06:51	17:30 (47)	07:27	07:08	07:37
	20:41	25 19:51 (53)	20:01	19:03	42 18:12 (47)	18:10	16:33	16:29
23	05:42	19:26 (53)	06:16	06:52	17:30 (47)	07:28	07:09	07:37
	20:40	26 19:52 (53)	19:57	19:01	42 18:12 (47)	18:09	16:32	16:29
24	05:43	19:26 (53)	06:17	06:53	17:29 (47)	07:30	07:11	07:38
	20:39	26 19:52 (53)	19:56	19:00	42 18:11 (47)	18:07	16:31	16:30
25	05:44	19:25 (53)	06:19	06:54	17:29 (47)	07:31	07:12	07:38
	20:38	28 19:53 (53)	19:54	18:58	41 18:10 (47)	18:06	16:31	16:31
26	05:45	19:25 (53)	06:20	06:55	17:28 (47)	07:32	07:13	07:38
	20:37	28 19:53 (53)	19:52	18:56	42 18:10 (47)	18:04	16:30	16:31
27	05:46	19:25 (53)	06:21	06:57	17:28 (47)	07:34	07:14	07:39
	20:36	28 19:53 (53)	19:51	18:54	41 18:09 (47)	18:03	16:29	16:32
28	05:47	19:24 (53)	06:22	06:58	17:29 (47)	07:35	07:15	07:39
	20:35	30 19:54 (53)	19:49	18:52	40 18:09 (47)	18:01	16:29	16:33
29	05:48	19:24 (53)	06:23	06:59	17:29 (47)	07:36	07:17	07:39
	20:34	30 19:54 (53)	19:47	18:50	38 18:07 (47)	18:00	16:28	16:33
30	05:49	19:24 (53)	06:24	07:00	17:29 (47)	07:38	07:18	07:39
	20:33	30 19:54 (53)	19:45	18:49	37 18:06 (47)	17:58	16:28	16:34
31	05:50	19:24 (53)	06:26	07:01	17:29 (47)	07:39	07:19	07:40
	20:32	30 19:54 (53)	19:44	18:48	37 18:06 (47)	17:57	16:28	16:35
Potential sun hours	469	434	376	341	290	277		
Total, worst case	435	263	725	160				
Sun reduction	0.63	0.59	0.54	0.44				
Oper. time red.	1.00	1.00	1.00	1.00				
Wind dir. red.	0.51	0.51	0.62	0.62				
Total reduction	0.33	0.31	0.34	0.28				
Total, real	142	80	245	44				

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)



Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 90

Licensed user:

EDR

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US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-48 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (352)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36	07:23 17:14	06:43 17:52		06:47 19:31	
2	07:40 16:37	07:22 17:15	06:41 17:53	16 16:56 (47)	06:45 17:12 (47)	
3	07:40 16:38	07:21 17:16	06:39 17:54	16 16:53 (47)	06:44 17:14 (47)	
4	07:40 16:39	07:20 17:18	06:38 17:56	16 16:50 (47)	06:42 17:16 (47)	
5	07:40 16:40	07:18 17:19	06:36 17:57	16 16:48 (47)	06:40 17:17 (47)	
6	07:40 16:41	07:17 17:21	06:34 17:58	16 16:46 (47)	06:38 17:19 (47)	
7	07:40 16:42	07:16 17:22	06:33 18:00	16 16:44 (47)	06:36 17:20 (47)	
8	07:39 16:43	07:15 17:23	06:31 18:01	16 16:42 (47)	06:35 17:21 (47)	
9	07:39 16:44	07:13 17:25	06:29 18:02	16 16:40 (47)	06:33 17:22 (47)	
10	07:39 16:45	07:12 17:26	06:27 18:04	16 16:38 (47)	06:31 17:23 (47)	
11	07:39 16:46	07:11 17:28	06:25 18:06	16 16:36 (47)	06:29 17:24 (47)	
12	07:38 16:48	07:09 17:29	06:24 18:08	16 16:34 (47)	06:28 17:25 (47)	
13	07:38 16:49	07:08 17:30	06:22 18:10	16 16:32 (47)	06:26 17:26 (47)	
14	07:37 16:50	07:07 17:32	06:20 18:12	16 16:30 (47)	06:24 17:27 (47)	
15	07:37 16:51	07:05 17:33	06:18 18:14	16 16:28 (47)	06:22 17:28 (47)	
16	07:36 16:52	07:04 17:34	06:16 18:16	16 16:26 (47)	06:21 17:29 (47)	
17	07:36 16:53	07:02 17:36	06:15 18:18	16 16:24 (47)	06:19 17:30 (47)	
18	07:35 16:54	07:01 17:37	06:13 18:20	16 16:22 (47)	06:17 17:31 (47)	
19	07:35 16:55	06:59 17:39	06:11 18:22	16 16:20 (47)	06:16 17:32 (47)	
20	07:34 16:56	06:58 17:40	06:09 18:24	16 16:18 (47)	06:14 17:33 (47)	
21	07:33 16:57	06:56 17:41	06:07 18:26	16 16:16 (47)	06:12 17:34 (47)	
22	07:32 17:00	06:54 17:43	06:05 18:28	16 16:14 (47)	06:11 17:35 (47)	
23	07:32 17:01	06:53 17:44	06:04 18:30	16 16:12 (47)	06:09 17:36 (47)	
24	07:31 17:03	06:51 17:45	06:02 18:32	16 16:10 (47)	06:08 17:37 (47)	
25	07:30 17:04	06:50 17:47	06:00 18:34	16 16:08 (47)	06:06 17:38 (47)	
26	07:29 17:05	06:48 17:48	06:58 18:36	14 16:06 (47)	20:00 19:17 (53)	
27	07:28 17:07	06:46 17:49	06:56 18:38	16 16:04 (47)	20:00 19:15 (53)	
28	07:27 17:08	06:45 17:51	06:54 18:40	16 16:02 (47)	20:00 19:13 (53)	
29	07:26 17:09	06:45 17:52	06:53 18:42	16 16:00 (47)	20:00 19:11 (53)	
30	07:25 17:11	06:45 17:53	06:51 18:44	16 16:00 (47)	20:00 19:09 (53)	
31	07:24 17:12	06:45 17:54	06:49 18:46	16 16:00 (47)	20:00 19:07 (53)	
Potential sun hours	288	293	369	403	457	463
Total, worst case			813		92	485
Sun reduction			0.47		0.49	0.55
Oper. time red.			1.00		1.00	1.00
Wind dir. red.			0.64		0.52	0.52
Total reduction			0.30		0.26	0.29
Total, real			247		23	139

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 91

Licensed user:

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-48 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (352)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1   05:25	05:51	19:19 (53)	06:27	07:01	17:20 (47)	06:40   07:19
20:52	20:31	26 19:45 (53)	19:42	18:47	40 18:00 (47)	16:55   16:28
2   05:25	05:52	19:18 (53)	06:28	07:02	17:20 (47)	06:42   07:20
20:52	20:30	28 19:46 (53)	19:40	18:45	40 18:00 (47)	16:54   16:27
3   05:26	05:54	19:18 (53)	06:29	07:04	17:21 (47)	06:43   07:21
20:52	20:28	28 19:46 (53)	19:38	18:43	39 18:00 (47)	16:53   16:27
4   05:26	05:55	19:17 (53)	06:30	07:05	17:21 (47)	06:44   07:22
20:51	20:27	29 19:46 (53)	19:37	18:41	38 17:59 (47)	16:51   16:27
5   05:27	05:56	19:17 (53)	06:31	07:06	17:21 (47)	06:46   07:23
20:51	20:26	29 19:46 (53)	19:35	18:39	36 17:57 (47)	16:50   16:26
6   05:27	05:57	19:17 (53)	06:32	07:07	17:21 (47)	06:47   07:24
20:51	20:25	29 19:46 (53)	19:33	18:38	35 17:56 (47)	16:49   16:26
7   05:28	05:58	19:17 (53)	06:34	07:08	17:22 (47)	06:48   07:25
20:50	20:23	29 19:46 (53)	19:31	18:36	33 17:55 (47)	16:48   16:26
8   05:29	05:59	19:17 (53)	06:35	07:10	17:23 (47)	06:50   07:26
20:50	20:22	28 19:45 (53)	19:29	18:34	31 17:54 (47)	16:46   16:26
9   05:30	06:00	19:17 (53)	06:36	07:11	17:24 (47)	06:51   07:27
20:50	20:21	28 19:45 (53)	19:27	18:32	28 17:52 (47)	16:45   16:26
10   05:30	06:01	19:17 (53)	06:37	07:12	17:25 (47)	06:52   07:28
20:49	20:19	27 19:44 (53)	19:26	18:31	24 17:49 (47)	16:44   16:26
11   05:31	06:03	19:17 (53)	06:38	07:13	17:28 (47)	06:54   07:29
20:49	20:18	26 19:43 (53)	19:24	18:29	19 17:47 (47)	16:43   16:26
12   05:32	06:04	19:17 (53)	06:39	07:15	17:31 (47)	06:55   07:30
20:48	20:16	26 19:43 (53)	19:22	18:27	12 17:43 (47)	16:42   16:26
13   05:33	06:05	19:19 (53)	06:40	07:16		06:56   07:31
20:48	20:15	23 19:42 (53)	19:20	18:25		16:41   16:26
14   05:34	06:06	19:20 (53)	06:42	07:17		06:58   07:32
20:47	20:13	21 19:41 (53)	19:18	18:24		16:40   16:26
15   05:34	06:07	19:21 (53)	06:43	07:18		06:59   07:32
20:47	20:12	18 19:39 (53)	19:16	18:22		16:39   16:26
16   05:35	06:08	19:22 (53)	06:44	07:20		07:00   07:33
20:46	20:10	15 19:37 (53)	19:15	18:20		16:38   16:27
17   05:36	06:09	19:25 (53)	06:45	17:40 (47)	07:21	07:02   07:34
20:45	20:09	9 19:34 (53)	19:13	12 17:52 (47)	18:18	16:37   16:27
18   05:37	06:11		06:46	17:36 (47)	07:22	07:03   07:34
20:44	20:07		19:11	19 17:55 (47)	18:17	16:36   16:27
19   05:38	06:12		06:47	17:33 (47)	07:23	07:04   07:35
20:44	20:06		19:09	24 17:57 (47)	18:15	16:35   16:28
20   05:39	06:13		06:48	17:31 (47)	07:25	07:05   07:36
20:43	20:04		19:07	27 17:58 (47)	18:14	16:34   16:28
21   05:40	06:14		06:50	17:30 (47)	07:26	07:07   07:36
20:42	20:02		19:05	30 18:00 (47)	18:12	16:33   16:28
22   05:41	06:15		06:51	17:28 (47)	07:27	07:08   07:37
20:41	20:01		19:03	33 18:01 (47)	18:10	16:33   16:29
23   05:42	6 19:29 (53)	06:16	06:52	17:26 (47)	07:28	07:09   07:37
20:40	19:35 (53)	19:57	19:01	35 18:01 (47)	18:09	16:32   16:29
24   05:43	12 19:26 (53)	06:17	06:53	17:25 (47)	07:30	07:11   07:38
20:39	19:38 (53)	19:56	19:00	36 18:01 (47)	18:07	16:31   16:30
25   05:44	15 19:25 (53)	06:19	06:54	17:24 (47)	07:31	07:12   07:38
20:38	19:40 (53)	19:54	18:58	38 18:02 (47)	18:06	16:31   16:31
26   05:45	18 19:23 (53)	06:20	06:55	17:23 (47)	07:32	07:13   07:38
20:37	19:41 (53)	19:52	18:56	39 18:02 (47)	18:04	16:30   16:31
27   05:46	20 19:22 (53)	06:21	06:57	17:22 (47)	07:34	07:14   07:39
20:36	19:42 (53)	19:51	18:54	39 18:01 (47)	18:03	16:29   16:32
28   05:47	22 19:21 (53)	06:22	06:58	17:22 (47)	07:35	07:15   07:39
20:35	19:43 (53)	19:49	18:52	40 18:02 (47)	18:01	16:29   16:33
29   05:48	23 19:21 (53)	06:23	06:59	17:21 (47)	07:36	07:17   07:39
20:34	19:44 (53)	19:47	18:50	41 18:02 (47)	18:00	16:28   16:33
30   05:49	24 19:20 (53)	06:24	07:00	17:21 (47)	07:38	07:18   07:39
20:33	19:44 (53)	19:45	18:49	40 18:01 (47)	17:58	16:28   16:34
31   05:50	26 19:19 (53)	06:26			07:39	07:40   07:40
20:32	19:45 (53)	19:44			17:57	16:35   16:35
Potential sun hours	469	434	376	341	290	277
Total, worst case	166	419	453	375		
Sun reduction	0.63	0.59	0.54	0.44		
Oper. time red.	1.00	1.00	1.00	1.00		
Wind dir. red.	0.52	0.52	0.64	0.64		
Total reduction	0.33	0.31	0.35	0.28		
Total, real	54	129	158	107		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 92

Licensed user:

EDR

217 Montgomery St.
US-SYRACUSE, NY 13202
(315) 471 0688

Steve Curtis, scurtis@edr.com

Calculated:

3/18/2011 3:22 PM/2.7.453

SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-5 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (5)

Assumptions for shadow calculations

Maximum distance for influence 1,000 m
Minimum sun height over horizon for influence 3 °
Day step for calculation 1 days
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760
Idle start wind speed: Cut in wind speed from power curve

Calendar table with columns for months (January to December) and rows for time slots (e.g., 07:40, 16:36). Includes summary rows for Potential sun hours, Total, worst case, Sun reduction, Oper. time red., Wind dir. red., Total reduction, and Total, real.

Table layout: For each day in each month the following matrix apply

Day in month Sun rise (hh:mm) Sun set (hh:mm) Minutes with flicker First time (hh:mm) with flicker Last time (hh:mm) with flicker (WTG causing flicker first time) (WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 93

Licensed user:

**EDR**

217 Montgomery St.  
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Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-51 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (32)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	18:01 (47) 18:39 (47)	05:57 20:06	05:25 19:28 (53)
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	18:01 (47) 18:38 (47)	05:55 20:07	05:24 19:28 (53)
3	07:40 16:38	07:21 17:16	06:39 17:54	06:44 19:33	18:01 (47) 18:37 (47)	05:54 20:08	05:24 19:29 (53)
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:34	18:02 (47) 18:37 (47)	05:53 20:10	05:23 19:30 (53)
5	07:40 16:40	07:18 17:19	06:36 17:57	06:40 19:36	18:03 (47) 18:35 (47)	05:51 20:11	05:23 19:31 (53)
6	07:40 16:41	07:17 17:21	06:34 17:58	06:38 19:37	18:03 (47) 18:33 (47)	05:50 20:12	05:22 19:32 (53)
7	07:40 16:42	07:16 17:22	06:33 18:00	06:36 19:38	18:04 (47) 18:32 (47)	05:49 20:13	05:22 19:33 (53)
8	07:39 16:43	07:15 17:23	07:31 19:01	06:35 19:39	18:06 (47) 18:29 (47)	05:47 20:14	05:22 19:34 (53)
9	07:39 16:44	07:13 17:25	07:29 19:02	06:33 19:41	18:08 (47) 18:28 (47)	05:46 20:16	05:21 19:35 (53)
10	07:39 16:45	07:12 17:26	07:27 19:04	06:31 19:42	18:11 (47) 18:24 (47)	05:45 20:17	05:21 19:36 (53)
11	07:39 16:46	07:11 17:28	07:25 19:05	06:29 19:43	05:44 20:18	05:44 20:19	05:21 19:37 (53)
12	07:38 16:48	07:09 17:29	07:24 19:06	06:28 19:44	05:42 20:19	05:42 20:20	05:21 19:38 (53)
13	07:38 16:49	07:08 17:30	07:22 19:07	06:26 19:45	05:41 20:20	05:41 20:21	05:21 19:39 (53)
14	07:37 16:50	07:07 17:32	07:20 19:09	06:24 19:47	05:40 20:21	05:40 20:22	05:21 19:40 (53)
15	07:37 16:51	07:05 17:33	07:18 19:10	06:22 19:48	05:39 20:22	05:39 20:23	05:20 19:41 (53)
16	07:36 16:52	07:04 17:34	07:16 19:11	06:21 19:49	05:38 20:24	05:38 20:25	05:20 19:42 (53)
17	07:36 16:54	07:02 17:36	07:15 19:12	06:19 18:32 (47)	05:37 20:25	05:37 20:26	05:20 19:43 (53)
18	07:35 16:55	07:01 17:37	07:13 19:14	06:17 18:34 (47)	05:36 20:26	05:36 20:27	05:21 19:44 (53)
19	07:35 16:56	06:59 17:39	07:11 19:15	06:16 18:36 (47)	05:35 20:27	05:35 20:28	05:21 19:45 (53)
20	07:34 16:57	06:58 17:40	07:09 19:16	06:14 18:37 (47)	05:34 20:28	05:34 20:29	05:21 19:46 (53)
21	07:33 16:59	06:56 17:41	07:07 19:17	06:12 18:38 (47)	05:33 20:29	05:33 20:30	05:21 19:47 (53)
22	07:32 17:00	06:54 17:43	07:05 19:19	06:11 18:39 (47)	05:32 20:30	05:32 20:31	05:21 19:48 (53)
23	07:32 17:01	06:53 17:44	07:04 19:20	06:09 18:41 (47)	05:31 20:31	05:31 20:32	05:21 19:49 (53)
24	07:31 17:03	06:51 17:45	07:02 19:21	06:08 18:42 (47)	05:30 20:32	05:30 20:33	05:22 19:50 (53)
25	07:30 17:04	06:50 17:47	07:00 19:22	06:06 18:43 (47)	05:29 20:33	05:29 20:34	05:22 19:51 (53)
26	07:29 17:05	06:48 17:48	06:58 19:23	06:04 18:44 (47)	05:28 20:34	05:28 20:35	05:22 19:52 (53)
27	07:28 17:07	06:46 17:49	06:56 19:25	06:03 18:45 (47)	05:28 20:35	05:28 20:36	05:23 19:53 (53)
28	07:27 17:08	06:45 17:51	06:54 19:26	06:01 18:46 (47)	05:27 20:36	05:27 20:37	05:23 19:54 (53)
29	07:26 17:09	06:45 17:51	06:53 19:27	06:00 18:47 (47)	05:26 20:37	05:26 20:38	05:24 19:55 (53)
30	07:25 17:11	06:45 17:51	06:51 19:28	05:58 18:48 (47)	05:26 20:38	05:26 20:39	05:24 19:56 (53)
31	07:24 17:12	06:49 17:50	06:49 19:30	05:58 18:49 (47)	05:25 20:39	05:25 20:40	05:24 19:57 (53)
Potential sun hours	288	293	369	403	457	463	122
Total, worst case			500	292	612		0.59
Sun reduction			0.47	0.49	0.55		1.00
Oper. time red.			1.00	1.00	1.00		0.51
Wind dir. red.			0.60	0.60	0.51		0.30
Total reduction			0.29	0.30	0.28		0.37
Total, real			143	87	173		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 94

Licensed user:

**EDR**

217 Montgomery St.  
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Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-51 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (32)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25	05:51	19:35 (53) 06:27		07:01	06:40 07:19
	20:52	20:31	23 19:58 (53) 19:42		18:47	16:55 16:28
2	05:25	05:52	19:35 (53) 06:28	18:09 (47)	07:02	06:42 07:20
	20:52	20:30	23 19:58 (53) 19:40	13 18:22 (47)	18:45	16:54 16:27
3	05:26	19:42 (53) 05:54	19:36 (53) 06:29	18:06 (47)	07:04	06:43 07:21
	20:52	4 19:46 (53) 20:28	21 19:57 (53) 19:38	20 18:26 (47)	18:43	16:53 16:27
4	05:26	19:40 (53) 05:55	19:37 (53) 06:30	18:04 (47)	07:05	06:44 07:22
	20:51	7 19:47 (53) 20:27	18 19:55 (53) 19:37	23 18:27 (47)	18:41	16:51 16:27
5	05:27	19:39 (53) 05:56	19:39 (53) 06:31	18:01 (47)	07:06	06:46 07:23
	20:51	10 19:49 (53) 20:26	15 19:54 (53) 19:35	28 18:29 (47)	18:39	16:50 16:26
6	05:27	19:39 (53) 05:57	19:41 (53) 06:32	18:00 (47)	07:07	06:47 07:24
	20:51	12 19:51 (53) 20:25	10 19:51 (53) 19:33	29 18:29 (47)	18:38	16:49 16:26
7	05:28	19:38 (53) 05:58	06:34	17:58 (47)	07:08	06:48 07:25
	20:50	13 19:51 (53) 20:23	19:31	32 18:30 (47)	18:36	16:48 16:26
8	05:29	19:37 (53) 05:59	06:35	17:56 (47)	07:10	06:50 07:26
	20:50	15 19:52 (53) 20:22	19:29	35 18:31 (47)	18:34	16:46 16:26
9	05:30	19:37 (53) 06:00	06:36	17:55 (47)	07:11	06:51 07:27
	20:50	16 19:53 (53) 20:21	19:27	36 18:31 (47)	18:32	16:45 16:26
10	05:30	19:36 (53) 06:01	06:37	17:54 (47)	07:12	06:52 07:28
	20:49	17 19:53 (53) 20:19	19:26	37 18:31 (47)	18:31	16:44 16:26
11	05:31	19:36 (53) 06:03	06:38	17:53 (47)	07:13	06:54 07:29
	20:49	18 19:54 (53) 20:18	19:24	38 18:31 (47)	18:29	16:43 16:26
12	05:32	19:35 (53) 06:04	06:39	17:52 (47)	07:15	06:55 07:30
	20:48	20 19:55 (53) 20:16	19:22	39 18:31 (47)	18:27	16:42 16:26
13	05:33	19:35 (53) 06:05	06:40	17:52 (47)	07:16	06:56 07:31
	20:48	21 19:56 (53) 20:15	19:20	40 18:32 (47)	18:25	16:41 16:26
14	05:34	19:35 (53) 06:06	06:42	17:52 (47)	07:17	06:58 07:32
	20:47	22 19:57 (53) 20:13	19:18	39 18:31 (47)	18:24	16:40 16:26
15	05:34	19:34 (53) 06:07	06:43	17:51 (47)	07:18	06:59 07:32
	20:47	23 19:57 (53) 20:12	19:16	40 18:31 (47)	18:22	16:39 16:26
16	05:35	19:34 (53) 06:08	06:44	17:51 (47)	07:20	07:00 07:33
	20:46	24 19:58 (53) 20:10	19:15	39 18:30 (47)	18:20	16:38 16:27
17	05:36	19:33 (53) 06:09	06:45	17:50 (47)	07:21	07:02 07:34
	20:45	25 19:58 (53) 20:09	19:13	39 18:29 (47)	18:18	16:37 16:27
18	05:37	19:33 (53) 06:11	06:46	17:50 (47)	07:22	07:03 07:34
	20:44	26 19:59 (53) 20:07	19:11	38 18:28 (47)	18:17	16:36 16:27
19	05:38	19:33 (53) 06:12	06:47	17:50 (47)	07:23	07:04 07:35
	20:44	26 19:59 (53) 20:06	19:09	37 18:27 (47)	18:15	16:35 16:28
20	05:39	19:33 (53) 06:13	06:48	17:50 (47)	07:25	07:05 07:36
	20:43	27 20:00 (53) 20:04	19:07	36 18:26 (47)	18:14	16:34 16:28
21	05:40	19:33 (53) 06:14	06:50	17:52 (47)	07:26	07:07 07:36
	20:42	27 20:00 (53) 20:02	19:05	34 18:26 (47)	18:12	16:33 16:28
22	05:41	19:33 (53) 06:15	06:51	17:52 (47)	07:27	07:08 07:37
	20:41	27 20:00 (53) 20:01	19:03	32 18:24 (47)	18:10	16:33 16:29
23	05:42	19:33 (53) 06:16	06:52	17:53 (47)	07:28	07:09 07:37
	20:40	28 20:01 (53) 19:57	19:01	29 18:22 (47)	18:09	16:32 16:29
24	05:43	19:33 (53) 06:17	06:53	17:54 (47)	07:30	07:11 07:38
	20:39	28 20:01 (53) 19:56	19:00	26 18:20 (47)	18:07	16:31 16:30
25	05:44	19:33 (53) 06:19	06:54	17:55 (47)	07:31	07:12 07:38
	20:38	28 20:01 (53) 19:54	18:58	23 18:18 (47)	18:06	16:31 16:31
26	05:45	19:33 (53) 06:20	06:55	17:58 (47)	07:32	07:13 07:38
	20:37	28 20:01 (53) 19:52	18:56	16 18:14 (47)	18:04	16:30 16:31
27	05:46	19:33 (53) 06:21	06:57	18:02 (47)	07:34	07:14 07:39
	20:36	28 20:01 (53) 19:51	18:54	7 18:09 (47)	18:03	16:29 16:32
28	05:47	19:33 (53) 06:22	06:58		07:35	07:15 07:39
	20:35	27 20:00 (53) 19:49	18:52		18:01	16:29 16:33
29	05:48	19:34 (53) 06:23	06:59		07:36	07:17 07:39
	20:34	26 20:00 (53) 19:47	18:50		18:00	16:28 16:33
30	05:49	19:34 (53) 06:24	07:00		07:38	07:18 07:39
	20:33	26 20:00 (53) 19:45	18:49		17:58	16:28 16:34
31	05:50	19:34 (53) 06:26			07:39	07:40 07:40
	20:32	25 19:59 (53) 19:44			17:57	16:27 16:35
Potential sun hours	469	434	376	341	290	277
Total, worst case	624	110	805			
Sun reduction	0.63	0.59	0.54			
Oper. time red.	1.00	1.00	1.00			
Wind dir. red.	0.51	0.51	0.60			
Total reduction	0.32	0.30	0.33			
Total, real	202	33	264			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 95

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-52 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (33)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	05:57 20:06	18:35 (47) 20:40
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	05:55 20:07	18:38 (47) 20:40
3	07:40 16:38	07:21 17:16	06:39 17:54	06:44 19:33	05:54 20:08	18:45 (47) 20:41
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:34	05:53 20:10	18:45 (47) 20:42
5	07:40 16:40	07:18 17:19	06:36 17:57	06:40 19:36	18:41 (47) 20:11	05:51 20:43
6	07:40 16:41	07:17 17:21	06:34 17:58	06:38 19:37	18:37 (47) 20:12	05:50 20:43
7	07:40 16:42	07:16 17:22	06:33 18:00	06:36 19:38	18:34 (47) 20:13	05:49 20:44
8	07:39 16:43	07:15 17:23	06:31 19:01	06:35 19:39	18:32 (47) 20:14	05:47 20:45
9	07:39 16:44	07:13 17:25	06:29 19:02	06:33 19:41	18:31 (47) 20:16	05:46 20:46
10	07:39 16:45	07:12 17:26	06:27 19:04	06:31 19:42	18:30 (47) 20:17	05:45 20:46
11	07:39 16:46	07:11 17:28	06:25 19:05	06:29 19:43	18:28 (47) 20:18	05:44 20:47
12	07:38 16:48	07:09 17:29	06:24 19:06	06:28 19:44	18:28 (47) 20:19	05:42 20:47
13	07:38 16:49	07:08 17:30	06:22 19:07	06:26 19:45	18:27 (47) 20:20	05:41 20:48
14	07:37 16:50	07:07 17:32	06:20 19:09	06:24 19:47	18:26 (47) 20:21	05:40 20:48
15	07:37 16:51	07:05 17:33	06:18 19:10	06:22 19:48	18:25 (47) 20:22	05:39 20:49
16	07:36 16:52	07:04 17:34	06:16 19:11	06:21 19:49	18:25 (47) 20:24	05:38 20:49
17	07:36 16:54	07:02 17:36	06:15 19:12	06:19 19:50	18:25 (47) 20:25	05:37 20:50
18	07:35 16:55	07:01 17:37	06:13 19:14	06:17 19:51	18:24 (47) 20:26	05:36 20:50
19	07:35 16:56	06:59 17:39	06:11 19:15	06:16 19:53	18:25 (47) 20:27	05:35 20:51
20	07:34 16:57	06:58 17:40	06:09 19:16	06:14 19:54	18:24 (47) 20:28	05:34 20:51
21	07:33 16:59	06:56 17:41	06:07 19:17	06:12 19:55	18:25 (47) 20:29	05:33 20:51
22	07:32 17:00	06:54 17:43	06:05 19:19	06:11 19:56	18:25 (47) 20:30	05:32 20:51
23	07:32 17:01	06:53 17:44	06:04 19:20	06:09 19:58	18:25 (47) 20:31	05:31 19:50 (53) 20:52
24	07:31 17:03	06:51 17:45	06:02 19:21	06:08 19:59	18:26 (47) 20:32	05:30 19:49 (53) 20:52
25	07:30 17:04	06:50 17:47	06:00 19:22	06:06 20:00	18:26 (47) 20:33	05:29 20:03 (53) 20:52
26	07:29 17:05	06:48 17:48	06:58 19:23	06:04 20:00	18:27 (47) 20:34	05:28 19:47 (53) 20:52
27	07:28 17:07	06:46 17:49	06:56 19:25	06:03 20:01	18:28 (47) 20:35	05:27 19:46 (53) 20:52
28	07:27 17:08	06:45 17:51	06:54 19:26	06:01 20:02	18:29 (47) 20:36	05:26 19:46 (53) 20:52
29	07:26 17:09	06:45 17:51	06:53 19:27	06:00 20:04	18:31 (47) 20:37	05:25 19:45 (53) 20:52
30	07:25 17:11	06:45 19:28	06:51 20:05	05:58 20:05	18:32 (47) 20:38	05:24 19:45 (53) 20:52
31	07:24 17:12	06:49 19:30	06:49 20:05	05:58 20:05	18:32 (47) 20:38	05:24 19:44 (53) 20:52
Potential sun hours	288	293	369	403	457	463
Total, worst case				841	177	793
Sun reduction				0.49	0.55	0.59
Oper. time red.				1.00	1.00	1.00
Wind dir. red.				0.55	0.51	0.50
Total reduction				0.27	0.28	0.30
Total, real				229	50	235

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 96

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-52 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (33)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December			
1	05:25	19:49 (53)	05:51	06:27	18:27 (47)	07:01	06:40	07:19	
	27	20:16 (53)	20:31	19:42	35	19:02 (47)	18:47	16:55	16:28
2	05:25	19:49 (53)	05:52	06:28	18:28 (47)	07:02	06:42	07:20	
	26	20:15 (53)	20:30	19:40	33	19:01 (47)	18:45	16:54	16:27
3	05:26	19:49 (53)	05:54	06:29	18:29 (47)	07:04	06:43	07:21	
	27	20:16 (53)	20:28	19:38	31	19:00 (47)	18:43	16:53	16:27
4	05:26	19:49 (53)	05:55	06:30	18:30 (47)	07:05	06:44	07:22	
	26	20:15 (53)	20:27	19:37	28	18:58 (47)	18:41	16:51	16:27
5	05:27	19:50 (53)	05:56	06:31	18:31 (47)	07:06	06:46	07:23	
	26	20:16 (53)	20:26	19:35	25	18:56 (47)	18:39	16:50	16:26
6	05:27	19:50 (53)	05:57	06:32	18:33 (47)	07:07	06:47	07:24	
	26	20:16 (53)	20:25	19:33	21	18:54 (47)	18:38	16:49	16:26
7	05:28	19:50 (53)	05:58	06:34	18:36 (47)	07:08	06:48	07:25	
	26	20:16 (53)	20:23	19:31	14	18:50 (47)	18:36	16:48	16:26
8	05:29	19:51 (53)	05:59	06:35	07:10	06:50	07:26		
	25	20:16 (53)	20:22	19:29	18:34	16:46	16:26		
9	05:30	19:51 (53)	06:00	06:36	07:11	06:51	07:27		
	25	20:16 (53)	20:20	19:27	18:32	16:45	16:26		
10	05:30	19:51 (53)	06:01	06:37	07:12	06:52	07:28		
	24	20:15 (53)	20:19	19:26	18:31	16:44	16:26		
11	05:31	19:52 (53)	06:03	18:45 (47)	06:38	07:13	06:54	07:29	
	23	20:15 (53)	20:18	10	18:55 (47)	19:24	18:29	16:43	16:26
12	05:32	19:52 (53)	06:04	18:42 (47)	06:39	07:15	06:55	07:30	
	24	20:16 (53)	20:16	16	18:58 (47)	19:22	18:27	16:42	16:26
13	05:33	19:53 (53)	06:05	18:40 (47)	06:40	07:16	06:56	07:31	
	22	20:15 (53)	20:15	21	19:01 (47)	19:20	18:25	16:41	16:26
14	05:34	19:54 (53)	06:06	18:38 (47)	06:42	07:17	06:58	07:32	
	21	20:15 (53)	20:13	25	19:03 (47)	19:18	18:24	16:40	16:26
15	05:34	19:54 (53)	06:07	18:37 (47)	06:43	07:18	06:59	07:32	
	20	20:14 (53)	20:12	27	19:04 (47)	19:16	18:22	16:39	16:26
16	05:35	19:55 (53)	06:08	18:35 (47)	06:44	07:20	07:00	07:33	
	19	20:14 (53)	20:10	30	19:05 (47)	19:15	18:20	16:38	16:27
17	05:36	19:56 (53)	06:09	18:34 (47)	06:45	07:21	07:02	07:34	
	17	20:13 (53)	20:09	31	19:05 (47)	19:13	18:18	16:37	16:27
18	05:37	19:57 (53)	06:11	18:32 (47)	06:46	07:22	07:03	07:34	
	16	20:13 (53)	20:07	34	19:06 (47)	19:11	18:17	16:36	16:27
19	05:38	19:58 (53)	06:12	18:31 (47)	06:47	07:23	07:04	07:35	
	14	20:12 (53)	20:06	35	19:06 (47)	19:09	18:15	16:35	16:28
20	05:39	20:00 (53)	06:13	18:30 (47)	06:48	07:25	07:05	07:36	
	10	20:10 (53)	20:04	37	19:07 (47)	19:07	18:14	16:34	16:28
21	05:40	20:03 (53)	06:14	18:29 (47)	06:50	07:26	07:07	07:36	
	5	20:08 (53)	20:02	38	19:07 (47)	19:05	18:12	16:33	16:28
22	05:41	06:15	18:29 (47)	06:51	07:27	07:08	07:37		
	20:41	20:01	38	19:07 (47)	19:03	18:10	16:33	16:29	
23	05:42	06:16	18:28 (47)	06:52	07:28	07:09	07:37		
	20:40	19:57	39	19:07 (47)	19:01	18:09	16:32	16:29	
24	05:43	06:17	18:28 (47)	06:53	07:30	07:11	07:38		
	20:39	19:56	40	19:08 (47)	19:00	18:07	16:31	16:30	
25	05:44	06:19	18:28 (47)	06:54	07:31	07:12	07:38		
	20:38	19:54	39	19:07 (47)	18:58	18:06	16:31	16:31	
26	05:45	06:20	18:27 (47)	06:55	07:32	07:13	07:38		
	20:37	19:52	40	19:07 (47)	18:56	18:04	16:30	16:31	
27	05:46	06:21	18:27 (47)	06:57	07:34	07:14	07:39		
	20:36	19:51	39	19:06 (47)	18:54	18:03	16:29	16:32	
28	05:47	06:22	18:27 (47)	06:58	07:35	07:15	07:39		
	20:35	19:49	39	19:06 (47)	18:52	18:01	16:29	16:33	
29	05:48	06:23	18:27 (47)	06:59	07:36	07:17	07:39		
	20:34	19:47	38	19:05 (47)	18:50	18:00	16:28	16:33	
30	05:49	06:24	18:27 (47)	07:00	07:38	07:18	07:39		
	20:33	19:45	37	19:04 (47)	18:49	17:58	16:28	16:34	
31	05:50	06:26	18:27 (47)	07:01	07:39	07:19	07:40		
	20:32	19:44	36	19:03 (47)	18:47	17:57	16:27	16:35	
Potential sun hours	469	434	376	341	290	277			
Total, worst case	449	689	187						
Sun reduction	0.63	0.59	0.54						
Oper. time red.	1.00	1.00	1.00						
Wind dir. red.	0.50	0.55	0.55						
Total reduction	0.32	0.33	0.30						
Total, real	142	226	56						

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 97

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-53 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (34)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	05:57 20:06	18:37 (47) 20:40	05:25 20:52	05:51 20:31	18:51 (47) 19:42	06:27 19:01	07:01 16:40	07:19 16:28
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	05:55 20:07	18:36 (47) 20:40	05:25 20:52	05:52 20:30	18:50 (47) 19:40	06:28 19:10	18:47 16:54	16:27 07:21
3	07:40 16:38	07:21 17:16	06:39 17:54	06:44 19:33	05:54 20:08	18:37 (47) 20:42	05:26 20:52	05:54 20:28	18:50 (47) 19:38	06:29 19:38	18:43 16:53	16:27 07:22
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:34	05:53 20:10	18:37 (47) 20:42	05:26 20:51	05:55 20:27	18:49 (47) 19:37	06:30 19:37	18:41 16:51	16:27 07:23
5	07:40 16:40	07:18 17:19	06:36 17:57	06:40 19:36	05:51 20:11	18:37 (47) 20:43	05:27 20:51	05:56 20:26	18:48 (47) 19:35	06:31 19:35	18:39 16:50	16:28 07:24
6	07:40 16:41	07:17 17:21	06:34 17:58	06:38 19:37	05:50 20:12	18:37 (47) 20:43	05:27 20:51	05:57 20:25	18:47 (47) 19:33	06:32 19:33	18:38 16:49	16:28 07:25
7	07:40 16:42	07:16 17:22	06:33 18:00	06:36 19:38	05:49 20:13	18:38 (47) 20:44	05:28 20:50	05:58 20:23	18:47 (47) 19:31	06:34 19:31	18:36 16:48	16:28 07:26
8	07:39 16:43	07:15 17:23	07:31 19:01	06:35 19:39	05:47 20:14	18:39 (47) 20:45	05:29 20:50	05:59 20:22	18:46 (47) 19:29	06:35 19:29	18:34 16:46	16:28 07:27
9	07:39 16:44	07:13 17:25	07:29 19:02	06:33 19:41	05:46 20:16	18:38 (47) 20:46	05:30 20:50	06:00 20:20	18:46 (47) 19:27	06:36 19:27	18:32 16:45	16:28 07:28
10	07:39 16:45	07:12 17:26	07:27 19:04	06:31 19:42	05:45 20:17	18:39 (47) 20:46	05:30 20:49	06:01 20:19	18:45 (47) 19:26	06:37 19:26	18:31 16:44	16:28 07:29
11	07:39 16:46	07:11 17:28	07:25 19:05	06:29 19:43	05:44 20:18	18:40 (47) 20:47	05:31 20:49	06:03 20:18	18:45 (47) 19:24	06:38 19:24	18:29 16:43	16:28 07:30
12	07:38 16:48	07:09 17:29	07:24 19:06	06:28 19:44	05:42 20:19	18:41 (47) 20:47	05:32 20:48	06:04 20:16	18:45 (47) 19:22	06:39 19:22	18:27 16:42	16:28 07:31
13	07:38 16:49	07:08 17:30	07:22 19:07	06:26 19:45	05:41 20:20	18:42 (47) 20:48	05:33 20:48	06:05 20:15	18:45 (47) 19:20	06:40 19:20	18:25 16:41	16:28 07:32
14	07:37 16:50	07:07 17:32	07:20 19:09	06:24 19:47	05:40 20:21	18:43 (47) 20:48	05:34 20:47	06:06 20:13	18:45 (47) 19:18	06:42 19:18	18:24 16:40	16:28 07:33
15	07:37 16:51	07:05 17:33	07:18 19:10	06:22 19:48	05:39 20:22	18:44 (47) 20:49	05:34 20:47	06:07 20:12	18:45 (47) 19:16	06:43 19:16	18:18 16:39	16:28 07:34
16	07:36 16:52	07:04 17:34	07:16 19:11	06:21 19:49	05:38 20:24	18:46 (47) 20:49	05:35 20:46	06:08 20:10	18:45 (47) 19:15	06:44 19:15	18:20 16:38	16:28 07:35
17	07:36 16:54	07:02 17:36	07:15 19:12	06:19 19:50	05:37 20:25	18:47 (47) 20:50	05:36 20:45	06:09 20:09	18:45 (47) 19:13	06:45 19:13	18:18 16:37	16:28 07:36
18	07:35 16:55	07:01 17:37	07:13 19:14	06:17 19:51	05:36 20:26	18:48 (47) 20:50	05:37 20:44	06:11 20:07	18:45 (47) 19:11	06:46 19:11	18:17 16:36	16:28 07:37
19	07:35 16:56	06:59 17:39	07:11 19:15	06:16 19:53	05:35 20:27	18:46 (47) 20:51	05:38 20:44	06:12 20:06	18:45 (47) 19:09	06:47 19:09	18:15 16:35	16:28 07:38
20	07:34 16:57	06:58 17:40	07:09 19:16	06:14 19:54	05:34 20:28	18:44 (47) 20:52	05:39 20:51	06:13 20:04	18:46 (47) 19:07	06:48 19:07	18:14 16:34	16:28 07:39
21	07:33 16:59	06:56 17:41	07:07 19:17	06:12 19:55	05:33 20:29	18:43 (47) 20:52	05:40 20:51	06:14 20:02	18:46 (47) 19:05	06:50 19:05	18:12 16:33	16:28 07:40
22	07:32 17:00	06:54 17:43	07:05 19:19	06:11 19:56	05:32 20:30	18:41 (47) 20:53	05:41 20:51	06:15 20:01	18:47 (47) 19:03	06:51 19:03	18:12 16:33	16:28 07:41
23	07:32 17:01	06:53 17:44	07:04 19:20	06:09 19:58	05:31 20:31	18:40 (47) 20:52	05:42 20:52	06:16 19:57	18:48 (47) 19:01	06:52 19:01	18:09 16:32	16:28 07:42
24	07:31 17:03	06:51 17:45	07:02 19:21	06:08 19:59	05:30 20:32	18:40 (47) 20:53	05:43 20:52	06:17 19:50	18:47 (47) 19:00	06:53 19:00	18:07 16:31	16:28 07:43
25	07:30 17:04	06:50 17:47	07:00 19:22	06:06 19:57	05:29 20:33	18:38 (47) 20:54	05:44 20:52	06:19 19:51	18:46 (47) 19:00	06:54 19:00	18:07 16:31	16:28 07:44
26	07:29 17:05	06:48 17:48	06:58 19:23	06:04 19:59	05:28 20:34	18:37 (47) 20:54	05:45 20:52	06:20 19:52	18:54 (47) 19:00	06:55 19:00	18:06 16:31	16:28 07:45
27	07:28 17:07	06:46 17:49	06:56 19:25	06:03 19:59	05:27 20:35	18:37 (47) 20:55	05:46 20:52	06:21 19:51	18:57 (47) 19:00	06:57 19:00	18:04 16:30	16:28 07:46
28	07:27 17:08	06:45 17:51	06:54 19:26	06:01 19:59	05:26 20:36	18:37 (47) 20:56	05:47 20:52	06:22 19:49	18:56 (47) 19:00	06:58 19:00	18:03 16:29	16:28 07:47
29	07:26 17:09	06:45 17:52	06:53 19:27	06:00 19:59	05:25 20:37	18:37 (47) 20:57	05:48 20:52	06:23 19:49	18:55 (47) 19:00	06:59 19:00	18:01 16:29	16:28 07:48
30	07:25 17:11	06:45 17:53	06:51 19:28	05:58 19:59	05:24 20:38	18:37 (47) 20:58	05:49 20:52	06:24 19:49	18:53 (47) 19:00	06:59 19:00	18:00 16:28	16:28 07:49
31	07:24 17:12	06:45 17:54	06:49 19:30	05:57 19:59	05:23 20:39	18:37 (47) 20:59	05:50 20:52	06:26 19:49	18:52 (47) 19:00	06:59 19:00	17:58 16:28	16:28 07:50
Potential sun hours	288	293	369	403	457	463	469	434	376	341	290	277
Total, worst case				482	601	264	183	933				
Sun reduction				0.49	0.55	0.59	0.63	0.59				
Oper. time red.				1.00	1.00	1.00	1.00	1.00				
Wind dir. red.				0.52	0.52	0.49	0.52	0.52				
Total reduction				0.25	0.29	0.29	0.33	0.31				
Total, real				123	172	77	60	286				

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)



Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 98

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

### SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-54 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (35)

#### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	05:57 20:06	05:25 20:40	18:53 (47) 20:52	05:25 20:31	19:08 (47) 19:42	06:27 18:47	07:01 16:55	06:40 16:28
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	05:55 20:07	05:24 20:40	18:53 (47) 20:52	05:52 20:30	19:09 (47) 19:40	06:28 18:45	07:02 16:54	06:42 16:27
3	07:40 16:38	07:21 17:16	06:39 17:55	06:44 19:33	05:54 20:08	05:24 20:41	18:54 (47) 20:52	05:54 20:28	19:10 (47) 19:38	06:29 18:43	07:04 16:53	06:43 16:27
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:34	05:53 20:10	05:23 20:42	18:53 (47) 20:51	05:55 20:27	19:11 (47) 19:37	06:30 18:41	07:05 16:51	06:44 16:27
5	07:40 16:40	07:18 17:19	06:36 17:57	06:40 19:36	05:51 20:11	19:10 (47) 20:43	18:54 (47) 20:51	05:56 20:26	19:12 (47) 19:35	06:31 18:39	07:06 16:50	06:46 16:26
6	07:40 16:41	07:17 17:21	06:34 17:58	06:38 19:37	05:50 20:12	19:06 (47) 20:43	18:55 (47) 20:51	05:57 20:25	19:01 (47) 19:35	06:32 18:38	07:07 16:49	06:47 16:26
7	07:40 16:42	07:16 17:22	06:33 18:00	06:36 19:38	05:49 20:13	19:04 (47) 20:44	18:54 (47) 20:50	05:58 20:23	19:00 (47) 19:31	06:34 18:36	07:08 16:48	06:48 16:26
8	07:39 16:43	07:15 17:23	07:31 19:01	06:35 19:39	05:47 20:14	19:02 (47) 20:45	18:55 (47) 20:50	05:59 20:22	19:01 (47) 19:29	06:35 18:34	07:10 16:46	06:50 16:26
9	07:39 16:44	07:13 17:25	07:29 19:02	06:33 19:41	05:46 20:16	19:00 (47) 20:46	18:55 (47) 20:50	06:00 20:21	19:01 (47) 19:27	06:36 18:32	07:11 16:45	06:51 16:26
10	07:39 16:45	07:12 17:26	07:27 19:04	06:31 19:42	05:45 20:17	18:59 (47) 20:46	18:56 (47) 20:49	06:01 20:19	19:00 (47) 19:26	06:37 18:31	07:12 16:44	06:52 16:26
11	07:39 16:46	07:11 17:28	07:25 19:05	06:29 19:43	05:44 20:18	18:58 (47) 20:47	18:56 (47) 20:49	06:03 20:18	19:01 (47) 19:24	06:38 18:29	07:13 16:43	06:54 16:26
12	07:38 16:48	07:09 17:29	07:24 19:06	06:28 19:44	05:42 20:19	18:57 (47) 20:47	18:56 (47) 20:48	06:04 20:16	19:01 (47) 19:22	06:39 18:27	07:15 16:42	06:55 16:26
13	07:38 16:49	07:08 17:30	07:22 19:07	06:26 19:45	05:41 20:20	18:56 (47) 20:48	18:56 (47) 20:48	06:05 20:15	19:01 (47) 19:20	06:40 18:25	07:16 16:41	06:56 16:26
14	07:37 16:50	07:07 17:32	07:20 19:09	06:24 19:47	05:40 20:21	18:55 (47) 20:48	18:56 (47) 20:47	06:06 20:13	19:02 (47) 19:18	06:42 18:24	07:17 16:40	06:58 16:26
15	07:37 16:51	07:05 17:33	07:18 19:10	06:22 19:48	05:39 20:22	18:55 (47) 20:49	18:57 (47) 20:47	06:07 20:12	19:01 (47) 19:16	06:43 18:22	07:18 16:39	06:59 16:26
16	07:36 16:52	07:04 17:34	07:16 19:11	06:21 19:49	05:38 20:24	18:54 (47) 20:49	18:57 (47) 20:46	06:08 20:10	19:01 (47) 19:15	06:44 18:20	07:20 16:38	07:00 16:27
17	07:36 16:54	07:02 17:36	07:15 19:12	06:19 19:50	05:37 20:25	18:54 (47) 20:50	18:57 (47) 20:45	06:09 20:09	19:01 (47) 19:13	06:45 18:18	07:21 16:37	07:02 16:27
18	07:35 16:55	07:01 17:37	07:13 19:14	06:17 19:51	05:36 20:26	18:53 (47) 20:50	18:57 (47) 20:44	06:11 20:07	19:02 (47) 19:11	06:46 18:17	07:22 16:36	07:03 16:27
19	07:35 16:56	06:59 17:39	07:11 19:15	06:16 19:53	05:35 20:27	18:53 (47) 20:51	18:58 (47) 20:44	06:12 20:06	19:02 (47) 19:09	06:47 18:15	07:23 16:35	07:04 16:28
20	07:34 16:57	06:58 17:40	07:09 19:16	06:14 19:54	05:34 20:28	18:53 (47) 20:51	18:58 (47) 20:43	06:13 20:04	19:02 (47) 19:07	06:48 18:14	07:25 16:34	07:05 16:28
21	07:33 16:59	06:56 17:41	07:07 19:17	06:12 19:55	05:33 20:29	18:52 (47) 20:51	18:58 (47) 20:42	06:14 20:02	19:02 (47) 19:05	06:50 18:12	07:26 16:33	07:07 16:28
22	07:32 17:00	06:54 17:43	07:05 19:19	06:11 19:56	05:32 20:30	18:52 (47) 20:51	18:58 (47) 20:41	06:15 20:01	19:03 (47) 19:03	06:51 18:10	07:27 16:33	07:08 16:29
23	07:32 17:01	06:53 17:44	07:04 19:20	06:09 19:58	05:31 20:31	18:52 (47) 20:52	18:58 (47) 20:40	06:16 19:57	19:03 (47) 19:01	06:52 18:09	07:28 16:32	07:09 16:27
24	07:31 17:03	06:51 17:45	07:02 19:21	06:08 19:59	05:30 20:32	18:53 (47) 20:52	18:59 (47) 20:39	06:17 19:56	19:03 (47) 19:04	06:53 18:07	07:30 16:31	07:11 16:30
25	07:30 17:04	06:50 17:47	07:00 19:22	06:06 20:00	05:29 20:33	18:52 (47) 20:52	18:59 (47) 20:38	06:19 19:54	19:04 (47) 19:04	06:54 18:06	07:31 16:31	07:12 16:31
26	07:29 17:05	06:48 17:48	06:58 19:23	06:04 20:00	05:29 20:34	18:52 (47) 20:52	18:59 (47) 20:37	06:20 19:52	19:04 (47) 19:04	06:55 18:04	07:32 16:30	07:13 16:31
27	07:28 17:07	06:46 17:49	06:56 19:25	06:03 20:01	05:28 20:35	18:52 (47) 20:52	19:00 (47) 20:36	06:21 19:51	19:05 (47) 19:05	06:57 18:54	07:34 16:30	07:14 16:32
28	07:27 17:08	06:45 17:51	06:54 19:26	06:01 20:02	05:27 20:36	18:53 (47) 20:52	18:59 (47) 20:35	06:22 19:49	19:05 (47) 19:06	06:58 18:50	07:35 16:29	07:15 16:33
29	07:26 17:09	06:44 17:52	06:53 19:27	06:00 20:04	05:26 20:37	18:52 (47) 20:52	19:00 (47) 20:34	06:23 19:47	19:06 (47) 19:06	06:59 18:50	07:36 16:28	07:17 16:33
30	07:25 17:11	06:43 17:53	06:52 19:28	06:00 20:05	05:26 20:38	18:53 (47) 20:52	19:00 (47) 20:33	06:24 19:45	19:06 (47) 19:06	07:00 18:49	07:38 16:28	07:18 16:34
31	07:24 17:12	06:42 17:54	06:51 19:29	06:00 20:06	05:26 20:39	18:54 (47) 20:53	19:00 (47) 20:32	06:25 19:44	19:07 (47) 19:07	07:01 18:48	07:39 16:27	07:19 16:35
Potential sun hours	288	293	369	403	457	463	469	434	376	341	290	277
Total, worst case					1052	1347	1390	193				
Sun reduction					0.55	0.59	0.63	0.59				
Oper. time red.					1.00	1.00	1.00	1.00				
Wind dir. red.					0.51	0.51	0.51	0.51				
Total reduction					0.28	0.30	0.32	0.30				
Total, real					298	409	450	59				

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker
			(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 99

Licensed user:

**EDR**

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(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-6 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (359)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June		
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	07:48 (55) 08:12 (55)	05:57 20:06	05:25 20:40	18:49 (54) 19:38 (54)
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	07:50 (55) 08:10 (55)	05:56 20:07	19:07 (54) 20:40	18:49 (54) 19:38 (54)
3	07:40 16:38	07:21 17:16	06:40 17:55	06:44 19:33	07:52 (55) 08:06 (55)	05:54 20:09	19:03 (54) 20:41	18:50 (54) 19:38 (54)
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:35	07:58 (55) 08:01 (55)	05:53 20:10	19:01 (54) 20:42	18:49 (54) 19:38 (54)
5	07:40 16:40	07:19 17:19	06:36 17:57	06:40 19:36	06:40 20:11	05:51 20:11	18:58 (54) 20:43	18:50 (54) 19:38 (54)
6	07:40 16:41	07:17 17:21	06:34 17:58	06:38 19:37	06:38 20:12	05:50 20:12	18:56 (54) 20:44	18:51 (54) 19:38 (54)
7	07:40 16:42	07:16 17:22	06:33 18:00	06:36 19:38	06:36 20:13	05:49 20:13	18:55 (54) 20:44	18:50 (54) 19:38 (54)
8	07:40 16:43	07:15 17:23	06:31 19:01	06:35 19:39	06:35 20:14	05:47 20:14	18:54 (54) 20:45	18:51 (54) 19:38 (54)
9	07:39 16:44	07:13 17:25	06:29 19:02	06:33 19:41	06:33 20:16	05:46 20:16	18:52 (54) 20:46	18:51 (54) 19:38 (54)
10	07:39 16:45	07:12 17:26	06:27 19:04	06:31 19:42	06:31 20:17	05:45 20:17	18:52 (54) 20:46	18:52 (54) 19:39 (54)
11	07:39 16:46	07:11 17:28	06:25 19:05	06:29 19:43	06:29 20:18	05:44 20:18	18:51 (54) 20:47	18:52 (54) 19:39 (54)
12	07:38 16:48	07:09 17:29	06:24 19:06	06:28 19:44	06:28 20:19	05:42 20:19	18:50 (54) 20:47	18:52 (54) 19:38 (54)
13	07:38 16:49	07:08 17:30	06:22 19:07	06:26 19:45	06:26 20:20	05:41 20:20	18:50 (54) 20:48	18:52 (54) 19:38 (54)
14	07:38 16:50	07:07 17:32	06:20 19:09	06:24 19:47	06:24 20:21	05:40 20:21	18:49 (54) 20:49	18:53 (54) 19:38 (54)
15	07:37 16:51	07:05 17:33	06:18 19:10	06:22 19:48	06:22 20:23	05:39 20:23	18:49 (54) 20:49	18:53 (54) 19:39 (54)
16	07:37 16:52	07:04 17:34	06:16 19:11	06:21 19:49	06:21 20:24	05:38 20:24	18:49 (54) 20:49	18:53 (54) 19:39 (54)
17	07:36 16:54	07:02 17:36	06:15 19:12	06:19 19:50	06:19 20:25	05:37 20:25	18:48 (54) 20:50	18:53 (54) 19:39 (54)
18	07:35 16:55	07:01 17:37	06:13 19:14	06:17 19:52	06:17 20:26	05:36 20:26	18:48 (54) 20:50	18:54 (54) 19:39 (54)
19	07:35 16:56	06:59 17:39	06:11 19:15	06:16 19:53	06:16 20:27	05:35 20:27	18:48 (54) 20:51	18:55 (54) 19:40 (54)
20	07:34 16:57	06:58 17:40	06:09 19:16	06:14 19:54	06:14 20:28	05:34 20:28	18:48 (54) 20:51	18:55 (54) 19:40 (54)
21	07:33 16:59	06:56 17:41	06:07 19:17	06:12 19:55	06:12 20:29	05:33 20:29	18:47 (54) 20:51	18:55 (54) 19:40 (54)
22	07:33 17:00	06:54 17:43	06:06 19:19	06:11 19:56	06:11 20:30	05:32 20:30	18:47 (54) 20:51	18:55 (54) 19:40 (54)
23	07:32 17:01	06:53 17:44	06:04 19:20	06:09 19:58	06:09 20:31	05:31 20:31	18:47 (54) 20:52	18:55 (54) 19:40 (54)
24	07:31 17:03	06:51 17:45	06:02 19:21	06:08 19:59	06:08 20:32	05:30 20:32	18:48 (54) 20:52	18:56 (54) 19:41 (54)
25	07:30 17:04	06:50 17:47	06:00 19:22	06:06 20:00	06:06 20:33	05:29 20:33	18:48 (54) 20:52	18:55 (54) 19:41 (54)
26	07:29 17:05	06:48 17:48	06:58 19:24	06:04 20:00	06:04 20:34	05:29 20:34	18:47 (54) 20:52	18:55 (54) 19:41 (54)
27	07:28 17:07	06:46 17:49	06:56 19:25	06:03 20:01	06:03 20:35	05:28 20:35	18:47 (54) 20:52	18:56 (54) 19:42 (54)
28	07:27 17:08	06:45 17:51	06:55 19:26	06:01 20:02	06:01 20:36	05:27 20:36	18:48 (54) 20:52	18:56 (54) 19:42 (54)
29	07:26 17:09		06:53 19:27	06:00 20:04	06:00 20:37	05:26 20:37	18:48 (54) 20:52	18:56 (54) 19:42 (54)
30	07:25 17:11		06:51 19:28	05:58 20:05	05:58 20:38	05:26 20:38	18:49 (54) 20:52	18:56 (54) 19:42 (54)
31	07:24 17:12		06:49 19:30	05:57 20:05	05:57 20:39	05:25 20:39	18:48 (54) 19:38 (54)	18:56 (54) 19:42 (54)
Potential sun hours	288	293	369	403	457	463	1392	
Total, worst case			582	61	1257		1392	
Sun reduction			0.47	0.49	0.55		0.59	
Oper. time red.			1.00	1.00	1.00		1.00	
Wind dir. red.			0.53	0.53	0.52		0.52	
Total reduction			0.25	0.26	0.28		0.30	
Total, real			145	16	356		423	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 100

Licensed user:

EDR

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US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-6 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (359)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25 20:52	18:57 (54) 19:43 (54)	05:51 20:31	19:01 (54) 19:42 (54)	06:27 18:47	07:01 07:42 (55)
2	05:25 20:52	18:56 (54) 19:43 (54)	05:52 20:30	19:02 (54) 19:43 (54)	06:28 18:45	07:03 07:50 (55)
3	05:26 20:52	18:57 (54) 19:44 (54)	05:54 20:28	19:02 (54) 19:42 (54)	06:29 18:43	07:04 18:43
4	05:26 20:51	18:56 (54) 19:43 (54)	05:55 20:27	19:03 (54) 19:41 (54)	06:30 18:41	07:05 18:41
5	05:27 20:51	18:57 (54) 19:44 (54)	05:56 20:26	19:04 (54) 19:39 (54)	06:31 18:39	07:06 18:39
6	05:27 20:51	18:57 (54) 19:45 (54)	05:57 20:25	19:05 (54) 19:38 (54)	06:32 18:38	07:07 18:38
7	05:28 20:51	18:56 (54) 19:44 (54)	05:58 20:23	19:07 (54) 19:36 (54)	06:34 18:36	07:09 18:36
8	05:29 20:50	18:57 (54) 19:45 (54)	05:59 20:22	19:08 (54) 19:34 (54)	06:35 18:34	07:10 18:34
9	05:30 20:50	18:57 (54) 19:45 (54)	06:00 20:21	19:10 (54) 19:32 (54)	06:36 18:32	07:11 18:32
10	05:30 20:49	18:56 (54) 19:45 (54)	06:01 20:19	19:13 (54) 19:29 (54)	06:37 18:31	07:12 18:31
11	05:31 20:49	18:57 (54) 19:45 (54)	06:03 20:18	19:18 (54) 19:23 (54)	06:38 18:30	07:13 18:30
12	05:32 20:48	18:57 (54) 19:46 (54)	06:04 20:16	19:22 19:22	06:39 08:06 (55)	07:15 18:27
13	05:33 20:48	18:57 (54) 19:46 (54)	06:05 20:15	19:20 19:20	06:40 08:07 (55)	07:16 18:25
14	05:34 20:47	18:57 (54) 19:47 (54)	06:06 20:13	19:18 19:18	06:42 08:08 (55)	07:17 18:24
15	05:34 20:47	18:56 (54) 19:46 (54)	06:07 20:12	19:16 19:16	06:43 08:08 (55)	07:18 18:22
16	05:35 20:46	18:57 (54) 19:46 (54)	06:08 20:10	19:15 19:15	06:44 08:08 (55)	07:20 18:20
17	05:36 20:45	18:57 (54) 19:47 (54)	06:09 20:09	19:15 19:15	06:45 08:08 (55)	07:21 18:20
18	05:37 20:45	18:57 (54) 19:47 (54)	06:11 20:07	19:13 19:13	06:46 08:08 (55)	07:22 18:19
19	05:38 20:44	18:57 (54) 19:47 (54)	06:12 20:06	19:11 19:09	06:47 08:08 (55)	07:23 18:19
20	05:39 20:43	18:57 (54) 19:47 (54)	06:13 20:04	19:09 19:07	06:48 08:07 (55)	07:25 18:14
21	05:40 20:42	18:58 (54) 19:47 (54)	06:14 20:02	19:07 19:05	06:50 08:07 (55)	07:26 18:12
22	05:41 20:41	18:58 (54) 19:47 (54)	06:15 20:01	19:05 19:03	06:51 08:07 (55)	07:27 18:10
23	05:42 20:40	18:58 (54) 19:47 (54)	06:16 19:57	19:03 19:02	06:52 08:06 (55)	07:29 18:09
24	05:43 20:39	18:58 (54) 19:47 (54)	06:17 19:56	19:02 19:00	06:53 08:05 (55)	07:30 18:07
25	05:44 20:39	18:58 (54) 19:47 (54)	06:19 19:54	19:01 18:58	06:54 08:04 (55)	07:31 18:06
26	05:45 20:38	18:59 (54) 19:46 (54)	06:20 19:52	19:00 18:56	06:55 08:03 (55)	07:32 18:04
27	05:46 20:36	18:59 (54) 19:46 (54)	06:21 19:51	18:58 18:54	06:57 08:02 (55)	07:34 18:03
28	05:47 20:35	18:59 (54) 19:46 (54)	06:22 19:49	18:56 18:52	06:58 08:00 (55)	07:35 18:01
29	05:48 20:34	19:00 (54) 19:45 (54)	06:23 19:47	18:54 18:50	06:59 07:58 (55)	07:36 18:00
30	05:49 20:33	19:00 (54) 19:45 (54)	06:24 19:45	18:52 18:49	07:00 07:55 (55)	07:38 17:58
31	05:50 20:32	19:01 (54) 19:44 (54)	06:26 19:44	18:49 18:49	07:38 (55) 17:57	07:38 17:57
Potential sun hours	469	434	376	341	290	277
Total, worst case	1489	327	645	8		
Sun reduction	0.63	0.59	0.54	0.44		
Oper. time red.	1.00	1.00	1.00	1.00		
Wind dir. red.	0.52	0.52	0.53	0.53		
Total reduction	0.32	0.30	0.29	0.23		
Total, real	484	99	185	2		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 101

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-7 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (6)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December	
1	07:40 16:36	07:23 17:14	06:43 17:52	16:16 (55) 17:01 (55)	06:47 19:31	05:57 20:06	05:25 20:40	05:24 20:52	05:51 20:31	06:27 19:42	07:01 18:47	17:00 (55) 16:55	06:40 16:28
2	07:40 16:37	07:22 17:15	06:41 17:53	16:17 (55) 17:01 (55)	06:45 19:32	05:55 20:07	05:24 20:40	05:25 20:52	05:52 20:30	06:28 19:40	07:02 18:45	16:58 (55) 16:54	06:42 16:27
3	07:40 16:38	07:21 17:16	06:39 17:54	16:16 (55) 17:01 (55)	06:44 19:33	05:54 20:08	05:23 20:41	05:26 20:52	05:54 20:28	06:29 19:38	07:04 18:43	16:57 (55) 16:53	06:43 16:27
4	07:40 16:39	07:20 17:18	06:38 17:56	16:16 (55) 17:00 (55)	06:42 19:34	05:53 20:10	05:23 20:42	05:26 20:51	05:55 20:27	06:30 19:37	07:05 18:41	16:56 (55) 16:51	06:44 16:27
5	07:40 16:40	07:19 17:19	06:36 17:57	16:16 (55) 17:00 (55)	06:40 19:36	05:51 20:11	05:23 20:43	05:27 20:51	05:56 20:26	06:31 19:35	07:06 18:39	16:54 (55) 16:50	06:46 16:26
6	07:40 16:41	07:17 17:21	06:34 17:58	16:17 (55) 17:00 (55)	06:38 19:37	05:50 20:12	05:22 20:44	05:27 20:51	05:57 20:25	06:32 19:33	07:07 18:38	16:53 (55) 16:49	06:47 16:26
7	07:40 16:42	07:16 17:22	06:33 18:00	16:17 (55) 16:59 (55)	06:36 19:38	05:49 20:13	05:22 20:44	05:28 20:51	05:58 20:23	06:34 19:31	07:09 18:36	16:53 (55) 16:48	06:48 16:26
8	07:39 16:43	07:15 17:23	06:31 19:01	17:17 (55) 17:58 (55)	06:35 19:39	05:47 20:14	05:22 20:45	05:29 20:50	05:59 20:22	06:35 19:29	07:10 18:34	16:52 (55) 16:46	06:50 16:26
9	07:39 16:44	07:13 17:25	06:29 19:02	17:18 (55) 17:57 (55)	06:33 19:41	05:46 20:16	05:21 20:46	05:30 20:50	06:00 20:21	06:36 19:27	07:11 18:32	16:51 (55) 16:45	06:51 16:26
10	07:39 16:45	07:12 17:26	06:27 19:04	17:18 (55) 17:56 (55)	06:31 19:42	05:45 20:17	05:21 20:46	05:30 20:49	06:01 20:19	06:37 19:26	07:12 18:31	16:50 (55) 16:44	06:52 16:26
11	07:39 16:46	07:11 17:28	06:25 19:05	17:20 (55) 17:55 (55)	06:29 19:43	05:43 20:18	05:21 20:47	05:31 20:49	06:03 20:18	06:38 19:24	07:13 18:29	16:51 (55) 16:35	06:54 16:43
12	07:38 16:47	07:09 17:29	06:24 19:06	17:21 (55) 17:53 (55)	06:28 19:44	05:42 20:19	05:21 20:47	05:32 20:48	06:04 20:16	06:39 19:22	07:15 18:27	16:50 (55) 16:35	06:55 16:42
13	07:38 16:49	07:08 17:30	06:22 19:07	17:22 (55) 17:51 (55)	06:26 19:45	05:41 20:20	05:21 20:48	05:33 20:48	06:05 20:15	06:40 19:20	07:16 18:25	16:50 (55) 16:34	06:56 16:41
14	07:37 16:50	07:07 17:32	06:20 19:09	17:24 (55) 17:49 (55)	06:24 19:47	05:40 20:21	05:20 20:49	05:34 20:47	06:06 20:13	06:42 19:18	07:17 18:24	16:49 (55) 16:33	06:58 16:40
15	07:37 16:51	07:05 17:33	06:18 19:10	17:26 (55) 17:46 (55)	06:22 19:48	05:39 20:22	05:20 20:49	05:34 20:47	06:07 20:12	06:43 19:16	07:18 18:22	16:50 (55) 16:33	06:59 16:26
16	07:36 16:52	07:04 17:34	16:34 (55) 16:45 (55)	07:16 19:11	06:21 19:49	05:38 20:24	05:20 20:49	05:35 20:46	06:08 20:10	06:44 19:15	07:20 18:20	16:50 (55) 16:38	07:00 16:27
17	07:36 16:54	07:02 17:36	16:30 (55) 16:50 (55)	07:15 19:12	06:19 19:50	05:37 20:25	05:20 20:50	05:36 20:45	06:09 20:09	06:45 19:13	07:21 18:18	16:50 (55) 16:37	07:02 16:27
18	07:35 16:55	07:01 17:37	16:27 (55) 16:52 (55)	07:13 19:14	06:17 19:52	05:36 20:26	05:20 20:50	05:37 20:45	06:11 20:07	06:46 19:11	07:22 18:17	16:51 (55) 16:35	07:03 16:27
19	07:35 16:56	06:59 17:39	16:26 (55) 16:54 (55)	07:11 19:15	06:16 19:53	05:35 20:27	05:21 20:51	05:38 20:44	06:12 20:06	06:47 19:09	07:23 18:15	16:52 (55) 16:35	07:04 16:28
20	07:34 16:57	06:58 17:40	16:24 (55) 16:55 (55)	07:09 19:16	06:14 19:54	05:34 20:28	05:21 20:51	05:39 20:43	06:13 20:04	06:48 19:07	07:25 18:14	16:52 (55) 16:34	07:05 16:28
21	07:33 16:59	06:56 17:41	16:23 (55) 16:53 (55)	07:07 19:17	06:12 19:55	05:33 20:29	05:21 20:51	05:40 20:42	06:14 20:02	06:50 19:05	07:26 18:12	16:54 (55) 16:33	07:07 16:28
22	07:33 17:00	06:54 17:43	16:21 (55) 16:58 (55)	07:05 19:19	06:11 19:56	05:32 20:30	05:21 20:51	05:41 20:41	06:15 20:01	06:51 19:03	07:27 18:10	16:55 (55) 16:33	07:08 16:29
23	07:32 17:01	06:53 17:44	16:20 (55) 16:58 (55)	07:04 19:20	06:09 19:58	05:31 20:31	05:21 20:52	05:42 20:40	06:16 19:57	06:52 19:01	07:29 18:09	16:56 (55) 16:32	07:09 16:29
24	07:31 17:03	06:51 17:45	16:20 (55) 17:00 (55)	07:02 19:21	06:08 19:59	05:30 20:32	05:22 20:52	05:43 20:39	06:17 19:56	06:53 19:00	07:30 18:07	16:58 (55) 16:31	07:11 16:30
25	07:30 17:04	06:50 17:47	16:18 (55) 17:00 (55)	07:00 19:22	06:06 20:00	05:29 20:33	05:22 20:52	05:44 20:38	06:19 19:54	06:54 18:58	07:31 18:06	17:01 (55) 16:31	07:12 16:31
26	07:29 17:05	06:48 17:48	16:17 (55) 17:00 (55)	06:58 19:23	06:04 20:00	05:28 20:34	05:22 20:52	05:45 20:37	06:20 19:52	06:55 18:56	07:32 18:04	17:06 (55) 16:30	07:13 16:31
27	07:28 17:07	06:46 17:49	16:18 (55) 17:01 (55)	06:56 19:25	06:03 20:01	05:28 20:35	05:23 20:52	05:46 20:36	06:21 19:51	06:57 18:54	17:14 (55) 17:23 (55)	07:34 18:03	07:14 16:32
28	07:27 17:08	06:45 17:51	16:17 (55) 17:01 (55)	06:54 19:26	06:01 20:02	05:27 20:36	05:23 20:52	05:47 20:35	06:22 19:49	06:58 18:52	17:09 (55) 17:27 (55)	07:35 18:01	07:15 16:33
29	07:26 17:09	06:45 17:51	16:17 (55) 17:01 (55)	06:54 19:26	06:01 20:02	05:27 20:36	05:23 20:52	05:47 20:35	06:22 19:49	06:58 18:52	17:09 (55) 17:27 (55)	07:35 18:01	07:15 16:33
30	07:25 17:11	06:45 17:51	16:17 (55) 17:01 (55)	06:54 19:26	06:01 20:02	05:27 20:36	05:23 20:52	05:47 20:35	06:22 19:49	06:58 18:52	17:09 (55) 17:27 (55)	07:35 18:01	07:15 16:33
31	07:24 17:12	06:45 17:51	16:17 (55) 17:01 (55)	06:54 19:26	06:01 20:02	05:27 20:36	05:23 20:52	05:47 20:35	06:22 19:49	06:58 18:52	17:09 (55) 17:27 (55)	07:35 18:01	07:15 16:33
Potential sun hours	288	293	369	403	457	463	469	434	376	341	290	277	
Total, worst case		436	579						79	954			
Sun reduction		0.39	0.47						0.54	0.44			
Oper. time red.		1.00	1.00						1.00	1.00			
Wind dir. red.		0.68	0.68						0.68	0.68			
Total reduction		0.27	0.32						0.37	0.30			
Total, real		116	186						29	287			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 102

Licensed user:

**EDR**

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(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-73 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (340)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36 37	14:58 (36) 15:35 (36) 17:14	07:23 17:52	06:43 19:31	05:57 20:06	06:22 (45) 20:40
2	07:40 16:37 36	14:59 (36) 15:35 (36) 17:15	07:22 17:53	06:41 19:32	05:56 20:07	06:18 (45) 20:40
3	07:40 16:38 36	14:59 (36) 15:35 (36) 17:17	07:21 17:55	06:40 19:33	05:54 20:09	06:17 (45) 20:41
4	07:40 16:39 36	15:00 (36) 15:36 (36) 17:18	07:20 17:56	06:38 19:35	05:53 20:10	06:16 (45) 20:42
5	07:40 16:40 35	15:01 (36) 15:36 (36) 17:19	07:19 17:57	06:36 19:36	05:51 20:11	06:14 (45) 20:43
6	07:40 16:41 35	15:02 (36) 15:37 (36) 17:21	07:17 17:59	06:34 19:37	05:50 20:12	06:14 (45) 20:44
7	07:40 16:42 34	15:02 (36) 15:36 (36) 17:22	07:16 18:00	06:33 19:38	05:49 20:13	06:14 (45) 20:44
8	07:40 16:43 34	15:03 (36) 15:37 (36) 17:23	07:15 19:01	07:31 19:39	05:47 20:14	06:13 (45) 20:45
9	07:39 16:44 33	15:04 (36) 15:37 (36) 17:25	07:14 19:02	07:29 19:41	05:46 20:16	06:12 (45) 20:46
10	07:39 16:45 32	15:04 (36) 15:36 (36) 17:26	07:12 19:04	07:27 19:42	05:45 20:17	06:13 (45) 20:46
11	07:39 16:46 32	15:05 (36) 15:37 (36) 17:28	07:11 19:05	07:26 19:43	05:44 20:18	06:13 (45) 20:47
12	07:38 16:48 31	15:06 (36) 15:37 (36) 17:29	07:09 19:06	07:24 19:44	05:42 20:19	06:13 (45) 20:47
13	07:38 16:49 30	15:07 (36) 15:37 (36) 17:30	07:08 19:07	07:22 19:46	05:41 20:20	06:13 (45) 20:48
14	07:38 16:50 29	15:08 (36) 15:37 (36) 17:32	07:07 19:09	07:20 19:47	05:40 20:21	06:14 (45) 20:49
15	07:37 16:51 27	15:09 (36) 15:36 (36) 17:33	07:05 19:10	07:18 19:48	05:39 20:23	06:14 (45) 20:49
16	07:37 16:52 25	15:10 (36) 15:35 (36) 17:35	07:04 19:11	07:17 19:49	05:38 20:24	06:15 (45) 20:49
17	07:36 16:54 23	15:12 (36) 15:35 (36) 17:36	07:02 19:12	07:15 19:50	05:37 20:25	06:16 (45) 20:50
18	07:35 16:55 21	15:13 (36) 15:34 (36) 17:37	07:01 19:14	07:13 19:52	05:36 20:26	06:16 (45) 20:50
19	07:35 16:56 18	15:15 (36) 15:33 (36) 17:39	06:59 19:15	07:11 19:53	05:35 20:27	06:18 (45) 20:51
20	07:34 16:58 15	15:17 (36) 15:32 (36) 17:40	06:58 19:16	07:09 19:54	05:34 20:28	06:19 (45) 20:51
21	07:33 16:59 10	15:20 (36) 15:32 (36) 17:41	06:56 19:17	07:07 19:55	05:33 20:29	06:21 (45) 20:51
22	07:33 17:00	15:30 (36) 06:54	07:06 17:43	06:11 19:19	05:32 19:56	06:26 (45) 20:30
23	07:32 17:01	06:53	07:04 17:44	06:09 19:20	05:31 19:58	20:31
24	07:31 17:03	06:51	07:02 17:45	06:08 19:21	05:30 19:59	20:32
25	07:30 17:04	06:50	07:00 17:47	06:06 19:22	05:29 20:00	20:33
26	07:29 17:05	06:48	06:58 17:48	06:05 19:24	05:29 20:00	20:34
27	07:28 17:07	06:46	06:56 17:49	06:03 19:25	05:28 20:01	20:35
28	07:27 17:08	06:45	06:55 17:51	06:02 19:26	05:27 20:03	20:36
29	07:26 17:10	06:45	06:55 19:27	06:02 20:04	05:27 20:04	20:37
30	07:25 17:11	06:45	06:55 19:28	06:02 20:05	05:27 20:05	20:38
31	07:24 17:12	06:45	06:55 19:30	06:02 20:05	05:27 20:05	20:38
Potential sun hours	288	293	369	403	457	463
Total, worst case	609				357	
Sun reduction	0.33				0.55	
Oper. time red.	1.00				1.00	
Wind dir. red.	0.76				0.66	
Total reduction	0.26				0.37	
Total, real	157				134	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 103

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

### SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2 Shadow receptor: R-73 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (340)

#### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25 20:52	05:52 20:31	06:23 (45) 19:42	06:27 18:47	07:01 16:56	06:40 16:28
2	05:25 20:52	05:53 20:30	06:23 (45) 19:40	06:28 18:45	07:03 16:54	06:42 16:27
3	05:26 20:52	05:54 20:29	06:23 (45) 19:38	06:29 18:43	07:04 16:53	06:43 16:27
4	05:26 20:51	05:55 20:27	06:23 (45) 19:37	06:30 18:41	07:05 16:52	06:44 16:27
5	05:27 20:51	05:56 20:26	06:23 (45) 19:35	06:31 18:40	07:06 16:50	06:46 16:27
6	05:28 20:51	05:57 20:25	06:23 (45) 19:33	06:33 18:38	07:07 16:49	06:47 16:26
7	05:28 20:51	05:58 20:23	06:24 (45) 19:31	06:34 18:36	07:09 16:48	06:48 16:26
8	05:29 20:50	05:59 20:22	06:24 (45) 19:29	06:35 18:34	07:10 16:46	06:50 16:26
9	05:30 20:50	06:00 20:21	06:25 (45) 19:28	06:36 18:32	07:11 16:45	06:51 16:26
10	05:30 20:49	06:02 20:19	06:26 (45) 19:26	06:37 18:31	07:12 16:44	06:52 16:26
11	05:31 20:49	06:03 20:18	06:28 (45) 19:24	06:38 18:29	07:13 16:43	06:54 16:26
12	05:32 20:48	06:04 20:16	06:33 (45) 19:22	06:39 18:27	07:15 16:42	06:55 16:26
13	05:33 20:48	06:05 20:15	06:34 (45) 19:20	06:41 18:25	07:16 16:41	06:56 16:26
14	05:34 20:47	06:06 20:13	06:34 (45) 19:18	06:42 18:24	07:17 16:40	06:58 16:26
15	05:35 20:47	06:07 20:12	06:34 (45) 19:16	06:43 18:22	07:18 16:39	06:59 16:27
16	05:35 20:46	06:08 20:10	06:44 (45) 19:15	06:44 18:20	07:20 16:38	07:00 16:27
17	05:36 20:45	06:10 20:09	06:45 (45) 19:13	06:45 18:19	07:21 16:37	07:02 16:27
18	05:37 20:45	06:11 20:07	06:46 (45) 19:11	06:46 18:17	07:22 16:36	07:03 16:27
19	05:38 20:44	06:12 20:06	06:47 (45) 19:09	06:47 18:15	07:23 16:35	07:04 16:28
20	05:39 20:43	06:13 20:04	06:49 (45) 19:07	06:49 18:14	07:25 16:34	07:06 16:28
21	05:40 20:42	06:14 20:02	06:50 (45) 19:05	06:50 18:12	07:26 16:34	07:07 16:29
22	05:41 20:41	06:15 20:01	06:51 (45) 19:03	06:51 18:10	07:27 16:33	07:08 16:29
23	05:42 20:40	06:31 (45) 06:36 (45)	06:16 19:58	06:52 19:02	07:29 18:09	07:09 16:32
24	05:43 20:39	06:29 (45) 06:40 (45)	06:18 19:56	06:53 19:00	07:30 18:07	07:11 16:31
25	05:44 20:39	06:28 (45) 06:41 (45)	06:19 19:54	06:54 18:58	07:31 18:06	07:12 16:31
26	05:45 20:38	06:27 (45) 06:42 (45)	06:20 19:52	06:56 18:56	07:32 18:04	07:13 16:30
27	05:46 20:36	06:26 (45) 06:43 (45)	06:21 19:51	06:57 18:54	07:34 18:03	07:14 16:30
28	05:47 20:35	06:25 (45) 06:44 (45)	06:22 19:49	06:58 18:52	07:35 18:01	07:15 16:29
29	05:48 20:34	06:25 (45) 06:44 (45)	06:23 19:47	06:59 18:50	07:36 18:00	07:17 16:29
30	05:49 20:33	06:24 (45) 06:45 (45)	06:24 19:46	07:00 18:49	07:38 17:58	07:18 16:28
31	05:50 20:32	06:24 (45) 06:45 (45)	06:26 19:44	07:39 17:57	07:40 17:57	07:19 16:35
Potential sun hours	469	434	376	342	290	277
Total, worst case	143	211			229	1119
Sun reduction	0.63	0.59			0.27	0.25
Oper. time red.	1.00	1.00			1.00	1.00
Wind dir. red.	0.66	0.66			0.76	0.76
Total reduction	0.43	0.40			0.21	0.20
Total, real	61	85			48	218

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 104

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-74 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (338)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40	08:10 (35) 07:23	08:03 (36) 06:43	06:47	05:57	05:25
	16:36 53	15:56 (25) 17:14	08:37 (36) 17:52	19:31	20:06	20:40
2	07:40	08:11 (35) 07:22	08:03 (36) 06:41	06:46	05:56	05:24
	16:37 54	15:57 (25) 17:15	08:38 (36) 17:53	19:32	20:07	20:40
3	07:40	08:11 (35) 07:21	08:03 (36) 06:40	06:44	05:54	05:24
	16:38 54	15:58 (25) 17:17	08:39 (36) 17:55	19:33	20:09	20:41
4	07:40	08:12 (35) 07:20	08:02 (36) 06:38	06:42	05:53	05:23
	16:39 54	15:58 (25) 17:18	08:38 (36) 17:56	19:35	20:10	20:42
5	07:40	08:12 (35) 07:19	08:02 (36) 06:36	06:40	05:51	05:23
	16:40 54	15:59 (25) 17:19	08:39 (36) 17:57	19:36	20:11	20:43
6	07:40	08:13 (35) 07:17	08:03 (36) 06:34	06:38	05:50	05:22
	16:41 55	16:00 (25) 17:21	08:39 (36) 17:59	19:37	20:12	20:44
7	07:40	08:13 (35) 07:16	08:02 (36) 06:33	06:37	05:49	05:22
	16:42 54	16:00 (25) 17:22	08:39 (36) 18:00	19:38	20:13	20:44
8	07:40	08:13 (35) 07:15	08:03 (36) 07:31	06:35	05:47	05:22
	16:43 55	16:00 (25) 17:24	08:39 (36) 19:01	19:39	20:15	20:45
9	07:39	08:14 (35) 07:14	08:03 (36) 07:29	06:33	05:46	05:22
	16:44 55	16:01 (25) 17:25	08:39 (36) 19:02	19:41	20:16	20:46
10	07:39	08:14 (35) 07:12	08:03 (36) 07:27	06:31	05:45	05:21
	16:45 55	16:01 (25) 17:26	08:38 (36) 19:04	19:42	20:17	20:46
11	07:39	08:15 (35) 07:11	08:04 (36) 07:26	06:30	05:44	05:21
	16:47 55	16:02 (25) 17:28	08:38 (36) 19:05	19:43	20:18	20:47
12	07:38	08:16 (35) 07:09	08:05 (36) 07:24	06:28	05:42	05:21
	16:48 55	16:03 (25) 17:29	08:38 (36) 19:06	19:44	20:19	20:48
13	07:38	08:16 (35) 07:08	08:05 (36) 07:22	06:26	05:41	05:21
	16:49 54	16:03 (25) 17:30	08:37 (36) 19:07	19:46	20:20	20:48
14	07:38	08:18 (35) 07:07	08:06 (36) 07:20	06:24	19:13 (24) 05:40	05:21
	16:50 53	16:04 (25) 17:32	08:36 (36) 19:09	19:47	9 19:22 (24) 20:21	20:49
15	07:37	08:18 (35) 07:05	08:07 (36) 07:18	06:23	19:11 (24) 05:39	05:21
	16:51 52	16:04 (25) 17:33	08:34 (36) 19:10	19:48	14 19:25 (24) 20:23	20:49
16	07:37	08:19 (35) 07:04	08:09 (36) 07:17	06:21	19:09 (24) 05:38	05:21
	16:53 49	16:03 (25) 17:35	08:33 (36) 19:11	19:49	17 19:26 (24) 20:24	20:50
17	07:36	08:20 (35) 07:02	08:10 (36) 07:15	06:19	19:07 (24) 05:37	05:21
	16:54 48	16:04 (25) 17:36	08:31 (36) 19:13	19:50	19 19:26 (24) 20:25	20:50
18	07:35	08:21 (35) 07:01	08:13 (36) 07:13	06:18	19:07 (24) 05:36	05:21
	16:55 46	16:04 (25) 17:37	08:29 (36) 19:14	19:52	21 19:28 (24) 20:26	20:50
19	07:35	08:23 (35) 06:59	08:16 (36) 07:11	06:16	19:06 (24) 05:35	05:21
	16:56 42	16:04 (25) 17:39	9 08:25 (36) 19:15	19:53	21 19:27 (24) 20:27	20:51
20	07:34	08:26 (35) 06:58	07:09 06:14	19:05 (24) 05:34	05:21	
	16:58 38	16:05 (25) 17:40	19:16 19:54	22 19:27 (24) 20:28	20:51	
21	07:33	15:34 (25) 06:56	07:07 06:13	19:05 (24) 05:33	05:21	
	16:59 30	16:04 (25) 17:41	19:17 19:55	23 19:28 (24) 20:29	20:51	
22	07:33	08:12 (36) 06:55	07:06 06:11	19:04 (24) 05:32	05:21	
	17:00 40	16:04 (25) 17:43	19:19 19:57	23 19:27 (24) 20:30	20:51	
23	07:32	08:10 (36) 06:53	07:04 06:09	19:05 (24) 05:31	05:22	
	17:02 44	16:04 (25) 17:44	19:20 19:58	22 19:27 (24) 20:31	20:52	
24	07:31	08:08 (36) 06:51	07:02 06:08	19:05 (24) 05:30	05:22	
	17:03 46	16:03 (25) 17:45	19:21 19:59	21 19:26 (24) 20:32	20:52	
25	07:30	08:07 (36) 06:50	07:00 06:06	19:06 (24) 05:29	05:22	
	17:04 48	16:03 (25) 17:47	19:22 20:00	20 19:26 (24) 20:33	20:52	
26	07:29	08:06 (36) 06:48	06:58 06:05	19:06 (24) 05:29	05:22	
	17:06 48	16:02 (25) 17:48	19:24 20:00	18 19:24 (24) 20:34	20:52	
27	07:28	08:05 (36) 06:46	06:56 06:03	19:07 (24) 05:28	05:23	
	17:07 47	16:01 (25) 17:49	19:25 20:01	16 19:23 (24) 20:35	20:52	
28	07:27	08:05 (36) 06:45	06:55 06:02	19:08 (24) 05:27	05:23	
	17:08 46	16:00 (25) 17:51	19:26 20:03	13 19:21 (24) 20:36	20:52	
29	07:26	08:04 (36) 06:43	06:53 06:00	19:11 (24) 05:27	05:24	
	17:10 44	15:58 (25) 17:52	19:27 20:04	8 19:19 (24) 20:37	20:52	
30	07:25	08:04 (36) 06:41	06:51 05:59	05:26	05:24	
	17:11 37	15:54 (25) 17:53	19:29 20:05	05:26	20:38	20:52
31	07:24	08:03 (36) 06:39	06:49	05:25		
	17:12 33	08:36 (36) 06:37	19:30	20:39		
Potential sun hours	288	293	369	403	457	463
Total, worst case	1498	584		287		
Sun reduction	0.33	0.39		0.49		
Oper. time red.	1.00	1.00		1.00		
Wind dir. red.	0.64	0.48		0.52		
Total reduction	0.22	0.19		0.26		
Total, real	323	112		74		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 105

Licensed user:

EDR

217 Montgomery St.  
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(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-74 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (338)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25 20:52	05:52 20:31	06:27 19:42	07:01 18:47	06:40 16:56	07:33 (36) 08:08 (36)
2	05:25 20:52	05:53 20:30	06:28 19:40	07:03 18:45	06:42 16:54	07:32 (36) 08:08 (36)
3	05:26 20:52	05:54 20:29	06:29 19:38	07:04 18:43	06:43 16:53	07:32 (36) 08:09 (36)
4	05:26 20:51	05:55 20:27	06:30 19:37	07:05 18:41	06:44 16:52	07:32 (36) 08:08 (36)
5	05:27 20:51	05:56 20:26	06:31 19:35	07:06 18:40	06:46 16:50	07:33 (36) 08:09 (36)
6	05:28 20:51	05:57 20:25	06:33 19:33	07:07 18:38	06:47 16:49	07:32 (36) 08:09 (36)
7	05:28 20:51	05:58 20:23	06:34 19:31	07:09 18:36	06:48 16:48	07:33 (36) 08:09 (36)
8	05:29 20:50	05:59 20:22	06:35 19:29	07:10 18:34	06:50 16:47	07:33 (36) 08:08 (36)
9	05:30 20:50	06:00 20:21	06:36 19:28	07:11 18:32	06:51 16:45	07:33 (36) 08:08 (36)
10	05:31 20:49	06:02 20:19	06:37 19:26	07:12 18:31	06:52 16:44	07:34 (36) 08:08 (36)
11	05:31 20:49	06:03 20:18	06:38 19:24	07:14 18:29	06:54 16:43	07:34 (36) 08:07 (36)
12	05:32 20:48	06:04 20:16	06:39 19:22	07:15 18:27	06:55 16:42	07:36 (36) 15:27 (25)
13	05:33 20:48	06:05 20:15	06:41 19:20	07:16 18:25	06:56 16:41	07:36 (36) 15:30 (25)
14	05:34 20:47	06:06 20:13	19:18 (24) 19:18	06:42 18:24	06:58 16:40	07:38 (36) 15:33 (25)
15	05:35 20:47	06:07 20:12	19:15 (24) 19:29 (24)	06:43 19:17	06:59 16:39	07:38 (36) 15:34 (25)
16	05:35 20:46	06:08 20:10	19:14 (24) 19:30 (24)	06:44 19:15	07:00 16:38	07:39 (36) 15:35 (25)
17	05:36 20:45	06:10 20:09	19:12 (24) 19:31 (24)	06:45 19:13	07:02 16:37	07:41 (36) 15:37 (25)
18	05:37 20:45	06:11 20:07	19:11 (24) 19:32 (24)	06:46 19:11	07:03 16:36	07:42 (36) 15:37 (25)
19	05:38 20:44	06:12 20:06	19:10 (24) 19:32 (24)	06:47 19:09	07:04 16:35	07:45 (36) 15:39 (25)
20	05:39 20:43	06:13 20:04	19:10 (24) 19:32 (24)	06:49 19:07	07:06 16:34	07:47 (36) 15:39 (25)
21	05:40 20:42	06:14 20:03	19:09 (24) 19:32 (24)	06:50 19:05	07:07 16:34	15:09 (25) 15:39 (25)
22	05:41 20:41	06:15 20:01	19:10 (24) 19:32 (24)	06:51 19:03	07:08 16:33	08:02 (35) 15:41 (25)
23	05:42 20:40	06:16 19:58	19:10 (24) 19:32 (24)	06:52 19:02	07:09 16:32	08:00 (35) 15:41 (25)
24	05:43 20:40	06:18 19:56	19:09 (24) 19:31 (24)	06:53 19:00	07:11 16:31	07:58 (35) 15:41 (25)
25	05:44 20:39	06:19 19:54	19:10 (24) 19:30 (24)	06:54 18:58	07:12 16:31	07:58 (35) 15:42 (25)
26	05:45 20:38	06:20 19:53	19:10 (24) 19:29 (24)	06:56 18:56	07:13 16:30	07:58 (35) 15:43 (25)
27	05:46 20:37	06:21 19:51	19:11 (24) 19:28 (24)	06:57 18:54	07:14 16:30	07:57 (35) 15:43 (25)
28	05:47 20:35	06:22 19:49	19:12 (24) 19:26 (24)	06:58 18:52	07:16 16:29	07:57 (35) 15:43 (25)
29	05:48 20:34	06:23 19:47	19:14 (24) 19:23 (24)	06:59 18:51	07:17 16:29	07:57 (35) 15:44 (25)
30	05:49 20:33	06:25 19:46	07:00 18:49	07:38 18:49	07:18 16:28	07:57 (35) 15:44 (25)
31	05:50 20:32	06:26 19:44	07:39 17:57	08:34 (36) 09:08 (36)	07:18 16:28	07:40 16:35
Potential sun hours	469	434	376	342	290	277
Total, worst case		292		233	1260	1620
Sun reduction		0.59		0.44	0.27	0.25
Oper. time red.		1.00		1.00	1.00	1.00
Wind dir. red.		0.52		0.48	0.59	0.64
Total reduction		0.31		0.22	0.16	0.16
Total, real		91		51	206	267

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)



Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 106

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**EDR**

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-76 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (282)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36	07:23 17:14	06:43 17:52	07:09 (36) 07:31 (36)	06:47 19:31	05:57 20:06
2	07:40 16:37	07:22 17:15	06:41 17:53	07:10 (36) 07:32 (36)	06:46 19:32	05:56 20:07
3	07:40 16:38	07:21 17:17	06:40 17:55	07:10 (36) 07:31 (36)	06:44 19:33	05:54 20:09
4	07:40 16:39	07:20 17:18	06:38 17:56	07:10 (36) 07:30 (36)	06:42 19:35	05:53 20:10
5	07:40 16:40	07:19 17:19	06:36 17:57	07:11 (36) 07:28 (36)	06:40 19:36	05:51 20:11
6	07:40 16:41	07:17 17:21	06:34 17:59	07:13 (36) 07:27 (36)	06:38 19:37	05:50 20:12
7	07:40 16:42	07:16 17:22	06:33 18:00	07:14 (36) 07:25 (36)	06:37 19:38	05:49 20:13
8	07:40 16:43	07:15 17:24	06:31 19:01	07:31 19:40	06:35 20:15	05:47 20:16
9	07:39 16:44	07:14 17:25	06:29 19:02	07:29 19:41	06:33 20:16	05:46 20:16
10	07:39 16:45	07:12 17:26	06:27 19:04	07:27 19:42	06:31 20:17	05:45 20:17
11	07:39 16:47	07:11 17:28	06:26 19:05	07:26 19:43	06:30 20:18	05:44 20:18
12	07:38 16:48	07:10 17:29	06:24 19:06	07:24 19:44	06:28 20:19	05:43 20:19
13	07:38 16:49	07:08 17:30	06:22 19:08	07:22 19:46	06:26 20:20	05:41 20:20
14	07:38 16:50	07:07 17:32	06:20 19:09	07:20 19:47	06:24 20:21	05:40 20:21
15	07:37 16:51	07:05 17:33	06:18 19:10	07:18 19:48	06:23 20:22	05:39 20:22
16	07:37 16:53	07:04 17:35	06:17 19:11	07:17 19:49	06:21 20:24	05:38 20:24
17	07:36 16:54	07:02 17:36	06:15 19:13	07:15 19:50	06:19 20:25	05:37 20:25
18	07:35 16:55	07:01 17:37	06:13 19:14	07:13 19:52	06:18 20:26	05:36 20:26
19	07:35 16:56	06:59 17:39	06:11 19:15	07:11 19:53	06:16 20:27	05:35 20:27
20	07:34 16:58	06:58 17:40	06:09 19:16	07:09 19:54	06:14 20:28	05:34 20:28
21	07:33 16:59	06:56 17:41	06:07 19:17	07:07 19:55	06:13 20:29	05:33 20:29
22	07:33 17:00	06:55 17:43	07:06 07:18 (36)	07:06 07:25 (36)	06:11 19:57	05:32 20:30
23	07:32 17:02	06:53 17:44	07:04 07:28 (36)	07:04 07:28 (36)	06:09 19:58	05:31 20:31
24	07:31 17:03	06:51 17:45	07:02 07:14 (36)	07:02 07:30 (36)	06:08 19:59	05:30 20:32
25	07:30 17:04	06:50 17:47	07:00 07:12 (36)	07:00 07:30 (36)	06:06 20:00	05:29 20:33
26	07:29 17:06	06:48 17:48	06:58 07:12 (36)	06:58 07:32 (36)	06:05 20:00	05:29 20:34
27	07:28 17:07	06:46 17:49	06:57 07:11 (36)	06:57 07:32 (36)	06:03 20:01	05:28 20:35
28	07:27 17:08	06:45 17:51	06:55 07:10 (36)	06:55 07:32 (36)	06:02 20:03	05:27 20:36
29	07:26 17:10		06:53 19:27	06:53 19:27	06:00 20:04	05:27 20:37
30	07:25 17:11		06:51 19:29	06:51 19:29	05:59 20:05	05:26 20:38
31	07:24 17:12		06:49 19:30	06:49 19:30	05:57 20:39	05:25 19:56 (24)
Potential sun hours	288	293	369	403	457	463
Total, worst case		116	127		349	1207
Sun reduction		0.39	0.47		0.55	0.59
Oper. time red.		1.00	1.00		1.00	1.00
Wind dir. red.		0.52	0.52		0.51	0.51
Total reduction		0.20	0.24		0.28	0.30
Total, real		23	31		97	360

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 107

Licensed user:

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Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-76 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (282)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December				
1	05:25	19:25 (24)	05:52	06:27	07:01	06:40	07:19			
	20:52	40	20:05 (24)	20:31	19:42	18:47	16:28			
2	05:25	19:24 (24)	05:53	06:28	07:03	06:42	07:20			
	20:52	41	20:05 (24)	20:30	19:40	18:45	16:27			
3	05:26	19:25 (24)	05:54	06:29	07:04	06:43	07:21			
	20:52	40	20:05 (24)	20:29	19:39	18:43	16:27			
4	05:26	19:26 (24)	05:55	06:30	07:05	06:44	07:22			
	20:52	40	20:06 (24)	20:27	19:37	18:41	16:27			
5	05:27	19:26 (24)	05:56	06:31	07:06	06:46	07:23			
	20:51	39	20:05 (24)	20:26	19:35	18:40	16:27			
6	05:28	19:26 (24)	05:57	06:33	07:07	07:52 (36)	06:47	07:24		
	20:51	40	20:06 (24)	20:25	19:33	18:38	7	07:59 (36)	16:49	16:26
7	05:28	19:26 (24)	05:58	06:34	07:09	07:49 (36)	06:48	07:25		
	20:51	39	20:05 (24)	20:23	19:31	18:36	13	08:02 (36)	16:48	16:26
8	05:29	19:27 (24)	05:59	06:35	07:10	07:47 (36)	06:50	07:26		
	20:50	38	20:05 (24)	20:22	19:29	18:34	16	08:03 (36)	16:47	16:26
9	05:30	19:27 (24)	06:01	06:36	07:11	07:46 (36)	06:51	07:27		
	20:50	39	20:06 (24)	20:21	19:28	18:32	18	08:04 (36)	16:45	16:26
10	05:31	19:28 (24)	06:02	06:37	07:12	07:44 (36)	06:52	07:28		
	20:49	38	20:06 (24)	20:19	19:26	18:31	20	08:04 (36)	16:44	16:26
11	05:31	19:28 (24)	06:03	06:38	07:14	07:44 (36)	06:54	07:29		
	20:49	37	20:05 (24)	20:18	19:24	18:29	21	08:05 (36)	16:43	16:26
12	05:32	19:29 (24)	06:04	06:39	07:15	07:43 (36)	06:55	07:30		
	20:48	36	20:05 (24)	20:16	19:22	18:27	22	08:05 (36)	16:42	16:26
13	05:33	19:29 (24)	06:05	06:41	07:16	07:43 (36)	06:56	07:31		
	20:48	36	20:05 (24)	20:15	19:20	18:25	21	08:04 (36)	16:41	16:26
14	05:34	19:30 (24)	06:06	06:42	07:17	07:44 (36)	06:58	07:32		
	20:47	35	20:05 (24)	20:13	19:18	18:24	21	08:05 (36)	16:40	16:26
15	05:35	19:31 (24)	06:07	06:43	07:18	07:43 (36)	06:59	07:32		
	20:47	33	20:04 (24)	20:12	19:17	18:22	21	08:04 (36)	16:39	16:27
16	05:36	19:31 (24)	06:08	06:44	07:20	07:44 (36)	07:00	07:33		
	20:46	32	20:03 (24)	20:10	19:15	18:20	19	08:03 (36)	16:38	16:27
17	05:36	19:32 (24)	06:10	06:45	07:21	07:44 (36)	07:02	07:34		
	20:45	31	20:03 (24)	20:09	19:13	18:19	17	08:01 (36)	16:37	16:27
18	05:37	19:32 (24)	06:11	06:46	07:22	07:46 (36)	07:03	07:35		
	20:45	30	20:02 (24)	20:07	19:11	18:17	14	08:00 (36)	16:36	16:27
19	05:38	19:33 (24)	06:12	06:47	07:24	07:47 (36)	07:04	07:35		
	20:44	29	20:02 (24)	20:06	19:09	18:15	11	07:58 (36)	16:35	16:28
20	05:39	19:35 (24)	06:13	06:49	07:25	07:06	07:36			
	20:43	26	20:01 (24)	20:04	19:07	18:14		16:34	16:28	
21	05:40	19:36 (24)	06:14	06:50	07:26	07:07	07:36			
	20:42	24	20:00 (24)	20:03	19:05	18:12		16:34	16:29	
22	05:41	19:37 (24)	06:15	06:51	07:27	07:08	07:37			
	20:41	22	19:59 (24)	20:01	19:04	18:11		16:33	16:29	
23	05:42	19:39 (24)	06:17	06:52	07:29	07:09	07:37			
	20:40	18	19:57 (24)	19:58	19:02	18:09		16:32	16:30	
24	05:43	19:41 (24)	06:18	06:53	07:30	07:11	07:38			
	20:40	14	19:55 (24)	19:56	19:00	18:07		16:31	16:30	
25	05:44	19:45 (24)	06:19	06:54	07:31	07:12	07:38			
	20:39	7	19:52 (24)	19:54	18:58	18:06		16:31	16:31	
26	05:45		06:20	06:56	07:33	07:13	07:39			
	20:38		19:53	18:56	18:04		16:30	16:31		
27	05:46		06:21	06:57	07:34	07:14	07:39			
	20:37		19:51	18:54	18:03		16:30	16:32		
28	05:47		06:22	06:58	07:35	07:16	07:39			
	20:36		19:49	18:52	18:01		16:29	16:33		
29	05:48		06:23	06:59	07:36	07:17	07:39			
	20:34		19:47	18:51	18:00		16:29	16:34		
30	05:49		06:25	07:00	07:38	07:18	07:40			
	20:33		19:46	18:49	17:58	16:28	16:34			
31	05:50		06:26		07:39		07:40			
	20:32		19:44		17:57		16:35			
Potential sun hours	469		434	376	342	290	277			
Total, worst case	804				241					
Sun reduction	0.63				0.44					
Oper. time red.	1.00				1.00					
Wind dir. red.	0.51				0.52					
Total reduction	0.32				0.23					
Total, real	256				55					

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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Licensed user:

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2 Shadow receptor: R-77 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (339)

Assumptions for shadow calculations

Maximum distance for influence 1,000 m
Minimum sun height over horizon for influence 3°
Day step for calculation 1 days
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum
Idle start wind speed: Cut in wind speed from power curve

Table with columns for months (January to December) and rows for days (1 to 31) showing sun rise/set times and shadow flicker analysis results.

Table layout: For each day in each month the following matrix apply

Matrix with columns: Day in month, Sun rise (hh:mm), Sun set (hh:mm), Minutes with flicker, First time (hh:mm) with flicker, Last time (hh:mm) with flicker, (WTG causing flicker first time), (WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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Licensed user:

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Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-78 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (46)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36	07:23 17:14	16:13 (07) 16:39 (07)	06:43 17:52	07:29 (25) 19:31	06:47 20:06
2	07:40 16:37	07:22 17:15	16:13 (07) 16:40 (07)	06:41 17:53	07:33 (25) 19:32	06:46 20:07
3	07:40 16:38	07:21 17:17	16:12 (07) 16:42 (07)	06:40 17:55	06:44 19:33	05:56 20:41
4	07:40 16:39	07:20 17:18	16:11 (07) 16:42 (07)	06:38 17:56	06:42 19:35	05:54 20:41
5	07:40 16:40	07:19 17:19	16:11 (07) 16:42 (07)	06:36 17:57	06:40 19:36	05:52 20:43
6	07:40 16:41	07:17 17:21	16:11 (07) 16:43 (07)	06:35 17:59	06:38 19:37	05:50 20:44
7	07:40 16:42	07:16 17:22	16:10 (07) 16:43 (07)	06:33 18:00	06:37 19:38	05:49 20:44
8	07:40 16:43	07:15 17:24	16:10 (07) 16:44 (07)	07:31 19:01	06:35 19:40	05:48 20:45
9	07:39 16:44	07:14 17:25	16:11 (07) 16:44 (07)	07:29 19:02	06:33 19:41	05:46 20:46
10	07:39 16:45	07:12 17:26	16:10 (07) 16:43 (07)	07:27 19:04	06:31 19:42	05:45 20:46
11	07:39 16:47	07:11 17:28	16:11 (07) 16:44 (07)	07:26 19:05	06:30 19:43	05:44 20:47
12	07:38 16:48	07:10 17:29	16:12 (07) 16:44 (07)	07:24 19:06	06:28 19:44	05:43 20:48
13	07:38 16:49	07:08 17:31	16:11 (07) 16:43 (07)	07:22 19:08	06:26 19:46	05:41 20:48
14	07:38 16:50	07:07 17:32	16:12 (07) 16:43 (07)	07:20 19:09	06:24 19:47	05:40 20:49
15	07:37 16:51	07:05 17:33	07:30 (25) 16:42 (07)	07:18 19:10	06:23 19:48	05:39 20:49
16	07:37 16:53	07:04 17:35	07:28 (25) 16:42 (07)	07:17 19:11	06:21 19:49	05:38 20:50
17	07:36 16:54	07:02 17:36	07:25 (25) 16:40 (07)	07:15 19:13	06:19 19:51	05:37 20:50
18	07:35 16:55	07:01 17:37	07:25 (25) 16:39 (07)	07:13 19:14	06:18 19:52	05:36 20:50
19	07:35 16:56	06:59 17:39	07:23 (25) 16:37 (07)	07:11 19:15	06:16 19:53	05:35 20:51
20	07:34 16:58	06:58 17:40	07:22 (25) 16:34 (07)	07:09 19:16	06:14 19:54	05:34 20:51
21	07:33 16:59	06:56 17:41	07:23 (25) 16:30 (07)	07:08 19:18	06:13 19:55	05:33 20:51
22	07:33 17:00	06:55 17:43	07:22 (25) 07:43 (25)	07:06 19:19	06:11 19:57	05:32 20:52
23	07:32 17:02	06:53 17:44	07:23 (25) 07:44 (25)	07:04 19:20	06:09 19:58	05:22 20:52
24	07:31 17:03	06:51 17:45	07:22 (25) 07:43 (25)	07:02 19:21	06:08 19:59	05:22 20:52
25	07:30 17:04	06:50 17:47	07:22 (25) 07:42 (25)	07:00 19:22	06:06 20:00	05:22 20:52
26	07:29 17:06	06:48 17:48	07:24 (25) 07:41 (25)	06:58 19:24	06:05 20:00	05:23 20:52
27	07:28 17:07	16:20 (07) 16:29 (07)	06:46 17:49	07:25 (25) 19:25	06:03 20:01	05:23 20:52
28	07:27 17:08	16:18 (07) 16:32 (07)	06:45 17:51	07:26 (25) 19:26	06:02 20:03	05:23 20:52
29	07:26 17:10	16:16 (07) 16:34 (07)	06:53 19:27	06:53	06:00 20:04	05:24 20:52
30	07:25 17:11	16:15 (07) 16:36 (07)	06:51 19:29	06:51	05:59 20:05	05:24 20:52
31	07:24 17:12	16:14 (07) 16:38 (07)	06:49 19:30	06:49	05:57 20:39	05:24 20:52
Potential sun hours	288	293	369	403	457	463
Total, worst case	86	816	4			712
Sun reduction	0.33	0.39	0.47			0.59
Oper. time red.	1.00	1.00	1.00			1.00
Wind dir. red.	0.71	0.65	0.51			0.70
Total reduction	0.23	0.25	0.24			0.41
Total, real	20	208	1			295

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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Licensed user:

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Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-78 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (46)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25 20:52	06:06 (24) 20:31	05:52 19:42	06:27 18:47	07:02 18:47	06:41 16:56
2	05:25 20:52	06:06 (24) 20:30	05:53 19:40	06:28 18:45	07:03 18:45	06:42 16:54
3	05:26 20:52	06:08 (24) 20:29	05:54 19:39	06:29 18:43	07:04 18:43	06:43 16:53
4	05:26 20:52	06:09 (24) 20:27	05:55 19:37	06:30 18:41	07:05 18:41	06:45 16:52
5	05:27 20:51	06:09 (24) 20:26	05:56 19:35	06:31 18:40	07:06 18:40	06:46 16:50
6	05:28 20:51	06:10 (24) 20:25	05:57 19:33	06:33 18:38	07:08 18:38	06:47 16:49
7	05:28 20:51	06:11 (24) 20:23	05:58 19:31	06:34 18:36	07:09 18:36	06:49 16:48
8	05:29 20:50	06:12 (24) 20:22	05:59 19:30	06:35 18:34	07:10 18:34	06:50 16:47
9	05:30 20:50	06:13 (24) 20:21	06:01 19:28	06:36 18:33	07:11 18:33	06:51 16:45
10	05:31 20:50	06:15 (24) 20:19	06:02 19:26	06:37 18:31	07:12 18:31	06:53 16:44
11	05:31 20:49	06:17 (24) 20:18	06:03 19:24	06:38 18:29	07:14 18:29	06:54 16:43
12	05:32 20:49	06:23 (24) 20:16	06:04 19:22	06:39 18:27	07:15 18:27	06:55 16:42
13	05:33 20:48	06:05 20:15	06:41 19:20	07:16 18:26	08:01 (25) 18:26	06:57 16:41
14	05:34 20:47	06:06 20:14	06:42 19:18	07:17 18:24	07:59 (25) 18:24	06:58 16:40
15	05:35 20:47	06:07 20:12	06:43 19:17	07:19 18:22	07:56 (25) 18:22	06:59 16:39
16	05:36 20:46	06:09 20:10	06:44 19:15	07:20 18:20	07:55 (25) 18:20	07:00 16:38
17	05:36 20:45	06:10 20:09	06:45 19:13	07:21 18:19	07:55 (25) 18:19	07:02 16:37
18	05:37 20:45	06:11 20:07	06:46 19:11	07:22 18:17	07:54 (25) 18:17	07:03 16:36
19	05:38 20:44	06:12 20:06	06:48 19:09	07:24 18:15	07:53 (25) 18:15	07:04 16:35
20	05:39 20:43	06:13 20:04	06:49 19:07	07:25 18:14	07:53 (25) 18:14	07:06 16:34
21	05:40 20:42	06:14 20:03	06:50 19:05	07:26 18:12	07:53 (25) 18:12	07:07 16:34
22	05:41 20:41	06:15 20:01	06:51 19:04	07:27 18:11	07:53 (25) 18:11	07:08 16:33
23	05:42 20:41	06:17 19:58	06:52 19:02	07:29 18:09	07:54 (25) 18:09	07:09 16:32
24	05:43 20:40	06:18 19:56	06:53 19:00	07:30 18:07	07:55 (25) 18:07	07:11 16:31
25	05:44 20:39	06:19 19:54	06:54 18:58	07:31 18:06	07:55 (25) 18:06	07:12 16:31
26	05:45 20:38	06:20 19:53	06:56 18:56	07:33 18:04	07:58 (25) 18:04	07:13 16:30
27	05:46 20:37	06:21 19:51	06:57 18:54	07:34 18:03	08:02 (25) 18:03	07:14 16:30
28	05:47 20:36	06:22 19:49	06:58 18:52	07:35 18:01	17:12 (07) 18:01	07:16 16:29
29	05:48 20:34	06:23 19:47	06:59 18:51	07:37 18:00	16:41 (07) 18:00	07:17 16:29
30	05:49 20:33	06:25 19:46	07:00 18:49	07:38 17:58	16:40 (07) 18:00	07:18 16:28
31	05:51 20:32	06:26 19:44	07:00 18:49	07:39 17:57	16:40 (07) 18:00	07:18 16:28
Potential sun hours	469	434	376	342	290	277
Total, worst case	203			521		394
Sun reduction	0.63			0.44		0.27
Oper. time red.	1.00			1.00		1.00
Wind dir. red.	0.70			0.62		0.71
Total reduction	0.44			0.27		0.19
Total, real	90			142		76

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-79 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (47)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36	15:38 (07) 07:23 15:56 (07) 17:14	15:43 (07) 06:43 16:13 (07) 17:52	06:47 19:31	05:57 20:06	05:25 06:19 (24)
2	07:40 16:37	15:38 (07) 07:22 15:57 (07) 17:15	15:44 (07) 06:41 16:12 (07) 17:53	06:46 19:32	05:56 20:07	05:24 06:19 (24)
3	07:40 16:38	15:38 (07) 07:21 15:58 (07) 17:17	15:46 (07) 06:40 16:11 (07) 17:55	06:44 19:33	05:54 20:09	05:24 06:20 (24)
4	07:40 16:39	15:38 (07) 07:20 15:59 (07) 17:18	15:47 (07) 06:38 16:10 (07) 17:56	06:42 19:35	05:53 20:10	05:23 06:21 (24)
5	07:40 16:40	15:38 (07) 07:19 16:00 (07) 17:19	15:49 (07) 06:36 16:08 (07) 17:57	06:36 19:36	05:52 20:11	05:23 06:21 (24)
6	07:40 16:41	15:38 (07) 07:17 16:02 (07) 17:21	15:51 (07) 06:35 16:07 (07) 17:59	06:38 19:37	05:50 20:12	05:23 06:22 (24)
7	07:40 16:42	15:38 (07) 07:16 16:03 (07) 17:22	15:54 (07) 06:33 16:02 (07) 18:00	06:37 19:38	05:49 20:13	05:22 06:22 (24)
8	07:40 16:43	15:37 (07) 07:15 16:03 (07) 17:24	16:02 (07) 18:00 19:01	06:35 19:40	05:48 20:15	05:22 06:22 (24)
9	07:39 16:44	15:37 (07) 07:14 16:04 (07) 17:25	19:01 19:02	19:40 19:41	20:15 20:16	21 23
10	07:39 16:45	15:38 (07) 07:12 16:06 (07) 17:26	07:27 19:04	06:31 19:42	05:45 20:17	25
11	07:39 16:47	15:37 (07) 07:11 16:07 (07) 17:28	07:26 19:05	06:30 19:43	05:44 20:18	27
12	07:38 16:48	15:37 (07) 07:10 16:07 (07) 17:29	07:24 19:06	06:28 19:44	05:43 20:19	29
13	07:38 16:49	15:37 (07) 07:08 16:08 (07) 17:31	07:22 19:08	06:26 19:46	05:41 20:20	30
14	07:38 16:50	15:37 (07) 07:07 16:09 (07) 17:32	07:20 19:09	06:24 19:47	05:40 20:22	32
15	07:37 16:51	15:37 (07) 07:05 16:09 (07) 17:33	07:18 19:10	06:23 19:48	05:39 20:23	32
16	07:37 16:53	15:37 (07) 07:04 16:11 (07) 17:35	07:17 19:11	06:21 19:49	05:38 20:24	33
17	07:36 16:54	15:37 (07) 07:02 16:11 (07) 17:36	07:15 19:13	06:19 19:51	05:37 20:25	34
18	07:35 16:55	15:37 (07) 07:01 16:11 (07) 17:37	07:13 19:14	06:18 19:52	05:36 20:26	34
19	07:35 16:56	15:37 (07) 06:59 16:11 (07) 17:39	07:11 19:15	06:16 19:53	05:35 20:27	34
20	07:34 16:58	15:38 (07) 06:58 16:13 (07) 17:40	07:09 19:16	06:14 19:54	05:34 20:28	34
21	07:33 16:59	15:38 (07) 06:56 16:13 (07) 17:41	07:08 19:18	06:13 19:55	05:33 20:29	35
22	07:33 17:00	15:38 (07) 06:55 16:13 (07) 17:43	07:06 19:19	06:11 19:57	05:32 20:30	35
23	07:32 17:02	15:38 (07) 06:53 16:13 (07) 17:44	07:04 19:20	06:09 19:58	05:31 20:31	35
24	07:31 17:03	15:38 (07) 06:51 16:13 (07) 17:46	07:02 19:21	06:08 19:59	05:30 20:32	35
25	07:30 17:04	15:38 (07) 06:50 16:14 (07) 17:47	07:00 19:22	06:06 20:00	05:30 20:33	34
26	07:29 17:06	15:39 (07) 06:48 16:14 (07) 17:48	06:58 19:24	06:05 20:00	05:29 20:34	34
27	07:28 17:07	15:39 (07) 06:46 16:14 (07) 17:49	06:57 19:25	06:03 20:01	05:28 20:35	34
28	07:27 17:08	15:40 (07) 06:45 16:14 (07) 17:51	06:55 19:26	06:02 20:03	05:27 20:36	33
29	07:26 17:10	15:40 (07) 06:43 16:14 (07) 17:52	06:53 19:27	06:00 20:04	05:27 20:37	33
30	07:25 17:11	15:41 (07) 06:42 16:13 (07) 17:53	06:51 19:29	05:59 20:05	05:26 20:38	32
31	07:24 17:12	15:42 (07) 06:41 16:13 (07) 17:54	06:49 19:30	05:57 20:06	05:25 20:39	32
Potential sun hours	288	293	369	403	457	463
Total, worst case	932	149			789	763
Sun reduction	0.33	0.39			0.55	0.59
Oper. time red.	1.00	1.00			1.00	1.00
Wind dir. red.	0.74	0.74			0.67	0.67
Total reduction	0.25	0.29			0.37	0.40
Total, real	232	44			294	305

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 112

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-79 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (47)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25	06:28 (24) 05:52	06:30 (24) 06:27	07:02	06:41	07:19
	20:52	26 06:54 (24) 20:31	29 06:59 (24) 19:42	18:47	16:56	16:28
2	05:25	06:28 (24) 05:53	06:31 (24) 06:28	07:03	06:42	07:20
	20:52	25 06:53 (24) 20:30	27 06:58 (24) 19:40	18:45	16:54	16:27
3	05:26	06:28 (24) 05:54	06:32 (24) 06:29	07:04	06:43	07:21
	20:52	26 06:54 (24) 20:29	25 06:57 (24) 19:39	18:43	16:53	16:27
4	05:26	06:28 (24) 05:55	06:33 (24) 06:30	07:05	06:45	15:24 (07) 07:22
	20:52	27 06:55 (24) 20:27	22 06:55 (24) 19:37	18:41	16:52	9 15:33 (07) 16:27
5	05:27	06:28 (24) 05:56	06:34 (24) 06:31	07:06	06:46	15:21 (07) 07:23
	20:51	27 06:55 (24) 20:26	20 06:54 (24) 19:35	18:40	16:50	16 15:37 (07) 16:27
6	05:28	06:28 (24) 05:57	06:36 (24) 06:33	07:08	06:47	15:18 (07) 07:24
	20:51	28 06:56 (24) 20:25	16 06:52 (24) 19:33	18:38	16:49	20 15:38 (07) 16:26
7	05:28	06:28 (24) 05:58	06:39 (24) 06:34	07:09	06:49	15:17 (07) 07:25
	20:51	29 06:57 (24) 20:23	10 06:49 (24) 19:31	18:36	16:48	24 15:41 (07) 16:26
8	05:29	06:27 (24) 05:59	06:35	07:10	06:50	15:16 (07) 07:26
	20:50	30 06:57 (24) 20:22	19:30	18:34	16:47	25 15:41 (07) 16:26
9	05:30	06:27 (24) 06:01	06:36	07:11	06:51	15:15 (07) 07:27
	20:50	31 06:58 (24) 20:21	19:28	18:33	16:45	28 15:43 (07) 16:26
10	05:31	06:28 (24) 06:02	06:37	07:12	06:53	15:14 (07) 07:28
	20:50	30 06:58 (24) 20:19	19:26	18:31	16:44	30 15:44 (07) 16:26
11	05:31	06:27 (24) 06:03	06:38	07:14	06:54	15:13 (07) 07:29
	20:49	31 06:58 (24) 20:18	19:24	18:29	16:43	31 15:44 (07) 16:26
12	05:32	06:27 (24) 06:04	06:39	07:15	06:55	15:13 (07) 07:30
	20:49	32 06:59 (24) 20:16	19:22	18:27	16:42	32 15:45 (07) 16:26
13	05:33	06:27 (24) 06:05	06:41	07:16	06:57	15:12 (07) 07:31
	20:48	32 06:59 (24) 20:15	19:20	18:26	16:41	33 15:45 (07) 16:26
14	05:34	06:27 (24) 06:06	06:42	07:17	06:58	15:13 (07) 07:32
	20:47	33 07:00 (24) 20:14	19:18	18:24	16:40	34 15:47 (07) 16:26
15	05:35	06:27 (24) 06:07	06:43	07:19	06:59	15:12 (07) 07:33
	20:47	33 07:00 (24) 20:12	19:17	18:22	16:39	35 15:47 (07) 16:27
16	05:36	06:26 (24) 06:09	06:44	07:20	07:00	15:13 (07) 07:33
	20:46	34 07:00 (24) 20:10	19:15	18:20	16:38	35 15:48 (07) 16:27
17	05:36	06:26 (24) 06:10	06:45	07:21	07:02	15:12 (07) 07:34
	20:45	34 07:00 (24) 20:09	19:13	18:19	16:37	36 15:48 (07) 16:27
18	05:37	06:26 (24) 06:11	06:46	07:22	07:03	15:12 (07) 07:35
	20:45	35 07:01 (24) 20:07	19:11	18:17	16:36	35 15:47 (07) 16:28
19	05:38	06:26 (24) 06:12	06:48	07:24	07:04	15:13 (07) 07:35
	20:44	35 07:01 (24) 20:06	19:09	18:15	16:35	35 15:48 (07) 16:28
20	05:39	06:27 (24) 06:13	06:49	07:25	07:06	15:13 (07) 07:36
	20:43	34 07:01 (24) 20:04	19:07	18:14	16:34	35 15:48 (07) 16:28
21	05:40	06:27 (24) 06:14	06:50	07:26	07:07	15:13 (07) 07:36
	20:42	34 07:01 (24) 20:03	19:05	18:12	16:34	35 15:48 (07) 16:29
22	05:41	06:27 (24) 06:15	06:51	07:27	07:08	15:14 (07) 07:37
	20:41	35 07:02 (24) 20:01	19:04	18:11	16:33	35 15:49 (07) 16:29
23	05:42	06:27 (24) 06:17	06:52	07:29	07:09	15:14 (07) 07:37
	20:41	35 07:02 (24) 19:58	19:02	18:09	16:32	34 15:48 (07) 16:30
24	05:43	06:27 (24) 06:18	06:53	07:30	07:11	15:14 (07) 07:38
	20:40	35 07:02 (24) 19:56	19:00	18:07	16:31	34 15:48 (07) 16:30
25	05:44	06:27 (24) 06:19	06:54	07:31	07:12	15:15 (07) 07:38
	20:39	35 07:02 (24) 19:54	18:58	18:06	16:31	34 15:49 (07) 16:31
26	05:45	06:28 (24) 06:20	06:56	07:33	07:13	15:15 (07) 07:39
	20:38	33 07:01 (24) 19:53	18:56	18:04	16:30	34 15:49 (07) 16:32
27	05:46	06:28 (24) 06:21	06:57	07:34	07:14	15:16 (07) 07:39
	20:37	33 07:01 (24) 19:51	18:54	18:03	16:30	32 15:48 (07) 16:32
28	05:47	06:28 (24) 06:22	06:58	07:35	07:16	15:17 (07) 07:39
	20:36	33 07:01 (24) 19:49	18:52	18:01	16:29	32 15:49 (07) 16:33
29	05:48	06:29 (24) 06:23	06:59	07:37	07:17	15:18 (07) 07:40
	20:34	32 07:01 (24) 19:47	18:51	18:00	16:29	31 15:49 (07) 16:34
30	05:49	06:29 (24) 06:25	07:00	07:38	07:18	15:18 (07) 07:40
	20:33	31 07:00 (24) 19:46	18:49	17:58	16:28	30 15:48 (07) 16:34
31	05:51	06:30 (24) 06:26	07:03	07:40	07:40	15:19 (07) 16:35
	20:32	29 06:59 (24) 19:44	17:57	17:57	16:35	17 15:55 (07)
Potential sun hours	469	434	376	342	290	277
Total, worst case	977	149			824	500
Sun reduction	0.63	0.59			0.27	0.25
Oper. time red.	1.00	1.00			1.00	1.00
Wind dir. red.	0.67	0.67			0.74	0.74
Total reduction	0.43	0.40			0.20	0.19
Total, real	418	60			168	94

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 113

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-83 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (49)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	
1	07:40 16:36	07:23 17:14	06:43 17:52	16:41 (08) 17:15 (08)	06:47 19:31	07:15 (25) 20:06	05:25 20:40
2	07:40 16:37	07:22 17:15	06:41 17:53	16:41 (08) 17:17 (08)	06:46 19:32	07:15 (25) 20:07	05:24 20:41
3	07:40 16:38	07:21 17:17	06:40 17:55	16:40 (08) 17:17 (08)	06:44 19:33	07:15 (25) 20:09	05:24 20:41
4	07:40 16:39	07:20 17:18	06:38 17:56	16:39 (08) 17:17 (08)	06:42 19:35	07:14 (25) 20:10	05:23 20:42
5	07:40 16:40	07:19 17:19	06:36 17:57	16:39 (08) 17:18 (08)	06:40 19:36	07:14 (25) 20:11	05:23 20:43
6	07:40 16:41	07:17 17:21	06:34 17:59	16:38 (08) 17:18 (08)	06:38 19:37	07:14 (25) 20:12	05:23 20:44
7	07:40 16:42	07:16 17:22	06:33 18:00	16:38 (08) 17:18 (08)	06:37 19:38	07:15 (25) 20:13	05:22 20:44
8	07:40 16:43	07:15 17:24	06:31 19:01	17:37 (08) 18:17 (08)	06:35 19:40	07:15 (25) 20:15	05:22 20:45
9	07:39 16:44	07:14 17:25	06:29 19:02	17:37 (08) 18:17 (08)	06:33 19:41	07:16 (25) 20:16	05:22 20:46
10	07:39 16:45	07:12 17:26	06:27 19:04	17:38 (08) 18:17 (08)	06:31 19:42	07:16 (25) 20:17	05:21 20:46
11	07:39 16:47	07:11 17:28	06:26 19:05	17:38 (08) 18:16 (08)	06:30 19:43	07:18 (25) 20:18	05:21 20:47
12	07:38 16:48	07:10 17:29	06:24 19:06	17:38 (08) 18:16 (08)	06:28 19:44	07:21 (25) 20:19	05:21 20:48
13	07:38 16:49	07:08 17:31	06:22 19:08	17:38 (08) 18:14 (08)	06:26 19:46	18:40 (07) 20:20	05:21 20:48
14	07:38 16:50	07:07 17:32	06:20 19:09	17:38 (08) 18:13 (08)	06:24 19:47	18:41 (07) 20:21	05:21 20:49
15	07:37 16:51	07:05 17:33	06:18 19:10	17:39 (08) 18:12 (08)	06:23 19:48	18:43 (07) 20:22	05:21 20:49
16	07:37 16:53	07:04 17:35	06:17 19:11	17:41 (08) 18:11 (08)	06:21 19:49	18:44 (07) 20:23	05:21 20:50
17	07:36 16:54	07:02 17:36	06:15 19:13	17:42 (08) 18:09 (08)	06:19 19:50	18:48 (07) 20:25	05:21 20:50
18	07:35 16:55	07:01 17:37	06:13 19:14	17:43 (08) 18:07 (08)	06:18 19:52	18:52 (07) 20:26	05:21 20:50
19	07:35 16:56	06:59 17:39	06:11 19:15	17:45 (08) 18:04 (08)	06:16 19:53	19:00 (07) 20:27	05:21 20:51
20	07:34 16:58	06:58 17:40	06:09 19:16	17:48 (08) 18:00 (08)	06:14 19:54	19:01 (07) 20:28	05:21 20:51
21	07:33 16:59	06:56 17:41	06:08 19:18	07:08 19:18	06:13 19:55	19:02 (07) 20:29	05:21 20:51
22	07:33 17:00	06:55 17:43	06:06 19:19	07:06 19:19	06:11 19:57	19:03 (07) 20:30	05:21 20:52
23	07:32 17:02	06:53 17:44	16:57 (08) 17:03 (08)	07:04 19:20	06:09 19:58	19:04 (07) 20:31	05:22 20:52
24	07:31 17:03	06:51 17:45	16:51 (08) 17:08 (08)	07:02 19:21	06:08 19:59	19:05 (07) 20:32	05:22 20:52
25	07:30 17:04	06:50 17:47	16:48 (08) 17:10 (08)	07:00 19:22	06:06 20:00	19:06 (07) 20:33	05:22 20:52
26	07:29 17:06	06:48 17:48	16:47 (08) 17:13 (08)	06:58 19:24	07:27 (25) 20:00	19:07 (07) 20:34	05:23 20:52
27	07:28 17:07	06:46 17:49	16:45 (08) 17:14 (08)	06:57 19:25	07:23 (25) 20:01	19:08 (07) 20:35	05:23 20:52
28	07:27 17:08	06:45 17:51	16:43 (08) 17:15 (08)	06:55 19:26	07:21 (25) 20:03	19:09 (07) 20:36	05:23 20:52
29	07:26 17:10		06:53 19:27	07:19 (25) 20:04	06:00 20:04	19:10 (07) 20:37	05:24 20:52
30	07:25 17:11		06:51 19:29	07:18 (25) 20:05	05:59 20:05	19:11 (07) 20:38	05:24 20:52
31	07:24 17:12		06:49 19:30	07:16 (25) 19:04 (07)		19:12 (07) 20:39	
Potential sun hours	288	293	369	403	457	463	
Total, worst case		132	820	667			
Sun reduction		0.39	0.47	0.49			
Oper. time red.		1.00	1.00	1.00			
Wind dir. red.		0.66	0.64	0.57			
Total reduction		0.26	0.30	0.28			
Total, real		34	248	187			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)



Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 114

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-83 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (49)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December		
1	05:25	05:52	06:27	07:18 (25)	07:02	17:17 (08)	06:41	07:19
	20:52	20:31	19:42	41 19:05 (07)	18:47	37 17:54 (08)	16:56	16:28
2	05:25	05:53	06:28	07:15 (25)	07:03	17:17 (08)	06:42	07:20
	20:52	20:30	19:40	47 19:05 (07)	18:45	38 17:55 (08)	16:54	16:27
3	05:26	05:54	06:29	07:14 (25)	07:04	17:16 (08)	06:43	07:21
	20:52	20:29	19:39	50 19:05 (07)	18:43	39 17:55 (08)	16:53	16:27
4	05:26	05:55	06:30	07:12 (25)	07:05	17:15 (08)	06:44	07:22
	20:52	20:27	19:37	51 19:04 (07)	18:41	39 17:54 (08)	16:52	16:27
5	05:27	05:56	06:31	07:11 (25)	07:06	17:14 (08)	06:46	07:23
	20:51	20:26	19:35	54 19:04 (07)	18:40	40 17:54 (08)	16:50	16:27
6	05:28	05:57	06:33	07:10 (25)	07:08	17:13 (08)	06:47	07:24
	20:51	20:25	19:33	54 19:03 (07)	18:38	41 17:54 (08)	16:49	16:26
7	05:28	05:58	06:34	07:09 (25)	07:09	17:14 (08)	06:49	07:25
	20:51	20:23	19:31	55 19:03 (07)	18:36	40 17:54 (08)	16:48	16:26
8	05:29	05:59	06:35	07:08 (25)	07:10	17:14 (08)	06:50	07:26
	20:50	20:22	19:29	55 19:02 (07)	18:34	39 17:53 (08)	16:47	16:26
9	05:30	06:01	06:36	07:08 (25)	07:11	17:13 (08)	06:51	07:27
	20:50	20:21	19:28	53 19:01 (07)	18:33	39 17:52 (08)	16:45	16:26
10	05:31	06:02	06:37	07:09 (25)	07:12	17:13 (08)	06:53	07:28
	20:49	20:19	19:26	51 19:00 (07)	18:31	38 17:51 (08)	16:44	16:26
11	05:31	06:03	06:38	07:09 (25)	07:14	17:14 (08)	06:54	07:29
	20:49	20:18	19:24	48 18:59 (07)	18:29	37 17:51 (08)	16:43	16:26
12	05:32	06:04	06:39	07:09 (25)	07:15	17:15 (08)	06:55	07:30
	20:49	20:16	19:22	44 18:57 (07)	18:27	35 17:50 (08)	16:42	16:26
13	05:33	06:05	06:41	07:09 (25)	07:16	17:15 (08)	06:56	07:31
	20:48	20:15	19:20	38 18:54 (07)	18:26	33 17:48 (08)	16:41	16:26
14	05:34	06:06	06:42	07:09 (25)	07:17	17:17 (08)	06:58	07:32
	20:47	20:13	19:18	28 18:49 (07)	18:24	30 17:47 (08)	16:40	16:26
15	05:35	06:07	06:43	07:10 (25)	07:19	17:18 (08)	06:59	07:32
	20:47	20:12	19:17	19 07:29 (25)	18:22	28 17:46 (08)	16:39	16:27
16	05:36	06:09	06:44	07:12 (25)	07:20	17:19 (08)	07:00	07:33
	20:46	20:10	19:15	15 07:27 (25)	18:20	24 17:43 (08)	16:38	16:27
17	05:36	06:10	06:45	07:14 (25)	07:21	17:20 (08)	07:02	07:34
	20:45	20:09	19:13	9 07:23 (25)	18:19	21 17:41 (08)	16:37	16:27
18	05:37	06:11	06:46	07:22	07:22	17:24 (08)	07:03	07:35
	20:45	20:07	19:11	18:17	14 17:38 (08)	16:36	16:28	
19	05:38	06:12	06:48	07:24	07:24	17:24 (08)	07:04	07:35
	20:44	20:06	19:09	18:15	16:35	16:28		
20	05:39	06:13	06:49	07:25	07:25	17:25 (08)	07:06	07:36
	20:43	20:04	19:07	18:14	16:34	16:28		
21	05:40	06:14	06:50	07:26	07:26	17:26 (08)	07:07	07:36
	20:42	20:03	19:05	18:12	16:34	16:29		
22	05:41	06:15	06:51	07:27	07:27	17:27 (08)	07:08	07:37
	20:41	20:01	19:04	18:11	16:33	16:29		
23	05:42	06:17	06:52	17:35 (08)	07:29	17:29 (08)	07:09	07:37
	20:40	19:58	19:02	8 17:43 (08)	18:09	16:32	16:30	
24	05:43	06:18	06:53	17:30 (08)	07:30	17:30 (08)	07:11	07:38
	20:40	19:56	19:00	17 17:47 (08)	18:07	16:31	16:30	
25	05:44	06:19	06:54	17:27 (08)	07:31	17:27 (08)	07:12	07:38
	20:39	19:54	18:58	22 17:49 (08)	18:06	16:31	16:31	
26	05:45	06:20	18:50 (07)	06:56	17:25 (08)	07:33	07:13	07:39
	20:38	19:53	6 18:56 (07)	18:56	26 17:51 (08)	18:04	16:30	16:32
27	05:46	06:21	18:46 (07)	06:57	17:23 (08)	07:34	07:14	07:39
	20:37	19:51	13 18:59 (07)	18:54	29 17:52 (08)	18:03	16:30	16:32
28	05:47	06:22	18:43 (07)	06:58	17:21 (08)	07:35	07:16	07:39
	20:36	19:49	18 19:01 (07)	18:52	32 17:53 (08)	18:01	16:29	16:33
29	05:48	06:23	18:41 (07)	06:59	17:19 (08)	07:37	07:17	07:39
	20:34	19:47	21 19:02 (07)	18:51	35 17:54 (08)	18:00	16:29	16:34
30	05:49	06:25	18:40 (07)	07:00	17:18 (08)	07:38	07:18	07:40
	20:33	19:46	23 19:03 (07)	18:49	36 17:54 (08)	17:58	16:28	16:34
31	05:51	06:26	07:21 (25)	07:39	07:39	17:59 (08)	07:19	07:40
	20:32	19:44	34 19:04 (07)	17:57	17:57	17:57	16:35	
Potential sun hours	469	434	376	342	290	277		
Total, worst case		115	917	612				
Sun reduction		0.59	0.54	0.44				
Oper. time red.		1.00	1.00	1.00				
Wind dir. red.		0.57	0.59	0.66				
Total reduction		0.33	0.32	0.29				
Total, real		38	294	177				

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 115

Licensed user:

EDR

217 Montgomery St.

US-SYRACUSE, NY 13202

(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-84 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (50)

Assumptions for shadow calculations

Maximum distance for influence 1,000 m
Minimum sun height over horizon for influence 3 °
Day step for calculation 1 days
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum
Idle start wind speed: Cut in wind speed from power curve

Table with columns for months (January to December) and rows for days (1 to 31). It contains sunrise and sunset times, and a summary section at the bottom with rows for 'Potential sun hours', 'Sun reduction', 'Oper. time red.', 'Wind dir. red.', 'Total reduction', and 'Total, real'.

Table layout: For each day in each month the following matrix apply

Matrix with columns: Day in month, Sun rise (hh:mm), Sun set (hh:mm), Minutes with flicker, First time (hh:mm) with flicker, Last time (hh:mm) with flicker, (WTG causing flicker first time), (WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 116

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-85 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (51)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June					
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	18:40 (08) 19:03 (08)	05:57 20:06	29	06:33 (25) 19:31 (07)	05:25 20:40	25	06:26 (25) 06:51 (25)
2	07:40 16:37	07:22 17:15	06:41 17:53	06:46 19:32	18:39 (08) 19:04 (08)	05:56 20:07	34	06:30 (25) 19:31 (07)	05:24 20:41	24	06:26 (25) 06:50 (25)
3	07:40 16:38	07:21 17:17	06:40 17:55	06:44 19:33	18:38 (08) 19:05 (08)	05:54 20:09	34	06:27 (25) 19:28 (07)	05:24 20:41	22	06:28 (25) 06:50 (25)
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:35	18:37 (08) 19:06 (08)	05:53 20:10	34	06:26 (25) 19:27 (07)	05:23 20:42	21	06:29 (25) 06:50 (25)
5	07:40 16:40	07:19 17:19	06:36 17:57	06:40 19:36	18:36 (08) 19:06 (08)	05:52 20:11	27	06:25 (25) 06:52 (25)	05:23 20:43	20	06:29 (25) 06:49 (25)
6	07:40 16:41	07:17 17:21	06:34 17:59	06:38 19:37	18:35 (08) 19:06 (08)	05:50 20:12	27	06:23 (25) 06:52 (25)	05:23 20:44	20	06:30 (25) 06:48 (25)
7	07:40 16:42	07:16 17:22	06:33 18:00	06:37 19:38	18:34 (08) 19:05 (08)	05:49 20:13	29	06:23 (25) 06:53 (25)	05:22 20:44	18	06:31 (25) 06:48 (25)
8	07:40 16:43	07:15 17:24	06:31 19:01	06:35 19:40	18:35 (08) 19:06 (08)	05:48 20:15	30	06:22 (25) 06:54 (25)	05:22 20:45	17	06:32 (25) 06:47 (25)
9	07:39 16:44	07:14 17:25	06:29 19:02	06:33 19:41	18:34 (08) 19:05 (08)	05:46 20:16	32	06:22 (25) 06:54 (25)	05:22 20:46	15	06:33 (25) 06:46 (25)
10	07:39 16:45	07:12 17:26	06:27 19:04	06:31 19:42	18:34 (08) 19:04 (08)	05:45 20:17	32	06:20 (25) 06:54 (25)	05:21 20:46	13	06:34 (25) 06:46 (25)
11	07:39 16:47	07:11 17:28	06:26 19:05	06:30 19:43	18:34 (08) 19:03 (08)	05:44 20:18	34	06:20 (25) 06:54 (25)	05:21 20:47	12	06:35 (25) 06:45 (25)
12	07:38 16:48	07:10 17:29	06:24 19:06	06:28 19:44	18:35 (08) 19:03 (08)	05:43 20:19	34	06:20 (25) 06:55 (25)	05:21 20:48	10	06:37 (25) 06:44 (25)
13	07:38 16:49	07:08 17:31	06:22 19:08	06:26 19:46	18:35 (08) 19:02 (08)	05:41 20:20	35	06:20 (25) 06:55 (25)	05:21 20:48	7	06:38 (25) 06:43 (25)
14	07:38 16:50	07:07 17:32	06:20 19:09	06:24 19:47	18:36 (08) 19:00 (08)	05:40 20:21	35	06:20 (25) 06:55 (25)	05:21 20:49	5	06:43 (25)
15	07:37 16:51	07:05 17:33	06:18 19:10	06:23 19:48	18:37 (08) 19:00 (08)	05:39 20:23	35	06:20 (25) 06:55 (25)	05:21 20:50		
16	07:37 16:53	07:04 17:35	06:17 19:11	06:21 19:49	18:38 (08) 18:58 (08)	05:38 20:24	35	06:20 (25) 06:55 (25)	05:21 20:50		
17	07:36 16:54	07:02 17:36	06:15 19:13	06:19 19:50	18:40 (08) 18:55 (08)	05:37 20:25	35	06:20 (25) 06:55 (25)	05:21 20:50		
18	07:35 16:55	07:01 17:37	06:13 19:14	06:18 19:52	18:44 (08) 19:29 (07)	05:36 20:26	35	06:20 (25) 06:55 (25)	05:21 20:50		
19	07:35 16:56	06:59 17:39	06:11 19:15	06:16 19:53	19:17 (07) 19:29 (07)	05:35 20:27	35	06:20 (25) 06:55 (25)	05:21 20:51		
20	07:34 16:58	06:58 17:40	06:09 19:16	06:14 19:54	19:15 (07) 19:30 (07)	05:34 20:28	35	06:20 (25) 06:55 (25)	05:21 20:51		
21	07:33 16:59	06:56 17:41	06:08 19:18	06:13 19:55	19:14 (07) 19:32 (07)	05:33 20:29	34	06:20 (25) 06:54 (25)	05:21 20:51		
22	07:33 17:00	06:55 17:43	06:06 19:19	06:11 19:57	19:13 (07) 19:33 (07)	05:32 20:30	34	06:20 (25) 06:54 (25)	05:21 20:52		
23	07:32 17:02	06:53 17:44	06:04 19:20	06:09 19:58	19:13 (07) 19:34 (07)	05:31 20:31	33	06:21 (25) 06:54 (25)	05:22 20:52		
24	07:31 17:03	06:51 17:45	06:02 19:21	06:08 19:59	19:12 (07) 19:34 (07)	05:30 20:32	33	06:21 (25) 06:54 (25)	05:22 20:52		
25	07:30 17:04	06:50 17:47	06:00 19:22	06:06 20:00	19:12 (07) 19:35 (07)	05:30 20:33	31	06:22 (25) 06:53 (25)	05:22 20:52		
26	07:29 17:06	06:48 17:48	06:58 19:24	06:05 20:00	19:11 (07) 19:34 (07)	05:29 20:34	31	06:22 (25) 06:53 (25)	05:23 20:52		
27	07:28 17:07	06:46 17:49	06:57 19:25	06:03 20:01	19:12 (07) 19:34 (07)	05:28 20:35	30	06:23 (25) 06:53 (25)	05:23 20:52		
28	07:27 17:08	06:45 17:51	06:55 19:26	06:02 20:03	19:11 (07) 19:33 (07)	05:27 20:36	29	06:23 (25) 06:52 (25)	05:23 20:52		
29	07:26 17:10	06:53 19:27	06:53 18:50 (08)	06:00 20:04	19:12 (07) 19:33 (07)	05:27 20:37	29	06:23 (25) 06:52 (25)	05:24 20:52	4	06:42 (25) 06:46 (25)
30	07:25 17:11	06:51 19:29	06:51 18:45 (08)	05:59 20:05	19:12 (07) 19:32 (07)	05:26 20:38	27	06:25 (25) 06:52 (25)	05:24 20:52	7	06:40 (25) 06:47 (25)
31	07:24 17:12	06:49 19:30	06:49 18:43 (08)	05:57 20:06	19:11 (07) 19:31 (07)	05:25 20:39	26	06:25 (25) 06:51 (25)			
Potential sun hours	288	293	369	403	457	1001	463				
Total, worst case			41	710	1001	220					
Sun reduction			0.47	0.49	0.55	0.59					
Oper. time red.			1.00	1.00	1.00	1.00					
Wind dir. red.			0.57	0.55	0.65	0.66					
Total reduction			0.26	0.27	0.36	0.39					
Total, real			11	190	356	85					

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 117

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-85 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (51)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December			
1	05:25 20:52	06:40 (25) 20:31	05:52 20:31	06:31 (25) 19:42	06:27 19:42	18:34 (08) 18:47	07:02 18:47	06:40 16:56	07:19 16:28
2	05:25 20:52	06:38 (25) 20:30	05:53 20:30	06:31 (25) 19:40	06:28 19:40	18:33 (08) 18:45	07:03 18:45	06:42 16:54	07:20 16:27
3	05:26 20:52	06:38 (25) 20:29	05:54 20:29	06:31 (25) 19:39	06:29 19:39	18:32 (08) 18:43	07:04 18:43	06:43 16:53	07:21 16:27
4	05:26 20:52	06:38 (25) 20:27	05:55 20:27	06:32 (25) 19:37	06:30 19:37	18:32 (08) 18:41	07:05 18:41	06:44 16:52	07:22 16:27
5	05:27 20:51	06:37 (25) 20:26	05:56 20:26	06:32 (25) 19:35	06:31 19:35	18:31 (08) 18:40	07:06 18:40	06:46 16:50	07:23 16:27
6	05:28 20:51	06:37 (25) 20:25	05:57 20:25	06:33 (25) 19:33	06:33 19:33	18:31 (08) 18:38	07:07 18:38	06:47 16:49	07:24 16:26
7	05:28 20:51	06:36 (25) 20:23	05:58 20:23	06:33 (25) 19:31	06:34 19:31	18:31 (08) 18:36	07:09 18:36	06:48 16:48	07:25 16:26
8	05:29 20:50	06:35 (25) 20:22	05:59 20:22	06:34 (25) 19:29	06:35 19:29	18:31 (08) 18:34	07:10 18:34	06:50 16:47	07:26 16:26
9	05:30 20:50	06:35 (25) 20:21	06:01 20:21	06:35 (25) 19:28	06:36 19:28	18:31 (08) 18:33	07:11 18:33	06:51 16:45	07:27 16:26
10	05:31 20:49	06:35 (25) 20:19	06:02 20:19	06:35 (25) 19:26	06:37 19:26	18:32 (08) 18:31	07:12 18:31	06:52 16:44	07:28 16:26
11	05:31 20:49	06:34 (25) 20:18	06:03 20:18	06:34 (25) 19:24	06:38 19:24	18:33 (08) 18:29	07:14 18:29	06:54 16:43	07:29 16:26
12	05:32 20:48	06:33 (25) 20:16	06:04 20:16	06:33 (25) 19:22	06:39 19:22	18:35 (08) 18:27	07:15 18:27	06:55 16:42	07:30 16:26
13	05:33 20:48	06:33 (25) 20:15	06:05 20:15	06:33 (25) 19:20	06:41 19:20	18:36 (08) 18:26	07:16 18:26	06:56 16:41	07:31 16:26
14	05:34 20:47	06:33 (25) 20:13	06:06 20:13	06:33 (25) 19:18	06:42 19:18	18:39 (08) 18:24	07:17 18:24	06:58 16:40	07:32 16:26
15	05:35 20:47	06:33 (25) 20:12	06:07 20:12	06:33 (25) 19:17	06:43 19:17	18:48 (08) 18:22	07:19 18:22	06:59 16:39	07:32 16:27
16	05:36 20:46	06:32 (25) 20:10	06:09 20:10	06:32 (25) 19:15	06:44 19:15	19:18 (07) 18:20	07:20 18:20	07:00 16:38	07:33 16:27
17	05:36 20:45	06:31 (25) 20:09	06:10 20:09	06:31 (25) 19:13	06:45 19:13	19:18 (07) 18:19	07:21 18:19	07:02 16:37	07:34 16:27
18	05:37 20:45	06:31 (25) 20:07	06:11 20:07	06:31 (25) 19:11	06:46 19:11	19:18 (07) 18:17	07:22 18:17	07:03 16:36	07:35 16:28
19	05:38 20:44	06:31 (25) 20:06	06:12 20:06	06:31 (25) 19:09	06:48 19:09	19:18 (07) 18:15	07:24 18:15	07:04 16:35	07:35 16:28
20	05:39 20:43	06:31 (25) 20:04	06:13 20:04	06:31 (25) 19:07	06:49 19:07	19:18 (07) 18:14	07:25 18:14	07:06 16:34	07:36 16:28
21	05:40 20:42	06:31 (25) 20:03	06:14 20:03	06:31 (25) 19:05	06:50 19:05	19:19 (07) 18:12	07:26 18:12	07:07 16:34	07:36 16:29
22	05:41 20:41	06:31 (25) 20:01	06:15 20:01	06:31 (25) 19:03	06:51 19:03	19:19 (07) 18:11	07:27 18:11	07:08 16:33	07:37 16:29
23	05:42 20:40	06:31 (25) 19:58	06:17 19:58	06:31 (25) 19:02	06:52 19:02	19:20 (07) 18:09	07:29 18:09	07:09 16:32	07:37 16:30
24	05:43 20:40	06:30 (25) 19:56	06:18 19:56	06:30 (25) 19:00	06:53 19:00	19:35 (07) 18:07	07:30 18:07	07:11 16:31	07:38 16:30
25	05:44 20:39	06:30 (25) 19:54	06:19 19:54	06:30 (25) 18:58	06:54 18:58	19:35 (07) 18:06	07:31 18:06	07:12 16:31	07:38 16:31
26	05:45 20:38	06:30 (25) 19:53	06:20 19:53	06:30 (25) 18:56	06:56 18:56	19:33 (07) 18:04	07:33 18:04	07:13 16:30	07:39 16:32
27	05:46 20:37	06:30 (25) 19:51	06:21 19:51	06:30 (25) 18:54	06:57 18:54	19:33 (07) 18:03	07:34 18:03	07:14 16:30	07:39 16:32
28	05:47 20:36	06:30 (25) 19:49	06:22 19:49	06:30 (25) 18:52	06:58 18:52	19:33 (07) 18:01	07:35 18:01	07:16 16:29	07:39 16:33
29	05:48 20:34	06:30 (25) 19:47	06:23 19:47	06:30 (25) 18:51	06:59 18:51	19:33 (07) 18:00	07:37 18:00	07:17 16:29	07:39 16:34
30	05:49 20:33	06:30 (25) 19:46	06:25 19:46	06:30 (25) 18:49	07:00 18:49	19:33 (07) 17:58	07:38 17:58	07:18 16:28	07:40 16:34
31	05:51 20:32	06:30 (25) 19:44	06:26 19:44	06:30 (25) 18:47	07:01 18:47	19:33 (07) 17:57	07:39 17:57	07:40 16:35	07:40 16:35
Potential sun hours	469	434	376	342	290	277			
Total, worst case	844	773	364						
Sun reduction	0.63	0.59	0.54						
Oper. time red.	1.00	1.00	1.00						
Wind dir. red.	0.66	0.58	0.57						
Total reduction	0.41	0.34	0.30						
Total, real	348	265	111						

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 118

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-87 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (313)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40	15:05 (08) 07:23	06:43	07:11 (25) 06:47	05:57	05:25
	16:36 38	15:43 (08) 17:14	17:52	54 17:15 (07) 19:31	20:06	20:40
2	07:40	15:06 (08) 07:22	06:41	07:11 (25) 06:46	05:56	05:24
	16:37 38	15:44 (08) 17:15	17:53	54 17:16 (07) 19:32	20:07	20:41
3	07:40	15:06 (08) 07:21	06:40	07:11 (25) 06:44	05:54	05:24
	16:38 38	15:44 (08) 17:17	17:55	53 17:15 (07) 19:33	20:09	20:41
4	07:40	15:07 (08) 07:20	06:38	07:11 (25) 06:42	05:53	05:23
	16:39 38	15:45 (08) 17:18	17:56	51 17:14 (07) 19:35	20:10	20:42
5	07:40	15:07 (08) 07:19	06:36	07:12 (25) 06:40	05:52	05:23
	16:40 39	15:46 (08) 17:19	17:57	48 17:13 (07) 19:36	20:11	20:43
6	07:40	15:08 (08) 07:17	06:34	07:12 (25) 06:38	05:50	05:23
	16:41 38	15:46 (08) 17:21	17:59	45 17:12 (07) 19:37	20:12	20:44
7	07:40	15:09 (08) 07:16	06:33	07:13 (25) 06:37	05:49	05:22
	16:42 38	15:47 (08) 17:22	18:00	39 17:10 (07) 19:38	20:13	20:44
8	07:40	15:08 (08) 07:15	07:31	08:14 (25) 06:35	05:48	05:22
	16:43 38	15:46 (08) 17:24	19:01	32 18:08 (07) 19:40	20:15	20:45
9	07:39	15:09 (08) 07:14	07:29	08:16 (25) 06:33	05:46	05:22
	16:44 38	15:47 (08) 17:25	19:02	22 18:05 (07) 19:41	20:16	20:46
10	07:39	15:10 (08) 07:12	07:27	06:31	05:45	05:21
	16:45 38	15:48 (08) 17:26	19:04	19:42	20:17	20:46
11	07:39	15:10 (08) 07:11	07:26	06:30	05:44	05:21
	16:47 37	15:47 (08) 17:28	19:05	19:43	20:18	20:47
12	07:38	15:11 (08) 07:10	07:24	06:28	05:43	05:21
	16:48 37	15:48 (08) 17:29	19:06	19:44	20:19	20:48
13	07:38	15:11 (08) 07:08	07:22	06:26	05:41	05:21
	16:49 37	15:48 (08) 17:31	19:08	19:46	20:20	20:48
14	07:38	15:12 (08) 07:07	07:20	06:24	05:40	05:21
	16:50 36	15:48 (08) 17:32	19:09	19:47	20:21	20:49
15	07:37	15:13 (08) 07:05	07:18	06:23	05:39	05:21
	16:51 35	15:48 (08) 17:33	19:10	19:48	20:23	20:49
16	07:37	15:14 (08) 07:04	07:17	06:21	05:38	05:21
	16:53 35	15:49 (08) 17:35	19:11	19:49	20:24	20:50
17	07:36	15:14 (08) 07:02	07:15	06:19	05:37	05:21
	16:54 34	15:48 (08) 17:36	19:13	19:51	20:25	20:50
18	07:35	15:15 (08) 07:01	16:59 (07) 07:13	06:18	05:36	05:21
	16:55 33	15:48 (08) 17:37	6 17:05 (07) 19:14	19:52	20:26	20:50
19	07:35	15:16 (08) 06:59	16:55 (07) 07:11	06:16	05:35	05:21
	16:56 31	15:47 (08) 17:39	14 17:09 (07) 19:15	19:53	20:27	20:51
20	07:34	15:17 (08) 06:58	16:52 (07) 07:09	06:14	05:34	05:21
	16:58 31	15:48 (08) 17:40	19 17:11 (07) 19:16	19:54	20:28	20:51
21	07:33	15:18 (08) 06:56	16:51 (07) 07:08	06:13	05:33	05:21
	16:59 29	15:47 (08) 17:41	22 17:13 (07) 19:18	19:55	20:29	20:51
22	07:33	15:19 (08) 06:55	16:49 (07) 07:06	06:11	05:32	05:21
	17:00 27	15:46 (08) 17:43	25 17:14 (07) 19:19	19:57	20:30	20:52
23	07:32	15:20 (08) 06:53	07:19 (25) 07:04	06:09	05:31	05:22
	17:02 26	15:46 (08) 17:44	37 17:15 (07) 19:20	19:58	20:31	20:52
24	07:31	15:22 (08) 06:51	07:17 (25) 07:02	06:08	05:30	05:22
	17:03 22	15:44 (08) 17:45	43 17:15 (07) 19:21	19:59	20:32	20:52
25	07:30	15:24 (08) 06:50	07:15 (25) 07:00	06:06	05:30	05:22
	17:04 19	15:43 (08) 17:47	47 17:15 (07) 19:22	20:00	20:33	20:52
26	07:29	15:26 (08) 06:48	07:14 (25) 06:58	06:05	05:29	05:23
	17:06 15	15:41 (08) 17:48	49 17:16 (07) 19:24	20:00	20:34	20:52
27	07:28	15:29 (08) 06:46	07:13 (25) 06:57	06:03	05:28	05:23
	17:07 10	15:39 (08) 17:49	52 17:16 (07) 19:25	20:01	20:35	20:52
28	07:27	06:45	07:12 (25) 06:55	06:02	05:27	05:23
	17:08	17:51	54 17:16 (07) 19:26	20:03	20:36	20:52
29	07:26		06:53	06:00	05:27	05:24
	17:10		19:27	20:04	20:37	20:52
30	07:25		06:51	05:59	05:26	05:24
	17:11		19:29	20:05	20:38	20:52
31	07:24		06:49		05:25	
	17:12		19:30		20:39	
Potential sun hours	288	293	369	403	457	463
Total, worst case	875	368	398			
Sun reduction	0.33	0.39	0.47			
Oper. time red.	1.00	1.00	1.00			
Wind dir. red.	0.76	0.62	0.60			
Total reduction	0.26	0.25	0.29			
Total, real	224	91	114			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 119

Licensed user:

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Calculated:

3/18/2011 3:22 PM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-87 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (313)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December	
1	05:25	05:52	06:27	07:02	06:41	07:19	14:52 (08)
	20:52	20:31	19:42	18:47	16:56	16:28	37 15:29 (08)
2	05:25	05:53	06:28	07:03	06:42	07:20	14:52 (08)
	20:52	20:30	19:40	18:45	16:54	16:27	38 15:30 (08)
3	05:26	05:54	06:29	07:04	06:43	07:21	14:52 (08)
	20:52	20:29	19:39	18:43	16:53	16:27	38 15:30 (08)
4	05:26	05:55	06:30	07:05	07:56 (25)	06:45	07:22 14:54 (08)
	20:52	20:27	19:37	18:41	14 17:41 (07)	16:52	16:27 37 15:31 (08)
5	05:27	05:56	06:31	07:06	07:52 (25)	06:46	07:23 14:54 (08)
	20:51	20:26	19:35	18:40	29 17:44 (07)	16:50	16:27 38 15:32 (08)
6	05:28	05:57	06:33	07:08	07:50 (25)	06:47	07:24 14:54 (08)
	20:51	20:25	19:33	18:38	36 17:46 (07)	16:49	16:26 38 15:32 (08)
7	05:28	05:58	06:34	07:09	07:49 (25)	06:49	07:25 14:54 (08)
	20:51	20:23	19:31	18:36	41 17:47 (07)	16:48	16:26 39 15:33 (08)
8	05:29	05:59	06:35	07:10	07:47 (25)	06:50	07:26 14:55 (08)
	20:50	20:22	19:30	18:34	46 17:48 (07)	16:47	16:26 38 15:33 (08)
9	05:30	06:01	06:36	07:11	07:46 (25)	06:51	07:27 14:55 (08)
	20:50	20:21	19:28	18:33	50 17:48 (07)	16:45	16:26 38 15:33 (08)
10	05:31	06:02	06:37	07:12	07:45 (25)	06:53	07:28 14:56 (08)
	20:50	20:19	19:26	18:31	51 17:48 (07)	16:44	16:26 38 15:34 (08)
11	05:31	06:03	06:38	07:14	07:45 (25)	06:54	07:29 14:56 (08)
	20:49	20:18	19:24	18:29	53 17:49 (07)	16:43	16:26 38 15:34 (08)
12	05:32	06:04	06:39	07:15	07:45 (25)	06:55	07:30 14:56 (08)
	20:49	20:16	19:22	18:27	54 17:49 (07)	16:42	16:26 38 15:34 (08)
13	05:33	06:05	06:41	07:16	07:44 (25)	06:57	07:31 14:56 (08)
	20:48	20:15	19:20	18:26	55 17:49 (07)	16:41	16:26 39 15:35 (08)
14	05:34	06:06	06:42	07:17	07:45 (25)	06:58	07:32 14:57 (08)
	20:47	20:13	19:18	18:24	53 17:49 (07)	16:40	16:26 38 15:35 (08)
15	05:35	06:07	06:43	07:19	07:45 (25)	06:59	15:02 (08) 07:32 14:58 (08)
	20:47	20:12	19:17	18:22	52 17:48 (07)	16:39	10 15:12 (08) 16:27 38 15:36 (08)
16	05:36	06:09	06:44	07:20	07:46 (25)	07:00	14:59 (08) 07:33 14:58 (08)
	20:46	20:10	19:15	18:20	50 17:48 (07)	16:38	15 15:14 (08) 16:27 38 15:36 (08)
17	05:36	06:10	06:45	07:21	07:48 (25)	07:02	14:58 (08) 07:34 14:58 (08)
	20:45	20:09	19:13	18:19	46 17:48 (07)	16:37	19 15:17 (08) 16:27 38 15:36 (08)
18	05:37	06:11	06:46	07:22	07:49 (25)	07:03	14:56 (08) 07:35 14:59 (08)
	20:45	20:07	19:11	18:17	42 17:47 (07)	16:36	22 15:18 (08) 16:28 38 15:37 (08)
19	05:38	06:12	06:48	07:24	07:51 (25)	07:04	14:55 (08) 07:35 14:59 (08)
	20:44	20:06	19:09	18:15	34 17:45 (07)	16:35	26 15:21 (08) 16:28 38 15:37 (08)
20	05:39	06:13	06:49	07:25	17:20 (07)	07:06	14:54 (08) 07:36 15:00 (08)
	20:43	20:04	19:07	18:14	24 17:44 (07)	16:34	27 15:21 (08) 16:28 38 15:38 (08)
21	05:40	06:14	06:50	07:26	17:22 (07)	07:07	14:53 (08) 07:36 15:00 (08)
	20:42	20:03	19:05	18:12	21 17:43 (07)	16:34	29 15:22 (08) 16:29 38 15:38 (08)
22	05:41	06:15	06:51	07:27	17:23 (07)	07:08	14:53 (08) 07:37 15:01 (08)
	20:41	20:01	19:04	18:11	18 17:41 (07)	16:33	31 15:24 (08) 16:29 38 15:39 (08)
23	05:42	06:17	06:52	07:29	17:26 (07)	07:09	14:53 (08) 07:37 15:01 (08)
	20:41	19:58	19:02	18:09	13 17:39 (07)	16:32	31 15:24 (08) 16:30 38 15:39 (08)
24	05:43	06:18	06:53	07:30	07:11	14:52 (08) 07:38 15:02 (08)	
	20:40	19:56	19:00	18:07	16:31	33 15:25 (08) 16:30 38 15:40 (08)	
25	05:44	06:19	06:54	07:31	07:12	14:52 (08) 07:38 15:02 (08)	
	20:39	19:54	18:58	18:06	16:31	34 15:26 (08) 16:31 38 15:40 (08)	
26	05:45	06:20	06:56	07:33	07:13	14:52 (08) 07:39 15:02 (08)	
	20:38	19:53	18:56	18:04	16:30	35 15:27 (08) 16:32 38 15:40 (08)	
27	05:46	06:21	06:57	07:34	07:14	14:52 (08) 07:39 15:04 (08)	
	20:37	19:51	18:54	18:03	16:30	35 15:27 (08) 16:32 37 15:41 (08)	
28	05:47	06:22	06:58	07:35	07:16	14:52 (08) 07:39 15:04 (08)	
	20:36	19:49	18:52	18:01	16:29	36 15:28 (08) 16:33 38 15:42 (08)	
29	05:48	06:23	06:59	07:37	07:17	14:52 (08) 07:39 15:04 (08)	
	20:34	19:47	18:51	18:00	16:29	37 15:29 (08) 16:34 38 15:42 (08)	
30	05:49	06:25	07:00	07:38	07:18	14:52 (08) 07:40 15:04 (08)	
	20:33	19:46	18:49	17:58	16:28	37 15:29 (08) 16:34 38 15:42 (08)	
31	05:51	06:26	07:03	07:39	07:19	14:52 (08) 07:40 15:04 (08)	
	20:32	19:44	18:47	17:57	16:28	37 15:29 (08) 16:34 38 15:42 (08)	
Potential sun hours	469	434	376	342	290	277	1177
Total, worst case				782	457		1177
Sun reduction				0.44	0.27		0.25
Oper. time red.				1.00	1.00		1.00
Wind dir. red.				0.61	0.76		0.76
Total reduction				0.27	0.21		0.19
Total, real				214	96		229

Table layout: For each day in each month the following matrix apply

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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 120

Licensed user:

**EDR**

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(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-88 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (337)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36 40	15:05 (25) 07:23 15:45 (25) 17:14 22	15:25 (25) 06:43 15:28 (25) 17:52	07:25 (36) 06:47 07:55 (36) 19:31	05:57 20:06 17	19:24 (24) 05:25 19:41 (24) 20:40
2	07:40 16:37 39	15:06 (25) 07:22 15:45 (25) 17:15 17	15:28 (25) 06:41 15:45 (25) 17:53 29	07:26 (36) 06:46 07:55 (36) 19:32	05:56 20:07 19	19:22 (24) 05:24 19:41 (24) 20:41
3	07:40 16:38 40	15:06 (25) 07:21 15:46 (25) 17:17 10	15:32 (25) 06:40 15:42 (25) 17:55 26	07:27 (36) 06:44 07:53 (36) 19:33	05:54 20:09 21	19:21 (24) 05:24 19:42 (24) 20:41
4	07:40 16:39 41	15:06 (25) 07:20 15:47 (25) 17:18	06:38 17:56 25	07:27 (36) 06:42 07:52 (36) 19:35	05:53 20:10 23	19:20 (24) 05:23 19:43 (24) 20:42
5	07:40 16:40 40	15:07 (25) 07:19 15:47 (25) 17:19	06:36 17:57 22	07:28 (36) 06:40 07:50 (36) 19:36	05:51 20:11 24	19:19 (24) 05:23 19:43 (24) 20:43
6	07:40 16:41 41	15:07 (25) 07:18 15:48 (25) 17:21	06:34 17:59 19	07:30 (36) 06:38 07:49 (36) 19:37	05:50 20:12 25	19:19 (24) 05:22 19:44 (24) 20:44
7	07:40 16:42 41	15:07 (25) 07:16 15:48 (25) 17:22	06:33 18:00 14	07:32 (36) 06:37 07:46 (36) 19:38	05:49 20:13 25	19:19 (24) 05:22 19:44 (24) 20:44
8	07:40 16:43 42	15:07 (25) 07:15 15:49 (25) 17:24	07:31 19:01 3	08:37 (36) 06:35 08:40 (36) 19:39	05:47 20:15 26	19:19 (24) 05:22 19:45 (24) 20:45
9	07:39 16:44 42	15:08 (25) 07:14 15:50 (25) 17:25	07:29 19:02	06:33 19:41	05:46 20:16 26	19:18 (24) 05:22 19:44 (24) 20:46
10	07:39 16:45 41	15:08 (25) 07:12 15:49 (25) 17:26	07:27 19:04	06:31 19:42	05:45 20:17 26	19:18 (24) 05:21 19:44 (24) 20:46
11	07:39 16:47 42	15:08 (25) 07:11 15:50 (25) 17:28	07:26 19:05	06:30 19:43	05:44 20:18 26	19:18 (24) 05:21 19:44 (24) 20:47
12	07:38 16:48 42	15:09 (25) 07:09 15:51 (25) 17:29	07:24 19:06	06:28 19:44	05:43 20:19 26	19:18 (24) 05:21 19:44 (24) 20:48
13	07:38 16:49 42	15:09 (25) 07:08 15:51 (25) 17:30	07:22 19:08	06:26 19:46	05:41 20:20 25	19:19 (24) 05:21 19:44 (24) 20:48
14	07:38 16:50 42	15:10 (25) 07:07 15:52 (25) 17:32	07:20 19:09	06:24 19:47	05:40 20:21 24	19:19 (24) 05:21 19:43 (24) 20:49
15	07:37 16:51 42	15:10 (25) 07:05 15:52 (25) 17:33	07:18 19:10	06:23 19:48	05:39 20:23 23	19:20 (24) 05:21 19:43 (24) 20:49
16	07:37 16:53 42	15:10 (25) 07:04 15:52 (25) 17:35	07:17 19:11	06:21 19:49	05:38 20:24 22	19:20 (24) 05:21 19:42 (24) 20:50
17	07:36 16:54 42	15:11 (25) 07:02 15:53 (25) 17:36	07:15 19:13	06:19 19:50	05:37 20:25 21	19:21 (24) 05:21 19:42 (24) 20:50
18	07:35 16:55 42	15:11 (25) 07:01 15:53 (25) 17:37	07:13 19:14	06:18 19:52	05:36 20:26 19	19:22 (24) 05:21 19:41 (24) 20:50
19	07:35 16:56 42	15:11 (25) 06:59 15:53 (25) 17:39	07:11 19:15	06:16 19:53	05:35 20:27 17	19:23 (24) 05:21 19:40 (24) 20:51
20	07:34 16:58 40	15:13 (25) 06:58 15:53 (25) 17:40	07:09 19:16	06:14 19:54	05:34 20:28 15	19:24 (24) 05:21 19:39 (24) 20:51
21	07:33 16:59 40	15:13 (25) 06:56 15:53 (25) 17:41	07:07 19:17	06:13 19:55	05:33 20:29 13	19:25 (24) 05:21 19:38 (24) 20:51
22	07:33 17:00 39	15:14 (25) 06:55 15:53 (25) 17:43	07:06 19:19	06:11 19:57	05:32 20:30 9	19:27 (24) 05:21 19:36 (24) 20:51
23	07:32 17:02 39	15:14 (25) 06:53 15:53 (25) 17:44	07:04 19:20	06:09 19:58	05:31 20:31	20:51 05:22
24	07:31 17:03 38	15:15 (25) 06:51 15:53 (25) 17:45	07:02 19:21	06:08 19:59	05:30 20:32	05:22 20:52
25	07:30 17:04 36	15:16 (25) 06:50 15:52 (25) 17:47	07:00 19:22	06:06 20:00	05:29 20:33	05:22 20:52
26	07:29 17:06 36	15:16 (25) 06:48 15:52 (25) 17:48	06:58 19:24	06:05 20:00	05:29 20:34	05:23 20:52
27	07:28 17:07 34	15:17 (25) 06:46 15:51 (25) 17:49	06:56 19:25	06:03 20:01	05:28 20:35	05:23 20:52
28	07:27 17:08 32	15:19 (25) 06:45 15:51 (25) 17:51	06:55 19:26	06:02 20:03	05:27 20:36	05:23 20:52
29	07:26 17:10 30	15:20 (25) 06:44 15:50 (25) 17:52	06:53 19:27	06:00 20:04	05:27 20:37	05:24 20:52
30	07:25 17:11 27	15:22 (25) 06:43 15:49 (25) 17:53	06:51 19:29	05:59 20:05	05:26 20:38	05:24 20:52
31	07:24 17:12 25	15:23 (25) 06:42 15:48 (25) 17:54	06:49 19:30	05:57 20:06	05:25 20:39	05:24 20:52
Potential sun hours	288	293	369	403	457	463
Total, worst case	1201	389	168	20	472	
Sun reduction	0.33	0.39	0.47	0.49	0.55	
Oper. time red.	1.00	1.00	1.00	1.00	1.00	
Wind dir. red.	0.76	0.54	0.51	0.51	0.51	
Total reduction	0.26	0.22	0.25	0.27	0.30	
Total, real	316	87	42	5	141	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

Printed/Page

3/21/2011 3:39 PM / 121

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-88 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (337)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December				
1	05:25	05:52	19:29 (24)	06:27	07:01	06:40	07:19	14:50 (25)		
	20:52	20:31	26 19:55 (24)	19:42	18:47	16:56	16:28	42 15:32 (25)		
2	05:25	05:53	19:29 (24)	06:28	07:03	06:42	07:20	14:51 (25)		
	20:52	20:30	26 19:55 (24)	19:40	18:45	16:54	16:27	41 15:32 (25)		
3	05:26	05:54	19:28 (24)	06:29	07:04	06:43	07:21	14:51 (25)		
	20:52	20:29	27 19:55 (24)	19:38	18:43	16:53	16:27	42 15:33 (25)		
4	05:26	05:55	19:28 (24)	06:30	07:05	06:44	07:22	14:52 (25)		
	20:51	20:27	26 19:54 (24)	19:37	18:41	16:52	16:27	42 15:34 (25)		
5	05:27	05:56	19:28 (24)	06:31	07:06	06:46	07:23	14:53 (25)		
	20:51	20:26	26 19:54 (24)	19:35	18:40	16:50	16:27	41 15:34 (25)		
6	05:28	05:57	19:28 (24)	06:33	07:07	08:10 (36)	06:47	07:24	14:53 (25)	
	20:51	20:25	26 19:54 (24)	19:33	18:38	10 08:20 (36)	16:49	16:26	41 15:34 (25)	
7	05:28	05:58	19:28 (24)	06:34	07:09	08:07 (36)	06:48	07:25	14:54 (25)	
	20:51	20:23	25 19:53 (24)	19:31	18:36	17 08:24 (36)	16:48	16:26	40 15:34 (25)	
8	05:29	05:59	19:29 (24)	06:35	07:10	08:05 (36)	06:50	15:01 (25)	07:26	14:54 (25)
	20:50	20:22	24 19:53 (24)	19:29	18:34	20 08:25 (36)	16:47	11 15:12 (25)	16:26	41 15:35 (25)
9	05:30	06:00	19:29 (24)	06:36	07:11	08:03 (36)	06:51	14:58 (25)	07:27	14:55 (25)
	20:50	20:21	23 19:52 (24)	19:28	18:32	23 08:26 (36)	16:45	17 15:15 (25)	16:26	40 15:35 (25)
10	05:31	06:02	19:30 (24)	06:37	07:12	08:01 (36)	06:52	14:56 (25)	07:28	14:56 (25)
	20:49	20:19	21 19:51 (24)	19:26	18:31	26 08:27 (36)	16:44	22 15:18 (25)	16:26	39 15:35 (25)
11	05:31	06:03	19:32 (24)	06:38	07:14	08:00 (36)	06:54	14:54 (25)	07:29	14:55 (25)
	20:49	20:18	18 19:50 (24)	19:24	18:29	28 08:28 (36)	16:43	25 15:19 (25)	16:26	40 15:35 (25)
12	05:32	06:04	19:33 (24)	06:39	07:15	07:59 (36)	06:55	14:53 (25)	07:30	14:56 (25)
	20:48	20:16	16 19:49 (24)	19:22	18:27	29 08:28 (36)	16:42	28 15:21 (25)	16:26	39 15:35 (25)
13	05:33	06:05	19:34 (24)	06:41	07:16	07:58 (36)	06:56	14:52 (25)	07:31	14:57 (25)
	20:48	20:15	13 19:47 (24)	19:20	18:25	30 08:28 (36)	16:41	30 15:22 (25)	16:26	39 15:36 (25)
14	05:34	06:06	19:38 (24)	06:42	07:17	07:58 (36)	06:58	14:52 (25)	07:32	14:58 (25)
	20:47	20:13	5 19:43 (24)	19:18	18:24	31 08:29 (36)	16:40	32 15:24 (25)	16:26	38 15:36 (25)
15	05:35	06:07	06:43	07:18	07:58 (36)	06:59	14:50 (25)	07:32	14:58 (25)	
	20:47	20:12	19:17	18:22	31 08:29 (36)	16:39	34 15:24 (25)	16:27	39 15:37 (25)	
16	05:35	06:08	06:44	07:20	07:57 (36)	07:00	14:49 (25)	07:33	14:58 (25)	
	20:46	20:10	19:15	18:20	31 08:28 (36)	16:38	36 15:25 (25)	16:27	38 15:36 (25)	
17	05:36	06:10	06:45	07:21	07:57 (36)	07:02	14:50 (25)	07:34	14:59 (25)	
	20:45	20:09	19:13	18:19	31 08:28 (36)	16:37	36 15:26 (25)	16:27	38 15:37 (25)	
18	05:37	06:11	06:46	07:22	07:58 (36)	07:03	14:49 (25)	07:35	15:00 (25)	
	20:45	20:07	19:11	18:17	30 08:28 (36)	16:36	38 15:27 (25)	16:27	38 15:38 (25)	
19	05:38	06:12	06:47	07:24	07:57 (36)	07:04	14:49 (25)	07:35	15:00 (25)	
	20:44	20:06	19:09	18:15	30 08:27 (36)	16:35	39 15:28 (25)	16:28	38 15:38 (25)	
20	05:39	06:13	06:49	07:25	07:58 (36)	07:06	14:49 (25)	07:36	15:01 (25)	
	20:43	20:04	19:07	18:14	28 08:26 (36)	16:34	39 15:28 (25)	16:28	38 15:39 (25)	
21	05:40	19:38 (24)	06:14	06:50	07:26	07:59 (36)	07:07	14:48 (25)	07:36	15:01 (25)
	20:42	7 19:45 (24)	20:03	19:05	18:12	27 08:26 (36)	16:34	40 15:28 (25)	16:29	37 15:38 (25)
22	05:41	19:36 (24)	06:15	06:51	07:27	07:59 (36)	07:08	14:49 (25)	07:37	15:02 (25)
	20:41	11 19:47 (24)	20:01	19:04	18:11	25 08:24 (36)	16:33	40 15:29 (25)	16:29	37 15:39 (25)
23	05:42	19:35 (24)	06:16	06:52	07:29	08:01 (36)	07:09	14:48 (25)	07:37	15:02 (25)
	20:40	14 19:49 (24)	19:58	19:02	18:09	23 08:24 (36)	16:32	42 15:30 (25)	16:30	37 15:39 (25)
24	05:43	19:34 (24)	06:18	06:53	07:30	08:02 (36)	07:11	14:48 (25)	07:38	15:03 (25)
	20:40	16 19:50 (24)	19:56	19:00	18:07	20 08:22 (36)	16:31	42 15:30 (25)	16:30	38 15:41 (25)
25	05:44	19:33 (24)	06:19	06:54	07:31	08:04 (36)	07:12	14:49 (25)	07:38	15:03 (25)
	20:39	18 19:51 (24)	19:54	18:58	18:06	15 08:19 (36)	16:31	42 15:31 (25)	16:31	38 15:41 (25)
26	05:45	19:32 (24)	06:20	06:56	07:33	08:07 (36)	07:13	14:49 (25)	07:39	15:03 (25)
	20:38	20 19:52 (24)	19:53	18:56	18:04	9 08:16 (36)	16:30	42 15:31 (25)	16:31	38 15:41 (25)
27	05:46	19:31 (24)	06:21	06:57	07:34	07:14	14:49 (25)	07:39	15:04 (25)	
	20:37	22 19:53 (24)	19:51	18:54	18:03	16:30	42 15:31 (25)	16:32	38 15:42 (25)	
28	05:47	19:31 (24)	06:22	06:58	07:35	07:16	14:49 (25)	07:39	15:04 (25)	
	20:35	22 19:53 (24)	19:49	18:52	18:01	16:29	42 15:31 (25)	16:33	39 15:43 (25)	
29	05:48	19:30 (24)	06:23	06:59	07:36	07:17	14:50 (25)	07:39	15:04 (25)	
	20:34	24 19:54 (24)	19:47	18:51	18:00	16:29	42 15:32 (25)	16:34	39 15:43 (25)	
30	05:49	19:30 (24)	06:25	07:00	07:38	07:18	14:50 (25)	07:40	15:05 (25)	
	20:33	24 19:54 (24)	19:46	18:49	17:58	16:28	42 15:32 (25)	16:34	38 15:43 (25)	
31	05:50	19:29 (24)	06:26	07:01	07:39	07:19	14:50 (25)	07:40	15:05 (25)	
	20:32	25 19:54 (24)	19:44	18:49	17:57	16:35	39 15:44 (25)			
Potential sun hours	469	434	376	342	290	277				
Total, worst case	203	302	514	803	1212					
Sun reduction	0.63	0.59	0.44	0.27	0.25					
Oper. time red.	1.00	1.00	1.00	1.00	1.00					
Wind dir. red.	0.51	0.51	0.51	0.76	0.76					
Total reduction	0.34	0.32	0.24	0.22	0.20					
Total, real	69	97	122	173	242					

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)



Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 122

Licensed user:

EDR

217 Montgomery St.

US-SYRACUSE, NY 13202

(315) 471 0688

Steve Curtis, scurtis@edr.com

Calculated:

3/18/2011 3:22 PM/2.7.453

### SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-89 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (52)

#### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.33	0.39	0.47	0.49	0.55	0.59	0.63	0.59	0.54	0.44	0.27	0.25

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
438	648	710	456	298	237	193	272	631	1,051	1,182	1,006	675	429	245	289	8,760

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:40 16:36	07:23 15:24 (36)	06:43 15:13 (36)	06:47 16:05 (36)	05:57 17:52	05:25 20:06	05:25 20:40	05:52 20:31	06:27 19:42	07:01 18:47	06:40 16:56	07:19 14:46 (36)
2	07:40 16:37	07:22 15:35 (36)	06:41 16:06 (36)	06:46 17:53	05:56 19:32	05:24 20:07	05:25 20:40	05:53 20:30	06:28 19:40	07:03 18:45	06:42 16:54	07:20 14:45 (36)
3	07:40 16:38	07:21 15:37 (36)	06:40 16:05 (36)	06:44 17:55	05:54 19:33	05:24 20:09	05:26 20:41	05:54 20:29	06:29 19:38	07:04 18:43	06:43 16:53	07:21 14:45 (36)
4	07:40 16:39	07:20 15:41 (36)	06:38 16:06 (36)	06:42 17:56	05:53 19:35	05:23 20:10	05:26 20:42	05:55 20:27	06:30 19:37	07:05 18:41	06:44 16:52	07:22 14:44 (36)
5	07:40 16:40	07:19 15:20 (36)	06:36 15:14 (36)	06:40 17:57	05:51 19:36	05:23 20:11	05:27 20:43	05:56 20:26	06:31 19:35	07:06 18:40	06:46 16:50	07:23 14:45 (36)
6	07:40 16:41	07:17 15:20 (36)	06:34 15:15 (36)	06:38 17:59	05:50 19:37	05:22 20:12	05:28 20:44	05:57 20:25	06:33 19:33	07:07 18:38	06:47 16:49	07:24 14:44 (36)
7	07:40 16:42	07:16 15:18 (36)	06:33 15:15 (36)	06:37 18:00	05:49 19:38	05:22 20:13	05:28 20:44	05:58 20:23	06:34 19:31	07:09 18:36	06:48 16:48	07:25 14:44 (36)
8	07:40 16:43	07:15 15:18 (36)	06:31 15:15 (36)	06:35 19:01	05:47 19:39	05:22 20:14	05:29 20:45	05:59 20:22	06:35 19:29	07:10 18:34	06:50 16:46	07:26 14:44 (36)
9	07:39 16:44	07:14 15:18 (36)	06:29 15:17 (36)	06:33 19:02	05:46 19:41	05:21 20:16	05:30 20:46	06:00 20:21	06:36 19:28	07:11 18:32	06:51 16:45	07:27 14:43 (36)
10	07:39 16:45	07:12 15:17 (36)	06:27 15:17 (36)	06:31 19:04	05:45 19:42	05:21 20:17	05:30 20:46	06:02 20:19	06:37 19:26	07:12 18:31	06:52 16:44	07:28 14:44 (36)
11	07:39 16:47	07:11 15:17 (36)	06:26 15:18 (36)	06:29 19:05	05:44 19:43	05:21 20:18	05:31 20:47	06:03 20:18	06:38 19:24	07:13 18:29	06:54 16:43	07:29 14:44 (36)
12	07:38 16:48	07:09 15:17 (36)	06:24 15:18 (36)	06:28 19:06	05:42 19:44	05:21 20:19	05:32 20:47	06:04 20:16	06:39 19:22	07:15 18:27	06:55 16:42	07:30 14:44 (36)
13	07:38 16:49	07:08 15:16 (36)	06:22 15:20 (36)	06:26 19:07	05:41 19:46	05:21 20:20	05:33 20:48	06:05 20:15	06:41 19:20	07:16 18:25	06:56 16:41	07:31 14:44 (36)
14	07:38 16:50	07:07 15:16 (36)	06:21 15:21 (36)	06:24 19:09	05:40 19:47	05:21 20:21	05:34 20:49	06:06 20:17	06:42 19:18	07:17 18:24	06:58 16:40	07:32 14:45 (36)
15	07:37 16:51	07:05 15:15 (36)	06:20 15:22 (36)	06:23 19:10	05:39 19:48	05:21 20:23	05:35 20:49	06:07 20:12	06:43 19:16	07:18 18:22	06:59 16:39	07:32 14:45 (36)
16	07:37 16:52	07:04 15:14 (36)	06:19 15:24 (36)	06:21 19:11	05:38 19:49	05:21 20:24	05:35 20:49	06:08 20:10	06:44 19:15	07:20 18:20	07:00 16:38	07:33 14:45 (36)
17	07:36 16:54	07:02 15:15 (36)	06:18 15:26 (36)	06:19 19:12	05:37 19:50	05:21 20:25	05:36 20:50	06:10 20:09	06:45 19:13	07:21 18:19	07:02 16:37	07:34 14:46 (36)
18	07:35 16:55	07:01 15:14 (36)	06:17 15:28 (36)	06:17 19:14	05:36 19:52	05:21 20:26	05:37 20:50	06:11 20:07	06:46 19:11	07:22 18:17	07:03 16:36	07:35 14:47 (36)
19	07:35 16:56	06:59 15:13 (36)	06:16 15:31 (36)	06:16 19:15	05:35 19:53	05:21 20:27	05:38 20:51	06:12 20:06	06:47 19:09	07:23 18:15	07:04 16:35	07:35 14:48 (36)
20	07:34 16:58	06:58 15:14 (36)	06:15 15:35 (36)	06:14 19:16	05:34 19:54	05:21 20:28	05:39 20:51	06:13 20:04	06:49 19:07	07:25 18:14	07:06 16:34	07:36 14:48 (36)
21	07:33 16:59	06:56 15:13 (36)	06:14 15:48 (36)	06:13 19:17	05:33 19:55	05:21 20:29	05:40 20:51	06:14 20:02	06:50 19:05	07:26 18:12	07:07 16:34	07:36 14:48 (36)
22	07:33 17:00	06:54 15:13 (36)	06:13 16:00 (36)	06:11 19:19	05:32 19:56	05:21 20:30	05:41 20:51	06:15 20:01	06:51 19:03	07:27 18:10	07:08 16:35	07:37 14:50 (36)
23	07:32 17:01	06:53 15:13 (36)	06:12 16:01 (36)	06:09 19:20	05:31 19:58	05:22 20:31	05:42 20:52	06:16 20:08	06:52 19:02	07:29 18:09	07:09 16:32	07:37 14:51 (36)
24	07:31 17:03	06:51 15:13 (36)	06:11 16:02 (36)	06:08 19:21	05:30 19:59	05:22 20:32	05:43 20:52	06:18 20:39	06:53 19:56	07:30 18:07	07:11 16:31	07:38 14:51 (36)
25	07:30 17:04	06:50 15:12 (36)	06:10 16:03 (36)	06:06 19:22	05:29 20:00	05:22 20:33	05:44 20:52	06:19 20:39	06:54 19:54	07:31 18:06	07:12 16:31	07:38 14:53 (36)
26	07:29 17:06	06:48 15:12 (36)	06:09 16:04 (36)	06:05 19:24	05:28 20:00	05:22 20:34	05:45 20:52	06:20 20:38	06:56 19:52	07:32 18:04	07:13 16:30	07:39 14:53 (36)
27	07:28 17:07	06:46 15:12 (36)	06:08 16:05 (36)	06:03 19:25	05:28 20:01	05:23 20:35	05:46 20:52	06:21 20:36	06:57 19:51	07:34 18:54	07:14 16:30	07:39 14:54 (36)
28	07:27 17:08	06:45 15:12 (36)	06:07 16:06 (36)	06:02 19:26	05:27 20:03	05:23 20:36	05:47 20:52	06:22 20:35	06:58 19:49	07:35 18:01	07:15 16:29	07:39 14:55 (36)
29	07:26 17:10	06:43 15:12 (36)	06:06 16:07 (36)	06:00 19:27	05:27 20:04	05:24 20:37	05:48 20:52	06:23 20:34	06:59 19:47	07:36 18:00	07:17 16:29	07:39 14:57 (36)
30	07:25 17:11	06:41 15:12 (36)	06:05 16:08 (36)	06:01 19:28	05:26 20:05	05:24 20:38	05:49 20:52	06:24 20:33	07:00 19:46	07:38 18:49	07:18 16:28	07:40 14:58 (36)
31	07:24 17:12	06:40 15:13 (36)	06:04 16:09 (36)	06:00 19:30	05:25 20:05	05:25 20:39	05:50 20:52	06:26 20:32	07:39 19:44	07:39 18:49	07:18 16:28	07:40 14:58 (36)
Potential sun hours	288	293	369	403	457	463	469	434	376	342	290	277
Total, worst case	1153	843								345	1419	254
Sun reduction	0.33	0.39								0.44	0.27	0.25
Oper. time red.	1.00	1.00								1.00	1.00	1.00
Wind dir. red.	0.75	0.75								0.75	0.75	0.75
Total reduction	0.25	0.29								0.33	0.20	0.19
Total, real	285	246								114	287	48

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker
			(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2**

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3/21/2011 3:39 PM / 123

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**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-93 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (55)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36	15:44 (35) 16:06 (35)	07:23 17:14	06:43 17:52	06:47 19:31	05:57 20:06
2	07:40 16:37	15:44 (35) 16:07 (35)	07:22 17:15	06:41 17:53	06:45 19:32	05:56 20:07
3	07:40 16:38	15:44 (35) 16:07 (35)	07:21 17:16	06:40 17:55	06:44 19:33	05:54 20:08
4	07:40 16:39	15:45 (35) 16:08 (35)	07:20 17:18	06:38 17:56	06:42 19:35	05:53 20:10
5	07:40 16:40	15:45 (35) 16:09 (35)	07:19 17:19	06:36 17:57	06:40 19:36	05:51 20:11
6	07:40 16:41	15:46 (35) 16:09 (35)	07:17 17:21	06:34 17:58	06:38 19:37	05:50 20:12
7	07:40 16:42	15:46 (35) 16:09 (35)	07:16 17:22	06:33 18:00	06:36 19:38	05:49 20:13
8	07:39 16:43	15:46 (35) 16:10 (35)	07:15 17:23	06:31 19:01	06:35 19:39	05:47 20:14
9	07:39 16:44	15:47 (35) 16:10 (35)	07:13 17:25	06:29 19:02	06:33 19:41	05:46 20:16
10	07:39 16:45	15:47 (35) 16:10 (35)	07:12 17:26	06:27 19:04	06:31 19:42	05:45 20:17
11	07:39 16:46	15:48 (35) 16:11 (35)	07:11 17:28	06:26 19:05	06:29 19:43	05:44 20:18
12	07:38 16:48	15:49 (35) 16:11 (35)	07:09 17:29	06:24 19:06	06:28 19:44	05:42 20:19
13	07:38 16:49	15:49 (35) 16:11 (35)	07:08 17:30	06:22 19:07	06:26 19:45	05:41 20:20
14	07:37 16:50	15:50 (35) 16:12 (35)	07:07 17:32	06:20 19:09	06:24 19:47	05:40 20:21
15	07:37 16:51	15:50 (35) 16:11 (35)	07:05 17:33	06:18 19:10	06:23 19:48	05:39 20:22
16	07:36 16:52	15:50 (35) 16:11 (35)	07:04 17:35	06:17 19:11	06:21 19:49	05:38 20:24
17	07:36 16:54	15:52 (35) 16:11 (35)	07:02 17:36	06:15 19:12	06:19 19:50	05:37 20:25
18	07:35 16:55	15:53 (35) 16:11 (35)	07:01 17:37	06:13 19:14	06:17 19:52	05:36 20:26
19	07:35 16:56	15:53 (35) 16:10 (35)	06:59 17:39	06:11 19:15	06:16 19:53	05:35 20:27
20	07:34 16:58	15:56 (35) 16:10 (35)	06:58 17:40	06:09 19:16	06:14 19:54	05:34 20:28
21	07:33 16:59	15:57 (35) 16:09 (35)	06:56 17:41	06:07 19:17	06:12 19:55	05:33 20:29
22	07:33 17:00	15:59 (35) 16:07 (35)	06:54 17:43	06:06 19:19	06:11 19:56	05:32 20:30
23	07:32 17:01	16:07 (35)	06:53 17:44	06:09 19:20	06:09 19:58	05:31 20:31
24	07:31 17:03		06:51 17:45	06:08 19:21	06:09 19:59	05:30 20:32
25	07:30 17:04		06:50 17:47	06:06 19:22	06:09 20:00	05:29 20:33
26	07:29 17:05		06:48 17:48	06:05 19:24	06:09 20:00	05:29 20:34
27	07:28 17:07		06:46 17:49	06:03 19:25	06:10 20:01	05:28 20:35
28	07:27 17:08		06:45 17:51	06:01 19:26	06:10 20:02	05:27 20:36
29	07:26 17:10		06:45 19:27	06:00 20:04	06:10 20:04	05:26 20:37
30	07:25 17:11		06:51 19:28	05:58 20:05	06:11 20:05	05:26 20:38
31	07:24 17:12		06:49 19:30	05:57 20:06	06:11 20:06	05:25 20:39
Potential sun hours	288	293	369	403	457	463
Total, worst case	450				648	671
Sun reduction	0.33				0.55	0.59
Oper. time red.	1.00				1.00	1.00
Wind dir. red.	0.74				0.68	0.68
Total reduction	0.25				0.38	0.40
Total, real	112				244	271

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G90\_R2

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3/21/2011 3:39 PM / 124

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(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/18/2011 3:22 PM/2.7.453

### SHADOW - Calendar

Calculation: 05030 SFA Gamesa G90\_R2Shadow receptor: R-93 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (55)

#### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25	06:20 (09) 05:51	06:24 (09) 06:27	07:01	06:40	07:19
	23	06:43 (09) 20:31	06:46 (09) 19:42	18:47	16:56	16:28
2	05:25	06:20 (09) 05:53	06:25 (09) 06:28	07:03	06:42	07:20
	23	06:43 (09) 20:30	06:45 (09) 19:40	18:45	16:54	16:27
3	05:26	06:20 (09) 05:54	06:27 (09) 06:29	07:04	06:43	07:21
	24	06:44 (09) 20:28	06:43 (09) 19:38	18:43	16:53	16:27
4	05:26	06:20 (09) 05:55	06:28 (09) 06:30	07:05	06:44	07:22
	24	06:44 (09) 20:27	06:41 (09) 19:37	18:41	16:51	16:27
5	05:27	06:20 (09) 05:56	06:32 (09) 06:31	07:06	06:46	07:23
	25	06:45 (09) 20:26	06:37 (09) 19:35	18:40	16:50	16:27
6	05:28	06:20 (09) 05:57	06:32	07:07	06:47	07:24
	26	06:46 (09) 20:25	19:33	18:38	16:49	16:26
7	05:28	06:19 (09) 05:58	06:34	07:09	06:48	07:25
	26	06:45 (09) 20:23	19:31	18:36	16:48	16:26
8	05:29	06:19 (09) 05:59	06:35	07:10	06:50	07:26
	27	06:46 (09) 20:22	19:29	18:34	16:46	16:26
9	05:30	06:20 (09) 06:00	06:36	07:11	06:51	07:27
	27	06:47 (09) 20:21	19:28	18:32	16:45	16:26
10	05:30	06:19 (09) 06:02	06:37	07:12	06:52	07:28
	28	06:47 (09) 20:19	19:26	18:31	16:44	16:26
11	05:31	06:19 (09) 06:03	06:38	07:13	06:54	07:29
	28	06:47 (09) 20:18	19:24	18:29	16:43	16:26
12	05:32	06:19 (09) 06:04	06:39	07:15	06:55	07:30
	29	06:48 (09) 20:16	19:22	18:27	16:42	16:26
13	05:33	06:19 (09) 06:05	06:40	07:16	06:56	07:31
	30	06:49 (09) 20:15	19:20	18:25	16:41	16:26
14	05:34	06:19 (09) 06:06	06:42	07:17	06:58	07:32
	30	06:49 (09) 20:13	19:18	18:24	16:40	16:26
15	05:35	06:18 (09) 06:07	06:43	07:18	06:59	07:32
	31	06:49 (09) 20:12	19:16	18:22	16:39	16:27
16	05:35	06:19 (09) 06:08	06:44	07:20	07:00	07:33
	30	06:49 (09) 20:10	19:15	18:20	16:38	16:27
17	05:36	06:19 (09) 06:10	06:45	07:21	07:02	07:34
	30	06:49 (09) 20:09	19:13	18:19	16:37	16:27
18	05:37	06:19 (09) 06:11	06:46	07:22	07:03	07:34
	31	06:50 (09) 20:07	19:11	18:17	16:36	16:27
19	05:38	06:19 (09) 06:12	06:47	07:23	07:04	07:35
	31	06:50 (09) 20:06	19:09	18:15	16:35	16:28
20	05:39	06:19 (09) 06:13	06:49	07:25	07:06	15:34 (35) 07:36
	31	06:50 (09) 20:04	19:07	18:14	16:34	8 15:42 (35) 16:28
21	05:40	06:19 (09) 06:14	06:50	07:26	07:07	15:32 (35) 07:36
	31	06:50 (09) 20:02	19:05	18:12	16:33	12 15:44 (35) 16:29
22	05:41	06:19 (09) 06:15	06:51	07:27	07:08	15:32 (35) 07:37
	31	06:50 (09) 20:01	19:03	18:10	16:33	14 15:46 (35) 16:29
23	05:42	06:20 (09) 06:16	06:52	07:29	07:09	15:31 (35) 07:37
	30	06:50 (09) 19:57	19:02	18:09	16:32	16 15:47 (35) 16:30
24	05:43	06:20 (09) 06:18	06:53	07:30	07:11	15:30 (35) 07:38
	30	06:50 (09) 19:56	19:00	18:07	16:31	18 15:48 (35) 16:30
25	05:44	06:20 (09) 06:19	06:54	07:31	07:12	15:30 (35) 07:38
	30	06:50 (09) 19:54	18:58	18:06	16:31	19 15:49 (35) 16:31
26	05:45	06:20 (09) 06:20	06:55	07:32	07:13	15:30 (35) 07:38
	30	06:50 (09) 19:52	18:56	18:04	16:30	20 15:50 (35) 16:31
27	05:46	06:21 (09) 06:21	06:57	07:34	07:14	15:29 (35) 07:39
	29	06:50 (09) 19:51	18:54	18:03	16:30	21 15:50 (35) 16:32
28	05:47	06:21 (09) 06:22	06:58	07:35	07:15	15:29 (35) 07:39
	28	06:49 (09) 19:49	18:52	18:01	16:29	22 15:51 (35) 16:33
29	05:48	06:22 (09) 06:23	06:59	07:36	07:17	15:30 (35) 07:39
	27	06:49 (09) 19:47	18:50	18:00	16:29	22 15:52 (35) 16:34
30	05:49	06:22 (09) 06:24	07:00	07:38	07:18	15:30 (35) 07:40
	26	06:48 (09) 19:46	18:49	17:58	16:28	23 15:53 (35) 16:34
31	05:50	06:23 (09) 06:26	07:03	07:39	07:40	15:30 (35) 07:40
	24	06:47 (09) 19:44	18:47	17:57	16:27	22 16:05 (35)
Potential sun hours	469	434	376	342	290	277
Total, worst case	870	76			195	682
Sun reduction	0.63	0.59			0.27	0.25
Oper. time red.	1.00	1.00			1.00	1.00
Wind dir. red.	0.68	0.68			0.74	0.74
Total reduction	0.43	0.40			0.20	0.19
Total, real	376	31			40	128

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:31 PM / 1

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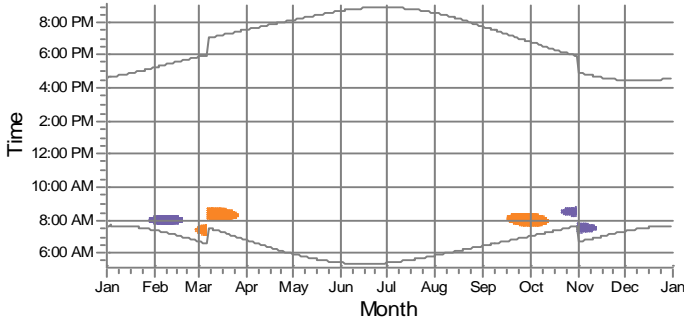
Calculated:

3/21/2011 11:14 AM/2.7.453

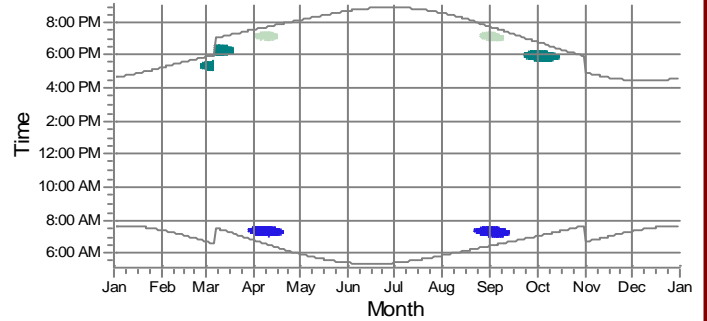
## SHADOW - Calendar, graphical

Calculation: 05030 SFA Gamesa G97\_R2

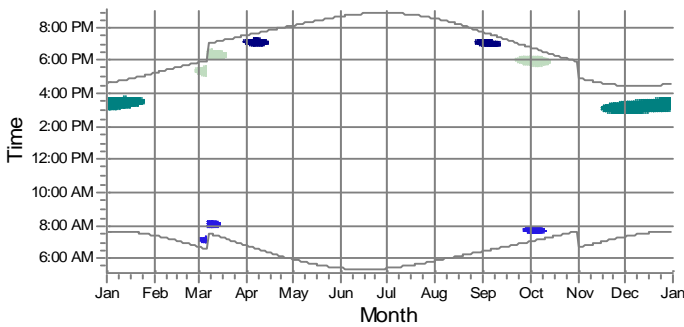
R-100: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (383)



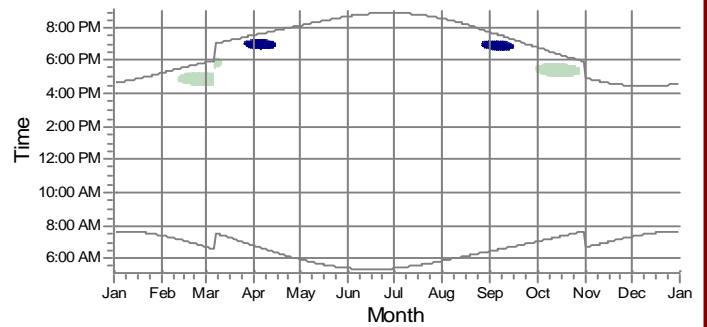
R-105: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (61)



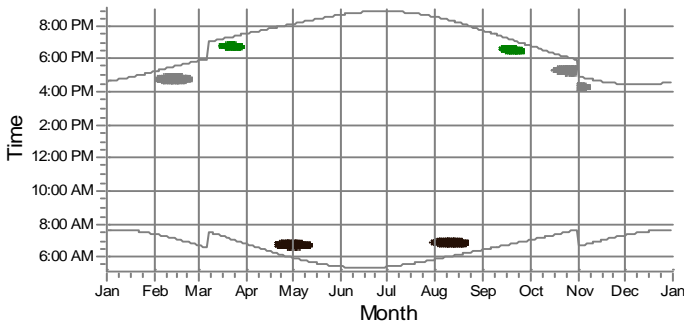
R-106: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (62)



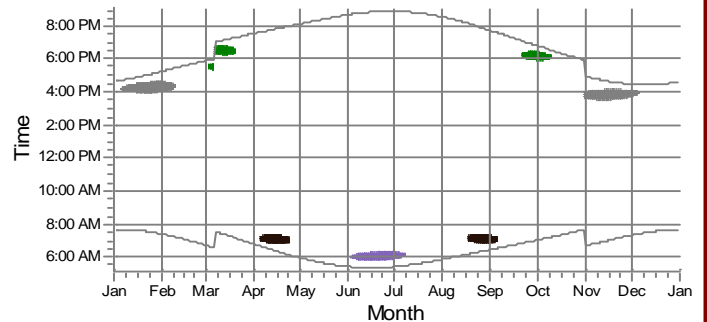
R-107: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (315)



R-111: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (366)



R-112: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (365)



WTGs

- |  |   |   |   |
|--|---|---|---|
| 01: GAMESA G97 2000 97.0 IOI hub: 90.0 m (1) | 10: GAMESA G97 2000 97.0 IOI hub: 90.0 m (7)  | 15: GAMESA G97 2000 97.0 IOI hub: 90.0 m (38) | 50: GAMESA G97 2000 97.0 IOI hub: 90.0 m (50) |
| 02: GAMESA G97 2000 97.0 IOI hub: 90.0 m (4) | 11: GAMESA G97 2000 97.0 IOI hub: 90.0 m (15) | 16: GAMESA G97 2000 97.0 IOI hub: 90.0 m (39) |   |
| 17: GAMESA G97 2000 97.0 IOI hub: 90.0 m (6) | 49: GAMESA G97 2000 97.0 IOI hub: 90.0 m (25) | 28: GAMESA G97 2000 97.0 IOI hub: 90.0 m (42) |   |

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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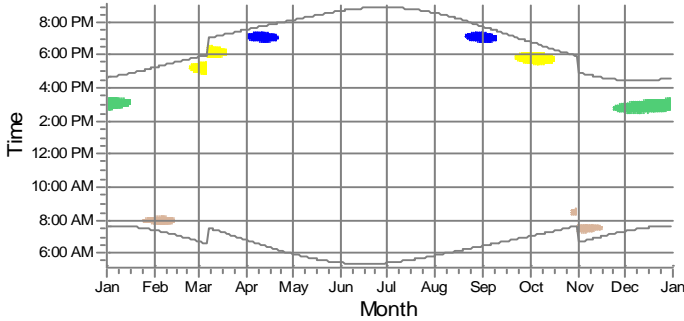
Calculated:

3/21/2011 11:14 AM/2.7.453

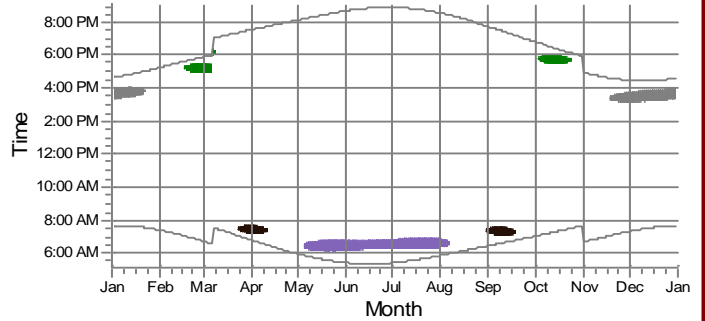
**SHADOW - Calendar, graphical**

Calculation: 05030 SFA Gamesa G97\_R2

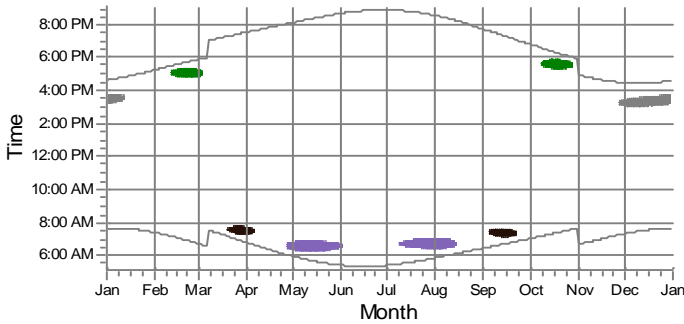
R-113: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (327)



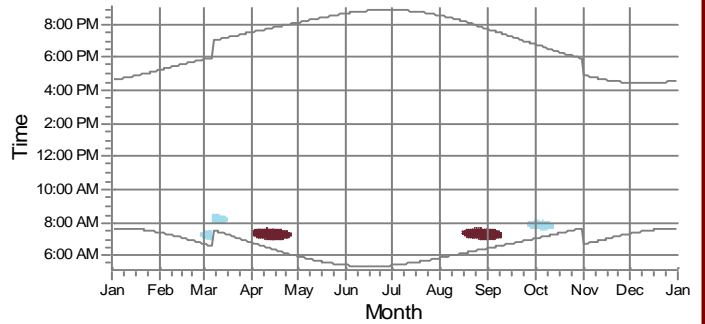
R-115: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (388)



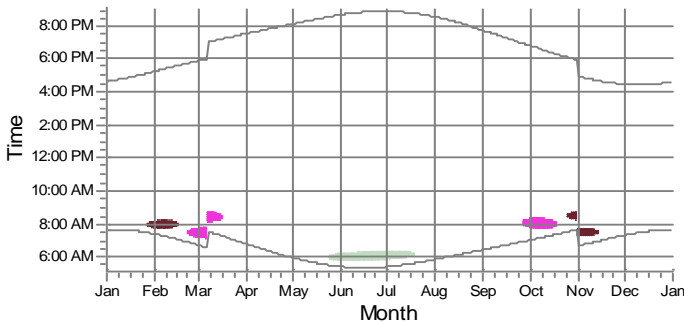
R-116: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (63)



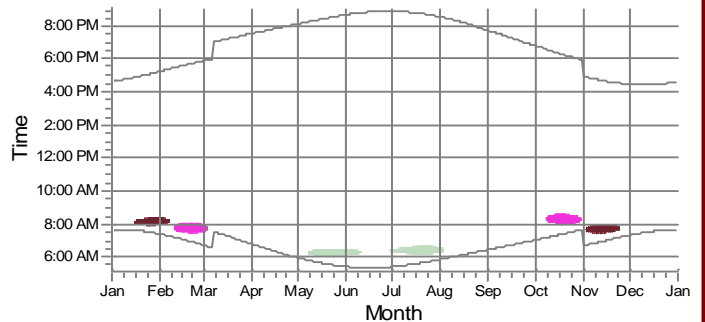
R-119: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (301)



R-120: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (334)



R-121: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (64)



WTGs

- |  |   |   |   |
|--|---|---|---|
| 01: GAMESA G97 2000 97.0 IOI hub: 90.0 m (1) | 02: GAMESA G97 2000 97.0 IOI hub: 90.0 m (4)  | 05: GAMESA G97 2000 97.0 IOI hub: 90.0 m (32) | 14: GAMESA G97 2000 97.0 IOI hub: 90.0 m (37) |
| 04: GAMESA G97 2000 97.0 IOI hub: 90.0 m (2) | 11: GAMESA G97 2000 97.0 IOI hub: 90.0 m (15) | 12: GAMESA G97 2000 97.0 IOI hub: 90.0 m (35) | 15: GAMESA G97 2000 97.0 IOI hub: 90.0 m (38) |
| 03: GAMESA G97 2000 97.0 IOI hub: 90.0 m (3) | 48: GAMESA G97 2000 97.0 IOI hub: 90.0 m (19) | 13: GAMESA G97 2000 97.0 IOI hub: 90.0 m (36) | 16: GAMESA G97 2000 97.0 IOI hub: 90.0 m (39) |

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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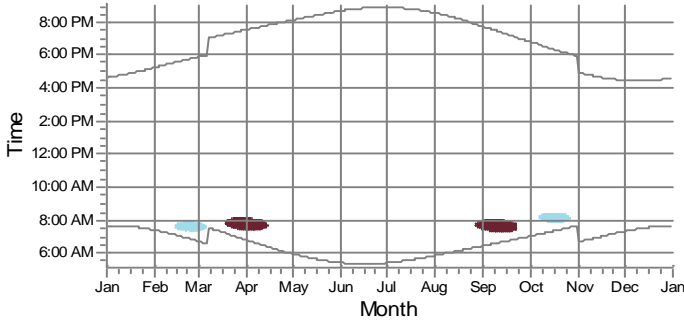
Calculated:

3/21/2011 11:14 AM/2.7.453

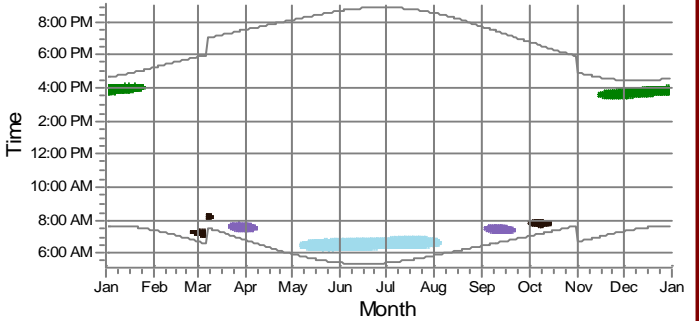
SHADOW - Calendar, graphical

Calculation: 05030 SFA Gamesa G97\_R2

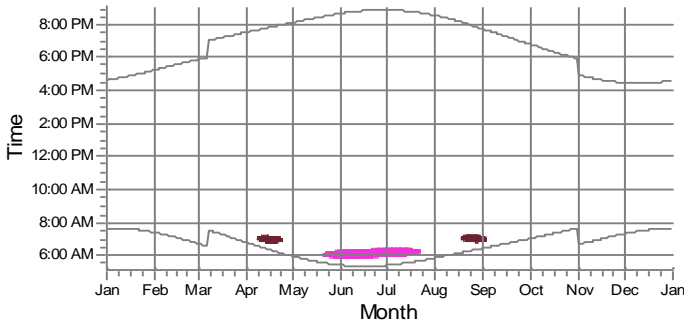
R-123: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (332)



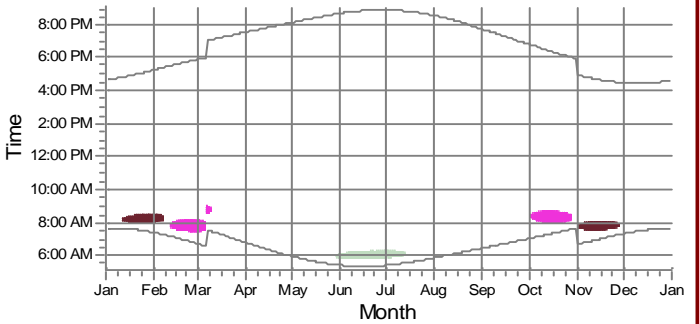
R-124: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (66)



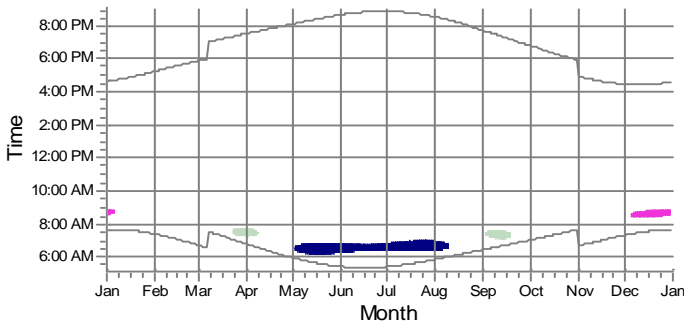
R-126: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (331)



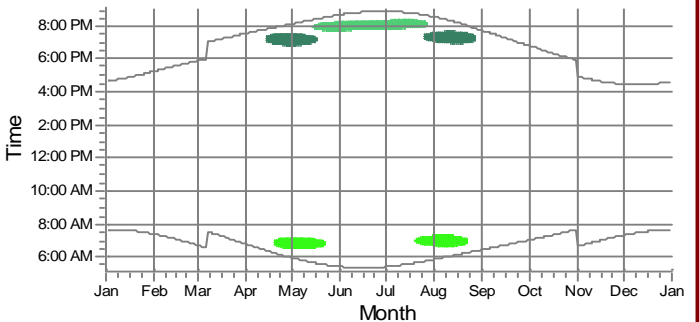
R-127: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (67)














R-128: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (68)



R-132: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (71)



WTGs

- |   |   |   |   |
|---|---|---|---|
|  01: GAMESA G97 2000 97.0 IOI hub: 90.0 m (1)  |  41: GAMESA G97 2000 97.0 IOI hub: 90.0 m (20) |  12: GAMESA G97 2000 97.0 IOI hub: 90.0 m (35) |  15: GAMESA G97 2000 97.0 IOI hub: 90.0 m (38) |
|  10: GAMESA G97 2000 97.0 IOI hub: 90.0 m (7)  |  05: GAMESA G97 2000 97.0 IOI hub: 90.0 m (32) |  13: GAMESA G97 2000 97.0 IOI hub: 90.0 m (36) |  16: GAMESA G97 2000 97.0 IOI hub: 90.0 m (39) |
|  11: GAMESA G97 2000 97.0 IOI hub: 90.0 m (15) |  06: GAMESA G97 2000 97.0 IOI hub: 90.0 m (33) |  14: GAMESA G97 2000 97.0 IOI hub: 90.0 m (37) |   |

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05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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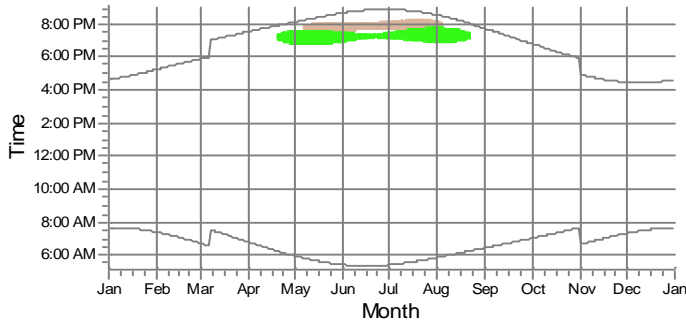
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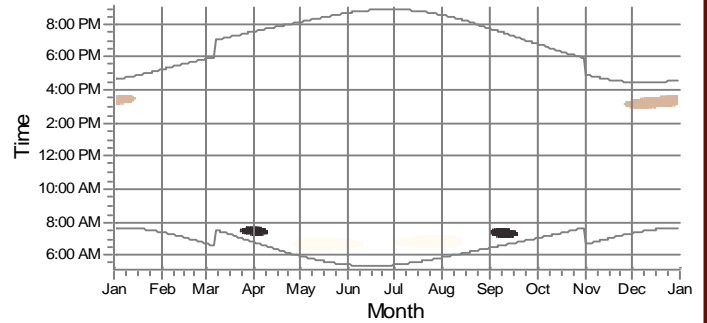
## SHADOW - Calendar, graphical

Calculation: 05030 SFA Gamesa G97\_R2

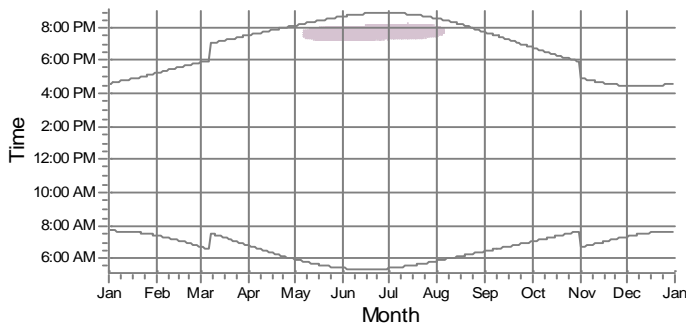
R-137: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (76)



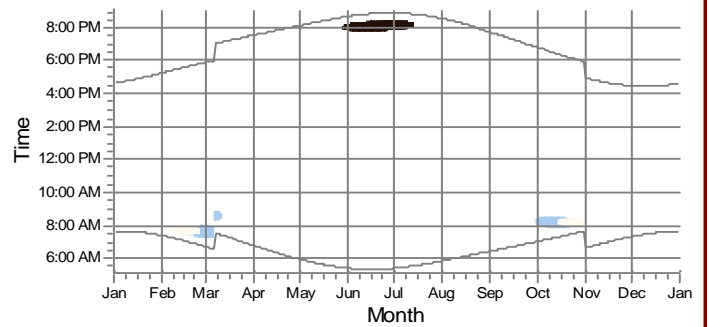
R-139: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (78)



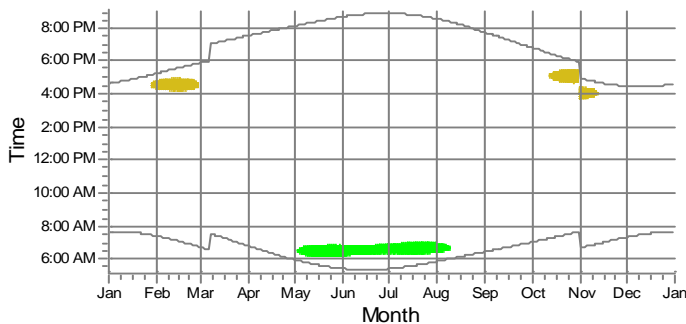
R-14: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (11)



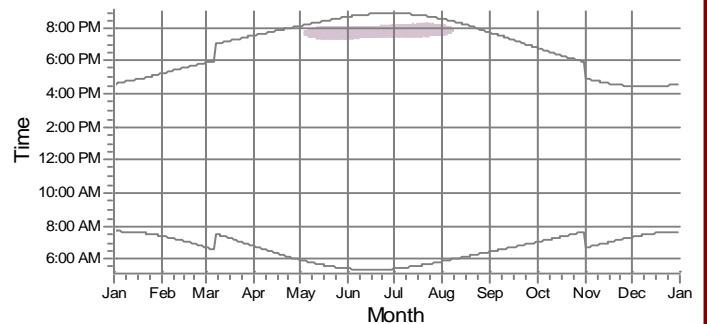
R-141: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (79)



R-147: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (83)



R-15: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (12)



WTGs

 29: GAMESA G97 2000 97.0 IO! hub: 90.0 m (9)	 48: GAMESA G97 2000 97.0 IO! hub: 90.0 m (19)	 18: GAMESA G97 2000 97.0 IO! hub: 90.0 m (34)
 19: GAMESA G97 2000 97.0 IO! hub: 90.0 m (16)	 41: GAMESA G97 2000 97.0 IO! hub: 90.0 m (20)	 16: GAMESA G97 2000 97.0 IO! hub: 90.0 m (39)
 20: GAMESA G97 2000 97.0 IO! hub: 90.0 m (17)	 46: GAMESA G97 2000 97.0 IO! hub: 90.0 m (27)	 21: GAMESA G97 2000 97.0 IO! hub: 90.0 m (40)

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**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:31 PM / 5

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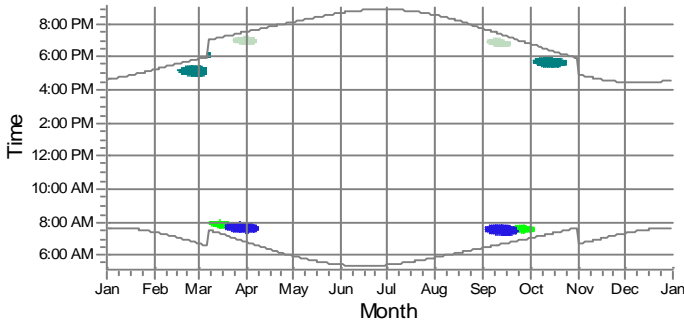
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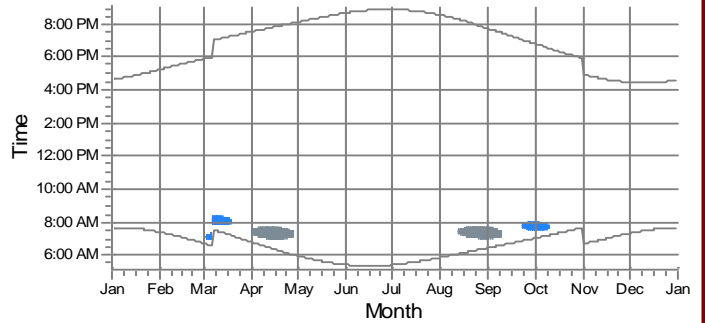
**SHADOW - Calendar, graphical**

Calculation: 05030 SFA Gamesa G97\_R2

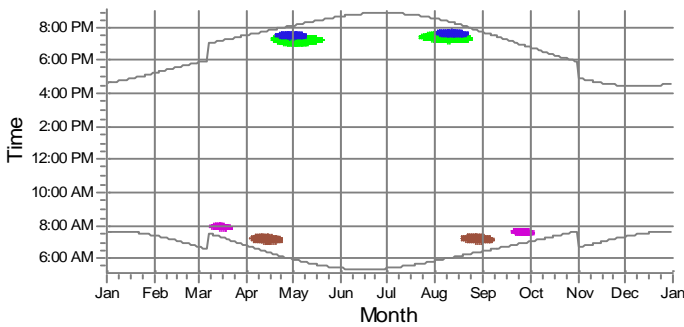
R-151: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (316)



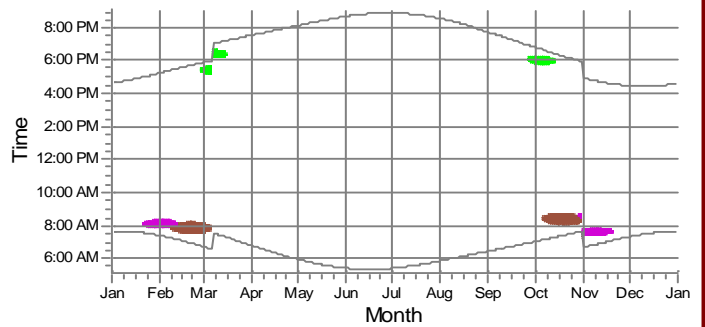
R-161: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (321)



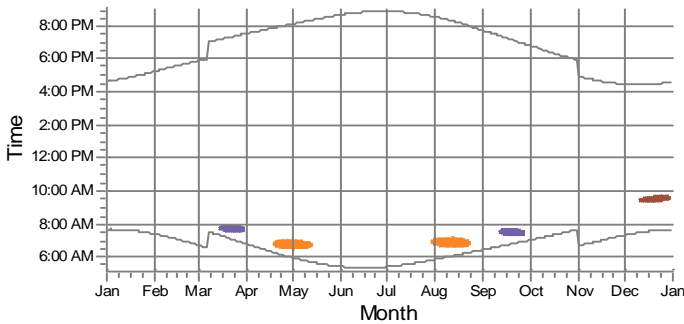
R-163: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (382)



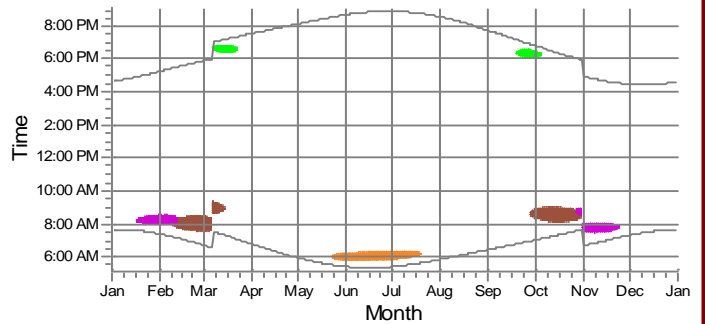
R-165: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (92)



R-166: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (93)



R-167: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (94)



WTGs

- |   |   |   |   |
|---|---|---|---|
| 17: GAMESA G97 2000 97.0 IOI hub: 90.0 m (6)  | 49: GAMESA G97 2000 97.0 IOI hub: 90.0 m (25) | 33: GAMESA G97 2000 97.0 IOI hub: 90.0 m (45) | 50: GAMESA G97 2000 97.0 IOI hub: 90.0 m (50) |
| 29: GAMESA G97 2000 97.0 IOI hub: 90.0 m (9)  | 28: GAMESA G97 2000 97.0 IOI hub: 90.0 m (42) | 38: GAMESA G97 2000 97.0 IOI hub: 90.0 m (46) |   |
| 11: GAMESA G97 2000 97.0 IOI hub: 90.0 m (15) | 32: GAMESA G97 2000 97.0 IOI hub: 90.0 m (44) | 39: GAMESA G97 2000 97.0 IOI hub: 90.0 m (47) |   |



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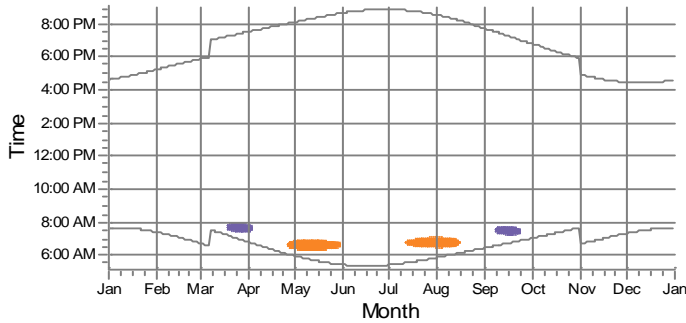
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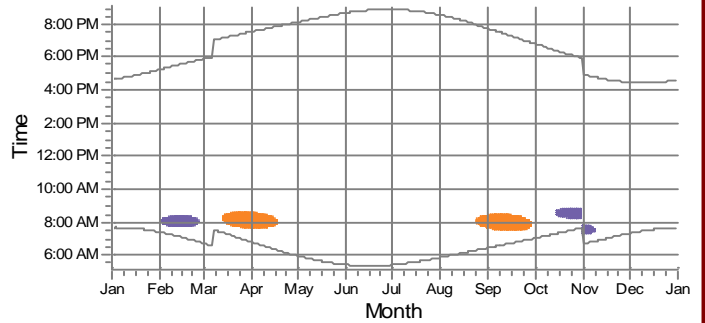
## SHADOW - Calendar, graphical

Calculation: 05030 SFA Gamesa G97\_R2

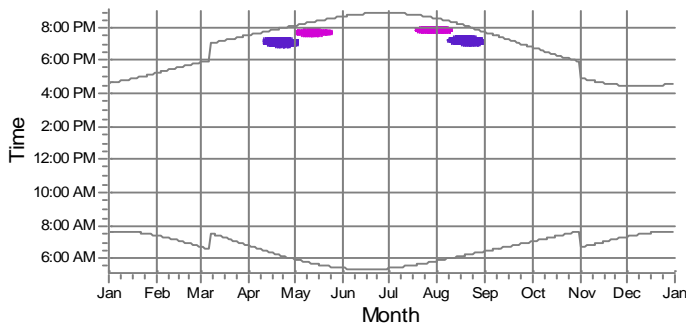
R-168: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (95)



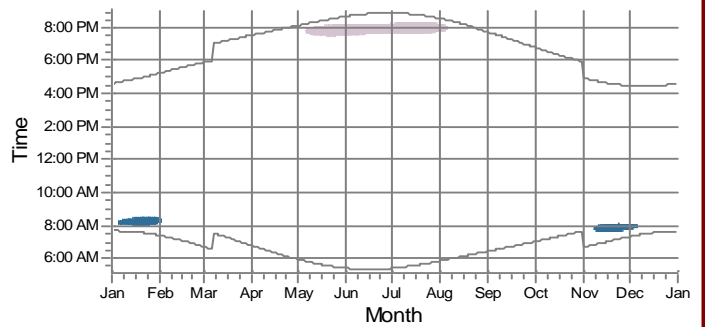
R-169: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (384)



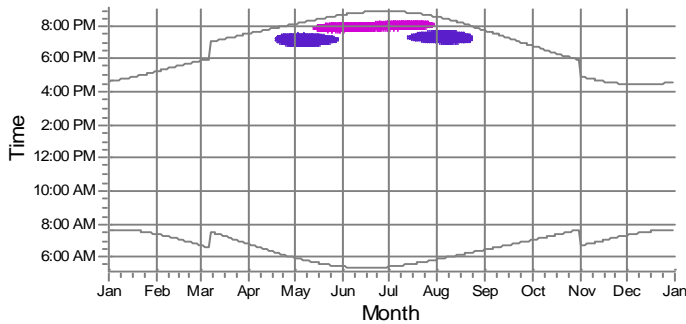
R-179: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (102)



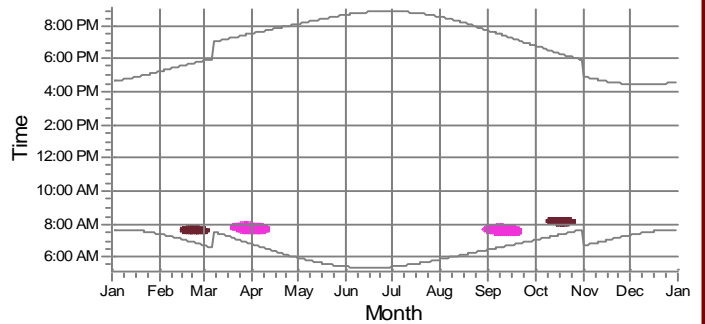
R-18: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (15)











R-182: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (103)



R-183: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (333)



WTGs

- |   |   |   |   |
|---|---|---|---|
|  52: GAMESA G97 2000 97.0 IOI hub: 90.0 m (24) |  46: GAMESA G97 2000 97.0 IOI hub: 90.0 m (27) |  13: GAMESA G97 2000 97.0 IOI hub: 90.0 m (36) |  40: GAMESA G97 2000 97.0 IOI hub: 90.0 m (48) |
|  49: GAMESA G97 2000 97.0 IOI hub: 90.0 m (25) |  12: GAMESA G97 2000 97.0 IOI hub: 90.0 m (35) |  39: GAMESA G97 2000 97.0 IOI hub: 90.0 m (47) |  50: GAMESA G97 2000 97.0 IOI hub: 90.0 m (50) |

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**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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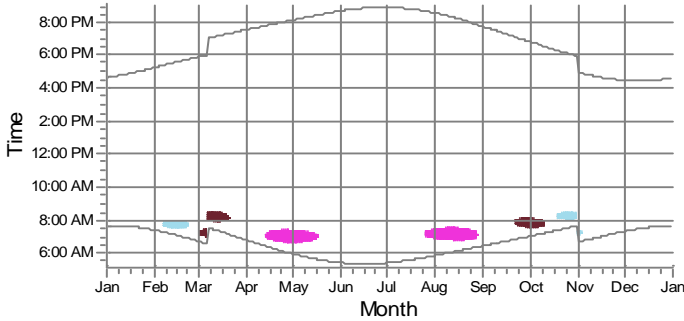
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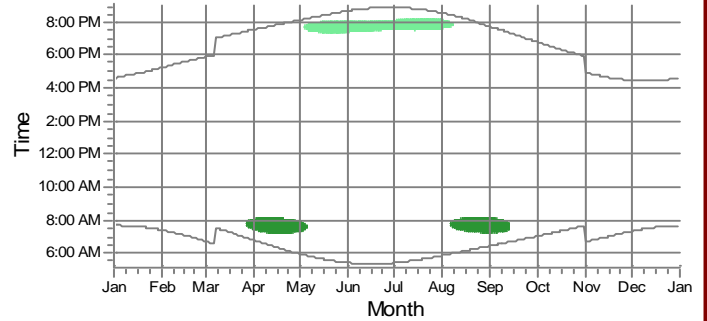
**SHADOW - Calendar, graphical**

Calculation: 05030 SFA Gamesa G97\_R2

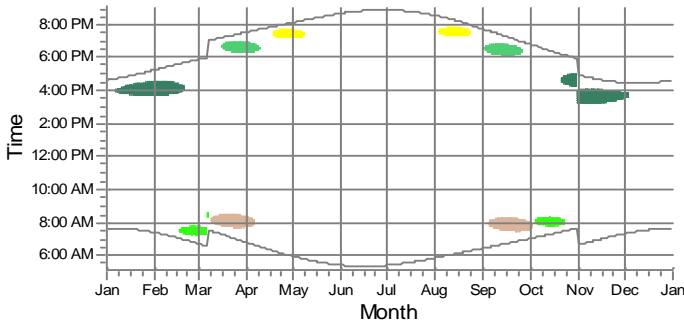
R-184: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (104)



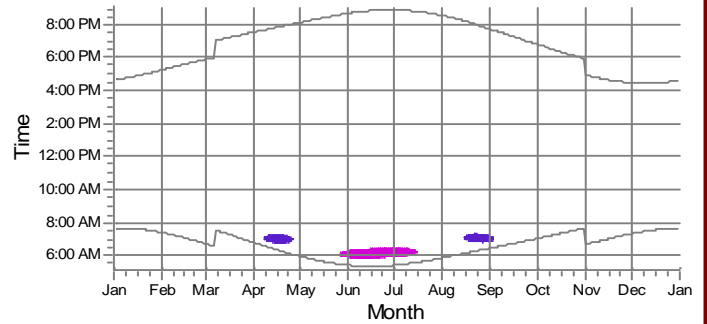
R-19: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (16)



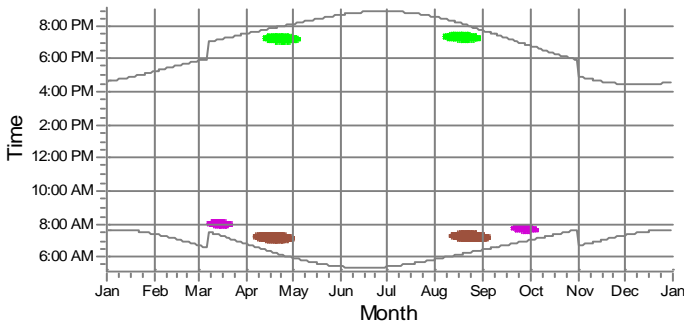
R-190: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (110)



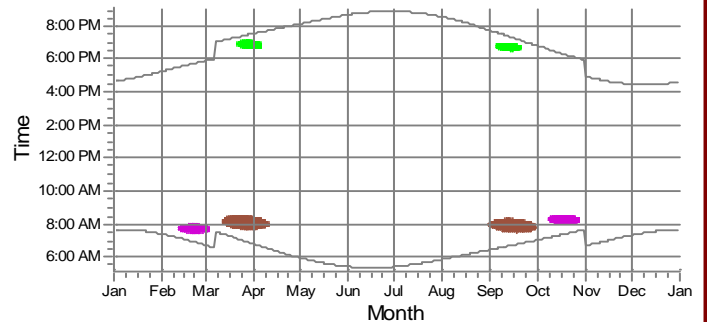
R-191: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (381)

















R-192: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (111)



R-193: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (112)



WTGs

- |   |   |   |   |
|---|---|---|---|
|  04: GAMESA G97 2000 97.0 IOI hub: 90.0 m (2)  |  54: GAMESA G97 2000 97.0 IOI hub: 90.0 m (28) |  12: GAMESA G97 2000 97.0 IOI hub: 90.0 m (35) |  39: GAMESA G97 2000 97.0 IOI hub: 90.0 m (47) |
|  29: GAMESA G97 2000 97.0 IOI hub: 90.0 m (9)  |  55: GAMESA G97 2000 97.0 IOI hub: 90.0 m (29) |  13: GAMESA G97 2000 97.0 IOI hub: 90.0 m (36) |  40: GAMESA G97 2000 97.0 IOI hub: 90.0 m (48) |
|  48: GAMESA G97 2000 97.0 IOI hub: 90.0 m (19) |  05: GAMESA G97 2000 97.0 IOI hub: 90.0 m (32) |  14: GAMESA G97 2000 97.0 IOI hub: 90.0 m (37) |   |
|  41: GAMESA G97 2000 97.0 IOI hub: 90.0 m (20) |  06: GAMESA G97 2000 97.0 IOI hub: 90.0 m (33) |  38: GAMESA G97 2000 97.0 IOI hub: 90.0 m (46) |   |

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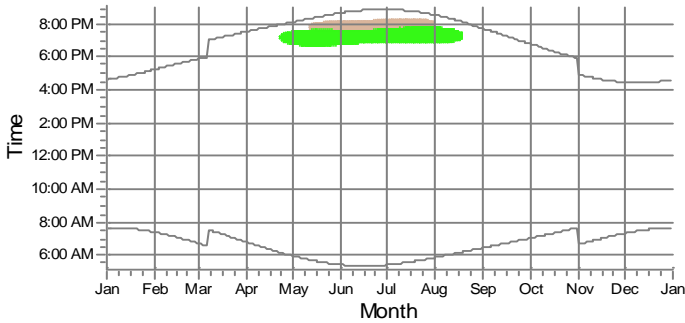
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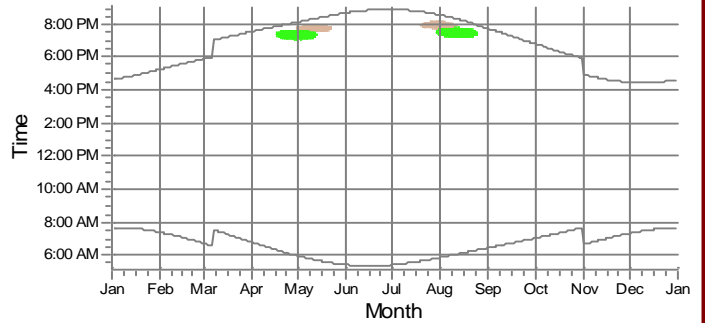
## SHADOW - Calendar, graphical

Calculation: 05030 SFA Gamesa G97\_R2

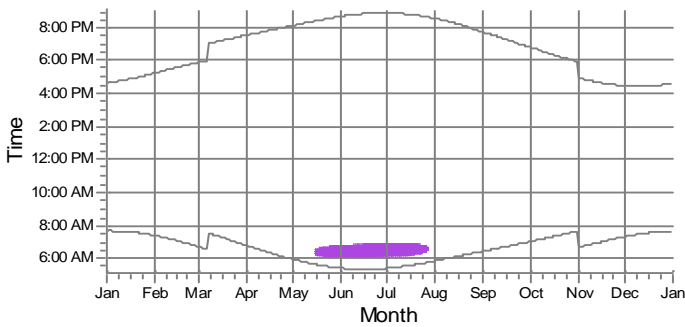
R-242: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (147)



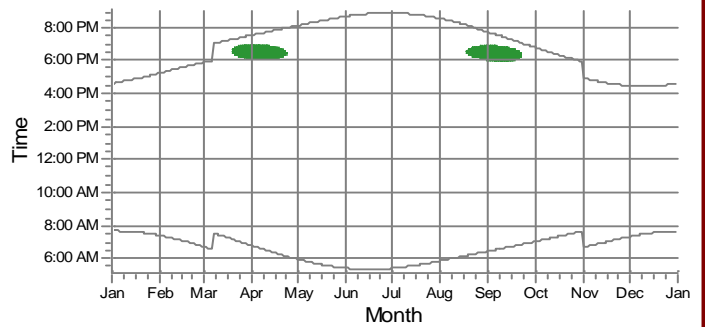
R-243: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (367)



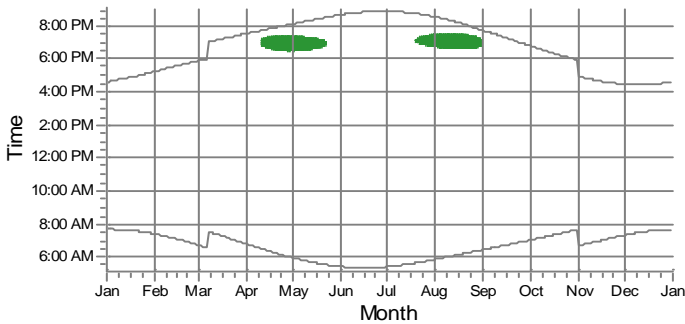
R-319: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (216)



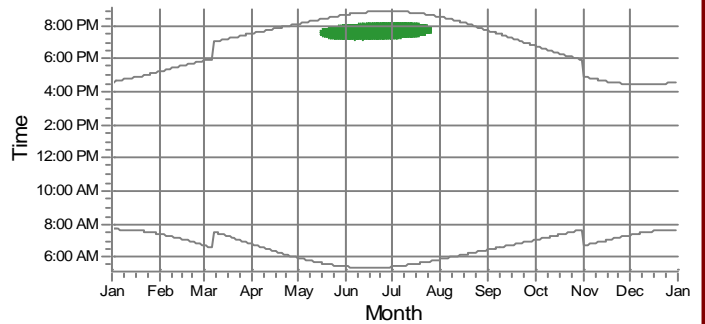
R-35: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (357)



R-36: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (24)



R-38: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (356)



WTGs

48: GAMESA G97 2000 97.0 IOI hub: 90.0 m (19)    41: GAMESA G97 2000 97.0 IOI hub: 90.0 m (20)    55: GAMESA G97 2000 97.0 IOI hub: 90.0 m (29)    09: GAMESA G97 2000 97.0 IOI hub: 90.0 m (49)

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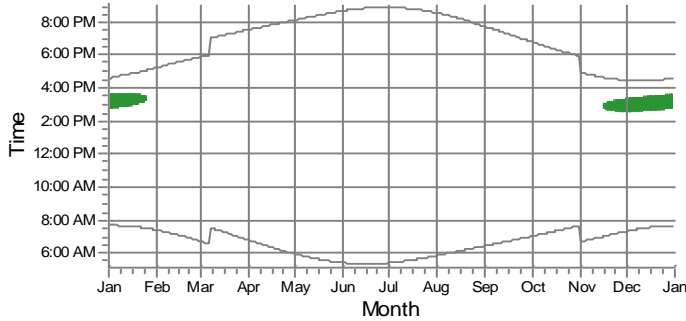
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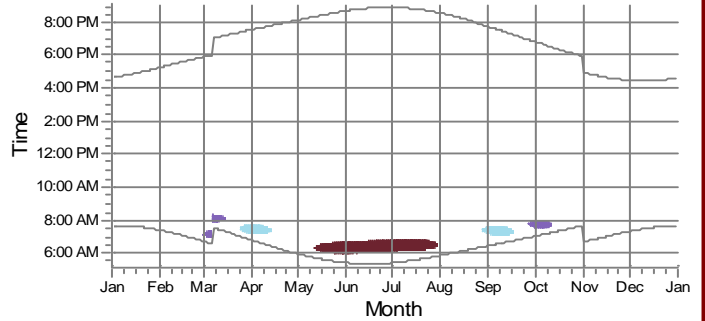
## SHADOW - Calendar, graphical

Calculation: 05030 SFA Gamesa G97\_R2

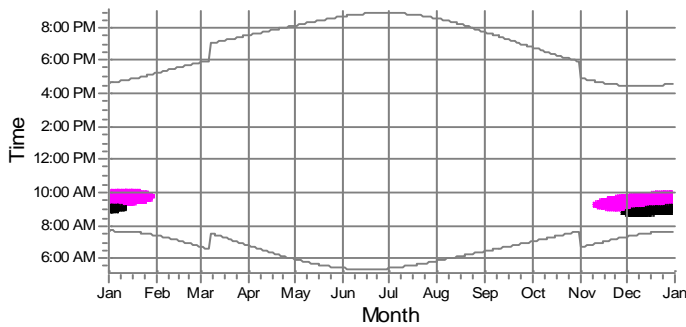
R-4: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (4)



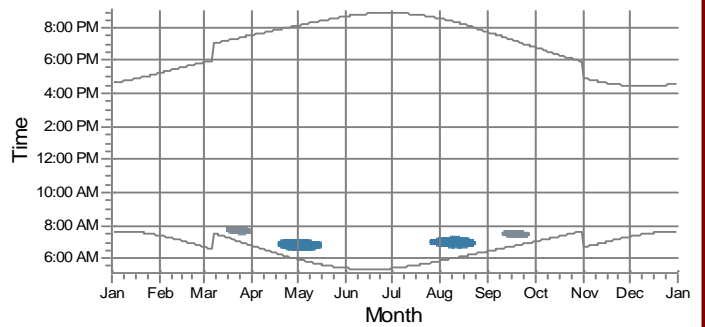
R-402: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (302)



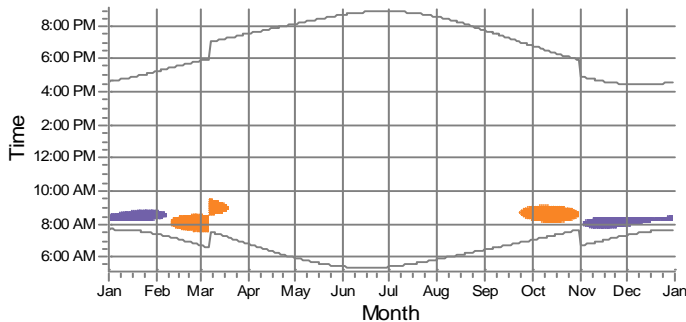
R-403: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (303)



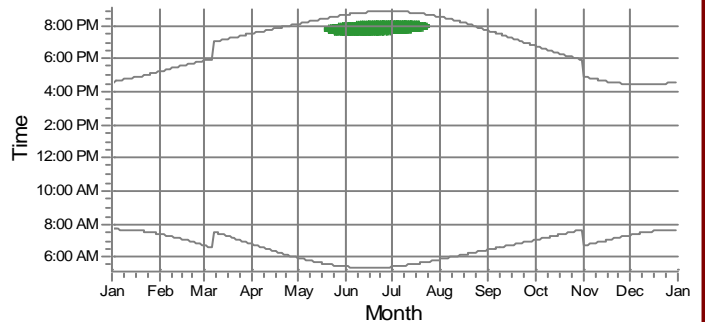
R-405: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (305)













R-409: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (308)



R-41: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (355)



WTGs

- |   |   |   |   |
|---|---|---|---|
|  07: GAMESA G97 2000 97.0 IOI hub: 90.0 m (5)  |  55: GAMESA G97 2000 97.0 IOI hub: 90.0 m (29) |  15: GAMESA G97 2000 97.0 IOI hub: 90.0 m (38) |  50: GAMESA G97 2000 97.0 IOI hub: 90.0 m (50) |
|  08: GAMESA G97 2000 97.0 IOI hub: 90.0 m (14) |  13: GAMESA G97 2000 97.0 IOI hub: 90.0 m (36) |  31: GAMESA G97 2000 97.0 IOI hub: 90.0 m (43) |   |
|  49: GAMESA G97 2000 97.0 IOI hub: 90.0 m (25) |  14: GAMESA G97 2000 97.0 IOI hub: 90.0 m (37) |  32: GAMESA G97 2000 97.0 IOI hub: 90.0 m (44) |   |

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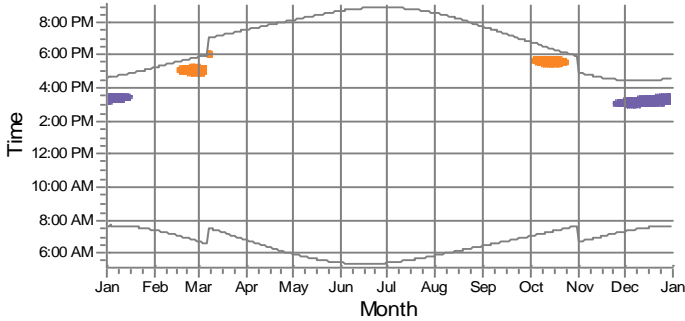
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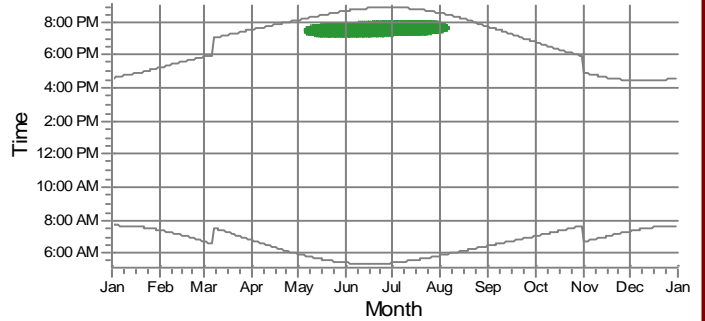
## SHADOW - Calendar, graphical

Calculation: 05030 SFA Gamesa G97\_R2

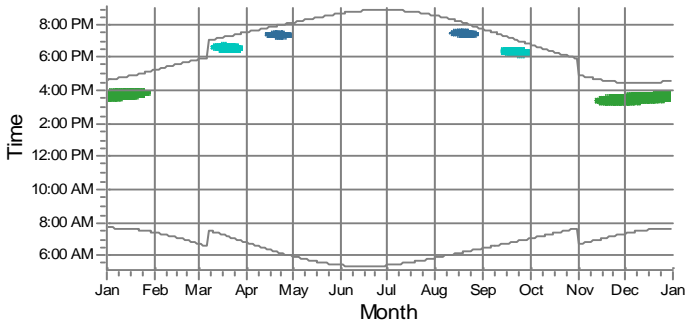
R-410: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (309)



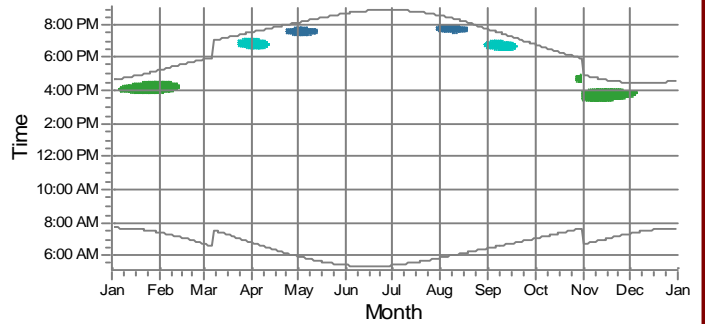
R-42: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (27)



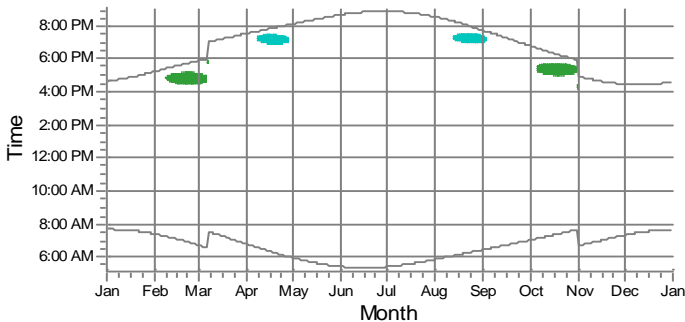
R-44: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (353)



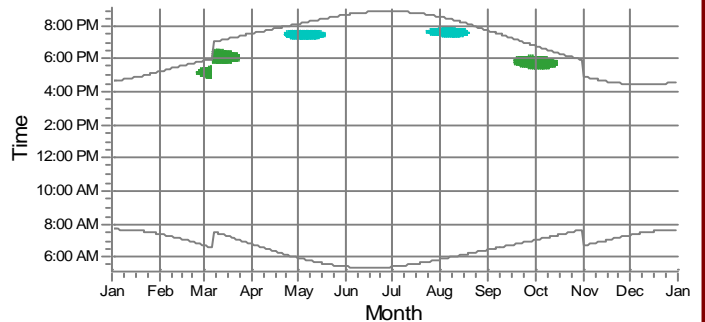
R-45: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (29)



R-46: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (30)



R-48: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (352)



WTGs

- |   |   |   |
|---|---|---|
|  47: GAMESA G97 2000 97.0 IOI hub: 90.0 m (22) |  52: GAMESA G97 2000 97.0 IOI hub: 90.0 m (24) |  55: GAMESA G97 2000 97.0 IOI hub: 90.0 m (29) |
|  53: GAMESA G97 2000 97.0 IOI hub: 90.0 m (23) |  49: GAMESA G97 2000 97.0 IOI hub: 90.0 m (25) |  50: GAMESA G97 2000 97.0 IOI hub: 90.0 m (50) |

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05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:31 PM / 11

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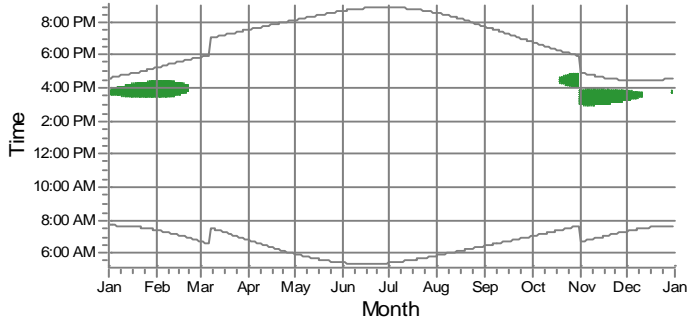
Calculated:

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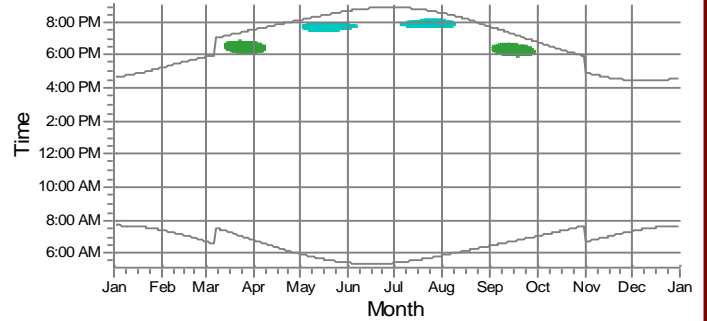
## SHADOW - Calendar, graphical

Calculation: 05030 SFA Gamesa G97\_R2

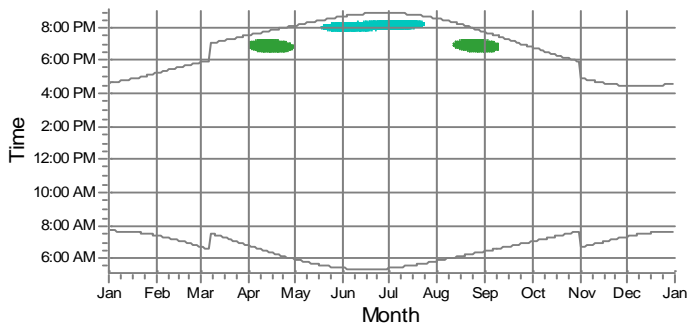
R-5: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (5)



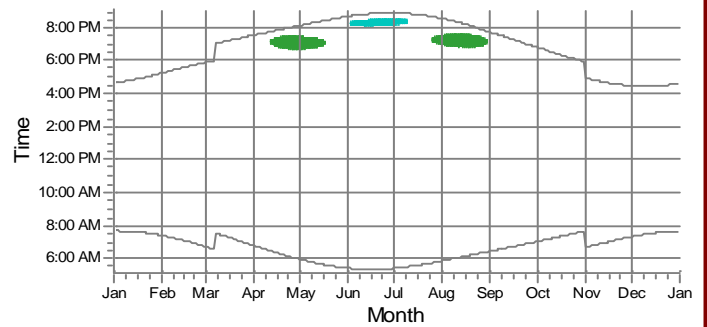
R-51: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (32)



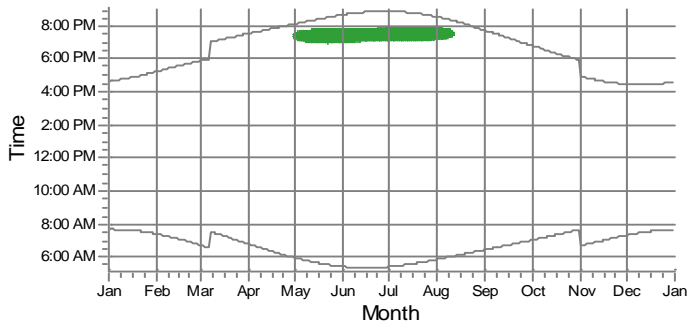
R-52: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (33)



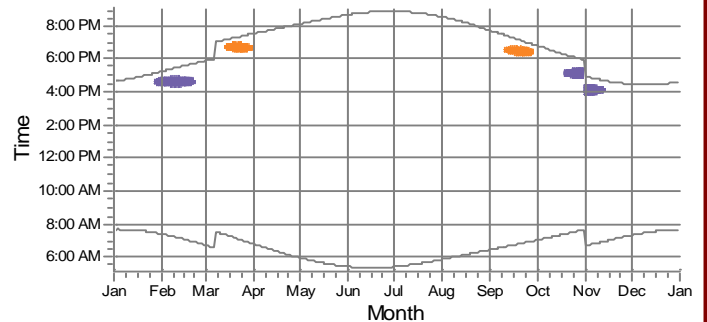
R-53: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (34)



R-54: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (35)



R-59: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (37)



WTGs

- 47: GAMESA G97 2000 97.0 IOI hub: 90.0 m (22)
- 49: GAMESA G97 2000 97.0 IOI hub: 90.0 m (25)
- 50: GAMESA G97 2000 97.0 IOI hub: 90.0 m (50)
- 53: GAMESA G97 2000 97.0 IOI hub: 90.0 m (23)
- 55: GAMESA G97 2000 97.0 IOI hub: 90.0 m (29)

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05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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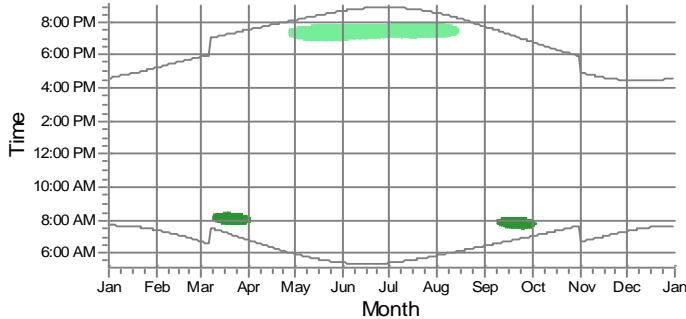
Calculated:

3/21/2011 11:14 AM/2.7.453

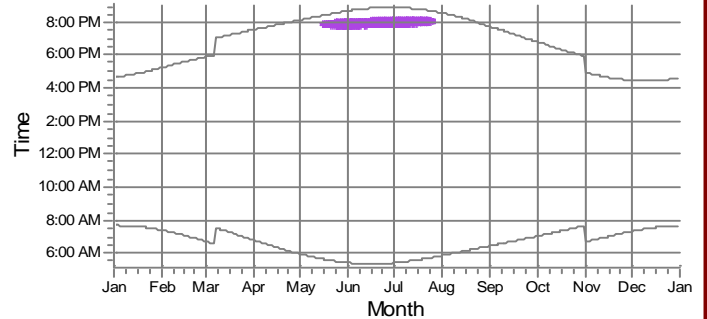
## SHADOW - Calendar, graphical

Calculation: 05030 SFA Gamesa G97\_R2

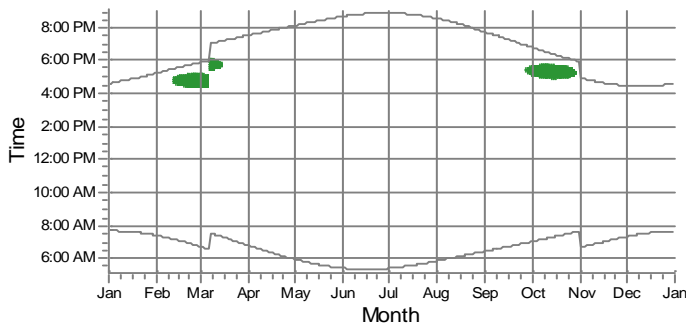
R-6: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (359)



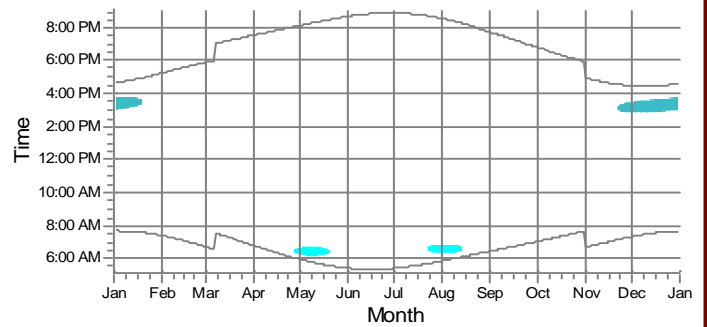
R-68: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (44)



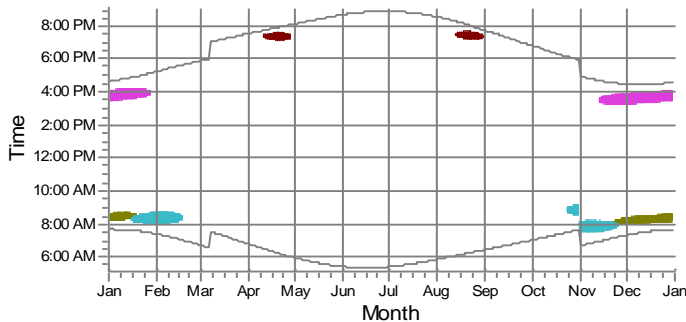
R-7: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (6)



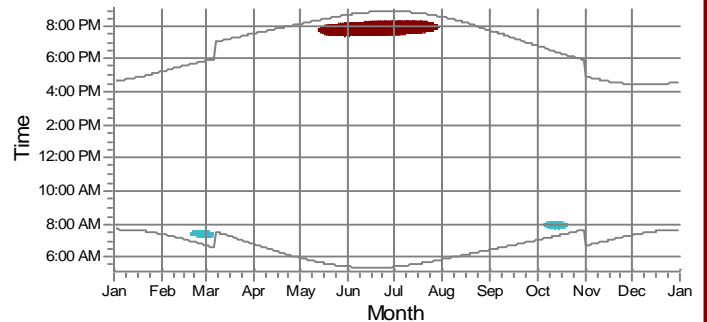
R-73: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (340)











R-74: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (338)



R-76: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (282)



WTGs

- |   |   |   |   |
|---|---|---|---|
|  24: GAMESA G97 2000 97.0 IOI hub: 90.0 m (8)  |  45: GAMESA G97 2000 97.0 IOI hub: 90.0 m (13) |  54: GAMESA G97 2000 97.0 IOI hub: 90.0 m (28) |  25: GAMESA G97 2000 97.0 IOI hub: 90.0 m (41) |
|  35: GAMESA G97 2000 97.0 IOI hub: 90.0 m (10) |  36: GAMESA G97 2000 97.0 IOI hub: 90.0 m (21) |  55: GAMESA G97 2000 97.0 IOI hub: 90.0 m (29) |  09: GAMESA G97 2000 97.0 IOI hub: 90.0 m (49) |

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05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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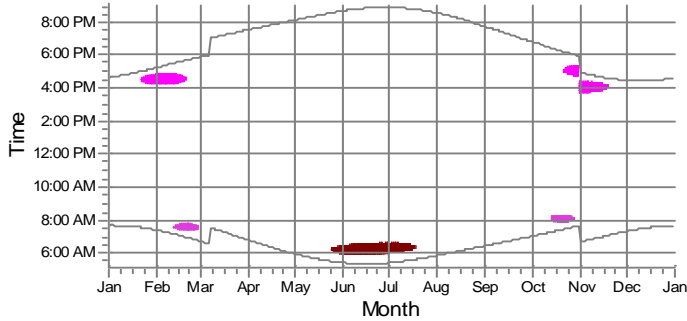
Calculated:

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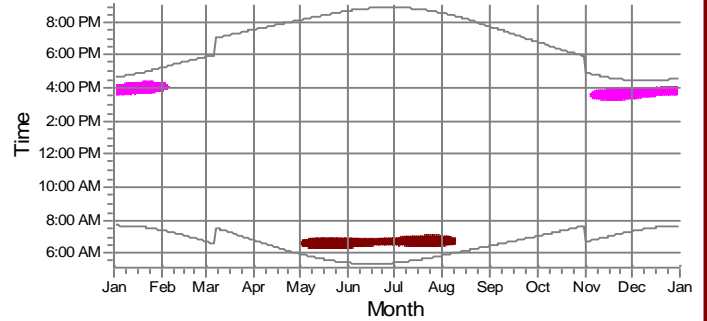
## SHADOW - Calendar, graphical

Calculation: 05030 SFA Gamesa G97\_R2

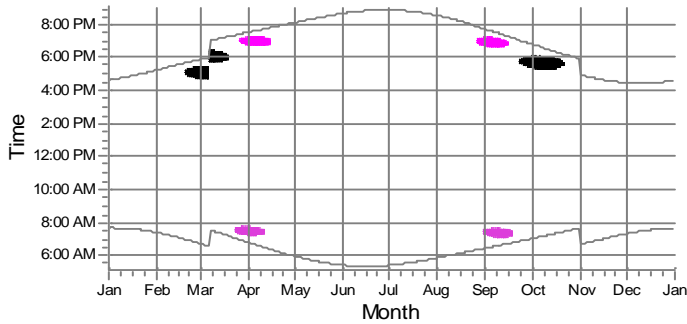
R-78: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (46)



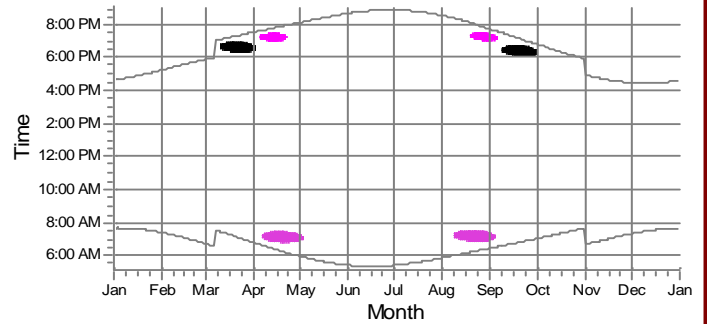
R-79: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (47)



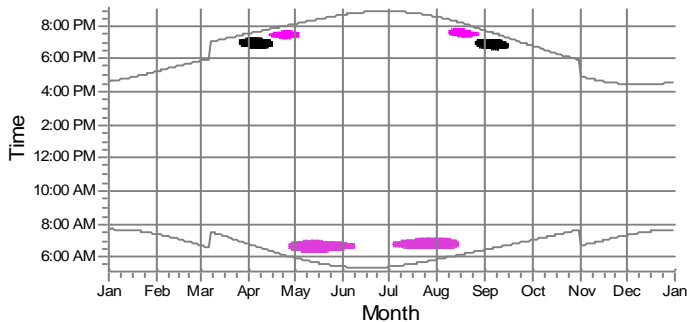
R-83: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (49)



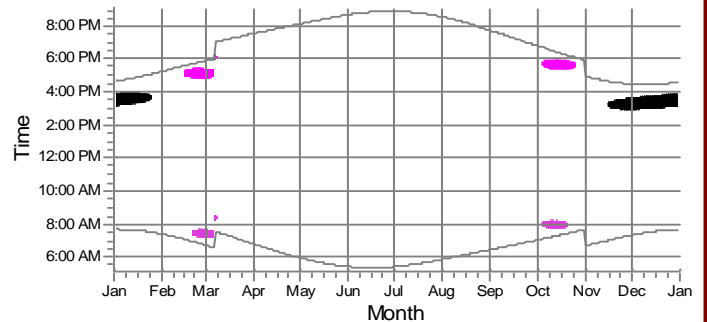
R-84: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (50)



R-85: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (51)



R-87: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (313)



WTGs

07: GAMESA G97 2000 97.0 IOI hub: 90.0 m (5)      24: GAMESA G97 2000 97.0 IOI hub: 90.0 m (8)      08: GAMESA G97 2000 97.0 IOI hub: 90.0 m (14)      25: GAMESA G97 2000 97.0 IOI hub: 90.0 m (41)



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05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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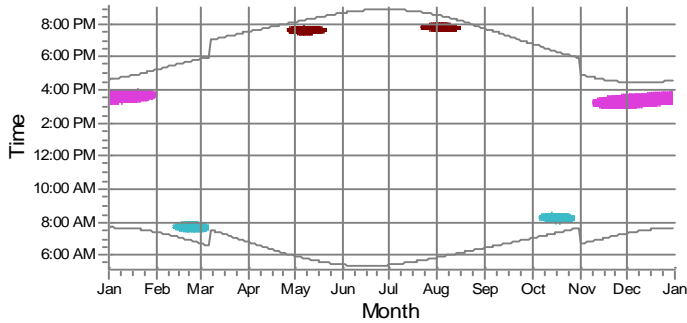
Calculated:

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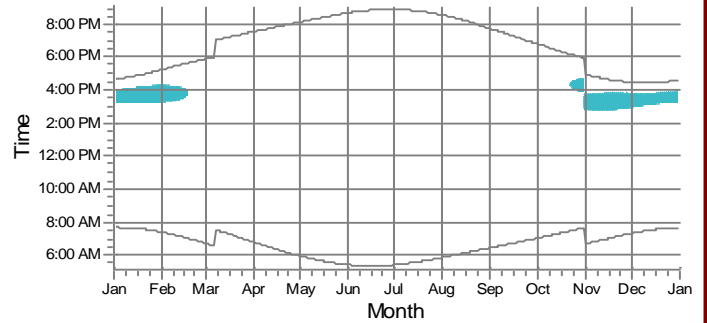
## SHADOW - Calendar, graphical

Calculation: 05030 SFA Gamesa G97\_R2

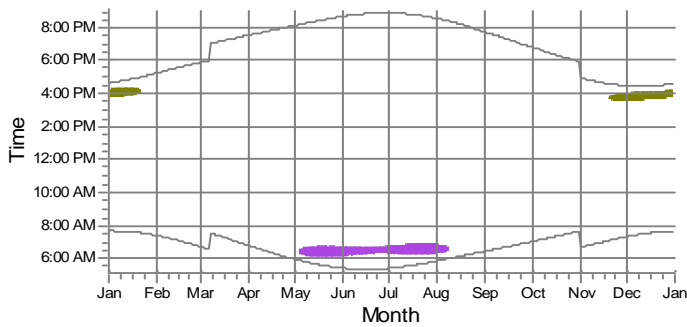
R-88: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (337)



R-89: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (52)



R-93: Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (55)



WTGs

- 24: GAMESA G97 2000 97.0 IO! hub: 90.0 m (8)
- 36: GAMESA G97 2000 97.0 IO! hub: 90.0 m (21)
- 09: GAMESA G97 2000 97.0 IO! hub: 90.0 m (49)
- 35: GAMESA G97 2000 97.0 IO! hub: 90.0 m (10)
- 25: GAMESA G97 2000 97.0 IO! hub: 90.0 m (41)

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05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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## SHADOW - Main Result

Calculation: 05030 SFA Gamesa G97\_R2

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.33	0.39	0.47	0.49	0.55	0.59	0.63	0.59	0.54	0.44	0.27	0.25

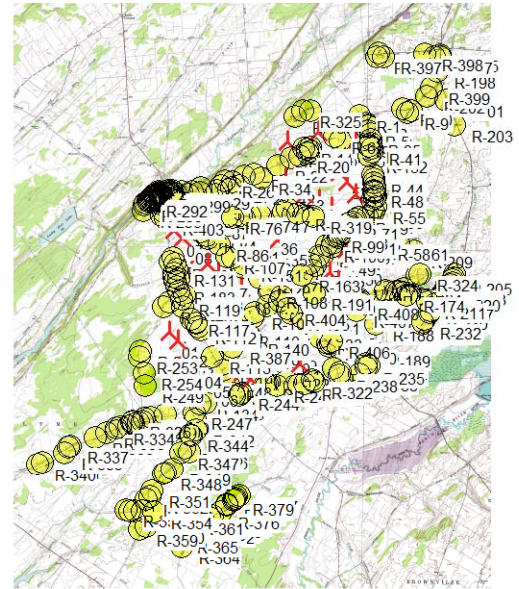
Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW
438	648	710	456	298	237	193	272	631	1,051	1,182	1,006

W	WNW	NW	NNW	Sum
675	429	245	289	8,760

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

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:  
 Height contours used: Height Contours: 05030 generated contours 5m.wpo (1)  
 Obstacles not used in calculation  
 Eye height: 1.5 m  
 Grid resolution: 10 m



Scale 1:200,000

▲ New WTG

● Shadow receptor

### WTGs

UTM NAD83 Zone: 18				Row data/Description	WTG type		Power, rated [kW]	Rotor diameter [m]	Hub height [m]	RPM [RPM]	
East	North	Z	Valid		Manufact.	Type-generator					
UTM NAD83 Zone: 18			[m]								
01	414,816	4,884,096	121.2	GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0
02	415,026	4,883,858	122.0	GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0
03	415,209	4,883,518	120.0	GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0
04	415,410	4,883,294	118.9	GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0
05	415,646	4,883,048	116.6	GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0
06	415,848	4,882,809	113.7	GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0
07	414,931	4,886,777	115.7	GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0
08	415,162	4,886,587	117.7	GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0
09	419,101	4,887,364	135.0	GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0
10	415,582	4,886,125	120.6	GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0
11	415,834	4,885,896	124.8	GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0
12	415,584	4,885,262	121.2	GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0
13	415,757	4,885,011	123.8	GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0
14	415,937	4,884,771	125.0	GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0
15	416,144	4,884,544	125.0	GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0
16	416,360	4,884,320	125.0	GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0
17	416,114	4,885,649	125.0	GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0
18	416,722	4,885,273	125.0	GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0
19	417,491	4,883,804	116.7	GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0
20	417,765	4,883,652	121.0	GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0
21	418,039	4,883,476	122.4	GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0
22	418,260	4,883,247	119.1	GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0
24	416,015	4,887,350	125.0	GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0
25	416,417	4,886,728	125.1	GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0

To be continued on next page...

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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## SHADOW - Main Result

Calculation: 05030 SFA Gamesa G97\_R2

...continued from previous page

UTM NAD83 Zone: 18				WTG type							
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	RPM [RPM]	
UTM NAD83 Zone: 18				[m]							
28	417,458	4,885,833	125.4 GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0	
29	417,766	4,885,724	125.1 GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0	
31	418,662	4,884,720	122.6 GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0	
32	418,890	4,884,509	125.0 GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0	
33	419,138	4,884,303	125.0 GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0	
35	417,678	4,886,530	128.3 GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0	
36	417,420	4,886,838	128.9 GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0	
38	419,070	4,885,660	125.0 GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0	
39	419,289	4,885,444	128.7 GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0	
40	419,504	4,885,234	127.0 GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0	
41	416,973	4,882,831	115.0 GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0	
42	417,879	4,888,143	130.4 GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0	
43	418,132	4,887,976	132.2 GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0	
44	418,387	4,887,724	134.3 GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0	
45	418,773	4,887,578	135.0 GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0	
46	417,947	4,889,134	125.7 GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0	
47	419,755	4,887,724	135.0 GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0	
48	416,734	4,883,006	115.0 GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0	
49	419,499	4,886,268	125.7 GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0	
50	419,670	4,886,024	130.0 GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0	
52	419,325	4,888,329	139.2 GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0	
53	419,531	4,888,056	137.8 GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0	
54	418,764	4,889,390	132.7 GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0	
55	419,740	4,889,165	140.0 GAMESA G97 2000 97.0 !O! hu...	Yes	GAMESA	G97-2,000	2,000	97.0	90.0	0.0	

## Shadow receptor-Input

UTM NAD83 Zone: 18										Direction mode
No.	East	North	Z	Width [m]	Height [m]	Height a.g.l. [m]	Degrees from south cw [°]	Slope of window [°]	Direction mode	
R-1	419,854	4,889,824	136.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-10	420,999	4,889,991	140.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-100	418,993	4,886,393	126.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-101	419,285	4,886,597	127.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-102	419,320	4,886,635	127.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-103	419,381	4,886,687	127.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-104	419,469	4,886,750	126.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-105	416,752	4,885,796	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-106	416,495	4,886,042	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-107	416,323	4,886,083	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-108	417,460	4,885,155	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-109	417,077	4,884,610	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-11	420,305	4,891,388	135.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-110	416,712	4,884,105	121.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-111	415,639	4,884,146	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-112	415,579	4,884,227	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-113	415,959	4,883,438	119.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-115	415,528	4,884,314	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-116	415,506	4,884,346	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"	
R-117	415,394	4,884,420	124.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"	

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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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## SHADOW - Main Result

Calculation: 05030 SFA Gamesa G97\_R2

...continued from previous page

UTM NAD83 Zone: 18

No.	East	North	Z	Width	Height	Height	Degrees from	Slope of	Direction mode
				[m]	[m]	a.g.l.	south cw	window	
			[m]	[m]	[m]	[m]	[°]	[°]	
R-119	415,139	4,884,966	120.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-12	420,369	4,891,475	135.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-120	414,962	4,885,449	116.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-121	414,940	4,885,534	116.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-122	414,928	4,885,643	116.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-123	415,215	4,885,044	120.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-124	415,400	4,884,567	124.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-125	414,663	4,884,749	117.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-126	414,799	4,884,875	118.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-127	415,061	4,885,479	117.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-128	414,949	4,885,905	116.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-129	414,840	4,885,952	115.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-13	418,554	4,889,946	125.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-130	414,910	4,886,045	115.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-131	415,018	4,885,752	117.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-132	416,388	4,882,693	111.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-133	416,506	4,882,467	110.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-134	415,617	4,882,173	107.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-135	415,762	4,882,212	106.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-136	416,542	4,882,379	110.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-137	417,411	4,882,718	115.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-138	417,876	4,882,761	111.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-139	417,176	4,883,474	115.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-14	418,373	4,888,957	132.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-140	416,965	4,883,922	115.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-141	416,929	4,884,008	117.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-142	416,443	4,883,603	116.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-143	416,881	4,883,927	116.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-144	416,875	4,883,880	115.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-145	417,032	4,884,460	123.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-146	417,490	4,885,220	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-147	417,192	4,885,518	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-148	417,724	4,884,898	118.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-149	417,778	4,885,033	120.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-15	418,469	4,888,921	134.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-150	416,652	4,886,360	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-151	416,792	4,885,867	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-152	420,115	4,888,740	140.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-153	418,595	4,882,803	110.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-154	418,428	4,882,785	110.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-155	419,156	4,883,116	109.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-156	419,028	4,883,715	123.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-157	418,815	4,883,934	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-158	419,013	4,883,775	123.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-159	419,074	4,883,795	124.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-16	418,554	4,888,975	135.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-160	419,277	4,883,689	121.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-161	418,331	4,884,469	123.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-162	418,087	4,885,363	120.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-163	418,330	4,885,587	122.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-165	418,547	4,885,894	125.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"

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## SHADOW - Main Result

Calculation: 05030 SFA Gamesa G97\_R2

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UTM NAD83 Zone: 18

No.	East	North	Z	Width	Height	Height	Degrees from	Slope of	Direction mode
				[m]	[m]	a.g.l.	south cw	window	
			[m]	[m]	[m]	[m]	[°]	[°]	
R-166	418,786	4,886,099	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-167	418,671	4,885,845	121.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-168	418,854	4,886,072	124.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-169	419,106	4,886,319	123.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-17	418,471	4,888,836	135.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-170	421,503	4,884,959	116.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-171	421,440	4,884,927	119.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-172	421,010	4,885,135	115.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-174	421,106	4,885,053	116.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-175	420,898	4,885,159	116.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-176	420,829	4,885,153	117.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-177	420,565	4,885,134	118.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-178	420,282	4,885,107	119.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-179	420,169	4,885,123	115.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-18	418,559	4,888,869	135.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-180	419,876	4,884,899	123.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-182	420,002	4,885,117	119.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-183	415,017	4,885,295	118.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-184	415,056	4,885,167	119.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-185	414,654	4,887,276	107.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-186	414,588	4,887,179	108.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-187	418,141	4,889,788	117.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-188	420,280	4,884,282	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-189	420,175	4,883,616	119.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-19	419,335	4,889,160	136.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-190	416,238	4,883,081	113.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-191	418,648	4,885,111	122.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-192	418,451	4,885,590	120.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-193	418,602	4,885,726	120.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-194	421,017	4,885,223	115.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-195	421,980	4,891,436	130.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-196	421,982	4,891,380	130.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-197	421,840	4,891,370	131.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-198	421,914	4,890,992	130.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-2	420,034	4,889,630	139.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-20	418,268	4,888,749	134.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-201	422,137	4,890,230	135.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-202	421,643	4,890,330	134.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-203	422,369	4,889,567	136.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-204	422,361	4,885,613	115.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-205	422,350	4,885,518	118.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-206	422,328	4,885,466	117.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-207	422,313	4,885,400	117.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-208	422,281	4,885,347	116.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-209	421,303	4,886,229	121.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-21	418,031	4,888,708	129.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-210	421,372	4,885,596	116.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-211	421,647	4,884,879	111.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-212	421,629	4,884,925	111.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-213	421,661	4,884,931	110.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-214	421,904	4,884,857	110.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"

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## SHADOW - Main Result

Calculation: 05030 SFA Gamesa G97\_R2

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UTM NAD83 Zone: 18

No.	East	North	Z	Width	Height	Height	Degrees from	Slope of	Direction mode
			[m]	[m]	[m]	a.g.l.	south cw	window	
			[m]	[m]	[m]	[m]	[°]	[°]	
R-215	421,924	4,884,887	108.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-216	421,947	4,884,910	106.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-217	421,982	4,884,988	105.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-218	422,016	4,885,010	105.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-219	422,043	4,885,043	108.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-22	417,693	4,888,489	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-220	422,039	4,885,083	110.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-221	422,088	4,885,095	114.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-222	422,081	4,885,146	115.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-223	422,205	4,885,232	116.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-224	421,841	4,884,887	108.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-225	421,703	4,884,916	110.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-226	421,778	4,884,723	110.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-227	421,853	4,884,835	110.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-228	421,837	4,884,785	110.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-229	421,820	4,884,753	110.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-23	417,046	4,888,265	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-230	421,703	4,884,602	114.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-231	421,582	4,884,427	114.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-232	421,524	4,884,356	113.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-233	421,509	4,884,299	113.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-234	420,103	4,883,203	110.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-235	420,030	4,883,151	110.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-236	420,022	4,883,237	110.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-237	419,341	4,883,023	110.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-238	419,326	4,882,950	110.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-239	418,400	4,882,707	110.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-24	416,791	4,888,213	124.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-240	418,236	4,882,693	110.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-241	418,139	4,882,672	110.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-242	417,359	4,882,723	115.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-243	417,648	4,882,664	112.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-244	416,725	4,882,446	112.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-245	416,654	4,882,406	110.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-246	415,493	4,881,768	100.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-247	415,475	4,881,955	103.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-248	414,136	4,881,795	105.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-249	414,163	4,882,664	112.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-25	416,483	4,888,054	122.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-250	414,323	4,881,811	105.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-251	414,704	4,881,891	105.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-252	414,029	4,883,588	117.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-253	414,026	4,883,435	117.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-254	414,150	4,882,990	115.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-255	414,577	4,887,486	103.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-256	414,584	4,887,524	102.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-257	414,649	4,887,521	102.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-258	414,923	4,887,561	100.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-259	415,307	4,887,732	104.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-26	416,276	4,888,099	119.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-260	415,406	4,887,817	100.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"

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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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## SHADOW - Main Result

Calculation: 05030 SFA Gamesa G97\_R2

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UTM NAD83 Zone: 18

No.	East	North	Z	Width	Height	Height	Degrees from	Slope of	Direction mode
			[m]	[m]	[m]	a.g.l.	south cw	window	
			[m]	[m]	[m]	[m]	[°]	[°]	
R-261	415,634	4,887,916	106.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-262	415,146	4,887,819	89.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-263	414,889	4,887,845	90.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-264	414,988	4,887,768	91.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-265	415,198	4,887,501	108.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-266	415,004	4,887,588	97.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-267	414,773	4,887,845	90.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-268	414,284	4,887,533	91.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-269	414,344	4,887,578	90.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-27	416,176	4,887,967	120.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-270	414,401	4,887,628	90.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-271	414,421	4,887,653	90.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-272	414,440	4,887,664	91.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-273	414,462	4,887,697	89.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-274	414,471	4,887,706	89.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-275	414,491	4,887,731	88.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-276	414,515	4,887,759	88.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-277	414,578	4,887,575	100.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-278	414,576	4,887,619	100.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-279	414,567	4,887,639	98.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-28	416,073	4,887,822	122.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-280	414,566	4,887,672	96.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-281	414,559	4,887,701	93.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-282	414,561	4,887,702	94.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-283	414,551	4,887,733	90.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-284	414,552	4,887,775	88.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-285	414,533	4,887,796	87.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-286	414,409	4,887,721	87.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-287	414,367	4,887,687	87.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-288	414,343	4,887,662	87.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-289	414,131	4,887,444	90.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-29	415,620	4,887,785	111.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-290	414,171	4,887,492	88.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-291	414,244	4,887,564	88.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-292	414,273	4,887,579	88.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-293	414,305	4,887,612	87.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-294	414,329	4,887,643	86.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-295	414,117	4,887,308	100.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-296	414,587	4,887,761	89.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-297	414,956	4,887,637	98.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-298	414,898	4,887,695	98.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-299	414,889	4,887,706	98.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-3	420,052	4,889,577	139.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-30	416,024	4,887,724	123.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-300	414,843	4,887,748	95.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-301	414,888	4,887,777	93.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-302	414,827	4,887,778	93.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-303	414,645	4,887,545	102.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-304	414,897	4,887,599	100.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-305	414,850	4,887,616	100.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-306	414,842	4,887,670	100.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"

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## SHADOW - Main Result

Calculation: 05030 SFA Gamesa G97\_R2

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UTM NAD83 Zone: 18

No.	East	North	Z	Width	Height	Height	Degrees from	Slope of	Direction mode
			[m]	[m]	[m]	a.g.l.	south cw	window	
			[m]	[m]	[m]	[m]	[°]	[°]	
R-307	414,753	4,887,659	99.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-308	414,631	4,887,575	101.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-309	414,631	4,887,595	100.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-31	416,395	4,887,865	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-310	414,633	4,887,634	98.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-311	414,625	4,887,658	97.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-312	414,619	4,887,682	96.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-313	414,601	4,887,706	95.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-314	414,727	4,887,597	100.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-315	414,698	4,887,621	100.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-316	414,713	4,887,629	100.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-317	414,796	4,887,730	95.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-319	418,630	4,887,159	132.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-32	416,455	4,887,901	124.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-321	417,402	4,884,778	122.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-322	418,664	4,882,751	109.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-324	421,448	4,885,607	115.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-325	418,346	4,889,948	118.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-326	413,843	4,881,723	101.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-327	413,814	4,881,684	100.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-328	413,859	4,881,631	100.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-329	413,985	4,881,685	100.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-33	416,652	4,887,961	125.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-330	414,101	4,881,709	101.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-331	413,725	4,881,584	96.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-332	413,494	4,881,570	95.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-333	413,394	4,881,471	94.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-334	413,394	4,881,529	95.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-335	413,135	4,881,420	95.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-336	412,855	4,881,290	94.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-337	412,167	4,881,068	93.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-338	412,124	4,881,023	93.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-339	412,021	4,880,890	92.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-34	417,257	4,888,166	125.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-340	411,313	4,880,580	93.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-341	411,436	4,880,631	94.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-342	415,517	4,881,486	100.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-343	415,401	4,881,326	100.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-344	415,355	4,881,370	99.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-345	415,219	4,880,999	102.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-346	415,344	4,880,914	102.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-347	415,119	4,880,878	102.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-348	414,658	4,880,310	100.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-349	414,883	4,880,439	101.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-35	420,161	4,889,178	140.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-350	414,711	4,880,349	100.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-351	414,338	4,879,859	98.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-352	414,287	4,879,708	98.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-353	414,205	4,879,635	98.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-354	414,407	4,879,285	99.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-355	414,080	4,879,316	95.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"

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**SHADOW - Main Result**

Calculation: 05030 SFA Gamesa G97\_R2

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UTM NAD83 Zone: 18

No.	East	North	Z	Width	Height	Height	Degrees from	Slope of	Direction mode
			[m]	[m]	[m]	a.g.l.	south cw	window	
			[m]	[m]	[m]	[m]	[°]	[°]	
R-356	413,882	4,879,323	95.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-357	413,769	4,879,318	94.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-358	413,656	4,879,336	92.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-359	414,027	4,878,839	95.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-36	420,164	4,889,093	140.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-360	414,184	4,878,923	95.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-361	415,225	4,879,144	100.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-362	414,903	4,879,208	100.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-363	415,080	4,878,870	100.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-364	415,131	4,878,377	100.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-365	415,080	4,878,671	100.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-366	415,135	4,878,716	100.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-367	415,143	4,878,661	100.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-368	415,294	4,878,995	101.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-369	415,413	4,878,945	101.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-37	420,096	4,888,928	140.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-370	415,493	4,879,007	102.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-371	415,654	4,879,018	103.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-372	415,530	4,878,907	102.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-373	415,722	4,879,066	103.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-374	415,876	4,879,152	103.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-375	415,956	4,879,200	104.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-376	416,184	4,879,292	105.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-377	416,674	4,879,725	105.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-378	416,592	4,879,694	105.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-379	416,560	4,879,665	105.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-38	420,103	4,888,997	140.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-380	416,528	4,879,630	105.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-381	416,501	4,879,606	105.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-382	416,343	4,879,503	105.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-383	416,330	4,879,471	105.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-384	416,356	4,887,153	125.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-387	416,475	4,883,682	117.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-388	419,856	4,882,958	110.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-389	421,747	4,884,650	112.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-39	420,172	4,888,860	140.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-390	421,185	4,885,058	117.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-391	421,157	4,885,008	118.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-392	421,205	4,885,030	118.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-393	421,228	4,885,045	118.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-394	420,957	4,884,977	117.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-395	420,542	4,885,196	116.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-396	419,841	4,884,962	124.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-397	420,499	4,891,372	135.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-398	421,584	4,891,442	135.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-399	421,773	4,890,558	131.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-4	420,073	4,889,536	140.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-401	417,940	4,887,361	131.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-402	415,174	4,884,761	122.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-403	414,705	4,887,100	110.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-404	417,946	4,884,689	115.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"

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## SHADOW - Main Result

Calculation: 05030 SFA Gamesa G97\_R2

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UTM NAD83 Zone: 18

No.	East	North	Z	Width	Height	Height	Degrees from	Slope of	Direction mode
			[m]	[m]	[m]	a.g.l.	south cw	window	
			[m]	[m]	[m]	[m]	[°]	[°]	
R-405	418,032	4,884,578	119.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-406	419,101	4,883,835	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-407	419,780	4,884,657	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-408	419,865	4,884,865	123.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-409	419,144	4,886,429	125.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-41	420,190	4,888,944	140.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-410	420,081	4,886,464	130.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-42	420,159	4,889,001	140.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-43	420,208	4,888,243	135.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-44	420,223	4,888,135	135.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-45	420,226	4,888,049	135.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-46	420,270	4,887,937	134.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-47	420,232	4,887,817	134.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-48	420,245	4,887,846	134.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-5	420,070	4,889,414	140.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-51	420,267	4,887,772	134.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-52	420,279	4,887,677	133.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-53	420,260	4,887,626	133.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-54	420,194	4,887,572	132.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-55	420,279	4,887,404	130.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-56	420,221	4,887,285	130.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-57	420,045	4,887,138	129.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-58	420,422	4,886,445	130.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-59	420,238	4,886,322	130.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-6	419,178	4,889,255	135.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-60	420,374	4,886,341	130.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-61	420,884	4,886,439	127.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-62	420,754	4,886,410	129.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-63	420,491	4,886,373	130.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-65	419,544	4,886,857	127.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-66	419,601	4,886,903	127.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-67	419,682	4,886,997	127.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-68	419,745	4,887,064	127.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-69	419,818	4,887,128	128.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-7	420,166	4,889,334	140.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-71	419,566	4,886,963	129.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-72	419,442	4,886,858	130.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-73	417,835	4,887,270	130.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-74	416,934	4,887,161	127.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-75	416,706	4,887,178	126.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-76	416,496	4,887,128	125.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-77	417,223	4,887,177	128.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-78	415,488	4,887,088	118.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-79	415,417	4,887,151	117.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-8	421,226	4,889,951	137.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-80	415,230	4,887,327	112.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-81	415,121	4,887,441	107.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-82	415,255	4,887,212	115.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-83	415,654	4,886,733	123.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-84	415,792	4,886,646	124.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-85	415,833	4,886,551	124.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"

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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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## SHADOW - Main Result

Calculation: 05030 SFA Gamesa G97\_R2

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**UTM NAD83 Zone: 18**

No.	East	North	Z	Width	Height	Height	Degrees from	Slope of	Direction mode
			[m]	[m]	[m]	a.g.l.	south cw	window	
			[m]	[m]	[m]	[m]	[°]	[°]	
R-86	416,125	4,886,406	125.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-87	415,583	4,886,993	120.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-88	416,800	4,887,085	127.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-89	417,730	4,887,095	130.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-9	421,113	4,889,891	138.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-90	418,085	4,887,196	131.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-91	418,213	4,887,217	132.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-92	418,367	4,887,168	132.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-93	418,438	4,887,121	132.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-94	418,593	4,887,092	132.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-95	418,969	4,886,958	132.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-96	419,208	4,886,881	131.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-97	419,317	4,886,828	130.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-98	419,287	4,886,708	129.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R-99	419,198	4,886,645	129.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"

## Calculation Results

Shadow receptor

**Shadow, worst case**

**Shadow, expected values**

No.	Shadow hours	Shadow days	Max shadow	Shadow hours
	per year	per year	hours per day	per year
	[h/year]	[days/year]	[h/day]	[h/year]
R-1	0:00	0	0:00	0:00
R-10	0:00	0	0:00	0:00
R-100	48:10	100	0:43	10:43
R-101	55:20	70	0:58	8:23
R-102	14:10	32	0:33	2:09
R-103	0:00	0	0:00	0:00
R-104	0:00	0	0:00	0:00
R-105	47:21	88	0:56	14:15
R-106	80:06	145	0:56	20:15
R-107	47:08	97	0:43	13:54
R-108	17:09	43	0:31	4:53
R-109	24:44	72	0:30	7:11
R-11	0:00	0	0:00	0:00
R-110	12:33	37	0:27	2:40
R-111	54:03	134	0:34	16:52
R-112	72:23	184	0:36	21:13
R-113	86:18	188	0:43	21:40
R-115	109:02	237	0:37	34:50
R-116	80:44	195	0:35	25:08
R-117	51:12	131	0:35	14:38
R-119	36:22	87	0:37	10:32
R-12	0:00	0	0:00	0:00
R-120	52:51	141	0:35	14:44
R-121	53:21	157	0:33	13:57
R-122	32:34	90	0:31	7:53
R-123	43:30	94	0:41	11:26
R-124	114:30	235	0:42	36:49
R-125	0:00	0	0:00	0:00

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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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**SHADOW - Main Result****Calculation:** 05030 SFA Gamesa G97\_R2

...continued from previous page

No.	Shadow, worst case		Max shadow hours per day [h/day]	Shadow, expected values
	Shadow hours per year [h/year]	Shadow days per year [days/year]		Shadow hours per year [h/year]
R-126	35:03	95	0:28	13:47
R-127	61:37	151	0:40	14:35
R-128	64:17	165	0:36	21:38
R-129	27:29	78	0:31	9:07
R-13	0:00	0	0:00	0:00
R-130	30:20	80	0:34	9:15
R-131	50:17	116	0:33	9:46
R-132	102:21	136	1:19	32:22
R-133	28:56	63	0:33	8:39
R-134	0:00	0	0:00	0:00
R-135	0:00	0	0:00	0:00
R-136	4:09	22	0:15	1:11
R-137	113:59	126	1:17	34:16
R-138	10:30	34	0:25	3:02
R-139	75:36	173	0:38	24:39
R-14	70:25	92	0:52	21:20
R-140	38:20	77	0:41	9:19
R-141	49:14	111	0:38	12:24
R-142	19:44	78	0:24	4:12
R-143	30:06	69	0:36	7:19
R-144	31:18	73	0:36	8:11
R-145	28:23	76	0:33	8:22
R-146	14:47	40	0:29	4:19
R-147	88:22	161	0:43	30:55
R-148	8:56	30	0:24	2:13
R-149	9:57	33	0:25	2:09
R-15	59:21	96	0:42	17:57
R-150	27:12	58	0:48	5:00
R-151	52:04	104	0:56	14:56
R-152	13:18	42	0:26	3:13
R-153	0:00	0	0:00	0:00
R-154	0:00	0	0:00	0:00
R-155	11:28	35	0:25	3:17
R-156	15:29	50	0:27	3:25
R-157	14:47	48	0:26	3:18
R-158	22:02	78	0:26	4:41
R-159	15:49	62	0:25	3:25
R-16	28:22	60	0:37	8:11
R-160	0:00	0	0:00	0:00
R-161	41:35	91	0:40	12:19
R-162	0:00	0	0:00	0:00
R-163	64:25	126	0:55	19:02
R-165	56:11	112	0:50	11:58
R-166	36:29	104	0:32	10:59
R-167	96:29	189	0:51	24:03
R-168	43:33	105	0:35	15:20
R-169	75:57	124	0:55	19:01
R-17	36:43	93	0:35	9:12
R-170	0:00	0	0:00	0:00
R-171	0:00	0	0:00	0:00
R-172	0:00	0	0:00	0:00

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05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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**SHADOW - Main Result****Calculation:** 05030 SFA Gamesa G97\_R2

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No.	Shadow, worst case		Max shadow hours per day [h/day]	Shadow, expected values
	Shadow hours per year [h/year]	Shadow days per year [days/year]		Shadow hours per year [h/year]
R-174	0:00	0	0:00	0:00
R-175	0:00	0	0:00	0:00
R-176	0:00	0	0:00	0:00
R-177	0:00	0	0:00	0:00
R-178	15:32	42	0:29	4:25
R-179	37:57	92	0:34	11:05
R-18	63:52	148	0:36	16:26
R-180	22:40	60	0:26	4:41
R-182	82:46	128	0:58	24:38
R-183	40:20	89	0:39	10:34
R-184	64:38	144	0:43	19:05
R-185	0:00	0	0:00	0:00
R-186	51:54	70	0:58	7:37
R-187	21:09	53	0:32	3:25
R-188	0:00	0	0:00	0:00
R-189	0:00	0	0:00	0:00
R-19	107:32	170	0:55	33:09
R-190	139:11	226	1:21	37:25
R-191	33:08	88	0:30	12:47
R-192	57:00	93	1:08	16:54
R-193	65:08	102	1:13	17:05
R-194	0:00	0	0:00	0:00
R-195	0:00	0	0:00	0:00
R-196	0:00	0	0:00	0:00
R-197	0:00	0	0:00	0:00
R-198	0:00	0	0:00	0:00
R-2	0:00	0	0:00	0:00
R-20	0:00	0	0:00	0:00
R-201	0:00	0	0:00	0:00
R-202	0:00	0	0:00	0:00
R-203	0:00	0	0:00	0:00
R-204	0:00	0	0:00	0:00
R-205	0:00	0	0:00	0:00
R-206	0:00	0	0:00	0:00
R-207	0:00	0	0:00	0:00
R-208	0:00	0	0:00	0:00
R-209	0:00	0	0:00	0:00
R-21	0:00	0	0:00	0:00
R-210	0:00	0	0:00	0:00
R-211	0:00	0	0:00	0:00
R-212	0:00	0	0:00	0:00
R-213	0:00	0	0:00	0:00
R-214	0:00	0	0:00	0:00
R-215	0:00	0	0:00	0:00
R-216	0:00	0	0:00	0:00
R-217	0:00	0	0:00	0:00
R-218	0:00	0	0:00	0:00
R-219	0:00	0	0:00	0:00
R-22	59:21	60	1:22	9:06
R-220	0:00	0	0:00	0:00
R-221	0:00	0	0:00	0:00

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**SHADOW - Main Result****Calculation:** 05030 SFA Gamesa G97\_R2

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No.	Shadow, worst case		Max shadow hours per day [h/day]	Shadow, expected values
	Shadow hours per year [h/year]	Shadow days per year [days/year]		Shadow hours per year [h/year]
R-222	0:00	0	0:00	0:00
R-223	0:00	0	0:00	0:00
R-224	0:00	0	0:00	0:00
R-225	0:00	0	0:00	0:00
R-226	0:00	0	0:00	0:00
R-227	0:00	0	0:00	0:00
R-228	0:00	0	0:00	0:00
R-229	0:00	0	0:00	0:00
R-23	11:50	34	0:27	3:09
R-230	0:00	0	0:00	0:00
R-231	0:00	0	0:00	0:00
R-232	0:00	0	0:00	0:00
R-233	0:00	0	0:00	0:00
R-234	0:00	0	0:00	0:00
R-235	0:00	0	0:00	0:00
R-236	0:00	0	0:00	0:00
R-237	0:00	0	0:00	0:00
R-238	0:00	0	0:00	0:00
R-239	0:00	0	0:00	0:00
R-24	0:00	0	0:00	0:00
R-240	0:00	0	0:00	0:00
R-241	0:00	0	0:00	0:00
R-242	137:45	119	1:26	41:40
R-243	36:40	73	0:49	10:40
R-244	17:14	57	0:25	5:09
R-245	27:41	71	0:27	8:18
R-246	0:00	0	0:00	0:00
R-247	0:00	0	0:00	0:00
R-248	0:00	0	0:00	0:00
R-249	0:00	0	0:00	0:00
R-25	0:00	0	0:00	0:00
R-250	0:00	0	0:00	0:00
R-251	0:00	0	0:00	0:00
R-252	0:00	0	0:00	0:00
R-253	0:00	0	0:00	0:00
R-254	0:00	0	0:00	0:00
R-255	0:00	0	0:00	0:00
R-256	0:00	0	0:00	0:00
R-257	0:00	0	0:00	0:00
R-258	0:00	0	0:00	0:00
R-259	15:40	43	0:29	2:57
R-26	0:00	0	0:00	0:00
R-260	24:53	64	0:31	3:45
R-261	0:00	0	0:00	0:00
R-262	10:41	36	0:24	1:59
R-263	0:00	0	0:00	0:00
R-264	0:00	0	0:00	0:00
R-265	12:04	34	0:27	3:05
R-266	0:00	0	0:00	0:00
R-267	0:00	0	0:00	0:00
R-268	0:00	0	0:00	0:00

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05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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**SHADOW - Main Result****Calculation:** 05030 SFA Gamesa G97\_R2

...continued from previous page

No.	Shadow, worst case		Max shadow hours per day [h/day]	Shadow, expected values
	Shadow hours per year [h/year]	Shadow days per year [days/year]		Shadow hours per year [h/year]
R-269	0:00	0	0:00	0:00
R-27	0:00	0	0:00	0:00
R-270	0:00	0	0:00	0:00
R-271	0:00	0	0:00	0:00
R-272	0:00	0	0:00	0:00
R-273	0:00	0	0:00	0:00
R-274	0:00	0	0:00	0:00
R-275	0:00	0	0:00	0:00
R-276	0:00	0	0:00	0:00
R-277	0:00	0	0:00	0:00
R-278	0:00	0	0:00	0:00
R-279	0:00	0	0:00	0:00
R-28	0:00	0	0:00	0:00
R-280	0:00	0	0:00	0:00
R-281	0:00	0	0:00	0:00
R-282	0:00	0	0:00	0:00
R-283	0:00	0	0:00	0:00
R-284	0:00	0	0:00	0:00
R-285	0:00	0	0:00	0:00
R-286	0:00	0	0:00	0:00
R-287	0:00	0	0:00	0:00
R-288	0:00	0	0:00	0:00
R-289	0:00	0	0:00	0:00
R-29	41:29	70	0:42	6:07
R-290	0:00	0	0:00	0:00
R-291	0:00	0	0:00	0:00
R-292	0:00	0	0:00	0:00
R-293	0:00	0	0:00	0:00
R-294	0:00	0	0:00	0:00
R-295	14:00	44	0:24	2:05
R-296	0:00	0	0:00	0:00
R-297	0:00	0	0:00	0:00
R-298	0:00	0	0:00	0:00
R-299	0:00	0	0:00	0:00
R-3	21:11	44	0:36	4:22
R-30	0:00	0	0:00	0:00
R-300	0:00	0	0:00	0:00
R-301	0:00	0	0:00	0:00
R-302	0:00	0	0:00	0:00
R-303	0:00	0	0:00	0:00
R-304	0:00	0	0:00	0:00
R-305	0:00	0	0:00	0:00
R-306	0:00	0	0:00	0:00
R-307	0:00	0	0:00	0:00
R-308	0:00	0	0:00	0:00
R-309	0:00	0	0:00	0:00
R-31	0:00	0	0:00	0:00
R-310	0:00	0	0:00	0:00
R-311	0:00	0	0:00	0:00
R-312	0:00	0	0:00	0:00
R-313	0:00	0	0:00	0:00

To be continued on next page...

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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## SHADOW - Main Result

Calculation: 05030 SFA Gamesa G97\_R2

...continued from previous page

No.	Shadow, worst case		Max shadow hours per day [h/day]	Shadow, expected values
	Shadow hours per year [h/year]	Shadow days per year [days/year]		Shadow hours per year [h/year]
R-314	0:00	0	0:00	0:00
R-315	0:00	0	0:00	0:00
R-316	0:00	0	0:00	0:00
R-317	0:00	0	0:00	0:00
R-319	48:23	74	0:47	19:59
R-32	0:00	0	0:00	0:00
R-321	0:00	0	0:00	0:00
R-322	0:00	0	0:00	0:00
R-324	0:00	0	0:00	0:00
R-325	0:00	0	0:00	0:00
R-326	0:00	0	0:00	0:00
R-327	0:00	0	0:00	0:00
R-328	0:00	0	0:00	0:00
R-329	0:00	0	0:00	0:00
R-33	9:03	32	0:21	1:47
R-330	0:00	0	0:00	0:00
R-331	0:00	0	0:00	0:00
R-332	0:00	0	0:00	0:00
R-333	0:00	0	0:00	0:00
R-334	0:00	0	0:00	0:00
R-335	0:00	0	0:00	0:00
R-336	0:00	0	0:00	0:00
R-337	0:00	0	0:00	0:00
R-338	0:00	0	0:00	0:00
R-339	0:00	0	0:00	0:00
R-34	32:20	78	0:36	8:54
R-340	0:00	0	0:00	0:00
R-341	0:00	0	0:00	0:00
R-342	0:00	0	0:00	0:00
R-343	0:00	0	0:00	0:00
R-344	0:00	0	0:00	0:00
R-345	0:00	0	0:00	0:00
R-346	0:00	0	0:00	0:00
R-347	0:00	0	0:00	0:00
R-348	0:00	0	0:00	0:00
R-349	0:00	0	0:00	0:00
R-35	47:35	71	0:53	14:35
R-350	0:00	0	0:00	0:00
R-351	0:00	0	0:00	0:00
R-352	0:00	0	0:00	0:00
R-353	0:00	0	0:00	0:00
R-354	0:00	0	0:00	0:00
R-355	0:00	0	0:00	0:00
R-356	0:00	0	0:00	0:00
R-357	0:00	0	0:00	0:00
R-358	0:00	0	0:00	0:00
R-359	0:00	0	0:00	0:00
R-36	58:57	87	0:53	17:24
R-360	0:00	0	0:00	0:00
R-361	0:00	0	0:00	0:00
R-362	0:00	0	0:00	0:00

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05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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**SHADOW - Main Result****Calculation:** 05030 SFA Gamesa G97\_R2

...continued from previous page

No.	Shadow, worst case		Max shadow hours per day [h/day]	Shadow, expected values
	Shadow hours per year [h/year]	Shadow days per year [days/year]		Shadow hours per year [h/year]
R-363	0:00	0	0:00	0:00
R-364	0:00	0	0:00	0:00
R-365	0:00	0	0:00	0:00
R-366	0:00	0	0:00	0:00
R-367	0:00	0	0:00	0:00
R-368	0:00	0	0:00	0:00
R-369	0:00	0	0:00	0:00
R-37	22:43	64	0:25	4:43
R-370	0:00	0	0:00	0:00
R-371	0:00	0	0:00	0:00
R-372	0:00	0	0:00	0:00
R-373	0:00	0	0:00	0:00
R-374	0:00	0	0:00	0:00
R-375	0:00	0	0:00	0:00
R-376	0:00	0	0:00	0:00
R-377	0:00	0	0:00	0:00
R-378	0:00	0	0:00	0:00
R-379	0:00	0	0:00	0:00
R-38	56:22	73	0:56	17:01
R-380	0:00	0	0:00	0:00
R-381	0:00	0	0:00	0:00
R-382	0:00	0	0:00	0:00
R-383	0:00	0	0:00	0:00
R-384	10:31	29	0:27	3:05
R-387	0:00	0	0:00	0:00
R-388	0:00	0	0:00	0:00
R-389	0:00	0	0:00	0:00
R-39	13:00	49	0:24	2:50
R-390	0:00	0	0:00	0:00
R-391	0:00	0	0:00	0:00
R-392	0:00	0	0:00	0:00
R-393	0:00	0	0:00	0:00
R-394	0:00	0	0:00	0:00
R-395	0:00	0	0:00	0:00
R-396	6:42	28	0:18	1:18
R-397	0:00	0	0:00	0:00
R-398	0:00	0	0:00	0:00
R-399	0:00	0	0:00	0:00
R-4	47:40	70	0:48	10:13
R-401	30:55	86	0:28	8:58
R-402	67:20	149	0:38	24:27
R-403	85:22	82	1:23	12:49
R-404	26:19	72	0:32	7:35
R-405	38:50	92	0:36	12:54
R-406	0:00	0	0:00	0:00
R-407	30:38	81	0:32	8:03
R-408	26:08	68	0:27	5:27
R-409	93:38	171	0:57	17:58
R-41	43:33	68	0:46	13:05
R-410	51:35	104	0:38	12:51
R-42	73:06	94	0:53	22:12

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**SHADOW - Main Result****Calculation:** 05030 SFA Gamesa G97\_R2

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No.	Shadow, worst case		Max shadow hours per day [h/day]	Shadow, expected values
	Shadow hours per year [h/year]	Shadow days per year [days/year]		Shadow hours per year [h/year]
R-43	33:09	98	0:32	9:20
R-44	73:32	155	0:39	18:47
R-45	71:45	164	0:41	19:09
R-46	45:49	97	0:41	13:25
R-47	60:02	122	0:45	18:16
R-48	53:59	111	0:44	16:19
R-5	73:25	108	0:55	17:53
R-51	57:36	125	0:43	17:36
R-52	61:55	127	0:43	18:28
R-53	52:10	110	0:45	15:08
R-54	77:16	104	0:51	23:30
R-55	2:01	14	0:11	0:34
R-56	0:00	0	0:00	0:00
R-57	10:31	35	0:24	2:57
R-58	24:09	77	0:27	6:09
R-59	40:11	92	0:36	11:14
R-6	111:21	161	0:54	32:53
R-60	26:37	76	0:30	7:38
R-61	0:00	0	0:00	0:00
R-62	0:00	0	0:00	0:00
R-63	19:05	65	0:26	5:29
R-65	0:00	0	0:00	0:00
R-66	0:00	0	0:00	0:00
R-67	0:00	0	0:00	0:00
R-68	37:55	75	0:34	11:25
R-69	23:34	59	0:31	7:00
R-7	40:50	65	0:49	12:09
R-71	0:00	0	0:00	0:00
R-72	0:00	0	0:00	0:00
R-73	44:12	102	0:39	11:48
R-74	106:41	153	1:01	20:24
R-75	37:22	93	0:32	9:18
R-76	59:44	109	0:46	17:19
R-77	58:19	104	0:55	9:55
R-78	62:28	128	0:43	19:43
R-79	98:55	195	0:39	30:37
R-8	0:00	0	0:00	0:00
R-80	14:16	38	0:29	4:21
R-81	10:18	32	0:25	2:52
R-82	28:49	78	0:30	8:26
R-83	63:04	105	1:00	18:44
R-84	56:10	102	0:59	17:30
R-85	70:57	150	0:44	24:20
R-86	36:02	88	0:38	9:48
R-87	72:03	114	0:59	17:14
R-88	95:49	181	0:46	23:18
R-89	91:07	119	0:58	21:05
R-9	0:00	0	0:00	0:00
R-90	31:34	89	0:31	9:57
R-91	24:41	77	0:27	7:21
R-92	28:33	82	0:31	9:18

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05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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**SHADOW - Main Result****Calculation:** 05030 SFA Gamesa G97\_R2

...continued from previous page

No.	Shadow, worst case			Shadow, expected values
	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow hours per year [h/year]
R-93	63:59	158	0:34	21:33
R-94	16:38	41	0:30	7:04
R-95	0:00	0	0:00	0:00
R-96	0:00	0	0:00	0:00
R-97	0:00	0	0:00	0:00
R-98	0:00	0	0:00	0:00
R-99	40:27	62	0:47	5:58

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

No.	Name	Worst case [h/year]	Expected [h/year]
01	GAMESA G97 2000 97.0 !O! hub: 90.0 m (1)	108:48	27:44
02	GAMESA G97 2000 97.0 !O! hub: 90.0 m (4)	92:48	21:12
03	GAMESA G97 2000 97.0 !O! hub: 90.0 m (3)	16:00	4:38
04	GAMESA G97 2000 97.0 !O! hub: 90.0 m (2)	40:48	11:59
05	GAMESA G97 2000 97.0 !O! hub: 90.0 m (32)	107:04	27:32
06	GAMESA G97 2000 97.0 !O! hub: 90.0 m (33)	134:54	37:52
07	GAMESA G97 2000 97.0 !O! hub: 90.0 m (5)	247:10	50:46
08	GAMESA G97 2000 97.0 !O! hub: 90.0 m (14)	148:18	36:27
09	GAMESA G97 2000 97.0 !O! hub: 90.0 m (49)	158:43	55:46
10	GAMESA G97 2000 97.0 !O! hub: 90.0 m (7)	124:43	41:47
11	GAMESA G97 2000 97.0 !O! hub: 90.0 m (15)	170:38	54:41
12	GAMESA G97 2000 97.0 !O! hub: 90.0 m (35)	190:21	49:47
13	GAMESA G97 2000 97.0 !O! hub: 90.0 m (36)	162:38	47:30
14	GAMESA G97 2000 97.0 !O! hub: 90.0 m (37)	104:50	34:37
15	GAMESA G97 2000 97.0 !O! hub: 90.0 m (38)	132:20	46:45
16	GAMESA G97 2000 97.0 !O! hub: 90.0 m (39)	119:07	36:06
17	GAMESA G97 2000 97.0 !O! hub: 90.0 m (6)	75:34	18:36
18	GAMESA G97 2000 97.0 !O! hub: 90.0 m (34)	63:57	17:50
19	GAMESA G97 2000 97.0 !O! hub: 90.0 m (16)	66:43	16:25
20	GAMESA G97 2000 97.0 !O! hub: 90.0 m (17)	71:19	22:37
21	GAMESA G97 2000 97.0 !O! hub: 90.0 m (40)	26:16	6:43
22	GAMESA G97 2000 97.0 !O! hub: 90.0 m (18)	43:36	10:14
24	GAMESA G97 2000 97.0 !O! hub: 90.0 m (8)	298:37	83:52
25	GAMESA G97 2000 97.0 !O! hub: 90.0 m (41)	181:22	49:34
28	GAMESA G97 2000 97.0 !O! hub: 90.0 m (42)	69:15	18:29
29	GAMESA G97 2000 97.0 !O! hub: 90.0 m (9)	134:16	44:42
31	GAMESA G97 2000 97.0 !O! hub: 90.0 m (43)	63:37	19:27
32	GAMESA G97 2000 97.0 !O! hub: 90.0 m (44)	59:32	17:41
33	GAMESA G97 2000 97.0 !O! hub: 90.0 m (45)	66:12	14:57
35	GAMESA G97 2000 97.0 !O! hub: 90.0 m (10)	50:26	9:48
36	GAMESA G97 2000 97.0 !O! hub: 90.0 m (21)	238:37	49:22
38	GAMESA G97 2000 97.0 !O! hub: 90.0 m (46)	117:42	30:07
39	GAMESA G97 2000 97.0 !O! hub: 90.0 m (47)	124:36	34:12
40	GAMESA G97 2000 97.0 !O! hub: 90.0 m (48)	70:46	21:11
41	GAMESA G97 2000 97.0 !O! hub: 90.0 m (20)	164:17	48:53
42	GAMESA G97 2000 97.0 !O! hub: 90.0 m (11)	75:47	15:54
43	GAMESA G97 2000 97.0 !O! hub: 90.0 m (12)	26:21	4:54
44	GAMESA G97 2000 97.0 !O! hub: 90.0 m (26)	0:00	0:00
45	GAMESA G97 2000 97.0 !O! hub: 90.0 m (13)	36:24	14:10

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**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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**SHADOW - Main Result****Calculation:** 05030 SFA Gamesa G97\_R2*...continued from previous page*

No.	Name	Worst case [h/year]	Expected [h/year]
46	GAMESA G97 2000 97.0 !O! hub: 90.0 m (27)	114:14	34:12
47	GAMESA G97 2000 97.0 !O! hub: 90.0 m (22)	301:23	83:50
48	GAMESA G97 2000 97.0 !O! hub: 90.0 m (19)	120:05	31:44
49	GAMESA G97 2000 97.0 !O! hub: 90.0 m (25)	315:29	81:11
50	GAMESA G97 2000 97.0 !O! hub: 90.0 m (50)	148:31	31:16
52	GAMESA G97 2000 97.0 !O! hub: 90.0 m (24)	109:43	24:31
53	GAMESA G97 2000 97.0 !O! hub: 90.0 m (23)	142:17	42:08
54	GAMESA G97 2000 97.0 !O! hub: 90.0 m (28)	127:35	35:41
55	GAMESA G97 2000 97.0 !O! hub: 90.0 m (29)	430:11	120:31

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-100 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (383)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June		
1	07:40 16:36	07:23 17:14	07:46 (50) 08:08 (50)	06:43 17:52	07:12 (49) 07:28 (49)	06:47 19:31	05:57 20:06	05:25 20:40
2	07:40 16:37	07:22 17:15	07:45 (50) 08:09 (50)	06:41 17:53	07:10 (49) 07:32 (49)	06:45 19:32	05:56 20:07	05:24 20:40
3	07:40 16:38	07:21 17:16	07:44 (50) 08:09 (50)	06:40 17:55	07:07 (49) 07:34 (49)	06:44 19:33	05:54 20:08	05:24 20:41
4	07:40 16:39	07:20 17:18	07:44 (50) 08:10 (50)	06:38 17:56	07:05 (49) 07:35 (49)	06:42 19:35	05:53 20:10	05:23 20:42
5	07:40 16:40	07:19 17:19	07:43 (50) 08:11 (50)	06:36 17:57	07:03 (49) 07:36 (49)	06:40 19:36	05:51 20:11	05:23 20:43
6	07:40 16:41	07:17 17:21	07:43 (50) 08:12 (50)	06:34 17:58	07:02 (49) 07:38 (49)	06:38 19:37	05:50 20:12	05:22 20:44
7	07:40 16:42	07:16 17:22	07:42 (50) 08:12 (50)	06:33 18:00	07:01 (49) 07:38 (49)	06:36 19:38	05:49 20:13	05:22 20:44
8	07:39 16:43	07:15 17:23	07:43 (50) 08:12 (50)	07:31 19:01	08:00 (49) 08:39 (49)	06:35 19:39	05:47 20:14	05:22 20:45
9	07:39 16:44	07:13 17:25	07:43 (50) 08:13 (50)	07:29 19:02	07:59 (49) 08:39 (49)	06:33 19:41	05:46 20:16	05:21 20:46
10	07:39 16:45	07:12 17:26	07:42 (50) 08:12 (50)	07:27 19:04	07:58 (49) 08:39 (49)	06:31 19:42	05:45 20:17	05:21 20:46
11	07:39 16:46	07:11 17:28	07:43 (50) 08:13 (50)	07:25 19:05	07:58 (49) 08:40 (49)	06:29 19:43	05:44 20:18	05:21 20:47
12	07:38 16:48	07:09 17:29	07:43 (50) 08:12 (50)	07:24 19:06	07:57 (49) 08:39 (49)	06:28 19:44	05:42 20:19	05:21 20:47
13	07:38 16:49	07:08 17:30	07:44 (50) 08:12 (50)	07:22 19:07	07:57 (49) 08:39 (49)	06:26 19:45	05:41 20:20	05:21 20:48
14	07:37 16:50	07:07 17:32	07:44 (50) 08:11 (50)	07:20 19:09	07:56 (49) 08:39 (49)	06:24 19:47	05:40 20:21	05:21 20:48
15	07:37 16:51	07:05 17:33	07:45 (50) 08:10 (50)	07:18 19:10	07:56 (49) 08:38 (49)	06:22 19:48	05:39 20:22	05:21 20:49
16	07:36 16:52	07:04 17:35	07:45 (50) 08:09 (50)	07:16 19:11	07:55 (49) 08:37 (49)	06:21 19:49	05:38 20:24	05:21 20:49
17	07:36 16:54	07:02 17:36	07:47 (50) 08:08 (50)	07:15 19:12	07:56 (49) 08:37 (49)	06:19 19:50	05:37 20:25	05:21 20:50
18	07:35 16:55	07:01 17:37	07:48 (50) 08:06 (50)	07:13 19:14	07:56 (49) 08:36 (49)	06:17 19:52	05:36 20:26	05:21 20:50
19	07:35 16:56	06:59 17:39	07:51 (50) 08:04 (50)	07:11 19:15	07:57 (49) 08:35 (49)	06:16 19:53	05:35 20:27	05:21 20:51
20	07:34 16:57	06:58 17:40	07:09 19:16	07:09 19:16	07:57 (49) 08:34 (49)	06:14 19:54	05:34 20:28	05:21 20:51
21	07:33 16:59	06:56 17:41	07:07 19:17	07:07 19:17	07:57 (49) 08:32 (49)	06:12 19:55	05:33 20:29	05:21 20:51
22	07:33 17:00	06:54 17:43	07:06 19:19	07:06 19:19	07:58 (49) 08:31 (49)	06:11 19:56	05:32 20:30	05:21 20:51
23	07:32 17:01	06:53 17:44	07:04 19:20	07:04 19:20	08:00 (49) 08:30 (49)	06:09 19:58	05:31 20:31	05:21 20:52
24	07:31 17:03	06:51 17:45	07:02 19:21	07:02 19:21	08:01 (49) 08:27 (49)	06:08 19:59	05:30 20:32	05:22 20:52
25	07:30 17:04	06:50 17:47	07:00 19:22	07:00 19:22	08:03 (49) 08:25 (49)	06:06 20:00	05:29 20:33	05:22 20:52
26	07:29 17:05	06:48 17:48	06:58 19:24	06:58 19:24	08:05 (49) 08:21 (49)	06:05 20:00	05:29 20:34	05:22 20:52
27	07:28 17:07	06:46 17:49	06:56 19:25	06:56 19:25	08:11 (49) 08:15 (49)	06:03 20:01	05:28 20:35	05:23 20:52
28	07:27 17:08	06:45 17:51	07:19 (49) 07:23 (49)	06:55 19:26	08:15 (49) 20:02	06:01 20:02	05:27 20:36	05:23 20:52
29	07:26 17:10	07:50 (50) 08:01 (50)	06:53 19:27	06:53 19:27	06:00 20:04	05:26 20:04	05:26 20:37	05:24 20:52
30	07:25 17:11	07:48 (50) 08:04 (50)	06:51 19:28	06:51 19:28	05:58 20:05	05:26 20:05	05:26 20:38	05:24 20:52
31	07:24 17:12	07:47 (50) 08:06 (50)	06:49 19:30	06:49 19:30	05:55 20:05	05:25 20:05	05:25 20:39	05:24 20:52
Potential sun hours	288	293	369	403	457	463		
Total, worst case	46	492	896					
Sun reduction	0.33	0.39	0.47					
Oper. time red.	1.00	1.00	1.00					
Wind dir. red.	0.50	0.50	0.52					
Total reduction	0.16	0.19	0.24					
Total, real	8	95	217					

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 2

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-100 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (383)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December		
1	05:25	05:51	06:27	07:01	07:36 (49)	06:40	07:12 (50)	07:19
	20:52	20:31	19:42	18:47	18:18 (49)	16:55	30 07:42 (50)	16:28
2	05:25	05:53	06:28	07:03	07:35 (49)	06:42	07:12 (50)	07:20
	20:52	20:30	19:40	18:45	18:17 (49)	16:54	30 07:42 (50)	16:27
3	05:26	05:54	06:29	07:04	07:36 (49)	06:43	07:12 (50)	07:21
	20:52	20:28	19:38	18:43	18:18 (49)	16:53	30 07:42 (50)	16:27
4	05:26	05:55	06:30	07:05	07:36 (49)	06:44	07:12 (50)	07:22
	20:51	20:27	19:37	18:41	18:17 (49)	16:51	29 07:41 (50)	16:27
5	05:27	05:56	06:31	07:06	07:36 (49)	06:46	07:13 (50)	07:23
	20:51	20:26	19:35	18:39	18:16 (49)	16:50	29 07:42 (50)	16:26
6	05:28	05:57	06:32	07:07	07:36 (49)	06:47	07:13 (50)	07:24
	20:51	20:25	19:33	18:38	18:14 (49)	16:49	28 07:41 (50)	16:26
7	05:28	05:58	06:34	07:09	07:38 (49)	06:48	07:13 (50)	07:25
	20:51	20:23	19:31	18:36	18:14 (49)	16:48	27 07:40 (50)	16:26
8	05:29	05:59	06:35	07:10	07:38 (49)	06:50	07:15 (50)	07:26
	20:50	20:22	19:29	18:34	18:12 (49)	16:46	25 07:40 (50)	16:26
9	05:30	06:00	06:36	07:11	07:39 (49)	06:51	07:15 (50)	07:27
	20:50	20:21	19:27	18:32	18:11 (49)	16:45	24 07:39 (50)	16:26
10	05:30	06:02	06:37	07:12	07:40 (49)	06:52	07:17 (50)	07:28
	20:49	20:19	19:26	18:31	18:08 (49)	16:44	21 07:38 (50)	16:26
11	05:31	06:03	06:38	07:13	07:42 (49)	06:54	07:18 (50)	07:29
	20:49	20:18	19:24	18:29	18:07 (49)	16:43	19 07:37 (50)	16:26
12	05:32	06:04	06:39	07:15	07:44 (49)	06:55	07:20 (50)	07:30
	20:48	20:16	19:22	18:27	18:04 (49)	16:42	16 07:36 (50)	16:26
13	05:33	06:05	06:40	07:16	07:47 (49)	06:56	07:22 (50)	07:31
	20:48	20:15	19:20	18:25	18:00 (49)	16:41	11 07:33 (50)	16:26
14	05:34	06:06	06:42	07:17	07:48 (49)	06:58	07:23 (50)	07:32
	20:47	20:13	19:18	18:24	18:00 (49)	16:40	10 07:32 (50)	16:26
15	05:35	06:07	06:43	07:18	07:49 (49)	06:59	07:24 (50)	07:33
	20:47	20:12	19:16	18:22	18:00 (49)	16:39	9 07:31 (50)	16:27
16	05:35	06:08	06:44	07:20	07:50 (49)	07:00	07:25 (50)	07:33
	20:46	20:10	19:15	18:20	18:00 (49)	16:38	8 07:30 (50)	16:27
17	05:36	06:10	06:45	07:21	07:51 (49)	07:02	07:26 (50)	07:34
	20:45	20:09	19:13	18:19	18:00 (49)	16:37	7 07:29 (50)	16:27
18	05:37	06:11	06:46	07:22	07:52 (49)	07:03	07:27 (50)	07:34
	20:44	20:07	19:11	18:17	18:00 (49)	16:36	6 07:28 (50)	16:27
19	05:38	06:12	06:47	07:23	07:53 (49)	07:04	07:28 (50)	07:35
	20:44	20:06	19:09	18:15	18:00 (49)	16:35	5 07:27 (50)	16:28
20	05:39	06:13	06:48	07:25	07:54 (49)	07:05	07:29 (50)	07:36
	20:43	20:04	19:07	18:14	18:00 (49)	16:34	4 07:26 (50)	16:28
21	05:40	06:14	06:50	07:26	07:55 (49)	07:07	07:30 (50)	07:36
	20:42	20:02	19:05	18:12	18:00 (49)	16:33	3 07:25 (50)	16:29
22	05:41	06:15	06:51	07:27	07:56 (49)	07:08	07:31 (50)	07:37
	20:41	20:01	19:03	18:10	18:00 (49)	16:32	2 07:24 (50)	16:29
23	05:42	06:16	06:52	07:29	07:57 (49)	07:09	07:32 (50)	07:37
	20:40	19:57	19:02	18:09	18:00 (49)	16:32	1 07:23 (50)	16:30
24	05:43	06:18	06:53	07:30	07:58 (49)	07:11	07:33 (50)	07:38
	20:39	19:56	19:00	18:07	18:00 (49)	16:31	0 07:22 (50)	16:30
25	05:44	06:19	06:54	07:31	07:59 (49)	07:12	07:34 (50)	07:38
	20:38	19:54	18:58	18:06	18:00 (49)	16:31	0 07:21 (50)	16:31
26	05:45	06:20	06:55	07:32	08:00 (49)	07:13	07:35 (50)	07:38
	20:37	19:52	18:56	18:04	18:00 (49)	16:30	0 07:20 (50)	16:31
27	05:46	06:21	06:57	07:34	08:01 (49)	07:14	07:36 (50)	07:39
	20:36	19:51	18:54	18:03	18:00 (49)	16:30	0 07:19 (50)	16:32
28	05:47	06:22	06:58	07:35	08:02 (49)	07:15	07:37 (50)	07:39
	20:35	19:49	18:52	18:01	18:00 (49)	16:29	0 07:18 (50)	16:33
29	05:48	06:23	06:59	07:36	08:03 (49)	07:17	07:38 (50)	07:39
	20:34	19:47	18:50	18:00	18:00 (49)	16:29	0 07:17 (50)	16:34
30	05:49	06:24	07:00	07:38	08:04 (49)	07:18	07:39 (50)	07:40
	20:33	19:45	18:49	17:58	18:00 (49)	16:28	0 07:16 (50)	16:34
31	05:50	06:26	07:01	07:39	08:05 (49)	07:19	07:40 (50)	07:40
	20:32	19:44	18:48	17:57	18:00 (49)	16:27	0 07:15 (50)	16:35
Potential sun hours	469	434	376	342	290	277		
Total, worst case			480	657	319			
Sun reduction			0.54	0.44	0.27			
Oper. time red.			1.00	1.00	1.00			
Wind dir. red.			0.52	0.51	0.50			
Total reduction			0.28	0.22	0.13			
Total, real			134	147	43			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 3

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-105 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (61)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	
1	07:40 16:36	07:23 17:14	06:43 17:52	17:05 (17) 17:27 (17)	06:47 19:31	07:08 (28) 20:06	05:25 20:40
2	07:40 16:37	07:22 17:15	06:41 17:53	17:04 (17) 17:29 (17)	06:46 19:32	07:06 (28) 19:09 (11)	05:24 20:40
3	07:40 16:38	07:21 17:17	06:40 17:55	17:02 (17) 17:30 (17)	06:44 19:33	07:05 (28) 19:11 (11)	05:24 20:41
4	07:40 16:39	07:20 17:18	06:38 17:56	17:01 (17) 17:30 (17)	06:42 19:35	07:04 (28) 19:12 (11)	05:23 20:42
5	07:40 16:40	07:19 17:19	06:36 17:57	16:59 (17) 17:31 (17)	06:40 19:36	07:03 (28) 19:13 (11)	05:23 20:43
6	07:40 16:41	07:17 17:21	06:34 17:59	16:59 (17) 17:32 (17)	06:38 19:37	07:02 (28) 19:14 (11)	05:22 20:44
7	07:40 16:42	07:16 17:22	06:33 18:00	16:58 (17) 17:32 (17)	06:37 19:38	07:01 (28) 19:15 (11)	05:22 20:44
8	07:40 16:43	07:15 17:24	06:31 19:01	17:58 (17) 18:32 (17)	06:35 19:39	07:01 (28) 19:17 (11)	05:22 20:45
9	07:39 16:44	07:14 17:25	06:29 19:02	17:57 (17) 18:31 (17)	06:33 19:41	07:00 (28) 19:17 (11)	05:22 20:46
10	07:39 16:45	07:12 17:26	06:27 19:04	17:58 (17) 18:32 (17)	06:31 19:42	07:00 (28) 19:17 (11)	05:21 20:46
11	07:39 16:47	07:11 17:28	06:26 19:05	17:57 (17) 18:31 (17)	06:30 19:43	06:59 (28) 19:16 (11)	05:21 20:47
12	07:38 16:48	07:09 17:29	06:24 19:06	17:57 (17) 18:30 (17)	06:28 19:44	07:00 (28) 19:16 (11)	05:21 20:47
13	07:38 16:49	07:08 17:31	06:22 19:08	17:57 (17) 18:30 (17)	06:26 19:46	07:00 (28) 19:15 (11)	05:21 20:48
14	07:38 16:50	07:07 17:32	06:20 19:09	17:58 (17) 18:28 (17)	06:24 19:47	07:00 (28) 19:14 (11)	05:21 20:49
15	07:37 16:51	07:05 17:33	06:18 19:10	17:58 (17) 18:27 (17)	06:23 19:48	07:01 (28) 19:13 (11)	05:21 20:49
16	07:37 16:53	07:04 17:35	06:17 19:11	18:00 (17) 18:27 (17)	06:21 19:49	07:02 (28) 19:11 (11)	05:21 20:49
17	07:36 16:54	07:02 17:36	06:15 19:13	18:01 (17) 18:25 (17)	06:19 19:50	07:03 (28) 19:08 (11)	05:21 20:50
18	07:35 16:55	07:01 17:37	06:13 19:14	18:02 (17) 18:23 (17)	06:18 19:52	07:05 (28) 07:23 (28)	05:21 20:50
19	07:35 16:56	06:59 17:39	06:11 19:15	18:04 (17) 18:20 (17)	06:16 19:53	07:06 (28) 07:20 (28)	05:21 20:51
20	07:34 16:58	06:58 17:40	06:09 19:16	18:08 (17) 18:15 (17)	06:14 19:54	07:10 (28) 07:15 (28)	05:21 20:51
21	07:33 16:59	06:56 17:41	06:07 19:17	07:07 19:17	06:13 19:55	05:33 20:29	05:21 20:51
22	07:33 17:00	06:55 17:43	06:06 19:19	07:06 19:19	06:11 19:56	05:32 20:30	05:21 20:51
23	07:32 17:02	06:53 17:44	06:04 19:20	07:04 19:20	06:09 19:58	05:31 20:31	05:22 20:52
24	07:31 17:03	06:51 17:45	06:02 19:21	07:02 19:21	06:08 19:59	05:30 20:32	05:22 20:52
25	07:30 17:04	06:50 17:47	06:00 19:22	07:00 19:22	06:06 20:00	05:30 20:33	05:22 20:52
26	07:29 17:06	06:48 17:48	06:58 19:24	06:58 19:24	06:05 20:00	05:29 20:34	05:23 20:52
27	07:28 17:07	06:46 17:49	17:11 (17) 17:22 (17)	06:56 19:25	06:03 20:01	05:28 20:35	05:23 20:52
28	07:27 17:08	06:45 17:51	17:07 (17) 17:25 (17)	06:55 19:26	06:02 20:03	05:27 20:36	05:23 20:52
29	07:26 17:10	06:44 17:44	06:53 19:27	06:53 19:27	06:00 20:04	05:27 20:37	05:24 20:52
30	07:25 17:11	06:43 17:43	06:51 19:29	07:16 (28) 19:29	05:59 20:05	05:26 20:38	05:24 20:52
31	07:24 17:12	06:42 17:42	06:49 19:30	07:11 (28) 07:26 (28)	06:05 20:05	05:25 20:39	05:24 20:52
Potential sun hours	288	293	369	403	457	463	
Total, worst case		29	581	806			
Sun reduction		0.39	0.47	0.49			
Oper. time red.		1.00	1.00	1.00			
Wind dir. red.		0.63	0.63	0.58			
Total reduction		0.25	0.30	0.28			
Total, real		7	173	229			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 4

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-105 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (61)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December		
1	05:25	05:52	06:27	06:59 (28)	07:01	17:36 (17)	06:40	07:19
	20:52	20:31	19:42	56 19:16 (11)	18:47	33 18:09 (17)	16:56	16:28
2	05:25	05:53	06:28	06:59 (28)	07:03	17:36 (17)	06:42	07:20
	20:52	20:30	19:40	56 19:16 (11)	18:45	34 18:10 (17)	16:54	16:27
3	05:26	05:54	06:29	06:58 (28)	07:04	17:35 (17)	06:43	07:21
	20:52	20:29	19:38	56 19:15 (11)	18:43	34 18:09 (17)	16:53	16:27
4	05:26	05:55	06:30	06:58 (28)	07:05	17:35 (17)	06:44	07:22
	20:51	20:27	19:37	54 19:14 (11)	18:41	34 18:09 (17)	16:52	16:27
5	05:27	05:56	06:31	06:58 (28)	07:06	17:34 (17)	06:46	07:23
	20:51	20:26	19:35	52 19:12 (11)	18:40	34 18:08 (17)	16:50	16:27
6	05:28	05:57	06:33	06:58 (28)	07:07	17:34 (17)	06:47	07:24
	20:51	20:25	19:33	49 19:10 (11)	18:38	34 18:08 (17)	16:49	16:26
7	05:28	05:58	06:34	06:58 (28)	07:09	17:35 (17)	06:48	07:25
	20:51	20:23	19:31	46 19:08 (11)	18:36	33 18:08 (17)	16:48	16:26
8	05:29	05:59	06:35	06:58 (28)	07:10	17:35 (17)	06:50	07:26
	20:50	20:22	19:29	42 19:06 (11)	18:34	32 18:07 (17)	16:47	16:26
9	05:30	06:01	06:36	06:59 (28)	07:11	17:35 (17)	06:51	07:27
	20:50	20:21	19:28	36 19:04 (11)	18:32	30 18:05 (17)	16:45	16:26
10	05:31	06:02	06:37	06:59 (28)	07:12	17:35 (17)	06:52	07:28
	20:49	20:19	19:26	31 19:02 (11)	18:31	29 18:04 (17)	16:44	16:26
11	05:31	06:03	06:38	07:01 (28)	07:14	17:37 (17)	06:54	07:29
	20:49	20:18	19:24	21 07:22 (28)	18:29	26 18:03 (17)	16:43	16:26
12	05:32	06:04	06:39	07:03 (28)	07:15	17:38 (17)	06:55	07:30
	20:48	20:16	19:22	16 07:19 (28)	18:27	23 18:01 (17)	16:42	16:26
13	05:33	06:05	06:41	07:06 (28)	07:16	17:39 (17)	06:56	07:31
	20:48	20:15	19:20	9 07:15 (28)	18:25	20 17:59 (17)	16:41	16:26
14	05:34	06:06	06:42	07:17	17:42 (17)	17:42 (17)	06:58	07:32
	20:47	20:13	19:18	18:24	15 17:57 (17)	16:40	16:26	
15	05:35	06:07	06:43	07:18	17:45 (17)	17:45 (17)	06:59	07:32
	20:47	20:12	19:17	18:22	8 17:53 (17)	16:39	16:27	
16	05:36	06:08	06:44	07:20	17:47 (17)	17:47 (17)	07:00	07:33
	20:46	20:10	19:15	18:20	16:38	16:27		
17	05:36	06:10	06:45	07:21	17:48 (17)	17:48 (17)	07:02	07:34
	20:45	20:09	19:13	18:19	16:37	16:27		
18	05:37	06:11	06:46	07:22	17:49 (17)	17:49 (17)	07:03	07:35
	20:45	20:07	19:11	18:17	16:36	16:27		
19	05:38	06:12	06:47	07:24	17:50 (17)	17:50 (17)	07:04	07:35
	20:44	20:06	19:09	18:15	16:35	16:28		
20	05:39	06:13	06:49	07:25	17:51 (17)	17:51 (17)	07:06	07:36
	20:43	20:04	19:07	18:14	16:34	16:28		
21	05:40	06:14	06:50	07:26	17:52 (17)	17:52 (17)	07:07	07:36
	20:42	20:02	19:05	18:12	16:34	16:29		
22	05:41	06:15	06:51	07:27	17:53 (17)	17:53 (17)	07:08	07:37
	20:41	20:01	19:04	18:11	16:33	16:29		
23	05:42	06:17	07:14 (28)	06:52	07:29	17:54 (17)	07:09	07:37
	20:40	19:58	7 07:21 (28)	19:02	18:09	16:32	16:30	
24	05:43	06:18	07:10 (28)	06:53	17:49 (17)	17:49 (17)	07:11	07:38
	20:39	19:56	14 07:24 (28)	19:00	13 18:02 (17)	18:07	16:31	16:30
25	05:44	06:19	07:07 (28)	06:54	17:45 (17)	17:45 (17)	07:12	07:38
	20:39	19:54	19 07:26 (28)	18:58	19 18:04 (17)	18:06	16:31	16:31
26	05:45	06:20	07:05 (28)	06:56	17:43 (17)	17:43 (17)	07:13	07:39
	20:38	19:52	33 19:11 (11)	18:56	23 18:06 (17)	18:04	16:30	16:32
27	05:46	06:21	07:04 (28)	06:57	17:42 (17)	17:42 (17)	07:14	07:39
	20:37	19:51	39 19:13 (11)	18:54	26 18:08 (17)	18:03	16:30	16:32
28	05:47	06:22	07:02 (28)	06:58	17:40 (17)	17:40 (17)	07:15	07:39
	20:35	19:49	45 19:14 (11)	18:52	28 18:08 (17)	18:01	16:29	16:33
29	05:48	06:23	07:01 (28)	06:59	17:39 (17)	17:39 (17)	07:17	07:39
	20:34	19:47	48 19:14 (11)	18:51	30 18:09 (17)	18:00	16:29	16:34
30	05:49	06:25	07:00 (28)	07:00	17:37 (17)	17:37 (17)	07:18	07:40
	20:33	19:46	52 19:15 (11)	18:49	32 18:09 (17)	17:58	16:28	16:34
31	05:51	06:26	06:59 (28)	07:01	17:35 (17)	17:35 (17)	07:19	07:40
	20:32	19:44	54 19:15 (11)	18:47	17:57	16:28	16:35	
Potential sun hours	469	434	376	342	290	277		
Total, worst case		311	695	419				
Sun reduction		0.59	0.54	0.44				
Oper. time red.		1.00	1.00	1.00				
Wind dir. red.		0.58	0.59	0.63				
Total reduction		0.34	0.32	0.28				
Total, real		106	223	117				

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)



Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 5

Licensed user:

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2 Shadow receptor: R-106 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (62)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36 44	14:56 (17) 07:23 15:40 (17) 17:14	06:43 17:52 18	17:09 (11) 06:47 17:27 (11) 19:31	18:57 (10) 05:57 19:08 (10) 20:06	05:25 20:40
2	07:40 16:37 43	14:57 (17) 07:22 15:40 (17) 17:15	06:41 17:53 28	07:02 (28) 06:46 17:30 (11) 19:32	18:55 (10) 05:56 19:09 (10) 20:07	05:24 20:40
3	07:40 16:38 44	14:57 (17) 07:21 15:41 (17) 17:17	06:40 17:55 35	07:00 (28) 06:44 17:31 (11) 19:33	18:55 (10) 05:54 19:11 (10) 20:09	05:24 20:41
4	07:40 16:39 43	14:58 (17) 07:20 15:41 (17) 17:18	06:38 17:56 40	06:58 (28) 06:42 17:31 (11) 19:35	18:53 (10) 05:53 19:12 (10) 20:10	05:23 20:42
5	07:40 16:40 42	14:59 (17) 07:19 15:41 (17) 17:19	06:36 17:57 45	06:56 (28) 06:40 17:32 (11) 19:36	18:52 (10) 05:52 19:13 (10) 20:11	05:23 20:43
6	07:40 16:41 43	14:59 (17) 07:17 15:42 (17) 17:21	06:34 17:59 49	06:55 (28) 06:38 17:33 (11) 19:37	18:52 (10) 05:50 19:14 (10) 20:12	05:22 20:44
7	07:40 16:42 42	14:59 (17) 07:16 15:41 (17) 17:22	06:33 18:00 52	06:53 (28) 06:37 17:33 (11) 19:38	18:51 (10) 05:49 19:15 (10) 20:13	05:22 20:44
8	07:40 16:43 42	15:00 (17) 07:15 15:42 (17) 17:24	07:31 19:01 54	07:51 (28) 06:35 18:33 (11) 19:39	18:51 (10) 05:48 19:16 (10) 20:15	05:22 20:45
9	07:39 16:44 41	15:01 (17) 07:14 15:42 (17) 17:25	07:29 19:02 56	07:50 (28) 06:33 18:33 (11) 19:41	18:51 (10) 05:46 19:15 (10) 20:16	05:22 20:46
10	07:39 16:45 41	15:01 (17) 07:12 15:42 (17) 17:26	07:27 19:04 55	07:51 (28) 06:31 18:34 (11) 19:42	18:51 (10) 05:45 19:14 (10) 20:17	05:21 20:46
11	07:39 16:47 40	15:02 (17) 07:11 15:43 (17) 17:28	07:26 19:05 54	07:51 (28) 06:30 18:33 (11) 19:43	18:51 (10) 05:44 19:13 (10) 20:18	05:21 20:47
12	07:38 16:48 40	15:03 (17) 07:09 15:43 (17) 17:29	07:24 19:06 52	07:51 (28) 06:28 18:32 (11) 19:44	18:53 (10) 05:43 19:12 (10) 20:19	05:21 20:48
13	07:38 16:49 38	15:04 (17) 07:08 15:42 (17) 17:31	07:22 19:08 50	07:52 (28) 06:26 18:32 (11) 19:46	18:53 (10) 05:41 19:11 (10) 20:20	05:21 20:48
14	07:38 16:50 38	15:05 (17) 07:07 15:43 (17) 17:32	07:20 19:09 47	07:52 (28) 06:24 18:31 (11) 19:47	18:55 (10) 05:40 19:08 (10) 20:21	05:21 20:49
15	07:37 16:51 36	15:06 (17) 07:05 15:42 (17) 17:33	07:18 19:10 40	07:54 (28) 06:23 18:29 (11) 19:48	18:58 (10) 05:39 19:06 (10) 20:23	05:21 20:49
16	07:37 16:53 36	15:06 (17) 07:04 15:42 (17) 17:35	07:17 19:11 29	08:00 (28) 06:21 18:29 (11) 19:49	05:38 20:24	05:21 20:50
17	07:36 16:54 34	15:08 (17) 07:02 15:42 (17) 17:36	07:15 19:13 24	18:03 (11) 06:19 18:27 (11) 19:50	05:37 20:25	05:21 20:50
18	07:35 16:55 33	15:09 (17) 07:01 15:42 (17) 17:37	07:13 19:14 21	18:04 (11) 06:18 18:25 (11) 19:52	05:36 20:26	05:21 20:50
19	07:35 16:56 32	15:09 (17) 06:59 15:41 (17) 17:39	07:11 19:15 16	18:06 (11) 06:16 18:22 (11) 19:53	05:35 20:27	05:21 20:51
20	07:34 16:58 29	15:12 (17) 06:58 15:41 (17) 17:40	07:09 19:16 8	18:10 (11) 06:14 18:18 (11) 19:54	05:34 20:28	05:21 20:51
21	07:33 16:59 27	15:13 (17) 06:56 15:40 (17) 17:41	07:07 19:17 7	06:13 19:55	05:33 20:29	05:21 20:51
22	07:33 17:00 25	15:14 (17) 06:55 15:39 (17) 17:43	07:06 19:19 19	06:11 19:57	05:32 20:30	05:21 20:51
23	07:32 17:02 21	15:16 (17) 06:53 15:37 (17) 17:44	07:04 19:20 19	06:09 19:58	05:31 20:31	05:22 20:52
24	07:31 17:03 18	15:18 (17) 06:51 15:36 (17) 17:45	07:02 19:21 19	06:08 19:59	05:30 20:32	05:22 20:52
25	07:30 17:04 11	15:22 (17) 06:50 15:33 (17) 17:47	07:00 19:22 20	06:06 20:00	05:30 20:33	05:22 20:52
26	07:29 17:06 11	06:48 17:48	06:58 19:24 20	06:05 20:00	05:29 20:34	05:23 20:52
27	07:28 17:07 11	06:46 17:49	06:57 19:25 20	06:03 20:01	05:28 20:35	05:23 20:52
28	07:27 17:08 11	06:45 17:51 12	06:55 17:13 (11) 19:26 17:25 (11)	06:02 20:03	05:27 20:36	05:23 20:52
29	07:26 17:10 11	06:45 17:51 12	06:53 19:27 20	06:00 20:04	05:27 20:37	05:24 20:52
30	07:25 17:11 11	06:45 17:51 12	06:51 19:29 20	05:59 20:05	05:26 20:38	05:24 20:52
31	07:24 17:12 11	06:45 17:51 12	06:49 19:30 7	19:00 (10) 19:07 (10)	05:25 20:39	05:24 20:52
Potential sun hours	288	293	369	403	457	463
Total, worst case	883	12	780	279		
Sun reduction	0.33	0.39	0.47	0.49		
Oper. time red.	1.00	1.00	1.00	1.00		
Wind dir. red.	0.76	0.63	0.59	0.55		
Total reduction	0.26	0.25	0.29	0.28		
Total, real	231	3	226	79		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 6

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(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2 Shadow receptor: R-106 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (62)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25 20:52	05:52 20:31	06:27 19:42	18:51 (10) 18:13 (10)	07:01 18:47	07:30 (28) 16:56
2	05:25 20:52	05:53 20:30	06:28 19:40	18:50 (10) 19:13 (10)	07:03 18:45	07:30 (28) 16:54
3	05:26 20:52	05:54 20:29	06:29 19:39	18:49 (10) 19:13 (10)	07:04 18:43	07:29 (28) 16:53
4	05:26 20:51	05:55 20:27	06:30 19:37	18:48 (10) 19:13 (10)	07:05 18:41	07:28 (28) 16:52
5	05:27 20:51	05:56 20:26	06:31 19:35	18:48 (10) 19:12 (10)	07:06 18:40	07:27 (28) 16:50
6	05:28 20:51	05:57 20:25	06:33 19:33	18:48 (10) 19:10 (10)	07:07 18:38	07:28 (28) 16:49
7	05:28 20:51	05:58 20:23	06:34 19:31	18:47 (10) 19:08 (10)	07:09 18:36	07:30 (28) 16:48
8	05:29 20:50	05:59 20:22	06:35 19:29	18:48 (10) 19:06 (10)	07:10 18:34	07:31 (28) 16:47
9	05:30 20:50	06:01 20:21	06:36 19:28	18:48 (10) 19:04 (10)	07:11 18:32	07:32 (28) 16:45
10	05:31 20:49	06:02 20:19	06:37 19:26	18:48 (10) 19:02 (10)	07:12 18:31	07:33 (28) 16:44
11	05:31 20:49	06:03 20:18	06:38 19:24	18:50 (10) 19:02 (10)	07:14 18:29	07:35 (28) 16:43
12	05:32 20:48	06:04 20:16	06:39 19:22	18:52 (10) 19:00 (10)	07:15 18:27	07:36 (28) 16:42
13	05:33 20:48	06:05 20:15	06:41 19:20	07:16 18:25	07:16 18:25	17:44 (11) 16:41
14	05:34 20:47	06:06 20:13	06:42 19:18	07:17 18:24	07:17 18:24	17:48 (11) 16:40
15	05:35 20:47	06:07 20:12	06:43 19:17	07:18 18:22	07:18 18:22	17:56 (11) 16:40
16	05:36 20:46	06:08 20:10	06:44 19:15	07:20 18:20	07:20 18:20	07:00 16:38
17	05:36 20:45	06:10 20:09	06:45 19:13	07:21 18:19	07:21 18:19	14:56 (17) 16:37
18	05:37 20:45	06:11 20:07	06:46 19:11	07:22 18:17	07:22 18:17	15:07 (17) 16:36
19	05:38 20:44	06:12 20:06	06:47 19:09	07:24 18:15	07:24 18:15	15:17 (17) 16:35
20	05:39 20:43	06:13 20:04	06:49 19:07	07:25 18:14	07:25 18:14	15:27 (17) 16:34
21	05:40 20:42	06:14 20:03	06:50 19:05	07:26 18:12	07:26 18:12	15:37 (17) 16:33
22	05:41 20:41	06:15 20:01	06:51 19:04	07:27 18:11	07:27 18:11	15:47 (17) 16:32
23	05:42 20:40	06:17 19:58	06:52 19:02	17:57 (11) 18:09	07:29 18:09	15:57 (17) 16:31
24	05:43 20:40	06:18 19:56	06:53 19:00	17:51 (11) 18:07	07:30 18:07	16:07 (17) 16:30
25	05:44 20:39	06:19 19:54	06:54 18:58	17:48 (11) 18:06	07:31 18:06	16:17 (17) 16:29
26	05:45 20:38	06:20 19:53	06:56 18:56	17:46 (11) 18:04	07:33 18:04	16:27 (17) 16:28
27	05:46 20:37	06:21 19:51	06:57 18:54	17:44 (11) 18:03	07:34 18:03	16:37 (17) 16:27
28	05:47 20:35	06:22 19:49	06:58 18:52	17:42 (11) 18:01	07:35 18:01	16:47 (17) 16:26
29	05:48 20:34	06:23 19:47	06:59 18:50	17:40 (11) 18:00	07:36 18:00	16:57 (17) 16:25
30	05:49 20:33	06:25 19:46	07:00 18:49	17:38 (11) 17:58	07:38 17:58	17:07 (17) 16:24
31	05:51 20:32	06:26 19:44	07:01 19:11	18:48 (10) 17:57	07:39 17:57	17:17 (17) 16:23
Potential sun hours	469	434	376	342	290	277
Total, worst case		60	443	584	417	1348
Sun reduction		0.59	0.54	0.44	0.27	0.25
Oper. time red.		1.00	1.00	1.00	1.00	1.00
Wind dir. red.		0.55	0.58	0.59	0.76	0.76
Total reduction		0.34	0.33	0.27	0.21	0.20
Total, real		20	144	157	89	267

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 7

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-107 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (315)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36	07:23 17:14	06:43 17:52	16:27 (11) 17:09 (11)	06:47 19:31	18:43 (10) 20:06
2	07:40 16:37	07:22 17:15	06:41 17:53	16:28 (11) 17:09 (11)	06:46 19:32	18:42 (10) 20:07
3	07:40 16:38	07:21 17:17	06:40 17:55	16:28 (11) 17:08 (11)	06:44 19:33	18:42 (10) 20:09
4	07:40 16:39	07:20 17:18	06:38 17:56	16:28 (11) 17:07 (11)	06:42 19:35	18:41 (10) 20:10
5	07:40 16:40	07:19 17:19	06:36 17:57	16:28 (11) 17:06 (11)	06:40 19:36	18:40 (10) 20:11
6	07:40 16:41	07:17 17:21	06:34 17:59	16:30 (11) 17:06 (11)	06:38 19:37	18:40 (10) 20:12
7	07:40 16:42	07:16 17:22	06:33 18:00	16:30 (11) 17:04 (11)	06:37 19:38	18:39 (10) 20:13
8	07:40 16:43	07:15 17:24	06:31 19:01	17:31 (11) 18:03 (11)	06:35 19:40	18:40 (10) 20:15
9	07:39 16:44	07:14 17:25	06:29 19:02	17:33 (11) 18:01 (11)	06:33 19:41	18:40 (10) 20:16
10	07:39 16:45	07:12 17:26	06:27 19:04	17:35 (11) 17:59 (11)	06:31 19:42	18:40 (10) 20:17
11	07:39 16:47	07:11 17:28	06:26 19:05	17:37 (11) 17:56 (11)	06:30 19:43	18:40 (10) 20:18
12	07:38 16:48	07:10 17:29	06:24 19:06	17:41 (11) 17:52 (11)	06:28 19:44	18:42 (10) 20:19
13	07:38 16:49	07:08 17:31	16:42 (11) 16:56 (11)	07:22 19:08	06:26 19:46	18:43 (10) 20:20
14	07:38 16:50	07:07 17:32	16:39 (11) 17:00 (11)	07:20 19:09	06:24 19:47	18:44 (10) 20:21
15	07:37 16:51	07:05 17:33	16:37 (11) 17:02 (11)	07:18 19:10	06:23 19:48	18:47 (10) 20:23
16	07:37 16:53	07:04 17:35	16:36 (11) 17:04 (11)	07:17 19:11	06:21 19:49	18:59 (10) 20:24
17	07:36 16:54	07:02 17:36	16:34 (11) 17:05 (11)	07:15 19:13	06:19 19:50	19:01 (10) 20:25
18	07:35 16:55	07:01 17:37	16:33 (11) 17:07 (11)	07:13 19:14	06:18 19:52	18:47 (10) 20:26
19	07:35 16:56	06:59 17:39	16:31 (11) 17:07 (11)	07:11 19:15	06:16 19:53	18:59 (10) 20:27
20	07:34 16:58	06:58 17:40	16:30 (11) 17:08 (11)	07:09 19:16	06:14 19:54	18:59 (10) 20:28
21	07:33 16:59	06:56 17:41	16:30 (11) 17:09 (11)	07:08 19:17	06:13 19:55	18:59 (10) 20:29
22	07:33 17:00	06:55 17:43	16:29 (11) 17:09 (11)	07:06 19:19	06:11 19:57	18:59 (10) 20:30
23	07:32 17:02	06:53 17:44	16:29 (11) 17:10 (11)	07:04 19:20	06:09 19:58	18:59 (10) 20:31
24	07:31 17:03	06:51 17:45	16:28 (11) 17:10 (11)	07:02 19:21	06:08 19:59	18:59 (10) 20:32
25	07:30 17:04	06:50 17:47	16:27 (11) 17:10 (11)	07:00 19:22	06:06 20:00	18:59 (10) 20:33
26	07:29 17:06	06:48 17:48	16:28 (11) 17:10 (11)	06:58 19:24	06:05 20:00	18:59 (10) 20:34
27	07:28 17:07	06:46 17:49	16:27 (11) 17:10 (11)	06:57 19:25	18:55 (10) 19:00 (10)	18:59 (10) 20:01
28	07:27 17:08	06:45 17:51	16:27 (11) 17:09 (11)	06:55 19:26	18:51 (10) 19:04 (10)	18:59 (10) 20:03
29	07:26 17:10		06:53 19:27	17:09 (11) 19:27	18:48 (10) 19:05 (10)	18:59 (10) 20:04
30	07:25 17:11		06:51 19:29	18:46 (10) 19:29	18:46 (10) 19:06 (10)	18:59 (10) 20:05
31	07:24 17:12		06:49 19:30	18:44 (10) 19:07 (10)		18:59 (10) 20:05
Potential sun hours	288	293	369	403	457	463
Total, worst case		559	462	383		
Sun reduction		0.39	0.47	0.49		
Oper. time red.		1.00	1.00	1.00		
Wind dir. red.		0.68	0.66	0.56		
Total reduction		0.27	0.31	0.28		
Total, real		149	144	107		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 8

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-107 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (315)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25	05:52	06:27	18:40 (10) 07:01	17:23 (11) 06:40	07:19
	20:52	20:31	19:42	26 19:06 (10) 18:47	4 17:27 (11) 16:56	16:28
2	05:25	05:53	06:28	18:39 (10) 07:03	17:17 (11) 06:42	07:20
	20:52	20:30	19:40	27 19:06 (10) 18:45	17 17:34 (11) 16:54	16:27
3	05:26	05:54	06:29	18:38 (10) 07:04	17:14 (11) 06:43	07:21
	20:52	20:29	19:39	28 19:06 (10) 18:43	22 17:36 (11) 16:53	16:27
4	05:26	05:55	06:30	18:37 (10) 07:05	17:11 (11) 06:44	07:22
	20:51	20:27	19:37	29 19:06 (10) 18:41	27 17:38 (11) 16:52	16:27
5	05:27	05:56	06:31	18:36 (10) 07:06	17:09 (11) 06:46	07:23
	20:51	20:26	19:35	30 19:06 (10) 18:40	30 17:39 (11) 16:50	16:27
6	05:28	05:57	06:33	18:36 (10) 07:07	17:07 (11) 06:47	07:24
	20:51	20:25	19:33	30 19:06 (10) 18:38	32 17:39 (11) 16:49	16:26
7	05:28	05:58	06:34	18:35 (10) 07:09	17:06 (11) 06:48	07:25
	20:51	20:23	19:31	30 19:05 (10) 18:36	35 17:41 (11) 16:48	16:26
8	05:29	05:59	06:35	18:35 (10) 07:10	17:04 (11) 06:50	07:26
	20:50	20:22	19:29	30 19:05 (10) 18:34	37 17:41 (11) 16:47	16:26
9	05:30	06:01	06:36	18:35 (10) 07:11	17:03 (11) 06:51	07:27
	20:50	20:21	19:28	29 19:04 (10) 18:32	39 17:42 (11) 16:45	16:26
10	05:31	06:02	06:37	18:35 (10) 07:12	17:02 (11) 06:52	07:28
	20:49	20:19	19:26	27 19:02 (10) 18:31	40 17:42 (11) 16:44	16:26
11	05:31	06:03	06:38	18:36 (10) 07:14	17:02 (11) 06:54	07:29
	20:49	20:18	19:24	26 19:02 (10) 18:29	41 17:43 (11) 16:43	16:26
12	05:32	06:04	06:39	18:36 (10) 07:15	17:01 (11) 06:55	07:30
	20:48	20:16	19:22	24 19:00 (10) 18:27	42 17:43 (11) 16:42	16:26
13	05:33	06:05	06:41	18:37 (10) 07:16	17:00 (11) 06:56	07:31
	20:48	20:15	19:20	21 18:58 (10) 18:25	42 17:42 (11) 16:41	16:26
14	05:34	06:06	06:42	18:38 (10) 07:17	17:00 (11) 06:58	07:32
	20:47	20:13	19:18	18 18:56 (10) 18:24	43 17:43 (11) 16:40	16:26
15	05:35	06:07	06:43	18:40 (10) 07:18	17:00 (11) 06:59	07:32
	20:47	20:12	19:17	14 18:54 (10) 18:22	42 17:42 (11) 16:39	16:27
16	05:36	06:09	06:44	18:43 (10) 07:20	16:59 (11) 07:00	07:33
	20:46	20:10	19:15	8 18:51 (10) 18:20	43 17:42 (11) 16:38	16:27
17	05:36	06:10	06:45	07:21	16:59 (11) 07:02	07:34
	20:45	20:09	19:13	18:19	42 17:41 (11) 16:37	16:27
18	05:37	06:11	06:46	07:22	17:00 (11) 07:03	07:35
	20:45	20:07	19:11	18:17	41 17:41 (11) 16:36	16:27
19	05:38	06:12	06:47	07:24	16:59 (11) 07:04	07:35
	20:44	20:06	19:09	18:15	41 17:40 (11) 16:35	16:28
20	05:39	06:13	06:49	07:25	16:59 (11) 07:06	07:36
	20:43	20:04	19:07	18:14	40 17:39 (11) 16:34	16:28
21	05:40	06:14	06:50	07:26	17:01 (11) 07:07	07:36
	20:42	20:03	19:05	18:12	38 17:39 (11) 16:34	16:29
22	05:41	06:15	06:51	07:27	17:01 (11) 07:08	07:37
	20:41	20:01	19:04	18:11	37 17:38 (11) 16:33	16:29
23	05:42	06:17	06:52	07:29	17:02 (11) 07:09	07:37
	20:40	19:58	19:02	18:09	35 17:37 (11) 16:32	16:30
24	05:43	06:18	06:53	07:30	17:03 (11) 07:11	07:38
	20:40	19:56	19:00	18:07	33 17:36 (11) 16:31	16:30
25	05:44	06:19	06:54	07:31	17:04 (11) 07:12	07:38
	20:39	19:54	18:58	18:06	30 17:34 (11) 16:31	16:31
26	05:45	06:20	06:56	07:33	17:06 (11) 07:13	07:39
	20:38	19:53	18:56	18:04	27 17:33 (11) 16:30	16:32
27	05:46	06:21	06:57	07:34	17:07 (11) 07:14	07:39
	20:37	19:51	18:54	18:03	24 17:31 (11) 16:30	16:32
28	05:47	06:22	18:48 (10) 06:58	07:35	17:09 (11) 07:16	07:39
	20:35	19:49	12 19:00 (10) 18:52	18:01	19 17:28 (11) 16:29	16:33
29	05:48	06:23	18:45 (10) 06:59	07:36	17:13 (11) 07:17	07:39
	20:34	19:47	17 19:02 (10) 18:51	18:00	12 17:25 (11) 16:29	16:34
30	05:49	06:25	18:43 (10) 07:00	07:38	07:18	07:40
	20:33	19:46	20 19:03 (10) 18:49	17:58	16:28	16:34
31	05:51	06:26	18:41 (10) 07:01	07:39	07:18	07:40
	20:32	19:44	23 19:04 (10) 17:57	17:57	16:35	16:35
Potential sun hours	469	434	376	342	290	277
Total, worst case		72	397	955		
Sun reduction		0.59	0.54	0.44		
Oper. time red.		1.00	1.00	1.00		
Wind dir. red.		0.56	0.56	0.68		
Total reduction		0.34	0.31	0.30		
Total, real		24	122	288		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 9

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-111 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (366)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:37	07:23 17:14		06:43 17:52	06:47 19:31	05:57 20:06
2	07:40 16:37	07:22 17:15	11	16:37 (02) 16:48 (02)	06:41 17:53	06:25 (16) 06:25 (16)
3	07:40 16:38	07:21 17:17	17	16:33 (02) 16:50 (02)	06:40 17:55	06:24 (16) 06:24 (16)
4	07:40 16:39	07:20 17:18	21	16:32 (02) 16:53 (02)	06:38 17:56	06:25 (16) 06:25 (16)
5	07:40 16:40	07:19 17:19	23	16:31 (02) 16:54 (02)	06:36 17:57	06:25 (16) 06:25 (16)
6	07:40 16:41	07:17 17:21	26	16:30 (02) 16:56 (02)	06:34 17:59	06:25 (16) 06:24 (16)
7	07:40 16:42	07:16 17:22	27	16:29 (02) 16:56 (02)	06:33 18:00	06:26 (16) 06:26 (16)
8	07:40 16:43	07:15 17:24	30	16:28 (02) 16:58 (02)	07:31 19:01	06:27 (16) 06:53 (16)
9	07:39 16:44	07:14 17:25	31	16:28 (02) 16:59 (02)	07:29 19:02	06:28 (16) 06:52 (16)
10	07:39 16:46	07:12 17:26	32	16:27 (02) 16:59 (02)	07:27 19:04	06:28 (16) 06:50 (16)
11	07:39 16:47	07:11 17:28	33	16:27 (02) 17:00 (02)	07:26 19:05	06:29 (16) 06:49 (16)
12	07:38 16:48	07:10 17:29	33	16:27 (02) 17:00 (02)	07:24 19:06	06:30 (16) 06:48 (16)
13	07:38 16:49	07:08 17:31	34	16:26 (02) 17:00 (02)	07:22 19:08	06:32 (16) 06:46 (16)
14	07:38 16:50	07:07 17:32	34	16:27 (02) 17:01 (02)	07:20 19:09	06:35 (16) 06:43 (16)
15	07:37 16:51	07:05 17:33	34	16:26 (02) 17:00 (02)	07:18 19:10	06:23 19:48
16	07:37 16:53	07:04 17:35	33	16:27 (02) 17:00 (02)	07:17 19:11	06:21 19:49
17	07:36 16:54	07:02 17:36	33	16:27 (02) 17:00 (02)	07:15 19:13	06:19 19:50
18	07:35 16:55	07:01 17:37	32	16:28 (02) 17:00 (02)	07:13 19:14	06:18 19:52
19	07:35 16:56	06:59 17:39	31	16:28 (02) 16:59 (02)	07:11 19:15	06:16 19:53
20	07:34 16:58	06:58 17:40	29	16:28 (02) 16:57 (02)	07:09 19:16	06:14 19:54
21	07:33 16:59	06:56 17:41	27	16:30 (02) 16:57 (02)	07:08 19:18	06:13 19:55
22	07:33 17:00	06:55 17:43	24	16:31 (02) 16:55 (02)	07:06 19:19	06:11 19:57
23	07:32 17:02	06:53 17:44	21	16:33 (02) 16:54 (02)	07:04 19:20	06:09 19:58
24	07:31 17:03	06:51 17:46	18	16:34 (02) 16:52 (02)	07:02 19:21	06:08 19:59
25	07:30 17:04	06:50 17:47	11	16:37 (02) 16:48 (02)	07:00 19:22	06:06 20:00
26	07:29 17:06	06:48 17:48		06:58 19:24	25	18:55 (01) 20:00
27	07:28 17:07	06:46 17:50		06:57 19:25	24	18:55 (01) 20:01
28	07:27 17:08	06:45 17:51		06:55 19:26	22	18:53 (01) 20:03
29	07:26 17:10			06:53 19:27	20	18:31 (01) 20:04
30	07:25 17:11			06:51 19:29	17	18:32 (01) 20:05
31	07:24 17:13			06:49 19:30	11	18:34 (01) 20:05
Potential sun hours	288	293	369	403	457	463
Total, worst case		645	350	277	341	
Sun reduction		0.39	0.47	0.49	0.55	
Oper. time red.		1.00	1.00	1.00	1.00	
Wind dir. red.		0.70	0.60	0.64	0.64	
Total reduction		0.27	0.28	0.32	0.35	
Total, real		177	99	87	121	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker
			(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 10

Licensed user:

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Calculated:

3/21/2011 11:14 AM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2 Shadow receptor: R-111 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (366)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25	05:52	06:40 (16)	06:27	07:02	06:40
	20:52	20:31	19 06:59 (16)	19:42	18:47	15:57 (02)
2	05:25	05:53	06:39 (16)	06:28	07:03	06:42
	20:52	20:30	21 07:00 (16)	19:40	18:45	31 16:28 (02)
3	05:26	05:54	06:38 (16)	06:29	07:04	06:43
	20:52	20:29	23 07:01 (16)	19:39	18:43	30 16:27 (02)
4	05:27	05:55	06:37 (16)	06:30	07:05	06:44
	20:51	20:27	25 07:02 (16)	19:37	18:41	29 16:27 (02)
5	05:27	05:56	06:36 (16)	06:32	07:06	06:46
	20:51	20:26	26 07:02 (16)	19:35	18:40	28 16:26 (02)
6	05:28	05:57	06:35 (16)	06:33	07:07	06:47
	20:51	20:25	28 07:03 (16)	19:33	18:38	26 16:26 (02)
7	05:29	05:58	06:35 (16)	06:34	07:09	06:48
	20:51	20:23	28 07:03 (16)	19:31	18:36	23 16:24 (02)
8	05:29	05:59	06:34 (16)	06:35	07:10	06:50
	20:50	20:22	30 07:04 (16)	19:29	18:34	20 16:23 (02)
9	05:30	06:01	06:33 (16)	06:36	07:11	06:51
	20:50	20:21	31 07:04 (16)	19:28	18:33	17 16:21 (02)
10	05:31	06:02	06:34 (16)	06:37	07:12	06:52
	20:49	20:19	31 07:05 (16)	19:26	18:31	11 16:18 (02)
11	05:31	06:03	06:34 (16)	06:38	07:14	06:54
	20:49	20:18	31 07:05 (16)	19:24	18:29	16:43
12	05:32	06:04	06:33 (16)	06:40	07:15	06:55
	20:48	20:16	31 07:04 (16)	19:22	18:27 (01)	16:42
13	05:33	06:05	06:33 (16)	06:41	07:16	06:56
	20:48	20:15	31 07:04 (16)	19:20	18:24 (01)	16:41
14	05:34	06:06	06:33 (16)	06:42	07:17	06:58
	20:47	20:13	31 07:04 (16)	19:18	18:22 (01)	16:40
15	05:35	06:07	06:33 (16)	06:43	07:19	06:59
	20:47	20:12	30 07:03 (16)	19:17	18:20 (01)	16:39
16	05:36	06:09	06:33 (16)	06:44	07:20	07:00
	20:46	20:10	30 07:03 (16)	19:15	18:18 (01)	17:13 (02)
17	05:37	06:10	06:33 (16)	06:45	07:21	07:02
	20:45	20:09	29 07:02 (16)	19:13	18:17 (01)	17:07 (02)
18	05:37	06:11	06:34 (16)	06:46	07:22	07:03
	20:45	20:07	27 07:01 (16)	19:11	18:16 (01)	17:05 (02)
19	05:38	06:12	06:34 (16)	06:48	07:24	07:04
	20:44	20:06	25 06:59 (16)	19:09	18:15 (01)	17:24 (02)
20	05:39	06:13	06:35 (16)	06:49	07:25	07:06
	20:43	20:04	23 06:58 (16)	19:07	18:15 (01)	17:01 (02)
21	05:40	06:14	06:37 (16)	06:50	07:26	07:07
	20:42	20:03	20 06:57 (16)	19:05	18:15 (01)	17:26 (02)
22	05:41	06:15	06:39 (16)	06:51	07:27	07:08
	20:41	20:01	16 06:55 (16)	19:04	18:15 (01)	17:00 (02)
23	05:42	06:17	06:41 (16)	06:52	07:29	07:09
	20:40	19:58	11 06:52 (16)	19:02	18:15 (01)	16:58 (02)
24	05:43	06:18	06:42 (16)	06:53	07:30	07:10
	20:39	19:56	06:54	18:58	18:15 (01)	17:29 (02)
25	05:44	06:19	06:54	18:58	18:15 (01)	16:57 (02)
	20:39	19:54	06:56	18:58	18:15 (01)	17:29 (02)
26	05:45	06:20	06:56	18:58	18:15 (01)	16:56 (02)
	20:38	19:53	06:57	18:58	18:15 (01)	17:29 (02)
27	05:46	06:21	06:57	18:58	18:15 (01)	16:56 (02)
	20:37	19:51	06:58	18:58	18:15 (01)	17:29 (02)
28	05:47	06:22	06:58	18:58	18:15 (01)	16:55 (02)
	20:35	19:49	06:59	18:58	18:15 (01)	17:29 (02)
29	05:48	06:23	06:59	18:58	18:15 (01)	16:55 (02)
	20:34	2 06:50 (16)	19:47	18:58	18:15 (01)	17:29 (02)
30	05:50	06:44 (16)	06:25	07:00	07:38	16:56 (02)
	20:33	11 06:55 (16)	19:46	18:49	17:59	17:29 (02)
31	05:51	06:42 (16)	06:26	07:00	07:39	16:57 (02)
	20:32	15 06:57 (16)	19:44	18:49	17:57	17:29 (02)
Potential sun hours	469	434	376	342	290	277
Total, worst case	28	597	354	436	215	
Sun reduction	0.63	0.59	0.54	0.44	0.27	
Oper. time red.	1.00	1.00	1.00	1.00	1.00	
Wind dir. red.	0.64	0.64	0.60	0.70	0.70	
Total reduction	0.41	0.38	0.32	0.31	0.19	
Total, real	11	227	115	135	41	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 11

Licensed user:

**EDR**

217 Montgomery St.

US-SYRACUSE, NY 13202

(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-112 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (365)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.33	0.39	0.47	0.49	0.55	0.59	0.63	0.59	0.54	0.44	0.27	0.25

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
438	648	710	456	298	237	193	272	631	1,051	1,182	1,006	675	429	245	289	8,760

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

	January	February	March	April	May	June
1   07:40		07:23	15:58 (02)	06:43		05:25
1   16:37		17:14	34 16:32 (02)	17:52		20:06
2   07:40		07:22	15:59 (02)	06:41		05:56
2   16:37		17:15	32 16:31 (02)	17:53		20:07
3   07:40		07:21	16:00 (02)	06:40		05:54
3   16:38		17:17	31 16:31 (02)	17:55		20:09
4   07:40		07:20	16:00 (02)	06:38	17:23 (01)	05:53
4   16:39		17:18	30 16:30 (02)	17:56	10 17:33 (01)	20:10
5   07:40		07:19	16:01 (02)	06:36	17:20 (01)	05:52
5   16:40		17:19	29 16:30 (02)	17:57	14 17:34 (01)	20:11
6   07:40	16:04 (02)	07:17	16:03 (02)	06:34	17:18 (01)	05:50
6   16:41	6 16:10 (02)	17:21	16:29 (02)	17:59	8 07:08 (16)	20:12
7   07:40	16:01 (02)	07:16	16:03 (02)	06:33	17:17 (01)	05:49
7   16:42	11 16:12 (02)	17:22	16:27 (02)	18:00	15 07:12 (16)	20:13
8   07:40	16:00 (02)	07:15	16:05 (02)	07:31	18:15 (01)	05:48
8   16:43	14 16:14 (02)	17:24	16:26 (02)	19:01	18 07:13 (16)	20:15
9   07:39	16:00 (02)	07:14	16:08 (02)	07:29	18:14 (01)	05:46
9   16:44	16 16:16 (02)	17:25	16:24 (02)	19:02	21 07:14 (16)	20:16
10   07:39	15:59 (02)	07:12	16:11 (02)	07:27	18:14 (01)	05:45
10   16:46	18 16:17 (02)	17:26	16:21 (02)	19:04	24 07:15 (16)	20:17
11   07:39	15:58 (02)	07:11	07:26	19:05	18:13 (01)	05:44
11   16:47	21 16:19 (02)	17:28	19:05	29 18:42 (01)	26 07:16 (16)	20:18
12   07:38	15:58 (02)	07:10	07:24	19:06	18:13 (01)	05:43
12   16:48	22 16:20 (02)	17:29	19:06	28 18:41 (01)	27 07:16 (16)	20:19
13   07:38	15:57 (02)	07:08	07:22	19:07	18:12 (01)	05:41
13   16:49	24 16:21 (02)	17:31	19:08	29 18:41 (01)	28 07:16 (16)	20:20
14   07:38	15:57 (02)	07:07	07:20	19:09	18:12 (01)	05:40
14   16:50	26 16:23 (02)	17:32	19:09	28 18:40 (01)	29 07:16 (16)	20:21
15   07:37	15:57 (02)	07:05	07:18	19:10	18:12 (01)	05:39
15   16:51	26 16:23 (02)	17:33	19:10	28 18:40 (01)	29 07:16 (16)	20:23
16   07:37	15:56 (02)	07:04	07:17	19:11	18:13 (01)	05:38
16   16:53	28 16:24 (02)	17:35	19:11	27 18:40 (01)	29 07:16 (16)	20:24
17   07:36	15:56 (02)	07:02	07:15	19:12	18:13 (01)	05:37
17   16:54	30 16:26 (02)	17:36	19:13	25 18:38 (01)	29 07:15 (16)	20:25
18   07:35	15:56 (02)	07:01	07:13	19:14	18:14 (01)	05:36
18   16:55	30 16:26 (02)	17:37	19:14	23 18:37 (01)	28 07:15 (16)	20:26
19   07:35	15:55 (02)	06:59	07:11	19:15	18:15 (01)	05:35
19   16:56	32 16:27 (02)	17:39	19:15	20 18:35 (01)	27 07:14 (16)	20:27
20   07:34	15:56 (02)	06:58	07:09	19:16	18:16 (01)	05:34
20   16:58	32 16:28 (02)	17:40	19:16	17 18:33 (01)	25 07:12 (16)	20:28
21   07:33	15:56 (02)	06:56	07:08	19:17	18:19 (01)	05:33
21   16:59	33 16:29 (02)	17:42	19:18	10 18:29 (01)	24 07:12 (16)	20:29
22   07:33	15:55 (02)	06:55	07:06	19:19	06:49 (16)	05:32
22   17:00	34 16:29 (02)	17:43	19:19	21 07:10 (16)	20:30	20:51
23   07:32	15:55 (02)	06:53	07:04	19:20	06:50 (16)	05:31
23   17:02	35 16:30 (02)	17:44	19:20	19 07:09 (16)	20:31	20:52
24   07:31	15:55 (02)	06:51	07:02	19:21	06:51 (16)	05:30
24   17:03	35 16:30 (02)	17:46	19:21	16 07:07 (16)	20:32	20:52
25   07:30	15:55 (02)	06:50	07:00	19:22	06:54 (16)	05:29
25   17:04	35 16:30 (02)	17:47	19:22	10 07:04 (16)	20:33	20:52
26   07:29	15:55 (02)	06:48	06:58	19:23	05:29	05:23
26   17:06	36 16:31 (02)	17:48	19:24	20:00	20:34	20:52
27   07:28	15:56 (02)	06:46	06:57	19:25	05:28	05:23
27   17:07	35 16:31 (02)	17:50	19:25	20:01	20:35	20:52
28   07:27	15:56 (02)	06:45	06:55	19:26	05:27	05:23
28   17:08	35 16:31 (02)	17:51	19:26	20:03	20:36	20:52
29   07:26	15:56 (02)		06:53	19:27	05:27	05:24
29   17:10	35 16:31 (02)		19:27	20:04	20:37	20:52
30   07:25	15:57 (02)		06:51	19:28	05:26	05:24
30   17:11	35 16:32 (02)		19:29	20:05	20:38	20:52
31   07:24	15:57 (02)		06:49		05:25	
31   17:13	35 16:32 (02)		19:30		20:39	
Potential sun hours	288	293	369	403	457	463
Total, worst case	719	253	404	453		555
Sun reduction	0.33	0.39	0.47	0.49		0.59
Oper. time red.	1.00	1.00	1.00	1.00		1.00
Wind dir. red.	0.73	0.73	0.62	0.61		0.71
Total reduction	0.24	0.29	0.29	0.30		0.43
Total, real	174	73	119	137		237

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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Licensed user:

**EDR**

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(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

Calculation: 05030 SFA Gamesa G97\_R2 Shadow receptor: R-112 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (365)

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
 438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
 Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October		November		December		
1	05:25	05:53 (15)	05:52		06:27	06:49 (16)	07:02		17:51 (01)	06:40	15:40 (02)	07:19	15:40 (02)
	20	06:13 (15)	20:31		19:42	26 07:15 (16)	18:47	29	18:20 (01)	16:56	11 15:51 (02)	16:28	21 16:01 (02)
2	05:25	05:54 (15)	05:53		06:28	06:50 (16)	07:03		17:52 (01)	06:42	15:36 (02)	07:20	15:42 (02)
	19	06:13 (15)	20:30		19:40	24 07:14 (16)	18:45	28	18:20 (01)	16:54	17 15:53 (02)	16:28	18 16:00 (02)
3	05:26	05:54 (15)	05:54		06:29	06:51 (16)	07:04		17:51 (01)	06:43	15:35 (02)	07:21	15:43 (02)
	18	06:12 (15)	20:29		19:39	21 07:12 (16)	18:43	29	18:20 (01)	16:53	21 15:56 (02)	16:27	16 15:59 (02)
4	05:27	05:55 (15)	05:55		06:30	06:52 (16)	07:05		17:51 (01)	06:44	15:33 (02)	07:22	15:44 (02)
	17	06:12 (15)	20:27		19:37	18 07:10 (16)	18:41	27	18:18 (01)	16:52	24 15:57 (02)	16:27	14 15:58 (02)
5	05:27	05:56 (15)	05:56		06:32	06:53 (16)	07:06		17:51 (01)	06:46	15:32 (02)	07:23	15:47 (02)
	15	06:11 (15)	20:26		19:35	15 07:08 (16)	18:40	25	18:16 (01)	16:50	27 15:59 (02)	16:27	11 15:58 (02)
6	05:28	05:57 (15)	05:57		06:33	06:56 (16)	07:07		17:52 (01)	06:47	15:31 (02)	07:24	15:50 (02)
	13	06:10 (15)	20:25		19:33	8 07:04 (16)	18:38	22	18:14 (01)	16:49	28 15:59 (02)	16:27	6 15:56 (02)
7	05:29	05:59 (15)	05:58		06:34		07:09		17:53 (01)	06:48	15:31 (02)	07:25	
	10	06:09 (15)	20:23		19:31		18:36	20	18:13 (01)	16:48	30 16:01 (02)	16:26	
8	05:29	06:01 (15)	05:59		06:35		07:10		17:54 (01)	06:50	15:30 (02)	07:26	
	6	06:07 (15)	20:22		19:29		18:34	17	18:11 (01)	16:47	31 16:01 (02)	16:26	
9	05:30		06:01		06:36		07:11		17:56 (01)	06:51	15:29 (02)	07:27	
	20		20:21		19:28		18:33	13	18:09 (01)	16:45	32 16:01 (02)	16:26	
10	05:31		06:02		06:37		07:12		17:59 (01)	06:52	15:29 (02)	07:28	
	20		20:19		19:26		18:31	8	18:07 (01)	16:44	33 16:02 (02)	16:26	
11	05:31		06:03		06:38		07:14			06:54	15:28 (02)	07:29	
	20		20:18		19:24		18:29			16:43	35 16:03 (02)	16:26	
12	05:32		06:04		06:40		07:15			06:55	15:29 (02)	07:30	
	20		20:16		19:22		18:27			16:42	34 16:03 (02)	16:26	
13	05:33		06:05		06:41		07:16			06:56	15:28 (02)	07:31	
	20		20:15		19:20		18:26			16:41	35 16:03 (02)	16:26	
14	05:34		06:06		06:42		07:17			06:58	15:29 (02)	07:32	
	20		20:13		19:18		18:24			16:40	35 16:04 (02)	16:27	
15	05:35		06:07		06:43		07:19			06:59	15:29 (02)	07:32	
	20		20:12		19:17		18:22			16:39	35 16:04 (02)	16:27	
16	05:36		06:09		06:44		07:20			07:00	15:28 (02)	07:33	
	20		20:10		19:15		18:20			16:38	36 16:04 (02)	16:27	
17	05:37		06:10		06:45		07:21			07:02	15:29 (02)	07:34	
	20		20:09		19:13		18:19			16:37	35 16:04 (02)	16:27	
18	05:37		06:11	07:00 (16)	06:46		07:22			07:03	15:29 (02)	07:35	
	20		20:07	11 07:11 (16)	19:11		18:17			16:36	35 16:04 (02)	16:28	
19	05:38		06:12	06:57 (16)	06:48		07:24			07:04	15:30 (02)	07:35	
	20		20:06	16 07:13 (16)	19:09		18:15			16:35	35 16:05 (02)	16:28	
20	05:39		06:13	06:55 (16)	06:49		07:25			07:06	15:30 (02)	07:36	
	20		20:04	19 07:14 (16)	19:07		18:14			16:34	34 16:04 (02)	16:28	
21	05:40		06:14	06:54 (16)	06:50		07:26			07:07	15:31 (02)	07:36	
	20		20:03	22 07:16 (16)	19:05		18:12			16:34	33 16:04 (02)	16:29	
22	05:41		06:15	06:53 (16)	06:51		07:27			07:08	15:32 (02)	07:37	
	20		20:01	24 07:17 (16)	19:04	7 18:06 (01)	18:11			16:33	32 16:04 (02)	16:29	
23	05:42		06:17	06:52 (16)	06:52		18:02 (01)	07:29		07:09	15:32 (02)	07:37	
	20		19:58	25 07:17 (16)	19:02	14 18:16 (01)	18:09			16:32	32 16:04 (02)	16:30	
24	05:43		06:18	06:51 (16)	06:53		17:59 (01)	07:30		07:11	15:33 (02)	07:38	
	20		19:56	27 07:18 (16)	19:00	19 18:18 (01)	18:07			16:32	30 16:03 (02)	16:30	
25	05:44		06:19	06:50 (16)	06:54		17:57 (01)	07:31		07:12	15:34 (02)	07:38	
	20		19:54	28 07:18 (16)	18:58	22 18:19 (01)	18:06			16:31	30 16:04 (02)	16:31	
26	05:45		06:20	06:49 (16)	06:56		17:56 (01)	07:33		07:13	15:35 (02)	07:39	
	20		19:53	29 07:18 (16)	18:56	25 18:21 (01)	18:04			16:30	28 16:03 (02)	16:32	
27	05:46		06:21	06:49 (16)	06:57		17:55 (01)	07:34		07:14	15:36 (02)	07:39	
	20		19:51	28 07:17 (16)	18:54	26 18:21 (01)	18:03			16:30	26 16:02 (02)	16:32	
28	05:47		06:22	06:48 (16)	06:58		17:54 (01)	07:35		07:16	15:36 (02)	07:39	
	20		19:49	29 07:17 (16)	18:52	27 18:21 (01)	18:01			16:29	26 16:02 (02)	16:33	
29	05:48		06:23	06:48 (16)	06:59		17:53 (01)	07:36		07:17	15:38 (02)	07:39	
	20		19:47	29 07:17 (16)	18:51	28 18:21 (01)	18:00			16:29	24 16:02 (02)	16:34	
30	05:50		06:25	06:48 (16)	07:00		17:52 (01)	07:38		07:18	15:39 (02)	07:40	
	20		19:46	28 07:16 (16)	18:49	29 18:21 (01)	17:59			16:28	22 16:01 (02)	16:35	
31	05:51		06:26	06:49 (16)			07:39					07:40	
	20		19:44	27 07:16 (16)			17:57					16:35	
Potential sun hours	469		434		376		342			290		277	
Total, worst case		118		342		309		218		886		86	
Sun reduction		0.63		0.59		0.54		0.44		0.27		0.25	
Oper. time red.		1.00		1.00		1.00		1.00		1.00		1.00	
Wind dir. red.		0.71		0.61		0.61		0.62		0.73		0.73	
Total reduction		0.46		0.36		0.34		0.28		0.20		0.18	
Total, real		54		124		104		60		176		16	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)		First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker	(WTG causing flicker last time)



Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 13

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

### SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2 Shadow receptor: R-113 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (327)

#### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
 438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
 Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40	14:37 (05) 07:23	07:45 (48) 06:43	16:52 (04) 06:47	05:57	05:25
2	07:40	14:38 (05) 07:22	07:44 (48) 06:41	16:51 (04) 06:46	19:00 (03) 05:56	20:40
3	07:40	14:39 (05) 07:21	07:42 (48) 06:40	16:50 (04) 06:44	19:06 (03) 05:54	20:40
4	07:40	14:39 (05) 07:20	07:42 (48) 06:38	16:49 (04) 06:42	18:56 (03) 05:54	20:41
5	07:40	14:40 (05) 07:19	07:42 (48) 06:36	16:48 (04) 06:40	19:10 (03) 05:09	20:42
6	07:40	14:42 (05) 07:17	07:43 (48) 06:34	16:48 (04) 06:38	18:53 (03) 05:53	20:43
7	07:40	14:42 (05) 07:16	07:42 (48) 06:33	16:48 (04) 06:37	19:12 (03) 05:52	20:44
8	07:39	14:43 (05) 07:15	07:43 (48) 07:31	17:47 (04) 06:35	18:49 (03) 05:49	20:44
9	07:39	14:44 (05) 07:14	07:44 (48) 07:29	17:47 (04) 06:33	19:15 (03) 05:48	20:45
10	07:39	14:45 (05) 07:12	07:44 (48) 07:27	17:47 (04) 06:31	18:47 (03) 05:46	20:46
11	07:39	14:47 (05) 07:11	07:45 (48) 07:26	17:47 (04) 06:30	19:16 (03) 05:45	20:46
12	07:38	14:49 (05) 07:09	07:46 (48) 07:24	17:47 (04) 06:28	18:46 (03) 05:44	20:47
13	07:38	14:50 (05) 07:08	07:48 (48) 07:22	17:47 (04) 06:26	19:15 (03) 05:43	20:47
14	07:38	14:52 (05) 07:07	07:51 (48) 07:20	17:48 (04) 06:24	18:45 (03) 05:41	20:48
15	07:37	14:53 (05) 07:05	07:18	17:48 (04) 06:23	19:15 (03) 05:40	20:49
16	07:37	14:56 (05) 07:04	07:17	17:50 (04) 06:21	18:44 (03) 05:39	20:49
17	07:36	15:00 (05) 07:02	07:15	17:51 (04) 06:19	18:46 (03) 05:38	20:50
18	07:35	15:09 (05) 07:01	07:13	17:52 (04) 06:18	19:13 (03) 05:37	20:51
19	07:35	06:59	07:11	17:54 (04) 06:16	18:48 (03) 05:36	20:51
20	07:34	06:58	07:09	17:57 (04) 06:14	19:09 (03) 05:35	20:51
21	07:33	06:56	07:08	18:11 (04) 06:13	18:49 (03) 05:34	20:51
22	07:33	06:55	07:06	06:11	19:07 (03) 05:33	20:51
23	07:32	06:53	07:04	06:09	18:55 (03) 05:32	20:51
24	07:31	06:51	07:02	06:08	19:00 (03) 05:31	20:52
25	07:30	06:50	07:00	06:06	05:31	20:52
26	07:29	06:48	06:58	06:05	05:30	20:52
27	07:28	06:46	06:56	06:03	05:29	20:52
28	07:27	06:45	06:54	06:02	05:28	20:52
29	07:26	06:44	06:53	06:00	05:27	20:52
30	07:25	06:43	06:51	05:59	05:26	20:52
31	07:24	06:42	06:50	05:58	05:25	20:52
Potential sun hours	288	293	369	403	457	463
Total, worst case	602	413	672	477		
Sun reduction	0.33	0.39	0.47	0.49		
Oper. time red.	1.00	1.00	1.00	1.00		
Wind dir. red.	0.73	0.53	0.64	0.55		
Total reduction	0.25	0.21	0.31	0.28		
Total, real	148	88	209	132		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 14

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-113 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (327)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December			
1	05:25 20:52	05:52 20:31	06:27 19:42	18:45 (03) 19:15 (03)	07:01 18:47	17:26 (04) 16:56	07:14 (48) 16:28	07:19 16:28	14:29 (05) 14:58 (05)
2	05:25 20:52	05:53 20:30	06:28 19:40	18:45 (03) 19:14 (03)	07:03 18:45	17:26 (04) 16:54	07:12 (48) 16:28	07:20 16:28	14:28 (05) 14:59 (05)
3	05:26 20:52	05:54 20:28	06:29 19:39	18:45 (03) 19:14 (03)	07:04 18:43	17:25 (04) 16:53	07:13 (48) 16:27	07:21 16:27	14:28 (05) 15:00 (05)
4	05:27 20:51	05:55 20:27	06:30 19:37	18:45 (03) 19:13 (03)	07:05 18:41	17:24 (04) 16:52	07:12 (48) 16:27	07:22 16:27	14:27 (05) 15:01 (05)
5	05:27 20:51	05:56 20:26	06:31 19:35	18:45 (03) 19:11 (03)	07:06 18:40	17:24 (04) 16:50	07:12 (48) 16:27	07:23 16:27	14:27 (05) 15:02 (05)
6	05:28 20:51	05:57 20:25	06:33 19:33	18:45 (03) 19:10 (03)	07:07 18:38	17:23 (04) 16:49	07:12 (48) 16:27	07:24 16:27	14:28 (05) 15:04 (05)
7	05:29 20:51	05:58 20:23	06:34 19:31	18:46 (03) 19:08 (03)	07:09 18:36	17:24 (04) 16:48	07:13 (48) 16:26	07:25 16:26	14:28 (05) 15:05 (05)
8	05:29 20:50	05:59 20:22	06:35 19:29	18:47 (03) 19:06 (03)	07:10 18:34	17:24 (04) 16:47	07:13 (48) 16:26	07:26 16:26	14:28 (05) 15:05 (05)
9	05:30 20:50	06:01 20:21	06:36 19:28	18:49 (03) 19:04 (03)	07:11 18:33	17:24 (04) 16:45	07:14 (48) 16:26	07:27 16:26	14:28 (05) 15:06 (05)
10	05:31 20:49	06:02 20:19	06:37 19:26	18:53 (03) 19:00 (03)	07:12 18:31	17:24 (04) 16:44	07:16 (48) 16:26	07:28 16:26	14:27 (05) 15:06 (05)
11	05:31 20:49	06:03 20:18	06:38 19:24	07:14 18:29	07:14 18:00 (04)	17:25 (04) 16:43	07:17 (48) 16:26	07:29 16:26	14:27 (05) 15:07 (05)
12	05:32 20:48	06:04 20:16	06:39 19:22	07:15 18:27	07:15 17:58 (04)	17:25 (04) 16:42	07:19 (48) 16:26	07:30 16:26	14:27 (05) 15:08 (05)
13	05:33 20:48	06:05 20:15	06:41 19:20	07:16 18:26	07:16 17:56 (04)	17:26 (04) 16:41	07:20 (48) 16:26	07:31 16:26	14:28 (05) 15:08 (05)
14	05:34 20:47	06:06 20:13	06:42 19:18	07:17 18:24	07:17 17:56 (04)	17:28 (04) 16:40	07:22 (48) 16:26	07:32 16:26	14:28 (05) 15:09 (05)
15	05:35 20:47	06:07 20:12	06:43 19:17	07:18 18:22	07:18 17:53 (04)	17:29 (04) 16:39	07:23 (48) 16:26	07:32 16:26	14:29 (05) 15:10 (05)
16	05:36 20:46	06:09 20:10	06:44 19:15	07:19 18:20	07:19 17:50 (04)	17:30 (04) 16:38	07:24 (48) 16:26	07:33 16:26	14:28 (05) 15:10 (05)
17	05:37 20:45	06:10 20:09	06:45 19:13	07:21 18:19	07:21 17:51 (04)	17:33 (04) 16:38	07:26 (48) 16:26	07:34 16:26	14:29 (05) 15:11 (05)
18	05:37 20:45	06:11 20:07	06:46 19:11	07:22 18:17	07:22 17:47 (04)	17:34 (04) 16:37	07:27 (48) 16:26	07:34 16:26	14:30 (05) 15:12 (05)
19	05:38 20:44	06:12 20:06	06:48 19:09	07:24 18:15	07:24 17:45 (04)	17:35 (04) 16:36	07:28 (48) 16:26	07:35 16:26	14:29 (05) 15:12 (05)
20	05:39 20:43	06:13 20:04	06:49 19:07	07:25 18:14	07:25 17:43 (04)	17:36 (04) 16:35	07:29 (48) 16:26	07:36 16:26	14:30 (05) 15:13 (05)
21	05:40 20:42	06:14 20:02	19:00 (03) 19:05	06:50 18:56 (03)	07:26 18:12	17:37 (04) 16:34	07:30 (48) 16:26	07:36 16:26	14:30 (05) 15:13 (05)
22	05:41 20:41	06:15 20:01	18:56 (03) 19:04	06:51 19:03	07:27 18:11	17:38 (04) 16:33	07:31 (48) 16:26	07:37 16:26	14:31 (05) 15:14 (05)
23	05:42 20:40	06:17 19:58	18:54 (03) 19:02	06:52 19:02	17:42 (04) 18:09	17:39 (04) 16:32	07:32 (48) 16:26	07:37 16:26	14:31 (05) 15:14 (05)
24	05:43 20:39	06:18 19:56	18:52 (03) 19:13 (03)	06:53 19:00	17:38 (04) 18:07	17:40 (04) 16:32	07:33 (48) 16:26	07:38 16:26	14:32 (05) 15:15 (05)
25	05:44 20:38	06:19 19:54	18:50 (03) 19:14 (03)	06:54 18:58	17:35 (04) 18:06	17:41 (04) 16:31	07:34 (48) 14:38 (05)	07:38 16:31	14:33 (05) 15:15 (05)
26	05:45 20:38	06:20 19:52	18:49 (03) 19:14 (03)	06:56 18:56	17:34 (04) 18:04	17:42 (04) 16:30	07:35 (48) 15:40 (05)	07:39 16:32	14:33 (05) 15:15 (05)
27	05:46 20:36	06:21 19:51	18:48 (03) 19:15 (03)	06:57 18:54	17:32 (04) 18:03	17:43 (04) 16:30	07:36 (48) 14:33 (05)	07:39 16:32	14:33 (05) 15:15 (05)
28	05:47 20:35	06:22 19:49	18:47 (03) 19:15 (03)	06:58 18:52	17:30 (04) 18:01	17:44 (04) 16:29	07:37 (48) 14:31 (05)	07:39 16:33	14:34 (05) 15:16 (05)
29	05:48 20:34	06:23 19:47	18:46 (03) 19:15 (03)	06:59 18:51	17:29 (04) 18:03	17:45 (04) 16:29	07:38 (48) 14:31 (05)	07:39 16:34	14:35 (05) 15:16 (05)
30	05:50 20:33	06:25 19:46	18:45 (03) 19:15 (03)	07:00 18:49	17:27 (04) 17:59	17:46 (04) 16:28	14:30 (05) 16:28	07:40 16:35	14:35 (05) 15:16 (05)
31	05:51 20:32	06:26 19:44	18:45 (03) 19:15 (03)	07:00 18:48	17:27 (04) 17:57	17:47 (04) 16:28	14:31 (05) 16:28	07:40 16:35	14:36 (05) 15:17 (05)
Potential sun hours	469	434	376	342	290	277			
Total, worst case		253	444	633	458	1226			
Sun reduction		0.59	0.54	0.44	0.27	0.25			
Oper. time red.		1.00	1.00	1.00	1.00	1.00			
Wind dir. red.		0.55	0.60	0.63	0.57	0.77			
Total reduction		0.33	0.33	0.28	0.16	0.20			
Total, real		84	146	180	72	242			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 15

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-115 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (388)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June					
1	07:40 16:37	15:18 (02) 15:53 (02)	07:23 17:14	06:43 17:52	16:53 (01) 17:23 (01)	06:47 19:31	26	07:09 (16) 07:35 (16)	05:57 20:06	05:25 20:40	06:06 (15) 06:40 (15)
2	07:40 16:37	15:18 (02) 15:54 (02)	07:22 17:15	06:41 17:53	16:53 (01) 17:23 (01)	06:46 19:32	27	07:08 (16) 07:35 (16)	05:56 20:07	05:24 20:40	06:06 (15) 06:39 (15)
3	07:40 16:38	15:19 (02) 15:54 (02)	07:21 17:17	06:40 17:55	16:53 (01) 17:22 (01)	06:44 19:33	27	07:09 (16) 07:36 (16)	05:54 20:09	05:24 20:41	06:07 (15) 06:40 (15)
4	07:40 16:39	15:20 (02) 15:55 (02)	07:20 17:18	06:38 17:56	16:54 (01) 17:21 (01)	06:42 19:35	27	07:08 (16) 07:35 (16)	05:53 20:10	05:23 20:42	06:08 (15) 06:40 (15)
5	07:40 16:40	15:20 (02) 15:55 (02)	07:19 17:19	06:36 17:57	16:54 (01) 17:20 (01)	06:40 19:36	26	07:08 (16) 07:34 (16)	05:52 20:11	05:23 20:43	06:08 (15) 06:39 (15)
6	07:40 16:41	15:21 (02) 15:56 (02)	07:17 17:21	06:34 17:59	16:56 (01) 17:19 (01)	06:38 19:37	25	07:08 (16) 07:33 (16)	05:50 20:12	05:23 20:44	06:08 (15) 06:40 (15)
7	07:40 16:42	15:21 (02) 15:56 (02)	07:16 17:22	06:33 18:00	16:57 (01) 17:17 (01)	06:37 19:38	22	07:10 (16) 07:32 (16)	05:49 20:13	05:22 20:44	06:09 (15) 06:40 (15)
8	07:40 16:43	15:22 (02) 15:56 (02)	07:15 17:24	06:31 18:01	17:58 (01) 18:15 (01)	06:35 19:40	21	07:10 (16) 07:31 (16)	05:48 20:15	05:22 20:45	06:09 (15) 06:39 (15)
9	07:39 16:44	15:23 (02) 15:56 (02)	07:14 17:25	06:29 19:03	18:01 (01) 18:11 (01)	06:33 19:41	18	07:11 (16) 07:29 (16)	05:46 20:16	05:22 20:46	06:10 (15) 06:39 (15)
10	07:39 16:46	15:23 (02) 15:56 (02)	07:12 17:26	06:27 19:04	18:11 (01) 19:04	06:31 19:42	13	07:13 (16) 07:26 (16)	05:45 20:17	05:21 20:46	06:10 (15) 06:39 (15)
11	07:39 16:47	15:24 (02) 15:56 (02)	07:11 17:28	06:26 19:05	19:04 19:43	06:30 19:44	6	07:17 (16) 07:23 (16)	05:44 20:18	05:21 20:47	06:11 (15) 06:39 (15)
12	07:38 16:48	15:24 (02) 15:57 (02)	07:10 17:29	06:25 19:06	19:05 19:44	06:28 19:44	28	07:17 (16) 07:23 (16)	05:43 20:19	05:21 20:48	06:11 (15) 06:39 (15)
13	07:38 16:49	15:25 (02) 15:57 (02)	07:08 17:31	06:24 19:08	19:06 19:46	06:26 19:46	30	07:19 (16) 07:24 (16)	05:41 20:20	05:21 20:48	06:12 (15) 06:39 (15)
14	07:38 16:50	15:25 (02) 15:57 (02)	07:07 17:32	06:23 19:09	19:08 19:46	06:24 19:47	32	07:20 (16) 07:25 (16)	05:40 20:21	05:21 20:49	06:12 (15) 06:39 (15)
15	07:37 16:51	15:27 (02) 15:57 (02)	07:05 17:33	06:22 19:10	19:09 19:48	06:23 19:48	34	07:21 (16) 07:26 (16)	05:39 20:22	05:21 20:49	06:13 (15) 06:39 (15)
16	07:37 16:53	15:27 (02) 15:58 (02)	07:04 17:35	06:21 19:11	19:10 19:49	06:22 19:49	34	07:22 (16) 07:27 (16)	05:38 20:23	05:21 20:49	06:13 (15) 06:40 (15)
17	07:36 16:54	15:30 (02) 15:58 (02)	07:02 17:36	06:20 19:13	19:11 19:50	06:19 19:50	34	07:23 (16) 07:28 (16)	05:37 20:24	05:21 20:50	06:13 (15) 06:40 (15)
18	07:35 16:55	15:31 (02) 15:59 (02)	07:01 17:37	06:18 19:14	19:12 19:52	06:18 19:52	35	07:24 (16) 07:29 (16)	05:36 20:25	05:21 20:50	06:13 (15) 06:40 (15)
19	07:35 16:56	15:32 (02) 15:54 (02)	06:59 17:39	06:16 19:15	19:13 19:53	06:16 19:53	36	07:25 (16) 07:30 (16)	05:35 20:26	05:21 20:51	06:14 (15) 06:40 (15)
20	07:34 16:58	15:34 (02) 15:54 (02)	06:58 17:40	06:14 19:16	19:14 19:54	06:14 19:54	36	07:26 (16) 07:31 (16)	05:34 20:27	05:21 20:51	06:14 (15) 06:40 (15)
21	07:33 16:59	15:34 (02) 15:55 (02)	06:57 17:41	06:13 19:17	19:15 19:55	06:13 19:55	36	07:27 (16) 07:32 (16)	05:33 20:28	05:21 20:51	06:14 (15) 06:40 (15)
22	07:33 17:00	15:35 (02) 15:56 (02)	06:56 17:42	06:12 19:18	19:16 19:56	06:12 19:56	36	07:28 (16) 07:33 (16)	05:32 20:29	05:21 20:51	06:15 (15) 06:41 (15)
23	07:32 17:02	15:36 (02) 15:57 (02)	06:55 17:43	06:11 19:19	19:17 19:57	06:11 19:57	36	07:29 (16) 07:34 (16)	05:31 20:30	05:22 20:51	06:15 (15) 06:41 (15)
24	07:31 17:03	15:43 (02) 15:58 (02)	06:53 17:44	06:10 19:20	19:18 19:58	06:10 19:58	36	07:30 (16) 07:35 (16)	05:30 20:31	05:22 20:52	06:15 (15) 06:41 (15)
25	07:30 17:04	15:44 (02) 15:59 (02)	06:52 17:45	06:09 19:21	19:19 19:59	06:09 19:59	37	07:31 (16) 07:36 (16)	05:29 20:32	05:22 20:52	06:15 (15) 06:41 (15)
26	07:29 17:06	15:45 (02) 15:59 (02)	06:51 17:46	06:08 19:22	19:20 19:60	06:08 19:60	37	07:32 (16) 07:37 (16)	05:28 20:33	05:22 20:52	06:15 (15) 06:41 (15)
27	07:28 17:07	15:46 (02) 15:59 (02)	06:50 17:47	06:07 19:23	19:21 19:61	06:07 19:61	36	07:33 (16) 07:38 (16)	05:27 20:34	05:22 20:52	06:15 (15) 06:41 (15)
28	07:27 17:08	15:47 (02) 15:59 (02)	06:49 17:48	06:06 19:24	19:22 19:62	06:06 19:62	36	07:34 (16) 07:39 (16)	05:26 20:35	05:22 20:52	06:15 (15) 06:41 (15)
29	07:26 17:10	15:48 (02) 15:59 (02)	06:48 17:49	06:05 19:25	19:23 19:63	06:05 19:63	35	07:35 (16) 07:40 (16)	05:25 20:36	05:22 20:52	06:15 (15) 06:41 (15)
30	07:25 17:11	15:49 (02) 15:59 (02)	06:47 17:50	06:04 19:26	19:24 19:64	06:04 19:64	35	07:36 (16) 07:41 (16)	05:24 20:37	05:22 20:52	06:15 (15) 06:41 (15)
31	07:24 17:13	15:50 (02) 15:59 (02)	06:46 17:51	06:03 19:27	19:25 19:65	06:03 19:65	34	07:37 (16) 07:42 (16)	05:23 20:38	05:22 20:52	06:14 (15) 06:42 (15)
Potential sun hours	288	293	369	403	457	463					
Total, worst case	649	253	342	238	822	850					
Sun reduction	0.33	0.39	0.47	0.49	0.55	0.59					
Oper. time red.	1.00	1.00	1.00	1.00	1.00	1.00					
Wind dir. red.	0.76	0.66	0.63	0.58	0.68	0.68					
Total reduction	0.25	0.26	0.30	0.29	0.38	0.41					
Total, real	164	66	103	69	311	345					

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 16

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
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Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-115 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (388)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25	06:15 (15) 05:52	06:18 (15) 06:27	07:15 (16) 07:02	06:40	07:19 15:06 (02)
	20:52	28 06:43 (15) 20:31	29 06:47 (15) 19:42	7 07:22 (16) 18:47	16:56	16:28 32 15:38 (02)
2	05:25	06:15 (15) 05:53	06:19 (15) 06:28	07:11 (16) 07:03	06:42	07:20 15:06 (02)
	20:52	29 06:44 (15) 20:30	27 06:46 (15) 19:40	14 07:25 (16) 18:45	16:54	16:28 33 15:39 (02)
3	05:26	06:15 (15) 05:54	06:20 (15) 06:29	07:09 (16) 07:04	06:43	07:21 15:06 (02)
	20:52	29 06:44 (15) 20:29	25 06:45 (15) 19:39	18 07:27 (16) 18:43	16:53	16:27 33 15:39 (02)
4	05:27	06:15 (15) 05:55	06:21 (15) 06:30	07:07 (16) 07:05	17:42 (01) 06:44	07:22 15:06 (02)
	20:51	30 06:45 (15) 20:27	23 06:44 (15) 19:37	21 07:28 (16) 18:41	4 17:46 (01) 16:52	16:27 34 15:40 (02)
5	05:27	06:14 (15) 05:56	06:22 (15) 06:32	07:06 (16) 07:06	17:36 (01) 06:46	07:23 15:07 (02)
	20:51	31 06:45 (15) 20:26	20 06:42 (15) 19:35	22 07:28 (16) 18:40	14 17:50 (01) 16:50	16:27 34 15:41 (02)
6	05:28	06:15 (15) 05:57	06:24 (15) 06:33	07:04 (16) 07:07	17:33 (01) 06:47	07:24 15:07 (02)
	20:51	31 06:46 (15) 20:25	16 06:40 (15) 19:33	25 07:29 (16) 18:38	19 17:52 (01) 16:49	16:27 35 15:42 (02)
7	05:29	06:15 (15) 05:58	06:27 (15) 06:34	07:03 (16) 07:09	17:32 (01) 06:48	07:25 15:07 (02)
	20:51	31 06:46 (15) 20:23	10 06:37 (15) 19:31	26 07:29 (16) 18:36	22 17:54 (01) 16:48	16:26 35 15:42 (02)
8	05:29	06:14 (15) 05:59	06:35	07:02 (16) 07:10	17:30 (01) 06:50	07:26 15:08 (02)
	20:50	32 06:46 (15) 20:22	19:29 27 07:29 (16) 18:34	25 17:55 (01) 16:47	16:26 35 15:43 (02)	
9	05:30	06:14 (15) 06:01	06:36	07:02 (16) 07:11	17:29 (01) 06:51	07:27 15:08 (02)
	20:50	33 06:47 (15) 20:21	19:28 27 07:29 (16) 18:33	26 17:55 (01) 16:45	16:26 35 15:43 (02)	
10	05:31	06:15 (15) 06:02	06:37	07:02 (16) 07:12	17:28 (01) 06:52	07:28 15:09 (02)
	20:49	33 06:48 (15) 20:19	19:26 27 07:29 (16) 18:31	27 17:55 (01) 16:44	16:26 35 15:44 (02)	
11	05:31	06:14 (15) 06:03	06:38	07:02 (16) 07:14	17:27 (01) 06:54	07:29 15:08 (02)
	20:49	33 06:47 (15) 20:18	19:24 27 07:29 (16) 18:29	29 17:56 (01) 16:43	16:26 35 15:43 (02)	
12	05:32	06:14 (15) 06:04	06:40	07:02 (16) 07:15	17:27 (01) 06:55	07:30 15:09 (02)
	20:48	34 06:48 (15) 20:16	19:22 26 07:28 (16) 18:27	29 17:56 (01) 16:42	16:26 35 15:44 (02)	
13	05:33	06:14 (15) 06:05	06:41	07:02 (16) 07:16	17:26 (01) 06:56	07:31 15:09 (02)
	20:48	34 06:48 (15) 20:15	19:20 25 07:27 (16) 18:26	30 17:56 (01) 16:41	16:26 36 15:45 (02)	
14	05:34	06:14 (15) 06:06	06:42	07:03 (16) 07:17	17:26 (01) 06:58	07:32 15:10 (02)
	20:47	35 06:49 (15) 20:13	19:18 23 07:26 (16) 18:24	30 17:56 (01) 16:40	16:27 36 15:45 (02)	
15	05:35	06:14 (15) 06:07	06:43	07:04 (16) 07:19	17:26 (01) 06:59	07:32 15:10 (02)
	20:47	35 06:49 (15) 20:12	19:17 20 07:24 (16) 18:22	30 17:56 (01) 16:39	16:27 36 15:46 (02)	
16	05:36	06:15 (15) 06:09	06:44	07:05 (16) 07:20	17:26 (01) 07:00	07:33 15:10 (02)
	20:46	35 06:50 (15) 20:10	19:15 17 07:22 (16) 18:20	29 17:55 (01) 16:38	16:27 36 15:46 (02)	
17	05:37	06:14 (15) 06:10	06:45	07:06 (16) 07:21	17:25 (01) 07:02	07:34 15:11 (02)
	20:45	35 06:49 (15) 20:09	19:13 14 07:20 (16) 18:19	29 17:54 (01) 16:37	16:27 36 15:47 (02)	
18	05:37	06:14 (15) 06:11	06:46	07:07 (16) 07:22	17:26 (01) 07:03	07:35 15:12 (02)
	20:45	36 06:50 (15) 20:07	19:11 10 07:17 (16) 18:17	27 17:53 (01) 16:36	16:28 35 15:47 (02)	
19	05:38	06:14 (15) 06:12	06:48	07:24	17:27 (01) 07:04	15:18 (02) 07:35 15:12 (02)
	20:44	36 06:50 (15) 20:06	19:09	18:15 24 17:51 (01) 16:35	3 15:21 (02) 16:28 35 15:47 (02)	
20	05:39	06:14 (15) 06:13	06:49	07:25	17:27 (01) 07:06	15:13 (02) 07:36 15:12 (02)
	20:43	36 06:50 (15) 20:04	19:07	18:14 22 17:49 (01) 16:34	12 15:25 (02) 16:28 36 15:48 (02)	
21	05:40	06:14 (15) 06:14	06:50	07:26	17:29 (01) 07:07	15:11 (02) 07:36 15:12 (02)
	20:42	36 06:50 (15) 20:03	19:05	18:12 19 17:48 (01) 16:34	16 15:27 (02) 16:29 36 15:48 (02)	
22	05:41	06:14 (15) 06:15	06:51	07:27	17:30 (01) 07:08	15:10 (02) 07:37 15:13 (02)
	20:41	36 06:50 (15) 20:01	19:04	18:11 16 17:46 (01) 16:33	20 15:30 (02) 16:29 36 15:49 (02)	
23	05:42	06:14 (15) 06:17	06:52	07:29	17:33 (01) 07:09	15:09 (02) 07:37 15:13 (02)
	20:40	36 06:50 (15) 19:58	19:02	18:09 12 17:45 (01) 16:32	22 15:31 (02) 16:30 36 15:49 (02)	
24	05:43	06:15 (15) 06:18	06:53	07:30	17:37 (01) 07:11	15:08 (02) 07:38 15:14 (02)
	20:40	35 06:50 (15) 19:56	19:00	18:07 4 17:41 (01) 16:32	24 15:32 (02) 16:30 36 15:50 (02)	
25	05:44	06:15 (15) 06:19	06:54	07:31	07:12	15:08 (02) 07:38 15:15 (02)
	20:39	35 06:50 (15) 19:54	18:58	18:06	16:31 26 15:34 (02) 16:31 35 15:50 (02)	
26	05:45	06:15 (15) 06:20	06:56	07:33	07:13	15:07 (02) 07:39 15:15 (02)
	20:38	35 06:50 (15) 19:53	18:56	18:04	16:30 27 15:34 (02) 16:32 36 15:51 (02)	
27	05:46	06:15 (15) 06:21	06:57	07:34	07:14	15:06 (02) 07:39 15:16 (02)
	20:37	35 06:50 (15) 19:51	18:54	18:03	16:30 29 15:35 (02) 16:32 36 15:52 (02)	
28	05:47	06:16 (15) 06:22	06:58	07:35	07:16	15:06 (02) 07:39 15:16 (02)
	20:35	34 06:50 (15) 19:49	18:52	18:01	16:29 30 15:36 (02) 16:33 36 15:52 (02)	
29	05:48	06:16 (15) 06:23	06:59	07:36	07:17	15:07 (02) 07:39 15:17 (02)
	20:34	33 06:49 (15) 19:47	18:51	18:00	16:29 30 15:37 (02) 16:34 35 15:52 (02)	
30	05:50	06:17 (15) 06:25	07:00	07:38	07:18	15:06 (02) 07:40 15:17 (02)
	20:33	32 06:49 (15) 19:46	18:49	17:59	16:28 32 15:38 (02) 16:35 36 15:53 (02)	
31	05:51	06:17 (15) 06:26	07:01	07:39	07:40	15:07 (02) 07:40 15:17 (02)
	20:32	31 06:48 (15) 19:44	18:48	17:57	16:35 36 15:53 (02)	
Potential sun hours	469	434	376	342	290	277
Total, worst case	1034	150	376	467	271	1090
Sun reduction	0.63	0.59	0.54	0.44	0.27	0.25
Oper. time red.	1.00	1.00	1.00	1.00	1.00	1.00
Wind dir. red.	0.68	0.68	0.58	0.66	0.76	0.76
Total reduction	0.43	0.41	0.32	0.29	0.21	0.19
Total, real	448	61	120	138	56	209

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 17

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-116 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (63)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
 438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
 Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:37	15:10 (02) 15:39 (02)	07:23 17:14	06:43 17:52	16:47 (01) 17:11 (01)	06:47 19:31
2	07:40 16:37	15:11 (02) 15:39 (02)	07:22 17:15	06:41 17:53	16:49 (01) 17:10 (01)	06:46 19:32
3	07:40 16:38	15:11 (02) 15:39 (02)	07:21 17:17	06:40 17:55	16:50 (01) 17:08 (01)	06:44 19:33
4	07:40 16:39	15:12 (02) 15:39 (02)	07:20 17:18	06:38 17:56	16:52 (01) 17:05 (01)	06:42 19:35
5	07:40 16:40	15:13 (02) 15:40 (02)	07:19 17:19	06:36 17:57	06:40 19:36	06:40 20:11
6	07:40 16:41	15:15 (02) 15:40 (02)	07:17 17:21	06:34 17:59	06:38 19:37	06:38 20:12
7	07:40 16:42	15:15 (02) 15:39 (02)	07:16 17:22	06:33 18:00	06:37 19:38	05:49 20:13
8	07:40 16:43	15:16 (02) 15:39 (02)	07:15 17:24	06:31 19:01	06:35 19:40	05:48 20:15
9	07:39 16:44	15:18 (02) 15:39 (02)	07:14 17:25	07:29 19:03	06:33 19:41	05:46 20:16
10	07:39 16:46	15:19 (02) 15:38 (02)	07:12 17:26	07:27 19:04	06:31 19:42	05:45 20:17
11	07:39 16:47	15:20 (02) 15:37 (02)	07:11 17:28	07:26 19:05	06:30 19:43	05:44 20:18
12	07:38 16:48	15:23 (02) 15:37 (02)	07:10 17:29	07:24 19:06	06:28 19:44	05:43 20:19
13	07:38 16:49	15:25 (02) 15:35 (02)	07:08 17:31	07:22 19:08	06:26 19:46	05:41 20:20
14	07:38 16:50	15:35 (02) 17:32	07:07 19:09	07:20 19:09	06:24 19:47	05:40 20:21
15	07:37 16:51	17:05 17:33	07:18 19:10	07:18 19:10	06:23 19:48	05:39 20:23
16	07:37 16:53	17:04 17:35	07:17 19:11	07:17 19:11	06:21 19:49	05:38 20:24
17	07:36 16:54	17:02 17:36	07:15 19:13	07:15 19:13	06:19 19:50	05:37 20:25
18	07:35 16:55	17:01 17:37	07:13 19:14	07:13 19:14	06:18 19:52	05:36 20:26
19	07:35 16:56	17:37 17:39	07:11 19:15	07:11 19:15	06:16 19:53	05:35 20:27
20	07:34 16:58	17:39 17:40	07:09 19:16	07:09 19:16	06:14 19:54	05:34 20:28
21	07:33 16:59	17:40 17:42	07:08 19:18	07:08 19:18	06:13 19:55	05:33 20:29
22	07:33 17:00	17:43 17:43	07:06 19:19	07:06 19:19	06:11 19:57	05:32 20:30
23	07:32 17:02	17:43 17:44	07:04 19:20	07:04 19:20	06:09 19:58	05:31 20:31
24	07:31 17:03	17:44 17:46	07:02 19:21	07:02 19:21	06:08 19:59	05:30 20:32
25	07:30 17:04	17:46 17:47	07:00 19:22	07:00 19:22	06:06 20:00	05:30 20:33
26	07:29 17:06	17:47 17:48	07:00 19:24	07:00 19:24	06:06 20:00	05:30 20:34
27	07:28 17:07	17:48 17:50	07:00 19:25	07:00 19:25	06:06 20:01	05:30 20:35
28	07:27 17:08	17:49 17:51	07:00 19:26	07:00 19:26	06:06 20:02	05:30 20:36
29	07:26 17:10	17:51 17:52	07:00 19:27	07:00 19:27	06:06 20:03	05:30 20:37
30	07:25 17:11	17:52 17:53	07:00 19:28	07:00 19:28	06:06 20:04	05:30 20:38
31	07:24 17:13	17:53 17:54	07:00 19:29	07:00 19:29	06:06 20:05	05:30 20:39
Potential sun hours	288	293	369	403	457	463
Total, worst case	292	419	305	160	907	20
Sun reduction	0.33	0.39	0.47	0.49	0.55	0.59
Oper. time red.	1.00	1.00	1.00	1.00	1.00	1.00
Wind dir. red.	0.76	0.67	0.60	0.60	0.66	0.66
Total reduction	0.26	0.27	0.29	0.30	0.37	0.40
Total, real	75	112	87	48	335	8

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 18

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-116 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (63)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25	05:52	06:24 (15) 06:27	07:02	06:40	07:19 15:03 (02)
	20:52	20:31 35 06:59 (15) 19:42		18:47	16:56	16:28 16 15:19 (02)
2	05:25	05:53	06:24 (15) 06:28	07:03	06:42	07:20 15:02 (02)
	20:52	20:30 35 06:59 (15) 19:40		18:45	16:54	16:28 19 15:21 (02)
3	05:26	05:54	06:24 (15) 06:29	07:04	06:43	07:21 15:01 (02)
	20:52	20:29 35 06:59 (15) 19:39		18:43	16:53	16:27 21 15:22 (02)
4	05:27	05:55	06:24 (15) 06:30	07:05	06:44	07:22 15:00 (02)
	20:51	20:27 34 06:58 (15) 19:37		18:41	16:52	16:27 23 15:23 (02)
5	05:27	05:56	06:24 (15) 06:32	07:06	06:46	07:23 15:01 (02)
	20:51	20:26 34 06:58 (15) 19:35		18:40	16:50	16:27 24 15:25 (02)
6	05:28	05:57	06:24 (15) 06:33	07:07	06:47	07:24 15:01 (02)
	20:51	20:25 33 06:57 (15) 19:33	10 07:17 (16) 07:07		16:49	16:27 25 15:26 (02)
7	05:29	05:58	06:25 (15) 06:34	07:14 (16) 07:09	06:48	07:25 15:01 (02)
	20:51	20:23 32 06:57 (15) 19:31	15 07:29 (16) 18:36		16:48	16:26 26 15:27 (02)
8	05:29	05:59	06:25 (15) 06:35	07:12 (16) 07:10	06:50	07:26 15:01 (02)
	20:50	20:22 31 06:56 (15) 19:29	18 07:30 (16) 18:34		16:47	16:26 26 15:27 (02)
9	05:30	06:01	06:26 (15) 06:36	07:10 (16) 07:11	17:29 (01) 06:51	07:27 15:01 (02)
	20:50	20:21 29 06:55 (15) 19:28	21 07:31 (16) 18:33	9 17:38 (01) 16:45		16:26 27 15:28 (02)
10	05:31	06:37 (15) 06:02	06:27 (15) 06:37	07:10 (16) 07:12	17:25 (01) 06:52	07:28 15:01 (02)
	20:49	6 06:43 (15) 20:19	28 06:55 (15) 19:26	23 07:33 (16) 18:31	16 17:41 (01) 16:44	16:26 28 15:29 (02)
11	05:31	06:34 (15) 06:03	06:28 (15) 06:38	07:08 (16) 07:14	17:24 (01) 06:54	07:29 15:00 (02)
	20:49	10 06:44 (15) 20:18	26 06:54 (15) 19:24	25 07:33 (16) 18:29	19 17:43 (01) 16:43	16:26 29 15:29 (02)
12	05:32	06:33 (15) 06:04	06:29 (15) 06:40	07:07 (16) 07:15	17:22 (01) 06:55	07:30 15:00 (02)
	20:48	13 06:46 (15) 20:16	23 06:52 (15) 19:22	26 07:33 (16) 18:27	22 17:44 (01) 16:42	16:26 30 15:30 (02)
13	05:33	06:32 (15) 06:05	06:31 (15) 06:41	07:07 (16) 07:16	17:20 (01) 06:56	07:31 15:01 (02)
	20:48	16 06:48 (15) 20:15	19 06:50 (15) 19:20	26 07:33 (16) 18:26	25 17:45 (01) 16:41	16:26 29 15:30 (02)
14	05:34	06:31 (15) 06:06	06:33 (15) 06:42	07:06 (16) 07:17	17:19 (01) 06:58	07:32 15:01 (02)
	20:47	19 06:50 (15) 20:13	15 06:48 (15) 19:18	26 07:32 (16) 18:24	27 17:46 (01) 16:40	16:27 30 15:31 (02)
15	05:35	06:31 (15) 06:07	06:36 (15) 06:43	07:06 (16) 07:19	17:18 (01) 06:59	07:32 15:02 (02)
	20:47	20 06:51 (15) 20:12	8 06:44 (15) 19:17	26 07:32 (16) 18:22	29 17:47 (01) 16:39	16:27 30 15:32 (02)
16	05:36	06:30 (15) 06:09	06:44	07:06 (16) 07:20	17:17 (01) 07:00	07:33 15:01 (02)
	20:46	22 06:52 (15) 20:10	19:15	25 07:31 (16) 18:20	30 17:47 (01) 16:38	16:27 31 15:32 (02)
17	05:37	06:29 (15) 06:10	06:45	07:06 (16) 07:21	17:16 (01) 07:02	07:34 15:02 (02)
	20:45	23 06:52 (15) 20:09	19:13	24 07:30 (16) 18:19	30 17:46 (01) 16:37	16:27 31 15:33 (02)
18	05:37	06:28 (15) 06:11	06:46	07:07 (16) 07:22	17:16 (01) 07:03	07:35 15:03 (02)
	20:45	25 06:53 (15) 20:07	19:11	22 07:29 (16) 18:17	31 17:47 (01) 16:36	16:28 31 15:34 (02)
19	05:38	06:28 (15) 06:12	06:48	07:09 (16) 07:24	17:16 (01) 07:04	07:35 15:02 (02)
	20:44	26 06:54 (15) 20:06	19:09	19 07:28 (16) 18:15	31 17:47 (01) 16:35	16:28 32 15:34 (02)
20	05:39	06:27 (15) 06:13	06:49	07:10 (16) 07:25	17:15 (01) 07:06	07:36 15:03 (02)
	20:43	28 06:55 (15) 20:04	19:07	17 07:27 (16) 18:14	31 17:46 (01) 16:34	16:28 32 15:35 (02)
21	05:40	06:27 (15) 06:14	06:50	07:11 (16) 07:26	17:16 (01) 07:07	07:36 15:03 (02)
	20:42	28 06:55 (15) 20:03	19:05	13 07:24 (16) 18:12	30 17:46 (01) 16:34	16:29 32 15:35 (02)
22	05:41	06:26 (15) 06:15	06:51	07:12 (16) 07:27	17:16 (01) 07:08	07:37 15:04 (02)
	20:41	30 06:56 (15) 20:01	19:04	9 07:21 (16) 18:11	29 17:45 (01) 16:33	16:29 32 15:36 (02)
23	05:42	06:26 (15) 06:17	06:52	07:29	17:17 (01) 07:09	07:37 15:04 (02)
	20:40	31 06:57 (15) 19:58	19:02	18:09	28 17:45 (01) 16:32	16:30 32 15:36 (02)
24	05:43	06:25 (15) 06:18	06:53	07:30	17:17 (01) 07:11	07:38 15:05 (02)
	20:40	32 06:57 (15) 19:56	19:00	18:07	26 17:43 (01) 16:32	16:30 32 15:37 (02)
25	05:44	06:25 (15) 06:19	06:54	07:31	17:17 (01) 07:12	07:38 15:06 (02)
	20:39	33 06:58 (15) 19:54	18:58	18:06	24 17:41 (01) 16:31	16:31 31 15:37 (02)
26	05:45	06:25 (15) 06:20	06:56	07:33	17:19 (01) 07:13	07:39 15:06 (02)
	20:38	33 06:58 (15) 19:53	18:56	18:04	21 17:40 (01) 16:30	16:32 31 15:37 (02)
27	05:46	06:25 (15) 06:21	06:57	07:34	17:20 (01) 07:14	07:39 15:07 (02)
	20:37	33 06:58 (15) 19:51	18:54	18:03	19 17:39 (01) 16:30	16:32 31 15:38 (02)
28	05:47	06:24 (15) 06:22	06:58	07:35	17:21 (01) 07:16	07:39 15:07 (02)
	20:35	35 06:59 (15) 19:49	18:52	18:01	16 17:37 (01) 16:29	16:33 31 15:38 (02)
29	05:48	06:24 (15) 06:23	06:59	07:36	17:24 (01) 07:17	07:39 15:08 (02)
	20:34	35 06:59 (15) 19:47	18:51	18:00	12 17:36 (01) 16:29	10 15:16 (02) 16:34 30 15:38 (02)
30	05:50	06:24 (15) 06:25	07:00	07:38	07:18	15:04 (02) 07:40 15:08 (02)
	20:33	35 06:59 (15) 19:46	18:49	17:59	16:28 14 15:18 (02) 16:35 30 15:38 (02)	
31	05:51	06:24 (15) 06:26		07:39		07:40 15:09 (02)
	20:32	35 06:59 (15) 19:44		17:57		16:35 30 15:39 (02)
Potential sun hours	469	434	376	342	290	277
Total, worst case	568	417	345	505	24	882
Sun reduction	0.63	0.59	0.54	0.44	0.27	0.25
Oper. time red.	1.00	1.00	1.00	1.00	1.00	1.00
Wind dir. red.	0.66	0.66	0.57	0.67	0.76	0.76
Total reduction	0.42	0.40	0.31	0.30	0.21	0.19
Total, real	241	165	109	153	5	171

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker (WTG causing flicker first time)	Last time (hh:mm) with flicker (WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 19

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

### SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2 Shadow receptor: R-117 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (364)

#### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40	07:23	16:13 (01)	06:43	06:47	05:57
	16:37	17:14	33 16:46 (01)	17:52	19:31	20:06
2	07:40	07:22	16:13 (01)	06:41	06:46	05:56
	16:37	17:15	33 16:46 (01)	17:53	19:32	20:07
3	07:40	07:21	16:13 (01)	06:40	06:44	05:54
	16:38	17:17	34 16:47 (01)	17:55	19:33	20:09
4	07:40	07:20	16:12 (01)	06:38	06:42	05:53
	16:39	17:18	35 16:47 (01)	17:56	19:35	20:10
5	07:40	07:19	16:12 (01)	06:36	06:40	05:52
	16:40	17:19	35 16:47 (01)	17:57	19:36	20:11
6	07:40	07:17	16:13 (01)	06:34	06:38	05:50
	16:41	17:21	35 16:48 (01)	17:59	19:37	20:12
7	07:40	07:16	16:12 (01)	06:33	06:37	05:49
	16:42	17:22	35 16:47 (01)	18:00	19:38	20:13
8	07:40	07:15	16:13 (01)	07:31	06:35	05:48
	16:43	17:24	34 16:47 (01)	19:01	19:40	20:15
9	07:39	07:14	16:13 (01)	07:29	06:33	05:46
	16:44	17:25	34 16:47 (01)	19:03	19:41	20:16
10	07:39	07:12	16:13 (01)	07:27	06:31	05:45
	16:46	17:26	34 16:47 (01)	19:04	19:42	20:17
11	07:39	07:11	16:14 (01)	07:26	06:30	05:44
	16:47	17:28	33 16:47 (01)	19:05	19:43	20:18
12	07:38	07:10	16:15 (01)	07:24	06:28	05:43
	16:48	17:29	31 16:46 (01)	19:06	19:44	20:19
13	07:38	07:08	16:16 (01)	07:22	06:26	05:41
	16:49	17:31	29 16:45 (01)	19:08	19:46	20:20
14	07:38	07:07	16:17 (01)	07:20	06:24	05:40
	16:50	17:32	28 16:45 (01)	19:09	19:47	20:21
15	07:37	07:05	16:18 (01)	07:18	06:23	05:39
	16:51	17:33	25 16:43 (01)	19:10	19:48	20:22
16	07:37	07:04	16:20 (01)	07:17	06:21	05:38
	16:53	17:35	22 16:42 (01)	19:11	19:49	20:24
17	07:36	07:02	16:21 (01)	07:15	06:19	05:37
	16:54	17:36	18 16:39 (01)	19:13	19:50	20:25
18	07:35	07:01	16:25 (01)	07:13	06:18	05:36
	16:55	17:37	12 16:37 (01)	19:14	19:52	20:26
19	07:35	06:59	07:11	06:16	06:16	05:35
	16:56	17:39	19:15	22 07:53 (16)	19:53	20:27
20	07:34	06:58	07:09	06:14	06:14	05:34
	16:58	17:40	19:16	23 07:52 (16)	19:54	20:28
21	07:33	06:56	07:08	06:13	06:13	05:33
	16:59	17:42	19:18	23 07:52 (16)	19:55	20:29
22	07:33	16:24 (01)	06:55	07:06	06:11	05:32
	17:00	6 16:30 (01)	17:43	19:19	22 07:52 (16)	19:57
23	07:32	16:20 (01)	06:53	07:04	06:09	05:31
	17:02	13 16:33 (01)	17:44	19:20	21 07:51 (16)	19:58
24	07:31	16:19 (01)	06:51	07:02	06:08	05:30
	17:03	17 16:36 (01)	17:46	19:21	20 07:50 (16)	19:59
25	07:30	16:17 (01)	06:50	07:00	06:06	05:29
	17:04	21 16:38 (01)	17:47	19:22	17 07:48 (16)	20:00
26	07:29	16:16 (01)	06:48	06:58	06:05	05:28
	17:06	23 16:39 (01)	17:48	19:24	14 07:46 (16)	20:00
27	07:28	16:15 (01)	06:46	06:57	06:03	05:27
	17:07	25 16:40 (01)	17:50	19:25	9 07:43 (16)	20:01
28	07:27	16:14 (01)	06:45	06:55	06:02	05:26
	17:08	28 16:42 (01)	17:51	19:26	20:03	24 07:04 (15)
29	07:26	16:14 (01)	06:43	06:53	06:00	05:25
	17:10	29 16:43 (01)	17:49	19:27	20:04	22 07:03 (15)
30	07:25	16:13 (01)	06:41	06:51	05:59	05:24
	17:11	31 16:44 (01)	17:49	19:29	20:05	19 07:01 (15)
31	07:24	16:13 (01)	06:40	06:49	05:58	05:23
	17:13	32 16:45 (01)	17:49	19:30	20:06	20:22
Potential sun hours	288	293	369	403	457	463
Total, worst case	225	540	246	493	25	
Sun reduction	0.33	0.39	0.47	0.49	0.55	
Oper. time red.	1.00	1.00	1.00	1.00	1.00	
Wind dir. red.	0.71	0.71	0.55	0.62	0.62	
Total reduction	0.24	0.28	0.26	0.31	0.35	
Total, real	54	153	65	152	9	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-117 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (364)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25 20:52	05:52 20:31	06:27 19:42	06:53 (15) 06:58 (15)	07:02 18:47	06:40 16:56
2	05:25 20:52	05:53 20:30	06:28 19:40	07:03 18:45	07:03 18:45	33 16:16 (01) 16:28
3	05:26 20:52	05:54 20:29	06:29 19:39	07:04 18:43	07:04 18:43	34 16:16 (01) 16:28
4	05:27 20:51	05:55 20:27	06:30 19:37	07:05 18:41	07:05 18:41	35 16:17 (01) 16:27
5	05:27 20:51	05:56 20:26	06:32 19:35	07:06 18:40	07:06 18:40	35 16:17 (01) 16:27
6	05:28 20:51	05:57 20:25	06:33 19:33	07:08 18:38	07:08 18:38	35 16:17 (01) 16:27
7	05:29 20:51	05:58 20:23	06:34 19:31	07:09 18:36	07:09 18:36	35 16:17 (01) 16:27
8	05:29 20:50	05:59 20:22	06:35 19:29	07:10 18:34	07:10 18:34	34 16:17 (01) 16:26
9	05:30 20:50	06:01 20:21	06:36 19:28	07:11 18:33	07:11 18:33	34 16:17 (01) 16:26
10	05:31 20:49	06:02 20:19	06:37 19:26	07:12 18:31	07:12 18:31	33 16:16 (01) 16:26
11	05:31 20:49	06:03 20:18	06:38 19:24	07:14 18:29	07:14 18:29	32 16:16 (01) 16:26
12	05:32 20:48	06:04 20:16	06:40 19:22	07:15 18:27	07:15 18:27	32 16:16 (01) 16:26
13	05:33 20:48	06:05 20:15	06:41 19:20	07:16 18:26	07:16 18:26	31 16:16 (01) 16:26
14	05:34 20:47	06:06 20:13	06:42 19:18	07:17 18:24	07:17 18:24	31 16:16 (01) 16:26
15	05:35 20:47	06:07 20:12	06:43 19:17	07:19 18:22	07:19 18:22	28 16:15 (01) 16:27
16	05:36 20:46	06:09 20:10	06:44 19:15	07:24 (16) 07:32 (16)	07:20 18:20	25 16:13 (01) 16:27
17	05:37 20:45	06:10 20:09	06:45 19:13	07:21 (16) 07:34 (16)	07:21 18:19	23 16:12 (01) 16:27
18	05:37 20:45	06:11 20:07	06:46 19:11	07:18 (16) 07:35 (16)	07:22 18:17	20 16:11 (01) 16:27
19	05:38 20:44	06:12 20:06	06:47 19:09	07:18 (16) 07:37 (16)	07:24 18:15	20 17:10 (01) 16:31
20	05:39 20:43	06:13 20:04	06:49 19:07	07:16 (16) 07:37 (16)	07:25 18:14	13 16:08 (01) 16:28
21	05:40 20:42	06:14 20:03	06:50 19:05	07:15 (16) 07:37 (16)	07:26 18:12	6 16:05 (01) 16:28
22	05:41 20:41	06:15 20:01	06:51 19:04	07:14 (16) 07:37 (16)	07:27 18:11	6 16:05 (01) 16:28
23	05:42 20:40	06:17 19:58	06:52 19:02	07:14 (16) 07:37 (16)	07:29 18:09	4 16:59 (01) 16:32
24	05:43 20:40	06:18 19:56	06:53 19:00	07:14 (16) 07:36 (16)	07:30 18:07	15 17:08 (01) 16:32
25	05:44 20:39	06:19 19:54	06:54 18:58	07:15 (16) 07:35 (16)	07:31 18:06	20 17:10 (01) 16:31
26	05:45 20:38	06:20 19:53	06:55 18:56	07:17 (16) 07:35 (16)	07:33 18:04	20 17:10 (01) 16:31
27	05:46 20:37	06:21 19:51	06:56 18:54	07:18 (16) 07:34 (16)	07:34 18:03	23 17:12 (01) 16:30
28	05:47 20:35	06:22 19:49	06:57 18:52	07:19 (16) 07:32 (16)	07:34 18:01	26 17:13 (01) 16:30
29	05:48 20:34	06:23 19:47	06:59 18:51	07:20 (16) 07:30 (16)	07:37 18:00	28 17:13 (01) 16:29
30	05:50 20:33	06:25 19:46	07:00 18:49	07:21 (16) 07:26 (16)	07:38 17:59	30 17:15 (01) 16:29
31	05:51 20:32	06:26 19:44	07:01 18:48	07:22 (16) 07:27 (16)	07:39 17:58	31 17:15 (01) 16:28
Potential sun hours	469	434	376	342	290	277
Total, worst case		515	255	209	564	
Sun reduction		0.59	0.54	0.44	0.27	
Oper. time red.		1.00	1.00	1.00	1.00	
Wind dir. red.		0.62	0.55	0.71	0.71	
Total reduction		0.37	0.30	0.32	0.20	
Total, real		191	77	67	111	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edr.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-119 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (301)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:37	07:23 17:14	06:43 17:52	07:04 (14) 07:18 (14)	06:47 19:31	05:57 20:06
2	07:40 16:37	07:22 17:15	06:41 17:53	07:02 (14) 07:21 (14)	06:46 19:32	05:56 20:07
3	07:40 16:38	07:21 17:17	06:40 17:55	07:00 (14) 07:22 (14)	06:44 19:33	05:54 20:09
4	07:40 16:39	07:20 17:18	06:38 17:56	06:59 (14) 07:22 (14)	06:42 19:35	05:53 20:10
5	07:40 16:40	07:19 17:19	06:36 17:57	06:59 (14) 07:24 (14)	06:40 19:36	05:52 20:11
6	07:40 16:41	07:17 17:21	06:35 17:59	06:58 (14) 07:24 (14)	06:38 19:37	05:50 20:12
7	07:40 16:42	07:16 17:22	06:33 18:00	06:57 (14) 07:24 (14)	06:37 19:38	05:49 20:13
8	07:40 16:43	07:15 17:24	06:31 19:01	07:56 (14) 08:23 (14)	06:35 19:40	05:48 20:15
9	07:39 16:44	07:14 17:25	06:29 19:03	07:56 (14) 08:23 (14)	06:33 19:41	05:46 20:16
10	07:39 16:46	07:12 17:26	06:27 19:04	07:56 (14) 08:23 (14)	06:31 19:42	05:45 20:17
11	07:39 16:47	07:11 17:28	06:26 19:05	07:56 (14) 08:22 (14)	06:30 19:43	05:44 20:18
12	07:38 16:48	07:10 17:29	06:24 19:06	07:57 (14) 08:21 (14)	06:28 19:44	05:43 20:19
13	07:38 16:49	07:08 17:31	06:22 19:08	07:57 (14) 08:20 (14)	06:26 19:46	05:41 20:20
14	07:38 16:50	07:07 17:32	06:20 19:09	07:58 (14) 08:18 (14)	06:24 19:47	05:40 20:21
15	07:37 16:51	07:05 17:33	06:18 19:10	07:59 (14) 08:16 (14)	06:23 19:48	05:39 20:23
16	07:37 16:53	07:04 17:35	06:17 19:11	08:01 (14) 08:15 (14)	06:21 19:49	05:38 20:24
17	07:36 16:54	07:02 17:36	06:15 19:13	08:05 (14) 08:10 (14)	06:19 19:50	05:37 20:25
18	07:35 16:55	07:01 17:37	06:13 19:14	07:13 19:52	06:18 19:53	05:36 20:26
19	07:35 16:56	06:59 17:39	06:11 19:15	07:11 19:53	06:16 19:54	05:35 20:27
20	07:34 16:58	06:58 17:40	06:09 19:16	07:09 19:54	06:14 19:55	05:34 20:28
21	07:33 16:59	06:56 17:42	06:08 19:18	07:08 19:55	06:13 19:56	05:33 20:29
22	07:33 17:00	06:55 17:43	06:06 19:19	07:07 19:57	06:11 19:58	05:32 20:30
23	07:32 17:02	06:53 17:44	06:04 19:20	07:06 19:58	06:09 19:59	05:31 20:31
24	07:31 17:03	06:51 17:46	06:02 19:21	07:05 19:59	06:07 20:00	05:30 20:32
25	07:30 17:04	06:50 17:47	06:00 19:22	07:04 20:00	06:05 20:01	05:29 20:33
26	07:29 17:06	06:48 17:48	06:58 19:24	07:03 20:00	06:03 20:02	05:28 20:34
27	07:28 17:07	06:46 17:50	06:57 19:25	07:02 20:01	06:02 20:03	05:27 20:35
28	07:27 17:08	06:45 17:51	06:55 19:26	07:08 (14) 07:15 (14)	06:02 20:04	05:27 20:36
29	07:26 17:10		06:53 19:27		06:00 20:05	05:26 20:37
30	07:25 17:11		06:51 19:29		05:59 20:05	05:25 20:38
31	07:24 17:13		06:49 19:30		05:57 20:39	05:24 20:39
Potential sun hours	288	293	369	403	457	463
Total, worst case		7	366	712		
Sun reduction		0.39	0.47	0.49		
Oper. time red.		1.00	1.00	1.00		
Wind dir. red.		0.52	0.52	0.60		
Total reduction		0.20	0.24	0.29		
Total, real		1	89	208		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-119 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (301)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December		
1	05:25	05:52	06:27	06:58 (13)	07:02	07:35 (14)	06:40	07:19
	20:52	20:31	19:42	35 07:33 (13)	18:47	25 08:00 (14)	16:56	16:28
2	05:25	05:53	06:28	06:58 (13)	07:03	07:35 (14)	06:42	07:20
	20:52	20:30	19:40	34 07:32 (13)	18:45	26 08:01 (14)	16:54	16:28
3	05:26	05:54	06:29	06:58 (13)	07:04	07:34 (14)	06:43	07:21
	20:52	20:29	19:39	33 07:31 (13)	18:43	27 08:01 (14)	16:53	16:27
4	05:27	05:55	06:30	06:58 (13)	07:05	07:34 (14)	06:44	07:22
	20:52	20:27	19:37	32 07:30 (13)	18:42	27 08:01 (14)	16:52	16:27
5	05:27	05:56	06:32	06:59 (13)	07:06	07:33 (14)	06:46	07:23
	20:51	20:26	19:35	29 07:28 (13)	18:40	27 08:00 (14)	16:50	16:27
6	05:28	05:57	06:33	06:59 (13)	07:08	07:33 (14)	06:47	07:24
	20:51	20:25	19:33	28 07:27 (13)	18:38	28 08:01 (14)	16:49	16:27
7	05:29	05:58	06:34	07:00 (13)	07:09	07:33 (14)	06:48	07:25
	20:51	20:23	19:31	25 07:25 (13)	18:36	27 08:00 (14)	16:48	16:26
8	05:29	05:59	06:35	07:02 (13)	07:10	07:33 (14)	06:50	07:26
	20:50	20:22	19:30	20 07:22 (13)	18:34	26 07:59 (14)	16:47	16:26
9	05:30	06:01	06:36	07:04 (13)	07:11	07:33 (14)	06:51	07:27
	20:50	20:21	19:28	15 07:19 (13)	18:33	25 07:58 (14)	16:45	16:26
10	05:31	06:02	06:37	07:09 (13)	07:12	07:34 (14)	06:52	07:28
	20:49	20:19	19:26	6 07:15 (13)	18:31	22 07:56 (14)	16:44	16:26
11	05:31	06:03	06:38	07:14	07:14	07:35 (14)	06:54	07:29
	20:49	20:18	19:24	18:29	20 07:55 (14)	16:43	16:26	
12	05:32	06:04	06:40	07:15	07:15	07:36 (14)	06:55	07:30
	20:48	20:16	19:22	18:27	17 07:53 (14)	16:42	16:26	
13	05:33	06:05	06:41	07:16	07:16	07:38 (14)	06:56	07:31
	20:48	20:15	19:20	18:26	12 07:50 (14)	16:41	16:26	
14	05:34	06:06	06:42	07:17	07:17	06:58	07:32	
	20:47	20:13	19:18	18:24	16:40	16:27		
15	05:35	06:07	06:43	07:19	07:19	06:59	07:32	
	20:47	20:12	19:17	18:22	16:39	16:27		
16	05:36	06:09	07:15 (13)	06:44	07:20	07:00	07:33	
	20:46	20:10	7 07:22 (13)	19:15	18:20	16:38	16:27	
17	05:37	06:10	07:11 (13)	06:45	07:21	07:02	07:34	
	20:45	20:09	15 07:26 (13)	19:13	18:19	16:37	16:27	
18	05:37	06:11	07:08 (13)	06:46	07:22	07:03	07:35	
	20:45	20:07	20 07:28 (13)	19:11	18:17	16:36	16:28	
19	05:38	06:12	07:06 (13)	06:48	07:24	07:04	07:35	
	20:44	20:06	23 07:29 (13)	19:09	18:15	16:35	16:28	
20	05:39	06:13	07:04 (13)	06:49	07:25	07:06	07:36	
	20:43	20:04	26 07:30 (13)	19:07	18:14	16:35	16:28	
21	05:40	06:14	07:04 (13)	06:50	07:26	07:07	07:36	
	20:42	20:03	28 07:32 (13)	19:05	18:12	16:34	16:29	
22	05:41	06:15	07:03 (13)	06:51	07:27	07:08	07:37	
	20:41	20:01	30 07:33 (13)	19:04	18:11	16:33	16:29	
23	05:42	06:17	07:01 (13)	06:52	07:29	07:09	07:37	
	20:40	19:58	32 07:33 (13)	19:02	18:09	16:32	16:30	
24	05:43	06:18	07:00 (13)	06:53	07:30	07:11	07:38	
	20:40	19:56	34 07:34 (13)	19:00	18:07	16:32	16:30	
25	05:44	06:19	07:00 (13)	06:54	07:31	07:12	07:38	
	20:39	19:54	34 07:34 (13)	18:58	18:06	16:31	16:31	
26	05:45	06:20	06:59 (13)	06:56	07:33	07:13	07:39	
	20:38	19:53	35 07:34 (13)	18:56	18:04	16:30	16:32	
27	05:46	06:21	06:58 (13)	06:57	07:44 (14)	07:34	07:14	07:39
	20:37	19:51	36 07:34 (13)	18:54	11 07:55 (14)	18:03	16:30	16:32
28	05:47	06:22	06:58 (13)	06:58	07:41 (14)	07:35	07:16	07:39
	20:36	19:49	36 07:34 (13)	18:52	16 07:57 (14)	18:01	16:29	16:33
29	05:48	06:24	06:57 (13)	06:59	07:39 (14)	07:37	07:17	07:39
	20:34	19:47	36 07:33 (13)	18:51	19 07:58 (14)	18:00	16:29	16:34
30	05:50	06:25	06:57 (13)	07:00	07:37 (14)	07:38	07:18	07:40
	20:33	19:46	36 07:33 (13)	18:49	22 07:59 (14)	17:59	16:28	16:35
31	05:51	06:26	06:58 (13)	07:01	07:39	07:39	07:19	07:40
	20:32	19:44	35 07:33 (13)	18:48	17:57	16:27	16:35	
Potential sun hours	469	434	376	342	290	277		
Total, worst case		463	325	309				
Sun reduction		0.59	0.54	0.44				
Oper. time red.		1.00	1.00	1.00				
Wind dir. red.		0.60	0.58	0.52				
Total reduction		0.35	0.31	0.23				
Total, real		163	102	70				

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 23

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-120 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (334)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36	07:23 17:14	07:45 (13) 08:06 (13)	06:43 17:52	07:09 (12) 19:31	06:47 20:06
2	07:40 16:37	07:22 17:15	07:45 (13) 08:07 (13)	06:41 17:53	07:09 (12) 19:32	06:46 20:07
3	07:40 16:38	07:21 17:17	07:44 (13) 08:08 (13)	06:40 17:55	07:08 (12) 19:33	06:44 20:09
4	07:40 16:39	07:20 17:18	07:43 (13) 08:08 (13)	06:38 17:56	07:07 (12) 19:35	06:42 20:10
5	07:40 16:40	07:19 17:19	07:43 (13) 08:08 (13)	06:36 17:57	07:07 (12) 19:36	06:40 20:11
6	07:40 16:41	07:17 17:21	07:44 (13) 08:09 (13)	06:35 17:59	07:07 (12) 19:37	06:38 20:12
7	07:40 16:42	07:16 17:22	07:43 (13) 08:08 (13)	06:33 18:00	07:06 (12) 19:38	06:37 20:13
8	07:40 16:43	07:15 17:24	07:43 (13) 08:09 (13)	07:31 19:01	08:06 (12) 19:40	06:35 20:15
9	07:39 16:44	07:14 17:25	07:44 (13) 08:09 (13)	07:29 19:03	08:06 (12) 19:41	06:33 20:16
10	07:39 16:46	07:12 17:26	07:44 (13) 08:08 (13)	07:27 19:04	08:07 (12) 19:42	06:31 20:17
11	07:39 16:47	07:11 17:28	07:45 (13) 08:08 (13)	07:26 19:05	08:07 (12) 19:43	06:30 20:18
12	07:38 16:48	07:10 17:29	07:46 (13) 08:08 (13)	07:24 19:06	08:08 (12) 19:44	06:28 20:19
13	07:38 16:49	07:08 17:31	07:46 (13) 08:06 (13)	07:22 19:08	08:08 (12) 19:46	06:26 20:20
14	07:38 16:50	07:07 17:32	07:48 (13) 08:05 (13)	07:20 19:09	08:09 (12) 19:47	06:24 20:21
15	07:37 16:51	07:05 17:33	07:50 (13) 08:03 (13)	07:18 19:10	08:12 (12) 19:48	06:23 20:22
16	07:37 16:53	07:04 17:35	07:53 (13) 08:00 (13)	07:17 19:11	08:14 (12) 19:49	06:21 20:24
17	07:36 16:54	07:02 17:36	08:00 (13) 19:13	07:15 19:13	08:19 (12) 19:51	06:19 20:25
18	07:35 16:55	07:01 17:37	07:13 19:14	07:13 19:14	06:18 19:52	06:18 20:26
19	07:35 16:56	06:59 17:39	07:11 19:15	07:11 19:15	06:16 19:53	06:16 20:27
20	07:34 16:58	06:58 17:40	07:09 19:16	07:09 19:16	06:14 19:54	06:14 20:28
21	07:33 16:59	06:56 17:42	07:08 19:18	07:08 19:18	06:13 19:55	06:13 20:29
22	07:33 17:00	06:55 17:43	07:06 19:19	07:06 19:19	06:11 19:57	06:11 20:30
23	07:32 17:02	06:53 17:44	07:24 (12) 07:28 (12)	07:04 19:20	06:09 19:58	05:31 20:31
24	07:31 17:03	06:51 17:46	07:18 (12) 07:33 (12)	07:02 19:21	06:08 19:59	05:30 20:32
25	07:30 17:04	06:50 17:47	07:15 (12) 07:35 (12)	07:00 19:22	06:06 20:00	05:30 20:33
26	07:29 17:06	06:48 17:48	07:14 (12) 07:37 (12)	06:58 19:24	06:05 20:00	05:29 20:34
27	07:28 17:07	06:46 17:50	07:12 (12) 07:38 (12)	06:57 19:25	06:03 20:01	05:28 20:35
28	07:27 17:08	06:45 07:59 (13)	07:10 (12) 07:39 (12)	06:55 19:26	06:02 20:03	05:27 20:36
29	07:26 17:10	06:44 08:01 (13)	06:53 19:27	06:53 19:27	06:00 20:04	05:27 20:37
30	07:25 17:11	06:43 08:03 (13)	06:51 19:29	06:51 19:29	05:59 20:05	05:26 20:38
31	07:24 17:13	06:42 08:05 (13)	06:49 19:30	06:49 19:30	05:25 20:39	05:25 20:39
Potential sun hours	288	293	369	403	457	463
Total, worst case	57	461	483	521	569	579
Sun reduction	0.33	0.39	0.47	0.55	0.59	0.59
Oper. time red.	1.00	1.00	1.00	1.00	1.00	1.00
Wind dir. red.	0.50	0.50	0.52	0.71	0.71	0.71
Total reduction	0.16	0.19	0.24	0.35	0.38	0.40
Total, real	9	87	114	142	155	159

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 24

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-120 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (334)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December					
1	05:25	05:51 (11)	05:52	06:27	07:02	07:47 (12)	06:41	07:13 (13)	07:19		
	24	06:15 (11)	20:31	19:42	18:47	28	08:15 (12)	16:56	25	07:38 (13)	16:28
2	05:25	05:52 (11)	05:53	06:28	07:03	07:46 (12)	06:42	07:14 (13)	07:20		
	24	06:16 (11)	20:30	19:40	18:45	30	08:16 (12)	16:54	25	07:39 (13)	16:28
3	05:26	05:51 (11)	05:54	06:29	07:04	07:45 (12)	06:43	07:13 (13)	07:21		
	24	06:15 (11)	20:29	19:39	18:43	32	08:17 (12)	16:53	26	07:39 (13)	16:27
4	05:27	05:52 (11)	05:55	06:30	07:05	07:44 (12)	06:45	07:13 (13)	07:22		
	24	06:16 (11)	20:27	19:37	18:42	33	08:17 (12)	16:52	25	07:38 (13)	16:27
5	05:27	05:52 (11)	05:56	06:32	07:06	07:43 (12)	06:46	07:13 (13)	07:23		
	23	06:15 (11)	20:26	19:35	18:40	34	08:17 (12)	16:50	26	07:39 (13)	16:27
6	05:28	05:52 (11)	05:57	06:33	07:08	07:43 (12)	06:47	07:13 (13)	07:24		
	24	06:16 (11)	20:25	19:33	18:38	34	08:17 (12)	16:49	25	07:38 (13)	16:27
7	05:29	05:53 (11)	05:58	06:34	07:09	07:43 (12)	06:49	07:14 (13)	07:25		
	23	06:16 (11)	20:23	19:31	18:36	34	08:17 (12)	16:48	25	07:39 (13)	16:26
8	05:29	05:53 (11)	05:59	06:35	07:10	07:42 (12)	06:50	07:14 (13)	07:26		
	22	06:15 (11)	20:22	19:30	18:34	34	08:16 (12)	16:47	24	07:38 (13)	16:26
9	05:30	05:54 (11)	06:01	06:36	07:11	07:42 (12)	06:51	07:16 (13)	07:27		
	21	06:15 (11)	20:21	19:28	18:33	34	08:16 (12)	16:45	22	07:38 (13)	16:26
10	05:31	05:55 (11)	06:02	06:37	07:12	07:42 (12)	06:53	07:16 (13)	07:28		
	21	06:16 (11)	20:19	19:26	18:31	33	08:15 (12)	16:44	21	07:37 (13)	16:26
11	05:31	05:55 (11)	06:03	06:38	07:14	07:42 (12)	06:54	07:17 (13)	07:29		
	20	06:15 (11)	20:18	19:24	18:29	33	08:15 (12)	16:43	18	07:35 (13)	16:26
12	05:32	05:56 (11)	06:04	06:40	07:15	07:43 (12)	06:55	07:19 (13)	07:30		
	19	06:15 (11)	20:16	19:22	18:27	31	08:14 (12)	16:42	16	07:35 (13)	16:26
13	05:33	05:57 (11)	06:05	06:41	07:16	07:43 (12)	06:56	07:20 (13)	07:31		
	17	06:14 (11)	20:15	19:20	18:26	30	08:13 (12)	16:41	13	07:33 (13)	16:26
14	05:34	05:58 (11)	06:06	06:42	07:17	07:44 (12)	06:58	07:23 (13)	07:32		
	16	06:14 (11)	20:13	19:18	18:24	28	08:12 (12)	16:40	8	07:31 (13)	16:27
15	05:35	05:59 (11)	06:07	06:43	07:19	07:45 (12)	06:59	07:24 (13)	07:32		
	15	06:14 (11)	20:12	19:17	18:22	25	08:10 (12)	16:39			16:27
16	05:36	06:00 (11)	06:09	06:44	07:20	07:46 (12)	07:00	07:25 (13)	07:33		
	13	06:13 (11)	20:10	19:15	18:20	22	08:08 (12)	16:38			16:27
17	05:37	06:00 (11)	06:10	06:45	07:21	07:49 (12)	07:02	07:27 (13)	07:34		
	11	06:11 (11)	20:09	19:13	18:19	18	08:07 (12)	16:37			16:27
18	05:37	06:01 (11)	06:11	06:46	07:22	07:51 (12)	07:03	07:28 (13)	07:35		
	9	06:10 (11)	20:07	19:11	18:17	12	08:03 (12)	16:36			16:28
19	05:38	06:04 (11)	06:12	06:48	07:24	07:52 (12)	07:04	07:29 (13)	07:36		
	3	06:07 (11)	20:06	19:09	18:15		16:35				16:28
20	05:39	06:13	06:49	07:25	07:53 (12)	07:06	07:31 (13)	07:37	07:36		
	20	06:14	19:07	18:14	18:14		16:34				16:28
21	05:40	06:14	06:50	07:26	07:54 (12)	07:07	07:32 (13)	07:38	07:36		
	20	06:15	19:05	18:12	18:12		16:34				16:29
22	05:41	06:15	06:51	07:27	07:55 (12)	07:08	07:33 (13)	07:39	07:37		
	20	06:16	19:04	18:11	18:11		16:33				16:29
23	05:42	06:17	06:52	07:29	07:56 (12)	07:09	07:34 (13)	07:40	07:37		
	20	06:17	19:02	18:09	18:09		16:32				16:30
24	05:43	06:18	06:53	07:30	07:57 (12)	07:11	07:35 (13)	07:41	07:38		
	20	06:18	19:00	18:07	18:07		16:32				16:30
25	05:44	06:19	06:54	07:31	07:58 (12)	07:12	07:36 (13)	07:42	07:38		
	20	06:19	18:58	18:06	18:06		16:31				16:31
26	05:45	06:20	06:56	07:33	07:59 (12)	07:13	07:37 (13)	07:43	07:39		
	20	06:20	18:56	18:04	18:04	9	08:22 (13)	07:13			16:32
27	05:46	06:21	06:57	07:34	08:00 (12)	07:14	07:38 (13)	07:44	07:39		
	20	06:21	18:54	18:03	18:03	14	08:31 (13)	07:14			16:32
28	05:47	06:22	06:58	07:35	08:01 (12)	07:15	07:39 (13)	07:45	07:39		
	20	06:22	18:52	18:01	18:01	17	08:34 (13)	07:15			16:33
29	05:48	06:24	06:59	07:37	08:02 (12)	07:16	07:40 (13)	07:46	07:39		
	20	06:24	18:51	18:00	18:00	20	08:36 (13)	07:16			16:34
30	05:50	06:25	07:00	07:38	08:03 (12)	07:17	07:41 (13)	07:47	07:40		
	20	06:25	18:49	18:00	18:00	21	08:37 (13)	07:17			16:35
31	05:51	06:26		07:39	08:04 (12)	07:18	07:42 (13)	07:48	07:40		
	20	06:26		17:57	17:57	24	08:38 (13)	07:18			16:35
Potential sun hours	469	434	376	342	290	277					
Total, worst case	353		77	630	299						
Sun reduction	0.63		0.54	0.44	0.27						
Oper. time red.	1.00		1.00	1.00	1.00						
Wind dir. red.	0.71		0.52	0.51	0.50						
Total reduction	0.43		0.27	0.22	0.13						
Total, real	152		21	138	39						

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 25

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2 Shadow receptor: R-121 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (64)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June			
1	07:40	07:23	07:55 (13)	06:43	07:28 (12)	06:47	05:57	05:25	06:03 (11)
	16:36	17:14	23 08:18 (13)	17:52	25 07:53 (12)	19:31	20:06	20:40	19 06:22 (11)
2	07:40	07:22	07:56 (13)	06:41	07:30 (12)	06:46	05:56	05:24	06:03 (11)
	16:37	17:15	22 08:18 (13)	17:53	22 07:52 (12)	19:32	20:07	20:41	19 06:22 (11)
3	07:40	07:21	07:57 (13)	06:40	07:32 (12)	06:44	05:54	05:24	06:05 (11)
	16:38	17:17	20 08:17 (13)	17:55	17 07:49 (12)	19:33	20:09	20:41	17 06:22 (11)
4	07:40	07:20	07:57 (13)	06:38	07:35 (12)	06:42	05:53	05:23	06:06 (11)
	16:39	17:18	19 08:16 (13)	17:56	11 07:46 (12)	19:35	20:10	20:42	16 06:22 (11)
5	07:40	07:19	07:58 (13)	06:36	06:40	05:52	05:23	05:23	06:06 (11)
	16:40	17:19	17 08:15 (13)	17:57	19:36	20:11	20:43	20:43	15 06:21 (11)
6	07:40	07:17	08:00 (13)	06:35	06:38	05:50	05:23	05:23	06:07 (11)
	16:41	17:21	14 08:14 (13)	17:59	19:37	20:12	20:44	20:44	13 06:20 (11)
7	07:40	07:16	08:02 (13)	06:33	06:37	05:49	05:22	05:22	06:08 (11)
	16:42	17:22	8 08:10 (13)	18:00	19:38	20:13	20:44	20:44	12 06:20 (11)
8	07:40	07:15	07:31	06:31	06:35	05:48	05:22	05:22	06:08 (11)
	16:43	17:24	19:01	19:40	20:15	20:45	20:45	20:45	11 06:19 (11)
9	07:39	07:14	07:29	06:33	05:46	05:22	05:22	05:22	06:10 (11)
	16:44	17:25	19:03	19:41	20:16	4 06:14 (11)	20:46	20:46	8 06:18 (11)
10	07:39	07:12	07:27	06:31	05:45	06:06 (11)	05:21	05:21	06:11 (11)
	16:46	17:26	19:04	19:42	20:17	11 06:17 (11)	20:46	20:46	7 06:18 (11)
11	07:39	07:11	07:38 (12)	07:26	06:30	05:44	06:05 (11)	05:21	06:13 (11)
	16:47	17:28	9 07:47 (12)	19:05	19:43	20:18	14 06:19 (11)	20:47	4 06:17 (11)
12	07:38	07:10	07:35 (12)	07:24	06:28	05:43	06:04 (11)	05:21	
	16:48	17:29	16 07:51 (12)	19:06	19:44	20:19	16 06:20 (11)	20:48	
13	07:38	07:08	07:33 (12)	07:22	06:26	05:41	06:03 (11)	05:21	
	16:49	17:31	19 07:52 (12)	19:08	19:46	20:20	18 06:21 (11)	20:48	
14	07:38	07:07	07:32 (12)	07:20	06:24	05:40	06:02 (11)	05:21	
	16:50	17:32	22 07:54 (12)	19:09	19:47	20:21	20 06:22 (11)	20:49	
15	07:37	07:05	07:30 (12)	07:18	06:23	05:39	06:01 (11)	05:21	
	16:51	17:33	25 07:55 (12)	19:10	19:48	20:23	22 06:23 (11)	20:49	
16	07:37	07:04	07:29 (12)	07:17	06:21	05:38	06:00 (11)	05:21	
	16:53	17:35	28 07:57 (12)	19:11	19:49	20:24	23 06:23 (11)	20:50	
17	07:36	07:59 (13)	07:02	07:15	06:19	05:37	06:00 (11)	05:21	
	16:54	8 08:07 (13)	17:36	19:13	19:51	20:25	23 06:23 (11)	20:50	
18	07:35	07:58 (13)	07:01	07:13	06:18	05:36	06:00 (11)	05:21	
	16:55	11 08:09 (13)	17:37	19:14	19:52	20:26	24 06:24 (11)	20:50	
19	07:35	07:57 (13)	06:59	07:27 (12)	07:11	06:16	05:35	05:59 (11)	05:21
	16:56	13 08:10 (13)	17:39	19:15	19:53	20:27	25 06:24 (11)	20:51	
20	07:34	07:57 (13)	06:58	07:26 (12)	07:09	06:14	05:34	05:59 (11)	05:21
	16:58	15 08:12 (13)	17:40	19:16	19:54	20:28	25 06:24 (11)	20:51	
21	07:33	07:56 (13)	06:56	07:26 (12)	07:08	06:13	05:33	05:59 (11)	05:21
	16:59	17 08:13 (13)	17:42	19:18	19:55	20:29	25 06:24 (11)	20:51	
22	07:33	07:55 (13)	06:55	07:26 (12)	07:06	06:11	05:32	05:59 (11)	05:21
	17:00	19 08:14 (13)	17:43	19:19	19:57	20:30	25 06:24 (11)	20:52	
23	07:32	07:54 (13)	06:53	07:26 (12)	07:04	06:09	05:31	06:00 (11)	05:22
	17:02	21 08:15 (13)	17:44	19:20	19:58	20:31	24 06:24 (11)	20:52	
24	07:31	07:53 (13)	06:51	07:26 (12)	07:02	06:08	05:30	06:00 (11)	05:22
	17:03	22 08:15 (13)	17:46	19:21	19:59	20:32	24 06:24 (11)	20:52	
25	07:30	07:53 (13)	06:50	07:26 (12)	07:00	06:06	05:30	06:00 (11)	05:22
	17:04	23 08:16 (13)	17:47	19:22	20:00	20:33	24 06:24 (11)	20:52	
26	07:29	07:53 (13)	06:48	07:27 (12)	06:58	06:05	05:29	06:00 (11)	05:23
	17:06	23 08:16 (13)	17:48	19:24	20:00	20:34	23 06:23 (11)	20:52	
27	07:28	07:53 (13)	06:46	07:27 (12)	06:57	06:03	05:28	06:01 (11)	05:23
	17:07	24 08:17 (13)	17:50	19:25	20:01	20:35	23 06:24 (11)	20:52	
28	07:27	07:53 (13)	06:45	07:28 (12)	06:55	06:02	05:27	06:01 (11)	05:23
	17:08	24 08:17 (13)	17:51	19:26	20:03	20:36	22 06:23 (11)	20:52	
29	07:26	07:53 (13)		06:53	06:00	05:27	06:02 (11)	05:24	
	17:10	25 08:18 (13)		19:27	20:04	20:37	22 06:24 (11)	20:52	
30	07:25	07:54 (13)		06:51	05:59	05:26	06:02 (11)	05:24	
	17:11	24 08:18 (13)		19:29	20:05	20:38	21 06:23 (11)	20:52	
31	07:24	07:54 (13)		06:49		05:25	06:02 (11)		
	17:13	24 08:18 (13)		19:30		20:39	20 06:22 (11)		
Potential sun hours	288	293	369	403	457		463		
Total, worst case	293	610	75		478		141		
Sun reduction	0.33	0.39	0.47		0.55		0.59		
Oper. time red.	1.00	1.00	1.00		1.00		1.00		
Wind dir. red.	0.49	0.50	0.51		0.68		0.68		
Total reduction	0.15	0.19	0.23		0.36		0.39		
Total, real	45	116	17		173		55		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 26

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-121 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (64)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25	06:18 (11) 05:52	06:15 (11) 06:27	07:02	06:41	07:19
	20:52	2 06:20 (11) 20:31	15 06:30 (11) 19:42	18:47	16:56	16:28
2	05:25	06:17 (11) 05:53	06:16 (11) 06:28	07:03	06:42	07:20
	20:52	5 06:22 (11) 20:30	13 06:29 (11) 19:40	18:45	16:54	16:28
3	05:26	06:15 (11) 05:54	06:17 (11) 06:29	07:04	06:43	07:21
	20:52	8 06:23 (11) 20:29	9 06:26 (11) 19:39	18:43	16:53	16:27
4	05:27	06:15 (11) 05:55	06:30 07:05	06:30 07:05	06:45	07:32 (13) 07:22
	20:52	10 06:25 (11) 20:27	19:37 18:42	16:52	9 07:41 (13) 16:27	
5	05:27	06:14 (11) 05:56	06:32 07:06	06:32 07:06	06:46	07:30 (13) 07:23
	20:51	11 06:25 (11) 20:26	19:35 18:40	16:50	14 07:44 (13) 16:27	
6	05:28	06:13 (11) 05:57	06:33 07:08	06:33 07:08	06:47	07:28 (13) 07:24
	20:51	13 06:26 (11) 20:25	19:33 18:38	16:49	17 07:45 (13) 16:27	
7	05:29	06:13 (11) 05:58	06:34 07:09	06:34 07:09	06:49	07:28 (13) 07:25
	20:51	14 06:27 (11) 20:23	19:31 18:36	16:48	19 07:47 (13) 16:26	
8	05:29	06:12 (11) 05:59	06:35 07:10	06:35 07:10	06:50	07:26 (13) 07:26
	20:50	16 06:28 (11) 20:22	19:30 18:34	16:47	21 07:47 (13) 16:26	
9	05:30	06:12 (11) 06:01	06:36 07:11	08:13 (12) 06:51	07:26 (13) 07:27	
	20:50	17 06:29 (11) 20:21	19:28 18:33	4 08:17 (12) 16:45	23 07:49 (13) 16:26	
10	05:31	06:12 (11) 06:02	06:37 07:12	08:07 (12) 06:53	07:26 (13) 07:28	
	20:49	18 06:30 (11) 20:19	19:26 18:31	14 08:21 (12) 16:44	23 07:49 (13) 16:26	
11	05:31	06:11 (11) 06:03	06:38 07:14	08:05 (12) 06:54	07:25 (13) 07:29	
	20:49	19 06:30 (11) 20:18	19:24 18:29	19 08:24 (12) 16:43	24 07:49 (13) 16:26	
12	05:32	06:11 (11) 06:04	06:40 07:15	08:03 (12) 06:55	07:26 (13) 07:30	
	20:48	19 06:30 (11) 20:16	19:22 18:27	23 08:26 (12) 16:42	24 07:50 (13) 16:26	
13	05:33	06:11 (11) 06:05	06:41 07:16	08:01 (12) 06:56	07:25 (13) 07:31	
	20:48	20 06:31 (11) 20:15	19:20 18:26	26 08:27 (12) 16:41	24 07:49 (13) 16:26	
14	05:34	06:11 (11) 06:06	06:42 07:17	08:01 (12) 06:58	07:26 (13) 07:32	
	20:47	21 06:32 (11) 20:14	19:18 18:24	27 08:28 (12) 16:40	24 07:50 (13) 16:27	
15	05:35	06:10 (11) 06:07	06:43 07:19	07:59 (12) 06:59	07:26 (13) 07:32	
	20:47	23 06:33 (11) 20:12	19:17 18:22	30 08:29 (12) 16:39	24 07:50 (13) 16:27	
16	05:36	06:10 (11) 06:09	06:44 07:20	07:58 (12) 07:00	07:26 (13) 07:33	
	20:46	23 06:33 (11) 20:10	19:15 18:20	31 08:29 (12) 16:38	23 07:49 (13) 16:27	
17	05:37	06:09 (11) 06:10	06:45 07:21	07:58 (12) 07:02	07:27 (13) 07:34	
	20:45	24 06:33 (11) 20:09	19:13 18:19	32 08:30 (12) 16:37	23 07:50 (13) 16:27	
18	05:37	06:09 (11) 06:11	06:46 07:22	07:57 (12) 07:03	07:27 (13) 07:35	
	20:45	24 06:33 (11) 20:07	19:11 18:17	32 08:29 (12) 16:36	22 07:49 (13) 16:28	
19	05:38	06:09 (11) 06:12	06:48 07:24	07:57 (12) 07:04	07:29 (13) 07:35	
	20:44	25 06:34 (11) 20:06	19:09 18:15	32 08:29 (12) 16:35	21 07:50 (13) 16:28	
20	05:39	06:09 (11) 06:13	06:49 07:25	07:57 (12) 07:06	07:30 (13) 07:36	
	20:43	25 06:34 (11) 20:04	19:07 18:14	33 08:30 (12) 16:34	19 07:49 (13) 16:28	
21	05:40	06:09 (11) 06:14	06:50 07:26	07:57 (12) 07:07	07:31 (13) 07:36	
	20:42	25 06:34 (11) 20:03	19:05 18:12	32 08:29 (12) 16:34	17 07:48 (13) 16:29	
22	05:41	06:10 (11) 06:15	06:51 07:27	07:57 (12) 07:08	07:33 (13) 07:37	
	20:41	24 06:34 (11) 20:01	19:04 18:11	31 08:28 (12) 16:33	15 07:48 (13) 16:29	
23	05:42	06:10 (11) 06:17	06:52 07:29	07:58 (12) 07:09	07:34 (13) 07:37	
	20:40	24 06:34 (11) 19:58	19:02 18:09	30 08:28 (12) 16:32	13 07:47 (13) 16:30	
24	05:43	06:10 (11) 06:18	06:53 07:30	07:58 (12) 07:11	07:35 (13) 07:38	
	20:40	24 06:34 (11) 19:56	19:00 18:07	29 08:27 (12) 16:32	11 07:46 (13) 16:30	
25	05:44	06:10 (11) 06:19	06:54 07:31	07:58 (12) 07:12	07:37 (13) 07:38	
	20:39	24 06:34 (11) 19:54	18:58 18:06	28 08:26 (12) 16:31	8 07:45 (13) 16:31	
26	05:45	06:10 (11) 06:20	06:56 07:33	07:59 (12) 07:13	07:39	
	20:38	24 06:34 (11) 19:53	18:56 18:04	27 08:26 (12) 16:30	16:32	
27	05:46	06:11 (11) 06:21	06:57 07:34	08:00 (12) 07:14	07:39	
	20:37	23 06:34 (11) 19:51	18:54 18:03	24 08:24 (12) 16:30	16:32	
28	05:47	06:11 (11) 06:22	06:58 07:35	08:01 (12) 07:16	07:39	
	20:36	22 06:33 (11) 19:49	18:52 18:01	22 08:23 (12) 16:29	16:33	
29	05:48	06:12 (11) 06:24	06:59 07:37	08:03 (12) 07:17	07:39	
	20:34	21 06:33 (11) 19:47	18:51 18:00	19 08:22 (12) 16:29	16:34	
30	05:50	06:13 (11) 06:25	07:00 07:38	08:05 (12) 07:18	07:40	
	20:33	19 06:32 (11) 19:46	18:49 17:59	14 08:19 (12) 16:28	16:35	
31	05:51	06:14 (11) 06:26	07:39	08:09 (12)	07:40	
	20:32	17 06:31 (11) 19:44	17:57	6 08:15 (12)	16:35	
Potential sun hours	469	434	376	342	290	277
Total, worst case	584	37	565	418		
Sun reduction	0.63	0.59	0.44	0.27		
Oper. time red.	1.00	1.00	1.00	1.00		
Wind dir. red.	0.68	0.68	0.51	0.49		
Total reduction	0.42	0.39	0.22	0.13		
Total, real	243	14	122	53		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 27

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-123 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (332)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36	07:23 17:14	06:43 17:52	07:19 (14) 06:47	07:23 (13) 05:57	05:25 20:40
2	07:40 16:37	07:22 17:15	06:41 17:53	07:21 (14) 06:46	07:22 (13) 05:56	05:24 20:41
3	07:40 16:38	07:21 17:17	06:40 17:55	07:22 (14) 06:44	07:23 (13) 05:54	05:24 20:41
4	07:40 16:39	07:20 17:18	06:38 17:56	07:23 (14) 06:42	07:22 (13) 05:53	05:23 20:42
5	07:40 16:40	07:19 17:19	06:36 17:57	07:26 (14) 06:40	07:22 (13) 05:52	05:23 20:43
6	07:40 16:41	07:17 17:21	06:34 17:59	07:30 (14) 06:38	07:22 (13) 05:50	05:23 20:44
7	07:40 16:42	07:16 17:22	06:33 18:00	07:34 (14) 06:37	08:00 (13) 20:12	20:44 05:22
8	07:40 16:43	07:15 17:24	06:31 19:01	06:35 19:38	07:23 (13) 05:49	05:22 20:44
9	07:39 16:44	07:14 17:25	06:29 19:03	07:29 19:41	08:00 (13) 20:12	20:44 05:22
10	07:39 16:46	07:12 17:26	06:27 19:04	07:27 19:42	07:24 (13) 05:46	05:22 20:46
11	07:39 16:47	07:11 17:28	06:26 19:05	07:26 19:43	07:26 (13) 05:44	05:21 20:46
12	07:38 16:48	07:10 17:29	06:24 19:06	07:24 19:44	07:27 (13) 05:43	05:21 20:48
13	07:38 16:49	07:08 17:31	06:22 19:08	07:22 19:46	07:29 (13) 05:41	05:21 20:48
14	07:38 16:50	07:07 17:32	06:20 19:09	07:20 19:47	07:31 (13) 05:40	05:21 20:49
15	07:37 16:51	07:05 17:33	06:18 19:10	07:18 19:48	07:46 (13) 20:21	20:49 05:21
16	07:37 16:53	07:04 17:35	06:17 19:11	07:17 19:49	07:38 (13) 05:39	05:21 20:49
17	07:36 16:54	07:02 17:36	06:15 19:12	07:15 19:50	07:40 (13) 20:23	20:49 05:21
18	07:35 16:55	07:01 17:37	06:14 19:13	07:14 19:51	07:41 (13) 06:14	06:14 05:21
19	07:35 16:56	06:59 17:39	06:13 19:14	07:13 19:52	07:42 (13) 06:13	06:13 05:21
20	07:34 16:58	06:58 17:40	06:12 19:15	07:12 19:53	07:43 (13) 06:12	06:12 05:21
21	07:33 16:59	06:56 17:42	06:11 19:16	07:11 19:54	07:44 (13) 06:11	06:11 05:21
22	07:33 17:00	06:55 17:43	06:10 19:17	07:10 19:55	07:45 (13) 06:10	06:10 05:21
23	07:32 17:02	06:53 17:44	06:09 19:18	07:09 19:56	07:46 (13) 06:09	06:09 05:22
24	07:31 17:03	06:51 17:46	06:08 19:19	07:08 19:57	07:47 (13) 06:08	06:08 05:22
25	07:30 17:04	06:50 17:47	06:07 19:20	07:07 19:58	07:48 (13) 06:07	06:07 05:22
26	07:29 17:06	06:48 17:48	06:06 19:21	07:06 19:59	07:49 (13) 06:06	06:06 05:22
27	07:28 17:07	06:46 17:50	06:05 19:22	07:05 20:00	07:50 (13) 06:05	06:05 05:22
28	07:27 17:08	06:45 17:51	06:04 19:23	07:04 20:01	07:51 (13) 06:04	06:04 05:23
29	07:26 17:10	06:44 17:52	06:03 19:24	07:03 20:02	07:52 (13) 06:03	06:03 05:23
30	07:25 17:11	06:43 17:53	06:02 19:25	07:02 20:03	07:53 (13) 06:02	06:02 05:24
31	07:24 17:13	06:42 17:54	06:01 19:26	07:01 20:04	07:54 (13) 06:01	06:01 05:24
Potential sun hours	288	293	343	486	465	463
Total, worst case						
Sun reduction		0.39	0.47	0.49	0.55	0.59
Oper. time red.		1.00	1.00	1.00	1.00	1.00
Wind dir. red.		0.51	0.55	0.56	0.56	0.56
Total reduction		0.20	0.26	0.28	0.28	0.28
Total, real		68	126	128	128	128

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 28

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-123 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (332)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December		
1	05:25	05:52	06:27	07:25 (13)	07:02	06:40	07:19	
	20:52	20:31	19:42	28 07:53 (13)	18:47	16:56	16:28	
2	05:25	05:53	06:28	07:23 (13)	07:03	06:42	07:20	
	20:52	20:30	19:40	31 07:54 (13)	18:45	16:54	16:28	
3	05:26	05:54	06:29	07:22 (13)	07:04	06:43	07:21	
	20:52	20:29	19:39	33 07:55 (13)	18:43	16:53	16:27	
4	05:27	05:55	06:30	07:21 (13)	07:05	06:44	07:22	
	20:52	20:27	19:37	35 07:56 (13)	18:41	16:52	16:27	
5	05:27	05:56	06:32	07:19 (13)	07:06	06:46	07:23	
	20:51	20:26	19:35	37 07:56 (13)	18:40	16:50	16:27	
6	05:28	05:57	06:33	07:18 (13)	07:08	06:47	07:24	
	20:51	20:25	19:33	38 07:56 (13)	18:38	16:49	16:27	
7	05:29	05:58	06:34	07:17 (13)	07:09	06:48	07:25	
	20:51	20:23	19:31	39 07:56 (13)	18:36	16:48	16:26	
8	05:29	05:59	06:35	07:17 (13)	07:10	08:02 (14)	06:50	07:26
	20:50	20:22	19:30	39 07:56 (13)	18:34	10 08:12 (14)	16:47	16:26
9	05:30	06:01	06:36	07:16 (13)	07:11	07:59 (14)	06:51	07:27
	20:50	20:21	19:28	40 07:56 (13)	18:33	16 08:15 (14)	16:45	16:26
10	05:31	06:02	06:37	07:16 (13)	07:12	07:56 (14)	06:52	07:28
	20:49	20:19	19:26	41 07:57 (13)	18:31	20 08:16 (14)	16:44	16:26
11	05:31	06:03	06:38	07:16 (13)	07:14	07:55 (14)	06:54	07:29
	20:49	20:18	19:24	41 07:57 (13)	18:29	23 08:18 (14)	16:43	16:26
12	05:32	06:04	06:40	07:15 (13)	07:15	07:54 (14)	06:55	07:30
	20:48	20:16	19:22	41 07:56 (13)	18:27	25 08:19 (14)	16:42	16:26
13	05:33	06:05	06:41	07:15 (13)	07:16	07:52 (14)	06:56	07:31
	20:48	20:15	19:20	40 07:55 (13)	18:26	27 08:19 (14)	16:41	16:26
14	05:34	06:06	06:42	07:15 (13)	07:17	07:52 (14)	06:58	07:32
	20:47	20:13	19:18	40 07:55 (13)	18:24	28 08:20 (14)	16:40	16:27
15	05:35	06:07	06:43	07:15 (13)	07:19	07:51 (14)	06:59	07:32
	20:47	20:12	19:17	39 07:54 (13)	18:22	29 08:20 (14)	16:39	16:27
16	05:36	06:09	06:44	07:15 (13)	07:20	07:51 (14)	07:00	07:33
	20:46	20:10	19:15	38 07:53 (13)	18:20	29 08:20 (14)	16:38	16:27
17	05:37	06:10	06:45	07:15 (13)	07:21	07:50 (14)	07:02	07:34
	20:45	20:09	19:13	36 07:51 (13)	18:19	29 08:19 (14)	16:37	16:27
18	05:37	06:11	06:46	07:16 (13)	07:22	07:51 (14)	07:03	07:35
	20:45	20:07	19:11	34 07:50 (13)	18:17	29 08:20 (14)	16:36	16:28
19	05:38	06:12	06:48	07:18 (13)	07:24	07:50 (14)	07:04	07:35
	20:44	20:06	19:09	31 07:49 (13)	18:15	29 08:19 (14)	16:35	16:28
20	05:39	06:13	06:49	07:18 (13)	07:25	07:50 (14)	07:06	07:36
	20:43	20:04	19:07	29 07:47 (13)	18:14	28 08:18 (14)	16:34	16:28
21	05:40	06:14	06:50	07:20 (13)	07:26	07:51 (14)	07:07	07:36
	20:42	20:03	19:05	25 07:45 (13)	18:12	27 08:18 (14)	16:34	16:29
22	05:41	06:15	06:51	07:21 (13)	07:27	07:51 (14)	07:08	07:37
	20:41	20:01	19:04	22 07:43 (13)	18:11	26 08:17 (14)	16:33	16:29
23	05:42	06:17	06:52	07:24 (13)	07:29	07:53 (14)	07:09	07:37
	20:40	19:58	19:02	15 07:39 (13)	18:09	23 08:16 (14)	16:32	16:30
24	05:43	06:18	06:53		07:30	07:54 (14)	07:11	07:38
	20:40	19:56	19:00		18:07	21 08:15 (14)	16:32	16:30
25	05:44	06:19	06:54		07:31	07:55 (14)	07:12	07:38
	20:39	19:54	18:58		18:06	18 08:13 (14)	16:31	16:31
26	05:45	06:20	06:56		07:33	07:57 (14)	07:13	07:39
	20:38	19:53	18:56		18:04	14 08:11 (14)	16:30	16:32
27	05:46	06:21	06:57		07:34	08:00 (14)	07:14	07:39
	20:37	19:51	18:54		18:03	7 08:07 (14)	16:30	16:32
28	05:47	06:22	06:58		07:35		07:16	07:39
	20:36	19:49	5 07:42 (13)	18:52	18:01		16:29	16:33
29	05:48	06:23	06:59		07:37		07:17	07:39
	20:34	19:47	15 07:47 (13)	18:51	18:00		16:29	16:34
30	05:50	06:25	07:29 (13)	07:00	07:38		07:18	07:40
	20:33	19:46	21 07:50 (13)	18:49	17:59		16:28	16:35
31	05:51	06:26	07:27 (13)		07:39			07:40
	20:32	19:44	25 07:52 (13)		17:57			16:35
Potential sun hours	469	434	376		342		290	277
Total, worst case		66	792		458			
Sun reduction		0.59	0.54		0.44			
Oper. time red.		1.00	1.00		1.00			
Wind dir. red.		0.56	0.56		0.51			
Total reduction		0.33	0.30		0.22			
Total, real		22	240		103			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 29

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edr.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-124 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (66)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:37	15:33 (01) 16:05 (01)	07:23 17:14	06:43 17:52	07:03 (16) 07:19 (16)	06:47 19:31
2	07:40 16:37	15:34 (01) 16:05 (01)	07:22 17:15	06:41 17:53	07:02 (16) 07:20 (16)	06:46 19:32
3	07:40 16:38	15:34 (01) 16:06 (01)	07:21 17:17	06:40 17:55	07:00 (16) 07:20 (16)	06:44 19:33
4	07:40 16:39	15:35 (01) 16:07 (01)	07:20 17:18	06:38 17:56	06:58 (16) 07:20 (16)	06:42 19:35
5	07:40 16:40	15:35 (01) 16:07 (01)	07:19 17:19	06:36 17:57	06:57 (16) 07:20 (16)	06:40 19:36
6	07:40 16:41	15:36 (01) 16:08 (01)	07:17 17:21	06:34 17:59	06:58 (16) 07:20 (16)	06:38 19:37
7	07:40 16:42	15:35 (01) 16:08 (01)	07:16 17:22	06:33 18:00	06:58 (16) 07:19 (16)	06:37 19:38
8	07:40 16:43	15:36 (01) 16:08 (01)	07:15 17:24	06:31 18:01	07:58 (16) 08:18 (16)	06:35 19:40
9	07:39 16:44	15:37 (01) 16:09 (01)	07:14 17:25	06:29 18:03	07:58 (16) 08:17 (16)	06:33 19:41
10	07:39 16:46	15:37 (01) 16:09 (01)	07:12 17:26	06:27 18:04	08:00 (16) 08:16 (16)	06:31 19:42
11	07:39 16:47	15:38 (01) 16:10 (01)	07:11 17:28	06:26 18:05	08:02 (16) 08:14 (16)	06:30 19:43
12	07:38 16:48	15:38 (01) 16:10 (01)	07:10 17:29	06:25 18:06	08:06 (16) 08:09 (16)	06:28 19:44
13	07:38 16:49	15:38 (01) 16:10 (01)	07:08 17:31	06:22 18:08	07:22 07:40 (15)	06:26 19:45
14	07:38 16:50	15:40 (01) 16:11 (01)	07:07 17:32	06:20 18:09	07:20 07:40 (15)	06:24 19:46
15	07:37 16:51	15:40 (01) 16:10 (01)	07:05 17:33	06:19 18:10	07:18 07:40 (15)	06:23 19:47
16	07:37 16:53	15:40 (01) 16:10 (01)	07:04 17:35	06:17 18:11	07:17 07:40 (15)	06:21 19:48
17	07:36 16:54	15:41 (01) 16:11 (01)	07:02 17:36	06:15 18:12	07:15 07:40 (15)	06:19 19:49
18	07:35 16:55	15:42 (01) 16:10 (01)	07:01 17:37	06:13 18:13	07:13 07:40 (15)	06:18 19:50
19	07:35 16:56	15:42 (01) 16:10 (01)	06:59 17:39	06:11 18:14	07:11 07:40 (15)	06:16 19:51
20	07:34 16:58	15:44 (01) 16:11 (01)	06:58 17:40	06:09 18:15	07:09 07:40 (15)	06:14 19:52
21	07:33 16:59	15:45 (01) 16:10 (01)	06:56 17:42	06:08 18:16	07:08 07:28 (15)	06:13 19:53
22	07:33 17:00	15:46 (01) 16:09 (01)	06:55 17:43	06:06 18:17	07:06 07:40 (15)	06:11 19:54
23	07:32 17:02	15:47 (01) 16:09 (01)	06:53 17:44	06:04 18:18	07:04 07:43 (15)	06:09 19:55
24	07:31 17:03	15:48 (01) 16:08 (01)	06:51 17:46	06:02 18:19	07:02 07:44 (15)	06:08 19:56
25	07:30 17:04	15:50 (01) 16:06 (01)	06:50 17:47	06:00 18:20	07:00 07:45 (15)	06:06 20:00
26	07:29 17:06	15:52 (01) 16:04 (01)	06:48 17:48	06:58 18:21	07:45 (15) 07:15 (16)	06:05 20:00
27	07:28 17:07	15:56 (01) 16:01 (01)	06:46 17:50	06:57 18:22	07:18 (15) 07:46 (15)	06:03 20:01
28	07:27 17:08	16:01 (01) 06:45	07:05 (16) 17:51	06:55 18:23	07:18 (15) 07:47 (15)	06:02 20:03
29	07:26 17:10			06:53 18:24	07:17 (15) 07:47 (15)	06:00 20:04
30	07:25 17:11			06:51 18:25	07:16 (15) 07:46 (15)	05:59 20:05
31	07:24 17:13			06:49 18:26	07:16 (15) 07:46 (15)	05:57 20:05
Potential sun hours	288	293	369	403	457	463
Total, worst case	743	29	461	206	866	1168
Sun reduction	0.33	0.39	0.47	0.49	0.55	0.59
Oper. time red.	1.00	1.00	1.00	1.00	1.00	1.00
Wind dir. red.	0.75	0.52	0.55	0.57	0.68	0.68
Total reduction	0.25	0.20	0.26	0.28	0.38	0.41
Total, real	185	6	120	59	328	474

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 30

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-124 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (66)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25 20:52	06:12 (14) 05:52 06:51 (14) 20:31	06:21 (14) 06:27 06:49 (14) 19:42	07:02 18:47	06:40 16:56	07:19 15:20 (01) 16:28 32 15:52 (01)
2	05:25 20:52	06:13 (14) 05:53 06:52 (14) 20:30	06:22 (14) 06:28 06:48 (14) 19:40	07:03 18:45	06:42 16:54	07:20 15:20 (01) 16:28 32 15:52 (01)
3	05:26 20:52	06:12 (14) 05:54 06:52 (14) 20:29	06:23 (14) 06:29 06:47 (14) 19:39	07:21 (15) 07:04 07:30 (15) 18:43	06:43 16:53	07:21 15:20 (01) 16:27 32 15:52 (01)
4	05:27 20:51	06:13 (14) 05:55 06:53 (14) 20:27	06:25 (14) 06:30 06:45 (14) 19:37	07:18 (15) 07:05 07:33 (15) 18:41	06:44 16:52	07:22 15:20 (01) 16:27 32 15:52 (01)
5	05:27 20:51	06:12 (14) 05:56 06:52 (14) 20:26	06:27 (14) 06:32 06:42 (14) 19:35	07:15 (15) 07:06 07:35 (15) 18:40	06:46 16:50	07:23 15:22 (01) 16:27 32 15:54 (01)
6	05:28 20:51	06:13 (14) 05:57 06:53 (14) 20:25	06:32 (14) 06:33 06:37 (14) 19:33	07:13 (15) 07:08 07:36 (15) 18:38	06:47 16:49	07:24 15:22 (01) 16:27 32 15:54 (01)
7	05:29 20:51	06:13 (14) 05:58 06:54 (14) 20:23	06:34 19:31	07:12 (15) 07:09 07:37 (15) 18:36	06:48 16:48	07:25 15:22 (01) 16:26 32 15:54 (01)
8	05:29 20:50	06:13 (14) 05:59 06:53 (14) 20:22	06:35 19:29	07:10 (15) 07:10 07:37 (15) 18:34	06:50 16:47	07:26 15:23 (01) 16:26 32 15:55 (01)
9	05:30 20:50	06:13 (14) 06:01 06:54 (14) 20:21	06:36 19:28	07:09 (15) 07:11 07:37 (15) 18:33	06:51 16:45	07:27 15:23 (01) 16:26 32 15:55 (01)
10	05:31 20:49	06:13 (14) 06:02 06:54 (14) 20:19	06:37 19:26	07:09 (15) 07:12 07:38 (15) 18:31	06:52 16:44	07:28 15:24 (01) 16:26 31 15:55 (01)
11	05:31 20:49	06:13 (14) 06:03 06:54 (14) 20:18	06:38 19:24	07:09 (15) 07:14 07:38 (15) 18:29	06:54 16:43	07:29 15:23 (01) 16:26 32 15:55 (01)
12	05:32 20:48	06:13 (14) 06:04 06:54 (14) 20:16	06:40 19:22	07:08 (15) 07:15 07:38 (15) 18:27	06:55 16:42	07:30 15:24 (01) 16:26 31 15:55 (01)
13	05:33 20:48	06:13 (14) 06:05 06:55 (14) 20:15	06:41 19:20	07:07 (15) 07:16 07:37 (15) 18:26	06:56 16:41	07:31 15:25 (01) 16:26 31 15:56 (01)
14	05:34 20:47	06:14 (14) 06:06 06:55 (14) 20:13	06:42 19:18	07:07 (15) 07:17 07:37 (15) 18:24	06:58 16:40	07:32 15:26 (01) 16:27 31 15:57 (01)
15	05:35 20:47	06:14 (14) 06:07 06:55 (14) 20:12	06:43 19:17	07:07 (15) 07:19 07:36 (15) 18:22	06:59 16:39	15:29 (01) 07:32 15:26 (01) 16:27 31 15:57 (01)
16	05:36 20:46	06:14 (14) 06:09 06:56 (14) 20:10	06:44 19:15	07:07 (15) 07:20 07:35 (15) 18:20	07:00 16:38	15:25 (01) 07:33 15:26 (01) 16:27 31 15:57 (01)
17	05:37 20:45	06:13 (14) 06:10 06:55 (14) 20:09	06:45 19:13	07:07 (15) 07:21 07:34 (15) 18:19	07:02 16:37	15:24 (01) 07:34 15:27 (01) 16:27 31 15:58 (01)
18	05:37 20:45	06:14 (14) 06:11 06:55 (14) 20:07	06:46 19:11	07:08 (15) 07:22 07:32 (15) 18:17	07:03 16:36	15:22 (01) 07:35 15:28 (01) 16:28 30 15:58 (01)
19	05:38 20:44	06:14 (14) 06:12 06:55 (14) 20:06	06:48 19:09	07:09 (15) 07:24 07:32 (15) 18:15	07:04 16:35	15:22 (01) 07:35 15:28 (01) 16:28 30 15:58 (01)
20	05:39 20:43	06:14 (14) 06:13 06:55 (14) 20:04	06:49 19:07	07:11 (15) 07:25 07:29 (15) 18:14	07:06 16:34	15:21 (01) 07:36 15:29 (01) 16:28 30 15:59 (01)
21	05:40 20:42	06:15 (14) 06:14 06:55 (14) 20:03	06:50 19:05	07:12 (15) 07:26 07:27 (15) 18:12	07:07 16:34	15:20 (01) 07:36 15:29 (01) 16:29 30 15:59 (01)
22	05:41 20:41	06:15 (14) 06:15 06:55 (14) 20:01	06:51 19:04	07:16 (15) 07:27 07:22 (15) 18:11	07:08 16:33	15:20 (01) 07:37 15:30 (01) 16:29 30 16:00 (01)
23	05:42 20:40	06:15 (14) 06:17 06:55 (14) 19:58	06:52 19:02	07:29 18:09	07:09 16:32	15:19 (01) 07:37 15:30 (01) 16:30 30 16:00 (01)
24	05:43 20:40	06:16 (14) 06:18 06:55 (14) 19:56	06:53 19:00	07:30 18:07	07:11 16:32	15:19 (01) 07:38 15:31 (01) 16:30 30 16:01 (01)
25	05:44 20:39	06:16 (14) 06:19 06:54 (14) 19:54	06:54 18:58	07:31 18:06	07:12 16:31	15:19 (01) 07:38 15:31 (01) 16:31 30 16:01 (01)
26	05:45 20:38	06:17 (14) 06:20 06:54 (14) 19:53	06:56 18:56	07:33 18:04	07:13 16:30	15:19 (01) 07:39 15:32 (01) 16:32 30 16:01 (01)
27	05:46 20:37	06:17 (14) 06:21 06:54 (14) 19:51	06:57 18:54	07:34 18:03	07:14 16:30	15:19 (01) 07:39 15:32 (01) 16:32 31 16:03 (01)
28	05:47 20:35	06:18 (14) 06:22 06:53 (14) 19:49	06:58 18:52	07:35 18:01	07:16 16:29	15:19 (01) 07:39 15:32 (01) 16:31 31 16:03 (01)
29	05:48 20:34	06:18 (14) 06:23 06:52 (14) 19:47	06:59 18:51	07:37 18:00	07:17 16:29	15:20 (01) 07:39 15:32 (01) 16:31 31 16:03 (01)
30	05:50 20:33	06:19 (14) 06:25 06:51 (14) 19:46	07:00 18:49	07:38 17:59	07:18 16:28	15:20 (01) 07:40 15:33 (01) 16:35 31 16:04 (01)
31	05:51 20:32	06:20 (14) 06:26 06:51 (14) 19:44	07:01 18:48	07:39 17:57	07:19 16:35	15:20 (01) 07:40 15:33 (01) 16:35 31 16:04 (01)
Potential sun hours	469	434	376	342	290	277
Total, worst case	1217	118	465	245	390	962
Sun reduction	0.63	0.59	0.54	0.44	0.27	0.25
Oper. time red.	1.00	1.00	1.00	1.00	1.00	1.00
Wind dir. red.	0.68	0.68	0.57	0.52	0.75	0.75
Total reduction	0.43	0.41	0.31	0.23	0.20	0.19
Total, real	527	48	146	56	80	182

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 31

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2 Shadow receptor: R-126 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (331)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40	07:23	06:43	06:47	05:57	05:25
	16:37	17:14	17:52	19:31	20:06	20:40
2	07:40	07:22	06:41	06:46	05:56	05:24
	16:37	17:15	17:53	19:32	20:07	20:41
3	07:40	07:21	06:40	06:44	05:54	05:24
	16:38	17:17	17:55	19:33	20:09	20:41
4	07:40	07:20	06:38	06:42	05:53	05:23
	16:39	17:18	17:56	19:35	20:10	20:42
5	07:40	07:19	06:36	06:40	05:52	05:23
	16:40	17:20	17:57	19:36	20:11	20:43
6	07:40	07:17	06:35	06:38	05:50	05:23
	16:41	17:21	17:59	19:37	20:12	20:44
7	07:40	07:16	06:33	06:37	05:49	05:22
	16:42	17:22	18:00	19:38	20:13	20:44
8	07:40	07:15	07:31	06:35	05:48	05:22
	16:43	17:24	19:01	19:40	20:15	20:45
9	07:39	07:14	07:29	06:33	06:53 (13)	05:46
	16:44	17:25	19:03	19:41	9 07:02 (13)	20:16
10	07:39	07:12	07:27	06:31	06:51 (13)	05:45
	16:46	17:26	19:04	19:42	13 07:04 (13)	20:17
11	07:39	07:11	07:26	06:30	06:50 (13)	05:44
	16:47	17:28	19:05	19:43	16 07:06 (13)	20:18
12	07:38	07:10	07:24	06:28	06:48 (13)	05:43
	16:48	17:29	19:06	19:44	19 07:07 (13)	20:19
13	07:38	07:08	07:22	06:26	06:46 (13)	05:41
	16:49	17:31	19:08	19:46	21 07:07 (13)	20:20
14	07:38	07:07	07:20	06:24	06:44 (13)	05:40
	16:50	17:32	19:09	19:47	23 07:07 (13)	20:21
15	07:37	07:05	07:19	06:23	06:44 (13)	05:39
	16:51	17:33	19:10	19:48	23 07:07 (13)	20:23
16	07:37	07:04	07:17	06:21	06:43 (13)	05:38
	16:53	17:35	19:11	19:49	24 07:07 (13)	20:24
17	07:36	07:02	07:15	06:19	06:43 (13)	05:37
	16:54	17:36	19:13	19:51	23 07:06 (13)	20:25
18	07:35	07:01	07:13	06:18	06:43 (13)	05:36
	16:55	17:37	19:14	19:52	23 07:06 (13)	20:26
19	07:35	06:59	07:11	06:16	06:43 (13)	05:35
	16:56	17:39	19:15	19:53	22 07:05 (13)	20:27
20	07:34	06:58	07:09	06:14	06:44 (13)	05:34
	16:58	17:40	19:16	19:54	21 07:05 (13)	20:28
21	07:33	06:56	07:08	06:13	06:44 (13)	05:33
	16:59	17:42	19:18	19:55	20 07:04 (13)	20:29
22	07:33	06:55	07:06	06:11	06:45 (13)	05:32
	17:00	17:43	19:19	19:57	17 07:02 (13)	20:30
23	07:32	06:53	07:04	06:09	06:47 (13)	05:31
	17:02	17:44	19:20	19:58	14 07:01 (13)	20:31
24	07:31	06:51	07:02	06:08	06:49 (13)	05:30
	17:03	17:46	19:21	19:59	8 06:57 (13)	20:32
25	07:30	06:50	07:00	06:06	05:30	05:52 (12)
	17:04	17:47	19:22	20:00	17 06:09 (12)	20:52
26	07:29	06:48	06:58	06:05	05:29	05:51 (12)
	17:06	17:48	19:24	20:00	18 06:09 (12)	20:52
27	07:28	06:46	06:57	06:03	05:28	05:51 (12)
	17:07	17:50	19:25	20:01	20 06:11 (12)	20:52
28	07:27	06:45	06:55	06:02	05:27	05:50 (12)
	17:08	17:51	19:26	20:03	21 06:11 (12)	20:52
29	07:26		06:53	06:00	05:27	05:50 (12)
	17:10		19:27	20:04	22 06:12 (12)	20:52
30	07:25		06:51	05:59	05:26	05:49 (12)
	17:11		19:29	20:05	23 06:12 (12)	20:52
31	07:24		06:49		05:25	05:48 (12)
	17:13		19:30		24 06:12 (12)	
Potential sun hours	288	293	369	403	457	463
Total, worst case				296	186	825
Sun reduction				0.49	0.55	0.59
Oper. time red.				1.00	1.00	1.00
Wind dir. red.				0.61	0.70	0.70
Total reduction				0.30	0.39	0.41
Total, real				89	72	341

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 32

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2 Shadow receptor: R-126 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (331)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25	05:53 (12) 05:52	06:27	06:49 (13) 07:02	06:41	07:19
	28	06:21 (12) 20:31	19:42	16 07:05 (13) 18:47	16:56	16:28
2	05:25	05:53 (12) 05:53	06:28	06:50 (13) 07:03	06:42	07:20
	28	06:21 (12) 20:30	19:40	13 07:03 (13) 18:45	16:54	16:28
3	05:26	05:53 (12) 05:54	06:29	06:51 (13) 07:04	06:43	07:21
	28	06:21 (12) 20:29	19:39	9 07:00 (13) 18:43	16:53	16:27
4	05:27	05:54 (12) 05:55	06:30	07:05	06:45	07:22
	27	06:21 (12) 20:27	19:37	18:42	16:52	16:27
5	05:27	05:53 (12) 05:56	06:32	07:06	06:46	07:23
	28	06:21 (12) 20:26	19:35	18:40	16:50	16:27
6	05:28	05:54 (12) 05:57	06:33	07:08	06:47	07:24
	27	06:21 (12) 20:25	19:33	18:38	16:49	16:27
7	05:29	05:55 (12) 05:58	06:34	07:09	06:49	07:25
	27	06:22 (12) 20:23	19:31	18:36	16:48	16:26
8	05:29	05:54 (12) 06:00	06:35	07:10	06:50	07:26
	27	06:21 (12) 20:22	19:30	18:34	16:47	16:26
9	05:30	05:55 (12) 06:01	06:36	07:11	06:51	07:27
	26	06:21 (12) 20:21	19:28	18:33	16:45	16:26
10	05:31	05:56 (12) 06:02	06:37	07:12	06:53	07:28
	26	06:22 (12) 20:19	19:26	18:31	16:44	16:26
11	05:31	05:55 (12) 06:03	06:38	07:14	06:54	07:29
	26	06:21 (12) 20:18	19:24	18:29	16:43	16:26
12	05:32	05:56 (12) 06:04	06:40	07:15	06:55	07:30
	25	06:21 (12) 20:16	19:22	18:27	16:42	16:26
13	05:33	05:57 (12) 06:05	06:41	07:16	06:56	07:31
	24	06:21 (12) 20:15	19:20	18:26	16:41	16:26
14	05:34	05:58 (12) 06:06	06:42	07:17	06:58	07:32
	23	06:21 (12) 20:13	19:18	18:24	16:40	16:27
15	05:35	05:59 (12) 06:07	06:43	07:19	06:59	07:32
	22	06:21 (12) 20:12	19:17	18:22	16:39	16:27
16	05:36	06:00 (12) 06:09	06:44	07:20	07:00	07:33
	20	06:20 (12) 20:10	19:15	18:20	16:38	16:27
17	05:37	06:00 (12) 06:10	06:45	07:21	07:02	07:34
	19	06:19 (12) 20:09	19:13	18:19	16:37	16:27
18	05:37	06:01 (12) 06:11	06:46	07:22	07:03	07:35
	17	06:18 (12) 20:07	19:11	18:17	16:36	16:28
19	05:38	06:02 (12) 06:12	06:54 (13) 06:48	07:24	07:04	07:35
	16	06:18 (12) 20:06	10 07:04 (13) 19:09	18:15	16:35	16:28
20	05:39	06:03 (12) 06:13	06:52 (13) 06:49	07:25	07:06	07:36
	14	06:17 (12) 20:04	15 07:07 (13) 19:07	18:14	16:35	16:28
21	05:40	06:04 (12) 06:14	06:51 (13) 06:50	07:26	07:07	07:36
	12	06:16 (12) 20:03	17 07:08 (13) 19:05	18:12	16:34	16:29
22	05:41	06:06 (12) 06:15	06:49 (13) 06:51	07:27	07:08	07:37
	8	06:14 (12) 20:01	20 07:09 (13) 19:04	18:11	16:33	16:29
23	05:42	06:17	06:48 (13) 06:52	07:29	07:09	07:37
	20	19:58	21 07:09 (13) 19:02	18:09	16:32	16:30
24	05:43	06:18	06:47 (13) 06:53	07:30	07:11	07:38
	20	19:56	22 07:09 (13) 19:00	18:08	16:32	16:30
25	05:44	06:19	06:46 (13) 06:55	07:31	07:12	07:38
	20	19:54	23 07:09 (13) 18:58	18:06	16:31	16:31
26	05:45	06:20	06:46 (13) 06:56	07:33	07:13	07:39
	20	19:53	23 07:09 (13) 18:56	18:04	16:30	16:32
27	05:46	06:21	06:45 (13) 06:57	07:34	07:14	07:39
	20	19:51	24 07:09 (13) 18:54	18:03	16:30	16:32
28	05:47	06:22	06:45 (13) 06:58	07:35	07:16	07:39
	20	19:49	23 07:08 (13) 18:52	18:01	16:29	16:33
29	05:48	06:24	06:45 (13) 06:59	07:37	07:17	07:39
	20	19:47	23 07:08 (13) 18:51	18:00	16:29	16:34
30	05:50	06:25	06:46 (13) 07:00	07:38	07:18	07:40
	20	19:46	21 07:07 (13) 18:49	17:59	16:28	16:35
31	05:51	06:26	06:48 (13)	07:39		07:40
	20	19:44	18 07:06 (13)	17:57		16:35
Potential sun hours	469	434	376	342	290	277
Total, worst case	498	260	38			
Sun reduction	0.63	0.59	0.54			
Oper. time red.	1.00	1.00	1.00			
Wind dir. red.	0.70	0.61	0.61			
Total reduction	0.44	0.36	0.33			
Total, real	220	94	13			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 33

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2 Shadow receptor: R-127 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (67)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	
1	07:40 16:36	07:23 17:14	27 07:59 (13) 08:26 (13)	06:43 17:52	38 07:25 (12) 08:03 (12)	06:47 19:31	05:57 20:06
2	07:40 16:37	07:22 17:15	26 08:01 (13) 08:26 (13)	06:41 17:53	37 07:26 (12) 08:03 (12)	06:46 19:32	05:56 20:07
3	07:40 16:38	07:21 17:17	24 08:01 (13) 08:25 (13)	06:40 17:55	36 07:26 (12) 08:02 (12)	06:44 19:33	05:54 20:09
4	07:40 16:39	07:20 17:18	23 08:01 (13) 08:24 (13)	06:38 17:56	35 07:26 (12) 08:01 (12)	06:42 19:35	05:53 20:10
5	07:40 16:40	07:19 17:19	22 08:03 (13) 08:23 (13)	06:36 17:57	34 07:28 (12) 08:01 (12)	06:40 19:36	05:52 20:11
6	07:40 16:41	07:17 17:21	21 08:05 (13) 08:22 (13)	06:35 17:59	33 07:28 (12) 07:59 (12)	06:38 19:37	05:50 20:12
7	07:40 16:42	07:16 17:22	20 08:06 (13) 08:21 (13)	06:33 18:00	32 07:29 (12) 07:57 (12)	06:37 19:38	05:49 20:13
8	07:40 16:43	07:15 17:24	19 08:09 (13) 08:17 (13)	06:31 19:01	31 08:30 (12) 08:55 (12)	06:35 19:40	05:48 20:15
9	07:39 16:44	07:14 17:25	18 07:29 19:03	25 08:32 (12) 08:52 (12)	30 06:33 19:41	05:46 20:16	20:45 20:46
10	07:39 16:44	07:12 17:26	17 07:27 19:04	24 08:36 (12) 08:49 (12)	29 06:31 19:42	05:45 20:17	20:46 20:46
11	07:39 16:46	07:11 17:28	16 07:26 19:05	23 06:30 19:43	28 05:44 20:18	05:44 20:19	20:46 20:48
12	07:38 16:47	07:10 17:29	15 07:24 19:06	22 06:28 19:44	27 05:43 20:19	05:43 20:20	20:47 20:48
13	07:38 16:49	08:05 (13) 08:10 (13)	14 07:08 17:31	21 07:22 19:08	26 06:26 19:46	05:41 20:20	20:48 20:48
14	07:38 16:50	08:03 (13) 08:13 (13)	13 07:07 17:32	20 07:20 19:09	25 06:24 19:47	05:40 20:21	20:49 20:49
15	07:37 16:51	08:01 (13) 08:15 (13)	12 07:05 17:33	19 07:18 19:10	24 06:23 19:48	05:39 20:22	20:50 20:49
16	07:37 16:53	08:00 (13) 08:16 (13)	11 07:04 17:35	18 07:17 19:11	23 06:21 19:49	05:38 20:23	20:51 20:50
17	07:36 16:54	08:00 (13) 08:18 (13)	10 07:02 17:36	17 07:15 19:13	22 06:19 19:51	05:37 20:25	20:51 20:50
18	07:35 16:55	07:59 (13) 08:19 (13)	9 07:01 17:37	16 07:13 19:14	21 06:18 19:52	05:36 20:26	20:51 20:50
19	07:35 16:56	07:58 (13) 08:20 (13)	8 06:59 17:39	15 07:11 19:15	20 06:16 19:53	05:35 20:27	20:51 20:51
20	07:34 16:56	07:59 (13) 08:22 (13)	7 06:58 17:40	14 07:09 19:16	19 06:14 19:54	05:34 20:28	20:51 20:51
21	07:33 16:59	07:58 (13) 08:22 (13)	6 06:56 17:42	13 07:08 19:18	18 06:13 19:55	05:33 20:29	20:51 20:51
22	07:33 17:00	07:58 (13) 08:23 (13)	5 06:55 17:43	12 07:06 19:19	17 06:11 19:57	05:32 20:30	20:51 20:52
23	07:32 17:02	07:57 (13) 08:24 (13)	4 06:53 17:44	11 07:04 19:20	16 06:09 19:58	05:31 20:31	20:52 20:52
24	07:31 17:03	07:57 (13) 08:24 (13)	3 06:51 17:46	10 07:02 19:21	15 06:08 19:59	05:30 20:32	20:52 20:52
25	07:30 17:04	07:57 (13) 08:24 (13)	2 06:50 17:47	9 07:00 19:22	14 06:06 20:00	05:29 20:33	20:52 20:52
26	07:29 17:06	07:57 (13) 08:25 (13)	1 06:48 17:48	8 06:58 19:24	13 06:05 20:00	05:29 20:34	20:52 20:52
27	07:28 17:07	07:57 (13) 08:25 (13)	0 06:46 17:50	7 06:57 19:25	12 06:03 20:01	05:28 20:35	20:52 20:52
28	07:27 17:08	07:57 (13) 08:26 (13)	0 06:45 17:51	6 06:55 19:26	11 06:02 20:03	05:27 20:36	20:52 20:52
29	07:26 17:10	07:58 (13) 08:26 (13)	0 06:53 19:27	5 06:53 19:27	10 06:00 20:04	05:27 20:37	20:52 20:52
30	07:25 17:11	07:58 (13) 08:26 (13)	0 06:51 19:29	4 06:51 19:29	9 05:59 20:05	05:26 20:38	20:52 20:52
31	07:24 17:13	07:59 (13) 08:26 (13)	0 06:49 19:30	3 06:49 19:30	8 05:55 20:05	05:25 20:39	20:52 20:39
Potential sun hours	288	293	369	403	457	463	
Total, worst case	426	678	296		7	652	
Sun reduction	0.33	0.39	0.47		0.55	0.59	
Oper. time red.	1.00	1.00	1.00		1.00	1.00	
Wind dir. red.	0.48	0.50	0.51		0.71	0.71	
Total reduction	0.15	0.19	0.23		0.38	0.40	
Total, real	65	128	68		3	263	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 34

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-127 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (67)

Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25	05:50 (11)	05:52	06:27	07:02	06:41
	20:52	22 06:12 (11)	20:31	19:42	18:47	16:28
2	05:25	05:51 (11)	05:53	06:28	07:03	06:42
	20:52	22 06:13 (11)	20:30	19:40	18:45	16:28
3	05:26	05:50 (11)	05:54	06:29	07:04	06:43
	20:52	22 06:12 (11)	20:29	19:39	18:43	9 08:25 (12) 16:53
4	05:27	05:51 (11)	05:55	06:30	07:05	08:11 (12) 06:45
	20:52	21 06:12 (11)	20:27	19:37	18:42	17 08:28 (12) 16:52
5	05:27	05:51 (11)	05:56	06:32	07:06	08:08 (12) 06:46
	20:51	20 06:11 (11)	20:26	19:35	18:40	23 08:31 (12) 16:50
6	05:28	05:52 (11)	05:57	06:33	07:08	08:07 (12) 06:47
	20:51	20 06:12 (11)	20:25	19:33	18:38	26 08:33 (12) 16:49
7	05:28	05:53 (11)	05:58	06:34	07:09	08:05 (12) 06:49
	20:51	19 06:12 (11)	20:23	19:31	18:36	29 08:34 (12) 16:48
8	05:29	05:53 (11)	05:59	06:35	07:10	08:03 (12) 06:50
	20:50	17 06:10 (11)	20:22	19:30	18:34	32 08:35 (12) 16:47
9	05:30	05:55 (11)	06:01	06:36	07:11	08:01 (12) 06:51
	20:50	15 06:10 (11)	20:21	19:28	18:33	34 08:35 (12) 16:45
10	05:31	05:56 (11)	06:02	06:37	07:12	08:00 (12) 06:53
	20:49	14 06:10 (11)	20:19	19:26	18:31	36 08:36 (12) 16:44
11	05:31	05:56 (11)	06:03	06:38	07:14	08:00 (12) 06:54
	20:49	12 06:08 (11)	20:18	19:24	18:29	37 08:37 (12) 16:43
12	05:32	05:58 (11)	06:04	06:40	07:15	07:59 (12) 06:55
	20:48	9 06:07 (11)	20:16	19:22	18:27	38 08:37 (12) 16:42
13	05:33	06:01 (11)	06:05	06:41	07:16	07:58 (12) 06:56
	20:48	4 06:05 (11)	20:15	19:20	18:26	39 08:37 (12) 16:41
14	05:34	06:06	06:42	07:17	07:58 (12) 06:58	28 07:58 (13) 07:32
	20:47	20:13	19:18	18:24	40 08:38 (12) 16:40	28 07:58 (13) 16:27
15	05:35	06:07	06:43	07:19	07:58 (12) 06:59	28 07:58 (13) 07:32
	20:47	20:12	19:17	18:22	39 08:37 (12) 16:39	28 07:58 (13) 16:27
16	05:36	06:09	06:44	07:20	07:57 (12) 07:00	28 07:58 (13) 07:33
	20:46	20:10	19:15	18:20	40 08:37 (12) 16:38	28 07:58 (13) 16:27
17	05:37	06:10	06:45	07:21	07:58 (12) 07:02	28 07:58 (13) 07:34
	20:45	20:09	19:13	18:19	39 08:37 (12) 16:37	27 07:58 (13) 16:27
18	05:37	06:11	06:46	07:22	07:57 (12) 07:03	27 07:58 (13) 07:35
	20:45	20:07	19:11	18:17	39 08:36 (12) 16:36	27 07:58 (13) 16:28
19	05:38	06:12	06:48	07:24	07:57 (12) 07:04	27 07:58 (13) 07:35
	20:44	20:06	19:09	18:15	39 08:36 (12) 16:35	27 07:59 (13) 16:28
20	05:39	06:13	06:49	07:25	07:57 (12) 07:06	27 07:59 (13) 07:36
	20:43	20:04	19:07	18:14	38 08:35 (12) 16:34	25 07:58 (13) 16:28
21	05:40	06:14	06:50	07:26	07:58 (12) 07:07	27 07:59 (13) 07:36
	20:42	20:03	19:05	18:12	37 08:35 (12) 16:34	24 07:57 (13) 16:29
22	05:41	06:15	06:51	07:27	07:58 (12) 07:08	24 07:57 (13) 07:37
	20:41	20:01	19:04	18:11	35 08:33 (12) 16:33	23 07:58 (13) 16:29
23	05:42	06:17	06:52	07:29	08:00 (12) 07:09	23 07:58 (13) 07:37
	20:40	19:58	19:02	18:09	33 08:33 (12) 16:32	22 07:57 (13) 16:30
24	05:43	06:18	06:53	07:30	08:00 (12) 07:11	22 07:57 (13) 07:38
	20:40	19:56	19:00	18:07	32 08:32 (12) 16:32	20 07:56 (13) 16:30
25	05:44	06:19	06:54	07:31	08:01 (12) 07:12	20 07:56 (13) 07:38
	20:39	19:54	18:58	18:06	29 08:30 (12) 16:31	18 07:56 (13) 16:31
26	05:45	06:20	06:56	07:33	08:03 (12) 07:13	18 07:56 (13) 07:39
	20:38	19:53	18:56	18:04	26 08:29 (12) 16:30	16 07:55 (13) 16:32
27	05:46	06:21	06:57	07:34	08:05 (12) 07:14	16 07:55 (13) 07:39
	20:37	19:51	18:54	18:03	22 08:27 (12) 16:30	14 07:54 (13) 16:32
28	05:47	06:22	06:58	07:35	08:07 (12) 07:16	14 07:54 (13) 07:39
	20:36	19:49	18:52	18:01	17 08:24 (12) 16:29	10 07:52 (13) 16:33
29	05:48	06:23	06:59	07:37	08:11 (12) 07:17	10 07:52 (13) 07:39
	20:34	19:47	18:51	18:00	9 08:20 (12) 16:29	6 07:51 (13) 16:34
30	05:50	06:25	07:00	07:38	07:18	07:40
	20:33	19:46	18:49	17:59	16:28	16:35
31	05:51	06:26	07:01	07:39	07:19	07:40
	20:32	19:44	17:57	17:57	16:28	16:35
Potential sun hours	469	434	376	342	290	277
Total, worst case	217			834	587	
Sun reduction	0.63			0.44	0.27	
Oper. time red.	1.00			1.00	1.00	
Wind dir. red.	0.71			0.51	0.48	
Total reduction	0.43			0.22	0.13	
Total, real	94			180	74	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 35

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-128 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (68)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	
1	07:40 16:36	08:32 (12) 17:14	07:23 17:52	06:43 19:31	06:47 25 07:13 (11) 20:06	05:57 20:40	06:13 (10) 29 06:42 (10)
2	07:40 16:37	08:33 (12) 17:15	07:22 17:53	06:41 19:32	25 07:12 (11) 20:07	05:56 20:41	06:13 (10) 29 06:42 (10)
3	07:40 16:38	08:34 (12) 17:17	07:21 17:55	06:40 19:33	25 07:13 (11) 20:09	05:54 6 06:30 (10) 20:41	06:14 (10) 28 06:42 (10)
4	07:40 16:39	08:35 (12) 17:18	07:20 17:56	06:38 19:35	24 07:13 (11) 20:10	05:53 14 06:34 (10) 20:42	06:15 (10) 27 06:42 (10)
5	07:40 16:40	08:37 (12) 17:19	07:19 17:57	06:36 19:36	21 07:14 (11) 20:11	05:52 19 06:37 (10) 20:43	06:15 (10) 26 06:41 (10)
6	07:40 16:41	08:39 (12) 17:21	07:17 17:59	06:35 19:37	20 07:14 (11) 20:12	05:50 22 06:38 (10) 20:44	06:16 (10) 25 06:41 (10)
7	07:40 16:42	08:46 (12) 17:21	17:59	19:37	20 07:34 (11) 20:12	22 06:38 (10) 20:44	25 06:41 (10)
8	07:40 16:43	07:16 17:22	18:00	19:38	17 07:33 (11) 20:13	25 06:39 (10) 20:44	24 06:41 (10)
9	07:40 16:43	07:15 17:24	18:00	19:38	17 07:33 (11) 20:13	25 06:39 (10) 20:44	24 06:41 (10)
10	07:39 16:44	07:15 17:24	19:01	19:40	12 07:30 (11) 20:15	26 06:40 (10) 20:45	23 06:40 (10)
11	07:39 16:44	07:14 17:25	19:01	19:40	12 07:30 (11) 20:15	26 06:40 (10) 20:45	23 06:40 (10)
12	07:39 16:44	07:12 17:25	19:03	19:41	4 07:25 (11) 20:16	28 06:41 (10) 20:46	23 06:40 (10)
13	07:39 16:46	07:12 17:26	19:03	19:41	4 07:25 (11) 20:16	28 06:41 (10) 20:46	23 06:40 (10)
14	07:39 16:46	07:12 17:26	19:03	19:41	4 07:25 (11) 20:16	28 06:41 (10) 20:46	23 06:40 (10)
15	07:39 16:47	07:11 17:28	19:05	19:43	31 06:42 (10) 20:47	21 06:40 (10)	
16	07:38 16:48	07:10 17:29	19:06	19:44	33 06:43 (10) 20:48	20 06:40 (10)	
17	07:38 16:49	07:08 17:31	19:08	19:46	33 06:43 (10) 20:48	20 06:40 (10)	
18	07:38 16:50	07:07 17:32	19:09	19:47	33 06:43 (10) 20:49	19 06:40 (10)	
19	07:37 16:51	07:05 17:33	19:10	19:48	35 06:44 (10) 20:49	18 06:39 (10)	
20	07:37 16:53	07:04 17:35	19:11	19:49	35 06:44 (10) 20:50	17 06:39 (10)	
21	07:36 16:54	07:02 17:36	19:13	19:51	35 06:44 (10) 20:50	17 06:39 (10)	
22	07:36 16:54	07:01 17:37	19:14	19:52	35 06:44 (10) 20:50	16 06:39 (10)	
23	07:35 16:55	06:59 17:39	19:15	19:53	35 06:44 (10) 20:51	16 06:39 (10)	
24	07:35 16:56	06:58 17:40	19:16	19:54	35 06:44 (10) 20:51	16 06:39 (10)	
25	07:34 16:58	06:58 17:42	19:18	19:55	35 06:44 (10) 20:51	16 06:39 (10)	
26	07:34 16:58	06:55 17:43	19:19	19:57	35 06:44 (10) 20:52	16 06:40 (10)	
27	07:33 17:00	06:53 17:44	19:20	19:58	34 06:44 (10) 20:52	16 06:40 (10)	
28	07:32 17:02	06:53 17:44	19:20	19:58	34 06:44 (10) 20:52	16 06:40 (10)	
29	07:32 17:03	06:51 17:46	19:21	7 07:25 (11) 06:08	34 06:44 (10) 20:52	16 06:40 (10)	
30	07:30 17:04	06:50 17:47	19:22	14 07:35 (11) 20:00	34 06:44 (10) 20:52	17 06:40 (10)	
31	07:29 17:06	06:48 17:48	19:24	17 07:36 (11) 20:00	33 06:43 (10) 20:52	17 06:41 (10)	
32	07:28 17:07	06:46 17:50	19:25	20 07:37 (11) 20:01	33 06:44 (10) 20:52	17 06:41 (10)	
33	07:27 17:08	06:45 17:51	19:26	23 07:39 (11) 20:03	32 06:43 (10) 20:52	19 06:43 (10)	
34	07:26 17:10	06:45 19:27	24 07:39 (11) 20:04	31 06:43 (10) 20:52	19 06:43 (10)		
35	07:25 17:11	06:51 19:29	25 07:39 (11) 20:05	31 06:43 (10) 20:52	20 06:43 (10)		
36	07:24 17:13	06:49 19:30	26 07:39 (11) 20:05	30 06:42 (10)			
Potential sun hours	288	293	369	403	457	463	
Total, worst case	74		156	173	872	609	
Sun reduction	0.33		0.47	0.49	0.55	0.59	
Oper. time red.	1.00		1.00	1.00	1.00	1.00	
Wind dir. red.	0.52		0.58	0.58	0.67	0.67	
Total reduction	0.17		0.27	0.28	0.36	0.39	
Total, real	13		42	48	316	237	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 36

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

### SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2 Shadow receptor: R-128 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (68)

#### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
 438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
 Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25	06:23 (10) 05:52	06:21 (10) 06:27	07:02	06:41	07:19
	20:52	21 06:44 (10) 20:31	32 06:53 (10) 19:42	18:47	16:56	16:28
2	05:25	06:24 (10) 05:53	06:21 (10) 06:28	07:03	06:42	07:20
	20:52	21 06:45 (10) 20:30	31 06:52 (10) 19:40	18:45	16:54	16:28
3	05:26	06:23 (10) 05:54	06:22 (10) 06:29	07:19 (11) 07:04	06:43	07:21
	20:52	22 06:45 (10) 20:29	30 06:52 (10) 19:39	4 07:23 (11) 18:43	16:53	16:27
4	05:27	06:23 (10) 05:55	06:23 (10) 06:30	07:15 (11) 07:05	06:45	07:22
	20:52	23 06:46 (10) 20:27	28 06:51 (10) 19:37	12 07:27 (11) 18:42	16:52	16:27
5	05:27	06:22 (10) 05:56	06:23 (10) 06:32	07:12 (11) 07:06	06:46	07:23
	20:51	24 06:46 (10) 20:26	27 06:50 (10) 19:35	17 07:29 (11) 18:40	16:50	16:27
6	05:28	06:22 (10) 05:57	06:24 (10) 06:33	07:10 (11) 07:08	06:47	07:24
	20:51	25 06:47 (10) 20:25	24 06:48 (10) 19:33	20 07:30 (11) 18:38	16:49	16:27
7	05:28	06:22 (10) 05:58	06:26 (10) 06:34	07:09 (11) 07:09	06:49	07:25
	20:51	26 06:48 (10) 20:23	21 06:47 (10) 19:31	21 07:30 (11) 18:36	16:48	16:26
8	05:29	06:21 (10) 05:59	06:27 (10) 06:35	07:07 (11) 07:10	06:50	07:26
	20:50	27 06:48 (10) 20:22	18 06:45 (10) 19:30	24 07:31 (11) 18:34	16:47	16:26
9	05:30	06:21 (10) 06:01	06:30 (10) 06:36	07:06 (11) 07:11	06:51	07:27
	20:50	28 06:49 (10) 20:21	12 06:42 (10) 19:28	25 07:31 (11) 18:33	16:45	16:26
10	05:31	06:21 (10) 06:02	06:37	07:07 (11) 07:12	06:53	07:28
	20:49	29 06:50 (10) 20:19	19:26	25 07:32 (11) 18:31	16:44	16:26
11	05:31	06:20 (10) 06:03	06:38	07:06 (11) 07:14	06:54	07:29
	20:49	29 06:49 (10) 20:18	19:24	25 07:31 (11) 18:29	16:43	16:26
12	05:32	06:20 (10) 06:04	06:40	07:06 (11) 07:15	06:55	07:30
	20:49	30 06:50 (10) 20:16	19:22	25 07:31 (11) 18:27	16:42	16:26
13	05:33	06:20 (10) 06:05	06:41	07:05 (11) 07:16	06:57	07:31
	20:48	31 06:51 (10) 20:15	19:20	25 07:30 (11) 18:26	16:41	16:26
14	05:34	06:20 (10) 06:06	06:42	07:05 (11) 07:17	06:58	07:32
	20:47	32 06:52 (10) 20:14	19:18	24 07:29 (11) 18:24	16:40	16:27
15	05:35	06:20 (10) 06:07	06:43	07:05 (11) 07:19	06:59	07:32
	20:47	32 06:52 (10) 20:12	19:17	23 07:28 (11) 18:22	16:39	16:27
16	05:36	06:20 (10) 06:09	06:44	07:06 (11) 07:20	07:00	07:33
	20:46	33 06:53 (10) 20:10	19:15	21 07:27 (11) 18:20	16:38	16:27
17	05:37	06:19 (10) 06:10	06:45	07:07 (11) 07:21	07:02	07:34
	20:45	33 06:52 (10) 20:09	19:13	18 07:25 (11) 18:19	16:37	16:27
18	05:37	06:19 (10) 06:11	06:46	07:08 (11) 07:22	07:03	07:35
	20:45	34 06:53 (10) 20:07	19:11	15 07:23 (11) 18:17	16:36	16:28
19	05:38	06:19 (10) 06:12	06:48	07:11 (11) 07:24	07:04	07:35
	20:44	34 06:53 (10) 20:06	19:09	9 07:20 (11) 18:15	16:35	16:28
20	05:39	06:19 (10) 06:13	06:49	07:25	07:06	07:36
	20:43	35 06:54 (10) 20:04	19:07	18:14	16:34	16:28
21	05:40	06:19 (10) 06:14	06:50	07:26	07:07	07:36
	20:42	35 06:54 (10) 20:03	19:05	18:12	16:34	16:29
22	05:41	06:19 (10) 06:15	06:51	07:27	07:08	07:37
	20:41	35 06:54 (10) 20:01	19:04	18:11	16:33	16:29
23	05:42	06:19 (10) 06:17	06:52	07:29	07:09	07:37
	20:41	35 06:54 (10) 19:58	19:02	18:09	16:32	16:30
24	05:43	06:19 (10) 06:18	06:53	07:30	07:11	07:38
	20:40	36 06:55 (10) 19:56	19:00	18:07	16:32	16:30
25	05:44	06:19 (10) 06:19	06:54	07:31	07:12	07:38
	20:39	36 06:55 (10) 19:54	18:58	18:06	16:31	16:31
26	05:45	06:19 (10) 06:20	06:56	07:33	07:13	07:39
	20:38	36 06:55 (10) 19:53	18:56	18:04	16:30	16:32
27	05:46	06:20 (10) 06:21	06:57	07:34	07:14	07:39
	20:37	35 06:55 (10) 19:51	18:54	18:03	16:30	16:32
28	05:47	06:20 (10) 06:22	06:58	07:35	07:16	07:39
	20:36	34 06:54 (10) 19:49	18:52	18:01	16:29	16:33
29	05:48	06:20 (10) 06:23	06:59	07:37	07:17	07:39
	20:34	34 06:54 (10) 19:47	18:51	18:00	16:29	16:34
30	05:50	06:20 (10) 06:25	07:00	07:38	07:18	07:40
	20:33	34 06:54 (10) 19:46	18:49	17:59	16:28	16:35
31	05:51	06:21 (10) 06:26		07:39		07:40
	20:32	32 06:53 (10) 19:44		17:57		16:35
Potential sun hours	469	434	376	342	290	277
Total, worst case	951	223	333			466
Sun reduction	0.63	0.59	0.54			0.25
Oper. time red.	1.00	1.00	1.00			1.00
Wind dir. red.	0.67	0.67	0.58			0.52
Total reduction	0.42	0.39	0.31			0.13
Total, real	395	87	102			60

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 37

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com  
Calculated:

3/21/2011 11:14 AM/2.7.453

### SHADOW - Calendar

**Calculation:** 05030 SFA Gamesa G97\_R2Shadow receptor: R-132 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (71)

#### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3°  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:40 16:37	07:23 17:14	06:43 17:52	06:47 19:31	05:57 20:06	06:28 (41) 05:25 19:26 (06) 20:40	19:39 (05) 05:25 20:06 (05) 20:52	19:45 (05) 05:52 20:14 (05) 20:31	06:39 (41) 06:27 19:30 (06) 19:42	07:01 06:40 18:47 18:56	06:40 07:19 16:56 16:28	07:19 16:28
2	07:40 16:37	07:22 17:15	06:41 17:53	06:46 19:32	05:56 20:07	06:28 (41) 05:24 19:26 (06) 20:40	19:38 (05) 05:25 20:06 (05) 20:52	19:46 (05) 05:53 20:14 (05) 20:30	06:38 (41) 06:28 19:31 (06) 19:40	07:03 06:42 18:45 18:54	06:42 07:20 16:54 16:28	07:20 16:28
3	07:40 16:38	07:21 17:17	06:40 17:55	06:44 19:33	05:54 20:09	06:27 (41) 05:24 19:25 (06) 20:41	19:39 (05) 05:26 20:08 (05) 20:52	19:45 (05) 05:54 20:14 (05) 20:28	06:38 (41) 06:29 19:32 (06) 19:38	07:04 06:43 18:43 18:53	06:43 07:21 16:53 16:27	07:21 16:27
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:35	05:53 20:10	06:27 (41) 05:23 19:25 (06) 20:42	19:40 (05) 05:27 20:09 (05) 20:51	19:46 (05) 05:55 20:15 (05) 20:27	06:37 (41) 06:30 19:32 (06) 19:37	07:05 06:44 18:41 18:52	06:44 07:22 16:52 16:27	07:22 16:27
5	07:40 16:40	07:19 17:19	06:36 17:57	06:40 19:36	05:52 20:11	06:28 (41) 05:23 19:25 (06) 20:43	19:39 (05) 05:27 20:08 (05) 20:51	19:45 (05) 05:56 20:14 (05) 20:26	06:37 (41) 06:31 19:35 19:40	07:06 06:46 18:40 18:50	06:46 07:23 16:50 16:27	07:23 16:27
6	07:40 16:41	07:17 17:21	06:34 17:59	06:38 19:37	05:50 20:12	06:27 (41) 05:23 19:24 (06) 20:44	19:40 (05) 05:28 20:09 (05) 20:51	19:46 (05) 05:57 20:15 (05) 20:25	06:37 (41) 06:33 19:33 (06) 19:33	07:07 06:47 18:38 18:48	06:47 07:24 16:49 16:27	07:24 16:27
7	07:40 16:42	07:16 17:22	06:33 18:00	06:37 19:38	05:49 20:13	06:27 (41) 05:22 19:23 (06) 20:44	19:40 (05) 05:29 20:09 (05) 20:51	19:46 (05) 05:58 20:16 (05) 20:23	06:36 (41) 06:34 19:33 (06) 19:31	07:09 06:48 18:36 18:46	06:48 07:25 16:48 16:26	07:25 16:26
8	07:39 16:43	07:15 17:24	06:31 19:01	06:35 19:39	05:48 20:14	06:27 (41) 05:22 19:23 (06) 20:45	19:40 (05) 05:29 20:09 (05) 20:50	19:46 (05) 05:59 20:15 (05) 20:22	06:36 (41) 06:35 19:34 (06) 19:29	07:10 06:50 18:34 18:44	06:50 07:26 16:47 16:26	07:26 16:26
9	07:39 16:44	07:14 17:25	06:29 19:02	06:33 19:41	05:46 20:16	06:28 (41) 05:22 19:22 (06) 20:46	19:40 (05) 05:30 20:09 (05) 20:50	19:46 (05) 06:01 20:16 (05) 20:21	06:36 (41) 06:36 19:34 (06) 19:28	07:11 06:51 18:33 18:43	06:51 07:27 16:45 16:26	07:27 16:26
10	07:39 16:46	07:12 17:26	06:27 19:04	06:31 19:42	05:45 20:17	06:27 (41) 05:21 19:21 (06) 20:46	19:41 (05) 05:31 20:09 (05) 20:49	19:47 (05) 06:02 20:16 (05) 20:19	06:37 (41) 06:37 19:35 (06) 19:26	07:12 06:52 18:31 18:41	06:52 07:28 16:44 16:26	07:28 16:26
11	07:39 16:47	07:11 17:28	06:26 19:05	06:30 19:43	05:44 20:18	06:28 (41) 05:21 19:20 (06) 20:47	19:41 (05) 05:31 20:10 (05) 20:49	19:46 (05) 06:03 20:15 (05) 20:18	06:37 (41) 06:38 19:35 (06) 19:24	07:14 06:54 18:29 18:43	06:54 07:30 16:43 16:26	07:30 16:26
12	07:38 16:48	07:09 17:29	06:24 19:06	06:28 19:44	05:43 20:19	06:28 (41) 05:21 19:19 (06) 20:47	19:41 (05) 05:32 20:10 (05) 20:48	19:47 (05) 06:04 20:16 (05) 20:16	06:37 (41) 06:39 19:35 (06) 19:22	07:15 06:55 18:27 18:42	06:55 07:30 16:42 16:26	07:30 16:26
13	07:38 16:49	07:08 17:31	06:22 19:08	06:26 19:46	05:41 20:20	06:29 (41) 05:21 19:18 (06) 20:48	19:42 (05) 05:33 20:10 (05) 20:48	19:47 (05) 06:05 20:16 (05) 20:15	06:37 (41) 06:41 19:34 (06) 19:20	07:16 06:56 18:26 18:41	06:56 07:31 16:41 16:26	07:31 16:26
14	07:37 16:50	07:07 17:32	06:20 19:09	06:24 19:47	05:40 20:21	06:30 (41) 05:21 19:17 (06) 20:48	19:42 (05) 05:34 20:10 (05) 20:47	19:47 (05) 06:06 20:16 (05) 20:13	06:37 (41) 06:42 19:34 (06) 19:18	07:17 06:58 18:24 18:40	06:58 07:32 16:40 16:27	07:32 16:27
15	07:37 16:51	07:05 17:33	06:18 19:10	06:23 19:48	05:39 20:22	19:03 (06) 05:39 19:14 (06) 20:22	19:42 (05) 05:35 20:10 (05) 20:47	19:48 (05) 06:07 20:16 (05) 20:12	06:38 (41) 06:43 19:34 (06) 19:17	07:18 06:59 18:22 18:39	06:59 07:32 16:27 16:27	07:32 16:27
16	07:36 16:53	07:04 17:35	06:17 19:11	06:21 19:49	05:38 20:24	18:59 (06) 05:38 19:17 (06) 20:24	19:43 (05) 05:36 20:10 (05) 20:46	19:48 (05) 06:09 20:17 (05) 20:10	06:38 (41) 06:44 19:33 (06) 19:15	07:20 06:59 18:20 18:38	07:00 07:33 16:27 16:27	07:33 16:27
17	07:36 16:54	07:02 17:36	06:15 19:13	06:19 19:50	05:37 20:25	18:56 (06) 05:37 19:19 (06) 20:25	19:43 (05) 05:37 20:11 (05) 20:45	19:48 (05) 06:10 20:16 (05) 20:09	06:39 (41) 06:45 19:33 (06) 19:13	07:21 06:57 18:19 18:37	07:02 07:34 16:27 16:27	07:34 16:27
18	07:35 16:55	07:01 17:37	06:13 19:14	06:18 19:52	05:36 20:26	18:55 (06) 05:36 19:21 (06) 20:26	19:43 (05) 05:37 20:11 (05) 20:44	19:49 (05) 06:12 20:15 (05) 20:07	06:39 (41) 06:46 19:32 (06) 19:11	07:22 06:58 18:17 18:36	07:03 07:35 16:28 16:28	07:35 16:28
19	07:35 16:56	06:59 17:39	06:11 19:15	06:16 19:53	05:35 20:27	18:52 (06) 05:35 19:22 (06) 20:27	19:43 (05) 05:38 20:11 (05) 20:44	19:49 (05) 06:13 20:15 (05) 20:06	06:40 (41) 06:47 19:31 (06) 19:09	07:23 07:04 18:15 18:35	07:04 07:36 16:28 16:28	07:36 16:28
20	07:34 16:58	06:58 17:40	06:09 19:16	06:14 19:54	05:34 20:28	06:46 (41) 05:34 19:23 (06) 20:28	19:43 (05) 05:39 20:11 (05) 20:43	19:49 (05) 06:13 20:15 (05) 20:04	06:41 (41) 06:49 19:30 (06) 19:07	07:25 07:06 18:14 18:34	07:06 07:36 16:28 16:28	07:36 16:28
21	07:33 16:59	06:56 17:41	06:07 19:17	06:13 19:55	05:33 20:29	06:41 (41) 05:33 19:24 (06) 20:29	19:43 (05) 05:40 20:11 (05) 20:42	19:49 (05) 06:14 20:15 (05) 20:02	06:40 (41) 06:50 19:30 (06) 19:05	07:26 07:07 18:12 18:34	07:07 07:36 16:29 16:29	07:36 16:29
22	07:33 17:00	06:54 17:43	06:06 19:19	06:11 19:56	05:32 20:30	06:38 (41) 05:32 19:25 (06) 20:30	19:44 (05) 05:41 20:12 (05) 20:41	19:49 (05) 06:15 20:14 (05) 20:01	06:46 (41) 06:51 19:29 (06) 19:04	07:27 07:08 18:11 18:33	07:08 07:37 16:29 16:29	07:37 16:29
23	07:32 17:02	06:53 17:44	06:04 19:20	06:09 19:58	05:31 20:31	06:36 (41) 05:31 19:26 (06) 20:31	19:44 (05) 05:42 20:12 (05) 20:40	19:49 (05) 06:17 20:14 (05) 19:58	06:47 (41) 06:52 19:28 (06) 19:02	07:29 07:09 18:09 18:32	07:09 07:37 16:30 16:30	07:37 16:30
24	07:31 17:03	06:51 17:45	06:02 19:21	06:08 19:59	05:30 20:32	06:34 (41) 05:30 19:26 (06) 20:32	19:44 (05) 05:43 20:12 (05) 20:39	19:49 (05) 06:18 20:13 (05) 19:56	06:45 (41) 06:53 19:26 (06) 19:00	07:30 07:11 18:07 18:32	07:11 07:38 16:32 16:30	07:38 16:30
25	07:30 17:04	06:50 17:47	06:00 19:22	06:06 19:59	05:29 20:33	06:33 (41) 05:30 19:26 (06) 20:33	19:44 (05) 05:44 20:12 (05) 20:38	19:49 (05) 06:19 20:12 (05) 19:54	06:44 (41) 06:54 19:24 (06) 18:58	07:31 07:12 18:06 18:31	07:12 07:38 16:31 16:31	07:38 16:31
26	07:29 17:06	06:48 17:48	06:59 19:24	06:05 19:57	05:29 20:34	06:32 (41) 05:29 19:26 (06) 20:34	19:45 (05) 05:45 20:13 (05) 20:37	19:54 (05) 06:26 20:11 (05) 19:52	06:43 (41) 06:20 19:29 (06) 18:56	07:32 07:13 18:04 18:30	07:13 07:38 16:32 16:32	07:38 16:32
27	07:28 17:07	06:46 17:49	06:57 19:25	06:03 19:58	05:28 20:35	06:31 (41) 05:28 19:27 (06) 20:35	19:45 (05) 05:46 20:12 (05) 20:36	19:54 (05) 06:27 20:10 (05) 19:51	06:42 (41) 06:21 19:01 (06) 06:57	07:34 07:14 18:03 18:30	07:14 07:39 16:32 16:32	07:39 16:32
28	07:27 17:08	06:45 17:51	06:55 19:26	06:02 19:59	05:27 20:36	06:30 (41) 05:27 19:26 (06) 20:36	19:45 (05) 05:47 20:13 (05) 20:35	19:54 (05) 06:28 20:07 (05) 19:49	06:42 (41) 06:22 19:05 (06) 06:58	07:35 07:15 18:01 18:29	07:15 07:39 16:33 16:33	07:39 16:33
29	07:26 17:10	06:53 19:27	06:00 19:24	06:06 19:57	05:27 20:37	06:29 (41) 05:27 19:26 (06) 20:37	19:45 (05) 05:48 20:13 (05) 20:34	19:54 (05) 06:29 20:07 (06) 19:47	06:41 (41) 06:23 19:27 (06) 19:47	07:36 07:17 18:01 18:29	07:17 07:39 16:34 16:34	07:39 16:34
30	07:25 17:11	06:51 19:29	06:59 20:05	06:00 19:58	05:26 20:38	06:28 (41) 05:26 19:26 (06) 20:38	19:46 (05) 05:50 20:14 (05) 20:33	19:54 (05) 06:30 20:09 (06) 19:46	06:40 (41) 06:25 19:28 (06) 19:46	07:38 07:18 18:49 18:28	07:18 07:40 16:35 16:35	07:40 16:35
31	07:24 17:13	06:49 19:30	06:59 19:30	06:09 19:56	05:25 20:39	06:25 (06) 05:25 19:27 (06) 20:39	19:45 (05) 05:51 20:32 62	19:49 (05) 06:26 19:29 (06) 19:44	06:39 (41) 06:26 19:29 (06) 19:44	07:39 07:17 18:28 18:53	07:39 07:40 16:35 16:35	07:40 16:35
Potential sun hours	289	293	369	403	457	463	469	434	376	342	290	277
Total, worst case				825	1645	850	1113	1708				
Sun reduction				0.49	0.55	0.59	0.63	0.59				
Oper. time red.				1.00	1.00	1.00	1.00	1.00				
Wind dir. red.				0.56	0.57	0.50	0.54	0.57				
Total reduction				0.27	0.31	0.30	0.34	0.34				
Total, real				226	512	253	378	574				

Table layout: For each day in each month the following matrix apply

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

Printed/Page

3/21/2011 2:14 PM / 38

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

Calculation: 05030 SFA Gamesa G97\_R2 Shadow receptor: R-137 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (76)

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December	
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	05:57 20:06	18:43 (41) 20:39	05:25 20:00 (48)	18:51 (41) 20:52	19:04 (41) 20:31	05:52 20:05 (48)	18:51 (41) 19:42	06:27 16:56	07:01 16:28
2	07:40 16:37	07:22 17:15	06:41 17:53	06:46 19:32	05:56 20:07	18:43 (41) 20:40	05:24 20:52	18:51 (41) 20:52	19:03 (41) 20:30	05:53 20:03 (48)	18:51 (41) 19:40	06:28 16:54	07:03 16:28
3	07:40 16:38	07:21 17:17	06:40 17:55	06:44 19:33	05:54 20:08	18:42 (41) 20:41	05:24 20:52	18:53 (41) 20:52	19:03 (41) 20:28	05:54 20:02 (48)	18:51 (41) 19:38	06:29 16:53	07:04 16:27
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:35	05:53 20:10	18:42 (41) 20:43	05:23 20:51	18:54 (41) 20:51	19:03 (41) 20:27	05:55 20:05 (48)	18:51 (41) 19:37	06:30 16:51	07:05 16:52
5	07:40 16:40	07:19 17:19	06:36 17:57	06:40 19:36	05:52 20:11	18:42 (41) 20:43	05:23 20:51	18:54 (41) 20:52	19:02 (41) 20:26	05:56 20:05 (48)	18:51 (41) 19:35	06:31 16:50	07:06 16:27
6	07:40 16:41	07:17 17:21	06:34 17:59	06:38 19:37	05:50 20:12	18:41 (41) 20:43	05:23 20:51	18:55 (41) 20:51	19:02 (41) 20:25	05:57 20:06 (48)	18:50 (41) 19:33	06:32 16:49	07:07 16:26
7	07:40 16:42	07:16 17:22	06:33 18:00	06:37 19:38	05:49 20:13	18:41 (41) 20:44	05:22 20:50	18:56 (41) 20:50	19:02 (41) 20:23	05:58 20:06 (48)	18:50 (41) 19:31	06:33 16:48	07:08 16:26
8	07:39 16:43	07:15 17:24	06:31 19:01	06:35 19:39	05:48 20:14	18:41 (41) 20:45	05:22 20:50	18:57 (41) 20:50	19:00 (41) 20:22	05:59 20:06 (48)	18:50 (41) 19:29	06:34 16:47	07:09 16:26
9	07:39 16:44	07:13 17:25	06:29 19:02	06:33 19:41	05:46 20:16	18:41 (41) 20:46	05:22 20:50	18:58 (41) 20:50	19:00 (41) 20:21	06:01 20:07 (48)	18:51 (41) 19:28	06:35 16:45	07:11 16:26
10	07:39 16:46	07:12 17:26	06:27 19:04	06:31 19:42	05:45 20:17	18:40 (41) 20:46	05:21 20:49	18:59 (41) 20:49	19:00 (41) 20:19	06:02 20:08 (48)	18:52 (41) 19:26	06:36 16:44	07:12 16:26
11	07:39 16:47	07:11 17:28	06:26 19:05	06:30 19:43	05:44 20:18	18:40 (41) 20:47	05:21 20:49	19:00 (41) 20:49	18:59 (41) 20:18	06:03 20:07 (48)	18:52 (41) 19:24	06:37 16:43	07:13 16:26
12	07:38 16:48	07:09 17:29	06:24 19:06	06:28 19:44	05:43 20:19	18:41 (41) 20:47	05:21 20:49	19:01 (41) 20:48	18:58 (41) 20:16	06:04 20:08 (48)	18:52 (41) 19:22	06:38 16:42	07:14 16:26
13	07:38 16:49	07:08 17:31	06:22 19:07	06:26 19:45	05:41 20:20	18:41 (41) 20:48	05:21 20:49	19:02 (41) 20:48	18:59 (41) 20:15	06:05 20:08 (48)	18:53 (41) 19:20	06:39 16:41	07:15 16:26
14	07:37 16:50	07:07 17:32	06:20 19:09	06:24 19:47	05:40 20:21	18:41 (41) 20:48	05:21 20:47	19:03 (41) 20:47	18:58 (41) 20:13	06:06 20:09 (48)	18:53 (41) 19:18	06:40 16:40	07:16 16:27
15	07:37 16:51	07:05 17:33	06:18 19:10	06:23 19:48	05:39 20:22	18:41 (41) 20:49	05:21 20:47	19:03 (41) 20:47	18:58 (41) 20:12	06:07 20:09 (48)	18:54 (41) 19:16	06:41 16:39	07:17 16:27
16	07:36 16:53	07:04 17:35	06:17 19:11	06:21 19:49	05:38 20:24	18:42 (41) 20:49	05:21 20:46	19:04 (41) 20:46	18:56 (41) 20:10	06:09 20:08 (48)	18:55 (41) 19:15	06:42 16:38	07:20 16:27
17	07:36 16:54	07:02 17:36	06:15 19:12	06:19 19:50	05:37 20:25	18:42 (41) 20:50	05:21 20:45	19:05 (41) 20:45	18:56 (41) 20:09	06:10 20:09 (48)	18:55 (41) 19:13	06:43 16:37	07:21 16:27
18	07:35 16:55	07:01 17:37	06:13 19:14	06:18 19:52	05:36 20:26	18:42 (41) 20:50	05:21 20:44	19:05 (41) 20:44	18:55 (41) 20:07	06:11 20:09 (48)	18:56 (41) 19:11	06:44 16:36	07:22 16:28
19	07:35 16:56	06:59 17:39	06:11 19:15	06:16 19:53	05:35 20:27	18:43 (41) 20:50	05:21 20:44	19:06 (41) 20:44	18:55 (41) 20:06	06:12 20:10 (48)	18:57 (41) 19:09	06:45 16:35	07:23 16:28
20	07:34 16:58	06:58 17:40	06:09 19:16	06:14 19:54	05:34 20:28	18:43 (41) 20:51	05:21 20:43	19:07 (41) 20:43	18:55 (41) 20:04	06:13 20:10 (48)	18:59 (41) 19:07	06:46 16:34	07:25 16:28
21	07:33 16:59	06:56 17:41	06:07 19:17	06:13 19:55	05:33 20:29	18:43 (41) 20:51	05:21 20:42	19:06 (41) 20:42	18:54 (41) 20:02	06:14 20:10 (48)	19:02 (41) 19:05	06:47 16:34	07:26 16:29
22	07:33 17:00	06:54 17:43	06:06 19:19	06:11 19:56	05:32 20:30	18:44 (41) 20:51	05:21 20:41	19:06 (41) 20:41	18:54 (41) 20:01	06:15 20:11 (48)	19:05 (41) 19:03	06:48 16:33	07:27 16:29
23	07:32 17:02	06:53 17:44	06:04 19:20	06:09 19:57	05:31 20:31	18:45 (41) 20:51	05:21 20:40	19:07 (41) 20:40	18:54 (41) 19:57	06:17 20:10 (48)	19:11 (41) 19:02	06:49 16:32	07:29 16:30
24	07:31 17:03	06:51 17:45	06:02 19:21	06:08 19:59	05:30 20:32	18:45 (41) 20:51	05:21 20:40	19:08 (41) 20:39	18:53 (41) 19:56	06:18 20:10 (48)	19:03 (41) 19:00	06:50 16:32	07:30 16:30
25	07:30 17:04	06:50 17:47	06:00 19:22	06:06 19:59	05:29 20:33	18:46 (41) 20:51	05:21 20:40	19:09 (41) 20:38	18:53 (41) 19:54	06:19 20:09 (48)	19:04 (41) 19:00	06:51 16:31	07:31 16:31
26	07:29 17:06	06:48 17:48	06:58 19:24	06:05 19:58	05:28 20:34	18:46 (41) 20:52	05:21 20:40	19:06 (41) 20:37	18:53 (41) 19:52	06:20 20:09 (48)	19:05 (41) 19:00	06:52 16:30	07:32 16:32
27	07:28 17:07	06:46 17:49	06:56 19:25	06:03 19:59	05:27 20:35	18:47 (41) 20:52	05:23 20:40	19:06 (41) 20:36	18:52 (41) 19:51	06:21 20:09 (48)	19:06 (41) 19:00	06:53 16:30	07:34 16:32
28	07:27 17:08	06:45 17:51	06:55 19:26	06:02 19:59	05:26 20:36	18:48 (41) 20:52	05:23 20:40	19:07 (41) 20:35	18:52 (41) 19:49	06:22 20:08 (48)	19:07 (41) 19:00	06:54 16:29	07:35 16:33
29	07:26 17:10	06:44 19:27	06:54 19:27	06:00 20:04	05:25 20:37	18:49 (41) 20:52	05:24 20:40	19:08 (41) 20:34	18:52 (41) 19:47	06:23 20:08 (48)	19:08 (41) 19:00	06:55 16:29	07:36 16:34
30	07:25 17:11	06:43 19:28	06:53 20:05	06:00 20:05	05:24 20:38	18:50 (41) 20:52	05:25 20:40	19:09 (41) 20:33	18:52 (41) 19:46	06:24 20:09 (48)	19:09 (41) 18:49	06:56 16:28	07:37 16:35
31	07:24 17:12	06:42 19:30	06:52 20:06	06:00 20:06	05:25 20:39	18:51 (41) 20:48	05:25 20:40	19:10 (41) 20:32	18:51 (41) 19:44	06:25 20:06 (48)	19:10 (41) 17:57	06:57 16:27	07:38 16:35
Potential sun hours	289	293	369	403	457	463	469	434	376	342	290	277	
Total, worst case				357	2080	1320	2067	1015					
Sun reduction				0.49	0.55	0.59	0.63	0.59					
Oper. time red.				1.00	1.00	1.00	1.00	1.00					
Wind dir. red.				0.52	0.51	0.51	0.51	0.52					
Total reduction				0.25	0.28	0.30	0.32	0.30					
Total, real				90	589	399	669	309					

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 39

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-139 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (78)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36 31	15:03 (48) 15:34 (48) 17:14	07:23 07:22 17:52	06:43 06:41	06:47 07:11 (21) 05:57	06:25 (20) 06:25 (20) 05:25
2	07:40 16:37 31	15:04 (48) 15:35 (48) 17:15	07:22 07:21 17:53	06:41 06:40	06:46 07:11 (21) 05:54	06:24 (20) 06:22 (20) 05:24
3	07:40 16:38 30	15:05 (48) 15:36 (48) 17:17	07:21 07:17 17:55	06:40 06:38	06:44 07:11 (21) 05:53	06:22 (20) 06:21 (20) 05:23
4	07:40 16:39 29	15:06 (48) 15:37 (48) 17:18	07:20 07:18 17:56	06:38 06:36	06:42 07:10 (21) 05:52	06:21 (20) 06:20 (20) 05:22
5	07:40 16:40 28	15:07 (48) 15:38 (48) 17:19	07:19 07:17 17:57	06:36 06:34	06:40 07:10 (21) 05:51	06:20 (20) 06:19 (20) 05:21
6	07:40 16:41 27	15:08 (48) 15:39 (48) 17:20	07:18 07:16 17:58	06:34 06:33	06:38 07:11 (21) 05:50	06:19 (20) 06:18 (20) 05:20
7	07:40 16:42 26	15:09 (48) 15:40 (48) 17:21	07:17 07:15 18:00	06:33 06:31	06:37 07:12 (21) 05:49	06:18 (20) 06:17 (20) 05:19
8	07:39 16:43 26	15:10 (48) 15:41 (48) 17:22	07:16 07:14 18:01	06:31 06:30	06:35 07:13 (21) 05:48	06:17 (20) 06:16 (20) 05:18
9	07:39 16:44 24	15:11 (48) 15:42 (48) 17:23	07:15 07:13 18:02	06:30 06:29	06:34 07:14 (21) 05:47	06:16 (20) 06:15 (20) 05:17
10	07:39 16:45 23	15:12 (48) 15:43 (48) 17:24	07:14 07:12 18:03	06:29 06:28	06:33 07:15 (21) 05:46	06:15 (20) 06:14 (20) 05:16
11	07:39 16:46 20	15:13 (48) 15:44 (48) 17:25	07:13 07:11 18:04	06:28 06:27	06:32 07:16 (21) 05:45	06:14 (20) 06:13 (20) 05:15
12	07:38 16:47 18	15:14 (48) 15:45 (48) 17:26	07:12 07:10 18:05	06:27 06:26	06:31 07:17 (21) 05:44	06:13 (20) 06:12 (20) 05:14
13	07:38 16:48 16	15:15 (48) 15:46 (48) 17:27	07:11 07:09 18:06	06:26 06:25	06:30 07:18 (21) 05:43	06:12 (20) 06:11 (20) 05:13
14	07:37 16:49 12	15:16 (48) 15:47 (48) 17:28	07:10 07:08 18:07	06:25 06:24	06:29 07:19 (21) 05:42	06:11 (20) 06:10 (20) 05:12
15	07:37 16:50 12	15:17 (48) 15:48 (48) 17:29	07:09 07:07 18:08	06:24 06:23	06:28 07:20 (21) 05:41	06:10 (20) 06:09 (20) 05:11
16	07:36 16:51 3	15:18 (48) 15:49 (48) 17:30	07:08 07:06 18:09	06:23 06:22	06:27 07:21 (21) 05:40	06:09 (20) 06:08 (20) 05:10
17	07:36 16:52 3	15:19 (48) 15:50 (48) 17:31	07:07 07:05 18:10	06:22 06:21	06:26 07:22 (21) 05:39	06:08 (20) 06:07 (20) 05:09
18	07:35 16:53 3	15:20 (48) 15:51 (48) 17:32	07:06 07:04 18:11	06:21 06:20	06:25 07:23 (21) 05:38	06:07 (20) 06:06 (20) 05:08
19	07:35 16:54 3	15:21 (48) 15:52 (48) 17:33	07:05 07:03 18:12	06:20 06:19	06:24 07:24 (21) 05:37	06:06 (20) 06:05 (20) 05:07
20	07:34 16:55 3	15:22 (48) 15:53 (48) 17:34	07:04 07:02 18:13	06:19 06:18	06:23 07:25 (21) 05:36	06:05 (20) 06:04 (20) 05:06
21	07:33 16:56 3	15:23 (48) 15:54 (48) 17:35	07:03 07:01 18:14	06:18 06:17	06:22 07:26 (21) 05:35	06:04 (20) 06:03 (20) 05:05
22	07:33 16:57 3	15:24 (48) 15:55 (48) 17:36	07:02 07:00 18:15	06:17 06:16	06:21 07:27 (21) 05:34	06:03 (20) 06:02 (20) 05:04
23	07:32 16:58 3	15:25 (48) 15:56 (48) 17:37	07:01 06:59 18:16	06:16 06:15	06:20 07:28 (21) 05:33	06:02 (20) 06:01 (20) 05:03
24	07:31 16:59 3	15:26 (48) 15:57 (48) 17:38	06:59 06:57 18:17	06:15 06:14	06:19 07:29 (21) 05:32	06:01 (20) 06:00 (20) 05:02
25	07:30 17:00 3	15:27 (48) 15:58 (48) 17:39	06:58 06:56 18:18	06:14 06:13	06:18 07:30 (21) 05:31	06:00 (20) 05:59 (20) 05:01
26	07:29 17:01 3	15:28 (48) 15:59 (48) 17:40	06:57 06:55 18:19	06:13 06:12	06:17 07:31 (21) 05:30	05:59 (20) 05:58 (20) 05:00
27	07:28 17:02 3	15:29 (48) 16:00 (48) 17:41	06:56 06:54 18:20	06:12 06:11	06:16 07:32 (21) 05:29	05:58 (20) 05:57 (20) 05:00
28	07:27 17:03 3	15:30 (48) 16:01 (48) 17:42	06:55 06:53 18:21	06:11 06:10	06:15 07:33 (21) 05:28	05:57 (20) 05:56 (20) 05:00
29	07:26 17:04 3	15:31 (48) 16:02 (48) 17:43	06:54 06:52 18:22	06:10 06:09	06:14 07:34 (21) 05:27	05:56 (20) 05:55 (20) 05:00
30	07:25 17:05 3	15:32 (48) 16:03 (48) 17:44	06:53 06:51 18:23	06:09 06:08	06:13 07:35 (21) 05:26	05:55 (20) 05:54 (20) 05:00
31	07:24 17:06 3	15:33 (48) 16:04 (48) 17:45	06:52 06:50 18:24	06:08 06:07	06:12 07:36 (21) 05:25	05:54 (20) 05:53 (20) 05:00
Potential sun hours	288	293	369	403	457	463
Total, worst case	344		121	256	1038	174
Sun reduction	0.33		0.47	0.49	0.55	0.59
Oper. time red.	1.00		1.00	1.00	1.00	1.00
Wind dir. red.	0.76		0.58	0.59	0.66	0.66
Total reduction	0.26		0.28	0.30	0.37	0.40
Total, real	89		34	76	384	69

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 40

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2 Shadow receptor: R-139 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (78)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25 20:52	05:52 20:31	06:27 (20) 19:42	06:27 19:42	07:01 18:47	06:40 16:56
2	05:25 20:52	06:39 (20) 20:30	06:27 (20) 19:40	06:28 (20) 19:40	07:14 (21) 18:45	06:42 16:54
3	05:26 20:52	06:38 (20) 20:28	06:28 (20) 19:38	06:29 (20) 19:38	07:11 (21) 18:43	06:43 16:53
4	05:27 20:51	06:38 (20) 20:27	06:28 (20) 19:37	06:30 (20) 19:37	07:09 (21) 18:41	06:44 16:52
5	05:27 20:51	06:36 (20) 20:26	06:28 (20) 19:35	06:31 (20) 19:35	07:08 (21) 18:40	06:46 16:50
6	05:28 20:51	06:36 (20) 20:25	06:28 (20) 19:33	06:33 (20) 19:33	07:06 (21) 18:38	06:47 16:49
7	05:28 20:51	06:35 (20) 20:23	06:29 (20) 19:31	06:34 (20) 19:31	07:05 (21) 18:36	06:48 16:48
8	05:29 20:50	06:53 (20) 20:22	07:02 (20) 19:29	07:02 (20) 19:29	07:04 (21) 18:34	16:48 16:47
9	05:30 20:50	06:34 (20) 20:21	06:30 (20) 19:28	06:36 (20) 19:28	07:04 (21) 18:32	06:51 16:45
10	05:31 20:49	06:55 (20) 20:19	07:00 (20) 19:26	07:00 (20) 19:26	07:03 (21) 18:31	06:52 16:44
11	05:31 20:49	06:32 (20) 20:18	06:33 (20) 19:24	06:38 (20) 19:24	07:04 (21) 18:29	06:54 16:43
12	05:32 20:48	06:32 (20) 20:16	06:32 (20) 19:22	06:39 (20) 19:22	07:04 (21) 18:27	06:55 16:42
13	05:33 20:48	06:32 (20) 20:15	06:32 (20) 19:21	06:41 (20) 19:21	07:04 (21) 18:25	06:56 16:41
14	05:34 20:47	06:31 (20) 20:13	06:31 (20) 19:19	06:42 (20) 19:19	07:04 (21) 18:23	06:58 16:41
15	05:35 20:47	06:31 (20) 20:12	06:31 (20) 19:18	06:43 (20) 19:18	07:05 (21) 18:22	06:59 16:40
16	05:36 20:46	06:30 (20) 20:10	06:30 (20) 19:16	06:44 (20) 19:16	07:05 (21) 18:20	07:00 16:38
17	05:36 20:45	06:30 (20) 20:09	06:30 (20) 19:15	06:45 (20) 19:15	07:07 (21) 18:19	07:02 16:37
18	05:37 20:44	06:29 (20) 20:07	06:29 (20) 19:13	06:46 (20) 19:13	07:10 (21) 18:17	07:03 16:36
19	05:38 20:44	06:29 (20) 20:06	06:29 (20) 19:12	06:47 (20) 19:12	07:23 (21) 18:15	07:04 16:35
20	05:39 20:43	06:29 (20) 20:04	06:29 (20) 19:10	06:49 (20) 19:10	07:25 (21) 18:14	07:05 16:34
21	05:40 20:42	06:28 (20) 20:02	06:28 (20) 19:08	06:50 (20) 19:08	07:26 (21) 18:12	07:07 16:33
22	05:41 20:41	06:28 (20) 20:01	06:28 (20) 19:06	06:51 (20) 19:06	07:27 (21) 18:11	07:08 16:33
23	05:42 20:40	06:28 (20) 19:57	06:28 (20) 19:04	06:52 (20) 19:04	07:29 (21) 18:09	07:09 16:32
24	05:43 20:39	06:28 (20) 19:54	06:28 (20) 19:02	06:53 (20) 19:02	07:30 (21) 18:07	07:11 16:32
25	05:44 20:38	06:28 (20) 19:54	06:28 (20) 19:00	06:54 (20) 19:00	07:31 (21) 18:06	07:12 16:31
26	05:45 20:37	06:28 (20) 19:52	06:28 (20) 18:58	06:56 (20) 18:58	07:32 (21) 18:04	07:13 16:30
27	05:46 20:36	06:28 (20) 19:51	06:28 (20) 18:56	06:57 (20) 18:56	07:34 (21) 18:03	07:14 16:30
28	05:47 20:35	06:27 (20) 19:49	06:27 (20) 18:54	06:58 (20) 18:54	07:35 (21) 18:03	07:15 16:30
29	05:48 20:34	06:27 (20) 19:47	06:27 (20) 18:52	06:59 (20) 18:52	07:36 (21) 18:01	07:16 16:29
30	05:49 20:33	06:27 (20) 19:46	06:27 (20) 18:51	07:00 (20) 18:51	07:37 (21) 18:00	07:17 16:29
31	05:51 20:32	06:27 (20) 19:44	06:27 (20) 18:49	07:00 (20) 18:49	07:38 (21) 18:00	07:18 16:29
Potential sun hours	469	434	376	342	290	277
Total, worst case	835	419	350	45	954	
Sun reduction	0.63	0.59	0.54	0.27	0.25	
Oper. time red.	1.00	1.00	1.00	1.00	1.00	
Wind dir. red.	0.66	0.66	0.58	0.76	0.76	
Total reduction	0.42	0.40	0.32	0.21	0.20	
Total, real	354	166	112	9	186	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 41

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

### SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-14 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (11)

#### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	05:57 20:06	05:25 20:40	19:08 (46) 20:52	05:51 20:31	19:26 (46) 19:42	07:01 18:47	06:40 16:55	07:19 16:28
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	05:56 20:07	05:24 20:40	19:08 (46) 20:52	05:53 20:30	19:14 (46) 19:28 (46)	07:03 18:45	06:42 16:54	07:20 16:27
3	07:40 16:38	07:21 17:16	06:40 17:55	06:44 19:33	05:54 20:09	05:24 20:41	19:08 (46) 20:52	05:54 20:29	19:14 (46) 19:38 (46)	07:04 18:43	06:43 16:53	07:21 16:27
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:35	05:53 20:10	05:23 20:42	19:08 (46) 20:51	05:55 20:27	19:14 (46) 19:54 (46)	07:05 18:41	06:44 16:51	07:22 16:27
5	07:40 16:40	07:19 17:19	06:36 17:57	06:40 19:36	05:51 20:11	05:23 20:43	19:08 (46) 20:51	05:56 20:26	19:14 (46) 19:52 (46)	07:06 18:40	06:46 16:50	07:23 16:26
6	07:40 16:41	07:17 17:21	06:34 17:58	06:38 19:37	05:50 20:12	05:22 20:44	19:09 (46) 20:51	05:57 20:25	19:15 (46) 19:48 (46)	07:07 18:38	06:47 16:49	07:24 16:26
7	07:40 16:42	07:16 17:22	06:33 18:00	06:36 19:38	05:49 20:13	19:25 (46) 20:44	19:08 (46) 20:51	05:58 20:23	19:14 (46) 19:31	07:09 18:36	06:48 16:48	07:25 16:26
8	07:40 16:43	07:15 17:23	06:31 19:01	06:35 19:39	05:47 20:14	19:22 (46) 20:45	19:09 (46) 20:50	05:59 20:22	19:15 (46) 20:07 (46)	07:10 18:34	06:50 16:46	07:26 16:26
9	07:39 16:44	07:14 17:25	06:29 19:02	06:33 19:39	05:46 20:16	19:19 (46) 20:46	19:09 (46) 20:50	06:00 20:21	19:15 (46) 20:07 (46)	07:11 18:32	06:51 16:45	07:27 16:26
10	07:39 16:45	07:12 17:26	06:27 19:04	06:31 19:42	05:45 20:17	19:17 (46) 20:46	19:10 (46) 20:49	06:02 20:19	19:15 (46) 20:06 (46)	07:12 18:31	06:52 16:44	07:28 16:26
11	07:39 16:46	07:11 17:28	06:26 19:05	06:29 19:43	05:44 20:18	19:16 (46) 20:47	19:10 (46) 20:49	06:03 20:18	19:15 (46) 20:07 (46)	07:13 18:29	06:54 16:43	07:29 16:26
12	07:38 16:48	07:09 17:29	06:24 19:06	06:28 19:44	05:42 20:19	19:15 (46) 20:48	19:09 (46) 20:48	06:04 20:16	19:16 (46) 20:07 (46)	07:15 18:27	06:55 16:42	07:30 16:26
13	07:38 16:49	07:08 17:30	06:22 19:07	06:26 19:46	05:41 20:20	19:14 (46) 20:48	19:10 (46) 20:48	06:05 20:15	19:16 (46) 20:07 (46)	07:16 18:25	06:56 16:41	07:31 16:26
14	07:38 16:50	07:07 17:32	06:20 19:09	06:24 19:47	05:40 20:21	19:13 (46) 20:49	19:10 (46) 20:47	06:06 20:13	19:16 (46) 20:08 (46)	07:17 18:24	06:58 16:40	07:32 16:26
15	07:37 16:51	07:05 17:33	06:18 19:10	06:22 19:48	05:39 20:23	19:12 (46) 20:49	19:10 (46) 20:47	06:07 20:12	19:16 (46) 20:07 (46)	07:18 18:22	06:59 16:39	07:32 16:26
16	07:37 16:52	07:04 17:35	06:17 19:11	06:21 19:49	05:38 20:24	19:11 (46) 20:50	19:10 (46) 20:46	06:08 20:10	19:16 (46) 20:07 (46)	07:20 18:20	07:00 16:38	07:33 16:27
17	07:36 16:54	07:02 17:36	06:15 19:12	06:19 19:50	05:37 20:25	19:11 (46) 20:50	19:11 (46) 20:45	06:09 20:09	19:17 (46) 20:07 (46)	07:21 18:19	07:02 16:37	07:34 16:27
18	07:35 16:55	07:01 17:37	06:13 19:14	06:17 19:52	05:36 20:26	19:10 (46) 20:50	19:12 (46) 20:45	06:11 20:07	19:17 (46) 20:07 (46)	07:22 18:17	07:03 16:36	07:35 16:27
19	07:35 16:56	06:59 17:39	06:11 19:15	06:16 19:53	05:35 20:27	19:09 (46) 20:51	19:12 (46) 20:44	06:12 20:06	19:17 (46) 20:07 (46)	07:23 18:15	07:04 16:35	07:35 16:28
20	07:34 16:57	06:58 17:40	06:09 19:16	06:14 19:54	05:34 20:28	19:09 (46) 20:51	19:12 (46) 20:43	06:13 20:04	19:18 (46) 20:07 (46)	07:25 18:14	07:06 16:34	07:36 16:28
21	07:33 16:59	06:56 17:41	06:07 19:17	06:12 19:55	05:33 20:29	19:08 (46) 20:51	19:12 (46) 20:42	06:14 20:02	19:18 (46) 20:07 (46)	07:26 18:12	07:07 16:33	07:36 16:29
22	07:33 17:00	06:54 17:43	06:06 19:19	06:11 19:56	05:32 20:30	19:08 (46) 20:51	19:12 (46) 20:41	06:15 20:01	19:19 (46) 20:06 (46)	07:27 18:10	07:08 16:33	07:37 16:29
23	07:32 17:01	06:53 17:44	06:04 19:20	06:09 19:58	05:31 20:31	19:08 (46) 20:51	19:13 (46) 20:40	06:16 19:58	19:19 (46) 20:06 (46)	07:29 18:09	07:09 16:32	07:37 16:30
24	07:31 17:03	06:51 17:45	06:02 19:21	06:08 19:59	05:30 20:32	19:08 (46) 20:52	19:13 (46) 20:39	06:18 19:56	19:20 (46) 20:06 (46)	07:30 18:07	07:11 16:31	07:38 16:30
25	07:30 17:04	06:50 17:47	06:00 19:22	06:06 20:00	05:29 20:33	19:08 (46) 20:52	19:13 (46) 20:39	06:19 19:54	19:20 (46) 20:05 (46)	07:31 18:06	07:12 16:31	07:38 16:31
26	07:29 17:05	06:48 17:48	06:58 19:24	06:05 20:00	05:29 20:34	19:07 (46) 20:52	19:12 (46) 20:38	06:20 19:52	19:21 (46) 20:05 (46)	07:32 18:04	07:13 16:30	07:39 16:31
27	07:28 17:07	06:46 17:49	06:56 19:25	06:03 20:01	05:28 20:35	19:08 (46) 20:53	19:13 (46) 20:37	06:21 19:51	19:22 (46) 20:04 (46)	07:34 18:03	07:14 16:29	07:39 16:32
28	07:27 17:08	06:45 17:51	06:55 19:26	06:01 20:03	05:27 20:36	19:08 (46) 20:52	19:13 (46) 20:35	06:22 19:49	19:23 (46) 20:03 (46)	07:35 18:01	07:16 16:29	07:39 16:33
29	07:26 17:10	06:45 17:51	06:55 19:27	06:01 20:04	05:26 20:37	19:07 (46) 20:54	19:14 (46) 20:34	06:23 19:47	19:24 (46) 20:03 (46)	07:36 18:00	07:17 16:28	07:39 16:33
30	07:25 17:11	06:45 17:51	06:55 19:28	06:01 20:05	05:26 20:38	19:07 (46) 20:52	19:14 (46) 20:33	06:24 19:46	19:25 (46) 20:02 (46)	07:38 18:49	07:18 16:28	07:40 16:34
31	07:24 17:12	06:49 19:30	06:59 20:39	06:25 20:39	05:25 20:39	19:07 (46) 20:52	19:14 (46) 20:32	06:26 19:44	19:26 (46) 20:01 (46)	07:39 18:57	07:40 16:35	07:40 16:35
Potential sun hours	288	293	369	403	457	463	469	434	376	341	290	277
Total, worst case					1039	1538	1500	148				
Sun reduction					0.55	0.59	0.63	0.59				
Oper. time red.					1.00	1.00	1.00	1.00				
Wind dir. red.					0.51	0.51	0.51	0.51				
Total reduction					0.28	0.30	0.32	0.30				
Total, real					291	463	482	45				

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 42

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-141 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (79)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.33	0.39	0.47	0.49	0.55	0.59	0.63	0.59	0.54	0.44	0.27	0.25

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
438	648	710	456	298	237	193	272	631	1,051	1,182	1,006	675	429	245	289	8,760

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

	January	February	March	April	May	June
1	07:40 16:36	07:23 17:14	06:43 17:52	07:16 (19) 07:53 (19)	06:47 19:31	05:57 20:06
2	07:40 16:37	07:22 17:15	06:41 17:53	07:16 (19) 07:54 (19)	06:46 19:32	05:56 20:07
3	07:40 16:38	07:21 17:17	06:40 17:55	07:16 (19) 07:53 (19)	06:44 19:33	05:54 20:09
4	07:40 16:39	07:20 17:18	06:38 17:56	07:16 (19) 07:52 (19)	06:42 19:35	05:53 20:10
5	07:40 16:40	07:19 17:19	06:36 17:57	07:16 (19) 07:51 (19)	06:40 19:36	05:52 20:11
6	07:40 16:41	07:17 17:21	06:34 17:59	07:17 (19) 07:51 (19)	06:38 19:37	05:50 20:12
7	07:40 16:42	07:16 17:22	06:33 18:00	07:18 (19) 07:50 (19)	06:37 19:38	05:49 20:13
8	07:39 16:43	07:15 17:24	06:31 19:01	08:18 (19) 08:48 (19)	06:35 19:39	05:48 20:14
9	07:39 16:44	07:14 17:25	07:37 (20) 07:40 (20)	07:29 19:02	06:33 19:41	05:46 20:16
10	07:39 16:45	07:12 17:26	07:33 (20) 07:44 (20)	07:27 19:04	06:31 19:42	05:45 20:17
11	07:39 16:47	07:11 17:28	07:32 (20) 07:46 (20)	07:26 19:05	06:30 19:43	05:44 20:18
12	07:38 16:48	07:09 17:29	07:30 (20) 07:47 (20)	07:24 19:06	06:28 19:44	05:43 20:19
13	07:38 16:49	07:08 17:31	07:29 (20) 07:49 (20)	07:22 19:08	06:26 19:46	05:41 20:20
14	07:37 16:50	07:07 17:32	07:28 (20) 07:50 (20)	07:20 19:09	06:24 19:47	05:40 20:21
15	07:37 16:51	07:05 17:33	07:26 (20) 07:50 (20)	07:18 19:10	06:23 19:48	05:39 20:22
16	07:36 16:53	07:04 17:35	07:26 (20) 07:51 (20)	07:17 19:11	06:21 19:49	05:38 20:24
17	07:36 16:54	07:02 17:36	07:26 (20) 07:51 (20)	07:15 19:13	06:19 19:50	05:37 20:25
18	07:35 16:55	07:01 17:37	07:25 (20) 07:50 (20)	07:13 19:14	06:18 19:52	05:36 20:26
19	07:35 16:56	06:59 17:39	07:25 (19) 07:51 (19)	07:11 19:15	06:16 19:53	05:35 20:27
20	07:34 16:58	06:58 17:40	07:22 (19) 07:50 (20)	07:09 19:16	06:14 19:54	05:34 20:28
21	07:33 16:59	06:56 17:41	07:22 (19) 07:51 (19)	07:07 19:17	06:13 19:55	05:33 20:29
22	07:33 17:00	06:54 17:43	07:20 (19) 07:52 (19)	07:06 19:19	06:11 19:56	05:32 20:30
23	07:32 17:02	06:53 17:44	07:19 (19) 07:52 (19)	07:04 19:20	06:09 19:58	05:31 20:31
24	07:31 17:03	06:51 17:45	07:19 (19) 07:53 (19)	07:02 19:21	06:08 19:59	05:30 20:32
25	07:30 17:04	06:50 17:47	07:18 (19) 07:53 (19)	07:00 19:22	06:06 20:00	05:30 20:33
26	07:29 17:06	06:48 17:48	07:17 (19) 07:53 (19)	06:58 19:24	06:05 20:00	05:29 20:34
27	07:28 17:07	06:46 17:49	07:17 (19) 07:54 (19)	06:56 19:25	06:03 20:01	05:28 20:35
28	07:27 17:08	06:45 17:51	07:16 (19) 07:54 (19)	06:55 19:26	06:02 20:02	05:27 20:36
29	07:26 17:10		06:53 19:27	06:00 20:04	05:27 20:37	05:24 20:52
30	07:25 17:11		06:51 19:28	05:59 20:05	05:26 20:38	05:24 20:52
31	07:24 17:12		06:49 19:30	05:58 20:06	05:25 20:39	05:23 20:04 (16)
Potential sun hours	288	293	369	403	457	463
Total, worst case		514	362		33	844
Sun reduction		0.39	0.47		0.55	0.59
Oper. time red.		1.00	1.00		1.00	1.00
Wind dir. red.		0.51	0.51		0.50	0.50
Total reduction		0.20	0.24		0.27	0.29
Total, real		103	87		9	248

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 43

Licensed user:

**EDR**

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US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-141 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (79)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25 20:52	19:49 (16) 20:18 (16)	05:52 20:31	06:27 19:42	07:01 18:47	07:19 16:28
2	05:25 20:52	19:49 (16) 20:17 (16)	05:53 20:30	06:28 19:40	07:03 18:45	07:20 16:27
3	05:26 20:52	19:50 (16) 20:17 (16)	05:54 20:28	06:29 19:38	07:04 18:43	07:21 16:27
4	05:27 20:51	19:50 (16) 20:18 (16)	05:55 20:27	06:30 19:37	07:05 18:41	07:22 16:27
5	05:27 20:51	19:50 (16) 20:17 (16)	05:56 20:26	06:31 19:35	07:06 18:40	07:23 16:27
6	05:28 20:51	19:51 (16) 20:17 (16)	05:57 20:25	06:33 19:33	07:07 18:38	07:24 16:26
7	05:28 20:51	19:52 (16) 20:17 (16)	05:58 20:23	06:34 19:31	07:09 18:36	07:25 16:26
8	05:29 20:50	19:53 (16) 20:16 (16)	05:59 20:22	06:35 19:29	07:10 18:34	07:26 16:26
9	05:30 20:50	19:54 (16) 20:16 (16)	06:01 20:21	06:36 19:28	07:11 18:32	07:27 16:26
10	05:31 20:49	19:55 (16) 20:15 (16)	06:02 20:19	06:37 19:26	07:12 18:31	07:28 16:26
11	05:31 20:49	19:55 (16) 20:14 (16)	06:03 20:18	06:38 19:24	07:14 18:29	07:29 16:26
12	05:32 20:48	19:57 (16) 20:13 (16)	06:04 20:16	06:39 19:22	07:15 18:27	07:30 16:26
13	05:33 20:48	19:58 (16) 20:12 (16)	06:05 20:15	06:41 19:20	07:16 18:25	07:31 16:26
14	05:34 20:47	20:01 (16) 20:10 (16)	06:06 20:13	06:42 19:18	07:17 18:24	07:32 16:26
15	05:35 20:47	06:07 20:12	06:43 19:17	06:43 18:22	07:18 18:22	07:32 16:27
16	05:36 20:46	06:09 20:10	06:44 19:15	06:44 18:20	07:20 18:20	07:33 16:27
17	05:36 20:45	06:10 20:09	06:45 19:13	06:45 18:19	07:21 18:19	07:34 16:27
18	05:37 20:45	06:11 20:07	06:46 19:11	06:46 18:17	07:22 18:17	07:34 16:28
19	05:38 20:44	06:12 20:06	06:47 19:09	06:47 18:15	07:23 18:15	07:35 16:28
20	05:39 20:43	06:13 20:04	06:49 19:07	06:49 18:14	07:25 18:14	07:36 16:28
21	05:40 20:42	06:14 20:02	06:50 19:05	06:50 18:12	07:26 18:12	07:36 16:29
22	05:41 20:41	06:15 20:01	06:51 19:03	06:51 18:11	07:27 18:11	07:37 16:29
23	05:42 20:40	06:17 19:58	06:52 19:02	06:52 18:09	07:29 18:09	07:37 16:30
24	05:43 20:39	06:18 19:56	06:53 19:00	06:53 18:07	07:30 18:07	07:38 16:30
25	05:44 20:38	06:19 19:54	06:54 18:58	06:54 18:06	07:31 18:06	07:38 16:31
26	05:45 20:37	06:20 19:52	06:56 18:56	06:56 18:04	07:32 18:04	07:38 16:32
27	05:46 20:36	06:21 19:51	06:57 18:54	06:57 18:03	07:33 18:03	07:39 16:32
28	05:47 20:35	06:22 19:49	06:58 18:52	06:58 18:01	07:35 18:01	07:39 16:33
29	05:48 20:34	06:23 19:47	06:59 18:51	06:59 18:00	07:36 18:00	07:39 16:34
30	05:49 20:33	06:25 19:46	07:00 18:49	07:00 17:58	07:38 18:00	07:40 16:35
31	05:51 20:32	06:26 19:44	07:00 17:57	07:00 17:57	07:39 18:02	07:40 16:35
Potential sun hours	469	434	376	342	290	277
Total, worst case	313			878	10	
Sun reduction	0.63			0.44	0.27	
Oper. time red.	1.00			1.00	1.00	
Wind dir. red.	0.50			0.51	0.51	
Total reduction	0.31			0.23	0.14	
Total, real	98			198	1	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 44

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2 Shadow receptor: R-147 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (83)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36	07:23 17:14	16:16 (18) 16:41 (18)	06:43 17:52	06:47 19:31	05:57 20:06
2	07:40 16:37	07:22 17:15	16:15 (18) 16:43 (18)	06:41 17:53	06:46 19:32	05:56 20:07
3	07:40 16:38	07:21 17:17	16:13 (18) 16:43 (18)	06:40 17:55	06:44 19:33	05:54 20:09
4	07:40 16:39	07:20 17:18	16:12 (18) 16:45 (18)	06:38 17:56	06:42 19:35	05:53 20:10
5	07:40 16:40	07:19 17:19	16:12 (18) 16:46 (18)	06:36 17:57	06:40 19:36	05:51 20:11
6	07:40 16:41	07:17 17:21	16:11 (18) 16:48 (18)	06:34 17:59	06:38 19:37	05:50 20:12
7	07:40 16:42	07:16 17:22	16:10 (18) 16:48 (18)	06:33 18:00	06:37 19:38	05:49 20:13
8	07:40 16:43	07:15 17:24	16:10 (18) 16:49 (18)	07:31 19:01	06:35 19:39	05:47 20:14
9	07:39 16:44	07:14 17:25	16:10 (18) 16:50 (18)	07:29 19:02	06:33 19:41	05:46 20:16
10	07:39 16:45	07:12 17:26	16:09 (18) 16:50 (18)	07:27 19:04	06:31 19:42	05:45 20:17
11	07:39 16:47	07:11 17:28	16:09 (18) 16:51 (18)	07:26 19:05	06:30 19:43	05:44 20:18
12	07:38 16:48	07:09 17:29	16:08 (18) 16:50 (18)	07:24 19:06	06:28 19:44	05:43 20:19
13	07:38 16:49	07:08 17:30	16:08 (18) 16:51 (18)	07:22 19:07	06:26 19:46	05:41 20:20
14	07:38 16:50	07:07 17:32	16:09 (18) 16:51 (18)	07:20 19:09	06:24 19:47	05:40 20:21
15	07:37 16:51	07:05 17:33	16:08 (18) 16:51 (18)	07:18 19:10	06:23 19:48	05:39 20:23
16	07:37 16:53	07:04 17:35	16:09 (18) 16:51 (18)	07:17 19:11	06:21 19:49	05:38 20:24
17	07:36 16:54	07:02 17:36	16:08 (18) 16:51 (18)	07:15 19:12	06:19 19:50	05:37 20:25
18	07:35 16:55	07:01 17:37	16:08 (18) 16:50 (18)	07:13 19:14	06:18 19:52	05:36 20:26
19	07:35 16:56	06:59 17:39	16:09 (18) 16:50 (18)	07:11 19:15	06:16 19:53	05:35 20:27
20	07:34 16:58	06:58 17:40	16:09 (18) 16:49 (18)	07:09 19:16	06:14 19:54	05:34 20:28
21	07:33 16:59	06:56 17:41	16:11 (18) 16:49 (18)	07:07 19:17	06:13 19:55	05:33 20:29
22	07:33 17:00	06:54 17:43	16:11 (18) 16:48 (18)	07:06 19:19	06:11 19:56	05:32 20:30
23	07:32 17:02	06:53 17:44	16:12 (18) 16:46 (18)	07:04 19:20	06:09 19:58	05:31 20:31
24	07:31 17:03	06:51 17:45	16:13 (18) 16:46 (18)	07:02 19:21	06:08 19:59	05:30 20:32
25	07:30 17:04	06:50 17:47	16:14 (18) 16:44 (18)	07:00 19:22	06:06 20:00	05:29 20:33
26	07:29 17:06	06:48 17:48	16:16 (18) 16:42 (18)	06:58 19:24	06:05 20:00	05:29 20:34
27	07:28 17:07	06:46 17:49	16:19 (18) 16:40 (18)	06:56 19:25	06:03 20:01	05:28 20:35
28	07:27 17:08	06:45 17:51	16:21 (18) 16:37 (18)	06:55 19:26	06:02 20:03	05:27 20:36
29	07:26 17:10	16:23 (18) 16:32 (18)	16:37 (18)	06:53 20:04	06:00 20:04	05:27 20:37
30	07:25 17:11	16:20 (18) 16:36 (18)	16:36 (18)	06:51 19:28	05:59 20:05	05:26 20:38
31	07:24 17:12	16:18 (18) 16:39 (18)	16:39 (18)	06:49 19:30	05:57 20:06	05:25 20:39
Potential sun hours	288	293	369	403	457	463
Total, worst case	46	1000			940	925
Sun reduction	0.33	0.39			0.55	0.59
Oper. time red.	1.00	1.00			1.00	1.00
Wind dir. red.	0.71	0.71			0.67	0.67
Total reduction	0.23	0.28			0.37	0.40
Total, real	11	278			350	369

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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Licensed user:

**EDR**

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US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-147 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (83)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25 20:52	06:18 (29) 05:52	06:20 (29) 06:27	07:01	06:40	15:38 (18) 07:19
2	05:25 20:52	06:17 (29) 05:53	06:21 (29) 06:28	07:03	06:42	15:38 (18) 07:20
3	05:26 20:52	06:18 (29) 05:54	06:21 (29) 06:29	07:04	06:43	15:40 (18) 07:21
4	05:26 20:51	06:18 (29) 05:55	06:22 (29) 06:30	07:05	06:44	15:40 (18) 07:22
5	05:27 20:51	06:17 (29) 05:56	06:23 (29) 06:31	07:06	06:46	15:41 (18) 07:23
6	05:28 20:51	06:18 (29) 05:57	06:25 (29) 06:33	07:07	06:47	15:42 (18) 07:24
7	05:28 20:51	06:17 (29) 05:58	06:26 (29) 06:34	07:09	06:48	15:43 (18) 07:25
8	05:29 20:50	06:17 (29) 05:59	06:28 (29) 06:35	07:10	06:50	15:44 (18) 07:26
9	05:30 20:50	06:17 (29) 06:00	06:32 (29) 06:36	07:11	06:51	15:45 (18) 07:27
10	05:31 20:49	06:18 (29) 06:02	06:37 07:12	07:12	06:52	15:47 (18) 07:28
11	05:31 20:49	06:17 (29) 06:03	06:38 07:13	07:13	06:54	15:49 (18) 07:29
12	05:32 20:48	06:17 (29) 06:04	06:39 07:15	07:15	06:55	15:52 (18) 07:30
13	05:33 20:48	06:17 (29) 06:05	06:41 07:16	07:16	06:56	15:56 (18) 07:31
14	05:34 20:47	06:17 (29) 06:06	06:42 07:17	07:17	06:58	16:03 (18) 07:32
15	05:35 20:47	06:17 (29) 06:07	06:43 07:18	07:18	06:59	16:08 (18) 07:33
16	05:36 20:46	06:16 (29) 06:08	06:44 07:20	07:20	07:00	16:13 (18) 07:34
17	05:36 20:45	06:16 (29) 06:10	06:45 07:21	07:21	07:02	16:18 (18) 07:35
18	05:37 20:45	06:17 (29) 06:11	06:46 07:22	07:22	07:03	16:23 (18) 07:36
19	05:38 20:44	06:17 (29) 06:12	06:47 07:23	07:23	07:04	16:28 (18) 07:37
20	05:39 20:43	06:17 (29) 06:13	06:49 07:25	07:25	07:06	16:33 (18) 07:38
21	05:40 20:42	06:17 (29) 06:14	06:50 07:26	07:26	07:07	16:38 (18) 07:39
22	05:41 20:41	06:17 (29) 06:15	06:51 07:27	07:27	07:08	16:43 (18) 07:40
23	05:42 20:40	06:16 (29) 06:16	06:52 07:29	07:29	07:09	16:48 (18) 07:41
24	05:43 20:39	06:17 (29) 06:18	06:53 07:30	07:30	07:11	16:53 (18) 07:42
25	05:44 20:38	06:18 (29) 06:19	06:54 07:31	07:31	07:12	16:58 (18) 07:43
26	05:45 20:38	06:18 (29) 06:20	06:55 07:32	07:32	07:13	17:03 (18) 07:44
27	05:46 20:36	06:18 (29) 06:21	06:56 07:33	07:33	07:14	17:08 (18) 07:45
28	05:47 20:35	06:18 (29) 06:22	06:57 07:34	07:34	07:15	17:13 (18) 07:46
29	05:48 20:34	06:19 (29) 06:23	06:58 07:35	07:35	07:16	17:18 (18) 07:47
30	05:49 20:33	06:19 (29) 06:25	06:59 07:36	07:36	07:17	17:23 (18) 07:48
31	05:50 20:32	06:20 (29) 06:26	07:00 07:38	07:38	07:18	17:28 (18) 07:49
Potential sun hours	469	434	376	342	290	277
Total, worst case	1118	214	675	384		
Sun reduction	0.63	0.59	0.44	0.27		
Oper. time red.	1.00	1.00	1.00	1.00		
Wind dir. red.	0.67	0.67	0.71	0.71		
Total reduction	0.43	0.40	0.31	0.19		
Total, real	477	85	211	74		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 46

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Steve Curtis, scurtis@edr.com

Calculated:

3/21/2011 11:14 AM/2.7.453

SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-15 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (12)

Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	05:57 20:06	05:25 20:40	19:18 (46) 05:25	05:51 20:31	19:31 (46) 06:27	07:01 18:47	06:40 16:55	07:19 16:28
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	05:56 20:07	05:24 20:40	19:18 (46) 05:25	05:53 20:30	19:32 (46) 06:28	07:03 18:45	06:42 16:54	07:20 16:27
3	07:40 16:38	07:21 17:16	06:40 17:55	06:44 19:33	05:54 20:09	05:24 20:41	19:19 (46) 05:26	05:54 20:30	19:32 (46) 06:29	07:04 18:43	06:43 16:53	07:21 16:27
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:35	05:53 20:10	05:23 20:42	19:19 (46) 05:26	05:55 20:31	19:33 (46) 06:30	07:05 18:41	06:44 16:51	07:22 16:27
5	07:40 16:40	07:19 17:19	06:36 17:57	06:40 19:36	05:51 20:11	19:30 (46) 05:23	19:19 (46) 05:27	05:56 20:32	19:35 (46) 06:31	07:06 18:37	06:46 16:50	07:23 16:26
6	07:40 16:41	07:17 17:21	06:34 17:58	06:38 19:37	05:50 20:12	19:28 (46) 05:22	19:20 (46) 05:28	05:57 20:33	19:36 (46) 06:32	07:07 18:38	06:47 16:49	07:24 16:26
7	07:40 16:42	07:16 17:22	06:33 18:00	06:36 19:38	05:49 20:13	19:47 (46) 05:22	19:20 (46) 05:28	05:58 20:34	19:38 (46) 06:34	07:09 18:39	06:48 16:48	07:25 16:26
8	07:40 16:43	07:15 17:23	06:31 19:01	06:35 19:39	05:47 20:14	19:49 (46) 05:22	19:20 (46) 05:29	05:59 20:35	19:41 (46) 06:35	07:10 18:34	06:50 16:46	07:26 16:26
9	07:39 16:44	07:14 17:25	06:29 19:02	06:33 19:41	05:46 20:16	19:51 (46) 05:25	19:22 (46) 05:30	06:00 20:36	19:26 (46) 06:00	07:11 18:28	06:51 16:45	07:27 16:26
10	07:39 16:45	07:12 17:26	06:27 19:04	06:31 19:42	05:45 20:17	19:21 (46) 05:21	19:21 (46) 05:30	06:01 20:37	19:27 (46) 06:01	07:12 18:31	06:52 16:44	07:28 16:26
11	07:39 16:46	07:11 17:28	06:26 19:05	06:29 19:43	05:44 20:18	19:21 (46) 05:21	19:22 (46) 05:31	06:03 20:38	19:26 (46) 06:03	07:13 18:29	06:54 16:43	07:29 16:26
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13	07:38 16:49	07:08 17:30	06:22 19:07	06:26 19:46	05:41 20:20	19:19 (46) 05:21	19:22 (46) 05:34	06:05 20:40	19:26 (46) 06:05	07:16 18:25	06:56 16:41	07:31 16:26
14	07:38 16:50	07:07 17:32	06:20 19:09	06:24 19:47	05:40 20:21	19:19 (46) 05:21	19:22 (46) 05:34	06:06 20:41	19:26 (46) 06:06	07:17 18:24	06:58 16:40	07:32 16:26
15	07:37 16:51	07:05 17:33	06:18 19:10	06:22 19:48	05:39 20:23	19:18 (46) 05:21	19:23 (46) 05:36	06:07 20:42	19:26 (46) 06:07	07:18 18:22	06:59 16:39	07:33 16:26
16	07:37 16:52	07:04 17:34	06:17 19:11	06:21 19:49	05:38 20:24	19:18 (46) 05:20	19:23 (46) 05:36	06:08 20:43	19:26 (46) 06:08	07:20 18:20	07:00 16:38	07:33 16:27
17	07:36 16:54	07:02 17:36	06:15 19:12	06:19 19:50	05:37 20:25	19:18 (46) 05:21	19:24 (46) 05:37	06:09 20:44	19:26 (46) 06:09	07:21 18:19	07:02 16:37	07:34 16:27
18	07:35 16:55	07:01 17:37	06:13 19:14	06:17 19:52	05:36 20:26	19:17 (46) 05:21	19:24 (46) 05:38	06:11 20:45	19:26 (46) 06:11	07:22 18:17	07:03 16:36	07:35 16:27
19	07:35 16:56	06:59 17:39	06:11 19:15	06:16 19:53	05:35 20:27	19:17 (46) 05:21	19:24 (46) 05:38	06:12 20:46	19:26 (46) 06:12	07:23 18:15	07:04 16:35	07:35 16:28
20	07:34 16:57	06:58 17:40	06:09 19:16	06:14 19:54	05:34 20:28	19:17 (46) 05:21	19:25 (46) 05:39	06:13 20:47	19:27 (46) 06:13	07:25 18:14	07:06 16:34	07:36 16:28
21	07:33 16:59	06:56 17:41	06:07 19:17	06:12 19:55	05:33 20:29	19:16 (46) 05:21	19:25 (46) 05:40	06:14 20:48	19:27 (46) 06:14	07:26 18:12	07:07 16:33	07:36 16:29
22	07:33 17:00	06:54 17:43	06:06 19:19	06:11 19:56	05:32 20:30	19:16 (46) 05:21	19:25 (46) 05:41	06:15 20:49	19:27 (46) 06:15	07:27 18:10	07:08 16:33	07:37 16:29
23	07:32 17:01	06:53 17:44	06:04 19:20	06:09 19:58	05:31 20:31	19:16 (46) 05:21	19:25 (46) 05:42	06:16 20:50	19:27 (46) 06:16	07:29 18:09	07:09 16:32	07:37 16:30
24	07:31 17:03	06:51 17:45	06:02 19:21	06:08 19:59	05:30 20:32	19:17 (46) 05:22	19:25 (46) 05:43	06:18 20:51	19:27 (46) 06:18	07:30 18:07	07:11 16:31	07:38 16:30
25	07:30 17:04	06:50 17:47	06:00 19:22	06:06 20:00	05:29 20:33	19:17 (46) 05:22	19:25 (46) 05:44	06:19 20:52	19:28 (46) 06:19	07:31 18:06	07:12 16:31	07:38 16:31
26	07:29 17:05	06:48 17:48	06:58 19:24	06:05 20:00	05:29 20:34	19:17 (46) 05:22	19:25 (46) 05:45	06:20 20:53	19:28 (46) 06:20	07:32 18:04	07:13 16:30	07:39 16:31
27	07:28 17:07	06:46 17:49	06:56 19:25	06:03 20:01	05:28 20:35	19:17 (46) 05:23	19:26 (46) 05:46	06:21 20:54	19:28 (46) 06:21	07:34 18:03	07:14 16:29	07:39 16:32
28	07:27 17:08	06:45 17:51	06:55 19:26	06:01 20:03	05:27 20:36	19:17 (46) 05:23	19:26 (46) 05:47	06:22 20:55	19:29 (46) 06:22	07:35 18:02	07:16 16:29	07:39 16:33
29	07:26 17:10	06:45 17:51	06:55 19:26	06:01 20:03	05:27 20:36	19:17 (46) 05:23	19:26 (46) 05:47	06:22 20:55	19:29 (46) 06:23	07:36 18:00	07:17 16:28	07:39 16:33
30	07:25 17:11	06:45 17:51	06:55 19:26	06:01 20:03	05:27 20:36	19:17 (46) 05:23	19:26 (46) 05:47	06:22 20:55	19:29 (46) 06:23	07:36 18:00	07:17 16:28	07:39 16:33
31	07:24 17:12	06:45 17:51	06:55 19:26	06:01 20:03	05:27 20:36	19:17 (46) 05:23	19:26 (46) 05:47	06:22 20:55	19:29 (46) 06:23	07:36 18:00	07:17 16:28	07:39 16:33
Potential sun hours	288	293	369	403	457	463	469	434	376	341	290	277
Total, worst case					984	1132	1244	201				
Sun reduction					0.55	0.59	0.63	0.59				
Oper. time red.					1.00	1.00	1.00	1.00				
Wind dir. red.					0.51	0.51	0.51	0.51				
Total reduction					0.28	0.30	0.32	0.30				
Total, real					276	341	400	61				

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 47

Licensed user:

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-151 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (316)

Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
 438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
 Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December	
1	07:40 16:36	07:23 17:14	06:43 17:52	16:48 (17) 17:19 (17)	06:47 19:31	56 19:07 (11)	05:57 20:06	05:25 20:40	05:25 20:52	05:52 20:51	06:27 19:42	07:01 18:47	07:22 (29) 16:56
2	07:40 16:37	07:22 17:15	06:41 17:53	16:49 (17) 17:20 (17)	06:46 19:32	55 19:07 (11)	05:56 20:07	05:24 20:40	05:25 20:52	05:53 20:30	06:28 19:40	07:03 18:45	07:24 (29) 16:54
3	07:40 16:38	07:21 17:17	06:40 17:55	16:49 (17) 17:19 (17)	06:44 19:33	54 19:07 (11)	05:54 20:09	05:24 20:41	05:26 20:52	05:54 20:29	06:29 19:38	07:25 (28) 18:43	07:25 (29) 16:54
4	07:40 16:39	07:20 17:18	06:38 17:56	16:49 (17) 17:18 (17)	06:42 19:35	51 19:06 (11)	05:53 20:10	05:23 20:42	05:26 20:51	05:55 20:27	06:30 19:37	07:22 (28) 18:41	07:26 (29) 16:54
5	07:40 16:40	07:19 17:19	06:36 17:57	16:50 (17) 17:16 (17)	06:40 19:36	46 19:04 (11)	05:51 20:11	05:23 20:43	05:27 20:51	05:56 20:26	06:31 19:35	07:19 (28) 18:40	07:26 (29) 16:50
6	07:40 16:41	07:17 17:21	06:34 17:59	16:51 (17) 17:16 (17)	06:38 19:37	41 19:02 (11)	05:50 20:12	05:22 20:44	05:28 20:51	05:57 20:25	06:33 19:33	07:18 (28) 18:38	07:27 (29) 16:48
7	07:40 16:42	07:16 17:22	06:33 18:00	16:52 (17) 17:14 (17)	06:37 19:38	35 19:00 (11)	05:49 20:13	05:22 20:44	05:28 20:51	05:58 20:23	06:34 19:31	07:16 (28) 18:36	07:28 (29) 16:48
8	07:40 16:43	07:15 17:24	06:31 18:01	16:54 (17) 17:15 (17)	06:35 19:39	24 18:57 (11)	05:48 20:14	05:22 20:45	05:29 20:50	05:59 20:22	06:35 19:29	07:15 (28) 18:34	07:29 (29) 16:47
9	07:39 16:44	07:14 17:25	06:29 18:02	17:49 (29) 18:09 (17)	06:33 19:41	13 07:40 (28)	05:46 20:16	05:22 20:46	05:30 20:50	06:01 20:21	06:36 19:28	07:13 (28) 18:32	07:29 (29) 16:45
10	07:39 16:45	07:12 17:26	06:27 18:04	17:48 (29) 18:09 (17)	06:31 19:42		05:45 20:17	05:21 20:46	05:31 20:49	06:02 20:19	06:37 19:26	07:12 (28) 18:29	07:29 (29) 16:44
11	07:39 16:47	07:11 17:28	06:26 18:05	17:46 (29) 18:09 (17)	06:30 19:43		05:44 20:18	05:21 20:47	05:31 20:49	06:03 20:18	06:38 19:24	07:12 (28) 18:29	07:29 (29) 16:43
12	07:38 16:48	07:09 17:29	06:24 18:06	17:44 (29) 18:08 (17)	06:28 19:44		05:43 20:19	05:21 20:47	05:32 20:48	06:04 20:16	06:39 19:22	07:12 (28) 18:25	07:29 (29) 16:42
13	07:38 16:49	07:08 17:31	06:22 18:07	17:42 (29) 18:08 (17)	06:26 19:46		05:41 20:20	05:21 20:48	05:33 20:48	06:05 20:15	06:41 19:20	07:11 (28) 18:26	07:29 (29) 16:41
14	07:38 16:50	07:07 17:32	06:20 18:09	17:40 (29) 18:08 (17)	06:24 19:47		05:40 20:21	05:21 20:49	05:34 20:47	06:06 20:13	06:42 19:18	07:11 (28) 18:24	07:29 (29) 16:40
15	07:37 16:51	07:05 17:33	06:18 18:10	17:38 (29) 18:08 (17)	06:23 19:48		05:39 20:23	05:21 20:49	05:35 20:47	06:07 20:12	06:43 19:17	07:10 (28) 18:22	07:29 (29) 16:39
16	07:37 16:53	07:04 17:35	06:17 18:11	17:38 (29) 18:08 (17)	06:21 19:49		05:38 20:24	05:21 20:49	05:36 20:46	06:08 20:10	06:44 19:15	07:10 (28) 18:20	07:29 (29) 16:38
17	07:36 16:54	07:02 17:36	17:05 (17) 18:06 (17)	17:05 (17) 18:06 (17)	06:19 19:50		05:37 20:25	05:21 20:50	05:36 20:45	06:10 20:09	06:45 19:13	07:10 (28) 18:19	07:29 (29) 16:37
18	07:35 16:55	07:01 17:37	16:58 (17) 17:11 (17)	16:58 (17) 17:11 (17)	06:18 19:52		05:36 20:26	05:21 20:50	05:37 20:45	06:11 20:07	06:46 19:11	07:10 (28) 18:17	07:29 (29) 16:36
19	07:35 16:56	06:59 17:39	16:56 (17) 17:14 (17)	16:56 (17) 17:14 (17)	06:16 19:53		05:35 20:27	05:21 20:51	05:38 20:44	06:12 20:06	06:47 19:09	07:11 (28) 18:15	07:29 (29) 16:35
20	07:34 16:58	06:58 17:40	16:54 (17) 17:16 (17)	16:54 (17) 17:16 (17)	06:14 19:54		05:34 20:28	05:21 20:51	05:39 20:43	06:13 20:04	06:49 19:07	07:12 (28) 18:14	07:29 (29) 16:34
21	07:33 16:59	06:56 17:41	16:53 (17) 17:18 (17)	16:53 (17) 17:18 (17)	06:13 19:55		05:33 20:29	05:21 20:51	05:40 20:42	06:14 20:02	06:50 19:05	07:13 (28) 18:12	07:29 (29) 16:34
22	07:33 17:00	06:55 17:43	16:52 (17) 17:18 (17)	16:52 (17) 17:18 (17)	06:11 19:56		05:32 20:30	05:21 20:51	05:41 20:41	06:15 20:01	06:51 19:04	07:15 (28) 18:11	07:29 (29) 16:33
23	07:32 17:02	06:53 17:44	16:50 (17) 17:19 (17)	16:50 (17) 17:19 (17)	06:09 19:58		05:31 20:31	05:22 20:52	05:42 20:40	06:17 19:58	06:52 19:02	07:17 (28) 18:09	07:29 (29) 16:32
24	07:31 17:03	06:51 17:45	16:50 (17) 17:20 (17)	16:50 (17) 17:20 (17)	06:08 19:59		05:30 20:32	05:22 20:52	05:43 20:39	06:18 19:56	06:53 19:00	07:22 (29) 18:07	07:30 (29) 16:31
25	07:30 17:04	06:50 17:47	16:49 (17) 17:21 (17)	16:49 (17) 17:21 (17)	06:06 20:00		05:30 20:33	05:22 20:52	05:44 20:39	06:19 19:54	06:54 18:58	07:20 (29) 18:06	07:30 (29) 16:31
26	07:29 17:06	06:48 17:48	16:48 (17) 17:22 (17)	16:48 (17) 17:22 (17)	06:05 20:00		05:29 20:34	05:23 20:52	05:45 20:38	06:20 19:52	06:56 18:56	07:19 (29) 18:04	07:30 (29) 16:30
27	07:28 17:07	06:46 17:49	16:47 (17) 17:23 (17)	16:47 (17) 17:23 (17)	06:03 20:01		05:28 20:35	05:23 20:52	05:46 20:37	06:21 19:51	06:57 18:54	07:20 (29) 18:03	07:31 (29) 16:30
28	07:27 17:08	06:45 17:51	16:48 (17) 17:24 (17)	16:48 (17) 17:24 (17)	06:02 20:03		05:27 20:36	05:23 20:52	05:47 20:35	06:22 19:49	06:58 18:52	07:19 (29) 18:01	07:31 (29) 16:29
29	07:26 17:10		16:47 (17) 17:25 (17)	16:47 (17) 17:25 (17)	06:00 20:04		05:27 20:37	05:24 20:52	05:48 20:34	06:23 19:47	06:59 18:51	07:20 (29) 18:00	07:32 (29) 16:29
30	07:25 17:11		16:46 (17) 17:26 (17)	16:46 (17) 17:26 (17)	05:59 20:05		05:26 20:38	05:24 20:52	05:49 20:33	06:25 19:46	07:00 18:49	07:21 (29) 17:58	07:33 (29) 16:28
31	07:24 17:12		16:45 (17) 17:27 (17)	16:45 (17) 17:27 (17)	20:05		05:25 20:39	05:22 20:52	05:43 20:32	06:26 19:44	07:39 17:57	07:39 (29) 17:57	07:40 (29) 16:35
Potential sun hours	288	293	291	369	403		457	463	469	434	376	1001	575
Total, worst case			0.39	0.47	0.49					1.00		0.54	0.44
Sun reduction			1.00	0.58	0.57					1.00		0.56	0.65
Oper. time red.			0.26	0.28	0.28					0.31		0.29	0.29
Wind dir. red.			0.26	0.28	0.28					0.31		0.29	0.29
Total reduction			0.26	0.28	0.28					0.31		0.29	0.29
Total, real			76	244	105					306		166	166

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

Printed/Page

3/21/2011 2:14 PM / 48

Licensed user:

**EDR**  
217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688  
Steve Curtis, scurtis@edrpc.com  
Calculated:  
3/21/2011 11:14 AM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-161 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (321)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.33	0.39	0.47	0.49	0.55	0.59	0.63	0.59	0.54	0.44	0.27	0.25

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
438	648	710	456	298	237	193	272	631	1,051	1,182	1,006	675	429	245	289	8,760

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

	January	February	March	April	May	June	July	August	September	October	November	December				
1	07:40	07:23	06:43	06:47	05:57	05:25	05:25	05:52	06:27	06:58 (32)	07:01	07:28 (33)	06:40	07:19		
2	16:36	17:14	17:52	19:31	20:06	20:39	20:52	20:31	19:42	38	07:36 (32)	18:47	27	07:55 (33)	16:56	16:28
3	07:40	07:22	06:41	06:46	07:16 (32)	05:56	05:24	05:25	06:28	37	06:59 (32)	07:03	07:27 (33)	06:42	07:20	
4	16:37	17:15	17:53	19:32	9	07:25 (32)	20:07	20:40	19:40	37	07:36 (32)	18:45	27	07:54 (33)	16:54	16:27
5	07:40	07:21	06:40	07:04 (33)	06:44	07:12 (32)	05:54	05:24	06:29	36	06:59 (32)	07:04	07:28 (33)	06:43	07:21	
6	16:38	17:17	17:55	2	07:05 (33)	19:33	18	07:30 (32)	19:38	36	07:35 (32)	18:43	27	07:55 (33)	16:53	16:27
7	07:40	07:20	06:38	06:58 (33)	06:42	07:09 (32)	05:53	05:23	06:30	35	06:59 (32)	07:05	07:28 (33)	06:44	07:22	
8	16:39	17:18	17:56	13	07:11 (33)	19:35	23	07:32 (32)	19:37	35	07:34 (32)	18:41	26	07:54 (33)	16:52	16:27
9	07:40	07:19	06:36	06:56 (33)	06:40	07:07 (32)	05:51	05:23	06:31	34	07:00 (32)	07:06	07:28 (33)	06:46	07:23	
10	16:40	17:19	17:57	16	07:12 (33)	19:36	26	07:33 (32)	19:35	32	07:32 (32)	18:40	25	07:53 (33)	16:50	16:27
11	07:40	07:17	06:34	06:55 (33)	06:38	07:05 (32)	05:50	05:22	06:33	31	07:01 (32)	07:07	07:28 (33)	06:47	07:24	
12	16:41	17:21	17:59	20	07:15 (33)	19:37	29	07:34 (32)	19:33	30	07:31 (32)	18:38	24	07:52 (33)	16:49	16:26
13	07:40	07:16	06:33	06:53 (33)	06:37	07:03 (32)	05:49	05:22	06:34	29	07:02 (32)	07:09	07:30 (33)	06:48	07:25	
14	16:42	17:22	18:00	22	07:15 (33)	19:38	32	07:35 (32)	19:31	27	07:29 (32)	18:36	21	07:51 (33)	16:48	16:26
15	07:39	07:15	07:31	07:51 (33)	06:35	07:02 (32)	05:47	05:22	06:35	26	07:03 (32)	07:10	07:31 (33)	06:50	07:26	
16	16:43	17:24	19:01	25	08:16 (33)	19:39	35	07:37 (32)	19:29	23	07:26 (32)	18:34	18	07:49 (33)	16:47	16:26
17	07:39	07:13	07:29	07:50 (33)	06:33	07:01 (32)	05:46	05:22	06:36	22	07:05 (32)	07:11	07:32 (33)	06:51	07:27	
18	16:44	17:25	19:02	26	08:16 (33)	19:41	36	07:37 (32)	19:28	18	07:23 (32)	18:32	15	07:47 (33)	16:45	16:26
19	07:39	07:12	07:27	07:49 (33)	06:31	07:00 (32)	05:45	05:21	06:37	17	07:09 (32)	07:12	07:34 (33)	06:52	07:28	
20	16:45	17:26	19:04	27	08:16 (33)	19:42	37	07:37 (32)	19:26	10	07:19 (32)	18:31	9	07:43 (33)	16:44	16:26
21	07:39	07:11	07:26	07:50 (33)	06:29	06:59 (32)	05:44	05:21	06:38	9	07:07 (32)	07:13	06:54	07:29		
22	16:47	17:28	19:05	27	08:17 (33)	19:43	38	07:37 (32)	19:24	8	07:18 (32)	18:29	16:43	16:26		
23	07:38	07:09	07:24	07:49 (33)	06:28	06:59 (32)	05:42	05:21	06:39	7	07:08 (32)	07:15	06:55	07:30		
24	16:48	17:29	19:06	27	08:16 (33)	19:44	39	07:38 (32)	19:22	6	07:19 (32)	18:26	16:42	16:26		
25	07:38	07:08	07:22	07:49 (33)	06:26	06:58 (32)	05:41	05:21	06:41	5	07:16 (32)	07:16	06:56	07:31		
26	16:49	17:30	19:07	27	08:16 (33)	19:45	39	07:37 (32)	19:20	4	07:18 (32)	18:25	16:41	16:26		
27	07:37	07:07	07:20	07:49 (33)	06:24	06:57 (32)	05:40	05:21	06:42	3	07:15 (32)	07:17	06:58	07:32		
28	16:50	17:32	19:09	26	08:15 (33)	19:47	40	07:37 (32)	19:13	2	07:28 (32)	18:18	16:40	16:26		
29	07:37	07:05	07:18	07:49 (33)	06:23	06:57 (32)	05:39	05:21	06:43	1	07:12 (32)	07:18	06:59	07:32		
30	16:51	17:33	19:10	25	08:14 (33)	19:48	40	07:37 (32)	19:08	0	07:11 (32)	18:22	16:39	16:27		
31	07:36	07:04	07:17	07:50 (33)	06:21	06:57 (32)	05:38	05:21	06:44	-1	07:10 (32)	07:20	07:00	07:33		
32	16:53	17:35	19:11	23	08:13 (33)	19:49	40	07:37 (32)	19:04	-2	07:09 (32)	18:20	16:38	16:27		
33	07:36	07:02	07:15	07:51 (33)	06:19	06:56 (32)	05:37	05:21	06:45	-3	07:08 (32)	07:21	07:02	07:34		
34	16:54	17:36	19:12	21	08:12 (33)	19:50	40	07:36 (32)	19:09	-4	07:07 (32)	18:19	16:37	16:27		
35	07:35	07:01	07:13	07:52 (33)	06:17	06:57 (32)	05:36	05:21	06:46	-5	07:06 (32)	07:22	07:03	07:34		
36	16:55	17:37	19:14	18	08:10 (33)	19:52	39	07:36 (32)	19:07	-6	07:05 (32)	18:17	16:36	16:27		
37	07:35	06:59	07:11	07:53 (33)	06:16	06:57 (32)	05:35	05:21	06:47	-7	07:05 (32)	07:23	07:04	07:35		
38	16:56	17:39	19:15	14	08:07 (33)	19:53	38	07:35 (32)	19:06	-8	07:06 (32)	18:16	16:35	16:28		
39	07:34	06:58	07:09	07:56 (33)	06:14	06:57 (32)	05:34	05:21	06:48	-9	07:06 (32)	07:25	07:05	07:36		
40	16:58	17:40	19:16	7	08:03 (33)	19:54	37	07:34 (32)	19:05	-10	07:07 (32)	18:14	16:34	16:28		
41	07:33	06:56	07:07	08:13	06:13	06:58 (32)	05:33	05:21	06:49	-11	07:07 (32)	07:26	07:07	07:36		
42	16:59	17:41	19:17	19:55	36	07:34 (32)	20:29	20:51	19:12	-12	07:08 (32)	18:12	16:34	16:29		
43	07:33	06:54	07:06	08:11	06:11	06:58 (32)	05:32	05:21	06:50	-13	07:09 (32)	07:27	07:08	07:37		
44	17:00	17:43	19:19	19:56	34	07:32 (32)	20:30	20:51	19:13	-14	07:10 (32)	18:10	16:33	16:29		
45	07:32	06:53	07:04	08:09	06:10	06:59 (32)	05:31	05:22	06:51	-15	07:11 (32)	07:29	07:09	07:37		
46	17:02	17:44	19:20	19:58	33	07:32 (32)	20:31	20:52	19:14	-16	07:12 (32)	18:09	16:32	16:30		
47	07:31	06:51	07:02	08:08	06:10	06:59 (32)	05:30	05:22	06:52	-17	07:13 (32)	07:30	07:11	07:38		
48	17:03	17:45	19:21	19:59	31	07:30 (32)	20:32	20:52	19:15	-18	07:14 (32)	18:07	16:31	16:30		
49	07:30	06:50	07:00	08:06	06:10	07:01 (32)	05:29	05:22	06:53	-19	07:15 (32)	07:31	07:12	07:38		
50	17:04	17:47	19:22	20:00	28	07:29 (32)	20:33	20:52	19:16	-20	07:16 (32)	18:06	16:31	16:31		
51	07:29	06:48	06:58	06:05	07:01 (32)	05:29	05:23	05:45	06:54	-21	07:17 (32)	07:32	07:13	07:38		
52	17:06	17:48	19:24	20:00	26	07:27 (32)	20:34	20:52	19:17	-22	07:18 (32)	18:05	16:30	16:31		
53	07:28	06:46	06:56	06:03	07:03 (32)	05:28	05:23	05:46	06:55	-23	07:19 (32)	07:34	07:14	07:39		
54	17:07	17:49	19:25	20:01	22	07:25 (32)	20:35	20:52	19:18	-24	07:20 (32)	18:04	16:30	16:32		
55	07:27	06:45	06:55	06:02	07:05 (32)	05:27	05:23	05:47	06:56	-25	07:21 (32)	07:35	07:15	07:39		
56	17:08	17:51	19:26	20:02	18	07:23 (32)	20:36	20:52	19:19	-26	07:22 (32)	18:03	16:29	16:33		
57	07:26	06:40	06:53	06:00	07:08 (32)	05:27	05:24	05:48	06:57	-27	07:23 (32)	07:36	07:17	07:40		
58	17:10	17:52	19:27	20:04	12	07:20 (32)	20:37	20:52	19:20	-28	07:24 (32)	18:02	16:29	16:34		
59	07:25	06:41	06:51	05:59	06:07	05:26	05:24	05:49	06:58	-29	07:25 (32)	07:37	07:18	07:41		
60	17:11	17:53	19:28	20:05	10	07:18 (32)	20:38	20:52	19:21	-30	07:26 (32)	18:01	16:28	16:34		
61	07:24	06:40	06:49	05:58	06:08	05:25	05:23	05:50	06:59	-31	07:27 (32)	07:38	07:19	07:42		
62	17:12	17:54	19:30	20:06	8	07:16 (32)	20:39	20:52	19:22	-32	07:28 (32)	18:00	16:27	16:35		
Potential sun hours	288	293	369	403	457	463	469	434	376	342	290	277				
Total, worst case			366	875				600	435	219						
Sun reduction			0.47	0.49				0.59	0.54	0.44						
Oper. time red.			1.00	1.00				1.00	1.00	1.00						
Wind dir. red.			0.52	0.60				0.60	0.57	0.52						
Total reduction			0.24	0.29				0.35	0.31	0.23						
Total, real			89	256				211	134	50						

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 49

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-163 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (382)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	05:57 20:06	18:51 (29) 20:40
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	05:56 20:07	48 19:39 (28) 20:40
3	07:40 16:38	07:21 17:17	06:40 17:55	06:44 19:33	05:54 20:08	48 19:38 (28) 20:41
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:35	07:09 (38) 07:11 (38)	47 19:38 (28) 20:42
5	07:40 16:40	07:19 17:19	06:36 17:57	06:40 19:36	07:03 (38) 07:16 (38)	47 19:37 (28) 20:43
6	07:40 16:41	07:17 17:21	06:34 17:59	06:38 19:37	07:00 (38) 07:18 (38)	47 18:51 (29) 20:44
7	07:40 16:42	07:16 17:22	06:33 18:00	06:37 19:38	06:57 (38) 07:19 (38)	45 18:51 (29) 20:44
8	07:39 16:43	07:15 17:23	06:31 19:01	06:35 19:39	06:57 (38) 07:21 (38)	44 18:52 (29) 20:45
9	07:39 16:44	07:13 17:25	06:29 19:02	07:51 (39) 07:54 (39)	06:33 19:41	24 18:52 (29) 20:46
10	07:39 16:45	07:12 17:26	06:27 19:04	07:47 (39) 07:58 (39)	06:31 19:42	26 18:52 (29) 20:46
11	07:39 16:47	07:11 17:28	06:26 19:05	07:46 (39) 08:00 (39)	06:29 19:43	28 18:53 (29) 20:47
12	07:38 16:48	07:09 17:29	06:24 19:06	07:44 (39) 08:01 (39)	06:28 19:44	28 18:54 (29) 20:47
13	07:38 16:49	07:08 17:30	06:22 19:07	07:42 (39) 08:02 (39)	06:26 19:45	29 18:55 (29) 20:48
14	07:37 16:50	07:07 17:32	06:20 19:09	07:40 (39) 08:02 (39)	06:24 19:47	30 18:56 (29) 20:48
15	07:37 16:51	07:05 17:33	06:18 19:10	07:39 (39) 08:03 (39)	06:23 19:48	30 18:57 (29) 20:49
16	07:36 16:52	07:04 17:35	06:17 19:11	07:39 (39) 08:03 (39)	06:21 19:49	30 18:58 (29) 20:49
17	07:36 16:54	07:02 17:36	06:15 19:12	07:39 (39) 08:02 (39)	06:19 19:50	30 18:59 (29) 20:50
18	07:35 16:55	07:01 17:37	06:13 19:14	07:39 (39) 08:01 (39)	06:17 19:52	29 19:00 (29) 20:50
19	07:35 16:56	06:59 17:39	06:11 19:15	07:39 (39) 08:00 (39)	06:16 19:53	29 19:02 (29) 20:51
20	07:34 16:58	06:58 17:40	06:09 19:16	07:39 (39) 07:59 (39)	06:14 19:54	45 19:04 (29) 20:51
21	07:33 16:59	06:56 17:41	06:07 19:17	07:40 (39) 07:57 (39)	06:13 19:55	47 19:16 (29) 20:51
22	07:33 17:00	06:54 17:43	06:06 19:19	07:41 (39) 07:55 (39)	06:11 19:56	55 19:08 (29) 20:51
23	07:32 17:01	06:53 17:44	06:04 19:20	07:44 (39) 07:53 (39)	06:09 19:58	54 19:12 (29) 20:52
24	07:31 17:03	06:51 17:45	06:02 19:21	06:08 19:59	06:08 20:00	54 19:22 (29) 20:52
25	07:30 17:04	06:50 17:47	06:00 19:22	06:06 20:00	06:06 20:00	52 19:23 (29) 20:52
26	07:29 17:06	06:48 17:48	06:58 19:24	06:05 20:00	06:05 20:00	42 19:23 (29) 20:52
27	07:28 17:07	06:46 17:49	06:56 19:25	06:03 20:01	06:03 20:01	44 19:23 (29) 20:52
28	07:27 17:08	06:45 17:51	06:55 19:26	06:02 20:02	06:02 20:02	46 19:23 (29) 20:52
29	07:26 17:10	06:45 19:27	06:55 19:27	06:02 20:04	06:02 20:04	47 19:23 (29) 20:52
30	07:25 17:11	06:45 19:28	06:55 19:28	06:02 20:05	06:02 20:05	47 19:23 (29) 20:52
31	07:24 17:12	06:45 19:30	06:55 19:30	06:02 20:05	06:02 20:05	48 19:23 (29) 20:52
Potential sun hours	288	293	369	403	457	463
Total, worst case			259	958	700	
Sun reduction			0.47	0.49	0.55	
Oper. time red.			1.00	1.00	1.00	
Wind dir. red.			0.54	0.56	0.52	
Total reduction			0.25	0.28	0.28	
Total, real			65	264	199	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 50

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-163 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (382)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December							
1	05:25	05:52	19:04 (29)	06:27	06:51 (38)	07:01	07:22 (39)	06:40	07:19				
	20:52	20:31	33	19:37 (29)	19:42	29	07:20 (38)	18:47	18:47	18	07:40 (39)	16:56	16:28
2	05:25	05:53	19:03 (29)	06:28	06:53 (38)	07:03	07:23 (39)	06:42	07:20				
	20:52	20:30	36	19:39 (28)	19:40	27	07:20 (38)	18:45	16	07:39 (39)	16:54	16:27	
3	05:26	05:54	19:03 (29)	06:29	06:53 (38)	07:04	07:25 (39)	06:43	07:21				
	20:52	20:28	39	19:42 (28)	19:38	26	07:19 (38)	18:43	12	07:37 (39)	16:53	16:27	
4	05:26	05:55	19:02 (29)	06:30	06:54 (38)	07:05	07:26 (39)	06:44	07:22				
	20:51	20:27	41	19:43 (28)	19:37	24	07:18 (38)	18:41	8	07:34 (39)	16:52	16:27	
5	05:27	05:56	19:01 (29)	06:31	06:54 (38)	07:06	07:27 (39)	06:46	07:23				
	20:51	20:26	43	19:44 (28)	19:35	22	07:16 (38)	18:40	16:50	16:27			
6	05:28	05:57	19:01 (29)	06:33	06:56 (38)	07:07	07:28 (39)	06:47	07:24				
	20:51	20:25	44	19:45 (28)	19:33	18	07:14 (38)	18:38	16:49	16:26			
7	05:28	05:58	19:00 (29)	06:34	06:57 (38)	07:09	07:30 (39)	06:48	07:25				
	20:51	20:23	46	19:46 (28)	19:31	14	07:11 (38)	18:36	16:48	16:26			
8	05:29	05:59	19:00 (29)	06:35	07:02 (38)	07:10	07:31 (39)	06:50	07:26				
	20:50	20:22	46	19:46 (28)	19:29	4	07:06 (38)	18:34	16:46	16:26			
9	05:30	06:00	19:00 (29)	06:36	07:11	07:11	07:32 (39)	06:51	07:27				
	20:50	20:21	47	19:47 (28)	19:28	18:32	16:45	16:26					
10	05:31	06:02	18:59 (29)	06:37	07:12	07:12	07:33 (39)	06:52	07:28				
	20:49	20:19	48	19:47 (28)	19:26	18:31	16:44	16:26					
11	05:31	06:03	18:59 (29)	06:38	07:13	07:13	07:34 (39)	06:54	07:29				
	20:49	20:18	48	19:47 (28)	19:24	18:29	16:43	16:26					
12	05:32	06:04	19:00 (29)	06:39	07:15	07:15	07:35 (39)	06:55	07:30				
	20:48	20:16	48	19:48 (28)	19:22	18:27	16:42	16:26					
13	05:33	06:05	19:00 (29)	06:41	07:16	07:16	07:36 (39)	06:56	07:31				
	20:48	20:15	47	19:47 (28)	19:20	18:25	16:41	16:26					
14	05:34	06:06	19:00 (29)	06:42	07:17	07:17	07:37 (39)	06:58	07:32				
	20:47	20:13	47	19:47 (28)	19:18	18:24	16:40	16:26					
15	05:35	06:07	19:00 (29)	06:43	07:18	07:18	07:38 (39)	06:59	07:32				
	20:47	20:12	47	19:47 (28)	19:16	18:22	16:39	16:27					
16	05:35	06:08	19:00 (29)	06:44	07:20	07:20	07:39 (39)	07:00	07:33				
	20:46	20:10	45	19:45 (28)	19:15	18:20	16:38	16:27					
17	05:36	06:10	19:00 (29)	06:45	07:21	07:21	07:40 (39)	07:02	07:34				
	20:45	20:09	44	19:44 (28)	19:13	18:19	16:37	16:27					
18	05:37	06:11	07:07 (38)	06:46	07:22	07:22	07:41 (39)	07:03	07:34				
	20:44	20:07	47	19:42 (28)	19:11	18:17	16:36	16:27					
19	05:38	06:12	07:03 (38)	06:47	07:23	07:23	07:42 (39)	07:04	07:35				
	20:44	20:06	52	19:40 (28)	19:09	18:15	16:35	16:28					
20	05:39	06:13	07:01 (38)	06:49	07:32 (39)	07:25	07:43 (39)	07:05	07:36				
	20:43	20:04	54	19:39 (28)	19:07	6	07:38 (39)	18:14	16:34	16:28			
21	05:40	06:14	06:59 (38)	06:50	07:28 (39)	07:26	07:44 (39)	07:07	07:36				
	20:42	20:02	54	19:37 (28)	19:05	13	07:41 (39)	18:12	16:34	16:29			
22	05:41	06:15	06:58 (38)	06:51	07:26 (39)	07:27	07:45 (39)	07:08	07:37				
	20:41	20:01	54	19:36 (28)	19:03	16	07:42 (39)	18:10	16:33	16:29			
23	05:42	06:16	06:57 (38)	06:52	07:24 (39)	07:29	07:46 (39)	07:09	07:37				
	20:40	9	19:25 (29)	19:57	47	19:28 (29)	19:02	19	07:43 (39)	18:09	16:32	16:30	
24	05:43	19:14 (29)	06:18	06:55 (38)	06:53	07:23 (39)	07:30	07:11	07:38				
	20:39	14	19:28 (29)	19:56	45	19:25 (29)	19:00	21	07:44 (39)	18:07	16:31	16:30	
25	05:44	19:12 (29)	06:19	06:55 (38)	06:54	07:22 (39)	07:31	07:12	07:38				
	20:38	18	19:30 (29)	19:54	36	19:20 (29)	18:58	22	07:44 (39)	18:06	16:31	16:31	
26	05:45	19:10 (29)	06:20	06:54 (38)	06:55	07:21 (39)	07:32	07:13	07:38				
	20:37	22	19:32 (29)	19:52	29	07:23 (38)	18:56	23	07:44 (39)	18:04	16:30	16:31	
27	05:46	19:09 (29)	06:21	06:53 (38)	06:57	07:21 (39)	07:34	07:14	07:39				
	20:36	24	19:33 (29)	19:51	30	07:23 (38)	18:54	23	07:44 (39)	18:03	16:30	16:32	
28	05:47	19:08 (29)	06:22	06:52 (38)	06:58	07:21 (39)	07:35	07:15	07:39				
	20:35	26	19:34 (29)	19:49	31	07:23 (38)	18:52	23	07:44 (39)	18:01	16:29	16:33	
29	05:48	19:07 (29)	06:23	06:52 (38)	06:59	07:20 (39)	07:36	07:17	07:39				
	20:34	28	19:35 (29)	19:47	30	07:22 (38)	18:50	23	07:43 (39)	18:00	16:29	16:34	
30	05:49	19:06 (29)	06:24	06:52 (38)	07:00	07:21 (39)	07:38	07:18	07:40				
	20:33	30	19:36 (29)	19:45	30	07:22 (38)	18:49	21	07:42 (39)	17:58	16:28	16:34	
31	05:50	19:05 (29)	06:26	06:52 (38)	07:09	07:39	07:40	07:19	07:40				
	20:32	32	19:37 (29)	19:44	29	07:21 (38)	17:57	16:35	277				
Potential sun hours	469	434	376	342	290	277							
Total, worst case	203	1317	374	54									
Sun reduction	0.63	0.59	0.54	0.44									
Oper. time red.	1.00	1.00	1.00	1.00									
Wind dir. red.	0.52	0.54	0.57	0.54									
Total reduction	0.33	0.32	0.31	0.24									
Total, real	66	420	114	13									

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 51

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-165 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (92)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June		
1	07:40	07:23	07:49 (39)	06:43	07:31 (38)	06:47	05:57	05:25
	16:36	17:14	27 08:16 (39)	17:52	49 17:29 (29)	19:31	20:06	20:40
2	07:40	07:22	07:50 (39)	06:41	07:32 (38)	06:45	05:56	05:24
	16:37	17:15	27 08:17 (39)	17:53	50 17:31 (29)	19:32	20:07	20:40
3	07:40	07:21	07:49 (39)	06:40	07:33 (38)	06:44	05:54	05:24
	16:38	17:17	27 08:16 (39)	17:55	50 17:32 (29)	19:33	20:08	20:41
4	07:40	07:20	07:50 (39)	06:38	07:34 (38)	06:42	05:53	05:23
	16:39	17:18	26 08:16 (39)	17:56	49 17:33 (29)	19:35	20:10	20:42
5	07:40	07:19	07:50 (39)	06:36	07:36 (38)	06:40	05:51	05:23
	16:40	17:19	26 08:16 (39)	17:57	47 17:34 (29)	19:36	20:11	20:43
6	07:40	07:17	07:51 (39)	06:34	07:39 (38)	06:38	05:50	05:22
	16:41	17:21	25 08:16 (39)	17:58	42 17:35 (29)	19:37	20:12	20:44
7	07:40	07:16	07:51 (39)	06:33	07:45 (38)	06:37	05:49	05:22
	16:42	17:22	24 08:15 (39)	18:00	30 17:35 (29)	19:38	20:13	20:44
8	07:39	07:15	07:52 (39)	07:31	18:07 (29)	06:35	05:47	05:22
	16:43	17:23	23 08:15 (39)	19:01	28 18:35 (29)	19:39	20:14	20:45
9	07:39	07:13	07:43 (38)	07:29	18:06 (29)	06:33	05:46	05:21
	16:44	17:25	31 08:14 (39)	19:02	28 18:34 (29)	19:41	20:16	20:46
10	07:39	07:12	07:39 (38)	07:27	18:06 (29)	06:31	05:45	05:21
	16:45	17:26	33 08:12 (39)	19:04	27 18:33 (29)	19:42	20:17	20:46
11	07:39	07:11	07:38 (38)	07:26	18:07 (29)	06:29	05:44	05:21
	16:46	17:28	32 08:10 (39)	19:05	27 18:34 (29)	19:43	20:18	20:47
12	07:38	07:09	07:36 (38)	07:24	18:07 (29)	06:28	05:42	05:21
	16:48	17:29	31 08:07 (39)	19:06	25 18:32 (29)	19:44	20:19	20:47
13	07:38	07:08	07:35 (38)	07:22	18:08 (29)	06:26	05:41	05:21
	16:49	17:30	29 08:04 (38)	19:07	23 18:31 (29)	19:45	20:20	20:48
14	07:37	07:07	07:33 (38)	07:20	18:08 (29)	06:24	05:40	05:21
	16:50	17:32	31 08:04 (38)	19:09	21 18:29 (29)	19:47	20:21	20:48
15	07:37	07:05	07:32 (38)	07:18	18:10 (29)	06:23	05:39	05:21
	16:51	17:33	34 08:06 (38)	19:10	17 18:27 (29)	19:48	20:22	20:49
16	07:36	07:04	07:31 (38)	07:17	18:13 (29)	06:21	05:38	05:21
	16:52	17:35	35 08:06 (38)	19:11	13 18:26 (29)	19:49	20:24	20:49
17	07:36	07:02	07:31 (38)	07:15	18:17 (29)	06:19	05:37	05:21
	16:54	17:36	36 08:07 (38)	19:12	3 18:20 (29)	19:50	20:25	20:50
18	07:35	07:01	07:30 (38)	07:13	06:17	05:36	05:21	
	16:55	17:37	37 08:07 (38)	19:14	19:52	20:26	20:50	
19	07:35	06:59	07:30 (38)	07:11	06:16	05:35	05:21	
	16:56	17:39	38 08:08 (38)	19:15	19:53	20:27	20:51	
20	07:34	06:58	07:29 (38)	07:09	06:14	05:34	05:21	
	16:58	17:40	39 08:08 (38)	19:16	19:54	20:28	20:51	
21	07:33	07:57 (39)	06:56	07:30 (38)	07:07	06:13	05:33	05:21
	16:59	7 08:04 (39)	17:41	39 08:09 (38)	19:17	19:55	20:29	20:51
22	07:33	07:55 (39)	06:54	07:29 (38)	07:06	06:11	05:32	05:21
	17:00	12 08:07 (39)	17:43	39 08:08 (38)	19:19	19:56	20:30	20:51
23	07:32	07:54 (39)	06:53	07:29 (38)	07:04	06:09	05:31	05:22
	17:01	14 08:08 (39)	17:44	39 08:08 (38)	19:20	19:58	20:31	20:52
24	07:31	07:53 (39)	06:51	07:29 (38)	07:02	06:08	05:30	05:22
	17:03	17 08:10 (39)	17:45	39 08:08 (38)	19:21	19:59	20:32	20:52
25	07:30	07:52 (39)	06:50	07:29 (38)	07:00	06:06	05:29	05:22
	17:04	19 08:11 (39)	17:47	38 08:07 (38)	19:22	20:00	20:33	20:52
26	07:29	07:51 (39)	06:48	07:29 (38)	06:58	06:05	05:29	05:22
	17:05	21 08:12 (39)	17:48	37 08:06 (38)	19:24	20:00	20:34	20:52
27	07:28	07:50 (39)	06:46	07:30 (38)	06:56	06:03	05:28	05:23
	17:07	23 08:13 (39)	17:49	36 08:06 (38)	19:25	20:01	20:35	20:52
28	07:27	07:50 (39)	06:45	07:30 (38)	06:55	06:01	05:27	05:23
	17:08	24 08:14 (39)	17:51	47 17:28 (29)	19:26	20:02	20:36	20:52
29	07:26	07:49 (39)		06:53	06:00	05:27	05:24	
	17:10	26 08:15 (39)		19:27	20:04	20:37	20:52	
30	07:25	07:49 (39)		06:51	05:59	05:26	05:24	
	17:11	26 08:15 (39)		19:28	20:05	20:38	20:52	
31	07:24	07:49 (39)		06:49		05:25		
	17:12	27 08:16 (39)		19:30		20:39		
Potential sun hours	288	293	369	403	457	463		
Total, worst case	216	925	529					
Sun reduction	0.33	0.39	0.47					
Oper. time red.	1.00	1.00	1.00					
Wind dir. red.	0.49	0.50	0.59					
Total reduction	0.16	0.19	0.28					
Total, real	35	180	146					

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 52

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-165 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (92)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December	
1	05:25 20:52	05:52 20:31	06:27 19:42	07:01 18:47	17:46 (29) 18:11 (29)	06:40 16:56	07:10 (38) 16:28
2	05:25 20:52	05:53 20:30	06:28 19:40	07:03 18:45	17:45 (29) 18:11 (29)	06:42 16:54	07:12 (38) 16:27
3	05:26 20:52	05:54 20:28	06:29 19:38	07:04 18:43	17:45 (29) 18:12 (29)	06:43 16:53	07:22 (39) 16:27
4	05:26 20:51	05:55 20:27	06:30 19:37	07:05 18:41	17:44 (29) 18:12 (29)	06:44 16:51	07:21 (39) 16:27
5	05:27 20:51	05:56 20:26	06:31 19:35	07:06 18:40	17:43 (29) 18:11 (29)	06:46 16:50	07:21 (39) 16:27
6	05:28 20:51	05:57 20:25	06:32 19:33	07:07 18:38	17:43 (29) 18:11 (29)	06:47 16:49	07:20 (39) 16:26
7	05:28 20:51	05:58 20:23	06:34 19:31	07:09 18:36	08:17 (38) 18:11 (29)	06:48 16:48	07:21 (39) 16:26
8	05:29 20:50	05:59 20:22	06:35 19:29	07:10 18:34	08:13 (38) 18:10 (29)	06:50 16:46	07:20 (39) 16:26
9	05:30 20:50	06:00 20:21	06:36 19:28	07:11 18:32	08:10 (38) 18:09 (29)	06:51 16:45	07:20 (39) 16:26
10	05:30 20:49	06:02 20:19	06:37 19:26	07:12 18:31	08:08 (38) 18:07 (29)	06:52 16:44	07:20 (39) 16:26
11	05:31 20:49	06:03 20:18	06:38 19:24	07:13 18:29	08:07 (38) 18:06 (29)	06:54 16:43	07:20 (39) 16:26
12	05:32 20:48	06:04 20:16	06:39 19:22	07:15 18:27	08:05 (38) 18:04 (29)	06:55 16:42	07:21 (39) 16:26
13	05:33 20:48	06:05 20:15	06:40 19:20	07:16 18:25	08:04 (38) 18:02 (29)	06:56 16:41	07:21 (39) 16:26
14	05:34 20:47	06:06 20:13	06:42 19:18	07:17 18:24	08:02 (38) 17:59 (29)	06:58 16:40	07:22 (39) 16:26
15	05:35 20:47	06:07 20:12	06:43 19:16	07:18 18:22	08:02 (38) 08:39 (38)	06:59 16:39	07:23 (39) 16:27
16	05:35 20:46	06:08 20:10	06:44 19:15	07:20 18:20	08:01 (38) 08:39 (38)	07:00 16:38	07:24 (39) 16:27
17	05:36 20:45	06:10 20:09	06:45 19:13	07:21 18:19	08:00 (38) 08:39 (38)	07:02 16:37	07:26 (39) 16:27
18	05:37 20:44	06:11 20:07	06:46 19:11	07:22 18:17	08:01 (38) 08:40 (38)	07:03 16:36	07:27 (39) 16:27
19	05:38 20:44	06:12 20:06	06:47 19:09	07:23 18:15	08:00 (38) 08:39 (38)	07:04 16:35	07:28 (39) 16:28
20	05:39 20:43	06:13 20:04	06:49 19:07	07:25 18:14	08:00 (38) 08:39 (38)	07:05 16:34	07:30 (39) 16:28
21	05:40 20:42	06:14 20:02	06:50 19:05	07:26 18:12	08:00 (38) 08:39 (38)	07:07 16:34	07:32 (39) 16:29
22	05:41 20:41	06:15 20:01	06:51 19:03	07:27 18:10	08:00 (38) 08:39 (38)	07:08 16:33	07:37 16:29
23	05:42 20:40	06:16 19:57	06:52 19:02	07:29 18:09	08:00 (38) 08:38 (38)	07:09 16:32	07:37 16:30
24	05:43 20:39	06:18 19:56	06:53 19:00	07:30 18:07	08:01 (38) 08:38 (38)	07:11 16:31	07:38 16:30
25	05:44 20:38	06:19 19:54	06:54 18:58	07:31 18:06	08:01 (38) 08:37 (38)	07:12 16:31	07:38 16:31
26	05:45 20:37	06:20 19:52	06:55 18:56	07:32 18:04	08:02 (38) 08:37 (38)	07:13 16:30	07:38 16:31
27	05:46 20:36	06:21 19:51	06:57 18:54	17:55 (29) 18:06 (29)	07:34 18:03	07:14 16:30	07:39 16:32
28	05:47 20:35	06:22 19:49	06:58 18:52	17:52 (29) 18:08 (29)	07:35 18:01	07:15 16:29	07:39 16:33
29	05:48 20:34	06:23 19:47	06:59 18:50	17:50 (29) 18:10 (29)	07:36 18:00	07:17 16:29	07:39 16:34
30	05:49 20:33	06:24 19:45	07:00 18:49	17:48 (29) 18:10 (29)	07:38 17:58	07:18 16:28	07:40 16:34
31	05:50 20:32	06:26 19:44		07:39 17:57	08:08 (38) 08:41 (39)	07:18 16:28	07:40 16:35
Potential sun hours	469	434	376	342	290		277
Total, worst case			69	1149	483		
Sun reduction			0.54	0.44	0.27		
Oper. time red.			1.00	1.00	1.00		
Wind dir. red.			0.63	0.54	0.49		
Total reduction			0.34	0.24	0.13		
Total, real			23	271	63		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)



Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 53

Licensed user:

**EDR**

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-166 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (93)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	05:57 20:06	06:26 (49) 06:57 (49)	05:25 20:40
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	05:56 20:07	06:25 (49) 06:56 (49)	05:24 20:40
3	07:40 16:38	07:21 17:16	06:40 17:55	06:44 19:33	05:54 20:08	06:26 (49) 06:56 (49)	05:24 20:41
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:35	05:53 20:10	06:26 (49) 06:56 (49)	05:23 20:42
5	07:40 16:40	07:19 17:19	06:36 17:57	06:40 19:36	05:51 20:11	06:26 (49) 06:55 (49)	05:23 20:43
6	07:40 16:41	07:17 17:21	06:34 17:58	06:38 19:37	05:50 20:12	06:26 (49) 06:55 (49)	05:22 20:44
7	07:40 16:42	07:16 17:22	06:33 18:00	06:36 19:38	05:49 20:13	06:27 (49) 06:54 (49)	05:22 20:44
8	07:39 16:43	07:15 17:23	06:31 19:01	06:35 19:39	05:47 20:14	06:28 (49) 06:54 (49)	05:22 20:45
9	07:39 16:44	07:13 17:25	06:29 19:02	06:33 19:41	05:46 20:16	06:28 (49) 06:52 (49)	05:21 20:46
10	07:39 16:45	07:12 17:26	06:27 19:04	06:31 19:42	05:45 20:17	06:29 (49) 06:51 (49)	05:21 20:46
11	07:39 16:46	07:11 17:28	06:25 19:05	06:29 19:43	05:44 20:18	06:31 (49) 06:50 (49)	05:21 20:47
12	07:38 16:48	07:09 17:29	06:24 19:06	06:28 19:44	05:42 20:19	06:32 (49) 06:48 (49)	05:21 20:47
13	07:38 16:49	07:08 17:30	06:22 19:07	06:26 19:45	05:41 20:20	06:34 (49) 06:46 (49)	05:21 20:48
14	07:37 16:50	07:07 17:32	06:20 19:09	06:24 19:47	05:40 20:21	06:38 (49) 06:43 (49)	05:21 20:48
15	07:37 16:51	07:05 17:33	06:18 19:10	06:23 19:48	05:39 20:22	06:38 (49) 06:43 (49)	05:21 20:49
16	07:36 16:52	07:04 17:35	06:16 19:11	06:21 19:49	05:38 20:24	06:38 (49) 06:43 (49)	05:21 20:49
17	07:36 16:54	07:02 17:36	06:15 19:12	06:19 19:50	05:37 20:25	06:38 (49) 06:43 (49)	05:21 20:50
18	07:35 16:55	07:01 17:37	06:13 19:14	06:17 19:52	05:36 20:26	06:38 (49) 06:43 (49)	05:21 20:50
19	07:35 16:56	06:59 17:39	07:11 19:15	06:16 19:53	06:40 (49) 06:47 (49)	05:35 20:27	05:21 20:51
20	07:34 16:58	06:58 17:40	07:09 19:16	06:14 19:54	06:39 (49) 06:51 (49)	05:34 20:28	05:21 20:51
21	07:33 16:59	06:56 17:41	07:07 19:17	06:12 19:55	06:34 (49) 06:53 (49)	05:33 20:29	05:21 20:51
22	07:33 17:00	06:54 17:43	07:06 19:19	06:11 19:56	06:32 (49) 06:54 (49)	05:32 20:30	05:21 20:51
23	07:32 17:01	06:53 17:44	07:04 19:20	06:09 19:58	06:31 (49) 06:56 (49)	05:31 20:31	05:22 20:52
24	07:31 17:03	06:51 17:45	07:02 19:21	06:08 19:59	06:29 (49) 06:56 (49)	05:30 20:32	05:22 20:52
25	07:30 17:04	06:50 17:47	07:00 19:22	06:06 20:00	06:29 (49) 06:57 (49)	05:29 20:33	05:22 20:52
26	07:29 17:05	06:48 17:48	06:58 19:24	06:05 20:01	06:28 (49) 06:57 (49)	05:29 20:34	05:22 20:52
27	07:28 17:07	06:46 17:49	06:56 19:25	06:03 20:01	06:27 (49) 06:58 (49)	05:28 20:35	05:23 20:52
28	07:27 17:08	06:45 17:51	06:55 19:26	06:01 20:02	06:26 (49) 06:57 (49)	05:27 20:36	05:23 20:52
29	07:26 17:10	06:45 17:51	06:53 19:27	06:00 20:04	06:26 (49) 06:58 (49)	05:26 20:37	05:24 20:52
30	07:25 17:11	06:45 17:51	06:51 19:28	05:58 20:05	06:26 (49) 06:57 (49)	05:26 20:38	05:24 20:52
31	07:24 17:12	06:45 19:30	06:49 19:30	05:58 20:05	06:26 (49) 06:57 (49)	05:26 20:38	05:24 20:52
Potential sun hours	288	293	369	403	457		463
Total, worst case			316	297	331		
Sun reduction			0.47	0.49	0.55		
Oper. time red.			1.00	1.00	1.00		
Wind dir. red.			0.56	0.64	0.64		
Total reduction			0.26	0.31	0.35		
Total, real			82	92	115		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 54

Licensed user:

**EDR**

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-166 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (93)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December		
1   05:25	05:51	06:42 (49)	06:27	07:01	06:40	07:19		
20:52	20:31	18 07:00 (49)	19:42	18:47	16:56	16:28		
2   05:25	05:53	06:41 (49)	06:28	07:03	06:42	07:20		
20:52	20:30	20 07:01 (49)	19:40	18:45	16:54	16:27		
3   05:26	05:54	06:40 (49)	06:29	07:04	06:43	07:21		
20:52	20:28	22 07:02 (49)	19:38	18:43	16:53	16:27		
4   05:26	05:55	06:38 (49)	06:30	07:05	06:44	07:22		
20:51	20:27	25 07:03 (49)	19:37	18:41	16:51	16:27		
5   05:27	05:56	06:37 (49)	06:31	07:06	06:46	07:23		
20:51	20:26	27 07:04 (49)	19:35	18:40	16:50	16:27		
6   05:28	05:57	06:37 (49)	06:32	07:07	06:47	07:24		
20:51	20:25	27 07:04 (49)	19:33	18:38	16:49	16:26		
7   05:28	05:58	06:36 (49)	06:34	07:09	06:48	07:25		
20:51	20:23	29 07:05 (49)	19:31	18:36	16:48	16:26		
8   05:29	05:59	06:35 (49)	06:35	07:10	06:50	07:26		
20:50	20:22	30 07:05 (49)	19:29	18:34	16:46	16:26		
9   05:30	06:00	06:35 (49)	06:36	07:11	06:51	07:27		
20:50	20:21	30 07:05 (49)	19:28	18:32	16:45	16:26		
10   05:30	06:02	06:34 (49)	06:37	07:12	06:52	07:28		
20:49	20:19	31 07:05 (49)	19:26	18:31	16:44	16:26		
11   05:31	06:03	06:34 (49)	06:38	07:13	06:54	07:29		
20:49	20:18	31 07:05 (49)	19:24	18:29	16:43	16:26		
12   05:32	06:04	06:34 (49)	06:39	07:25 (50)	07:15	06:55	07:30	09:20 (38)
20:48	20:16	32 07:06 (49)	19:22	8 07:33 (50)	18:27	16:42	16:26	6 09:26 (38)
13   05:33	06:05	06:34 (49)	06:40	07:22 (50)	07:16	06:56	07:31	09:19 (38)
20:48	20:15	32 07:06 (49)	19:20	14 07:36 (50)	18:25	16:41	16:26	9 09:28 (38)
14   05:34	06:06	06:34 (49)	06:42	07:20 (50)	07:17	06:58	07:32	09:18 (38)
20:47	20:13	31 07:05 (49)	19:18	17 07:37 (50)	18:24	16:40	16:26	12 09:30 (38)
15   05:35	06:07	06:34 (49)	06:43	07:18 (50)	07:18	06:59	07:32	09:18 (38)
20:47	20:12	31 07:05 (49)	19:16	20 07:38 (50)	18:22	16:39	16:27	14 09:32 (38)
16   05:35	06:08	06:34 (49)	06:44	07:16 (50)	07:20	07:00	07:33	09:17 (38)
20:46	20:10	30 07:04 (49)	19:15	23 07:39 (50)	18:20	16:38	16:27	15 09:32 (38)
17   05:36	06:10	06:34 (49)	06:45	07:15 (50)	07:21	07:02	07:34	09:18 (38)
20:45	20:09	29 07:03 (49)	19:13	24 07:39 (50)	18:19	16:37	16:27	15 09:33 (38)
18   05:37	06:11	06:35 (49)	06:46	07:14 (50)	07:22	07:03	07:34	09:18 (38)
20:44	20:07	28 07:03 (49)	19:11	25 07:39 (50)	18:17	16:36	16:27	17 09:35 (38)
19   05:38	06:12	06:35 (49)	06:47	07:13 (50)	07:23	07:04	07:35	09:18 (38)
20:44	20:06	26 07:01 (49)	19:09	25 07:38 (50)	18:15	16:35	16:28	17 09:35 (38)
20   05:39	06:13	06:36 (49)	06:49	07:14 (50)	07:25	07:05	07:36	09:18 (38)
20:43	20:04	24 07:00 (49)	19:07	25 07:39 (50)	18:14	16:34	16:28	18 09:36 (38)
21   05:40	06:14	06:37 (49)	06:50	07:13 (50)	07:26	07:07	07:36	09:18 (38)
20:42	20:02	22 06:59 (49)	19:05	25 07:38 (50)	18:12	16:33	16:29	18 09:36 (38)
22   05:41	06:15	06:38 (49)	06:51	07:13 (50)	07:27	07:08	07:37	09:19 (38)
20:41	20:01	19 06:57 (49)	19:03	25 07:38 (50)	18:10	16:33	16:29	18 09:37 (38)
23   05:42	06:16	06:41 (49)	06:52	07:13 (50)	07:29	07:09	07:37	09:19 (38)
20:40	19:57	14 06:55 (49)	19:02	24 07:37 (50)	18:09	16:32	16:30	18 09:37 (38)
24   05:43	06:18	06:45 (49)	06:53	07:14 (50)	07:30	07:11	07:38	09:20 (38)
20:39	19:56	5 06:50 (49)	19:00	21 07:35 (50)	18:07	16:31	16:30	18 09:38 (38)
25   05:44	06:19		06:54	07:15 (50)	07:31	07:12	07:38	09:21 (38)
20:38	19:54		18:58	19 07:34 (50)	18:06	16:31	16:31	17 09:38 (38)
26   05:45	06:20		06:55	07:16 (50)	07:32	07:13	07:38	09:21 (38)
20:37	19:52		18:56	15 07:31 (50)	18:04	16:30	16:31	17 09:38 (38)
27   05:46	06:21		06:57	07:18 (50)	07:34	07:14	07:39	09:22 (38)
20:36	19:51		18:54	12 07:30 (50)	18:03	16:30	16:32	15 09:37 (38)
28   05:47	06:22		06:58		07:35	07:15	07:39	09:24 (38)
20:35	19:49		18:52		18:01	16:29	16:33	14 09:38 (38)
29   05:48	06:23		06:59		07:36	07:17	07:39	09:25 (38)
20:34	19:47		18:50		18:00	16:29	16:34	12 09:37 (38)
30   05:49	06:47 (49)	06:24	07:00		07:38	07:18	07:40	09:26 (38)
20:33	8 06:55 (49)	19:45	18:49		17:58	16:28	16:34	11 09:37 (38)
31   05:50	06:44 (49)	06:26			07:39		07:40	09:28 (38)
20:32	14 06:58 (49)	19:44			17:57		16:35	7 09:35 (38)
Potential sun hours	469	434	376	342	290	277		288
Total, worst case	22	613	322					288
Sun reduction	0.63	0.59	0.54					0.25
Oper. time red.	1.00	1.00	1.00					1.00
Wind dir. red.	0.64	0.64	0.56					0.54
Total reduction	0.40	0.37	0.30					0.13
Total, real	9	228	96					39

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 55

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2 Shadow receptor: R-167 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (94)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	
1	07:40 16:36	07:23 17:14	07:56 (39) 08:28 (39)	06:43 17:52	07:33 (38) 08:22 (38)	06:47 19:31	05:57 20:06
2	07:40 16:37	07:22 17:15	07:56 (39) 08:28 (39)	06:41 17:53	07:33 (38) 08:23 (38)	06:45 19:32	05:56 20:07
3	07:40 16:38	07:21 17:17	07:56 (39) 08:27 (39)	06:40 17:55	07:33 (38) 08:22 (38)	06:44 19:33	05:54 20:08
4	07:40 16:39	07:20 17:18	07:56 (39) 08:27 (39)	06:38 17:56	07:33 (38) 08:21 (38)	06:42 19:35	05:53 20:10
5	07:40 16:40	07:19 17:19	07:57 (39) 08:28 (39)	06:36 17:57	07:33 (38) 08:20 (38)	06:40 19:36	05:51 20:11
6	07:40 16:41	07:17 17:21	07:58 (39) 08:28 (39)	06:34 17:58	07:34 (38) 08:19 (38)	06:38 19:37	05:50 20:12
7	07:40 16:42	07:16 17:22	07:58 (39) 08:26 (39)	06:33 18:00	07:35 (38) 08:18 (38)	06:36 19:38	05:49 20:13
8	07:39 16:43	07:15 17:23	07:59 (39) 08:26 (39)	07:31 19:01	08:35 (38) 18:38 (29)	06:35 19:39	05:47 20:14
9	07:39 16:44	07:13 17:25	08:00 (39) 08:26 (39)	07:29 19:02	08:36 (38) 18:40 (29)	06:33 19:41	05:46 20:16
10	07:39 16:45	07:12 17:26	07:53 (38) 08:24 (39)	07:27 19:04	08:37 (38) 18:41 (29)	06:31 19:42	05:45 20:17
11	07:39 16:46	07:11 17:28	07:49 (38) 08:23 (39)	07:26 19:05	08:39 (38) 18:43 (29)	06:29 19:43	05:44 20:18
12	07:38 16:48	07:09 17:29	07:46 (38) 08:20 (39)	07:24 19:06	08:40 (38) 18:44 (29)	06:28 19:44	05:42 20:19
13	07:38 16:49	07:08 17:30	07:45 (38) 08:18 (39)	07:22 19:07	08:42 (38) 18:45 (29)	06:26 19:45	05:41 20:20
14	07:37 16:50	07:07 17:32	07:42 (38) 08:16 (38)	07:20 19:09	08:45 (38) 18:46 (29)	06:24 19:47	05:40 20:21
15	07:37 16:51	07:05 17:33	07:41 (38) 08:18 (38)	07:18 19:10	08:51 (38) 18:46 (29)	06:23 19:48	05:39 20:22
16	07:36 16:52	07:04 17:35	07:40 (38) 08:18 (38)	07:16 19:11	18:21 (29) 18:45 (29)	06:21 19:49	05:38 20:24
17	07:36 16:54	07:02 17:36	07:39 (38) 08:20 (38)	07:15 19:12	18:21 (29) 18:45 (29)	06:19 19:50	05:37 20:25
18	07:35 16:55	07:01 08:05 (39)	07:37 (38) 08:12 (39)	07:13 19:14	18:21 (29) 18:45 (29)	06:17 19:52	05:36 20:26
19	07:35 16:56	08:02 (39) 08:15 (39)	06:59 19:39	07:37 (38) 08:22 (38)	07:11 19:15	06:16 19:53	05:35 20:27
20	07:34 16:58	08:01 (39) 08:17 (39)	06:58 19:40	07:36 (38) 08:22 (38)	07:09 19:16	06:14 19:54	05:34 20:28
21	07:33 16:59	08:00 (39) 08:19 (39)	06:56 19:41	07:36 (38) 08:23 (38)	07:07 19:17	06:12 19:55	05:33 20:29
22	07:33 17:00	07:59 (39) 08:20 (39)	06:54 19:43	07:35 (38) 08:23 (38)	07:06 19:19	06:11 19:56	05:32 20:30
23	07:32 17:01	07:58 (39) 08:21 (39)	06:53 19:44	07:34 (38) 08:23 (38)	07:04 19:20	06:09 19:58	05:31 20:31
24	07:31 17:03	07:57 (39) 08:22 (39)	06:51 19:45	07:34 (38) 08:24 (38)	07:02 19:21	06:08 19:59	05:30 20:32
25	07:30 17:04	07:57 (39) 08:23 (39)	06:50 19:47	07:33 (38) 08:23 (38)	07:00 19:22	06:06 20:00	05:29 20:33
26	07:29 17:05	07:56 (39) 08:24 (39)	06:48 19:48	07:33 (38) 08:23 (38)	06:58 19:24	06:05 20:00	05:29 20:34
27	07:28 17:07	07:56 (39) 08:25 (39)	06:46 19:49	07:33 (38) 08:24 (38)	06:56 19:25	06:03 20:01	05:28 20:35
28	07:27 17:08	07:56 (39) 08:26 (39)	06:45 19:51	07:33 (38) 08:23 (38)	06:55 19:26	06:01 20:02	05:27 20:36
29	07:26 17:10	07:56 (39) 08:26 (39)	06:45 19:51	07:33 (38) 08:26 (39)	06:55 19:27	06:00 20:04	05:26 20:37
30	07:25 17:11	07:56 (39) 08:27 (39)	06:45 19:52	07:33 (38) 08:27 (39)	06:55 19:28	05:59 20:05	05:26 20:38
31	07:24 17:12	07:56 (39) 08:27 (39)	06:45 19:53	07:33 (38) 08:27 (39)	06:55 19:30	05:58 20:39	05:26 20:40
Potential sun hours	288	293	309	369	403	457	463
Total, worst case	329	329	1079	848	112	757	
Sun reduction	0.33	0.39	0.47	0.55	0.59	0.63	0.59
Oper. time red.	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Wind dir. red.	0.49	0.50	0.54	0.71	0.71	0.71	0.71
Total reduction	0.16	0.19	0.25	0.38	0.38	0.40	0.40
Total, real	51	204	210	42	306		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 56

Licensed user:

**EDR**

217 Montgomery St.  
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Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-167 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (94)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December							
1	05:25	05:50 (49)	05:52	06:27	07:01	08:20 (38)	06:40	07:24 (38)	07:19				
	26	06:16 (49)	20:31	19:42	18:47	48	18:23 (29)	16:56	30	07:54 (39)	16:28		
2	05:25	05:50 (49)	05:53	06:28	07:03	08:17 (38)	06:42	07:29 (39)	07:20				
	26	06:16 (49)	20:30	19:40	18:45	51	18:21 (29)	16:54	26	07:55 (39)	16:27		
3	05:26	05:51 (49)	05:54	06:29	07:04	08:16 (38)	06:43	07:29 (39)	07:21				
	25	06:16 (49)	20:28	19:38	18:43	51	18:20 (29)	16:53	27	07:56 (39)	16:27		
4	05:26	05:51 (49)	05:55	06:30	07:05	08:14 (38)	06:44	07:27 (39)	07:22				
	25	06:16 (49)	20:27	19:37	18:41	51	18:18 (29)	16:51	29	07:56 (39)	16:27		
5	05:27	05:51 (49)	05:56	06:31	07:06	08:13 (38)	06:46	07:28 (39)	07:23				
	25	06:16 (49)	20:26	19:35	18:40	49	18:16 (29)	16:50	29	07:57 (39)	16:27		
6	05:28	05:52 (49)	05:57	06:32	07:07	08:11 (38)	06:47	07:27 (39)	07:24				
	25	06:17 (49)	20:25	19:33	18:38	42	08:53 (38)	16:49	30	07:57 (39)	16:26		
7	05:28	05:52 (49)	05:58	06:34	07:09	08:11 (38)	06:48	07:27 (39)	07:25				
	24	06:16 (49)	20:23	19:31	18:36	44	08:55 (38)	16:48	31	07:58 (39)	16:26		
8	05:29	05:53 (49)	05:59	06:35	07:10	08:09 (38)	06:50	07:27 (39)	07:26				
	23	06:16 (49)	20:22	19:29	18:34	46	08:55 (38)	16:46	31	07:58 (39)	16:26		
9	05:30	05:54 (49)	06:00	06:36	07:11	08:08 (38)	06:51	07:26 (39)	07:27				
	23	06:17 (49)	20:21	19:28	18:32	47	08:55 (38)	16:45	32	07:58 (39)	16:26		
10	05:30	05:55 (49)	06:02	06:37	07:12	08:07 (38)	06:52	07:27 (39)	07:28				
	22	06:17 (49)	20:19	19:26	18:31	48	08:55 (38)	16:44	32	07:59 (39)	16:26		
11	05:31	05:55 (49)	06:03	06:38	07:13	08:07 (38)	06:54	07:27 (39)	07:29				
	21	06:16 (49)	20:18	19:24	18:29	49	08:56 (38)	16:43	31	07:58 (39)	16:26		
12	05:32	05:56 (49)	06:04	06:39	07:15	08:07 (38)	06:55	07:28 (39)	07:30				
	20	06:16 (49)	20:16	19:22	18:27	49	08:56 (38)	16:42	31	07:59 (39)	16:26		
13	05:33	05:57 (49)	06:05	06:40	07:16	08:06 (38)	06:56	07:28 (39)	07:31				
	19	06:16 (49)	20:15	19:20	18:25	50	08:56 (38)	16:41	30	07:58 (39)	16:26		
14	05:34	05:58 (49)	06:06	06:42	07:17	08:05 (38)	06:58	07:28 (39)	07:32				
	17	06:15 (49)	20:13	19:18	18:24	50	08:55 (38)	16:40	30	07:58 (39)	16:26		
15	05:35	05:58 (49)	06:07	06:43	07:18	08:06 (38)	06:59	07:29 (39)	07:32				
	16	06:14 (49)	20:12	19:16	18:22	50	08:56 (38)	16:39	29	07:58 (39)	16:27		
16	05:35	05:59 (49)	06:08	06:44	07:20	08:05 (38)	07:00	07:29 (39)	07:33				
	15	06:14 (49)	20:10	19:15	18:20	51	08:56 (38)	16:38	28	07:57 (39)	16:27		
17	05:36	06:00 (49)	06:10	06:45	07:21	08:05 (38)	07:02	07:31 (39)	07:34				
	13	06:13 (49)	20:09	19:13	18:19	50	08:55 (38)	16:37	26	07:57 (39)	16:27		
18	05:37	06:01 (49)	06:11	06:46	07:22	08:06 (38)	07:03	07:31 (39)	07:34				
	11	06:12 (49)	20:07	19:11	18:17	49	08:55 (38)	16:36	25	07:56 (39)	16:27		
19	05:38	06:02 (49)	06:12	06:47	07:23	08:06 (38)	07:04	07:32 (39)	07:35				
	8	06:10 (49)	20:06	19:09	18:15	48	08:54 (38)	16:35	23	07:55 (39)	16:28		
20	05:39	06:05 (49)	06:13	06:49	07:25	08:05 (38)	07:05	07:34 (39)	07:36				
	2	06:07 (49)	20:04	19:07	4	18:20 (29)	18:14	48	08:53 (38)	16:34	21	07:55 (39)	16:28
21	05:40	06:14	06:50	07:26	07:27	08:07 (38)	07:07	07:35 (39)	07:36				
	20	06:14	20:02	19:05	13	18:24 (29)	18:12	46	08:53 (38)	16:34	19	07:54 (39)	16:29
22	05:41	06:15	06:51	07:27	07:27	08:07 (38)	07:08	07:37 (39)	07:37				
	20	06:15	20:01	19:03	16	18:25 (29)	18:10	45	08:52 (38)	16:33	16	07:53 (39)	16:29
23	05:42	06:16	06:52	07:29	07:29	08:07 (38)	07:09	07:39 (39)	07:37				
	20	06:16	19:57	19:02	19	18:26 (29)	18:09	44	08:51 (38)	16:32	13	07:52 (39)	16:30
24	05:43	06:18	06:53	07:30	07:30	08:08 (38)	07:11	07:41 (39)	07:38				
	20	06:17	19:56	19:00	22	18:27 (29)	18:07	43	08:51 (38)	16:31	8	07:49 (39)	16:30
25	05:44	06:19	06:54	07:31	07:31	08:09 (38)	07:12	07:42 (39)	07:38				
	20	06:18	19:54	18:58	23	18:27 (29)	18:06	40	08:49 (38)	16:31	07:38		
26	05:45	06:20	06:55	07:32	07:32	08:11 (38)	07:13	07:43 (39)	07:38				
	20	06:18	19:52	18:56	24	18:27 (29)	18:04	38	08:49 (38)	16:30	16:31		
27	05:46	06:21	06:57	07:34	07:34	08:11 (38)	07:14	07:44 (39)	07:39				
	20	06:19	19:51	18:54	25	18:28 (29)	18:03	36	08:47 (38)	16:30	16:32		
28	05:47	06:22	06:58	07:35	07:35	08:12 (38)	07:15	07:45 (39)	07:39				
	20	06:19	19:49	18:52	24	18:27 (29)	18:01	33	08:45 (38)	16:29	16:33		
29	05:48	06:23	06:59	07:36	07:36	08:15 (38)	07:17	07:46 (39)	07:39				
	20	06:19	19:47	18:50	38	18:26 (29)	18:00	34	08:49 (39)	16:29	16:34		
30	05:49	06:24	07:00	07:38	07:38	08:16 (38)	07:18	07:47 (39)	07:40				
	20	06:19	19:45	18:49	45	18:25 (29)	17:58	35	08:51 (39)	16:28	16:34		
31	05:50	06:26	07:02	07:39	07:39	08:20 (38)	07:20	07:48 (39)	07:40				
	20	06:20	19:44	18:47	33	08:53 (39)	07:21	07:49 (39)	07:40				
Potential sun hours	469	434	376	342	290	277							
Total, worst case	386	253	1398	627									
Sun reduction	0.63	0.54	0.44	0.27									
Oper. time red.	1.00	1.00	1.00	1.00									
Wind dir. red.	0.71	0.60	0.51	0.49									
Total reduction	0.43	0.31	0.22	0.13									
Total, real	167	79	305	80									

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 57

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(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2 Shadow receptor: R-168 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (95)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	07:23 (50) 20:06	05:57 25 06:21 (49) 20:40
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	07:23 (50) 20:07	05:56 27 06:46 (49) 20:40
3	07:40 16:38	07:21 17:16	06:40 17:55	06:44 19:33	07:25 (50) 20:08	05:54 29 06:47 (49) 20:41
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:35	07:27 (50) 20:10	05:53 30 06:48 (49) 20:42
5	07:40 16:40	07:19 17:19	06:36 17:57	06:40 19:36	06:40 20:11	05:51 32 06:48 (49) 20:43
6	07:40 16:41	07:17 17:21	06:34 17:58	06:38 19:37	06:38 20:12	05:50 33 06:49 (49) 20:44
7	07:40 16:42	07:16 17:22	06:33 18:00	06:36 19:38	06:36 20:13	05:49 33 06:49 (49) 20:44
8	07:39 16:43	07:15 17:23	06:31 19:01	06:35 19:39	06:35 20:14	05:47 34 06:50 (49) 20:45
9	07:39 16:44	07:13 17:25	06:29 19:02	06:33 19:41	06:33 20:16	05:46 34 06:49 (49) 20:46
10	07:39 16:45	07:12 17:26	06:27 19:04	06:31 19:42	06:31 20:17	05:45 34 06:49 (49) 20:46
11	07:39 16:46	07:11 17:28	06:25 19:05	06:29 19:43	06:29 20:18	05:44 34 06:49 (49) 20:47
12	07:38 16:48	07:09 17:29	06:24 19:06	06:28 19:44	06:28 20:19	05:42 34 06:49 (49) 20:47
13	07:38 16:49	07:08 17:30	06:22 19:07	06:26 19:45	06:26 20:20	05:41 34 06:49 (49) 20:48
14	07:37 16:50	07:07 17:32	06:20 19:09	06:24 19:47	06:24 20:21	05:40 34 06:49 (49) 20:48
15	07:37 16:51	07:05 17:33	06:18 19:10	06:23 19:48	06:23 20:22	05:39 34 06:49 (49) 20:49
16	07:36 16:52	07:04 17:35	06:16 19:11	06:21 19:49	06:21 20:24	05:38 33 06:49 (49) 20:49
17	07:36 16:54	07:02 17:36	06:15 19:12	06:19 19:50	06:19 20:25	05:37 33 06:49 (49) 20:50
18	07:35 16:55	07:01 17:37	06:13 19:14	06:17 19:52	06:17 20:26	05:36 32 06:48 (49) 20:50
19	07:35 16:56	06:59 17:39	07:11 19:15	07:34 (50) 19:53	06:16 20:27	05:35 31 06:48 (49) 20:51
20	07:34 16:58	06:58 17:40	07:09 19:16	07:30 (50) 19:54	06:14 20:28	05:34 30 06:47 (49) 20:51
21	07:33 16:59	06:56 17:41	07:07 19:17	07:28 (50) 19:55	06:12 20:29	05:33 28 06:46 (49) 20:51
22	07:33 17:00	06:54 17:43	07:06 19:19	07:26 (50) 19:56	06:11 20:30	05:32 28 06:46 (49) 20:51
23	07:32 17:01	06:53 17:44	07:04 19:20	07:26 (50) 19:58	06:09 20:31	05:31 26 06:45 (49) 20:52
24	07:31 17:03	06:51 17:45	07:02 19:21	07:24 (50) 19:59	06:08 20:32	05:30 25 06:45 (49) 20:52
25	07:30 17:04	06:50 17:47	07:00 19:22	07:23 (50) 20:00	06:06 20:33	05:29 23 06:44 (49) 20:52
26	07:29 17:05	06:48 17:48	06:58 19:24	07:23 (50) 20:00	06:05 20:34	05:29 21 06:43 (49) 20:52
27	07:28 17:07	06:46 17:49	06:56 19:25	07:22 (50) 20:01	06:03 20:35	05:28 20 06:43 (49) 20:52
28	07:27 17:08	06:45 17:51	06:55 19:26	07:21 (50) 20:02	06:01 20:36	05:27 17 06:41 (49) 20:52
29	07:26 17:10	06:53 19:27	07:22 (50) 20:04	06:00 20:04	06:24 (49) 20:37	05:26 15 06:40 (49) 20:52
30	07:25 17:11	06:51 19:28	07:22 (50) 20:05	05:58 20:05	06:22 (49) 20:38	05:26 12 06:39 (49) 20:52
31	07:24 17:12	06:49 19:30	07:22 (50) 20:05	05:57 20:06	06:22 (49) 20:39	05:26 7 06:36 (49) 20:52
Potential sun hours	288	293	369	403	457	463
Total, worst case			303	135	862	
Sun reduction			0.47	0.49	0.55	
Oper. time red.			1.00	1.00	1.00	
Wind dir. red.			0.56	0.61	0.66	
Total reduction			0.26	0.30	0.36	
Total, real			80	40	311	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 58

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-168 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (95)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December			
1	05:25	05:51	06:25 (49)	06:27	07:01	06:40	07:19		
	20:52	20:31	35 07:00 (49)	19:42	18:47	16:56	16:28		
2	05:25	05:53	06:25 (49)	06:28	07:03	06:42	07:20		
	20:52	20:30	35 07:00 (49)	19:40	18:45	16:54	16:27		
3	05:26	05:54	06:25 (49)	06:29	07:04	06:43	07:21		
	20:52	20:28	35 07:00 (49)	19:38	18:43	16:53	16:27		
4	05:26	05:55	06:25 (49)	06:30	07:05	06:44	07:22		
	20:51	20:27	35 07:00 (49)	19:37	18:41	16:51	16:27		
5	05:27	05:56	06:25 (49)	06:31	07:06	06:46	07:23		
	20:51	20:26	34 06:59 (49)	19:35	18:40	16:50	16:27		
6	05:28	05:57	06:26 (49)	06:32	07:07	06:47	07:24		
	20:51	20:25	33 06:59 (49)	19:33	18:38	16:49	16:26		
7	05:28	05:58	06:26 (49)	06:34	07:09	06:48	07:25		
	20:51	20:23	32 06:58 (49)	19:31	18:36	16:48	16:26		
8	05:29	05:59	06:26 (49)	06:35	07:10	06:50	07:26		
	20:50	20:22	32 06:58 (49)	19:29	11 07:33 (50)	18:34	16:46	16:26	
9	05:30	06:00	06:27 (49)	06:36	07:11	06:51	07:27		
	20:50	20:21	30 06:57 (49)	19:28	16 07:35 (50)	18:32	16:45	16:26	
10	05:30	06:02	06:27 (49)	06:37	07:12	06:52	07:28		
	20:49	20:19	29 06:56 (49)	19:26	20 07:37 (50)	18:31	16:44	16:26	
11	05:31	06:03	06:28 (49)	06:38	07:13	06:54	07:29		
	20:49	20:18	27 06:55 (49)	19:24	22 07:37 (50)	18:29	16:43	16:26	
12	05:32	06:39 (49)	06:04	06:39	07:15 (50)	07:15	06:55	07:30	
	20:48	4 06:43 (49)	20:16	24 06:54 (49)	19:22	24 07:39 (50)	18:27	16:42	16:26
13	05:33	06:37 (49)	06:05	06:31 (49)	06:40	07:13 (50)	07:16	06:56	07:31
	20:48	9 06:46 (49)	20:15	22 06:53 (49)	19:20	26 07:39 (50)	18:25	16:41	16:26
14	05:34	06:35 (49)	06:06	06:32 (49)	06:42	07:13 (50)	07:17	06:58	07:32
	20:47	13 06:48 (49)	20:13	19 06:51 (49)	19:18	26 07:39 (50)	18:24	16:40	16:26
15	05:35	06:33 (49)	06:07	06:34 (49)	06:43	07:12 (50)	07:18	06:59	07:32
	20:47	16 06:49 (49)	20:12	14 06:48 (49)	19:16	27 07:39 (50)	18:22	16:39	16:27
16	05:35	06:32 (49)	06:08	06:39 (49)	06:44	07:11 (50)	07:20	07:00	07:33
	20:46	18 06:50 (49)	20:10	4 06:43 (49)	19:15	28 07:39 (50)	18:20	16:38	16:27
17	05:36	06:31 (49)	06:10	06:45	07:11 (50)	07:21	07:02	07:34	
	20:45	21 06:52 (49)	20:09	19:13	27 07:38 (50)	18:19	16:37	16:27	
18	05:37	06:31 (49)	06:11	06:46	07:11 (50)	07:22	07:03	07:34	
	20:44	22 06:53 (49)	20:07	19:11	26 07:37 (50)	18:17	16:36	16:27	
19	05:38	06:30 (49)	06:12	06:47	07:11 (50)	07:23	07:04	07:35	
	20:44	24 06:54 (49)	20:06	19:09	25 07:36 (50)	18:15	16:35	16:28	
20	05:39	06:30 (49)	06:13	06:49	07:12 (50)	07:25	07:05	07:36	
	20:43	25 06:55 (49)	20:04	19:07	24 07:36 (50)	18:14	16:34	16:28	
21	05:40	06:29 (49)	06:14	06:50	07:12 (50)	07:26	07:07	07:36	
	20:42	27 06:56 (49)	20:02	19:05	23 07:35 (50)	18:12	16:33	16:29	
22	05:41	06:28 (49)	06:15	06:51	07:13 (50)	07:27	07:08	07:37	
	20:41	29 06:57 (49)	20:01	19:03	20 07:33 (50)	18:10	16:33	16:29	
23	05:42	06:28 (49)	06:16	06:52	07:14 (50)	07:29	07:09	07:37	
	20:40	29 06:57 (49)	19:57	19:02	17 07:31 (50)	18:09	16:32	16:30	
24	05:43	06:28 (49)	06:18	06:53	07:16 (50)	07:30	07:11	07:38	
	20:39	30 06:58 (49)	19:56	19:00	12 07:28 (50)	18:07	16:31	16:30	
25	05:44	06:27 (49)	06:19	06:54	07:31	07:12	07:38		
	20:38	31 06:58 (49)	19:54	18:58	18:06	16:31	16:31		
26	05:45	06:27 (49)	06:20	06:55	07:32	07:13	07:38		
	20:37	32 06:59 (49)	19:52	18:56	18:04	16:30	16:31		
27	05:46	06:26 (49)	06:21	06:57	07:34	07:14	07:39		
	20:36	33 06:59 (49)	19:51	18:54	18:03	16:30	16:32		
28	05:47	06:26 (49)	06:22	06:58	07:35	07:15	07:39		
	20:35	34 07:00 (49)	19:49	18:52	18:01	16:29	16:33		
29	05:48	06:26 (49)	06:23	06:59	07:36	07:17	07:39		
	20:34	34 07:00 (49)	19:47	18:50	18:00	16:29	16:34		
30	05:49	06:26 (49)	06:24	07:00	07:38	07:18	07:40		
	20:33	34 07:00 (49)	19:45	18:49	17:58	16:28	16:34		
31	05:50	06:26 (49)	06:26	07:00	07:39	07:19	07:40		
	20:32	34 07:00 (49)	19:44		17:57		16:35		
Potential sun hours	469	434	376	342	290	277			
Total, worst case	499	440	374						
Sun reduction	0.63	0.59	0.54						
Oper. time red.	1.00	1.00	1.00						
Wind dir. red.	0.66	0.66	0.56						
Total reduction	0.41	0.39	0.30						
Total, real	206	170	113						

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 59

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

### SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-169 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (384)

#### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	07:36 (49) 08:30 (49)	05:57 20:06
2	07:40 16:37	07:22 17:15	07:54 (50) 08:04 (50)	06:41 19:32	07:35 (49) 08:30 (49)	05:56 20:07
3	07:40 16:38	07:21 17:16	07:50 (50) 08:06 (50)	06:40 19:33	07:35 (49) 08:29 (49)	05:54 20:08
4	07:40 16:39	07:20 17:18	07:48 (50) 08:09 (50)	06:38 19:34	07:36 (49) 08:29 (49)	05:53 20:10
5	07:40 16:40	07:19 17:19	07:47 (50) 08:11 (50)	06:36 19:36	07:35 (49) 08:28 (49)	05:51 20:11
6	07:40 16:41	07:17 17:21	07:46 (50) 08:12 (50)	06:34 19:37	07:35 (49) 08:27 (49)	05:50 20:12
7	07:40 16:42	07:16 17:22	07:44 (50) 08:13 (50)	06:33 19:38	07:35 (49) 08:26 (49)	05:49 20:13
8	07:39 16:43	07:15 17:23	07:44 (50) 08:14 (50)	07:31 19:39	07:36 (49) 08:25 (49)	05:47 20:14
9	07:39 16:44	07:13 17:25	07:43 (50) 08:15 (50)	07:29 19:41	07:37 (49) 08:24 (49)	05:46 20:16
10	07:39 16:45	07:12 17:26	07:42 (50) 08:15 (50)	07:27 19:42	07:37 (49) 08:22 (49)	05:45 20:17
11	07:39 16:46	07:11 17:28	07:42 (50) 08:16 (50)	07:25 19:43	07:37 (49) 08:21 (49)	05:44 20:18
12	07:38 16:48	07:09 17:29	07:41 (50) 08:16 (50)	07:24 19:44	07:39 (49) 08:20 (49)	05:42 20:19
13	07:38 16:49	07:08 17:30	07:41 (50) 08:17 (50)	07:22 19:45	07:40 (49) 08:18 (49)	05:41 20:20
14	07:37 16:50	07:07 17:32	07:41 (50) 08:16 (50)	07:20 19:47	08:03 (49) 08:16 (49)	05:40 20:21
15	07:37 16:51	07:05 17:33	07:41 (50) 08:17 (50)	07:18 19:48	07:58 (49) 08:14 (49)	05:39 20:22
16	07:36 16:52	07:04 17:35	07:41 (50) 08:16 (50)	07:16 19:49	07:54 (49) 08:11 (49)	05:38 20:24
17	07:36 16:53	07:02 17:36	07:41 (50) 08:17 (50)	07:15 19:50	07:52 (49) 08:08 (49)	05:37 20:25
18	07:35 16:55	07:01 17:37	07:41 (50) 08:16 (50)	07:13 19:52	07:50 (49) 08:04 (49)	05:36 20:26
19	07:35 16:56	06:59 17:39	07:42 (50) 08:16 (50)	07:11 19:53	07:48 (49) 08:27 (49)	05:35 20:27
20	07:34 16:57	06:58 17:40	07:42 (50) 08:15 (50)	07:09 19:54	07:46 (49) 08:28 (49)	05:34 20:28
21	07:33 16:59	06:56 17:41	07:43 (50) 08:15 (50)	07:07 19:55	07:44 (49) 08:29 (49)	05:33 20:29
22	07:33 17:00	06:54 17:43	07:44 (50) 08:13 (50)	07:06 19:56	07:43 (49) 08:30 (49)	05:32 20:30
23	07:32 17:01	06:53 17:44	07:45 (50) 08:11 (50)	07:04 19:58	07:42 (49) 08:31 (49)	05:31 20:31
24	07:31 17:03	06:51 17:45	07:46 (50) 08:10 (50)	07:02 19:59	07:41 (49) 08:31 (49)	05:30 20:32
25	07:30 17:04	06:50 17:47	07:48 (50) 08:08 (50)	07:00 20:00	07:40 (49) 08:32 (49)	05:29 20:33
26	07:29 17:05	06:48 17:48	07:50 (50) 08:05 (50)	06:58 20:00	07:39 (49) 08:32 (49)	05:29 20:34
27	07:28 17:07	06:46 17:49	07:55 (50) 08:01 (50)	06:56 19:25	07:38 (49) 08:31 (49)	05:28 20:35
28	07:27 17:08	06:45 17:51	06:55 19:26	06:55 19:26	07:37 (49) 08:31 (49)	05:27 20:36
29	07:26 17:10		06:53 19:27	06:53 19:27	07:37 (49) 08:32 (49)	05:26 20:37
30	07:25 17:11		06:51 19:28	06:51 19:28	07:37 (49) 08:32 (49)	05:26 20:38
31	07:24 17:12		06:49 19:30	06:49 19:30	07:36 (49) 08:31 (49)	05:25 20:39
Potential sun hours	288	293	369	403	457	463
Total, worst case		722		779		764
Sun reduction		0.39		0.47		0.49
Oper. time red.		1.00		1.00		1.00
Wind dir. red.		0.50		0.54		0.54
Total reduction		0.19		0.25		0.26
Total, real		140		197		202

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 60

Licensed user:

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217 Montgomery St.  
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(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-169 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (384)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25	05:51	06:27	07:36 (49)	07:01	06:40
	20:52	20:31	19:42	18:20 (49)	18:47	16:55
2	05:25	05:53	06:28	07:36 (49)	07:03	06:42
	20:52	20:30	19:40	18:21 (49)	18:45	16:54
3	05:26	05:54	06:29	07:35 (49)	07:04	06:43
	20:52	20:28	19:38	18:22 (49)	18:43	16:53
4	05:26	05:55	06:30	07:33 (49)	07:05	06:44
	20:51	20:27	19:37	18:22 (49)	18:41	16:51
5	05:27	05:56	06:31	07:32 (49)	07:06	06:46
	20:51	20:26	19:35	18:23 (49)	18:39	16:50
6	05:28	05:57	06:32	07:31 (49)	07:07	06:47
	20:51	20:25	19:33	18:23 (49)	18:38	16:49
7	05:28	05:58	06:34	07:31 (49)	07:09	06:48
	20:51	20:23	19:31	18:23 (49)	18:36	16:48
8	05:29	05:59	06:35	07:30 (49)	07:10	06:50
	20:50	20:22	19:29	18:23 (49)	18:34	16:46
9	05:30	06:00	06:36	07:29 (49)	07:11	06:51
	20:50	20:21	19:27	18:23 (49)	18:32	16:45
10	05:30	06:02	06:37	07:28 (49)	07:12	06:52
	20:49	20:19	19:26	18:23 (49)	18:31	16:44
11	05:31	06:03	06:38	07:28 (49)	07:13	06:54
	20:49	20:18	19:24	18:23 (49)	18:29	16:43
12	05:32	06:04	06:39	07:28 (49)	07:15	06:55
	20:48	20:16	19:22	18:23 (49)	18:27	16:42
13	05:33	06:05	06:40	07:28 (49)	07:16	06:56
	20:48	20:15	19:20	18:23 (49)	18:25	16:41
14	05:34	06:06	06:42	07:27 (49)	07:17	06:58
	20:47	20:13	19:18	18:22 (49)	18:24	16:40
15	05:35	06:07	06:43	07:27 (49)	07:18	06:59
	20:47	20:12	19:16	18:22 (49)	18:22	16:39
16	05:35	06:08	06:44	07:27 (49)	07:20	06:59
	20:46	20:10	19:15	18:21 (49)	18:20	16:38
17	05:36	06:10	06:45	07:27 (49)	07:21	07:02
	20:45	20:09	19:13	18:20 (49)	18:19	16:37
18	05:37	06:11	06:46	07:27 (49)	07:22	07:03
	20:44	20:07	19:11	18:19 (49)	18:17	16:36
19	05:38	06:12	06:47	07:27 (49)	07:23	07:04
	20:44	20:06	19:09	18:18 (49)	18:15	16:35
20	05:39	06:13	06:48	07:27 (49)	07:25	07:05
	20:43	20:04	19:07	18:17 (49)	18:14	16:34
21	05:40	06:14	06:50	07:27 (49)	07:26	07:07
	20:42	20:02	19:05	18:16 (49)	18:12	16:33
22	05:41	06:15	06:51	07:27 (49)	07:27	07:08
	20:41	20:01	19:03	18:15 (49)	18:10	16:32
23	05:42	06:16	06:52	07:30 (49)	07:29	07:09
	20:40	19:57	19:02	18:13 (49)	18:09	16:31
24	05:43	06:18	06:53	07:31 (49)	07:30	07:11
	20:39	19:56	19:00	18:11 (49)	18:07	16:30
25	05:44	06:19	06:54	07:32 (49)	07:31	07:12
	20:38	19:54	18:58	18:08 (49)	18:06	16:29
26	05:45	06:20	06:55	07:33 (49)	07:32	07:13
	20:37	19:52	18:56	18:07 (49)	18:04	16:28
27	05:46	06:21	06:56	07:36 (49)	07:34	07:14
	20:36	19:51	18:54	18:05 (49)	18:03	16:27
28	05:47	06:22	06:58	07:38 (49)	07:35	07:15
	20:35	19:49	18:52	18:02 (49)	18:01	16:26
29	05:48	06:23	06:59	07:41 (49)	07:36	07:17
	20:34	19:47	18:50	17:58 (49)	18:00	16:25
30	05:49	06:24	07:00		07:38	07:18
	20:33	19:45	18:49		17:58	16:24
31	05:50	06:26	07:38 (49)		07:39	07:40
	20:32	19:44	18:19 (49)		17:57	16:23
Potential sun hours	469	434	376	342	290	277
Total, worst case		209	1354	512	217	
Sun reduction		0.59	0.54	0.44	0.27	
Oper. time red.		1.00	1.00	1.00	1.00	
Wind dir. red.		0.54	0.54	0.50	0.50	
Total reduction		0.32	0.29	0.22	0.13	
Total, real		67	394	112	29	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)



Project: **05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

Printed/Page: 3/21/2011 2:14 PM / 61

Licensed user:  
**EDR**  
 217 Montgomery St.  
 US-SYRACUSE, NY 13202  
 (315) 471 0688  
 Steve Curtis, scurtis@edrpc.com  
 Calculated:  
 3/21/2011 11:14 AM/2.7.453

### SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2 Shadow receptor: R-179 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (102)

#### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []  
 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25  
 Operational time  
 N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
 438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
 Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December	
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	05:57 20:06	18:49 (40) 19:13 (40)	05:25 20:39	05:51 20:31	19:35 (39) 20:00 (39)	06:27 18:57 (40)	07:01 19:10 (40)	06:40 18:47	07:19 16:28
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	05:56 20:07	18:50 (40) 19:41 (39)	05:24 20:40	05:53 20:30	19:35 (39) 19:59 (39)	06:28 19:40	07:02 18:45	06:42 16:54	07:20 16:27
3	07:40 16:38	07:21 17:16	06:39 17:55	06:44 19:33	05:54 20:08	18:52 (40) 19:44 (39)	05:24 20:41	05:54 20:28	19:35 (39) 19:59 (39)	06:29 19:38	07:04 18:43	06:43 16:53	07:21 16:27
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:34	05:53 20:10	18:55 (40) 19:46 (39)	05:26 20:42	05:55 20:27	19:35 (39) 19:59 (39)	06:30 19:37	07:05 18:41	06:44 16:51	07:22 16:27
5	07:40 16:40	07:18 17:19	06:36 17:57	06:40 19:36	05:51 20:11	18:56 (40) 19:47 (39)	05:27 20:43	05:56 20:26	19:35 (39) 19:58 (39)	06:31 19:35	07:06 18:39	06:46 16:50	07:23 16:23
6	07:40 16:41	07:17 17:21	06:34 17:58	06:38 19:37	05:50 20:12	18:57 (40) 19:48 (39)	05:28 20:43	05:57 20:25	19:35 (39) 19:57 (39)	06:32 19:33	07:07 18:38	06:47 16:49	07:24 16:24
7	07:40 16:42	07:16 17:22	06:33 18:00	06:36 19:38	05:49 20:13	18:58 (40) 19:49 (39)	05:28 20:44	05:58 20:23	19:36 (39) 19:57 (39)	06:34 19:31	07:08 18:36	06:48 16:48	07:25 16:25
8	07:39 16:43	07:15 17:23	06:31 19:01	06:35 19:39	05:47 20:14	18:59 (40) 19:49 (39)	05:29 20:45	05:59 20:22	19:06 (40) 19:55 (39)	06:35 19:29	07:10 18:34	06:50 16:46	07:26 16:26
9	07:39 16:44	07:13 17:25	06:29 19:02	06:33 19:41	05:46 20:15	18:59 (40) 19:49 (39)	05:30 20:45	06:00 20:20	19:02 (40) 19:54 (39)	06:36 19:27	07:11 18:32	06:51 16:45	07:27 16:26
10	07:39 16:45	07:12 17:26	06:27 19:04	06:31 19:42	05:45 20:17	19:00 (40) 19:49 (39)	05:30 20:46	06:01 20:19	19:00 (40) 19:52 (39)	06:37 19:26	07:12 18:31	06:52 16:44	07:28 16:26
11	07:39 16:46	07:11 17:28	06:25 19:05	06:29 19:43	05:44 20:18	18:58 (40) 19:49 (39)	05:31 20:47	06:03 20:18	18:58 (40) 19:49 (39)	06:38 19:24	07:13 18:29	06:54 16:43	07:29 16:26
12	07:38 16:48	07:09 17:29	06:24 19:06	06:28 19:44	05:42 20:19	18:56 (40) 19:49 (39)	05:32 20:47	06:04 20:16	18:57 (40) 19:21 (40)	06:39 19:22	07:15 18:27	06:55 16:42	07:30 16:26
13	07:38 16:49	07:08 17:30	06:22 19:07	06:26 19:45	05:41 20:20	18:53 (40) 19:49 (39)	05:33 20:48	06:05 20:15	18:56 (40) 19:23 (40)	06:40 19:20	07:16 18:25	06:56 16:41	07:31 16:26
14	07:37 16:50	07:06 17:32	06:20 19:09	06:24 19:47	05:40 20:21	18:51 (40) 19:49 (39)	05:34 20:48	06:06 20:13	18:55 (40) 19:23 (40)	06:42 19:18	07:17 18:24	06:58 16:40	07:32 16:26
15	07:37 16:51	07:05 17:33	06:18 19:10	06:22 19:48	05:39 20:22	18:49 (40) 19:49 (39)	05:35 20:49	06:07 20:12	18:54 (40) 19:24 (40)	06:43 19:16	07:18 18:22	06:59 16:39	07:33 16:26
16	07:36 16:52	07:04 17:34	06:16 19:11	06:21 19:49	05:38 20:23	18:48 (40) 19:49 (39)	05:36 20:49	06:08 20:10	18:53 (40) 19:24 (40)	06:44 19:14	07:20 18:20	07:00 16:38	07:34 16:27
17	07:36 16:54	07:02 17:36	06:15 19:12	06:19 19:50	05:37 20:25	18:48 (40) 19:48 (39)	05:36 20:50	06:09 20:09	18:52 (40) 19:24 (40)	06:45 19:13	07:21 18:19	07:01 16:37	07:34 16:27
18	07:35 16:55	07:01 17:37	06:13 19:14	06:17 19:51	05:36 20:26	18:47 (40) 19:48 (39)	05:37 20:50	06:11 20:07	18:52 (40) 19:24 (40)	06:46 19:11	07:22 18:17	07:03 16:36	07:34 16:27
19	07:35 16:56	06:59 17:39	06:11 19:15	06:16 19:53	05:35 20:27	18:46 (40) 19:47 (39)	05:38 20:50	06:12 20:07	18:51 (40) 19:24 (40)	06:47 19:09	07:23 18:15	07:04 16:35	07:35 16:28
20	07:34 16:57	06:57 17:40	06:09 19:16	06:14 19:54	05:34 20:28	18:46 (40) 19:47 (39)	05:39 20:51	06:13 20:04	18:50 (40) 19:24 (40)	06:48 19:07	07:25 18:14	07:05 16:34	07:36 16:28
21	07:33 16:59	06:56 17:41	06:07 19:17	06:12 19:55	05:33 20:29	18:46 (40) 19:46 (39)	05:40 20:51	06:14 20:02	18:50 (40) 19:24 (40)	06:50 19:05	07:26 18:12	07:07 16:33	07:36 16:29
22	07:32 17:00	06:54 17:43	06:05 19:19	06:11 19:56	05:32 20:30	18:45 (40) 19:45 (39)	05:41 20:51	06:15 20:01	18:49 (40) 19:23 (40)	06:51 19:03	07:27 18:10	07:08 16:33	07:37 16:29
23	07:32 17:01	06:53 17:44	06:04 19:20	06:09 19:58	05:31 20:31	18:45 (40) 19:44 (39)	05:42 20:51	06:16 19:57	18:50 (40) 19:24 (40)	06:52 19:01	07:28 18:09	07:09 16:32	07:38 16:30
24	07:31 17:03	06:51 17:45	06:02 19:21	06:08 19:59	05:30 20:32	18:45 (40) 19:43 (39)	05:43 20:52	06:17 19:57	18:50 (40) 19:24 (40)	06:53 19:00	07:30 18:07	07:10 16:31	07:38 16:30
25	07:30 17:04	06:49 17:47	06:00 19:22	06:06 20:00	05:29 20:33	18:45 (40) 19:41 (39)	05:44 20:52	06:18 19:58	18:50 (40) 19:24 (40)	06:54 18:58	07:31 18:06	07:12 16:31	07:38 16:31
26	07:29 17:05	06:48 17:48	06:58 19:23	06:04 20:00	05:28 20:34	18:46 (40) 19:40 (39)	05:45 20:52	06:20 19:59	18:51 (40) 19:24 (40)	06:55 18:56	07:32 18:04	07:13 16:30	07:38 16:31
27	07:28 17:07	06:46 17:49	06:56 19:25	06:03 20:01	05:28 20:35	18:45 (40) 19:40 (39)	05:46 20:52	06:21 19:59	18:51 (40) 19:24 (40)	06:57 18:54	07:34 18:03	07:14 16:30	07:39 16:32
28	07:27 17:08	06:45 17:51	06:55 19:26	06:01 20:02	05:27 20:36	18:46 (40) 19:40 (39)	05:47 20:52	06:22 19:35	18:51 (40) 19:24 (40)	06:58 18:52	07:35 18:01	07:15 16:29	07:39 16:33
29	07:26 17:10	06:44 17:52	06:54 19:27	06:00 20:04	05:26 20:37	18:48 (40) 19:40 (39)	05:48 20:52	06:23 19:35	18:52 (40) 19:24 (40)	06:59 18:50	07:36 18:00	07:16 16:28	07:39 16:34
30	07:25 17:11	06:43 17:53	06:53 19:28	05:58 20:05	05:26 20:38	18:48 (40) 19:40 (39)	05:49 20:52	06:24 19:35	18:53 (40) 19:24 (40)	07:00 18:49	07:38 17:58	07:18 16:28	07:39 16:34
31	07:24 17:12	06:42 17:54	06:52 19:29	05:57 20:06	05:25 20:39	18:49 (40) 19:40 (39)	05:50 20:52	06:25 19:44	18:54 (40) 19:24 (40)	07:01 18:48	07:39 17:57	07:40 16:35	
Potential sun hours	288	293	369	403	457	463	469	434	376		342	290	277
Total, worst case				572	555		270	867	13				
Sun reduction				0.49	0.55		0.63	0.59	0.54				
Oper. time red.				1.00	1.00		1.00	1.00	1.00				
Wind dir. red.				0.53	0.52		0.51	0.53	0.53				
Total reduction				0.26	0.28		0.32	0.31	0.29				
Total, real				148	157		87	269	4				

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 62

Licensed user:

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(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-18 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (15)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36	07:23 17:14	08:08 (52) 08:21 (52)	06:43 17:52	06:47 19:31	05:57 20:06
2	07:40 16:37	07:22 17:15	08:10 (52) 08:19 (52)	06:41 17:53	06:45 19:32	05:56 20:07
3	07:40 16:38	07:21 17:16	06:40 17:55	06:44 19:33	05:54 20:09	05:24 20:41
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:35	05:53 20:10	05:23 20:42
5	07:40 16:40	07:19 17:19	06:36 17:57	06:40 19:36	05:51 20:11	05:23 20:43
6	07:40 16:41	08:04 (52) 08:10 (52)	07:17 17:21	06:34 17:58	06:38 19:37	05:50 20:12
7	07:40 16:42	08:03 (52) 08:11 (52)	07:16 17:22	06:33 18:00	06:36 19:38	05:49 20:13
8	07:40 16:43	08:03 (52) 08:13 (52)	07:15 17:23	07:31 19:01	06:35 19:39	05:47 20:14
9	07:39 16:44	08:03 (52) 08:15 (52)	07:14 17:25	07:29 19:02	06:33 19:41	05:46 20:16
10	07:39 16:45	08:02 (52) 08:15 (52)	07:12 17:26	07:27 19:04	06:31 19:42	05:45 20:17
11	07:39 16:46	08:02 (52) 08:17 (52)	07:11 17:28	07:26 19:05	06:29 19:43	05:44 20:18
12	07:38 16:48	08:02 (52) 08:18 (52)	07:09 17:29	07:24 19:06	06:28 19:44	05:42 20:19
13	07:38 16:49	08:01 (52) 08:19 (52)	07:08 17:30	07:22 19:07	06:26 19:46	05:41 20:20
14	07:38 16:50	08:01 (52) 08:20 (52)	07:07 17:32	07:20 19:09	06:24 19:47	05:40 20:21
15	07:37 16:51	08:00 (52) 08:21 (52)	07:05 17:33	07:18 19:10	06:22 19:48	05:39 20:23
16	07:37 16:52	07:59 (52) 08:21 (52)	07:04 17:34	07:17 19:11	06:21 19:49	05:38 20:24
17	07:36 16:54	07:59 (52) 08:23 (52)	07:02 17:36	07:15 19:12	06:19 19:50	05:37 20:25
18	07:35 16:55	07:59 (52) 08:23 (52)	07:01 17:37	07:13 19:14	06:17 19:52	05:36 20:26
19	07:35 16:56	07:59 (52) 08:23 (52)	06:59 17:39	07:11 19:15	06:16 19:53	05:35 20:27
20	07:34 16:57	07:59 (52) 08:24 (52)	06:58 17:40	07:09 19:16	06:14 19:54	05:34 20:28
21	07:33 16:59	07:59 (52) 08:25 (52)	06:56 17:41	07:07 19:17	06:12 19:55	05:33 20:29
22	07:33 17:00	07:59 (52) 08:25 (52)	06:54 17:43	07:06 19:19	06:11 19:56	05:32 20:30
23	07:32 17:01	08:00 (52) 08:25 (52)	06:53 17:44	07:04 19:20	06:09 19:58	05:31 20:31
24	07:31 17:03	08:00 (52) 08:25 (52)	06:51 17:45	07:02 19:21	06:08 19:59	05:30 20:32
25	07:30 17:04	08:00 (52) 08:25 (52)	06:50 17:47	07:00 19:22	06:06 20:00	05:29 20:33
26	07:29 17:05	08:01 (52) 08:25 (52)	06:48 17:48	06:58 19:24	06:05 20:00	05:29 20:34
27	07:28 17:07	08:01 (52) 08:25 (52)	06:46 17:49	06:56 19:25	06:03 20:01	05:28 20:35
28	07:27 17:08	08:02 (52) 08:24 (52)	06:45 17:51	06:55 19:26	06:01 20:03	05:27 20:36
29	07:26 17:10	08:03 (52) 08:24 (52)	06:45 17:51	06:53 19:27	06:00 20:04	05:26 20:37
30	07:25 17:11	08:04 (52) 08:23 (52)	06:45 17:51	06:51 19:28	05:58 20:05	05:26 20:38
31	07:24 17:12	08:06 (52) 08:22 (52)	06:45 17:51	06:49 19:30	05:57 20:39	05:25 20:39
Potential sun hours	288	293	369	403	457	463
Total, worst case	510	22			740	906
Sun reduction	0.33	0.39			0.55	0.59
Oper. time red.	1.00	1.00			1.00	1.00
Wind dir. red.	0.49	0.49			0.51	0.51
Total reduction	0.16	0.19			0.28	0.30
Total, real	82	4			206	270

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project: **05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 63  
Licensed user:  
**EDR**  
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US-SYRACUSE, NY 13202  
(315) 471 0688  
Steve Curtis, scurtis@edrpc.com  
Calculated:  
3/21/2011 11:14 AM/2.7.453

### SHADOW - Calendar

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-18 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (15)**

#### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []  
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25  
Operational time  
N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December			
1	05:25 20:52	19:37 (46) 20:08 (46)	05:51 20:31	19:42 (46) 20:05 (46)	06:27 19:42	07:01 18:47	06:40 16:55	07:19 16:28	07:44 (52) 07:59 (52)
2	05:25 20:52	19:37 (46) 20:07 (46)	05:53 20:30	19:43 (46) 20:04 (46)	06:28 19:40	07:03 18:45	06:42 16:54	07:20 16:27	07:45 (52) 07:58 (52)
3	05:26 20:52	19:37 (46) 20:08 (46)	05:54 20:29	19:45 (46) 20:03 (46)	06:29 19:38	07:04 18:43	06:43 16:53	07:21 16:27	07:46 (52) 07:58 (52)
4	05:26 20:51	19:37 (46) 20:08 (46)	05:55 20:27	19:46 (46) 20:02 (46)	06:30 19:37	07:05 18:41	06:44 16:51	07:22 16:27	07:47 (52) 07:57 (52)
5	05:27 20:51	19:37 (46) 20:09 (46)	05:56 20:26	19:48 (46) 20:00 (46)	06:31 19:35	07:06 18:40	06:46 16:50	07:23 16:26	07:49 (52) 07:57 (52)
6	05:28 20:51	19:37 (46) 20:10 (46)	05:57 20:25	19:53 (46) 19:57 (46)	06:32 19:33	07:07 18:38	06:47 16:49	07:24 16:26	07:50 (52) 07:56 (52)
7	05:28 20:51	19:37 (46) 20:09 (46)	05:58 20:23		06:34 19:31	07:09 18:36	06:48 16:48	07:25 16:26	
8	05:29 20:50	19:37 (46) 20:10 (46)	05:59 20:22		06:35 19:29	07:10 18:34	06:50 16:46	07:26 16:26	
9	05:30 20:50	19:37 (46) 20:11 (46)	06:00 20:21		06:36 19:28	07:11 18:32	06:51 16:45	07:27 16:26	07:40 (52) 07:49 (52)
10	05:30 20:49	19:36 (46) 20:10 (46)	06:01 20:19		06:37 19:26	07:12 18:31	06:52 16:44	07:28 16:26	07:38 (52) 07:52 (52)
11	05:31 20:49	19:37 (46) 20:11 (46)	06:03 20:18		06:38 19:24	07:13 18:29	06:54 16:43	07:29 16:26	07:37 (52) 07:53 (52)
12	05:32 20:48	19:37 (46) 20:11 (46)	06:04 20:16		06:39 19:22	07:15 18:27	06:55 16:42	07:30 16:26	07:36 (52) 07:55 (52)
13	05:33 20:48	19:37 (46) 20:12 (46)	06:05 20:15		06:40 19:20	07:16 18:25	06:56 16:41	07:31 16:26	07:35 (52) 07:56 (52)
14	05:34 20:47	19:37 (46) 20:12 (46)	06:06 20:13		06:42 19:18	07:17 18:24	06:58 16:40	07:32 16:26	07:35 (52) 07:57 (52)
15	05:34 20:47	19:36 (46) 20:12 (46)	06:07 20:12		06:43 19:16	07:18 18:22	06:59 16:39	07:32 16:26	07:34 (52) 07:58 (52)
16	05:35 20:46	19:36 (46) 20:12 (46)	06:08 20:10		06:44 19:15	07:20 18:20	07:00 16:38	07:33 16:27	07:34 (52) 07:58 (52)
17	05:36 20:45	19:37 (46) 20:12 (46)	06:09 20:09		06:45 19:13	07:21 18:19	07:02 16:37	07:34 (52) 16:27	07:34 (52) 07:59 (52)
18	05:37 20:45	19:37 (46) 20:13 (46)	06:11 20:07		06:46 19:11	07:22 18:17	07:03 16:36	07:35 (52) 16:27	07:34 (52) 07:59 (52)
19	05:38 20:44	19:37 (46) 20:13 (46)	06:12 20:06		06:47 19:09	07:23 18:15	07:04 16:35	07:35 (52) 16:28	07:35 (52) 08:00 (52)
20	05:39 20:43	19:37 (46) 20:13 (46)	06:13 20:04		06:49 19:07	07:25 18:14	07:06 16:34	07:34 (52) 16:28	07:34 (52) 08:00 (52)
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22	05:41 20:41	19:38 (46) 20:13 (46)	06:15 20:01		06:51 19:03	07:27 18:10	07:08 16:33	07:35 (52) 16:29	07:35 (52) 08:00 (52)
23	05:42 20:40	19:38 (46) 20:13 (46)	06:16 19:58		06:52 19:02	07:29 18:09	07:09 16:32	07:36 (52) 16:30	07:36 (52) 08:00 (52)
24	05:43 20:39	19:38 (46) 20:13 (46)	06:18 19:56		06:53 19:00	07:30 18:07	07:11 16:31	07:36 (52) 16:30	07:36 (52) 08:00 (52)
25	05:44 20:39	19:38 (46) 20:13 (46)	06:19 19:54		06:54 18:58	07:31 18:06	07:12 16:31	07:37 (52) 16:31	07:37 (52) 08:01 (52)
26	05:45 20:38	19:39 (46) 20:12 (46)	06:20 19:52		06:55 18:56	07:32 18:04	07:13 16:30	07:38 (52) 16:31	07:38 (52) 08:00 (52)
27	05:46 20:37	19:39 (46) 20:11 (46)	06:21 19:51		06:57 18:54	07:34 18:03	07:14 16:29	07:39 (52) 16:32	07:39 (52) 08:00 (52)
28	05:47 20:35	19:40 (46) 20:10 (46)	06:22 19:49		06:58 18:52	07:35 18:01	07:15 16:29	07:39 (52) 16:33	07:40 (52) 07:59 (52)
29	05:48 20:34	19:40 (46) 20:09 (46)	06:23 19:47		06:59 18:50	07:36 18:00	07:17 16:28	07:39 (52) 16:33	07:42 (52) 08:00 (52)
30	05:49 20:33	19:41 (46) 20:08 (46)	06:24 19:46		07:00 18:49	07:38 17:58	07:18 16:28	07:43 (52) 16:34	07:43 (52) 08:00 (52)
31	05:50 20:32	19:41 (46) 20:06 (46)	06:26 19:44		07:39 17:57		07:40 16:35	07:40 16:35	
Potential sun hours	469	434		376	341	290		277	
Total, worst case	1026		94			470		64	
Sun reduction	0.63		0.59			0.27		0.25	
Oper. time red.	1.00		1.00			1.00		1.00	
Wind dir. red.	0.51		0.51			0.49		0.49	
Total reduction	0.32		0.30			0.13		0.12	
Total, real	327		28			62		8	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 64

Licensed user:

**EDR**  
 217 Montgomery St.  
 US-SYRACUSE, NY 13202  
 (315) 471 0688  
 Steve Curtis, scurtis@edrpc.com  
 Calculated:  
 3/21/2011 11:14 AM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-182 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (103)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.33	0.39	0.47	0.49	0.55	0.59	0.63	0.59	0.54	0.44	0.27	0.25

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
438	648	710	456	298	237	193	272	631	1,051	1,182	1,006	675	429	245	289	8,760

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:40	07:23	06:43	06:47	05:57	18:43 (40) 05:25	19:34 (39) 05:25	19:40 (39) 05:51	18:53 (40) 06:27	07:01	06:40	07:19
2	07:40	07:22	06:41	06:45	20:06	19:26 (40) 20:39	20:04 (39) 20:52	20:10 (39) 20:31	19:36 (40) 19:42	18:47	16:55	16:28
3	07:40	07:21	06:39	06:44	05:56	18:42 (40) 05:24	19:33 (39) 05:25	19:40 (39) 05:53	18:53 (40) 06:28	07:02	06:42	07:20
4	07:40	07:20	06:38	06:42	20:07	19:26 (40) 20:40	20:04 (39) 20:52	20:10 (39) 20:30	19:36 (40) 19:40	18:45	16:54	16:27
5	07:40	07:18	06:36	06:40	05:54	18:42 (40) 05:24	19:34 (39) 05:26	19:41 (39) 05:54	18:52 (40) 06:29	07:04	06:43	07:21
6	07:40	07:18	06:36	06:40	20:08	19:26 (40) 20:41	20:05 (39) 20:51	20:10 (39) 20:28	19:36 (40) 19:38	18:43	16:53	16:27
7	07:40	07:18	06:36	06:40	05:53	18:42 (40) 05:23	19:34 (39) 05:26	19:40 (39) 05:55	18:52 (40) 06:30	07:05	06:44	07:22
8	07:40	07:17	06:35	06:39	20:10	19:27 (40) 20:42	20:04 (39) 20:51	20:10 (39) 20:27	19:36 (40) 19:37	18:41	16:51	16:27
9	07:40	07:17	06:35	06:39	05:51	18:41 (40) 05:23	19:34 (39) 05:27	19:41 (39) 05:56	18:52 (40) 06:31	07:06	06:46	07:23
10	07:40	07:17	06:35	06:39	20:11	19:26 (40) 20:43	20:05 (39) 20:51	20:11 (39) 20:26	19:36 (40) 19:35	18:39	16:50	16:26
11	07:40	07:17	06:35	06:39	05:50	18:42 (40) 05:22	19:35 (39) 05:28	19:41 (39) 05:57	18:51 (40) 06:32	07:07	06:47	07:24
12	07:40	07:17	06:35	06:39	20:12	19:26 (40) 20:43	20:05 (39) 20:51	20:11 (39) 20:25	19:36 (40) 19:33	18:38	16:49	16:26
13	07:40	07:16	06:33	06:36	05:49	18:42 (40) 05:22	19:34 (39) 05:28	19:40 (39) 05:58	18:51 (40) 06:34	07:08	06:48	07:25
14	07:40	07:16	06:33	06:36	20:13	19:26 (40) 20:44	20:04 (39) 20:50	20:11 (39) 20:23	19:36 (40) 19:31	18:36	16:48	16:26
15	07:39	07:15	06:31	06:35	05:47	18:42 (40) 05:22	19:35 (39) 05:29	19:41 (39) 05:59	18:51 (40) 06:35	07:10	06:50	07:26
16	07:39	07:15	06:31	06:35	20:14	19:27 (40) 20:45	20:05 (39) 20:50	20:11 (39) 20:22	19:36 (40) 19:29	18:34	16:46	16:26
17	07:39	07:15	06:31	06:35	05:46	18:42 (40) 05:21	19:35 (39) 05:30	19:41 (39) 06:00	18:51 (40) 06:36	07:11	06:51	07:27
18	07:39	07:15	06:31	06:35	20:15	19:26 (40) 20:45	20:05 (39) 20:50	20:12 (39) 20:20	19:36 (40) 19:27	18:32	16:45	16:26
19	07:39	07:15	06:31	06:35	05:45	18:42 (40) 05:21	19:36 (39) 05:30	19:41 (39) 06:01	18:51 (40) 06:37	07:12	06:52	07:28
20	07:39	07:15	06:31	06:35	20:17	19:25 (40) 20:46	20:05 (39) 20:49	20:11 (39) 20:19	19:35 (40) 19:26	18:31	16:44	16:26
21	07:39	07:15	06:31	06:35	05:44	18:42 (40) 05:21	19:36 (39) 05:31	19:41 (39) 06:03	18:51 (40) 06:38	07:13	06:54	07:29
22	07:39	07:15	06:31	06:35	20:18	19:25 (40) 20:47	20:06 (39) 20:49	20:12 (39) 20:18	19:35 (40) 19:24	18:29	16:43	16:26
23	07:39	07:15	06:31	06:35	05:42	18:43 (40) 05:21	19:37 (39) 05:32	19:41 (39) 06:04	18:52 (40) 06:39	07:15	06:55	07:30
24	07:39	07:15	06:31	06:35	20:19	19:25 (40) 20:47	20:06 (39) 20:48	20:12 (39) 20:16	19:35 (40) 19:22	18:27	16:42	16:26
25	07:39	07:15	06:31	06:35	05:41	18:43 (40) 05:21	19:36 (39) 05:33	19:42 (39) 06:05	18:52 (40) 06:40	07:16	06:56	07:31
26	07:39	07:15	06:31	06:35	20:20	19:25 (40) 20:48	20:05 (39) 20:48	20:12 (39) 20:15	19:34 (40) 19:20	18:25	16:41	16:26
27	07:39	07:15	06:31	06:35	05:40	18:44 (40) 05:21	19:36 (39) 05:34	19:12 (40) 06:06	18:52 (40) 06:42	07:17	06:58	07:31
28	07:39	07:15	06:31	06:35	20:21	19:25 (40) 20:48	20:05 (39) 20:47	20:13 (39) 20:13	19:34 (40) 19:18	18:24	16:40	16:26
29	07:39	07:15	06:31	06:35	05:39	18:45 (40) 05:21	19:37 (39) 05:35	19:08 (40) 06:07	18:52 (40) 06:43	07:18	06:59	07:32
30	07:39	07:15	06:31	06:35	20:22	19:24 (40) 20:49	20:05 (39) 20:46	20:12 (39) 20:12	19:33 (40) 19:16	18:22	16:39	16:27
31	07:39	07:15	06:31	06:35	05:38	18:45 (40) 05:21	19:37 (39) 05:35	19:06 (40) 06:08	18:53 (40) 06:44	07:20	07:00	07:33
32	07:39	07:15	06:31	06:35	20:23	19:26 (40) 20:49	20:06 (39) 20:46	20:12 (39) 20:10	19:32 (40) 19:15	18:20	16:38	16:27
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34	07:39	07:15	06:31	06:35	20:25	19:26 (40) 20:50	20:06 (39) 20:45	20:12 (39) 20:09	19:31 (40) 19:13	18:19	16:37	16:27
35	07:39	07:15	06:31	06:35	05:36	18:46 (40) 05:21	19:38 (39) 05:37	19:03 (40) 06:11	18:54 (40) 06:46	07:22	07:03	07:34
36	07:39	07:15	06:31	06:35	20:26	19:25 (40) 20:50	20:07 (39) 20:44	20:12 (39) 20:07	19:29 (40) 19:11	18:17	16:36	16:27
37	07:39	07:15	06:31	06:35	05:35	18:47 (40) 05:21	19:38 (39) 05:38	19:02 (40) 06:12	18:54 (40) 06:47	07:23	07:04	07:35
38	07:39	07:15	06:31	06:35	20:27	19:25 (40) 20:50	20:07 (39) 20:44	20:12 (39) 20:06	19:28 (40) 19:09	18:15	16:35	16:28
39	07:39	07:15	06:31	06:35	05:34	18:48 (40) 05:21	19:39 (39) 05:39	19:01 (40) 06:13	18:55 (40) 06:48	07:25	07:05	07:36
40	07:39	07:15	06:31	06:35	20:28	19:24 (40) 20:51	20:07 (39) 20:43	20:12 (39) 20:04	19:26 (40) 19:07	18:14	16:34	16:28
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42	07:39	07:15	06:31	06:35	20:29	19:24 (40) 20:52	20:07 (39) 20:42	20:12 (39) 20:02	19:25 (40) 19:05	18:12	16:33	16:29
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52	07:39	07:15	06:31	06:35	20:34	19:24 (40) 20:54	20:09 (39) 20:37	20:09 (39) 19:52	18:56 (40) 06:56	07:34	07:14	07:39
53	07:39	07:15	06:31	06:35	05:27	18:57 (40) 05:23	19:40 (39) 05:46	18:56 (40) 06:21	18:54 (40) 06:51	07:34	07:14	07:39
54	07:39	07:15	06:31	06:35	20:35	19:24 (40) 20:55	20:08 (39) 20:36	20:08 (39) 19:51	18:54 (40) 06:52	07:34	07:14	07:39
55	07:39	07:15	06:31	06:35	05:27	18:58 (40) 05:23	19:40 (39) 05:47	18:55 (40) 06:22	18:54 (40) 06:52	07:34	07:14	07:39
56	07:39	07:15	06:31	06:35	20:36	19:24 (40) 20:56	20:08 (39) 20:35	20:06 (39) 19:49	18:52 (40) 06:53	07:34	07:14	07:39
57	07:39	07:15	06:31	06:35	05:26	19:01 (40) 05:24	19:40 (39) 05:48	18:55 (40) 06:23	18:50 (40) 06:53	07:36	07:16	07:39
58	07:39	07:15	06:31	06:35	20:37	19:24 (40) 20:57	20:09 (39) 20:34	20:04 (39) 19:47	18:50 (40) 06:54	07:36	07:16	07:39
59	07:39	07:15	06:31	06:35	05:25	19:03 (40) 05:24	19:40 (39) 05:49	18:54 (40) 06:24	18:50 (40) 06:54	07:36	07:16	07:39
60	07:39	07:15	06:31	06:35	20:38	19:24 (40) 20:58	20:09 (39) 20:33	20:03 (39) 19:45	18:49 (40) 06:54	07:36	07:16	07:39
61	07:39	07:15	06:31	06:35	05:25	19:33 (39) 05:24	19:40 (39) 05:49	18:54 (40) 06:26	18:49 (40) 06:54	07:36	07:16	07:39
62	07:39	07:15	06:31	06:35	20:39	19:24 (40) 20:59	20:09 (39) 20:33	20:03 (39) 19:45	18:49 (40) 06:54	07:36	07:16	07:39
63	07:39	07:15	06:31	06:35	05:24	19:33 (39) 05:24	19:40 (39) 05:49	18:54 (40) 06:26	18:49 (40) 06:54	07:36	07:16	07:39

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 65

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**EDR**

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(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-183 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (333)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36	07:23 17:14	06:43 17:52	07:21 (13) 06:47 19:31	07:22 (12) 05:57 20:06	05:25 20:40
2	07:40 16:37	07:22 17:15	06:41 17:53	07:23 (13) 06:46 19:32	07:21 (12) 05:56 20:07	05:24 20:41
3	07:40 16:38	07:21 17:17	06:40 17:55	07:24 (13) 06:44 19:33	07:22 (12) 05:54 20:09	05:24 20:41
4	07:40 16:39	07:20 17:18	06:38 17:56	07:25 (13) 06:42 19:35	07:22 (12) 05:53 20:10	05:23 20:42
5	07:40 16:40	07:19 17:19	06:36 17:57	07:30 (13) 06:40 19:36	07:22 (12) 05:52 20:11	05:23 20:43
6	07:40 16:41	07:17 17:21	06:35 17:59	07:36 (13) 06:38 19:37	07:22 (12) 05:50 20:12	05:23 20:44
7	07:40 16:42	07:16 17:22	06:33 18:00	06:37 19:38	07:23 (12) 05:49 20:13	05:22 20:44
8	07:40 16:43	07:15 17:24	06:31 19:01	07:31 19:40	07:23 (12) 05:48 20:15	05:22 20:45
9	07:39 16:44	07:14 17:25	06:29 19:03	07:29 19:41	07:24 (12) 05:46 20:16	05:22 20:46
10	07:39 16:46	07:12 17:26	06:27 19:04	07:27 19:42	07:25 (12) 05:45 20:17	05:21 20:46
11	07:39 16:47	07:11 17:28	06:26 19:05	07:26 19:43	07:27 (12) 05:44 20:18	05:21 20:47
12	07:38 16:48	07:10 17:29	06:24 19:06	07:24 19:44	07:28 (12) 05:43 20:19	05:21 20:48
13	07:38 16:49	07:08 17:31	06:22 19:08	07:22 19:46	07:30 (12) 05:41 20:20	05:21 20:48
14	07:38 16:50	07:07 17:32	06:20 19:09	07:20 19:47	07:45 (12) 05:40 20:21	05:21 20:49
15	07:37 16:51	07:05 17:33	06:18 19:10	07:18 19:48	06:23 20:23	05:21 20:49
16	07:37 16:53	07:04 17:35	06:17 19:11	07:17 19:49	06:21 20:24	05:21 20:50
17	07:36 16:54	07:02 17:36	06:15 19:12	07:15 19:51	06:19 20:25	05:21 20:50
18	07:35 16:55	07:01 17:37	06:13 19:14	07:13 19:52	06:18 20:26	05:21 20:50
19	07:35 16:56	06:59 17:39	06:11 19:15	07:11 19:53	06:16 20:27	05:21 20:51
20	07:34 16:58	06:58 17:40	06:09 19:16	07:09 19:54	06:14 20:28	05:21 20:51
21	07:33 16:59	06:56 17:42	06:08 19:18	07:08 19:55	06:13 20:29	05:21 20:51
22	07:33 17:00	06:55 17:43	06:06 19:19	07:06 19:57	06:11 20:30	05:21 20:52
23	07:32 17:02	06:53 17:44	06:04 19:20	07:04 19:58	06:09 20:31	05:22 20:52
24	07:31 17:03	06:51 17:46	06:02 19:21	07:02 19:59	06:08 20:32	05:22 20:52
25	07:30 17:04	06:50 17:47	06:00 19:22	07:00 20:00	06:06 20:33	05:22 20:52
26	07:29 17:06	06:48 17:48	06:58 19:24	07:26 (12) 06:05	06:05 20:34	05:23 20:52
27	07:28 17:07	06:46 17:50	06:57 19:25	07:25 (12) 06:03	06:03 20:35	05:23 20:52
28	07:27 17:08	06:45 17:51	06:55 19:26	07:25 (12) 06:02	06:02 20:36	05:23 20:52
29	07:26 17:10		06:53 19:27	07:24 (12) 06:00	06:00 20:37	05:24 20:52
30	07:25 17:11		06:51 19:29	07:23 (12) 05:59	05:59 20:38	05:24 20:52
31	07:24 17:13		06:49 19:30	07:22 (12) 05:58	05:58 20:39	05:25 20:52
Potential sun hours	288	293	369	403	457	463
Total, worst case		343	447	409		
Sun reduction		0.39	0.47	0.49		
Oper. time red.		1.00	1.00	1.00		
Wind dir. red.		0.51	0.55	0.56		
Total reduction		0.20	0.26	0.28		
Total, real		68	116	113		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 66

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2 Shadow receptor: R-183 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (333)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December		
1	05:25	05:52	06:27	07:26 (12)	07:02	06:41	07:19	
	20:52	20:31	19:42	24 07:50 (12)	18:47	16:56	16:28	
2	05:25	05:53	06:28	07:24 (12)	07:03	06:42	07:20	
	20:52	20:30	19:40	27 07:51 (12)	18:45	16:54	16:28	
3	05:26	05:54	06:29	07:22 (12)	07:04	06:43	07:21	
	20:52	20:29	19:39	30 07:52 (12)	18:43	16:53	16:27	
4	05:27	05:55	06:30	07:20 (12)	07:05	06:45	07:22	
	20:52	20:27	19:37	33 07:53 (12)	18:42	16:52	16:27	
5	05:27	05:56	06:32	07:19 (12)	07:06	06:46	07:23	
	20:51	20:26	19:35	34 07:53 (12)	18:40	16:50	16:27	
6	05:28	05:57	06:33	07:18 (12)	07:08	06:47	07:24	
	20:51	20:25	19:33	35 07:53 (12)	18:38	16:49	16:27	
7	05:29	05:58	06:34	07:17 (12)	07:09	06:49	07:25	
	20:51	20:23	19:31	37 07:54 (12)	18:36	16:48	16:26	
8	05:29	05:59	06:35	07:16 (12)	07:10	06:50	07:26	
	20:50	20:22	19:30	38 07:54 (12)	18:34	16:47	16:26	
9	05:30	06:01	06:36	07:15 (12)	07:11	08:02 (13)	06:51	07:27
	20:50	20:21	19:28	39 07:54 (12)	18:33	11 08:13 (13)	16:45	16:26
10	05:31	06:02	06:37	07:15 (12)	07:12	07:59 (13)	06:53	07:28
	20:49	20:19	19:26	39 07:54 (12)	18:31	16 08:15 (13)	16:44	16:26
11	05:31	06:03	06:38	07:15 (12)	07:14	07:57 (13)	06:54	07:29
	20:49	20:18	19:24	39 07:54 (12)	18:29	20 08:17 (13)	16:43	16:26
12	05:32	06:04	06:40	07:14 (12)	07:15	07:55 (13)	06:55	07:30
	20:48	20:16	19:22	39 07:53 (12)	18:27	23 08:18 (13)	16:42	16:26
13	05:33	06:05	06:41	07:14 (12)	07:16	07:54 (13)	06:56	07:31
	20:48	20:15	19:20	39 07:53 (12)	18:26	25 08:19 (13)	16:41	16:26
14	05:34	06:06	06:42	07:14 (12)	07:17	07:54 (13)	06:58	07:32
	20:47	20:13	19:18	38 07:52 (12)	18:24	26 08:20 (13)	16:40	16:27
15	05:35	06:07	06:43	07:14 (12)	07:19	07:53 (13)	06:59	07:32
	20:47	20:12	19:17	37 07:51 (12)	18:22	27 08:20 (13)	16:39	16:27
16	05:36	06:09	06:44	07:14 (12)	07:20	07:52 (13)	07:00	07:33
	20:46	20:10	19:15	36 07:50 (12)	18:20	28 08:20 (13)	16:38	16:27
17	05:37	06:10	06:45	07:14 (12)	07:21	07:52 (13)	07:02	07:34
	20:45	20:09	19:13	35 07:49 (12)	18:19	28 08:20 (13)	16:37	16:27
18	05:37	06:11	06:46	07:15 (12)	07:22	07:51 (13)	07:03	07:35
	20:45	20:07	19:11	33 07:48 (12)	18:17	29 08:20 (13)	16:36	16:28
19	05:38	06:12	06:48	07:16 (12)	07:24	07:51 (13)	07:04	07:35
	20:44	20:06	19:09	31 07:47 (12)	18:15	28 08:19 (13)	16:35	16:28
20	05:39	06:13	06:49	07:17 (12)	07:25	07:51 (13)	07:06	07:36
	20:43	20:04	19:07	28 07:45 (12)	18:14	28 08:19 (13)	16:34	16:28
21	05:40	06:14	06:50	07:18 (12)	07:26	07:52 (13)	07:07	07:36
	20:42	20:03	19:05	25 07:43 (12)	18:12	27 08:19 (13)	16:34	16:29
22	05:41	06:15	06:51	07:20 (12)	07:27	07:52 (13)	07:08	07:37
	20:41	20:01	19:04	20 07:40 (12)	18:11	26 08:18 (13)	16:33	16:29
23	05:42	06:17	06:52	07:23 (12)	07:29	07:53 (13)	07:09	07:37
	20:40	19:58	19:02	13 07:36 (12)	18:09	24 08:17 (13)	16:32	16:30
24	05:43	06:18	06:53		07:30	07:54 (13)	07:11	07:38
	20:40	19:56	19:00		18:07	22 08:16 (13)	16:32	16:30
25	05:44	06:19	06:54		07:31	07:55 (13)	07:12	07:38
	20:39	19:54	18:58		18:06	19 08:14 (13)	16:31	16:31
26	05:45	06:20	06:56		07:33	07:57 (13)	07:13	07:39
	20:38	19:53	18:56		18:04	16 08:13 (13)	16:30	16:32
27	05:46	06:21	06:57		07:34	07:59 (13)	07:14	07:39
	20:37	19:51	18:54		18:03	11 08:10 (13)	16:30	16:32
28	05:47	06:22	06:58		07:35		07:16	07:39
	20:36	19:49	18:52		18:01		16:29	16:33
29	05:48	06:24	07:36 (12)	06:59	07:37		07:17	07:39
	20:34	19:47	3 07:39 (12)	18:51	18:00		16:29	16:34
30	05:50	06:25	07:30 (12)	07:00	07:38		07:18	07:40
	20:33	19:46	15 07:45 (12)	18:49	17:59		16:28	16:35
31	05:51	06:26	07:28 (12)		07:39			07:40
	20:32	19:44	20 07:48 (12)		17:57			16:35
Potential sun hours	469	434	376	342	290	277		
Total, worst case		38	749	434				
Sun reduction		0.59	0.54	0.44				
Oper. time red.		1.00	1.00	1.00				
Wind dir. red.		0.56	0.56	0.51				
Total reduction		0.33	0.30	0.22				
Total, real		13	227	97				

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-184 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (104)

Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:37	07:23 17:14	06:43 17:52	06:47 19:31	05:57 20:06	06:37 (12) 20:40
2	07:40 16:37	07:22 17:15	06:41 17:53	06:46 19:32	05:56 20:07	06:37 (12) 20:41
3	07:40 16:38	07:21 17:17	06:40 17:55	07:05 (13) 07:16 (13)	06:44 19:33	06:37 (12) 20:41
4	07:40 16:39	07:20 17:18	06:38 17:56	07:01 (13) 07:19 (13)	06:42 19:35	06:37 (12) 20:42
5	07:40 16:40	07:19 17:19	06:36 17:57	07:00 (13) 07:21 (13)	06:40 19:36	06:38 (12) 20:43
6	07:40 16:41	07:17 17:21	06:35 17:59	06:58 (13) 07:22 (13)	06:38 19:37	06:38 (12) 20:44
7	07:40 16:42	07:16 17:22	07:37 (14) 07:44 (14)	06:33 18:00	06:57 (13) 07:23 (13)	06:37 (12) 20:44
8	07:40 16:43	07:15 17:24	07:36 (14) 07:47 (14)	07:31 19:01	07:55 (13) 08:23 (13)	06:35 19:40
9	07:39 16:44	07:14 17:25	07:35 (14) 07:49 (14)	07:29 19:03	07:54 (13) 08:24 (13)	06:33 19:41
10	07:39 16:46	07:12 17:26	07:33 (14) 07:50 (14)	07:27 19:04	07:54 (13) 08:25 (13)	06:31 19:42
11	07:39 16:47	07:11 17:28	07:32 (14) 07:51 (14)	07:26 19:05	07:54 (13) 08:24 (13)	06:30 19:43
12	07:38 16:48	07:10 17:29	07:31 (14) 07:52 (14)	07:24 19:06	07:53 (13) 08:24 (13)	06:28 19:44
13	07:38 16:49	07:08 17:31	07:30 (14) 07:52 (14)	07:22 19:08	07:53 (13) 08:23 (13)	06:26 19:46
14	07:38 16:50	07:07 17:32	07:30 (14) 07:53 (14)	07:20 19:09	07:52 (13) 08:23 (13)	06:24 19:47
15	07:37 16:51	07:05 17:33	07:29 (14) 07:53 (14)	07:18 19:10	07:53 (13) 08:23 (13)	06:23 19:48
16	07:37 16:53	07:04 17:35	07:30 (14) 07:53 (14)	07:17 19:11	07:53 (13) 08:22 (13)	06:21 19:49
17	07:36 16:54	07:02 17:36	07:29 (14) 07:53 (14)	07:15 19:13	07:54 (13) 08:21 (13)	06:19 19:50
18	07:35 16:55	07:01 17:37	07:30 (14) 07:53 (14)	07:13 19:14	07:54 (13) 08:19 (13)	06:18 19:52
19	07:35 16:56	06:59 17:39	07:30 (14) 07:52 (14)	07:11 19:15	07:55 (13) 08:17 (13)	06:16 19:53
20	07:34 16:58	06:58 17:40	07:31 (14) 07:50 (14)	07:09 19:16	07:56 (13) 08:15 (13)	06:14 19:54
21	07:33 16:59	06:56 17:42	07:32 (14) 07:49 (14)	07:08 19:18	07:58 (13) 08:12 (13)	06:13 19:55
22	07:33 17:00	06:55 17:43	07:34 (14) 07:47 (14)	07:06 19:19	08:04 (13) 08:07 (13)	06:11 19:57
23	07:32 17:02	06:53 17:44	07:37 (14) 07:45 (14)	07:04 19:20	06:09 19:58	06:40 (12) 20:31
24	07:31 17:03	06:51 17:46	07:02 19:21	06:08 19:59	06:39 (12) 07:19 (12)	05:30 20:32
25	07:30 17:04	06:50 17:47	07:00 19:22	06:06 20:00	06:39 (12) 07:20 (12)	05:30 20:33
26	07:29 17:06	06:48 17:48	06:58 19:24	06:05 20:00	06:38 (12) 07:20 (12)	05:29 20:34
27	07:28 17:07	06:46 17:50	06:57 19:25	06:03 20:01	06:38 (12) 07:20 (12)	05:28 20:35
28	07:27 17:08	06:45 17:51	06:55 19:26	06:02 20:03	06:37 (12) 07:20 (12)	05:27 20:36
29	07:26 17:10		06:53 19:27	06:00 20:04	06:37 (12) 07:20 (12)	05:27 20:37
30	07:25 17:11		06:51 19:29	05:59 20:05	06:37 (12) 07:19 (12)	05:26 20:38
31	07:24 17:13		06:49 19:30		05:25 20:39	
Potential sun hours	288	293	369	403	457	463
Total, worst case		307	480	575	567	
Sun reduction		0.39	0.47	0.49	0.55	
Oper. time red.		1.00	1.00	1.00	1.00	
Wind dir. red.		0.51	0.52	0.62	0.62	
Total reduction		0.20	0.24	0.30	0.34	
Total, real		60	116	173	191	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker
			(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 68

Licensed user:

**EDR**

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US-SYRACUSE, NY 13202

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-184 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (104)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
 438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
 Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December				
1	05:25	05:52	06:52 (12)	06:27	07:02	07:32 (13)	06:41	07:03 (14)	07:19	
	20:52	20:31	31 07:23 (12)	19:42	18:47	31 08:03 (13)	16:56	16 07:19 (14)	16:28	
2	05:25	05:53	06:51 (12)	06:28	07:03	07:32 (13)	06:42	07:05 (14)	07:20	
	20:52	20:30	32 07:23 (12)	19:40	18:45	31 08:03 (13)	16:54	14 07:19 (14)	16:28	
3	05:26	05:54	06:50 (12)	06:29	07:04	07:32 (13)	06:43	07:06 (14)	07:21	
	20:52	20:29	34 07:24 (12)	19:39	18:43	30 08:02 (13)	16:53	11 07:17 (14)	16:27	
4	05:27	05:55	06:49 (12)	06:30	07:05	07:32 (13)	06:44	07:07 (14)	07:22	
	20:52	20:27	36 07:25 (12)	19:37	18:42	29 08:01 (13)	16:52	6 07:13 (14)	16:27	
5	05:27	05:56	06:48 (12)	06:32	07:06	07:32 (13)	06:46		07:23	
	20:51	20:26	37 07:25 (12)	19:35	18:40	28 08:00 (13)	16:50		16:27	
6	05:28	05:57	06:48 (12)	06:33	07:08	07:33 (13)	06:47		07:24	
	20:51	20:25	38 07:26 (12)	19:33	18:38	27 08:00 (13)	16:49		16:27	
7	05:29	05:58	06:47 (12)	06:34	07:09	07:33 (13)	06:48		07:25	
	20:51	20:23	39 07:26 (12)	19:31	18:36	26 07:59 (13)	16:48		16:26	
8	05:29	05:59	06:46 (12)	06:35	07:10	07:34 (13)	06:50		07:26	
	20:50	20:22	41 07:27 (12)	19:30	18:34	23 07:57 (13)	16:47		16:26	
9	05:30	06:01	06:46 (12)	06:36	07:11	07:35 (13)	06:51		07:27	
	20:50	20:21	41 07:27 (12)	19:28	18:33	20 07:55 (13)	16:45		16:26	
10	05:31	06:02	06:46 (12)	06:37	07:12	07:37 (13)	06:52		07:28	
	20:49	20:19	42 07:28 (12)	19:26	18:31	15 07:52 (13)	16:44		16:26	
11	05:31	06:03	06:46 (12)	06:38	07:14	07:41 (13)	06:54		07:29	
	20:49	20:18	42 07:28 (12)	19:24	18:29	8 07:49 (13)	16:43		16:26	
12	05:32	06:04	06:46 (12)	06:40	07:15		06:55		07:30	
	20:48	20:16	42 07:28 (12)	19:22	18:27		16:42		16:26	
13	05:33	06:05	06:45 (12)	06:41	07:16		06:56		07:31	
	20:48	20:15	43 07:28 (12)	19:20	18:26		16:41		16:26	
14	05:34	06:06	06:45 (12)	06:42	07:17		06:58		07:32	
	20:47	20:13	43 07:28 (12)	19:18	18:24		16:40		16:27	
15	05:35	06:07	06:45 (12)	06:43	07:19		06:59		07:32	
	20:47	20:12	42 07:27 (12)	19:17	18:22		16:39		16:27	
16	05:36	06:09	06:45 (12)	06:44	07:20		07:00		07:33	
	20:46	20:10	42 07:27 (12)	19:15	18:20		16:38		16:27	
17	05:37	06:10	06:45 (12)	06:45	07:21		07:02		07:34	
	20:45	20:09	41 07:26 (12)	19:13	18:19		16:37		16:27	
18	05:37	06:11	06:45 (12)	06:46	07:22		07:03		07:35	
	20:45	20:07	41 07:26 (12)	19:11	18:17		16:36		16:28	
19	05:38	06:12	06:45 (12)	06:48	07:24	08:06 (14)	07:04		07:35	
	20:44	20:06	40 07:25 (12)	19:09	18:15	11 08:17 (14)	16:35		16:28	
20	05:39	06:13	06:45 (12)	06:49	07:25	08:03 (14)	07:06		07:36	
	20:43	20:04	39 07:24 (12)	19:07	18:14	15 08:18 (14)	16:35		16:28	
21	05:40	06:14	06:46 (12)	06:50	07:26	08:02 (14)	07:07		07:36	
	20:42	20:03	38 07:24 (12)	19:05	18:12	18 08:20 (14)	16:34		16:29	
22	05:41	06:15	06:47 (12)	06:51	07:27	08:01 (14)	07:08		07:37	
	20:41	20:01	36 07:23 (12)	19:04	18:11	20 08:21 (14)	16:33		16:29	
23	05:42	06:17	06:47 (12)	06:52	07:41 (13)	07:29	08:01 (14)	07:09	07:37	
	20:40	19:58	35 07:22 (12)	19:02	18 07:59 (13)	18:09	21 08:22 (14)	16:32	16:30	
24	05:43	06:18	06:48 (12)	06:53	07:39 (13)	07:30	08:00 (14)	07:11	07:38	
	20:40	19:56	32 07:20 (12)	19:00	21 08:00 (13)	18:07	22 08:22 (14)	16:32	16:30	
25	05:44	06:19	06:49 (12)	06:54	07:37 (13)	07:31	07:59 (14)	07:12	07:38	
	20:39	19:54	29 07:18 (12)	18:58	24 08:01 (13)	18:06	23 08:22 (14)	16:31	16:31	
26	05:45	07:02 (12)	06:20	06:51 (12)	06:56	07:36 (13)	07:33	07:59 (14)	07:13	07:39
	20:38	11 07:13 (12)	19:53	25 07:16 (12)	18:56	27 08:03 (13)	18:04	24 08:23 (14)	16:30	16:32
27	05:46	06:59 (12)	06:21	06:52 (12)	06:57	07:35 (13)	07:34	07:59 (14)	07:14	07:39
	20:37	17 07:16 (12)	19:51	22 07:14 (12)	18:54	28 08:03 (13)	18:03	23 08:22 (14)	16:30	16:32
28	05:47	06:57 (12)	06:22	06:55 (12)	06:58	07:34 (13)	07:35	07:58 (14)	07:16	07:39
	20:36	21 07:18 (12)	19:49	16 07:11 (12)	18:52	29 08:03 (13)	18:01	24 08:22 (14)	16:29	16:33
29	05:48	06:56 (12)	06:24	07:00 (12)	06:59	07:33 (13)	07:37	07:59 (14)	07:17	07:39
	20:34	23 07:19 (12)	19:47	5 07:05 (12)	18:51	30 08:03 (13)	18:00	23 08:22 (14)	16:29	16:34
30	05:50	06:54 (12)	06:25	07:00	07:32 (13)	07:38	08:00 (14)	07:18	07:40	07:40
	20:33	26 07:20 (12)	19:46	18:49	31 08:03 (13)	17:59	21 08:21 (14)	16:28	16:35	16:35
31	05:51	06:53 (12)	06:26			07:39	08:02 (14)		07:40	07:40
	20:32	29 07:22 (12)	19:44			17:57	19 08:21 (14)		16:35	16:35
Potential sun hours	469	434	376	342	290	277				
Total, worst case	127	1024	219	532	47					
Sun reduction	0.63	0.59	0.54	0.44	0.27					
Oper. time red.	1.00	1.00	1.00	1.00	1.00					
Wind dir. red.	0.62	0.62	0.52	0.51	0.51					
Total reduction	0.39	0.36	0.28	0.22	0.14					
Total, real	49	371	61	119	6					

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)



Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 69

Licensed user:

EDR

217 Montgomery St.

US-SYRACUSE, NY 13202

(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-19 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (16)

Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
 438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
 Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June			
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	07:25 (55) 07:58 (55)	05:57 20:06	07:16 (55) 07:50 (55)	05:25 20:40	19:20 (54) 19:57 (54)
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	07:23 (55) 07:59 (55)	05:55 20:07	07:17 (55) 07:48 (55)	05:24 20:40	19:20 (54) 19:57 (54)
3	07:40 16:38	07:21 17:16	06:40 17:55	06:44 19:33	07:20 (55) 08:01 (55)	05:54 20:08	07:19 (55) 07:46 (55)	05:24 20:41	19:21 (54) 19:57 (54)
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:35	07:20 (55) 08:02 (55)	05:53 20:10	07:22 (55) 07:44 (55)	05:23 20:42	19:21 (54) 19:56 (54)
5	07:40 16:40	07:19 17:19	06:36 17:57	06:40 19:36	07:18 (55) 08:03 (55)	05:51 20:11	07:24 (55) 19:41 (54)	05:23 20:43	19:22 (54) 19:57 (54)
6	07:40 16:41	07:17 17:21	06:34 17:58	06:38 19:37	07:16 (55) 08:03 (55)	05:50 20:12	07:29 (55) 19:45 (54)	05:22 20:44	19:22 (54) 19:57 (54)
7	07:40 16:42	07:16 17:22	06:33 18:00	06:36 19:38	07:15 (55) 08:04 (55)	05:49 20:13	19:27 (54) 19:47 (54)	05:22 20:44	19:22 (54) 19:56 (54)
8	07:40 16:43	07:15 17:23	06:31 19:01	06:35 19:39	07:15 (55) 08:05 (55)	05:47 20:14	19:26 (54) 19:49 (54)	05:22 20:45	19:23 (54) 19:56 (54)
9	07:39 16:44	07:13 17:25	06:29 19:02	06:33 19:41	07:14 (55) 08:05 (55)	05:46 20:16	19:24 (54) 19:50 (54)	05:21 20:46	19:23 (54) 19:57 (54)
10	07:39 16:45	07:12 17:26	06:27 19:04	06:31 19:42	07:12 (55) 08:05 (55)	05:45 20:17	19:23 (54) 19:51 (54)	05:21 20:46	19:24 (54) 19:57 (54)
11	07:39 16:46	07:11 17:28	06:25 19:05	06:29 19:43	07:11 (55) 08:05 (55)	05:44 20:18	19:22 (54) 19:52 (54)	05:21 20:47	19:24 (54) 19:57 (54)
12	07:38 16:48	07:09 17:29	06:24 19:06	06:28 19:44	07:12 (55) 08:05 (55)	05:42 20:19	19:21 (54) 19:53 (54)	05:21 20:47	19:24 (54) 19:56 (54)
13	07:38 16:49	07:08 17:30	06:22 19:07	06:26 19:45	07:11 (55) 08:05 (55)	05:41 20:20	19:21 (54) 19:54 (54)	05:21 20:48	19:24 (54) 19:56 (54)
14	07:38 16:50	07:07 17:32	06:20 19:09	06:24 19:47	07:10 (55) 08:04 (55)	05:40 20:21	19:20 (54) 19:54 (54)	05:21 20:49	19:25 (54) 19:56 (54)
15	07:37 16:51	07:05 17:33	06:18 19:10	06:22 19:48	07:09 (55) 08:04 (55)	05:39 20:22	19:20 (54) 19:55 (54)	05:20 20:49	19:25 (54) 19:56 (54)
16	07:37 16:52	07:04 17:34	06:16 19:11	06:21 19:49	07:10 (55) 08:04 (55)	05:38 20:24	19:19 (54) 19:55 (54)	05:20 20:50	19:26 (54) 19:56 (54)
17	07:36 16:54	07:02 17:36	06:15 19:12	06:19 19:50	07:09 (55) 08:03 (55)	05:37 20:25	19:19 (54) 19:56 (54)	05:20 20:50	19:26 (54) 19:57 (54)
18	07:35 16:55	07:01 17:37	06:13 19:14	06:17 19:52	07:09 (55) 08:03 (55)	05:36 20:26	19:19 (54) 19:56 (54)	05:21 20:50	19:26 (54) 19:57 (54)
19	07:35 16:56	06:59 17:39	07:11 19:15	06:16 19:53	07:09 (55) 08:03 (55)	05:35 20:27	19:18 (54) 19:56 (54)	05:21 20:51	19:27 (54) 19:58 (54)
20	07:34 16:57	06:58 17:40	07:09 19:16	06:14 19:54	07:09 (55) 08:02 (55)	05:34 20:28	19:18 (54) 19:56 (54)	05:21 20:51	19:27 (54) 19:58 (54)
21	07:33 16:59	06:56 17:41	07:07 19:17	06:12 19:55	07:10 (55) 08:01 (55)	05:33 20:29	19:18 (54) 19:56 (54)	05:21 20:51	19:27 (54) 19:58 (54)
22	07:33 17:00	06:54 17:43	07:06 19:19	06:11 19:56	07:10 (55) 08:00 (55)	05:32 20:30	19:18 (54) 19:56 (54)	05:21 20:51	19:27 (54) 19:58 (54)
23	07:32 17:01	06:53 17:44	07:04 19:20	06:09 19:58	07:10 (55) 08:00 (55)	05:31 20:31	19:18 (54) 19:56 (54)	05:21 20:52	19:27 (54) 19:58 (54)
24	07:31 17:03	06:51 17:45	07:02 19:21	06:08 19:59	07:10 (55) 07:59 (55)	05:30 20:32	19:19 (54) 19:57 (54)	05:22 20:52	19:28 (54) 19:59 (54)
25	07:30 17:04	06:50 17:47	07:00 19:22	06:06 20:00	07:10 (55) 07:57 (55)	05:29 20:33	19:18 (54) 19:57 (54)	05:22 20:52	19:28 (54) 19:59 (54)
26	07:29 17:05	06:48 17:48	06:58 19:24	06:04 20:00	07:11 (55) 07:57 (55)	05:28 20:34	19:18 (54) 19:57 (54)	05:22 20:52	19:28 (54) 19:58 (54)
27	07:28 17:07	06:46 17:49	06:56 19:25	06:03 20:01	07:12 (55) 07:55 (55)	05:28 20:35	19:18 (54) 19:56 (54)	05:23 20:52	19:28 (54) 19:59 (54)
28	07:27 17:08	06:45 17:51	06:55 19:26	06:01 20:02	07:13 (55) 07:54 (55)	05:27 20:36	19:19 (54) 19:57 (54)	05:23 20:52	19:28 (54) 19:59 (54)
29	07:26 17:09	06:53 19:27	06:53 19:27	06:00 20:04	07:14 (55) 07:53 (55)	05:26 20:37	19:19 (54) 19:57 (54)	05:24 20:52	19:29 (54) 20:00 (54)
30	07:25 17:11	06:51 19:28	06:51 19:28	05:58 20:05	07:15 (55) 07:54 (55)	05:26 20:38	19:20 (54) 19:57 (54)	05:24 20:52	19:28 (54) 20:00 (54)
31	07:24 17:12	06:49 19:30	06:49 19:30	05:58 20:06	07:15 (55) 07:54 (55)	05:26 20:39	19:20 (54) 19:57 (54)	05:24 20:52	19:28 (54) 20:00 (54)
Potential sun hours	288	293	369	403	457	463			
Total, worst case			65	1438	1025	972			
Sun reduction			0.47	0.49	0.55	0.59			
Oper. time red.			1.00	1.00	1.00	1.00			
Wind dir. red.			0.58	0.58	0.52	0.51			
Total reduction			0.28	0.29	0.29	0.30			
Total, real			18	413	294	294			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker (WTG causing flicker first time)	Last time (hh:mm) with flicker (WTG causing flicker last time)
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Project: **05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

Printed/Page: 3/21/2011 2:14 PM / 70  
 Licensed user:  
**EDR**  
 217 Montgomery St.  
 US-SYRACUSE, NY 13202  
 (315) 471 0688  
 Steve Curtis, scurtis@edrpc.com  
 Calculated:  
 3/21/2011 11:14 AM/2.7.453

### SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-19 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (16)

#### Assumptions for shadow calculations

Maximum distance for influence	1,000 m	Sunshine probability S/S0 (Sun hours/Possible sun hours) []	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec					
Minimum sun height over horizon for influence	3 °		0.33	0.39	0.47	0.49	0.55	0.59	0.63	0.59	0.54	0.44	0.27	0.25					
Day step for calculation	1 days	Operational time																	
Time step for calculation	1 minutes		N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
		Idle start wind speed: Cut in wind speed from power curve	438	648	710	456	298	237	193	272	631	1,051	1,182	1,006	675	429	245	289	8,760

	July	August	September	October	November	December						
1	05:25	19:29 (54)	05:51	19:32 (54)	06:27	07:10 (55)	07:01	06:40	07:19			
	20:52	32	20:01 (54)	20:31	31	20:03 (54)	19:42	54	08:04 (55)	18:47	16:55	16:28
2	05:25	19:28 (54)	05:52	19:33 (54)	06:28	07:11 (55)	07:03	06:42	07:20			
	20:52	33	20:01 (54)	20:30	29	20:02 (54)	19:40	53	08:04 (55)	18:45	16:54	16:27
3	05:26	19:29 (54)	05:54	19:34 (54)	06:29	07:12 (55)	07:04	06:43	07:21			
	20:52	33	20:02 (54)	20:28	27	20:01 (54)	19:38	51	08:03 (55)	18:43	16:53	16:27
4	05:26	19:28 (54)	05:55	19:35 (54)	06:30	07:12 (55)	07:05	06:44	07:22			
	20:51	34	20:02 (54)	20:27	25	20:00 (54)	19:37	50	08:02 (55)	18:41	16:51	16:27
5	05:27	19:28 (54)	05:56	19:36 (54)	06:31	07:12 (55)	07:06	06:46	07:23			
	20:51	34	20:02 (54)	20:26	22	19:58 (54)	19:35	49	08:01 (55)	18:39	16:50	16:26
6	05:27	19:29 (54)	05:57	19:38 (54)	06:32	07:12 (55)	07:07	06:47	07:24			
	20:51	34	20:03 (54)	20:25	18	19:56 (54)	19:33	48	08:00 (55)	18:38	16:49	16:26
7	05:28	19:28 (54)	05:58	07:37 (55)	06:34	07:13 (55)	07:09	06:48	07:25			
	20:51	35	20:03 (54)	20:23	24	19:54 (54)	19:31	45	07:58 (55)	18:36	16:48	16:26
8	05:29	19:28 (54)	05:59	07:32 (55)	06:35	07:14 (55)	07:10	06:50	07:26			
	20:50	36	20:04 (54)	20:22	22	19:48 (54)	19:29	43	07:57 (55)	18:34	16:46	16:26
9	05:30	19:28 (54)	06:00	07:30 (55)	06:36	07:14 (55)	07:11	06:51	07:27			
	20:50	36	20:04 (54)	20:21	23	07:53 (55)	19:28	41	07:55 (55)	18:32	16:45	16:26
10	05:30	19:28 (54)	06:01	07:27 (55)	06:37	07:15 (55)	07:12	06:52	07:28			
	20:49	36	20:04 (54)	20:19	28	07:55 (55)	19:26	38	07:53 (55)	18:31	16:44	16:26
11	05:31	19:28 (54)	06:03	07:25 (55)	06:38	07:17 (55)	07:13	06:54	07:29			
	20:49	36	20:04 (54)	20:18	32	07:57 (55)	19:24	34	07:51 (55)	18:29	16:43	16:26
12	05:32	19:28 (54)	06:04	07:24 (55)	06:39	07:19 (55)	07:15	06:55	07:30			
	20:48	37	20:05 (54)	20:16	34	07:58 (55)	19:22	30	07:49 (55)	18:27	16:42	16:26
13	05:33	19:28 (54)	06:05	07:23 (55)	06:40	07:22 (55)	07:16	06:56	07:31			
	20:48	37	20:05 (54)	20:15	37	08:00 (55)	19:20	24	07:46 (55)	18:25	16:41	16:26
14	05:34	19:28 (54)	06:06	07:22 (55)	06:42	07:25 (55)	07:17	06:58	07:32			
	20:47	38	20:06 (54)	20:13	39	08:01 (55)	19:18	16	07:41 (55)	18:24	16:40	16:26
15	05:34	19:27 (54)	06:07	07:20 (55)	06:43	07:18 (55)	07:18	06:59	07:32			
	20:47	38	20:05 (54)	20:12	42	08:02 (55)	19:16	18	18:22	16:39	16:26	
16	05:35	19:28 (54)	06:08	07:19 (55)	06:44	07:19 (55)	06:44	07:20	07:30			
	20:46	38	20:06 (54)	20:10	44	08:03 (55)	19:15	18	18:20	16:38	16:27	
17	05:36	19:28 (54)	06:09	07:18 (55)	06:45	07:18 (55)	06:45	07:21	07:34			
	20:45	38	20:06 (54)	20:09	45	08:03 (55)	19:13	18	18:19	16:37	16:27	
18	05:37	19:28 (54)	06:11	07:17 (55)	06:46	07:17 (55)	06:46	07:22	07:34			
	20:45	38	20:06 (54)	20:07	47	08:04 (55)	19:11	18	18:17	16:36	16:27	
19	05:38	19:28 (54)	06:12	07:16 (55)	06:47	07:16 (55)	06:47	07:23	07:35			
	20:44	39	20:07 (54)	20:06	49	08:05 (55)	19:09	18	18:15	16:35	16:28	
20	05:39	19:28 (54)	06:13	07:15 (55)	06:48	07:15 (55)	06:48	07:25	07:36			
	20:43	39	20:07 (54)	20:04	50	08:05 (55)	19:07	18	18:14	16:34	16:28	
21	05:40	19:28 (54)	06:14	07:14 (55)	06:50	07:14 (55)	06:50	07:26	07:36			
	20:42	39	20:07 (54)	20:02	51	08:05 (55)	19:05	18	18:12	16:33	16:28	
22	05:41	19:28 (54)	06:15	07:14 (55)	06:51	07:14 (55)	06:51	07:27	07:37			
	20:41	39	20:07 (54)	20:01	51	08:05 (55)	19:03	18	18:10	16:33	16:29	
23	05:42	19:29 (54)	06:16	07:14 (55)	06:52	07:14 (55)	06:52	07:29	07:39			
	20:40	38	20:07 (54)	19:57	52	08:06 (55)	19:02	18	18:09	16:32	16:29	
24	05:43	19:29 (54)	06:17	07:13 (55)	06:53	07:13 (55)	06:53	07:30	07:41			
	20:39	38	20:07 (54)	19:56	53	08:06 (55)	19:00	18	18:07	16:31	16:30	
25	05:44	19:29 (54)	06:19	07:13 (55)	06:54	07:13 (55)	06:54	07:31	07:42			
	20:38	38	20:07 (54)	19:54	53	08:06 (55)	18:58	18	18:06	16:31	16:31	
26	05:45	19:29 (54)	06:20	07:12 (55)	06:55	07:12 (55)	06:55	07:32	07:43			
	20:37	37	20:06 (54)	19:52	54	08:06 (55)	18:56	18	18:04	16:30	16:31	
27	05:46	19:30 (54)	06:21	07:12 (55)	06:57	07:12 (55)	06:57	07:34	07:44			
	20:36	36	20:06 (54)	19:51	54	08:06 (55)	18:54	18	18:03	16:29	16:32	
28	05:47	19:30 (54)	06:22	07:11 (55)	06:58	07:11 (55)	06:58	07:35	07:45			
	20:35	36	20:06 (54)	19:49	55	08:06 (55)	18:52	18	18:01	16:29	16:33	
29	05:48	19:30 (54)	06:23	07:11 (55)	06:59	07:11 (55)	06:59	07:36	07:47			
	20:34	35	20:05 (54)	19:47	54	08:05 (55)	18:50	18	18:00	16:28	16:33	
30	05:49	19:31 (54)	06:24	07:11 (55)	07:00	07:11 (55)	07:00	07:38	07:48			
	20:33	34	20:05 (54)	19:45	54	08:05 (55)	18:49	17	17:58	16:28	16:34	
31	05:50	19:31 (54)	06:26	07:11 (55)	07:01	07:11 (55)	07:01	07:39	07:50			
	20:32	33	20:04 (54)	19:44	53	08:04 (55)	18:48	17	17:57	16:27	16:35	
Potential sun hours	469		434		376		341		290		277	
Total, worst case	1124		1252		576							
Sun reduction	0.63		0.59		0.54							
Oper. time red.	1.00		1.00		1.00							
Wind dir. red.	0.51		0.57		0.58							
Total reduction	0.32		0.34		0.32							
Total, real	363		426		182							

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 71

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-190 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (110)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:37	07:23 17:14	15:39 (06) 16:27 (06)	06:43 17:52	07:12 (41) 06:47 07:41 (41)	06:57 20:06
2	07:40 16:37	07:22 17:15	15:39 (06) 16:27 (06)	06:41 17:53	07:13 (41) 06:46 07:41 (41)	05:56 19:09 (04) 20:07
3	07:40 16:38	07:21 17:17	15:38 (06) 16:27 (06)	06:40 17:55	07:13 (41) 06:44 07:40 (41)	05:54 19:08 (04) 20:41
4	07:40 16:39	07:20 17:18	15:39 (06) 16:27 (06)	06:38 17:56	07:13 (41) 06:42 07:39 (41)	05:53 19:09 (04) 20:42
5	07:40 16:40	07:19 17:19	15:39 (06) 16:27 (06)	06:36 17:57	07:13 (41) 06:40 07:37 (41)	05:52 19:10 (04) 20:43
6	07:40 16:41	07:17 17:21	15:40 (06) 16:28 (06)	06:34 17:59	07:15 (41) 06:38 07:36 (41)	05:50 19:11 (04) 20:44
7	07:40 16:42	07:16 17:22	15:40 (06) 16:27 (06)	06:33 18:00	07:16 (41) 06:37 07:34 (41)	05:49 19:12 (04) 20:44
8	07:39 16:43	07:15 15:54 (06)	15:40 (06) 16:27 (06)	07:31 19:01	08:18 (41) 06:35 08:31 (41)	05:48 19:14 (04) 20:45
9	07:39 16:44	07:14 16:01 (06)	15:41 (06) 16:27 (06)	07:29 19:02	06:33 19:41	05:46 19:17 (04) 20:46
10	07:39 16:46	07:12 16:03 (06)	15:41 (06) 16:26 (06)	07:27 19:04	06:31 19:42	05:45 20:16 7 19:24 (04)
11	07:39 16:47	07:11 16:06 (06)	15:43 (06) 16:26 (06)	07:26 19:05	06:30 19:43	05:44 20:17 20:46
12	07:38 16:48	07:09 16:08 (06)	15:43 (06) 16:24 (06)	07:24 19:06	06:28 19:44	05:43 20:19 20:47
13	07:38 16:49	07:08 16:09 (06)	15:44 (06) 16:24 (06)	07:22 19:08	06:26 19:46	05:41 20:20 20:48
14	07:37 16:50	07:07 16:11 (06)	15:46 (06) 16:24 (06)	07:20 19:09	06:24 19:47	05:40 20:21 20:49
15	07:37 16:51	07:05 16:12 (06)	15:47 (06) 16:22 (06)	07:18 19:10	06:23 19:48	05:39 20:22 20:50
16	07:36 16:53	07:04 16:13 (06)	15:49 (06) 16:21 (06)	07:17 19:11	06:21 19:49	05:38 20:24 20:51
17	07:36 16:54	07:02 16:15 (06)	15:50 (06) 16:19 (06)	07:15 19:13	06:19 19:50	05:37 20:25 20:52
18	07:35 16:55	07:01 16:16 (06)	07:25 (41) 16:16 (06)	07:13 19:14	06:18 19:52	05:36 20:26 20:50
19	07:35 16:56	06:59 16:17 (06)	07:21 (41) 16:14 (06)	07:11 19:15	06:16 19:53	05:35 19:18 (04) 20:27
20	07:34 16:58	06:58 16:19 (06)	07:18 (41) 16:10 (06)	07:09 19:16	06:14 19:54	05:34 19:15 (04) 20:28
21	07:33 16:59	06:56 16:20 (06)	07:17 (41) 16:08 (06)	07:08 19:17	06:13 19:55	05:33 19:13 (04) 20:29
22	07:33 17:00	06:55 16:21 (06)	07:16 (41) 16:07 (06)	07:06 19:19	06:11 19:56	05:32 19:11 (04) 20:30
23	07:32 17:02	06:53 16:21 (06)	07:14 (41) 16:07 (06)	07:04 19:20	06:09 19:58	05:31 19:11 (04) 20:31
24	07:31 17:03	06:51 16:23 (06)	07:14 (41) 16:07 (06)	07:02 19:21	06:08 19:59	05:30 19:09 (04) 20:32
25	07:30 17:04	06:50 16:23 (06)	07:13 (41) 16:07 (06)	07:00 19:22	06:06 20:00	05:29 19:08 (04) 20:33
26	07:29 17:06	06:48 16:23 (06)	07:12 (41) 16:06 (06)	06:58 19:24	06:05 20:00	05:28 19:08 (04) 20:34
27	07:28 17:07	06:46 16:24 (06)	07:13 (41) 16:05 (06)	06:57 19:25	06:03 20:01	05:27 19:08 (04) 20:35
28	07:27 17:08	06:45 16:25 (06)	07:12 (41) 16:05 (06)	06:55 19:26	06:02 20:03	05:26 19:08 (04) 20:36
29	07:26 17:10	06:43 16:25 (06)	06:53 16:05 (06)	06:53 19:27	06:00 20:04	05:25 19:08 (04) 20:37
30	07:25 17:11	06:41 16:26 (06)	06:51 16:05 (06)	06:51 19:29	05:59 20:05	05:24 19:07 (04) 20:38
31	07:24 17:13	06:39 16:26 (06)	06:49 16:05 (06)	06:49 19:30	05:57 20:05	05:23 19:34 (04) 20:39
Potential sun hours	289	293	369	403	457	463
Total, worst case	806	1037	1424	710	173	
Sun reduction	0.33	0.39	0.47	0.49	0.55	
Oper. time red.	1.00	1.00	1.00	1.00	1.00	
Wind dir. red.	0.73	0.68	0.55	0.55	0.52	
Total reduction	0.25	0.27	0.27	0.28	0.29	
Total, real	200	282	379	197	51	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 72

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-190 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (110)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25 20:52	05:52 20:31	06:27 19:42	07:01 18:47	07:32 (48) 16:40	15:11 (06) 07:19
2	05:25 20:52	05:53 20:30	06:28 19:40	18:26 (05) 18:30 (05)	07:03 18:45	15:10 (06) 16:28
3	05:26 20:52	05:54 20:28	06:29 19:38	18:20 (05) 18:35 (05)	07:04 18:43	15:10 (06) 16:28
4	05:27 20:51	05:55 20:27	19:26 (04) 19:35 (04)	06:30 19:37	18:17 (05) 18:37 (05)	07:05 18:41
5	05:27 20:51	05:56 20:26	19:23 (04) 19:37 (04)	06:31 19:35	07:48 (48) 18:39 (05)	07:06 18:40
6	05:28 20:51	05:57 20:25	19:21 (04) 19:38 (04)	06:33 19:33	07:44 (48) 18:40 (05)	07:07 18:38
7	05:29 20:51	05:58 20:23	19:20 (04) 19:39 (04)	06:34 19:31	07:41 (48) 18:41 (05)	07:09 18:36
8	05:29 20:50	05:59 20:22	19:19 (04) 19:40 (04)	06:35 19:29	07:38 (48) 18:41 (05)	07:10 18:34
9	05:30 20:50	06:01 20:21	19:18 (04) 19:41 (04)	06:36 19:28	07:36 (48) 18:42 (05)	07:11 18:33
10	05:31 20:49	06:02 20:19	19:18 (04) 19:42 (04)	06:37 19:26	07:35 (48) 18:42 (05)	07:12 18:31
11	05:31 20:49	06:03 20:18	19:17 (04) 19:42 (04)	06:38 19:24	07:34 (48) 18:43 (05)	07:14 18:29
12	05:32 20:48	06:04 20:16	19:16 (04) 19:43 (04)	06:39 19:22	07:33 (48) 18:43 (05)	07:15 18:27
13	05:33 20:48	06:05 20:15	19:16 (04) 19:43 (04)	06:41 19:20	07:31 (48) 18:42 (05)	07:16 18:26
14	05:34 20:47	06:06 20:13	19:16 (04) 19:42 (04)	06:42 19:18	07:30 (48) 18:42 (05)	07:17 18:24
15	05:35 20:47	06:07 20:12	19:15 (04) 19:42 (04)	06:43 19:17	07:29 (48) 18:41 (05)	07:18 18:22
16	05:36 20:46	06:09 20:10	19:15 (04) 19:42 (04)	06:44 19:15	07:28 (48) 18:41 (05)	07:20 18:20
17	05:37 20:45	06:10 20:09	19:15 (04) 19:41 (04)	06:45 19:13	07:28 (48) 18:40 (05)	07:21 18:19
18	05:37 20:45	06:11 20:07	19:15 (04) 19:41 (04)	06:46 19:11	07:27 (48) 18:39 (05)	07:22 18:17
19	05:38 20:44	06:12 20:06	19:15 (04) 19:40 (04)	06:47 19:09	07:27 (48) 18:39 (05)	07:23 18:15
20	05:39 20:43	06:13 20:04	19:16 (04) 19:39 (04)	06:49 19:07	07:27 (48) 18:38 (05)	07:25 18:14
21	05:40 20:42	06:14 20:02	19:17 (04) 19:38 (04)	06:50 19:05	07:27 (48) 18:36 (05)	07:26 18:12
22	05:41 20:41	06:15 20:01	19:18 (04) 19:36 (04)	06:51 19:04	07:26 (48) 18:35 (05)	07:27 18:11
23	05:42 20:40	06:17 19:58	19:20 (04) 19:34 (04)	06:52 19:02	07:26 (48) 18:33 (05)	07:29 18:09
24	05:43 20:39	06:18 19:56	19:22 (04) 19:31 (04)	06:53 19:00	07:26 (48) 18:30 (05)	07:30 18:07
25	05:44 20:38	06:19 19:54	06:54 18:58	07:26 (48) 18:27 (05)	07:31 18:27 (05)	07:12 18:06
26	05:45 20:37	06:20 19:52	06:56 18:56	07:28 (48) 18:24 (05)	07:33 18:24 (05)	07:13 18:04
27	05:46 20:36	06:21 19:51	06:57 18:54	07:28 (48) 18:22 (05)	07:34 18:22 (05)	07:14 18:03
28	05:47 20:35	06:22 19:49	06:58 18:52	07:29 (48) 18:20 (05)	07:35 18:20 (05)	07:15 18:01
29	05:48 20:34	06:23 19:47	06:59 18:51	07:30 (48) 18:18 (05)	07:36 18:18 (05)	07:17 18:00
30	05:50 20:33	06:25 19:46	07:00 18:49	07:31 (48) 18:17 (05)	07:38 18:17 (05)	07:18 18:00
31	05:51 20:32	06:26 19:44	07:00 18:48	07:31 (48) 18:16 (05)	07:39 18:16 (05)	07:19 18:00
Potential sun hours	469	434	376	342	290	277
Total, worst case		448	1654	812	1236	51
Sun reduction		0.59	0.54	0.44	0.27	0.25
Oper. time red.		1.00	1.00	1.00	1.00	1.00
Wind dir. red.		0.52	0.56	0.60	0.73	0.73
Total reduction		0.31	0.31	0.27	0.20	0.19
Total, real		141	515	221	251	10

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 73

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2 Shadow receptor: R-191 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (381)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40	07:23	06:43	06:47	05:57	05:25
	16:36	17:14	17:52	19:31	20:06	19 06:11 (39)
2	07:40	07:22	06:41	06:45	05:56	05:24
	16:37	17:15	17:53	19:32	20:07	21 06:12 (39)
3	07:40	07:21	06:40	06:44	05:54	05:24
	16:38	17:17	17:55	19:33	20:08	22 06:13 (39)
4	07:40	07:20	06:38	06:42	05:53	05:23
	16:39	17:18	17:56	19:35	20:10	23 06:13 (39)
5	07:40	07:19	06:36	06:40	05:51	05:23
	16:40	17:19	17:57	19:36	20:11	24 06:14 (39)
6	07:40	07:17	06:34	06:38	05:50	05:22
	16:41	17:21	17:58	19:37	20:12	25 06:15 (39)
7	07:40	07:16	06:33	06:37	05:49	05:22
	16:42	17:22	18:00	19:38	20:13	26 06:15 (39)
8	07:39	07:15	07:31	06:35	05:47	05:22
	16:43	17:23	19:01	19:39	20:14	27 06:16 (39)
9	07:39	07:13	07:29	06:33	06:54 (40)	05:46
	16:44	17:25	19:02	19:41	9 07:03 (40)	20:16
10	07:39	07:12	07:27	06:31	06:51 (40)	05:45
	16:45	17:26	19:04	19:42	14 07:05 (40)	20:17
11	07:39	07:11	07:26	06:29	06:49 (40)	05:44
	16:47	17:28	19:05	19:43	18 07:07 (40)	20:18
12	07:38	07:09	07:24	06:28	06:48 (40)	05:42
	16:48	17:29	19:06	19:44	20 07:08 (40)	20:19
13	07:38	07:08	07:22	06:26	06:46 (40)	05:41
	16:49	17:30	19:07	19:45	23 07:09 (40)	20:20
14	07:37	07:07	07:20	06:24	06:45 (40)	05:40
	16:50	17:32	19:09	19:47	24 07:09 (40)	20:21
15	07:37	07:05	07:18	06:23	06:45 (40)	05:39
	16:51	17:33	19:10	19:48	25 07:10 (40)	20:22
16	07:36	07:04	07:16	06:21	06:44 (40)	05:38
	16:52	17:35	19:11	19:49	26 07:10 (40)	20:24
17	07:36	07:02	07:15	06:19	06:43 (40)	05:37
	16:54	17:36	19:12	19:50	26 07:09 (40)	20:25
18	07:35	07:01	07:13	06:17	06:43 (40)	05:36
	16:55	17:37	19:14	19:52	27 07:10 (40)	20:26
19	07:35	06:59	07:11	06:16	06:43 (40)	05:35
	16:56	17:39	19:15	19:53	26 07:09 (40)	20:27
20	07:34	06:58	07:09	06:14	06:42 (40)	05:34
	16:58	17:40	19:16	19:54	26 07:08 (40)	20:28
21	07:33	06:56	07:07	06:13	06:43 (40)	05:33
	16:59	17:41	19:17	19:55	25 07:08 (40)	20:29
22	07:33	06:54	07:06	06:11	06:43 (40)	05:32
	17:00	17:43	19:19	19:56	23 07:06 (40)	20:30
23	07:32	06:53	07:04	06:09	06:45 (40)	05:31
	17:01	17:44	19:20	19:58	21 07:06 (40)	20:31
24	07:31	06:51	07:02	06:08	06:45 (40)	05:30
	17:03	17:45	19:21	19:59	19 07:04 (40)	20:32
25	07:30	06:50	07:00	06:06	06:47 (40)	05:29
	17:04	17:47	19:22	20:00	16 07:03 (40)	20:33
26	07:29	06:48	06:58	06:05	06:48 (40)	05:29
	17:06	17:48	19:24	20:00	12 07:00 (40)	20:34
27	07:28	06:46	06:56	06:03	06:53 (40)	05:28
	17:07	17:49	19:25	20:01	3 06:56 (40)	20:35
28	07:27	06:45	06:55	06:02	05:27	05:57 (39)
	17:08	17:51	19:26	20:02	8 06:05 (39)	20:36
29	07:26	06:44	06:54	06:00	05:27	05:55 (39)
	17:10	17:53	19:27	20:04	12 06:07 (39)	20:37
30	07:25	06:43	06:53	05:59	05:26	05:54 (39)
	17:11	17:54	19:28	20:05	15 06:09 (39)	20:38
31	07:24	06:42	06:52	05:58	05:25	05:52 (39)
	17:12	17:55	19:29	20:06	18 06:10 (39)	20:39
Potential sun hours	288	293	369	403	457	463
Total, worst case				383	53	830
Sun reduction				0.49	0.55	0.59
Oper. time red.				1.00	1.00	1.00
Wind dir. red.				0.61	0.71	0.71
Total reduction				0.30	0.39	0.42
Total, real				115	21	345

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 74

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-191 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (381)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25	05:53 (39)	05:52	06:27	06:48 (40)	07:01
	29	06:22 (39)	20:31	19:42	18	07:06 (40)
2	05:25	05:53 (39)	05:53	06:28	06:50 (40)	07:03
	28	06:21 (39)	20:30	19:40	14	07:04 (40)
3	05:26	05:54 (39)	05:54	06:29	06:52 (40)	07:04
	28	06:22 (39)	20:28	19:38	9	07:01 (40)
4	05:26	05:54 (39)	05:55	06:30	07:05	06:44
	27	06:21 (39)	20:27	19:37	18	07:06
5	05:27	05:55 (39)	05:56	06:31	07:06	06:46
	26	06:21 (39)	20:26	19:35	18	07:07
6	05:28	05:56 (39)	05:57	06:32	07:07	06:47
	25	06:21 (39)	20:25	19:33	18	07:09
7	05:28	05:56 (39)	05:58	06:34	07:09	06:48
	24	06:20 (39)	20:23	19:31	18	07:10
8	05:29	05:57 (39)	05:59	06:35	07:10	06:50
	23	06:20 (39)	20:22	19:29	18	07:11
9	05:30	05:58 (39)	06:00	06:36	07:11	06:51
	22	06:20 (39)	20:21	19:28	18	07:12
10	05:31	05:59 (39)	06:02	06:37	07:12	06:52
	21	06:20 (39)	20:19	19:26	18	07:13
11	05:31	05:59 (39)	06:03	06:38	07:13	06:54
	20	06:19 (39)	20:18	19:24	18	07:15
12	05:32	06:00 (39)	06:04	06:39	07:15	06:55
	18	06:18 (39)	20:16	19:22	18	07:16
13	05:33	06:02 (39)	06:05	06:40	07:16	06:56
	16	06:18 (39)	20:15	19:20	18	07:17
14	05:34	06:03 (39)	06:06	06:42	07:17	06:58
	14	06:17 (39)	20:13	19:18	18	07:18
15	05:35	06:04 (39)	06:07	06:43	07:18	06:59
	10	06:14 (39)	20:12	19:16	18	07:20
16	05:35	06:08 (39)	06:08	06:44	07:20	07:00
	3	06:11 (39)	20:10	6	07:04 (40)	19:15
17	05:36	06:10	06:09	06:45	07:21	07:02
	20	06:09	13	07:07 (40)	19:13	18:19
18	05:37	06:11	06:52 (40)	06:46	07:22	07:03
	20	06:07	17	07:09 (40)	19:11	18:17
19	05:38	06:12	06:51 (40)	06:47	07:23	07:04
	20	06:06	19	07:10 (40)	19:09	18:15
20	05:39	06:13	06:49 (40)	06:49	07:25	07:05
	20	06:04	22	07:11 (40)	19:07	18:14
21	05:40	06:14	06:48 (40)	06:50	07:26	07:07
	20	06:02	23	07:11 (40)	19:05	18:12
22	05:41	06:15	06:48 (40)	06:51	07:27	07:08
	20	06:01	25	07:13 (40)	19:03	18:10
23	05:42	06:16	06:47 (40)	06:52	07:29	07:09
	20	06:00	26	07:13 (40)	19:02	18:09
24	05:43	06:18	06:47 (40)	06:53	07:30	07:11
	20	06:01	26	07:13 (40)	19:00	18:07
25	05:44	06:19	06:46 (40)	06:54	07:31	07:12
	20	06:00	26	07:12 (40)	18:58	18:06
26	05:45	06:20	06:46 (40)	06:55	07:32	07:13
	20	06:01	26	07:12 (40)	18:56	18:04
27	05:46	06:21	06:46 (40)	06:57	07:34	07:14
	20	06:02	25	07:11 (40)	18:54	18:03
28	05:47	06:22	06:45 (40)	06:58	07:35	07:15
	20	06:03	26	07:11 (40)	18:52	18:01
29	05:48	06:23	06:46 (40)	06:59	07:36	07:17
	20	06:04	24	07:10 (40)	18:50	18:00
30	05:49	06:24	06:46 (40)	07:00	07:38	07:18
	20	06:05	23	07:09 (40)	18:49	17:58
31	05:50	06:26	06:47 (40)	07:01	07:39	07:19
	20	06:06	20	07:07 (40)	18:47	17:57
Potential sun hours	469	434	376	342	290	277
Total, worst case	334	347	41			
Sun reduction	0.63	0.59	0.54			
Oper. time red.	1.00	1.00	1.00			
Wind dir. red.	0.71	0.61	0.61			
Total reduction	0.44	0.36	0.33			
Total, real	148	125	14			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 75

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-192 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (111)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	05:57 20:06	06:57 (38) 19:21 (29)	05:25 20:40
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	05:56 20:07	06:59 (38) 19:19 (29)	05:24 20:40
3	07:40 16:38	07:21 17:17	06:40 17:55	06:44 19:33	05:54 20:08	18:56 (29) 19:18 (29)	05:24 20:41
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:35	05:53 20:10	18:58 (29) 19:17 (29)	05:23 20:42
5	07:40 16:40	07:19 17:19	06:36 17:57	06:40 19:36	05:51 20:11	18:59 (29) 19:14 (29)	05:23 20:43
6	07:40 16:41	07:17 17:21	06:34 17:58	06:38 19:37	05:50 20:12	19:02 (29) 19:12 (29)	05:22 20:44
7	07:40 16:42	07:16 17:22	06:33 18:00	06:37 19:38	07:05 (38) 07:15 (38)	05:49 20:13	05:22 20:44
8	07:39 16:43	07:15 17:23	07:31 19:01	06:35 19:39	07:02 (38) 07:20 (38)	05:47 20:14	05:22 20:45
9	07:39 16:44	07:13 17:25	07:29 19:02	06:33 19:41	06:59 (38) 07:21 (38)	05:46 20:16	05:21 20:46
10	07:39 16:45	07:12 17:26	07:27 19:04	06:31 19:42	06:57 (38) 07:22 (38)	05:45 20:17	05:21 20:46
11	07:39 16:47	07:11 17:28	07:26 19:05	06:29 19:43	06:55 (38) 07:23 (38)	05:44 20:18	05:21 20:47
12	07:38 16:48	07:09 17:29	07:24 19:06	06:28 19:44	06:55 (38) 07:25 (38)	05:42 20:19	05:21 20:47
13	07:38 16:49	07:08 17:30	07:22 19:07	06:26 19:45	06:53 (38) 07:45 (39)	05:41 20:20	05:21 20:48
14	07:37 16:50	07:07 17:32	07:20 19:09	06:24 19:47	06:52 (38) 07:44 (39)	05:40 20:21	05:21 20:48
15	07:37 16:51	07:05 17:33	07:18 19:10	06:23 19:48	06:52 (38) 07:44 (39)	05:39 20:22	05:21 20:49
16	07:36 16:52	07:04 17:35	07:17 19:11	06:21 19:49	06:51 (38) 07:44 (39)	05:38 20:24	05:21 20:49
17	07:36 16:54	07:02 17:36	07:15 19:12	06:19 19:50	06:50 (38) 07:44 (39)	05:37 20:25	05:21 20:50
18	07:35 16:55	07:01 17:37	07:13 19:14	06:17 19:52	06:50 (38) 07:44 (39)	05:36 20:26	05:21 20:50
19	07:35 16:56	06:59 17:39	07:11 19:15	06:16 19:53	06:49 (38) 07:45 (39)	05:35 20:27	05:21 20:51
20	07:34 16:58	06:58 17:40	07:09 19:16	06:14 19:54	06:49 (38) 07:46 (39)	05:34 20:28	05:21 20:51
21	07:33 16:59	06:56 17:41	07:07 19:17	06:13 19:55	06:49 (38) 07:47 (39)	05:33 20:29	05:21 20:51
22	07:33 17:00	06:54 17:43	07:06 19:19	06:11 19:56	06:49 (38) 07:50 (39)	05:32 20:30	05:21 20:51
23	07:32 17:01	06:53 17:44	07:04 19:20	06:09 19:58	06:50 (38) 07:50 (39)	05:31 20:31	05:22 20:52
24	07:31 17:03	06:51 17:45	07:02 19:21	06:08 19:59	06:49 (38) 07:50 (39)	05:30 20:32	05:22 20:52
25	07:30 17:04	06:50 17:47	07:00 19:22	06:06 20:00	06:50 (38) 07:51 (39)	05:29 20:33	05:22 20:52
26	07:29 17:06	06:48 17:48	06:58 19:24	06:05 20:00	06:51 (38) 07:52 (39)	05:29 20:34	05:22 20:52
27	07:28 17:07	06:46 17:49	06:56 19:25	06:03 20:01	06:52 (38) 07:53 (39)	05:28 20:35	05:23 20:52
28	07:27 17:08	06:45 17:51	06:55 19:26	06:02 20:02	06:52 (38) 07:54 (39)	05:27 20:36	05:23 20:52
29	07:26 17:10		06:53 19:27	06:00 20:04	06:54 (38) 07:55 (39)	05:27 20:37	05:24 20:52
30	07:25 17:11		06:51 19:28	05:59 20:05	06:55 (38) 07:56 (39)	05:26 20:38	05:24 20:52
31	07:24 17:12		06:49 19:30		05:25 20:39		
Potential sun hours	288	293	369	403	457		463
Total, worst case			342	1216	142		
Sun reduction			0.47	0.49	0.55		
Oper. time red.			1.00	1.00	1.00		
Wind dir. red.			0.53	0.57	0.54		
Total reduction			0.25	0.28	0.29		
Total, real			85	340	42		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:  
**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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 3/21/2011 2:14 PM / 76  
 Licensed user:  
**EDR**  
 217 Montgomery St.  
 US-SYRACUSE, NY 13202  
 (315) 471 0688  
 Steve Curtis, scurtis@edrpc.com  
 Calculated:  
 3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-192 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (111)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []  
 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25  
 Operational time  
 N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
 438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
 Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December	
1	05:25 20:52	05:52 20:31	06:27 19:42	06:54 (38) 07:22 (38)	07:01 18:47	07:25 (39) 16:56	07:19 16:28
2	05:25 20:52	05:53 20:30	06:28 19:40	06:56 (38) 07:21 (38)	07:03 18:45	07:25 (39) 16:54	07:20 16:27
3	05:26 20:52	05:54 20:28	06:29 19:38	06:57 (38) 07:19 (38)	07:04 18:43	07:27 (39) 16:53	06:43 16:27
4	05:26 20:51	05:55 20:27	06:30 19:37	06:59 (38) 07:17 (38)	07:05 18:41	07:27 (39) 16:52	06:44 16:27
5	05:27 20:51	05:56 20:26	06:31 19:35	07:02 (38) 07:13 (38)	07:06 18:40	07:29 (39) 16:50	06:46 16:27
6	05:28 20:51	05:57 20:25	06:32 19:33	07:07 18:38	07:07 16:49	07:31 (39) 16:49	06:47 16:26
7	05:28 20:51	05:58 20:23	19:11 (29) 19:22 (29)	06:34 19:31	07:09 18:36	07:09 16:48	06:48 16:26
8	05:29 20:50	05:59 20:22	19:08 (29) 19:25 (29)	06:35 19:29	07:10 18:34	07:10 16:46	06:50 16:26
9	05:30 20:50	06:00 20:21	19:06 (29) 19:26 (29)	06:36 19:28	07:11 18:32	06:51 16:45	07:27 16:26
10	05:31 20:49	06:02 20:19	19:05 (29) 19:27 (29)	06:37 19:26	07:12 18:31	06:52 16:44	07:28 16:26
11	05:31 20:49	06:03 20:18	07:07 (38) 19:28 (29)	06:38 19:24	07:13 18:29	06:54 16:43	07:29 16:26
12	05:32 20:48	06:04 20:16	07:05 (38) 19:30 (29)	06:39 19:22	07:15 18:27	06:55 16:42	07:30 16:26
13	05:33 20:48	06:05 20:15	07:03 (38) 19:30 (29)	06:40 19:20	07:16 18:25	06:56 16:41	07:31 16:26
14	05:34 20:47	06:06 20:13	07:01 (38) 19:31 (29)	06:42 19:18	07:17 18:24	06:58 16:40	07:32 16:26
15	05:35 20:47	06:07 20:12	07:00 (38) 19:31 (29)	06:43 19:16	07:18 18:22	06:59 16:39	07:32 16:27
16	05:35 20:46	06:08 20:10	06:58 (38) 19:31 (29)	06:44 19:15	07:20 18:20	07:00 16:38	07:33 16:27
17	05:36 20:45	06:10 20:09	06:57 (38) 19:31 (29)	06:45 19:13	07:21 18:19	07:02 16:37	07:34 16:27
18	05:37 20:44	06:11 20:07	06:56 (38) 19:31 (29)	06:46 19:11	07:22 18:17	07:03 16:36	07:34 16:27
19	05:38 20:44	06:12 20:06	06:55 (38) 19:31 (29)	06:47 19:09	07:23 18:15	07:04 16:35	07:35 16:28
20	05:39 20:43	06:13 20:04	06:54 (38) 19:30 (29)	06:49 19:07	07:25 18:14	07:05 16:34	07:36 16:28
21	05:40 20:42	06:14 20:02	06:54 (38) 19:30 (29)	06:50 19:05	07:26 18:12	07:07 16:34	07:36 16:29
22	05:41 20:41	06:15 20:01	06:54 (38) 19:30 (29)	06:51 19:03	07:27 18:10	07:08 16:33	07:37 16:29
23	05:42 20:40	06:16 19:57	06:54 (38) 19:29 (29)	06:52 19:02	07:29 18:09	07:09 16:32	07:37 16:30
24	05:43 20:39	06:18 19:56	06:53 (38) 19:28 (29)	06:53 19:00	07:30 18:07	07:11 16:31	07:38 16:30
25	05:44 20:38	06:19 19:54	06:53 (38) 19:27 (29)	06:54 18:58	07:31 18:06	07:12 16:31	07:38 16:31
26	05:45 20:37	06:20 19:52	06:53 (38) 19:26 (29)	06:55 18:56	07:32 18:04	07:13 16:30	07:38 16:31
27	05:46 20:36	06:21 19:51	06:53 (38) 19:24 (29)	06:57 18:54	07:33 18:03	07:14 16:30	07:39 16:32
28	05:47 20:35	06:22 19:49	06:53 (38) 19:23 (29)	06:58 18:52	07:35 18:01	07:15 16:29	07:39 16:33
29	05:48 20:34	06:23 19:47	06:53 (38) 19:20 (29)	06:59 18:50	07:36 18:00	07:17 16:29	07:39 16:34
30	05:49 20:33	06:24 19:45	06:53 (38) 19:17 (29)	07:00 18:49	07:37 17:58	07:18 16:28	07:40 16:34
31	05:50 20:32	06:26 19:44	06:53 (38) 07:24 (38)		07:39 17:57		07:40 16:35
Potential sun hours	469	434	376	342	290	277	
Total, worst case		1268	343	109			
Sun reduction		0.59	0.54	0.44			
Oper. time red.		1.00	1.00	1.00			
Wind dir. red.		0.56	0.55	0.53			
Total reduction		0.33	0.30	0.23			
Total, real		421	102	25			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)



Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

### SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-193 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (112)

#### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December								
1	07:40	07:23	06:43	07:27 (39)	06:47	07:38 (38)	05:57	05:25	05:25	05:52	06:27	07:50 (38)	07:01	07:44 (38)	06:40	07:19				
	16:36	17:14	17:52	07:50 (39)	19:31	19:00 (29)	20:06	20:40	20:52	20:31	19:42	10	08:00 (38)	18:47	16:56	16:28				
2	07:40	07:22	06:41	07:29 (39)	06:45	07:38 (38)	05:56	05:24	05:25	05:53	06:28	07:46 (38)	07:03	07:46 (38)	06:42	07:20				
	16:37	17:15	17:53	07:50 (39)	19:32	18:59 (29)	20:07	20:40	20:52	20:30	19:40	19	08:05 (38)	18:45	16:54	16:27				
3	07:40	07:21	06:40	07:30 (39)	06:44	07:39 (38)	05:54	05:24	05:26	05:54	06:29	07:43 (38)	07:04		06:43	07:21				
	16:38	17:17	17:55	07:47 (39)	19:33	18:59 (29)	20:08	20:41	20:52	20:28	19:38	24	08:07 (38)	18:43	16:53	16:27				
4	07:40	07:20	06:38	07:32 (39)	06:42	07:39 (38)	05:53	05:23	05:26	05:55	06:30	07:41 (38)	07:05		06:44	07:22				
	16:39	17:18	17:56	07:44 (39)	19:35	18:58 (29)	20:10	20:42	20:51	20:27	19:37	28	08:09 (38)	18:41	16:51	16:27				
5	07:40	07:19	06:36		06:40	07:40 (38)	05:51	05:23	05:27	05:56	06:31	07:39 (38)	07:06		06:46	07:23				
	16:40	17:19	17:57		19:36	18:56 (29)	20:11	20:43	20:51	20:26	19:35	43	18:48 (29)	18:40	16:50	16:27				
6	07:40	07:17	06:34		06:38	07:41 (38)	05:50	05:22	05:28	05:57	06:32	07:37 (38)	07:07		06:47	07:24				
	16:41	17:21	17:58		19:37	18:51 (29)	20:12	20:44	20:51	20:25	19:33	50	18:50 (29)	18:38	16:49	16:26				
7	07:40	07:16	06:33		06:37	07:41 (38)	05:49	05:22	05:28	05:58	06:34	07:35 (38)	07:09		06:48	07:25				
	16:42	17:22	18:00		19:38	18:51 (29)	20:13	20:44	20:51	20:23	19:31	56	18:51 (29)	18:36	16:48	16:26				
8	07:39	07:15	06:31		06:35	07:44 (38)	05:47	05:22	05:29	05:59	06:35	07:34 (38)	07:10		06:50	07:26				
	16:43	17:23	18:01		19:39	18:52 (29)	20:14	20:45	20:50	20:22	19:29	61	18:52 (29)	18:34	16:46	16:26				
9	07:39	07:13	06:29		06:33	07:45 (38)	05:46	05:21	05:30	06:00	06:36	07:32 (38)	07:11	08:09 (39)	06:51	07:27				
	16:44	17:25	18:02		19:41	18:58 (29)	20:16	20:46	20:50	20:21	19:28	65	18:52 (29)	18:32	7	08:16 (39)	16:45	16:26		
10	07:39	07:12	06:27		06:31	07:47 (38)	05:45	05:21	05:30	06:02	06:37	07:31 (38)	07:12	08:05 (39)	06:52	07:28				
	16:45	17:26	18:04		19:42	19:06 (38)	20:17	20:46	20:49	20:19	19:26	67	18:52 (29)	18:31	15	08:20 (39)	16:44	16:26		
11	07:39	07:11	06:26		06:29	07:51 (38)	05:44	05:21	05:31	06:03	06:38	07:30 (38)	07:13	08:03 (39)	06:54	07:29				
	16:46	17:28	18:05		19:43	18:51 (29)	20:18	20:47	20:49	20:18	19:24	70	18:52 (29)	18:29	19	08:22 (39)	16:43	16:26		
12	07:38	07:09	06:24		06:28	08:01 (38)	05:42	05:21	05:32	06:04	06:39	07:30 (38)	07:15	08:01 (39)	06:55	07:30				
	16:48	17:29	18:06		19:44		20:19	20:47	20:48	20:16	19:22	71	18:53 (29)	18:27	23	08:24 (39)	16:42	16:26		
13	07:38	07:08	06:22	07:35 (39)	07:22	07:59 (38)	06:26	05:41	05:21	05:33	06:05	06:40	07:16	07:59 (39)	06:56	07:31				
	16:49	17:30	18:07	11	07:46 (39)	19:07	08:13 (38)	19:45	20:20	20:48	20:48	20:15	19:20	73	18:53 (29)	18:25	25	08:24 (39)	16:41	16:26
14	07:37	07:07	06:20	07:32 (39)	07:20	07:55 (38)	06:24	05:40	05:21	05:34	06:06	06:42	07:17	07:58 (39)	06:58	07:32				
	16:50	17:32	18:09	16	07:48 (39)	19:09	08:16 (38)	19:47	20:21	20:48	20:47	20:13	19:18	71	18:52 (29)	18:24	27	08:25 (39)	16:40	16:26
15	07:37	07:05	06:18	07:30 (39)	07:18	07:52 (38)	06:23	05:39	05:21	05:35	06:07	06:43	07:18	07:58 (39)	06:59	07:32				
	16:51	17:33	18:10	21	07:51 (39)	19:10	08:18 (38)	19:48	20:22	20:49	20:47	20:12	19:16	72	18:51 (29)	18:22	28	08:26 (39)	16:39	16:27
16	07:36	07:04	06:17	07:28 (39)	07:17	07:50 (38)	06:21	05:38	05:21	05:35	06:08	06:44	07:20	07:57 (39)	07:00	07:33				
	16:52	17:35	18:12	23	07:51 (39)	19:11	08:21 (38)	19:49	20:24	20:49	20:46	20:10	19:15	72	18:50 (29)	18:20	29	08:26 (39)	16:38	16:27
17	07:36	07:02	06:15	07:28 (39)	07:15	07:48 (38)	06:19	05:37	05:21	05:36	06:10	06:45	07:20	07:56 (39)	07:02	07:34				
	16:54	17:36	18:13	25	07:53 (39)	19:12	08:22 (38)	19:50	20:25	20:50	20:45	20:09	19:13	69	18:49 (29)	18:19	30	08:26 (39)	16:37	16:27
18	07:35	07:01	06:14	07:26 (39)	07:13	07:46 (38)	06:17	05:36	05:21	05:37	06:11	06:46	07:20	07:56 (39)	07:03	07:34				
	16:55	17:37	18:14	27	07:53 (39)	19:14	08:23 (38)	19:52	20:26	20:50	20:44	20:07	19:11	68	18:48 (29)	18:17	31	08:27 (39)	16:36	16:27
19	07:35	06:59	06:11	07:26 (39)	07:11	07:45 (38)	06:16	05:35	05:21	05:38	06:12	06:47	07:23	07:56 (39)	07:04	07:35				
	16:56	17:39	18:16	29	07:55 (39)	19:15	08:24 (38)	19:53	20:27	20:51	20:44	20:06	19:09	65	18:46 (29)	18:15	30	08:26 (39)	16:35	16:28
20	07:34	06:58	06:10	07:25 (39)	07:09	07:43 (38)	06:14	05:34	05:21	05:39	06:13	06:49	07:25	07:55 (39)	07:05	07:36				
	16:58	17:40	18:17	30	07:55 (39)	19:16	08:24 (38)	19:54	20:28	20:51	20:43	20:04	19:07	61	18:45 (29)	18:14	31	08:26 (39)	16:34	16:28
21	07:33	06:56	06:08	07:25 (39)	07:07	07:42 (38)	06:13	05:33	05:21	05:40	06:14	06:50	07:27	07:56 (39)	07:07	07:36				
	16:59	17:41	18:18	30	07:55 (39)	19:17	08:25 (38)	19:55	20:29	20:51	20:42	20:02	19:05	53	18:41 (29)	18:12	30	08:26 (39)	16:34	16:29
22	07:33	06:54	06:06	07:25 (39)	07:06	07:41 (38)	06:11	05:32	05:21	05:41	06:15	06:51	07:27	07:56 (39)	07:08	07:37				
	17:00	17:43	18:20	30	07:55 (39)	19:19	08:24 (38)	19:56	20:30	20:51	20:41	20:01	19:03	43	08:10 (38)	18:10	29	08:25 (39)	16:33	16:29
23	07:32	06:53	06:05	07:24 (39)	07:04	07:41 (38)	06:09	05:31	05:22	05:42	06:16	06:52	07:28	07:56 (39)	07:09	07:37				
	17:01	17:44	18:21	31	07:55 (39)	19:20	08:28 (38)	19:58	20:31	20:52	20:40	19:57	19:02	41	08:09 (38)	18:09	28	08:24 (39)	16:32	16:30
24	07:31	06:51	06:03	07:23 (39)	07:02	07:40 (38)	06:08	05:30	05:22	05:43	06:18	06:53	07:28	07:56 (39)	07:11	07:38				
	17:03	17:45	18:22	30	07:55 (39)	19:21	08:29 (38)	19:59	20:32	20:52	20:39	19:56	19:00	40	08:08 (38)	18:07	27	08:24 (39)	16:31	16:30
25	07:30	06:50	06:02	07:25 (39)	07:00	07:39 (38)	06:06	05:29	05:22	05:44	06:19	06:54	07:29	07:58 (39)	07:12	07:38				
	17:04	17:47	18:24	29	07:54 (39)	19:22	08:28 (38)	19:58	20:33	20:52	20:38	19:54	18:58	37	08:06 (38)	18:06	24	08:22 (39)	16:31	16:31
26	07:29	06:48	06:00	07:25 (39)	06:58	07:39 (38)	06:05	05:29	05:22	05:45	06:20	06:55	07:29	07:59 (39)	07:13	07:38				
	17:05	17:48	18:25	28	07:53 (39)	19:24	08:28 (38)	19:58	20:34	20:52	20:37	19:52	18:56	35	08:04 (38)	18:04	23	08:22 (39)	16:30	16:31
27	07:28	06:46	06:03	07:26 (39)	06:56	07:38 (38)	06:03	05:28	05:23	05:46	06:21	06:57	07:31	07:54 (39)	07:14	07:39				
	17:07	17:49	18:26	27	07:53 (39)	19:25	08:29 (38)	19:57	20:35	20:52	20:36	19:51	18:54	32	08:03 (38)	18:03	20	08:20 (39)	16:30	16:32
28	07:27	06:45	06:01	07:26 (39)	06:55	07:38 (38)	06:01	05:27	05:23	05:47	06:22	06:58	07:33	07:56 (39)	07:15	07:39				
	17:08	17:51	18:28	26	07:52 (39)	19:26	08:31 (38)	19:59	20:36	20:52	20:35	19:49	18:52	28	08:01 (38)	18:01	15	08:17 (39)	16:29	16:33
29	07:26		06:53		06:53	07:38 (38)	06:00	05:27	05:24	05:48	06:23	06:59	07:35	07:58 (39)	07:17	07:39				
	17:10		19:27		19:27	19:02 (29)	20:04	20:37	20:52	20:34	19:47	18:50	23	07:58 (38)	18:00	10	08:15 (39)	16:29	16:34	
30	07:25		06:51		06:51	07:38 (38)	05:59	05:26	05:24	05:49	06:24	07:00	07:37	07:58 (39)	07:38			07:18	16:40	
	17:11		19:28		19:28	19:02 (29)	20:05	20:38	20:52	20:33</										

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 78

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Steve Curtis, scurtis@edrpc.com
Calculated:

3/21/2011 11:14 AM/2.7.453

SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2 Shadow receptor: R-242 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (147)

Assumptions for shadow calculations

Maximum distance for influence 1,000 m
Minimum sun height over horizon for influence 3 °
Day step for calculation 1 days
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760
Idle start wind speed: Cut in wind speed from power curve

Table with 12 columns for months (January to December) and rows for each day of the month, showing sun rise/set times, shadow reduction, and operational time. Includes summary rows for 'Potential sun hours' and 'Total, worst case'.

Table layout: For each day in each month the following matrix apply

Day in month Sun rise (hh:mm) Sun set (hh:mm) Minutes with flicker First time (hh:mm) with flicker Last time (hh:mm) with flicker (WTG causing flicker first time) (WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

Printed/Page

3/21/2011 2:14 PM / 79

Licensed user:

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-243 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (367)

Assumptions for shadow calculations

Maximum distance for influence 1,000 m
Minimum sun height over horizon for influence 3 °
Day step for calculation 1 days
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760
Idle start wind speed: Cut in wind speed from power curve

Table with 12 columns for months (January to December) and rows for each day of the month. Columns contain start and end times for shadow. Summary rows at the bottom show total sun hours, reduction, and real values for each month.

Table layout: For each day in each month the following matrix apply

Matrix with 5 columns: Day in month, Sun rise (hh:mm), Sun set (hh:mm), Minutes with flicker, First time (hh:mm) with flicker, Last time (hh:mm) with flicker, (WTG causing flicker first time), (WTG causing flicker last time)

Project: **05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

Printed/Page  
3/21/2011 2:14 PM / 80

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**EDR**  
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US-SYRACUSE, NY 13202  
(315) 471 0688  
Steve Curtis, scurtis@edrpc.com  
Calculated:  
3/21/2011 11:14 AM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-319 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (216)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	05:57 20:06	05:25 20:40	06:00 (09) 20:52	05:51 20:31	06:27 19:42	07:01 18:47	06:40 16:56	07:19 16:28
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	05:56 20:07	05:24 20:40	06:00 (09) 20:52	05:53 20:30	06:28 19:40	07:03 18:45	06:42 16:54	07:20 16:27
3	07:40 16:38	07:21 17:16	06:40 17:55	06:44 19:33	05:54 20:08	05:24 20:41	06:00 (09) 20:52	05:54 20:28	06:29 19:38	07:04 18:43	06:43 16:53	07:21 16:27
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:35	05:53 20:10	05:23 20:42	06:00 (09) 20:51	05:55 20:27	06:30 19:37	07:05 18:41	06:44 16:51	07:22 16:27
5	07:40 16:40	07:19 17:19	06:36 17:57	06:40 19:36	05:51 20:11	05:23 20:43	06:00 (09) 20:51	05:56 20:26	06:31 19:35	07:06 18:40	06:46 16:50	07:23 16:26
6	07:40 16:41	07:17 17:21	06:34 17:58	06:38 19:37	05:50 20:12	05:22 20:44	06:00 (09) 20:51	05:57 20:25	06:32 19:33	07:07 18:38	06:47 16:49	07:24 16:26
7	07:40 16:42	07:16 17:22	06:33 18:00	06:36 19:38	05:49 20:13	05:22 20:44	06:00 (09) 20:51	05:58 20:23	06:34 19:31	07:09 18:36	06:48 16:48	07:25 16:26
8	07:39 16:43	07:15 17:23	07:31 19:01	06:35 19:39	05:47 20:14	05:22 20:45	06:00 (09) 20:50	05:59 20:22	06:35 19:29	07:10 18:34	06:50 16:46	07:26 16:26
9	07:39 16:44	07:13 17:25	07:29 19:02	06:33 19:41	05:46 20:16	05:21 20:46	06:00 (09) 20:50	06:00 (09) 20:21	06:36 19:28	07:11 18:32	06:51 16:45	07:27 16:26
10	07:39 16:45	07:12 17:26	07:27 19:04	06:31 19:42	05:45 20:17	05:21 20:46	06:00 (09) 20:49	06:02 (09) 20:19	06:37 (09) 19:26	07:12 (09) 18:31	06:52 (09) 16:44	07:28 (09) 16:26
11	07:39 16:46	07:11 17:28	07:26 19:05	06:29 19:43	05:44 20:18	05:21 20:47	06:00 (09) 20:49	06:03 (09) 20:18	06:38 (09) 19:24	07:13 (09) 18:29	06:54 (09) 16:43	07:29 (09) 16:26
12	07:38 16:48	07:09 17:29	07:24 19:06	06:28 19:44	05:42 20:19	05:21 20:47	06:01 (09) 20:48	06:04 (09) 20:16	06:39 (09) 19:22	07:15 (09) 18:27	06:55 (09) 16:42	07:30 (09) 16:26
13	07:38 16:49	07:08 17:30	07:22 19:07	06:26 19:45	05:41 20:20	05:21 20:48	06:00 (09) 20:48	06:05 (09) 20:15	06:40 (09) 19:20	07:16 (09) 18:25	06:56 (09) 16:41	07:31 (09) 16:26
14	07:37 16:50	07:07 17:32	07:20 19:09	06:24 19:47	05:40 20:21	05:21 20:49	06:00 (09) 20:47	06:06 (09) 20:13	06:42 (09) 19:18	07:17 (09) 18:24	06:58 (09) 16:40	07:32 (09) 16:26
15	07:37 16:51	07:05 17:33	07:18 19:10	06:23 19:48	05:39 20:22	05:21 20:49	06:00 (09) 20:47	06:07 (09) 20:12	06:43 (09) 19:16	07:18 (09) 18:22	06:59 (09) 16:39	07:32 (09) 16:27
16	07:36 16:52	07:04 17:35	07:17 19:11	06:21 19:49	05:38 20:24	05:21 20:49	06:00 (09) 20:46	06:08 (09) 20:10	06:44 (09) 19:15	07:20 (09) 18:20	07:00 (09) 16:38	07:33 (09) 16:27
17	07:36 16:54	07:02 17:36	07:15 19:12	06:19 19:50	05:37 20:25	05:21 20:50	06:00 (09) 20:45	06:09 (09) 20:09	06:45 (09) 19:13	07:21 (09) 18:19	07:02 (09) 16:37	07:34 (09) 16:27
18	07:35 16:55	07:01 17:37	07:13 19:14	06:17 19:52	05:36 20:26	05:21 20:50	06:01 (09) 20:45	06:11 (09) 20:07	06:46 (09) 19:11	07:22 (09) 18:17	07:03 (09) 16:36	07:34 (09) 16:27
19	07:35 16:56	06:59 17:39	07:11 19:15	06:16 19:53	05:35 20:27	05:21 20:51	06:02 (09) 20:44	06:12 (09) 20:06	06:47 (09) 19:09	07:23 (09) 18:15	07:04 (09) 16:35	07:35 (09) 16:28
20	07:34 16:57	06:58 17:40	07:09 19:16	06:14 19:54	05:34 20:28	05:21 20:51	06:03 (09) 20:43	06:13 (09) 20:04	06:49 (09) 19:07	07:25 (09) 18:14	07:06 (09) 16:34	07:36 (09) 16:28
21	07:33 16:59	06:56 17:41	07:07 19:17	06:12 19:55	05:33 20:29	05:21 20:51	06:04 (09) 20:42	06:14 (09) 20:02	06:50 (09) 19:05	07:26 (09) 18:12	07:07 (09) 16:33	07:36 (09) 16:29
22	07:33 17:00	06:54 17:43	07:06 19:19	06:11 19:56	05:32 20:30	05:21 20:51	06:02 (09) 20:41	06:15 (09) 20:01	06:51 (09) 19:03	07:27 (09) 18:10	07:08 (09) 16:33	07:37 (09) 16:29
23	07:32 17:01	06:53 17:44	07:04 19:20	06:09 19:58	05:31 20:31	05:21 20:52	06:03 (09) 20:40	06:16 (09) 19:57	06:52 (09) 19:02	07:29 (09) 18:09	07:09 (09) 16:32	07:37 (09) 16:30
24	07:31 17:03	06:51 17:45	07:02 19:21	06:08 19:59	05:30 20:32	05:22 20:52	06:03 (09) 20:39	06:17 (09) 19:56	06:53 (09) 19:00	07:30 (09) 18:07	07:11 (09) 16:31	07:38 (09) 16:30
25	07:30 17:04	06:50 17:47	07:00 19:22	06:06 20:00	05:29 20:33	05:22 20:52	06:02 (09) 20:38	06:19 (09) 19:54	06:54 (09) 18:58	07:31 (09) 18:06	07:12 (09) 16:31	07:38 (09) 16:31
26	07:29 17:05	06:48 17:48	06:58 19:24	06:05 20:00	05:29 20:34	05:22 20:52	06:03 (09) 20:37	06:21 (09) 19:52	06:55 (09) 18:56	07:32 (09) 18:04	07:13 (09) 16:30	07:38 (09) 16:31
27	07:28 17:07	06:46 17:49	06:56 19:25	06:03 20:01	05:28 20:35	05:23 20:52	06:03 (09) 20:36	06:23 (09) 19:51	06:57 (09) 18:54	07:34 (09) 18:03	07:14 (09) 16:30	07:39 (09) 16:32
28	07:27 17:08	06:45 17:51	06:55 19:26	06:01 20:02	05:27 20:36	05:23 20:52	06:03 (09) 20:35	06:27 (09) 19:49	06:58 (09) 18:52	07:35 (09) 18:01	07:15 (09) 16:29	07:39 (09) 16:33
29	07:26 17:10	06:53 19:27	07:06 20:04	06:00 20:26	05:26 20:37	05:24 20:52	06:04 (09) 20:34	06:23 (09) 19:47	06:59 (09) 18:50	07:36 (09) 18:00	07:17 (09) 16:29	07:39 (09) 16:34
30	07:25 17:11	06:51 19:28	07:05 20:05	05:58 20:26	05:26 20:38	05:24 20:52	06:04 (09) 20:33	06:24 (09) 19:45	07:00 (09) 18:49	07:38 (09) 17:58	07:18 (09) 16:28	07:40 (09) 16:34
31	07:24 17:12	06:49 19:30	07:04 20:39	05:57 20:42	05:25 20:49	05:24 20:52	06:00 (09) 20:32	06:26 (09) 19:44	07:01 (09) 17:57	07:39 (09) 17:57	07:19 (09) 16:28	07:40 (09) 16:35
Potential sun hours	288	293	369	403	457	463	469	434	376	342	290	277
Total, worst case					512	1366	1025					
Sun reduction					0.55	0.59	0.63					
Oper. time red.					1.00	1.00	1.00					
Wind dir. red.					0.69	0.69	0.69					
Total reduction					0.38	0.41	0.44					
Total, real					195	558	447					

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 81

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

### SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-35 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (357)

#### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December	
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	18:02 (55) 20:06	05:57 20:40	05:25 20:52	05:51 20:31	06:27 19:42	17:58 (55) 18:48 (55)	07:01 18:47	06:40 16:55	07:19 16:28
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	18:01 (55) 20:07	05:55 20:40	05:24 20:52	05:52 20:30	06:28 19:40	17:57 (55) 18:48 (55)	07:02 18:45	06:42 16:54	07:20 16:27
3	07:40 16:38	07:21 17:16	06:39 17:54	06:44 19:33	18:00 (55) 20:08	05:54 20:41	05:23 20:52	05:54 20:28	06:29 19:38	17:57 (55) 18:49 (55)	07:04 18:43	06:43 16:53	07:21 16:27
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:34	18:01 (55) 20:10	05:53 20:42	05:23 20:51	05:55 20:27	06:30 19:37	17:57 (55) 18:48 (55)	07:05 18:41	06:44 16:51	07:22 16:27
5	07:40 16:40	07:19 17:19	06:36 17:57	06:40 19:36	18:00 (55) 20:11	05:51 20:43	05:23 20:51	05:56 20:26	06:31 19:35	17:56 (55) 18:48 (55)	07:06 18:39	06:46 16:50	07:23 16:26
6	07:40 16:41	07:17 17:21	06:34 17:58	06:38 19:37	17:59 (55) 20:12	05:50 20:44	05:22 20:51	05:57 20:25	06:32 19:33	17:55 (55) 18:48 (55)	07:07 18:38	06:47 16:49	07:24 16:26
7	07:40 16:42	07:16 17:22	06:33 18:00	06:36 19:38	17:59 (55) 20:13	05:49 20:44	05:22 20:51	05:58 20:23	06:34 19:31	17:55 (55) 18:47 (55)	07:09 18:36	06:48 16:48	07:25 16:26
8	07:39 16:43	07:15 17:23	07:31 19:01	06:35 19:39	17:59 (55) 20:14	05:47 20:45	05:22 20:50	05:59 20:22	06:35 19:29	17:55 (55) 18:46 (55)	07:10 18:34	06:50 16:46	07:26 16:26
9	07:39 16:44	07:13 17:25	07:29 19:02	06:33 19:41	17:59 (55) 20:16	05:46 20:46	05:21 20:50	06:00 20:21	06:36 19:27	17:54 (55) 18:46 (55)	07:11 18:32	06:51 16:45	07:27 16:26
10	07:39 16:45	07:12 17:26	07:27 19:04	06:31 19:42	17:59 (55) 20:17	05:45 20:46	05:21 20:51	06:01 20:21	06:37 19:26	17:54 (55) 18:45 (55)	07:12 18:31	06:52 16:44	07:28 16:26
11	07:39 16:46	07:11 17:28	07:25 19:05	06:29 19:43	17:59 (55) 20:18	05:43 20:47	05:21 20:49	06:03 20:18	06:38 19:24	17:54 (55) 18:44 (55)	07:13 18:29	06:54 16:43	07:29 16:26
12	07:38 16:47	07:09 17:29	07:24 19:06	06:28 19:44	18:00 (55) 20:19	05:42 20:47	05:21 20:48	06:04 20:16	06:39 19:22	17:54 (55) 18:43 (55)	07:15 18:27	06:55 16:42	07:30 16:26
13	07:38 16:49	07:08 17:30	07:22 19:07	06:26 19:45	18:00 (55) 20:20	05:41 20:48	05:21 20:48	06:05 20:15	06:40 19:20	17:55 (55) 18:43 (55)	07:16 18:25	06:56 16:41	07:31 16:26
14	07:37 16:50	07:07 17:32	07:20 19:09	06:24 19:47	18:01 (55) 20:21	05:40 20:49	05:20 20:47	06:06 20:13	06:42 19:18	17:55 (55) 18:42 (55)	07:17 18:24	06:58 16:40	07:32 16:26
15	07:37 16:51	07:05 17:33	07:18 19:10	06:22 19:48	18:01 (55) 20:22	05:39 20:49	05:20 20:47	06:07 20:12	06:43 19:16	17:56 (55) 18:40 (55)	07:18 18:22	06:59 16:39	07:32 16:26
16	07:36 16:52	07:04 17:34	07:16 19:11	06:21 19:49	18:02 (55) 20:24	05:38 20:49	05:20 20:46	06:08 20:10	06:44 19:15	17:56 (55) 18:39 (55)	07:20 18:20	07:00 16:38	07:33 16:27
17	07:36 16:54	07:02 17:36	07:15 19:12	06:19 19:50	18:03 (55) 20:25	05:37 20:50	05:20 20:45	06:09 20:09	06:45 19:13	17:57 (55) 18:37 (55)	07:21 18:18	07:02 16:37	07:34 16:27
18	07:35 16:55	07:01 17:37	07:13 19:14	06:17 19:52	18:04 (55) 20:26	05:36 20:50	05:20 20:45	06:11 20:07	06:46 19:11	17:58 (55) 18:35 (55)	07:22 18:17	07:03 16:36	07:34 16:27
19	07:35 16:56	06:59 17:39	07:11 19:15	06:16 19:53	18:05 (55) 20:27	05:35 20:51	05:21 20:44	06:12 20:06	06:47 18:23 (55)	17:59 (55) 19:09	07:23 18:33 (55)	07:04 16:35	07:35 16:28
20	07:34 16:57	06:58 17:40	07:09 19:16	06:14 19:54	18:07 (55) 20:28	05:34 20:51	05:21 20:43	06:13 20:04	06:48 18:36 (55)	18:00 (55) 19:07	07:25 18:30 (55)	07:05 16:34	07:36 16:28
21	07:33 16:59	06:56 17:41	07:07 19:17	06:12 19:55	18:08 (55) 20:29	05:33 20:51	05:21 20:42	06:14 20:02	06:50 18:39 (55)	18:03 (55) 19:05	07:26 18:33 (55)	07:07 16:33	07:36 16:28
22	07:33 17:00	06:54 17:43	07:05 19:19	06:11 19:56	18:11 (55) 20:30	05:32 20:51	05:21 20:41	06:15 20:01	06:51 18:41 (55)	18:06 (55) 19:03	07:27 18:25 (55)	07:08 16:33	07:37 16:29
23	07:32 17:01	06:53 17:44	07:04 19:20	06:09 19:58	18:16 (55) 20:31	05:31 20:52	05:21 20:40	06:16 19:57	06:52 18:10 (55)	18:13 (55) 19:01	07:29 18:17 (55)	07:09 16:32	07:37 16:29
24	07:31 17:03	06:51 17:45	07:02 19:21	06:08 19:59	18:13 (55) 20:32	05:30 20:52	05:22 20:39	06:17 19:56	06:53 18:09 (55)	18:15 (55) 19:00	07:30 18:07	07:11 16:31	07:38 16:30
25	07:30 17:04	06:50 17:47	07:00 19:22	06:06 20:00	18:11 (55) 20:33	05:29 20:52	05:22 20:38	06:19 19:54	06:54 18:45 (55)	18:07 (55) 18:58	07:31 18:06	07:12 16:31	07:38 16:31
26	07:29 17:05	06:48 17:48	06:58 19:23	06:04 20:00	18:09 (55) 20:34	05:28 20:52	05:22 20:37	06:20 19:52	06:55 18:46 (55)	18:06 (55) 18:56	07:32 18:04	07:13 16:30	07:38 16:31
27	07:28 17:07	06:46 17:49	06:56 19:25	06:03 20:01	18:07 (55) 20:35	05:28 20:52	05:23 20:36	06:21 19:51	06:57 18:04 (55)	18:05 (55) 18:54	07:34 18:03	07:14 16:29	07:39 16:32
28	07:27 17:08	06:45 17:51	06:54 19:26	06:01 20:02	18:06 (55) 20:36	05:27 20:52	05:23 20:35	06:22 19:49	06:58 18:03 (55)	18:06 (55) 18:52	07:35 18:01	07:15 16:29	07:39 16:33
29	07:26 17:09	06:53 19:27	06:53 19:27	06:00 20:04	18:05 (55) 20:37	05:26 20:52	05:23 20:34	06:23 19:47	06:59 18:01 (55)	18:05 (55) 18:50	07:36 18:00	07:17 16:28	07:39 16:33
30	07:25 17:11	06:51 19:28	06:51 19:28	05:58 20:05	18:04 (55) 20:38	05:26 20:52	05:24 20:33	06:24 19:45	07:00 18:48 (55)	18:00 (55) 18:49	07:38 17:58	07:18 16:28	07:40 16:34
31	07:24 17:12	06:49 19:30	06:49 19:30	05:55 20:06	18:03 (55) 20:39	05:25 20:52	05:25 20:32	06:25 19:44	07:00 18:48 (55)	17:59 (55) 19:44	07:39 17:57	07:40 16:35	07:40 16:35
Potential sun hours	288	293	369	403	457	463	469	434	376	341	290	277	
Total, worst case			404	1011				455	985				
Sun reduction			0.47	0.49				0.59	0.54				
Oper. time red.			1.00	1.00				1.00	1.00				
Wind dir. red.			0.59	0.59				0.59	0.59				
Total reduction			0.28	0.29				0.35	0.32				
Total, real			112	292				158	313				

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 82

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-36 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (24)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
 438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
 Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December	
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	05:57 20:06	18:26 (55) 20:40	05:24 20:52	05:51 20:31	06:27 19:42	18:47 (55) 19:02 (55)	07:01 18:47	06:40 16:55	07:19 16:28
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	05:55 20:07	18:25 (55) 20:40	05:24 20:52	05:52 20:30	06:28 19:40	18:45 (55) 19:40	07:02 18:45	06:42 16:54	07:20 16:27
3	07:40 16:38	07:21 17:16	06:39 17:54	06:44 19:33	05:54 20:08	18:26 (55) 20:41	05:26 20:52	05:54 20:28	06:29 19:38	18:39 (55) 19:38	07:04 18:43	06:43 16:53	07:21 16:27
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:34	05:53 20:10	18:26 (55) 20:42	05:26 20:51	05:55 20:27	06:30 19:37	18:38 (55) 19:35	07:05 18:41	06:44 16:51	07:22 16:27
5	07:40 16:40	07:19 17:19	06:36 17:57	06:40 19:36	05:51 20:11	18:26 (55) 20:43	05:27 20:51	05:56 20:26	06:31 19:35	18:37 (55) 19:35	07:06 18:39	06:46 16:50	07:23 16:26
6	07:40 16:41	07:17 17:21	06:34 17:58	06:38 19:37	05:50 20:12	18:27 (55) 20:44	05:27 20:51	05:57 20:25	06:32 19:33	18:37 (55) 19:33	07:07 18:38	06:47 16:49	07:24 16:26
7	07:40 16:42	07:16 17:22	06:33 18:00	06:36 19:38	05:49 20:13	18:27 (55) 20:44	05:28 20:51	05:58 20:23	06:34 19:31	18:36 (55) 19:31	07:09 18:36	06:48 16:48	07:25 16:25
8	07:39 16:43	07:15 17:23	07:31 19:01	06:35 19:39	05:47 20:14	18:27 (55) 20:45	05:29 20:50	05:59 20:22	06:35 19:29	18:35 (55) 19:29	07:10 18:34	06:50 16:46	07:26 16:26
9	07:39 16:44	07:13 17:25	07:29 19:02	06:33 19:41	05:46 20:16	18:28 (55) 20:46	05:30 20:50	06:00 20:21	06:36 19:27	18:35 (55) 19:27	07:11 18:32	06:51 16:45	07:27 16:26
10	07:39 16:45	07:12 17:26	07:27 19:04	06:31 19:42	05:45 20:17	18:29 (55) 20:46	05:30 20:49	06:01 20:19	06:37 19:26	18:34 (55) 19:26	07:12 18:31	06:52 16:44	07:28 16:28
11	07:39 16:46	07:11 17:28	07:25 19:05	06:29 19:43	18:47 (55) 20:18	05:43 20:18	05:31 20:47	06:03 20:18	06:38 19:24	18:34 (55) 19:24	07:13 18:29	06:54 16:43	07:29 16:29
12	07:38 16:47	07:09 17:29	07:24 19:06	06:28 19:44	18:44 (55) 20:19	05:42 20:19	05:32 20:48	06:04 20:16	06:39 19:22	18:33 (55) 19:22	07:15 18:27	06:55 16:42	07:30 16:27
13	07:38 16:49	07:08 17:30	07:22 19:07	06:26 19:45	18:41 (55) 20:20	05:41 20:20	05:33 20:48	06:05 20:15	06:40 19:20	18:34 (55) 19:20	07:16 18:25	06:56 16:41	07:31 16:25
14	07:37 16:50	07:07 17:32	07:20 19:09	06:24 19:47	18:38 (55) 20:21	05:40 20:21	05:34 20:47	06:06 20:13	06:42 19:18	18:34 (55) 19:18	07:17 18:24	06:58 16:40	07:32 16:26
15	07:37 16:51	07:05 17:33	07:18 19:10	06:22 19:48	18:36 (55) 20:22	05:39 20:22	05:34 20:47	06:07 20:12	06:43 19:16	18:33 (55) 19:16	07:18 18:22	06:59 16:39	07:33 16:27
16	07:36 16:52	07:04 17:34	07:16 19:11	06:21 19:49	18:35 (55) 20:24	05:38 20:24	05:35 20:49	06:08 20:10	06:44 19:15	18:33 (55) 19:15	07:20 18:20	07:00 16:38	07:34 16:27
17	07:36 16:54	07:02 17:36	07:15 19:12	06:19 19:50	18:33 (55) 20:25	05:37 20:25	05:36 20:45	06:09 20:09	06:45 19:13	18:33 (55) 19:13	07:21 18:18	07:02 16:37	07:35 16:27
18	07:35 16:55	07:01 17:37	07:13 19:14	06:17 19:52	18:32 (55) 20:26	05:36 20:26	05:35 20:50	06:11 20:07	06:46 19:11	18:33 (55) 19:11	07:22 18:17	07:03 16:36	07:36 16:27
19	07:35 16:56	06:59 17:39	07:11 19:15	06:16 19:53	18:31 (55) 20:27	05:35 20:27	05:38 20:44	06:12 20:06	06:47 19:09	18:33 (55) 19:09	07:23 18:15	07:04 16:35	07:37 16:28
20	07:34 16:57	06:58 17:40	07:09 19:16	06:14 19:54	18:30 (55) 20:28	05:34 20:28	05:39 20:43	06:13 20:04	06:48 19:07	18:33 (55) 19:07	07:24 18:14	07:05 16:34	07:38 16:28
21	07:33 16:59	06:56 17:43	07:07 19:17	06:12 19:55	18:29 (55) 20:29	05:33 20:29	05:40 20:42	8 18:58 (55) 19:06 (55)	06:14 19:05	18:33 (55) 19:05	07:25 18:12	07:06 16:33	07:39 16:28
22	07:33 17:00	06:54 17:43	07:05 19:19	06:11 19:56	18:28 (55) 20:30	05:32 20:30	05:41 20:41	06:15 20:01	06:51 19:03	18:33 (55) 19:03	07:27 18:10	07:08 16:33	07:40 16:28
23	07:32 17:01	06:53 17:44	07:04 19:20	06:09 19:58	18:27 (55) 20:31	05:31 20:31	05:42 20:40	06:16 19:57	06:52 19:01	18:34 (55) 19:01	07:29 18:09	07:09 16:32	07:41 16:29
24	07:31 17:03	06:51 17:45	07:02 19:21	06:08 19:59	18:27 (55) 20:32	05:30 20:32	05:43 20:49	06:17 19:56	06:53 19:00	18:35 (55) 19:00	07:30 18:07	07:11 16:31	07:42 16:30
25	07:30 17:04	06:50 17:47	07:00 19:22	06:06 20:00	18:26 (55) 20:33	05:29 20:33	05:44 20:38	06:19 19:54	06:54 18:58	18:36 (55) 18:58	07:31 18:06	07:12 16:31	07:43 16:31
26	07:29 17:05	06:48 17:48	06:58 19:23	06:04 20:00	18:26 (55) 20:34	05:28 20:34	05:45 20:37	06:20 19:52	06:55 18:56	18:36 (55) 18:56	07:32 18:04	07:13 16:30	07:44 16:31
27	07:28 17:07	06:46 17:49	06:56 19:25	06:03 20:01	18:26 (55) 20:35	05:28 20:35	05:46 20:36	06:21 19:51	06:57 18:54	18:37 (55) 18:54	07:34 18:03	07:14 16:29	07:45 16:32
28	07:27 17:08	06:45 17:51	06:54 19:26	06:01 20:02	18:26 (55) 20:36	05:27 20:36	05:47 20:35	06:22 19:49	06:58 18:52	18:38 (55) 18:52	07:35 18:01	07:15 16:29	07:46 16:33
29	07:26 17:09	06:43 18:27	06:53 19:27	06:00 20:04	18:25 (55) 20:37	05:26 20:37	05:48 20:34	06:23 19:47	06:59 18:50	18:39 (55) 18:50	07:36 18:00	07:17 16:28	07:47 16:33
30	07:25 17:11	06:41 18:28	06:51 19:28	05:58 20:05	18:25 (55) 20:38	05:26 20:38	05:49 20:33	06:24 19:45	07:00 18:49	18:41 (55) 18:49	07:38 17:58	07:18 16:28	07:48 16:34
31	07:24 17:12	06:39 18:30	06:49 19:30	05:55 20:09	18:25 (55) 20:39	05:25 20:39	05:50 20:32	06:25 19:44	07:01 19:06	18:43 (55) 19:06	07:39 17:57	07:19 16:35	07:49 16:35
Potential sun hours	288	293	369	403	457	463	469	434	376	315	290	277	
Total, worst case				862	894		339	1427	15				
Sun reduction				0.49	0.55		0.63	0.59	0.54				
Oper. time red.				1.00	1.00		1.00	1.00	1.00				
Wind dir. red.				0.53	0.53		0.53	0.53	0.53				
Total reduction				0.26	0.29		0.33	0.31	0.29				
Total, real				223	260		113	445	4				

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 83

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-38 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (356)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	05:57 20:06	05:25 20:40	19:08 (55) 05:24	05:51 20:06 (55)	06:27 20:31	07:01 19:42	06:40 18:47	07:19 16:55
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	05:55 20:07	05:24 20:40	19:07 (55) 05:25	05:52 20:06 (55)	06:28 20:30	07:02 19:40	06:42 18:45	07:20 16:54
3	07:40 16:38	07:21 17:16	06:39 17:54	06:44 19:33	05:54 20:08	05:23 20:41	19:07 (55) 05:26	05:54 20:06 (55)	06:29 20:28	07:04 19:38	06:43 18:43	07:21 16:53
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:34	05:53 20:10	05:23 20:42	19:07 (55) 05:27	05:55 20:06 (55)	06:30 20:27	07:05 19:37	06:54 18:41	07:22 16:51
5	07:40 16:40	07:19 17:19	06:36 17:57	06:40 19:36	05:51 20:11	05:23 20:43	19:07 (55) 05:27	05:56 20:06 (55)	06:31 20:26	07:06 19:35	06:46 18:39	07:23 16:50
6	07:40 16:41	07:17 17:21	06:34 17:58	06:38 19:37	05:50 20:12	05:22 20:44	19:07 (55) 05:27	05:57 20:06 (55)	06:32 20:25	07:07 19:33	06:47 18:38	07:24 16:49
7	07:40 16:42	07:16 17:22	06:33 18:00	06:36 19:38	05:49 20:13	05:22 20:44	19:06 (55) 05:28	05:58 20:06 (55)	06:34 20:23	07:09 19:31	06:48 18:36	07:25 16:48
8	07:39 16:43	07:15 17:23	07:31 19:01	06:35 19:39	05:47 20:14	05:22 20:45	19:07 (55) 05:29	05:59 20:06 (55)	06:35 20:22	07:10 19:29	06:50 18:34	07:26 16:46
9	07:39 16:44	07:13 17:25	07:29 19:02	06:33 19:41	05:46 20:16	05:21 20:46	19:07 (55) 05:30	06:00 20:06 (55)	06:36 20:21	07:11 19:27	06:51 18:32	07:27 16:45
10	07:39 16:45	07:12 17:26	07:27 19:04	06:31 19:42	05:45 20:17	05:21 20:46	19:07 (55) 05:30	06:01 20:05 (55)	06:37 20:19	07:12 19:26	06:52 18:31	07:28 16:44
11	07:39 16:46	07:11 17:28	07:25 19:05	06:29 19:43	05:43 20:18	05:21 20:47	19:07 (55) 05:31	06:03 20:05 (55)	06:38 20:18	07:13 19:24	06:54 18:29	07:29 16:43
12	07:38 16:47	07:09 17:29	07:24 19:06	06:28 19:44	05:42 20:19	05:21 20:47	19:06 (55) 05:32	06:04 20:05 (55)	06:39 20:16	07:15 19:22	06:55 18:27	07:30 16:42
13	07:38 16:49	07:08 17:30	07:22 19:07	06:26 19:45	05:41 20:20	05:21 20:48	19:07 (55) 05:33	06:05 20:05 (55)	06:40 20:15	07:16 19:20	06:56 18:25	07:31 16:41
14	07:37 16:50	07:07 17:32	07:20 19:09	06:24 19:47	05:40 20:21	05:20 20:49	19:07 (55) 05:34	06:06 20:04 (55)	06:42 20:13	07:17 19:18	06:58 18:24	07:32 16:40
15	07:37 16:51	07:05 17:33	07:18 19:10	06:22 19:48	05:39 20:22	05:20 20:49	19:07 (55) 05:34	06:07 20:03 (55)	06:43 20:12	07:18 19:16	06:59 18:22	07:32 16:39
16	07:36 16:52	07:04 17:34	07:16 19:11	06:21 19:49	05:38 20:24	19:28 (55) 05:20	19:07 (55) 05:35	06:08 20:03 (55)	06:44 20:10	07:20 19:15	07:00 18:20	07:33 16:38
17	07:36 16:54	07:02 17:36	07:15 19:12	06:19 19:50	05:37 20:25	19:23 (55) 05:20	19:07 (55) 05:36	06:09 20:03 (55)	06:45 20:09	07:21 19:13	07:02 18:18	07:34 16:37
18	07:35 16:55	07:01 17:37	07:13 19:14	06:17 19:52	05:36 20:26	19:40 (55) 05:20	19:07 (55) 05:37	06:11 20:03 (55)	06:46 20:07	07:22 19:11	07:03 18:17	07:34 16:36
19	07:35 16:56	06:59 17:39	07:11 19:15	06:16 19:53	05:35 20:27	19:18 (55) 05:21	19:08 (55) 05:38	06:12 20:01 (55)	06:47 20:06	07:23 19:09	07:04 18:15	07:35 16:35
20	07:34 16:57	06:58 17:40	07:09 19:16	06:14 19:54	05:34 20:28	19:16 (55) 05:21	19:08 (55) 05:39	06:13 20:04 (55)	06:48 20:04	07:25 19:07	07:05 18:14	07:36 16:34
21	07:33 16:59	06:56 17:41	07:07 19:17	06:12 19:55	05:33 20:29	19:15 (55) 05:21	19:08 (55) 05:40	06:14 20:00 (55)	06:50 20:02	07:26 19:05	07:07 18:12	07:36 16:33
22	07:33 17:00	06:54 17:43	07:05 19:19	06:11 19:56	05:32 20:30	19:13 (55) 05:21	19:08 (55) 05:41	06:15 20:01 (55)	06:51 20:01	07:27 19:03	07:08 18:10	07:37 16:33
23	07:32 17:01	06:53 17:44	07:04 19:20	06:09 19:58	05:31 20:31	19:49 (55) 05:21	19:08 (55) 05:42	06:16 20:04 (55)	06:52 19:57	07:29 19:01	07:09 18:09	07:37 16:32
24	07:31 17:03	06:51 17:45	07:02 19:21	06:08 19:59	05:30 20:32	19:12 (55) 05:22	19:09 (55) 05:43	06:17 20:05 (55)	06:53 19:56	07:30 19:00	07:11 18:07	07:38 16:30
25	07:30 17:04	06:50 17:47	07:00 19:22	06:06 20:00	05:29 20:33	19:11 (55) 05:22	19:09 (55) 05:44	06:19 20:06 (55)	06:54 19:54	07:31 18:58	07:12 18:06	07:38 16:31
26	07:29 17:05	06:48 17:48	06:58 19:23	06:04 20:00	05:28 20:34	19:10 (55) 05:22	19:09 (55) 05:45	06:20 20:05 (55)	06:55 19:52	07:32 18:56	07:13 18:04	07:38 16:30
27	07:28 17:07	06:46 17:49	06:56 19:25	06:03 20:01	05:28 20:35	19:53 (55) 05:22	19:10 (55) 05:46	06:21 20:06 (55)	06:57 19:51	07:34 18:54	07:14 18:03	07:39 16:32
28	07:27 17:08	06:45 17:51	06:54 19:26	06:01 20:02	05:27 20:36	19:09 (55) 05:23	19:10 (55) 05:47	06:22 20:05 (55)	06:58 19:49	07:35 18:52	07:15 18:01	07:39 16:33
29	07:26 17:09	06:45 17:51	06:54 19:26	06:01 20:02	05:27 20:36	19:09 (55) 05:23	19:10 (55) 05:47	06:23 20:06 (55)	06:59 19:47	07:36 18:50	07:17 18:00	07:39 16:33
30	07:25 17:11	06:45 19:28	06:51 20:05	05:58 20:05	05:26 20:38	19:08 (55) 05:24	19:11 (55) 05:48	06:24 20:06 (55)	07:00 19:45	07:38 18:49	07:18 17:58	07:40 16:34
31	07:24 17:12	06:49 19:30	06:54 20:39	05:58 20:39	05:25 20:48	19:08 (55) 05:25	20:06 (55) 20:33	06:26 05:50	07:39 19:44	07:57 17:57	07:40 16:35	
Potential sun hours	288	293	369	403	457	463	469	434	376	341	290	277
Total, worst case					568	1640	1174					
Sun reduction					0.55	0.59	0.63					
Oper. time red.					1.00	1.00	1.00					
Wind dir. red.					0.51	0.51	0.51					
Total reduction					0.28	0.30	0.32					
Total, real					158	489	374					

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project: **05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

Printed/Page  
3/21/2011 2:14 PM / 84  
Licensed user:  
**EDR**  
217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688  
Steve Curtis, scurtis@edrpc.com  
Calculated:  
3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-4 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (4)

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []  
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25  
Operational time  
N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December				
1	07:40	14:44 (55)	07:23	06:43	06:47	05:57	05:25	05:24	05:51	06:27	07:01	06:40	07:19	14:33 (55)		
2	07:40	14:45 (55)	07:22	06:41	06:45	05:55	05:24	05:25	05:52	06:28	07:03	06:42	16:28	43 15:16 (55)		
3	07:40	14:45 (55)	07:21	06:39	06:44	05:54	05:23	05:26	05:54	06:29	07:04	06:43	16:27	44 15:16 (55)		
4	07:40	14:46 (55)	07:20	06:38	06:42	05:53	05:23	05:26	05:55	06:30	07:05	06:44	16:27	45 15:17 (55)		
5	07:40	14:47 (55)	07:19	06:36	06:40	05:51	05:23	05:27	05:56	06:31	07:06	06:46	16:27	45 15:17 (55)		
6	07:40	14:47 (55)	07:17	06:34	06:38	05:50	05:22	05:27	05:57	06:32	07:07	06:47	16:26	46 15:19 (55)		
7	07:40	14:47 (55)	07:16	06:33	06:36	05:49	05:22	05:28	05:58	06:34	07:09	06:48	16:26	45 15:19 (55)		
8	07:39	14:48 (55)	07:15	06:31	06:35	05:47	05:22	05:29	05:59	06:35	07:10	06:50	16:26	46 15:20 (55)		
9	07:39	14:49 (55)	07:13	06:29	06:33	05:46	05:21	05:30	06:00	06:36	07:11	06:51	16:26	46 15:20 (55)		
10	07:39	14:49 (55)	07:12	06:27	06:31	05:45	05:21	05:30	06:01	06:37	07:12	06:52	16:26	47 15:21 (55)		
11	07:39	14:51 (55)	07:11	06:25	06:29	05:43	05:21	05:31	06:03	06:38	07:13	06:54	16:26	47 15:21 (55)		
12	07:38	14:52 (55)	07:09	06:24	06:28	05:42	05:21	05:32	06:04	06:39	07:15	06:55	16:26	47 15:21 (55)		
13	07:38	14:52 (55)	07:08	06:22	06:26	05:41	05:21	05:33	06:05	06:40	07:16	06:56	16:26	47 15:22 (55)		
14	07:37	14:53 (55)	07:07	06:20	06:24	05:40	05:20	05:34	06:06	06:42	07:17	06:58	16:26	48 15:23 (55)		
15	07:37	14:54 (55)	07:05	06:18	06:22	05:39	05:20	05:34	06:07	06:43	07:18	06:59	16:26	47 15:23 (55)		
16	07:36	14:55 (55)	07:04	06:16	06:21	05:38	05:20	05:35	06:08	06:44	07:20	07:00	16:26	48 15:24 (55)		
17	07:36	14:56 (55)	07:02	06:15	06:19	05:37	05:20	05:36	06:09	06:45	07:21	07:02	14:45 (55)	16:27	48 15:24 (55)	
18	07:35	14:57 (55)	07:01	06:13	06:17	05:36	05:20	05:37	06:11	06:46	07:22	07:03	14:45 (55)	16:27	48 15:25 (55)	
19	07:35	14:58 (55)	06:59	06:11	06:16	05:35	05:21	05:38	06:12	06:47	07:23	07:04	14:45 (55)	16:27	48 15:25 (55)	
20	07:34	15:00 (55)	06:58	06:09	06:14	05:34	05:21	05:39	06:13	06:48	07:25	07:06	14:45 (55)	16:28	48 15:25 (55)	
21	07:33	15:02 (55)	06:56	06:07	06:12	05:33	05:21	05:40	06:14	06:50	07:26	07:07	14:45 (55)	16:28	48 15:26 (55)	
22	07:33	15:03 (55)	06:54	06:05	06:11	05:32	05:21	05:41	06:15	06:51	07:27	07:08	14:45 (55)	16:28	48 15:26 (55)	
23	07:32	15:05 (55)	06:53	06:04	06:09	05:31	05:21	05:42	06:16	06:52	07:29	07:09	14:45 (55)	16:29	48 15:27 (55)	
24	07:31	15:07 (55)	06:51	06:02	06:08	05:30	05:22	05:43	06:17	06:53	07:30	07:11	14:45 (55)	16:29	48 15:27 (55)	
25	07:30	15:11 (55)	06:50	06:00	06:06	05:29	05:22	05:44	06:19	06:54	07:31	07:12	14:45 (55)	16:30	48 15:28 (55)	
26	07:29	15:24 (55)	06:48	06:58	06:04	05:28	05:22	05:45	06:20	06:55	07:32	07:13	14:45 (55)	16:31	48 15:28 (55)	
27	07:28	06:46	06:56	06:03	05:28	05:23	05:23	05:46	06:21	06:57	07:34	07:14	14:45 (55)	16:31	47 15:28 (55)	
28	07:27	06:45	06:54	06:01	05:27	05:23	05:23	05:47	06:22	06:58	07:35	07:15	14:45 (55)	16:32	48 15:29 (55)	
29	07:26	06:45	06:53	06:00	05:26	05:23	05:23	05:48	06:23	06:59	07:36	07:17	14:45 (55)	16:33	48 15:29 (55)	
30	07:25	06:45	06:51	05:58	05:26	05:24	05:24	05:49	06:24	07:00	07:38	07:18	14:45 (55)	16:34	47 15:30 (55)	
31	07:24	06:49	06:49	06:05	05:25	05:25	05:25	05:50	06:25	07:39	07:39	07:19	14:45 (55)	16:35	48 15:31 (55)	
Potential sun hours	288	293	369	403	457	463	469	434	376	341	290	277	1457			
Total, worst case	953										450		1457			
Sun reduction	0.33										0.27		0.25			
Oper. time red.	1.00										1.00		1.00			
Wind dir. red.	0.77										0.77		0.77			
Total reduction	0.25										0.21		0.19			
Total, real	241										93		279			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)



Project:  
**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

Printed/Page  
 3/21/2011 2:14 PM / 85  
 Licensed user:  
**EDR**  
 217 Montgomery St.  
 US-SYRACUSE, NY 13202  
 (315) 471 0688  
 Steve Curtis, scurtis@edrpc.com  
 Calculated:  
 3/21/2011 11:14 AM/2.7.453

### SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2 Shadow receptor: R-402 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (302)

#### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
 438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
 Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June			
1	07:40 16:37	07:23 17:14	06:43 17:52	07:04 (15) 07:05 (15)	06:47 19:31	07:10 (14) 07:37 (14)	05:57 20:06	05:25 20:40	05:58 (13) 06:35 (13)
2	07:40 16:37	07:22 17:15	06:41 17:53	07:02 (15) 07:11 (15)	06:46 19:32	07:09 (14) 07:37 (14)	05:56 20:07	05:24 20:41	05:57 (13) 06:35 (13)
3	07:40 16:38	07:21 17:17	06:40 17:55	07:00 (15) 07:12 (15)	06:44 19:33	07:09 (14) 07:38 (14)	05:54 20:09	05:24 20:41	05:58 (13) 06:36 (13)
4	07:40 16:39	07:20 17:18	06:38 17:56	06:58 (15) 07:13 (15)	06:42 19:35	07:08 (14) 07:38 (14)	05:53 20:10	05:23 20:42	05:58 (13) 06:36 (13)
5	07:40 16:40	07:19 17:19	06:36 17:57	06:57 (15) 07:15 (15)	06:40 19:36	07:08 (14) 07:37 (14)	05:52 20:11	05:23 20:43	05:58 (13) 06:36 (13)
6	07:40 16:41	07:17 17:21	06:34 17:59	06:55 (15) 07:15 (15)	06:38 19:37	07:07 (14) 07:36 (14)	05:50 20:12	05:23 20:44	05:58 (13) 06:36 (13)
7	07:40 16:42	07:16 17:22	06:33 18:00	06:53 (15) 07:15 (15)	06:37 19:38	07:08 (14) 07:36 (14)	05:49 20:13	05:22 20:44	05:59 (13) 06:37 (13)
8	07:40 16:43	07:15 17:24	06:31 19:01	07:52 (15) 08:15 (15)	06:35 19:40	07:08 (14) 07:35 (14)	05:48 20:15	05:22 20:45	05:58 (13) 06:36 (13)
9	07:39 16:44	07:14 17:25	06:29 19:03	07:52 (15) 08:14 (15)	06:33 19:41	07:08 (14) 07:34 (14)	05:46 20:16	05:22 20:46	05:59 (13) 06:37 (13)
10	07:39 16:46	07:12 17:26	06:27 19:04	07:52 (15) 08:14 (15)	06:31 19:42	07:09 (14) 07:32 (14)	05:45 20:17	05:21 20:46	05:59 (13) 06:37 (13)
11	07:39 16:47	07:11 17:28	06:26 19:05	07:52 (15) 08:13 (15)	06:30 19:43	07:11 (14) 07:32 (14)	05:44 20:18	05:21 20:47	05:59 (13) 06:37 (13)
12	07:38 16:48	07:10 17:29	06:24 19:06	07:53 (15) 08:12 (15)	06:28 19:44	07:12 (14) 07:29 (14)	05:43 20:19	05:21 20:48	06:00 (13) 06:38 (13)
13	07:38 16:49	07:08 17:31	06:22 19:08	07:54 (15) 08:10 (15)	06:26 19:46	07:13 (14) 07:26 (14)	05:41 20:20	06:12 (13) 06:18 (13)	06:00 (13) 06:38 (13)
14	07:38 16:50	07:07 17:32	06:20 19:09	07:55 (15) 08:08 (15)	06:24 19:47	07:18 (14) 07:21 (14)	05:40 20:21	06:09 (13) 06:22 (13)	06:00 (13) 06:38 (13)
15	07:37 16:51	07:05 17:33	06:18 19:10	07:57 (15) 08:05 (15)	06:23 19:48	07:17 (14) 07:21 (14)	05:39 20:22	06:06 (13) 06:24 (13)	06:01 (13) 06:38 (13)
16	07:37 16:53	07:04 17:35	06:17 19:11	07:58 (15) 19:11	06:21 19:49	07:20 (14) 20:24	05:38 20:25	06:05 (13) 06:27 (13)	06:01 (13) 06:39 (13)
17	07:36 16:54	07:02 17:36	06:15 19:13	07:59 (15) 19:13	06:19 19:50	07:21 (14) 20:25	05:37 20:26	06:04 (13) 06:28 (13)	06:01 (13) 06:39 (13)
18	07:35 16:55	07:01 17:37	06:13 19:14	07:59 (15) 19:14	06:18 19:52	07:22 (14) 20:26	05:36 20:27	06:02 (13) 06:29 (13)	06:01 (13) 06:39 (13)
19	07:35 16:56	06:59 17:39	06:11 19:15	07:59 (15) 19:15	06:16 19:53	07:23 (14) 20:27	05:35 20:28	06:01 (13) 06:30 (13)	06:01 (13) 06:39 (13)
20	07:34 16:58	06:58 17:40	06:09 19:16	07:59 (15) 19:16	06:14 19:54	07:24 (14) 20:28	05:34 20:29	06:01 (13) 06:31 (13)	06:01 (13) 06:39 (13)
21	07:33 16:59	06:56 17:42	06:08 19:18	07:59 (15) 19:18	06:13 19:55	07:25 (14) 20:29	05:33 20:30	06:00 (13) 06:32 (13)	06:01 (13) 06:40 (13)
22	07:33 17:00	06:55 17:43	06:06 19:19	07:59 (15) 19:19	06:11 19:57	07:26 (14) 20:30	05:32 20:31	06:00 (13) 06:33 (13)	06:02 (13) 06:40 (13)
23	07:32 17:02	06:53 17:44	06:04 19:20	07:59 (15) 19:20	06:09 19:58	07:27 (14) 20:31	05:31 20:32	06:00 (13) 06:34 (13)	06:02 (13) 06:40 (13)
24	07:31 17:03	06:51 17:46	06:02 19:21	07:59 (15) 19:21	06:08 19:59	07:28 (14) 20:32	05:30 20:33	06:00 (13) 06:35 (13)	06:02 (13) 06:40 (13)
25	07:30 17:04	06:50 17:47	06:00 19:22	07:59 (15) 19:22	06:06 20:00	07:29 (14) 20:33	05:30 20:34	06:00 (13) 06:36 (13)	06:02 (13) 06:40 (13)
26	07:29 17:06	06:48 17:48	06:58 19:24	07:23 (14) 07:28 (14)	06:05 20:00	07:30 (14) 20:34	05:29 20:35	06:00 (13) 06:37 (13)	06:03 (13) 06:40 (13)
27	07:28 17:07	06:46 17:50	06:57 19:25	07:18 (14) 07:32 (14)	06:03 20:01	07:31 (14) 20:35	05:28 20:36	06:00 (13) 06:38 (13)	06:03 (13) 06:40 (13)
28	07:27 17:08	06:45 17:51	06:55 19:26	07:16 (14) 07:35 (14)	06:02 20:03	07:32 (14) 20:36	05:27 20:37	06:00 (13) 06:39 (13)	06:03 (13) 06:41 (13)
29	07:26 17:10	06:45 17:51	06:53 19:27	07:14 (14) 07:36 (14)	06:00 20:04	07:33 (14) 20:37	05:26 20:38	06:00 (13) 06:40 (13)	06:03 (13) 06:41 (13)
30	07:25 17:11	06:45 17:51	06:51 19:28	07:12 (14) 07:37 (14)	05:59 20:05	07:34 (14) 20:38	05:25 20:39	06:00 (13) 06:41 (13)	06:04 (13) 06:42 (13)
31	07:24 17:13	06:45 17:51	06:49 19:30	07:11 (14) 07:37 (14)	05:58 20:06	07:35 (14) 20:39	05:24 20:40	06:00 (13) 06:42 (13)	06:04 (13) 06:42 (13)
Potential sun hours	288	293	369	403	457	463	463	1135	
Total, worst case			353	330	548			0.59	
Sun reduction			0.47	0.49	0.55			1.00	
Oper. time red.			1.00	1.00	1.00			0.69	
Wind dir. red.			0.54	0.58	0.69			0.40	
Total reduction			0.25	0.28	0.38			0.40	
Total, real			89	94	206			458	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker (WTG causing flicker first time)	Last time (hh:mm) with flicker (WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 86

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-402 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (302)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25 20:52	06:04 (13) 20:31	05:52 19:42	07:10 (14) 18:47	07:02 18	07:32 (15) 16:42
2	05:25 20:52	06:04 (13) 20:30	05:53 19:40	07:08 (14) 18:45	07:03 21	07:31 (15) 16:54
3	05:26 20:52	06:04 (13) 20:29	05:54 19:39	07:06 (14) 18:43	07:04 22	07:30 (15) 16:53
4	05:27 20:51	06:04 (13) 20:27	05:55 19:37	07:05 (14) 18:41	07:05 23	07:29 (15) 16:52
5	05:27 20:51	06:04 (13) 20:26	05:56 19:35	07:04 (14) 18:40	07:06 22	07:29 (15) 16:50
6	05:28 20:51	06:05 (13) 20:25	05:57 19:33	07:04 (14) 18:38	07:08 23	07:29 (15) 16:49
7	05:29 20:51	06:05 (13) 20:23	05:58 19:31	07:03 (14) 18:36	07:09 21	07:30 (15) 16:48
8	05:29 20:50	06:05 (13) 20:22	05:59 19:30	07:02 (14) 18:34	07:10 19	07:31 (15) 16:47
9	05:30 20:50	06:05 (13) 20:21	06:01 19:28	07:02 (14) 18:33	07:11 17	07:32 (15) 16:45
10	05:31 20:49	06:06 (13) 20:19	06:02 19:26	07:03 (14) 18:31	07:12 14	07:33 (15) 16:44
11	05:31 20:49	06:06 (13) 20:18	06:03 19:24	07:03 (14) 18:29	07:14 11	07:35 (15) 16:43
12	05:32 20:48	06:06 (13) 20:16	06:04 19:22	07:03 (14) 18:27	07:15 7	07:36 (15) 16:42
13	05:33 20:48	06:06 (13) 20:15	06:05 19:20	07:03 (14) 18:26	07:16 16	06:56 16:41
14	05:34 20:47	06:07 (13) 20:13	06:06 19:18	07:04 (14) 18:24	07:17 16	06:58 16:40
15	05:35 20:47	06:07 (13) 20:12	06:07 19:17	07:05 (14) 18:22	07:19 19	06:59 16:39
16	05:36 20:46	06:08 (13) 20:10	06:09 19:15	07:07 (14) 18:20	07:20 15	07:00 16:38
17	05:37 20:45	06:08 (13) 20:09	06:10 19:14	07:08 (14) 18:19	07:21 8	07:02 16:37
18	05:37 20:45	06:08 (13) 20:07	06:11 19:13	07:08 (14) 18:17	07:22 18	07:03 16:36
19	05:38 20:44	06:08 (13) 20:06	06:12 19:11	07:09 (14) 18:15	07:24 18	07:04 16:35
20	05:39 20:43	06:09 (13) 20:04	06:13 19:09	07:10 (14) 18:14	07:25 17	07:06 16:35
21	05:40 20:42	06:09 (13) 20:03	06:14 19:07	07:11 (14) 18:12	07:26 16	07:07 16:34
22	05:41 20:41	06:10 (13) 20:01	06:15 19:05	07:12 (14) 18:11	07:27 15	07:08 16:33
23	05:42 20:40	06:11 (13) 19:58	06:17 19:02	07:13 (14) 18:09	07:29 14	07:09 16:32
24	05:43 20:40	06:12 (13) 19:56	06:18 19:00	07:14 (14) 18:07	07:30 13	07:11 16:32
25	05:44 20:39	06:13 (13) 19:54	06:19 18:58	07:15 (14) 18:06	07:31 12	07:12 16:31
26	05:45 20:38	06:13 (13) 19:53	06:20 18:56	07:16 (14) 18:04	07:33 11	07:13 16:31
27	05:46 20:37	06:15 (13) 19:51	06:21 18:54	07:17 (14) 18:03	07:34 10	07:14 16:30
28	05:47 20:36	06:16 (13) 19:49	06:22 18:52	07:18 (14) 18:01	07:35 9	07:16 16:30
29	05:48 20:34	06:18 (13) 19:47	06:24 18:51	07:19 (14) 18:00	07:36 8	07:17 16:30
30	05:50 20:33	06:20 (13) 19:46	06:25 18:49	07:20 (14) 17:59	07:38 7	07:18 16:30
31	05:51 20:32	06:21 (13) 19:44	06:26 18:47	07:21 (14) 17:57	07:39 6	07:19 16:30
Potential sun hours	469	434	376	342	290	277
Total, worst case	979	35	442	218		
Sun reduction	0.63	0.59	0.54	0.44		
Oper. time red.	1.00	1.00	1.00	1.00		
Wind dir. red.	0.69	0.58	0.58	0.52		
Total reduction	0.43	0.34	0.31	0.23		
Total, real	422	12	137	49		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 87

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
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Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

### SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-403 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (303)

#### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December	
1	07:40 16:36	08:41 (08) 10:03 (07)	07:23 17:14	06:43 17:52	06:47 19:31	05:57 20:06	05:25 20:40	05:25 20:31	05:52 19:42	06:27 18:47	07:02 16:56	06:41 16:28	08:34 (08) 73 09:48 (07)
2	07:40 16:37	08:42 (08) 10:03 (07)	07:22 17:15	06:41 17:53	06:46 19:32	05:56 20:07	05:24 20:41	05:25 20:52	05:53 20:30	06:28 19:40	07:03 16:54	06:42 16:28	75 09:48 (07) 08:32 (08)
3	07:40 16:38	08:43 (08) 10:04 (07)	07:21 17:17	06:40 17:55	06:44 19:34	05:54 20:09	05:24 20:41	05:26 20:52	05:54 20:29	06:29 19:39	07:04 16:53	06:43 16:27	76 09:48 (07) 08:32 (08)
4	07:40 16:39	08:44 (08) 10:04 (07)	07:20 17:18	06:38 17:56	06:42 19:35	05:53 20:10	05:23 20:42	05:27 20:52	05:55 20:27	06:30 19:37	07:05 16:52	06:45 16:27	78 09:50 (07) 08:32 (08)
5	07:40 16:40	08:45 (08) 10:04 (07)	07:19 17:19	06:36 17:57	06:40 19:36	05:52 20:11	05:23 20:43	05:27 20:51	05:56 20:26	06:32 19:35	07:06 16:50	06:46 16:27	78 09:50 (07) 08:32 (08)
6	07:40 16:41	08:46 (08) 10:05 (07)	07:18 17:21	06:35 17:59	06:38 19:37	05:50 20:12	05:23 20:44	05:28 20:51	05:57 20:25	06:33 19:33	07:08 16:49	06:47 16:27	79 09:51 (07) 08:32 (08)
7	07:40 16:42	08:47 (08) 10:05 (07)	07:16 17:22	06:33 18:00	06:37 19:38	05:49 20:13	05:22 20:44	05:28 20:51	05:58 20:23	06:34 19:31	07:09 16:48	06:49 16:26	79 09:51 (07) 08:32 (08)
8	07:40 16:43	08:47 (08) 10:05 (07)	07:15 17:24	06:31 19:01	06:35 19:40	05:48 20:15	05:22 20:45	05:29 20:50	05:59 20:22	06:35 19:30	07:10 16:47	06:50 16:26	80 09:52 (07) 08:32 (08)
9	07:39 16:44	08:49 (08) 10:05 (07)	07:14 17:25	06:29 19:03	06:33 19:41	05:46 20:16	05:22 20:46	05:30 20:50	06:01 20:21	06:36 19:28	07:11 16:45	06:51 16:26	81 09:53 (07) 08:32 (08)
10	07:39 16:46	08:50 (08) 10:06 (07)	07:12 17:26	06:27 19:04	06:31 19:42	05:45 20:17	05:21 20:46	05:31 20:50	06:02 20:19	06:37 19:26	07:12 16:44	06:53 16:26	81 09:53 (07) 08:32 (08)
11	07:39 16:47	08:51 (08) 10:05 (07)	07:11 17:28	06:26 19:05	06:30 19:43	05:44 20:18	05:21 20:47	05:31 20:49	06:03 20:18	06:38 19:24	07:14 16:43	06:54 12 09:18 (07)	08:32 (08) 82 09:54 (07)
12	07:39 16:48	08:54 (08) 10:06 (07)	07:10 17:29	06:24 19:06	06:28 19:44	05:43 20:19	05:21 20:48	05:32 20:49	06:04 20:16	06:40 19:22	07:15 16:42	06:55 20 09:23 (07)	08:32 (08) 81 09:53 (07)
13	07:38 16:49	08:56 (08) 10:06 (07)	07:08 17:31	06:22 19:08	06:26 19:46	05:41 20:20	05:21 20:48	05:33 20:48	06:05 20:15	06:41 19:20	07:16 16:41	06:57 26 09:26 (07)	08:32 (08) 82 09:54 (07)
14	07:38 16:50	08:58 (08) 10:06 (07)	07:07 17:32	06:20 19:09	06:24 19:47	05:40 20:22	05:21 20:49	05:34 20:47	06:06 20:14	06:42 19:18	07:17 16:40	06:58 30 09:29 (07)	08:32 (08) 83 09:55 (07)
15	07:37 16:51	08:59 (08) 10:06 (07)	07:05 17:33	06:19 19:10	06:23 19:48	05:39 20:23	05:21 20:49	05:35 20:47	06:07 20:12	06:43 19:17	07:19 16:39	06:59 34 09:31 (07)	08:32 (08) 83 09:56 (07)
16	07:37 16:53	09:13 (07) 10:06 (07)	07:04 17:35	06:17 19:11	06:21 19:49	05:38 20:24	05:21 20:50	05:36 20:46	06:09 20:11	06:44 19:15	07:20 16:38	07:01 37 09:33 (07)	08:32 (08) 82 09:56 (07)
17	07:36 16:54	09:13 (07) 10:05 (07)	07:02 17:36	06:15 19:13	06:19 19:51	05:37 20:25	05:21 20:50	05:36 20:45	06:10 20:09	06:45 19:13	07:21 16:37	07:02 39 09:34 (07)	08:32 (08) 83 09:56 (07)
18	07:36 16:55	09:14 (07) 10:05 (07)	07:01 17:37	06:13 19:14	06:18 19:52	05:36 20:26	05:21 20:50	05:37 20:45	06:11 20:07	06:46 19:11	07:22 16:36	07:03 41 09:35 (07)	08:32 (08) 83 09:57 (07)
19	07:35 16:56	09:15 (07) 10:05 (07)	06:59 17:39	06:11 19:15	06:16 19:53	05:35 20:27	05:21 20:51	05:38 20:44	06:12 20:06	06:48 19:09	07:24 16:35	07:04 43 09:37 (07)	08:32 (08) 83 09:57 (07)
20	07:34 16:58	09:16 (07) 10:05 (07)	06:58 17:40	06:09 19:16	06:14 19:54	05:34 20:28	05:21 20:51	05:39 20:43	06:13 20:04	06:49 19:07	07:25 16:34	07:06 45 09:38 (07)	08:32 (08) 83 09:58 (07)
21	07:34 16:59	09:17 (07) 10:04 (07)	06:56 17:42	06:08 19:18	06:13 19:55	05:33 20:29	05:21 20:51	05:40 20:42	06:14 20:03	06:50 19:05	07:26 16:34	07:07 47 09:39 (07)	08:32 (08) 83 09:59 (07)
22	07:33 17:00	09:18 (07) 10:03 (07)	06:55 17:43	06:06 19:19	06:11 19:57	05:32 20:30	05:21 20:52	05:41 20:41	06:15 20:01	06:51 19:04	07:27 16:33	07:08 49 09:41 (07)	08:32 (08) 83 09:59 (07)
23	07:32 17:02	09:19 (07) 10:02 (07)	06:53 17:44	06:04 19:20	06:09 19:58	05:31 20:31	05:22 20:52	05:42 20:41	06:17 19:58	06:52 19:02	07:29 16:32	07:10 50 09:41 (07)	08:32 (08) 83 09:59 (07)
24	07:31 17:03	09:20 (07) 10:01 (07)	06:51 17:46	06:03 19:21	06:08 19:59	05:30 20:32	05:22 20:52	05:43 20:40	06:18 19:56	06:53 19:00	07:30 16:32	07:11 51 09:42 (07)	08:32 (08) 83 10:00 (07)
25	07:30 17:04	09:21 (07) 10:00 (07)	06:50 17:47	06:02 19:23	06:06 20:00	05:30 20:33	05:22 20:52	05:44 20:39	06:19 19:54	06:55 18:58	07:31 16:31	07:12 52 09:43 (07)	08:32 (08) 83 10:00 (07)
26	07:29 17:06	09:22 (07) 09:59 (07)	06:48 17:48	06:58 19:24	06:05 20:00	05:29 20:34	05:23 20:52	05:45 20:38	06:20 19:53	06:56 18:56	07:33 16:30	07:13 53 09:44 (07)	08:32 (08) 83 10:00 (07)
27	07:28 17:07	09:24 (07) 09:58 (07)	06:46 17:50	06:57 19:25	06:03 20:01	05:28 20:35	05:23 20:52	05:46 20:37	06:21 19:51	06:57 18:54	07:34 16:30	07:14 54 09:45 (07)	08:32 (08) 83 10:01 (07)
28	07:28 17:08	09:26 (07) 09:56 (07)	06:45 17:51	06:55 19:26	06:02 20:03	05:27 20:36	05:23 20:52	05:47 20:36	06:22 19:49	06:58 18:52	07:35 16:29	07:16 55 09:46 (07)	08:32 (08) 82 10:01 (07)
29	07:27 17:10	09:28 (07) 09:54 (07)	06:45 17:51	06:55 19:26	06:00 20:03	05:27 20:36	05:24 20:52	05:48 20:35	06:23 19:47	06:59 18:51	07:37 16:29	07:17 56 09:47 (07)	08:32 (08) 83 10:02 (07)
30	07:26 17:11	09:31 (07) 09:51 (07)	06:45 17:51	06:51 19:29	05:59 20:05	05:26 20:38	05:24 20:52	05:50 20:33	06:25 19:45	07:00 18:49	07:38 16:28	07:18 59 09:47 (07)	08:32 (08) 82 10:02 (07)
31	07:24 17:13	09:36 (07) 09:47 (07)	06:49 17:51	06:49 19:30	05:59 20:05	05:26 20:39	05:24 20:52	05:51 20:32	06:26 19:44	07:39 17:57	07:40 16:35	07:40 82 10:02 (07)	08:40 (08)
Potential sun hours	288	293	369	403	457	463	469	434	376	342	290	277	
Total, worst case	1735										872	2515	
Sun reduction	0.33										0.27	0.25	
Oper. time red.	1.00										1.00	1.00	
Wind dir. red.	0.54										0.54	0.53	
Total reduction	0.18										0.15	0.13	
Total, real	307										127	336	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-405 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (305)

Assumptions for shadow calculations

Maximum distance for influence 1,000 m
Minimum sun height over horizon for influence 3 °
Day step for calculation 1 days
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760
Idle start wind speed: Cut in wind speed from power curve

Table with 6 columns (January to June) and 31 rows of data showing sun rise and set times, potential sun hours, and various reduction factors.

Table layout: For each day in each month the following matrix apply

Matrix with 5 columns: Day in month, Sun rise (hh:mm), Sun set (hh:mm), Minutes with flicker, First time (hh:mm) with flicker, Last time (hh:mm) with flicker, (WTG causing flicker first time), (WTG causing flicker last time)

Project: **05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 89  
Licensed user:  
**EDR**  
217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688  
Steve Curtis, scurtis@edrpc.com  
Calculated:  
3/21/2011 11:14 AM/2.7.453

### SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2 Shadow receptor: R-405 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (305)

#### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time  
N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December	
1   05:25	05:52	06:43 (31)	06:27	07:01	06:40	07:19	
20:52	20:31	26 07:09 (31)	19:42	18:47	16:56	16:28	
2   05:25	05:53	06:42 (31)	06:28	07:03	06:42	07:20	
20:52	20:30	28 07:10 (31)	19:40	18:45	16:54	16:27	
3   05:26	05:54	06:41 (31)	06:29	07:04	06:43	07:21	
20:52	20:28	30 07:11 (31)	19:38	18:43	16:53	16:27	
4   05:26	05:55	06:40 (31)	06:30	07:05	06:44	07:22	
20:51	20:27	31 07:11 (31)	19:37	18:41	16:52	16:27	
5   05:27	05:56	06:39 (31)	06:31	07:06	06:46	07:23	
20:51	20:26	33 07:12 (31)	19:35	18:40	16:50	16:27	
6   05:28	05:57	06:39 (31)	06:33	07:07	06:47	07:24	
20:51	20:25	33 07:12 (31)	19:33	18:38	16:49	16:26	
7   05:28	05:58	06:38 (31)	06:34	07:09	06:48	07:25	
20:50	20:23	34 07:12 (31)	19:31	18:36	16:48	16:26	
8   05:29	05:59	06:38 (31)	06:35	07:10	06:50	07:26	
20:50	20:22	35 07:13 (31)	19:29	18:34	16:47	16:26	
9   05:30	06:00	06:37 (31)	06:36	07:11	06:51	07:27	
20:50	20:21	36 07:13 (31)	19:28	18:32	16:45	16:26	
10   05:31	06:02	06:37 (31)	06:37	07:12	06:52	07:28	
20:49	20:19	36 07:13 (31)	19:26	18:31	16:44	16:26	
11   05:31	06:03	06:38 (31)	06:38	07:24 (32)	07:13	06:54	07:29
20:49	20:18	35 07:13 (31)	19:24	9 07:33 (32)	18:29	16:43	16:26
12   05:32	06:04	06:38 (31)	06:39	07:22 (32)	07:15	06:55	07:30
20:48	20:16	35 07:13 (31)	19:22	15 07:37 (32)	18:27	16:42	16:26
13   05:33	06:05	06:37 (31)	06:41	07:20 (32)	07:16	06:56	07:31
20:48	20:15	36 07:13 (31)	19:20	18 07:38 (32)	18:25	16:41	16:26
14   05:34	06:06	06:37 (31)	06:42	07:18 (32)	07:17	06:58	07:32
20:47	20:13	35 07:12 (31)	19:18	21 07:39 (32)	18:24	16:40	16:26
15   05:35	06:07	06:37 (31)	06:43	07:16 (32)	07:18	06:59	07:32
20:47	20:12	35 07:12 (31)	19:16	23 07:39 (32)	18:22	16:39	16:27
16   05:36	06:08	06:38 (31)	06:44	07:15 (32)	07:20	07:00	07:33
20:46	20:10	33 07:11 (31)	19:15	24 07:39 (32)	18:20	16:38	16:27
17   05:36	06:10	06:38 (31)	06:45	07:14 (32)	07:21	07:02	07:34
20:45	20:09	32 07:10 (31)	19:13	25 07:39 (32)	18:19	16:37	16:27
18   05:37	06:11	06:38 (31)	06:46	07:13 (32)	07:22	07:03	07:34
20:44	20:07	31 07:09 (31)	19:11	26 07:39 (32)	18:17	16:36	16:27
19   05:38	06:12	06:39 (31)	06:47	07:13 (32)	07:23	07:04	07:35
20:44	20:06	29 07:08 (31)	19:09	26 07:39 (32)	18:15	16:35	16:28
20   05:39	06:13	06:40 (31)	06:49	07:14 (32)	07:25	07:05	07:36
20:43	20:04	27 07:07 (31)	19:07	25 07:39 (32)	18:14	16:34	16:28
21   05:40	06:14	06:40 (31)	06:50	07:13 (32)	07:26	07:07	07:36
20:42	20:02	25 07:05 (31)	19:05	26 07:39 (32)	18:12	16:34	16:29
22   05:41	06:15	06:43 (31)	06:51	07:13 (32)	07:27	07:08	07:37
20:41	20:01	21 07:04 (31)	19:03	24 07:37 (32)	18:10	16:33	16:29
23   05:42	06:16	06:44 (31)	06:52	07:14 (32)	07:29	07:09	07:37
20:40	19:57	18 07:02 (31)	19:02	22 07:36 (32)	18:09	16:32	16:30
24   05:43	06:18	06:47 (31)	06:53	07:14 (32)	07:30	07:11	07:38
20:39	19:56	11 06:58 (31)	19:00	21 07:35 (32)	18:07	16:31	16:30
25   05:44	06:19	06:48 (31)	06:54	07:15 (32)	07:31	07:12	07:38
20:38	19:54	18:58	18	07:33 (32)	18:06	16:31	16:31
26   05:45	06:53 (31)	06:20	06:56	07:16 (32)	07:32	07:13	07:38
20:37	7 07:00 (31)	19:52	18:56	14 07:30 (32)	18:04	16:30	16:31
27   05:46	06:50 (31)	06:21	06:57	07:20 (32)	07:34	07:14	07:39
20:36	13 07:03 (31)	19:51	18:54	7 07:27 (32)	18:03	16:30	16:32
28   05:47	06:48 (31)	06:22	06:58	07:35	07:15	07:39	
20:35	17 07:05 (31)	19:49	18:52	18:01	16:29	16:33	
29   05:48	06:46 (31)	06:23	06:59	07:36	07:17	07:39	
20:34	20 07:06 (31)	19:47	18:50	18:00	16:29	16:34	
30   05:49	06:45 (31)	06:25	07:00	07:38	07:18	07:39	
20:33	22 07:07 (31)	19:45	18:49	17:58	16:28	16:34	
31   05:50	06:44 (31)	06:26	07:39	17:57	16:28	07:40	
20:32	25 07:09 (31)	19:44	17:57	16:28	16:35		
Potential sun hours	469	434	376	342	290	277	
Total, worst case	104	725	344				
Sun reduction	0.63	0.59	0.54				
Oper. time red.	1.00	1.00	1.00				
Wind dir. red.	0.63	0.63	0.56				
Total reduction	0.40	0.37	0.30				
Total, real	41	270	103				

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2 Shadow receptor: R-409 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (308)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
 438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
 Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June			
1	07:40 16:36	08:10 (50) 08:27 (50)	07:23 17:14	08:14 (50) 08:44 (50)	06:43 17:52	07:31 (49) 08:28 (49)	06:47 19:31	05:57 20:06	05:25 20:40
2	07:40 16:37	08:10 (50) 08:28 (50)	07:22 17:15	08:15 (50) 08:43 (50)	06:41 17:53	07:32 (49) 08:28 (49)	06:45 19:32	05:56 20:07	05:24 20:40
3	07:40 16:38	08:10 (50) 08:29 (50)	07:21 17:16	08:15 (50) 08:41 (50)	06:40 17:55	07:32 (49) 08:28 (49)	06:44 19:33	05:54 20:08	05:24 20:41
4	07:40 16:39	08:10 (50) 08:30 (50)	07:20 17:18	08:17 (50) 08:41 (50)	06:38 17:56	07:31 (49) 08:27 (49)	06:42 19:34	05:53 20:10	05:23 20:42
5	07:40 16:40	08:10 (50) 08:31 (50)	07:19 17:19	08:19 (50) 08:39 (50)	06:36 17:57	07:31 (49) 08:26 (49)	06:40 19:36	05:51 20:11	05:23 20:43
6	07:40 16:41	08:10 (50) 08:33 (50)	07:17 17:21	08:21 (50) 08:38 (50)	06:34 17:58	07:32 (49) 08:26 (49)	06:38 19:37	05:50 20:12	05:22 20:44
7	07:40 16:42	08:09 (50) 08:33 (50)	07:16 17:22	08:24 (50) 08:34 (50)	06:33 18:00	07:32 (49) 08:25 (49)	06:36 19:38	05:49 20:13	05:22 20:44
8	07:39 16:43	08:09 (50) 08:34 (50)	07:15 17:23	07:31 19:01	07:31 19:01	08:32 (49) 09:24 (49)	06:35 19:39	05:47 20:14	05:22 20:45
9	07:39 16:44	08:09 (50) 08:35 (50)	07:13 17:25	07:29 19:02	07:29 19:02	08:32 (49) 09:23 (49)	06:33 19:41	05:46 20:16	05:21 20:46
10	07:39 16:45	08:08 (50) 08:36 (50)	07:12 17:26	07:27 19:04	07:27 19:04	08:33 (49) 09:21 (49)	06:31 19:42	05:45 20:17	05:21 20:46
11	07:39 16:46	08:08 (50) 08:37 (50)	07:11 17:28	07:25 19:05	07:25 19:05	08:34 (49) 09:21 (49)	06:29 19:43	05:44 20:18	05:21 20:47
12	07:38 16:48	08:08 (50) 08:37 (50)	07:09 17:29	07:24 19:06	07:24 19:06	08:35 (49) 09:19 (49)	06:28 19:44	05:42 20:19	05:21 20:47
13	07:38 16:49	08:08 (50) 08:39 (50)	07:08 17:30	07:22 19:07	07:22 19:07	08:35 (49) 09:18 (49)	06:26 19:45	05:41 20:20	05:21 20:48
14	07:37 16:50	08:08 (50) 08:39 (50)	07:07 17:32	07:20 19:09	07:20 19:09	08:36 (49) 09:15 (49)	06:24 19:47	05:40 20:21	05:21 20:48
15	07:37 16:51	08:08 (50) 08:40 (50)	07:05 17:33	07:18 19:10	07:18 19:10	08:37 (49) 09:13 (49)	06:22 19:48	05:39 20:22	05:21 20:49
16	07:36 16:52	08:08 (50) 08:41 (50)	07:04 17:34	07:16 19:11	07:16 19:11	08:39 (49) 09:11 (49)	06:21 19:49	05:38 20:24	05:21 20:49
17	07:36 16:53	08:08 (50) 08:42 (50)	07:02 17:36	07:15 19:12	07:15 19:12	08:42 (49) 09:09 (49)	06:19 19:50	05:37 20:25	05:21 20:50
18	07:35 16:54	08:08 (50) 08:42 (50)	07:01 17:37	07:13 19:14	07:13 19:14	08:44 (49) 09:05 (49)	06:17 19:52	05:36 20:26	05:21 20:50
19	07:35 16:55	08:08 (50) 08:42 (50)	06:59 17:37	07:11 19:14	07:11 19:14	08:49 (49) 09:05 (49)	06:16 19:52	05:35 20:26	05:21 20:50
20	07:34 16:56	08:09 (50) 08:42 (50)	06:58 17:39	07:09 19:15	07:09 19:15	08:59 (49) 09:09 (49)	06:14 19:53	05:34 20:27	05:21 20:51
21	07:33 16:57	08:09 (50) 08:44 (50)	06:56 17:41	07:07 19:17	07:07 19:17	08:59 (49) 09:09 (49)	06:12 19:54	05:33 20:28	05:21 20:51
22	07:33 17:00	08:09 (50) 08:44 (50)	06:54 17:43	07:06 19:19	07:06 19:19	08:59 (49) 09:09 (49)	06:11 19:55	05:32 20:30	05:21 20:51
23	07:32 17:01	08:09 (50) 08:44 (50)	06:53 17:44	07:04 19:20	07:04 19:20	08:59 (49) 09:09 (49)	06:09 19:56	05:31 20:31	05:21 20:52
24	07:31 17:03	08:09 (50) 08:45 (50)	06:51 17:45	07:02 19:21	07:02 19:21	08:59 (49) 09:09 (49)	06:08 19:57	05:30 20:32	05:22 20:52
25	07:30 17:04	08:09 (50) 08:45 (50)	06:50 17:47	07:00 19:22	07:00 19:22	08:59 (49) 09:09 (49)	06:06 20:00	05:29 20:33	05:22 20:52
26	07:29 17:05	08:10 (50) 08:45 (50)	06:48 17:48	06:58 19:24	06:58 19:24	08:59 (49) 09:09 (49)	06:05 20:01	05:29 20:34	05:22 20:52
27	07:28 17:07	08:10 (50) 08:45 (50)	06:46 17:49	06:56 19:25	06:56 19:25	08:59 (49) 09:09 (49)	06:03 20:02	05:28 20:35	05:23 20:52
28	07:27 17:08	08:11 (50) 08:45 (50)	06:45 17:51	06:55 19:26	06:55 19:26	08:59 (49) 09:09 (49)	06:01 20:03	05:27 20:36	05:23 20:52
29	07:26 17:10	08:11 (50) 08:45 (50)	06:45 17:51	06:53 19:27	06:53 19:27	08:59 (49) 09:09 (49)	06:00 20:04	05:26 20:37	05:24 20:52
30	07:25 17:11	08:12 (50) 08:44 (50)	06:45 17:51	06:51 19:28	06:51 19:28	08:59 (49) 09:09 (49)	05:58 20:05	05:26 20:38	05:24 20:52
31	07:24 17:12	08:13 (50) 08:44 (50)	06:45 17:51	06:49 19:30	06:49 19:30	08:59 (49) 09:09 (49)	05:55 20:06	05:25 20:39	05:24 20:52
Potential sun hours	288	293	369	403	457	463			
Total, worst case	921	950	837						
Sun reduction	0.33	0.39	0.47						
Oper. time red.	1.00	1.00	1.00						
Wind dir. red.	0.50	0.50	0.51						
Total reduction	0.16	0.20	0.24						
Total, real	151	187	199						

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

## SHADOW - Calendar

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-409 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (308)**

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25 20:52	05:51 20:31	06:27 19:42	07:01 18:47	08:14 (49) 16:55	07:19 16:28
2	05:25 20:52	05:53 20:30	06:28 19:40	07:03 18:45	08:12 (49) 16:54	07:20 16:27
3	05:26 20:52	05:54 20:28	06:29 19:38	07:04 18:43	08:12 (49) 16:53	07:21 16:27
4	05:26 20:51	05:55 20:27	06:30 19:37	07:05 18:41	08:10 (49) 16:51	07:22 16:27
5	05:27 20:51	05:56 20:26	06:31 19:35	07:06 18:39	08:09 (49) 16:50	07:23 16:26
6	05:28 20:51	05:57 20:25	06:32 19:33	07:07 18:38	08:08 (49) 16:49	07:24 16:26
7	05:28 20:51	05:58 20:23	06:34 19:31	07:09 18:36	08:08 (49) 16:48	07:25 16:26
8	05:29 20:50	05:59 20:22	06:35 19:29	07:10 18:34	08:07 (49) 16:46	07:26 16:26
9	05:30 20:50	06:00 20:21	06:36 19:27	07:11 18:32	08:06 (49) 16:45	07:27 16:26
10	05:30 20:49	06:02 20:19	06:37 19:26	07:12 18:31	08:06 (49) 16:44	07:28 16:26
11	05:31 20:49	06:03 20:18	06:38 19:24	07:13 18:29	08:06 (49) 16:43	07:29 16:26
12	05:32 20:48	06:04 20:16	06:39 19:22	07:15 18:27	08:05 (49) 16:42	07:30 16:26
13	05:33 20:48	06:05 20:15	06:40 19:20	07:16 18:25	08:05 (49) 16:41	07:31 16:26
14	05:34 20:47	06:06 20:13	06:42 19:18	07:17 18:24	08:04 (49) 16:40	07:32 16:26
15	05:35 20:47	06:07 20:12	06:43 19:16	07:18 18:22	08:05 (49) 16:39	07:32 16:26
16	05:35 20:46	06:08 20:10	06:44 19:15	07:20 18:20	08:05 (49) 16:38	07:33 16:26
17	05:36 20:45	06:10 20:09	06:45 19:13	07:21 18:19	08:05 (49) 16:37	07:34 16:27
18	05:37 20:44	06:11 20:07	06:46 19:11	07:22 18:17	08:06 (49) 16:36	07:34 16:27
19	05:38 20:44	06:12 20:06	06:47 19:09	07:23 18:15	08:06 (49) 16:35	07:35 16:28
20	05:39 20:43	06:13 20:04	06:48 19:07	07:25 18:14	08:06 (49) 16:34	07:36 16:28
21	05:40 20:42	06:14 20:02	06:50 19:05	07:26 18:12	08:07 (49) 16:33	07:36 16:29
22	05:41 20:41	06:15 20:01	06:51 19:03	07:27 18:10	08:07 (49) 16:33	07:37 16:29
23	05:42 20:40	06:16 19:57	06:52 19:02	07:29 18:09	08:08 (49) 16:32	07:37 16:30
24	05:43 20:39	06:18 19:56	06:53 19:00	07:30 18:07	08:10 (49) 16:31	07:38 16:30
25	05:44 20:38	06:19 19:54	06:54 18:58	07:31 18:06	08:10 (49) 16:31	07:38 16:31
26	05:45 20:37	06:20 19:52	06:55 18:56	07:32 18:04	08:12 (49) 16:30	07:38 16:31
27	05:46 20:36	06:21 19:51	06:57 18:54	07:34 18:03	08:13 (49) 16:30	07:39 16:32
28	05:47 20:35	06:22 19:49	06:58 18:52	07:35 18:01	08:15 (49) 16:29	07:39 16:33
29	05:48 20:34	06:23 19:47	06:59 18:50	07:36 18:00	08:17 (49) 16:29	07:39 16:34
30	05:49 20:33	06:24 19:45	07:00 18:49	07:38 17:58	08:20 (49) 16:28	07:40 16:34
31	05:50 20:32	06:26 19:44		07:39 17:57	08:24 (49) 16:39	07:40 16:35
Potential sun hours	469	434	376	342	290	277
Total, worst case			190	1461	828	431
Sun reduction			0.54	0.44	0.27	0.25
Oper. time red.			1.00	1.00	1.00	1.00
Wind dir. red.			0.51	0.51	0.50	0.50
Total reduction			0.27	0.22	0.13	0.12
Total, real			52	325	111	54

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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Licensed user:

EDR

217 Montgomery St.
US-SYRACUSE, NY 13202
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Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-41 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (355)

Assumptions for shadow calculations

Maximum distance for influence 1,000 m
Minimum sun height over horizon for influence 3 °
Day step for calculation 1 days
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760
Idle start wind speed: Cut in wind speed from power curve

Table with columns for months (January to December) and rows for time slots (1 to 31) showing sun rise/set times and shadow flicker data.

Table layout: For each day in each month the following matrix apply

Matrix with columns: Day in month, Sun rise (hh:mm), Sun set (hh:mm), Minutes with flicker, First time (hh:mm) with flicker, Last time (hh:mm) with flicker, (WTG causing flicker first time), (WTG causing flicker last time)



Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 93

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Calculated:

3/21/2011 11:14 AM/2.7.453

### SHADOW - Calendar

**Calculation: 05030 SFA Gamesa G97\_R2 Shadow receptor: R-410 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (309)**

#### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
 438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
 Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40	14:58 (50) 07:23	06:43	16:41 (49) 06:47	05:57	05:25
	16:36 36	15:34 (50) 17:14	17:52	17:18 (49) 19:31	20:06	20:39
2	07:40	14:58 (50) 07:22	06:41	16:42 (49) 06:45	05:56	05:24
	16:37 36	15:34 (50) 17:15	17:53	17:18 (49) 19:32	20:07	20:40
3	07:40	14:59 (50) 07:21	06:39	16:42 (49) 06:44	05:54	05:24
	16:38 35	15:34 (50) 17:16	17:55	17:17 (49) 19:33	20:08	20:41
4	07:40	15:00 (50) 07:20	06:38	16:42 (49) 06:42	05:53	05:23
	16:39 34	15:34 (50) 17:18	17:56	17:16 (49) 19:34	20:10	20:42
5	07:40	15:01 (50) 07:18	06:36	16:42 (49) 06:40	05:51	05:23
	16:40 34	15:35 (50) 17:19	17:57	17:15 (49) 19:36	20:11	20:43
6	07:40	15:02 (50) 07:17	06:34	16:44 (49) 06:38	05:50	05:22
	16:41 33	15:35 (50) 17:21	17:58	17:15 (49) 19:37	20:12	20:43
7	07:40	15:02 (50) 07:16	06:33	16:45 (49) 06:36	05:49	05:22
	16:42 32	15:34 (50) 17:22	18:00	17:13 (49) 19:38	20:13	20:44
8	07:39	15:03 (50) 07:15	07:31	17:46 (49) 06:35	05:47	05:22
	16:43 32	15:35 (50) 17:23	19:01	18:11 (49) 19:39	20:14	20:45
9	07:39	15:05 (50) 07:13	07:29	17:47 (49) 06:33	05:46	05:21
	16:44 30	15:35 (50) 17:25	19:02	18:09 (49) 19:41	20:16	20:46
10	07:39	15:05 (50) 07:12	07:27	17:49 (49) 06:31	05:45	05:21
	16:45 29	15:34 (50) 17:26	19:04	18:06 (49) 19:42	20:17	20:46
11	07:39	15:06 (50) 07:11	07:25	17:54 (49) 06:29	05:44	05:21
	16:46 28	15:34 (50) 17:28	19:05	18:03 (49) 19:43	20:18	20:47
12	07:38	15:07 (50) 07:09	07:24	06:28	05:42	05:21
	16:48 26	15:33 (50) 17:29	19:06	19:44	20:19	20:47
13	07:38	15:09 (50) 07:08	07:22	06:26	05:41	05:21
	16:49 24	15:33 (50) 17:30	19:07	19:45	20:20	20:48
14	07:37	15:10 (50) 07:06	07:20	06:24	05:40	05:21
	16:50 22	15:32 (50) 17:32	19:09	19:47	20:21	20:48
15	07:37	15:12 (50) 07:05	07:18	06:22	05:39	05:21
	16:51 20	15:32 (50) 17:33	19:10	19:48	20:22	20:49
16	07:36	15:14 (50) 07:04	16:54 (49) 07:16	06:21	05:38	05:21
	16:52 16	15:30 (50) 17:34	17:07 (49) 19:11	19:49	20:24	20:49
17	07:36	15:17 (50) 07:02	16:51 (49) 07:15	06:19	05:37	05:21
	16:54 12	15:29 (50) 17:36	17:10 (49) 19:12	19:50	20:25	20:50
18	07:35	15:22 (50) 07:01	16:49 (49) 07:13	06:17	05:36	05:21
	16:55 3	15:25 (50) 17:37	17:12 (49) 19:14	19:51	20:26	20:50
19	07:35	06:59	16:48 (49) 07:11	06:16	05:35	05:21
	16:56	17:39 26	17:14 (49) 19:15	19:53	20:27	20:50
20	07:34	06:58	16:46 (49) 07:09	06:14	05:34	05:21
	16:57	17:40 29	17:15 (49) 19:16	19:54	20:28	20:51
21	07:33	06:56	16:46 (49) 07:07	06:12	05:33	05:21
	16:59	17:41 30	17:16 (49) 19:17	19:55	20:29	20:51
22	07:32	06:54	16:44 (49) 07:05	06:11	05:32	05:21
	17:00	17:43 33	17:17 (49) 19:19	19:56	20:30	20:51
23	07:32	06:53	16:43 (49) 07:04	06:09	05:31	05:21
	17:01	17:44 34	17:17 (49) 19:20	19:58	20:31	20:52
24	07:31	06:51	16:43 (49) 07:02	06:08	05:30	05:22
	17:03	17:45 35	17:18 (49) 19:21	19:59	20:32	20:52
25	07:30	06:50	16:42 (49) 07:00	06:06	05:29	05:22
	17:04	17:47 36	17:18 (49) 19:22	20:00	20:33	20:52
26	07:29	06:48	16:42 (49) 06:58	06:04	05:29	05:22
	17:05	17:48 36	17:18 (49) 19:23	20:00	20:34	20:52
27	07:28	06:46	16:42 (49) 06:56	06:03	05:28	05:23
	17:07	17:49 37	17:19 (49) 19:25	20:01	20:35	20:52
28	07:27	06:45	16:42 (49) 06:55	06:01	05:27	05:23
	17:08	17:51 36	17:18 (49) 19:26	20:02	20:36	20:52
29	07:26		06:53	06:00	05:26	05:24
	17:10		19:27	20:04	20:37	20:52
30	07:25		06:51	05:58	05:26	05:24
	17:11		19:28	20:05	20:38	20:52
31	07:24		06:49		05:25	
	17:12		19:30		20:39	
Potential sun hours	288	293	369	403	457	463
Total, worst case	482	387	307			
Sun reduction	0.33	0.39	0.47			
Oper. time red.	1.00	1.00	1.00			
Wind dir. red.	0.76	0.67	0.67			
Total reduction	0.26	0.26	0.32			
Total, real	124	102	98			

**Table layout: For each day in each month the following matrix apply**

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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Licensed user:

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2 Shadow receptor: R-410 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (309)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December	
1	05:25	05:51	06:27	07:01	06:40	07:19	14:49 (50)
	20:52	20:31	19:42	18:47	16:55	16:28	27 15:16 (50)
2	05:25	05:53	06:28	07:02	06:42	07:20	14:48 (50)
	20:52	20:30	19:40	18:45	16:54	16:27	29 15:17 (50)
3	05:26	05:54	06:29	07:04	17:29 (49)	06:43	07:21 14:48 (50)
	20:52	20:28	19:38	18:43	14 17:43 (49)	16:53	16:27 30 15:18 (50)
4	05:26	05:55	06:30	07:05	17:26 (49)	06:44	07:22 14:47 (50)
	20:51	20:27	19:37	18:41	20 17:46 (49)	16:51	16:27 32 15:19 (50)
5	05:27	05:56	06:31	07:06	17:23 (49)	06:46	07:23 14:47 (50)
	20:51	20:26	19:35	18:39	24 17:47 (49)	16:50	16:26 32 15:19 (50)
6	05:28	05:57	06:32	07:07	17:21 (49)	06:47	07:24 14:47 (50)
	20:51	20:25	19:33	18:38	27 17:48 (49)	16:49	16:26 33 15:20 (50)
7	05:28	05:58	06:34	07:08	17:20 (49)	06:48	07:25 14:47 (50)
	20:50	20:23	19:31	18:36	30 17:50 (49)	16:48	16:26 34 15:21 (50)
8	05:29	05:59	06:35	07:10	17:19 (49)	06:50	07:26 14:47 (50)
	20:50	20:22	19:29	18:34	31 17:50 (49)	16:46	16:26 34 15:21 (50)
9	05:30	06:00	06:36	07:11	17:17 (49)	06:51	07:27 14:47 (50)
	20:50	20:20	19:27	18:32	33 17:50 (49)	16:45	16:26 35 15:22 (50)
10	05:30	06:01	06:37	07:12	17:16 (49)	06:52	07:28 14:48 (50)
	20:49	20:19	19:26	18:31	35 17:51 (49)	16:44	16:26 35 15:23 (50)
11	05:31	06:03	06:38	07:13	17:16 (49)	06:54	07:29 14:48 (50)
	20:49	20:18	19:24	18:29	35 17:51 (49)	16:43	16:26 36 15:24 (50)
12	05:32	06:04	06:39	07:15	17:15 (49)	06:55	07:30 14:48 (50)
	20:48	20:16	19:22	18:27	36 17:51 (49)	16:42	16:26 36 15:24 (50)
13	05:33	06:05	06:40	07:16	17:14 (49)	06:56	07:31 14:49 (50)
	20:48	20:15	19:20	18:25	37 17:51 (49)	16:41	16:26 36 15:25 (50)
14	05:34	06:06	06:42	07:17	17:14 (49)	06:58	07:31 14:49 (50)
	20:47	20:13	19:18	18:24	36 17:50 (49)	16:40	16:26 37 15:26 (50)
15	05:34	06:07	06:43	07:18	17:14 (49)	06:59	07:32 14:50 (50)
	20:47	20:12	19:16	18:22	37 17:51 (49)	16:39	16:26 37 15:27 (50)
16	05:35	06:08	06:44	07:20	17:14 (49)	07:00	07:33 14:49 (50)
	20:46	20:10	19:15	18:20	36 17:50 (49)	16:38	16:27 38 15:27 (50)
17	05:36	06:09	06:45	07:21	17:14 (49)	07:02	07:34 14:50 (50)
	20:45	20:09	19:13	18:19	35 17:49 (49)	16:37	16:27 37 15:27 (50)
18	05:37	06:11	06:46	07:22	17:15 (49)	07:03	07:34 14:51 (50)
	20:44	20:07	19:11	18:17	34 17:49 (49)	16:36	16:27 37 15:28 (50)
19	05:38	06:12	06:47	07:23	17:15 (49)	07:04	07:35 14:51 (50)
	20:44	20:06	19:09	18:15	33 17:48 (49)	16:35	16:28 37 15:28 (50)
20	05:39	06:13	06:48	07:25	17:15 (49)	07:05	07:36 14:52 (50)
	20:43	20:04	19:07	18:14	32 17:47 (49)	16:34	16:28 37 15:29 (50)
21	05:40	06:14	06:50	07:26	17:16 (49)	07:07	07:36 14:51 (50)
	20:42	20:02	19:05	18:12	31 17:47 (49)	16:33	16:29 38 15:29 (50)
22	05:41	06:15	06:51	07:27	17:17 (49)	07:08	07:37 14:52 (50)
	20:41	20:01	19:03	18:10	28 17:45 (49)	16:33	16:29 38 15:30 (50)
23	05:42	06:16	06:52	07:28	17:18 (49)	07:09	07:37 14:53 (50)
	20:40	19:57	19:01	18:09	25 17:43 (49)	16:32	16:30 37 15:30 (50)
24	05:43	06:17	06:53	07:30	17:20 (49)	07:10	07:38 14:54 (50)
	20:39	19:56	19:00	18:07	22 17:42 (49)	16:31	2 15:01 (50) 16:30 37 15:31 (50)
25	05:44	06:19	06:54	07:31	17:22 (49)	07:12	14:54 (50) 07:38 14:54 (50)
	20:38	19:54	18:58	18:06	17 17:39 (49)	16:31	12 15:06 (50) 16:31 37 15:31 (50)
26	05:45	06:20	06:55	07:32	17:24 (49)	07:13	14:53 (50) 07:38 14:54 (50)
	20:37	19:52	18:56	18:04	12 17:36 (49)	16:30	16 15:09 (50) 16:31 37 15:31 (50)
27	05:46	06:21	06:57	07:34	17:26 (49)	07:14	14:51 (50) 07:39 14:54 (50)
	20:36	19:51	18:54	18:03	16:29	20 15:11 (50) 16:32 38 15:32 (50)	
28	05:47	06:22	06:58	07:35	17:28 (49)	07:15	14:50 (50) 07:39 14:56 (50)
	20:35	19:49	18:52	18:01	16:29	22 15:12 (50) 16:33 37 15:33 (50)	
29	05:48	06:23	06:59	07:36	17:30 (49)	07:16	14:50 (50) 07:39 14:56 (50)
	20:34	19:47	18:50	18:00	16:28	24 15:14 (50) 16:33 37 15:33 (50)	
30	05:49	06:24	07:00	07:38	17:32 (49)	07:17	14:49 (50) 07:39 14:57 (50)
	20:33	19:45	18:49	17:58	16:28	26 15:15 (50) 16:34 36 15:33 (50)	
31	05:50	06:26	07:02	07:40	17:34 (49)	07:18	14:48 (50) 07:40 14:57 (50)
	20:32	19:44	18:48	17:57	16:27	28 15:16 (50) 16:35 36 15:33 (50)	
Potential sun hours	469	434	376	342	290	277	
Total, worst case				700	122	1097	
Sun reduction				0.44	0.27	0.25	
Oper. time red.				1.00	1.00	1.00	
Wind dir. red.				0.67	0.76	0.76	
Total reduction				0.30	0.21	0.19	
Total, real				209	26	213	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker (WTG causing flicker first time)	Last time (hh:mm) with flicker (WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-42 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (27)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December			
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	05:57 20:06	05:25 20:40	19:01 (55) 19:53 (55)	05:24 20:52	19:07 (55) 19:59 (55)	05:51 20:31	19:18 (55) 19:54 (55)	06:27 18:47	07:01 16:55	06:40 16:28	07:19 16:28
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	05:55 20:07	05:25 20:40	19:01 (55) 19:53 (55)	05:26 20:52	19:07 (55) 19:59 (55)	05:54 20:30	19:20 (55) 19:52 (55)	06:29 18:45	07:04 16:54	06:43 16:54	07:21 16:27
3	07:40 16:38	07:21 17:16	06:39 17:54	06:44 19:33	05:54 20:08	05:23 20:41	19:01 (55) 19:53 (55)	05:26 20:52	19:07 (55) 19:59 (55)	05:54 20:28	19:20 (55) 19:51 (55)	06:29 18:43	07:04 16:53	06:43 16:53	07:21 16:27
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:34	05:53 20:10	05:23 20:42	19:01 (55) 19:53 (55)	05:26 20:51	19:07 (55) 19:59 (55)	05:55 20:27	19:22 (55) 19:49 (55)	06:30 18:37	07:05 16:51	06:44 16:51	07:22 16:27
5	07:40 16:40	07:19 17:19	06:36 17:57	06:40 19:36	05:51 20:11	05:23 20:43	19:01 (55) 19:54 (55)	05:27 20:51	19:07 (55) 19:59 (55)	05:56 20:26	19:24 (55) 19:47 (55)	06:31 18:39	07:06 16:50	06:46 16:50	07:23 16:26
6	07:40 16:41	07:17 17:21	06:34 17:58	06:38 19:37	05:50 20:12	05:22 20:44	19:19 (55) 19:54 (55)	05:27 20:51	19:08 (55) 19:59 (55)	05:57 20:25	19:26 (55) 19:44 (55)	06:32 18:38	07:07 16:49	06:47 16:49	07:24 16:26
7	07:40 16:42	07:16 17:22	06:33 18:00	06:36 19:38	05:49 20:13	05:22 20:44	19:15 (55) 19:54 (55)	05:28 20:51	19:01 (55) 19:59 (55)	05:58 20:23	19:27 (55) 19:40 (55)	06:34 18:36	07:09 16:48	06:48 16:48	07:25 16:26
8	07:39 16:43	07:15 17:23	07:31 19:01	06:35 19:39	05:47 20:14	05:22 20:45	19:12 (55) 19:54 (55)	05:29 20:50	19:08 (55) 19:59 (55)	05:59 20:22	19:28 (55) 19:42 (55)	06:35 18:34	07:10 16:46	06:50 16:46	07:26 16:26
9	07:39 16:44	07:13 17:25	07:29 19:02	06:33 19:41	05:46 20:16	05:21 20:46	19:10 (55) 19:54 (55)	05:30 20:50	19:08 (55) 19:59 (55)	06:00 20:21	19:30 (55) 19:44 (55)	06:36 18:32	07:11 16:45	06:51 16:45	07:27 16:26
10	07:39 16:45	07:12 17:26	07:27 19:04	06:31 19:42	05:45 20:17	05:21 20:46	19:09 (55) 19:55 (55)	05:30 20:49	19:08 (55) 19:59 (55)	06:01 20:19	19:37 (55) 19:49 (55)	06:37 18:31	07:12 16:44	06:52 16:44	07:28 16:26
11	07:39 16:46	07:11 17:28	07:25 19:05	06:29 19:43	05:43 20:18	05:21 20:47	19:08 (55) 19:55 (55)	05:31 20:49	19:08 (55) 19:59 (55)	06:03 20:18	19:38 (55) 19:49 (55)	06:38 18:29	07:13 16:43	06:54 16:43	07:29 16:26
12	07:38 16:47	07:09 17:29	07:24 19:06	06:28 19:44	05:42 20:19	05:21 20:47	19:07 (55) 19:54 (55)	05:32 20:48	19:08 (55) 19:59 (55)	06:04 20:16	19:39 (55) 19:49 (55)	06:39 18:27	07:15 16:42	06:55 16:42	07:30 16:26
13	07:38 16:49	07:08 17:30	07:22 19:07	06:26 19:45	05:41 20:20	05:21 20:48	19:06 (55) 19:55 (55)	05:33 20:48	19:09 (55) 19:59 (55)	06:05 20:15	19:40 (55) 19:49 (55)	06:40 18:25	07:16 16:41	06:56 16:41	07:31 16:26
14	07:37 16:50	07:07 17:32	07:20 19:09	06:24 19:47	05:40 20:21	05:20 20:48	19:05 (55) 19:55 (55)	05:34 20:47	19:08 (55) 19:59 (55)	06:06 20:13	19:41 (55) 19:49 (55)	06:42 18:24	07:17 16:40	06:58 16:40	07:32 16:26
15	07:37 16:51	07:05 17:33	07:18 19:10	06:22 19:48	05:39 20:22	05:20 20:49	19:04 (55) 19:55 (55)	05:34 20:47	19:08 (55) 19:59 (55)	06:07 20:12	19:42 (55) 19:49 (55)	06:43 18:22	07:18 16:39	06:59 16:39	07:32 16:26
16	07:36 16:52	07:04 17:34	07:16 19:11	06:21 19:49	05:38 20:24	05:20 20:49	19:04 (55) 19:55 (55)	05:35 20:46	19:09 (55) 19:59 (55)	06:08 20:10	19:43 (55) 19:49 (55)	06:44 18:20	07:20 16:38	07:00 16:38	07:33 16:27
17	07:36 16:54	07:02 17:36	07:15 19:12	06:19 19:50	05:37 20:25	05:20 20:50	19:03 (55) 19:55 (55)	05:36 20:45	19:09 (55) 19:59 (55)	06:09 20:09	19:44 (55) 19:49 (55)	06:45 18:18	07:21 16:37	07:02 16:37	07:34 16:27
18	07:35 16:55	07:01 17:37	07:13 19:14	06:17 19:52	05:36 20:26	05:20 20:50	19:02 (55) 19:55 (55)	05:37 20:45	19:10 (55) 19:59 (55)	06:11 20:07	19:45 (55) 19:49 (55)	06:46 18:17	07:22 16:36	07:03 16:36	07:34 16:27
19	07:35 16:56	06:59 17:39	07:11 19:15	06:16 19:53	05:35 20:27	05:21 20:51	19:02 (55) 19:55 (55)	05:38 20:44	19:10 (55) 19:59 (55)	06:12 20:06	19:46 (55) 19:49 (55)	06:47 18:15	07:23 16:35	07:04 16:35	07:35 16:28
20	07:34 16:57	06:58 17:40	07:09 19:16	06:14 19:54	05:34 20:28	05:21 20:51	19:01 (55) 19:55 (55)	05:39 20:43	19:10 (55) 19:59 (55)	06:13 20:04	19:47 (55) 19:49 (55)	06:48 18:14	07:25 16:34	07:05 16:34	07:36 16:28
21	07:33 16:59	06:56 17:41	07:07 19:17	06:12 19:55	05:33 20:29	05:21 20:51	19:01 (55) 19:55 (55)	05:40 20:42	19:11 (55) 19:59 (55)	06:14 20:02	19:48 (55) 19:51 (55)	06:50 18:12	07:26 16:33	07:07 16:33	07:36 16:28
22	07:33 17:00	06:54 17:43	07:05 19:19	06:11 19:56	05:32 20:30	05:21 20:51	19:00 (55) 19:50 (55)	05:41 20:41	19:11 (55) 19:59 (55)	06:15 20:01	19:49 (55) 19:51 (55)	06:51 18:10	07:27 16:33	07:08 16:33	07:37 16:29
23	07:32 17:01	06:53 17:44	07:04 19:20	06:09 19:58	05:31 20:31	05:21 20:51	19:00 (55) 19:50 (55)	05:42 20:40	19:12 (55) 19:59 (55)	06:16 19:57	19:50 (55) 19:51 (55)	06:52 18:09	07:29 16:32	07:09 16:32	07:37 16:29
24	07:31 17:03	06:51 17:45	07:02 19:21	06:08 19:59	05:30 20:32	05:22 20:51	19:01 (55) 19:51 (55)	05:43 20:39	19:12 (55) 19:59 (55)	06:17 19:56	19:51 (55) 19:52 (55)	06:53 18:07	07:30 16:31	07:11 16:31	07:38 16:30
25	07:30 17:04	06:50 17:47	07:00 19:22	06:06 20:00	05:29 20:33	05:22 20:52	19:00 (55) 19:51 (55)	05:44 20:38	19:13 (55) 19:59 (55)	06:19 19:54	19:52 (55) 19:53 (55)	06:54 18:06	07:31 16:31	07:12 16:31	07:38 16:31
26	07:29 17:05	06:48 17:48	06:58 19:23	06:04 20:00	05:28 20:34	05:22 20:52	19:00 (55) 19:51 (55)	05:45 20:37	19:13 (55) 19:59 (55)	06:20 19:52	19:54 (55) 19:55 (55)	06:55 18:04	07:32 16:30	07:13 16:30	07:38 16:31
27	07:28 17:07	06:46 17:49	06:56 19:25	06:03 20:01	05:28 20:35	05:23 20:52	19:00 (55) 19:51 (55)	05:46 20:36	19:14 (55) 19:59 (55)	06:21 19:51	19:56 (55) 19:57 (55)	06:57 18:03	07:34 16:29	07:14 16:29	07:39 16:32
28	07:27 17:08	06:45 17:51	06:54 19:26	06:01 20:02	05:27 20:36	05:23 20:52	19:00 (55) 19:52 (55)	05:47 20:35	19:15 (55) 19:59 (55)	06:22 19:49	19:58 (55) 19:59 (55)	06:58 18:01	07:35 16:29	07:15 16:29	07:39 16:33
29	07:26 17:09	06:45 17:52	06:53 19:27	06:00 20:04	05:26 20:37	05:24 20:52	19:00 (55) 19:52 (55)	05:48 20:34	19:16 (55) 19:59 (55)	06:23 19:47	19:59 (55) 19:59 (55)	06:59 18:00	07:36 16:28	07:17 16:28	07:39 16:33
30	07:25 17:11	06:45 17:53	06:51 19:28	05:58 20:05	05:26 20:38	05:24 20:52	19:00 (55) 19:53 (55)	05:49 20:33	19:16 (55) 19:56 (55)	06:24 19:45	19:59 (55) 19:59 (55)	07:00 18:49	07:38 16:28	07:18 16:28	07:40 16:34
31	07:24 17:12	06:49 17:54	06:51 19:29	05:58 20:06	05:26 20:39	05:24 20:52	19:00 (55) 19:53 (55)	05:50 20:32	19:17 (55) 19:56 (55)	06:25 19:44	19:59 (55) 19:59 (55)	07:39 18:49	07:39 16:28	07:40 16:34	07:40 16:34
Potential sun hours	288	293	369	403	457	463	469	434	376	341	290	277			
Total, worst case					1102	1569	1537	178							
Sun reduction					0.55	0.59	0.63	0.59							
Oper. time red.					1.00	1.00	1.00	1.00							
Wind dir. red.					0.51	0.51	0.51	0.51							
Total reduction					0.28	0.30	0.32	0.30							
Total, real					310	473	495	54							

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker (WTG causing flicker first time)	Last time (hh:mm) with flicker (WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 96

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-44 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (353)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36 38	15:18 (47) 15:56 (47)	07:23 17:14	06:43 17:52	06:47 19:31	05:57 20:06
2	07:40 16:37 38	15:18 (47) 15:56 (47)	07:22 17:15	06:41 17:53	06:45 19:32	05:55 20:07
3	07:40 16:38 38	15:19 (47) 15:57 (47)	07:21 17:16	06:39 17:54	06:44 19:33	05:54 20:08
4	07:40 16:39 39	15:19 (47) 15:58 (47)	07:20 17:18	06:38 17:56	06:42 19:34	05:53 20:10
5	07:40 16:40 38	15:20 (47) 15:58 (47)	07:18 17:19	06:36 17:57	06:40 19:36	05:51 20:11
6	07:40 16:41 39	15:20 (47) 15:59 (47)	07:17 17:21	06:34 17:58	06:38 19:37	05:50 20:12
7	07:40 16:42 39	15:20 (47) 15:59 (47)	07:16 17:22	06:33 18:00	06:36 19:38	05:49 20:13
8	07:39 16:43 38	15:21 (47) 15:59 (47)	07:15 17:23	07:31 19:01	06:35 19:39	05:47 20:14
9	07:39 16:44 39	15:21 (47) 16:00 (47)	07:13 17:25	07:29 19:02	06:33 19:41	05:46 20:16
10	07:39 16:45 39	15:21 (47) 16:00 (47)	07:12 17:26	07:27 19:04	06:31 19:42	05:45 20:17
11	07:39 16:46 38	15:22 (47) 16:00 (47)	07:11 17:28	07:25 19:05	06:29 19:43	05:44 20:18
12	07:38 16:48 38	15:23 (47) 16:01 (47)	07:09 17:29	07:24 19:06	06:28 19:44	05:42 20:19
13	07:38 16:49 38	15:23 (47) 16:01 (47)	07:08 17:30	07:22 19:07	06:26 19:45	05:41 20:20
14	07:37 16:50 38	15:23 (47) 16:01 (47)	07:07 17:32	07:20 19:09	06:24 19:47	05:40 20:21
15	07:37 16:51 37	15:24 (47) 16:01 (47)	07:05 17:33	07:18 19:10	06:22 19:48	05:39 20:22
16	07:36 16:52 37	15:24 (47) 16:01 (47)	07:04 17:34	07:16 19:11	06:21 19:49	05:38 20:24
17	07:36 16:54 36	15:26 (47) 16:02 (47)	07:02 17:36	07:15 19:12	06:19 19:50	05:37 20:25
18	07:35 16:55 36	15:26 (47) 16:02 (47)	07:01 17:37	07:13 19:14	06:17 19:52	05:36 20:26
19	07:35 16:56 35	15:26 (47) 16:01 (47)	06:59 17:39	07:11 19:15	06:16 19:53	05:35 20:27
20	07:34 16:57 34	15:28 (47) 16:02 (47)	06:58 17:40	07:09 19:16	06:14 19:54	05:34 20:28
21	07:33 16:59 32	15:29 (47) 16:01 (47)	06:56 17:41	07:07 19:17	06:12 19:55	05:33 20:29
22	07:33 17:00 31	15:30 (47) 16:01 (47)	06:54 17:43	07:05 19:19	06:11 19:56	05:32 20:30
23	07:32 17:01 30	15:30 (47) 16:00 (47)	06:53 17:44	07:04 19:20	06:09 19:58	05:31 20:31
24	07:31 17:03 28	15:32 (47) 16:00 (47)	06:51 17:45	07:02 19:21	06:08 19:59	05:30 20:32
25	07:30 17:04 26	15:33 (47) 15:59 (47)	06:50 17:47	07:00 19:22	06:06 20:00	05:29 20:33
26	07:29 17:05 24	15:34 (47) 15:58 (47)	06:48 17:48	06:58 19:23	06:04 20:00	05:28 20:34
27	07:28 17:07 20	15:36 (47) 15:56 (47)	06:46 17:49	06:56 19:25	06:03 20:01	05:28 20:35
28	07:27 17:08 16	15:39 (47) 15:55 (47)	06:45 17:51	06:54 19:26	06:01 20:02	05:27 20:36
29	07:26 17:09 10	15:42 (47) 15:52 (47)	06:53 17:51	06:53 19:27	06:00 20:04	05:26 20:37
30	07:25 17:11		06:51 19:28	06:51 19:28	05:58 20:05	05:26 20:38
31	07:24 17:12		06:49 19:30	06:49 19:30	05:57 20:05	05:25 20:39
Potential sun hours	288	293	369	403	457	463
Total, worst case	969		507	338	9	
Sun reduction	0.33		0.47	0.49	0.55	
Oper. time red.	1.00		1.00	1.00	1.00	
Wind dir. red.	0.75		0.61	0.52	0.52	
Total reduction	0.26		0.30	0.26	0.30	
Total, real	251		151	89	3	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 97

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-44 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (353)

Assumptions for shadow calculations

Maximum distance for influence 1,000 m
Minimum sun height over horizon for influence 3 °
Day step for calculation 1 days
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760
Idle start wind speed: Cut in wind speed from power curve

Table with columns for months (July to December) and rows for days (1 to 31), showing sun rise/set times and shadow flicker minutes.

Table layout: For each day in each month the following matrix apply

Matrix with columns: Day in month, Sun rise (hh:mm), Sun set (hh:mm), Minutes with flicker, First time (hh:mm) with flicker, Last time (hh:mm) with flicker, (WTG causing flicker first time), (WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 98

Licensed user:

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Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-45 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (29)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June				
1	07:40	07:23	15:48 (47)	06:43	06:47	18:30 (53)	05:57	19:19 (52)	05:25	
	16:36	17:14	40 16:28 (47)	17:52	19:31	32 19:02 (53)	20:06	24 19:43 (52)	20:40	
2	07:40	07:22	15:49 (47)	06:41	06:45	18:29 (53)	05:55	19:18 (52)	05:24	
	16:37	17:15	39 16:28 (47)	17:53	19:32	33 19:02 (53)	20:07	25 19:43 (52)	20:40	
3	07:40	07:21	15:48 (47)	06:39	06:44	18:29 (53)	05:54	19:18 (52)	05:24	
	16:38	17:16	39 16:27 (47)	17:54	19:33	32 19:01 (53)	20:08	25 19:43 (52)	20:41	
4	07:40	07:20	15:49 (47)	06:38	06:42	18:30 (53)	05:53	19:19 (52)	05:23	
	16:39	17:18	38 16:27 (47)	17:56	19:34	31 19:01 (53)	20:10	24 19:43 (52)	20:42	
5	07:40	07:18	15:50 (47)	06:36	06:40	18:29 (53)	05:51	19:18 (52)	05:23	
	16:40	17:19	37 16:27 (47)	17:57	19:36	32 19:01 (53)	20:11	24 19:42 (52)	20:43	
6	07:40	15:57 (47)	07:17	15:51 (47)	06:34	06:38	18:29 (53)	05:50	19:19 (52)	05:22
	16:41	6 16:03 (47)	17:21	36 16:27 (47)	17:58	19:37	31 19:00 (53)	20:12	23 19:42 (52)	20:44
7	07:40	15:54 (47)	07:16	15:51 (47)	06:33	06:36	18:30 (53)	05:49	19:19 (52)	05:22
	16:42	11 16:05 (47)	17:22	35 16:26 (47)	18:00	19:38	29 18:59 (53)	20:13	23 19:42 (52)	20:44
8	07:39	15:53 (47)	07:15	15:52 (47)	07:31	06:35	18:30 (53)	05:47	19:19 (52)	05:22
	16:43	15 16:08 (47)	17:23	34 16:26 (47)	19:01	19:39	27 18:57 (53)	20:14	22 19:41 (52)	20:45
9	07:39	15:53 (47)	07:13	15:54 (47)	07:29	06:33	18:31 (53)	05:46	19:20 (52)	05:21
	16:44	17 16:10 (47)	17:25	31 16:25 (47)	19:02	19:41	26 18:57 (53)	20:16	20 19:40 (52)	20:46
10	07:39	15:51 (47)	07:12	15:55 (47)	07:27	06:31	18:32 (53)	05:45	19:20 (52)	05:21
	16:45	20 16:11 (47)	17:26	28 16:23 (47)	19:04	19:42	23 18:55 (53)	20:17	20 19:40 (52)	20:46
11	07:39	15:51 (47)	07:11	15:57 (47)	07:25	06:29	18:33 (53)	05:44	19:22 (52)	05:21
	16:46	22 16:13 (47)	17:28	25 16:22 (47)	19:05	19:43	20 18:53 (53)	20:18	17 19:39 (52)	20:47
12	07:38	15:51 (47)	07:09	15:58 (47)	07:24	06:28	18:36 (53)	05:42	19:23 (52)	05:21
	16:48	24 16:15 (47)	17:29	22 16:20 (47)	19:06	19:44	15 18:51 (53)	20:19	15 19:38 (52)	20:47
13	07:38	15:50 (47)	07:08	16:01 (47)	07:22	06:26	18:40 (53)	05:41	19:25 (52)	05:21
	16:49	25 16:15 (47)	17:30	17 16:18 (47)	19:07	19:45	6 18:46 (53)	20:20	11 19:36 (52)	20:48
14	07:37	15:49 (47)	07:07	16:04 (47)	07:20	06:24	18:40 (53)	05:40	19:27 (52)	05:21
	16:50	27 16:16 (47)	17:32	10 16:14 (47)	19:09	19:47	7 19:34 (52)	20:21	7 19:34 (52)	20:48
15	07:37	15:49 (47)	07:05	16:07 (47)	07:18	06:22	18:40 (53)	05:39	19:28 (52)	05:20
	16:51	29 16:18 (47)	17:33	16:08 (47)	07:16	19:48	19:48	20:22	20:49	20:49
16	07:36	15:48 (47)	07:04	16:09 (47)	07:16	06:21	18:40 (53)	05:38	19:29 (52)	05:20
	16:52	31 16:19 (47)	17:34	16:10 (47)	07:15	19:49	19:49	20:24	20:49	20:49
17	07:36	15:48 (47)	07:02	16:11 (47)	07:15	06:19	18:40 (53)	05:37	19:30 (52)	05:20
	16:54	32 16:20 (47)	17:36	16:12 (47)	07:14	19:50	19:50	20:25	20:50	20:50
18	07:35	15:48 (47)	07:01	16:13 (47)	07:13	06:17	18:40 (53)	05:36	19:31 (52)	05:21
	16:55	33 16:21 (47)	17:37	16:14 (47)	07:12	19:51	19:51	20:26	20:50	20:50
19	07:35	15:47 (47)	06:59	16:15 (47)	07:11	06:16	18:40 (53)	05:35	19:32 (52)	05:21
	16:56	35 16:22 (47)	17:39	16:16 (47)	07:10	19:53	19:53	20:27	20:51	20:51
20	07:34	15:48 (47)	06:58	16:17 (47)	07:09	06:14	18:40 (53)	05:34	19:33 (52)	05:21
	16:57	35 16:23 (47)	17:40	16:18 (47)	07:08	19:54	19:54	20:28	20:51	20:51
21	07:33	15:47 (47)	06:56	16:19 (47)	07:07	06:12	18:40 (53)	05:33	19:34 (52)	05:21
	16:59	37 16:24 (47)	17:41	16:20 (47)	07:06	19:55	19:55	20:29	20:51	20:51
22	07:33	15:47 (47)	06:54	16:21 (47)	07:05	06:11	18:40 (53)	05:32	19:35 (52)	05:21
	17:00	37 16:24 (47)	17:43	16:22 (47)	07:04	19:56	19:56	20:30	20:51	20:51
23	07:32	15:47 (47)	06:53	16:23 (47)	07:04	06:09	18:40 (53)	05:31	19:36 (52)	05:21
	17:01	38 16:25 (47)	17:44	16:24 (47)	07:03	19:58	19:58	20:31	20:52	20:52
24	07:31	15:46 (47)	06:51	16:25 (47)	07:02	06:08	19:30 (52)	05:30	19:37 (52)	05:22
	17:03	39 16:25 (47)	17:45	16:26 (47)	07:01	19:21	12 18:55 (53)	19:59	4 19:34 (52)	20:32
25	07:30	15:46 (47)	06:50	16:27 (47)	07:00	06:06	18:39 (53)	05:29	19:26 (52)	05:29
	17:04	40 16:26 (47)	17:47	16:28 (47)	06:59	19:22	18 18:57 (53)	20:00	10 19:36 (52)	20:33
26	07:29	15:46 (47)	06:48	16:29 (47)	06:58	06:04	18:37 (53)	05:28	19:24 (52)	05:28
	17:05	40 16:26 (47)	17:48	16:30 (47)	06:57	19:23	22 18:59 (53)	20:00	13 19:37 (52)	20:34
27	07:28	15:46 (47)	06:46	16:31 (47)	06:56	06:03	18:35 (53)	05:27	19:22 (52)	05:28
	17:07	41 16:27 (47)	17:49	16:32 (47)	06:55	19:25	25 19:00 (53)	20:01	16 19:38 (52)	20:35
28	07:27	15:47 (47)	06:45	16:33 (47)	06:54	06:01	18:33 (53)	05:26	19:21 (52)	05:27
	17:08	40 16:27 (47)	17:51	16:34 (47)	06:53	19:26	28 19:01 (53)	20:02	18 19:39 (52)	20:36
29	07:26	15:47 (47)	06:44	16:35 (47)	06:53	06:00	18:33 (53)	05:25	19:20 (52)	05:26
	17:09	41 16:28 (47)	17:52	16:36 (47)	06:52	19:27	29 19:02 (53)	20:04	20 19:40 (52)	20:37
30	07:25	15:47 (47)	06:43	16:37 (47)	06:51	05:58	18:32 (53)	05:24	19:19 (52)	05:26
	17:11	41 16:28 (47)	17:53	16:38 (47)	06:50	19:28	30 19:02 (53)	20:05	23 19:42 (52)	20:38
31	07:24	15:47 (47)	06:42	16:39 (47)	06:49	05:57	18:31 (53)	05:23	19:18 (52)	05:25
	17:12	41 16:28 (47)	17:54	16:40 (47)	06:48	19:30	31 19:02 (53)	20:06	24 19:43 (52)	20:39
Potential sun hours	288	293	369	403	457	463				
Total, worst case	797	431	195	441	280					
Sun reduction	0.33	0.39	0.47	0.49	0.55					
Oper. time red.	1.00	1.00	1.00	1.00	1.00					
Wind dir. red.	0.73	0.73	0.58	0.56	0.52					
Total reduction	0.25	0.30	0.28	0.29	0.29					
Total, real	199	127	55	126	82					

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 99

Licensed user:

EDR

217 Montgomery St.

US-SYRACUSE, NY 13202

(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-45 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (29)

Assumptions for shadow calculations

Maximum distance for influence 1,000 m
Minimum sun height over horizon for influence 3 °
Day step for calculation 1 days
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760
Idle start wind speed: Cut in wind speed from power curve

Table with columns for months (July-December) and rows for specific times of day, showing sun rise/set times and shadow calculations.

Table layout: For each day in each month the following matrix apply

Matrix defining table layout: Day in month, Sun rise (hh:mm), Sun set (hh:mm), Minutes with flicker, First time (hh:mm) with flicker, Last time (hh:mm) with flicker, (WTG causing flicker first time), (WTG causing flicker last time)

Project: **05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 100  
Licensed user:  
**EDR**  
217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688  
Steve Curtis, scurtis@edrpc.com  
Calculated:  
3/21/2011 11:14 AM/2.7.453

### SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-46 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (30)

#### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []  
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25  
Operational time  
N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36	07:23 17:14	06:43 17:52	36 16:27 (47) 19:31	05:57 20:06	05:25 20:40
2	07:40 16:37	07:22 17:15	06:41 17:53	35 16:28 (47) 19:32	05:55 20:07	05:24 20:40
3	07:40 16:38	07:21 17:16	06:39 17:54	32 16:29 (47) 19:33	05:54 20:08	05:24 20:41
4	07:40 16:39	07:20 17:18	06:38 17:56	29 16:30 (47) 19:34	05:53 20:10	05:23 20:42
5	07:40 16:40	07:18 17:19	06:36 17:57	26 16:31 (47) 19:36	05:51 20:11	05:23 20:43
6	07:40 16:41	07:17 17:21	06:34 17:58	22 16:34 (47) 19:37	05:50 20:12	05:22 20:43
7	07:40 16:42	07:16 17:22	06:33 18:00	17 16:36 (47) 19:38	05:49 20:13	05:22 20:44
8	07:39 16:43	07:15 17:23	06:31 18:01	8 17:40 (47) 19:39	05:47 20:14	05:22 20:45
9	07:39 16:44	07:13 17:25	16:45 (47) 19:02	06:33 19:41	12 19:03 (53) 20:16	05:46 20:46
10	07:39 16:45	07:12 17:26	16:38 (47) 19:04	06:31 19:42	17 19:00 (53) 20:17	05:45 20:46
11	07:39 16:46	07:11 17:28	16:36 (47) 19:05	06:29 19:43	22 18:57 (53) 20:18	05:44 20:47
12	07:38 16:48	07:09 17:29	16:34 (47) 19:06	06:28 19:44	24 18:55 (53) 20:19	05:42 20:47
13	07:38 16:49	07:08 17:30	16:32 (47) 19:07	06:26 19:45	26 18:55 (53) 20:20	05:41 20:48
14	07:37 16:50	07:07 17:32	16:31 (47) 19:09	06:24 19:47	27 18:54 (53) 20:21	05:40 20:48
15	07:37 16:51	07:05 17:33	16:30 (47) 19:10	06:22 19:48	29 18:52 (53) 20:22	05:39 20:49
16	07:36 16:52	07:04 17:34	16:28 (47) 19:11	06:21 19:49	30 18:52 (53) 20:24	05:38 20:49
17	07:36 16:54	07:02 17:36	16:28 (47) 19:12	06:19 19:50	30 18:52 (53) 20:25	05:37 20:50
18	07:35 16:55	07:01 17:37	16:27 (47) 19:13	06:17 19:51	30 18:51 (53) 20:26	05:36 20:50
19	07:35 16:56	06:59 17:39	16:27 (47) 19:15	06:16 19:53	31 18:51 (53) 20:27	05:35 20:51
20	07:34 16:57	06:58 17:40	16:26 (47) 19:16	06:14 19:54	30 18:51 (53) 20:28	05:34 20:51
21	07:33 16:59	06:56 17:41	16:26 (47) 19:17	06:12 19:55	30 18:51 (53) 20:29	05:33 20:51
22	07:32 17:00	06:54 17:43	16:26 (47) 19:19	06:11 19:56	29 18:51 (53) 20:30	05:32 20:51
23	07:32 17:01	06:53 17:44	16:25 (47) 19:20	06:09 19:58	28 18:51 (53) 20:31	05:31 20:52
24	07:31 17:03	06:51 17:45	16:26 (47) 19:21	06:08 19:59	26 18:52 (53) 20:32	05:30 20:52
25	07:30 17:04	06:50 17:47	16:26 (47) 19:22	06:06 20:00	24 18:53 (53) 20:33	05:29 20:52
26	07:29 17:05	06:48 17:48	16:25 (47) 19:23	06:04 20:00	22 18:54 (53) 20:34	05:28 20:52
27	07:28 17:07	06:46 17:49	16:26 (47) 19:25	06:03 20:01	19 18:55 (53) 20:35	05:28 20:52
28	07:27 17:08	06:45 17:51	16:27 (47) 19:26	06:01 20:02	15 18:57 (53) 20:36	05:27 20:52
29	07:26 17:09		06:53 19:27	06:00 20:04	10 18:59 (53) 20:37	05:26 20:52
30	07:25 17:11		06:51 19:28	05:58 20:05		05:24 20:52
31	07:24 17:12		06:49 19:30			05:25 20:52
Potential sun hours	288	293	369	403	457	463
Total, worst case		653	205	511		
Sun reduction		0.39	0.47	0.49		
Oper. time red.		1.00	1.00	1.00		
Wind dir. red.		0.69	0.69	0.53		
Total reduction		0.27	0.33	0.26		
Total, real		177	67	135		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)



Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 101

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation:** 05030 SFA Gamesa G97\_R2Shadow receptor: R-46 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (30)

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []  
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25  
Operational time  
N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25	05:51	06:27	18:56 (53) 07:01	06:40	16:09 (47) 07:19
	20:52	20:31	19:42	22 19:18 (53) 18:47	16:55	13 16:22 (47) 16:28
2	05:25	05:52	06:28	18:58 (53) 07:02	06:42	07:20
	20:52	20:30	19:40	17 19:15 (53) 18:45	16:54	16:27
3	05:26	05:54	06:29	19:01 (53) 07:04	06:43	07:21
	20:52	20:28	19:38	12 19:13 (53) 18:43	16:53	16:27
4	05:26	05:55	06:30	07:05	06:44	07:22
	20:51	20:27	19:37	18:41	16:51	16:27
5	05:27	05:56	06:31	07:06	06:46	07:23
	20:51	20:26	19:35	18:39	16:50	16:26
6	05:27	05:57	06:32	07:07	17:13 (47) 06:47	07:24
	20:51	20:25	19:33	18:38	14 17:27 (47) 16:49	16:26
7	05:28	05:58	06:34	07:08	17:11 (47) 06:48	07:25
	20:50	20:23	19:31	18:36	20 17:31 (47) 16:48	16:26
8	05:29	05:59	06:35	07:10	17:08 (47) 06:50	07:26
	20:50	20:22	19:29	18:34	24 17:32 (47) 16:46	16:26
9	05:30	06:00	06:36	07:11	17:05 (47) 06:51	07:27
	20:50	20:21	19:27	18:32	28 17:33 (47) 16:45	16:26
10	05:30	06:01	06:37	07:12	17:03 (47) 06:52	07:28
	20:49	20:19	19:26	18:31	31 17:34 (47) 16:44	16:26
11	05:31	06:03	06:38	07:13	17:03 (47) 06:54	07:29
	20:49	20:18	19:24	18:29	33 17:36 (47) 16:43	16:26
12	05:32	06:04	06:39	07:15	17:01 (47) 06:55	07:30
	20:48	20:16	19:22	18:27	35 17:36 (47) 16:42	16:26
13	05:33	06:05	06:40	07:16	17:00 (47) 06:56	07:31
	20:48	20:15	19:20	18:25	36 17:36 (47) 16:41	16:26
14	05:34	06:06	19:07 (53) 06:42	07:17	16:59 (47) 06:58	07:32
	20:47	20:13	11 19:18 (53) 19:18	18:24	38 17:37 (47) 16:40	16:26
15	05:34	06:07	19:04 (53) 06:43	07:18	16:59 (47) 06:59	07:32
	20:47	20:12	16 19:20 (53) 19:16	18:22	38 17:37 (47) 16:39	16:26
16	05:35	06:08	19:02 (53) 06:44	07:20	16:58 (47) 07:00	07:33
	20:46	20:10	20 19:22 (53) 19:15	18:20	39 17:37 (47) 16:38	16:27
17	05:36	06:09	19:01 (53) 06:45	07:21	16:57 (47) 07:02	07:34
	20:45	20:09	22 19:23 (53) 19:13	18:18	40 17:37 (47) 16:37	16:27
18	05:37	06:11	18:59 (53) 06:46	07:22	16:57 (47) 07:03	07:34
	20:44	20:07	25 19:24 (53) 19:11	18:17	41 17:38 (47) 16:36	16:27
19	05:38	06:12	18:58 (53) 06:47	07:23	16:57 (47) 07:04	07:35
	20:44	20:06	26 19:24 (53) 19:09	18:15	40 17:37 (47) 16:35	16:28
20	05:39	06:13	18:57 (53) 06:48	07:25	16:56 (47) 07:05	07:36
	20:43	20:04	28 19:25 (53) 19:07	18:14	40 17:36 (47) 16:34	16:28
21	05:40	06:14	18:56 (53) 06:50	07:26	16:57 (47) 07:07	07:36
	20:42	20:02	29 19:25 (53) 19:05	18:12	40 17:37 (47) 16:33	16:28
22	05:41	06:15	18:55 (53) 06:51	07:27	16:57 (47) 07:08	07:37
	20:41	20:01	30 19:25 (53) 19:03	18:10	39 17:36 (47) 16:33	16:29
23	05:42	06:16	18:55 (53) 06:52	07:28	16:57 (47) 07:09	07:37
	20:40	19:57	30 19:25 (53) 19:01	18:09	38 17:35 (47) 16:32	16:29
24	05:43	06:17	18:55 (53) 06:53	07:30	16:58 (47) 07:11	07:38
	20:39	19:56	30 19:25 (53) 19:00	18:07	37 17:35 (47) 16:31	16:30
25	05:44	06:19	18:55 (53) 06:54	07:31	16:58 (47) 07:12	07:38
	20:38	19:54	30 19:25 (53) 18:58	18:06	36 17:34 (47) 16:31	16:31
26	05:45	06:20	18:54 (53) 06:55	07:32	16:58 (47) 07:13	07:38
	20:37	19:52	30 19:24 (53) 18:56	18:04	34 17:32 (47) 16:30	16:31
27	05:46	06:21	18:54 (53) 06:57	07:34	17:00 (47) 07:14	07:39
	20:36	19:51	30 19:24 (53) 18:54	18:03	32 17:32 (47) 16:29	16:32
28	05:47	06:22	18:54 (53) 06:58	07:35	17:01 (47) 07:15	07:39
	20:35	19:49	29 19:23 (53) 18:52	18:01	29 17:30 (47) 16:29	16:33
29	05:48	06:23	18:54 (53) 06:59	07:36	17:02 (47) 07:17	07:39
	20:34	19:47	28 19:22 (53) 18:50	18:00	27 17:29 (47) 16:28	16:33
30	05:49	06:24	18:55 (53) 07:00	07:38	17:04 (47) 07:18	07:39
	20:33	19:45	26 19:21 (53) 18:49	17:58	23 17:27 (47) 16:28	16:34
31	05:50	06:26	18:55 (53)	07:39	17:05 (47)	07:40
	20:32	19:44	24 19:19 (53)	17:57	20 17:25 (47)	16:35
Potential sun hours	469	434	376	341	290	277
Total, worst case		464	51	852	13	
Sun reduction		0.59	0.54	0.44	0.27	
Oper. time red.		1.00	1.00	1.00	1.00	
Wind dir. red.		0.53	0.53	0.69	0.69	
Total reduction		0.32	0.29	0.31	0.19	
Total, real		147	15	261	2	

**Table layout: For each day in each month the following matrix apply**

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 102

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-47 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (31)

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	18:02 (47) 20:06	19:21 (53) 20:40
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	18:10 (47) 20:07	19:42 (53) 20:40
3	07:40 16:38	07:21 17:16	06:39 17:54	06:44 19:33	18:10 (47) 20:08	19:42 (53) 20:41
4	07:40 16:39	07:20 17:18	06:38 17:56	17:07 (47) 19:34	18:10 (47) 20:10	19:42 (53) 20:42
5	07:40 16:40	07:18 17:19	06:36 17:57	17:02 (47) 19:36	18:10 (47) 20:11	19:42 (53) 20:43
6	07:40 16:41	07:17 17:21	06:34 17:58	17:00 (47) 19:37	18:10 (47) 20:12	19:42 (53) 20:43
7	07:40 16:42	07:16 17:22	06:33 18:00	16:58 (47) 19:38	18:10 (47) 20:13	19:42 (53) 20:44
8	07:39 16:43	07:15 17:23	06:31 19:01	17:56 (47) 19:39	18:10 (47) 20:14	19:42 (53) 20:45
9	07:39 16:44	07:13 17:25	06:29 19:02	17:54 (47) 19:41	18:10 (47) 20:16	19:42 (53) 20:46
10	07:39 16:45	07:12 17:26	06:27 19:04	17:53 (47) 19:42	18:10 (47) 20:17	19:42 (53) 20:46
11	07:39 16:46	07:11 17:28	06:25 19:05	17:52 (47) 19:43	18:10 (47) 20:18	19:42 (53) 20:47
12	07:38 16:48	07:09 17:29	06:24 19:06	17:51 (47) 19:44	18:10 (47) 20:19	19:42 (53) 20:47
13	07:38 16:49	07:08 17:30	06:22 19:07	17:50 (47) 19:45	18:10 (47) 20:20	19:42 (53) 20:48
14	07:37 16:50	07:07 17:32	06:20 19:09	17:49 (47) 19:47	18:10 (47) 20:21	19:42 (53) 20:48
15	07:37 16:51	07:05 17:33	06:18 19:10	17:48 (47) 19:48	18:10 (47) 20:22	19:42 (53) 20:49
16	07:36 16:52	07:04 17:34	06:16 19:11	17:48 (47) 19:49	18:10 (47) 20:23	19:42 (53) 20:49
17	07:36 16:54	07:02 17:36	06:15 19:12	17:48 (47) 19:50	18:10 (47) 20:25	19:42 (53) 20:50
18	07:35 16:55	07:01 17:37	06:13 19:14	17:48 (47) 19:51	18:10 (47) 20:26	19:42 (53) 20:50
19	07:35 16:56	06:59 17:39	06:11 19:15	17:47 (47) 19:53	18:10 (47) 20:27	19:42 (53) 20:51
20	07:34 16:57	06:58 17:40	06:09 19:16	17:47 (47) 19:54	18:10 (47) 20:28	19:42 (53) 20:51
21	07:33 16:59	06:56 17:41	06:07 19:17	17:47 (47) 19:55	18:10 (47) 20:29	19:42 (53) 20:51
22	07:32 17:00	06:54 17:43	06:05 19:19	17:47 (47) 19:56	18:10 (47) 20:30	19:42 (53) 20:51
23	07:32 17:01	06:53 17:44	06:04 19:20	17:48 (47) 19:58	18:10 (47) 20:31	19:42 (53) 20:52
24	07:31 17:03	06:51 17:45	06:02 19:21	17:48 (47) 19:59	18:10 (47) 20:32	19:42 (53) 20:52
25	07:30 17:04	06:50 17:47	06:00 19:22	17:49 (47) 20:00	18:10 (47) 20:33	19:42 (53) 20:52
26	07:29 17:05	06:48 17:48	06:58 19:23	17:50 (47) 20:00	18:10 (47) 20:34	19:42 (53) 20:52
27	07:28 17:07	06:46 17:49	06:56 19:25	17:50 (47) 20:01	18:10 (47) 20:35	19:42 (53) 20:52
28	07:27 17:08	06:45 17:51	06:54 19:26	17:51 (47) 20:02	18:10 (47) 20:36	19:42 (53) 20:52
29	07:26 17:09	06:43 19:27	06:53 19:27	17:54 (47) 20:04	19:26 (53) 20:37	19:42 (53) 20:52
30	07:25 17:11	06:41 19:28	06:51 19:28	17:55 (47) 20:05	19:23 (53) 20:38	19:42 (53) 20:52
31	07:24 17:12	06:39 19:30	06:49 19:30	17:58 (47) 20:05	19:40 (53) 20:39	19:42 (53) 20:52
Potential sun hours	288	293	369	403	457	463
Total, worst case			1019	37	733	
Sun reduction			0.47	0.49	0.55	
Oper. time red.			1.00	1.00	1.00	
Wind dir. red.			0.62	0.54	0.51	
Total reduction			0.29	0.27	0.29	
Total, real			300	10	209	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker (WTG causing flicker first time)	Last time (hh:mm) with flicker (WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 103

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-47 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (31)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1   05:25	05:51	19:25 (53)	06:27	07:01	17:29 (47)	06:40   07:19
20:52	20:31	32 19:57 (53)	19:42	18:47	43 18:12 (47)	16:55   16:28
2   05:25	05:52	19:25 (53)	06:28	07:02	17:30 (47)	06:42   07:20
20:52	20:30	32 19:57 (53)	19:40	18:45	40 18:10 (47)	16:54   16:27
3   05:26	05:54	19:25 (53)	06:29	07:04	17:31 (47)	06:43   07:21
20:52	20:28	32 19:57 (53)	19:38	18:43	39 18:10 (47)	16:53   16:27
4   05:26	05:55	19:25 (53)	06:30	07:05	17:31 (47)	06:44   07:22
20:51	20:27	31 19:56 (53)	19:37	18:41	37 18:08 (47)	16:51   16:27
5   05:27	05:56	19:25 (53)	06:31	07:06	17:32 (47)	06:46   07:23
20:51	20:26	31 19:56 (53)	19:35	18:39	35 18:07 (47)	16:50   16:26
6   05:27	05:57	19:25 (53)	06:32	07:07	17:33 (47)	06:47   07:24
20:51	20:25	30 19:55 (53)	19:33	18:38	32 18:05 (47)	16:49   16:26
7   05:28	05:58	19:26 (53)	06:34	07:08	17:35 (47)	06:48   07:25
20:50	20:23	29 19:55 (53)	19:31	18:36	28 18:03 (47)	16:48   16:26
8   05:29	05:59	19:26 (53)	06:35	07:10	17:37 (47)	06:50   07:26
20:50	20:22	28 19:54 (53)	19:29	18:34	24 18:01 (47)	16:46   16:26
9   05:30	06:00	19:27 (53)	06:36	07:11	17:39 (47)	06:51   07:27
20:50	20:21	26 19:53 (53)	19:27	18:32	18 17:57 (47)	16:45   16:26
10   05:30	06:01	19:27 (53)	06:37	07:12	17:44 (47)	06:52   07:28
20:49	20:19	25 19:52 (53)	19:26	18:31	7 17:51 (47)	16:44   16:26
11   05:31	06:03	19:28 (53)	06:38	17:56 (47)	07:13	06:54   07:29
20:49	20:18	23 19:51 (53)	19:24	5 18:01 (47)	18:29	16:43   16:26
12   05:32	06:04	19:29 (53)	06:39	17:50 (47)	07:15	06:55   07:30
20:48	20:16	20 19:49 (53)	19:22	16 18:06 (47)	18:27	16:42   16:26
13   05:33	06:05	19:32 (53)	06:40	17:47 (47)	07:16	06:56   07:31
20:48	20:15	16 19:48 (53)	19:20	23 18:10 (47)	18:25	16:41   16:26
14   05:34	19:40 (53)	06:06	06:42	19:34 (53)	06:42	17:44 (47)   07:17
20:47	2 19:41 (53)	20:13	19:18	28 18:12 (47)	18:24	16:40   16:26
15   05:34	19:35 (53)	06:07	06:43	17:42 (47)	07:18	06:59   07:32
20:47	9 19:44 (53)	20:12	19:16	31 18:13 (47)	18:22	16:39   16:26
16   05:35	19:34 (53)	06:08	06:44	17:40 (47)	07:20	07:00   07:33
20:46	12 19:46 (53)	20:10	19:15	34 18:14 (47)	18:20	16:38   16:27
17   05:36	19:33 (53)	06:09	06:45	17:38 (47)	07:21	07:02   07:34
20:45	15 19:48 (53)	20:09	19:13	36 18:14 (47)	18:18	16:37   16:27
18   05:37	19:32 (53)	06:11	06:46	17:36 (47)	07:22	07:03   07:34
20:44	17 19:49 (53)	20:07	19:11	39 18:15 (47)	18:17	16:36   16:27
19   05:38	19:31 (53)	06:12	06:47	17:35 (47)	07:23	07:04   07:35
20:44	20 19:51 (53)	20:06	19:09	40 18:15 (47)	18:15	16:35   16:28
20   05:39	19:30 (53)	06:13	06:48	17:34 (47)	07:25	07:05   07:36
20:43	22 19:52 (53)	20:04	19:07	41 18:15 (47)	18:14	16:34   16:28
21   05:40	19:29 (53)	06:14	06:50	17:34 (47)	07:26	07:07   07:36
20:42	24 19:53 (53)	20:02	19:05	42 18:16 (47)	18:12	16:33   16:28
22   05:41	19:29 (53)	06:15	06:51	17:33 (47)	07:27	07:08   07:37
20:41	24 19:53 (53)	20:01	19:03	43 18:16 (47)	18:10	16:33   16:29
23   05:42	19:28 (53)	06:16	06:52	17:32 (47)	07:28	07:09   07:37
20:40	26 19:54 (53)	19:57	19:01	44 18:16 (47)	18:09	16:32   16:29
24   05:43	19:28 (53)	06:17	06:53	17:31 (47)	07:30	07:11   07:38
20:39	27 19:55 (53)	19:56	19:00	45 18:16 (47)	18:07	16:31   16:30
25   05:44	19:27 (53)	06:19	06:54	17:30 (47)	07:31	07:12   07:38
20:38	28 19:55 (53)	19:54	18:58	45 18:15 (47)	18:06	16:31   16:31
26   05:45	19:27 (53)	06:20	06:55	17:30 (47)	07:32	07:13   07:38
20:37	29 19:56 (53)	19:52	18:56	45 18:15 (47)	18:04	16:30   16:31
27   05:46	19:27 (53)	06:21	06:57	17:29 (47)	07:34	07:14   07:39
20:36	29 19:56 (53)	19:51	18:54	45 18:14 (47)	18:03	16:29   16:32
28   05:47	19:26 (53)	06:22	06:58	17:30 (47)	07:35	07:15   07:39
20:35	31 19:57 (53)	19:49	18:52	45 18:15 (47)	18:01	16:29   16:33
29   05:48	19:26 (53)	06:23	06:59	17:30 (47)	07:36	07:17   07:39
20:34	31 19:57 (53)	19:47	18:50	44 18:14 (47)	18:00	16:28   16:33
30   05:49	19:26 (53)	06:24	07:00	17:29 (47)	07:38	07:18   07:39
20:33	31 19:57 (53)	19:45	18:49	44 18:13 (47)	17:58	16:28   16:34
31   05:50	19:25 (53)	06:26	07:39	07:39	16:28	07:40   07:40
20:32	32 19:57 (53)	19:44	17:57	17:57	16:35	16:35   16:35
Potential sun hours	469	434	376	341	290	277
Total, worst case	409	366	735	303		
Sun reduction	0.63	0.59	0.54	0.44		
Oper. time red.	1.00	1.00	1.00	1.00		
Wind dir. red.	0.51	0.51	0.62	0.62		
Total reduction	0.33	0.31	0.34	0.28		
Total, real	134	112	249	84		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 104

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-48 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (352)

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.33	0.39	0.47	0.49	0.55	0.59	0.63	0.59	0.54	0.44	0.27	0.25

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
438	648	710	456	298	237	193	272	631	1,051	1,182	1,006	675	429	245	289	8,760

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

	January	February	March	April	May	June
1	07:40 16:36	07:23 17:14	06:43 17:52	16:53 (47) 17:20 (47)	06:47 19:31	05:57 20:06
2	07:40 16:37	07:22 17:15	06:41 17:53	16:52 (47) 17:22 (47)	06:45 19:32	05:55 20:07
3	07:40 16:38	07:21 17:16	06:39 17:54	16:50 (47) 17:23 (47)	06:44 19:33	05:54 20:08
4	07:40 16:39	07:20 17:18	06:38 17:56	16:48 (47) 17:24 (47)	06:42 19:34	05:53 20:10
5	07:40 16:40	07:18 17:19	06:36 17:57	16:47 (47) 17:25 (47)	06:40 19:36	05:51 20:11
6	07:40 16:41	07:17 17:21	06:34 17:58	16:46 (47) 17:26 (47)	06:38 19:37	05:50 20:12
7	07:40 16:42	07:16 17:22	06:33 18:00	16:45 (47) 17:26 (47)	06:36 19:38	05:49 20:13
8	07:39 16:43	07:15 17:23	07:31 19:01	17:44 (47) 18:26 (47)	06:35 19:39	05:47 20:14
9	07:39 16:44	07:13 17:25	07:29 19:02	17:44 (47) 18:26 (47)	06:33 19:41	05:46 20:16
10	07:39 16:45	07:12 17:26	07:27 19:04	17:43 (47) 18:26 (47)	06:31 19:42	05:45 20:17
11	07:39 16:46	07:11 17:28	07:25 19:05	17:43 (47) 18:27 (47)	06:29 19:43	05:44 20:18
12	07:38 16:48	07:09 17:29	07:24 19:06	17:43 (47) 18:27 (47)	06:28 19:44	05:42 20:19
13	07:38 16:49	07:08 17:30	07:22 19:07	17:43 (47) 18:26 (47)	06:26 19:45	05:41 20:20
14	07:37 16:50	07:07 17:32	07:20 19:09	17:42 (47) 18:26 (47)	06:24 19:47	05:40 20:21
15	07:37 16:51	07:05 17:33	07:18 19:10	17:42 (47) 18:25 (47)	06:22 19:48	05:39 20:22
16	07:36 16:52	07:04 17:34	07:16 19:11	17:42 (47) 18:24 (47)	06:21 19:49	05:38 20:24
17	07:36 16:54	07:02 17:36	07:15 19:12	17:43 (47) 18:24 (47)	06:19 19:50	05:37 20:25
18	07:35 16:55	07:01 17:37	07:13 19:14	17:44 (47) 18:23 (47)	06:17 19:51	05:36 20:26
19	07:35 16:56	06:59 17:39	07:11 19:15	17:44 (47) 18:22 (47)	06:16 19:53	05:35 20:27
20	07:34 16:57	06:58 17:40	07:09 19:16	17:45 (47) 18:20 (47)	06:14 19:54	05:34 20:28
21	07:33 16:59	06:56 17:41	07:07 19:17	17:46 (47) 18:18 (47)	06:12 19:55	05:33 20:29
22	07:32 17:00	06:54 17:43	07:05 19:19	17:47 (47) 18:16 (47)	06:11 19:56	05:32 20:30
23	07:32 17:01	06:53 17:44	07:04 19:20	17:49 (47) 18:15 (47)	06:09 19:58	05:31 20:31
24	07:31 17:03	06:51 17:45	07:02 19:21	17:51 (47) 18:12 (47)	06:08 19:59	05:30 20:32
25	07:30 17:04	06:50 17:47	07:00 19:22	17:54 (47) 18:09 (47)	06:06 20:00	05:29 20:33
26	07:29 17:05	06:48 17:48	17:03 (47) 19:23	06:58 20:00	06:04 20:01	05:28 20:34
27	07:28 17:07	06:46 17:49	16:59 (47) 19:25	06:56 20:01	06:03 20:02	05:28 20:35
28	07:27 17:08	06:45 17:51	16:55 (47) 19:26	06:54 20:02	06:01 20:02	05:27 20:36
29	07:26 17:09	06:44 17:19 (47)	06:53 19:27	06:53 20:04	06:00 20:04	05:26 20:37
30	07:25 17:11	06:43 17:11	06:52 19:28	06:52 20:05	05:58 20:05	05:26 20:38
31	07:24 17:12	06:42 17:12	06:49 19:30	06:51 20:06	05:57 20:06	05:25 20:39
Potential sun hours	288	293	369	403	457	463
Total, worst case		48	908	170	484	
Sun reduction		0.39	0.47	0.49	0.55	
Oper. time red.		1.00	1.00	1.00	1.00	
Wind dir. red.		0.64	0.64	0.52	0.52	
Total reduction		0.25	0.30	0.26	0.29	
Total, real		12	276	43	139	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker
			(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-48 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (352)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.33	0.39	0.47	0.49	0.55	0.59	0.63	0.59	0.54	0.44	0.27	0.25

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
438	648	710	456	298	237	193	272	631	1,051	1,182	1,006	675	429	245	289	8,760

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

	July	August	September	October	November	December		
1	05:25	05:51	19:21 (53)	06:27	07:01	17:22 (47)	06:40	07:19
	20:52	20:31	19:48 (53)	19:42	18:47	18:05 (47)	16:55	16:28
2	05:25	05:52	19:20 (53)	06:28	07:02	17:21 (47)	06:42	07:20
	20:52	20:30	19:48 (53)	19:40	18:45	18:05 (47)	16:54	16:27
3	05:26	05:54	19:19 (53)	06:29	07:04	17:21 (47)	06:43	07:21
	20:52	20:28	19:49 (53)	19:38	18:43	18:05 (47)	16:53	16:27
4	05:26	05:55	19:19 (53)	06:30	07:05	17:21 (47)	06:44	07:22
	20:51	20:27	19:49 (53)	19:37	18:41	18:04 (47)	16:51	16:27
5	05:27	05:56	19:19 (53)	06:31	07:06	17:21 (47)	06:46	07:23
	20:51	20:26	19:49 (53)	19:35	18:39	18:03 (47)	16:50	16:26
6	05:27	05:57	19:18 (53)	06:32	07:07	17:21 (47)	06:47	07:24
	20:51	20:25	19:49 (53)	19:33	18:38	18:02 (47)	16:49	16:26
7	05:28	05:58	19:18 (53)	06:34	07:08	17:22 (47)	06:48	07:25
	20:50	20:23	19:49 (53)	19:31	18:36	18:02 (47)	16:48	16:26
8	05:29	05:59	19:18 (53)	06:35	07:10	17:22 (47)	06:50	07:26
	20:50	20:22	19:49 (53)	19:29	18:34	18:01 (47)	16:46	16:26
9	05:30	06:00	19:17 (53)	06:36	07:11	17:22 (47)	06:51	07:27
	20:50	20:21	19:48 (53)	19:27	18:32	18:00 (47)	16:45	16:26
10	05:30	06:01	19:17 (53)	06:37	07:12	17:23 (47)	06:52	07:28
	20:49	20:19	19:48 (53)	19:26	18:31	17:58 (47)	16:44	16:26
11	05:31	06:03	19:17 (53)	06:38	07:13	17:25 (47)	06:54	07:29
	20:49	20:18	19:48 (53)	19:24	18:29	17:57 (47)	16:43	16:26
12	05:32	06:04	19:17 (53)	06:39	07:15	17:26 (47)	06:55	07:30
	20:48	20:16	19:47 (53)	19:22	18:27	17:55 (47)	16:42	16:26
13	05:33	06:05	19:19 (53)	06:40	07:16	17:27 (47)	06:56	07:31
	20:48	20:15	19:47 (53)	19:20	18:25	17:53 (47)	16:41	16:26
14	05:34	06:06	19:19 (53)	06:42	07:17	17:29 (47)	06:58	07:32
	20:47	20:13	19:46 (53)	19:18	18:24	17:50 (47)	16:40	16:26
15	05:34	06:07	19:20 (53)	06:43	07:18	17:33 (47)	06:59	07:32
	20:47	20:12	19:45 (53)	19:16	18:22	17:47 (47)	16:39	16:26
16	05:35	06:08	19:20 (53)	06:44	07:20		07:00	07:33
	20:46	20:10	19:44 (53)	19:15	18:20		16:38	16:27
17	05:36	06:09	19:21 (53)	06:45	07:21		07:02	07:34
	20:45	20:09	19:42 (53)	19:13	18:18		16:37	16:27
18	05:37	06:11	19:23 (53)	06:46	17:43 (47)	07:22	07:03	07:34
	20:44	20:07	19:40 (53)	19:11	17:55 (47)	18:17	16:36	16:27
19	05:38	06:12	19:25 (53)	06:47	17:38 (47)	07:23	07:04	07:35
	20:44	20:06	19:38 (53)	19:09	17:58 (47)	18:15	16:35	16:28
20	05:39	06:13	19:29 (53)	06:48	17:35 (47)	07:25	07:05	07:36
	20:43	20:04	19:33 (53)	19:07	18:00 (47)	18:14	16:34	16:28
21	05:40	06:14		06:50	17:34 (47)	07:26	07:07	07:36
	20:42	20:02		19:05	18:02 (47)	18:12	16:33	16:28
22	05:41	06:15		06:51	17:32 (47)	07:27	07:08	07:37
	20:41	20:01		19:03	18:03 (47)	18:10	16:33	16:29
23	05:42	06:16		06:52	17:30 (47)	07:28	07:09	07:37
	20:40	19:57		19:01	18:04 (47)	18:09	16:32	16:29
24	05:43	19:32 (53)	06:17	06:53	17:28 (47)	07:30	07:11	07:38
	20:39	19:37 (53)	19:56	19:00	18:05 (47)	18:07	16:31	16:30
25	05:44	19:29 (53)	06:19	06:54	17:27 (47)	07:31	07:12	07:38
	20:38	19:40 (53)	19:54	18:58	18:05 (47)	18:06	16:31	16:31
26	05:45	19:27 (53)	06:20	06:55	17:25 (47)	07:32	07:13	07:38
	20:37	19:42 (53)	19:52	18:56	18:05 (47)	18:04	16:30	16:31
27	05:46	19:26 (53)	06:21	06:57	17:24 (47)	07:34	07:14	07:39
	20:36	19:44 (53)	19:51	18:54	18:05 (47)	18:03	16:29	16:32
28	05:47	19:24 (53)	06:22	06:58	17:24 (47)	07:35	07:15	07:39
	20:35	19:45 (53)	19:49	18:52	18:06 (47)	18:01	16:29	16:33
29	05:48	19:23 (53)	06:23	06:59	17:23 (47)	07:36	07:17	07:39
	20:34	19:46 (53)	19:47	18:50	18:06 (47)	18:00	16:28	16:33
30	05:49	19:22 (53)	06:24	07:00	17:22 (47)	07:38	07:18	07:39
	20:33	19:47 (53)	19:45	18:49	18:06 (47)	17:58	16:28	16:34
31	05:50	19:22 (53)	06:26		07:39		07:40	07:40
	20:32	19:47 (53)	19:44		17:57		16:35	16:35
Potential sun hours	469	434	376	341	290	277		
Total, worst case	143	520	435	531				
Sun reduction	0.63	0.59	0.54	0.44				
Oper. time red.	1.00	1.00	1.00	1.00				
Wind dir. red.	0.52	0.52	0.64	0.64				
Total reduction	0.33	0.31	0.35	0.28				
Total, real	47	160	152	151				

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 106

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edr.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-5 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (5)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December				
1	07:40	15:35 (55)	07:23	15:24 (55)	06:43	06:47	05:57	05:25	05:24	05:51	06:27	07:01	06:40	14:57 (55)	07:19	15:11 (55)
2	07:40	15:34 (55)	07:22	15:25 (55)	06:41	06:45	05:55	05:24	05:25	05:52	06:28	07:02	06:42	14:56 (55)	07:20	15:12 (55)
3	07:40	15:33 (55)	07:21	15:24 (55)	06:39	06:44	05:54	05:23	05:26	05:54	06:29	07:04	06:43	14:56 (55)	07:21	15:13 (55)
4	07:40	15:33 (55)	07:20	15:25 (55)	06:38	06:42	05:53	05:23	05:26	05:55	06:30	07:05	06:44	14:55 (55)	07:22	15:14 (55)
5	07:40	15:32 (55)	07:19	15:25 (55)	06:36	06:40	05:51	05:23	05:27	05:56	06:31	07:06	06:46	14:55 (55)	07:23	15:16 (55)
6	07:40	15:32 (55)	07:17	15:26 (55)	06:34	06:38	05:50	05:22	05:27	05:57	06:32	07:07	06:47	14:55 (55)	07:24	15:18 (55)
7	07:40	15:31 (55)	07:16	15:25 (55)	06:33	06:36	05:49	05:22	05:28	05:58	06:34	07:09	06:48	14:55 (55)	07:25	15:19 (55)
8	07:39	15:30 (55)	07:15	15:25 (55)	06:31	06:35	05:47	05:22	05:29	05:59	06:35	07:10	06:50	14:55 (55)	07:26	15:21 (55)
9	07:39	15:30 (55)	07:13	15:27 (55)	06:29	06:33	05:46	05:21	05:30	06:00	06:36	07:11	06:51	14:55 (55)	07:27	15:22 (55)
10	07:39	15:29 (55)	07:12	15:27 (55)	06:27	06:31	05:45	05:21	05:30	06:01	06:37	07:12	06:52	14:55 (55)	07:28	15:23 (55)
11	07:39	15:29 (55)	07:11	15:28 (55)	06:25	06:29	05:43	05:21	05:31	06:03	06:38	07:13	06:54	14:55 (55)	07:29	15:25 (55)
12	07:38	15:28 (55)	07:10	15:28 (55)	06:24	06:28	05:42	05:21	05:32	06:04	06:39	07:15	06:55	14:56 (55)	07:30	15:28 (55)
13	07:38	15:28 (55)	07:08	15:30 (55)	06:22	06:26	05:41	05:21	05:33	06:05	06:40	07:16	06:56	14:56 (55)	07:31	15:30 (55)
14	07:37	15:28 (55)	07:07	15:30 (55)	06:20	06:24	05:40	05:20	05:34	06:06	06:42	07:17	06:58	14:57 (55)	07:32	15:32 (55)
15	07:37	15:27 (55)	07:05	15:32 (55)	06:18	06:22	05:39	05:20	05:34	06:07	06:43	07:18	06:59	14:57 (55)	07:32	15:32 (55)
16	07:36	15:26 (55)	07:04	15:32 (55)	06:16	06:21	05:38	05:20	05:35	06:08	06:44	07:20	07:00	14:57 (55)	07:33	15:33 (55)
17	07:36	15:26 (55)	07:02	15:34 (55)	06:15	06:19	05:37	05:20	05:36	06:09	06:45	07:21	07:02	14:58 (55)	07:34	15:34 (55)
18	07:35	15:26 (55)	07:01	15:36 (55)	06:13	06:17	05:36	05:20	05:37	06:11	06:46	07:22	07:03	14:58 (55)	07:34	15:34 (55)
19	07:35	15:25 (55)	06:59	15:38 (55)	06:11	06:16	05:35	05:21	05:38	06:12	06:47	07:23	07:04	15:00 (55)	07:35	15:35 (55)
20	07:34	15:26 (55)	06:58	15:40 (55)	06:10	06:14	05:34	05:21	05:39	06:13	06:48	07:25	07:05	15:00 (55)	07:36	15:36 (55)
21	07:33	15:25 (55)	06:56	15:44 (55)	06:07	06:12	05:33	05:21	05:40	06:14	06:50	07:26	07:06	15:01 (55)	07:36	15:36 (55)
22	07:33	15:25 (55)	06:54	15:48 (55)	06:05	06:11	05:32	05:21	05:41	06:15	06:51	07:27	07:07	15:02 (55)	07:37	15:37 (55)
23	07:32	15:25 (55)	06:53	16:00 (55)	06:03	06:09	05:31	05:21	05:42	06:16	06:52	07:29	07:09	15:02 (55)	07:37	15:37 (55)
24	07:31	15:24 (55)	06:51	16:16 (55)	06:01	06:07	05:30	05:22	05:43	06:17	06:53	07:30	07:10	15:03 (55)	07:38	15:38 (55)
25	07:30	15:24 (55)	06:50	16:32 (55)	05:59	06:05	05:29	05:22	05:44	06:19	06:54	07:31	07:11	15:04 (55)	07:38	15:38 (55)
26	07:29	15:24 (55)	06:48	16:48 (55)	05:57	06:03	05:28	05:22	05:45	06:20	06:55	07:32	07:12	15:05 (55)	07:38	15:38 (55)
27	07:28	15:24 (55)	06:46	17:04 (55)	05:55	06:01	05:27	05:23	05:46	06:21	06:57	07:34	07:13	15:06 (55)	07:39	15:39 (55)
28	07:27	15:24 (55)	06:45	17:20 (55)	05:53	06:00	05:26	05:23	05:47	06:22	06:58	07:35	07:14	15:07 (55)	07:39	15:39 (55)
29	07:26	15:24 (55)	06:44	17:36 (55)	05:51	06:00	05:25	05:23	05:48	06:23	06:59	07:36	07:15	15:08 (55)	07:39	15:39 (55)
30	07:25	15:24 (55)	06:43	17:52 (55)	05:49	06:00	05:24	05:23	05:49	06:24	07:00	07:38	07:16	15:09 (55)	07:39	15:39 (55)
31	07:24	15:24 (55)	06:42	18:08 (55)	05:47	06:00	05:23	05:23	05:50	06:25	07:01	07:39	07:17	15:10 (55)	07:40	15:40 (55)
Potential sun hours	288	293	369	403	457	463	469	434	376	341	290	277	276	276	276	276
Total, worst case	1206	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984
Sun reduction	0.33	0.39	0.47	0.49	0.55	0.59	0.63	0.59	0.54	0.44	0.27	0.25	0.25	0.25	0.25	0.25
Oper. time red.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Wind dir. red.	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74
Total reduction	0.24	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
Total, real	294	284	284	284	284	284	284	284	284	284	284	284	284	284	284	284

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project: **05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

Printed/Page: 3/21/2011 2:14 PM / 107  
 Licensed user:  
**EDR**  
 217 Montgomery St.  
 US-SYRACUSE, NY 13202  
 (315) 471 0688  
 Steve Curtis, scurtis@edrpc.com  
 Calculated:  
 3/21/2011 11:14 AM/2.7.453

### SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-51 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (32)

#### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []  
 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25  
 Operational time  
 N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
 438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
 Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	18:03 (47) 20:06	05:57 20:40	18 19:31 (53)
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	18:03 (47) 20:07	05:55 20:40	17 19:48 (53)
3	07:40 16:38	07:21 17:16	06:39 17:54	06:44 19:33	18:04 (47) 20:08	05:54 20:41	14 19:47 (53)
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:34	18:05 (47) 20:10	05:53 20:42	13 19:46 (53)
5	07:40 16:40	07:18 17:19	06:36 17:57	06:40 19:36	18:06 (47) 20:11	05:51 20:43	10 19:45 (53)
6	07:40 16:41	07:17 17:21	06:34 17:58	06:38 19:37	18:07 (47) 20:12	05:50 20:44	7 19:44 (53)
7	07:40 16:42	07:16 17:22	06:33 18:00	06:36 19:38	18:09 (47) 20:13	05:49 20:45	2 19:41 (53)
8	07:39 16:43	07:15 17:23	06:31 18:01	06:35 19:39	18:10 (47) 20:14	05:47 20:46	
9	07:39 16:44	07:13 17:25	06:29 18:02	06:33 19:41	18:14 (47) 20:16	05:46 20:47	
10	07:39 16:45	07:12 17:26	06:27 18:04	06:31 19:42	18:28 (47) 20:17	05:45 20:48	
11	07:39 16:46	07:11 17:28	06:25 18:05	06:29 19:43	18:42 (47) 20:18	05:44 20:49	
12	07:38 16:48	07:09 17:29	06:24 18:06	06:28 19:44	18:43 (47) 20:19	05:42 20:50	
13	07:38 16:49	07:08 17:30	06:22 18:07	06:26 19:45	18:44 (47) 20:20	05:41 20:51	
14	07:37 16:50	07:07 17:32	06:20 18:09	06:24 19:47	18:45 (47) 20:21	05:40 20:52	
15	07:37 16:51	07:05 17:33	06:18 18:10	06:22 19:48	18:46 (47) 20:22	05:39 20:53	
16	07:36 16:52	07:04 17:34	06:16 18:11	06:21 19:49	18:47 (47) 20:23	05:38 20:54	
17	07:36 16:54	07:02 17:36	06:15 18:12	06:19 19:50	18:48 (47) 20:24	05:37 20:55	
18	07:35 16:55	07:01 17:37	06:13 18:13	06:17 19:51	18:49 (47) 20:25	05:36 20:56	
19	07:35 16:56	06:59 17:39	06:11 18:14	06:16 19:53	18:50 (47) 20:26	05:35 20:57	
20	07:34 16:57	06:58 17:40	06:09 18:15	06:14 19:54	18:51 (47) 20:27	05:34 20:58	
21	07:33 16:59	06:56 17:41	06:07 18:16	06:12 19:55	18:52 (47) 20:28	05:33 20:59	
22	07:32 17:00	06:54 17:43	06:05 18:17	06:11 19:56	18:53 (47) 20:29	05:32 21:00	
23	07:32 17:01	06:53 17:44	06:04 18:18	06:09 19:58	18:54 (47) 20:30	05:31 21:01	
24	07:31 17:03	06:51 17:45	06:02 18:19	06:08 19:59	18:55 (47) 20:31	05:30 21:02	
25	07:30 17:04	06:50 17:47	06:00 18:20	06:06 20:00	18:56 (47) 20:32	05:29 21:03	
26	07:29 17:05	06:48 17:48	06:58 18:21	06:04 20:00	18:57 (47) 20:33	05:28 21:04	
27	07:28 17:07	06:46 17:49	06:56 18:22	06:03 20:01	18:58 (47) 20:34	05:27 21:05	
28	07:27 17:08	06:45 17:51	06:54 18:23	06:01 20:02	18:59 (47) 20:35	05:26 21:06	
29	07:26 17:09	06:43 17:52	06:53 18:24	06:00 20:04	18:59 (47) 20:36	05:25 21:07	
30	07:25 17:11	06:41 17:53	06:51 18:25	06:58 20:05	18:59 (47) 20:37	05:24 21:08	
31	07:24 17:12	06:40 17:54	06:49 18:26	06:57 20:06	18:59 (47) 20:38	05:23 21:09	
Potential sun hours	288	293	369	403	457	463	81
Total, worst case			657	271	706		0.59
Sun reduction			0.47	0.49	0.55		1.00
Oper. time red.			1.00	1.00	1.00		0.51
Wind dir. red.			0.60	0.60	0.51		0.30
Total reduction			0.29	0.30	0.28		25
Total, real			188	81	200		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:  
**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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 3/21/2011 2:14 PM / 108  
 Licensed user:  
**EDR**  
 217 Montgomery St.  
 US-SYRACUSE, NY 13202  
 (315) 471 0688  
 Steve Curtis, scurtis@edrpc.com  
 Calculated:  
 3/21/2011 11:14 AM/2.7.453

### SHADOW - Calendar

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-51 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (32)**

#### Assumptions for shadow calculations

Maximum distance for influence	1,000 m	Sunshine probability S/S0 (Sun hours/Possible sun hours) []
Minimum sun height over horizon for influence	3 °	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Day step for calculation	1 days	0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25
Time step for calculation	1 minutes	Operational time
		N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum
		438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760
		Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25	05:51	19:35 (53) 06:27		07:01	06:40 07:19
	20:52	20:31	28 20:03 (53) 19:42		18:47	16:55 16:28
2	05:25	05:52	19:35 (53) 06:28		07:02	06:42 07:20
	20:52	20:30	27 20:02 (53) 19:40		18:45	16:54 16:27
3	05:26	05:54	19:36 (53) 06:29	18:12 (47)	07:04	06:43 07:21
	20:52	20:28	26 20:02 (53) 19:38	14 18:26 (47)	18:43	16:53 16:27
4	05:26	05:55	19:36 (53) 06:30		18:08 (47)	07:05 06:44 07:22
	20:51	20:27	25 20:01 (53) 19:37	21 18:29 (47)	18:41	16:51 16:27
5	05:27	05:56	19:37 (53) 06:31		18:06 (47)	07:06 06:46 07:23
	20:51	20:26	23 20:00 (53) 19:35	25 18:31 (47)	18:39	16:50 16:26
6	05:27	19:44 (53) 05:57	19:38 (53) 06:32		18:03 (47)	07:07 06:47 07:24
	20:51	6 19:50 (53) 20:25	21 19:59 (53) 19:33	29 18:32 (47)	18:38	16:49 16:26
7	05:28	19:42 (53) 05:58	19:39 (53) 06:34		18:01 (47)	07:08 06:48 07:25
	20:50	9 19:51 (53) 20:23	18 19:57 (53) 19:31	32 18:33 (47)	18:36	16:48 16:26
8	05:29	19:41 (53) 05:59	19:40 (53) 06:35		18:00 (47)	07:10 06:50 07:26
	20:50	12 19:53 (53) 20:22	15 19:55 (53) 19:29	34 18:34 (47)	18:34	16:46 16:26
9	05:30	19:41 (53) 06:00	19:43 (53) 06:36		17:58 (47)	07:11 06:51 07:27
	20:50	13 19:54 (53) 20:21	9 19:52 (53) 19:27	36 18:34 (47)	18:32	16:45 16:26
10	05:30	19:39 (53) 06:01	06:37		17:57 (47)	07:12 06:52 07:28
	20:49	16 19:55 (53) 20:19	19:26	38 18:35 (47)	18:31	16:44 16:26
11	05:31	19:39 (53) 06:03	06:38		17:55 (47)	07:13 06:54 07:29
	20:49	17 19:56 (53) 20:18	19:24	40 18:35 (47)	18:29	16:43 16:26
12	05:32	19:38 (53) 06:04	06:39		17:54 (47)	07:15 06:55 07:30
	20:48	19 19:57 (53) 20:16	19:22	41 18:35 (47)	18:27	16:42 16:26
13	05:33	19:38 (53) 06:05	06:40		17:54 (47)	07:16 06:56 07:31
	20:48	20 19:58 (53) 20:15	19:20	42 18:36 (47)	18:25	16:41 16:26
14	05:34	19:38 (53) 06:06	06:42		17:53 (47)	07:17 06:58 07:32
	20:47	21 19:59 (53) 20:13	19:18	43 18:36 (47)	18:24	16:40 16:26
15	05:34	19:36 (53) 06:07	06:43		17:53 (47)	07:18 06:59 07:32
	20:47	23 19:59 (53) 20:12	19:16	42 18:35 (47)	18:22	16:39 16:26
16	05:35	19:36 (53) 06:08	06:44		17:52 (47)	07:20 07:00 07:33
	20:46	24 20:00 (53) 20:10	19:15	43 18:35 (47)	18:20	16:38 16:27
17	05:36	19:36 (53) 06:09	06:45		17:52 (47)	07:21 07:02 07:34
	20:45	24 20:00 (53) 20:09	19:13	42 18:34 (47)	18:18	16:37 16:27
18	05:37	19:35 (53) 06:11	06:46		17:51 (47)	07:22 07:03 07:34
	20:44	26 20:01 (53) 20:07	19:11	43 18:34 (47)	18:17	16:36 16:27
19	05:38	19:35 (53) 06:12	06:47		17:51 (47)	07:23 07:04 07:35
	20:44	27 20:02 (53) 20:06	19:09	42 18:33 (47)	18:15	16:35 16:28
20	05:39	19:35 (53) 06:13	06:48		17:51 (47)	07:25 07:05 07:36
	20:43	27 20:02 (53) 20:04	19:07	41 18:32 (47)	18:14	16:34 16:28
21	05:40	19:35 (53) 06:14	06:50		17:52 (47)	07:26 07:07 07:36
	20:42	28 20:03 (53) 20:02	19:05	40 18:32 (47)	18:12	16:33 16:28
22	05:41	19:34 (53) 06:15	06:51		17:52 (47)	07:27 07:08 07:37
	20:41	29 20:03 (53) 20:01	19:03	39 18:31 (47)	18:10	16:33 16:29
23	05:42	19:34 (53) 06:16	06:52		17:52 (47)	07:28 07:09 07:37
	20:40	29 20:03 (53) 19:57	19:01	38 18:30 (47)	18:09	16:32 16:29
24	05:43	19:34 (53) 06:17	06:53		17:52 (47)	07:30 07:11 07:38
	20:39	30 20:04 (53) 19:56	19:00	36 18:28 (47)	18:07	16:31 16:30
25	05:44	19:34 (53) 06:19	06:54		17:53 (47)	07:31 07:12 07:38
	20:38	30 20:04 (53) 19:54	18:58	34 18:27 (47)	18:06	16:31 16:31
26	05:45	19:34 (53) 06:20	06:55		17:54 (47)	07:32 07:13 07:38
	20:37	30 20:04 (53) 19:52	18:56	31 18:25 (47)	18:04	16:30 16:31
27	05:46	19:34 (53) 06:21	06:57		17:55 (47)	07:34 07:14 07:39
	20:36	30 20:04 (53) 19:51	18:54	27 18:22 (47)	18:03	16:29 16:32
28	05:47	19:34 (53) 06:22	06:58		17:58 (47)	07:35 07:15 07:39
	20:35	30 20:04 (53) 19:49	18:52	23 18:21 (47)	18:01	16:29 16:33
29	05:48	19:34 (53) 06:23	06:59		18:00 (47)	07:36 07:17 07:39
	20:34	30 20:04 (53) 19:47	18:50	17 18:17 (47)	18:00	16:28 16:33
30	05:49	19:34 (53) 06:24	07:00		18:05 (47)	07:38 07:18 07:39
	20:33	30 20:04 (53) 19:45	18:49	7 18:12 (47)	17:58	16:28 16:34
31	05:50	19:34 (53) 06:26			07:39	07:40 07:40
	20:32	29 20:03 (53) 19:44			17:57	16:35 16:35
Potential sun hours	469	434	376	341	290	277
Total, worst case	609	192	940			
Sun reduction	0.63	0.59	0.54			
Oper. time red.	1.00	1.00	1.00			
Wind dir. red.	0.51	0.51	0.60			
Total reduction	0.32	0.30	0.33			
Total, real	198	58	308			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)



Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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Licensed user:

**EDR**

217 Montgomery St.

US-SYRACUSE, NY 13202

(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-52 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (33)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
 438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
 Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	05:57 20:06	18:43 (47) 18:49 (47)
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	18:44 (47) 18:59 (47)	05:55 20:07
3	07:40 16:38	07:21 17:16	06:39 17:54	06:44 19:33	18:40 (47) 19:01 (47)	05:54 20:08
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:34	18:39 (47) 19:04 (47)	05:53 20:10
5	07:40 16:40	07:18 17:19	06:36 17:57	06:40 19:36	18:36 (47) 19:05 (47)	05:51 20:11
6	07:40 16:41	07:17 17:21	06:34 17:58	06:38 19:37	18:34 (47) 19:06 (47)	05:50 20:12
7	07:40 16:42	07:16 17:22	06:33 18:00	06:36 19:38	18:33 (47) 19:07 (47)	05:49 20:13
8	07:39 16:43	07:15 17:23	06:31 19:01	06:35 19:39	18:31 (47) 19:08 (47)	05:47 20:14
9	07:39 16:44	07:13 17:25	06:29 19:02	06:33 19:41	18:31 (47) 19:09 (47)	05:46 20:16
10	07:39 16:45	07:12 17:26	06:27 19:04	06:31 19:42	18:29 (47) 19:09 (47)	05:45 20:17
11	07:39 16:46	07:11 17:28	06:25 19:05	06:29 19:43	18:28 (47) 19:09 (47)	05:44 20:18
12	07:38 16:48	07:09 17:29	06:24 19:06	06:28 19:44	18:28 (47) 19:10 (47)	05:42 20:19
13	07:38 16:49	07:08 17:30	06:22 19:07	06:26 19:45	18:28 (47) 19:10 (47)	05:41 20:20
14	07:37 16:50	07:07 17:32	06:20 19:09	06:24 19:47	18:27 (47) 19:09 (47)	05:40 20:21
15	07:37 16:51	07:05 17:33	06:18 19:10	06:22 19:48	18:26 (47) 19:09 (47)	05:39 20:22
16	07:36 16:52	07:04 17:34	06:16 19:11	06:21 19:49	18:27 (47) 19:09 (47)	05:38 20:24
17	07:36 16:54	07:02 17:36	06:15 19:12	06:19 19:50	18:26 (47) 19:09 (47)	05:37 20:25
18	07:35 16:55	07:01 17:37	06:13 19:14	06:17 19:51	18:26 (47) 19:08 (47)	05:36 20:26
19	07:35 16:56	06:59 17:39	07:11 19:15	06:16 19:53	18:27 (47) 19:08 (47)	05:35 20:27
20	07:34 16:57	06:58 17:40	07:09 19:16	06:14 19:54	18:27 (47) 19:07 (47)	05:34 20:28
21	07:33 16:59	06:56 17:41	07:07 19:17	06:12 19:55	18:27 (47) 19:07 (47)	05:33 20:29
22	07:32 17:00	06:54 17:43	07:05 19:19	06:11 19:56	18:28 (47) 19:06 (47)	05:32 20:30
23	07:32 17:01	06:53 17:44	07:04 19:20	06:09 19:58	18:28 (47) 19:04 (47)	05:31 20:31
24	07:31 17:03	06:51 17:45	07:02 19:21	06:08 19:59	18:29 (47) 19:04 (47)	05:30 20:32
25	07:30 17:04	06:50 17:47	07:00 19:22	06:06 20:00	18:29 (47) 19:02 (47)	05:29 20:33
26	07:29 17:05	06:48 17:48	06:58 19:23	06:04 20:00	18:31 (47) 19:01 (47)	05:28 20:34
27	07:28 17:07	06:46 17:49	06:56 19:25	06:03 20:01	18:32 (47) 18:59 (47)	05:28 20:35
28	07:27 17:08	06:45 17:51	06:54 19:26	06:01 20:02	18:33 (47) 18:58 (47)	05:27 20:36
29	07:26 17:09		06:53 19:27	06:00 20:04	18:36 (47) 18:56 (47)	05:26 20:37
30	07:25 17:11		06:51 19:28	05:58 20:05	18:38 (47) 18:53 (47)	05:26 20:38
31	07:24 17:12		06:49 19:30		05:25 20:39	19:44 (53) 20:11 (53)
Potential sun hours	288	293	369	403	457	463
Total, worst case				988	269	862
Sun reduction				0.49	0.55	0.59
Oper. time red.				1.00	1.00	1.00
Wind dir. red.				0.55	0.50	0.50
Total reduction				0.27	0.28	0.30
Total, real				269	75	256

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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Licensed user:

**EDR**

217 Montgomery St.

US-SYRACUSE, NY 13202

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-52 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (33)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
 438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
 Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25 20:52	19:50 (53) 20:31	05:51 20:31	06:27 19:42	18:27 (47) 18:47	07:01 18:47
2	05:25 20:52	19:50 (53) 20:30	05:52 20:30	06:28 19:40	18:27 (47) 19:07 (47)	07:02 18:45
3	05:26 20:52	19:50 (53) 20:28	05:54 20:28	06:29 19:38	18:29 (47) 19:07 (47)	07:04 18:43
4	05:26 20:51	19:50 (53) 20:27	05:55 20:27	06:30 19:37	18:29 (47) 19:06 (47)	07:05 18:41
5	05:27 20:51	19:50 (53) 20:26	05:56 20:26	06:31 19:35	18:30 (47) 19:04 (47)	07:06 18:39
6	05:27 20:51	19:51 (53) 20:25	05:57 20:25	06:32 19:33	18:30 (47) 19:03 (47)	07:07 18:38
7	05:28 20:50	19:51 (53) 20:23	05:58 20:23	06:34 19:31	18:31 (47) 19:01 (47)	07:08 18:36
8	05:29 20:50	19:51 (53) 20:22	05:59 20:22	06:35 19:29	18:33 (47) 18:58 (47)	07:10 18:34
9	05:30 20:50	19:52 (53) 20:20	06:00 20:20	06:36 19:27	18:34 (47) 18:56 (47)	07:11 18:32
10	05:30 20:49	19:51 (53) 20:19	06:01 20:19	06:37 19:26	18:37 (47) 18:52 (47)	07:12 18:31
11	05:31 20:49	19:52 (53) 20:18	06:03 20:18	06:38 19:24	18:37 (47) 18:29	07:13 18:31
12	05:32 20:48	19:52 (53) 20:16	06:04 20:16	18:49 (47) 18:58 (47)	06:39 19:22	07:15 18:27
13	05:33 20:48	19:53 (53) 20:15	06:05 20:15	18:46 (47) 19:02 (47)	06:40 19:20	07:16 18:25
14	05:34 20:47	19:53 (53) 20:13	06:06 20:13	18:43 (47) 19:04 (47)	06:42 19:18	07:17 18:24
15	05:34 20:47	19:53 (53) 20:12	06:07 20:12	18:41 (47) 19:06 (47)	06:43 19:16	07:18 18:22
16	05:35 20:46	19:54 (53) 20:10	06:08 20:10	18:39 (47) 19:07 (47)	06:44 19:15	07:20 18:20
17	05:36 20:45	19:54 (53) 20:09	06:09 20:09	18:37 (47) 19:08 (47)	06:45 19:13	07:21 18:18
18	05:37 20:44	19:55 (53) 20:07	06:11 20:07	18:36 (47) 19:09 (47)	06:46 19:11	07:22 18:17
19	05:38 20:44	19:56 (53) 20:06	06:12 20:06	18:34 (47) 19:10 (47)	06:47 19:09	07:23 18:15
20	05:39 20:43	19:57 (53) 20:04	06:13 20:04	18:33 (47) 19:10 (47)	06:48 19:07	07:25 18:14
21	05:40 20:42	19:58 (53) 20:02	06:14 20:02	18:32 (47) 19:10 (47)	06:50 19:05	07:26 18:12
22	05:41 20:41	19:59 (53) 20:01	06:15 20:01	18:31 (47) 19:11 (47)	06:51 19:03	07:27 18:10
23	05:42 20:40	20:01 (53) 19:57	06:16 19:57	18:30 (47) 19:11 (47)	06:52 19:01	07:28 18:09
24	05:43 20:39	20:03 (53) 19:56	06:17 19:56	18:30 (47) 19:12 (47)	06:53 19:00	07:30 18:07
25	05:44 20:38	20:12 (53) 19:54	06:19 19:54	18:30 (47) 19:12 (47)	06:54 18:58	07:31 18:06
26	05:45 20:37	06:20 19:52	06:20 19:52	18:29 (47) 19:11 (47)	06:55 18:56	07:32 18:04
27	05:46 20:36	06:21 19:51	06:21 19:51	18:29 (47) 19:11 (47)	06:57 18:54	07:34 18:03
28	05:47 20:35	06:22 19:49	06:22 19:49	18:28 (47) 19:11 (47)	06:58 18:52	07:35 18:01
29	05:48 20:34	06:23 19:47	06:23 19:47	18:28 (47) 19:10 (47)	06:59 18:50	07:36 18:00
30	05:49 20:33	06:24 19:45	06:24 19:45	18:28 (47) 19:10 (47)	07:00 18:49	07:38 17:58
31	05:50 20:32	06:26 19:44	06:26 19:44	18:27 (47) 19:09 (47)	07:01 18:47	07:39 17:57
Potential sun hours	469	434	376	341	290	277
Total, worst case	589	692	315			
Sun reduction	0.63	0.59	0.54			
Oper. time red.	1.00	1.00	1.00			
Wind dir. red.	0.50	0.55	0.55			
Total reduction	0.32	0.33	0.30			
Total, real	187	227	95			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 111

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-53 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (34)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	05:57 20:06	18:39 (47) 20:40	05:25 20:52	05:51 20:25 (53)	06:27 19:42	07:01 18:47	06:40 16:55	07:19 16:28
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	05:55 20:07	18:38 (47) 20:40	05:25 20:52	05:52 20:24 (53)	06:42 19:40	07:02 18:45	06:42 16:54	07:20 16:27
3	07:40 16:38	07:21 17:16	06:39 17:54	06:44 19:33	05:54 20:08	18:39 (47) 20:41	20:07 (53) 20:52	05:54 20:28 (53)	06:29 19:38	07:04 18:43	06:43 16:53	07:21 16:27
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:34	05:53 20:10	18:40 (47) 20:42	20:05 (53) 20:51	05:55 20:27 (53)	06:30 19:37	07:05 18:41	06:44 16:51	07:22 16:27
5	07:40 16:40	07:18 17:19	06:36 17:57	06:40 19:36	05:51 20:11	18:39 (47) 20:43	20:04 (53) 20:51	05:56 20:26 (53)	06:31 19:35	07:06 18:39	06:46 16:50	07:23 16:26
6	07:40 16:41	07:17 17:21	06:34 17:58	06:38 19:37	05:50 20:12	18:40 (47) 20:43	20:04 (53) 20:51	05:57 20:25 (53)	06:32 19:33	07:07 18:38	06:47 16:49	07:24 16:26
7	07:40 16:42	07:16 17:22	06:33 18:00	06:36 19:38	05:49 20:13	18:41 (47) 20:44	20:02 (53) 20:50	05:58 20:23 (53)	06:34 19:31	07:08 18:36	06:48 16:48	07:25 16:26
8	07:39 16:43	07:15 17:23	06:31 19:01	06:35 19:39	05:47 20:14	18:42 (47) 20:45	20:02 (53) 20:50	05:59 20:22 (53)	06:35 19:29	07:10 18:34	06:50 16:46	07:26 16:26
9	07:39 16:44	07:13 17:25	06:29 19:02	06:33 19:41	05:46 20:16	18:42 (47) 20:46	20:02 (53) 20:50	06:00 20:20 (53)	06:36 19:27	07:11 18:32	06:51 16:45	07:27 16:26
10	07:39 16:45	07:12 17:26	06:27 19:04	06:31 19:42	05:45 20:17	18:43 (47) 20:46	20:02 (53) 20:49	06:01 20:19 (53)	06:37 19:26	07:12 18:31	06:52 16:44	07:28 16:26
11	07:39 16:46	07:11 17:28	06:25 19:05	06:29 19:43	05:44 20:18	18:44 (47) 20:47	20:02 (53) 20:49	06:03 20:18 (53)	06:38 19:24	07:13 18:29	06:54 16:43	07:29 16:26
12	07:38 16:48	07:09 17:29	06:24 19:06	06:28 19:44	05:42 20:19	18:45 (47) 20:47	20:01 (53) 20:48	06:04 20:16 (53)	06:39 19:22	07:15 18:27	06:55 16:42	07:30 16:26
13	07:38 16:49	07:08 17:30	06:22 19:07	06:26 19:45	18:58 (47) 05:41	18:46 (47) 20:48	20:01 (53) 20:43	06:05 20:15 (53)	06:40 19:20	07:16 18:25	06:56 16:41	07:31 16:26
14	07:37 16:50	07:07 17:32	06:20 19:09	06:24 19:47	05:40 20:21	18:48 (47) 20:48	20:01 (53) 20:47	06:06 20:13 (53)	06:42 19:18	07:17 18:24	06:58 16:40	07:32 16:26
15	07:37 16:51	07:05 17:33	06:18 19:10	06:22 19:48	05:39 20:22	18:51 (47) 20:49	20:01 (53) 20:47	06:07 20:12 (53)	06:43 19:16	07:18 18:22	06:59 16:39	07:32 16:26
16	07:36 16:52	07:04 17:34	06:16 19:11	06:21 19:49	05:38 20:23	18:49 (47) 20:49	20:01 (53) 20:46	06:08 20:10 (53)	06:44 19:15	07:20 18:20	07:00 16:38	07:33 16:27
17	07:36 16:54	07:02 17:36	06:15 19:12	06:19 19:50	05:37 20:25	18:47 (47) 20:50	20:01 (53) 20:45	06:09 20:09 (53)	06:45 19:13	07:21 18:18	07:02 16:37	07:34 16:27
18	07:35 16:55	07:01 17:37	06:13 19:14	06:17 19:51	05:36 20:26	18:45 (47) 20:50	20:01 (53) 20:44	06:11 20:07 (53)	06:46 19:11	07:22 18:17	07:03 16:36	07:35 16:27
19	07:35 16:56	06:59 17:39	06:11 19:15	06:16 19:53	05:35 20:27	18:44 (47) 20:51	20:02 (53) 20:44	06:12 20:06 (53)	06:47 19:09	07:23 18:15	07:04 16:35	07:36 16:28
20	07:34 16:57	06:58 17:40	06:09 19:16	06:14 19:54	05:34 20:28	18:43 (47) 20:52	20:02 (53) 20:43	06:13 20:04 (53)	06:48 19:07	07:25 18:14	07:05 16:34	07:37 16:28
21	07:33 16:59	06:56 17:41	06:07 19:17	06:12 19:55	05:33 20:29	18:43 (47) 20:52	20:02 (53) 20:42	06:14 20:02 (53)	06:50 19:05	07:26 18:12	07:07 16:33	07:38 16:28
22	07:32 17:00	06:54 17:43	06:05 19:19	06:11 19:56	05:32 20:30	18:41 (47) 20:52	20:02 (53) 20:41	06:15 20:01 (53)	06:51 19:03	07:27 18:10	07:08 16:33	07:37 16:29
23	07:32 17:01	06:53 17:44	06:04 19:20	06:09 19:58	05:31 20:31	18:40 (47) 20:52	20:02 (53) 20:40	06:16 19:57 (53)	06:52 19:01	07:28 18:09	07:09 16:32	07:37 16:29
24	07:31 17:03	06:51 17:45	06:02 19:21	06:08 19:59	05:30 20:32	18:40 (47) 20:52	20:03 (53) 20:39	06:17 19:56 (53)	06:53 19:00	07:30 18:07	07:11 16:31	07:38 16:30
25	07:30 17:04	06:50 17:47	06:00 19:22	06:06 20:00	05:29 20:33	18:39 (47) 20:52	20:03 (53) 20:38	06:19 19:54 (53)	06:54 18:58	07:31 18:06	07:12 16:31	07:38 16:31
26	07:29 17:05	06:48 17:48	05:58 19:23	06:04 20:00	05:28 20:34	18:39 (47) 20:52	20:03 (53) 20:37	06:20 19:52 (53)	06:55 18:56	07:32 18:04	07:13 16:30	07:38 16:31
27	07:28 17:07	06:46 17:49	06:56 19:25	06:03 20:01	05:28 20:35	18:38 (47) 20:52	20:04 (53) 20:36	06:21 19:51 (53)	06:57 18:54	07:34 18:03	07:14 16:29	07:39 16:32
28	07:27 17:08	06:45 17:51	06:54 19:26	06:01 20:02	05:27 20:36	18:39 (47) 20:52	20:05 (53) 20:35	06:22 19:49 (53)	06:58 18:52	07:35 18:01	07:15 16:29	07:39 16:33
29	07:26 17:09	06:45 17:52	06:53 19:27	06:00 20:04	05:26 20:37	18:39 (47) 20:52	20:05 (53) 20:34	06:23 19:47 (53)	06:59 18:50	07:36 18:00	07:17 16:28	07:39 16:33
30	07:25 17:11	06:45 17:54	06:52 19:28	05:58 20:05	05:26 20:38	18:38 (47) 20:52	20:05 (53) 20:33	06:24 19:45 (53)	07:00 18:49	07:38 17:58	07:18 16:28	07:39 16:34
31	07:24 17:12	06:45 17:55	06:49 19:30	05:57 20:06	05:25 20:39	18:38 (47) 20:52	20:05 (53) 20:32	06:26 19:44 (53)	07:39 17:57	07:39 17:57	07:40 16:35	16:35 277
Potential sun hours	288	293	369	403	457	463	469	434	376	290	277	
Total, worst case				652	570	530	263	1115				
Sun reduction				0.49	0.55	0.59	0.63	0.59				
Oper. time red.				1.00	1.00	1.00	1.00	1.00				
Wind dir. red.				0.52	0.52	0.49	0.50	0.52				
Total reduction				0.25	0.29	0.29	0.32	0.31				
Total, real				166	163	154	84	342				

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 112

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edr.com

Calculated:

3/21/2011 11:14 AM/2.7.453

SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-54 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (35)

Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December	
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	05:57 20:06	19:13 (47) 20:40	18:56 (47) 20:25	19:03 (47) 20:31	19:07 (47) 20:31	06:27 19:42	07:01 18:47	06:40 16:55	07:19 16:28
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	05:55 20:07	19:09 (47) 20:40	18:56 (47) 20:52	19:03 (47) 20:30	19:07 (47) 20:30	06:28 19:40	07:02 18:45	06:42 16:54	07:20 16:27
3	07:40 16:38	07:21 17:16	06:39 17:55	06:44 19:33	05:54 20:08	19:07 (47) 20:41	18:56 (47) 20:52	19:04 (47) 20:28	19:08 (47) 20:28	06:29 19:38	07:04 18:43	06:43 16:53	07:21 16:27
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:34	05:53 20:10	19:05 (47) 20:42	18:56 (47) 20:51	19:03 (47) 20:27	19:09 (47) 20:27	06:30 19:37	07:05 18:41	06:44 16:51	07:22 16:27
5	07:40 16:40	07:18 17:19	06:36 17:57	06:40 19:36	05:51 20:11	19:03 (47) 20:43	18:57 (47) 20:51	19:03 (47) 20:26	19:09 (47) 20:26	06:31 19:35	07:06 18:39	06:46 16:50	07:23 16:26
6	07:40 16:41	07:17 17:21	06:34 17:58	06:38 19:37	05:50 20:12	19:01 (47) 20:43	18:57 (47) 20:51	19:04 (47) 20:25	19:10 (47) 20:25	06:32 19:33	07:07 18:38	06:47 16:49	07:24 16:26
7	07:40 16:42	07:16 17:22	06:33 18:00	06:36 19:38	05:49 20:13	19:00 (47) 20:44	18:57 (47) 20:50	19:03 (47) 20:23	19:11 (47) 20:23	06:34 19:31	07:08 18:36	06:48 16:48	07:25 16:26
8	07:39 16:43	07:15 17:23	07:31 19:01	06:35 19:39	05:47 20:14	19:00 (47) 20:45	18:58 (47) 20:50	19:03 (47) 20:22	19:13 (47) 20:22	06:35 19:44	07:10 18:29	06:50 16:46	07:26 16:26
9	07:39 16:44	07:13 17:25	07:29 19:02	06:33 19:41	05:46 20:16	19:03 (47) 20:46	18:58 (47) 20:50	19:04 (47) 20:21	19:14 (47) 20:21	06:00 19:27	07:11 18:34	06:51 16:46	07:27 16:26
10	07:39 16:45	07:12 17:26	07:27 19:04	06:31 19:42	05:45 20:17	18:57 (47) 20:46	18:59 (47) 20:49	19:03 (47) 20:19	19:16 (47) 20:19	06:01 19:26	07:12 18:31	06:52 16:44	07:28 16:26
11	07:39 16:46	07:11 17:28	07:25 19:05	06:29 19:43	05:44 20:18	18:57 (47) 20:47	18:59 (47) 20:49	19:03 (47) 20:18	19:18 (47) 20:18	06:03 19:24	07:13 18:29	06:54 16:43	07:29 16:26
12	07:38 16:48	07:09 17:29	07:24 19:06	06:28 19:44	05:42 20:19	18:56 (47) 20:47	18:59 (47) 20:48	19:03 (47) 20:16	19:22 (47) 20:16	06:04 19:22	07:15 18:27	06:55 16:42	07:30 16:26
13	07:38 16:49	07:08 17:30	07:22 19:07	06:26 19:45	05:41 20:20	18:56 (47) 20:48	18:59 (47) 20:48	19:04 (47) 20:15	19:24 (47) 20:15	06:05 19:20	07:16 18:25	06:56 16:41	07:31 16:26
14	07:37 16:50	07:07 17:32	07:20 19:09	06:24 19:47	05:40 20:21	18:55 (47) 20:48	19:00 (47) 20:47	19:04 (47) 20:13	19:25 (47) 20:13	06:06 19:18	07:17 18:24	06:58 16:40	07:32 16:26
15	07:37 16:51	07:05 17:33	07:18 19:10	06:22 19:48	05:39 20:22	18:55 (47) 20:49	19:00 (47) 20:47	19:03 (47) 20:12	19:26 (47) 20:12	06:07 19:16	07:18 18:22	06:59 16:39	07:32 16:26
16	07:36 16:52	07:04 17:34	07:16 19:11	06:21 19:49	05:38 20:24	18:55 (47) 20:49	19:00 (47) 20:46	19:03 (47) 20:10	19:27 (47) 20:10	06:08 19:15	07:20 18:20	07:00 16:38	07:33 16:27
17	07:36 16:54	07:02 17:36	07:15 19:12	06:19 19:50	05:37 20:25	18:55 (47) 20:50	19:00 (47) 20:45	19:03 (47) 20:09	19:28 (47) 20:09	06:09 19:13	07:21 18:18	07:02 16:37	07:34 16:27
18	07:35 16:55	07:01 17:37	07:13 19:14	06:17 19:51	05:36 20:26	18:54 (47) 20:50	19:01 (47) 20:44	19:04 (47) 20:07	19:29 (47) 20:07	06:11 19:11	07:22 18:17	07:03 16:36	07:34 16:27
19	07:35 16:56	06:59 17:39	07:11 19:15	06:16 19:53	05:35 20:27	18:54 (47) 20:51	19:02 (47) 20:44	19:04 (47) 20:06	19:29 (47) 20:06	06:12 19:09	07:23 18:15	07:04 16:35	07:35 16:28
20	07:34 16:57	06:58 17:40	07:09 19:16	06:14 19:54	05:34 20:28	18:54 (47) 20:51	19:02 (47) 20:43	19:04 (47) 20:04	19:30 (47) 20:04	06:13 19:07	07:25 18:14	07:05 16:34	07:36 16:28
21	07:33 16:59	06:56 17:41	07:07 19:17	06:12 19:55	05:33 20:29	18:54 (47) 20:51	19:02 (47) 20:42	19:04 (47) 20:02	19:31 (47) 20:02	06:14 19:05	07:26 18:12	07:07 16:33	07:36 16:28
22	07:32 17:00	06:54 17:43	07:05 19:19	06:11 19:56	05:32 20:30	18:54 (47) 20:51	19:02 (47) 20:41	19:04 (47) 20:01	19:32 (47) 20:01	06:15 19:03	07:27 18:10	07:08 16:33	07:37 16:29
23	07:32 17:01	06:53 17:44	07:04 19:20	06:09 19:58	05:31 20:31	18:53 (47) 20:52	19:02 (47) 20:40	19:04 (47) 20:00	19:33 (47) 20:00	06:16 19:01	07:28 18:09	07:09 16:32	07:37 16:29
24	07:31 17:03	06:51 17:45	07:02 19:21	06:08 19:59	05:30 20:32	18:54 (47) 20:52	19:03 (47) 20:39	19:05 (47) 20:00	19:34 (47) 20:00	06:17 19:01	07:30 18:07	07:11 16:31	07:38 16:30
25	07:30 17:04	06:50 17:47	07:00 19:22	06:06 20:00	05:29 20:33	18:54 (47) 20:52	19:02 (47) 20:38	19:06 (47) 20:00	19:35 (47) 20:00	06:19 19:01	07:31 18:06	07:12 16:31	07:38 16:31
26	07:29 17:05	06:48 17:48	06:58 19:23	06:04 20:00	05:29 20:34	18:54 (47) 20:52	19:02 (47) 20:37	19:07 (47) 20:00	19:36 (47) 20:00	06:20 19:02	07:32 18:04	07:13 16:30	07:38 16:31
27	07:28 17:07	06:46 17:49	06:56 19:25	06:03 20:01	05:28 20:35	18:54 (47) 20:52	19:03 (47) 20:36	19:08 (47) 20:00	19:37 (47) 20:00	06:21 19:03	07:34 18:03	07:14 16:29	07:39 16:32
28	07:27 17:08	06:45 17:51	06:54 19:26	06:01 20:02	05:27 20:36	18:55 (47) 20:52	19:04 (47) 20:35	19:09 (47) 20:00	19:38 (47) 20:00	06:22 19:04	07:35 18:01	07:15 16:29	07:39 16:33
29	07:26 17:09	06:45 17:51	06:53 19:27	06:00 20:04	05:26 20:37	18:54 (47) 20:52	19:05 (47) 20:34	19:10 (47) 20:00	19:39 (47) 20:00	06:23 19:05	07:36 18:00	07:17 16:28	07:39 16:33
30	07:25 17:11	06:45 19:28	06:51 19:28	05:58 20:05	05:26 20:38	18:55 (47) 20:52	19:06 (47) 20:33	19:11 (47) 20:00	19:40 (47) 20:00	06:24 19:06	07:38 18:49	07:18 16:28	07:39 16:34
31	07:24 17:12	06:49 19:30	06:49 19:30	05:58 20:39	05:25 20:39	18:55 (47) 20:52	19:07 (47) 20:32	19:12 (47) 20:00	19:41 (47) 20:00	06:26 19:07	07:39 18:49	07:40 16:35	07:40 16:35
Potential sun hours	288	293	369	403	457	463	469	434	376	341	290	277	
Total, worst case					1342	1391	1510	393					
Sun reduction					0.55	0.59	0.63	0.59					
Oper. time red.					1.00	1.00	1.00	1.00					
Wind dir. red.					0.51	0.51	0.51	0.51					
Total reduction					0.28	0.30	0.32	0.30					
Total, real					380	422	489	119					

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 113

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-59 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (37)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40	07:23	16:19 (50)	06:43	06:47	05:25
	16:36	17:14	27 16:46 (50)	17:52	19:31	20:39
2	07:40	07:22	16:19 (50)	06:41	06:45	05:56
	16:37	17:15	28 16:47 (50)	17:53	19:32	20:40
3	07:40	07:21	16:17 (50)	06:39	06:44	05:54
	16:38	17:16	30 16:47 (50)	17:55	19:33	20:41
4	07:40	07:20	16:17 (50)	06:38	06:42	05:53
	16:39	17:18	31 16:48 (50)	17:56	19:34	20:42
5	07:40	07:18	16:17 (50)	06:36	06:40	05:51
	16:40	17:19	32 16:49 (50)	17:57	19:36	20:43
6	07:40	07:17	16:17 (50)	06:34	06:38	05:50
	16:41	17:21	33 16:50 (50)	17:58	19:37	20:43
7	07:40	07:16	16:16 (50)	06:33	06:36	05:49
	16:42	17:22	34 16:50 (50)	18:00	19:38	20:44
8	07:39	07:15	16:16 (50)	07:31	06:35	05:47
	16:43	17:23	35 16:51 (50)	19:01	19:39	20:45
9	07:39	07:13	16:16 (50)	07:29	06:33	05:46
	16:44	17:25	35 16:51 (50)	19:02	19:41	20:46
10	07:39	07:12	16:15 (50)	07:27	06:31	05:45
	16:45	17:26	36 16:51 (50)	19:04	19:42	20:46
11	07:39	07:11	16:16 (50)	07:25	06:29	05:44
	16:46	17:28	35 16:51 (50)	19:05	19:43	20:47
12	07:38	07:09	16:15 (50)	07:24	06:28	05:42
	16:48	17:29	36 16:51 (50)	19:06	19:44	20:47
13	07:38	07:08	16:16 (50)	07:22	06:26	05:41
	16:49	17:30	35 16:51 (50)	19:07	19:45	20:48
14	07:37	07:06	16:16 (50)	07:20	18:36 (49)	06:24
	16:50	17:32	34 16:50 (50)	19:09	10 18:46 (49)	19:47
15	07:37	07:05	16:17 (50)	07:18	18:32 (49)	06:22
	16:51	17:33	33 16:50 (50)	19:10	15 18:47 (49)	19:48
16	07:36	07:04	16:17 (50)	07:16	18:30 (49)	06:21
	16:52	17:34	32 16:49 (50)	19:11	18 18:48 (49)	19:49
17	07:36	07:02	16:18 (50)	07:15	18:29 (49)	06:19
	16:54	17:36	31 16:49 (50)	19:12	21 18:50 (49)	19:50
18	07:35	07:01	16:19 (50)	07:13	18:27 (49)	06:17
	16:55	17:37	29 16:48 (50)	19:14	25 18:52 (49)	19:51
19	07:35	06:59	16:20 (50)	07:11	18:26 (49)	06:16
	16:56	17:39	27 16:47 (50)	19:15	27 18:53 (49)	19:53
20	07:34	06:57	16:21 (50)	07:09	18:25 (49)	06:14
	16:57	17:40	24 16:45 (50)	19:16	29 18:54 (49)	19:54
21	07:33	06:56	16:24 (50)	07:07	18:24 (49)	06:12
	16:59	17:41	20 16:44 (50)	19:17	30 18:54 (49)	19:55
22	07:32	06:54	16:26 (50)	07:05	18:23 (49)	06:11
	17:00	17:43	15 16:41 (50)	19:19	30 18:53 (49)	19:56
23	07:32	06:53	16:30 (50)	07:04	18:24 (49)	06:09
	17:01	17:44	6 16:36 (50)	19:20	30 18:54 (49)	19:58
24	07:31	06:51	07:02	18:24 (49)	06:08	05:30
	17:03	17:45	19:21	30 18:54 (49)	19:59	20:32
25	07:30	06:50	07:00	18:23 (49)	06:06	05:29
	17:04	17:47	19:22	30 18:53 (49)	20:00	20:33
26	07:29	06:48	06:58	18:23 (49)	06:04	05:29
	17:05	17:48	19:23	29 18:52 (49)	20:00	20:34
27	07:28	06:46	06:56	18:24 (49)	06:03	05:28
	17:07	17:49	19:25	27 18:51 (49)	20:01	20:35
28	07:27	16:25 (50)	06:54	18:24 (49)	06:01	05:27
	17:08	12 16:37 (50)	17:51	19:26	25 18:49 (49)	20:02
29	07:26	16:23 (50)	06:53	18:26 (49)	06:00	05:26
	17:09	17 16:40 (50)	19:27	23 18:49 (49)	20:04	20:37
30	07:25	16:22 (50)	06:51	18:27 (49)	05:58	05:26
	17:11	20 16:42 (50)	19:28	20 18:47 (49)	20:05	20:38
31	07:24	16:20 (50)	06:49	18:28 (49)	05:25	05:25
	17:12	24 16:44 (50)	19:30	16 18:44 (49)	20:39	20:39
Potential sun hours	288	293	369	403	457	463
Total, worst case	73	678	435	10		
Sun reduction	0.33	0.39	0.47	0.49		
Oper. time red.	1.00	1.00	1.00	1.00		
Wind dir. red.	0.71	0.71	0.60	0.60		
Total reduction	0.24	0.28	0.29	0.30		
Total, real	17	190	124	3		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 114

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-59 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (37)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25 20:52	05:51 20:31	06:27 19:42	07:01 18:47	06:40 16:55 36	15:45 (50) 16:21 (50) 16:28
2	05:25 20:52	05:53 20:30	06:28 19:40	07:02 18:45	06:42 16:54 35	15:45 (50) 16:20 (50) 16:27
3	05:26 20:52	05:54 20:28	06:29 19:38	07:04 18:43	06:43 16:53 36	15:45 (50) 16:21 (50) 16:27
4	05:26 20:51	05:55 20:27	06:30 19:37	07:05 18:41	06:44 16:51 35	15:45 (50) 16:20 (50) 16:27
5	05:27 20:51	05:56 20:26	06:31 19:35	07:06 18:39	06:46 16:50 34	15:46 (50) 16:20 (50) 16:26
6	05:28 20:51	05:57 20:25	06:32 19:33	07:07 18:38	06:47 16:49 32	15:47 (50) 16:19 (50) 16:26
7	05:28 20:50	05:58 20:23	06:34 19:31	07:08 18:36	06:48 16:48 31	15:47 (50) 16:18 (50) 16:26
8	05:29 20:50	05:59 20:22	06:35 19:29	07:10 18:34	06:50 16:46 30	15:48 (50) 16:18 (50) 16:26
9	05:30 20:50	06:00 20:20	06:36 19:27	07:11 18:32	06:51 16:45 28	15:49 (50) 16:17 (50) 16:26
10	05:30 20:49	06:01 20:19	06:37 19:26	07:12 18:31	06:52 16:44 26	15:50 (50) 16:16 (50) 16:26
11	05:31 20:49	06:03 20:18	06:38 19:24	18:23 (49) 18:33 (49) 18:29	07:13 16:43 24	15:51 (50) 16:15 (50) 16:26
12	05:32 20:48	06:04 20:16	06:39 19:22	18:20 (49) 18:35 (49) 18:27	07:15 16:42 20	15:54 (50) 16:14 (50) 16:26
13	05:33 20:48	06:05 20:15	06:40 19:20	18:18 (49) 18:38 (49) 18:25	07:16 16:41 17	15:55 (50) 16:12 (50) 16:26
14	05:34 20:47	06:06 20:13	06:42 19:18	18:16 (49) 18:39 (49) 18:24	07:17 16:40 12	15:57 (50) 16:09 (50) 16:26
15	05:34 20:47	06:07 20:12	06:43 19:16	18:14 (49) 18:40 (49) 18:22	07:18 16:39	16:26 16:26
16	05:35 20:46	06:08 20:10	06:44 19:14	18:13 (49) 18:40 (49) 18:20	07:20 16:38	16:27 16:27
17	05:36 20:45	06:09 20:09	06:45 19:13	18:12 (49) 18:40 (49) 18:19	07:21 16:37	16:27 16:27
18	05:37 20:44	06:11 20:07	06:46 19:11	18:11 (49) 18:40 (49) 18:17	07:22 16:36	16:27 16:27
19	05:38 20:44	06:12 20:06	06:47 19:09	18:10 (49) 18:40 (49) 18:15	16:59 (50) 17:09 (50) 16:35	07:23 16:35
20	05:39 20:43	06:13 20:04	06:48 19:07	18:09 (49) 18:39 (49) 18:14	07:25 17:12 (50) 16:34	16:35 16:34
21	05:40 20:42	06:14 20:02	06:50 19:05	18:10 (49) 18:40 (49) 18:12	16:54 (50) 17:15 (50) 16:33	07:26 16:33
22	05:41 20:41	06:15 20:01	06:51 19:03	18:09 (49) 18:39 (49) 18:10	07:27 17:16 (50) 16:33	16:33 16:33
23	05:42 20:40	06:16 19:57	06:52 19:01	18:09 (49) 18:38 (49) 18:09	07:28 17:17 (50) 16:32	16:33 16:30
24	05:43 20:39	06:17 19:56	06:53 19:00	18:09 (49) 18:37 (49) 18:07	07:30 17:18 (50) 16:31	16:30 16:30
25	05:44 20:38	06:19 19:54	06:54 18:58	18:10 (49) 18:35 (49) 18:06	07:31 17:19 (50) 16:31	16:31 16:31
26	05:45 20:37	06:20 19:52	06:55 18:56	18:10 (49) 18:33 (49) 18:04	07:32 17:19 (50) 16:30	16:31 16:30
27	05:46 20:36	06:21 19:51	06:57 18:54	18:11 (49) 18:30 (49) 18:03	07:34 17:20 (50) 16:29	16:30 16:29
28	05:47 20:35	06:22 19:49	06:58 18:52	18:13 (49) 18:29 (49) 18:01	07:35 17:20 (50) 16:29	16:29 16:29
29	05:48 20:34	06:23 19:47	06:59 18:50	18:15 (49) 18:27 (49) 18:00	07:36 17:21 (50) 16:28	16:28 16:28
30	05:49 20:33	06:24 19:45	07:00 18:49	18:15 (49) 17:58 36	07:38 17:21 (50) 16:28	16:28 16:28
31	05:50 20:32	06:26 19:44		18:15 (49) 17:57 36	16:44 (50) 17:20 (50)	16:28 16:28
Potential sun hours	469	434	376	342	290	277
Total, worst case			450	369	396	
Sun reduction			0.54	0.44	0.27	
Oper. time red.			1.00	1.00	1.00	
Wind dir. red.			0.60	0.71	0.71	
Total reduction			0.33	0.32	0.19	
Total, real			147	117	77	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 115

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation:** 05030 SFA Gamesa G97\_R2Shadow receptor: R-6 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (359)

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	07:47 (55) 20:06	19:01 (54) 05:25
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	07:49 (55) 20:07	18:59 (54) 05:24
3	07:40 16:38	07:21 17:16	06:40 17:55	06:44 19:33	07:53 (55) 20:09	18:58 (54) 05:24
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:35	08:00 (55) 20:10	18:57 (54) 05:23
5	07:40 16:40	07:19 17:19	06:36 17:57	06:40 19:36	05:51 20:11	18:55 (54) 05:23
6	07:40 16:41	07:17 17:21	06:34 17:58	06:38 19:37	05:50 20:12	18:54 (54) 05:22
7	07:40 16:42	07:16 17:22	06:33 18:00	06:36 19:38	05:49 20:13	18:54 (54) 05:22
8	07:40 16:43	07:15 17:23	06:31 19:01	06:35 19:39	05:47 20:14	18:53 (54) 05:22
9	07:39 16:44	07:13 17:25	06:29 19:02	06:33 19:41	05:46 20:16	18:52 (54) 05:21
10	07:39 16:45	07:12 17:26	06:27 19:04	07:58 (55) 08:10 (55)	06:31 19:42	18:51 (54) 05:21
11	07:39 16:46	07:11 17:28	06:25 19:05	07:55 (55) 08:14 (55)	06:29 19:43	18:50 (54) 05:21
12	07:38 16:48	07:09 17:29	06:24 19:06	07:53 (55) 08:16 (55)	06:28 19:44	18:50 (54) 05:21
13	07:38 16:49	07:08 17:30	06:22 19:07	07:50 (55) 08:18 (55)	06:26 19:45	18:50 (54) 05:21
14	07:38 16:50	07:07 17:32	06:20 19:09	07:48 (55) 08:19 (55)	06:24 19:47	18:50 (54) 05:21
15	07:37 16:51	07:05 17:33	06:18 19:10	07:47 (55) 08:19 (55)	06:22 19:48	18:50 (54) 05:20
16	07:37 16:52	07:04 17:34	06:16 19:11	07:45 (55) 08:20 (55)	06:21 19:49	18:50 (54) 05:20
17	07:36 16:54	07:02 17:36	06:15 19:12	07:45 (55) 08:21 (55)	06:19 19:50	18:50 (54) 05:20
18	07:35 16:55	07:01 17:37	06:13 19:14	07:44 (55) 08:21 (55)	06:17 19:52	18:49 (54) 05:21
19	07:35 16:56	06:59 17:39	06:11 19:15	07:43 (55) 08:21 (55)	06:16 19:53	18:49 (54) 05:21
20	07:34 16:57	06:58 17:40	06:09 19:16	07:42 (55) 08:21 (55)	06:14 19:54	18:49 (54) 05:21
21	07:33 16:59	06:56 17:41	06:07 19:17	07:42 (55) 08:21 (55)	06:12 19:55	18:49 (54) 05:21
22	07:33 17:00	06:54 17:43	06:06 19:19	07:41 (55) 08:20 (55)	06:11 19:56	18:49 (54) 05:21
23	07:32 17:01	06:53 17:44	06:04 19:20	07:42 (55) 08:20 (55)	06:09 19:58	18:49 (54) 05:21
24	07:31 17:03	06:51 17:45	06:02 19:21	07:42 (55) 08:20 (55)	06:08 19:59	18:50 (54) 05:22
25	07:30 17:04	06:50 17:47	06:00 19:22	07:41 (55) 08:19 (55)	06:06 20:00	18:50 (54) 05:22
26	07:29 17:05	06:48 17:48	05:58 19:24	07:41 (55) 08:18 (55)	06:04 20:00	18:50 (54) 05:22
27	07:28 17:07	06:46 17:49	05:56 19:25	07:42 (55) 08:17 (55)	06:03 20:01	18:50 (54) 05:23
28	07:27 17:08	06:45 17:51	05:55 19:26	07:42 (55) 08:15 (55)	06:01 20:02	18:51 (54) 05:23
29	07:26 17:09	06:45 19:27	05:53 19:27	07:43 (55) 08:15 (55)	06:00 20:04	18:51 (54) 05:24
30	07:25 17:11	06:45 19:28	05:51 19:28	07:44 (55) 08:13 (55)	05:58 20:05	18:51 (54) 05:24
31	07:24 17:12	06:44 19:30	05:49 19:30	07:45 (55) 08:11 (55)	05:58 20:05	18:51 (54) 05:24
Potential sun hours	288	293	369	403	457	463
Total, worst case			714	107	1515	1420
Sun reduction			0.47	0.49	0.55	0.59
Oper. time red.			1.00	1.00	1.00	1.00
Wind dir. red.			0.53	0.52	0.52	0.52
Total reduction			0.25	0.26	0.28	0.30
Total, real			178	27	430	432

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 116

Licensed user:

EDR

217 Montgomery St.
US-SYRACUSE, NY 13202
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-6 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (359)

Assumptions for shadow calculations

Maximum distance for influence 1,000 m
Minimum sun height over horizon for influence 3 °
Day step for calculation 1 days
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760
Idle start wind speed: Cut in wind speed from power curve

Table with columns for months (July to December) and rows for each day of the month, showing sun rise and set times and shadow calculations.

Table layout: For each day in each month the following matrix apply

Matrix with columns: Day in month, Sun rise (hh:mm), Sun set (hh:mm), Minutes with flicker, First time (hh:mm) with flicker, Last time (hh:mm) with flicker, (WTG causing flicker first time), (WTG causing flicker last time)



Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 117

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-68 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (44)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	05:57 20:06	05:25 20:40	19:32 (09) 20:52	05:25 20:52	19:38 (09) 20:31	05:51 19:42	06:27 18:47	07:01 16:55
2	07:40 16:37	07:22 17:15	06:41 17:53	06:45 19:32	05:56 20:07	05:24 20:40	19:31 (09) 20:52	05:25 20:52	19:37 (09) 20:30	05:53 19:40	06:28 18:45	07:03 16:54
3	07:40 16:38	07:21 17:16	06:39 17:55	06:44 19:33	05:54 20:08	05:24 20:41	19:32 (09) 20:52	05:26 20:52	19:38 (09) 20:28	05:54 19:38	06:29 18:43	07:04 16:53
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:34	05:53 20:10	05:23 20:42	19:31 (09) 20:51	05:26 20:51	19:37 (09) 20:27	05:55 19:37	06:30 18:41	07:05 16:51
5	07:40 16:40	07:18 17:19	06:36 17:57	06:40 19:36	05:51 20:11	05:23 20:43	19:32 (09) 20:51	05:27 20:51	19:38 (09) 20:26	05:56 19:35	06:31 18:39	07:06 16:50
6	07:40 16:41	07:17 17:21	06:34 17:58	06:38 19:37	05:50 20:12	05:22 20:43	19:32 (09) 20:51	05:28 20:51	19:39 (09) 20:25	05:57 19:33	06:32 18:38	07:07 16:49
7	07:40 16:42	07:16 17:22	06:33 18:00	06:36 19:38	05:49 20:13	05:22 20:44	19:32 (09) 20:50	05:28 20:50	19:38 (09) 20:23	05:58 19:31	06:34 18:36	07:09 16:48
8	07:39 16:43	07:15 17:23	07:31 19:01	06:35 19:39	05:47 20:14	05:22 20:45	19:32 (09) 20:50	05:29 20:50	19:39 (09) 20:22	05:59 19:29	06:35 18:34	07:10 16:46
9	07:39 16:44	07:13 17:25	07:29 19:02	06:33 19:41	05:46 20:16	05:21 20:46	19:33 (09) 20:50	05:30 20:50	19:39 (09) 20:21	06:00 19:27	06:36 18:32	07:11 16:45
10	07:39 16:45	07:12 17:26	07:27 19:04	06:31 19:42	05:45 20:17	05:21 20:46	19:33 (09) 20:49	05:30 20:49	19:39 (09) 20:19	06:01 19:26	06:37 18:31	07:12 16:44
11	07:39 16:46	07:11 17:28	07:25 19:05	06:29 19:43	05:44 20:18	05:21 20:47	19:34 (09) 20:49	05:31 20:49	19:39 (09) 20:18	06:03 19:24	06:38 18:29	07:13 16:43
12	07:38 16:48	07:09 17:29	07:24 19:06	06:28 19:44	05:42 20:19	05:21 20:47	19:33 (09) 20:48	05:32 20:48	19:40 (09) 20:16	06:04 19:22	06:39 18:27	07:15 16:42
13	07:38 16:49	07:08 17:30	07:22 19:07	06:26 19:45	05:41 20:20	05:21 20:48	19:33 (09) 20:48	05:33 20:48	19:40 (09) 20:15	06:05 19:20	06:40 18:25	07:16 16:41
14	07:37 16:50	07:07 17:32	07:20 19:09	06:24 19:47	05:40 20:21	05:21 20:48	19:33 (09) 20:47	05:34 20:47	19:40 (09) 20:13	06:06 19:18	06:42 18:24	07:17 16:40
15	07:37 16:51	07:05 17:33	07:18 19:10	06:22 19:48	05:39 20:22	19:44 (09) 20:49	05:21 20:49	05:34 20:47	19:40 (09) 20:12	06:07 19:16	06:43 18:22	07:18 16:39
16	07:36 16:52	07:04 17:34	07:16 19:11	06:21 19:49	05:38 20:24	19:41 (09) 20:49	05:20 20:49	05:35 20:46	19:40 (09) 20:10	06:08 19:15	06:44 18:20	07:20 16:38
17	07:36 16:54	07:02 17:36	07:15 19:12	06:19 19:50	05:37 20:25	19:39 (09) 20:50	05:21 20:50	05:36 20:45	19:41 (09) 20:09	06:09 19:13	06:45 18:19	07:21 16:37
18	07:35 16:55	07:01 17:37	07:13 19:14	06:17 19:52	05:36 20:26	19:37 (09) 20:50	05:21 20:50	05:37 20:44	19:42 (09) 20:07	06:11 19:11	06:46 18:17	07:22 16:36
19	07:35 16:56	06:59 17:39	07:11 19:15	06:16 19:53	05:35 20:27	19:36 (09) 20:51	05:21 20:51	05:38 20:44	19:42 (09) 20:06	06:12 19:09	06:47 18:15	07:23 16:35
20	07:34 16:57	06:58 17:40	07:09 19:16	06:14 19:54	05:34 20:28	19:35 (09) 20:51	05:21 20:51	05:39 20:43	19:43 (09) 20:04	06:13 19:07	06:48 18:14	07:25 16:34
21	07:33 16:59	06:56 17:41	07:07 19:17	06:12 19:55	05:33 20:29	19:34 (09) 20:51	05:21 20:51	05:40 20:42	19:43 (09) 20:02	06:14 19:05	06:50 18:12	07:26 16:33
22	07:33 17:00	06:54 17:43	07:05 19:19	06:11 19:56	05:32 20:30	19:33 (09) 20:51	05:21 20:51	05:41 20:41	19:44 (09) 20:15	06:51 19:03	07:27 18:10	07:08 16:33
23	07:32 17:01	06:53 17:44	07:04 19:20	06:09 19:58	05:31 20:31	19:33 (09) 20:52	05:21 20:52	05:42 20:40	19:45 (09) 19:57	06:16 19:01	06:52 18:09	07:28 16:32
24	07:31 17:03	06:51 17:45	07:02 19:21	06:08 19:59	05:30 20:32	19:33 (09) 20:52	05:22 20:52	05:43 20:39	19:46 (09) 19:56	06:17 19:00	06:53 18:07	07:30 16:31
25	07:30 17:04	06:50 17:47	07:00 19:22	06:06 20:00	05:29 20:33	19:32 (09) 20:52	05:22 20:52	05:44 20:38	19:47 (09) 19:54	06:19 18:58	06:54 18:06	07:31 16:31
26	07:29 17:05	06:48 17:48	06:58 19:23	06:04 20:00	05:29 20:34	19:32 (09) 20:52	05:22 20:52	05:45 20:37	19:48 (09) 19:52	06:20 18:56	06:55 18:04	07:32 16:30
27	07:28 17:07	06:46 17:49	06:56 19:25	06:03 20:01	05:28 20:35	19:31 (09) 20:52	05:23 20:52	05:46 20:36	19:50 (09) 19:51	06:21 18:54	06:57 18:03	07:34 16:29
28	07:27 17:08	06:45 17:51	06:55 19:26	06:01 20:02	05:27 20:36	19:32 (09) 20:52	05:23 20:52	05:47 20:35	19:52 (09) 20:03 (09)	06:22 19:49	06:58 18:52	07:35 18:01
29	07:26 17:10	06:45 19:27	06:53 20:04	06:00 20:37	05:26 20:37	19:31 (09) 20:52	05:24 20:52	05:48 20:34	06:23 19:47	06:59 18:50	07:36 18:00	07:17 16:28
30	07:25 17:11	06:45 19:28	06:51 20:05	05:58 20:38	05:26 20:38	19:32 (09) 20:52	05:24 20:52	05:49 20:33	06:24 19:45	07:00 18:49	07:38 17:58	07:18 16:28
31	07:24 17:12	06:49 19:30	06:49 20:39	05:58 20:39	05:25 20:40	19:31 (09) 20:52	05:24 20:52	05:49 20:32	06:26 19:44	07:39 17:57	07:40 16:57	07:40 16:35
Potential sun hours	288	293	369	403	457	463	469	434	376	342	290	277
Total, worst case					438	1013	824					
Sun reduction					0.55	0.59	0.63					
Oper. time red.					1.00	1.00	1.00					
Wind dir. red.					0.51	0.51	0.51					
Total reduction					0.28	0.30	0.32					
Total, real					122	302	262					

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 118

Licensed user:

EDR

217 Montgomery St.
US-SYRACUSE, NY 13202
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-7 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (6)

Assumptions for shadow calculations

Maximum distance for influence 1,000 m
Minimum sun height over horizon for influence 3 °
Day step for calculation 1 days
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760
Idle start wind speed: Cut in wind speed from power curve

Table with 12 columns (January to December) and multiple rows of shadow data including sun rise/set times, shadow length, and reduction factors. Includes summary rows for 'Potential sun hours' and 'Total, worst case'.

Table layout: For each day in each month the following matrix apply

Matrix with 5 columns: Day in month, Sun rise (hh:mm), Sun set (hh:mm), Minutes with flicker, First time (hh:mm) with flicker (WTG causing flicker first time), Last time (hh:mm) with flicker (WTG causing flicker last time).

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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Licensed user:

**EDR**

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-73 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (340)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36 37	15:00 (36) 15:37 (36) 17:14	07:23 07:22 17:52	06:43 06:41 19:31	05:57 20:06 13	06:18 (45) 06:31 (45) 20:40
2	07:40 16:37 37	15:01 (36) 15:38 (36) 17:15	07:22 07:21 17:53	06:41 06:40 19:32	05:56 20:07 15	06:16 (45) 06:31 (45) 20:40
3	07:40 16:38 37	15:01 (36) 15:38 (36) 17:17	07:21 07:20 17:55	06:40 06:38 19:33	05:54 20:09 18	06:15 (45) 06:33 (45) 20:41
4	07:40 16:39 36	15:02 (36) 15:38 (36) 17:18	07:20 07:19 17:56	06:38 06:36 19:35	05:53 20:10 19	06:14 (45) 06:33 (45) 20:42
5	07:40 16:40 36	15:03 (36) 15:39 (36) 17:19	07:19 07:17 17:57	06:36 06:34 19:36	05:51 20:11 21	06:12 (45) 06:33 (45) 20:43
6	07:40 16:41 35	15:04 (36) 15:39 (36) 17:21	07:17 07:16 17:59	06:34 06:33 19:37	05:50 20:12 23	06:11 (45) 06:34 (45) 20:44
7	07:40 16:42 34	15:04 (36) 15:38 (36) 17:22	07:16 07:15 18:00	06:33 06:31 19:38	05:49 20:13 23	06:11 (45) 06:34 (45) 20:44
8	07:40 16:43 34	15:05 (36) 15:39 (36) 17:23	07:15 07:14 19:01	06:35 06:33 19:39	05:47 20:14 23	06:11 (45) 06:34 (45) 20:45
9	07:39 16:44 33	15:06 (36) 15:39 (36) 17:25	07:14 07:12 19:02	06:33 06:31 19:41	05:46 20:16 24	06:10 (45) 06:34 (45) 20:46
10	07:39 16:45 31	15:07 (36) 15:38 (36) 17:26	07:12 07:11 19:04	06:31 06:29 19:42	05:45 20:17 24	06:10 (45) 06:34 (45) 20:46
11	07:39 16:46 30	15:08 (36) 15:38 (36) 17:28	07:11 07:09 19:05	06:29 06:28 19:43	05:44 20:18 23	06:10 (45) 06:33 (45) 20:47
12	07:38 16:48 30	15:09 (36) 15:39 (36) 17:29	07:09 07:08 19:06	06:28 06:26 19:44	05:42 20:19 22	06:11 (45) 06:33 (45) 20:47
13	07:38 16:49 28	15:10 (36) 15:38 (36) 17:30	07:08 07:07 19:07	06:26 06:24 19:46	05:41 20:20 22	06:11 (45) 06:33 (45) 20:48
14	07:38 16:50 26	15:12 (36) 15:38 (36) 17:32	07:07 07:05 19:09	06:24 06:23 19:47	05:40 20:21 20	06:12 (45) 06:32 (45) 20:49
15	07:37 16:51 24	15:13 (36) 15:37 (36) 17:33	07:05 07:04 19:10	06:23 06:21 19:48	05:39 20:22 19	06:13 (45) 06:32 (45) 20:49
16	07:37 16:52 22	15:14 (36) 15:36 (36) 17:35	07:04 07:02 19:11	06:21 06:19 19:49	05:38 20:24 18	06:13 (45) 06:31 (45) 20:49
17	07:36 16:53 18	15:17 (36) 15:35 (36) 17:36	07:02 07:13 19:12	06:19 06:17 19:50	05:37 20:25 16	06:14 (45) 06:30 (45) 20:50
18	07:35 16:54 18	15:18 (36) 15:34 (36) 17:37	07:01 07:00 19:14	06:17 06:16 19:52	05:36 20:26 14	06:15 (45) 06:29 (45) 20:50
19	07:35 16:55 16	15:21 (36) 15:31 (36) 17:39	06:59 06:58 19:15	07:11 06:58 19:53	05:35 20:27 10	06:17 (45) 06:27 (45) 20:51
20	07:34 16:56 10	15:31 (36) 06:58 17:40	06:59 06:58 19:16	07:11 06:58 19:54	05:34 20:28 5	06:20 (45) 06:25 (45) 20:51
21	07:33 16:57 10	06:56 17:41	06:58 19:17	06:58 19:55	05:33 20:29 10	06:25 (45) 20:51
22	07:33 16:59 10	06:54 17:41	06:58 19:17	06:58 19:55	05:32 20:30 10	20:51
23	07:32 17:00 10	06:53 17:43	06:58 19:19	06:58 19:56	05:31 20:31 10	20:52
24	07:32 17:01 10	06:53 17:44	06:58 19:20	06:58 19:58	05:31 20:31 10	20:52
25	07:30 17:03 10	06:50 17:45	06:58 19:21	06:58 19:59	05:30 20:32 10	20:52
26	07:29 17:05 10	06:50 17:47	06:58 19:22	06:58 20:00	05:29 20:33 10	20:52
27	07:28 17:07 10	06:46 17:48	06:58 19:24	06:58 20:00	05:29 20:34 10	20:52
28	07:27 17:08 10	06:46 17:49	06:58 19:25	06:58 20:01	05:28 20:35 10	20:52
29	07:26 17:10 10	06:45 17:51	06:58 19:26	06:58 20:03	05:27 20:36 10	20:52
30	07:25 17:11 10	06:45 17:51	06:58 19:26	06:58 20:03	05:27 20:36 10	20:52
31	07:24 17:12 10	06:45 17:51	06:58 19:26	06:58 20:03	05:27 20:36 10	20:52
Potential sun hours	288	293	369	403	457	463
Total, worst case	554			15	372	
Sun reduction	0.33			0.49	0.55	
Oper. time red.	1.00			1.00	1.00	
Wind dir. red.	0.76			0.66	0.66	
Total reduction	0.26			0.33	0.37	
Total, real	143			5	139	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-73 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (340)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25 20:52	05:52 20:31	06:21 (45) 19:42	06:27 18:47	07:01 16:56	07:19 15:20 (36)
2	05:25 20:52	05:53 20:30	06:21 (45) 19:40	06:28 18:45	07:03 16:54	07:20 15:21 (36)
3	05:26 20:52	05:54 20:29	06:21 (45) 19:38	06:29 18:43	07:04 16:53	07:21 15:22 (36)
4	05:26 20:51	05:55 20:27	06:20 (45) 19:37	06:30 18:41	07:05 16:52	07:22 15:23 (36)
5	05:27 20:51	05:56 20:26	06:20 (45) 19:35	06:31 18:40	07:06 16:50	07:23 15:24 (36)
6	05:28 20:51	05:57 20:25	06:20 (45) 19:33	06:33 18:38	07:07 16:49	07:24 15:25 (36)
7	05:28 20:51	05:58 20:23	06:21 (45) 19:31	06:34 18:36	07:09 16:48	07:25 15:26 (36)
8	05:29 20:50	05:59 20:22	06:22 (45) 19:29	06:35 18:34	07:10 16:46	07:26 15:26 (36)
9	05:30 20:50	06:00 20:21	06:23 (45) 19:28	06:36 18:32	07:11 16:45	07:27 15:27 (36)
10	05:30 20:49	06:02 20:19	06:24 (45) 19:26	06:37 18:31	07:12 16:44	07:28 15:28 (36)
11	05:31 20:49	06:03 20:18	06:25 (45) 19:24	06:38 18:29	07:13 16:43	07:29 15:27 (36)
12	05:32 20:48	06:04 20:16	06:27 (45) 19:22	06:39 18:27	07:15 16:42	07:30 15:28 (36)
13	05:33 20:48	06:05 20:15	06:28 (45) 19:20	06:41 18:25	07:16 16:41	07:31 15:29 (36)
14	05:34 20:47	06:06 20:13	06:30 (45) 19:18	06:42 18:24	07:17 16:40	07:32 15:30 (36)
15	05:35 20:47	06:07 20:12	06:32 (45) 19:16	06:43 18:22	07:18 16:39	07:32 15:30 (36)
16	05:35 20:46	06:08 20:10	06:44 19:15	07:20 18:20	07:00 16:38	07:33 15:30 (36)
17	05:36 20:45	06:10 20:09	06:45 19:13	07:21 18:19	07:02 16:37	07:34 15:31 (36)
18	05:37 20:45	06:11 20:07	06:46 19:11	07:22 18:17	07:03 16:36	07:35 15:32 (36)
19	05:38 20:44	06:12 20:06	06:47 19:09	07:23 18:15	07:04 16:35	07:35 15:32 (36)
20	05:39 20:43	06:13 20:04	06:49 19:07	07:25 18:14	07:06 16:34	07:36 15:33 (36)
21	05:40 20:42	06:14 20:02	06:50 19:05	07:26 18:12	07:07 16:34	07:36 15:33 (36)
22	05:41 20:41	06:15 20:01	06:51 19:03	07:27 18:10	07:08 16:33	07:37 15:34 (36)
23	05:42 20:40	06:16 19:58	06:52 19:02	07:29 18:09	07:09 16:32	07:37 15:34 (36)
24	05:43 20:39	06:29 (45) 19:56	06:53 19:00	07:30 18:07	07:11 16:31	07:38 15:35 (36)
25	05:44 20:39	06:27 (45) 19:54	06:54 18:58	07:31 18:06	07:12 16:31	07:38 15:35 (36)
26	05:45 20:38	06:26 (45) 19:52	06:56 18:56	07:32 18:04	07:13 16:30	07:39 15:35 (36)
27	05:46 20:36	06:24 (45) 19:51	06:57 18:54	07:34 18:03	07:14 16:30	07:39 15:36 (36)
28	05:47 20:35	06:24 (45) 19:49	06:58 18:52	07:35 18:01	07:15 16:29	07:39 15:36 (36)
29	05:48 20:34	06:23 (45) 19:47	06:59 18:50	07:36 18:00	07:17 16:29	07:39 15:37 (36)
30	05:49 20:33	06:22 (45) 19:46	07:00 18:49	07:38 17:58	07:18 16:28	07:40 15:37 (36)
31	05:50 20:32	06:22 (45) 19:44	07:00 18:49	07:38 17:57	07:18 16:28	07:40 15:37 (36)
Potential sun hours	469	434	376	342	290	277
Total, worst case	132	258			171	1150
Sun reduction	0.63	0.59			0.27	0.25
Oper. time red.	1.00	1.00			1.00	1.00
Wind dir. red.	0.66	0.66			0.76	0.76
Total reduction	0.43	0.40			0.21	0.20
Total, real	57	104			36	225

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 121

Licensed user:

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-74 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (338)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36	08:08 (35) 16:01 (25)	07:23 17:14	07:58 (36) 17:52	06:47 19:31	05:57 20:06
2	07:40 16:37	08:08 (35) 16:01 (25)	07:22 17:15	07:58 (36) 17:53	06:46 19:32	05:56 20:07
3	07:40 16:38	08:09 (35) 16:02 (25)	07:21 17:17	07:59 (36) 17:55	06:44 19:33	05:54 20:09
4	07:40 16:39	08:09 (35) 16:03 (25)	07:20 17:18	07:58 (36) 17:56	06:42 19:35	05:53 20:10
5	07:40 16:40	08:10 (35) 16:03 (25)	07:19 17:19	07:58 (36) 17:57	06:40 19:36	05:51 20:11
6	07:40 16:41	08:11 (35) 16:04 (25)	07:17 17:21	07:59 (36) 17:59	06:38 19:37	05:50 20:12
7	07:40 16:42	08:10 (35) 16:04 (25)	07:16 17:22	07:58 (36) 18:00	06:37 19:38	05:49 20:13
8	07:40 16:43	08:11 (35) 16:04 (25)	07:15 17:24	07:59 (36) 19:01	06:35 19:39	05:47 20:15
9	07:39 16:44	08:12 (35) 16:05 (25)	07:14 17:25	08:00 (36) 19:02	06:33 19:41	05:46 20:16
10	07:39 16:45	08:12 (35) 16:05 (25)	07:12 17:26	08:00 (36) 19:04	06:31 19:42	05:45 20:17
11	07:39 16:47	08:13 (35) 16:06 (25)	07:11 17:28	08:01 (36) 19:05	06:30 19:43	05:44 20:18
12	07:38 16:48	08:15 (35) 16:06 (25)	07:09 17:29	08:02 (36) 19:06	06:28 19:44	19:16 (24) 20:19
13	07:38 16:49	08:15 (35) 16:06 (25)	07:08 17:30	08:03 (36) 19:07	06:26 19:46	19:13 (24) 20:20
14	07:38 16:50	08:16 (35) 16:07 (25)	07:07 17:31	08:05 (36) 19:09	06:24 19:47	19:11 (24) 20:21
15	07:37 16:51	08:17 (35) 16:07 (25)	07:05 17:33	08:05 (36) 19:10	06:23 19:48	19:10 (24) 20:22
16	07:37 16:53	08:10 (36) 16:08 (25)	07:04 17:35	08:08 (36) 19:11	06:21 19:49	19:08 (24) 20:23
17	07:36 16:54	08:08 (36) 16:08 (25)	07:02 17:36	08:10 (36) 19:12	06:19 19:50	19:07 (24) 20:24
18	07:35 16:55	08:06 (36) 16:07 (25)	07:01 17:37	08:14 (36) 19:13	06:18 19:51	19:07 (24) 20:25
19	07:35 16:56	08:04 (36) 16:06 (25)	06:59 17:39	08:23 (36) 19:14	06:16 19:52	19:06 (24) 20:26
20	07:34 16:58	08:04 (36) 16:06 (25)	06:58 17:40	07:09 19:15	06:14 19:53	19:06 (24) 20:27
21	07:33 16:59	08:03 (36) 16:05 (25)	06:56 17:41	07:07 19:16	06:13 19:54	19:06 (24) 20:28
22	07:33 17:00	08:02 (36) 16:06 (25)	06:55 17:43	07:06 19:17	06:11 19:55	19:06 (24) 20:29
23	07:32 17:02	08:01 (36) 16:05 (25)	06:53 17:44	07:04 19:18	06:09 19:56	19:06 (24) 20:30
24	07:31 17:03	08:00 (36) 16:05 (25)	06:51 17:45	07:02 19:19	06:08 19:57	19:06 (24) 20:31
25	07:30 17:04	07:59 (36) 16:04 (25)	06:50 17:47	07:00 19:20	06:06 19:58	19:08 (24) 20:32
26	07:29 17:06	07:59 (36) 16:03 (25)	06:48 17:48	06:58 19:21	06:05 19:59	19:08 (24) 20:33
27	07:28 17:07	07:59 (36) 16:03 (25)	06:46 17:49	06:56 19:22	06:03 20:00	19:27 (24) 20:34
28	07:27 17:08	16:01 (25) 16:04 (25)	17:49 17:51	19:25 19:26	20:01 20:03	19:10 (24) 19:22 (24)
29	07:26 17:10	07:58 (36) 08:35 (36)	06:45 06:45	06:55 19:27	06:02 20:04	19:11 (24) 20:35
30	07:25 17:11	07:58 (36) 08:36 (36)	06:45 06:45	06:51 19:29	05:59 20:05	19:12 (24) 20:36
31	07:24 17:12	07:58 (36) 08:37 (36)	06:45 06:45	06:49 19:30	05:59 20:05	19:13 (24) 20:37
Potential sun hours	288	293	369	403	457	463
Total, worst case	1711	585		304		
Sun reduction	0.33	0.39		0.49		
Oper. time red.	1.00	1.00		1.00		
Wind dir. red.	0.62	0.48		0.52		
Total reduction	0.21	0.19		0.26		
Total, real	359	112		79		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 122

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-74 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (338)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25 20:52	05:52 20:31	06:27 19:42	07:01 18:47	06:40 18:56	07:30 (36) 16:28 59
2	05:25 20:52	05:53 20:30	06:28 19:40	07:03 18:45	06:42 16:54	07:29 (36) 16:27 59
3	05:26 20:52	05:54 20:29	06:29 19:38	07:04 18:43	06:43 16:53	07:29 (36) 16:27 60
4	05:26 20:51	05:55 20:27	06:30 19:37	07:05 18:41	06:44 16:52	07:28 (36) 16:27 59
5	05:27 20:51	05:56 20:26	06:31 19:35	07:06 18:40	06:46 16:50	07:29 (36) 16:27 60
6	05:28 20:51	05:57 20:25	06:33 19:33	07:07 18:38	06:47 16:49	07:28 (36) 16:26 60
7	05:28 20:51	05:58 20:23	06:34 19:31	07:09 18:36	06:48 16:48	07:29 (36) 16:26 60
8	05:29 20:50	05:59 20:22	06:35 19:29	07:10 18:34	06:50 16:47	07:28 (36) 16:26 61
9	05:30 20:50	06:00 20:21	06:36 19:28	07:11 18:32	06:51 16:45	07:28 (36) 16:26 60
10	05:31 20:49	06:02 20:19	06:37 19:26	07:12 18:31	06:52 16:44	07:29 (36) 16:26 60
11	05:31 20:49	06:03 20:18	06:38 19:24	07:14 18:29	06:54 16:43	07:29 (36) 16:26 60
12	05:32 20:48	06:04 20:16	06:39 19:22	07:15 18:27	06:55 16:42	07:30 (36) 16:26 59
13	05:33 20:48	06:05 20:15	06:41 19:20	07:16 18:25	06:56 16:41	07:30 (36) 16:26 60
14	05:34 20:47	06:06 20:13	19:22 (24) 19:18	06:42 18:24	06:58 16:40	07:31 (36) 16:26 59
15	05:35 20:47	06:07 20:12	19:27 (24) 19:17	06:43 18:22	06:59 16:39	07:32 (36) 16:27 59
16	05:35 20:46	06:08 20:10	19:26 (24) 19:15	06:44 18:20	07:00 16:38	07:32 (36) 16:27 59
17	05:36 20:45	06:10 20:09	19:24 (24) 19:13	06:45 18:19	07:02 16:37	07:33 (36) 16:27 60
18	05:37 20:45	06:11 20:07	19:23 (24) 19:11	06:46 18:17	07:03 16:36	07:34 (36) 16:27 58
19	05:38 20:44	06:12 20:06	19:22 (24) 19:09	06:47 18:15	07:04 16:35	07:36 (36) 16:28 59
20	05:39 20:43	06:13 20:04	19:21 (24) 19:07	06:49 18:14	07:06 16:34	07:37 (36) 16:28 59
21	05:40 20:42	06:14 20:03	19:20 (24) 19:05	06:50 18:12	07:07 16:34	07:38 (36) 16:29 59
22	05:41 20:41	06:15 20:01	19:19 (24) 19:03	06:51 18:11	07:08 16:33	07:40 (36) 16:29 59
23	05:42 20:40	06:16 19:58	19:18 (24) 19:02	06:52 18:09	07:09 16:32	07:41 (36) 16:30 59
24	05:43 20:40	06:18 19:56	19:17 (24) 19:00	06:53 18:07	07:11 16:31	07:42 (36) 16:30 59
25	05:44 20:39	06:19 19:54	19:16 (24) 18:58	06:54 18:06	07:12 16:31	07:46 (36) 16:31 58
26	05:45 20:38	06:20 19:53	19:15 (24) 18:56	06:55 18:04	07:13 16:30	07:49 (36) 16:31 59
27	05:46 20:37	06:21 19:51	19:14 (24) 18:54	06:57 18:03	07:14 16:30	07:56 (35) 16:32 60
28	05:47 20:35	06:22 19:49	19:13 (24) 18:52	06:58 18:01	07:16 16:29	07:55 (35) 16:33 59
29	05:48 20:34	06:23 19:47	19:12 (24) 18:51	06:59 18:00	07:17 16:29	07:56 (35) 16:34 59
30	05:49 20:33	06:25 19:46	19:11 (24) 18:49	07:00 17:58	07:18 16:28	07:56 (35) 16:34 60
31	05:50 20:32	06:26 19:44	19:10 (24) 18:47	07:01 17:57	07:19 16:28	07:56 (35) 16:35 60
Potential sun hours	469	434	376	342	290	277
Total, worst case		312		208	1440	1841
Sun reduction		0.59		0.44	0.27	0.25
Oper. time red.		1.00		1.00	1.00	1.00
Wind dir. red.		0.52		0.48	0.57	0.65
Total reduction		0.31		0.22	0.16	0.17
Total, real		97		45	228	304

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:  
**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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 3/21/2011 2:14 PM / 123  
 Licensed user:  
**EDR**  
 217 Montgomery St.  
 US-SYRACUSE, NY 13202  
 (315) 471 0688  
 Steve Curtis, scurtis@edrpc.com  
 Calculated:  
 3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-76 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (282)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []  
 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25  
 Operational time  
 N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
 438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
 Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June		
1	07:40 16:36	07:23 17:14	06:43 17:52	23 07:30 (36) 19:31	06:47 20:06	05:57 20:40	19:21 (24) 20:04 (24)	
2	07:40 16:37	07:22 17:15	06:41 17:53	22 07:30 (36) 19:32	06:46 20:07	05:56 20:41	19:20 (24) 20:04 (24)	
3	07:40 16:38	07:21 17:17	06:40 17:55	21 07:29 (36) 19:33	06:44 20:09	05:54 20:41	19:21 (24) 20:04 (24)	
4	07:40 16:39	07:20 17:18	06:38 17:56	20 07:29 (36) 19:35	06:42 20:10	05:53 20:42	19:21 (24) 20:05 (24)	
5	07:40 16:40	07:19 17:19	06:36 17:57	19 07:28 (36) 19:36	06:40 20:11	05:51 20:43	19:21 (24) 20:05 (24)	
6	07:40 16:41	07:17 17:21	06:34 17:59	18 07:26 (36) 19:37	06:38 20:12	05:50 20:44	19:21 (24) 20:05 (24)	
7	07:40 16:42	07:16 17:22	06:33 18:00	17 07:25 (36) 19:38	06:37 20:13	05:49 20:44	19:21 (24) 20:06 (24)	
8	07:40 16:43	07:15 17:24	06:31 19:01	16 07:21 (36) 19:38	06:35 20:15	05:47 20:45	19:21 (24) 20:06 (24)	
9	07:39 16:44	07:14 17:25	06:29 19:02	15 07:21 (36) 19:41	06:33 20:16	05:46 20:46	19:21 (24) 20:06 (24)	
10	07:39 16:45	07:12 17:26	06:27 19:04	14 07:21 (36) 19:42	06:31 20:17	05:45 20:46	19:21 (24) 20:06 (24)	
11	07:39 16:47	07:11 17:28	06:26 19:05	13 07:21 (36) 19:43	06:30 20:18	05:44 20:47	19:22 (24) 20:07 (24)	
12	07:38 16:48	07:10 17:29	06:24 19:06	12 07:21 (36) 19:44	06:28 20:19	05:43 20:48	19:22 (24) 20:07 (24)	
13	07:38 16:49	07:08 17:30	06:22 19:08	11 07:21 (36) 19:46	06:26 20:20	05:41 20:48	19:22 (24) 20:08 (24)	
14	07:38 16:50	07:07 17:32	06:20 19:09	10 07:21 (36) 19:47	06:24 20:21	05:40 19:46 (24) 20:49	19:22 (24) 20:08 (24)	
15	07:37 16:51	07:05 17:33	06:18 19:10	9 07:21 (36) 19:48	06:23 20:23	05:39 16 19:49 (24) 20:49	19:23 (24) 20:08 (24)	
16	07:37 16:53	07:04 17:35	06:17 19:11	8 07:21 (36) 19:49	06:21 20:24	05:38 22 19:52 (24) 20:50	19:23 (24) 20:08 (24)	
17	07:36 16:54	07:02 17:36	06:15 19:13	7 07:21 (36) 19:50	06:19 20:25	05:37 24 19:53 (24) 20:50	19:23 (24) 20:08 (24)	
18	07:35 16:55	07:01 17:37	06:13 19:14	6 07:21 (36) 19:52	06:18 20:26	05:36 28 19:55 (24) 20:50	19:23 (24) 20:09 (24)	
19	07:35 16:56	06:59 17:39	06:11 19:15	5 07:21 (36) 19:53	06:16 20:27	05:35 30 19:56 (24) 20:51	19:23 (24) 20:09 (24)	
20	07:34 16:58	06:58 17:40	07:18 (36) 07:21 (36) 19:16	4 07:21 (36) 19:54	07:09 20:28	05:34 32 19:57 (24) 20:51	19:23 (24) 20:09 (24)	
21	07:33 16:59	06:56 17:41	07:17 (36) 07:26 (36) 19:17	3 07:21 (36) 19:55	07:07 20:29	05:33 33 19:57 (24) 20:51	19:23 (24) 20:09 (24)	
22	07:33 17:00	06:55 17:43	07:15 (36) 07:28 (36) 19:19	2 07:21 (36) 19:57	07:06 20:30	05:32 35 19:58 (24) 20:52	19:23 (24) 20:09 (24)	
23	07:32 17:02	06:53 17:44	07:14 (36) 07:30 (36) 19:20	1 07:21 (36) 19:58	07:04 20:31	05:31 36 20:00 (24) 20:52	19:24 (24) 20:10 (24)	
24	07:31 17:03	06:51 17:45	07:12 (36) 07:30 (36) 19:21	0 07:21 (36) 19:59	07:02 20:32	05:30 37 20:00 (24) 20:52	19:24 (24) 20:10 (24)	
25	07:30 17:04	06:50 17:47	07:10 (36) 07:30 (36) 19:22	0 07:21 (36) 20:00	07:00 20:33	05:29 38 20:00 (24) 20:52	19:24 (24) 20:09 (24)	
26	07:29 17:06	06:48 17:48	07:09 (36) 07:31 (36) 19:24	0 07:21 (36) 20:00	06:58 20:34	05:29 40 20:01 (24) 20:52	19:25 (24) 20:10 (24)	
27	07:28 17:07	06:46 17:49	07:08 (36) 07:31 (36) 19:25	0 07:21 (36) 20:01	06:57 20:35	05:28 40 20:02 (24) 20:52	19:25 (24) 20:10 (24)	
28	07:27 17:08	06:45 17:51	07:07 (36) 07:31 (36) 19:26	0 07:21 (36) 20:02	06:55 20:36	05:27 41 20:02 (24) 20:52	19:25 (24) 20:10 (24)	
29	07:26 17:10	06:44 17:51	07:06 (36) 07:31 (36) 19:26	0 07:21 (36) 20:03	06:53 20:37	05:27 41 20:02 (24) 20:52	19:25 (24) 20:11 (24)	
30	07:25 17:11	06:43 17:52	07:05 (36) 07:31 (36) 19:27	0 07:21 (36) 20:04	06:51 20:38	05:26 42 20:03 (24) 20:52	19:25 (24) 20:10 (24)	
31	07:24 17:12	06:42 17:53	07:04 (36) 07:31 (36) 19:28	0 07:21 (36) 20:05	06:50 20:39	05:25 43 20:03 (24) 20:52	19:25 (24) 20:10 (24)	
Potential sun hours	288	293	369	403	457	463	1352	
Total, worst case		148	121		588		0.59	
Sun reduction		0.39	0.47		0.55		1.00	
Oper. time red.		1.00	1.00		1.00		0.51	
Wind dir. red.		0.52	0.52		0.51		0.30	
Total reduction		0.20	0.24		0.28			
Total, real		30	29		164		404	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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Licensed user:

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(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

### SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-76 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (282)

#### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December	
1	05:25	19:26 (24)	05:52	06:27	07:01	06:40	07:19
	20:52	45 20:11 (24)	20:31	19:42	18:47	16:56	16:28
2	05:25	19:26 (24)	05:53	06:28	07:03	06:42	07:20
	20:52	45 20:11 (24)	20:30	19:40	18:45	16:54	16:27
3	05:26	19:26 (24)	05:54	06:29	07:04	06:43	07:21
	20:52	45 20:11 (24)	20:29	19:39	18:43	16:53	16:27
4	05:26	19:27 (24)	05:55	06:30	07:05	06:44	07:22
	20:52	45 20:12 (24)	20:27	19:37	18:41	16:52	16:27
5	05:27	19:26 (24)	05:56	06:31	07:06	06:46	07:23
	20:51	45 20:11 (24)	20:26	19:35	18:40	16:50	16:27
6	05:28	19:27 (24)	05:57	06:33	07:07	06:47	07:24
	20:51	45 20:12 (24)	20:25	19:33	18:38	16:49	16:26
7	05:28	19:27 (24)	05:58	06:34	07:09	06:48	07:25
	20:51	44 20:11 (24)	20:23	19:31	18:36	16:48	16:26
8	05:29	19:27 (24)	05:59	06:35	07:10	06:49	07:26
	20:50	44 20:11 (24)	20:22	19:29	18:34	16:47	16:26
9	05:30	19:28 (24)	06:01	06:36	07:11	06:51	07:27
	20:50	44 20:12 (24)	20:21	19:28	18:32	16:45	16:26
10	05:31	19:28 (24)	06:02	06:37	07:12	06:52	07:28
	20:49	44 20:12 (24)	20:19	19:26	18:31	16:44	16:26
11	05:31	19:28 (24)	06:03	06:38	07:14	06:54	07:29
	20:49	43 20:11 (24)	20:18	19:24	18:29	16:43	16:26
12	05:32	19:29 (24)	06:04	06:39	07:15	06:55	07:30
	20:48	42 20:11 (24)	20:16	19:22	18:27	16:42	16:26
13	05:33	19:29 (24)	06:05	06:41	07:16	06:56	07:31
	20:48	43 20:12 (24)	20:15	19:20	18:25	16:41	16:26
14	05:34	19:30 (24)	06:06	06:42	07:17	06:58	07:32
	20:47	42 20:12 (24)	20:13	19:18	18:24	16:40	16:26
15	05:35	19:30 (24)	06:07	06:43	07:18	06:59	07:32
	20:47	42 20:12 (24)	20:12	19:17	18:22	16:39	16:27
16	05:36	19:30 (24)	06:08	06:44	07:20	07:01	07:33
	20:46	40 20:10 (24)	20:10	19:15	18:20	16:38	16:27
17	05:36	19:31 (24)	06:10	06:45	07:21	07:02	07:34
	20:45	39 20:10 (24)	20:09	19:13	18:19	16:37	16:27
18	05:37	19:31 (24)	06:11	06:46	07:22	07:03	07:35
	20:45	39 20:10 (24)	20:07	19:11	18:17	16:36	16:27
19	05:38	19:32 (24)	06:12	06:47	07:24	07:04	07:35
	20:44	38 20:10 (24)	20:06	19:09	18:15	16:35	16:28
20	05:39	19:33 (24)	06:13	06:49	07:25	07:06	07:36
	20:43	36 20:09 (24)	20:04	19:07	18:14	16:34	16:28
21	05:40	19:33 (24)	06:14	06:50	07:26	07:07	07:36
	20:42	36 20:09 (24)	20:03	19:05	18:12	16:34	16:29
22	05:41	19:34 (24)	06:15	06:51	07:27	07:08	07:37
	20:41	34 20:08 (24)	20:01	19:04	18:11	16:33	16:29
23	05:42	19:35 (24)	06:17	06:52	07:29	07:09	07:37
	20:40	33 20:08 (24)	19:58	19:02	18:09	16:32	16:30
24	05:43	19:36 (24)	06:18	06:53	07:30	07:11	07:38
	20:40	31 20:07 (24)	19:56	19:00	18:07	16:31	16:30
25	05:44	19:37 (24)	06:19	06:54	07:31	07:12	07:38
	20:39	29 20:06 (24)	19:54	18:58	18:06	16:31	16:31
26	05:45	19:39 (24)	06:20	06:56	07:33	07:13	07:39
	20:38	26 20:05 (24)	19:53	18:56	18:04	16:30	16:31
27	05:46	19:40 (24)	06:21	06:57	07:34	07:14	07:39
	20:37	23 20:03 (24)	19:51	18:54	18:03	16:30	16:32
28	05:47	19:42 (24)	06:22	06:58	07:35	07:16	07:39
	20:36	19 20:01 (24)	19:49	18:52	18:01	16:29	16:33
29	05:48	19:44 (24)	06:23	06:59	07:36	07:17	07:39
	20:34	15 19:59 (24)	19:47	18:51	18:00	16:29	16:34
30	05:49	19:49 (24)	06:25	07:00	07:38	07:18	07:40
	20:33	5 19:54 (24)	19:46	18:49	17:58	16:28	16:34
31	05:50		06:26		07:39		07:40
	20:32		19:44		17:57		16:35
Potential sun hours	469	434	376	342	290	277	
Total, worst case	1101			274			
Sun reduction	0.63			0.44			
Oper. time red.	1.00			1.00			
Wind dir. red.	0.51			0.52			
Total reduction	0.32			0.23			
Total, real	351			62			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 125

Licensed user:

**EDR**  
 217 Montgomery St.  
 US-SYRACUSE, NY 13202  
 (315) 471 0688  
 Steve Curtis, scurtis@edrpc.com  
 Calculated:  
 3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation:** 05030 SFA Gamesa G97\_R2Shadow receptor: R-78 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (46)

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
 438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
 Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40	07:23	16:12 (07)	06:43	06:47	05:57
	16:36	17:14	33 16:45 (07)	17:52	19:31	20:06
2	07:40	07:22	16:12 (07)	06:41	06:46	05:56
	16:37	17:15	34 16:46 (07)	17:53	19:32	20:07
3	07:40	07:21	16:12 (07)	06:40	06:44	05:54
	16:38	17:17	35 16:47 (07)	17:55	19:33	20:09
4	07:40	07:20	16:11 (07)	06:38	06:42	05:53
	16:39	17:18	35 16:46 (07)	17:56	19:35	20:10
5	07:40	07:19	16:11 (07)	06:36	06:40	05:52
	16:40	17:19	36 16:47 (07)	17:57	19:36	20:11
6	07:40	07:17	16:11 (07)	06:35	06:38	05:50
	16:41	17:21	36 16:47 (07)	17:59	19:37	20:12
7	07:40	07:16	16:11 (07)	06:33	06:37	05:49
	16:42	17:22	36 16:47 (07)	18:00	19:38	20:13
8	07:40	07:15	16:11 (07)	07:31	06:35	05:48
	16:43	17:24	36 16:47 (07)	19:01	19:40	20:15
9	07:39	07:14	16:12 (07)	07:29	06:33	05:46
	16:44	17:25	36 16:48 (07)	19:02	19:41	20:16
10	07:39	07:12	16:12 (07)	07:27	06:31	05:45
	16:45	17:26	35 16:47 (07)	19:04	19:42	20:17
11	07:39	07:11	16:12 (07)	07:26	06:30	05:44
	16:47	17:28	35 16:47 (07)	19:05	19:43	20:18
12	07:38	07:10	16:13 (07)	07:24	06:28	05:43
	16:48	17:29	34 16:47 (07)	19:06	19:44	20:19
13	07:38	07:08	07:30 (25)	07:22	06:26	05:41
	16:49	17:31	36 16:46 (07)	19:08	19:46	20:20
14	07:38	07:07	07:28 (25)	07:20	06:24	05:40
	16:50	17:32	41 16:46 (07)	19:09	19:47	20:22
15	07:37	07:05	07:26 (25)	07:18	06:23	05:39
	16:51	17:33	42 16:44 (07)	19:10	19:48	20:23
16	07:37	07:04	07:25 (25)	07:17	06:21	05:38
	16:53	17:35	42 16:43 (07)	19:11	19:49	20:24
17	07:36	07:02	07:23 (25)	07:15	06:19	05:37
	16:54	17:36	42 16:42 (07)	19:13	19:51	20:25
18	07:35	07:01	07:22 (25)	07:13	06:18	05:36
	16:55	17:37	40 16:40 (07)	19:14	19:52	20:26
19	07:35	06:59	07:20 (25)	07:11	06:16	05:35
	16:56	17:39	37 16:37 (07)	19:15	19:53	20:27
20	07:34	06:58	07:20 (25)	07:09	06:14	05:34
	16:58	17:40	27 16:32 (07)	19:16	19:54	20:28
21	07:33	06:56	07:20 (25)	07:08	06:13	05:33
	16:59	17:41	23 07:43 (25)	19:18	19:55	20:29
22	07:33	06:55	07:20 (25)	07:06	06:11	05:32
	17:00	17:43	22 07:42 (25)	19:19	19:57	20:30
23	07:32	06:53	07:20 (25)	07:04	06:09	05:31
	17:02	9 16:31 (07)	17:44 22 07:42 (25)	19:20	19:58	20:31
24	07:31	06:51	07:20 (25)	07:02	06:08	05:30
	17:03	15 16:34 (07)	17:45 21 07:41 (25)	19:21	19:59	20:32
25	07:30	06:50	07:21 (25)	07:00	06:06	05:30
	17:04	19 16:36 (07)	17:47 19 07:40 (25)	19:22	20:00	20:33
26	07:29	06:48	07:23 (25)	06:58	06:05	05:29
	17:06	22 16:38 (07)	17:48 16 07:39 (25)	19:24	20:00	20:34
27	07:28	06:46	07:24 (25)	06:57	06:03	05:28
	17:07	24 16:39 (07)	17:49 13 07:37 (25)	19:25	20:01	20:35
28	07:27	06:45	07:26 (25)	06:55	06:02	05:27
	17:08	27 16:41 (07)	17:51 8 07:34 (25)	19:26	20:03	20:36
29	07:26	06:43	06:53	06:53	06:00	05:27
	17:10	29 16:42 (07)	19:27 20:04	20:37	20	06:19 (24)
30	07:25	06:41	06:51	05:59	05:26	05:59 (24)
	17:11	30 16:43 (07)	19:29 20:05	20:38	22	06:21 (24)
31	07:24	06:40	06:49	05:25	05:25	05:57 (24)
	17:12	32 16:44 (07)	19:30 24	20:39	24	06:21 (24)
Potential sun hours	288	293	369	403	457	463
Total, worst case	207	872			104	1016
Sun reduction	0.33	0.39			0.55	0.59
Oper. time red.	1.00	1.00			1.00	1.00
Wind dir. red.	0.71	0.65			0.70	0.70
Total reduction	0.23	0.25			0.39	0.41
Total, real	49	221			40	421

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 126

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-78 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (46)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25 20:52	05:59 (24) 06:33 (24)	05:52 20:31	06:27 19:42	07:02 18:47	06:41 16:17 (07)
2	05:25 20:52	05:59 (24) 06:32 (24)	05:53 20:30	06:28 19:40	07:03 18:45	06:42 16:17 (07)
3	05:26 20:52	05:59 (24) 06:33 (24)	05:54 20:29	06:29 19:39	07:04 18:43	06:43 16:17 (07)
4	05:26 20:52	06:00 (24) 06:33 (24)	05:55 20:27	06:30 19:37	07:05 18:41	06:45 16:17 (07)
5	05:27 20:51	06:00 (24) 06:32 (24)	05:56 20:26	06:31 19:35	07:06 18:40	06:46 16:17 (07)
6	05:28 20:51	06:01 (24) 06:33 (24)	05:57 20:25	06:33 19:33	07:08 18:38	06:47 16:17 (07)
7	05:28 20:51	06:02 (24) 06:33 (24)	05:58 20:23	06:34 19:31	07:09 18:36	06:49 16:17 (07)
8	05:29 20:50	06:02 (24) 06:32 (24)	05:59 20:22	06:35 19:30	07:10 18:34	06:50 16:16 (07)
9	05:30 20:50	06:03 (24) 06:32 (24)	06:01 20:21	06:36 19:28	07:11 18:33	06:51 16:17 (07)
10	05:31 20:50	06:04 (24) 06:32 (24)	06:02 20:19	06:37 19:26	07:12 18:31	06:53 16:16 (07)
11	05:31 20:49	06:04 (24) 06:30 (24)	06:03 20:18	06:38 19:24	07:14 18:29	06:54 16:15 (07)
12	05:32 20:49	06:05 (24) 06:30 (24)	06:04 20:16	06:39 19:22	07:15 18:27	06:55 16:15 (07)
13	05:33 20:48	06:06 (24) 06:29 (24)	06:05 20:15	06:41 19:20	07:16 18:26	06:57 16:14 (07)
14	05:34 20:47	06:08 (24) 06:29 (24)	06:06 20:14	06:42 19:18	07:17 18:24	06:58 16:14 (07)
15	05:35 20:47	06:09 (24) 06:28 (24)	06:07 20:12	06:43 19:17	07:19 18:22	06:59 16:12 (07)
16	05:36 20:46	06:10 (24) 06:25 (24)	06:09 20:10	06:44 19:15	07:20 18:20	07:00 16:12 (07)
17	05:36 20:45	06:13 (24) 06:24 (24)	06:10 20:09	06:45 19:13	07:21 18:19	07:02 16:10 (07)
18	05:37 20:45	06:18 (24) 06:19 (24)	06:11 20:07	06:46 19:11	07:22 18:17	07:03 16:08 (07)
19	05:38 20:44	06:12 20:06	06:48 19:09	07:24 18:15	07:04 16:35	07:04 16:06 (07)
20	05:39 20:43	06:13 20:04	06:49 19:07	07:25 18:14	07:06 16:34	07:06 16:28
21	05:40 20:42	06:14 20:03	06:50 19:05	07:26 18:12	07:07 16:34	07:07 16:29
22	05:41 20:41	06:15 20:01	06:51 19:04	07:27 18:11	07:08 16:33	07:08 16:29
23	05:42 20:41	06:17 19:58	06:52 19:02	07:29 18:09	07:09 16:32	07:09 16:30
24	05:43 20:40	06:18 19:56	06:53 19:00	07:30 18:07	07:11 16:31	07:11 16:30
25	05:44 20:39	06:19 19:54	06:54 18:58	07:31 18:06	07:12 16:31	07:12 16:31
26	05:45 20:38	06:20 19:53	06:56 18:56	07:33 18:04	07:13 16:30	07:13 16:32
27	05:46 20:37	06:21 19:51	06:57 18:54	07:34 18:03	07:14 16:30	07:14 16:32
28	05:47 20:36	06:22 19:49	06:58 18:52	07:35 18:01	07:15 16:29	07:15 16:33
29	05:48 20:34	06:23 19:47	06:59 18:51	07:37 18:00	07:17 16:29	07:17 16:34
30	05:49 20:33	06:25 19:46	07:00 18:49	07:38 17:58	07:18 16:28	07:18 16:34
31	05:51 20:32	06:26 19:44	07:01 18:47	07:39 17:57	07:19 16:27	07:19 16:35
Potential sun hours	469	434	376	342	290	277
Total, worst case	458			533	558	
Sun reduction	0.63			0.44	0.27	
Oper. time red.	1.00			1.00	1.00	
Wind dir. red.	0.70			0.61	0.71	
Total reduction	0.44			0.27	0.19	
Total, real	203			143	107	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:  
**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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 3/21/2011 2:14 PM / 127  
 Licensed user:  
**EDR**  
 217 Montgomery St.  
 US-SYRACUSE, NY 13202  
 (315) 471 0688  
 Steve Curtis, scurtis@edrpc.com  
 Calculated:  
 3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-79 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (47)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []  
 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25  
 Operational time  
 N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
 438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
 Idle start wind speed: Cut in wind speed from power curve

January		February		March		April		May		June					
1	07:40	15:34 (07)	07:23	15:46 (07)	06:43	06:47	05:57			05:25	06:16 (24)				
	16:36	30	16:04 (07)	17:14	28	16:14 (07)	17:52	19:31	20:06		32	06:48 (24)			
2	07:40	15:35 (07)	07:22	15:48 (07)	06:41	06:46	05:56			06:29 (24)	05:24	06:16 (24)			
	16:37	30	16:05 (07)	17:15	26	16:14 (07)	17:53	19:32	20:07	6	06:35 (24)	20:41	31	06:47 (24)	
3	07:40	15:35 (07)	07:21	15:50 (07)	06:40	06:44	05:54			06:24 (24)	05:24	06:17 (24)			
	16:38	31	16:06 (07)	17:17	23	16:13 (07)	17:55	19:33	20:09	15	06:39 (24)	20:41	31	06:48 (24)	
4	07:40	15:35 (07)	07:20	15:51 (07)	06:38	06:42	05:53			06:22 (24)	05:23	06:18 (24)			
	16:39	32	16:07 (07)	17:18	19	16:10 (07)	17:56	19:35	20:10	19	06:41 (24)	20:42	30	06:48 (24)	
5	07:40	15:35 (07)	07:19	15:54 (07)	06:36	06:40	05:52			06:21 (24)	05:23	06:18 (24)			
	16:40	33	16:08 (07)	17:19	14	16:08 (07)	17:57	19:36	20:11	22	06:43 (24)	20:43	29	06:47 (24)	
6	07:40	15:36 (07)	07:17	15:59 (07)	06:35	06:38	05:50			06:19 (24)	05:23	06:19 (24)			
	16:41	33	16:09 (07)	17:21	4	16:03 (07)	17:59	19:37	20:12	25	06:44 (24)	20:44	28	06:47 (24)	
7	07:40	15:36 (07)	07:16			06:33	06:37	05:49			06:18 (24)	05:22	06:20 (24)		
	16:42	34	16:10 (07)	17:22		18:00	19:38	20:13	27	06:45 (24)	20:44	27	06:47 (24)		
8	07:40	15:36 (07)	07:15			07:31	06:35	05:48			06:17 (24)	05:22	06:20 (24)		
	16:43	35	16:10 (07)	17:24		19:01	19:40	20:15	29	06:46 (24)	20:45	26	06:46 (24)		
9	07:39	15:36 (07)	07:14			07:29	06:33	05:46			06:16 (24)	05:22	06:21 (24)		
	16:44	35	16:11 (07)	17:25		19:02	19:41	20:16	31	06:47 (24)	20:46	25	06:46 (24)		
10	07:39	15:36 (07)	07:12			07:27	06:31	05:45			06:15 (24)	05:21	06:21 (24)		
	16:45	36	16:12 (07)	17:26		19:04	19:42	20:17	32	06:47 (24)	20:46	25	06:46 (24)		
11	07:39	15:36 (07)	07:11			07:26	06:30	05:44			06:14 (24)	05:21	06:22 (24)		
	16:47	36	16:12 (07)	17:28		19:05	19:43	20:18	34	06:48 (24)	20:47	24	06:46 (24)		
12	07:38	15:36 (07)	07:10			07:24	06:28	05:43			06:14 (24)	05:21	06:23 (24)		
	16:48	37	16:13 (07)	17:29		19:06	19:44	20:19	34	06:48 (24)	20:48	23	06:46 (24)		
13	07:38	15:36 (07)	07:08			07:22	06:26	05:41			06:13 (24)	05:21	06:23 (24)		
	16:49	37	16:13 (07)	17:31		19:08	19:46	20:20	36	06:49 (24)	20:48	23	06:46 (24)		
14	07:38	15:37 (07)	07:07			07:20	06:24	05:40			06:13 (24)	05:21	06:24 (24)		
	16:50	37	16:14 (07)	17:32		19:09	19:47	20:22	36	06:49 (24)	20:49	22	06:46 (24)		
15	07:37	15:36 (07)	07:05			07:18	06:23	05:39			06:13 (24)	05:21	06:24 (24)		
	16:51	38	16:14 (07)	17:33		19:10	19:48	20:23	37	06:50 (24)	20:49	22	06:46 (24)		
16	07:37	15:37 (07)	07:04			07:17	06:21	05:38			06:13 (24)	05:21	06:25 (24)		
	16:53	38	16:15 (07)	17:35		19:11	19:49	20:24	37	06:50 (24)	20:50	21	06:46 (24)		
17	07:36	15:37 (07)	07:02			07:15	06:19	05:37			06:13 (24)	05:21	06:25 (24)		
	16:54	38	16:15 (07)	17:36		19:13	19:51	20:25	37	06:50 (24)	20:50	21	06:46 (24)		
18	07:35	15:37 (07)	07:01			07:13	06:18	05:36			06:13 (24)	05:21	06:25 (24)		
	16:55	39	16:16 (07)	17:37		19:14	19:52	20:26	37	06:50 (24)	20:50	21	06:46 (24)		
19	07:35	15:37 (07)	06:59			07:11	06:16	05:35			06:12 (24)	05:21	06:26 (24)		
	16:56	39	16:16 (07)	17:39		19:15	19:53	20:27	38	06:50 (24)	20:51	20	06:46 (24)		
20	07:34	15:38 (07)	06:58			07:09	06:14	05:34			06:12 (24)	05:21	06:26 (24)		
	16:58	39	16:17 (07)	17:40		19:16	19:54	20:28	38	06:50 (24)	20:51	20	06:46 (24)		
21	07:33	15:38 (07)	06:56			07:08	06:13	05:33			06:12 (24)	05:21	06:26 (24)		
	16:59	39	16:17 (07)	17:41		19:18	19:55	20:29	38	06:50 (24)	20:51	20	06:46 (24)		
22	07:33	15:38 (07)	06:55			07:06	06:11	05:32			06:12 (24)	05:21	06:26 (24)		
	17:00	39	16:17 (07)	17:43		19:19	19:57	20:30	37	06:49 (24)	20:52	20	06:46 (24)		
23	07:32	15:39 (07)	06:53			07:04	06:09	05:31			06:13 (24)	05:22	06:27 (24)		
	17:02	38	16:17 (07)	17:44		19:20	19:58	20:31	37	06:50 (24)	20:52	20	06:47 (24)		
24	07:31	15:39 (07)	06:51			07:02	06:08	05:30			06:13 (24)	05:22	06:27 (24)		
	17:03	38	16:17 (07)	17:46		19:21	19:59	20:32	37	06:50 (24)	20:52	20	06:47 (24)		
25	07:30	15:40 (07)	06:50			07:00	06:06	05:30			06:13 (24)	05:22	06:26 (24)		
	17:04	37	16:17 (07)	17:47		19:22	20:00	20:33	36	06:49 (24)	20:52	21	06:47 (24)		
26	07:29	15:40 (07)	06:48			06:58	06:05	05:29			06:13 (24)	05:23	06:27 (24)		
	17:06	37	16:17 (07)	17:48		19:24	20:00	20:34	36	06:49 (24)	20:52	21	06:48 (24)		
27	07:28	15:41 (07)	06:46			06:57	06:03	05:28			06:14 (24)	05:23	06:27 (24)		
	17:07	36	16:17 (07)	17:49		19:25	20:01	20:35	35	06:49 (24)	20:52	21	06:48 (24)		
28	07:27	15:42 (07)	06:45			06:55	06:02	05:27			06:14 (24)	05:23	06:27 (24)		
	17:08	34	16:16 (07)	17:51		19:26	20:03	20:36	35	06:49 (24)	20:52	22	06:49 (24)		
29	07:26	15:43 (07)				06:53	06:00	05:27			06:14 (24)	05:24	06:27 (24)		
	17:10	33	16:16 (07)			19:27	20:04	20:37	34	06:48 (24)	20:52	22	06:49 (24)		
30	07:25	15:44 (07)				06:51	05:59	05:26			06:15 (24)	05:24	06:26 (24)		
	17:11	32	16:16 (07)			19:29	20:05	20:38	34	06:49 (24)	20:52	23	06:49 (24)		
31	07:24	15:45 (07)				06:49		05:25			06:15 (24)				
	17:12	30	16:15 (07)			19:30		20:39	33	06:48 (24)					
Potential sun hours	288		293			369	403	457			463				
Total, worst case	1100		114					962			711				
Sun reduction	0.33		0.39					0.55			0.59				
Oper. time red.	1.00		1.00					1.00			1.00				
Wind dir. red.	0.74		0.74					0.67			0.67				
Total reduction	0.25		0.29					0.37			0.40				
Total, real	274		34					359			285				

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 128

Licensed user:

**EDR**

217 Montgomery St.

US-SYRACUSE, NY 13202

(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

## SHADOW - Calendar

**Calculation:** 05030 SFA Gamesa G97\_R2Shadow receptor: R-79 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (47)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
 438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
 Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October		November		December	
1	05:25	06:26 (24)	05:52	06:24 (24)	06:27	07:02	06:41				07:19	15:18 (07)
	20:52	24 06:50 (24)	20:31	35 06:59 (24)	19:42	18:47	16:56				16:28	36 15:54 (07)
2	05:25	06:26 (24)	05:53	06:25 (24)	06:28	07:03	06:42				07:20	15:18 (07)
	20:52	24 06:50 (24)	20:30	33 06:58 (24)	19:40	18:45	16:54				16:27	36 15:54 (07)
3	05:26	06:26 (24)	05:54	06:25 (24)	06:29	07:04	06:43				07:21	15:19 (07)
	20:52	25 06:51 (24)	20:29	33 06:58 (24)	19:39	18:43	16:53				16:27	35 15:54 (07)
4	05:26	06:26 (24)	05:55	06:26 (24)	06:30	07:05	06:45				07:22	15:20 (07)
	20:52	26 06:52 (24)	20:27	31 06:57 (24)	19:37	18:41	16:52				16:27	35 15:55 (07)
5	05:27	06:25 (24)	05:56	06:27 (24)	06:31	07:06	06:46			15:28 (07)	07:23	15:21 (07)
	20:51	27 06:52 (24)	20:26	29 06:56 (24)	19:35	18:40	16:50	6	15:34 (07)	16:27	34 15:55 (07)	
6	05:28	06:26 (24)	05:57	06:28 (24)	06:33	07:08	06:47				15:23 (07)	07:24 15:22 (07)
	20:51	27 06:53 (24)	20:25	27 06:55 (24)	19:33	18:38	16:49	15	15:38 (07)	16:26	33 15:55 (07)	
7	05:28	06:26 (24)	05:58	06:29 (24)	06:34	07:09	06:49				15:21 (07)	07:25 15:22 (07)
	20:51	28 06:54 (24)	20:23	24 06:53 (24)	19:31	18:36	16:48	20	15:41 (07)	16:26	33 15:55 (07)	
8	05:29	06:25 (24)	05:59	06:30 (24)	06:35	07:10	06:50				15:19 (07)	07:26 15:23 (07)
	20:50	29 06:54 (24)	20:22	22 06:52 (24)	19:30	18:34	16:47	24	15:43 (07)	16:26	32 15:55 (07)	
9	05:30	06:25 (24)	06:01	06:32 (24)	06:36	07:11	06:51				15:18 (07)	07:27 15:24 (07)
	20:50	30 06:55 (24)	20:21	17 06:49 (24)	19:28	18:33	16:45	27	15:45 (07)	16:26	31 15:55 (07)	
10	05:31	06:25 (24)	06:02	06:33 (24)	06:37	07:12	06:53				15:17 (07)	07:28 15:25 (07)
	20:50	30 06:55 (24)	20:19	13 06:48 (24)	19:26	18:31	16:44	28	15:45 (07)	16:26	30 15:55 (07)	
11	05:31	06:24 (24)	06:03	06:34 (24)	06:38	07:14	06:54				15:16 (07)	07:29 15:25 (07)
	20:49	31 06:55 (24)	20:18		19:24	18:29	16:43	30	15:46 (07)	16:26	30 15:55 (07)	
12	05:32	06:24 (24)	06:04	06:35 (24)	06:39	07:15	06:55				15:15 (07)	07:30 15:25 (07)
	20:49	32 06:56 (24)	20:16		19:22	18:27	16:42	33	15:48 (07)	16:26	30 15:55 (07)	
13	05:33	06:24 (24)	06:05	06:36 (24)	06:41	07:16	06:57				15:14 (07)	07:31 15:26 (07)
	20:48	33 06:57 (24)	20:15		19:20	18:26	16:41	34	15:48 (07)	16:26	29 15:55 (07)	
14	05:34	06:24 (24)	06:06	06:37 (24)	06:42	07:17	06:58				15:15 (07)	07:32 15:27 (07)
	20:47	33 06:57 (24)	20:14		19:18	18:24	16:40	34	15:49 (07)	16:26	28 15:55 (07)	
15	05:35	06:24 (24)	06:07	06:38 (24)	06:43	07:19	06:59				15:14 (07)	07:33 15:28 (07)
	20:47	34 06:58 (24)	20:12		19:17	18:22	16:39	36	15:50 (07)	16:27	28 15:56 (07)	
16	05:36	06:23 (24)	06:09	06:39 (24)	06:44	07:20	07:00				15:14 (07)	07:33 15:28 (07)
	20:46	35 06:58 (24)	20:10		19:15	18:20	16:38	37	15:51 (07)	16:27	27 15:55 (07)	
17	05:36	06:23 (24)	06:10	06:40 (24)	06:45	07:21	07:02				15:14 (07)	07:34 15:29 (07)
	20:45	35 06:58 (24)	20:09		19:13	18:19	16:37	37	15:51 (07)	16:27	27 15:56 (07)	
18	05:37	06:23 (24)	06:11	06:41 (24)	06:46	07:22	07:03				15:13 (07)	07:35 15:30 (07)
	20:45	36 06:59 (24)	20:07		19:11	18:17	16:36	38	15:51 (07)	16:28	27 15:57 (07)	
19	05:38	06:23 (24)	06:12	06:42 (24)	06:48	07:24	07:04				15:14 (07)	07:35 15:30 (07)
	20:44	36 06:59 (24)	20:06		19:09	18:15	16:35	38	15:52 (07)	16:28	26 15:56 (07)	
20	05:39	06:23 (24)	06:13	06:43 (24)	06:49	07:25	07:06				15:13 (07)	07:36 15:31 (07)
	20:43	36 06:59 (24)	20:04		19:07	18:14	16:34	39	15:52 (07)	16:28	26 15:57 (07)	
21	05:40	06:23 (24)	06:14	06:44 (24)	06:50	07:26	07:07				15:13 (07)	07:36 15:31 (07)
	20:42	37 07:00 (24)	20:03		19:05	18:12	16:34	39	15:52 (07)	16:29	26 15:57 (07)	
22	05:41	06:23 (24)	06:15	06:45 (24)	06:51	07:27	07:08				15:14 (07)	07:37 15:32 (07)
	20:41	37 07:00 (24)	20:01		19:04	18:11	16:33	39	15:53 (07)	16:29	26 15:58 (07)	
23	05:42	06:23 (24)	06:17	06:46 (24)	06:52	07:29	07:09				15:14 (07)	07:37 15:32 (07)
	20:41	37 07:00 (24)	19:58		19:02	18:09	16:32	39	15:53 (07)	16:30	26 15:58 (07)	
24	05:43	06:23 (24)	06:18	06:47 (24)	06:53	07:30	07:11				15:14 (07)	07:38 15:33 (07)
	20:40	37 07:00 (24)	19:56		19:00	18:07	16:31	39	15:53 (07)	16:30	26 15:59 (07)	
25	05:44	06:23 (24)	06:19	06:48 (24)	06:54	07:31	07:12				15:15 (07)	07:38 15:33 (07)
	20:39	37 07:00 (24)	19:54		18:58	18:06	16:31	39	15:54 (07)	16:31	27 16:00 (07)	
26	05:45	06:23 (24)	06:20	06:49 (24)	06:56	07:33	07:13				15:15 (07)	07:39 15:33 (07)
	20:38	37 07:00 (24)	19:53		18:56	18:04	16:30	38	15:53 (07)	16:32	27 16:00 (07)	
27	05:46	06:23 (24)	06:21	06:50 (24)	06:57	07:34	07:14				15:15 (07)	07:39 15:34 (07)
	20:37	37 07:00 (24)	19:51		18:54	18:03	16:30	38	15:53 (07)	16:32	27 16:01 (07)	
28	05:47	06:23 (24)	06:22	06:51 (24)	06:58	07:35	07:16				15:17 (07)	07:39 15:34 (07)
	20:36	37 07:00 (24)	19:49		18:52	18:01	16:29	37	15:54 (07)	16:33	28 16:02 (07)	
29	05:48	06:24 (24)	06:23	06:52 (24)	06:59	07:37	07:17				15:17 (07)	07:40 15:34 (07)
	20:34	36 07:00 (24)	19:47		18:51	18:00	16:29	37	15:54 (07)	16:34	28 16:02 (07)	
30	05:49	06:24 (24)	06:25	06:53 (24)	07:00	07:38	07:18				15:17 (07)	07:40 15:34 (07)
	20:33	36 07:00 (24)	19:46		18:49	17:58	16:28	37	15:54 (07)	16:34	29 16:03 (07)	
31	05:51	06:24 (24)	06:26	06:54 (24)	07:01	07:39	07:19				07:40	15:34 (07)
	20:32	35 06:59 (24)	19:44		18:47	17:57	16:27				16:35	29 16:03 (07)
Potential sun hours	469		434		376	342	290				277	
Total, worst case		1014		264			858				912	
Sun reduction		0.63		0.59			0.27				0.25	
Oper. time red.		1.00		1.00			1.00				1.00	
Wind dir. red.		0.67		0.67			0.74				0.74	
Total reduction		0.43		0.40			0.20				0.19	
Total, real		434		106			175				172	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)		First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project: **05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

Printed/Page: 3/21/2011 2:14 PM / 129  
 Licensed user:  
**EDR**  
 217 Montgomery St.  
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 (315) 471 0688  
 Steve Curtis, scurtis@edrpc.com  
 Calculated:  
 3/21/2011 11:14 AM/2.7.453

### SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-83 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (49)

#### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []  
 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25  
 Operational time  
 N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
 438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
 Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36	07:23 17:14	06:43 17:52	16:41 (08) 17:22 (08)	06:47 19:31	07:12 (25) 20:06
2	07:40 16:37	07:22 17:15	06:41 17:53	16:41 (08) 17:23 (08)	06:46 19:32	07:11 (25) 20:07
3	07:40 16:38	07:21 17:17	06:40 17:55	16:40 (08) 17:23 (08)	06:44 19:33	07:12 (25) 20:09
4	07:40 16:39	07:20 17:18	06:38 17:56	16:39 (08) 17:23 (08)	06:42 19:35	07:11 (25) 20:10
5	07:40 16:40	07:19 17:19	06:36 17:57	16:40 (08) 17:23 (08)	06:40 19:36	07:11 (25) 20:11
6	07:40 16:41	07:17 17:21	06:34 17:59	16:39 (08) 17:23 (08)	06:38 19:37	07:11 (25) 20:12
7	07:40 16:42	07:16 17:22	06:33 18:00	16:39 (08) 17:22 (08)	06:37 19:38	07:13 (25) 20:13
8	07:40 16:43	07:15 17:24	06:31 19:01	17:39 (08) 18:22 (08)	06:35 19:40	07:13 (25) 20:15
9	07:39 16:44	07:14 17:25	07:29 19:02	17:39 (08) 18:21 (08)	06:33 19:41	07:14 (25) 20:16
10	07:39 16:45	07:12 17:26	07:27 19:04	17:40 (08) 18:21 (08)	06:31 19:42	07:15 (25) 20:17
11	07:39 16:47	07:11 17:28	07:26 19:05	17:40 (08) 18:20 (08)	06:30 19:43	07:17 (25) 20:18
12	07:38 16:48	07:10 17:29	07:24 19:06	17:40 (08) 18:19 (08)	06:28 19:44	18:42 (07) 20:19
13	07:38 16:49	07:08 17:31	07:22 19:08	17:41 (08) 18:18 (08)	06:26 19:46	18:43 (07) 20:20
14	07:38 16:50	07:07 17:32	07:20 19:09	17:42 (08) 18:16 (08)	06:24 19:47	18:44 (07) 20:21
15	07:37 16:51	07:05 17:33	07:18 19:10	17:42 (08) 18:15 (08)	06:23 19:48	18:46 (07) 20:22
16	07:37 16:53	07:04 17:35	07:17 19:11	17:45 (08) 18:14 (08)	06:21 19:49	18:49 (07) 20:24
17	07:36 16:54	07:02 17:36	07:15 19:13	17:46 (08) 18:11 (08)	06:19 19:50	18:57 (07) 20:25
18	07:35 16:55	07:01 17:37	07:13 19:14	17:48 (08) 18:08 (08)	06:18 19:52	19:01 (07) 20:26
19	07:35 16:56	06:59 17:39	07:11 19:15	17:51 (08) 18:04 (08)	06:16 19:53	19:01 (07) 20:27
20	07:34 16:58	06:58 17:40	07:09 19:16	17:57 (08) 17:08 (08)	06:14 19:54	19:02 (07) 20:28
21	07:33 16:59	06:56 17:41	07:08 19:18	16:54 (08) 17:12 (08)	06:13 19:55	19:03 (07) 20:29
22	07:33 17:00	06:55 17:43	07:06 19:19	16:50 (08) 17:15 (08)	06:11 19:57	19:04 (07) 20:30
23	07:32 17:02	06:53 17:44	07:04 19:20	16:49 (08) 17:17 (08)	06:09 19:58	19:05 (07) 20:31
24	07:31 17:03	06:51 17:45	07:02 19:21	16:47 (08) 17:18 (08)	07:26 (25) 19:59	19:06 (07) 20:32
25	07:30 17:04	06:50 17:47	07:00 19:22	16:45 (08) 17:19 (08)	07:21 (25) 20:00	19:07 (07) 20:33
26	07:29 17:06	06:48 17:48	06:58 19:24	16:45 (08) 17:21 (08)	07:19 (25) 20:00	19:08 (07) 20:34
27	07:28 17:07	06:46 17:49	06:57 19:25	16:43 (08) 17:21 (08)	07:17 (25) 20:01	19:09 (07) 20:35
28	07:27 17:08	06:45 17:51	06:55 19:26	16:42 (08) 17:22 (08)	07:16 (25) 20:03	19:10 (07) 20:36
29	07:26 17:10	06:44 17:52	06:54 19:27	16:41 (08) 17:23 (08)	07:15 (25) 20:04	19:11 (07) 20:37
30	07:25 17:11	06:43 17:53	06:53 19:28	16:40 (08) 17:24 (08)	07:14 (25) 20:05	19:12 (07) 20:38
31	07:24 17:12	06:42 17:54	06:52 19:29	16:39 (08) 17:25 (08)	07:13 (25) 20:06	19:13 (07) 20:39
Potential sun hours	288	293	369	403	457	463
Total, worst case		261	940	679		
Sun reduction		0.39	0.47	0.49		
Oper. time red.		1.00	1.00	1.00		
Wind dir. red.		0.66	0.63	0.57		
Total reduction		0.26	0.30	0.28		
Total, real		67	282	190		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 130

Licensed user:

EDR

217 Montgomery St.

US-SYRACUSE, NY 13202

(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-83 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (49)

Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
 438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
 Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December		
1	05:25	05:52	06:27	07:17 (25)	07:02	17:19 (08)	06:41	07:19
	20:52	20:31	19:42	19:07 (07)	18:47	17:57 (08)	16:56	16:28
2	05:25	05:53	06:28	07:14 (25)	07:03	17:19 (08)	06:42	07:20
	20:52	20:30	19:40	19:07 (07)	18:45	17:59 (08)	16:54	16:27
3	05:26	05:54	06:29	07:12 (25)	07:04	17:18 (08)	06:43	07:21
	20:52	20:29	19:39	19:08 (07)	18:43	17:59 (08)	16:53	16:27
4	05:26	05:55	06:30	07:10 (25)	07:05	17:17 (08)	06:44	07:22
	20:52	20:27	19:37	19:08 (07)	18:41	17:59 (08)	16:52	16:27
5	05:27	05:56	06:31	07:09 (25)	07:06	17:16 (08)	06:46	07:23
	20:51	20:26	19:35	19:07 (07)	18:40	17:58 (08)	16:50	16:27
6	05:28	05:57	06:33	07:07 (25)	07:08	17:15 (08)	06:47	07:24
	20:51	20:25	19:33	19:07 (07)	18:38	17:58 (08)	16:49	16:26
7	05:28	05:58	06:34	07:06 (25)	07:09	17:15 (08)	06:49	07:25
	20:51	20:23	19:31	19:06 (07)	18:36	17:59 (08)	16:48	16:26
8	05:29	05:59	06:35	07:06 (25)	07:10	17:15 (08)	06:50	07:26
	20:50	20:22	19:29	19:06 (07)	18:34	17:58 (08)	16:47	16:26
9	05:30	06:01	06:36	07:05 (25)	07:11	17:14 (08)	06:51	07:27
	20:50	20:21	19:28	19:04 (07)	18:33	17:57 (08)	16:45	16:26
10	05:31	06:02	06:37	07:05 (25)	07:12	17:14 (08)	06:53	07:28
	20:49	20:19	19:26	19:03 (07)	18:31	17:57 (08)	16:44	16:26
11	05:31	06:03	06:38	07:05 (25)	07:14	17:15 (08)	06:54	07:29
	20:49	20:18	19:24	19:02 (07)	18:29	17:57 (08)	16:43	16:26
12	05:32	06:04	06:39	07:05 (25)	07:15	17:15 (08)	06:55	07:30
	20:49	20:16	19:22	19:00 (07)	18:27	17:56 (08)	16:42	16:26
13	05:33	06:05	06:41	07:05 (25)	07:16	17:15 (08)	06:56	07:31
	20:48	20:15	19:20	18:58 (07)	18:26	17:55 (08)	16:41	16:26
14	05:34	06:06	06:42	07:05 (25)	07:17	17:16 (08)	06:58	07:32
	20:47	20:13	19:18	18:56 (07)	18:24	17:55 (08)	16:40	16:26
15	05:35	06:07	06:43	07:05 (25)	07:19	17:16 (08)	06:59	07:32
	20:47	20:12	19:17	18:54 (07)	18:22	17:53 (08)	16:39	16:27
16	05:36	06:09	06:44	07:06 (25)	07:20	17:16 (08)	07:00	07:33
	20:46	20:10	19:15	18:52 (07)	18:20	17:52 (08)	16:38	16:27
17	05:36	06:10	06:45	07:07 (25)	07:21	17:17 (08)	07:02	07:34
	20:45	20:09	19:13	07:27 (25)	18:19	17:50 (08)	16:37	16:27
18	05:37	06:11	06:46	07:08 (25)	07:22	17:19 (08)	07:03	07:35
	20:45	20:07	19:11	07:24 (25)	18:17	17:49 (08)	16:36	16:28
19	05:38	06:12	06:48	07:12 (25)	07:24	17:20 (08)	07:04	07:35
	20:44	20:06	19:09	07:21 (25)	18:15	17:47 (08)	16:35	16:28
20	05:39	06:13	06:49		07:25	17:22 (08)	07:06	07:36
	20:43	20:04	19:07		18:14	17:44 (08)	16:34	16:28
21	05:40	06:14	06:50		07:26	17:25 (08)	07:07	07:36
	20:42	20:03	19:05		18:12	17:42 (08)	16:34	16:29
22	05:41	06:15	06:51		07:27	17:29 (08)	07:08	07:37
	20:41	20:01	19:04		18:11	17:37 (08)	16:33	16:29
23	05:42	06:17	06:52		07:29		07:09	07:37
	20:40	19:58	19:02		18:09		16:32	16:30
24	05:43	06:18	06:53	17:37 (08)	07:30		07:11	07:38
	20:40	19:56	19:00	17:46 (08)	18:07		16:31	16:30
25	05:44	06:19	06:54	17:32 (08)	07:31		07:12	07:38
	20:39	19:54	18:58	17:50 (08)	18:06		16:31	16:31
26	05:45	06:20	06:56	17:29 (08)	07:33		07:13	07:39
	20:38	19:53	18:56	17:53 (08)	18:04		16:30	16:32
27	05:46	06:21	06:57	17:27 (08)	07:34		07:14	07:39
	20:37	19:51	18:59 (07)	17:54 (08)	18:03		16:30	16:32
28	05:47	06:22	06:58	17:25 (08)	07:35		07:16	07:39
	20:36	19:49	18:52 (07)	17:56 (08)	18:01		16:29	16:33
29	05:48	06:23	06:59	17:23 (08)	07:37		07:17	07:39
	20:34	19:47	18:51 (07)	17:56 (08)	18:00		16:29	16:34
30	05:49	06:25	07:00	17:21 (08)	07:38		07:18	07:40
	20:33	19:46	18:49 (07)	17:57 (08)	17:58		16:28	16:34
31	05:51	06:26	07:01		07:39			07:40
	20:32	19:44	18:42 (07)		17:57			16:35
Potential sun hours	469	434	376	342		290		277
Total, worst case		92	1021		791			
Sun reduction		0.59	0.54		0.44			
Oper. time red.		1.00	1.00		1.00			
Wind dir. red.		0.56	0.59		0.66			
Total reduction		0.33	0.32		0.29			
Total, real		31	325		229			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

## SHADOW - Calendar

**Calculation:** 05030 SFA Gamesa G97\_R2Shadow receptor: R-84 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (50)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June		
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	18:21 (08) 18:39 (08)	05:57 20:06	06:51 (25) 07:11 (25)	05:25 20:40
2	07:40 16:37	07:22 17:15	06:41 17:53	06:46 19:32	18:24 (08) 18:36 (08)	05:56 20:07	06:53 (25) 07:10 (25)	05:24 20:41
3	07:40 16:38	07:21 17:17	06:40 17:55	06:44 19:33	06:44 19:33	05:54 20:09	06:55 (25) 07:06 (25)	05:24 20:41
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:35	06:42 19:35	05:53 20:10	05:53 20:10	05:23 20:42
5	07:40 16:40	07:19 17:19	06:36 17:57	06:40 19:36	06:40 19:36	05:52 20:11	05:52 20:11	05:23 20:43
6	07:40 16:41	07:17 17:21	06:34 17:59	06:38 19:37	19:07 (07) 19:14 (07)	05:50 20:12	05:50 20:12	05:23 20:44
7	07:40 16:42	07:16 17:22	06:33 18:00	06:37 19:38	19:04 (07) 19:15 (07)	05:49 20:13	05:49 20:13	05:22 20:44
8	07:40 16:43	07:15 17:24	07:31 19:01	06:35 19:40	07:03 (25) 19:17 (07)	05:48 20:15	05:48 20:15	05:22 20:45
9	07:39 16:44	07:14 17:25	07:29 19:02	06:33 19:41	06:58 (25) 19:18 (07)	05:46 20:16	05:46 20:16	05:22 20:46
10	07:39 16:45	07:12 17:26	07:27 19:04	06:31 19:42	06:55 (25) 19:19 (07)	05:45 20:17	05:45 20:17	05:21 20:46
11	07:39 16:47	07:11 17:28	07:26 19:05	06:30 19:43	06:53 (25) 19:20 (07)	05:44 20:18	05:44 20:18	05:21 20:47
12	07:38 16:48	07:10 17:29	07:24 19:06	18:30 (08) 18:42 (08)	06:28 19:44	05:43 20:19	05:43 20:19	05:21 20:48
13	07:38 16:49	07:08 17:31	07:22 19:08	18:26 (08) 18:45 (08)	06:26 19:46	05:41 20:20	05:41 20:20	05:21 20:48
14	07:38 16:50	07:07 17:32	07:20 19:09	18:24 (08) 18:46 (08)	06:24 19:47	05:40 20:21	05:40 20:21	05:21 20:49
15	07:37 16:51	07:05 17:33	07:18 19:10	18:22 (08) 18:47 (08)	06:23 19:48	05:39 20:23	05:39 20:23	05:21 20:49
16	07:37 16:53	07:04 17:35	07:17 19:11	18:21 (08) 18:49 (08)	06:21 19:49	05:38 20:24	05:38 20:24	05:21 20:50
17	07:36 16:54	07:02 17:36	07:15 19:13	18:20 (08) 18:50 (08)	06:19 19:50	05:37 20:25	05:37 20:25	05:21 20:50
18	07:35 16:55	07:01 17:37	07:13 19:14	18:18 (08) 18:51 (08)	06:18 19:52	05:36 20:26	05:36 20:26	05:21 20:50
19	07:35 16:56	06:59 17:39	07:11 19:15	18:17 (08) 18:51 (08)	06:16 19:53	05:35 20:27	05:35 20:27	05:21 20:51
20	07:34 16:58	06:58 17:40	07:09 19:16	18:16 (08) 18:51 (08)	06:14 19:54	05:34 20:28	05:34 20:28	05:21 20:51
21	07:33 16:59	06:56 17:41	07:08 19:18	18:16 (08) 18:51 (08)	06:13 19:55	05:33 20:29	05:33 20:29	05:21 20:51
22	07:33 17:00	06:55 17:43	07:06 19:19	18:16 (08) 18:51 (08)	06:11 19:57	05:32 20:30	05:32 20:30	05:21 20:52
23	07:32 17:02	06:53 17:44	07:04 19:20	18:16 (08) 18:51 (08)	06:09 19:58	05:31 20:31	05:31 20:31	05:22 20:52
24	07:31 17:03	06:51 17:45	07:02 19:21	18:15 (08) 18:50 (08)	06:08 19:59	05:30 20:32	05:30 20:32	05:22 20:52
25	07:30 17:04	06:50 17:47	07:00 19:22	18:15 (08) 18:49 (08)	06:06 20:00	05:30 20:33	05:30 20:33	05:22 20:52
26	07:29 17:06	06:48 17:48	06:58 19:24	18:15 (08) 18:49 (08)	06:05 20:00	05:29 20:34	05:29 20:34	05:23 20:52
27	07:28 17:07	06:46 17:49	06:57 19:25	18:15 (08) 18:47 (08)	06:03 20:01	05:28 20:35	05:28 20:35	05:23 20:52
28	07:27 17:08	06:45 17:51	06:55 19:26	18:17 (08) 18:47 (08)	06:02 20:03	05:27 20:36	05:27 20:36	05:23 20:52
29	07:26 17:10	06:45 17:51	06:53 19:27	18:17 (08) 18:46 (08)	06:00 20:04	05:27 20:37	05:27 20:37	05:24 20:52
30	07:25 17:11	06:45 17:51	06:51 19:29	18:18 (08) 18:44 (08)	05:59 20:05	05:26 20:38	05:26 20:38	05:24 20:52
31	07:24 17:12	06:45 17:51	06:49 19:30	18:19 (08) 18:42 (08)	05:59 20:05	05:26 20:39	05:26 20:39	05:24 20:52
Potential sun hours	288	293	369	403	457	463		
Total, worst case			586	1039	48			
Sun reduction			0.47	0.49	0.55			
Oper. time red.			1.00	1.00	1.00			
Wind dir. red.			0.60	0.59	0.61			
Total reduction			0.28	0.29	0.34			
Total, real			166	299	16			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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Licensed user:

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-84 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (50)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December				
1	05:25	05:52	06:27	06:53 (25)	07:02	18:07 (08)	06:40	07:19		
	20:52	20:31	19:42	45 19:20 (07)	18:47	15 18:22 (08)	16:56	16:28		
2	05:25	05:53	06:28	06:54 (25)	07:03	18:13 (08)	06:42	07:20		
	20:52	20:30	19:40	40 19:18 (07)	18:45	5 18:18 (08)	16:54	16:27		
3	05:26	05:54	06:29	06:56 (25)	07:04		06:43	07:21		
	20:52	20:29	19:39	32 19:16 (07)	18:43		16:53	16:27		
4	05:26	05:55	06:30	07:00 (25)	07:05		06:44	07:22		
	20:52	20:27	19:37	22 19:14 (07)	18:41		16:52	16:27		
5	05:27	05:56	06:31	19:01 (07)	07:06		06:46	07:23		
	20:51	20:26	19:35	11 19:12 (07)	18:40		16:50	16:27		
6	05:28	05:57	06:33	19:03 (07)	07:07		06:47	07:24		
	20:51	20:25	19:33	7 19:10 (07)	18:38		16:49	16:26		
7	05:28	05:58	06:34		07:09		06:48	07:25		
	20:51	20:23	19:31		18:36		16:48	16:26		
8	05:29	05:59	06:35		07:10		06:50	07:26		
	20:50	20:22	19:29		18:34		16:47	16:26		
9	05:30	06:01	07:07 (25)	06:36		07:11	06:51	07:27		
	20:50	20:21	4 07:11 (25)	19:28		18:33	16:45	16:26		
10	05:31	06:02	07:03 (25)	06:37	18:17 (08)	07:12	06:52	07:28		
	20:49	20:19	14 07:17 (25)	19:26	12 18:29 (08)	18:31	16:44	16:26		
11	05:31	06:03	07:01 (25)	06:38	18:14 (08)	07:14	06:54	07:29		
	20:49	20:18	18 07:19 (25)	19:24	18 18:32 (08)	18:29	16:43	16:26		
12	05:32	06:04	06:59 (25)	06:39	18:12 (08)	07:15	06:55	07:30		
	20:48	20:16	21 07:20 (25)	19:22	22 18:34 (08)	18:27	16:42	16:26		
13	05:33	06:05	06:57 (25)	06:41	18:10 (08)	07:16	06:56	07:31		
	20:48	20:15	25 07:22 (25)	19:20	25 18:35 (08)	18:26	16:41	16:26		
14	05:34	06:06	06:56 (25)	06:42	18:08 (08)	07:17	06:58	07:32		
	20:47	20:13	27 07:23 (25)	19:18	28 18:36 (08)	18:24	16:40	16:26		
15	05:35	06:07	06:54 (25)	06:43	18:06 (08)	07:19	06:59	07:32		
	20:47	20:12	29 07:23 (25)	19:17	30 18:36 (08)	18:22	16:39	16:27		
16	05:36	06:09	06:53 (25)	06:44	18:05 (08)	07:20	07:00	07:33		
	20:46	20:10	31 07:24 (25)	19:15	32 18:37 (08)	18:20	16:38	16:27		
17	05:36	06:10	06:52 (25)	06:45	18:04 (08)	07:21	07:02	07:34		
	20:45	20:09	32 07:24 (25)	19:13	33 18:37 (08)	18:19	16:37	16:27		
18	05:37	06:11	06:51 (25)	06:46	18:03 (08)	07:22	07:03	07:35		
	20:45	20:07	34 07:25 (25)	19:11	34 18:37 (08)	18:17	16:36	16:28		
19	05:38	06:12	06:51 (25)	06:48	18:03 (08)	07:24	07:04	07:35		
	20:44	20:06	34 07:25 (25)	19:09	35 18:38 (08)	18:15	16:35	16:28		
20	05:39	06:13	06:50 (25)	06:49	18:02 (08)	07:25	07:06	07:36		
	20:43	20:04	40 19:17 (07)	19:07	35 18:37 (08)	18:14	16:34	16:28		
21	05:40	06:14	06:50 (25)	06:50	18:02 (08)	07:26	07:07	07:36		
	20:42	20:03	48 19:21 (07)	19:05	35 18:37 (08)	18:12	16:34	16:29		
22	05:41	06:15	06:50 (25)	06:51	18:01 (08)	07:27	07:08	07:37		
	20:41	20:01	53 19:23 (07)	19:04	35 18:36 (08)	18:11	16:33	16:29		
23	05:42	06:17	06:50 (25)	06:52	18:01 (08)	07:29	07:09	07:37		
	20:40	19:58	56 19:24 (07)	19:02	34 18:35 (08)	18:09	16:32	16:30		
24	05:43	06:18	06:49 (25)	06:53	18:01 (08)	07:30	07:11	07:38		
	20:40	19:56	57 19:24 (07)	19:00	33 18:34 (08)	18:07	16:31	16:30		
25	05:44	06:19	06:49 (25)	06:54	18:01 (08)	07:31	07:12	07:38		
	20:39	19:54	59 19:25 (07)	18:58	32 18:33 (08)	18:06	16:31	16:31		
26	05:45	06:20	06:49 (25)	06:56	18:02 (08)	07:33	07:13	07:39		
	20:38	19:53	59 19:25 (07)	18:56	31 18:33 (08)	18:04	16:30	16:32		
27	05:46	06:21	06:49 (25)	06:57	18:02 (08)	07:34	07:14	07:39		
	20:37	19:51	59 19:25 (07)	18:54	29 18:31 (08)	18:03	16:30	16:32		
28	05:47	06:22	06:49 (25)	06:58	18:03 (08)	07:35	07:16	07:39		
	20:36	19:49	59 19:25 (07)	18:52	26 18:29 (08)	18:01	16:29	16:33		
29	05:48	06:23	06:50 (25)	06:59	18:04 (08)	07:37	07:17	07:39		
	20:34	19:47	56 19:24 (07)	18:51	23 18:27 (08)	18:00	16:29	16:34		
30	05:49	06:25	06:50 (25)	07:00	18:05 (08)	07:38	07:18	07:40		
	20:33	19:46	54 19:22 (07)	18:49	20 18:25 (08)	17:58	16:28	16:34		
31	05:51	06:26	06:52 (25)			07:39		07:40		
	20:32	19:44	49 19:21 (07)			17:57		16:35		
Potential sun hours	469	434		376		342		290		277
Total, worst case			918		759				20	
Sun reduction			0.59		0.54				0.44	
Oper. time red.			1.00		1.00				1.00	
Wind dir. red.			0.59		0.60				0.60	
Total reduction			0.35		0.32				0.27	
Total, real			320		244				5	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)



Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 133

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-85 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (51)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June			
1	07:40 16:36	07:23 17:14	06:43 17:52	06:47 19:31	18:40 (08) 19:08 (08)	05:57 20:06	06:23 (25) 19:33 (07)	05:25 20:40	06:24 (25) 23 06:47 (25)
2	07:40 16:37	07:22 17:15	06:41 17:53	06:46 19:32	18:38 (08) 19:09 (08)	05:56 20:07	06:22 (25) 19:32 (07)	05:24 20:41	06:25 (25) 21 06:46 (25)
3	07:40 16:38	07:21 17:17	06:40 17:55	06:44 19:33	18:38 (08) 19:10 (08)	05:54 20:09	06:20 (25) 19:29 (07)	05:24 20:41	06:26 (25) 20 06:46 (25)
4	07:40 16:39	07:20 17:18	06:38 17:56	06:42 19:35	18:37 (08) 19:10 (08)	05:53 20:10	06:19 (25) 19:25 (07)	05:23 20:42	06:27 (25) 18 06:45 (25)
5	07:40 16:40	07:19 17:19	06:36 17:57	06:40 19:36	18:37 (08) 19:10 (08)	05:52 20:11	06:19 (25) 06:17 (25)	05:23 20:43	06:28 (25) 16 06:44 (25)
6	07:40 16:41	07:17 17:21	06:34 17:59	06:38 19:37	18:36 (08) 19:10 (08)	05:50 20:12	06:17 (25) 06:17 (25)	05:23 20:44	06:30 (25) 13 06:43 (25)
7	07:40 16:42	07:16 17:22	06:33 18:00	06:37 19:38	18:36 (08) 19:09 (08)	05:49 20:13	06:17 (25) 06:53 (25)	05:22 20:44	06:31 (25) 12 06:43 (25)
8	07:40 16:43	07:15 17:24	06:31 19:01	06:35 19:40	18:36 (08) 19:09 (08)	05:48 20:15	06:17 (25) 06:53 (25)	05:22 20:45	06:32 (25) 9 06:41 (25)
9	07:39 16:44	07:14 17:25	06:29 19:02	06:33 19:41	18:36 (08) 19:08 (08)	05:46 20:16	06:17 (25) 06:54 (25)	05:22 20:46	06:35 (25) 4 06:39 (25)
10	07:39 16:45	07:12 17:26	06:27 19:04	06:31 19:42	18:36 (08) 19:07 (08)	05:45 20:17	06:15 (25) 06:53 (25)	05:21 20:46	
11	07:39 16:47	07:11 17:28	06:26 19:05	06:30 19:43	18:36 (08) 19:06 (08)	05:44 20:18	06:15 (25) 06:53 (25)	05:21 20:47	
12	07:38 16:48	07:10 17:29	06:24 19:06	06:28 19:44	18:37 (08) 19:06 (08)	05:43 20:19	06:15 (25) 06:54 (25)	05:21 20:48	
13	07:38 16:49	07:08 17:31	06:22 19:08	06:26 19:46	18:38 (08) 19:04 (08)	05:41 20:20	06:15 (25) 06:54 (25)	05:21 20:48	
14	07:38 16:50	07:07 17:32	06:20 19:09	06:24 19:47	18:39 (08) 19:03 (08)	05:40 20:21	06:15 (25) 06:54 (25)	05:21 20:49	
15	07:37 16:51	07:05 17:33	06:18 19:10	06:23 19:48	18:41 (08) 19:01 (08)	05:39 20:23	06:16 (25) 06:54 (25)	05:21 20:49	
16	07:37 16:53	07:04 17:35	06:17 19:11	06:21 19:49	18:42 (08) 19:26 (07)	05:38 20:24	06:16 (25) 06:54 (25)	05:21 20:50	
17	07:36 16:54	07:02 17:36	06:15 19:13	06:19 19:50	18:45 (08) 19:27 (07)	05:37 20:25	06:16 (25) 06:53 (25)	05:21 20:50	
18	07:35 16:55	07:01 17:37	06:13 19:14	06:18 19:52	19:18 (07) 19:29 (07)	05:36 20:26	06:16 (25) 06:53 (25)	05:21 20:50	
19	07:35 16:56	06:59 17:39	07:11 19:15	06:16 19:53	19:16 (07) 19:29 (07)	05:35 20:27	06:16 (25) 06:53 (25)	05:21 20:51	
20	07:34 16:58	06:58 17:40	07:09 19:16	06:14 19:54	19:15 (07) 19:30 (07)	05:34 20:28	06:16 (25) 06:52 (25)	05:21 20:51	
21	07:33 16:59	06:56 17:41	07:08 19:18	06:13 19:55	19:14 (07) 19:32 (07)	05:33 20:29	06:17 (25) 06:52 (25)	05:21 20:51	
22	07:33 17:00	06:55 17:43	07:06 19:19	06:11 19:57	19:13 (07) 19:33 (07)	05:32 20:30	06:17 (25) 06:51 (25)	05:21 20:52	
23	07:32 17:02	06:53 17:44	07:04 19:20	06:09 19:58	19:13 (07) 19:34 (07)	05:31 20:31	06:18 (25) 06:52 (25)	05:22 20:52	
24	07:31 17:03	06:51 17:45	07:02 19:21	06:08 19:59	19:12 (07) 19:35 (07)	05:30 20:32	06:19 (25) 06:51 (25)	05:22 20:52	
25	07:30 17:04	06:50 17:47	07:00 19:22	06:06 20:00	19:13 (07) 19:37 (07)	05:30 20:33	06:19 (25) 06:51 (25)	05:22 20:52	
26	07:29 17:06	06:48 17:48	06:58 19:24	06:05 20:00	19:12 (07) 19:37 (07)	05:29 20:34	06:19 (25) 06:50 (25)	05:23 20:52	
27	07:28 17:07	06:46 17:49	06:57 19:25	06:03 20:01	18:51 (08) 19:01 (08)	06:03 20:01	06:20 (25) 06:50 (25)	05:23 20:52	
28	07:27 17:08	06:45 17:51	06:55 19:26	06:02 20:03	18:48 (08) 19:04 (08)	06:02 20:03	06:21 (25) 06:49 (25)	05:23 20:52	
29	07:26 17:10		06:53 19:27	06:00 20:04	18:45 (08) 19:05 (08)	06:00 20:04	06:21 (25) 06:48 (25)	05:24 20:52	
30	07:25 17:11		06:51 19:29	05:59 20:05	18:43 (08) 19:06 (08)	05:59 20:05	06:23 (25) 06:48 (25)	05:24 20:52	
31	07:24 17:12		06:49 19:30	05:58 20:06	18:41 (08) 19:07 (08)	05:58 20:06	06:23 (25) 06:47 (25)	05:24 20:52	
Potential sun hours	288	293	369	403	457	463			
Total, worst case			95	799	1087	136			
Sun reduction			0.47	0.49	0.55	0.59			
Oper. time red.			1.00	1.00	1.00	1.00			
Wind dir. red.			0.57	0.56	0.65	0.66			
Total reduction			0.26	0.27	0.36	0.39			
Total, real			25	217	388	53			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 134

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation:** 05030 SFA Gamesa G97\_R2Shadow receptor: R-85 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (51)

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25	05:52	06:26 (25) 06:27	18:36 (08) 07:02	06:40	07:19
	20:52	20:31	38 07:04 (25) 19:42	30 19:06 (08) 18:47	16:56	16:28
2	05:25	05:53	06:26 (25) 06:28	18:35 (08) 07:03	06:42	07:20
	20:52	20:30	38 07:04 (25) 19:40	31 19:06 (08) 18:45	16:54	16:27
3	05:26	05:54	06:26 (25) 06:29	18:34 (08) 07:04	06:43	07:21
	20:52	20:29	38 07:04 (25) 19:39	32 19:06 (08) 18:43	16:53	16:27
4	05:26	06:39 (25) 05:55	06:26 (25) 06:30	18:33 (08) 07:05	06:44	07:22
	20:52	7 06:46 (25) 20:27	37 07:03 (25) 19:37	33 19:06 (08) 18:41	16:52	16:27
5	05:27	06:37 (25) 05:56	06:26 (25) 06:31	18:33 (08) 07:06	06:46	07:23
	20:51	10 06:47 (25) 20:26	37 07:03 (25) 19:35	33 19:06 (08) 18:40	16:50	16:27
6	05:28	06:36 (25) 05:57	06:27 (25) 06:33	18:32 (08) 07:07	06:47	07:24
	20:51	13 06:49 (25) 20:25	35 07:02 (25) 19:33	34 19:06 (08) 18:38	16:49	16:26
7	05:28	06:36 (25) 05:58	06:27 (25) 06:34	18:32 (08) 07:09	06:48	07:25
	20:51	15 06:51 (25) 20:23	35 07:02 (25) 19:31	33 19:05 (08) 18:36	16:48	16:26
8	05:29	06:34 (25) 05:59	06:28 (25) 06:35	18:32 (08) 07:10	06:50	07:26
	20:50	17 06:51 (25) 20:22	33 07:01 (25) 19:29	32 19:04 (08) 18:34	16:47	16:26
9	05:30	06:34 (25) 06:01	06:28 (25) 06:36	18:31 (08) 07:11	06:51	07:27
	20:50	19 06:53 (25) 20:21	39 19:36 (07) 19:28	32 19:03 (08) 18:33	16:45	16:26
10	05:31	06:33 (25) 06:02	06:30 (25) 06:37	18:32 (08) 07:12	06:52	07:28
	20:49	21 06:54 (25) 20:19	42 19:39 (07) 19:26	30 19:02 (08) 18:31	16:44	16:26
11	05:31	06:32 (25) 06:03	06:31 (25) 06:38	18:33 (08) 07:14	06:54	07:29
	20:49	22 06:54 (25) 20:18	43 19:41 (07) 19:24	29 19:02 (08) 18:29	16:43	16:26
12	05:32	06:32 (25) 06:04	06:32 (25) 06:39	18:33 (08) 07:15	06:55	07:30
	20:48	23 06:55 (25) 20:16	44 19:42 (07) 19:22	27 19:00 (08) 18:27	16:42	16:26
13	05:33	06:31 (25) 06:05	06:33 (25) 06:41	18:34 (08) 07:16	06:56	07:31
	20:48	25 06:56 (25) 20:15	43 19:43 (07) 19:20	24 18:58 (08) 18:26	16:41	16:26
14	05:34	06:31 (25) 06:06	06:35 (25) 06:42	18:35 (08) 07:17	06:58	07:32
	20:47	26 06:57 (25) 20:13	40 19:43 (07) 19:18	21 18:56 (08) 18:24	16:40	16:26
15	05:35	06:30 (25) 06:07	06:38 (25) 06:43	18:37 (08) 07:19	06:59	07:32
	20:47	28 06:58 (25) 20:12	34 19:43 (07) 19:17	17 18:54 (08) 18:22	16:39	16:27
16	05:36	06:29 (25) 06:09	19:20 (07) 06:44	18:39 (08) 07:20	07:00	07:33
	20:46	29 06:58 (25) 20:10	23 19:43 (07) 19:15	12 18:51 (08) 18:20	16:38	16:27
17	05:36	06:29 (25) 06:10	19:19 (07) 06:45	07:21	07:02	07:34
	20:45	30 06:59 (25) 20:09	24 19:43 (07) 19:13	18:19	16:37	16:27
18	05:37	06:28 (25) 06:11	19:19 (07) 06:46	07:22	07:03	07:35
	20:45	32 07:00 (25) 20:07	23 19:42 (07) 19:11	18:17	16:36	16:28
19	05:38	06:28 (25) 06:12	19:18 (07) 06:48	07:24	07:04	07:35
	20:44	32 07:00 (25) 20:06	22 19:40 (07) 19:09	18:15	16:35	16:28
20	05:39	06:28 (25) 06:13	19:18 (07) 06:49	07:25	07:06	07:36
	20:43	33 07:01 (25) 20:04	21 19:39 (07) 19:07	18:14	16:34	16:28
21	05:40	06:28 (25) 06:14	19:19 (07) 06:50	07:26	07:07	07:36
	20:42	34 07:02 (25) 20:03	19 19:38 (07) 19:05	18:12	16:34	16:29
22	05:41	06:27 (25) 06:15	19:19 (07) 06:51	07:27	07:08	07:37
	20:41	35 07:02 (25) 20:01	17 19:36 (07) 19:04	18:11	16:33	16:29
23	05:42	06:27 (25) 06:17	19:20 (07) 06:52	07:29	07:09	07:37
	20:40	36 07:03 (25) 19:58	15 19:35 (07) 19:02	18:09	16:32	16:30
24	05:43	06:27 (25) 06:18	19:20 (07) 06:53	07:30	07:11	07:38
	20:40	36 07:03 (25) 19:56	13 19:33 (07) 19:00	18:07	16:31	16:30
25	05:44	06:27 (25) 06:19	19:21 (07) 06:54	07:31	07:12	07:38
	20:39	37 07:04 (25) 19:54	10 19:31 (07) 18:58	18:06	16:31	16:31
26	05:45	06:26 (25) 06:20	18:47 (08) 06:56	07:33	07:13	07:39
	20:38	38 07:04 (25) 19:53	18 19:29 (07) 18:56	18:04	16:30	16:32
27	05:46	06:26 (25) 06:21	18:44 (08) 06:57	07:34	07:14	07:39
	20:37	38 07:04 (25) 19:51	20 19:28 (07) 18:54	18:03	16:30	16:32
28	05:47	06:26 (25) 06:22	18:41 (08) 06:58	07:35	07:16	07:39
	20:36	38 07:04 (25) 19:49	21 19:02 (08) 18:52	18:01	16:29	16:33
29	05:48	06:26 (25) 06:23	18:39 (08) 06:59	07:37	07:17	07:39
	20:34	38 07:04 (25) 19:47	25 19:04 (08) 18:51	18:00	16:29	16:34
30	05:49	06:26 (25) 06:25	18:38 (08) 07:00	07:38	07:18	07:40
	20:33	38 07:04 (25) 19:46	26 19:04 (08) 18:49	17:58	16:28	16:34
31	05:51	06:26 (25) 06:26	18:37 (08)	07:39		07:40
	20:32	38 07:04 (25) 19:44	29 19:06 (08)	17:57		16:35
Potential sun hours	469	434	376	342	290	277
Total, worst case	788	902	450			
Sun reduction	0.63	0.59	0.54			
Oper. time red.	1.00	1.00	1.00			
Wind dir. red.	0.66	0.60	0.57			
Total reduction	0.41	0.35	0.30			
Total, real	325	316	137			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 135

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

### SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2 Shadow receptor: R-87 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (313)

#### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 16:36 41	15:06 (08) 07:23 15:47 (08) 17:14	06:43 17:52 57	07:08 (25) 06:47 17:18 (07) 19:31	05:57 20:06	05:25 20:40
2	07:40 16:37 41	15:07 (08) 07:22 15:48 (08) 17:15	06:41 17:53 55	07:09 (25) 06:46 17:18 (07) 19:32	05:56 20:07	05:24 20:41
3	07:40 16:38 41	15:07 (08) 07:21 15:48 (08) 17:17	06:40 17:55 54	07:09 (25) 06:44 17:17 (07) 19:33	05:54 20:09	05:24 20:41
4	07:40 16:39 41	15:08 (08) 07:20 15:49 (08) 17:18	06:38 17:56 51	07:09 (25) 06:42 17:16 (07) 19:35	05:53 20:10	05:23 20:42
5	07:40 16:40 41	15:08 (08) 07:19 15:49 (08) 17:19	06:36 17:57 48	07:10 (25) 06:40 17:16 (07) 19:36	05:52 20:11	05:23 20:43
6	07:40 16:41 41	15:09 (08) 07:17 15:50 (08) 17:21	06:34 17:59 43	07:11 (25) 06:38 17:14 (07) 19:37	05:50 20:12	05:23 20:44
7	07:40 16:42 40	15:10 (08) 07:16 15:50 (08) 17:22	06:33 18:00 37	07:12 (25) 06:37 17:12 (07) 19:38	05:49 20:13	05:22 20:44
8	07:40 16:43 40	15:10 (08) 07:15 15:50 (08) 17:24	07:31 19:01 27	08:13 (25) 06:35 18:09 (07) 19:40	05:48 20:15	05:22 20:45
9	07:39 16:44 39	15:11 (08) 07:14 15:50 (08) 17:25	07:29 19:02 6	08:17 (25) 06:33 18:02 (07) 19:41	05:46 20:16	05:22 20:46
10	07:39 16:45 39	15:12 (08) 07:12 15:51 (08) 17:26	07:27 19:04	06:31 19:42	05:45 20:17	05:21 20:46
11	07:39 16:47 38	15:12 (08) 07:11 15:50 (08) 17:28	07:26 19:05	06:30 19:43	05:44 20:18	05:21 20:47
12	07:38 16:48 38	15:13 (08) 07:10 15:51 (08) 17:29	07:24 19:06	06:28 19:44	05:43 20:19	05:21 20:48
13	07:38 16:49 37	15:13 (08) 07:08 15:50 (08) 17:31	07:22 19:08	06:26 19:46	05:41 20:20	05:21 20:48
14	07:38 16:50 36	15:15 (08) 07:07 15:51 (08) 17:32	07:20 19:09	06:24 19:47	05:40 20:21	05:21 20:49
15	07:37 16:51 35	15:15 (08) 07:05 15:50 (08) 17:33	07:18 19:10	06:23 19:48	05:39 20:23	05:21 20:49
16	07:37 16:53 35	15:16 (08) 07:04 15:51 (08) 17:35	16:59 (07) 07:17 17:10 (07) 19:11	06:21 19:49	05:38 20:24	05:21 20:50
17	07:36 16:54 33	15:17 (08) 07:02 15:50 (08) 17:36	16:55 (07) 07:15 17:12 (07) 19:13	06:19 19:51	05:37 20:25	05:21 20:50
18	07:35 16:55 32	15:18 (08) 07:01 15:50 (08) 17:37	16:54 (07) 07:13 17:14 (07) 19:14	06:18 19:52	05:36 20:26	05:21 20:50
19	07:35 16:56 30	15:19 (08) 06:59 15:49 (08) 17:39	16:52 (07) 07:11 17:15 (07) 19:15	06:16 19:53	05:35 20:27	05:21 20:51
20	07:34 16:58 28	15:21 (08) 06:58 15:49 (08) 17:40	16:50 (07) 07:09 17:16 (07) 19:16	06:14 19:54	05:34 20:28	05:21 20:51
21	07:33 16:59 26	15:22 (08) 06:56 15:48 (08) 17:41	07:17 (25) 07:08 17:18 (07) 19:18	06:13 19:55	05:33 20:29	05:21 20:51
22	07:33 17:00 24	15:23 (08) 06:55 15:47 (08) 17:43	07:15 (25) 07:06 17:19 (07) 19:19	06:11 19:57	05:32 20:30	05:21 20:52
23	07:32 17:02 21	15:25 (08) 06:53 15:46 (08) 17:44	07:14 (25) 07:04 17:20 (07) 19:20	06:09 19:58	05:31 20:31	05:22 20:52
24	07:31 17:03 17	15:27 (08) 06:51 15:44 (08) 17:45	07:12 (25) 07:02 17:20 (07) 19:21	06:08 19:59	05:30 20:32	05:22 20:52
25	07:30 17:04 12	15:30 (08) 06:50 15:42 (08) 17:47	07:10 (25) 07:00 17:20 (07) 19:22	06:06 20:00	05:30 20:33	05:22 20:52
26	07:29 17:06	06:48 17:48 58	07:10 (25) 06:58 17:20 (07) 19:24	06:05 20:00	05:29 20:34	05:23 20:52
27	07:28 17:07	06:46 17:49 59	07:09 (25) 06:57 17:20 (07) 19:25	06:03 20:01	05:28 20:35	05:23 20:52
28	07:27 17:08	06:45 17:51 57	07:09 (25) 06:55 17:19 (07) 19:26	06:02 20:03	05:27 20:36	05:23 20:52
29	07:26 17:10		06:53 19:27	06:00 20:04	05:27 20:37	05:24 20:52
30	07:25 17:11		06:51 19:29	05:59 20:05	05:26 20:38	05:24 20:52
31	07:24 17:12		06:49 19:30		05:25 20:39	
Potential sun hours	288	293	369	403	457	463
Total, worst case	846	513	378			
Sun reduction	0.33	0.39	0.47			
Oper. time red.	1.00	1.00	1.00			
Wind dir. red.	0.76	0.62	0.60			
Total reduction	0.26	0.25	0.29			
Total, real	217	127	109			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 136

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-87 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (313)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25	05:52	06:27	07:02	06:41	07:19
	20:52	20:31	19:42	18:47	16:56	16:28
2	05:25	05:53	06:28	07:03	06:42	07:20
	20:52	20:30	19:40	18:45	16:54	16:27
3	05:26	05:54	06:29	07:04	06:43	07:21
	20:52	20:29	19:39	18:43	16:53	16:27
4	05:26	05:55	06:30	07:05	06:45	07:22
	20:52	20:27	19:37	18:41	16:52	16:27
5	05:27	05:56	06:31	07:06	07:52 (25)	06:46
	20:51	20:26	19:35	18:40	20 17:44 (07)	16:50
6	05:28	05:57	06:33	07:08	07:49 (25)	06:47
	20:51	20:25	19:33	18:38	33 17:47 (07)	16:49
7	05:28	05:58	06:34	07:09	07:47 (25)	06:49
	20:51	20:23	19:31	18:36	40 17:49 (07)	16:48
8	05:29	05:59	06:35	07:10	07:45 (25)	06:50
	20:50	20:22	19:30	18:34	47 17:50 (07)	16:47
9	05:30	06:01	06:36	07:11	07:44 (25)	06:51
	20:50	20:21	19:28	18:33	49 17:50 (07)	16:45
10	05:31	06:02	06:37	07:12	07:43 (25)	06:53
	20:50	20:19	19:26	18:31	53 17:51 (07)	16:44
11	05:31	06:03	06:38	07:14	07:43 (25)	06:54
	20:49	20:18	19:24	18:29	55 17:52 (07)	16:43
12	05:32	06:04	06:39	07:15	07:42 (25)	06:55
	20:49	20:16	19:22	18:27	57 17:52 (07)	16:42
13	05:33	06:05	06:41	07:16	07:41 (25)	06:57
	20:48	20:15	19:20	18:26	58 17:52 (07)	16:41
14	05:34	06:06	06:42	07:17	07:42 (25)	06:58
	20:47	20:13	19:18	18:24	59 17:53 (07)	16:40
15	05:35	06:07	06:43	07:19	07:42 (25)	06:59
	20:47	20:12	19:17	18:22	58 17:52 (07)	16:39
16	05:36	06:09	06:44	07:20	07:42 (25)	07:00
	20:46	20:10	19:15	18:20	57 17:52 (07)	16:38
17	05:36	06:10	06:45	07:21	07:43 (25)	07:02
	20:45	20:09	19:13	18:19	56 17:52 (07)	16:37
18	05:37	06:11	06:46	07:22	07:44 (25)	07:03
	20:45	20:07	19:11	18:17	52 17:51 (07)	16:36
19	05:38	06:12	06:48	07:24	07:45 (25)	07:04
	20:44	20:06	19:09	18:15	48 17:50 (07)	16:35
20	05:39	06:13	06:49	07:25	07:46 (25)	07:06
	20:43	20:04	19:07	18:14	44 17:49 (07)	16:34
21	05:40	06:14	06:50	07:26	07:49 (25)	07:07
	20:42	20:03	19:05	18:12	36 17:48 (07)	16:34
22	05:41	06:15	06:51	07:27	17:21 (07)	07:08
	20:41	20:01	19:04	18:11	25 17:46 (07)	16:33
23	05:42	06:17	06:52	07:29	17:23 (07)	07:09
	20:41	19:58	19:02	18:09	22 17:45 (07)	16:32
24	05:43	06:18	06:53	07:30	17:24 (07)	07:11
	20:40	19:56	19:00	18:07	19 17:43 (07)	16:31
25	05:44	06:19	06:54	07:31	17:25 (07)	07:12
	20:39	19:54	18:58	18:06	16 17:41 (07)	16:31
26	05:45	06:20	06:56	07:33	17:29 (07)	07:13
	20:38	19:53	18:56	18:04	10 17:39 (07)	16:30
27	05:46	06:21	06:57	07:34	07:14	14:54 (08)
	20:37	19:51	18:54	18:03	16:30	35 15:29 (08)
28	05:47	06:22	06:58	07:35	07:16	14:55 (08)
	20:36	19:49	18:52	18:01	16:29	36 15:31 (08)
29	05:48	06:23	06:59	07:37	07:17	14:54 (08)
	20:34	19:47	18:51	18:00	16:29	37 15:31 (08)
30	05:49	06:25	07:00	07:38	07:18	14:54 (08)
	20:33	19:46	18:49	17:58	16:28	38 15:32 (08)
31	05:51	06:26	07:03	07:39	07:19	14:54 (08)
	20:32	19:44	18:47	17:57	16:27	37 15:31 (08)
Potential sun hours	469	434	376	342	290	277
Total, worst case				914	403	1269
Sun reduction				0.44	0.27	0.25
Oper. time red.				1.00	1.00	1.00
Wind dir. red.				0.61	0.76	0.76
Total reduction				0.27	0.21	0.19
Total, real				251	85	247

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 137

Licensed user:

EDR

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US-SYRACUSE, NY 13202  
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Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

### SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2 Shadow receptor: R-88 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (337)

#### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.33	0.39	0.47	0.49	0.55	0.59	0.63	0.59	0.54	0.44	0.27	0.25

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
438	648	710	456	298	237	193	272	631	1,051	1,182	1,006	675	429	245	289	8,760

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

	January		February		March		April		May		June			
1	07:40	15:05 (25)	07:23	15:32 (25)	06:43	07:22 (36)	06:47	05:57	19:23 (24)	05:25				
	16:36	45	15:50 (25)	17:14	14	15:46 (25)	17:52	31	07:53 (36)	19:31	20:06	20	19:43 (24)	20:40
2	07:40	15:05 (25)	07:22	15:32 (25)	06:41	07:24 (36)	06:46	05:56	19:21 (24)	05:24				
	16:37	46	15:51 (25)	17:15	17:53	29	07:53 (36)	19:32	20:07	23	19:44 (24)	20:41		
3	07:40	15:06 (25)	07:21	15:33 (25)	06:40	07:24 (36)	06:44	05:54	19:21 (24)	05:24				
	16:38	45	15:51 (25)	17:17	17:55	27	07:51 (36)	19:33	20:09	24	19:45 (24)	20:41		
4	07:40	15:06 (25)	07:20	15:33 (25)	06:38	07:25 (36)	06:42	05:53	19:20 (24)	05:23				
	16:39	46	15:52 (25)	17:18	17:56	24	07:49 (36)	19:35	20:10	27	19:47 (24)	20:42		
5	07:40	15:07 (25)	07:19	15:34 (25)	06:36	07:26 (36)	06:40	05:51	19:19 (24)	05:23				
	16:40	45	15:52 (25)	17:19	17:57	21	07:47 (36)	19:36	20:11	28	19:47 (24)	20:43		
6	07:40	15:07 (25)	07:17	15:35 (25)	06:34	07:29 (36)	06:38	05:50	19:19 (24)	05:22				
	16:41	46	15:53 (25)	17:21	17:59	16	07:45 (36)	19:37	20:12	28	19:47 (24)	20:44		
7	07:40	15:07 (25)	07:16	15:36 (25)	06:33	07:33 (36)	06:37	05:49	19:19 (24)	05:22				
	16:42	46	15:53 (25)	17:22	18:00	7	07:40 (36)	19:38	20:13	29	19:48 (24)	20:44		
8	07:40	15:08 (25)	07:15	15:37 (25)	06:31	07:34 (36)	06:35	05:47	19:20 (24)	05:22				
	16:43	46	15:54 (25)	17:24	19:01		19:39	20:15	28	19:48 (24)	20:45			
9	07:39	15:09 (25)	07:14	15:38 (25)	06:29	07:35 (36)	06:33	05:46	19:19 (24)	05:22				
	16:44	45	15:54 (25)	17:25	19:02		19:41	20:16	28	19:47 (24)	20:46			
10	07:39	15:08 (25)	07:12	15:39 (25)	06:27	07:36 (36)	06:31	05:45	19:19 (24)	05:21				
	16:45	46	15:54 (25)	17:26	19:04		19:42	20:17	28	19:47 (24)	20:46			
11	07:39	15:09 (25)	07:11	15:40 (25)	06:26	07:37 (36)	06:30	05:44	19:19 (24)	05:21				
	16:47	46	15:55 (25)	17:28	19:05		19:43	20:18	28	19:47 (24)	20:47			
12	07:38	15:10 (25)	07:09	15:41 (25)	06:24	07:38 (36)	06:28	05:43	19:20 (24)	05:21				
	16:48	46	15:56 (25)	17:29	19:06		19:44	20:19	26	19:46 (24)	20:48			
13	07:38	15:10 (25)	07:08	15:42 (25)	06:22	07:39 (36)	06:26	05:41	19:20 (24)	05:21				
	16:49	45	15:55 (25)	17:30	9	07:44 (36)	19:08	19:46	20:20	26	19:46 (24)	20:48		
14	07:38	15:11 (25)	07:07	15:43 (25)	06:20	07:40 (36)	06:24	05:40	19:21 (24)	05:21				
	16:50	45	15:56 (25)	17:32	16	07:48 (36)	19:09	19:47	20:21	25	19:46 (24)	20:49		
15	07:37	15:11 (25)	07:05	15:44 (25)	06:18	07:41 (36)	06:23	05:39	19:22 (24)	05:21				
	16:51	45	15:56 (25)	17:33	21	07:50 (36)	19:10	19:48	20:23	23	19:45 (24)	20:49		
16	07:37	15:11 (25)	07:04	15:45 (25)	06:17	07:42 (36)	06:21	05:38	19:22 (24)	05:21				
	16:53	45	15:56 (25)	17:35	24	07:52 (36)	19:11	19:49	20:24	22	19:44 (24)	20:50		
17	07:36	15:13 (25)	07:02	15:46 (25)	06:15	07:43 (36)	06:19	05:37	19:23 (24)	05:21				
	16:54	43	15:56 (25)	17:36	27	07:53 (36)	19:13	19:50	20:25	20	19:43 (24)	20:50		
18	07:35	15:13 (25)	07:01	15:47 (25)	06:13	07:44 (36)	06:18	05:36	19:24 (24)	05:21				
	16:55	43	15:56 (25)	17:37	28	07:54 (36)	19:14	19:52	20:26	18	19:42 (24)	20:50		
19	07:35	15:13 (25)	06:59	15:48 (25)	06:11	07:45 (36)	06:16	05:35	19:26 (24)	05:21				
	16:56	43	15:56 (25)	17:39	30	07:54 (36)	19:15	19:53	20:27	15	19:41 (24)	20:51		
20	07:34	15:15 (25)	06:58	15:49 (25)	06:09	07:46 (36)	06:14	05:34	19:27 (24)	05:21				
	16:58	42	15:57 (25)	17:40	32	07:55 (36)	19:16	19:54	20:28	13	19:40 (24)	20:51		
21	07:33	15:15 (25)	06:56	15:50 (25)	06:07	07:47 (36)	06:13	05:33	19:29 (24)	05:21				
	16:59	41	15:56 (25)	17:41	33	07:56 (36)	19:17	19:55	20:29	9	19:38 (24)	20:51		
22	07:33	15:16 (25)	06:55	15:51 (25)	06:06	07:48 (36)	06:11	05:32	19:30 (24)	05:21				
	17:00	40	15:56 (25)	17:43	34	07:56 (36)	19:19	19:57	20:30		20:51			
23	07:32	15:17 (25)	06:53	15:52 (25)	06:04	07:49 (36)	06:09	05:31	19:31 (24)	05:22				
	17:02	39	15:56 (25)	17:44	33	07:56 (36)	19:20	19:58	20:31		20:52			
24	07:31	15:18 (25)	06:51	15:53 (25)	06:02	07:50 (36)	06:08	05:30	19:32 (24)	05:22				
	17:03	37	15:55 (25)	17:45	34	07:56 (36)	19:21	19:59	20:32		20:52			
25	07:30	15:19 (25)	06:50	15:54 (25)	06:00	07:51 (36)	06:06	05:29	19:33 (24)	05:22				
	17:04	36	15:55 (25)	17:47	33	07:55 (36)	19:22	20:00	20:33		20:52			
26	07:29	15:20 (25)	06:48	15:55 (25)	05:58	07:52 (36)	06:05	05:29	19:34 (24)	05:23				
	17:06	34	15:54 (25)	17:48	34	07:56 (36)	19:24	20:00	20:34		20:52			
27	07:28	15:21 (25)	06:46	15:56 (25)	05:56	07:53 (36)	06:03	05:28	19:35 (24)	05:23				
	17:07	32	15:53 (25)	17:49	33	07:55 (36)	19:25	20:01	9	19:39 (24)	20:35	20:52		
28	07:27	15:23 (25)	06:45	15:57 (25)	05:55	07:54 (36)	06:02	05:27	19:40 (24)	05:23				
	17:08	29	15:52 (25)	17:51	32	07:54 (36)	19:26	20:03	12	19:39 (24)	20:36	20:52		
29	07:26	15:24 (25)	06:43	15:58 (25)	05:53	07:55 (36)	06:00	05:26	19:41 (24)	05:24				
	17:10	27	15:51 (25)	17:52	31	07:55 (36)	19:27	20:04	16	19:41 (24)	20:37	20:52		
30	07:25	15:26 (25)	06:41	15:59 (25)	05:51	07:56 (36)	05:59	05:25	19:42 (24)	05:24				
	17:11	24	15:50 (25)	17:53	30	07:56 (36)	19:28	20:05	19	19:42 (24)	20:38	20:52		
31	07:24	15:29 (25)	06:39	16:00 (25)	05:49	07:57 (36)	05:57	05:25						
	17:12	19	15:48 (25)	17:54	29	07:57 (36)	19:29	20:06						
Potential sun hours	288		293		369		403		457		463			
Total, worst case		1257		467		155		56		488				
Sun reduction		0.33		0.39		0.47		0.49		0.55				
Oper. time red.		1.00		1.00		1.00		1.00		1.00				
Wind dir. red.		0.76		0.52		0.51		0.51		0.51				
Total reduction		0.26		0.21		0.25		0.27		0.30				
Total, real		331		99		39		15		146				

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 138

Licensed user:

**EDR**  
 217 Montgomery St.  
 US-SYRACUSE, NY 13202  
 (315) 471 0688  
 Steve Curtis, scurtis@edrpc.com  
 Calculated:  
 3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

Calculation: 05030 SFA Gamesa G97\_R2 Shadow receptor: R-88 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (337)

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
 Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
 Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December				
1	05:25	05:52	19:30 (24)	06:27	07:01	06:40	07:19	14:51 (25)		
	20:52	20:31	27 19:57 (24)	19:42	18:47	16:56	16:28	46 15:37 (25)		
2	05:25	05:53	19:30 (24)	06:28	07:03	06:42	07:20	14:51 (25)		
	20:52	20:30	27 19:57 (24)	19:40	18:45	16:54	16:27	46 15:37 (25)		
3	05:26	05:54	19:30 (24)	06:29	07:04	06:43	07:21	14:52 (25)		
	20:52	20:29	27 19:57 (24)	19:38	18:43	16:53	16:27	45 15:37 (25)		
4	05:26	05:55	19:29 (24)	06:30	07:05	06:44	07:22	14:53 (25)		
	20:51	20:27	28 19:57 (24)	19:37	18:41	16:52	16:27	46 15:39 (25)		
5	05:27	05:56	19:29 (24)	06:31	07:06	06:46	07:23	14:53 (25)		
	20:51	20:26	28 19:57 (24)	19:35	18:40	16:50	16:27	46 15:39 (25)		
6	05:28	05:57	19:29 (24)	06:33	07:07	06:47	07:24	14:53 (25)		
	20:51	20:25	28 19:57 (24)	19:33	18:38	16:49	16:26	46 15:39 (25)		
7	05:28	05:58	19:29 (24)	06:34	07:09	08:07 (36)	06:48	07:25	14:54 (25)	
	20:51	20:23	28 19:57 (24)	19:31	18:36	12 08:19 (36)	16:48	16:26	46 15:40 (25)	
8	05:29	05:59	19:29 (24)	06:35	07:10	08:03 (36)	06:50	07:26	14:54 (25)	
	20:50	20:22	27 19:56 (24)	19:29	18:34	19 08:22 (36)	16:47	16:26	46 15:40 (25)	
9	05:30	06:00	19:29 (24)	06:36	07:11	08:01 (36)	06:51	07:27	14:55 (25)	
	20:50	20:21	26 19:55 (24)	19:28	18:32	22 08:23 (36)	16:45	16:26	45 15:40 (25)	
10	05:31	06:02	19:29 (24)	06:37	07:12	07:59 (36)	06:52	15:03 (25)	07:28	14:55 (25)
	20:49	20:19	24 19:53 (24)	19:26	18:31	25 08:24 (36)	16:44	14 15:17 (25)	16:26	46 15:41 (25)
11	05:31	06:03	19:31 (24)	06:38	07:14	07:58 (36)	06:54	15:00 (25)	07:29	14:55 (25)
	20:49	20:18	22 19:53 (24)	19:24	18:29	28 08:26 (36)	16:43	19 15:19 (25)	16:26	45 15:40 (25)
12	05:32	06:04	19:31 (24)	06:39	07:15	07:57 (36)	06:55	14:58 (25)	07:30	14:56 (25)
	20:48	20:16	20 19:51 (24)	19:22	18:27	29 08:26 (36)	16:42	24 15:22 (25)	16:26	45 15:41 (25)
13	05:33	06:05	19:32 (24)	06:41	07:16	07:55 (36)	06:56	14:56 (25)	07:31	14:56 (25)
	20:48	20:15	18 19:50 (24)	19:20	18:25	31 08:26 (36)	16:41	27 15:23 (25)	16:26	45 15:41 (25)
14	05:34	06:06	19:33 (24)	06:42	07:17	07:55 (36)	06:58	14:55 (25)	07:32	14:57 (25)
	20:47	20:13	15 19:48 (24)	19:18	18:24	33 08:28 (36)	16:40	30 15:25 (25)	16:26	45 15:42 (25)
15	05:35	06:07	19:35 (24)	06:43	07:18	07:54 (36)	06:59	14:54 (25)	07:32	14:58 (25)
	20:47	20:12	12 19:47 (24)	19:17	18:22	33 08:27 (36)	16:39	32 15:26 (25)	16:27	45 15:43 (25)
16	05:35	06:08	19:37 (24)	06:44	07:20	07:54 (36)	07:00	14:53 (25)	07:33	14:57 (25)
	20:46	20:10	8 19:45 (24)	19:15	18:20	33 08:27 (36)	16:38	34 15:27 (25)	16:27	45 15:42 (25)
17	05:36	06:10	06:45	07:21	07:53 (36)	07:02	14:53 (25)	07:34	14:58 (25)	
	20:45	20:09	19:13	18:19	34 08:27 (36)	16:37	36 15:29 (25)	16:27	45 15:43 (25)	
18	05:37	06:11	06:46	07:22	07:54 (36)	07:03	14:52 (25)	07:35	14:59 (25)	
	20:45	20:07	19:11	18:17	33 08:27 (36)	16:36	37 15:29 (25)	16:27	45 15:44 (25)	
19	05:38	06:12	06:47	07:24	07:53 (36)	07:04	14:52 (25)	07:35	14:59 (25)	
	20:44	20:06	19:09	18:15	34 08:27 (36)	16:35	39 15:31 (25)	16:28	45 15:44 (25)	
20	05:39	06:13	06:49	07:25	07:53 (36)	07:06	14:51 (25)	07:36	15:00 (25)	
	20:43	20:04	19:07	18:14	33 08:26 (36)	16:34	40 15:31 (25)	16:28	44 15:44 (25)	
21	05:40	06:14	06:50	07:26	07:54 (36)	07:07	14:50 (25)	07:36	15:00 (25)	
	20:42	20:03	19:05	18:12	32 08:26 (36)	16:34	41 15:31 (25)	16:29	44 15:44 (25)	
22	05:41	19:41 (24)	06:15	06:51	07:27	07:54 (36)	07:08	14:51 (25)	07:37	15:01 (25)
	20:41	5 19:46 (24)	20:01	19:04	18:11	31 08:25 (36)	16:33	42 15:33 (25)	16:29	44 15:45 (25)
23	05:42	19:36 (24)	06:16	06:52	07:29	07:55 (36)	07:09	14:50 (25)	07:37	15:01 (25)
	20:40	11 19:49 (24)	19:58	19:02	18:09	30 08:25 (36)	16:32	43 15:33 (25)	16:30	44 15:45 (25)
24	05:43	19:37 (24)	06:18	06:53	07:30	07:56 (36)	07:11	14:50 (25)	07:38	15:02 (25)
	20:40	14 19:51 (24)	19:56	19:00	18:07	27 08:23 (36)	16:31	43 15:33 (25)	16:30	45 15:47 (25)
25	05:44	19:36 (24)	06:19	06:54	07:31	07:56 (36)	07:12	14:51 (25)	07:38	15:02 (25)
	20:39	16 19:52 (24)	19:54	18:58	18:06	26 08:22 (36)	16:31	43 15:34 (25)	16:31	45 15:47 (25)
26	05:45	19:34 (24)	06:20	06:56	07:33	07:58 (36)	07:13	14:50 (25)	07:39	15:02 (25)
	20:38	20 19:54 (24)	19:53	18:56	18:04	23 08:21 (36)	16:30	45 15:35 (25)	16:31	45 15:47 (25)
27	05:46	19:34 (24)	06:21	06:57	07:34	07:59 (36)	07:14	14:50 (25)	07:39	15:03 (25)
	20:37	20 19:54 (24)	19:51	18:54	18:03	20 08:19 (36)	16:30	45 15:35 (25)	16:32	45 15:48 (25)
28	05:47	19:33 (24)	06:22	06:58	07:35	08:01 (36)	07:16	14:50 (25)	07:39	15:04 (25)
	20:35	22 19:55 (24)	19:49	18:52	18:01	15 08:16 (36)	16:29	45 15:35 (25)	16:33	44 15:48 (25)
29	05:48	19:32 (24)	06:23	06:59	07:36	08:06 (36)	07:17	14:51 (25)	07:39	15:04 (25)
	20:34	24 19:56 (24)	19:47	18:51	18:00	6 08:12 (36)	16:29	45 15:36 (25)	16:34	45 15:49 (25)
30	05:49	19:31 (24)	06:25	07:00	07:38	07:18	14:51 (25)	07:40	15:04 (25)	
	20:33	25 19:56 (24)	19:46	18:49	17:58	16:28	46 15:37 (25)	16:34	45 15:49 (25)	
31	05:50	19:31 (24)	06:26	07:01	07:39	07:40	14:51 (25)	07:40	15:04 (25)	
	20:32	26 19:57 (24)	19:44	17:57	17:57	16:35	46 15:50 (25)	277		
Potential sun hours	469	434	376	342	290	770	1399			
Total, worst case	183	365	609	770						
Sun reduction	0.63	0.59	0.44	0.27			0.25			
Oper. time red.	1.00	1.00	1.00	1.00			1.00			
Wind dir. red.	0.51	0.51	0.51	0.76			0.76			
Total reduction	0.34	0.32	0.24	0.22			0.20			
Total, real	63	117	144	166			279			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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3/21/2011 2:14 PM / 139

Licensed user:

EDR

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-89 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (52)

Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December	
1	07:40	15:12 (36) 07:23	15:14 (36) 06:43	06:47	05:57	05:25	05:25	05:52	06:27	07:01	06:40	14:50 (36) 07:19	14:54 (36)
2	16:36	39 15:51 (36) 17:14	57 16:11 (36) 17:52	19:31	20:06	20:40	20:52	20:31	19:42	18:47	16:56	47 15:37 (36) 16:28	48 15:42 (36)
3	07:40	15:12 (36) 07:21	15:15 (36) 06:40	06:44	05:54	05:24	05:26	05:54	06:29	07:04	06:43	14:48 (36) 07:21	14:56 (36)
4	16:38	41 15:53 (36) 17:17	55 16:10 (36) 17:55	19:33	20:09	20:41	20:52	20:29	19:38	18:43	16:53	51 15:39 (36) 16:27	46 15:42 (36)
5	07:40	15:13 (36) 07:20	15:15 (36) 06:38	06:42	05:53	05:23	05:26	05:55	06:30	07:05	06:44	14:47 (36) 07:22	14:56 (36)
6	16:39	41 15:54 (36) 17:18	55 16:10 (36) 17:56	19:35	20:10	20:42	20:51	20:27	19:37	18:41	16:52	52 15:39 (36) 16:27	45 15:41 (36)
7	07:40	15:13 (36) 07:19	15:16 (36) 06:36	06:40	05:51	05:23	05:27	05:56	06:31	07:06	06:46	14:47 (36) 07:23	14:58 (36)
8	16:40	42 15:55 (36) 17:19	54 16:10 (36) 17:57	19:36	20:11	20:43	20:51	20:26	19:35	18:40	16:50	53 15:40 (36) 16:27	44 15:42 (36)
9	07:40	15:13 (36) 07:17	15:17 (36) 06:34	06:38	05:50	05:22	05:28	05:57	06:33	07:07	06:47	14:46 (36) 07:24	14:59 (36)
10	16:41	43 15:56 (36) 17:21	53 16:10 (36) 17:59	19:37	20:12	20:44	20:51	20:25	19:33	18:38	16:49	54 15:40 (36) 16:26	43 15:42 (36)
11	07:40	15:12 (36) 07:16	15:17 (36) 06:33	06:37	05:49	05:22	05:28	05:58	06:34	07:09	06:48	14:46 (36) 07:25	15:00 (36)
12	16:42	44 15:56 (36) 17:22	52 16:09 (36) 18:00	19:38	20:13	20:44	20:51	20:23	19:31	18:36	16:48	55 15:41 (36) 16:26	42 15:42 (36)
13	07:40	15:12 (36) 07:15	15:18 (36) 07:31	06:35	05:47	05:22	05:29	05:59	06:35	07:10	06:50	14:46 (36) 07:26	15:01 (36)
14	16:43	45 15:57 (36) 17:23	51 16:09 (36) 19:01	19:39	20:14	20:45	20:50	20:22	19:29	18:34	16:46	55 15:41 (36) 16:26	41 15:42 (36)
15	07:39	15:13 (36) 07:14	15:20 (36) 07:29	06:33	05:46	05:21	05:30	06:00	06:36	07:11	06:51	14:45 (36) 07:27	15:01 (36)
16	16:44	46 15:59 (36) 17:25	49 16:09 (36) 19:02	19:41	20:16	20:46	20:50	20:21	19:28	18:32	16:45	56 15:41 (36) 16:26	41 15:42 (36)
17	07:39	15:12 (36) 07:12	15:20 (36) 07:27	06:31	05:45	05:21	05:30	06:02	06:37	07:12	06:52	14:45 (36) 07:28	15:02 (36)
18	16:45	47 15:59 (36) 17:26	47 16:07 (36) 19:04	19:42	20:17	20:46	20:49	20:19	19:26	18:31	16:44	57 15:42 (36) 16:26	40 15:42 (36)
19	07:39	15:12 (36) 07:11	15:22 (36) 07:26	06:29	05:44	05:21	05:31	06:03	06:38	07:13	06:54	14:45 (36) 07:29	15:02 (36)
20	16:47	48 16:00 (36) 17:28	45 16:07 (36) 19:05	19:43	20:18	20:47	20:49	20:18	19:24	18:29	16:43	57 15:42 (36) 16:26	39 15:41 (36)
21	07:38	15:13 (36) 07:09	15:22 (36) 07:24	06:28	05:42	05:21	05:32	06:04	06:39	07:15	06:55	14:45 (36) 07:30	15:03 (36)
22	16:48	48 16:01 (36) 17:29	43 16:05 (36) 19:06	19:44	20:19	20:47	20:48	20:16	19:22	18:27	16:42	57 15:42 (36) 16:26	38 15:41 (36)
23	07:38	15:12 (36) 07:08	15:24 (36) 07:22	06:26	05:41	05:21	05:33	06:05	06:41	07:16	06:56	14:45 (36) 07:31	15:04 (36)
24	16:49	50 16:02 (36) 17:30	40 16:04 (36) 19:07	19:46	20:20	20:48	20:48	20:15	19:20	18:25	16:41	57 15:42 (36) 16:26	38 15:42 (36)
25	07:38	15:13 (36) 07:07	15:26 (36) 07:20	06:24	05:40	05:21	05:34	06:06	06:42	07:17	06:58	14:46 (36) 07:32	15:05 (36)
26	16:50	50 16:03 (36) 17:32	38 16:04 (36) 19:09	19:47	20:21	20:49	20:47	20:13	19:18	18:24	16:40	57 15:43 (36) 16:26	37 15:42 (36)
27	07:37	15:12 (36) 07:05	15:28 (36) 07:18	06:23	05:39	05:21	05:35	06:07	06:43	07:18	06:59	14:45 (36) 07:32	15:06 (36)
28	16:51	51 16:03 (36) 17:33	33 16:01 (36) 19:10	19:48	20:23	20:49	20:47	20:12	19:16	18:22	16:39	58 15:43 (36) 16:27	36 15:42 (36)
29	07:37	15:12 (36) 07:04	15:30 (36) 07:17	06:21	05:38	05:21	05:35	06:08	06:44	07:20	07:00	14:45 (36) 07:33	15:06 (36)
30	16:52	52 16:04 (36) 17:35	30 16:00 (36) 19:11	19:49	20:24	20:49	20:46	20:10	19:15	18:20	16:38	57 15:42 (36) 16:27	36 15:42 (36)
31	07:36	15:12 (36) 07:02	15:32 (36) 07:15	06:19	05:37	05:21	05:36	06:10	06:45	07:21	07:02	14:46 (36) 07:34	15:07 (36)
32	16:54	53 16:05 (36) 17:36	25 15:57 (36) 19:12	19:50	20:25	20:50	20:45	20:09	19:13	18:19	16:37	57 15:43 (36) 16:27	35 15:42 (36)
33	07:35	15:12 (36) 07:01	15:36 (36) 07:13	06:17	05:36	05:21	05:37	06:11	06:46	07:22	07:03	14:46 (36) 07:35	15:08 (36)
34	16:55	53 16:05 (36) 17:37	17 15:53 (36) 19:14	19:52	20:26	20:50	20:45	20:07	19:11	18:17	16:36	57 15:43 (36) 16:27	35 15:43 (36)
35	07:35	15:12 (36) 06:59	07:11	06:16	05:35	05:20	05:38	06:12	06:47	07:23	07:04	14:47 (36) 07:35	15:08 (36)
36	16:56	54 16:06 (36) 17:39	19:15	19:53	20:27	20:51	20:44	20:06	19:09	18:15	16:35	56 15:43 (36) 16:28	35 15:43 (36)
37	07:34	15:12 (36) 06:58	07:09	06:14	05:34	05:21	05:39	06:13	06:49	07:25	07:06	14:47 (36) 07:36	15:09 (36)
38	16:58	55 16:07 (36) 17:40	19:16	19:54	20:28	20:51	20:43	20:04	19:07	18:14	16:34	56 15:43 (36) 16:28	35 15:44 (36)
39	07:33	15:12 (36) 06:56	07:07	06:13	05:33	05:21	05:40	06:14	06:50	07:26	07:07	14:47 (36) 07:36	15:09 (36)
40	16:59	56 16:08 (36) 17:41	19:17	19:55	20:29	20:51	20:42	20:02	19:05	18:12	16:34	56 15:43 (36) 16:29	34 15:43 (36)
41	07:33	15:12 (36) 06:54	07:06	06:11	05:32	05:21	05:41	06:15	06:51	07:27	07:08	14:48 (36) 07:37	15:10 (36)
42	17:00	56 16:08 (36) 17:43	19:19	19:56	20:30	20:51	20:41	20:01	19:03	18:10	16:33	55 15:43 (36) 16:29	34 15:44 (36)
43	07:32	15:12 (36) 06:53	07:04	06:09	05:31	05:22	05:42	06:16	06:52	07:29	07:09	14:49 (36) 07:37	15:10 (36)
44	17:01	56 16:08 (36) 17:44	19:20	19:58	20:31	20:52	20:40	19:58	19:02	18:09	9 16:19 (36) 16:32	54 15:43 (36) 16:30	35 15:45 (36)
45	07:31	15:12 (36) 06:51	07:02	06:08	05:30	05:22	05:43	06:18	06:53	07:30	07:30	16:05 (36) 07:11	15:11 (36)
46	17:03	57 16:09 (36) 17:45	19:21	19:59	20:32	20:52	20:39	19:56	19:00	18:07	20 16:25 (36) 16:31	53 15:42 (36) 16:30	35 15:46 (36)
47	07:30	15:12 (36) 06:50	07:00	06:06	05:29	05:22	05:44	06:19	06:54	07:31	07:12	16:01 (36) 07:12	15:11 (36)
48	17:04	57 16:09 (36) 17:47	19:22	19:59	20:33	20:52	20:39	19:54	18:58	18:06	26 16:27 (36) 16:31	53 15:43 (36) 16:31	35 15:46 (36)
49	07:29	15:12 (36) 06:48	06:58	06:05	05:29	05:22	05:45	06:20	06:56	07:32	07:32	16:59 (36) 07:13	15:11 (36)
50	17:06	57 16:09 (36) 17:48	19:24	20:00	20:34	20:52	20:38	19:52	18:56	18:04	31 16:30 (36) 16:30	52 15:43 (36) 16:31	35 15:46 (36)
51	07:28	15:12 (36) 06:46	06:56	06:03	05:28	05:23	05:46	06:21	06:57	07:34	07:34	16:57 (36) 07:14	15:12 (36)
52	17:07	58 16:10 (36) 17:49	19:25	20:01	20:35	20:52	20:36	19:51	18:54	18:03	34 16:31 (36) 16:30	51 15:42 (36) 16:32	36 15:48 (36)
53	07:27	15:13 (36) 06:45	06:55	06:02	05:27	05:23	05:47	06:22	06:58	07:35	07:35	16:55 (36) 07:15	15:12 (36)
54	17:08	57 16:10 (36) 17:51	19:26	20:03	20:36	20:52	20:35	19:49	18:52	18:01	38 16:33 (36) 16:29	50 15:42 (36) 16:33	36 15:48 (36)
55	07:26	15:13 (36)	06:53	06:00	05:27	05:24	05:48	06:23	06:59	07:36	07:36	16:54 (36) 07:17	15:12 (36)
56	17:10	57 16:10 (36)	19:27	20:04	20:37	20:52	20:34	19:47	18:50	18:00	40 16:34 (36) 16:29	50 15:43 (36) 16:34	37 15:49 (36)
57	07:25	15:13 (36)	06:51	05:59	05:26	05:24	05:49	06:24	07:00	07:38	07:38	16:52 (36) 07:18	15:12 (36)
58	17:11	57 16:10 (36)	19:28	20:05	20:38	20:52	20:33	19:46	18:49	17:58	43 16:35 (36) 16:28	48 15:42 (36) 16:34	37 15:49 (36)
59	07:24	15:14 (36)	06:49	05:55	05:25	05:20	05:50	06:26	07:03	07:39	07:39	16:51 (36)	15:12 (36)
60	17:12	57 16:11 (36)	19:30	20:07	20:39	20:52	20:32	19:44	18:47	17:57	46 16:37 (36)	16:35	38 15:50 (36)
Potential sun hours	288	293	369	403	457	463	469	434	376	342	290	277	1193
Total, worst case	1567	800									287	1620	1193
Sun reduction	0.33	0.39									0.44	0.27	0.25
Oper. time red.	1.00	1.00									1.00	1.00	1.00
Wind dir. red.	0.75	0.75									0.75	0.75	0.75
Total reduction	0.25	0											

Project:

**05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2**

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3/21/2011 2:14 PM / 140

Licensed user:

**EDR**

217 Montgomery St.  
US-SYRACUSE, NY 13202  
(315) 471 0688

Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

**SHADOW - Calendar**

**Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-93 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (55)**

**Assumptions for shadow calculations**

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
438 648 710 456 298 237 193 272 631 1,051 1,182 1,006 675 429 245 289 8,760  
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1   07:40	15:44 (35)	07:23	06:43	06:47	05:57	05:25
16:36	24	16:08 (35)	17:14	17:52	19:31	20:06
2   07:40	15:44 (35)	07:22	06:41	06:45	05:56	05:24
16:37	25	16:09 (35)	17:15	17:53	19:32	20:07
3   07:40	15:45 (35)	07:21	06:40	06:44	05:54	05:24
16:38	25	16:10 (35)	17:16	17:55	19:33	20:08
4   07:40	15:45 (35)	07:20	06:38	06:42	05:53	05:23
16:39	26	16:11 (35)	17:18	17:56	19:35	20:10
5   07:40	15:46 (35)	07:19	06:36	06:40	05:51	06:17 (09)
16:40	25	16:11 (35)	17:19	17:57	19:36	20:11
6   07:40	15:47 (35)	07:17	06:34	06:38	05:50	06:15 (09)
16:41	25	16:12 (35)	17:21	17:58	19:37	20:12
7   07:40	15:46 (35)	07:16	06:33	06:36	05:49	06:13 (09)
16:42	25	16:11 (35)	17:22	18:00	19:38	20:13
8   07:39	15:47 (35)	07:15	07:31	06:35	05:47	06:12 (09)
16:43	25	16:12 (35)	17:23	19:01	19:39	20:14
9   07:39	15:48 (35)	07:13	07:29	06:33	05:46	06:10 (09)
16:44	25	16:13 (35)	17:25	19:02	19:41	20:16
10   07:39	15:48 (35)	07:12	07:27	06:31	05:45	06:09 (09)
16:45	24	16:12 (35)	17:26	19:04	19:42	20:17
11   07:39	15:49 (35)	07:11	07:26	06:29	05:44	06:08 (09)
16:46	24	16:13 (35)	17:28	19:05	19:43	20:18
12   07:38	15:50 (35)	07:09	07:24	06:28	05:42	06:07 (09)
16:48	23	16:13 (35)	17:29	19:06	19:44	20:19
13   07:38	15:50 (35)	07:08	07:22	06:26	05:41	06:07 (09)
16:49	23	16:13 (35)	17:30	19:07	19:45	20:20
14   07:37	15:51 (35)	07:07	07:20	06:24	05:40	06:07 (09)
16:50	22	16:13 (35)	17:32	19:09	19:47	20:21
15   07:37	15:52 (35)	07:05	07:18	06:23	05:39	06:06 (09)
16:51	21	16:13 (35)	17:33	19:10	19:48	20:22
16   07:36	15:52 (35)	07:04	07:17	06:21	05:38	06:06 (09)
16:52	20	16:12 (35)	17:35	19:11	19:49	20:24
17   07:36	15:54 (35)	07:02	07:15	06:19	05:37	06:06 (09)
16:54	19	16:13 (35)	17:36	19:12	19:50	20:25
18   07:35	15:55 (35)	07:01	07:13	06:17	05:36	06:06 (09)
16:55	17	16:12 (35)	17:37	19:14	19:52	20:26
19   07:35	15:56 (35)	06:59	07:11	06:16	05:35	06:05 (09)
16:56	15	16:11 (35)	17:39	19:15	19:53	20:27
20   07:34	15:58 (35)	06:58	07:09	06:14	05:34	06:05 (09)
16:58	13	16:11 (35)	17:40	19:16	19:54	20:28
21   07:33	16:01 (35)	06:56	07:07	06:12	05:33	06:05 (09)
16:59	8	16:09 (35)	17:41	19:17	19:55	20:29
22   07:33	17:00	06:54	07:06	06:11	05:32	06:05 (09)
17:01	23	06:53	07:04	06:09	05:31	06:05 (09)
17:03	17:01	17:44	19:20	19:58	20:31	33
24   07:31	17:03	06:51	07:02	06:08	05:30	06:06 (09)
17:04	25	17:45	19:21	19:59	20:32	33
17:05	17:04	06:50	07:00	06:06	05:29	06:06 (09)
26   07:29	17:05	17:47	19:22	20:00	20:33	33
17:06	26	06:48	06:58	06:05	05:29	06:06 (09)
17:07	27	17:48	19:24	20:00	20:34	32
17:08	27	06:46	06:56	06:03	05:28	06:07 (09)
17:09	28	17:49	19:25	20:01	20:35	32
17:10	28	06:45	06:55	06:01	05:27	06:07 (09)
17:11	29	17:51	19:26	20:02	20:36	31
17:12	29	06:44	06:54	06:00	05:26	06:07 (09)
17:13	30	17:52	19:27	20:04	20:37	31
17:14	30	06:43	06:53	06:00	05:25	06:08 (09)
17:15	31	17:53	19:28	20:05	20:38	30
17:16	31	06:42	06:52	06:00	05:24	06:08 (09)
17:17	17:12	19:30	20:39	30	06:38 (09)	
Potential sun hours	288	293	369	403	457	463
Total, worst case	454				787	622
Sun reduction	0.33				0.55	0.59
Oper. time red.	1.00				1.00	1.00
Wind dir. red.	0.74				0.68	0.68
Total reduction	0.25				0.38	0.40
Total, real	113				297	252

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)



Project:

05030 Horse Creek Wind Shadow Flicker Analysis\_G97\_R2

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Licensed user:

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Steve Curtis, scurtis@edrpc.com

Calculated:

3/21/2011 11:14 AM/2.7.453

## SHADOW - Calendar

Calculation: 05030 SFA Gamesa G97\_R2Shadow receptor: R-93 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 0.0° (55)

### Assumptions for shadow calculations

Maximum distance for influence 1,000 m  
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.33 0.39 0.47 0.49 0.55 0.59 0.63 0.59 0.54 0.44 0.27 0.25

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:25	06:19 (09) 05:51	06:18 (09) 06:27	07:01	06:40	07:19
	20:52	21 06:40 (09) 20:31	29 06:47 (09) 19:42	18:47	18:56	16:28
						24 15:55 (35)
2	05:25	06:18 (09) 05:53	06:19 (09) 06:28	07:03	06:42	07:20
	20:52	22 06:40 (09) 20:30	27 06:46 (09) 19:40	18:45	16:54	16:27
						24 15:55 (35)
3	05:26	06:18 (09) 05:54	06:20 (09) 06:29	07:04	06:43	07:21
	20:52	23 06:41 (09) 20:28	25 06:45 (09) 19:38	18:43	16:53	16:27
						25 15:56 (35)
4	05:26	06:18 (09) 05:55	06:21 (09) 06:30	07:05	06:44	07:22
	20:51	23 06:41 (09) 20:27	23 06:44 (09) 19:37	18:41	16:51	16:27
						25 15:56 (35)
5	05:27	06:18 (09) 05:56	06:22 (09) 06:31	07:06	06:46	07:23
	20:51	24 06:42 (09) 20:26	21 06:43 (09) 19:35	18:40	16:50	16:27
						25 15:57 (35)
6	05:28	06:18 (09) 05:57	06:23 (09) 06:32	07:07	06:47	07:24
	20:51	25 06:43 (09) 20:25	18 06:41 (09) 19:33	18:38	16:49	16:26
						25 15:58 (35)
7	05:28	06:17 (09) 05:58	06:25 (09) 06:34	07:09	06:48	07:25
	20:51	26 06:43 (09) 20:23	14 06:39 (09) 19:31	18:36	16:48	16:26
						25 15:58 (35)
8	05:29	06:17 (09) 05:59	06:29 (09) 06:35	07:10	06:50	07:26
	20:50	26 06:43 (09) 20:22	6 06:35 (09) 19:29	18:34	16:46	16:26
						26 15:59 (35)
9	05:30	06:17 (09) 06:00	06:36	07:11	06:51	07:27
	20:50	27 06:44 (09) 20:21	19:28	18:32	16:45	16:26
						25 15:59 (35)
10	05:30	06:16 (09) 06:02	06:37	07:12	06:52	07:28
	20:49	28 06:44 (09) 20:19	19:26	18:31	16:44	16:26
						25 15:58 (35)
11	05:31	06:16 (09) 06:03	06:38	07:13	06:54	07:29
	20:49	29 06:45 (09) 20:18	19:24	18:29	16:43	16:26
						24 15:58 (35)
12	05:32	06:16 (09) 06:04	06:39	07:15	06:55	07:30
	20:48	30 06:46 (09) 20:16	19:22	18:27	16:42	16:26
						23 15:58 (35)
13	05:33	06:16 (09) 06:05	06:40	07:16	06:56	07:31
	20:48	30 06:46 (09) 20:15	19:20	18:25	16:41	16:26
						24 15:59 (35)
14	05:34	06:16 (09) 06:06	06:42	07:17	06:58	07:32
	20:47	31 06:47 (09) 20:13	19:18	18:24	16:40	16:26
						23 15:59 (35)
15	05:35	06:15 (09) 06:07	06:43	07:18	06:59	07:32
	20:47	32 06:47 (09) 20:12	19:16	18:22	16:39	16:27
						22 15:59 (35)
16	05:35	06:16 (09) 06:08	06:44	07:20	07:00	07:33
	20:46	31 06:47 (09) 20:10	19:15	18:20	16:38	16:27
						23 15:59 (35)
17	05:36	06:16 (09) 06:10	06:45	07:21	07:02	07:34
	20:45	32 06:48 (09) 20:09	19:13	18:19	16:37	16:27
						22 15:59 (35)
18	05:37	06:16 (09) 06:11	06:46	07:22	07:03	07:34
	20:45	32 06:48 (09) 20:07	19:11	18:17	16:36	16:27
						22 16:00 (35)
19	05:38	06:16 (09) 06:12	06:47	07:23	07:04	07:35
	20:44	32 06:48 (09) 20:06	19:09	18:15	16:35	16:28
						22 16:00 (35)
20	05:39	06:16 (09) 06:13	06:49	07:25	07:06	07:36
	20:43	33 06:49 (09) 20:04	19:07	18:14	16:34	16:28
						22 16:01 (35)
21	05:40	06:16 (09) 06:14	06:50	07:26	07:07	07:36
	20:42	33 06:49 (09) 20:02	19:05	18:12	16:33	16:29
						21 15:43 (35)
22	05:41	06:16 (09) 06:15	06:51	07:27	07:08	07:37
	20:41	33 06:49 (09) 20:01	19:03	18:10	16:33	16:29
						21 16:01 (35)
23	05:42	06:16 (09) 06:16	06:52	07:29	07:09	07:37
	20:40	33 06:49 (09) 19:57	19:02	18:09	16:32	16:30
						15 15:48 (35)
24	05:43	06:16 (09) 06:18	06:53	07:30	07:11	07:38
	20:39	33 06:49 (09) 19:56	19:00	18:07	16:31	16:30
						17 15:49 (35)
25	05:44	06:16 (09) 06:19	06:54	07:31	07:12	07:38
	20:38	33 06:49 (09) 19:54	18:58	18:06	16:31	16:31
						19 15:51 (35)
26	05:45	06:16 (09) 06:20	06:55	07:32	07:13	07:38
	20:37	33 06:49 (09) 19:52	18:56	18:04	16:30	16:31
						20 15:51 (35)
27	05:46	06:16 (09) 06:21	06:57	07:34	07:14	07:39
	20:36	33 06:49 (09) 19:51	18:54	18:03	16:30	16:32
						21 15:52 (35)
28	05:47	06:17 (09) 06:22	06:58	07:35	07:15	07:39
	20:35	32 06:49 (09) 19:49	18:52	18:01	16:29	16:33
						23 15:53 (35)
29	05:48	06:17 (09) 06:23	06:59	07:36	07:17	07:39
	20:34	32 06:49 (09) 19:47	18:50	18:00	16:29	16:34
						23 15:54 (35)
30	05:49	06:17 (09) 06:24	07:00	07:38	07:18	07:40
	20:33	31 06:48 (09) 19:46	18:49	17:58	16:28	16:34
						23 15:54 (35)
31	05:50	06:18 (09) 06:26	07:03	07:39	07:40	07:40
	20:32	30 06:48 (09) 19:44	18:47	17:57	16:27	16:35
						24 16:07 (35)
Potential sun hours	469	434	376	342	290	277
Total, worst case					180	720
Sun reduction	0.63	0.59			0.27	0.25
Oper. time red.	1.00	1.00			1.00	1.00
Wind dir. red.	0.68	0.68			0.74	0.74
Total reduction	0.43	0.40			0.20	0.19
Total, real	394	66			37	136

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)