



Summary Report:

Lindahl Wind Farm Sound and Shadow Flicker Analysis Tioga, North Dakota

Submitted To:

Kevin Walter
TradeWind Energy, Inc.
Southlake Tech. Park
16105 W 113th St, Ste 1
Lenexa, KS 66219
Tel: (913) 322-7420
E-mail: kwalter@tradewindenergy.com

Submitted By:

Brandon Storm, PhD
Jay Haley, P.E., Partner
EAPC Wind Energy
3100 DeMers Ave.
Grand Forks, ND, 58201
Tel: 701-775-3000
E-mail: wind@eapc.net

October 5,


2015

Author:



Brandon Storm, PhD

Checked By:



Jay Haley, P.E., Partner

Approved By:



Jay Haley, P.E., Partner

Legal Notice and Disclaimer

This report was prepared by EAPC expressly for the benefit of the client. Neither EAPC nor any person acting on their behalf: (a) makes any warranty, express or implied, with respect to the use of any information or methods disclosed in this report; or (b) assumes any liability with respect to the use of any information or methods disclosed in this report.

Any recipient of this document, by their acceptance or use of this document, releases EAPC, its parent corporations and its affiliates, from any liability for direct, indirect, consequential, or special loss or damage whether arising in contract, warranty, express or implied, tort or otherwise, and irrespective of fault, negligence, and strict liability.

The responsibilities for the applications and use of the material contained in this document remain solely with the client.

The information contained in this report is intended for the exclusive use of the client and may contain confidential or privileged information.

Report Update

EAPC bears no responsibility to update this report for any changes occurring subsequent to the final issuance of this report.

Revision History

Revision No.	Revision Purpose	Date	Revised By
0	Original	02/17/2015	B. Storm
1	Typos / clarification	02/17/2015	B. Storm
2	Layout	06/16/2015	B. Storm
3	Participation designation	06/23/2015	B. Storm
4	Additional text	06/24/2015	B. Storm
5	Clarification	07/02/2015	B. Storm
6	Layout / turbine model	09/24/2015	B. Storm
7	Layout	09/28/2015	B. Storm
8	Minor Edits	10/05/2015	B. Storm

TABLE OF CONTENTS

<i>Executive Summary</i>	1
Appendix A: V117 / V110 No Ground Attenuation Sound Map	6
Appendix B: V117 / V110 General Ground Attenuation Sound Map	8
Appendix C: V110 No Ground Attenuation Sound Map	10
Appendix D: V110 General Ground Attenuation Sound Map.....	12
Appendix E: V117 / V110 Realistic Shadow Flicker Map	14
Appendix F: V110 Realistic Shadow Flicker Map	16
Appendix G: windPRO V117 / V110 Sound Analysis with No Ground Attenuation.....	18
Appendix H: windPRO V117 / V110 Sound Analysis with General Ground Attenuation	26
Appendix I: windPRO V110 Sound Analysis with No Ground Attenuation.....	34
Appendix J: windPRO V110 Sound Analysis with General Ground Attenuation	42
Appendix K: windPRO V117/V110 Shadow Flicker Report, No Obstacles	50
Appendix L: windPRO V110 Shadow Flicker Report, No Obstacles	86
Appendix M: windPRO V117/V110 Shadow Flicker Report, W/ Obstacles for Select Receptors.....	121
Appendix N: windPRO V110 Shadow Flicker Report, W/ Obstacles for Select Receptors	136

LIST OF TABLES

Table 1: Specifications of turbines evaluated within this report for the Lindahl wind farm. Turbines listed are to be considered representative and not inclusive of all turbines that could be installed.	2
Table 2: Noise estimates from windPRO assuming ground attenuation and no ground attenuation for V110 and V117/V110 layouts. Results presented for locations with no ground attenuation results above 35 dB(A) for V117/V110. The sound levels are estimated at the center of the house. The distance required to travel from each receptor to reach the 50 dB(A) limit reported for the V117/V110 no ground attenuation scenario (worst case). P indicates location is a participating landowner, NP denotes the location is a non-participating landowner. Appendices A and B shows which turbines were modeled as V117 and V110 turbines.....	3
Table 3: WindPRO estimated shadow flicker hours for realistic scenarios. Results presented for receptors listed in sound results. All locations with flicker reported are participating residences except for one. Appendix E shows which turbine locations were modeled as V117 and V110 turbines. Results with obstacles modeled are presented for four select locations....	5

Executive Summary

EAPC was hired by TradeWind Energy, Inc. to provide a shadow flicker and sound analysis on residences within one mile of proposed turbines of the 150.0 MW wind farm near Tioga, ND. Coordinates of the proposed turbines were supplied to EAPC via TradeWind (A059 layout). Occupied residence locations were determined by TradeWind and EAPC through aerial images and site-visits. A map of the turbine locations and assumed occupied residences are shown in the Appendices.

At the time this report was issued, a specific turbine model had not been selected. This report outlines the impacts using a variety of machines that are representative of likely turbine candidates. In particular, Vestas machines for the wind regime as dictated by TradeWind were evaluated (Table 1). The layout provided had 78 turbine locations. All 78 of the locations were included in each of the analyses, even though not all locations would ultimately be installed. For example, if all turbines installed were to be V100-2.2 turbines, only 68 turbines would be needed to achieve the 150 MW name plate capacity. In addition, it is also possible that a combination of turbine models would be utilized. Through an iterative process, it was determined what locations could be installed up to a V117-3.3 turbine, and the rest were evaluated up to a V110-2.0 turbine to limit the impact. This combination is referred to as the V117/V110 layout from hereon. The turbines that could be installed up to a V117-3.3 and up to a V110-2.0 are denoted in the included maps.

The sound produced from potential turbines modeled varies from 105.0 to 108.5 dB(A). Any turbine model with sound levels at or below those evaluated would be representative for the results presented. In particular, all considered turbine locations were modeled at an 107.5 dB(A) emission level (V110-2.0 80 m hub height (HH)), along with a combination of some turbines modeled with an emission level of 108.5 dB(A) (V117-3.3 84 m HH) and the remaining locations at 107.5 dB(A) (V117/V110 layout). The later V117/V110 case is considered the highest sound level evaluated. The higher case flicker resulted from the V117-3.3 on a 91.5 m hub height (HH) and V110-2.0 on an 80 m HH combination layout. Turbines with lower hub heights or shorter blades (e.g., V100-2.0 or V100-2.2) would result in a reduction of the size of the shadow flicker footprint. Details for the above stated results are presented in the rest of this report.

In summary, the A059 layout resulted in all occupied resident locations being under 50 dB(A) within 100 ft of the home under the worst case scenario (no ground attenuation) when modeling both a V110-2.0 turbine layout and the combination V117/V110 layout (Appendices A – D). Therefore a V100-2.0 and V100-2.2 layout, or any other turbine with equal or less sound emission, would be in compliance with state regulations. All non-participating residences have anticipated sound levels below 44.7 dB(A) assuming worst case scenario, and all participating residences have anticipated sound levels below 49.7 dB(A). No non-participating residences are anticipated to experience any shadow flicker above 2 hrs/yr for realistic assumptions. All participating locations were below 30 hrs/yr of shadow flicker for realistic assumptions and some obstacles when modeling the V110-2.0 and V117/V110 layout (Appendix E and Appendix F).

Table 1: Specifications of turbines evaluated within this report for the Lindahl wind farm. Turbines listed are to be considered representative and not inclusive of all turbines that could be installed.

Manufacturer	Model	Name plate capacity (kW)	Rotor diameter (m)	Hub height (m)	Sound level (dB(A))
Vestas	V117-3.3	3,300	117	84/91.5	108.5
Vestas	V110-2.0	2,000	110	80	107.5
Vestas	V100-2.0	2,000	100	80	105.0
Vestas	V100-2.2	2,200	100	80	105.0

Sound

For preliminary screening purposes, a worst case sound scenario was analyzed using windPRO. The worst case scenario assumes that the wind turbines are operating at a wind speed that results in the loudest anticipated sound being emitted. According to information supplied by the client, the loudest normal operating noise level emitted from the turbines in consideration was 108.5 dB(A) for the Vestas V117-3.3 and 107.5 dB(A) for the Vestas V110-2.0. The sound emission level of 108.5 dB(A) occurs for hub height wind speeds of 10 m/s for the Vestas V117-3.3 turbine and Vestas V110-2.0 turbine. While it is very likely a hub height of greater than 84 m (the lowest potential hub height for this machine) will be selected for the V117-3.3, the sound analysis of a hub height of 84 m resulted in the higher sound levels at the modeled receptors compared to the 91 m HH results. Therefore, all the sound results presented from here on are based on the lowest hub height of each turbine being considered, and would only improve with higher hub heights. The V117-3.3 turbine would exceed the state sound standards if this turbine was utilized for all 78 proposed locations. Therefore, a combination of V117 and V110 turbines were modeled as discussed above, and the same combination used for the shadow flicker results described below.

The windPRO analysis used the ISO 9613-2 General noise calculation model with no ambient noise considered and two different possibilities: with no ground attenuation, and General attenuation (ground factor of 0.5). Noise levels were modeled 1.5 m above ground level (AGL) at the noted occupied residences and did not incorporate ambient noise. The worst case scenario (no ground attenuation) for the V117/V110 layout resulted in no locations being above 50 dB(A) within 100 ft of a house (Table 3). The highest non-participating landowner had an anticipated sound level of 44.7 dB(A) for the worst case scenario. Results and maps depicting the worst case noise scenario results are shown in Appendix A and Appendix C.

Even though the worst case scenario resulted in all locations satisfying required sound standards, a more refined analysis was conducted for the V117/V110 and V110 only layouts. The refined analyses included: (1) the General ground attenuation option (Appendix B and Appendix H) and (2) analyzing the next loudest turbine being considered, V110-2.0 at 107.5 dB(A), with no ground attenuation (Appendix C and Appendix I) and (3) with General ground attenuation (Appendix D and Appendix J). The more refined and realistic calculations resulted in all locations with a predicted noise level contributed from the proposed turbines even further below 50 dB(A) within 100 ft of an occupied residence (Table 3).

If all of the turbine locations under consideration have a noise emission level of 107.5 dB(A) or less, no mitigation options are anticipated to be necessary to satisfy North Dakota State regulations regarding acceptable sound levels of 50 dB(A) or below within 100 ft of an occupied residence. The V117/V110

layout indicates that not all turbine locations can have a sound level of 108.5 dB(A), therefore the turbines noted as “up to V110” would require a sound level of 107.5 dB(A) or less to satisfy the 50 dB(A) requirement. If it was determined the turbine model to be installed has a sound emission below 107.5 dB(A) (e.g., V100-2.0 and V100-2.2), all locations could be used without violating the sound requirements.

Table 2: Noise estimates from windPRO assuming ground attenuation and no ground attenuation for V110 and V117/V110 layouts. Results presented for locations with no ground attenuation results above 35 dB(A) for V117/V110. The sound levels are estimated at the center of the house. The distance required to travel from each receptor to reach the 50 dB(A) limit reported for the V117/V110 no ground attenuation scenario (worst case). P indicates location is a participating landowner, NP denotes the location is a non-participating landowner. Appendices A and B shows which turbines were modeled as V117 and V110 turbines.

Sensor	V110-2.0 General Ground Atten. (dB(A))	V110-2.0 No Ground Atten. (dB(A))	V117 / V110 General Ground Atten. (dB(A))	V117 / V110 No Ground Atten. (dB(A))	Distance to travel from receptor to reach 50 dB(A) for V117/V110 No Grnd. Atten. (m / ft)
A-P	46.2	49.4	46.5	49.7	38 / 125
B-P	45.4	48.7	45.7	49.1	150 / 492
C-P	45.3	48.7	45.5	48.9	165 / 541
D-P	43.6	46.9	43.9	47.1	216 / 709
E-P	44.7	47.9	44.8	48.1	202 / 663
F-P	45.9	49.2	46.1	49.4	96 / 315
G-P	42.7	46.0	43.1	46.3	255 / 837
H-P	44.0	47.4	44.7	48.1	242 / 794
I-P	44.9	48.3	45.1	48.5	324 / 1,063
J-P	44.9	48.3	45.2	48.6	335 / 1,099
K-P	42.8	46.1	43.7	47.0	302 / 991
L-P	42.5	45.9	42.7	46.1	427 / 1,401
M-P	40.6	44.0	41.2	44.6	700 / 2,297
N-NP	39.2	42.6	40.0	43.4	713 / 2,339
O-P	39.9	43.3	40.6	44.0	695 / 2,280
P-NP	40.6	44.1	41.2	44.7	672 / 2,205
Q-NP	35.8	39.2	36.5	39.9	1,093 / 3,586
R-NP	34.0	37.3	34.7	37.9	1,290 / 4,232
S-P	36.7	39.9	37.1	40.4	1,256 / 4,121
T-NP	37.5	41.0	38.0	41.5	1,336 / 4,383
U-NP	34.8	38.2	35.3	38.7	1,439 / 4,721
V-P	36.8	40.1	37.3	40.6	1,369 / 4,491
W-NP	34.5	37.8	35.0	38.3	1,483 / 4,865
X-NP	34.1	37.5	34.8	38.1	1,500 / 4,921
Y-NP	38.7	42.3	39.3	42.9	1,441 / 4,728
Z-NP	36.6	39.9	37.1	40.4	1,490 / 4,888
AA-P	35.3	38.5	35.8	39.1	1,586 / 5,203
BB-NP	36.9	40.2	37.4	40.8	1,546 / 5,072
CC-P	35.2	38.4	35.6	38.8	1,675 / 5,495
DD-NP	34.3	37.6	34.9	38.2	1,746 / 5,728
EE-NP	36.3	39.6	36.8	40.2	1,724 / 5,656
FF-NP	32.4	35.6	32.9	36.1	1,904 / 6,247
GG-P	32.3	35.3	32.8	35.9	2,040 / 6,693
II-P	32.0	35.0	32.5	35.5	2,139 / 7,018

Shadow Flicker

For preliminary screening purposes, an absolute worst case shadow flicker scenario was analyzed using windPRO for the V117-3.3 on a 91.5 m HH and V110-2.0 on an 80 m HH combination layout. The worst case scenario assumes that the wind turbines are always operating, perpendicular to the sun, no cloud cover, all shadows within 1.5 km are visible, and that the sensors are 1 m by 1 m “Greenhouses.” Greenhouse sensor mode indicates that a shadow cast from any direction will be accumulated in the results. In reality, individual rooms and windows would need to be modeled to determine the actual impact on a house (i.e., if there are no windows on the side of a house where a shadow is cast, it would not be accumulated).

The worst case scenario for the V117/V110 layout resulted in 11 locations, all participating in the project, being above 30 hours a year (an arbitrary value). A refined analysis was performed to determine if any turbines should be moved or if other forms of mitigation are warranted. This revised analysis included sunshine probabilities and operational statistics (Appendix E and K), but no obstacle blockage. The refined analysis for the V117/110 layout resulted in four home locations having more than 30 hours a year of shadow flicker anticipated (Table 2).

To determine if those four participating locations were of high concern and if turbines were justified to be moved or excluded from the layout, a detailed shadow flicker analysis taking into consideration local obstacles (i.e., tree breaks) was performed. When taking into consideration local obstacles, and using a conservative estimate of the tree heights, all locations were below the arbitrary value of 30 hours per year (Table 2). Details regarding the refined shadow flicker analysis including obstacles for locations A-P, B-P, I-P, and J-P can be found in Appendix E and Appendix M.

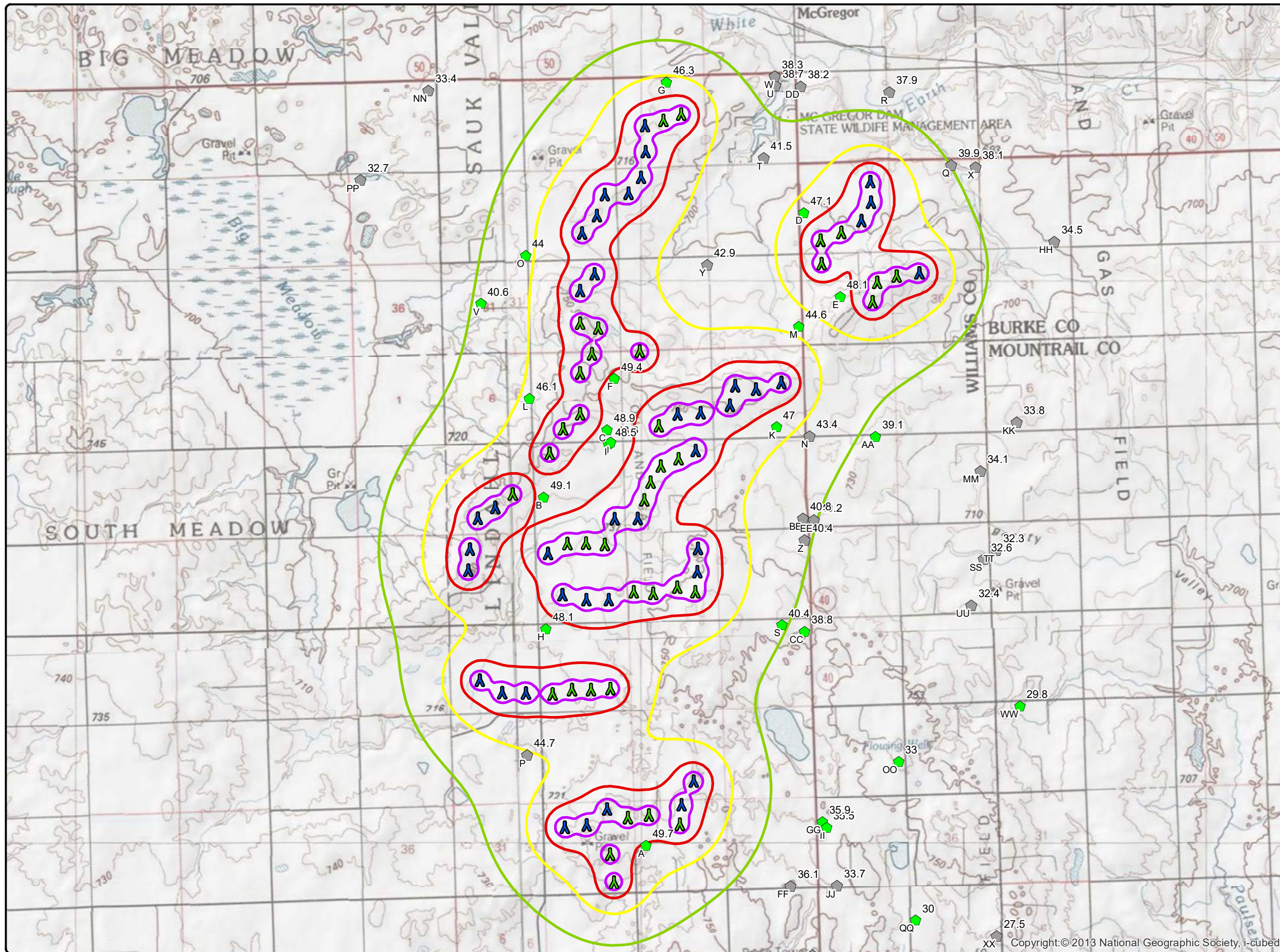
The V110 only scenario resulted in similar or less shadow flicker hours compared to the V117/110 layout. When modeling the V110 layout with realistic assumptions, but no obstacles, three participating locations had 30 hours per year (i.e., A-P, I-P, and J-P) (Appendix F and Appendix L). Once obstacles were taken into consideration all turbines with a rotor diameter of 110 m or less resulted in all residences having anticipated realistic shadow flicker hours below 30 hours per year (Table 2, Appendix F and N). Therefore any turbine with a rotor diameter less than 110 m and on an 80 m HH (e.g., V100-2.0 and V100-2.2) would result in all receptors to be below 30 hours per year.

Table 3: WindPRO estimated shadow flicker hours for realistic scenarios. Results presented for receptors listed in sound results. All locations with flicker reported are participating residences except for one. Appendix E shows which turbine locations were modeled as V117 and V110 turbines. Results with obstacles modeled are presented for four select locations.

Receptor	V110-2.0*	V117 /V110**
	Realistic Shadow No Obstacles / With Obstacles For Select Receptors (hrs/yr)	Realistic Shadow No Obstacles / With Obstacles For Select Receptors (hrs/yr)
A-P	30:51 / 12:16	33:00 / 12:18
B-P	29:37 / 4:49	31:36 / 5:20
C-P	28:03	28:45
D-P	20:08	22:48
E-P	26:53	27:10
F-P	25:49	26:28
G-P	0:00	0:00
H-P	6:42	7:57
I-P	36:28 / 22:33	37:10 / 22:37
J-P	32:16 / 11:48	33:02 / 11:50
K-P	19:56	22:09
L-P	29:43	29:47
M-P	2:26	2:26
N-NP	0:00	0:00
O-P	12:59	17:00
P-NP	0:00	0:00
Q-NP	1:11	1:36
R-NP	0:00	0:00
S-P	0:00	0:00
T-NP	0:00	0:00
U-NP	0:00	0:00
V-P	0:00	0:00
W-NP	0:00	0:00
X-NP	0:00	0:00
Y-NP	0:00	0:00
Z-NP	0:00	0:00
AA-P	0:00	0:00
BB-NP	0:00	0:00
CC-P	0:00	0:00
DD-NP	0:00	0:00
EE-NP	0:00	0:00
FF-NP	0:00	0:00
GG-P	0:00	0:00
II-P	0:00	0:00

* 80 m HH ** V117 with 91.5 m HH and V110 with 80.0 m HH

Appendix A: V117 / V110 No Ground Attenuation Sound Map



www.eapc.net | 701.775.3000

**Lindahl Wind Farm
V117 / V110
Worst Case Sound**

Client

TradeWind Energy, Inc.

Project Description

78 WTG locations (A059) designated as either V117-3.3 on 84 m HH or V110-2.0 on 80 m HH. Worst case noise map and data at receptors (dB(A)) within at least 1 mile of turbines. Assumes WTGs at rated noise of 107.5 dB(A) for V110 or 108.5 dB(A) for V117. ISO-9613-2 General model. No ground attenuation. No ambient noise considered.

Location: Tioga, ND

Project #: 20132550

Issue Dates

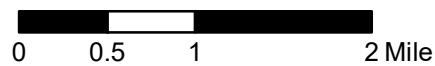
#	Description	Date
1	Original	2015.10.02

Drawn By: BS Checked By: JH

Legend

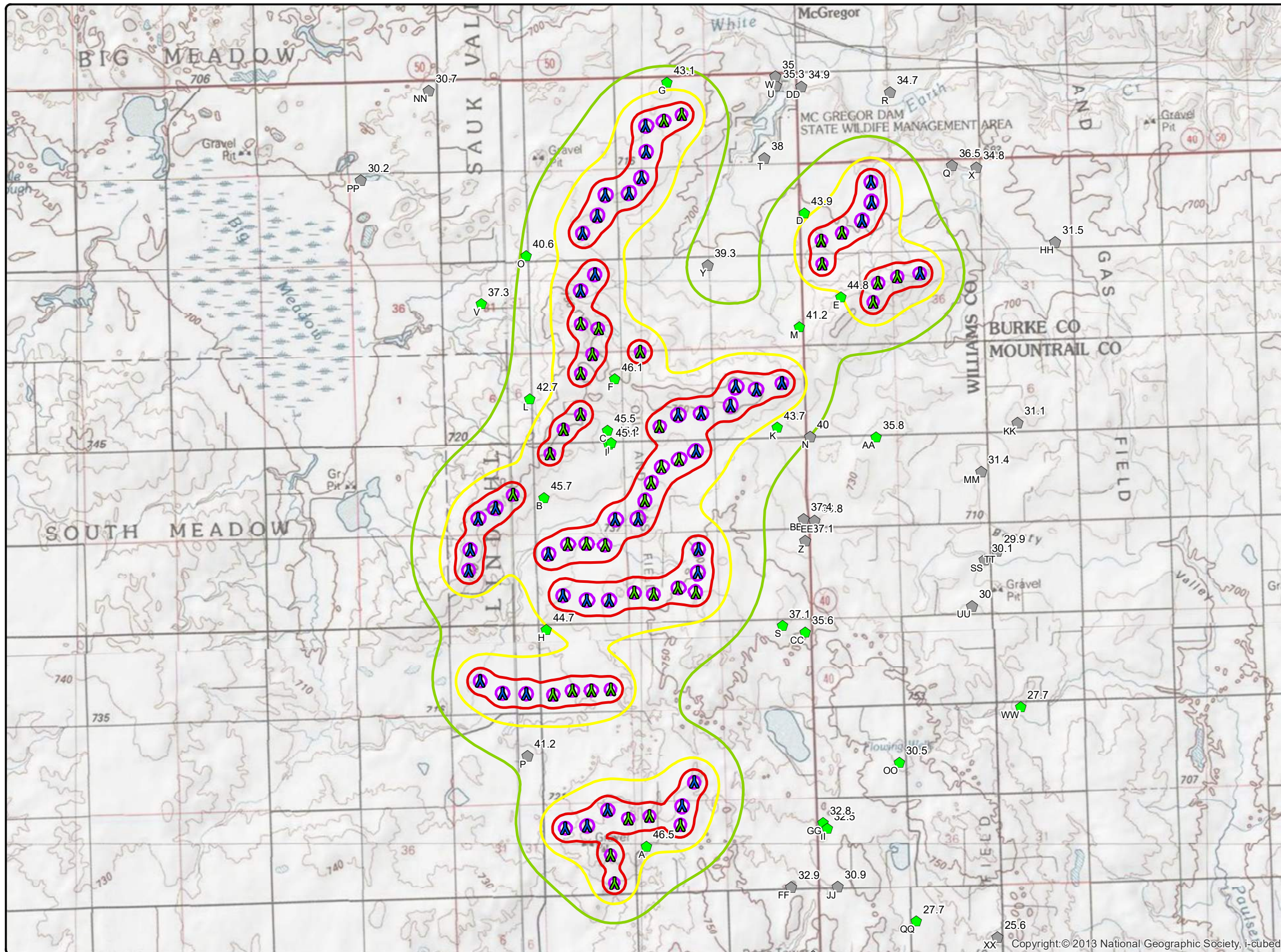
- up to V110
 - up to V117
 - Non-Participating
 - Participating
- Sound level (dB(A))**
- 40
 - 45
 - 50
 - 55

COPYRIGHT:
All maps, plans, specifications, computer files, field data, notes and other documents and instruments prepared by EAPC as instruments of service shall remain the property of EAPC. EAPC shall retain all common law, statutory and other reserved rights, including the copyright thereto.



Neither EAPC nor any person acting on their behalf: (a) makes any warranty, express or implied, with respect to the use of any information disclosed on this drawing; or (b) assumes any liability with respect to the use of any information or methods disclosed on this drawing. Any recipient of this document, by their acceptance or use of this document, releases EAPC, its parent corporations and its affiliates, from any liability for direct, indirect, consequential, or special loss or damage whether arising in contract, warranty, express or implied, tort or otherwise, and irrespective of fault, negligence, and strict liability. The responsibilities for the applications and use of the material contained in this document remain solely with the client.

Appendix B: V117 / V110 General Ground Attenuation Sound Map



www.eapc.net | 701.775.3000

Lindahl Wind Farm V117 / V110 Realistic Case Sound

Client

TradeWind Energy, Inc.

Project Description

78 WTG locations (A059) designated as either V117-3.3 on 84 m HH or V110-2.0 on 80 m HH. Realistic case noise map and data at receptors (dB(A)) within at least 1 mile of turbines. Assumes WTGs at rated noise of 107.5 dB(A) for V110 or 108.5 dB(A) for V117. ISO-9613-2 General model. General ground attenuation (0.5). No ambient noise considered.

Location: Tioga, ND

Project #: 20132550

Issue Dates

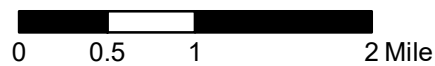
#	Description	Date
1	Original	2015.10.02

Drawn By: BS Checked By: JH

Legend

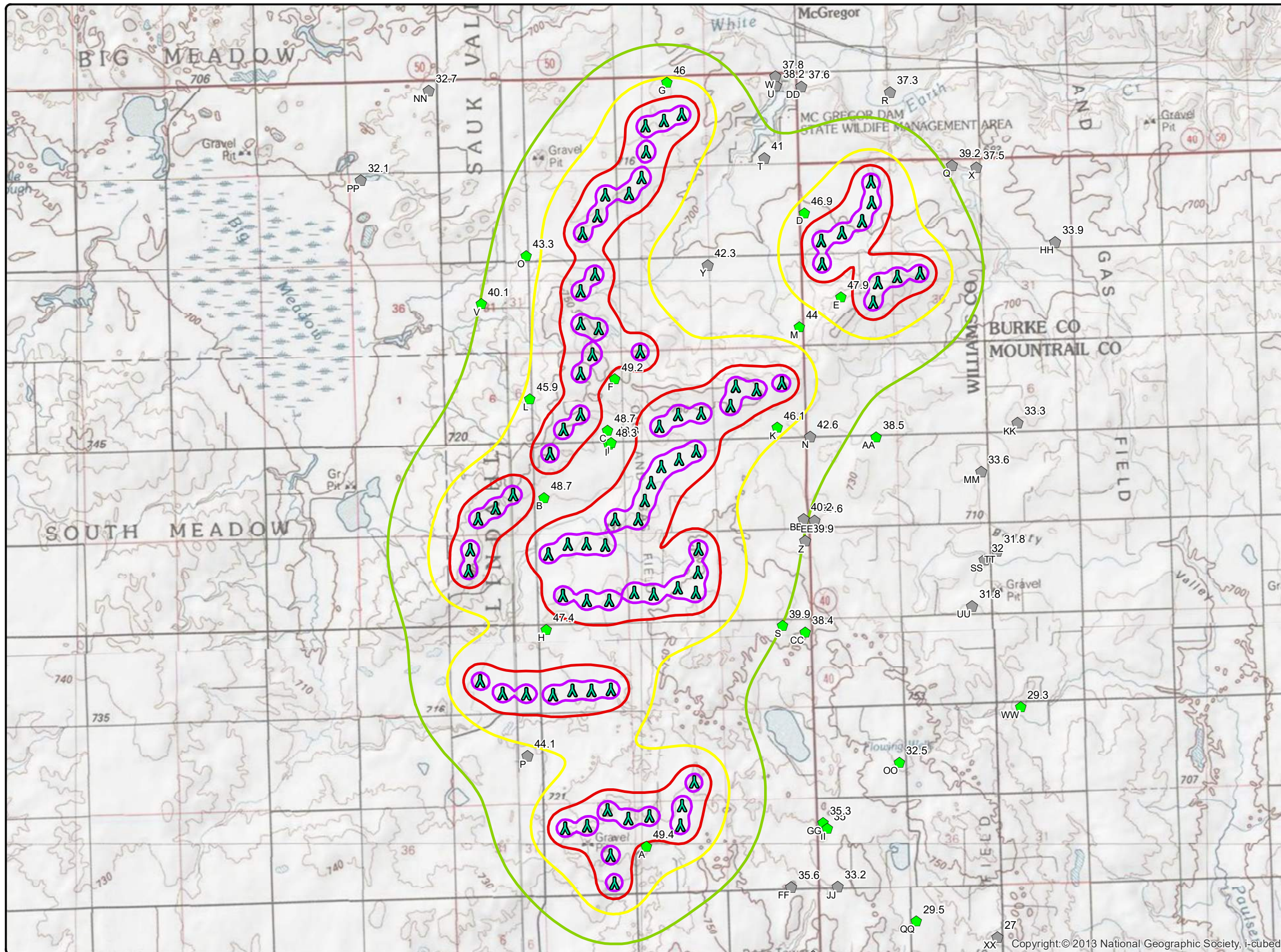
- up to V110
 - up to V117
 - Non-Participating
 - Participating
- Sound level (dB(A))**
- 40
 - 45
 - 50
 - 55

COPYRIGHT:
All maps, plans, specifications, computer files, field data, notes and other documents and instruments prepared by EAPC as instruments of service shall remain the property of EAPC. EAPC shall retain all common law, statutory and other reserved rights, including the copyright thereto.



Neither EAPC nor any person acting on their behalf: (a) makes any warranty, express or implied, with respect to the use of any information disclosed on this drawing; or (b) assumes any liability with respect to the use of any information or methods disclosed on this drawing. Any recipient of this document, by their acceptance or use of this document, releases EAPC, its parent corporations and its affiliates, from any liability for direct, indirect, consequential, or special loss or damage whether arising in contract, warranty, express or implied, tort or otherwise, and irrespective of fault, negligence, and strict liability. The responsibilities for the applications and use of the material contained in this document remain solely with the client.

Appendix C: V110 No Ground Attenuation Sound Map



www.eapc.net | 701.775.3000

Lindahl Wind Farm V110 Worst Case Sound

Client
TradeWind Energy, Inc.

Project Description
78 WTG locations (A059) designated as V110-2.0 on 80 m HH. Worst case noise map and data at receptors (dB(A)) within at least 1 mile of turbines. Assumes WTGs at rated noise of 107.5 dB(A). ISO-9613-2 General model. No ground attenuation. No ambient noise considered.

Location: Tioga, ND
Project #: 20132550
Issue Dates

#	Description	Date
1	Original	2015.10.02

Drawn By: BS Checked By: JH

Legend

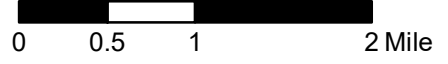
- V110 80m HH
- Non-Participating
- Participating

Sound level (dB(A))

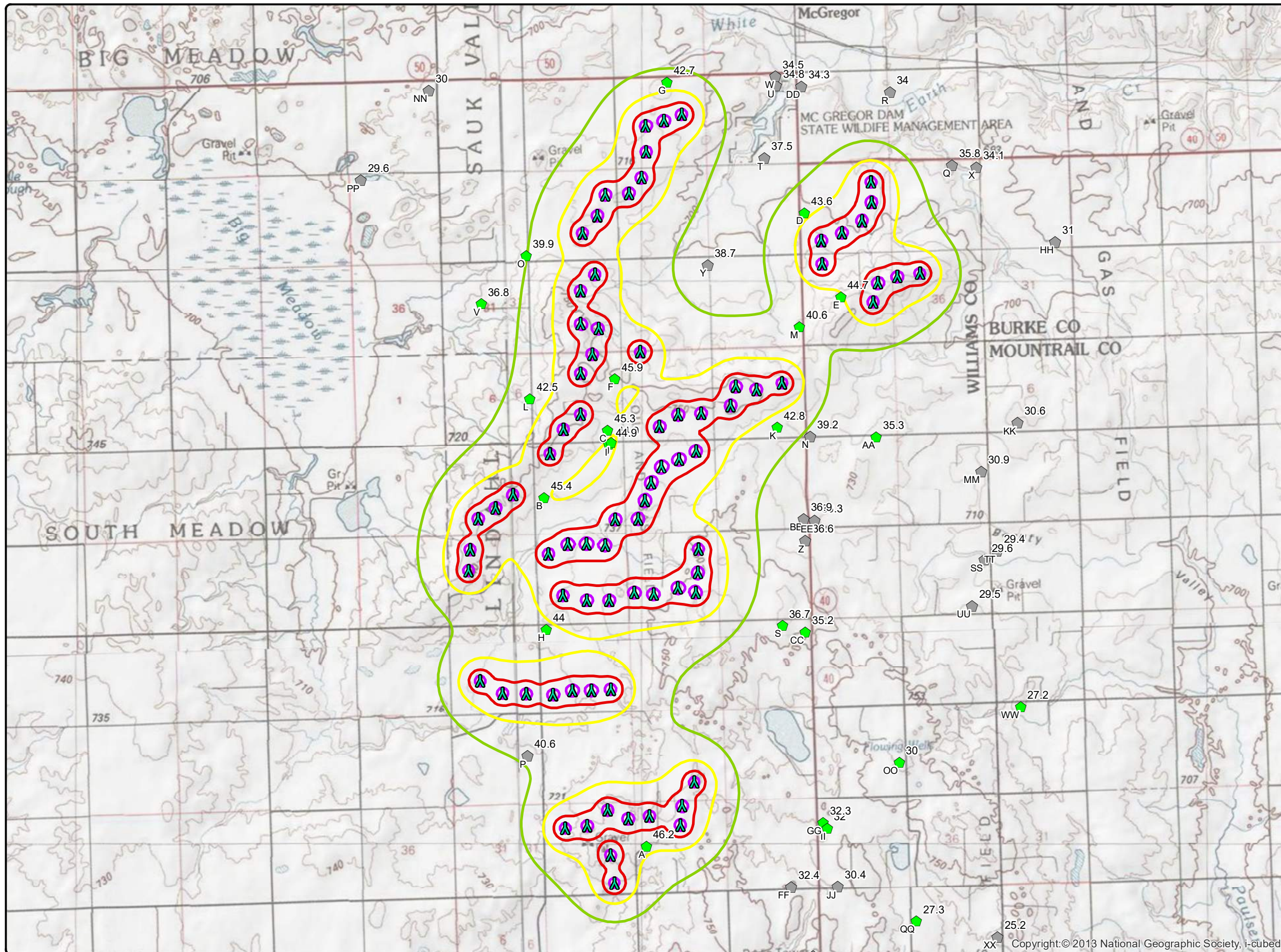
- 40
- 45
- 50
- 55

COPYRIGHT:
All maps, plans, specifications, computer files, field data, notes and other documents and instruments prepared by EAPC as instruments of service shall remain the property of EAPC. EAPC shall retain all common law, statutory and other reserved rights, including the copyright thereto.

Neither EAPC nor any person acting on their behalf: (a) makes any warranty, express or implied, with respect to the use of any information disclosed on this drawing; or (b) assumes any liability with respect to the use of any information or methods disclosed on this drawing. Any recipient of this document, by their acceptance or use of this document, releases EAPC, its parent corporations and its affiliates, from any liability for direct, indirect, consequential, or special loss or damage whether arising in contract, warranty, express or implied, tort or otherwise, and irrespective of fault, negligence, and strict liability. The responsibilities for the applications and use of the material contained in this document remain solely with the client.



Appendix D: V110 General Ground Attenuation Sound Map



www.eapc.net | 701.775.3000

Lindahl Wind Farm V110 Realistic Case Sound

Client
TradeWind Energy, Inc.

Project Description
78 WTG locations (A059) designated as V110-2.0 on 80 m HH. Realistic case noise map and data at receptors (dB(A)) within at least 1 mile of turbines. Assumes WTGs at rated noise of 107.5 dB(A). ISO-9613-2 General model. General ground attenuation (0.5) No ambient noise considered.

Location: Tioga, ND

Project #: 20132550

Issue Dates

#	Description	Date
1	Original	2015.10.02

Drawn By: BS Checked By: JH

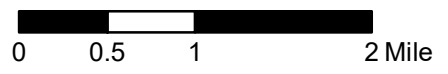
Legend

- V110 80m HH
- Non-Participating
- Participating

Sound level (dB(A))

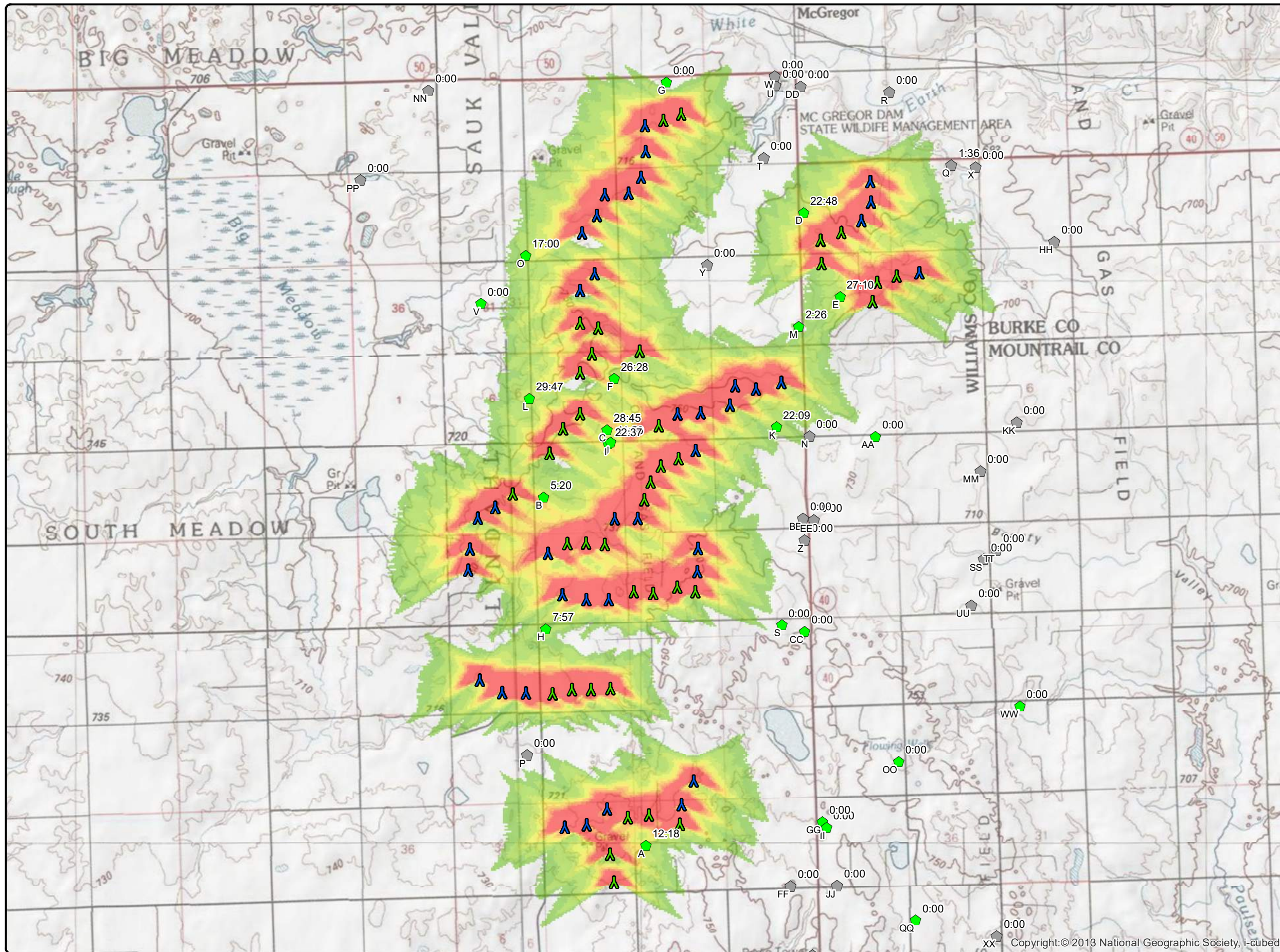
- 40
- 45
- 50
- 55

COPYRIGHT:
All maps, plans, specifications, computer files, field data, notes and other documents and instruments prepared by EAPC as instruments of service shall remain the property of EAPC. EAPC shall retain all common law, statutory and other reserved rights, including the copyright thereto.



Neither EAPC nor any person acting on their behalf: (a) makes any warranty, express or implied, with respect to the use of any information disclosed on this drawing; or (b) assumes any liability with respect to the use of any information or methods disclosed on this drawing. Any recipient of this document, by their acceptance or use of this document, releases EAPC, its parent corporations and its affiliates, from any liability for direct, indirect, consequential, or special loss or damage whether arising in contract, warranty, express or implied, tort or otherwise, and irrespective of fault, negligence, and strict liability. The responsibilities for the applications and use of the material contained in this document remain solely with the client.

Appendix E: V117 / V110 Realistic Shadow Flicker Map




EAPC
WIND ENERGY

www.eapc.net | 701.775.3000

**Lindahl Wind Farm
V117 / V110 Realistic Shadow
Flicker with Obstacles**

Client

TradeWind Energy, Inc.

Project Description

78 WTG locations (A059) designated as V110-2.0 on 80 m HH or V117-3.3 on 91.5 m HH. Realistic shadow flicker map and data at receptors (hrs/yr) within at least 1 mile of turbines. Assumes statistical reduction due to sunshine probability, turbine orientation and operation probability. Sensors in "greenhouse" mode. Obstacles assumed.

Location: Tioga, ND





Project #: 20132550

Issue Dates











#	Description	Date
1	Original	2015.10.02

Drawn By: BS Checked By: JH


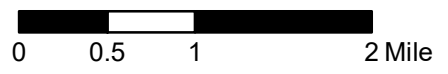
Legend

-  up to V110
-  up to V117
-  Non-Participating
-  Participating

Shadow Flicker (hrs/yr)

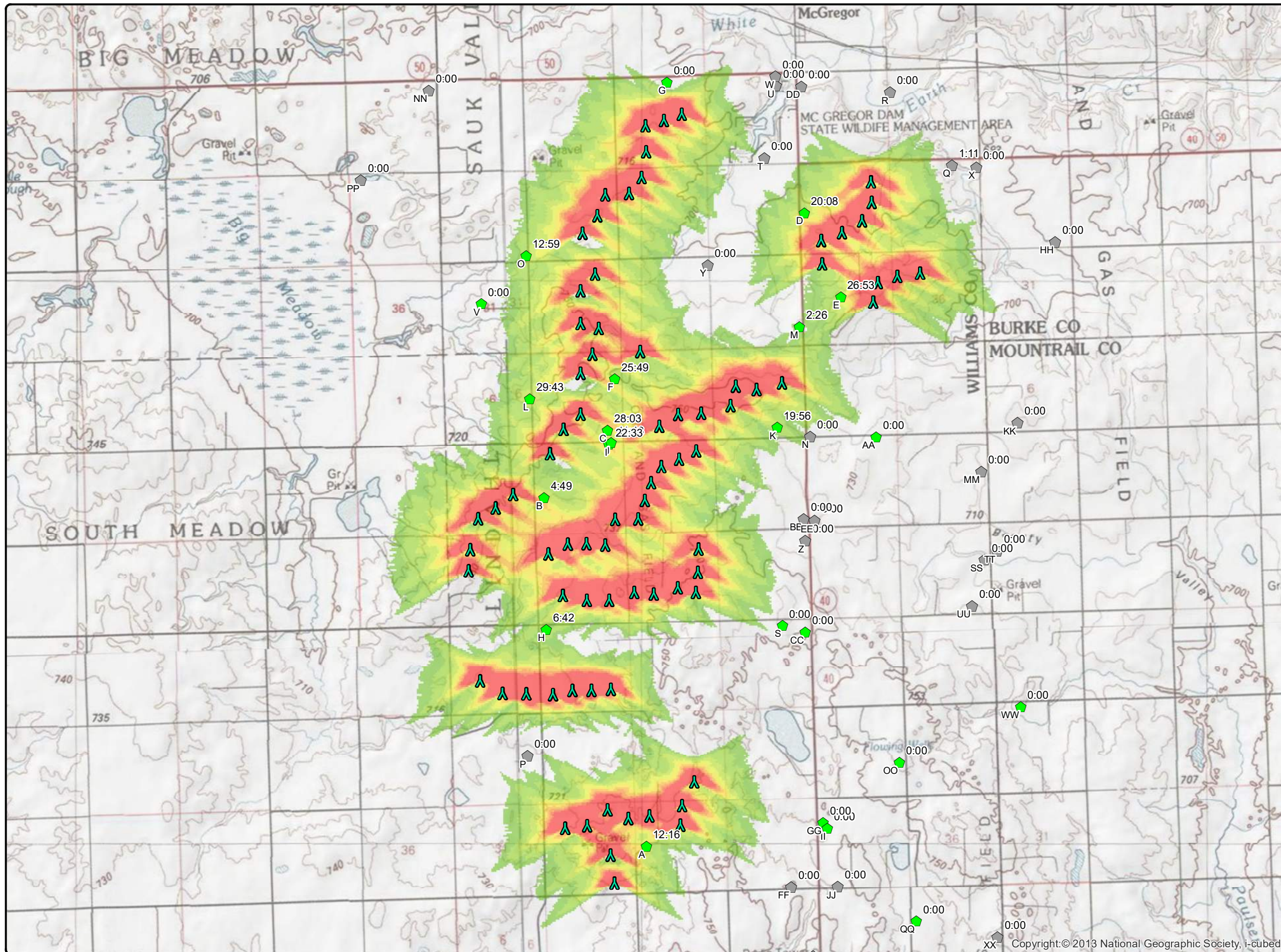
-  <5
-  5 - 10
-  10 - 20
-  20 - 30
-  30 - 40
-  40 - 50
-  50 - 60
-  60 - 70
-  70 - 80
-  >80

COPYRIGHT:
All maps, plans, specifications, computer files, field data, notes and other documents and instruments prepared by EAPC as instruments of service shall remain the property of EAPC. EAPC shall retain all common law, statutory and other reserved rights, including the copyright thereto.

Neither EAPC nor any person acting on their behalf: (a) makes any warranty, express or implied, with respect to the use of any information disclosed on this drawing; or (b) assumes any liability with respect to the use of any information or methods disclosed on this drawing. Any recipient of this document, by their acceptance or use of this document, releases EAPC, its parent corporations and its affiliates, from any liability for direct, indirect, consequential, or special loss or damage whether arising in contract, warranty, express or implied, tort or otherwise, and irrespective of fault, negligence, and strict liability. The responsibilities for the applications and use of the material contained in this document remain solely with the client.

Appendix F: V110 Realistic Shadow Flicker Map



www.eapc.net | 701.775.3000

Lindahl Wind Farm V110 Realistic Shadow Flicker with Obstacles

Client

TradeWind Energy, Inc.

Project Description

78 WTG locations (A059) designated as V110-2.0 on 80 m HH. Realistic shadow flicker map and data at receptors (hrs/yr) within at least 1 mile of turbines. Assumes statistical reduction due to sunshine probability, turbine orientation and operation probability. Sensors in "greenhouse" mode. Obstacles assumed.

Location: Tioga, ND

Project #: 20132550

Issue Dates

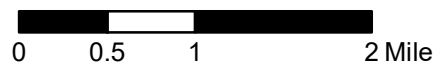
#	Description	Date
1	Original	2015.10.02

Drawn By: BS Checked By: JH

Legend

- V110 80m HH
 - Non-Participating
 - Participating
- Shadow Flicker (hrs/yr)**
- <5
 - 5 - 10
 - 10 - 20
 - 20 - 30
 - 30 - 40
 - 40 - 50
 - 50 - 60
 - 60 - 70
 - 70 - 80
 - >80

COPYRIGHT: All maps, plans, specifications, computer files, field data, notes and other documents and instruments prepared by EAPC as instruments of service shall remain the property of EAPC. EAPC shall retain all common law, statutory and other reserved rights, including the copyright thereto.



Neither EAPC nor any person acting on their behalf: (a) makes any warranty, express or implied, with respect to the use of any information disclosed on this drawing; or (b) assumes any liability with respect to the use of any information or methods disclosed on this drawing. Any recipient of this document, by their acceptance or use of this document, releases EAPC, its parent corporations and its affiliates, from any liability for direct, indirect, consequential, or special loss or damage whether arising in contract, warranty, express or implied, tort or otherwise, and irrespective of fault, negligence, and strict liability. The responsibilities for the applications and use of the material contained in this document remain solely with the client.

Appendix G: windPRO V117 / V110 Sound Analysis with No Ground Attenuation

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:02 AM / 1

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 3:12 PM/2.9.285

DECIBEL - Main Result

Calculation: A059 V110/V117 No Grnd Atten. Generic Octave

Noise calculation model:

ISO 9613-2 General

Wind speed:

95% rated power

Ground attenuation:

None

Meteorological coefficient, C0:

0.0 dB

Type of demand in calculation:

1: WTG noise is compared to demand (DK, DE, SE, NL etc.)

Noise values in calculation:

All noise values are mean values (Lwa) (Normal)

Pure tones:

Pure and Impulse tone penalty are added to WTG source noise

Height above ground level, when no value in NSA object:

1.5 m Don't allow override of model height with height from NSA object

Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:

0.0 dB(A)



Scale 1:400,000
 New WTG Noise sensitive area

WTGs

UTM NAD83 Zone: 13			Row data/Description	WTG type			Noise data			Wind speed [m/s]	Status	Lwa,ref [dB(A)]	Pure tones	
East	North	Z [m]		Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]					Creator
5	646,913	5,375,455	745.7 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
6	646,888	5,375,080	743.7 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
12	648,327	5,377,151	750.2 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
13	648,563	5,377,579	749.6 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
14	648,872	5,378,572	753.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
15	648,872	5,377,853	752.9 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
18	649,189	5,379,368	749.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
20	648,867	5,380,033	744.0 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
22	649,124	5,380,328	729.3 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
24	651,007	5,377,868	749.0 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
26	651,525	5,378,000	751.5 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
27	651,616	5,378,348	758.6 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
28	651,987	5,378,290	755.5 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
29	652,436	5,378,405	749.8 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
34	654,047	5,379,834	743.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
35	654,478	5,380,290	740.5 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
36	654,876	5,380,346	731.4 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
37	649,468	5,369,552	735.9 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
38	649,403	5,370,046	745.2 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
39	648,989	5,370,563	740.7 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
40	649,348	5,370,846	749.8 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
41	649,714	5,370,690	746.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
42	650,635	5,370,574	746.1 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
43	650,667	5,370,918	744.1 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
45	650,882	5,371,340	743.7 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
66	649,309	5,375,532	733.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
67	649,484	5,375,990	732.9 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
68	649,889	5,375,994	741.6 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
69	650,008	5,376,321	740.1 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
70	650,956	5,375,465	751.0 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
84	648,982	5,374,557	737.6 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
85	648,553	5,374,643	733.1 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
98	648,903	5,381,054	722.4 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
99	649,170	5,381,363	721.7 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
100	649,950	5,382,038	713.8 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
101	650,030	5,382,496	712.8 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
104	650,119	5,376,639	740.5 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
105	650,267	5,377,632	746.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
150	650,663	5,383,159	707.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
151	650,947	5,375,049	753.4 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
152	650,911	5,374,694	758.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
154	650,163	5,374,664	746.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
155	649,378	5,374,555	741.3 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h

To be continued on next page...

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:02 AM / 2

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 3:12 PM/2.9.285

DECIBEL - Main Result

Calculation: A059 V110/V117 No Grnd Atten. Generic Octave

...continued from previous page

UTM NAD83 Zone: 13			Row data/Description	WTG type		Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Noise data		Wind speed [m/s]	Status	LwA,ref [dB(A)]	Pure tones
East	North	Z		Valid	Manufact.				Type-generator	Creator				
156	649,818	5,374,694	743.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
158	650,613	5,377,049	737.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
164	649,406	5,372,982	725.6 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
165	647,909	5,372,903	716.3 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge	(95%) User value	108.5	0 dB h
166	647,487	5,372,910	715.6 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge	(95%) User value	108.5	0 dB h
171	647,671	5,376,427	743.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
173	647,364	5,376,192	740.7 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge	(95%) User value	108.5	0 dB h
174	647,056	5,376,002	741.8 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge	(95%) User value	108.5	0 dB h
175	653,143	5,380,511	713.2 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
176	653,130	5,380,927	710.2 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
177	653,497	5,381,062	704.1 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
178	653,850	5,381,276	700.7 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge	(95%) User value	108.5	0 dB h
179	654,022	5,381,604	696.2 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge	(95%) User value	108.5	0 dB h
180	654,011	5,381,966	694.9 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge	(95%) User value	108.5	0 dB h
183	649,728	5,381,758	721.2 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge	(95%) User value	108.5	0 dB h
184	650,599	5,377,842	746.4 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge	(95%) User value	108.5	0 dB h
205	648,594	5,370,523	731.5 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge	(95%) User value	108.5	0 dB h
206	650,092	5,370,737	743.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
300	654,134	5,380,179	734.1 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
302	648,870	5,379,451	759.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
303	649,079	5,378,913	759.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
304	649,308	5,381,738	716.8 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge	(95%) User value	108.5	0 dB h
305	650,346	5,383,045	709.5 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
306	650,021	5,382,956	710.0 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge	(95%) User value	108.5	0 dB h
307	647,090	5,373,129	713.2 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge	(95%) User value	108.5	0 dB h
308	649,061	5,372,960	722.4 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
309	648,724	5,372,961	720.3 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
310	648,383	5,372,885	719.3 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
311	648,975	5,375,560	734.6 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
312	648,641	5,375,554	726.9 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
313	648,297	5,375,376	728.5 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge	(95%) User value	108.5	0 dB h
314	649,928	5,378,956	741.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
315	650,591	5,374,779	748.6 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
316	650,301	5,376,922	735.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
317	650,917	5,377,197	740.0 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge	(95%) User value	108.5	0 dB h

h) Generic octave distribution used

Calculation Results

Sound Level

Noise sensitive area			UTM NAD83 Zone: 13			Demands		Sound Level		Demands fulfilled ?	
No.	Name	East	North	Z	Imission height	Noise	From WTGs	Distance to noise demand	Noise		Noise
				[m]	[m]	[dB(A)]	[dB(A)]	[m]			
A Participating		650,034	5,370,204	742.6	1.5	50.0	49.7	38	Yes		
B Participating		648,222	5,376,376	731.5	1.5	50.0	49.1	150	Yes		
C Participating		649,350	5,377,570	737.6	1.5	50.0	48.9	165	Yes		
D Participating		652,833	5,381,417	705.0	1.5	50.0	47.1	216	Yes		
E Participating		653,476	5,379,925	741.5	1.5	50.0	48.1	202	Yes		
F Participating		649,476	5,378,474	747.0	1.5	50.0	49.4	96	Yes		
G Participating		650,400	5,383,729	711.5	1.5	50.0	46.3	255	Yes		
H Participating		648,263	5,374,042	728.5	1.5	50.0	48.1	242	Yes		
I Participating		649,372	5,377,319	734.6	1.5	50.0	48.5	324	Yes		
J Participating		649,411	5,377,350	734.6	1.5	50.0	48.6	335	Yes		
K Participating		652,350	5,377,616	735.4	1.5	50.0	47.0	302	Yes		
L Participating		647,974	5,378,125	736.6	1.5	50.0	46.1	427	Yes		
M Participating		652,746	5,379,403	722.4	1.5	50.0	44.6	700	Yes		
N Non-Participating		652,934	5,377,454	728.5	1.5	50.0	43.4	713	Yes		
O Participating		647,905	5,380,657	723.4	1.5	50.0	44.0	695	Yes		
P Non-Participating		647,929	5,371,803	716.8	1.5	50.0	44.7	672	Yes		
Q Non-Participating		655,444	5,382,262	682.8	1.5	50.0	39.9	1,093	Yes		
R Non-Participating		654,346	5,383,551	675.6	1.5	50.0	37.9	1,290	Yes		
S Participating		652,445	5,374,111	759.0	1.5	50.0	40.4	1,256	Yes		

To be continued on next page...

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:02 AM / 3

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 3:12 PM/2.9.285

DECIBEL - Main Result

Calculation: A059 V110/V117 No Grnd Atten. Generic Octave

...continued from previous page

Noise sensitive area		UTM NAD83 Zone: 13			Demands			Sound Level		Demands fulfilled ?	
No.	Name	East	North	Z	Imission height	Noise	From WTGs	Distance to noise demand	Noise		
				[m]	[m]	[dB(A)]	[dB(A)]	[m]			
	T Non-Participating	652,124	5,382,382	698.0	1.5	50.0	41.5	1,336	Yes		
	U Non-Participating	652,329	5,383,668	691.9	1.5	50.0	38.7	1,439	Yes		
	V Participating	647,113	5,379,805	712.6	1.5	50.0	40.6	1,369	Yes		
	W Non-Participating	652,318	5,383,827	691.2	1.5	50.0	38.3	1,483	Yes		
	X Non-Participating	655,873	5,382,222	689.2	1.5	50.0	38.1	1,500	Yes		
	Y Non-Participating	651,119	5,380,491	705.0	1.5	50.0	42.9	1,441	Yes		
	Z Non-Participating	652,848	5,375,611	736.1	1.5	50.0	40.4	1,490	Yes		
	AA Participating	654,105	5,377,449	726.3	1.5	50.0	39.1	1,586	Yes		
	BB Non-Participating	652,820	5,375,995	733.4	1.5	50.0	40.8	1,546	Yes		
	CC Participating	652,849	5,373,992	753.0	1.5	50.0	38.8	1,675	Yes		
	DD Non-Participating	652,780	5,383,651	684.1	1.5	50.0	38.2	1,746	Yes		
	EE Non-Participating	653,014	5,375,966	734.6	1.5	50.0	40.2	1,724	Yes		
	FF Non-Participating	652,597	5,369,477	749.8	1.5	50.0	36.1	1,904	Yes		
	GG Participating	653,163	5,370,620	746.2	1.5	50.0	35.9	2,040	Yes		
	HH Non-Participating	657,270	5,380,900	701.0	1.5	50.0	34.5	2,134	Yes		
	II Participating	653,237	5,370,521	746.8	1.5	50.0	35.5	2,139	Yes		
	JJ Non-Participating	653,421	5,369,486	746.6	1.5	50.0	33.7	2,636	Yes		
	KK Non-Participating	656,603	5,377,699	728.9	1.5	50.0	33.8	2,822	Yes		
	LL Non-Participating	652,987	5,368,263	755.9	1.5	50.0	32.6	2,964	Yes		
	MM Non-Participating	655,962	5,376,837	710.2	1.5	50.0	34.1	3,233	Yes		
	NN Non-Participating	646,183	5,383,581	712.5	1.5	50.0	33.4	3,210	Yes		
	OO Participating	654,514	5,371,692	765.0	1.5	50.0	33.0	3,315	Yes		
	PP Non-Participating	644,980	5,381,994	704.1	1.5	50.0	32.7	3,659	Yes		
	QQ Participating	654,816	5,368,880	743.7	1.5	50.0	30.0	4,157	Yes		
	RR Non-Participating	654,290	5,367,724	742.3	1.5	50.0	29.4	4,298	Yes		
	SS Non-Participating	656,021	5,375,274	710.2	1.5	50.0	32.6	4,417	Yes		
	TT Non-Participating	656,242	5,375,429	710.2	1.5	50.0	32.3	4,491	Yes		
	UU Non-Participating	655,800	5,374,456	722.8	1.5	50.0	32.4	4,446	Yes		
	VV Non-Participating	655,758	5,368,066	719.3	1.5	50.0	27.6	5,356	Yes		
	WW Participating	656,662	5,372,675	722.4	1.5	50.0	29.8	5,602	Yes		
	XX Non-Participating	656,251	5,368,598	741.7	1.5	50.0	27.5	5,594	Yes		
	YY Non-Participating	656,161	5,367,989	720.8	1.5	50.0	27.0	5,751	Yes		
	ZZ Non-Participating	656,215	5,367,523	716.3	1.5	50.0	26.5	6,015	Yes		

Distances (m)

WTG	X	HH	T	D	DD	NN	PP	G	Y	O	V	L	F	M	E	KK	K	I	B	N	AA	MM
5	11229	11701	8668	8402	10080	8159	6819	8979	6562	5296	4355	2873	3960	7044	7941	9947	5851	3086	1601	6344	7464	9154
6	11478	11902	8986	8689	10401	8530	7173	9335	6869	5669	4731	3233	4268	7281	8178	10062	6022	3344	1860	6496	7596	9243
12	9092	9697	6464	6205	7879	6778	5887	6897	4353	3531	2919	1036	1752	4960	5849	8294	4050	1058	782	4617	5786	7642
13	8660	9319	5979	5742	7393	6457	5686	6419	3875	3148	2657	803	1279	4564	5445	8041	3787	850	1250	4373	5544	7436
14	7896	8715	5009	4877	6409	5685	5183	5379	2955	2298	2148	1003	612	3962	4799	7780	3607	1349	2290	4213	5352	7299
15	8253	8934	5576	5329	6992	6328	5683	6072	3465	2966	2628	938	866	4173	5049	7733	3486	732	1614	4082	5249	7163
18	7268	8225	4207	4181	5589	5176	4961	4526	2233	1819	2122	1738	939	3557	4323	7600	3614	2057	3144	4206	5277	7231
20	7340	8448	4016	4201	5329	4449	4354	4001	2298	1147	1769	2107	1674	3930	4610	8081	4240	2761	3714	4816	5841	7782
22	7010	8166	3636	3866	4941	4386	4466	3633	2002	1263	2078	2485	1887	3738	4371	7928	4215	3019	4054	4773	5753	7678
24	6530	6959	4650	3991	6049	7477	7304	5893	2625	4172	4349	3044	1647	2320	3214	5599	1366	1725	3160	1971	3126	5061
26	6061	6436	4423	3659	5789	7726	7668	5839	2524	4491	4767	3553	2103	1860	2741	5087	910	2258	3681	1511	2638	4587
27	5756	6203	4066	3302	5429	7544	7572	5517	2200	4371	4733	3649	2144	1546	2439	5029	1037	2469	3925	1593	2646	4601
28	5528	5893	4094	3240	5420	7854	7926	5666	2366	4719	5104	4017	2518	1347	2211	4654	766	2790	4224	1263	2279	4232
29	5137	5440	3989	3038	5257	8118	8275	5700	2467	5060	5504	4471	2961	1045	1842	4227	794	3251	4677	1074	1923	3859
34	3006	3395	3192	1995	4022	8711	9321	5336	3001	6197	6934	6309	4769	1371	578	3330	2793	5309	6774	2627	2386	3557
35	2383	2858	3149	1994	3766	8924	9650	5335	3365	6583	7381	6855	5322	1946	1066	3351	3417	5908	7380	3229	2865	3758
36	2125	2457	3423	2307	3914	9276	10033	5611	3760	6978	7782	7251	5715	2329	1462	3161	3719	6282	7749	3484	2998	3673
37	14197	13772	13102	12333	14483	14409	13227	14208	11063	11215	10520	8702	8922	10382	11121	10830	8564	7768	6937	8629	9158	9760
38	13789	13406	12633	11877	14018	13913	12741	13720	10585	10717	10024	8205	8429	9937	10686	10508	8124	7273	6439	8207	8770	9442
39	13540	13245	12228	11515	13626	13317	12114	13242	10154	10152	9431	7630	7926	9606	10382	10436	7813	6767	5864	7941	8579	9380

To be continued on next page...

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:02 AM / 4

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 3:12 PM/2.9.285

DECIBEL - Main Result

Calculation: A059 V110/V117 No Grnd Atten. Generic Octave

...continued from previous page

Table with columns WTG, X, HH, T, D, DD, NN, PP, G, Y, O, V, L, F, M, E, KK, K, I, B, N, AA, MM and rows 40-317. Includes a second row of columns WTG, TT, SS, EE, BB, H, Z, S, A, OO, WW, FF, LL, JJ, GG, II, YY, VV, ZZ, QQ, C, R, J and rows 5, 6, 12.

To be continued on next page...

Project:
20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:
 EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page
 10/2/2015 10:02 AM / 5
 Licensed user:
EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 3:12 PM/2.9.285

DECIBEL - Main Result

Calculation: A059 V110/V117 No Grnd Atten. Generic Octave

...continued from previous page

WTG	TT	SS	EE	BB	H	Z	S	A	OO	WW	FF	LL	JJ	GG	II	YY	VV	ZZ	QQ	C	R	J
13	7975	7806	4734	4542	3550	4715	5206	7520	8371	9468	9051	10313	9439	8342	8466	12235	11928	12637	10713	787	8313	878
14	8012	7873	4894	4715	4571	4958	5716	8449	8898	9771	9829	11100	10161	9036	9158	12851	12562	13267	11370	1110	7400	1336
15	7759	7600	4552	4363	3859	4565	5174	7737	8354	9354	9167	10436	9524	8410	8533	12265	11967	12674	10763	555	7902	737
18	8079	7965	5119	4956	5406	5245	6184	9203	9342	10032	10462	11737	10750	9609	9729	13345	13073	13772	11902	1805	6640	2030
20	8694	8593	5809	5651	6022	5950	6919	9898	10073	10720	11196	12471	11488	10347	10468	14081	13810	14509	12641	2510	6511	2738
22	8641	8551	5845	5695	6345	6010	7049	10165	10180	10742	11394	12669	11663	10515	10635	14205	13942	14638	12785	2767	6137	2992
24	5775	5645	2765	2607	4708	2913	4023	7726	7102	7678	8541	9807	8723	7562	7678	11143	10893	11582	9762	1684	6592	1678
26	5372	5258	2521	2387	5129	2731	3996	7938	6981	7399	8590	9846	8723	7560	7673	11033	10799	11479	9696	2217	6227	2212
27	5470	5372	2762	2643	5458	3002	4317	8296	7260	7593	8925	10178	9044	7882	7993	11313	11085	11762	9994	2396	5876	2420
28	5128	5037	2541	2442	5649	2814	4204	8319	7066	7307	8834	10077	8920	7760	7869	11115	10898	11568	9826	2734	5766	2742
29	4832	4760	2507	2440	6038	2824	4294	8546	7027	7120	8930	10157	8973	7819	7925	11062	10860	11520	9818	3197	5489	3204
34	4922	4969	4004	4030	8186	4390	5943	10433	8156	7622	10458	11620	10367	9257	9348	12033	11892	12501	10981	5214	3729	5260
35	5171	5248	4565	4604	8813	4955	6505	11022	8598	7922	10976	12119	10856	9759	9848	12416	12291	12885	11415	5805	3264	5858
36	5103	5200	4759	4812	9137	5151	6692	11239	8662	7876	11106	12230	10957	9876	9961	12424	12312	12893	11466	6184	3249	6233
37	8968	8700	7329	7263	4649	6938	5445	863	5481	7843	3130	3748	3954	3846	3892	6873	6463	7046	5390	8019	14825	7798
38	8704	8434	6935	6861	4156	6545	5077	651	5370	7721	3244	4003	4057	3804	3863	7064	6656	7264	5537	7524	14382	7304
39	8734	8464	6738	6647	3554	6354	4953	1105	5639	7959	3768	4613	4561	4175	4248	7620	7215	7840	6065	7017	14050	6800
40	8279	8009	6297	6210	3375	5912	4500	940	5235	7539	3526	4463	4294	3822	3903	7388	6987	7629	5811	6724	13653	6505
41	8067	7797	6223	6148	3653	5834	4378	582	4904	7226	3128	4075	3898	3450	3527	6990	6589	7232	5414	6890	13670	6667
42	7417	7149	5894	5845	4202	5502	3973	706	4037	6383	2248	3297	2991	2528	2603	6101	5704	6360	4511	7113	13498	6886
43	7172	6902	5567	5515	3942	5175	3655	954	3924	6247	2409	3526	3104	2514	2601	6226	5836	6505	4623	6781	13158	6554
45	6742	6472	5094	5042	3763	4702	3182	1418	3649	5932	2532	3728	3144	2392	2493	6253	5873	6558	4640	6416	12693	6188
66	6934	6717	3730	3542	1821	3540	3443	5377	6468	7889	6890	8147	7312	6244	6367	10191	9866	10576	8636	2038	9470	1821
67	6781	6576	3530	3336	2299	3385	3507	5812	6616	7907	7219	8484	7603	6510	6633	10421	10107	10817	8887	1586	8990	1362
68	6378	6174	3125	2931	2541	2984	3175	5792	6317	7543	7057	8329	7405	6293	6416	10170	9864	10573	8654	1666	8774	1438
69	6298	6104	3027	2831	2870	2927	3290	6117	6460	7588	7318	8591	7640	6516	6638	10358	10060	10767	8859	1412	8432	1190
70	5286	5069	2118	1938	3046	1898	2013	5341	5186	6352	6209	7483	6467	5324	5445	9110	8821	9526	7633	2648	8768	2437
84	7312	7076	4271	4099	884	4007	3492	4478	6230	7907	6235	7460	6740	5743	5865	9730	9384	10090	8140	3035	10472	2826
85	7729	7495	4653	4476	667	4403	3928	4680	6652	8345	6561	7770	7092	6119	6240	10108	9756	10460	8511	3034	10626	2840
98	9247	9169	6541	6398	7041	6722	7795	10909	10915	11420	12152	13428	12419	11270	11390	14946	14686	15381	13534	3513	5989	3739
99	9232	9166	6626	6492	7377	6828	7957	11193	11050	11473	12371	13645	12615	11461	11580	15091	14840	15530	13701	3797	5620	4020
100	9125	9089	6801	6690	8172	7050	8311	11835	11308	11521	12837	14106	13023	11862	11977	15361	15132	15810	14029	4508	4649	4719
101	9409	9384	7180	7075	8637	7440	8726	12292	11698	11851	13270	14537	13445	12283	12397	15750	15526	16201	14433	4973	4443	5183
104	6242	6058	2972	2777	3192	2916	3435	6436	6617	7650	7579	8854	7879	6745	6867	10552	10262	10967	9070	1208	8102	1003
105	6368	6219	3213	3033	4112	3278	4140	7432	7302	8091	8482	9756	8736	7587	7707	11302	11030	11729	9864	919	7189	901
150	9533	9533	7568	7482	9428	7858	9222	12971	12097	12079	13818	15077	13949	12786	12898	16136	15930	16593	14871	5741	3704	5943
151	5309	5079	2261	2098	2867	1982	1767	4930	4898	6189	5811	7086	6088	4953	5074	8777	8480	9187	7282	2984	9157	2767
152	5382	5143	2458	2310	2727	2143	1641	4575	4690	6095	5483	6758	5781	4655	4778	8516	8211	8920	7004	3272	9500	3050
154	6127	5890	3134	2972	1999	2847	2348	4462	5269	6797	5730	6996	6118	5035	5159	8974	8651	9361	7423	3018	9823	2789
155	6920	6682	3900	3731	1227	3627	3099	4400	5880	7523	6012	7254	6484	5460	5583	9441	9100	9808	7860	3015	10277	2795
156	6466	6230	3440	3272	1686	3166	2691	4495	5574	7136	5911	7170	6333	5271	5395	9230	8900	9610	7667	2914	9948	2687
158	5858	5692	2634	2446	3816	2658	3462	6870	6627	7465	7828	9101	8068	6916	7036	10624	10352	11051	9187	1366	7498	1239
164	7261	7001	4682	4554	1559	4331	3242	2848	5269	7263	4740	5924	5324	4438	4553	8400	8032	8727	6789	4588	11667	4368
165	8708	8452	5954	5803	1193	5633	4694	3435	6715	8756	5807	6879	6485	5729	5836	9605	9220	9896	7993	4885	12443	4694
166	9110	8856	6316	6161	1372	6003	5102	3716	7132	9178	6156	7201	6851	6121	6227	9973	9585	10257	8364	5019	12660	4839
171	8629	8429	5363	5167	2457	5241	5306	6657	8322	9743	8519	9742	9014	7993	8116	11970	11632	12341	10393	2031	9763	1970
173	8911	8706	5655	5460	2330	5515	5491	6556	8448	9941	8513	9721	9037	8042	8164	12028	11683	12390	10440	2417	10144	2352
174	9204	8995	5958	5764	2302	5805	5711	6518	8614	10166	8561	9751	9109	8140	8261	12129	11778	12482	10533	2779	10495	2714
175	5953	5976	4547	4528	8103	4909	6438	10766	8925	8590	11048	12249	11029	9891	9991	12881	12717	13347	11751	4800	3269	4891
176	6318	6350	4962	4942	8432	5324	6851	11161	9338	8976	11463	12665	11445	10307	10407	13289	13127	13755	12165	5056	2892	5160
177	6266	6315	5119	5112	8757	5490	7030	11397	9425	8965	11620	12810	11577	10448	10544	13342	13192	13810	12254	5422	2630	5521
178	6318	6383	5376	5381	9141	5753	7302	11711	9607	9049	11866	13042	11798	10678	10773	13487	13347	13955	12434	5830	2329	5926
179	6562	6638	5728	5736	9506	6107	7657	12078	9924	9311	12211	13381	12133	11018	11111	13782	13649	14251	12749	6173	1974	6274
180	6907	6988	6082	6089	9790	6461	8010	12417	10287	9662	12569											

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:02 AM / 6

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 3:12 PM/2.9.285

DECIBEL - Main Result

Calculation: A059 V110/V117 No Grnd Atten. Generic Octave

...continued from previous page

WTG	TT	SS	EE	BB	H	Z	S	A	OO	WW	FF	LL	JJ	GG	II	YY	VV	ZZ	QQ	C	R	J
304	9375	9319	6860	6732	7767	7076	8247	11557	11315	11672	12695	13969	12924	11768	11886	15363	15118	15805	13988	4168	5354	4389
305	9632	9623	7565	7472	9241	7844	9178	12845	12094	12142	13754	15016	13904	12741	12854	16140	15927	16595	14854	5565	4032	5771
306	9765	9748	7604	7503	9086	7870	9171	12752	12127	12240	13723	14990	13893	12730	12844	16178	15957	16630	14871	5428	4366	5639
307	9437	9185	6568	6407	1486	6270	5444	4150	7562	9583	6608	7646	7305	6571	6678	10426	10039	10710	8818	4983	12700	4817
308	7594	7335	4966	4831	1344	4623	3574	2923	5599	7607	4963	6122	5575	4723	4836	8667	8295	8986	7055	4619	11837	4404
309	7913	7655	5238	5097	1175	4902	3895	3052	5928	7943	5210	6344	5843	5019	5131	8946	8570	9257	7333	4651	11990	4443
310	8261	8003	5562	5419	1163	5232	4243	3149	6246	8282	5420	6524	6078	5290	5399	9191	8810	9492	7578	4784	12220	4582
311	7268	7052	4059	3870	1677	3873	3760	5460	6756	8211	7080	8327	7528	6477	6600	10439	10108	10817	8874	2045	9629	1842
312	7602	7386	4392	4202	1559	4208	4069	5529	7029	8522	7251	8488	7725	6693	6816	10667	10331	11039	9093	2137	9824	1954
313	7945	7725	4754	4565	1334	4557	4337	5456	7227	8791	7300	8520	7807	6804	6927	10790	10446	11152	9203	2434	10170	2267
314	7233	7119	4297	4139	5189	4440	5460	8753	8591	9209	9848	11122	10094	8942	9061	12615	12353	13048	11199	1502	6375	1687
315	5688	5453	2698	2539	2442	2406	1971	4609	4992	6425	5669	6943	6002	4890	5013	8783	8471	9181	7256	3055	9542	2829
316	6126	5953	2877	2684	3528	2865	3535	6723	6716	7649	7791	9066	8064	6922	7042	10684	10403	11105	9223	1151	7766	988
317	5611	5454	2432	2251	4123	2499	3444	7049	6576	7311	7901	9171	8108	6950	7068	10597	10335	11030	9186	1611	7220	1514
WTG	P	UU	CC	XX	RR	Q	W	U														
5	3791	8943	6114	11586	10686	10914	9965	9838														
6	3438	8934	6060	11388	10436	11171	10296	10167														
12	5363	7944	5516	11660	11155	8762	7778	7648														
13	5811	7882	5589	11823	11399	8324	7290	7160														
14	6835	8059	6066	12407	12126	7537	6284	6158														
15	6123	7716	5543	11837	11487	7914	6897	6765														
18	7669	8236	6504	12879	12713	6892	5447	5325														
20	8284	8898	7236	13612	13451	6945	5129	5020														
22	8609	8891	7350	13726	13622	6609	4738	4629														
24	6802	5884	4292	10651	10662	6245	6102	5949														
26	7165	5553	4221	10523	10642	5790	5881	5725														
27	7512	5714	4527	10796	10956	5475	5524	5368														
28	7652	5407	4384	10589	10814	5266	5547	5389														
29	7994	5188	4432	10523	10841	4891	5423	5264														
34	10096	5657	5964	11450	12113	2801	4351	4201														
35	10720	5982	6505	11826	12568	2196	4145	4004														
36	11011	5962	6670	11829	12636	1998	4320	4186														
37	2727	8009	5581	6850	5157	14045	14557	14403														
38	2293	7770	5239	7000	5411	13628	14086	13933														
39	1631	7845	5163	7523	6014	13362	13676	13524														
40	1712	7393	4707	7260	5846	12942	13317	13164														
41	2104	7157	4553	6864	5453	12913	13393	13239														
42	2972	6461	4073	5954	4635	12639	13360	13204														
43	2878	6234	3770	6047	4830	12309	13015	12858														
45	2989	5822	3302	6029	4969	11837	12570	12413														
66	3976	6580	3861	9812	9262	9107	8824	8679														
67	4467	6500	3914	10022	9562	8652	8334	8188														
68	4627	6108	3574	9756	9368	8376	8201	8053														
69	4974	6085	3674	9931	9605	8053	7854	7705														
70	4751	4948	2399	8672	8429	8145	8472	8317														
84	2949	6819	3908	9400	8653	10056	9852	9707														
85	2908	7250	4345	9788	8988	10273	9926	9783														
98	9302	9545	8090	14462	14378	6652	4399	4309														
99	9640	9574	8238	14598	14569	6338	3998	3911														
100	10433	9577	8553	14844	14958	5499	2968	2884														
101	10898	9896	8959	15227	15374	5419	2647	2581														
104	5309	6086	3803	10113	9843	7745	7517	7368														
105	6281	6380	4463	10836	10694	6946	6526	6379														
150	11681	10106	9424	15597	15856	4865	1785	1742														
151	4432	4889	2176	8352	8052	8500	8885	8729														
152	4153	4895	2061	8104	7746	8822	9241	9086														
154	3630	5641	2769	8594	8075	9253	9413	9261														

To be continued on next page...

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.

Kevin Walter

Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:02 AM / 7

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000

wind@eapc.net

Calculated:

10/1/2015 3:12 PM/2.9.285

DECIBEL - Main Result**Calculation:** A059 V110/V117 No Grnd Atten. Generic Octave

...continued from previous page

WTG	P	UU	CC	XX	RR	Q	W	U
155	3110	6423	3516	9096	8414	9808	9727	9579
156	3454	5987	3111	8863	8282	9430	9469	9319
158	5893	5799	3788	10159	10024	7108	6989	6838
164	1890	6562	3588	8129	7177	11072	11229	11079
165	1100	8043	5059	9388	8218	12016	11781	11637
166	1192	8456	5470	9768	8555	12279	11939	11798
171	4631	8365	5722	11615	10934	9720	8738	8610
173	4425	8613	5910	11690	10940	10106	9102	8975
174	4289	8880	6132	11806	10994	10467	9430	9305
175	10150	6612	6526	12312	12839	2892	3417	3260
176	10503	7000	6941	12718	13254	2672	3012	2856
177	10805	6996	7100	12765	13362	2287	3006	2856
178	11172	7093	7353	12904	13560	1874	2976	2835
179	11541	7366	7702	13196	13883	1567	2801	2670
180	11844	7720	8058	13555	14245	1463	2516	2393
183	10117	9497	8370	14688	14757	5738	3315	3227
184	6603	6206	4459	10835	10771	6558	6227	6078
205	1442	8210	5490	7895	6347	13592	13816	13666
206	2411	6813	4266	6520	5167	12707	13278	13123
300	10424	5961	6319	11773	12456	2461	4075	3928
302	7706	8543	6755	13125	12919	7150	5571	5454
303	7203	8065	6199	12564	12343	7193	5886	5760
304	10031	9756	8517	14862	14874	6159	3664	3585
305	11499	10175	9393	15608	15821	5158	2121	2079
306	11348	10279	9400	15652	15819	5467	2457	2415
307	1569	8811	5823	10221	9003	12378	11907	11770
308	1619	6903	3926	8410	7400	11282	11345	11196
309	1405	7232	4252	8700	7643	11475	11445	11298
310	1173	7582	4601	8960	7844	11739	11628	11483
311	3900	6914	4179	10071	9469	9315	8918	8775
312	3818	7243	4489	10310	9655	9554	9054	8913
313	3592	7559	4758	10451	9720	9925	9359	9221
314	7427	7398	5760	12136	12050	6431	5426	5289
315	3993	5219	2391	8381	7966	8919	9212	9058
316	5642	6027	3883	10232	10026	7414	7194	7044
317	6166	5600	3742	10119	10056	6793	6777	6623

Appendix H: windPRO V117 / V110 Sound Analysis with General Ground Attenuation

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 9:57 AM / 1

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 3:47 PM/2.9.285

DECIBEL - Main Result

Calculation: A059 V110/V117 Gen Grnd Atten. 0.5 Generic Octave

Noise calculation model:

ISO 9613-2 General

Wind speed:

95% rated power

Ground attenuation:

General, Ground factor: 0.5

Meteorological coefficient, C0:

0.0 dB

Type of demand in calculation:

1: WTG noise is compared to demand (DK, DE, SE, NL etc.)

Noise values in calculation:

All noise values are mean values (Lwa) (Normal)

Pure tones:

Pure and Impulse tone penalty are added to WTG source noise

Height above ground level, when no value in NSA object:

1.5 m Don't allow override of model height with height from NSA object

Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:

0.0 dB(A)



Scale 1:400,000

▲ New WTG

■ Noise sensitive area

WTGs

UTM NAD83 Zone: 13			Row data/Description	WTG type			Noise data			Wind speed [m/s]	Status	Lwa,ref [dB(A)]	Pure tones	
East	North	Z [m]		Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]					Creator
5	646,913	5,375,455	745.7 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
6	646,888	5,375,080	743.7 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
12	648,327	5,377,151	750.2 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
13	648,563	5,377,579	749.6 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
14	648,872	5,378,572	753.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
15	648,872	5,377,853	752.9 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
18	649,189	5,379,368	749.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
20	648,867	5,380,033	744.0 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
22	649,124	5,380,328	729.3 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
24	651,007	5,377,868	749.0 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
26	651,525	5,378,000	751.5 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
27	651,616	5,378,348	758.6 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
28	651,987	5,378,290	755.5 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
29	652,436	5,378,405	749.8 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
34	654,047	5,379,834	743.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
35	654,478	5,380,290	740.5 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
36	654,876	5,380,346	731.4 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
37	649,468	5,369,552	735.9 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
38	649,403	5,370,046	745.2 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
39	648,989	5,370,563	740.7 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
40	649,348	5,370,846	749.8 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
41	649,714	5,370,690	746.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
42	650,635	5,370,574	746.1 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
43	650,667	5,370,918	744.1 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
45	650,882	5,371,340	743.7 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
66	649,309	5,375,532	733.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
67	649,484	5,375,990	732.9 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
68	649,889	5,375,994	741.6 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
69	650,008	5,376,321	740.1 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
70	650,956	5,375,465	751.0 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
84	648,982	5,374,557	737.6 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
85	648,553	5,374,643	733.1 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
98	648,903	5,381,054	722.4 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
99	649,170	5,381,363	721.7 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
100	649,950	5,382,038	713.8 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
101	650,030	5,382,496	712.8 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
104	650,119	5,376,639	740.5 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
105	650,267	5,377,632	746.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
150	650,663	5,383,159	707.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
151	650,947	5,375,049	753.4 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h
152	650,911	5,374,694	758.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
154	650,163	5,374,664	746.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated (95%)	User value	107.5	0 dB h
155	649,378	5,374,555	741.3 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge (95%)	User value	108.5	0 dB h

To be continued on next page...

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 9:57 AM / 2

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 3:47 PM/2.9.285

DECIBEL - Main Result

Calculation: A059 V110/V117 Gen Grnd Atten. 0.5 Generic Octave

...continued from previous page

UTM NAD83 Zone: 13			Row data/Description	WTG type		Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Noise data		Wind speed [m/s]	Status	LwA,ref [dB(A)]	Pure tones
East	North	Z		Valid	Manufact.				Type-generator	Creator				
156	649,818	5,374,694	743.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
158	650,613	5,377,049	737.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
164	649,406	5,372,982	725.6 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
165	647,909	5,372,903	716.3 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge	(95%) User value	108.5	0 dB h
166	647,487	5,372,910	715.6 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge	(95%) User value	108.5	0 dB h
171	647,671	5,376,427	743.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
173	647,364	5,376,192	740.7 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge	(95%) User value	108.5	0 dB h
174	647,056	5,376,002	741.8 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge	(95%) User value	108.5	0 dB h
175	653,143	5,380,511	713.2 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
176	653,130	5,380,927	710.2 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
177	653,497	5,381,062	704.1 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
178	653,850	5,381,276	700.7 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge	(95%) User value	108.5	0 dB h
179	654,022	5,381,604	696.2 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge	(95%) User value	108.5	0 dB h
180	654,011	5,381,966	694.9 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge	(95%) User value	108.5	0 dB h
183	649,728	5,381,758	721.2 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge	(95%) User value	108.5	0 dB h
184	650,599	5,377,842	746.4 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge	(95%) User value	108.5	0 dB h
205	648,594	5,370,523	731.5 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge	(95%) User value	108.5	0 dB h
206	650,092	5,370,737	743.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
300	654,134	5,380,179	734.1 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
302	648,870	5,379,451	759.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
303	649,079	5,378,913	759.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
304	649,308	5,381,738	716.8 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge	(95%) User value	108.5	0 dB h
305	650,346	5,383,045	709.5 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
306	650,021	5,382,956	710.0 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge	(95%) User value	108.5	0 dB h
307	647,090	5,373,129	713.2 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge	(95%) User value	108.5	0 dB h
308	649,061	5,372,960	722.4 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
309	648,724	5,372,961	720.3 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
310	648,383	5,372,885	719.3 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
311	648,975	5,375,560	734.6 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
312	648,641	5,375,554	726.9 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
313	648,297	5,375,376	728.5 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge	(95%) User value	108.5	0 dB h
314	649,928	5,378,956	741.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
315	650,591	5,374,779	748.6 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
316	650,301	5,376,922	735.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%) User value	107.5	0 dB h
317	650,917	5,377,197	740.0 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	84.0	USER	Noise Mode 0 - No Trailing Edge	(95%) User value	108.5	0 dB h

h) Generic octave distribution used

Calculation Results

Sound Level

Noise sensitive area			UTM NAD83 Zone: 13			Demands		Sound Level		Demands fulfilled ?	
No.	Name	East	North	Z	Imission height	Noise	From WTGs	Distance to noise demand	Noise		Noise
				[m]	[m]	[dB(A)]	[dB(A)]	[m]			
A	Participating	650,034	5,370,204	742.6	1.5	50.0	46.5	277	Yes		
B	Participating	648,222	5,376,376	731.5	1.5	50.0	45.7	331	Yes		
C	Participating	649,350	5,377,570	737.6	1.5	50.0	45.5	338	Yes		
D	Participating	652,833	5,381,417	705.0	1.5	50.0	43.9	353	Yes		
E	Participating	653,476	5,379,925	741.5	1.5	50.0	44.8	354	Yes		
F	Participating	649,476	5,378,474	747.0	1.5	50.0	46.1	341	Yes		
G	Participating	650,400	5,383,729	711.5	1.5	50.0	43.1	398	Yes		
H	Participating	648,263	5,374,042	728.5	1.5	50.0	44.7	418	Yes		
I	Participating	649,372	5,377,319	734.6	1.5	50.0	45.1	509	Yes		
J	Participating	649,411	5,377,350	734.6	1.5	50.0	45.2	516	Yes		
K	Participating	652,350	5,377,616	735.4	1.5	50.0	43.7	495	Yes		
L	Participating	647,974	5,378,125	736.6	1.5	50.0	42.7	579	Yes		
M	Participating	652,746	5,379,403	722.4	1.5	50.0	41.2	823	Yes		
N	Non-Participating	652,934	5,377,454	728.5	1.5	50.0	40.0	845	Yes		
O	Participating	647,905	5,380,657	723.4	1.5	50.0	40.6	837	Yes		
P	Non-Participating	647,929	5,371,803	716.8	1.5	50.0	41.2	841	Yes		
Q	Non-Participating	655,444	5,382,262	682.8	1.5	50.0	36.5	1,226	Yes		
R	Non-Participating	654,346	5,383,551	675.6	1.5	50.0	34.7	1,398	Yes		
S	Participating	652,445	5,374,111	759.0	1.5	50.0	37.1	1,404	Yes		

To be continued on next page...

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 9:57 AM / 3

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 3:47 PM/2.9.285

DECIBEL - Main Result

Calculation: A059 V110/V117 Gen Grnd Atten. 0.5 Generic Octave

...continued from previous page

Noise sensitive area		UTM NAD83 Zone: 13			Demands			Sound Level		Demands fulfilled ?	
No.	Name	East	North	Z	Imission height	Noise	From WTGs	Distance to noise demand	Noise		
				[m]	[m]	[dB(A)]	[dB(A)]	[m]			
	T Non-Participating	652,124	5,382,382	698.0	1.5	50.0	38.0	1,447	Yes		
	U Non-Participating	652,329	5,383,668	691.9	1.5	50.0	35.3	1,540	Yes		
	V Participating	647,113	5,379,805	712.6	1.5	50.0	37.3	1,521	Yes		
	W Non-Participating	652,318	5,383,827	691.2	1.5	50.0	35.0	1,583	Yes		
	X Non-Participating	655,873	5,382,222	689.2	1.5	50.0	34.8	1,639	Yes		
	Y Non-Participating	651,119	5,380,491	705.0	1.5	50.0	39.3	1,615	Yes		
	Z Non-Participating	652,848	5,375,611	736.1	1.5	50.0	37.1	1,649	Yes		
	AA Participating	654,105	5,377,449	726.3	1.5	50.0	35.8	1,700	Yes		
	BB Non-Participating	652,820	5,375,995	733.4	1.5	50.0	37.4	1,695	Yes		
	CC Participating	652,849	5,373,992	753.0	1.5	50.0	35.6	1,823	Yes		
	DD Non-Participating	652,780	5,383,651	684.1	1.5	50.0	34.9	1,861	Yes		
	EE Non-Participating	653,014	5,375,966	734.6	1.5	50.0	36.8	1,874	Yes		
	FF Non-Participating	652,597	5,369,477	749.8	1.5	50.0	32.9	2,029	Yes		
	GG Participating	653,163	5,370,620	746.2	1.5	50.0	32.8	2,164	Yes		
	HH Non-Participating	657,270	5,380,900	701.0	1.5	50.0	31.5	2,237	Yes		
	II Participating	653,237	5,370,521	746.8	1.5	50.0	32.5	2,265	Yes		
	JJ Non-Participating	653,421	5,369,486	746.6	1.5	50.0	30.9	2,768	Yes		
	KK Non-Participating	656,603	5,377,699	728.9	1.5	50.0	31.1	2,937	Yes		
	LL Non-Participating	652,987	5,368,263	755.9	1.5	50.0	29.9	3,082	Yes		
	MM Non-Participating	655,962	5,376,837	710.2	1.5	50.0	31.4	3,351	Yes		
	NN Non-Participating	646,183	5,383,581	712.5	1.5	50.0	30.7	3,370	Yes		
	OO Participating	654,514	5,371,692	765.0	1.5	50.0	30.5	3,428	Yes		
	PP Non-Participating	644,980	5,381,994	704.1	1.5	50.0	30.2	3,795	Yes		
	QQ Participating	654,816	5,368,880	743.7	1.5	50.0	27.7	4,289	Yes		
	RR Non-Participating	654,290	5,367,724	742.3	1.5	50.0	27.2	4,418	Yes		
	SS Non-Participating	656,021	5,375,274	710.2	1.5	50.0	30.1	4,536	Yes		
	TT Non-Participating	656,242	5,375,429	710.2	1.5	50.0	29.9	4,608	Yes		
	UU Non-Participating	655,800	5,374,456	722.8	1.5	50.0	30.0	4,615	Yes		
	VV Non-Participating	655,758	5,368,066	719.3	1.5	50.0	25.8	5,483	Yes		
	WW Participating	656,662	5,372,675	722.4	1.5	50.0	27.7	5,713	Yes		
	XX Non-Participating	656,251	5,368,598	741.7	1.5	50.0	25.6	5,729	Yes		
	YY Non-Participating	656,161	5,367,989	720.8	1.5	50.0	25.3	5,879	Yes		
	ZZ Non-Participating	656,215	5,367,523	716.3	1.5	50.0	24.8	6,140	Yes		

Distances (m)

WTG	X	HH	T	D	DD	NN	PP	G	Y	O	V	L	F	M	E	KK	K	I	B	N	AA	MM
5	11229	11701	8668	8402	10080	8159	6819	8979	6562	5296	4355	2873	3960	7044	7941	9947	5851	3086	1601	6344	7464	9154
6	11478	11902	8986	8689	10401	8530	7173	9335	6869	5669	4731	3233	4268	7281	8178	10062	6022	3344	1860	6496	7596	9243
12	9092	9697	6464	6205	7879	6778	5887	6897	4353	3531	2919	1036	1752	4960	5849	8294	4050	1058	782	4617	5786	7642
13	8660	9319	5979	5742	7393	6457	5686	6419	3875	3148	2657	803	1279	4564	5445	8041	3787	850	1250	4373	5544	7436
14	7896	8715	5009	4877	6409	5685	5183	5379	2955	2298	2148	1003	612	3962	4799	7780	3607	1349	2290	4213	5352	7299
15	8253	8934	5576	5329	6992	6328	5683	6072	3465	2966	2628	938	866	4173	5049	7733	3486	732	1614	4082	5249	7163
18	7268	8225	4207	4181	5589	5176	4961	4526	2233	1819	2122	1738	939	3557	4323	7600	3614	2057	3144	4206	5277	7231
20	7340	8448	4016	4201	5329	4449	4354	4001	2298	1147	1769	2107	1674	3930	4610	8081	4240	2761	3714	4816	5841	7782
22	7010	8166	3636	3866	4941	4386	4466	3633	2002	1263	2078	2485	1887	3738	4371	7928	4215	3019	4054	4773	5753	7678
24	6530	6959	4650	3991	6049	7477	7304	5893	2625	4172	4349	3044	1647	2320	3214	5599	1366	1725	3160	1971	3126	5061
26	6061	6436	4423	3659	5789	7726	7668	5839	2524	4491	4767	3553	2103	1860	2741	5087	910	2258	3681	1511	2638	4587
27	5756	6203	4066	3302	5429	7544	7572	5517	2200	4371	4733	3649	2144	1546	2439	5029	1037	2469	3925	1593	2646	4601
28	5528	5893	4094	3240	5420	7854	7926	5666	2366	4719	5104	4017	2518	1347	2211	4654	766	2790	4224	1263	2279	4232
29	5137	5440	3989	3038	5257	8118	8275	5700	2467	5060	5504	4471	2961	1045	1842	4227	794	3251	4677	1074	1923	3859
34	3006	3395	3192	1995	4022	8711	9321	5336	3001	6197	6934	6309	4769	1371	578	3330	2793	5309	6774	2627	2386	3557
35	2383	2858	3149	1994	3766	8924	9650	5335	3365	6583	7381	6855	5322	1946	1066	3351	3417	5908	7380	3229	2865	3758
36	2125	2457	3423	2307	3914	9276	10033	5611	3760	6978	7782	7251	5715	2329	1462	3161	3719	6282	7749	3484	2998	3673
37	14197	13772	13102	12333	14483	14409	13227	14208	11063	11215	10520	8702	8922	10382	11121	10830	8564	7768	6937	8629	9158	9760
38	13789	13406	12633	11877	14018	13913	12741	13720	10585	10717	10024	8205	8429	9937	10686	10508	8124	7273	6439	8207	8770	9442
39	13540	13245	12228	11515	13626	13317	12114	13242	10154	10152	9431	7630	7926	9606	10382	10436	7813	6767	5864	7941	8579	9380

To be continued on next page...

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 9:57 AM / 4

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 3:47 PM/2.9.285

DECIBEL - Main Result

Calculation: A059 V110/V117 Gen Grnd Atten. 0.5 Generic Octave

...continued from previous page

WTG	X	HH	T	D	DD	NN	PP	G	Y	O	V	L	F	M	E	KK	K	I	B	N	AA	MM
40	13115	12800	11866	11131	13257	13123	11974	12926	9807	9917	9234	7408	7629	9207	9974	9980	7406	6473	5644	7519	8138	8924
41	13074	12702	11938	11172	13319	13366	12256	13057	9902	10130	9479	7636	7788	9226	9972	9828	7411	6638	5879	7492	8060	8765
42	12772	12274	11902	11064	13252	13748	12744	13158	9929	10446	9880	8006	7985	9078	9773	9295	7248	6862	6284	7254	7701	8222
43	12446	11969	11557	10720	12908	13434	12451	12814	9584	10123	9572	7694	7650	8736	9435	9012	6906	6531	5981	6918	7381	7942
45	11972	11498	11112	10264	12457	13112	12180	12399	9154	9781	9266	7382	7271	8276	8969	8554	6446	6167	5696	6449	6907	7485
66	9373	9602	7406	6860	8830	8635	7778	8270	5279	5314	4804	2917	2947	5177	6055	7609	3687	1788	1376	4103	5165	6780
67	8925	9205	6916	6377	8340	8278	7506	7793	4789	4927	4492	2615	2484	4721	5606	7321	3295	1334	1320	3748	4846	6533
68	8637	8863	6768	6171	8185	8444	7753	7752	4662	5068	4715	2865	2514	4448	5322	6927	2948	1422	1710	3377	4460	6131
69	8320	8585	6420	5827	7837	8206	7581	7419	4316	4819	4530	2719	2218	4123	5002	6738	2676	1183	1787	3138	4250	5976
70	8357	8331	7015	6241	8387	9416	8851	8283	5029	6022	5797	3996	3353	4326	5123	6073	2563	2439	2882	2805	3722	5191
84	10308	10437	8433	7867	9856	9448	8446	9281	6307	6195	5571	3708	3948	6136	7001	8244	4550	2790	1971	4900	5883	7343
85	10537	10730	8523	8013	9951	9247	8174	9272	6386	6049	5359	3530	3941	6344	7221	8611	4823	2799	1764	5205	6221	7727
98	7067	8369	3484	3947	4667	3713	4034	3066	2286	1074	2183	3073	2643	4183	4710	8399	4869	3764	4727	5405	6329	8223
99	6758	8113	3125	3664	4274	3721	4237	2667	2135	1449	2580	3452	2905	4078	4540	8287	4915	4049	5076	5427	6299	8162
100	5926	7408	2201	2949	3258	4071	4970	1750	1939	2468	3610	4384	3595	3842	4111	7943	5031	4754	5920	5470	6191	7950
101	5850	7414	2097	3004	2983	3997	5075	1287	2282	2810	3969	4831	4060	4116	4300	8138	5404	5219	6382	5819	6487	8199
104	8018	8324	6083	5495	7500	7980	7422	7096	3980	4588	4366	2610	1944	3813	4698	6570	2436	1010	1915	2931	4068	5847
105	7246	7728	5100	4573	6523	7216	6854	6099	2983	3838	3830	2345	1155	3047	3944	6337	2083	948	2400	2673	3842	5750
150	5294	6983	1655	2783	2173	4500	5801	628	2707	3724	4884	5707	4833	4295	4286	8068	5794	5981	7209	6141	6667	8249
151	8702	8615	7427	6642	8795	9772	9157	8697	5445	6380	6109	4278	3728	4711	5493	6246	2925	2763	3031	3120	3967	5324
152	9017	8886	7783	6993	9150	10067	9406	9050	5801	6678	6368	4517	4043	5054	5826	6437	3257	3043	3172	3422	4218	5487
154	9473	9455	7963	7262	9361	9765	8978	9068	5905	6404	5978	4095	3872	5397	6217	7120	3674	2770	2588	3932	4827	6193
155	10049	10127	8295	7683	9712	9575	8642	9231	6186	6277	5718	3836	3920	5903	6755	7880	4267	2764	2157	4588	5543	6968
156	9661	9698	8027	7368	9434	9602	8758	9054	5941	6263	5783	3895	3796	5545	6383	7421	3867	2663	2319	4163	5096	6507
158	7378	7691	5543	4900	6949	7893	7496	6684	3479	4511	4455	2850	1823	3177	4058	6025	1827	1270	2484	2356	3515	5353
164	11279	11160	9785	9105	11190	11079	10041	10793	7702	7821	7198	5339	5493	7238	8048	8605	5490	4337	3595	5696	6484	7606
165	12259	12312	10374	9836	11801	10817	9551	11109	8239	7754	6948	5223	5787	8103	8961	9929	6476	4652	3487	6780	7685	8963
166	12532	12632	10546	10048	11975	10751	9424	11205	8406	7759	6905	5238	5909	8356	9224	10298	6767	4795	3543	7094	8025	9341
171	10043	10590	7436	7180	8848	7307	6183	7796	5330	4237	3424	1725	2729	5883	6778	9022	4828	1921	553	5362	6515	8301
173	10429	10968	7809	7564	9218	7483	6273	8126	5708	4498	3622	2027	3109	6267	7162	9361	5186	2303	878	5711	6857	8622
174	10791	11328	8148	7918	9554	7629	6342	8420	6055	4732	3804	2313	3459	6629	7524	9697	5535	2664	1225	6055	7196	8945
175	3222	4145	2131	958	3161	7607	8297	4229	2024	5240	6071	5693	4195	1177	674	4459	3002	4941	6428	3064	3210	4631
176	3033	4140	1769	573	2746	7437	8220	3912	2058	5232	6121	5868	4401	1572	1060	4742	3402	5210	6693	3479	3612	4975
177	2644	3777	1905	753	2687	7736	8568	4087	2446	5607	6507	6256	4782	1821	1137	4578	3632	5570	7056	3652	3664	4892
178	2233	3441	2050	1027	2605	8006	8899	4233	2842	5977	6896	6668	5195	2174	1402	4514	3956	5976	7462	3930	3836	4916
179	1952	3324	2051	1204	2394	8085	9051	4199	3109	6190	7140	6977	5519	2544	1766	4681	4324	6323	7809	4290	4156	5147
180	1880	3429	1932	1300	2087	7993	9031	4019	3247	6245	7229	7156	5724	2858	2110	4993	4656	6566	8048	4639	4518	5488
183	6163	7591	2476	3124	3592	3986	4754	2082	1882	2130	3264	4034	3294	3828	4172	7984	4902	4453	5589	5367	6142	7942
184	6856	7339	4789	4216	6205	7242	6987	5891	2700	3897	4001	2640	1289	2655	3552	6006	1766	1334	2793	2367	3528	5457
205	13779	13527	12374	11690	13780	13279	12027	13329	10283	10158	9400	7627	8000	9803	10594	10754	8026	6841	5865	8178	7685	9704
206	12858	12443	11821	11026	13191	13426	12364	12996	9808	10159	9545	7686	7762	9064	9792	9532	7240	6621	5941	7294	7820	8466
300	2683	3218	2982	1796	3727	8648	9332	5152	3031	6247	7031	6494	4960	1590	705	3500	3123	5555	7030	2978	2730	3809
302	7532	8524	4380	4424	5738	4927	4648	4544	2478	1545	1792	1600	1150	3876	4630	7929	3934	2190	3143	4528	5605	7559
303	7557	8429	4616	4513	6012	5494	5128	4994	2579	2102	2159	1357	592	3700	4512	7622	3519	1621	2678	4122	5235	7189
304	6583	8006	2889	3540	3964	3628	4336	2271	2199	1771	2925	3851	3268	4156	4545	8339	5123	4420	5471	5613	6435	8264
305	5588	7249	1898	2973	2508	4197	5468	686	2668	3415	4577	5462	4653	4362	4420	8230	5787	5808	6999	6161	6741	8372
306	5898	7535	2180	3206	2845	3889	5132	861	2699	3125	4288	5247	4515	4478	4596	8424	5826	5674	6822	6226	6856	8529
307	12643	12807	10534	10084	11962	10492	9113	11105	8393	7572	6676	5074	5854	8447	9326	10554	6914	4771	3439	7271	8239	9616
308	11498	11421	9908	9260	11320	11004	9913	10852	7807	7784	7117	5278	5530	7423	8247	8908	5701	4370	3518	5933	6752	7916
309	11700	11665	10016	9402	11434	10920	9778	10898	7702	7740	7031	5218	5564	7595	8431	9194	5901	4406	3452	6157	7007	8211
310	11970	11968	10208	9623	11630	10920	9724	11030	8083	7787	7036	5256	5695	7844	8689	9526	6174	4543	3495	6449	7319	8548
311	9590	9866	7514	7014	8941	8493	7574	8293	5377	5208	4636	2754	2957	5384	6270	7922	3952	1803	1110	4389	5467	7103
312	9837	10151	7665	7208	9094	8395	7408	8362	5524	5156	4517	2656	3037	5627	6518	8246	4244	1910	923	4695	5783	7433
313	10211	10537	7983	7555	9412	8473	7403															

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 9:57 AM / 5

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 3:47 PM/2.9.285

DECIBEL - Main Result

Calculation: A059 V110/V117 Gen Grnd Atten. 0.5 Generic Octave

...continued from previous page

WTG	TT	SS	EE	BB	H	Z	S	A	OO	WW	FF	LL	JJ	GG	II	YY	VV	ZZ	QQ	C	R	J
13	7975	7806	4734	4542	3550	4715	5206	7520	8371	9468	9051	10313	9439	8342	8466	12235	11928	12637	10713	787	8313	878
14	8012	7873	4894	4715	4571	4958	5716	8449	8898	9771	9829	11100	10161	9036	9158	12851	12562	13267	11370	1110	7400	1336
15	7759	7600	4552	4363	3859	4565	5174	7737	8354	9354	9167	10436	9524	8410	8533	12265	11967	12674	10763	555	7902	737
18	8079	7965	5119	4956	5406	5245	6184	9203	9342	10032	10462	11737	10750	9609	9729	13345	13073	13772	11902	1805	6640	2030
20	8694	8593	5809	5651	6022	5950	6919	9898	10073	10720	11196	12471	11488	10347	10468	14081	13810	14509	12641	2510	6511	2738
22	8641	8551	5845	5695	6345	6010	7049	10165	10180	10742	11394	12669	11663	10515	10635	14205	13942	14638	12785	2767	6137	2992
24	5775	5645	2765	2607	4708	2913	4023	7726	7102	7678	8541	9807	8723	7562	7678	11143	10893	11582	9762	1684	6592	1678
26	5372	5258	2521	2387	5129	2731	3996	7938	6981	7399	8590	9846	8723	7560	7673	11033	10799	11479	9696	2217	6227	2212
27	5470	5372	2762	2643	5458	3002	4317	8296	7260	7593	8925	10178	9044	7882	7993	11313	11085	11762	9994	2396	5876	2420
28	5128	5037	2541	2442	5649	2814	4204	8319	7066	7307	8834	10077	8920	7760	7869	11115	10898	11568	9826	2734	5766	2742
29	4832	4760	2507	2440	6038	2824	4294	8546	7027	7120	8930	10157	8973	7819	7925	11062	10860	11520	9818	3197	5489	3204
34	4922	4969	4004	4030	8186	4390	5943	10433	8156	7622	10458	11620	10367	9257	9348	12033	11892	12501	10981	5214	3729	5260
35	5171	5248	4565	4604	8813	4955	6505	11022	8598	7922	10976	12119	10856	9759	9848	12416	12291	12885	11415	5805	3264	5858
36	5103	5200	4759	4812	9137	5151	6692	11239	8662	7876	11106	12230	10957	9876	9961	12424	12312	12893	11466	6184	3249	6233
37	8968	8700	7329	7263	4649	6938	5445	863	5481	7843	3130	3748	3954	3846	3892	6873	6463	7046	5390	8019	14825	7798
38	8704	8434	6935	6861	4156	6545	5077	651	5370	7721	3244	4003	4057	3804	3863	7064	6656	7264	5537	7524	14382	7304
39	8734	8464	6738	6647	3554	6354	4953	1105	5639	7959	3768	4613	4561	4175	4248	7620	7215	7840	6065	7017	14050	6800
40	8279	8009	6297	6210	3375	5912	4500	940	5235	7539	3526	4463	4294	3822	3903	7388	6987	7629	5811	6724	13653	6505
41	8067	7797	6223	6148	3653	5834	4378	582	4904	7226	3128	4075	3898	3450	3527	6990	6589	7232	5414	6890	13670	6667
42	7417	7149	5894	5845	4202	5502	3973	706	4037	6383	2248	3297	2991	2528	2603	6101	5704	6360	4511	7113	13498	6886
43	7172	6902	5567	5515	3942	5175	3655	954	3924	6247	2409	3526	3104	2514	2601	6226	5836	6505	4623	6781	13158	6554
45	6742	6472	5094	5042	3763	4702	3182	1418	3649	5932	2532	3728	3144	2392	2493	6253	5873	6558	4640	6416	12693	6188
66	6934	6717	3730	3542	1821	3540	3443	5377	6468	7889	6890	8147	7312	6244	6367	10191	9866	10576	8636	2038	9470	1821
67	6781	6576	3530	3336	2299	3385	3507	5812	6616	7907	7219	8484	7603	6510	6633	10421	10107	10817	8887	1586	8990	1362
68	6378	6174	3125	2931	2541	2984	3175	5792	6317	7543	7057	8329	7405	6293	6416	10170	9864	10573	8654	1666	8774	1438
69	6298	6104	3027	2831	2870	2927	3290	6117	6460	7588	7318	8591	7640	6516	6638	10358	10060	10767	8859	1412	8432	1190
70	5286	5069	2118	1938	3046	1898	2013	5341	5186	6352	6209	7483	6467	5324	5445	9110	8821	9526	7633	2648	8768	2437
84	7312	7076	4271	4099	884	4007	3492	4478	6230	7907	6235	7460	6740	5743	5865	9730	9384	10090	8140	3035	10472	2826
85	7729	7495	4653	4476	667	4403	3928	4680	6652	8345	6561	7770	7092	6119	6240	10108	9756	10460	8511	3034	10626	2840
98	9247	9169	6541	6398	7041	6722	7795	10909	10915	11420	12152	13428	12419	11270	11390	14946	14686	15381	13534	3513	5989	3739
99	9232	9166	6626	6492	7377	6828	7957	11193	11050	11473	12371	13645	12615	11461	11580	15091	14840	15530	13701	3797	5620	4020
100	9125	9089	6801	6690	8172	7050	8311	11835	11308	11521	12837	14106	13023	11862	11977	15361	15132	15810	14029	4508	4649	4719
101	9409	9384	7180	7075	8637	7440	8726	12292	11698	11851	13270	14537	13445	12283	12397	15750	15526	16201	14433	4973	4443	5183
104	6242	6058	2972	2777	3192	2916	3435	6436	6617	7650	7579	8854	7879	6745	6867	10552	10262	10967	9070	1208	8102	1003
105	6368	6219	3213	3033	4112	3278	4140	7432	7302	8091	8482	9756	8736	7587	7707	11302	11030	11729	9864	919	7189	901
150	9533	9533	7568	7482	9428	7858	9222	12971	12097	12079	13818	15077	13949	12786	12898	16136	15930	16593	14871	5741	3704	5943
151	5309	5079	2261	2098	2867	1982	1767	4930	4898	6189	5811	7086	6088	4953	5074	8777	8480	9187	7282	2984	9157	2767
152	5382	5143	2458	2310	2727	2143	1641	4575	4690	6095	5483	6758	5781	4655	4778	8516	8211	8920	7004	3272	9500	3050
154	6127	5890	3134	2972	1999	2847	2348	4462	5269	6797	5730	6996	6118	5035	5159	8974	8651	9361	7423	3018	9823	2789
155	6920	6682	3900	3731	1227	3627	3099	4400	5880	7523	6012	7254	6484	5460	5583	9441	9100	9808	7860	3015	10277	2795
156	6466	6230	3440	3272	1686	3166	2691	4495	5574	7136	5911	7170	6333	5271	5395	9230	8900	9610	7667	2914	9948	2687
158	5858	5692	2634	2446	3816	2658	3462	6870	6627	7465	7828	9101	8068	6916	7036	10624	10352	11051	9187	1366	7498	1239
164	7261	7001	4682	4554	1559	4331	3242	2848	5269	7263	4740	5924	5324	4438	4553	8400	8032	8727	6789	4588	11667	4368
165	8708	8452	5954	5803	1193	5633	4694	3435	6715	8756	5807	6879	6485	5729	5836	9605	9220	9896	7993	4885	12443	4694
166	9110	8856	6316	6161	1372	6003	5102	3716	7132	9178	6156	7201	6851	6121	6227	9973	9585	10257	8364	5019	12660	4839
171	8629	8429	5363	5167	2457	5241	5306	6657	8322	9743	8519	9742	9014	7993	8116	11970	11632	12341	10393	2031	9763	1970
173	8911	8706	5655	5460	2330	5515	5491	6556	8448	9941	8513	9721	9037	8042	8164	12028	11683	12390	10440	2417	10144	2352
174	9204	8995	5958	5764	2302	5805	5711	6518	8614	10166	8561	9751	9109	8140	8261	12129	11778	12482	10533	2779	10495	2714
175	5953	5976	4547	4528	8103	4909	6438	10766	8925	8590	11048	12249	11029	9891	9991	12881	12717	13347	11751	4800	3269	4891
176	6318	6350	4962	4942	8432	5324	6851	11161	9338	8976	11463	12665	11445	10307	10407	13289	13127	13755	12165	5056	2892	5160
177	6266	6315	5119	5112	8757	5490	7030	11397	9425	8965	11620	12810	11577	10448	10544	13342	13192	13810	12254	5422	2630	5521
178	6318	6383	5376	5381	9141	5753	7302	11711	9607	9049	11866	13042	11798	10678	10773	13487	13347	13955	12434	5830	2329	5926
179	6562	6638	5728	5736	9506	6107	7657	12078	9924	9311	12211	13381	12133	11018	11111	13782	13649	14251	1			

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 9:57 AM / 6

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 3:47 PM/2.9.285

DECIBEL - Main Result

Calculation: A059 V110/V117 Gen Grnd Atten. 0.5 Generic Octave

...continued from previous page

WTG	TT	SS	EE	BB	H	Z	S	A	OO	WW	FF	LL	JJ	GG	II	YY	VV	ZZ	QQ	C	R	J
304	9375	9319	6860	6732	7767	7076	8247	11557	11315	11672	12695	13969	12924	11768	11886	15363	15118	15805	13988	4168	5354	4389
305	9632	9623	7565	7472	9241	7844	9178	12845	12094	12142	13754	15016	13904	12741	12854	16140	15927	16595	14854	5565	4032	5771
306	9765	9748	7604	7503	9086	7870	9171	12752	12127	12240	13723	14990	13893	12730	12844	16178	15957	16630	14871	5428	4366	5639
307	9437	9185	6568	6407	1486	6270	5444	4150	7562	9583	6608	7646	7305	6571	6678	10426	10039	10710	8818	4983	12700	4817
308	7594	7335	4966	4831	1344	4623	3574	2923	5599	7607	4963	6122	5575	4723	4836	8667	8295	8986	7055	4619	11837	4404
309	7913	7655	5238	5097	1175	4902	3895	3052	5928	7943	5210	6344	5843	5019	5131	8946	8570	9257	7333	4651	11990	4443
310	8261	8003	5562	5419	1163	5232	4243	3149	6246	8282	5420	6524	6078	5290	5399	9191	8810	9492	7578	4784	12220	4582
311	7268	7052	4059	3870	1677	3873	3760	5460	6756	8211	7080	8327	7528	6477	6600	10439	10108	10817	8874	2045	9629	1842
312	7602	7386	4392	4202	1559	4208	4069	5529	7029	8522	7251	8488	7725	6693	6816	10667	10331	11039	9093	2137	9824	1954
313	7945	7725	4754	4565	1334	4557	4337	5456	7227	8791	7300	8520	7807	6804	6927	10790	10446	11152	9203	2434	10170	2267
314	7233	7119	4297	4139	5189	4440	5460	8753	8591	9209	9848	11122	10094	8942	9061	12615	12353	13048	11199	1502	6375	1687
315	5688	5453	2698	2539	2442	2406	1971	4609	4992	6425	5669	6943	6002	4890	5013	8783	8471	9181	7256	3055	9542	2829
316	6126	5953	2877	2684	3528	2865	3535	6723	6716	7649	7791	9066	8064	6922	7042	10684	10403	11105	9223	1151	7766	988
317	5611	5454	2432	2251	4123	2499	3444	7049	6576	7311	7901	9171	8108	6950	7068	10597	10335	11030	9186	1611	7220	1514
WTG	P	UU	CC	XX	RR	Q	W	U														
5	3791	8943	6114	11586	10686	10914	9965	9838														
6	3438	8934	6060	11388	10436	11171	10296	10167														
12	5363	7944	5516	11660	11155	8762	7778	7648														
13	5811	7882	5589	11823	11399	8324	7290	7160														
14	6835	8059	6066	12407	12126	7537	6284	6158														
15	6123	7716	5543	11837	11487	7914	6897	6765														
18	7669	8236	6504	12879	12713	6892	5447	5325														
20	8284	8898	7236	13612	13451	6945	5129	5020														
22	8609	8891	7350	13726	13622	6609	4738	4629														
24	6802	5884	4292	10651	10662	6245	6102	5949														
26	7165	5553	4221	10523	10642	5790	5881	5725														
27	7512	5714	4527	10796	10956	5475	5524	5368														
28	7652	5407	4384	10589	10814	5266	5547	5389														
29	7994	5188	4432	10523	10841	4891	5423	5264														
34	10096	5657	5964	11450	12113	2801	4351	4201														
35	10720	5982	6505	11826	12568	2196	4145	4004														
36	11011	5962	6670	11829	12636	1998	4320	4186														
37	2727	8009	5581	6850	5157	14045	14557	14403														
38	2293	7770	5239	7000	5411	13628	14086	13933														
39	1631	7845	5163	7523	6014	13362	13676	13524														
40	1712	7393	4707	7260	5846	12942	13317	13164														
41	2104	7157	4553	6864	5453	12913	13393	13239														
42	2972	6461	4073	5954	4635	12639	13360	13204														
43	2878	6234	3770	6047	4830	12309	13015	12858														
45	2989	5822	3302	6029	4969	11837	12570	12413														
66	3976	6580	3861	9812	9262	9107	8824	8679														
67	4467	6500	3914	10022	9562	8652	8334	8188														
68	4627	6108	3574	9756	9368	8376	8201	8053														
69	4974	6085	3674	9931	9605	8053	7854	7705														
70	4751	4948	2399	8672	8429	8145	8472	8317														
84	2949	6819	3908	9400	8653	10056	9852	9707														
85	2908	7250	4345	9788	8988	10273	9926	9783														
98	9302	9545	8090	14462	14378	6652	4399	4309														
99	9640	9574	8238	14598	14569	6338	3998	3911														
100	10433	9577	8553	14844	14958	5499	2968	2884														
101	10898	9896	8959	15227	15374	5419	2647	2581														
104	5309	6086	3803	10113	9843	7745	7517	7368														
105	6281	6380	4463	10836	10694	6946	6526	6379														
150	11681	10106	9424	15597	15856	4865	1785	1742														
151	4432	4889	2176	8352	8052	8500	8885	8729														
152	4153	4895	2061	8104	7746	8822	9241	9086														
154	3630	5641	2769	8594	8075	9253	9413	9261														

To be continued on next page...

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.

Kevin Walter

Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 9:57 AM / 7

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000

wind@eapc.net

Calculated:

10/1/2015 3:47 PM/2.9.285

DECIBEL - Main Result**Calculation:** A059 V110/V117 Gen Grnd Atten. 0.5 Generic Octave

...continued from previous page

WTG	P	UU	CC	XX	RR	Q	W	U
155	3110	6423	3516	9096	8414	9808	9727	9579
156	3454	5987	3111	8863	8282	9430	9469	9319
158	5893	5799	3788	10159	10024	7108	6989	6838
164	1890	6562	3588	8129	7177	11072	11229	11079
165	1100	8043	5059	9388	8218	12016	11781	11637
166	1192	8456	5470	9768	8555	12279	11939	11798
171	4631	8365	5722	11615	10934	9720	8738	8610
173	4425	8613	5910	11690	10940	10106	9102	8975
174	4289	8880	6132	11806	10994	10467	9430	9305
175	10150	6612	6526	12312	12839	2892	3417	3260
176	10503	7000	6941	12718	13254	2672	3012	2856
177	10805	6996	7100	12765	13362	2287	3006	2856
178	11172	7093	7353	12904	13560	1874	2976	2835
179	11541	7366	7702	13196	13883	1567	2801	2670
180	11844	7720	8058	13555	14245	1463	2516	2393
183	10117	9497	8370	14688	14757	5738	3315	3227
184	6603	6206	4459	10835	10771	6558	6227	6078
205	1442	8210	5490	7895	6347	13592	13816	13666
206	2411	6813	4266	6520	5167	12707	13278	13123
300	10424	5961	6319	11773	12456	2461	4075	3928
302	7706	8543	6755	13125	12919	7150	5571	5454
303	7203	8065	6199	12564	12343	7193	5886	5760
304	10031	9756	8517	14862	14874	6159	3664	3585
305	11499	10175	9393	15608	15821	5158	2121	2079
306	11348	10279	9400	15652	15819	5467	2457	2415
307	1569	8811	5823	10221	9003	12378	11907	11770
308	1619	6903	3926	8410	7400	11282	11345	11196
309	1405	7232	4252	8700	7643	11475	11445	11298
310	1173	7582	4601	8960	7844	11739	11628	11483
311	3900	6914	4179	10071	9469	9315	8918	8775
312	3818	7243	4489	10310	9655	9554	9054	8913
313	3592	7559	4758	10451	9720	9925	9359	9221
314	7427	7398	5760	12136	12050	6431	5426	5289
315	3993	5219	2391	8381	7966	8919	9212	9058
316	5642	6027	3883	10232	10026	7414	7194	7044
317	6166	5600	3742	10119	10056	6793	6777	6623

Appendix I: windPRO V110 Sound Analysis with No Ground Attenuation

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 9:53 AM / 1

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 4:02 PM/2.9.285

DECIBEL - Main Result

Calculation: A059 V110 2.0 80m HH No Grnd Atten. Generic Octave

Noise calculation model:

ISO 9613-2 General

Wind speed:

95% rated power

Ground attenuation:

None

Meteorological coefficient, C0:

0.0 dB

Type of demand in calculation:

1: WTG noise is compared to demand (DK, DE, SE, NL etc.)

Noise values in calculation:

All noise values are mean values (Lwa) (Normal)

Pure tones:

Pure and Impulse tone penalty are added to WTG source noise

Height above ground level, when no value in NSA object:

1.5 m Don't allow override of model height with height from NSA object

Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:

0.0 dB(A)



Scale 1:400,000
New WTG Noise sensitive area

WTGs

UTM NAD83 Zone: 13				WTG type			Noise data								
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Creator	Name	Wind speed [m/s]	Status	LwA,ref [dB(A)]	Pure tones
5	646,913	5,375,455	745.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
6	646,888	5,375,080	743.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
12	648,327	5,377,151	750.2 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
13	648,563	5,377,579	749.6 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
14	648,872	5,378,572	753.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
15	648,872	5,377,853	752.9 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
18	649,189	5,379,368	749.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
20	648,867	5,380,033	744.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
22	649,124	5,380,328	729.3 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
24	651,007	5,377,868	749.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
26	651,525	5,378,000	751.5 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
27	651,616	5,378,348	758.6 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
28	651,987	5,378,290	755.5 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
29	652,436	5,378,405	749.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
34	654,047	5,379,834	743.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
35	654,478	5,380,290	740.5 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
36	654,876	5,380,346	731.4 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
37	649,468	5,369,552	735.9 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
38	649,403	5,370,046	745.2 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
39	648,989	5,370,563	740.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
40	649,348	5,370,846	749.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
41	649,714	5,370,690	746.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
42	650,635	5,370,574	746.1 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
43	650,667	5,370,918	744.1 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
45	650,882	5,371,340	743.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
66	649,309	5,375,532	733.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
67	649,484	5,375,990	732.9 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
68	649,889	5,375,994	741.6 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
69	650,008	5,376,321	740.1 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
70	650,956	5,375,465	751.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
84	648,982	5,374,557	737.6 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
85	648,553	5,374,643	733.1 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
98	648,903	5,381,054	722.4 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
99	649,170	5,381,363	721.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
100	649,950	5,382,038	713.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
101	650,030	5,382,496	712.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
104	650,119	5,376,639	740.5 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
105	650,267	5,377,632	746.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h

To be continued on next page...

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 9:53 AM / 2

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 4:02 PM/2.9.285

DECIBEL - Main Result

Calculation: A059 V110 2.0 80m HH No Grnd Atten. Generic Octave

...continued from previous page

UTM NAD83 Zone: 13				WTG type		Noise data									
East	North	Z	Row	Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Creator	Name	Wind speed	Status	LwA,ref	Pure tones
			data/Description				[kW]	[m]	[m]			[m/s]		[dB(A)]	
150	650,663	5,383,159	707.7	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
151	650,947	5,375,049	753.4	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
152	650,911	5,374,694	758.8	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
154	650,163	5,374,664	746.8	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
155	649,378	5,374,555	741.3	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
156	649,818	5,374,694	743.7	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
158	650,613	5,377,049	737.8	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
164	649,406	5,372,982	725.6	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
165	647,909	5,372,903	716.3	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
166	647,487	5,372,910	715.6	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
171	647,671	5,376,427	743.7	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
173	647,364	5,376,192	740.7	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
174	647,056	5,376,002	741.8	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
175	653,143	5,380,511	713.2	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
176	653,130	5,380,927	710.2	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
177	653,497	5,381,062	704.1	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
178	653,850	5,381,276	700.7	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
179	654,022	5,381,604	696.2	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
180	654,011	5,381,966	694.9	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
183	649,728	5,381,758	721.2	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
184	650,599	5,377,842	746.4	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
205	648,594	5,370,523	731.5	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
206	650,092	5,370,737	743.7	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
300	654,134	5,380,179	734.1	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
302	648,870	5,379,451	759.0	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
303	649,079	5,378,913	759.0	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
304	649,308	5,381,738	716.8	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
305	650,346	5,383,045	709.5	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
306	650,021	5,382,956	710.0	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
307	647,090	5,373,129	713.2	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
308	649,061	5,372,960	722.4	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
309	648,724	5,372,961	720.3	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
310	648,383	5,372,885	719.3	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
311	648,975	5,375,560	734.6	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
312	648,641	5,375,554	726.9	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
313	648,297	5,375,376	728.5	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
314	649,928	5,378,956	741.0	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
315	650,591	5,374,779	748.6	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
316	650,301	5,376,922	735.0	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
317	650,917	5,377,197	740.0	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h

h) Generic octave distribution used

Calculation Results

Sound Level

Noise sensitive area		UTM NAD83 Zone: 13			Demands			Sound Level		Demands fulfilled ?	
No.	Name	East	North	Z	Imission height	Noise	From WTGs	Distance to noise demand	Noise		Noise
				[m]	[m]	[dB(A)]	[dB(A)]	[m]			
A	Participating	650,034	5,370,204	742.6	1.5	50.0	49.4	62	Yes		
B	Participating	648,222	5,376,376	731.5	1.5	50.0	48.7	181	Yes		
C	Participating	649,350	5,377,570	737.6	1.5	50.0	48.7	177	Yes		
D	Participating	652,833	5,381,417	705.0	1.5	50.0	46.9	226	Yes		
E	Participating	653,476	5,379,925	741.5	1.5	50.0	47.9	210	Yes		
F	Participating	649,476	5,378,474	747.0	1.5	50.0	49.2	112	Yes		
G	Participating	650,400	5,383,729	711.5	1.5	50.0	46.0	268	Yes		
H	Participating	648,263	5,374,042	728.5	1.5	50.0	47.4	303	Yes		
I	Participating	649,372	5,377,319	734.6	1.5	50.0	48.3	336	Yes		
J	Participating	649,411	5,377,350	734.6	1.5	50.0	48.3	347	Yes		
K	Participating	652,350	5,377,616	735.4	1.5	50.0	46.1	371	Yes		

To be continued on next page...

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 9:53 AM / 3

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 4:02 PM/2.9.285

DECIBEL - Main Result

Calculation: A059 V110 2.0 80m HH No Grnd Atten. Generic Octave

...continued from previous page

Noise sensitive area		UTM NAD83 Zone: 13			Demands			Sound Level		Demands fulfilled ?	
No.	Name	East	North	Z	Imission height	Noise	From WTGs	Distance to noise demand	Noise		
				[m]	[m]	[dB(A)]	[dB(A)]	[m]			
L	Participating	647,974	5,378,125	736.6	1.5	50.0	45.9		433	Yes	
M	Participating	652,746	5,379,403	722.4	1.5	50.0	44.0		745	Yes	
N	Non-Participating	652,934	5,377,454	728.5	1.5	50.0	42.6		761	Yes	
O	Participating	647,905	5,380,657	723.4	1.5	50.0	43.3		748	Yes	
P	Non-Participating	647,929	5,371,803	716.8	1.5	50.0	44.1		720	Yes	
Q	Non-Participating	655,444	5,382,262	682.8	1.5	50.0	39.2		1,140	Yes	
R	Non-Participating	654,346	5,383,551	675.6	1.5	50.0	37.3		1,328	Yes	
S	Participating	652,445	5,374,111	759.0	1.5	50.0	39.9		1,276	Yes	
T	Non-Participating	652,124	5,382,382	698.0	1.5	50.0	41.0		1,344	Yes	
U	Non-Participating	652,329	5,383,668	691.9	1.5	50.0	38.2		1,445	Yes	
V	Participating	647,113	5,379,805	712.6	1.5	50.0	40.1		1,413	Yes	
W	Non-Participating	652,318	5,383,827	691.2	1.5	50.0	37.8		1,488	Yes	
X	Non-Participating	655,873	5,382,222	689.2	1.5	50.0	37.5		1,549	Yes	
Y	Non-Participating	651,119	5,380,491	705.0	1.5	50.0	42.3		1,504	Yes	
Z	Non-Participating	652,848	5,375,611	736.1	1.5	50.0	39.9		1,539	Yes	
AA	Participating	654,105	5,377,449	726.3	1.5	50.0	38.5		1,627	Yes	
BB	Non-Participating	652,820	5,375,995	733.4	1.5	50.0	40.2		1,593	Yes	
CC	Participating	652,849	5,373,992	753.0	1.5	50.0	38.4		1,695	Yes	
DD	Non-Participating	652,780	5,383,651	684.1	1.5	50.0	37.6		1,786	Yes	
EE	Non-Participating	653,014	5,375,966	734.6	1.5	50.0	39.6		1,771	Yes	
FF	Non-Participating	652,597	5,369,477	749.8	1.5	50.0	35.6		1,920	Yes	
GG	Participating	653,163	5,370,620	746.2	1.5	50.0	35.3		2,081	Yes	
HH	Non-Participating	657,270	5,380,900	701.0	1.5	50.0	33.9		2,165	Yes	
II	Participating	653,237	5,370,521	746.8	1.5	50.0	35.0		2,181	Yes	
JJ	Non-Participating	653,421	5,369,486	746.6	1.5	50.0	33.2		2,655	Yes	
KK	Non-Participating	656,603	5,377,699	728.9	1.5	50.0	33.3		2,853	Yes	
LL	Non-Participating	652,987	5,368,263	755.9	1.5	50.0	32.1		2,977	Yes	
MM	Non-Participating	655,962	5,376,837	710.2	1.5	50.0	33.6		3,238	Yes	
NN	Non-Participating	646,183	5,383,581	712.5	1.5	50.0	32.7		3,270	Yes	
OO	Participating	654,514	5,371,692	765.0	1.5	50.0	32.5		3,353	Yes	
PP	Non-Participating	644,980	5,381,994	704.1	1.5	50.0	32.1		3,709	Yes	
QQ	Participating	654,816	5,368,880	743.7	1.5	50.0	29.5		4,176	Yes	
RR	Non-Participating	654,290	5,367,724	742.3	1.5	50.0	28.9		4,312	Yes	
SS	Non-Participating	656,021	5,375,274	710.2	1.5	50.0	32.0		4,460	Yes	
TT	Non-Participating	656,242	5,375,429	710.2	1.5	50.0	31.8		4,533	Yes	
UU	Non-Participating	655,800	5,374,456	722.8	1.5	50.0	31.8		4,484	Yes	
VV	Non-Participating	655,758	5,368,066	719.3	1.5	50.0	27.1		5,374	Yes	
WW	Participating	656,662	5,372,675	722.4	1.5	50.0	29.3		5,639	Yes	
XX	Non-Participating	656,251	5,368,598	741.7	1.5	50.0	27.0		5,615	Yes	
YY	Non-Participating	656,161	5,367,989	720.8	1.5	50.0	26.5		5,769	Yes	
ZZ	Non-Participating	656,215	5,367,523	716.3	1.5	50.0	26.0		6,031	Yes	

Distances (m)

WTG	X	HH	T	D	DD	NN	PP	G	Y	O	V	L	F	M	E	KK	K	I	B	N	AA	MM
5	11229	11701	8668	8402	10080	8159	6819	8979	6562	5296	4355	2873	3960	7044	7941	9947	5851	3086	1601	6344	7464	9154
6	11478	11902	8986	8689	10401	8530	7173	9335	6869	5669	4731	3233	4268	7281	8178	10062	6022	3344	1860	6496	7596	9243
12	9092	9697	6464	6205	7879	6778	5887	6897	4353	3531	2919	1036	1752	4960	5849	8294	4050	1058	782	4617	5786	7642
13	8660	9319	5979	5742	7393	6457	5686	6419	3875	3148	2657	803	1279	4564	5445	8041	3787	850	1250	4373	5544	7436
14	7896	8715	5009	4877	6409	5685	5183	5379	2955	2298	2148	1003	612	3962	4799	7780	3607	1349	2290	4213	5352	7299
15	8253	8934	5576	5329	6992	6328	5683	6072	3465	2966	2628	938	866	4173	5049	7733	3486	732	1614	4082	5249	7163
18	7268	8225	4207	4181	5589	5176	4961	4526	2233	1819	2122	1738	939	3557	4323	7600	3614	2057	3144	4206	5277	7231
20	7340	8448	4016	4201	5329	4449	4354	4001	2298	1147	1769	2107	1674	3930	4610	8081	4240	2761	3714	4816	5841	7782
22	7010	8166	3636	3866	4941	4386	4466	3633	2002	1263	2078	2485	1887	3738	4371	7928	4215	3019	4054	4773	5753	7678
24	6530	6959	4650	3991	6049	7477	7304	5893	2625	4172	4349	3044	1647	2320	3214	5599	1366	1725	3160	1971	3126	5061
26	6061	6436	4423	3659	5789	7726	7668	5839	2524	4491	4767	3553	2103	1860	2741	5087	910	2258	3681	1511	2638	4587

To be continued on next page...

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 9:53 AM / 4

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 4:02 PM/2.9.285

DECIBEL - Main Result

Calculation: A059 V110 2.0 80m HH No Grnd Atten. Generic Octave

...continued from previous page

WTG	X	HH	T	D	DD	NN	PP	G	Y	O	V	L	F	M	E	KK	K	I	B	N	AA	MM
27	5756	6203	4066	3302	5429	7544	7572	5517	2200	4371	4733	3649	2144	1546	2439	5029	1037	2469	3925	1593	2646	4601
28	5528	5893	4094	3240	5420	7854	7926	5666	2366	4719	5104	4017	2518	1347	2211	4654	766	2790	4224	1263	2279	4232
29	5137	5440	3989	3038	5257	8118	8275	5700	2467	5060	5504	4471	2961	1045	1842	4227	794	3251	4677	1074	1923	3859
34	3006	3395	3192	1995	4022	8711	9321	5336	3001	6197	6934	6309	4769	1371	578	3330	2793	5309	6774	2627	2386	3557
35	2383	2858	3149	1994	3766	8924	9650	5335	3365	6583	7381	6855	5322	1946	1066	3351	3417	5908	7380	3229	2865	3758
36	2125	2457	3423	2307	3914	9276	10033	5611	3760	6978	7782	7251	5715	2329	1462	3161	3719	6282	7749	3484	2998	3673
37	14197	13772	13102	12333	14483	14409	13227	14208	11063	11215	10520	8702	8922	10382	11121	10830	8564	7768	6937	8629	9158	9760
38	13789	13406	12633	11877	14018	13913	12741	13720	10585	10717	10024	8205	8429	9937	10686	10508	8124	7273	6439	8207	8770	9442
39	13540	13245	12228	11515	13626	13317	12114	13242	10154	10152	9431	7630	7926	9606	10382	10436	7813	6767	5864	7941	8579	9380
40	13115	12800	11866	11131	13257	13123	11974	12926	9807	9917	9234	7408	7629	9207	9974	9980	7406	6473	5644	7519	8138	8924
41	13074	12702	11938	11172	13319	13366	12256	13057	9902	10130	9479	7636	7788	9226	9972	9828	7411	6638	5879	7492	8060	8765
42	12772	12274	11902	11064	13252	13748	12744	13158	9929	10446	9880	8006	7985	9078	9773	9295	7248	6862	6284	7254	7701	8222
43	12446	11969	11557	10720	12908	13434	12451	12814	9584	10123	9572	7694	7650	8736	9435	9012	6906	6531	5981	6918	7381	7942
45	11972	11498	11112	10264	12457	13112	12180	12399	9154	9781	9266	7382	7271	8276	8969	8554	6446	6167	5696	6449	6907	7485
66	9373	9602	7406	6860	8830	8635	7778	8270	5279	5314	4804	2917	2947	5177	6055	7609	3687	1788	1376	4103	5165	6780
67	8925	9205	6916	6377	8340	8278	7506	7793	4789	4927	4492	2615	2484	4721	5606	7321	3295	1334	1320	3748	4846	6533
68	8637	8863	6768	6171	8185	8444	7753	7752	4662	5068	4715	2865	2514	4448	5322	6927	2948	1422	1710	3377	4460	6131
69	8320	8585	6420	5827	7837	8206	7581	7419	4316	4819	4530	2719	2218	4123	5002	6738	2676	1183	1787	3138	4250	5976
70	8357	8331	7015	6241	8387	9416	8851	8283	5029	6022	5797	3996	3353	4326	5123	6073	2563	2439	2882	2805	3722	5191
84	10308	10437	8433	7867	9856	9448	8446	9281	6307	6195	5571	3708	3948	6136	7001	8244	4550	2790	1971	4900	5883	7343
85	10537	10730	8523	8013	9951	9247	8174	9272	6386	6049	5359	3530	3941	6344	7221	8611	4823	2799	1764	5205	6221	7727
98	7067	8369	3484	3947	4667	3713	4034	3066	2286	1074	2183	3073	2643	4183	4710	8399	4869	3764	4727	5405	6329	8223
99	6758	8113	3125	3664	4274	3721	4237	2667	2135	1449	2580	3452	2905	4078	4540	8287	4915	4049	5076	5427	6299	8162
100	5926	7408	2201	2949	3258	4071	4970	1750	1939	2468	3610	4384	3595	3842	4111	7943	5031	4754	5920	5470	6191	7950
101	5850	7414	2097	3004	2983	3997	5075	1287	2282	2810	3969	4831	4060	4116	4300	8138	5404	5219	6382	5819	6487	8199
104	8018	8324	6083	5495	7500	7980	7422	7096	3980	4588	4366	2610	1944	3813	4698	6570	2436	1010	1915	2931	4068	5847
105	7246	7728	5100	4573	6523	7216	6854	6099	2983	3838	3830	2345	1155	3047	3944	6337	2083	948	2400	2673	3482	5750
150	5294	6983	1655	2783	2173	4500	5801	628	2707	3724	4884	5707	4833	4295	4286	8068	5794	5981	7209	6141	6667	8249
151	8702	8615	7427	6642	8795	9772	9157	8697	5445	6380	6109	4278	3728	4711	5493	6246	2925	2763	3031	3120	3967	5324
152	9017	8886	7783	6993	9150	10067	9406	9050	5801	6678	6368	4517	4043	5054	5826	6437	3257	3043	3172	3422	4128	5487
154	9473	9455	7963	7262	9361	9765	8978	9068	5905	6404	5978	4095	3872	5397	6217	7120	3674	2770	2588	3932	4827	6193
155	10049	10127	8295	7683	9712	9575	8642	9231	6186	6277	5718	3836	3920	5903	6755	7880	4267	2764	2157	4588	5543	6968
156	9661	9698	8027	7368	9434	9602	8758	9054	5941	6263	5783	3895	3796	5545	6383	7421	3867	2663	2319	4163	5096	6567
158	7378	7691	5543	4900	6949	7893	7496	6684	3479	4511	4455	2850	1823	3177	4058	6025	1827	1270	2484	2356	3515	5353
164	11279	11160	9785	9105	11190	11079	10041	10793	7702	7821	7198	5339	5493	7238	8048	8605	5490	4337	3595	5696	6484	7606
165	12259	12312	10374	9836	11801	10817	9551	11109	8239	7754	6948	5223	5787	8103	8961	9929	6476	4652	3487	6780	7685	8963
166	12532	12632	10546	10048	11975	10751	9424	11205	8406	7759	6905	5238	5909	8356	9224	10298	6767	4795	3543	7094	8025	9341
171	10043	10590	7436	7180	8848	7307	6183	7796	5330	4237	3424	1725	2729	5883	6778	9022	4828	1921	553	5362	6515	8301
173	10429	10968	7809	7564	9218	7483	6273	8126	5708	4498	3622	2027	3109	6267	7162	9361	5186	2303	878	5711	6857	8622
174	10791	11328	8148	7918	9554	7629	6342	8420	6055	4732	3804	2313	3459	6629	7524	9697	5935	2664	1225	6055	7196	8945
175	3222	4145	2131	958	3161	7607	8297	4229	2024	5240	6071	5693	4195	1177	674	4459	3002	4941	6428	3064	3210	4631
176	3033	4140	1769	573	2746	7437	8220	3912	2058	5232	6121	5868	4401	1572	1060	4742	3402	5210	6693	3479	3612	4975
177	2644	3777	1905	753	2687	7736	8568	4087	2446	5607	6507	6256	4782	1821	1137	4578	3632	5570	7056	3652	3664	4892
178	2233	3441	2050	1027	2605	8006	8899	4233	2842	5977	6896	6668	5195	2174	1402	4514	3956	5976	7462	3930	3836	4916
179	1952	3324	2051	1204	2394	8085	9051	4199	3109	6190	7140	6977	5519	2544	1766	4681	4324	6323	7809	4290	4156	5147
180	1880	3429	1932	1300	2087	7993	9031	4019	3247	6245	7229	7156	5724	2858	2110	4993	4656	6566	8048	4639	4518	5488
183	6163	7591	2476	3124	3592	3986	4754	2082	1882	2130	3264	4034	3294	3828	4172	7984	4902	4453	5589	5367	6142	7942
184	6856	7339	4789	4216	6205	7242	6987	5891	2700	3897	4001	2640	1289	2655	3552	6006	1766	1334	2793	2367	3528	5457
205	13779	13527	12374	11690	13780	13279	12027	13329	10283	10158	9400	7627	8000	9803	10594	10754	8026	6841	5865	8178	8851	9704
206	12858	12443	11821	11026	13191	13426	12364	12996	9808	10159	9545	7686	7762	9064	9792	9532	7240	6621	5941	7294	7820	8466
300	2683	3218	2982	1796	3727	8648	9332	5152	3031	6247	7031	6494	4960	1590	705	3500	3123	5555	7030	2978	2730	3809
302	7532	8524	4380	4424	5738	4927	4648	4544	2478	1545	1792	1600	1150	3876	4630	7929	3934	2190	3143	4528	5605	7559
303	7557	8429	4616	4513	6012	5494	5128	4994	2579	2102	2159	1357	592	3700	4512	7622	3519	1621	2678	4122	5235	7189
304	6583	8006	2889	3540	3964	3628	4336	2271	2199													

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 9:53 AM / 5

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 4:02 PM/2.9.285

DECIBEL - Main Result

Calculation: A059 V110 2.0 80m HH No Grnd Atten. Generic Octave

...continued from previous page

Table with columns WTG, X, HH, T, D, DD, NN, PP, G, Y, O, V, L, F, M, E, KK, K, I, B, N, AA, MM and rows of numerical data values.

To be continued on next page...

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 9:53 AM / 6

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 4:02 PM/2.9.285

DECIBEL - Main Result

Calculation: A059 V110 2.0 80m HH No Grnd Atten. Generic Octave

...continued from previous page

WTG	TT	SS	EE	BB	H	Z	S	A	OO	WW	FF	LL	JJ	GG	II	YY	VV	ZZ	QQ	C	R	J
180	6907	6988	6082	6089	9790	6461	8010	12417	10287	9662	12569	13742	12494	11378	11471	14142	14010	14611	13111	6407	1620	6517
183	9083	9036	6659	6540	7854	6894	8116	11558	11146	11428	12612	13883	12816	11656	11772	15198	14961	15644	13847	4205	4954	4419
184	6137	6000	3058	2889	4461	3168	4163	7659	7291	7966	8601	9872	8820	7664	7782	11315	11054	11749	9905	1278	6829	1286
205	9087	8817	7012	6914	3535	6632	5264	1475	6034	8350	4138	4940	4937	4643	7980	7574	8190	6435	7088	14242	6876	
206	7736	7466	5990	5924	3777	5599	4114	536	4524	6850	2804	3808	3556	3073	3152	6662	6264	6915	5076	6873	13502	6648
300	5197	5256	4359	4386	8493	4746	6299	10785	8496	7919	10812	11971	10717	9608	9700	12358	12222	12826	11320	5449	3379	5506
302	8398	8282	5415	5249	5443	5529	6426	9320	9595	10326	10648	11922	10955	9819	9941	13585	13307	14008	12129	1941	6841	2170
303	7966	7838	4916	4745	4939	5011	5864	8761	9038	9819	10071	11345	10379	9244	9366	13019	12739	13441	11558	1370	7018	1598
304	9375	9319	6860	6732	7767	7076	8247	11557	11315	11672	12695	13969	12924	11768	11886	15363	15118	15805	13988	4168	5354	4389
305	9632	9623	7565	7472	9241	7844	9178	12845	12094	12142	13754	15016	13904	12741	12854	16140	15927	16595	14854	5565	4032	5771
306	9765	9748	7604	7503	9086	7870	9171	12752	12127	12240	13723	14990	13893	12730	12844	16178	15957	16630	14871	5428	4366	5639
307	9437	9185	6568	6407	1486	6270	5444	4150	7562	9583	6608	7646	7305	6571	6678	10426	10039	10710	8818	4983	12700	4817
308	7594	7335	4966	4831	1344	4623	3574	2923	5599	7607	4963	6122	5575	4723	4836	8667	8295	8986	7055	4619	11837	4404
309	7913	7655	5238	5097	1175	4902	3895	3052	5928	7943	5210	6344	5843	5019	5131	8946	8570	9257	7333	4651	11990	4443
310	8261	8003	5562	5419	1163	5232	4243	3149	6246	8282	5420	6524	6078	5290	5399	9191	8810	9492	7578	4784	12220	4582
311	7268	7052	4059	3870	1677	3873	3760	5460	6756	8211	7080	8327	7528	6477	6600	10439	10108	10817	8874	2045	9629	1842
312	7602	7386	4392	4202	1559	4208	4069	5529	7029	8522	7251	8488	7725	6693	6816	10667	10331	11039	9093	2137	9824	1954
313	7945	7725	4754	4565	1334	4557	4337	5456	7227	8791	7300	8520	7807	6804	6927	10790	10446	11152	9203	2434	10170	2267
314	7233	7119	4297	4139	5189	4440	5460	8753	8591	9209	9848	11122	10094	8942	9061	12615	12353	13048	11199	1502	6375	1687
315	5688	5453	2698	2539	2442	2406	1971	4609	4992	6425	5669	6943	6002	4890	5013	8783	8471	9181	7256	3055	9542	2829
316	6126	5953	2877	2684	3528	2865	3535	6723	6716	7649	7791	9066	8064	6922	7042	10684	10403	11105	9223	1151	7766	988
317	5611	5454	2432	2251	4123	2499	3444	7049	6576	7311	7901	9171	8108	6950	7068	10597	10335	11030	9186	1611	7220	1514

WTG	P	UU	CC	XX	RR	Q	W	U
5	3791	8943	6114	11586	10686	10914	9965	9838
6	3438	8934	6060	11388	10436	11171	10296	10167
12	5363	7944	5516	11660	11155	8762	7778	7648
13	5811	7882	5589	11823	11399	8324	7290	7160
14	6835	8059	6066	12407	12126	7537	6284	6158
15	6123	7716	5543	11837	11487	7914	6897	6765
18	7669	8236	6504	12879	12713	6892	5447	5325
20	8284	8898	7236	13612	13451	6945	5129	5020
22	8609	8891	7350	13726	13622	6609	4738	4629
24	6802	5884	4292	10651	10662	6245	6102	5949
26	7165	5553	4221	10523	10642	5790	5881	5725
27	7512	5714	4527	10796	10956	5475	5524	5368
28	7652	5407	4384	10589	10814	5266	5547	5389
29	7994	5188	4432	10523	10841	4891	5423	5264
34	10096	5657	5964	11450	12113	2801	4351	4201
35	10720	5982	6505	11826	12568	2196	4145	4004
36	11011	5962	6670	11829	12636	1998	4320	4186
37	2727	8009	5581	6850	5157	14045	14557	14403
38	2293	7770	5239	7000	5411	13628	14086	13933
39	1631	7845	5163	7523	6014	13362	13676	13524
40	1712	7393	4707	7260	5846	12942	13317	13164
41	2104	7157	4553	6864	5453	12913	13393	13239
42	2972	6461	4073	5954	4635	12639	13360	13204
43	2878	6234	3770	6047	4830	12309	13015	12858
45	2989	5822	3302	6029	4969	11837	12570	12413
66	3976	6580	3861	9812	9262	9107	8824	8679
67	4467	6500	3914	10022	9562	8652	8334	8188
68	4627	6108	3574	9756	9368	8376	8201	8053
69	4974	6085	3674	9931	9605	8053	7854	7705
70	4751	4948	2399	8672	8429	8145	8472	8317
84	2949	6819	3908	9400	8653	10056	9852	9707
85	2908	7250	4345	9788	8988	10273	9926	9783
98	9302	9545	8090	14462	14378	6652	4399	4309
99	9640	9574	8238	14598	14569	6338	3998	3911
100	10433	9577	8553	14844	14958	5499	2968	2884

To be continued on next page...

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 9:53 AM / 7

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 4:02 PM/2.9.285

DECIBEL - Main Result

Calculation: A059 V110 2.0 80m HH No Grnd Atten. Generic Octave

...continued from previous page

WTG	P	UU	CC	XX	RR	Q	W	U
101	10898	9896	8959	15227	15374	5419	2647	2581
104	5309	6086	3803	10113	9843	7745	7517	7368
105	6281	6380	4463	10836	10694	6946	6526	6379
150	11681	10106	9424	15597	15856	4865	1785	1742
151	4432	4889	2176	8352	8052	8500	8885	8729
152	4153	4895	2061	8104	7746	8822	9241	9086
154	3630	5641	2769	8594	8075	9253	9413	9261
155	3110	6423	3516	9096	8414	9808	9727	9579
156	3454	5987	3111	8863	8282	9430	9469	9319
158	5893	5799	3788	10159	10024	7108	6989	6838
164	1890	6562	3588	8129	7177	11072	11229	11079
165	1100	8043	5059	9388	8218	12016	11781	11637
166	1192	8456	5470	9768	8555	12279	11939	11798
171	4631	8365	5722	11615	10934	9720	8738	8610
173	4425	8613	5910	11690	10940	10106	9102	8975
174	4289	8880	6132	11806	10994	10467	9430	9305
175	10150	6612	6526	12312	12839	2892	3417	3260
176	10503	7000	6941	12718	13254	2672	3012	2856
177	10805	6996	7100	12765	13362	2287	3006	2856
178	11172	7093	7353	12904	13560	1874	2976	2835
179	11541	7366	7702	13196	13883	1567	2801	2670
180	11844	7720	8058	13555	14245	1463	2516	2393
183	10117	9497	8370	14688	14757	5738	3315	3227
184	6603	6206	4459	10835	10771	6558	6227	6078
205	1442	8210	5490	7895	6347	13592	13816	13666
206	2411	6813	4266	6520	5167	12707	13278	13123
300	10424	5961	6319	11773	12456	2461	4075	3928
302	7706	8543	6755	13125	12919	7150	5571	5454
303	7203	8065	6199	12564	12343	7193	5886	5760
304	10031	9756	8517	14862	14874	6159	3664	3585
305	11499	10175	9393	15608	15821	5158	2121	2079
306	11348	10279	9400	15652	15819	5467	2457	2415
307	1569	8811	5823	10221	9003	12378	11907	11770
308	1619	6903	3926	8410	7400	11282	11345	11196
309	1405	7232	4252	8700	7643	11475	11445	11298
310	1173	7582	4601	8960	7844	11739	11628	11483
311	3900	6914	4179	10071	9469	9315	8918	8775
312	3818	7243	4489	10310	9655	9554	9054	8913
313	3592	7559	4758	10451	9720	9925	9359	9221
314	7427	7398	5760	12136	12050	6431	5426	5289
315	3993	5219	2391	8381	7966	8919	9212	9058
316	5642	6027	3883	10232	10026	7414	7194	7044
317	6166	5600	3742	10119	10056	6793	6777	6623

Appendix J: windPRO V110 Sound Analysis with General Ground Attenuation

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 9:44 AM / 1

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 4:11 PM/2.9.285

DECIBEL - Main Result

Calculation: A059 V110 2.0 80m HH Gen Grnd Atten. 0.5 Generic Octave

Noise calculation model:

ISO 9613-2 General

Wind speed:

95% rated power

Ground attenuation:

General, Ground factor: 0.5

Meteorological coefficient, C0:

0.0 dB

Type of demand in calculation:

1: WTG noise is compared to demand (DK, DE, SE, NL etc.)

Noise values in calculation:

All noise values are mean values (Lwa) (Normal)

Pure tones:

Pure and Impulse tone penalty are added to WTG source noise

Height above ground level, when no value in NSA object:

1.5 m Don't allow override of model height with height from NSA object

Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:

0.0 dB(A)



Scale 1:400,000

⤴ New WTG

▨ Noise sensitive area

WTGs

UTM NAD83 Zone: 13				WTG type			Noise data								
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Creator	Name	Wind speed [m/s]	Status	LwA,ref [dB(A)]	Pure tones
5	646,913	5,375,455	745.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
6	646,888	5,375,080	743.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
12	648,327	5,377,151	750.2 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
13	648,563	5,377,579	749.6 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
14	648,872	5,378,572	753.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
15	648,872	5,377,853	752.9 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
18	649,189	5,379,368	749.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
20	648,867	5,380,033	744.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
22	649,124	5,380,328	729.3 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
24	651,007	5,377,868	749.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
26	651,525	5,378,000	751.5 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
27	651,616	5,378,348	758.6 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
28	651,987	5,378,290	755.5 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
29	652,436	5,378,405	749.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
34	654,047	5,379,834	743.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
35	654,478	5,380,290	740.5 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
36	654,876	5,380,346	731.4 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
37	649,468	5,369,552	735.9 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
38	649,403	5,370,046	745.2 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
39	648,989	5,370,563	740.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
40	649,348	5,370,846	749.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
41	649,714	5,370,690	746.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
42	650,635	5,370,574	746.1 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
43	650,667	5,370,918	744.1 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
45	650,882	5,371,340	743.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
66	649,309	5,375,532	733.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
67	649,484	5,375,990	732.9 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
68	649,889	5,375,994	741.6 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
69	650,008	5,376,321	740.1 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
70	650,956	5,375,465	751.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
84	648,982	5,374,557	737.6 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
85	648,553	5,374,643	733.1 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
98	648,903	5,381,054	722.4 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
99	649,170	5,381,363	721.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
100	649,950	5,382,038	713.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
101	650,030	5,382,496	712.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
104	650,119	5,376,639	740.5 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
105	650,267	5,377,632	746.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h

To be continued on next page...

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 9:44 AM / 2

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 4:11 PM/2.9.285

DECIBEL - Main Result

Calculation: A059 V110 2.0 80m HH Gen Grnd Atten. 0.5 Generic Octave

...continued from previous page

UTM NAD83 Zone: 13				WTG type		Noise data									
East	North	Z	Row	Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Creator	Name	Wind speed	Status	LwA,ref	Pure tones
			data/Description				[kW]	[m]	[m]			[m/s]		[dB(A)]	
150	650,663	5,383,159	707.7	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
151	650,947	5,375,049	753.4	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
152	650,911	5,374,694	758.8	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
154	650,163	5,374,664	746.8	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
155	649,378	5,374,555	741.3	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
156	649,818	5,374,694	743.7	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
158	650,613	5,377,049	737.8	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
164	649,406	5,372,982	725.6	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
165	647,909	5,372,903	716.3	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
166	647,487	5,372,910	715.6	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
171	647,671	5,376,427	743.7	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
173	647,364	5,376,192	740.7	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
174	647,056	5,376,002	741.8	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
175	653,143	5,380,511	713.2	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
176	653,130	5,380,927	710.2	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
177	653,497	5,381,062	704.1	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
178	653,850	5,381,276	700.7	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
179	654,022	5,381,604	696.2	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
180	654,011	5,381,966	694.9	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
183	649,728	5,381,758	721.2	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
184	650,599	5,377,842	746.4	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
205	648,594	5,370,523	731.5	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
206	650,092	5,370,737	743.7	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
300	654,134	5,380,179	734.1	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
302	648,870	5,379,451	759.0	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
303	649,079	5,378,913	759.0	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
304	649,308	5,381,738	716.8	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
305	650,346	5,383,045	709.5	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
306	650,021	5,382,956	710.0	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
307	647,090	5,373,129	713.2	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
308	649,061	5,372,960	722.4	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
309	648,724	5,372,961	720.3	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
310	648,383	5,372,885	719.3	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
311	648,975	5,375,560	734.6	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
312	648,641	5,375,554	726.9	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
313	648,297	5,375,376	728.5	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
314	649,928	5,378,956	741.0	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
315	650,591	5,374,779	748.6	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
316	650,301	5,376,922	735.0	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h
317	650,917	5,377,197	740.0	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	USER	95% Rated	(95%)	User value	107.5	0 dB h

h) Generic octave distribution used

Calculation Results

Sound Level

Noise sensitive area		UTM NAD83 Zone: 13			Demands			Sound Level		Demands fulfilled ?	
No.	Name	East	North	Z	Imission height	Noise	From WTGs	Distance to noise demand	Noise		Noise
					[m]	[dB(A)]	[dB(A)]	[m]			
A	Participating	650,034	5,370,204	742.6	1.5	50.0	46.2	284	Yes		
B	Participating	648,222	5,376,376	731.5	1.5	50.0	45.4	338	Yes		
C	Participating	649,350	5,377,570	737.6	1.5	50.0	45.3	340	Yes		
D	Participating	652,833	5,381,417	705.0	1.5	50.0	43.6	356	Yes		
E	Participating	653,476	5,379,925	741.5	1.5	50.0	44.7	356	Yes		
F	Participating	649,476	5,378,474	747.0	1.5	50.0	45.9	343	Yes		
G	Participating	650,400	5,383,729	711.5	1.5	50.0	42.7	403	Yes		
H	Participating	648,263	5,374,042	728.5	1.5	50.0	44.0	451	Yes		
I	Participating	649,372	5,377,319	734.6	1.5	50.0	44.9	511	Yes		
J	Participating	649,411	5,377,350	734.6	1.5	50.0	44.9	518	Yes		
K	Participating	652,350	5,377,616	735.4	1.5	50.0	42.8	534	Yes		

To be continued on next page...

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 9:44 AM / 3

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 4:11 PM/2.9.285

DECIBEL - Main Result

Calculation: A059 V110 2.0 80m HH Gen Grnd Atten. 0.5 Generic Octave

...continued from previous page

Noise sensitive area		UTM NAD83 Zone: 13			Demands			Sound Level		Demands fulfilled ?	
No.	Name	East	North	Z	Imission height	Noise	From WTGs	Distance to noise demand	Noise		
				[m]	[m]	[dB(A)]	[dB(A)]	[m]			
L	Participating	647,974	5,378,125	736.6	1.5	50.0	42.5	581	Yes		
M	Participating	652,746	5,379,403	722.4	1.5	50.0	40.6	851	Yes		
N	Non-Participating	652,934	5,377,454	728.5	1.5	50.0	39.2	873	Yes		
O	Participating	647,905	5,380,657	723.4	1.5	50.0	39.9	868	Yes		
P	Non-Participating	647,929	5,371,803	716.8	1.5	50.0	40.6	872	Yes		
Q	Non-Participating	655,444	5,382,262	682.8	1.5	50.0	35.8	1,255	Yes		
R	Non-Participating	654,346	5,383,551	675.6	1.5	50.0	34.0	1,424	Yes		
S	Participating	652,445	5,374,111	759.0	1.5	50.0	36.7	1,412	Yes		
T	Non-Participating	652,124	5,382,382	698.0	1.5	50.0	37.5	1,450	Yes		
U	Non-Participating	652,329	5,383,668	691.9	1.5	50.0	34.8	1,542	Yes		
V	Participating	647,113	5,379,805	712.6	1.5	50.0	36.8	1,551	Yes		
W	Non-Participating	652,318	5,383,827	691.2	1.5	50.0	34.5	1,585	Yes		
X	Non-Participating	655,873	5,382,222	689.2	1.5	50.0	34.1	1,669	Yes		
Y	Non-Participating	651,119	5,380,491	705.0	1.5	50.0	38.7	1,653	Yes		
Z	Non-Participating	652,848	5,375,611	736.1	1.5	50.0	36.6	1,678	Yes		
AA	Participating	654,105	5,377,449	726.3	1.5	50.0	35.3	1,727	Yes		
BB	Non-Participating	652,820	5,375,995	733.4	1.5	50.0	36.9	1,722	Yes		
CC	Participating	652,849	5,373,992	753.0	1.5	50.0	35.2	1,831	Yes		
DD	Non-Participating	652,780	5,383,651	684.1	1.5	50.0	34.3	1,887	Yes		
EE	Non-Participating	653,014	5,375,966	734.6	1.5	50.0	36.3	1,901	Yes		
FF	Non-Participating	652,597	5,369,477	749.8	1.5	50.0	32.4	2,035	Yes		
GG	Participating	653,163	5,370,620	746.2	1.5	50.0	32.3	2,192	Yes		
HH	Non-Participating	657,270	5,380,900	701.0	1.5	50.0	31.0	2,259	Yes		
II	Participating	653,237	5,370,521	746.8	1.5	50.0	32.0	2,293	Yes		
JJ	Non-Participating	653,421	5,369,486	746.6	1.5	50.0	30.4	2,775	Yes		
KK	Non-Participating	656,603	5,377,699	728.9	1.5	50.0	30.6	2,961	Yes		
LL	Non-Participating	652,987	5,368,263	755.9	1.5	50.0	29.5	3,088	Yes		
MM	Non-Participating	655,962	5,376,837	710.2	1.5	50.0	30.9	3,353	Yes		
NN	Non-Participating	646,183	5,383,581	712.5	1.5	50.0	30.0	3,405	Yes		
OO	Participating	654,514	5,371,692	765.0	1.5	50.0	30.0	3,453	Yes		
PP	Non-Participating	644,980	5,381,994	704.1	1.5	50.0	29.6	3,826	Yes		
QQ	Participating	654,816	5,368,880	743.7	1.5	50.0	27.3	4,296	Yes		
RR	Non-Participating	654,290	5,367,724	742.3	1.5	50.0	26.7	4,424	Yes		
SS	Non-Participating	656,021	5,375,274	710.2	1.5	50.0	29.6	4,565	Yes		
TT	Non-Participating	656,242	5,375,429	710.2	1.5	50.0	29.4	4,635	Yes		
UU	Non-Participating	655,800	5,374,456	722.8	1.5	50.0	29.5	4,643	Yes		
VV	Non-Participating	655,758	5,368,066	719.3	1.5	50.0	25.3	5,490	Yes		
WW	Participating	656,662	5,372,675	722.4	1.5	50.0	27.2	5,739	Yes		
XX	Non-Participating	656,251	5,368,598	741.7	1.5	50.0	25.2	5,738	Yes		
YY	Non-Participating	656,161	5,367,989	720.8	1.5	50.0	24.8	5,886	Yes		
ZZ	Non-Participating	656,215	5,367,523	716.3	1.5	50.0	24.3	6,146	Yes		

Distances (m)

WTG	X	HH	T	D	DD	NN	PP	G	Y	O	V	L	F	M	E	KK	K	I	B	N	AA	MM
5	11229	11701	8668	8402	10080	8159	6819	8979	6562	5296	4355	2873	3960	7044	7941	9947	5851	3086	1601	6344	7464	9154
6	11478	11902	8986	8689	10401	8530	7173	9335	6869	5669	4731	3233	4268	7281	8178	10062	6022	3344	1860	6496	7596	9243
12	9092	9697	6464	6205	7879	6778	5887	6897	4353	3531	2919	1036	1752	4960	5849	8294	4050	1058	782	4617	5786	7642
13	8660	9319	5979	5742	7393	6457	5686	6419	3875	3148	2657	803	1279	4564	5445	8041	3787	850	1250	4373	5544	7436
14	7896	8715	5009	4877	6409	5685	5183	5379	2955	2298	2148	1003	612	3962	4799	7780	3607	1349	2290	4213	5352	7299
15	8253	8934	5576	5329	6992	6328	5683	6072	3465	2966	2628	938	866	4173	5049	7733	3486	732	1614	4082	5249	7163
18	7268	8225	4207	4181	5589	5176	4961	4526	2233	1819	2122	1738	939	3557	4323	7600	3614	2057	3144	4206	5277	7231
20	7340	8448	4016	4201	5329	4449	4354	4001	2298	1147	1769	2107	1674	3930	4610	8081	4240	2761	3714	4816	5841	7782
22	7010	8166	3636	3866	4941	4386	4466	3633	2002	1263	2078	2485	1887	3738	4371	7928	4215	3019	4054	4773	5753	7678
24	6530	6959	4650	3991	6049	7477	7304	5893	2625	4172	4349	3044	1647	2320	3214	5599	1366	1725	3160	1971	3126	5061
26	6061	6436	4423	3659	5789	7726	7668	5839	2524	4491	4767	3553	2103	1860	2741	5087	910	2258	3681	1511	2638	4587

To be continued on next page...

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 9:44 AM / 4

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 4:11 PM/2.9.285

DECIBEL - Main Result

Calculation: A059 V110 2.0 80m HH Gen Grnd Atten. 0.5 Generic Octave

...continued from previous page

WTG	X	HH	T	D	DD	NN	PP	G	Y	O	V	L	F	M	E	KK	K	I	B	N	AA	MM
27	5756	6203	4066	3302	5429	7544	7572	5517	2200	4371	4733	3649	2144	1546	2439	5029	1037	2469	3925	1593	2646	4601
28	5528	5893	4094	3240	5420	7854	7926	5666	2366	4719	5104	4017	2518	1347	2211	4654	766	2790	4224	1263	2279	4232
29	5137	5440	3989	3038	5257	8118	8275	5700	2467	5060	5504	4471	2961	1045	1842	4227	794	3251	4677	1074	1923	3859
34	3006	3395	3192	1995	4022	8711	9321	5336	3001	6197	6934	6309	4769	1371	578	3330	2793	5309	6774	2627	2386	3557
35	2383	2858	3149	1994	3766	8924	9650	5335	3365	6583	7381	6855	5322	1946	1066	3351	3417	5908	7380	3229	2865	3758
36	2125	2457	3423	2307	3914	9276	10033	5611	3760	6978	7782	7251	5715	2329	1462	3161	3719	6282	7749	3484	2998	3673
37	14197	13772	13102	12333	14483	14409	13227	14208	11063	11215	10520	8702	8922	10382	11121	10830	8564	7768	6937	8629	9158	9760
38	13789	13406	12633	11877	14018	13913	12741	13720	10585	10717	10024	8205	8429	9937	10686	10508	8124	7273	6439	8207	8770	9442
39	13540	13245	12228	11515	13626	13317	12114	13242	10154	10152	9431	7630	7926	9606	10382	10436	7813	6767	5864	7941	8579	9380
40	13115	12800	11866	11131	13257	13123	11974	12926	9807	9917	9234	7408	7629	9207	9974	9980	7406	6473	5644	7519	8138	8924
41	13074	12702	11938	11172	13319	13366	12256	13057	9902	10130	9479	7636	7788	9226	9972	9828	7411	6638	5879	7492	8060	8765
42	12772	12274	11902	11064	13252	13748	12744	13158	9929	10446	9880	8006	7985	9078	9773	9295	7248	6862	6284	7254	7701	8222
43	12446	11969	11557	10720	12908	13434	12451	12814	9584	10123	9572	7694	7650	8736	9435	9012	6906	6531	5981	6918	7381	7942
45	11972	11498	11112	10264	12457	13112	12180	12399	9154	9781	9266	7382	7271	8276	8969	8554	6446	6167	5696	6449	6907	7485
66	9373	9602	7406	6860	8830	8635	7778	8270	5279	5314	4804	2917	2947	5177	6055	7609	3687	1788	1376	4103	5165	6780
67	8925	9205	6916	6377	8340	8278	7506	7793	4789	4927	4492	2615	2484	4721	5606	7321	3295	1334	1320	3748	4846	6533
68	8637	8863	6768	6171	8185	8444	7753	7752	4662	5068	4715	2865	2514	4448	5322	6927	2948	1422	1710	3377	4460	6131
69	8320	8585	6420	5827	7837	8206	7581	7419	4316	4819	4530	2719	2218	4123	5002	6738	2676	1183	1787	3138	4250	5976
70	8357	8331	7015	6241	8387	9416	8851	8283	5029	6022	5797	3996	3353	4326	5123	6073	2563	2439	2882	2805	3722	5191
84	10308	10437	8433	7867	9856	9448	8446	9281	6307	6195	5571	3708	3948	6136	7001	8244	4550	2790	1971	4900	5883	7343
85	10537	10730	8523	8013	9951	9247	8174	9272	6386	6049	5359	3530	3941	6344	7221	8611	4823	2799	1764	5205	6221	7727
98	7067	8369	3484	3947	4667	3713	4034	3066	2286	1074	2183	3073	2643	4183	4710	8399	4869	3764	4727	5405	6329	8223
99	6758	8113	3125	3664	4274	3721	4237	2667	2135	1449	2580	3452	2905	4078	4540	8287	4915	4049	5076	5427	6299	8162
100	5926	7408	2201	2949	3258	4071	4970	1750	1939	2468	3610	4384	3595	3842	4111	7943	5031	4754	5920	5470	6191	7950
101	5850	7414	2097	3004	2983	3997	5075	1287	2282	2810	3969	4831	4060	4116	4300	8138	5404	5219	6382	5819	6487	8199
104	8018	8324	6083	5495	7500	7980	7422	7096	3980	4588	4366	2610	1944	3813	4698	6570	2436	1010	1915	2931	4068	5847
105	7246	7728	5100	4573	6523	7216	6854	6099	2983	3838	3830	2345	1155	3047	3944	6337	2083	948	2400	2673	3482	5750
150	5294	6983	1655	2783	2173	4500	5801	628	2707	3724	4884	5707	4833	4295	4286	8068	5794	5981	7209	6141	6667	8249
151	8702	8615	7427	6642	8795	9772	9157	8697	5445	6380	6109	4278	3728	4711	5493	6246	2925	2763	3031	3120	3967	5324
152	9017	8886	7783	6993	9150	10067	9406	9050	5801	6678	6368	4517	4043	5054	5826	6437	3257	3043	3172	3422	4128	5487
154	9473	9455	7963	7262	9361	9765	8978	9068	5905	6404	5978	4095	3872	5397	6217	7120	3674	2770	2588	3932	4827	6193
155	10049	10127	8295	7683	9712	9575	8642	9231	6186	6277	5718	3836	3920	5903	6755	7880	4267	2764	2157	4588	5543	6968
156	9661	9698	8027	7368	9434	9602	8758	9054	5941	6263	5783	3895	3796	5545	6383	7421	3867	2663	2319	4163	5096	6567
158	7378	7691	5543	4900	6949	7893	7496	6684	3479	4511	4455	2850	1823	3177	4058	6025	1827	1270	2484	2356	3515	5353
164	11279	11160	9785	9105	11190	11079	10041	10793	7702	7821	7198	5339	5493	7238	8048	8605	5490	4337	3595	5696	6484	7606
165	12259	12312	10374	9836	11801	10817	9551	11109	8239	7754	6948	5223	5787	8103	8961	9929	6476	4652	3487	6780	7685	8963
166	12532	12632	10546	10048	11975	10751	9424	11205	8406	7759	6905	5238	5909	8356	9224	10298	6767	4795	3543	7094	8025	9341
171	10043	10590	7436	7180	8848	7307	6183	7796	5330	4237	3424	1725	2729	5883	6778	9022	4828	1921	553	5362	6515	8301
173	10429	10968	7809	7564	9218	7483	6273	8126	5708	4498	3622	2027	3109	6267	7162	9361	5186	2303	878	5711	6857	8622
174	10791	11328	8148	7918	9554	7629	6342	8420	6055	4732	3804	2313	3459	6629	7524	9697	5635	2664	1225	6055	7196	8945
175	3222	4145	2131	958	3161	7607	8297	4229	2024	5240	6071	5693	4195	1177	674	4459	3002	4941	6428	3064	3210	4631
176	3033	4140	1769	573	2746	7437	8220	3912	2058	5232	6121	5868	4401	1572	1060	4742	3402	5210	6693	3479	3612	4975
177	2644	3777	1905	753	2687	7736	8568	4087	2446	5607	6507	6256	4782	1821	1137	4578	3632	5570	7056	3652	3664	4892
178	2233	3441	2050	1027	2605	8006	8899	4233	2842	5977	6896	6668	5195	2174	1402	4514	3956	5976	7462	3930	3836	4916
179	1952	3324	2051	1204	2394	8085	9051	4199	3109	6190	7140	6977	5519	2544	1766	4681	4324	6323	7809	4290	4156	5147
180	1880	3429	1932	1300	2087	7993	9031	4019	3247	6245	7229	7156	5724	2858	2110	4993	4656	6566	8048	4639	4518	5488
183	6163	7591	2476	3124	3592	3986	4754	2082	1882	2130	3264	4034	3294	3828	4172	7984	4902	4453	5589	5367	6142	7942
184	6856	7339	4789	4216	6205	7242	6987	5891	2700	3897	4001	2640	1289	2655	3552	6006	1766	1334	2793	2367	3528	5457
205	13779	13527	12374	11690	13780	13279	12027	13329	10283	10158	9400	7627	8000	9803	10594	10754	8026	6841	5865	8178	8851	9704
206	12858	12443	11821	11026	13191	13426	12364	12996	9808	10159	9545	7686	7762	9064	9792	9532	7240	6621	5941	7294	7820	8466
300	2683	3218	2982	1796	3727	8648	9332	5152	3031	6247	7031	6494	4960	1590	705	3500	3123	5555	7030	2978	2730	3809
302	7532	8524	4380	4424	5738	4927	4648	4544	2478	1545	1792	1600	1150	3876	4630	7929	3934	2190	3143	4528	5605	7559
303	7557	8429	4616	4513	6012	5494	5128	4994	2579	2102	2159	1357	592	3700	4512	7622	3519	1621	2678	4122	5235	7189
304	6583	8006	2889	3540	3964	3628																

Project:
20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:
 EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page
 10/2/2015 9:44 AM / 5
 Licensed user:
EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 4:11 PM/2.9.285

DECIBEL - Main Result

Calculation: A059 V110 2.0 80m HH Gen Grnd Atten. 0.5 Generic Octave

...continued from previous page

WTG	X	HH	T	D	DD	NN	PP	G	Y	O	V	L	F	M	E	KK	K	I	B	N	AA	MM
314	6783	7595	4070	3807	5494	5951	5806	4796	1943	2643	2940	2123	661	2853	3678	6793	2768	1729	3093	3360	4441	6395
315	9127	9060	7756	7007	9138	9844	9140	8952	5737	6463	6112	4248	3860	5102	5900	6684	3338	2817	2857	3556	4413	5752
316	7690	8025	5756	5159	7171	7830	7351	6808	3662	4438	4298	2620	1758	3483	4370	6350	2163	1010	2150	2686	3840	5662
317	7058	7354	5324	4635	6718	7948	7633	6553	3300	4587	4612	3086	1925	2866	3741	5708	1493	1550	2817	2033	3198	5058
WTG	TT	SS	EE	BB	H	Z	S	A	OO	WW	FF	LL	JJ	GG	II	YY	VV	ZZ	QQ	C	R	J
5	9329	9110	6123	5932	1954	5937	5693	6109	8482	10138	8249	9414	8831	7902	8021	11886	11526	12225	10281	3227	10991	3136
6	9361	9135	6190	6002	1723	5984	5641	5803	8345	10066	7999	9147	8601	7699	7817	11674	11308	12005	10065	3502	11287	3394
12	8100	7920	4835	4639	3110	4776	5119	7154	8251	9461	8782	10036	9204	8127	8250	12055	11737	12447	10513	1106	8786	1102
13	7975	7806	4734	4542	3550	4715	5206	7520	8371	9468	9051	10313	9439	8342	8466	12235	11928	12637	10713	787	8313	878
14	8012	7873	4894	4715	4571	4958	5716	8449	8898	9771	9829	11100	10161	9036	9158	12851	12562	13267	11370	1110	7400	1336
15	7759	7600	4552	4363	3859	4565	5174	7737	8354	9354	9167	10436	9524	8410	8533	12265	11967	12674	10763	555	7902	737
18	8079	7965	5119	4956	5406	5245	6184	9203	9342	10032	10462	11737	10750	9609	9729	13345	13073	13772	11902	1805	6640	2030
20	8694	8593	5809	5651	6022	5950	6919	9898	10073	10720	11196	12471	11488	10347	10468	14081	13810	14509	12641	2510	6511	2738
22	8641	8551	5845	5695	6345	6010	7049	10165	10180	10742	11394	12669	11663	10515	10635	14205	13942	14638	12785	2767	6137	2992
24	5775	5645	2765	2607	4708	2913	4023	7726	7102	7678	8541	9807	8723	7562	7678	11143	10893	11582	9762	1684	6592	1678
26	5372	5258	2521	2387	5129	2731	3996	7938	6981	7399	8590	9846	8723	7560	7673	11033	10799	11479	9696	2217	6227	2212
27	5470	5372	2762	2643	5458	3002	4317	8296	7260	7593	8925	10178	9044	7882	7993	11313	11085	11762	9994	2396	5876	2420
28	5128	5037	2541	2442	5649	2814	4204	8319	7066	7307	8834	10077	8920	7760	7869	11115	10898	11568	9826	2734	5766	2742
29	4832	4760	2507	2440	6038	2824	4294	8546	7027	7120	8930	10157	8973	7819	7925	11062	10860	11520	9818	3197	5489	3204
34	4922	4969	4004	4030	8186	4390	5943	10433	8156	7622	10458	11620	10367	9257	9348	12033	11892	12501	10981	5214	3729	5260
35	5171	5248	4565	4604	8813	4955	6505	11022	8598	7922	10976	12119	10856	9759	9848	12416	12291	12885	11415	5805	3264	5858
36	5103	5200	4759	4812	9137	5151	6692	11239	8662	7876	11106	12230	10957	9876	9961	12424	12312	12893	11466	6184	3249	6233
37	8968	8700	7329	7263	4649	6938	5445	863	5481	7843	3130	3748	3954	3846	3892	6873	6463	7046	5390	8019	14825	7798
38	8704	8434	6935	6861	4156	6545	5077	651	5370	7721	3244	4003	4057	3804	3863	7064	6656	7264	5537	7524	14382	7304
39	8734	8464	6738	6647	3554	6354	4953	1105	5639	7959	3768	4613	4561	4175	4248	7620	7215	7840	6065	7017	14050	6800
40	8279	8009	6297	6210	3375	5912	4500	940	5235	7539	3526	4463	4294	3822	3903	7388	6987	7629	5811	6724	13653	6505
41	8067	7797	6223	6148	3653	5834	4378	582	4904	7226	3128	4075	3898	3450	3527	6990	6589	7232	5414	6890	13670	6667
42	7417	7149	5894	5845	4202	5502	3973	706	4037	6383	2248	3297	2991	2528	2603	6101	5704	6360	4511	7113	13498	6886
43	7172	6902	5567	5515	3942	5175	3655	954	3924	6247	2409	3526	3104	2514	2601	6226	5836	6505	4623	6781	13158	6554
45	6742	6472	5094	5042	3763	4702	3182	1418	3649	5932	2532	3728	3144	2392	2493	6253	5873	6558	4640	6416	12693	6188
66	6934	6717	3730	3542	1821	3540	3443	5377	6468	7889	6890	8147	7312	6244	6367	10191	9866	10576	8636	2038	9470	1821
67	6781	6576	3530	3336	2299	3385	3507	5812	6616	7907	7219	8484	7603	6510	6633	10421	10107	10817	8887	1586	8990	1362
68	6378	6174	3125	2931	2541	2984	3175	5792	6317	7543	7057	8329	7405	6293	6416	10170	9864	10573	8654	1666	8774	1438
69	6298	6104	3027	2831	2870	2927	3290	6117	6460	7588	7318	8591	7640	6516	6638	10358	10060	10767	8859	1412	8432	1190
70	5286	5069	2118	1938	3046	1898	2013	5341	5186	6352	6209	7483	6467	5324	5445	9110	8821	9526	7633	2648	8768	2437
84	7312	7076	4271	4099	884	4007	3492	4478	6230	7907	6235	7460	6740	5743	5865	9730	9384	10090	8140	3035	10472	2826
85	7729	7495	4653	4476	667	4403	3928	4680	6652	8345	6561	7770	7092	6119	6240	10108	9756	10460	8511	3034	10626	2840
98	9247	9169	6541	6398	7041	6722	7795	10909	10915	11420	12152	13428	12419	11270	11390	14946	14686	15381	13534	3513	5989	3739
99	9232	9166	6626	6492	7377	6828	7957	11193	11050	11473	12371	13645	12615	11461	11580	15091	14840	15530	13701	3797	5620	4020
100	9125	9089	6801	6690	8172	7050	8311	11835	11308	11521	12837	14106	13023	11862	11977	15361	15132	15810	14029	4508	4649	4719
101	9409	9384	7180	7075	8637	7440	8726	12292	11698	11851	13270	14537	13445	12283	12397	15750	15526	16201	14433	4973	4443	5183
104	6242	6058	2972	2777	3192	2916	3435	6436	6617	7650	7579	8854	7879	6745	6867	10552	10262	10967	9070	1208	8102	1003
105	6368	6219	3213	3033	4112	3278	4140	7432	7302	8091	8482	9756	8736	7587	7707	11302	11030	11729	9864	919	7189	901
150	9533	9533	7568	7482	9428	7858	9222	12971	12097	12079	13818	15077	13949	12786	12898	16136	15930	16593	14871	5741	3704	5943
151	5309	5079	2261	2098	2867	1982	1767	4930	4898	6189	5811	7086	6088	4953	5074	8777	8480	9187	7282	2984	9157	2767
152	5382	5143	2458	2310	2727	2143	1641	4575	4690	6095	5483	6758	5781	4655	4778	8516	8211	8920	7004	3272	9500	3050
154	6127	5890	3134	2972	1999	2847	2348	4462	5269	6797	5730	6996	6118	5035	5159	8974	8651	9361	7423	3018	9823	2789
155	6920	6682	3900	3731	1227	3627	3099	4400	5880	7523	6012	7254	6484	5460	5583	9441	9100	9808	7860	3015	10277	2795
156	6466	6230	3440	3272	1686	3166	2691	4495	5574	7136	5911	7170	6333	5271	5395	9230	8900	9610	7667	2914	9948	2687
158	5858	5692	2634	2446	3816	2658	3462	6870	6627	7465	7828	9101	8068	6916	7036	10624	10352	11051	9187	1366	7498	1239
164	7261	7001	4682	4554	1559	4331	3242	2848	5269	7263	4740	5924	5324	4438	4553	8400	8032	8727	6789	4588	11667	4368
165	8708	8452	5954	5803	1193	5633	4694	3435	6715	8756	5807	6879	6485	5729	5836	9605	9220	9896	7993	4885	12443	4694
166	9110	8856	6316	6161	1372	6003	5102	3716	7132	9178	6156	7201	6851	6121	6227	9973	9585	10257	8364	5019	12660	4839
171	8629	8429	5363	5167	2457	5241	5306	6657	8322	9743	8519	9742	9014	7993	8116	11970	11632	12341	10393	2031	9763	1970

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 9:44 AM / 6

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 4:11 PM/2.9.285

DECIBEL - Main Result

Calculation: A059 V110 2.0 80m HH Gen Grnd Atten. 0.5 Generic Octave

...continued from previous page

WTG	TT	SS	EE	BB	H	Z	S	A	OO	WW	FF	LL	JJ	GG	II	YY	VV	ZZ	QQ	C	R	J
180	6907	6988	6082	6089	9790	6461	8010	12417	10287	9662	12569	13742	12494	11378	11471	14142	14010	14611	13111	6407	1620	6517
183	9083	9036	6659	6540	7854	6894	8116	11558	11146	11428	12612	13883	12816	11656	11772	15198	14961	15644	13847	4205	4954	4419
184	6137	6000	3058	2889	4461	3168	4163	7659	7291	7966	8601	9872	8820	7664	7782	11315	11054	11749	9905	1278	6829	1286
205	9087	8817	7012	6914	3535	6632	5264	1475	6034	8350	4138	4940	4937	4643	7980	7574	8190	6435	7088	14242	6876	
206	7736	7466	5990	5924	3777	5599	4114	536	4524	6850	2804	3808	3556	3073	3152	6662	6264	6915	5076	6873	13502	6648
300	5197	5256	4359	4386	8493	4746	6299	10785	8496	7919	10812	11971	10717	9608	9700	12358	12222	12826	11320	5449	3379	5506
302	8398	8282	5415	5249	5443	5529	6426	9320	9595	10326	10648	11922	10955	9819	9941	13585	13307	14008	12129	1941	6841	2170
303	7966	7838	4916	4745	4939	5011	5864	8761	9038	9819	10071	11345	10379	9244	9366	13019	12739	13441	11558	1370	7018	1598
304	9375	9319	6860	6732	7767	7076	8247	11557	11315	11672	12695	13969	12924	11768	11886	15363	15118	15805	13988	4168	5354	4389
305	9632	9623	7565	7472	9241	7844	9178	12845	12094	12142	13754	15016	13904	12741	12854	16140	15927	16595	14854	5565	4032	5771
306	9765	9748	7604	7503	9086	7870	9171	12752	12127	12240	13723	14990	13893	12730	12844	16178	15957	16630	14871	5428	4366	5639
307	9437	9185	6568	6407	1486	6270	5444	4150	7562	9583	6608	7646	7305	6571	6678	10426	10039	10710	8818	4983	12700	4817
308	7594	7335	4966	4831	1344	4623	3574	2923	5599	7607	4963	6122	5575	4723	4836	8667	8295	8986	7055	4619	11837	4404
309	7913	7655	5238	5097	1175	4902	3895	3052	5928	7943	5210	6344	5843	5019	5131	8946	8570	9257	7333	4651	11990	4443
310	8261	8003	5562	5419	1163	5232	4243	3149	6246	8282	5420	6524	6078	5290	5399	9191	8810	9492	7578	4784	12220	4582
311	7268	7052	4059	3870	1677	3873	3760	5460	6756	8211	7080	8327	7528	6477	6600	10439	10108	10817	8874	2045	9629	1842
312	7602	7386	4392	4202	1559	4208	4069	5529	7029	8522	7251	8488	7725	6693	6816	10667	10331	11039	9093	2137	9824	1954
313	7945	7725	4754	4565	1334	4557	4337	5456	7227	8791	7300	8520	7807	6804	6927	10790	10446	11152	9203	2434	10170	2267
314	7233	7119	4297	4139	5189	4440	5460	8753	8591	9209	9848	11122	10094	8942	9061	12615	12353	13048	11199	1502	6375	1687
315	5688	5453	2698	2539	2442	2406	1971	4609	4992	6425	5669	6943	6002	4890	5013	8783	8471	9181	7256	3055	9542	2829
316	6126	5953	2877	2684	3528	2865	3535	6723	6716	7649	7791	9066	8064	6922	7042	10684	10403	11105	9223	1151	7766	988
317	5611	5454	2432	2251	4123	2499	3444	7049	6576	7311	7901	9171	8108	6950	7068	10597	10335	11030	9186	1611	7220	1514

WTG	P	UU	CC	XX	RR	Q	W	U
5	3791	8943	6114	11586	10686	10914	9965	9838
6	3438	8934	6060	11388	10436	11171	10296	10167
12	5363	7944	5516	11660	11155	8762	7778	7648
13	5811	7882	5589	11823	11399	8324	7290	7160
14	6835	8059	6066	12407	12126	7537	6284	6158
15	6123	7716	5543	11837	11487	7914	6897	6765
18	7669	8236	6504	12879	12713	6892	5447	5325
20	8284	8898	7236	13612	13451	6945	5129	5020
22	8609	8891	7350	13726	13622	6609	4738	4629
24	6802	5884	4292	10651	10662	6245	6102	5949
26	7165	5553	4221	10523	10642	5790	5881	5725
27	7512	5714	4527	10796	10956	5475	5524	5368
28	7652	5407	4384	10589	10814	5266	5547	5389
29	7994	5188	4432	10523	10841	4891	5423	5264
34	10096	5657	5964	11450	12113	2801	4351	4201
35	10720	5982	6505	11826	12568	2196	4145	4004
36	11011	5962	6670	11829	12636	1998	4320	4186
37	2727	8009	5581	6850	5157	14045	14557	14403
38	2293	7770	5239	7000	5411	13628	14086	13933
39	1631	7845	5163	7523	6014	13362	13676	13524
40	1712	7393	4707	7260	5846	12942	13317	13164
41	2104	7157	4553	6864	5453	12913	13393	13239
42	2972	6461	4073	5954	4635	12639	13360	13204
43	2878	6234	3770	6047	4830	12309	13015	12858
45	2989	5822	3302	6029	4969	11837	12570	12413
66	3976	6580	3861	9812	9262	9107	8824	8679
67	4467	6500	3914	10022	9562	8652	8334	8188
68	4627	6108	3574	9756	9368	8376	8201	8053
69	4974	6085	3674	9931	9605	8053	7854	7705
70	4751	4948	2399	8672	8429	8145	8472	8317
84	2949	6819	3908	9400	8653	10056	9852	9707
85	2908	7250	4345	9788	8988	10273	9926	9783
98	9302	9545	8090	14462	14378	6652	4399	4309
99	9640	9574	8238	14598	14569	6338	3998	3911
100	10433	9577	8553	14844	14958	5499	2968	2884

To be continued on next page...

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 9:44 AM / 7

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000

wind@eapc.net

Calculated:

10/1/2015 4:11 PM/2.9.285

DECIBEL - Main Result

Calculation: A059 V110 2.0 80m HH Gen Grnd Atten. 0.5 Generic Octave

...continued from previous page

WTG	P	UU	CC	XX	RR	Q	W	U
101	10898	9896	8959	15227	15374	5419	2647	2581
104	5309	6086	3803	10113	9843	7745	7517	7368
105	6281	6380	4463	10836	10694	6946	6526	6379
150	11681	10106	9424	15597	15856	4865	1785	1742
151	4432	4889	2176	8352	8052	8500	8885	8729
152	4153	4895	2061	8104	7746	8822	9241	9086
154	3630	5641	2769	8594	8075	9253	9413	9261
155	3110	6423	3516	9096	8414	9808	9727	9579
156	3454	5987	3111	8863	8282	9430	9469	9319
158	5893	5799	3788	10159	10024	7108	6989	6838
164	1890	6562	3588	8129	7177	11072	11229	11079
165	1100	8043	5059	9388	8218	12016	11781	11637
166	1192	8456	5470	9768	8555	12279	11939	11798
171	4631	8365	5722	11615	10934	9720	8738	8610
173	4425	8613	5910	11690	10940	10106	9102	8975
174	4289	8880	6132	11806	10994	10467	9430	9305
175	10150	6612	6526	12312	12839	2892	3417	3260
176	10503	7000	6941	12718	13254	2672	3012	2856
177	10805	6996	7100	12765	13362	2287	3006	2856
178	11172	7093	7353	12904	13560	1874	2976	2835
179	11541	7366	7702	13196	13883	1567	2801	2670
180	11844	7720	8058	13555	14245	1463	2516	2393
183	10117	9497	8370	14688	14757	5738	3315	3227
184	6603	6206	4459	10835	10771	6558	6227	6078
205	1442	8210	5490	7895	6347	13592	13816	13666
206	2411	6813	4266	6520	5167	12707	13278	13123
300	10424	5961	6319	11773	12456	2461	4075	3928
302	7706	8543	6755	13125	12919	7150	5571	5454
303	7203	8065	6199	12564	12343	7193	5886	5760
304	10031	9756	8517	14862	14874	6159	3664	3585
305	11499	10175	9393	15608	15821	5158	2121	2079
306	11348	10279	9400	15652	15819	5467	2457	2415
307	1569	8811	5823	10221	9003	12378	11907	11770
308	1619	6903	3926	8410	7400	11282	11345	11196
309	1405	7232	4252	8700	7643	11475	11445	11298
310	1173	7582	4601	8960	7844	11739	11628	11483
311	3900	6914	4179	10071	9469	9315	8918	8775
312	3818	7243	4489	10310	9655	9554	9054	8913
313	3592	7559	4758	10451	9720	9925	9359	9221
314	7427	7398	5760	12136	12050	6431	5426	5289
315	3993	5219	2391	8381	7966	8919	9212	9058
316	5642	6027	3883	10232	10026	7414	7194	7044
317	6166	5600	3742	10119	10056	6793	6777	6623

Appendix K: windPRO V117/V110 Shadow Flicker Report, No Obstacles

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:11 AM / 1

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 4:44 PM/2.9.285

SHADOW - Main Result

Calculation: A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab

Assumptions for shadow calculations

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

Sunshine probability S (Average daily sunshine hours) [BISMARCK]
 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 4.92 5.13 7.45 8.03 10.20 11.21 11.69 10.35 8.68 5.69 4.02 3.69

Operational hours are calculated from WTGs in calculation and wind distribution:

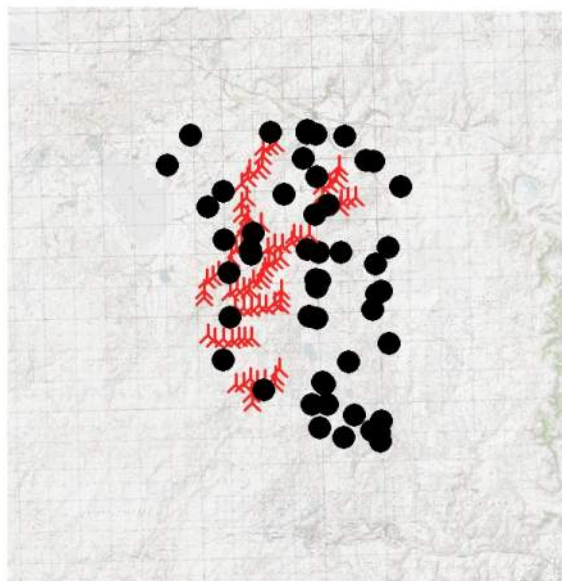
DNV Shadow

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
 662 334 353 412 609 964 791 576 697 906 1,119 1,195 8,618

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: 20100616_Lindahl_10ft_HCL.wpo (1)
 Obstacles not used in calculation
 Eye height: 1.5 m
 Grid resolution: 10.0 m



⤴ New WTG

Scale 1:400,000
 📍 Shadow receptor

WTGs

UTM NAD83 Zone: 13			WTG type									
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	RPM		
		[m]					[kW]	[m]	[m]	[RPM]		
5	646,913	5,375,455	745.7 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0		
6	646,888	5,375,080	743.7 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0		
12	648,327	5,377,151	750.2 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9		
13	648,563	5,377,579	749.6 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9		
14	648,872	5,378,572	753.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9		
15	648,872	5,377,853	752.9 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9		
18	649,189	5,379,368	749.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9		
20	648,867	5,380,033	744.0 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0		
22	649,124	5,380,328	729.3 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0		
24	651,007	5,377,868	749.0 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0		
26	651,525	5,378,000	751.5 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0		
27	651,616	5,378,348	758.6 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0		
28	651,987	5,378,290	755.5 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0		
29	652,436	5,378,405	749.8 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0		
34	654,047	5,379,834	743.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9		
35	654,478	5,380,290	740.5 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9		
36	654,876	5,380,346	731.4 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0		
37	649,468	5,369,552	735.9 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9		
38	649,403	5,370,046	745.2 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9		
39	648,989	5,370,563	740.7 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0		
40	649,348	5,370,846	749.8 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0		
41	649,714	5,370,690	746.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9		
42	650,635	5,370,574	746.1 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9		
43	650,667	5,370,918	744.1 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0		
45	650,882	5,371,340	743.7 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0		
66	649,309	5,375,532	733.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9		
67	649,484	5,375,990	732.9 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0		

To be continued on next page...

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:11 AM / 2

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net

Calculated:

10/1/2015 4:44 PM/2.9.285

SHADOW - Main Result

Calculation: A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab

...continued from previous page

UTM NAD83 Zone: 13				WTG type							
	East	North	Z [m]	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	RPM [RPM]
68	649,889	5,375,994	741.6	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
69	650,008	5,376,321	740.1	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
70	650,956	5,375,465	751.0	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
84	648,982	5,374,557	737.6	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
85	648,553	5,374,643	733.1	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
98	648,903	5,381,054	722.4	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
99	649,170	5,381,363	721.7	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
100	649,950	5,382,038	713.8	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
101	650,030	5,382,496	712.8	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
104	650,119	5,376,639	740.5	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
105	650,267	5,377,632	746.8	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
150	650,663	5,383,159	707.7	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
151	650,947	5,375,049	753.4	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
152	650,911	5,374,694	758.8	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
154	650,163	5,374,664	746.8	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
155	649,378	5,374,555	741.3	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
156	649,818	5,374,694	743.7	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
158	650,613	5,377,049	737.8	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
164	649,406	5,372,982	725.6	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
165	647,909	5,372,903	716.3	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
166	647,487	5,372,910	715.6	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
171	647,671	5,376,427	743.7	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
173	647,364	5,376,192	740.7	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
174	647,056	5,376,002	741.8	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
175	653,143	5,380,511	713.2	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
176	653,130	5,380,927	710.2	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
177	653,497	5,381,062	704.1	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
178	653,850	5,381,276	700.7	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
179	654,022	5,381,604	696.2	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
180	654,011	5,381,966	694.9	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
183	649,728	5,381,758	721.2	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
184	650,599	5,377,842	746.4	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
205	648,594	5,370,523	731.5	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
206	650,092	5,370,737	743.7	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
300	654,134	5,380,179	734.1	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
302	648,870	5,379,451	759.0	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
303	649,079	5,378,913	759.0	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
304	649,308	5,381,738	716.8	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
305	650,346	5,383,045	709.5	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
306	650,021	5,382,956	710.0	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
307	647,090	5,373,129	713.2	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
308	649,061	5,372,960	722.4	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
309	648,724	5,372,961	720.3	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
310	648,383	5,372,885	719.3	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
311	648,975	5,375,560	734.6	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
312	648,641	5,375,554	726.9	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
313	648,297	5,375,376	728.5	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
314	649,928	5,378,956	741.0	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
315	650,591	5,374,779	748.6	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
316	650,301	5,376,922	735.0	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
317	650,917	5,377,197	740.0	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:11 AM / 3

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 4:44 PM/2.9.285

SHADOW - Main Result

Calculation: A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab

Shadow receptor-Input

UTM NAD83 Zone: 13

No.	Name	East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
				[m]	[m]	[m]	[m]	[°]	[°]	
A	Participating	650,034	5,370,204	742.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
B	Participating	648,222	5,376,376	731.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
C	Participating	649,350	5,377,570	737.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
D	Participating	652,833	5,381,417	705.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
E	Participating	653,476	5,379,925	741.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
F	Participating	649,476	5,378,474	747.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
G	Participating	650,400	5,383,729	711.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
H	Participating	648,263	5,374,042	728.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
I	Participating	649,372	5,377,319	734.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
J	Participating	649,411	5,377,350	734.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
K	Participating	652,350	5,377,616	735.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
L	Participating	647,974	5,378,125	736.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
M	Participating	652,746	5,379,403	722.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
N	Non-Participating	652,934	5,377,454	728.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
O	Participating	647,905	5,380,657	723.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
P	Non-Participating	647,929	5,371,803	716.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
Q	Non-Participating	655,444	5,382,262	682.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R	Non-Participating	654,346	5,383,551	675.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
S	Participating	652,445	5,374,111	759.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
T	Non-Participating	652,124	5,382,382	698.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
U	Non-Participating	652,329	5,383,668	691.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
V	Participating	647,113	5,379,805	712.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
W	Non-Participating	652,318	5,383,827	691.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
X	Non-Participating	655,873	5,382,222	689.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
Y	Non-Participating	651,119	5,380,491	705.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
Z	Non-Participating	652,848	5,375,611	736.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
AA	Participating	654,105	5,377,449	726.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
BB	Non-Participating	652,820	5,375,995	733.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
CC	Participating	652,849	5,373,992	753.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
DD	Non-Participating	652,780	5,383,651	684.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
EE	Non-Participating	653,014	5,375,966	734.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
FF	Non-Participating	652,597	5,369,477	749.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
GG	Participating	653,163	5,370,620	746.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
HH	Non-Participating	657,270	5,380,900	701.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
II	Participating	653,237	5,370,521	746.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
JJ	Non-Participating	653,421	5,369,486	746.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
KK	Non-Participating	656,603	5,377,699	728.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
LL	Non-Participating	652,987	5,368,263	755.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
MM	Non-Participating	655,962	5,376,837	710.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
NN	Non-Participating	646,183	5,383,581	712.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
OO	Participating	654,514	5,371,692	765.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
PP	Non-Participating	644,980	5,381,994	704.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
QQ	Participating	654,816	5,368,880	743.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
RR	Non-Participating	654,290	5,367,724	742.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
SS	Non-Participating	656,021	5,375,274	710.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
TT	Non-Participating	656,242	5,375,429	710.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
UU	Non-Participating	655,800	5,374,456	722.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
VV	Non-Participating	655,758	5,368,066	719.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
WW	Participating	656,662	5,372,675	722.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
XX	Non-Participating	656,251	5,368,598	741.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
YY	Non-Participating	656,161	5,367,989	720.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
ZZ	Non-Participating	656,215	5,367,523	716.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:11 AM / 4

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 4:44 PM/2.9.285

SHADOW - Main Result**Calculation:** A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab**Calculation Results**

Shadow receptor

No.	Name	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]
A	Participating	87:15	223	0:39	33:00
B	Participating	77:42	197	0:46	31:36
C	Participating	70:17	176	1:01	28:45
D	Participating	61:33	190	0:35	22:48
E	Participating	63:52	138	0:44	27:10
F	Participating	75:52	167	0:43	26:28
G	Participating	0:00	0	0:00	0:00
H	Participating	20:54	101	0:24	7:57
I	Participating	91:42	214	1:08	37:10
J	Participating	82:42	192	1:06	33:02
K	Participating	46:07	127	0:32	22:09
L	Participating	79:11	199	0:34	29:47
M	Participating	6:05	29	0:19	2:26
N	Non-Participating	0:00	0	0:00	0:00
O	Participating	43:12	157	0:26	17:00
P	Non-Participating	0:00	0	0:00	0:00
Q	Non-Participating	4:15	23	0:17	1:36
R	Non-Participating	0:00	0	0:00	0:00
S	Participating	0:00	0	0:00	0:00
T	Non-Participating	0:00	0	0:00	0:00
U	Non-Participating	0:00	0	0:00	0:00
V	Participating	0:00	0	0:00	0:00
W	Non-Participating	0:00	0	0:00	0:00
X	Non-Participating	0:00	0	0:00	0:00
Y	Non-Participating	0:00	0	0:00	0:00
Z	Non-Participating	0:00	0	0:00	0:00
AA	Participating	0:00	0	0:00	0:00
BB	Non-Participating	0:00	0	0:00	0:00
CC	Participating	0:00	0	0:00	0:00
DD	Non-Participating	0:00	0	0:00	0:00
EE	Non-Participating	0:00	0	0:00	0:00
FF	Non-Participating	0:00	0	0:00	0:00
GG	Participating	0:00	0	0:00	0:00
HH	Non-Participating	0:00	0	0:00	0:00
II	Participating	0:00	0	0:00	0:00
JJ	Non-Participating	0:00	0	0:00	0:00
KK	Non-Participating	0:00	0	0:00	0:00
LL	Non-Participating	0:00	0	0:00	0:00
MM	Non-Participating	0:00	0	0:00	0:00
NN	Non-Participating	0:00	0	0:00	0:00
OO	Participating	0:00	0	0:00	0:00
PP	Non-Participating	0:00	0	0:00	0:00
QQ	Participating	0:00	0	0:00	0:00
RR	Non-Participating	0:00	0	0:00	0:00
SS	Non-Participating	0:00	0	0:00	0:00
TT	Non-Participating	0:00	0	0:00	0:00
UU	Non-Participating	0:00	0	0:00	0:00
VV	Non-Participating	0:00	0	0:00	0:00
WW	Participating	0:00	0	0:00	0:00
XX	Non-Participating	0:00	0	0:00	0:00
YY	Non-Participating	0:00	0	0:00	0:00
ZZ	Non-Participating	0:00	0	0:00	0:00

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.

Kevin Walter

Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:11 AM / 5

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000

wind@eapc.net

Calculated:

10/1/2015 4:44 PM/2.9.285

SHADOW - Main Result**Calculation:** A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab

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

No.	Name	Worst case [h/year]	Expected [h/year]
5	up to V117	0:00	0:00
6	up to V117	0:00	0:00
12	up to V110	18:15	6:39
13	up to V110	100:07	37:21
14	up to V110	62:23	27:22
15	up to V110	55:58	18:37
18	up to V110	0:00	0:00
20	up to V117	13:28	4:38
22	up to V117	6:23	2:25
24	up to V117	6:15	2:47
26	up to V117	36:10	18:09
27	up to V117	0:00	0:00
28	up to V117	0:00	0:00
29	up to V117	0:00	0:00
34	up to V110	37:13	15:56
35	up to V110	9:57	4:04
36	up to V117	3:43	1:27
37	up to V110	17:09	4:16
38	up to V110	24:17	9:06
39	up to V117	12:23	6:01
40	up to V117	0:00	0:00
41	up to V110	0:00	0:00
42	up to V110	30:03	12:18
43	up to V117	0:00	0:00
45	up to V117	0:00	0:00
66	up to V110	9:14	3:11
67	up to V117	5:27	1:53
68	up to V117	0:00	0:00
69	up to V110	0:00	0:00
70	up to V117	0:00	0:00
84	up to V117	3:04	1:12
85	up to V117	0:00	0:00
98	up to V117	13:37	5:39
99	up to V117	9:44	4:02
100	up to V117	0:00	0:00
101	up to V117	0:00	0:00
104	up to V110	29:35	9:43
105	up to V110	31:51	13:44
150	up to V110	0:00	0:00
151	up to V117	0:00	0:00
152	up to V110	0:00	0:00
154	up to V110	0:00	0:00
155	up to V117	13:07	5:28
156	up to V110	0:00	0:00
158	up to V110	10:44	3:59
164	up to V110	0:00	0:00
165	up to V117	0:00	0:00
166	up to V117	0:00	0:00
171	up to V110	40:35	18:05
173	up to V117	15:17	5:54
174	up to V117	7:06	2:29
175	up to V110	0:00	0:00
176	up to V110	16:29	5:12
177	up to V110	21:23	7:29
178	up to V117	9:30	4:04
179	up to V117	6:20	2:35

To be continued on next page...

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.

Kevin Walter

Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:11 AM / 6

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000

wind@eapc.net

Calculated:

10/1/2015 4:44 PM/2.9.285

SHADOW - Main Result**Calculation:** A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab

...continued from previous page

No.	Name	Worst case [h/year]	Expected [h/year]
180	up to V117	12:06	4:52
183	up to V117	0:00	0:00
184	up to V117	25:09	10:10
205	up to V117	3:23	1:31
206	up to V110	0:00	0:00
300	up to V110	30:44	12:49
302	up to V110	0:00	0:00
303	up to V110	1:47	0:43
304	up to V117	0:00	0:00
305	up to V110	0:00	0:00
306	up to V117	0:00	0:00
307	up to V117	4:43	1:17
308	up to V110	0:00	0:00
309	up to V110	0:00	0:00
310	up to V110	0:00	0:00
311	up to V110	0:29	0:08
312	up to V110	0:00	0:00
313	up to V117	0:00	0:00
314	up to V110	0:00	0:00
315	up to V110	0:00	0:00
316	up to V110	24:26	8:38
317	up to V117	3:42	1:15

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:11 AM / 7

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 4:44 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: A - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
662	334	353	412	609	964	791	576	697	906	1,119	1,195	8,618

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

	January	February	March	April	May	June	
1	08:44	15:54 (37)	08:22	07:35	18:03 (38)	07:32	
	17:08	26	16:20 (37)	17:50	8	18:11 (38)	20:21
2	08:44	15:54 (37)	08:21	07:33	17:59 (38)	07:30	
	17:09	26	16:20 (37)	17:52	14	18:13 (38)	20:22
3	08:44	15:55 (37)	08:20	07:31	17:57 (38)	07:28	
	17:10	25	16:20 (37)	17:54	17	18:14 (38)	20:24
4	08:44	15:56 (37)	08:18	07:29	17:55 (38)	07:26	
	17:11	23	16:19 (37)	17:55	21	18:16 (38)	20:25
5	08:44	15:57 (37)	08:17	07:27	17:53 (38)	07:24	
	17:12	23	16:20 (37)	17:57	25	18:18 (38)	20:26
6	08:44	15:58 (37)	08:15	07:25	17:50 (38)	07:22	
	17:13	22	16:20 (37)	17:58	28	18:18 (38)	20:28
7	08:43	15:58 (37)	08:14	07:23	17:49 (38)	07:20	
	17:14	21	16:19 (37)	18:00	31	18:20 (38)	20:29
8	08:43	16:00 (37)	08:12	08:21	18:48 (38)	07:17	
	17:15	19	16:19 (37)	18:00	33	19:21 (38)	20:31
9	08:43	16:01 (37)	08:11	08:19	18:47 (38)	07:15	
	17:16	17	16:18 (37)	18:02	36	19:23 (38)	20:32
10	08:42	16:03 (37)	08:09	08:17	18:47 (38)	07:13	
	17:18	15	16:18 (37)	18:03	38	19:25 (38)	20:34
11	08:42	16:04 (37)	08:08	08:15	18:46 (38)	07:11	
	17:19	13	16:17 (37)	18:05	39	19:25 (38)	20:35
12	08:41	16:07 (37)	08:06	08:13	18:46 (38)	07:09	
	17:20	9	16:16 (37)	18:07	39	19:25 (38)	20:37
13	08:41	08:04	08:11	08:19	18:46 (38)	07:07	
	17:22	08:03	19:52	39	19:25 (38)	20:38	
14	08:40	08:03	08:09	18:46 (38)	07:05		
	17:23	18:10	19:54	38	19:24 (38)	20:40	
15	08:40	08:01	08:07	18:46 (38)	07:04		
	17:24	18:11	19:55	38	19:24 (38)	20:41	
16	08:39	07:59	08:05	18:46 (38)	07:02		
	17:26	18:13	19:57	37	19:23 (38)	20:43	
17	08:38	07:57	08:03	18:46 (38)	07:00		
	17:27	18:15	19:58	37	19:23 (38)	20:44	
18	08:37	07:56	08:01	18:47 (38)	06:58		
	17:29	18:16	20:00	35	19:22 (38)	20:46	
19	08:37	07:54	07:59	18:47 (38)	06:56		
	17:30	18:18	20:01	34	19:21 (38)	20:47	
20	08:36	07:52	07:57	18:47 (38)	06:54		
	17:32	18:20	20:03	32	19:19 (38)	20:48	
21	08:35	07:50	07:55	18:48 (38)	06:52		
	17:33	18:21	20:04	29	19:17 (38)	20:50	
22	08:34	07:48	07:53	18:49 (38)	06:50		
	17:35	18:23	20:06	27	19:16 (38)	20:51	
23	08:33	07:47	07:50	18:51 (38)	06:48		
	17:36	18:24	20:07	23	19:14 (38)	20:53	
24	08:32	07:45	07:48	18:53 (38)	06:46		
	17:38	18:26	20:09	18	19:11 (38)	20:54	
25	08:31	07:43	07:46	18:57 (38)	06:45		
	17:39	18:28	20:10	10	19:07 (38)	20:56	
26	08:30	07:41	07:44	06:43			
	17:41	18:29	20:12	20:57	10	20:28 (205)	21:38
27	08:29	07:39	07:42	06:41			
	17:42	18:31	20:13	20:59	3	20:25 (205)	21:39
28	08:27	07:37	07:40	06:39			
	17:44	18:32	20:15	21:00	1	20:35 (39)	21:40
29	08:26	07:38	07:38	06:38			
	17:45	20:16	21:02	5	20:36 (39)	21:41	
30	08:25	07:36	07:36	06:36			
	17:47	20:18	21:03	8	20:38 (39)	21:42	
31	08:24	07:34	07:34	05:56			
	17:49	20:19	21:43	26	06:48 (42)	21:58	
Potential sun hours	274	285	368	409	471	481	
Total, worst case	239		726	114	546	1057	
Sun reduction	0.56		0.63	0.59	0.67	0.70	
Oper. time red.	0.98		0.98	0.98	0.98	0.98	
Wind dir. red.	0.54		0.62	0.70	0.67	0.59	
Total reduction	0.30		0.38	0.40	0.44	0.40	
Total, real	71		274	46	238	423	

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:11 AM / 8

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 4:44 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: A - Participating**

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [BISMARCK]
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
4.92 5.13 7.45 8.03 10.20 11.21 11.69 10.35 8.68 5.69 4.02 3.69

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
662 334 353 412 609 964 791 576 697 906 1,119 1,195 8,618
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December					
1	05:54	06:21 (42)	06:26	20:37 (39)	07:09	07:51	18:26 (38)	07:37	08:22	15:46 (37)	
	21:58	36 06:57 (42)	21:32	23 21:00 (39)	20:37	19:35	39 19:05 (38)	17:34	17:00	13 15:59 (37)	
2	05:55	06:22 (42)	06:27	20:36 (39)	07:10	07:52	18:25 (38)	07:39	08:23	15:46 (37)	
	21:58	35 06:57 (42)	21:31	24 21:00 (39)	20:35	19:33	39 19:04 (38)	17:32	17:00	15 16:01 (37)	
3	05:56	06:23 (42)	06:29	20:35 (39)	07:12	07:54	18:24 (38)	07:41	08:25	15:45 (37)	
	21:57	35 06:58 (42)	21:29	25 21:00 (39)	20:33	19:31	39 19:03 (38)	17:31	16:59	17 16:02 (37)	
4	05:56	06:23 (42)	06:30	20:36 (39)	07:13	07:55	18:25 (38)	07:42	08:26	15:44 (37)	
	21:57	34 06:57 (42)	21:28	24 21:00 (39)	20:31	19:29	37 19:02 (38)	17:29	16:59	19 16:03 (37)	
5	05:57	06:24 (42)	06:31	20:35 (39)	07:14	07:57	18:25 (38)	07:44	08:27	15:45 (37)	
	21:57	33 06:57 (42)	21:26	23 20:58 (39)	20:29	19:27	34 18:59 (38)	17:28	16:58	20 16:05 (37)	
6	05:58	06:25 (42)	06:33	20:35 (39)	07:16	07:58	18:26 (38)	07:45	08:28	15:44 (37)	
	21:56	33 06:58 (42)	21:25	21 20:56 (39)	20:27	19:25	32 18:58 (38)	17:26	16:58	22 16:06 (37)	
7	05:59	06:26 (42)	06:34	20:35 (39)	07:17	07:59	18:26 (38)	07:47	08:29	15:44 (37)	
	21:56	32 06:58 (42)	21:23	20 20:55 (39)	20:25	19:23	29 18:55 (38)	17:25	16:58	23 16:07 (37)	
8	05:59	06:26 (42)	06:35	20:36 (39)	07:18	08:01	18:27 (38)	07:48	08:30	15:44 (37)	
	21:55	31 06:57 (42)	21:21	18 20:54 (39)	20:23	19:20	26 18:53 (38)	17:23	16:58	23 16:07 (37)	
9	06:00	06:27 (42)	06:37	20:36 (39)	07:20	08:02	18:28 (38)	07:50	08:32	15:44 (37)	
	21:55	30 06:57 (42)	21:20	16 20:52 (39)	20:21	19:18	23 18:51 (38)	17:22	16:57	24 16:08 (37)	
10	06:01	06:28 (42)	06:38	20:36 (39)	07:21	08:04	18:30 (38)	07:52	08:33	15:44 (37)	
	21:54	29 06:57 (42)	21:18	14 20:50 (39)	20:19	19:16	19 18:49 (38)	17:20	16:57	25 16:09 (37)	
11	06:02	06:29 (42)	06:40	20:37 (39)	07:23	08:05	18:31 (38)	07:53	08:34	15:44 (37)	
	21:54	28 06:57 (42)	21:17	12 20:49 (39)	20:17	19:14	16 18:47 (38)	17:19	16:57	26 16:10 (37)	
12	06:03	06:30 (42)	06:41	20:37 (39)	07:24	08:07	18:34 (38)	07:55	08:34	15:44 (37)	
	21:53	27 06:57 (42)	21:15	10 20:47 (39)	20:15	19:12	11 18:45 (38)	17:18	16:57	26 16:10 (37)	
13	06:04	06:31 (42)	06:42	20:38 (39)	07:25	08:08		07:56	08:35	15:44 (37)	
	21:52	25 06:56 (42)	21:13	7 20:45 (39)	20:13	19:10		17:17	16:57	27 16:11 (37)	
14	06:05	06:32 (42)	06:44	20:39 (39)	07:27	08:10		07:58	08:36	15:45 (37)	
	21:52	24 06:56 (42)	21:11	4 20:43 (39)	20:11	19:08		17:15	16:57	27 16:12 (37)	
15	06:06	06:33 (42)	06:45		07:28	08:11		07:59	08:37	15:45 (37)	
	21:51	23 06:56 (42)	21:10		20:09	19:06		17:14	16:57	28 16:13 (37)	
16	06:07	06:34 (42)	06:46	20:28 (205)	07:30	08:13		08:01	08:38	15:45 (37)	
	21:50	21 06:55 (42)	21:08	5 20:33 (205)	20:06	19:05		17:13	16:58	27 16:12 (37)	
17	06:08	06:35 (42)	06:48	20:24 (205)	07:31	08:14		08:02	08:39	15:45 (37)	
	21:49	19 06:54 (42)	21:06	11 20:35 (205)	20:04	19:03		17:12	16:58	28 16:13 (37)	
18	06:09	06:36 (42)	06:49	20:23 (205)	07:32	18:47 (38)	08:16	08:04	08:39	15:46 (37)	
	21:48	17 06:53 (42)	21:04	14 20:37 (205)	20:02	5 18:52 (38)	19:01	17:11	16:58	28 16:14 (37)	
19	06:10	06:37 (42)	06:51	20:22 (205)	07:34	18:42 (38)	08:17	08:05	08:40	15:47 (37)	
	21:47	15 06:52 (42)	21:02	13 20:35 (205)	20:00	16 18:58 (38)	18:57	17:10	16:59	28 16:15 (37)	
20	06:11	06:38 (42)	06:52	20:20 (205)	07:35	18:38 (38)	08:19	08:07	08:41	15:47 (37)	
	21:46	13 06:51 (42)	21:01	13 20:33 (205)	19:58	22 19:00 (38)	18:55	17:09	16:59	28 16:15 (37)	
21	06:12	06:39 (42)	06:53	20:20 (205)	07:37	18:35 (38)	08:20	08:08	08:41	15:47 (37)	
	21:45	10 06:49 (42)	20:59	12 20:32 (205)	19:56	26 19:01 (38)	18:53	17:08	16:59	29 16:16 (37)	
22	06:14	06:40 (42)	06:55	20:20 (205)	07:38	18:34 (38)	08:22	08:10	08:42	15:47 (37)	
	21:44	7 06:47 (42)	20:57	10 20:30 (205)	19:54	29 19:03 (38)	18:51	17:07	17:00	29 16:16 (37)	
23	06:15		06:56	20:19 (205)	07:39	18:32 (38)	08:23	08:11	08:42	15:48 (37)	
	21:43		20:55	9 20:28 (205)	19:52	31 19:03 (38)	18:49	17:06	17:00	29 16:17 (37)	
24	06:16	20:45 (39)	06:58	20:19 (205)	07:41	18:31 (38)	08:25	08:13	08:43	15:49 (37)	
	21:42	6 20:51 (39)	20:53	8 20:27 (205)	19:50	33 19:04 (38)	18:48	17:05	17:01	28 16:17 (37)	
25	06:17	20:43 (39)	06:59	20:19 (205)	07:42	18:29 (38)	08:27	08:14	08:43	15:49 (37)	
	21:41	10 20:53 (39)	20:51	5 20:24 (205)	19:47	35 19:04 (38)	18:46	17:04	17:02	28 16:17 (37)	
26	06:18	20:42 (39)	07:00	20:19 (205)	07:44	18:28 (38)	08:28	08:15	08:43	15:49 (37)	
	21:40	14 20:56 (39)	20:49	3 20:22 (205)	19:45	36 19:04 (38)	18:44	17:03	17:02	28 16:17 (37)	
27	06:20	20:40 (39)	07:02		07:45	18:28 (38)	08:30	08:17	08:44	15:50 (37)	
	21:39	17 20:57 (39)	20:47		19:43	37 19:05 (38)	18:42	17:03	17:03	28 16:18 (37)	
28	06:21	20:39 (39)	07:03		07:47	18:26 (38)	08:31	08:18	08:44	15:51 (37)	
	21:37	19 20:58 (39)	20:45		19:41	39 19:05 (38)	18:41	17:02	17:04	27 16:18 (37)	
29	06:22	20:38 (39)	07:05		07:48	18:26 (38)	08:33	08:20	08:44	15:51 (37)	
	21:36	20 20:58 (39)	20:43		19:39	39 19:05 (38)	18:39	17:01	17:05	28 16:19 (37)	
30	06:23	20:37 (39)	07:06		07:49	18:25 (38)	08:34	08:21	15:48 (37)	15:52 (37)	
	21:35	22 20:59 (39)	20:41		19:37	39 19:04 (38)	18:37	17:01	17:05	27 16:19 (37)	
31	06:25	20:37 (39)	07:07				08:36	9 15:57 (37)	08:44	15:53 (37)	
	21:33	23 21:00 (39)	20:39				18:36		17:06	26 16:19 (37)	
Potential sun hours	486	445		379		337		278		260	
Total, worst case	688		344		387		344		9		781
Sun reduction	0.75		0.72		0.69		0.52		0.43		0.44
Oper. time red.	0.98		0.98		0.98		0.98		0.98		0.98
Wind dir. red.	0.61		0.70		0.62		0.62		0.54		0.54
Total reduction	0.44		0.50		0.41		0.32		0.23		0.23
Total, real	305		171		160		108		2		182

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:11 AM / 9

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000

wind@eapc.net

Calculated:

10/1/2015 4:44 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: B - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
662	334	353	412	609	964	791	576	697	906	1,119	1,195	8,618

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

	January	February	March	April	May	June
1	08:45 17:07	09:12 (66) 08:23 09:17 (66) 17:50	07:35 18:34	08:03 (67) 07:32 18:11 (174) 20:21	06:34 21:05	19:27 (171) 05:55 20:02 (171) 21:45
2	08:45 17:08	09:12 (66) 08:21 09:18 (66) 17:52	07:33 18:35	08:04 (67) 07:30 18:12 (174) 20:22	06:32 21:06	19:28 (171) 05:55 20:00 (171) 21:46
3	08:45 17:09	09:12 (66) 08:20 09:19 (66) 17:53	07:31 18:37	08:06 (67) 07:28 18:14 (174) 20:24	06:31 21:08	19:29 (171) 05:54 19:59 (171) 21:47
4	08:44 17:10	09:12 (66) 08:18 09:20 (66) 17:55	07:29 18:39	17:52 (174) 07:26 18:13 (174) 20:25	06:29 21:09	19:30 (171) 05:54 19:57 (171) 21:47
5	08:44 17:12	09:11 (66) 08:17 09:20 (66) 17:57	07:28 18:40	17:52 (174) 07:24 18:13 (174) 20:27	19:42 (171) 06:27 19:57 (171) 21:10	19:32 (171) 05:53 19:56 (171) 21:48
6	08:44 17:13	09:11 (66) 08:16 09:20 (66) 17:58	07:26 18:42	17:53 (174) 07:22 18:19 (173) 20:28	19:38 (171) 06:26 20:00 (171) 21:12	19:34 (171) 05:52 19:54 (171) 21:49
7	08:44 17:14	09:11 (66) 08:14 09:21 (66) 18:00	07:24 18:43	17:54 (174) 07:20 18:21 (173) 20:30	19:36 (171) 06:24 20:02 (171) 21:13	19:37 (171) 05:52 19:51 (171) 21:50
8	08:43 17:15	09:10 (66) 08:13 09:21 (66) 18:00	08:21 18:45	18:55 (174) 07:17 19:22 (173) 20:31	19:34 (171) 06:23 20:04 (171) 21:15	05:52 21:51
9	08:43 17:16	09:10 (66) 08:11 09:22 (66) 18:02	08:19 19:46	19:22 (173) 20:31 19:24 (173) 20:33	20:04 (171) 21:15 20:05 (171) 21:16	06:21 21:52
10	08:43 17:17	09:09 (66) 08:09 09:22 (66) 18:03	08:17 19:48	19:00 (173) 07:13 19:25 (173) 20:34	19:30 (171) 06:20 20:06 (171) 21:18	06:20 21:52
11	08:42 17:19	09:09 (66) 08:08 09:23 (66) 18:05	08:15 19:49	18:59 (173) 07:11 19:26 (173) 20:35	19:29 (171) 06:18 20:07 (171) 21:19	06:18 21:53
12	08:42 17:20	09:08 (66) 08:06 09:23 (66) 18:07	08:13 19:51	18:58 (173) 07:09 19:27 (173) 20:37	19:27 (171) 06:17 20:08 (171) 21:20	06:17 21:54
13	08:41 17:21	09:07 (66) 08:04 09:23 (66) 18:08	08:11 19:52	18:58 (173) 07:07 19:28 (173) 20:38	19:26 (171) 06:16 20:08 (171) 21:22	06:16 21:54
14	08:41 17:22	09:07 (66) 08:03 09:24 (66) 18:10	08:09 19:54	18:57 (173) 07:05 19:28 (173) 20:40	19:25 (171) 06:14 20:09 (171) 21:23	06:14 21:55
15	08:40 17:24	09:06 (66) 08:01 09:24 (66) 18:11	08:07 19:55	18:57 (173) 07:04 19:28 (173) 20:41	19:25 (171) 06:13 20:09 (171) 21:24	06:13 21:55
16	08:39 17:26	09:06 (66) 07:59 09:23 (66) 18:13	08:05 19:57	18:57 (173) 07:02 19:27 (173) 20:43	19:25 (171) 06:12 20:10 (171) 21:26	06:12 21:56
17	08:38 17:27	09:07 (66) 07:58 09:23 (66) 18:15	08:03 19:58	18:57 (173) 07:00 19:27 (173) 20:44	19:24 (171) 06:10 20:10 (171) 21:27	06:10 21:56
18	08:38 17:28	09:08 (66) 07:56 09:22 (66) 18:16	08:01 20:00	18:57 (173) 06:58 19:26 (173) 20:46	19:24 (171) 06:09 20:10 (171) 21:28	06:09 21:57
19	08:37 17:30	09:09 (66) 07:54 09:22 (66) 18:18	08:17 (67) 07:59 08:18 (67) 20:01	18:58 (173) 06:56 19:25 (173) 20:47	19:23 (171) 06:08 20:09 (171) 21:30	06:08 21:57
20	08:36 17:31	09:10 (66) 07:52 09:21 (66) 18:20	08:15 (67) 07:57 08:19 (67) 20:03	18:58 (173) 06:54 19:24 (173) 20:49	19:23 (171) 06:07 20:09 (171) 21:31	06:07 21:58
21	08:35 17:33	09:12 (66) 07:50 09:19 (66) 18:21	08:13 (67) 07:55 08:20 (67) 20:04	18:58 (173) 06:52 18:59 (173) 06:50	19:23 (171) 06:05 19:22 (171) 06:04	06:05 06:50
22	08:34 17:34	09:19 (66) 18:21 18:23	08:11 (67) 07:53 08:21 (67) 20:06	18:59 (173) 06:50 19:21 (173) 20:52	19:22 (171) 06:04 20:08 (171) 21:33	06:04 21:58
23	08:33 17:36	09:09 (66) 07:54 18:24	08:17 (67) 07:59 08:09 (67) 07:51	18:58 (173) 06:56 19:01 (173) 06:48	19:23 (171) 06:08 20:08 (171) 21:35	06:08 21:58
24	08:32 17:37	07:45 18:26	08:21 (67) 20:07 08:08 (67) 07:48	19:04 (173) 06:46 19:15 (173) 20:55	19:23 (171) 06:02 20:08 (171) 21:36	06:02 21:58
25	08:31 17:39	07:43 18:28	08:06 (67) 07:46 18:04 (174) 20:10	06:45 20:56	19:23 (171) 06:01 20:07 (171) 21:37	06:01 21:59
26	08:30 17:41	07:41 18:29	08:04 (67) 07:44 18:06 (174) 20:12	06:43 20:57	19:23 (171) 06:00 20:06 (171) 21:38	06:00 21:59
27	08:29 17:42	07:39 18:31	08:02 (67) 07:42 18:08 (174) 20:13	06:41 20:59	19:24 (171) 05:59 20:06 (171) 21:39	05:59 21:59
28	08:28 17:44	07:37 18:32	08:02 (67) 07:40 18:09 (174) 20:15	06:39 21:00	19:25 (171) 05:59 20:05 (171) 21:40	05:59 21:59
29	08:26 17:45	18:32	08:09 (174) 20:15 07:38	06:38 21:02	19:25 (171) 05:58 20:04 (171) 21:41	05:58 21:58
30	08:25 17:47	07:36 20:18	07:36 20:16	06:36 21:03	19:26 (171) 05:57 20:03 (171) 21:43	05:57 21:58
31	08:24 17:49	07:34 20:19	07:34 20:19	07:34 21:03	05:56 21:44	05:56 21:44
Potential sun hours	273	285	368	410	471	481
Total, worst case	248	175	639	1027	182	
Sun reduction	0.56	0.50	0.63	0.59	0.67	
Oper. time red.	0.98	0.98	0.98	0.98	0.98	
Wind dir. red.	0.72	0.67	0.63	0.69	0.69	
Total reduction	0.39	0.33	0.39	0.40	0.45	
Total, real	98	59	248	409	83	

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:11 AM / 10

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 4:44 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: B - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
662	334	353	412	609	964	791	576	697	906	1,119	1,195	8,618

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

	July	August	September	October	November	December
1	05:54 06:26 21:58 21:32		07:09 20:38	19:28 (171) 07:51 20:06 (171) 19:35	18:38 (173) 07:38 19:07 (173) 17:34	08:22 17:00 14
2	05:55 06:27 21:58 21:31		07:10 20:36	19:29 (171) 07:52 20:05 (171) 19:33	18:38 (173) 07:39 19:06 (173) 17:32	08:24 16:59 13
3	05:55 06:29 21:58 21:29		07:12 20:34	19:30 (171) 07:54 20:03 (171) 19:31	18:38 (173) 07:41 19:04 (173) 17:31	08:25 16:59 12
4	05:56 06:30 21:57 21:28		07:13 20:32	19:31 (171) 07:55 20:01 (171) 19:29	18:39 (173) 07:42 19:02 (173) 17:29	08:26 16:59 11
5	05:57 06:31 21:57 21:26	8	19:50 (171) 07:14 19:58 (171) 20:29	19:33 (171) 07:57 20:00 (171) 19:27	18:33 (174) 07:44 19:00 (173) 17:28	08:27 16:58 10
6	05:58 06:33 21:57 21:25	16	19:46 (171) 07:16 20:02 (171) 20:27	19:34 (171) 07:58 19:57 (171) 19:25	18:30 (174) 07:46 18:57 (173) 17:26	08:29 16:58 10
7	05:58 06:34 21:56 21:23	21	19:43 (171) 07:17 20:04 (171) 20:25	19:37 (171) 08:00 19:52 (171) 19:23	18:29 (174) 07:47 18:56 (173) 17:25	08:30 16:58 9
8	05:59 06:35 21:56 21:22	25	19:41 (171) 07:19 20:06 (171) 20:23	19:39 (171) 08:03 19:21	18:27 (174) 07:49 18:53 (173) 17:23	08:31 16:57 8
9	06:00 06:37 21:55 21:20	28	19:39 (171) 07:20 20:07 (171) 20:21	19:37 (171) 07:21 19:18	18:27 (174) 07:50 18:48 (174) 17:22	08:32 16:57 7
10	06:01 06:38 21:55 21:18	31	19:37 (171) 07:23 20:08 (171) 20:19	19:35 (171) 07:23 19:16	18:27 (174) 07:53 18:48 (174) 17:20	08:33 16:57 6
11	06:02 06:39 21:54 21:17	33	19:37 (171) 07:23 20:10 (171) 20:17	19:35 (171) 07:24 19:14	18:39 (174) 07:55 18:47 (174) 17:19	08:34 16:57 6
12	06:03 06:41 21:53 21:15	36	19:35 (171) 07:24 20:11 (171) 20:15	19:35 (171) 07:24 19:12	18:37 (174) 07:55 18:45 (174) 17:18	08:35 16:57 5
13	06:04 06:42 21:53 21:13	37	19:34 (171) 07:25 20:11 (171) 20:13	19:34 (171) 07:25 19:10	18:36 (174) 07:56 18:43 (174) 17:16	08:36 16:57 4
14	06:05 06:44 21:52 21:12	39	19:32 (171) 07:27 20:11 (171) 20:11	19:32 (171) 07:27 19:08	18:34 (174) 07:58 18:41 (174) 17:15	08:37 16:57 4
15	06:06 06:45 21:51 21:10	41	19:32 (171) 07:28 20:13 (171) 20:09	19:32 (171) 07:28 19:07	18:35 (174) 08:00 18:39 (174) 17:14	08:37 16:57 3
16	06:07 06:46 21:50 21:08	42	19:31 (171) 07:30 20:13 (171) 20:07	19:31 (171) 07:30 19:05	18:36 (174) 08:01 18:37 (174) 17:13	08:38 16:58 3
17	06:08 06:48 21:50 21:06	43	19:30 (171) 07:31 20:13 (171) 20:04	19:30 (171) 07:31 19:03	18:38 (174) 08:03 18:35 (174) 17:12	08:39 16:58 2
18	06:09 06:49 21:49 21:05	44	19:30 (171) 07:32 20:14 (171) 20:02	19:30 (171) 07:32 19:01	18:40 (174) 08:04 18:33 (174) 17:11	08:40 16:58 2
19	06:10 06:51 21:48 21:03	44	19:29 (171) 07:34 20:13 (171) 20:00	18:52 (173) 08:17 19:02 (173) 18:57	18:41 (174) 08:06 18:53 (173) 17:09	08:40 16:58 6
20	06:11 06:52 21:47 21:01	45	19:28 (171) 07:35 20:13 (171) 19:58	18:48 (173) 08:19 19:04 (173) 18:55	18:43 (173) 08:07 18:52 (173) 17:08	08:41 16:59 6
21	06:12 06:53 21:46 20:59	46	19:28 (171) 07:37 20:14 (171) 19:56	18:45 (173) 08:21 19:06 (173) 18:53	18:44 (173) 08:09 18:46 (173) 17:07	08:41 16:59 6
22	06:13 06:55 21:45 20:57	46	19:27 (171) 07:38 20:13 (171) 19:54	18:44 (173) 08:22 19:07 (173) 18:51	18:44 (173) 08:22 18:49 (173) 17:07	08:42 17:00 6
23	06:15 06:56 21:44 20:55	46	19:27 (171) 07:40 20:13 (171) 19:52	18:42 (173) 08:24 19:08 (173) 18:49	18:42 (173) 08:24 17:06 13	08:42 17:00 7
24	06:16 06:58 21:42 20:53	46	19:27 (171) 07:41 20:13 (171) 19:50	18:41 (173) 08:25 19:09 (173) 18:48	18:41 (173) 08:25 17:05 15	08:43 17:01 6
25	06:17 06:59 21:41 20:51	45	19:27 (171) 07:42 20:12 (171) 19:48	18:40 (173) 08:27 19:09 (173) 18:46	18:40 (173) 08:27 17:04 16	08:43 17:01 4
26	06:18 07:00 21:40 20:49	46	19:26 (171) 07:44 20:12 (171) 19:45	18:40 (173) 08:28 19:09 (173) 18:44	18:40 (173) 08:28 17:03 17	08:44 17:02 2
27	06:20 07:02 21:39 20:48	45	19:27 (171) 07:45 20:12 (171) 19:43	18:39 (173) 08:30 19:09 (173) 18:42	18:45 (173) 08:27 18:38 (173) 08:31	08:44 17:03 3
28	06:21 07:03 21:38 20:46	45	19:26 (171) 07:47 20:11 (171) 19:41	18:38 (173) 08:31 19:08 (173) 18:41	18:38 (173) 08:31 18:20 17	08:44 17:04 3
29	06:22 07:05 21:36 20:44	43	19:26 (171) 07:48 20:09 (171) 19:39	18:38 (173) 08:33 19:08 (173) 18:39	18:38 (173) 08:33 17:01 16	08:44 17:04 3
30	06:23 07:06 21:35 20:42	42	19:27 (171) 07:49 20:09 (171) 19:37	18:37 (173) 08:35 19:07 (173) 18:37	18:37 (173) 08:35 17:00 15	08:45 17:05 4
31	06:25 07:07 21:34 20:40	41	19:27 (171) 07:49 20:08 (171) 19:37	18:36 (173) 08:36 18:36	18:36 (173) 08:36 17:06 5	08:45 17:06 5
Potential sun hours	486	445	379	336	277	260
Total, worst case		1024	504	528	145	190
Sun reduction		0.72	0.69	0.52	0.43	0.44
Oper. time red.		0.98	0.98	0.98	0.98	0.98
Wind dir. red.		0.69	0.65	0.64	0.72	0.71
Total reduction		0.49	0.44	0.33	0.31	0.31
Total, real		500	222	175	44	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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:11 AM / 11

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 4:44 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: C - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
662	334	353	412	609	964	791	576	697	906	1,119	1,195	8,618

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

	January	February	March	April	May	June	
1 08:45	08:23	09:04 (316)	07:35	17:42 (12)	07:32	07:53 (105) 06:34	05:55
17:07	17:50	8 09:12 (316)	18:34	14 17:56 (12)	20:21	50 19:57 (13) 21:05	21:45
2 08:45	08:21		07:33	17:45 (12)	07:30	07:51 (105) 06:32	05:55
17:08	17:52		18:35	8 17:53 (12)	20:22	55 19:59 (13) 21:06	21:46
3 08:45	08:20		07:31		07:28	07:49 (105) 06:31	05:54
17:09	17:53		18:37		20:24	59 20:00 (13) 21:08	21:47
4 08:44	08:18		07:29		07:26	07:48 (105) 06:29	05:53
17:10	17:55		18:38		20:25	60 20:00 (13) 21:09	21:47
5 08:44	08:17		07:27		07:24	07:48 (105) 06:27	05:53 21:01 (15)
17:11	17:57		18:40		20:27	60 20:00 (13) 21:10	6 21:07 (15)
6 08:44	08:15		07:25		07:21	07:48 (105) 06:26	05:52 20:59 (15)
17:13	17:58		18:42		20:28	59 19:59 (13) 21:12	11 21:10 (15)
7 08:44	08:14		07:23		07:19	07:48 (105) 06:24	05:52 20:57 (15)
17:14	18:00		18:43		20:30	58 19:59 (13) 21:13	15 21:12 (15)
8 08:43	08:12		08:21		07:17	07:48 (105) 06:23	05:51 20:56 (15)
17:15	18:00		18:45		20:31	56 19:58 (13) 21:15	17 21:13 (15)
9 08:43	08:11		08:19		07:15	07:49 (105) 06:21	05:51 20:56 (15)
17:16	18:02		19:46		20:32	54 19:58 (13) 21:16	19 21:15 (15)
10 08:43	08:09	08:33 (158)	08:17		07:13	07:35 (184) 06:20	05:51 20:54 (15)
17:17	18:03	3 08:36 (158)	19:48		20:34	51 19:57 (13) 21:18	21 21:15 (15)
11 08:42	08:08		08:15		07:11	07:33 (184) 06:18	05:50 20:54 (15)
17:19	18:05	5 08:36 (158)	19:49		20:35	51 19:56 (13) 21:19	22 21:16 (15)
12 08:42	09:08 (316)	08:06	08:29 (158)	08:13	07:09	07:31 (184) 06:17	05:50 20:54 (15)
17:20	2 09:10 (316)	18:06	7 08:36 (158)	19:51	20:37	49 19:55 (13) 21:20	21:54 23 21:17 (15)
13 08:41	09:07 (316)	08:04	08:28 (158)	08:11	07:07	07:29 (184) 06:15	05:50 20:54 (15)
17:21	4 09:11 (316)	18:08	10 08:38 (158)	19:52	20:38	39 19:53 (13) 21:22	21:54 24 21:18 (15)
14 08:41	09:07 (316)	08:03	08:26 (158)	08:09	07:05	07:27 (184) 06:14	05:50 20:54 (15)
17:23	5 09:12 (316)	18:10	11 08:37 (158)	19:54	20:40	34 19:51 (13) 21:23	21:55 25 21:19 (15)
15 08:40	09:06 (316)	08:01	08:24 (158)	08:07	07:03	07:25 (184) 06:13	05:50 20:54 (15)
17:24	7 09:13 (316)	18:11	13 08:37 (158)	19:55	20:41	33 19:49 (13) 21:24	21:55 25 21:19 (15)
16 08:39	09:05 (316)	07:59	08:22 (158)	08:05	07:01	07:23 (184) 06:11	05:50 20:54 (15)
17:25	9 09:14 (316)	18:13	19 17:48 (12)	19:57	20:43	29 19:46 (13) 21:26	21:56 26 21:20 (15)
17 08:38	09:04 (316)	07:58	08:21 (158)	08:03	07:00	07:22 (184) 06:10	05:50 20:54 (15)
17:27	10 09:14 (316)	18:15	25 17:51 (12)	19:58	20:44	20 07:42 (184) 21:27	21:56 26 21:20 (15)
18 08:38	09:03 (316)	07:56	08:20 (158)	08:01	06:58	07:20 (184) 06:09	05:50 20:53 (15)
17:28	12 09:15 (316)	18:16	27 17:52 (12)	20:00	20:46	21 07:41 (184) 21:28	21:57 28 21:21 (15)
19 08:37	09:02 (316)	07:54	08:21 (158)	07:59	06:56	07:20 (184) 06:08	05:50 20:53 (15)
17:30	13 09:15 (316)	18:18	27 17:54 (12)	20:01	20:47	20 07:40 (184) 21:30	21:57 28 21:21 (15)
20 08:36	09:01 (316)	07:52	08:23 (158)	07:57	06:54	07:20 (184) 06:06	05:50 20:53 (15)
17:31	15 09:16 (316)	18:19	25 17:55 (12)	20:03	20:49	20 07:40 (184) 21:31	21:58 28 21:21 (15)
21 08:35	09:00 (316)	07:50	08:24 (158)	07:55	06:52	07:20 (184) 06:05	05:50 20:53 (15)
17:33	16 09:16 (316)	18:21	19 17:57 (12)	20:04	20:50	18 07:38 (184) 21:32	21:58 28 21:21 (15)
22 08:34	08:59 (316)	07:49	08:25 (158)	07:53	06:50	07:21 (184) 06:04	05:50 20:53 (15)
17:34	18 09:17 (316)	18:23	20 17:58 (12)	20:06	20:52	16 07:37 (184) 21:33	21:58 28 21:21 (15)
23 08:33	08:58 (316)	07:47	08:26 (158)	07:51	06:48	07:23 (184) 06:03	05:51 20:54 (15)
17:36	19 09:17 (316)	18:24	22 18:00 (12)	20:07	20:53	13 07:36 (184) 21:35	21:58 28 21:22 (15)
24 08:32	08:57 (316)	07:45	08:27 (158)	07:48	06:46	07:25 (184) 06:02	05:51 20:54 (15)
17:37	20 09:17 (316)	18:26	23 18:01 (12)	20:09	20:54	8 07:33 (184) 21:36	21:58 28 21:22 (15)
25 08:31	08:56 (316)	07:43	08:28 (158)	07:46	06:45		06:01 05:51 20:55 (15)
17:39	21 09:17 (316)	18:27	22 18:01 (12)	20:10	20:56		21:37 21:58 26 21:21 (15)
26 08:30	08:56 (316)	07:41	08:29 (158)	07:44	06:43		06:00 05:52 20:56 (15)
17:41	21 09:17 (316)	18:29	21 18:00 (12)	20:12	20:57		21:38 21:59 26 21:22 (15)
27 08:29	08:56 (316)	07:39	08:30 (158)	07:42	08:04 (105)	06:41	05:59 05:52 20:56 (15)
17:42	20 09:16 (316)	18:31	19 17:59 (12)	20:13	17 19:51 (13)	20:59	21:39 21:59 26 21:22 (15)
28 08:28	08:57 (316)	07:37	08:31 (158)	07:40	08:02 (105)	06:39	05:58 05:52 20:57 (15)
17:44	19 09:16 (316)	18:32	17 17:58 (12)	20:15	26 19:52 (13)	21:00	21:40 21:59 25 21:22 (15)
29 08:26	08:58 (316)			07:38	08:00 (105)	06:37	05:58 05:53 20:57 (15)
17:45	18 09:16 (316)			20:16	34 19:54 (13)	21:02	21:41 21:58 24 21:21 (15)
30 08:25	08:59 (316)			07:36	07:58 (105)	06:36	05:57 05:53 20:58 (15)
17:47	15 09:14 (316)			20:18	39 19:55 (13)	21:03	21:43 21:58 24 21:22 (15)
31 08:24	09:01 (316)			07:34	07:56 (105)		05:56
17:48	12 09:13 (316)			20:19	46 19:57 (13)		21:44
Potential sun hours	273	285	368	410	471	481	607
Total, worst case	276	343	184	933			0.70
Sun reduction	0.56	0.50	0.63	0.59			0.98
Oper. time red.	0.98	0.98	0.98	0.98			0.72
Wind dir. red.	0.72	0.65	0.66	0.66			0.50
Total reduction	0.40	0.32	0.41	0.38			301
Total, real	109	110	75	357			

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:11 AM / 12

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 4:44 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: C - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
662	334	353	412	609	964	791	576	697	906	1,119	1,195	8,618

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

	July	August	September	October	November	December
1	05:54 23 21:58	20:58 (15) 21:21 (15) 20:59 (15)	06:26 21:32 06:27	07:09 20:38 07:10	07:32 (184) 19:55 (13) 07:34 (184)	07:51 19:35 07:52
2	05:55 22 21:58	21:01 (15) 21:21 (15) 21:01 (15)	06:29 21:31 06:30	07:11 20:36 07:13	07:47 (105) 19:56 (13) 07:46 (105)	07:54 19:33 07:55
3	05:56 19 21:57	21:01 (15) 21:20 (15) 21:19 (15)	06:30 21:29 21:28	07:14 20:34 20:31	07:47 (105) 19:56 (13) 19:55 (13)	07:54 19:31 19:29
4	05:57 18 21:57	21:03 (15) 21:18 (15) 21:05 (15)	06:31 21:26 06:33	07:14 20:29 07:16	07:45 (105) 19:56 (13) 07:44 (105)	07:57 19:27 07:58
5	05:57 15 21:57	21:03 (15) 21:18 (15) 21:05 (15)	06:31 21:26 06:33	07:14 20:29 07:16	07:45 (105) 19:56 (13) 07:44 (105)	07:57 19:27 07:58
6	05:57 12 21:57	21:05 (15) 21:17 (15) 21:06 (15)	06:33 21:25 06:34	07:16 20:27 07:17	07:44 (105) 19:55 (13) 07:43 (105)	07:58 19:25 08:00
7	05:58 9 21:56	21:15 (15) 21:23 06:35	06:34 21:23 06:35	07:17 20:25 07:18	07:43 (105) 19:55 (13) 07:43 (105)	08:00 19:22 08:01
8	05:59 21:56	21:22 06:37	06:35 21:22	07:18 20:23	07:43 (105) 19:55 (13)	08:01 19:20
9	06:00 21:55	21:20 06:38	06:37 21:20	07:20 20:21	07:43 (105) 19:54 (13)	08:02 19:18
10	06:01 21:55	21:20 06:38	06:37 21:20	07:20 20:21	07:43 (105) 19:54 (13)	08:02 19:18
11	06:02 21:54	21:17 06:41	06:39 21:17	07:23 20:17	07:46 (105) 19:51 (13)	08:05 19:14
12	06:03 21:53	21:15 06:42	06:41 21:15	07:24 20:15	07:47 (105) 19:48 (13)	08:07 19:12
13	06:04 21:53	21:13 06:44	06:42 21:13	07:25 20:13	07:48 (105) 19:46 (13)	08:08 19:10
14	06:05 21:52	21:12 06:45	06:44 21:12	07:27 20:11	07:50 (105) 19:44 (13)	08:10 19:08
15	06:06 21:51	21:10 06:46	06:45 21:10	07:28 20:09	07:51 (105) 19:42 (13)	08:11 19:06
16	06:07 21:50	21:08 06:48	06:46 21:08	07:30 20:06	07:53 (105) 19:40 (13)	08:13 19:04
17	06:08 21:50	21:06 06:49	06:48 21:06	07:31 20:04	07:54 (105) 07:57 (105)	08:14 19:03
18	06:09 21:49	21:05 06:50	06:49 21:05	07:32 20:02	07:57 (105) 19:01	08:14 19:01
19	06:10 21:48	21:03 06:52	06:50 21:03	07:34 20:00	07:58 (105) 18:57	08:15 18:57
20	06:11 21:47	21:01 06:53	06:51 21:01	07:35 19:58	07:59 (105) 18:55	08:16 18:55
21	06:12 21:46	20:59 06:55	06:52 20:59	07:36 19:56	08:00 (105) 18:53	08:17 18:53
22	06:13 21:45	20:57 06:56	06:53 20:57	07:37 19:54	08:01 (105) 18:51	08:18 18:51
23	06:15 21:44	20:55 06:57	06:55 20:55	07:38 19:52	08:02 (105) 18:49	08:19 18:49
24	06:16 21:42	20:53 06:59	06:56 20:53	07:39 19:50	08:03 (105) 18:48	08:20 18:48
25	06:17 21:41	20:51 07:00	06:59 20:51	07:40 19:47	08:04 (105) 18:46	08:21 18:46
26	06:18 21:40	20:49 07:02	07:00 20:49	07:41 19:45	08:05 (105) 18:44	08:22 18:44
27	06:19 21:39	20:47 07:03	07:02 20:47	07:42 19:43	08:06 (105) 18:42	08:23 18:42
28	06:21 21:38	20:46 07:04	07:03 20:46	07:43 19:41	08:07 (105) 18:41	08:24 18:41
29	06:22 21:36	20:44 07:06	07:04 20:44	07:44 19:39	08:08 (105) 18:39	08:25 18:39
30	06:23 21:35	20:42 07:07	07:06 20:42	07:45 19:37	08:09 (105) 18:37	08:26 18:37
31	06:25 21:34	20:40 07:08	07:07 20:40	07:46 19:35	08:10 (105) 18:35	08:27 18:35
Potential sun hours	486	445	379	784	336	277
Total, worst case	118	324	784	357	291	260
Sun reduction	0.75	0.72	0.69	0.52	0.43	
Oper. time red.	0.98	0.98	0.98	0.98	0.98	
Wind dir. red.	0.72	0.64	0.67	0.64	0.72	
Total reduction	0.53	0.46	0.45	0.33	0.31	
Total, real	62	148	355	118	90	

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:11 AM / 13

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 4:44 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: D - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
662	334	353	412	609	964	791	576	697	906	1,119	1,195	8,618

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

	January	February	March	April	May	June
1 08:45	10:25 (176) 08:22	08:47 (177) 07:35		07:32	06:34	05:55
17:07	28 10:53 (176) 17:50	19 09:06 (177) 18:34		20:21	21:05	21:45
2 08:45	10:27 (176) 08:21	08:45 (177) 07:33		07:29	06:32	05:54
17:08	26 10:53 (176) 17:51	21 09:06 (177) 18:35		20:22	21:06	21:46
3 08:45	10:28 (176) 08:20	08:44 (177) 07:31		07:27	06:30	05:54
17:09	25 10:53 (176) 17:53	23 09:07 (177) 18:37		20:23	21:07	21:46
4 08:44	10:29 (176) 08:18	08:42 (177) 07:29		07:25	07:47 (179) 06:29	05:53
17:10	24 10:53 (176) 17:55	26 09:08 (177) 18:38		20:25	3 07:50 (179) 21:09	21:47
5 08:44	10:30 (176) 08:17	08:41 (177) 07:27		07:23	07:45 (179) 06:27	06:50 (180) 05:53
17:11	22 10:52 (176) 17:56	28 09:09 (177) 18:40		20:26	6 07:51 (179) 21:10	3 06:53 (180) 21:48
6 08:44	10:32 (176) 08:15	08:39 (177) 07:25	07:47 (178) 07:21	07:43 (179) 06:26	06:49 (180) 05:52	06:49 (180) 05:52
17:12	19 10:51 (176) 17:58	30 09:09 (177) 18:41	2 07:49 (178) 20:28	9 07:52 (179) 21:12	5 06:54 (180) 21:49	06:47 (180) 05:52
7 08:44	10:34 (176) 08:14	08:38 (177) 07:23	07:45 (178) 07:19	07:41 (179) 06:24	06:47 (180) 05:52	06:47 (180) 05:52
17:13	17 10:51 (176) 18:00	32 09:10 (177) 18:43	6 07:51 (178) 20:29	11 07:52 (179) 21:13	7 06:54 (180) 21:50	06:46 (180) 05:51
8 08:43	10:36 (176) 08:12	08:36 (177) 08:21	08:43 (178) 07:17	08:43 (178) 07:17	07:39 (179) 06:22	06:46 (180) 05:51
17:15	13 10:49 (176) 18:00	34 09:10 (177) 18:44	10 08:53 (178) 20:31	14 07:53 (179) 21:15	9 06:55 (180) 21:51	06:45 (180) 05:51
9 08:43	10:39 (176) 08:11	08:35 (177) 08:19	08:41 (178) 07:15	08:41 (178) 07:15	07:37 (179) 06:21	06:45 (180) 05:51
17:16	8 10:47 (176) 18:01	35 09:10 (177) 19:46	13 08:54 (178) 20:32	16 07:53 (179) 21:16	11 06:56 (180) 21:52	06:44 (180) 05:50
10 08:43	10:40 (176) 08:09	08:36 (177) 08:17	08:39 (178) 07:13	08:39 (178) 07:13	07:35 (179) 06:19	06:43 (180) 05:50
17:17	18:03	34 09:10 (177) 19:48	16 08:55 (178) 20:34	17 07:52 (179) 21:17	12 06:55 (180) 21:52	06:43 (180) 05:50
11 08:42	10:42 (176) 08:08	08:35 (177) 08:15	08:37 (178) 07:11	07:33 (179) 06:18	06:42 (180) 05:50	06:42 (180) 05:50
17:18	18:05	35 09:10 (177) 19:49	18 08:55 (178) 20:35	19 07:52 (179) 21:19	14 06:56 (180) 21:53	06:40 (180) 05:50
12 08:42	10:43 (176) 08:06	08:35 (177) 08:13	08:35 (178) 07:09	07:31 (179) 06:17	06:40 (180) 05:50	06:40 (180) 05:50
17:20	18:06	35 09:10 (177) 19:51	20 08:55 (178) 20:37	20 07:51 (179) 21:20	15 06:55 (180) 21:54	06:39 (180) 05:50
13 08:41	10:44 (176) 08:04	08:36 (177) 08:11	08:33 (178) 07:07	07:30 (179) 06:15	06:39 (180) 05:50	06:39 (180) 05:50
17:21	18:08	34 09:10 (177) 19:52	22 08:55 (178) 20:38	20 07:50 (179) 21:22	16 06:55 (180) 21:54	06:38 (180) 05:50
14 08:40	10:45 (176) 08:03	08:37 (177) 08:09	08:31 (178) 07:05	07:30 (179) 06:14	06:38 (180) 05:50	06:38 (180) 05:50
17:22	18:09	32 09:09 (177) 19:54	24 08:55 (178) 20:40	19 07:49 (179) 21:23	17 06:55 (180) 21:55	06:37 (180) 05:49
15 08:40	10:46 (176) 08:01	08:37 (177) 08:07	08:29 (178) 07:03	07:31 (179) 06:12	06:37 (180) 05:49	06:37 (180) 05:49
17:24	18:11	31 09:08 (177) 19:55	26 08:55 (178) 20:41	16 07:47 (179) 21:24	18 06:55 (180) 21:55	06:35 (180) 05:49
16 08:39	10:47 (176) 07:59	08:37 (177) 08:05	08:29 (178) 07:01	07:33 (179) 06:11	06:35 (180) 05:49	06:35 (180) 05:49
17:25	18:13	30 09:07 (177) 19:57	25 08:54 (178) 20:43	12 07:45 (179) 21:26	19 06:54 (180) 21:56	06:34 (180) 05:49
17 08:38	10:48 (176) 07:57	08:38 (177) 08:03	08:29 (178) 06:59	07:35 (179) 06:10	06:34 (180) 05:49	06:34 (180) 05:49
17:27	18:14	28 09:06 (177) 19:58	25 08:54 (178) 20:44	7 07:42 (179) 21:27	19 06:54 (180) 21:56	06:33 (180) 05:49
18 08:38	10:49 (176) 07:56	08:40 (177) 08:01	08:30 (178) 06:57	06:09	06:36 (180) 05:49	06:36 (180) 05:49
17:28	18:16	26 09:06 (177) 20:00	23 08:53 (178) 20:46	21:28	17 06:53 (180) 21:57	06:35 (180) 05:49
19 08:37	10:50 (176) 07:54	08:41 (177) 07:59	08:30 (178) 06:55	06:07	06:37 (180) 05:49	06:37 (180) 05:49
17:30	18:18	23 09:04 (177) 20:01	20 08:50 (178) 20:47	21:30	16 06:53 (180) 21:57	06:36 (180) 05:49
20 08:36	10:51 (176) 07:52	08:43 (177) 07:57	08:31 (178) 06:54	06:06	06:38 (180) 05:50	06:38 (180) 05:50
17:31	18:19	19 09:02 (177) 20:03	18 08:49 (178) 20:49	21:31	14 06:52 (180) 21:57	06:37 (180) 05:50
21 08:35	10:52 (176) 07:50	08:46 (177) 07:54	08:33 (178) 06:52	06:05	06:39 (180) 05:50	06:39 (180) 05:50
17:32	18:21	13 08:59 (177) 20:04	13 08:46 (178) 20:50	21:32	12 06:51 (180) 21:58	06:38 (180) 05:50
22 08:34	10:53 (176) 07:48	08:47 (177) 07:52	08:38 (178) 06:50	06:04	06:41 (180) 05:50	06:41 (180) 05:50
17:34	18:22	20:06	3 08:41 (178) 20:51	21:33	8 06:49 (180) 21:58	06:40 (180) 05:50
23 08:33	10:54 (176) 07:47	07:50	06:48	06:03	06:44 (180) 05:50	06:44 (180) 05:50
17:36	18:24	20:07	20:53	21:35	2 06:46 (180) 21:58	06:43 (180) 05:50
24 08:32	10:55 (176) 07:45	07:48	06:46	06:02	05:51	05:51
17:37	18:26	20:09	20:54	21:36	21:58	05:51
25 08:31	10:56 (176) 07:43	07:46	06:44	06:01	05:51	05:51
17:39	18:27	20:10	20:56	21:37	21:59	05:51
26 08:30	10:57 (176) 07:41	07:44	06:42	06:00	05:51	05:51
17:40	18:29	20:12	20:57	21:38	21:59	05:51
27 08:29	10:58 (176) 08:53 (177) 07:39	07:42	06:41	05:59	05:52	05:52
17:42	2 18:30	20:13	20:59	21:39	21:59	05:52
28 08:28	10:59 (176) 08:52 (177) 07:37	07:40	06:39	05:58	05:52	05:52
17:43	7 18:32	20:15	21:00	21:40	21:59	05:52
29 08:26	10:59 (176) 08:51 (177) 07:38	07:38	06:37	05:57	05:53	05:53
17:45	10 19:01 (177) 07:36	20:16	21:02	21:41	21:58	05:53
30 08:25	10:59 (176) 08:49 (177) 07:36	07:36	06:35	05:56	05:53	05:53
17:47	13 19:02 (177) 07:34	20:18	21:03	21:42	21:58	05:53
31 08:24	10:59 (176) 08:48 (177) 07:34	07:34	06:34	05:56	05:53	05:53
17:48	16 19:04 (177) 07:34	20:19	21:04	21:44	21:58	05:53
Potential sun hours	273	284	368	410	472	482
Total, worst case	230	588	284	189	234	
Sun reduction	0.56	0.50	0.63	0.59	0.67	
Oper. time red.	0.98	0.98	0.98	0.98	0.98	
Wind dir. red.	0.70	0.72	0.69	0.64	0.60	
Total reduction	0.39	0.36	0.43	0.37	0.40	
Total, real	89	212	122	71	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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:11 AM / 14

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net

Calculated:

10/1/2015 4:44 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: D - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
662	334	353	412	609	964	791	576	697	906	1,119	1,195	8,618

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

	July	August	September	October	November	December					
1	05:54	06:26	06:51 (180)	07:08	07:32 (179)	07:51	08:13 (178)	07:37	08:04 (177)	08:22	
	21:58	21:32	15 07:06 (180)	20:37	19 07:51 (179)	19:35	21 08:34 (178)	17:34	35 08:39 (177)	16:59	
2	05:54	06:27	06:53 (180)	07:10	07:33 (179)	07:52	08:15 (178)	07:39	08:05 (177)	08:24	
	21:58	21:31	13 07:06 (180)	20:35	17 07:50 (179)	19:33	19 08:34 (178)	17:32	34 08:39 (177)	16:59	
3	05:55	06:28	06:54 (180)	07:11	07:35 (179)	07:54	08:16 (178)	07:41	08:06 (177)	08:25	10:23 (176)
	21:58	21:29	12 07:06 (180)	20:33	16 07:51 (179)	19:31	17 08:33 (178)	17:30	34 08:40 (177)	16:59	7 10:30 (176)
4	05:56	06:30	06:55 (180)	07:13	07:36 (179)	07:55	08:18 (178)	07:42	08:07 (177)	08:26	10:21 (176)
	21:57	21:28	10 07:05 (180)	20:31	14 07:50 (179)	19:28	14 08:32 (178)	17:29	32 08:39 (177)	16:58	13 10:34 (176)
5	05:56	06:31	06:56 (180)	07:14	07:37 (179)	07:56	08:19 (178)	07:44	08:09 (177)	08:27	10:19 (176)
	21:57	21:26	8 07:04 (180)	20:29	12 07:49 (179)	19:26	11 08:30 (178)	17:27	30 08:39 (177)	16:58	17 10:36 (176)
6	05:57	06:32	06:58 (180)	07:15	07:39 (179)	07:58	08:21 (178)	07:45	08:11 (177)	08:28	10:18 (176)
	21:57	21:25	6 07:04 (180)	20:27	9 07:48 (179)	19:24	8 08:29 (178)	17:26	28 08:39 (177)	16:57	19 10:37 (176)
7	05:58	06:34	06:59 (180)	07:17	07:40 (179)	07:59	08:22 (178)	07:47	08:13 (177)	08:30	10:17 (176)
	21:56	21:23	4 07:03 (180)	20:25	6 07:46 (179)	19:22	4 08:26 (178)	17:24	25 08:38 (177)	16:57	22 10:39 (176)
8	05:59	06:35	07:00 (180)	07:18	07:41 (179)	08:01	07:49	08:14 (177)	08:31	10:16 (176)	
	21:56	21:22	2 07:02 (180)	20:23	3 07:44 (179)	19:20	17:23	23 08:37 (177)	16:57	24 10:40 (176)	
9	06:00	06:36	07:20	08:02	07:50	08:02	08:16 (177)	08:32	10:16 (176)		
	21:55	21:20	20:21	19:18	17:21	21 08:37 (177)	16:57	25 10:41 (176)	10:16 (176)		
10	06:00	06:38	07:21	08:04	07:52	08:18 (177)	08:33	10:16 (176)			
	21:55	21:18	20:19	19:16	17:20	18 08:36 (177)	16:57	26 10:42 (176)	10:16 (176)		
11	06:01	06:39	07:22	08:05	07:53	08:19 (177)	08:34	10:16 (176)			
	21:54	21:17	20:17	19:14	17:19	16 08:35 (177)	16:57	27 10:43 (176)	10:16 (176)		
12	06:02	06:40	07:24	08:07	07:55	08:21 (177)	08:35	10:16 (176)			
	21:53	21:15	20:15	19:12	17:17	13 08:34 (177)	16:57	28 10:44 (176)	10:16 (176)		
13	06:03	06:42	07:25	08:08	07:56	08:23 (177)	08:36	10:16 (176)			
	21:53	21:13	20:13	19:10	17:16	10 08:33 (177)	16:57	29 10:45 (176)	10:16 (176)		
14	06:04	06:43	07:27	08:10	07:58	08:24 (177)	08:37	10:16 (176)			
	21:52	21:12	20:11	19:08	17:15	6 08:30 (177)	16:57	30 10:46 (176)	10:16 (176)		
15	06:05	06:45	07:28	08:11	07:59	08:26 (177)	08:37	10:16 (176)			
	21:51	21:10	20:08	19:06	17:14	2 08:28 (177)	16:57	31 10:47 (176)	10:17 (176)		
16	06:06	06:46	07:29	08:13	08:01	08:38	10:17 (176)				
	21:50	21:08	20:06	19:04	17:12	16:57	31 10:48 (176)	10:17 (176)			
17	06:07	06:47	07:31	08:14	08:02	08:39	10:17 (176)				
	21:50	21:06	20:04	19:02	17:11	16:57	32 10:49 (176)	10:17 (176)			
18	06:08	06:49	07:32	08:16	08:04	08:40	10:17 (176)				
	21:49	21:04	20:02	19:00	17:10	16:58	32 10:49 (176)	10:17 (176)			
19	06:10	06:50	07:34	08:17	08:06	08:40	10:17 (176)				
	21:48	21:03	20:00	18:57	17:09	16:58	33 10:50 (176)	10:17 (176)			
20	06:11	06:52	07:35	08:19	08:07	08:41	10:17 (176)				
	21:47	21:01	19:58	18:55	7 09:27 (177)	17:08	16:58	33 10:50 (176)	10:18 (176)		
21	06:12	06:51 (180)	06:53	07:36	08:20	09:15 (177)	08:08	08:41	10:18 (176)		
	21:46	6 06:57 (180)	20:59	19:56	18:53	15 09:30 (177)	17:07	16:59	33 10:51 (176)	10:18 (176)	
22	06:13	06:49 (180)	06:54	07:38	08:20 (178)	08:22	09:13 (177)	08:10	08:42	10:18 (176)	
	21:45	10 06:59 (180)	20:57	19:54	11 08:31 (178)	18:51	20 09:33 (177)	17:06	16:59	33 10:51 (176)	10:19 (176)
23	06:14	06:49 (180)	06:56	07:39	08:16 (178)	08:23	09:10 (177)	08:11	08:42	10:19 (176)	
	21:43	13 07:02 (180)	20:55	19:52	17 08:33 (178)	18:49	24 09:34 (177)	17:05	17:00	33 10:52 (176)	10:19 (176)
24	06:15	06:48 (180)	06:57	07:41	08:14 (178)	08:25	09:09 (177)	08:13	08:43	10:19 (176)	
	21:42	15 07:03 (180)	20:53	19:49	19 08:33 (178)	18:47	27 09:36 (177)	17:04	17:00	33 10:52 (176)	10:21 (176)
25	06:17	06:47 (180)	06:59	07:42	08:13 (178)	08:27	09:08 (177)	08:14	08:43	10:21 (176)	
	21:41	16 07:03 (180)	20:51	19:47	22 08:35 (178)	18:46	29 09:37 (177)	17:04	17:01	32 10:53 (176)	10:21 (176)
26	06:18	06:46 (180)	07:00	07:38 (179)	07:43	08:11 (178)	08:28	09:07 (177)	08:16	08:44	10:21 (176)
	21:40	18 07:04 (180)	20:49	7 07:45 (179)	19:45	24 08:35 (178)	18:44	30 09:37 (177)	17:03	17:02	32 10:53 (176)
27	06:19	06:45 (180)	07:01	07:34 (179)	07:45	08:11 (178)	08:30	09:06 (177)	08:17	08:44	10:21 (176)
	21:39	19 07:04 (180)	20:47	13 07:47 (179)	19:43	25 08:36 (178)	18:42	32 09:38 (177)	17:02	17:02	32 10:53 (176)
28	06:20	06:46 (180)	07:03	07:33 (179)	07:46	08:10 (178)	08:31	09:06 (177)	08:18	08:44	10:22 (176)
	21:38	19 07:05 (180)	20:45	16 07:49 (179)	19:41	26 08:36 (178)	18:40	33 09:39 (177)	17:01	17:03	31 10:53 (176)
29	06:22	06:48 (180)	07:04	07:31 (179)	07:48	08:11 (178)	08:33	09:05 (177)	08:20	08:44	10:23 (176)
	21:36	18 07:06 (180)	20:43	19 07:50 (179)	19:39	25 08:36 (178)	18:39	34 09:39 (177)	17:01	17:04	30 10:53 (176)
30	06:23	06:49 (180)	07:06	07:30 (179)	07:49	08:12 (178)	08:34	09:05 (177)	08:21	08:44	10:23 (176)
	21:35	17 07:06 (180)	20:41	20 07:50 (179)	19:37	23 08:35 (178)	18:37	34 09:39 (177)	17:00	17:05	30 10:53 (176)
31	06:24	06:50 (180)	07:07	07:31 (179)	07:49	08:36	09:05 (177)	08:21	08:45	10:24 (176)	
	21:34	16 07:06 (180)	20:39	20 07:51 (179)	19:35	35 09:40 (177)	17:06	29 10:53 (176)			
Potential sun hours	486	445	379	288	414	277	260	807			
Total, worst case	167	165	288	414	277	260	807				
Sun reduction	0.75	0.72	0.69	0.52	0.327	0.44	0.44				
Oper. time red.	0.98	0.98	0.98	0.98	0.98	0.98	0.98				
Wind dir. red.	0.60	0.62	0.68	0.71	0.72	0.69	0.69				
Total reduction	0.44	0.45	0.46	0.37	0.31	0.30	0.30				
Total, real	74	74	132	154	102	245					

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:11 AM / 15

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 4:44 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: E - Participating**

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [BISMARCK]
 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 4.92 5.13 7.45 8.03 10.20 11.21 11.69 10.35 8.68 5.69 4.02 3.69

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
 662 334 353 412 609 964 791 576 697 906 1,119 1,195 8,618
 Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	08:45	08:22	07:35	07:32	06:34	06:57 (300) 05:55
	17:07	17:50	18:34	20:20	21:05	24 07:21 (300) 21:44
2	08:44	08:21	07:33	07:29	06:32	06:55 (300) 05:54
	17:08	17:51	18:35	20:22	21:06	26 07:21 (300) 21:45
3	08:44	08:20	07:31	07:27	06:30	06:53 (300) 05:54
	17:09	17:53	18:37	20:23	21:07	28 07:21 (300) 21:46
4	08:44	08:18	07:29	07:25	06:29	06:52 (300) 05:53
	17:10	17:55	18:38	20:25	21:09	30 07:22 (300) 21:47
5	08:44	08:17	07:27	07:49 (34) 07:23	06:27	06:50 (300) 05:53
	17:11	17:56	18:40	15 08:04 (34) 20:26	21:10	31 07:21 (300) 21:48
6	08:44	08:15	07:25	07:47 (34) 07:21	06:26	06:49 (300) 05:52
	17:12	17:58	18:41	20 08:07 (34) 20:28	21:12	33 07:22 (300) 21:49
7	08:44	08:14	07:23	07:45 (34) 07:19	06:24	06:47 (300) 05:52
	17:13	18:00	18:43	24 08:09 (34) 20:29	21:13	35 07:22 (300) 21:50
8	08:43	08:12	08:21	08:43 (34) 07:17	06:22	06:46 (300) 05:51
	17:15	18:00	18:44	27 09:10 (34) 20:31	21:15	36 07:22 (300) 21:51
9	08:43	08:11	08:19	08:41 (34) 07:15	06:21	06:45 (300) 05:51
	17:16	18:01	19:46	31 09:12 (34) 20:32	21:16	37 07:22 (300) 21:52
10	08:43	08:09	08:17	08:39 (34) 07:13	06:19	06:44 (300) 05:50
	17:17	18:03	19:48	34 09:13 (34) 20:34	21:17	38 07:22 (300) 21:52
11	08:42	08:08	08:15	08:37 (34) 07:11	06:18	06:45 (300) 05:50
	17:18	18:05	19:49	36 09:13 (34) 20:35	21:19	37 07:22 (300) 21:53
12	08:42	08:06	08:13	08:35 (34) 07:09	06:17	06:44 (300) 05:50
	17:20	18:06	19:51	39 09:14 (34) 20:37	21:20	37 07:21 (300) 21:54
13	08:41	08:04	08:11	08:34 (34) 07:07	06:15	06:45 (300) 05:50
	17:21	18:08	19:52	41 09:15 (34) 20:38	21:21	36 07:21 (300) 21:54
14	08:40	08:03	08:09	08:33 (34) 07:05	06:14	06:45 (300) 05:50
	17:22	18:09	19:54	42 09:15 (34) 20:40	21:23	36 07:21 (300) 21:55
15	08:40	08:01	08:07	08:32 (34) 07:03	06:12	06:46 (300) 05:49
	17:24	18:11	19:55	43 09:15 (34) 20:41	21:24	35 07:21 (300) 21:55
16	08:39	07:59	08:05	08:32 (34) 07:01	06:11	06:45 (300) 05:49
	17:25	18:13	19:57	43 09:15 (34) 20:43	21:26	35 07:20 (300) 21:56
17	08:38	07:57	08:03	08:32 (34) 06:59	06:10	06:46 (300) 05:49
	17:27	18:14	19:58	43 09:15 (34) 20:44	21:27	33 07:19 (300) 21:56
18	08:38	07:56	08:01	08:30 (34) 06:57	07:19 (36) 06:09	06:47 (300) 05:49
	17:28	18:16	20:00	44 09:14 (34) 20:46	1 07:20 (36) 21:28	32 07:19 (300) 21:57
19	08:37	07:54	07:59	08:30 (34) 06:55	07:18 (36) 06:07	06:48 (300) 05:50
	17:30	18:18	20:01	44 09:14 (34) 20:47	3 07:21 (36) 21:29	30 07:18 (300) 21:57
20	08:36	07:52	07:57	08:30 (34) 06:54	07:16 (36) 06:06	06:48 (300) 05:50
	17:31	18:19	20:03	43 09:13 (34) 20:48	6 07:22 (36) 21:31	30 07:18 (300) 21:57
21	08:35	07:50	07:54	08:30 (34) 06:52	07:14 (36) 06:05	06:49 (300) 05:50
	17:33	18:21	20:04	43 09:13 (34) 20:50	8 07:22 (36) 21:32	28 07:17 (300) 21:58
22	08:34	07:48	07:52	08:31 (34) 06:50	07:12 (36) 06:04	06:50 (300) 05:50
	17:34	18:22	20:06	41 09:12 (34) 20:51	9 07:21 (36) 21:33	26 07:16 (300) 21:58
23	08:33	07:47	07:50	08:31 (34) 06:48	07:10 (36) 06:03	06:51 (300) 05:50
	17:36	18:24	20:07	40 09:11 (34) 20:53	11 07:21 (36) 21:34	24 07:15 (300) 21:58
24	08:32	07:45	07:48	08:31 (34) 06:46	07:09 (300) 06:02	06:52 (300) 05:51
	17:37	18:26	20:09	39 09:10 (34) 20:54	12 07:21 (36) 21:36	22 07:14 (300) 21:58
25	08:31	07:43	07:46	08:32 (34) 06:44	07:07 (300) 06:01	06:53 (300) 05:51
	17:39	18:27	20:10	37 09:09 (34) 20:56	14 07:21 (36) 21:37	20 07:13 (300) 21:58
26	08:30	07:41	07:44	08:33 (34) 06:42	07:05 (300) 06:00	06:54 (300) 05:51
	17:40	18:29	20:12	35 09:08 (34) 20:57	14 07:19 (36) 21:38	18 07:12 (300) 21:58
27	08:29	07:39	07:42	08:34 (34) 06:41	07:03 (300) 05:59	06:55 (300) 05:52
	17:42	18:30	20:13	32 09:06 (34) 20:59	15 07:18 (36) 21:39	16 07:11 (300) 21:58
28	08:27	07:37	07:40	08:35 (34) 06:39	07:02 (300) 05:58	06:58 (300) 05:52
	17:43	18:32	20:15	29 09:04 (34) 21:00	16 07:18 (300) 21:40	12 07:10 (300) 21:58
29	08:26		07:38	08:36 (34) 06:37	07:00 (300) 05:57	07:01 (300) 05:53
	17:45		20:16	25 09:01 (34) 21:02	19 07:19 (300) 21:41	6 07:07 (300) 21:58
30	08:25		07:36	08:38 (34) 06:35	06:58 (300) 05:56	05:53
	17:47		20:18	20 08:58 (34) 21:03	22 07:20 (300) 21:42	21:58
31	08:24		07:34	08:41 (34)	05:56	
	17:48		20:19	14 08:55 (34)	21:43	
Potential sun hours	273	284	368	410	472	481
Total, worst case			924	150	831	
Sun reduction			0.63	0.59	0.67	
Oper. time red.			0.98	0.98	0.98	
Wind dir. red.			0.69	0.61	0.61	
Total reduction			0.43	0.35	0.40	
Total, real			397	53	334	

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:11 AM / 16

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 4:44 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: E - Participating**

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [BISMARCK]
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
4.92 5.13 7.45 8.03 10.20 11.21 11.69 10.35 8.68 5.69 4.02 3.69

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
662 334 353 412 609 964 791 576 697 906 1,119 1,195 8,618
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December		
1 05:54		06:26	06:55 (300) 07:08		07:51	08:13 (34) 07:37 08:22		
21:58		21:32	37 07:32 (300) 20:37		19:35	40 08:53 (34) 17:34 17:00		
2 05:54		06:27	06:55 (300) 07:10		07:52	08:15 (34) 07:39 08:24		
21:58		21:31	37 07:32 (300) 20:35		19:33	38 08:53 (34) 17:32 16:59		
3 05:55		06:28	06:55 (300) 07:11		07:54	08:16 (34) 07:41 08:25		
21:58		21:29	37 07:32 (300) 20:33		19:31	35 08:51 (34) 17:30 16:59		
4 05:56		06:30	06:55 (300) 07:13		07:55	08:18 (34) 07:42 08:26		
21:57		21:28	37 07:32 (300) 20:31		19:28	32 08:50 (34) 17:29 16:58		
5 05:56		06:31	06:56 (300) 07:14		07:56	08:19 (34) 07:44 08:27		
21:57		21:26	36 07:32 (300) 20:29		19:26	29 08:48 (34) 17:27 16:58		
6 05:57		06:32	06:58 (300) 07:15		07:58	08:21 (34) 07:45 08:28		
21:57		21:25	34 07:32 (300) 20:27		19:24	26 08:47 (34) 17:26 16:57		
7 05:58		06:34	06:59 (300) 07:17		07:59	08:22 (34) 07:47 08:30		
21:56		21:23	33 07:32 (300) 20:25		19:22	22 08:44 (34) 17:24 16:57		
8 05:59		06:35	07:00 (300) 07:18		08:01	08:24 (34) 07:48 08:31		
21:56		21:21	31 07:31 (300) 20:23		19:20	17 08:41 (34) 17:23 16:57		
9 06:00		06:36	07:02 (300) 07:20		08:02	08:25 (34) 07:50 08:32		
21:55		21:20	29 07:31 (300) 20:21		19:18	12 08:37 (34) 17:21 16:57		
10 06:00		06:38	07:03 (300) 07:21		08:04		07:52 08:33	
21:55		21:18	27 07:30 (300) 20:19		19:16		17:20 16:57	
11 06:01		06:39	07:04 (300) 07:22		08:05		07:53 08:34	
21:54		21:17	25 07:29 (300) 20:17		19:14		17:19 16:57	
12 06:02		06:40	07:05 (300) 07:24		08:34 (34) 08:07		07:55 08:35	
21:53		21:15	23 07:28 (300) 20:15	12	08:46 (34) 19:12		17:17 16:57	
13 06:03		06:42	07:07 (300) 07:25		08:29 (34) 08:08		07:56 08:36	
21:53		21:13	21 07:28 (300) 20:13	20	08:49 (34) 19:10		17:16 16:57	
14 06:04		06:43	07:08 (300) 07:27		08:27 (34) 08:10		07:58 08:36	
21:52		21:11	18 07:26 (300) 20:10	25	08:52 (34) 19:08		17:15 16:57	
15 06:05		06:45	07:09 (300) 07:28		08:25 (34) 08:11		07:59 08:37	
21:51	9	07:17 (300) 21:10	16	07:25 (300) 20:08	28	08:53 (34) 19:06		17:14 16:57
16 06:06		06:46	07:11 (300) 07:29		08:22 (34) 08:13		08:01 08:38	
21:50	13	07:19 (300) 21:08	15	07:26 (36) 20:06	32	08:54 (34) 19:04		17:12 16:57
17 06:07		06:47	07:12 (300) 07:31		08:21 (34) 08:14		08:02 08:39	
21:49	17	07:21 (300) 21:06	14	07:26 (36) 20:04	35	08:56 (34) 19:02		17:11 16:57
18 06:09		06:49	07:13 (300) 07:32		08:20 (34) 08:16		08:04 08:39	
21:49	19	07:22 (300) 21:04	13	07:26 (36) 20:02	36	08:56 (34) 19:00		17:10 16:58
19 06:10		06:50	07:15 (35) 07:34		08:18 (34) 08:17		08:05 08:40	
21:48	21	07:23 (300) 21:02	12	07:27 (36) 20:00	38	08:56 (34) 18:57		17:09 16:58
20 06:11		06:52	07:16 (36) 07:35		08:17 (34) 08:19		08:07 08:41	
21:47	23	07:24 (300) 21:01	11	07:27 (36) 19:58	40	08:57 (34) 18:55		17:08 16:58
21 06:12		06:53	07:17 (36) 07:36		08:16 (34) 08:20		08:08 08:41	
21:46	25	07:25 (300) 20:59	9	07:26 (36) 19:56	41	08:57 (34) 18:53		17:07 16:59
22 06:13		06:54	07:19 (36) 07:38		08:16 (34) 08:22		08:10 08:42	
21:45	27	07:26 (300) 20:57	7	07:26 (36) 19:54	42	08:58 (34) 18:51		17:06 16:59
23 06:14		06:56	07:20 (36) 07:39		08:15 (34) 08:23		08:11 08:42	
21:43	29	07:28 (300) 20:55	5	07:25 (36) 19:51	43	08:58 (34) 18:49		17:05 17:00
24 06:15		06:57	07:21 (36) 07:41		08:14 (34) 08:25		08:13 08:43	
21:42	30	07:29 (300) 20:53	3	07:24 (36) 19:49	43	08:57 (34) 18:47		17:04 17:00
25 06:17		06:59	07:42		08:14 (34) 08:26		08:14 08:43	
21:41	31	07:29 (300) 20:51		19:47	44	08:58 (34) 18:46		17:04 17:01
26 06:18		07:00	07:43		08:13 (34) 08:28		08:16 08:43	
21:40	33	07:30 (300) 20:49		19:45	44	08:57 (34) 18:44		17:03 17:02
27 06:19		07:01	07:45		08:14 (34) 08:30		08:17 08:44	
21:39	34	07:30 (300) 20:47		19:43	43	08:57 (34) 18:42		17:02 17:02
28 06:20		07:03	07:46		08:13 (34) 08:31		08:18 08:44	
21:37	34	07:30 (300) 20:45		19:41	43	08:56 (34) 18:40		17:01 17:03
29 06:22		07:04	07:48		08:14 (34) 08:33		08:20 08:44	
21:36	35	07:31 (300) 20:43		19:39	42	08:56 (34) 18:39		17:01 17:04
30 06:23		07:06	07:49		08:13 (34) 08:34		08:21 08:44	
21:35	36	07:32 (300) 20:41		19:37	42	08:55 (34) 18:37		17:00 17:05
31 06:24		07:07			08:36		08:36 08:44	
21:33	37	07:32 (300) 20:39			18:35		17:06 17:06	
Potential sun hours	486	445	379	336	277	260		
Total, worst case	453	530	693	251				
Sun reduction	0.75	0.72	0.69	0.52				
Oper. time red.	0.98	0.98	0.98	0.98				
Wind dir. red.	0.61	0.61	0.69	0.69				
Total reduction	0.45	0.43	0.47	0.36				
Total, real	202	229	325	90				

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:11 AM / 17

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 4:44 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: F - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
662	334	353	412	609	964	791	576	697	906	1,119	1,195	8,618

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

	January	February	March	April	May	June
1 08:45	16:01 (15) 08:23	08:47 (184) 07:35	07:32	06:34	19:40 (14) 05:55	
17:07	34 16:35 (13) 17:50	15 09:02 (184) 18:34	20:21	21:05	39 20:19 (14) 21:45	
2 08:45	16:01 (15) 08:21	08:45 (184) 07:33	07:30	06:32	19:40 (14) 05:55	
17:08	36 16:37 (13) 17:52	17 09:02 (184) 18:35	20:22	21:06	38 20:18 (14) 21:46	
3 08:45	16:02 (15) 08:20	08:44 (184) 07:31	07:28	06:31	19:42 (14) 05:54	
17:09	35 16:37 (13) 17:53	19 09:03 (184) 18:37	20:24	21:08	36 20:18 (14) 21:47	
4 08:44	16:02 (15) 08:18	08:42 (184) 07:29	07:26	06:29	19:42 (14) 05:53	
17:10	36 16:38 (13) 17:55	20 09:02 (184) 18:38	20:25	21:09	34 20:16 (14) 21:48	
5 08:44	16:03 (15) 08:17	08:41 (184) 07:27	07:24	06:27	19:43 (14) 05:53	
17:11	35 16:38 (13) 17:57	21 09:02 (184) 18:40	20:27	21:10	33 20:16 (14) 21:48	
6 08:44	16:03 (15) 08:16	08:42 (184) 07:25	07:21	06:26	19:44 (14) 05:52	
17:13	35 16:38 (13) 17:58	20 09:02 (184) 18:42	20:28	21:12	30 20:14 (14) 21:49	
7 08:44	16:04 (15) 08:14	08:43 (184) 07:23	07:19	06:24	19:45 (14) 05:52	
17:14	34 16:38 (13) 18:00	19 09:02 (184) 18:43	20:30	21:13	29 20:14 (14) 21:50	
8 08:43	16:04 (15) 08:12	08:44 (184) 08:21	07:17	06:23	19:46 (14) 05:51	
17:15	34 16:38 (13) 18:00	16 09:00 (184) 18:45	20:31	21:15	26 20:12 (14) 21:51	
9 08:43	16:05 (15) 08:11	08:45 (184) 08:19	07:15	06:21	19:48 (14) 05:51	
17:16	33 16:38 (13) 18:02	14 08:59 (184) 19:46	20:32	21:16	23 20:11 (14) 21:52	
10 08:43	16:05 (15) 08:09	08:47 (184) 08:17	07:13	20:01 (14) 06:20	19:49 (14) 05:51	
17:17	32 16:37 (13) 18:03	10 08:57 (184) 19:48	20:34	20:07 (14) 21:18	19 20:08 (14) 21:52	
11 08:42	16:06 (15) 08:08	08:15	07:11	19:55 (14) 06:18	19:52 (14) 05:50	
17:19	32 16:38 (13) 18:05	19:49	20:35	17 20:12 (14) 21:19	14 20:06 (14) 21:53	
12 08:42	16:06 (15) 08:06	08:13	07:09	19:52 (14) 06:17	19:57 (14) 05:50	
17:20	31 16:37 (13) 18:06	19:51	20:37	21 20:13 (14) 21:20	4 20:01 (14) 21:54	
13 08:41	16:07 (15) 08:04	08:11	07:07	19:50 (14) 06:15	05:50	
17:21	29 16:36 (15) 18:08	19:52	20:38	24 20:14 (14) 21:22	21:54	
14 08:41	16:08 (15) 08:03	08:09	07:05	19:48 (14) 06:14	05:50	
17:23	29 16:37 (15) 18:10	19:54	20:40	28 20:16 (14) 21:23	21:55	
15 08:40	16:09 (15) 08:01	08:07	07:03	19:46 (14) 06:13	05:50	
17:24	28 16:37 (15) 18:11	19:55	20:41	31 20:17 (14) 21:24	21:55	
16 08:39	16:09 (15) 07:59	08:05	07:01	19:45 (14) 06:11	05:50	
17:25	27 16:36 (15) 18:13	19:57	20:43	33 20:18 (14) 21:26	21:56	
17 08:38	16:10 (15) 07:58	08:03	07:00	19:44 (14) 06:10	05:50	
17:27	26 16:36 (15) 18:15	19:58	20:44	37 20:21 (14) 21:27	21:56	
18 08:38	16:11 (15) 07:56	08:01	06:58	19:43 (14) 06:09	05:50	
17:28	25 16:36 (15) 18:16	20:00	20:46	38 20:21 (14) 21:28	21:57	
19 08:37	16:12 (15) 07:54	07:59	06:56	19:42 (14) 06:08	05:50	
17:30	23 16:35 (15) 18:18	20:01	20:47	40 20:22 (14) 21:30	21:57	
20 08:36	16:13 (15) 07:52	07:57	06:54	19:41 (14) 06:06	05:50	
17:31	22 16:35 (15) 18:19	20:03	20:49	41 20:22 (14) 21:31	21:58	
21 08:35	16:15 (15) 07:50	07:55	06:52	19:41 (14) 06:05	05:50	
17:33	19 16:34 (15) 18:21	20:04	20:50	41 20:22 (14) 21:32	21:58	
22 08:34	16:17 (15) 07:49	07:53	06:50	19:40 (14) 06:04	05:50	
17:34	16 16:33 (15) 18:23	20:06	20:52	42 20:22 (14) 21:33	21:58	
23 08:33	16:19 (15) 07:47	07:50	06:48	19:40 (14) 06:03	05:51	
17:36	12 16:31 (15) 18:24	20:07	20:53	42 20:22 (14) 21:35	21:58	
24 08:32	16:23 (15) 07:45	07:48	06:46	19:40 (14) 06:02	05:51	
17:37	5 16:28 (15) 18:26	20:09	20:55	42 20:22 (14) 21:36	21:58	
25 08:31	07:43	07:46	06:45	19:39 (14) 06:01	05:51	
17:39	18:27	20:10	20:56	43 20:22 (14) 21:37	21:59	
26 08:30	08:55 (184) 07:41	07:44	06:43	19:39 (14) 06:00	05:52	
17:40	2 08:57 (184) 18:29	20:12	20:57	42 20:21 (14) 21:38	21:59	
27 08:29	08:53 (184) 07:39	07:42	06:41	19:40 (14) 05:59	05:52	
17:42	5 08:58 (184) 18:31	20:13	20:59	41 20:21 (14) 21:39	21:59	
28 08:28	08:52 (184) 07:37	07:40	06:39	19:40 (14) 05:58	05:52	
17:44	7 08:59 (184) 18:32	20:15	21:00	41 20:21 (14) 21:40	21:59	
29 08:26	08:51 (184)	07:38	06:37	19:39 (14) 05:58	05:53	
17:45	9 09:00 (184)	20:16	21:02	41 20:20 (14) 21:41	21:59	
30 08:25	08:50 (184)	07:36	06:36	19:40 (14) 05:57	05:53	
17:47	11 09:01 (184)	20:18	21:03	40 20:20 (14) 21:43	21:58	
31 08:24	08:48 (184)	07:34	06:34	05:56		
17:48	13 09:01 (184)	20:19	21:04	21:44		
Potential sun hours	273	284	368	410	471	481
Total, worst case	715	171	731	325		
Sun reduction	0.56	0.50	0.59	0.67		
Oper. time red.	0.98	0.98	0.98	0.98		
Wind dir. red.	0.55	0.72	0.69	0.69		
Total reduction	0.29	0.35	0.39	0.45		
Total, real	211	60	288	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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:11 AM / 18

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 4:44 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: F - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
662	334	353	412	609	964	791	576	697	906	1,119	1,195	8,618

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

	July	August	September	October	November	December
1	05:54 06:26	20:05 (14) 07:09	19:54 (14) 07:51	07:38	08:17 (184) 08:22	15:48 (15)
2	05:55 06:27	20:02 (14) 07:10	20:00 (14) 07:52	07:39	08:14 (184) 08:24	15:48 (15)
3	05:55 06:29	19:59 (14) 07:11	20:06 (14) 07:53	07:41	08:13 (184) 08:25	15:48 (15)
4	05:56 06:30	19:57 (14) 07:13	19:57 (14) 07:13	07:55	08:13 (184) 08:26	15:49 (15)
5	05:57 06:31	19:56 (14) 07:14	19:56 (14) 07:14	07:57	08:11 (184) 08:27	15:49 (15)
6	05:57 06:33	19:54 (14) 07:16	19:54 (14) 07:16	07:58	08:11 (184) 08:29	15:49 (15)
7	05:58 06:34	19:53 (14) 07:17	19:53 (14) 07:17	08:00	08:13 (184) 08:30	15:49 (15)
8	05:59 06:35	19:53 (14) 07:18	19:53 (14) 07:18	08:01	08:14 (184) 08:31	15:50 (15)
9	06:00 06:37	19:51 (14) 07:20	19:51 (14) 07:20	08:02	08:16 (184) 08:32	15:50 (15)
10	06:01 06:38	19:50 (14) 07:21	19:50 (14) 07:21	08:04	08:18 (184) 08:33	15:51 (15)
11	06:02 06:39	19:49 (14) 07:23	19:49 (14) 07:23	08:05	08:19 (184) 08:34	15:52 (15)
12	06:03 06:41	19:49 (14) 07:24	19:49 (14) 07:24	08:07	08:21 (184) 08:35	15:52 (15)
13	06:04 06:42	19:48 (14) 07:25	19:48 (14) 07:25	08:08	08:23 (184) 08:36	15:52 (15)
14	06:05 06:44	19:47 (14) 07:27	19:47 (14) 07:27	08:10	08:24 (184) 08:37	15:52 (15)
15	06:06 06:45	19:47 (14) 07:28	19:47 (14) 07:28	08:11	08:26 (184) 08:37	15:53 (15)
16	06:07 06:46	19:46 (14) 07:30	19:46 (14) 07:30	08:13	08:28 (184) 08:38	15:54 (15)
17	06:08 06:48	19:46 (14) 07:31	19:46 (14) 07:31	08:14	08:30 (184) 08:39	15:54 (15)
18	06:09 06:49	19:46 (14) 07:32	19:46 (14) 07:32	08:16	15:57 (15) 08:40	15:54 (15)
19	06:10 06:50	19:45 (14) 07:34	19:45 (14) 07:34	08:17	16:02 (15) 16:58	15:55 (15)
20	06:11 06:52	19:45 (14) 07:35	19:45 (14) 07:35	08:19	15:52 (15) 08:41	15:56 (15)
21	06:12 06:53	19:46 (14) 07:37	19:46 (14) 07:37	08:21	16:08 (15) 16:59	15:56 (15)
22	06:13 06:55	19:45 (14) 07:38	19:45 (14) 07:38	08:22	15:51 (15) 08:41	15:56 (15)
23	06:15 06:56	19:45 (14) 07:39	19:45 (14) 07:39	08:24	16:10 (15) 16:59	15:57 (15)
24	06:16 06:57	19:46 (14) 07:41	19:46 (14) 07:41	08:25	15:49 (15) 08:42	15:57 (15)
25	06:17 06:59	19:46 (14) 07:42	19:46 (14) 07:42	08:27	16:11 (15) 17:00	15:57 (15)
26	06:18 07:00	19:46 (14) 07:44	19:46 (14) 07:44	08:28	15:49 (15) 08:43	15:58 (15)
27	06:19 07:02	19:48 (14) 07:45	19:48 (14) 07:45	08:30	16:12 (15) 17:00	15:58 (15)
28	06:21 07:03	19:48 (14) 07:47	19:48 (14) 07:47	08:31	15:49 (15) 08:44	15:59 (15)
29	06:22 07:04	19:49 (14) 07:48	19:49 (14) 07:48	08:33	16:16 (15) 17:03	15:59 (15)
30	06:23 07:06	19:51 (14) 07:49	19:51 (14) 07:49	08:34	15:48 (15) 08:44	15:59 (15)
31	06:25 07:07	19:52 (14) 07:50	19:52 (14) 07:50	08:36	16:17 (15) 17:03	16:32 (13)
Potential sun hours	486	445	379	336	277	260
Total, worst case		1043	23	3	510	1031
Sun reduction		0.72	0.69	0.52	0.43	0.44
Oper. time red.		0.98	0.98	0.98	0.98	0.98
Wind dir. red.		0.69	0.69	0.72	0.61	0.53
Total reduction		0.48	0.46	0.37	0.26	0.23
Total, real		505	11	1	132	234

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:11 AM / 19

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 4:44 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: H - Participating**

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

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

Assumptions for shadow calculations

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
662	334	353	412	609	964	791	576	697	906	1,119	1,195	8,618

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

	January	February	March	April	May	June
1	08:45	08:23	07:35	07:32	06:34	05:55
	17:07	17:50	18:34	20:21	21:05	21:45
2	08:45	08:21	07:33	07:30	06:32	05:55
	17:08	17:52	18:35	20:22	21:06	21:46
3	08:44	08:20	07:31	07:28	06:31	05:54
	17:09	17:54	18:37	20:24	21:08	21:46
4	08:44	08:18	07:29	07:26	06:29	05:54
	17:11	17:55	18:39	20:25	21:09	21:47
5	08:44	08:17	07:27	07:24	06:28	06:51 (155) 05:53
	17:12	17:57	18:40	20:27	21:10	3 06:54 (155) 21:48
6	08:44	08:15	07:25	07:22	06:26	06:49 (155) 05:53
	17:13	17:58	18:42	20:28	21:12	7 06:56 (155) 21:49
7	08:44	08:14	07:23	07:20	06:24	06:48 (155) 05:52
	17:14	18:00	18:43	20:30	21:13	9 06:57 (155) 21:50
8	08:43	08:12	08:21	07:18	06:23	06:46 (155) 05:52
	17:15	18:00	18:45	20:31	21:15	12 06:58 (155) 21:51
9	08:43	08:11	08:19	07:16	06:21	06:45 (155) 05:51
	17:16	18:02	19:46	20:33	21:16	14 06:59 (155) 21:52
10	08:43	08:09	08:17	07:13	06:20	06:44 (155) 05:51
	17:18	18:03	19:48	20:34	21:17	16 07:00 (155) 21:52
11	08:42	16:47 (307) 08:08	08:15	07:11	06:18	06:42 (155) 05:51
	17:19	1 16:48 (307) 18:05	19:49	20:35	21:19	18 07:00 (155) 21:53
12	08:42	16:47 (307) 08:06	08:13	07:09	06:17	06:41 (155) 05:50
	17:20	2 16:49 (307) 18:07	19:51	20:37	21:20	19 07:00 (155) 21:54
13	08:41	16:47 (307) 08:04	08:11	07:08	06:16	06:40 (155) 05:50
	17:22	4 16:51 (307) 18:08	19:52	20:38	21:22	21 07:01 (155) 21:54
14	08:40	16:48 (307) 08:03	08:09	07:06	06:14	06:38 (155) 05:50
	17:23	5 16:53 (307) 18:10	19:54	20:40	21:23	22 07:00 (155) 21:55
15	08:40	16:48 (307) 08:01	08:07	07:04	06:13	06:37 (155) 05:50
	17:24	6 16:54 (307) 18:11	19:55	20:41	21:24	24 07:01 (155) 21:55
16	08:39	16:48 (307) 07:59	08:05	07:02	06:12	06:38 (155) 05:50
	17:26	7 16:55 (307) 18:13	19:57	20:43	21:26	23 07:01 (155) 21:56
17	08:38	16:48 (307) 07:58	08:03	07:00	06:10	06:38 (155) 05:50
	17:27	9 16:57 (307) 18:15	19:58	20:44	21:27	23 07:01 (155) 21:56
18	08:38	16:48 (307) 07:56	08:01	06:58	06:09	06:38 (155) 05:50
	17:29	10 16:58 (307) 18:16	20:00	20:46	21:28	23 07:01 (155) 21:57
19	08:37	16:49 (307) 07:54	07:59	06:56	06:08	06:38 (155) 05:50
	17:30	11 17:00 (307) 18:18	20:01	20:47	21:30	22 07:00 (155) 21:57
20	08:36	16:49 (307) 07:52	07:57	06:54	06:07	06:38 (155) 05:50
	17:31	12 17:01 (307) 18:20	20:03	20:49	21:31	21 06:59 (155) 21:57
21	08:35	16:50 (307) 07:50	07:55	06:52	06:06	06:39 (155) 05:50
	17:33	13 17:03 (307) 18:21	20:04	20:50	21:32	20 06:59 (155) 21:58
22	08:34	16:51 (307) 07:49	07:53	06:50	06:04	06:39 (155) 05:51
	17:34	14 17:05 (307) 18:23	20:06	20:52	21:33	20 06:59 (155) 21:58
23	08:33	16:52 (307) 07:47	07:51	06:48	06:03	06:40 (155) 05:51
	17:36	14 17:06 (307) 18:24	20:07	20:53	21:35	18 06:58 (155) 21:58
24	08:32	16:53 (307) 07:45	07:48	06:46	06:02	06:41 (155) 05:51
	17:38	14 17:07 (307) 18:26	20:09	20:54	21:36	16 06:57 (155) 21:58
25	08:31	16:55 (307) 07:43	07:46	06:45	06:01	06:43 (155) 05:51
	17:39	11 17:06 (307) 18:28	20:10	20:56	21:37	14 06:57 (155) 21:58
26	08:30	16:57 (307) 07:41	07:44	06:43	06:00	06:44 (155) 05:52
	17:41	8 17:05 (307) 18:29	20:12	20:57	21:38	12 06:56 (155) 21:58
27	08:29	07:39	07:42	06:41	05:59	06:45 (155) 05:52
	17:42	18:31	20:13	20:59	21:39	10 06:55 (155) 21:58
28	08:28	07:37	07:40	06:39	05:59	06:46 (155) 05:53
	17:44	18:32	20:15	21:00	21:40	7 06:53 (155) 21:58
29	08:26		07:38	06:38	05:58	05:53
	17:45		20:16	21:02	21:41	8 06:28 (84)
30	08:25		07:36	06:36	05:57	05:54
	17:47		20:18	21:03	21:42	6 06:27 (84)
31	08:24		07:34	06:34	05:56	
	17:49		20:19	21:04	21:44	
Potential sun hours	273	285	368	409	471	481
Total, worst case	141				394	182
Sun reduction	0.56				0.67	0.70
Oper. time red.	0.98				0.98	0.98
Wind dir. red.	0.56				0.60	0.57
Total reduction	0.31				0.40	0.39
Total, real	43				156	71

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:11 AM / 20

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 4:44 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: H - Participating**

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [BISMARCK]
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
4.92 5.13 7.45 8.03 10.20 11.21 11.69 10.35 8.68 5.69 4.02 3.69

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
662 334 353 412 609 964 791 576 697 906 1,119 1,195 8,618
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December			
1	05:54	06:23 (84)	06:26	06:52 (155)	07:09	07:51	07:38	08:22	16:30 (307)
	21:58	06:25 (84)	19	07:11 (155)	20:38	19:35	17:34	17:00	1 16:31 (307)
2	05:55	06:27	17	06:53 (155)	07:10	07:52	07:39	08:24	
	21:58	21:31	17	07:10 (155)	20:36	19:33	17:32	17:00	
3	05:56	06:29	15	06:54 (155)	07:12	07:54	07:41	08:25	
	21:58	21:29	15	07:09 (155)	20:34	19:31	17:31	16:59	
4	05:56	06:30	13	06:56 (155)	07:13	07:55	07:42	08:26	
	21:57	21:28	13	07:09 (155)	20:31	19:29	17:29	16:59	
5	05:57	06:31	11	06:57 (155)	07:14	07:57	07:44	08:27	
	21:57	21:26	11	07:08 (155)	20:29	19:27	17:28	16:58	
6	05:58	06:33	8	06:58 (155)	07:16	07:58	07:45	08:28	
	21:57	21:25	8	07:06 (155)	20:27	19:25	17:26	16:58	
7	05:58	06:34	5	06:59 (155)	07:17	08:00	07:47	08:30	
	21:56	21:23	5	07:04 (155)	20:25	19:23	17:25	16:58	
8	05:59	06:35	1	07:01 (155)	07:19	08:01	07:49	08:31	
	21:56	21:22	1	07:02 (155)	20:23	19:21	17:23	16:57	
9	06:00	06:37		07:20	08:03	07:50	08:32	08:32	
	21:55	21:20		20:21	19:19	17:22	16:57		
10	06:01	06:38		07:21	08:04	07:52	08:33	08:33	
	21:55	21:18		20:19	19:16	17:20	16:57		
11	06:02	06:40		07:23	08:05	07:53	08:34	08:34	
	21:54	21:17		20:17	19:14	17:19	16:57		
12	06:03	06:41		07:24	08:07	07:55	08:35	08:35	
	21:53	21:15		20:15	19:12	17:18	16:57		
13	06:04	06:42		07:26	08:08	07:56	08:36	08:36	
	21:53	21:13		20:13	19:10	17:17	16:57		
14	06:05	06:44		07:27	08:10	07:58	08:36	08:36	
	21:52	21:12		20:11	19:09	17:15	16:57		
15	06:06	06:57 (155)		07:28	08:11	07:59	08:37	08:37	
	21:51	4 07:01 (155)		20:09	19:07	17:14	16:57		
16	06:07	06:55 (155)		07:30	08:13	08:01	16:30 (307)	08:38	
	21:50	9 07:04 (155)		20:07	19:05	17:13	8 16:38 (307)	16:58	
17	06:08	06:54 (155)		07:31	08:14	08:03	16:28 (307)	08:39	
	21:49	11 07:05 (155)		20:04	19:03	17:12	11 16:39 (307)	16:58	
18	06:09	06:53 (155)		07:32	08:16	08:04	16:27 (307)	08:40	
	21:49	13 07:06 (155)		20:02	19:01	17:11	14 16:41 (307)	16:58	
19	06:10	06:52 (155)		07:34	08:17	08:06	16:27 (307)	08:40	
	21:48	15 07:07 (155)		20:00	18:57	17:10	14 16:41 (307)	16:58	
20	06:11	06:51 (155)		07:35	08:19	08:07	16:26 (307)	08:41	
	21:47	17 07:08 (155)		19:58	18:55	17:09	14 16:40 (307)	16:59	
21	06:12	06:50 (155)		07:37	08:21	08:09	16:26 (307)	08:41	
	21:46	19 07:09 (155)		19:56	18:53	17:08	13 16:39 (307)	16:59	
22	06:14	06:50 (155)		07:38	08:22	08:10	16:25 (307)	08:42	
	21:45	19 07:09 (155)		19:54	18:51	17:07	12 16:37 (307)	17:00	
23	06:15	06:49 (155)		07:40	08:24	08:11	16:26 (307)	08:42	
	21:44	21 07:10 (155)		19:52	18:50	17:06	11 16:37 (307)	17:00	
24	06:16	06:49 (155)		07:41	08:25	08:13	16:25 (307)	08:43	
	21:42	21 07:10 (155)		19:50	18:48	17:05	10 16:35 (307)	17:01	
25	06:17	06:48 (155)		07:42	08:27	08:14	16:26 (307)	08:43	
	21:41	22 07:10 (155)		19:48	18:46	17:04	9 16:35 (307)	17:02	
26	06:18	06:49 (155)		07:44	08:28	08:16	16:27 (307)	08:44	
	21:40	22 07:11 (155)		19:45	18:44	17:03	7 16:34 (307)	17:02	
27	06:20	06:48 (155)		07:45	08:30	08:17	16:27 (307)	08:44	
	21:39	23 07:11 (155)		19:43	18:42	17:02	6 16:33 (307)	17:03	
28	06:21	06:48 (155)		07:47	08:31	08:18	16:27 (307)	08:44	
	21:38	23 07:11 (155)		19:41	18:41	17:02	5 16:32 (307)	17:04	
29	06:22	06:48 (155)		07:48	08:33	08:20	16:28 (307)	08:44	
	21:36	23 07:11 (155)		19:39	18:39	17:01	4 16:32 (307)	17:05	
30	06:23	06:49 (155)		07:49	08:34	08:21	16:28 (307)	08:44	
	21:35	22 07:11 (155)		19:37	18:37	17:01	3 16:31 (307)	17:05	
31	06:25	06:51 (155)			08:36			08:45	
	21:34	20 07:11 (155)			18:36			17:06	
Potential sun hours	486	445	379	336	277	260			
Total, worst case	306		89		141		1		
Sun reduction	0.75		0.72		0.43		0.44		
Oper. time red.	0.98		0.98		0.98		0.98		
Wind dir. red.	0.60		0.60		0.56		0.56		
Total reduction	0.44		0.43		0.24		0.24		
Total, real	135		38		34		0		

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)
--------------	------------------	----------------------	---------------------------------	--------------------------------	----------------------------------	---------------------------------

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:11 AM / 21

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 4:44 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: I - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
662	334	353	412	609	964	791	576	697	906	1,119	1,195	8,618

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

	January	February	March	April	May	June
1 08:45	09:14 (104) 08:23		07:35	07:58 (158) 07:32	06:34	06:57 (105) 05:55
17:07	28 09:42 (104) 17:50		18:34	7 08:05 (158) 20:21	21:05	46 20:39 (13) 21:45
2 08:45	09:15 (104) 08:21		07:33	07:56 (158) 07:30	06:32	06:55 (105) 05:55
17:08	27 09:42 (104) 17:52		18:35	9 08:05 (158) 20:22	21:06	50 20:40 (13) 21:46
3 08:45	09:16 (104) 08:20		07:31	07:54 (158) 07:28	06:31	06:54 (184) 05:54
17:09	27 09:43 (104) 17:53		18:37	11 08:05 (158) 20:24	21:08	54 20:42 (13) 21:47
4 08:44	09:16 (104) 08:18		07:29	07:52 (158) 07:26	06:29	06:52 (184) 05:53
17:10	27 09:43 (104) 17:55		18:38	13 08:05 (158) 20:25	21:09	57 20:43 (13) 21:47
5 08:44	09:16 (104) 08:17		07:27	07:50 (158) 07:24	06:27	06:51 (184) 05:53
17:11	27 09:43 (104) 17:57		18:40	15 08:05 (158) 20:27	21:10	61 20:45 (13) 21:48
6 08:44	09:17 (104) 08:15		07:25	07:48 (158) 07:21	06:26	06:49 (184) 05:52
17:13	27 09:44 (104) 17:58		18:42	17 08:05 (158) 20:28	21:12	63 20:45 (13) 21:49
7 08:44	09:18 (104) 08:14		07:23	07:46 (158) 07:19	06:24	06:48 (184) 05:52
17:14	26 09:44 (104) 18:00	1	08:39 (316) 18:43	18 08:04 (158) 20:30	21:13	65 20:46 (13) 21:50
8 08:43	09:18 (104) 08:12		08:36 (316) 08:21	08:46 (158) 07:17	06:23	06:46 (184) 05:51
17:15	26 09:44 (104) 18:00	5	08:41 (316) 18:45	17 09:03 (158) 20:31	21:15	66 20:45 (13) 21:51
9 08:43	09:19 (104) 08:11		08:34 (316) 08:19	08:46 (158) 07:15	06:21	06:45 (184) 05:51
17:16	26 09:45 (104) 18:02	8	08:42 (316) 19:46	15 09:01 (158) 20:32	21:16	68 20:46 (13) 21:52
10 08:43	09:19 (104) 08:09		08:33 (316) 08:17	08:48 (158) 07:13	06:20	06:43 (184) 05:51
17:17	25 09:44 (104) 18:03	11	08:44 (316) 19:48	12 19:25 (12) 20:34	21:17	67 20:45 (13) 21:52
11 08:42	09:21 (104) 08:08		08:31 (316) 08:15	19:19 (12) 07:11	06:18	06:43 (184) 05:51
17:19	24 09:45 (104) 18:05	13	08:44 (316) 19:49	7 19:26 (12) 20:35	21:19	67 20:45 (13) 21:53
12 08:42	09:21 (104) 08:06		08:29 (316) 08:13	19:17 (12) 07:09	06:17	06:43 (184) 05:50
17:20	24 09:45 (104) 18:06	16	08:45 (316) 19:51	11 19:28 (12) 20:37	21:20	65 20:45 (13) 21:54
13 08:41	09:22 (104) 08:04		08:28 (316) 08:11	19:15 (12) 07:07	06:15	06:43 (184) 05:50
17:21	22 09:44 (104) 18:08	18	08:46 (316) 19:52	14 19:29 (12) 20:38	21:22	63 20:44 (13) 21:54
14 08:41	09:23 (104) 08:03		08:26 (316) 08:09	19:14 (12) 07:05	06:14	06:43 (184) 05:50
17:23	22 09:45 (104) 18:10	20	08:46 (316) 19:54	17 19:31 (12) 20:40	21:23	61 20:44 (13) 21:55
15 08:40	09:24 (104) 08:01		08:24 (316) 08:07	19:13 (12) 07:03	06:13	06:44 (184) 05:50
17:24	20 09:44 (104) 18:11	22	08:46 (316) 19:55	20 19:33 (12) 20:41	21:24	59 20:44 (13) 21:55
16 08:39	09:25 (104) 07:59		08:22 (316) 08:05	19:13 (12) 07:02	06:11	06:45 (184) 05:50
17:25	18 09:43 (104) 18:13	24	08:46 (316) 19:57	21 19:34 (12) 20:43	21:26	49 20:44 (13) 21:56
17 08:38	09:26 (104) 07:58		08:21 (316) 08:03	19:12 (12) 07:00	06:10	06:46 (184) 05:50
17:27	17 09:43 (104) 18:15	25	08:46 (316) 19:58	24 19:36 (12) 20:44	21:27	42 20:44 (13) 21:56
18 08:38	09:28 (104) 07:56		08:21 (316) 08:01	19:12 (12) 06:58	06:09	06:47 (184) 05:50
17:28	14 09:42 (104) 18:16	25	08:46 (316) 20:00	24 19:36 (12) 20:46	21:28	38 20:42 (13) 21:57
19 08:37	09:30 (104) 07:54		08:21 (316) 07:59	19:12 (12) 06:56	06:08	06:49 (184) 05:50
17:30	10 09:40 (104) 18:18	24	08:45 (316) 20:01	24 19:36 (12) 20:47	21:30	33 20:42 (13) 21:57
20 08:36	09:34 (104) 07:52		08:22 (316) 07:57	19:13 (12) 06:54	06:07	20:18 (13) 21:50
17:31	3 09:37 (104) 18:19	22	08:44 (316) 20:03	22 19:35 (12) 20:49	21:31	23 20:41 (13) 21:57
21 08:35			07:50	08:23 (316) 07:55	06:05	20:19 (13) 05:50
17:33		19	08:42 (316) 20:04	21 19:33 (12) 20:50	21:32	21 20:40 (13) 21:58
22 08:34			07:49	08:24 (316) 07:53	06:04	20:20 (13) 05:50
17:34		17	08:41 (316) 20:06	19 19:32 (12) 20:52	21:33	19 20:39 (13) 21:58
23 08:33			07:47	08:26 (316) 07:51	06:03	20:21 (13) 05:51
17:36		13	08:39 (316) 20:07	16 19:30 (12) 20:53	21:35	17 20:38 (13) 21:58
24 08:32			07:45	08:29 (316) 07:48	06:02	20:23 (13) 05:51
17:37		6	08:35 (316) 20:09	12 19:28 (12) 20:54	21:36	14 20:37 (13) 21:58
25 08:31			07:43	08:45	06:01	20:25 (13) 05:51
17:39			18:27	12 07:19 (105) 21:37	10	20:35 (13) 21:58
26 08:30			07:41	06:43	06:00	20:29 (13) 05:52
17:41			18:29	15 07:20 (105) 21:38	4	20:33 (13) 21:59
27 08:29			07:39	06:41	05:59	05:52
17:42			18:31	23 20:34 (13) 21:39		21:59
28 08:28			07:37	08:00 (158) 07:40	06:39	07:02 (105) 05:58
17:44		4	08:04 (158) 20:15	31 21:00	31	20:35 (13) 21:40
29 08:26			17:45	06:37	05:58	05:53
17:45			20:16	37 21:02	37	20:36 (13) 21:41
30 08:25			07:36	06:36	05:57	05:53
17:47			20:18	42 20:38 (13) 21:43		21:58
31 08:24			07:34		05:56	
17:49			20:19		21:44	
Potential sun hours	273	285	368	410	471	481
Total, worst case	440	293	386	170	1182	
Sun reduction	0.56	0.50	0.63	0.59	0.67	
Oper. time red.	0.98	0.98	0.98	0.98	0.98	
Wind dir. red.	0.71	0.72	0.66	0.64	0.64	
Total reduction	0.39	0.36	0.41	0.37	0.44	
Total, real	172	105	158	63	517	

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:11 AM / 22

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 4:44 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: I - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
662	334	353	412	609	964	791	576	697	906	1,119	1,195	8,618

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

	July	August	September	October	November	December		
1	05:54	06:26	06:54 (184)	07:09	07:51	18:56 (12) 07:38	08:02 (316) 08:22	09:03 (104)
	21:58	21:32	66 20:56 (13) 20:38	19:35	12 19:08 (12) 17:34	10 08:12 (316) 17:00	24 09:27 (104)	
2	05:55	06:27	06:53 (184)	07:10	07:52	18:57 (12) 07:39	08:04 (316) 08:24	09:03 (104)
	21:58	21:31	68 20:56 (13) 20:36	19:33	9 19:06 (12) 17:32	7 08:11 (316) 16:59	24 09:27 (104)	
3	05:55	06:29	06:54 (184)	07:11	07:54	08:28 (158) 07:41	08:06 (316) 08:25	09:02 (104)
	21:58	21:29	67 20:55 (13) 20:34	19:31	12 19:04 (12) 17:31	4 08:10 (316) 16:59	26 09:28 (104)	
4	05:56	06:30	06:55 (184)	07:13	07:55	08:25 (158) 07:42	08:08 (316) 08:26	09:03 (104)
	21:57	21:28	66 20:55 (13) 20:31	19:29	13 08:38 (158) 17:29	1 08:09 (316) 16:58	26 09:29 (104)	
5	05:57	06:31	06:57 (184)	07:14	07:57	08:23 (158) 07:44	08:27	09:03 (104)
	21:57	21:26	66 20:56 (13) 20:29	19:27	15 08:38 (158) 17:28	16:58	26 09:29 (104)	
6	05:57	06:33	06:58 (184)	07:16	07:58	08:22 (158) 07:45	08:29	09:03 (104)
	21:57	21:25	65 20:55 (13) 20:27	19:25	18 08:40 (158) 17:26	16:58	27 09:30 (104)	
7	05:58	06:34	06:59 (184)	07:17	08:00	08:22 (158) 07:47	08:30	09:03 (104)
	21:56	21:23	62 20:54 (13) 20:25	19:22	17 08:39 (158) 17:25	16:58	27 09:30 (104)	
8	05:59	06:35	07:01 (184)	07:18	08:01	08:24 (158) 07:49	08:31	09:04 (104)
	21:56	21:22	60 20:54 (13) 20:23	19:20	16 08:40 (158) 17:23	16:57	26 09:30 (104)	
9	06:00	06:37	07:02 (184)	07:20	08:02	08:25 (158) 07:50	08:32	09:04 (104)
	21:55	21:20	57 20:52 (13) 20:21	19:18	14 08:39 (158) 17:22	16:57	27 09:31 (104)	
10	06:01	06:38	07:03 (184)	07:21	08:04	08:27 (158) 07:52	08:33	09:04 (104)
	21:55	21:18	52 20:50 (13) 20:19	19:16	13 08:40 (158) 17:20	16:57	27 09:31 (104)	
11	06:02	06:39	07:04 (105)	07:23	08:05	08:29 (158) 07:53	08:34	09:06 (104)
	21:54	21:17	50 20:49 (13) 20:17	19:14	10 08:39 (158) 17:19	16:57	27 09:33 (104)	
12	06:03	06:41	07:06 (105)	07:24	08:07	08:30 (158) 07:55	08:35	09:05 (104)
	21:53	21:15	45 20:48 (13) 20:15	19:12	8 08:38 (158) 17:18	16:57	27 09:32 (104)	
13	06:04	06:42	07:07 (105)	07:25	08:08	08:32 (158) 07:56	08:36	09:05 (104)
	21:53	21:13	41 20:46 (13) 20:13	19:10	5 08:37 (158) 17:16	16:57	28 09:33 (104)	
14	06:05	06:44	07:08 (105)	07:27	08:10	08:33 (158) 07:58	08:37	09:06 (104)
	21:52	21:12	36 20:44 (13) 20:11	19:08	2 08:35 (158) 17:15	16:57	27 09:33 (104)	
15	06:06	06:45	07:10 (105)	07:28	08:11	08:00	08:37	09:07 (104)
	21:51	21:10	30 20:43 (13) 20:09	19:06	17:14	16:57	27 09:34 (104)	
16	06:07	06:46	07:11 (105)	07:30	08:13	08:01	08:38	09:07 (104)
	21:50	21:08	21 20:40 (13) 20:06	19:04	17:13	16:57	28 09:35 (104)	
17	06:08	06:48	07:12 (105)	07:31	08:14	08:03	08:39	09:08 (104)
	21:50	21:06	14 07:26 (105) 20:04	19:03	17:12	16:58	27 09:35 (104)	
18	06:09	20:35 (13) 06:49	07:14 (105)	07:32	08:16	08:59 (316) 08:04	08:40	09:08 (104)
	21:49	8 20:43 (13) 21:04	11 07:25 (105) 20:02	19:01	9 09:08 (316) 17:10	16:58	27 09:35 (104)	
19	06:10	20:33 (13) 06:50	07:15 (105)	07:34	08:17	08:56 (316) 08:06	08:40	09:09 (104)
	21:48	13 20:46 (13) 21:03	7 07:22 (105) 20:00	11 19:15 (12) 18:57	15 09:11 (316) 17:09	16:58	27 09:36 (104)	
20	06:11	20:33 (13) 06:52	07:35	07:35	08:19	08:55 (316) 08:07	08:41	09:09 (104)
	21:47	15 20:48 (13) 21:01	19:58	15 19:16 (12) 18:55	18 09:13 (316) 17:08	16:59	27 09:36 (104)	
21	06:12	20:31 (13) 06:53	07:37	07:37	08:19	08:53 (316) 08:09	08:41	09:10 (104)
	21:46	18 20:49 (13) 20:59	19:56	18 19:17 (12) 18:53	20 09:13 (316) 17:07	16:59	27 09:37 (104)	
22	06:13	20:30 (13) 06:55	07:38	07:38	08:18	08:52 (316) 08:10	08:42	09:10 (104)
	21:45	20 20:50 (13) 20:57	19:54	20 19:18 (12) 18:51	22 09:14 (316) 17:06	3 09:13 (104) 17:00	27 09:37 (104)	
23	06:15	20:29 (13) 06:56	07:39	07:39	08:18	08:52 (316) 08:11	09:07 (104) 17:00	27 09:38 (104)
	21:44	22 20:51 (13) 20:55	19:52	22 19:18 (12) 18:49	23 09:15 (316) 17:06	10 09:17 (104) 17:00	27 09:38 (104)	
24	06:16	07:00 (184) 06:57	07:41	07:41	08:18	08:50 (316) 08:13	09:06 (104) 17:00	27 09:39 (104)
	21:42	30 20:52 (13) 20:53	19:50	23 19:19 (12) 18:48	25 09:15 (316) 17:05	14 09:20 (104) 17:01	27 09:38 (104)	
25	06:17	06:58 (184) 06:59	07:42	07:42	08:18	08:51 (316) 08:14	09:04 (104) 17:01	27 09:39 (104)
	21:41	35 20:52 (13) 20:51	19:47	24 19:19 (12) 18:46	25 09:16 (316) 17:04	17 09:21 (104) 17:01	27 09:39 (104)	
26	06:18	06:57 (184) 07:00	07:44	07:44	08:18	08:52 (316) 08:16	09:04 (104) 17:01	27 09:40 (104)
	21:40	39 20:53 (13) 20:49	19:45	24 19:18 (12) 18:44	23 09:15 (316) 17:03	18 09:22 (104) 17:02	27 09:39 (104)	
27	06:19	06:56 (184) 07:02	07:45	07:45	08:18	08:54 (316) 08:17	09:03 (104) 17:02	27 09:40 (104)
	21:39	43 20:54 (13) 20:47	19:43	23 19:17 (12) 18:42	21 09:15 (316) 17:02	20 09:23 (104) 17:03	28 09:40 (104)	
28	06:21	06:55 (184) 07:03	07:47	07:47	08:18	08:56 (316) 08:18	09:03 (104) 17:03	28 09:41 (104)
	21:38	54 20:55 (13) 20:46	19:41	20 19:14 (12) 18:41	19 09:15 (316) 17:02	22 09:25 (104) 17:04	27 09:40 (104)	
29	06:22	06:55 (184) 07:04	07:48	07:48	08:18	08:57 (316) 08:20	09:03 (104) 17:04	27 09:41 (104)
	21:36	59 20:55 (13) 20:44	19:39	17 19:12 (12) 18:39	17 09:14 (316) 17:01	22 09:25 (104) 17:04	27 09:40 (104)	
30	06:23	06:54 (184) 07:06	07:49	07:49	08:18	08:59 (316) 08:21	09:02 (104) 17:04	27 09:41 (104)
	21:35	62 20:55 (13) 20:42	19:37	15 19:10 (12) 18:37	15 09:14 (316) 17:00	24 09:26 (104) 17:05	28 09:41 (104)	
31	06:25	06:53 (184) 07:07	07:50	07:50	08:18	09:01 (316)	08:45	09:14 (104)
	21:34	65 20:55 (13) 20:40	19:35	13 09:14 (316)	17:06	27 09:41 (104)		
Potential sun hours	486	445	379	336	277	260		
Total, worst case	483	884	232	429	172	831		
Sun reduction	0.75	0.72	0.69	0.52	0.43	0.44		
Oper. time red.	0.98	0.98	0.98	0.98	0.98	0.98		
Wind dir. red.	0.67	0.65	0.64	0.70	0.71	0.71		
Total reduction	0.49	0.46	0.44	0.37	0.30	0.31		
Total, real	239	410	101	157	52	256		

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:11 AM / 23

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 4:44 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: J - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
662	334	353	412	609	964	791	576	697	906	1,119	1,195	8,618

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

	January	February	March	April	May	June	
1	08:45	09:27 (104) 08:23	07:35	07:58 (158) 07:32	06:34	06:57 (184) 05:55	
2	08:45	09:50 (104) 17:50	18:34	08:12 (158) 20:21	21:05	61 20:38 (13) 21:45	
3	08:45	09:28 (104) 08:21	08:45 (316) 07:33	07:56 (158) 07:30	06:32	06:55 (184) 05:55	
4	08:45	09:51 (104) 17:52	2 08:47 (316) 18:35	16 08:12 (158) 20:22	21:06	62 20:37 (13) 21:46	
5	08:45	09:29 (104) 08:20	08:44 (316) 07:31	07:54 (158) 07:28	06:31	06:54 (184) 05:54	
6	08:44	09:51 (104) 17:53	5 08:49 (316) 18:37	17 08:11 (158) 20:24	21:08	64 20:38 (13) 21:47	
7	08:44	09:30 (104) 08:18	08:42 (316) 07:29	07:52 (158) 07:26	06:29	06:52 (184) 05:53	
8	08:44	09:51 (104) 17:55	8 08:50 (316) 18:38	19 08:11 (158) 20:25	21:09	65 20:37 (13) 21:47	
9	08:44	09:30 (104) 08:17	08:41 (316) 07:27	07:52 (158) 07:24	06:27	06:51 (184) 05:53	
10	08:44	09:51 (104) 17:57	11 08:52 (316) 18:40	18 08:10 (158) 20:27	21:10	65 20:37 (13) 21:48	
11	08:44	09:31 (104) 08:15	08:39 (316) 07:25	07:53 (158) 07:21	06:26	06:49 (184) 05:52	
12	08:44	09:51 (104) 17:58	13 08:52 (316) 18:42	15 08:08 (158) 20:28	21:12	65 20:36 (13) 21:49	
13	08:44	09:32 (104) 08:14	08:38 (316) 07:23	07:55 (158) 07:19	06:24	06:48 (184) 05:52	
14	08:44	09:51 (104) 18:00	16 08:54 (316) 18:43	12 08:07 (158) 20:30	21:13	66 20:36 (13) 21:50	
15	08:43	09:33 (104) 08:12	08:36 (316) 08:21	08:57 (158) 07:17	06:23	06:46 (184) 05:51	
16	08:43	09:51 (104) 18:00	18 08:54 (316) 18:45	8 19:22 (12) 20:31	21:15	66 20:35 (13) 21:51	
17	08:43	09:34 (104) 08:11	08:34 (316) 08:19	19:16 (12) 07:15	06:21	06:45 (184) 05:51	
18	08:43	09:51 (104) 18:02	20 08:54 (316) 19:46	7 19:23 (12) 20:32	21:16	65 20:35 (13) 21:52	
19	08:43	09:35 (104) 08:09	08:33 (316) 08:17	19:14 (12) 07:13	06:20	06:44 (184) 05:51	
20	08:43	09:50 (104) 18:03	22 08:55 (316) 19:48	11 19:25 (12) 20:34	21:17	64 20:34 (13) 21:52	
21	08:42	09:37 (104) 08:08	08:31 (316) 08:15	19:12 (12) 07:11	06:18	06:45 (184) 05:51	
22	08:42	09:49 (104) 18:05	24 08:55 (316) 19:49	14 19:26 (12) 20:35	21:19	59 20:33 (13) 21:53	
23	08:42	09:39 (104) 08:06	08:29 (316) 08:13	19:11 (12) 07:09	06:17	06:45 (184) 05:50	
24	08:42	09:48 (104) 18:06	25 08:54 (316) 19:51	17 19:28 (12) 20:37	21:20	56 20:32 (13) 21:54	
25	08:41	08:04	08:29 (316) 08:11	19:11 (12) 07:07	06:15	06:45 (184) 05:50	
26	08:41	18:08	26 08:55 (316) 19:52	18 19:29 (12) 20:38	21:22	52 20:30 (13) 21:54	
27	08:41	08:03	08:29 (316) 08:09	19:10 (12) 07:05	06:14	06:46 (184) 05:50	
28	08:41	18:10	25 08:54 (316) 19:54	21 19:31 (12) 20:40	21:23	43 20:29 (13) 21:55	
29	08:40	08:01	08:29 (316) 08:07	19:10 (12) 07:03	06:13	06:47 (184) 05:50	
30	08:40	18:11	24 08:53 (316) 19:55	23 19:33 (12) 20:41	21:24	28 20:27 (13) 21:55	
31	08:39	07:59	08:30 (316) 08:05	19:10 (12) 07:01	06:11	06:48 (184) 05:50	
32	08:39	18:13	22 08:52 (316) 19:57	23 19:33 (12) 20:43	21:26	19 20:24 (13) 21:56	
33	08:38	07:58	08:32 (316) 08:03	19:10 (12) 07:00	06:10	06:49 (184) 05:50	
34	08:38	18:15	20 08:52 (316) 19:58	22 19:32 (12) 20:44	21:27	13 07:02 (184) 21:56	
35	08:38	07:56	08:33 (316) 08:01	19:11 (12) 06:58	06:09	06:50 (184) 05:50	
36	08:38	18:16	17 08:50 (316) 20:00	20 19:31 (12) 20:46	21:28	10 07:00 (184) 21:57	
37	08:37	07:54	08:34 (316) 07:59	19:11 (12) 06:56	06:08	06:53 (184) 05:50	
38	08:37	18:18	14 08:48 (316) 20:01	19 19:30 (12) 20:47	21:30	4 06:57 (184) 21:57	
39	08:36	07:52	08:37 (316) 07:57	19:12 (12) 06:54	06:07	06:57 (184) 05:50	
40	08:36	18:19	8 08:45 (316) 20:03	17 19:29 (12) 20:49	21:31	21:57	
41	08:35	07:50	07:55	19:13 (12) 06:52	07:14 (105)	06:05	05:50
42	08:35	18:21	20:04	13 19:26 (12) 20:50	3 07:17 (105)	21:32	21:58
43	08:34	07:49	07:53	19:17 (12) 06:50	07:12 (105)	06:04	05:50
44	08:34	18:23	20:06	5 19:22 (12) 20:52	18 20:27 (13)	21:33	21:58
45	08:33	07:47	07:50	06:48	07:11 (105)	06:03	05:51
46	08:33	18:24	20:07	20:53	26 20:29 (13)	21:35	21:58
47	08:32	07:45	08:07 (158) 07:48	06:46	07:09 (105)	06:02	05:51
48	08:32	18:26	1 08:08 (158) 20:09	20:54	32 20:30 (13)	21:36	21:58
49	08:31	07:43	08:06 (158) 07:46	06:45	07:07 (105)	06:01	05:51
50	08:31	18:27	4 08:10 (158) 20:10	20:56	37 20:31 (13)	21:37	21:58
51	08:30	07:41	08:04 (158) 07:44	06:43	07:05 (105)	06:00	05:52
52	08:30	18:29	7 08:11 (158) 20:12	20:57	42 20:32 (13)	21:38	21:59
53	08:29	07:39	08:02 (158) 07:42	06:41	07:04 (105)	05:59	05:52
54	08:29	18:31	10 08:12 (158) 20:13	20:59	47 20:34 (13)	21:39	21:59
55	08:28	07:37	08:00 (158) 07:40	06:39	07:02 (105)	05:58	05:52
56	08:28	18:32	12 08:12 (158) 20:15	21:00	51 20:35 (13)	21:40	21:59
57	08:26	07:38	07:38	06:37	07:00 (105)	05:58	05:53
58	08:25	18:45	20:16	21:02	55 20:36 (13)	21:41	21:58
59	08:25	07:36	07:36	06:36	06:59 (105)	05:57	05:53
60	08:25	18:47	20:18	21:03	58 20:38 (13)	21:43	21:58
61	08:24	07:34	07:34	07:34	05:56	05:56	05:56
62	08:24	18:49	20:19	21:04	21:44	21:44	21:58
63	Potential sun hours	273	285	368	410	471	481
64	Total, worst case	220	354	349	369	927	
65	Sun reduction	0.56	0.50	0.63	0.59	0.67	
66	Oper. time red.	0.98	0.98	0.98	0.98	0.98	
67	Wind dir. red.	0.70	0.72	0.66	0.65	0.64	
68	Total reduction	0.39	0.36	0.41	0.38	0.43	
69	Total, real	85	127	142	140	396	

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:11 AM / 24

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 4:44 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: J - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
662	334	353	412	609	964	791	576	697	906	1,119	1,195	8,618

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

	July	August	September	October	November	December										
1	05:54	06:26	06:56 (184)	07:09	07:51	18:51 (12)	07:38	08:02 (316)	08:22	09:20 (104)						
	21:58	21:32	57	20:43 (13)	20:38	19:35	17	19:08 (12)	17:34	22	08:24 (316)	17:00	11	09:31 (104)		
2	05:55	06:27	06:55 (184)	07:10	07:52	18:51 (12)	07:39	08:04 (316)	08:24	09:18 (104)						
	21:58	21:31	61	20:44 (13)	20:36	19:33	15	19:06 (12)	17:32	20	08:24 (316)	16:59	15	09:33 (104)		
3	05:55	06:29	06:55 (184)	07:11	07:54	18:52 (12)	07:41	08:06 (316)	08:25	09:17 (104)						
	21:58	21:29	63	20:44 (13)	20:33	19:31	12	19:04 (12)	17:31	18	08:24 (316)	16:59	17	09:34 (104)		
4	05:56	06:30	06:55 (184)	07:13	07:55	18:53 (12)	07:42	08:08 (316)	08:26	09:18 (104)						
	21:57	21:28	66	20:45 (13)	20:31	19:29	9	19:02 (12)	17:29	15	08:23 (316)	16:58	18	09:36 (104)		
5	05:57	06:31	06:57 (184)	07:14	07:57	18:54 (12)	07:44	08:09 (316)	08:27	09:17 (104)						
	21:57	21:26	65	20:46 (13)	20:29	19:27	5	18:59 (12)	17:28	13	08:22 (316)	16:58	19	09:36 (104)		
6	05:57	06:33	06:58 (184)	07:16	07:58	08:32 (158)	07:45	08:11 (316)	08:29	09:17 (104)						
	21:57	21:25	66	20:46 (13)	20:27	19:25	9	08:41 (158)	17:26	11	08:22 (316)	16:58	20	09:37 (104)		
7	05:58	06:34	06:59 (184)	07:17	08:00	08:29 (158)	07:47	08:13 (316)	08:30	09:17 (104)						
	21:56	21:23	66	20:46 (13)	20:25	19:22	14	08:43 (158)	17:25	8	08:21 (316)	16:58	21	09:38 (104)		
8	05:59	06:35	07:01 (184)	07:18	08:01	08:27 (158)	07:49	08:14 (316)	08:31	09:17 (104)						
	21:56	21:22	66	20:47 (13)	20:23	19:20	17	08:44 (158)	17:23	5	08:19 (316)	16:57	21	09:38 (104)		
9	06:00	06:37	07:02 (184)	07:20	08:02	08:26 (158)	07:50	08:16 (316)	08:32	09:17 (104)						
	21:55	21:20	64	20:47 (13)	20:21	19:18	18	08:44 (158)	17:22	1	08:17 (316)	16:57	22	09:39 (104)		
10	06:01	06:38	07:03 (184)	07:21	08:04	08:27 (158)	07:52	08:17 (316)	08:33	09:17 (104)						
	21:55	21:18	63	20:46 (13)	20:19	19:16	18	08:45 (158)	17:20			16:57	23	09:40 (104)		
11	06:02	06:39	07:04 (184)	07:23	08:05	08:29 (158)	07:53	08:18 (316)	08:34	09:18 (104)						
	21:54	21:17	62	20:46 (13)	20:17	19:14	17	08:46 (158)	17:19			16:57	23	09:41 (104)		
12	06:03	06:41	07:06 (184)	07:24	08:07	08:30 (158)	07:55	08:19 (316)	08:35	09:17 (104)						
	21:53	21:15	60	20:46 (13)	20:15	19:12	15	08:45 (158)	17:18			16:57	24	09:41 (104)		
13	06:04	06:42	07:07 (105)	07:25	08:08	08:32 (158)	07:56	08:21 (316)	08:36	09:18 (104)						
	21:53	21:13	58	20:45 (13)	20:13	19:10	13	08:45 (158)	17:16			16:57	24	09:42 (104)		
14	06:05	06:44	07:08 (105)	07:27	08:10	08:33 (158)	07:58	08:22 (316)	08:37	09:18 (104)						
	21:52	21:12	55	20:44 (13)	20:11	19:08	11	08:44 (158)	17:15			16:57	25	09:43 (104)		
15	06:06	06:45	07:10 (105)	07:28	08:11	08:35 (158)	08:00	08:24 (316)	08:37	09:18 (104)						
	21:51	21:10	51	20:43 (13)	20:09	19:06	9	08:44 (158)	17:14			16:57	25	09:43 (104)		
16	06:07	06:46	07:11 (105)	07:30	08:13	08:36 (158)	08:01	08:25 (316)	08:38	09:19 (104)						
	21:50	21:08	47	20:41 (13)	20:06	19:04	6	08:42 (158)	17:13			16:57	25	09:44 (104)		
17	06:08	06:48	07:12 (105)	07:31	08:14	08:38 (158)	08:03	08:27 (316)	08:39	09:20 (104)						
	21:50	21:06	41	20:39 (13)	20:04	19:03	3	08:41 (158)	17:12			16:58	25	09:45 (104)		
18	06:09	06:49	07:14 (105)	07:32	08:16	08:40	08:04	08:29 (316)	08:40	09:19 (104)						
	21:49	21:04	37	20:38 (13)	20:02	19:01		17:10	16:58	26	09:45 (104)					
19	06:10	06:50	07:15 (105)	07:34	08:17	08:41	08:06	08:30 (316)	08:40	09:20 (104)						
	21:48	21:03	31	20:36 (13)	20:00	18:57		17:09	16:58	26	09:46 (104)					
20	06:11	06:52	07:16 (105)	07:35	08:19	08:43	08:07	08:31 (316)	08:41	09:20 (104)						
	21:47	21:01	24	20:33 (13)	19:58	18:55		17:08	16:59	26	09:46 (104)					
21	06:12	06:53	07:18 (105)	07:37	08:20	08:44	08:09	08:33 (316)	08:41	09:21 (104)						
	21:46	20:59	16	20:32 (13)	19:56	18:53		17:07	16:59	26	09:47 (104)					
22	06:13	06:55	07:38	18:59 (12)	08:22	08:46	09:07 (316)	08:10	08:42	09:21 (104)						
	21:45	20:57	19:54	11	19:10 (12)	18:51	10	09:17 (316)	17:06	17:00	26	09:47 (104)				
23	06:15	06:56	07:39	18:57 (12)	08:24	08:48	09:04 (316)	08:11	08:42	09:22 (104)						
	21:44	20:55	19:52	15	19:12 (12)	18:49	15	09:19 (316)	17:06	17:00	26	09:48 (104)				
24	06:16	06:57	07:41	18:55 (12)	08:25	08:49	09:02 (316)	08:13	08:43	09:22 (104)						
	21:42	20:53	19:50	18	19:13 (12)	18:48	18	09:20 (316)	17:05	17:01	26	09:48 (104)				
25	06:17	07:02 (184)	06:59	07:42	18:53 (12)	08:27	09:01 (316)	08:14	08:43	09:23 (104)						
	21:41	7	07:09 (184)	20:51	19:47	21	19:14 (12)	18:46	21	09:22 (316)	17:04	17:01	26	09:49 (104)		
26	06:18	07:00 (184)	07:00	07:44	18:52 (12)	08:28	08:59 (316)	08:16	08:44	09:24 (104)						
	21:40	11	07:11 (184)	20:49	19:45	22	19:14 (12)	18:44	23	09:22 (316)	17:03	17:02	25	09:49 (104)		
27	06:19	06:59 (184)	07:02	07:45	18:52 (12)	08:30	08:59 (316)	08:17	08:44	09:24 (104)						
	21:39	14	07:13 (184)	20:47	19:43	22	19:14 (12)	18:42	24	09:23 (316)	17:02	17:03	25	09:49 (104)		
28	06:21	06:58 (184)	07:03	07:47	18:51 (12)	08:31	08:59 (316)	08:18	08:44	09:24 (104)						
	21:38	24	20:37 (13)	20:46	19:41	23	19:14 (12)	18:41	25	09:24 (316)	17:02	17:04	25	09:49 (104)		
29	06:22	06:57 (184)	07:04	07:48	18:51 (12)	08:33	08:57 (316)	08:20	08:44	09:25 (104)						
	21:36	38	20:39 (13)	20:44	19:39	21	19:12 (12)	18:39	27	09:24 (316)	17:01	17:04	25	09:50 (104)		
30	06:23	06:56 (184)	07:06	07:49	18:50 (12)	08:34	08:59 (316)	08:21	08:44	09:25 (104)						
	21:35	47	20:40 (13)	20:42	19:37	20	19:10 (12)	18:37	25	09:24 (316)	17:00	9	09:29 (104)	17:05	25	09:50 (104)
31	06:25	06:55 (184)	07:07	07:49	18:50 (12)	08:36	09:01 (316)	08:22	08:45	09:26 (104)						
	21:34	54	20:41 (13)	20:40	18:35	23	09:24 (316)	17:06	17:06	24	09:50 (104)					
Potential sun hours	486	445	379	336	277	260										
Total, worst case	195	119	173	419	122	715										
Sun reduction	0.75	0.72	0.69	0.52	0.43	0.44										
Oper. time red.	0.98	0.98	0.98	0.98	0.98	0.98										
Wind dir. red.	0.63	0.65	0.63	0.70	0.72	0.70										
Total reduction	0.47	0.46	0.43	0.36	0.31	0.31										
Total, real	91	518	75	152	38	218										

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:11 AM / 25

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 4:44 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: K - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
662	334	353	412	609	964	791	576	697	906	1,119	1,195	8,618

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

	January	February	March	April	May	June
1	08:44 08:22		07:35	18:02 (317) 07:32		06:34 05:55
	17:07 17:50		18:34	9 18:11 (317) 20:21		21:05 21:44
2	08:44 08:21		07:33	18:01 (317) 07:30		06:32 05:54
	17:08 17:52		18:35	11 18:12 (317) 20:22		21:06 21:45
3	08:44 08:20		07:31	18:01 (317) 07:27		06:30 05:54
	17:09 17:53		18:37	13 18:14 (317) 20:23		21:07 21:46
4	08:44 08:18		07:29	18:00 (317) 07:25		06:29 05:53
	17:10 17:55		18:38	15 18:15 (317) 20:25		21:09 21:47
5	08:44 08:17		07:27	18:00 (317) 07:23		06:27 05:53
	17:11 17:56		18:40	16 18:16 (317) 20:26		21:10 21:48
6	08:44 08:15		07:25	18:01 (317) 07:21		06:26 05:52
	17:12 17:58		18:41	15 18:16 (317) 20:28		21:12 21:49
7	08:44 08:14		07:23	18:02 (317) 07:19		06:24 05:52
	17:14 18:00		18:43	13 18:15 (317) 20:29		21:13 21:50
8	08:43 08:12		08:21	19:04 (317) 07:17		06:23 05:51
	17:15 18:00		18:45	8 19:12 (317) 20:31		21:15 21:51
9	08:43 08:11		08:19	07:15		06:21 05:51
	17:16 18:01		19:46	20:32		21:51 21:10
10	08:43 08:09		08:17	07:13		06:20 05:51
	17:17 18:03		19:48	20:34		21:52 21:10
11	08:42 08:08		08:15	07:11		06:18 05:50
	17:19 18:05		19:49	20:35		21:53 21:10
12	08:42 08:06		08:13	07:09		06:17 05:50
	17:20 18:06		19:51	20:37		21:54 21:11
13	08:41 08:04		08:11	07:07	20:13 (24) 06:15	05:50 20:40 (26)
	17:21 18:08		19:52	20:38	1 20:14 (24) 21:21	21:54 21:11 (26)
14	08:40 08:03		08:09	07:05	20:10 (24) 06:14	05:50 20:40 (26)
	17:23 18:10		19:54	20:40	6 20:16 (24) 21:23	21:55 21:11 (26)
15	08:40 08:01		08:07	07:03	20:09 (24) 06:13	05:50 20:40 (26)
	17:24 18:11		19:55	20:41	8 20:17 (24) 21:24	11 20:57 (26) 21:55
16	08:39 07:59		08:05	07:01	20:07 (24) 06:11	20:44 (26) 05:50
	17:25 18:13		19:57	20:43	11 20:18 (24) 21:26	15 20:59 (26) 21:56
17	08:38 07:57		08:03	06:59	20:06 (24) 06:10	20:42 (26) 05:50
	17:27 18:14		19:58	20:44	14 20:20 (24) 21:27	17 20:59 (26) 21:56
18	08:38 07:56		08:01	06:57	20:06 (24) 06:09	20:41 (26) 05:50
	17:28 18:16		20:00	20:46	16 20:22 (24) 21:28	20 21:01 (26) 21:57
19	08:37 07:54		07:59	06:56	20:06 (24) 06:08	20:40 (26) 05:50
	17:30 18:18		20:01	20:47	17 20:23 (24) 21:29	22 21:02 (26) 21:57
20	08:36 07:52		07:57	06:54	20:06 (24) 06:06	20:39 (26) 05:50
	17:31 18:19		20:03	20:48	18 20:24 (24) 21:31	24 21:03 (26) 21:57
21	08:35 07:50		07:55	06:52	20:05 (24) 06:05	20:39 (26) 05:50
	17:33 18:21		20:04	20:50	20 20:25 (24) 21:32	25 21:04 (26) 21:58
22	08:34 07:48		07:52	06:50	20:05 (24) 06:04	20:38 (26) 05:50
	17:34 18:22		20:06	20:51	19 20:24 (24) 21:33	27 21:05 (26) 21:58
23	08:33 07:47		07:50	06:48	20:06 (24) 06:03	20:38 (26) 05:50
	17:36 18:24		20:07	20:53	17 20:23 (24) 21:34	28 21:06 (26) 21:58
24	08:32 07:45		07:48	06:46	20:07 (24) 06:02	20:37 (26) 05:51
	17:37 18:26		20:09	20:54	16 20:23 (24) 21:36	29 21:06 (26) 21:58
25	08:31 07:43		07:46	06:44	20:08 (24) 06:01	20:37 (26) 05:51
	17:39 18:27		20:10	20:56	13 20:21 (24) 21:37	29 21:06 (26) 21:58
26	08:30 07:41	18:04 (317) 07:44	06:43	20:10 (24) 06:00	20:37 (26) 05:51	20:43 (26)
	17:40 18:29	1 18:05 (317) 20:12	20:57	9 20:19 (24) 21:38	30 21:07 (26) 21:58	31 21:14 (26)
27	08:29 07:39	18:03 (317) 07:42	06:41	05:59	20:37 (26) 05:52	20:43 (26)
	17:42 18:30	4 18:07 (317) 20:13	20:59	21:39	31 21:08 (26) 21:58	30 21:13 (26)
28	08:27 07:37	18:02 (317) 07:40	06:39	05:58	20:37 (26) 05:52	20:43 (26)
	17:44 18:32	6 18:08 (317) 20:15	21:00	21:40	31 21:08 (26) 21:58	31 21:14 (26)
29	08:26 07:38		07:38	06:37	05:57	20:37 (26) 05:53
	17:45 18:34		20:16	21:02	31 21:08 (26) 21:58	31 21:14 (26)
30	08:25 07:36		07:36	06:36	05:57	20:36 (26) 05:53
	17:47 18:36		20:18	21:03	32 21:08 (26) 21:58	31 21:15 (26)
31	08:24 07:48		07:34	05:56	20:37 (26) 05:56	20:44 (26)
	17:48 18:38		20:19	21:43	32 21:09 (26) 21:58	31 21:15 (26)
Potential sun hours	273	285	368	410	471	481
Total, worst case		11	100	185	434	938
Sun reduction		0.50	0.63	0.59	0.67	0.70
Oper. time red.		0.98	0.98	0.98	0.98	0.98
Wind dir. red.		0.61	0.61	0.69	0.72	0.72
Total reduction		0.30	0.38	0.40	0.47	0.49
Total, real		3	38	74	205	462

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:11 AM / 26

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 4:44 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: K - Participating**

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [BISMARCK]
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
4.92 5.13 7.45 8.03 10.20 11.21 11.69 10.35 8.68 5.69 4.02 3.69

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
662 334 353 412 609 964 791 576 697 906 1,119 1,195 8,618
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December		
1	05:54	20:43 (26)	06:26	07:08	07:51	07:37	08:22	
	21:58	31 21:14 (26)	21:32	20:37	19:35	17:34	17:00	
2	05:55	20:44 (26)	06:27	07:10	07:52	07:39	08:24	
	21:58	31 21:15 (26)	21:31	20:35	19:33	17:32	16:59	
3	05:55	20:43 (26)	06:28	07:11	07:54	07:41	08:25	
	21:58	32 21:15 (26)	21:29	20:33	19:31	17:30	16:59	
4	05:56	20:44 (26)	06:30	07:13	07:55	07:42	08:26	
	21:57	31 21:15 (26)	21:28	20:31	19:29	17:29	16:58	
5	05:57	20:44 (26)	06:31	07:14	07:56	18:44 (317)	07:44	08:27
	21:57	32 21:16 (26)	21:26	20:29	19:26	3 18:47 (317)	17:27	16:58
6	05:57	20:43 (26)	06:32	07:15	07:58	18:40 (317)	07:45	08:28
	21:57	32 21:15 (26)	21:25	20:27	19:24	11 18:51 (317)	17:26	16:58
7	05:58	20:44 (26)	06:34	07:17	07:59	18:38 (317)	07:47	08:30
	21:56	32 21:16 (26)	21:23	20:25	19:22	13 18:51 (317)	17:24	16:57
8	05:59	20:44 (26)	06:35	07:18	08:01	18:37 (317)	07:48	08:31
	21:56	32 21:16 (26)	21:21	20:23	19:20	16 18:53 (317)	17:23	16:57
9	06:00	20:45 (26)	06:36	07:20	08:02	18:35 (317)	07:50	08:32
	21:55	32 21:17 (26)	21:20	20:21	19:18	16 18:51 (317)	17:22	16:57
10	06:01	20:45 (26)	06:38	07:21	08:04	18:35 (317)	07:52	08:33
	21:55	32 21:17 (26)	21:18	20:19	19:16	14 18:49 (317)	17:20	16:57
11	06:02	20:45 (26)	06:39	07:22	08:05	18:34 (317)	07:53	08:34
	21:54	32 21:17 (26)	21:17	20:17	19:14	12 18:46 (317)	17:19	16:57
12	06:02	20:44 (26)	06:41	07:24	08:07	18:35 (317)	07:55	08:35
	21:53	32 21:16 (26)	21:15	20:15	19:12	10 18:45 (317)	17:17	16:57
13	06:03	20:45 (26)	06:42	07:25	08:08	18:34 (317)	07:56	08:36
	21:53	31 21:16 (26)	21:13	20:13	19:10	8 18:42 (317)	17:16	16:57
14	06:04	20:45 (26)	06:43	07:27	08:10	18:35 (317)	07:58	08:36
	21:52	31 21:16 (26)	21:11	20:11	19:08	6 18:41 (317)	17:15	16:57
15	06:05	20:45 (26)	06:45	07:28	08:11	18:37 (317)	07:59	08:37
	21:51	31 21:16 (26)	21:10	20:08	19:06	2 18:39 (317)	17:14	16:57
16	06:07	20:46 (26)	06:46	20:20 (24)	07:29	08:13	08:01	08:38
	21:50	30 21:16 (26)	21:08	2 20:22 (24)	20:06	19:04	17:13	16:57
17	06:08	20:46 (26)	06:48	20:16 (24)	07:31	08:14	08:02	08:39
	21:49	30 21:16 (26)	21:06	10 20:26 (24)	20:04	19:02	17:11	16:57
18	06:09	20:46 (26)	06:49	20:13 (24)	07:32	08:16	08:04	08:39
	21:48	30 21:16 (26)	21:04	14 20:27 (24)	20:02	19:00	17:10	16:58
19	06:10	20:47 (26)	06:50	20:13 (24)	07:34	08:17	08:05	08:40
	21:48	29 21:16 (26)	21:03	16 20:29 (24)	20:00	18:57	17:09	16:58
20	06:11	20:47 (26)	06:52	20:11 (24)	07:35	08:19	08:07	08:41
	21:47	28 21:15 (26)	21:01	18 20:29 (24)	19:58	18:55	17:08	16:59
21	06:12	20:48 (26)	06:53	20:10 (24)	07:36	08:20	08:08	08:41
	21:46	27 21:15 (26)	20:59	19 20:29 (24)	19:56	18:53	17:07	16:59
22	06:13	20:49 (26)	06:55	20:10 (24)	07:38	08:22	08:10	08:42
	21:44	26 21:15 (26)	20:57	20 20:30 (24)	19:54	18:51	17:06	16:59
23	06:14	20:50 (26)	06:56	20:09 (24)	07:39	08:23	08:11	08:42
	21:43	24 21:14 (26)	20:55	19 20:28 (24)	19:52	18:49	17:05	17:00
24	06:16	20:50 (26)	06:57	20:09 (24)	07:41	08:25	08:13	08:43
	21:42	23 21:13 (26)	20:53	17 20:26 (24)	19:49	18:47	17:04	17:01
25	06:17	20:51 (26)	06:59	20:09 (24)	07:42	08:27	08:14	08:43
	21:41	21 21:12 (26)	20:51	16 20:25 (24)	19:47	18:46	17:04	17:01
26	06:18	20:52 (26)	07:00	20:09 (24)	07:44	08:28	08:16	08:43
	21:40	19 21:11 (26)	20:49	13 20:22 (24)	19:45	18:44	17:03	17:02
27	06:19	20:53 (26)	07:02	20:09 (24)	07:45	08:30	08:17	08:44
	21:39	16 21:09 (26)	20:47	11 20:20 (24)	19:43	18:42	17:02	17:03
28	06:21	20:56 (26)	07:03	20:11 (24)	07:46	08:31	08:18	08:44
	21:37	13 21:09 (26)	20:45	8 20:19 (24)	19:41	18:40	17:01	17:03
29	06:22	20:58 (26)	07:04	20:11 (24)	07:48	08:33	08:20	08:44
	21:36	8 21:06 (26)	20:43	6 20:17 (24)	19:39	18:39	17:01	17:04
30	06:23	07:06	07:06	20:13 (24)	07:49	08:34	08:21	08:44
	21:35	06:24	20:41	1 20:14 (24)	19:37	18:37	17:00	17:05
31	06:24	07:07	07:07			08:36	08:24	08:44
	21:33	06:24	20:39			18:35	17:06	17:06
Potential sun hours	486	445		379	336		277	260
Total, worst case	798		190		111			
Sun reduction	0.75		0.72		0.52			
Oper. time red.	0.98		0.98		0.98			
Wind dir. red.	0.72		0.69		0.61			
Total reduction	0.53		0.49		0.31			
Total, real	419		93		35			

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:11 AM / 27

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 4:44 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: L - Participating**

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [BISMARCK]
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
4.92 5.13 7.45 8.03 10.20 11.21 11.69 10.35 8.68 5.69 4.02 3.69

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
662 334 353 412 609 964 791 576 697 906 1,119 1,195 8,618
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1 08:45	09:17 (13) 08:23		07:35	08:02 (15) 07:32	06:34	05:55
17:07	33 09:50 (13) 17:50		18:34	27 08:29 (15) 20:21	21:05	23 06:58 (14)
2 08:45	09:18 (13) 08:21		07:33	08:02 (15) 07:30	06:32	05:55
17:08	33 09:51 (13) 17:52		18:35	27 08:29 (15) 20:22	21:06	22 06:58 (14)
3 08:45	09:18 (13) 08:20		07:31	08:02 (15) 07:28	06:31	05:54
17:09	34 09:52 (13) 17:53		18:37	26 08:28 (15) 20:24	21:08	21 06:57 (14)
4 08:45	09:19 (13) 08:18		07:30	08:02 (15) 07:26	06:29	05:53
17:10	33 09:52 (13) 17:55		18:39	26 08:28 (15) 20:25	21:09	21 06:58 (14)
5 08:44	09:19 (13) 08:17		07:28	08:03 (15) 07:24	06:27	05:53
17:11	34 09:53 (13) 17:57		18:40	24 08:27 (15) 20:27	21:11	20 06:57 (14)
6 08:44	09:19 (13) 08:16		07:26	08:03 (15) 07:22	06:26	05:52
17:13	34 09:53 (13) 17:58		18:42	23 08:26 (15) 20:28	21:12	19 06:57 (14)
7 08:44	09:20 (13) 08:14		07:24	08:04 (15) 07:20	06:24	05:52
17:14	34 09:54 (13) 18:00		18:43	20 08:24 (15) 20:30	21:13	18 06:56 (14)
8 08:44	09:20 (13) 08:13		08:22	09:06 (15) 07:17	06:23	05:52
17:15	34 09:54 (13) 18:00		18:45	16 09:22 (15) 20:31	21:15	17 06:56 (14)
9 08:43	09:21 (13) 08:11		08:19	09:08 (15) 07:15	06:21	05:51
17:16	34 09:55 (13) 18:02		19:46	11 09:19 (15) 20:33	21:16	3 06:48 (14) 21:52
10 08:43	09:21 (13) 08:09		08:17	07:13	06:20	06:43 (14) 05:51
17:17	34 09:55 (13) 18:03		19:48	20:34	21:18	8 06:51 (14) 21:52
11 08:42	09:22 (13) 08:08		08:15	07:11	06:18	06:42 (14) 05:51
17:19	34 09:56 (13) 18:05		19:49	20:36	21:19	11 06:53 (14) 21:53
12 08:42	09:22 (13) 08:06		08:13	07:09	06:17	06:41 (14) 05:50
17:20	33 09:55 (13) 18:07		19:51	20:37	21:20	13 06:54 (14) 21:54
13 08:41	09:23 (13) 08:05		08:11	07:07	06:15	06:39 (14) 05:50
17:21	33 09:56 (13) 18:08		19:52	20:38	21:22	16 06:55 (14) 21:54
14 08:41	09:23 (13) 08:03		08:09	07:05	06:14	06:38 (14) 05:50
17:23	33 09:56 (13) 18:10		19:54	20:40	21:23	18 06:56 (14) 21:55
15 08:40	09:23 (13) 08:01		08:07	07:04	06:13	06:37 (14) 05:50
17:24	33 09:56 (13) 18:11		19:55	20:41	21:24	20 06:57 (14) 21:56
16 08:39	09:24 (13) 07:59		08:05	07:02	06:11	06:36 (14) 05:50
17:26	32 09:56 (13) 18:13		19:57	20:43	21:26	22 06:58 (14) 21:56
17 08:39	09:24 (13) 07:58		08:03	07:00	06:10	06:35 (14) 05:50
17:27	32 09:56 (13) 18:15		19:58	20:44	21:27	23 06:58 (14) 21:56
18 08:38	09:25 (13) 07:56		08:01	06:58	06:09	06:33 (14) 05:50
17:28	31 09:56 (13) 18:16		20:00	20:46	21:28	25 06:58 (14) 21:57
19 08:37	09:25 (13) 07:54		07:59	06:56	06:08	06:32 (14) 05:50
17:30	31 09:56 (13) 18:18		20:01	20:47	21:30	26 06:58 (14) 21:57
20 08:36	09:27 (13) 07:52		08:15 (15) 07:57	06:54	06:07	06:32 (14) 05:50
17:31	30 09:57 (13) 18:19		20:03	20:49	21:31	26 06:58 (14) 21:58
21 08:35	09:27 (13) 07:51		08:13 (15) 07:55	06:52	06:05	06:32 (14) 05:50
17:33	28 09:55 (13) 18:21		20:04	20:50	21:32	27 06:59 (14) 21:58
22 08:34	09:28 (13) 07:49		08:11 (15) 07:53	06:50	06:04	06:32 (14) 05:50
17:34	27 09:55 (13) 18:23		20:06	20:52	21:33	27 06:59 (14) 21:58
23 08:33	09:29 (13) 07:47		08:09 (15) 07:51	06:48	06:03	06:32 (14) 05:51
17:36	26 09:55 (13) 18:24		20:07	20:53	21:35	27 06:59 (14) 21:58
24 08:32	09:31 (13) 07:45		08:08 (15) 07:48	06:46	06:02	06:32 (14) 05:51
17:37	23 09:54 (13) 18:26		20:09	20:55	21:36	27 06:59 (14) 21:58
25 08:31	09:32 (13) 07:43		08:06 (15) 07:46	06:45	06:01	06:32 (14) 05:51
17:39	21 09:53 (13) 18:27		20:10	20:56	21:37	27 06:59 (14) 21:59
26 08:30	09:34 (13) 07:41		08:04 (15) 07:44	06:43	06:00	06:33 (14) 05:52
17:41	18 09:52 (13) 18:29		20:12	20:58	21:38	26 06:59 (14) 21:59
27 08:29	09:37 (13) 07:39		08:02 (15) 07:42	06:41	05:59	06:33 (14) 05:52
17:42	13 09:50 (13) 18:31		20:13	20:59	21:39	26 06:59 (14) 21:59
28 08:28	09:40 (13) 07:37		08:02 (15) 07:40	06:39	05:58	06:33 (14) 05:52
17:44	7 09:47 (13) 18:32		20:15	21:00	21:40	26 06:59 (14) 21:59
29 08:26			07:38	06:37	05:58	06:33 (14) 05:53
17:45			20:16	21:02	21:42	25 06:58 (14) 21:59
30 08:25			07:36	06:36	05:57	06:34 (14) 05:54
17:47			20:18	21:03	21:43	25 06:59 (14) 21:58
31 08:24			07:34		05:56	06:34 (14)
17:49			20:19		21:44	24 06:58 (14)
Potential sun hours	273	284	368	410	471	481
Total, worst case	822	163	200	498	506	0.70
Sun reduction	0.56	0.50	0.63	0.98	0.98	0.98
Oper. time red.	0.98	0.98	0.98	0.60	0.60	0.59
Wind dir. red.	0.71	0.70	0.70	0.40	0.41	0.41
Total reduction	0.39	0.35	0.44	0.40	0.41	0.41
Total, real	323	58	88	200	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	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
--------------	------------------	-----------------	----------------------	---------------------------------	--------------------------------	----------------------------------	---------------------------------

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:11 AM / 28

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 4:44 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor:** L - Participating

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
662	334	353	412	609	964	791	576	697	906	1,119	1,195	8,618

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

July	August	September	October	November	December	
1 05:54	06:21 (303) 06:26	06:52 (14) 07:09	07:51	07:38	08:23	
21:58	17 06:59 (14) 21:32	13 07:05 (14) 20:38	19:35	17:34	17:00 34 09:38 (13)	
2 05:55	06:22 (303) 06:27	06:53 (14) 07:10	07:52	07:39	08:24	
21:58	17 07:00 (14) 21:31	10 07:03 (14) 20:36	19:33	17:32	16:59 34 09:38 (13)	
3 05:55	06:23 (303) 06:29	06:54 (14) 07:12	07:54	07:41	08:25	
21:58	17 07:01 (14) 21:29	6 07:00 (14) 20:34	19:31	17:31	16:59 34 09:38 (13)	
4 05:56	06:44 (14) 06:30	07:13	07:55	08:47 (15) 07:42	08:26	
21:58	17 07:01 (14) 21:28	20:32	19:29	7 08:54 (15) 17:29	16:59 34 09:39 (13)	
5 05:57	06:44 (14) 06:31	07:14	07:57	08:44 (15) 07:44	08:27	
21:57	18 07:02 (14) 21:26	20:30	19:27	14 08:58 (15) 17:28	16:58 34 09:39 (13)	
6 05:58	06:44 (14) 06:33	07:16	07:58	08:41 (15) 07:46	08:29	
21:57	19 07:03 (14) 21:25	20:27	19:25	18 08:59 (15) 17:26	16:58 34 09:39 (13)	
7 05:58	06:43 (14) 06:34	07:17	08:00	08:40 (15) 07:47	08:30	
21:56	20 07:03 (14) 21:23	20:25	19:23	21 09:01 (15) 17:25	16:58 33 09:39 (13)	
8 05:59	06:43 (14) 06:35	07:19	08:01	08:38 (15) 07:49	08:31	
21:56	21 07:04 (14) 21:22	20:23	19:21	23 09:01 (15) 17:23	16:57 33 09:39 (13)	
9 06:00	06:43 (14) 06:37	07:20	08:03	08:37 (15) 07:50	08:32	
21:55	22 07:05 (14) 21:20	20:21	19:18	25 09:02 (15) 17:22	16:57 34 09:41 (13)	
10 06:01	06:43 (14) 06:38	07:21	08:04	08:36 (15) 07:52	08:33	
21:55	22 07:05 (14) 21:18	20:19	19:16	26 09:02 (15) 17:20	16:57 33 09:41 (13)	
11 06:02	06:43 (14) 06:39	07:23	08:06	08:36 (15) 07:53	08:34	
21:54	23 07:06 (14) 21:17	20:17	19:14	27 09:03 (15) 17:19	16:57 33 09:41 (13)	
12 06:03	06:43 (14) 06:41	07:24	08:07	08:35 (15) 07:55	08:35	
21:54	24 07:07 (14) 21:15	20:15	19:12	27 09:02 (15) 17:18	16:57 33 09:42 (13)	
13 06:04	06:43 (14) 06:42	07:25	08:08	08:35 (15) 07:57	08:36	
21:53	24 07:07 (14) 21:13	20:13	19:10	27 09:02 (15) 17:16	16:57 33 09:41 (13)	
14 06:05	06:42 (14) 06:44	07:27	08:10	08:34 (15) 07:58	08:37	
21:52	25 07:07 (14) 21:12	20:11	19:08	27 09:01 (15) 17:15	8 09:20 (13) 16:57 33 09:42 (13)	
15 06:06	06:42 (14) 06:45	07:28	08:11	08:35 (15) 08:00	09:09 (13) 08:37	
21:51	25 07:07 (14) 21:10	20:09	19:07	26 09:01 (15) 17:14	14 09:23 (13) 16:57 32 09:42 (13)	
16 06:07	06:42 (14) 06:46	07:30	08:13	08:36 (15) 08:01	09:07 (13) 08:38	
21:51	25 07:07 (14) 21:08	20:07	19:05	24 09:00 (15) 17:13	18 09:25 (13) 16:57 32 09:43 (13)	
17 06:08	06:41 (14) 06:48	07:31	08:14	08:38 (15) 08:03	09:06 (13) 08:39	
21:50	27 07:08 (14) 21:06	20:04	19:03	21 08:59 (15) 17:12	21 09:27 (13) 16:58 32 09:43 (13)	
18 06:09	06:41 (14) 06:49	07:32	08:16	08:40 (15) 08:04	09:05 (13) 08:40	
21:49	27 07:08 (14) 21:05	20:02	19:01	19 08:59 (15) 17:11	23 09:28 (13) 16:58 32 09:43 (13)	
19 06:10	06:42 (14) 06:51	07:34	08:18	08:41 (15) 08:06	09:04 (13) 08:40	
21:48	27 07:09 (14) 21:03	20:00	18:57	16 08:57 (15) 17:09	26 09:30 (13) 16:58 32 09:44 (13)	
20 06:11	06:42 (14) 06:52	07:35	08:19	08:43 (15) 08:07	09:03 (13) 08:41	
21:47	27 07:09 (14) 21:01	19:58	18:55	12 08:55 (15) 17:08	27 09:30 (13) 16:59 32 09:45 (13)	
21 06:12	06:42 (14) 06:53	07:37	08:21	08:44 (15) 08:09	09:03 (13) 08:42	
21:46	27 07:09 (14) 20:59	19:56	18:53	8 08:52 (15) 17:07	28 09:31 (13) 16:59 32 09:45 (13)	
22 06:13	06:42 (14) 06:55	07:38	08:22	08:10	09:03 (13) 08:42	
21:45	27 07:09 (14) 20:57	19:54	18:51	17:06	30 09:33 (13) 17:00 32 09:46 (13)	
23 06:15	06:42 (14) 06:56	07:40	08:24	08:12	09:03 (13) 08:43	
21:44	27 07:09 (14) 20:55	19:52	18:49	17:06	30 09:33 (13) 17:00 32 09:46 (13)	
24 06:16	06:42 (14) 06:58	07:41	08:25	08:13	09:03 (13) 08:43	
21:43	27 07:09 (14) 20:53	19:50	18:48	17:05	31 09:34 (13) 17:01 32 09:46 (13)	
25 06:17	06:43 (14) 06:59	07:42	08:27	08:14	09:02 (13) 08:43	
21:41	25 07:08 (14) 20:51	19:48	18:46	17:04	32 09:34 (13) 17:01 32 09:47 (13)	
26 06:18	06:44 (14) 07:00	07:44	08:28	08:16	09:03 (13) 08:44	
21:40	24 07:08 (14) 20:50	19:45	18:44	17:03	32 09:35 (13) 17:02 32 09:47 (13)	
27 06:20	06:46 (14) 07:02	07:45	08:30	08:17	09:02 (13) 08:44	
21:39	22 07:08 (14) 20:48	19:43	18:42	17:02	33 09:35 (13) 17:03 33 09:48 (13)	
28 06:21	06:47 (14) 07:03	07:47	08:31	08:19	09:03 (13) 08:44	
21:38	21 07:08 (14) 20:46	19:41	18:41	17:02	33 09:36 (13) 17:04 32 09:48 (13)	
29 06:22	06:48 (14) 07:05	07:48	08:33	08:20	09:03 (13) 08:44	
21:36	19 07:07 (14) 20:44	19:39	18:39	17:01	33 09:36 (13) 17:04 33 09:49 (13)	
30 06:23	06:49 (14) 07:06	07:49	08:35	08:21	09:03 (13) 08:45	
21:35	17 07:06 (14) 20:42	19:37	18:37	17:00	34 09:37 (13) 17:05 33 09:49 (13)	
31 06:25	06:50 (14) 07:07	07:50	08:36	08:23	09:04 (13) 08:45	
21:34	15 07:05 (14) 20:40	18:36	18:36	17:06	33 09:50 (13)	
Potential sun hours	486	445	379	336	277	260
Total, worst case	695	29	368	453	1017	
Sun reduction	0.75	0.72	0.52	0.43	0.44	
Oper. time red.	0.98	0.98	0.98	0.98	0.98	
Wind dir. red.	0.60	0.60	0.70	0.71	0.71	
Total reduction	0.44	0.43	0.37	0.31	0.31	
Total, real	309	12	135	139	315	

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:11 AM / 29

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 4:44 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor:** M - Participating

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [BISMARCK]
 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 4.92 5.13 7.45 8.03 10.20 11.21 11.69 10.35 8.68 5.69 4.02 3.69

Operational time
 N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
 662 334 353 412 609 964 791 576 697 906 1,119 1,195 8,618
 Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December	
1	08:45 17:07	08:22 17:50	07:35 18:34	07:32 20:21	06:34 21:05	07:00 (34) 21:44	05:55 21:58	05:54 21:32		07:08 20:37	07:51 19:35	07:37 17:34	08:22 17:00
2	08:45 17:08	08:21 17:52	07:33 18:35	07:30 20:22	06:32 21:06	07:00 (34) 21:45	05:54 21:58	05:54 21:31		07:10 20:35	07:52 19:33	07:39 17:32	08:24 16:59
3	08:44 17:09	08:20 17:53	07:31 18:37	07:27 20:23	06:30 21:07	07:01 (34) 21:46	05:55 21:58	05:55 21:29		07:11 20:33	07:54 19:31	07:41 17:30	08:25 16:59
4	08:44 17:10	08:18 17:55	07:29 18:38	07:25 20:25	06:29 21:09	07:02 (34) 21:47	05:53 21:57	05:56 21:28		07:13 20:31	07:55 19:28	07:42 17:29	08:26 16:58
5	08:44 17:11	08:17 17:56	07:27 18:40	07:23 20:26	06:27 21:10	07:03 (34) 21:48	05:53 21:57	05:56 21:26		07:14 20:29	07:56 19:26	07:44 17:27	08:27 16:58
6	08:44 17:12	08:15 17:58	07:25 18:41	07:21 20:28	06:26 21:12	07:12 (34) 21:49	05:52 21:57	05:57 21:25		06:32 20:27	07:15 19:24	07:45 17:26	08:28 16:58
7	08:44 17:13	08:14 18:00	07:23 18:43	07:19 20:29	06:24 21:13	07:15 (34) 21:50	05:52 21:56	05:58 21:23	07:15 (34) 20:25	07:17 19:22	07:59 18:22	07:47 17:24	08:30 16:57
8	08:43 17:15	08:12 18:00	08:21 18:44	07:17 20:31	06:22 21:15	07:12 (34) 21:51	05:59 21:56	05:55 21:22	07:12 (34) 20:23	07:18 19:20	08:01 17:23	07:48 16:57	08:31 16:57
9	08:43 17:16	08:11 18:01	08:19 19:46	07:15 20:32	06:21 21:16	08:11 (34) 21:52	05:51 21:55	06:00 21:20	07:11 (34) 20:21	07:20 19:18	08:02 17:21	07:50 16:57	08:32 16:57
10	08:43 17:17	08:09 18:03	08:17 19:48	07:13 20:34	06:19 21:17	08:09 (34) 21:52	05:51 21:55	06:38 21:18	07:10 (34) 20:19	07:21 19:16	08:04 17:20	07:52 16:57	08:33 16:57
11	08:42 17:18	08:08 18:05	08:15 19:49	07:11 20:35	06:18 21:19	08:15 (34) 21:53	05:50 21:54	06:39 21:17	07:08 (34) 20:17	07:22 19:14	08:05 17:19	07:53 16:57	08:34 16:57
12	08:42 17:20	08:06 18:06	08:13 19:51	07:09 20:37	06:17 21:20	08:06 (34) 21:54	05:50 21:53	06:41 21:15	07:08 (34) 20:15	07:24 19:12	08:07 17:17	07:55 16:57	08:35 16:57
13	08:41 17:21	08:04 18:08	08:11 19:52	07:07 20:38	06:15 21:22	08:11 (34) 21:54	05:50 21:53	06:42 21:13	07:07 (34) 20:13	07:25 19:10	08:08 17:16	07:56 16:57	08:36 16:57
14	08:40 17:22	08:03 18:09	08:09 19:54	07:05 20:40	06:14 21:23	08:04 (34) 21:55	05:50 21:52	06:43 21:11	07:08 (34) 20:11	07:27 19:08	08:10 17:15	07:58 16:57	08:36 16:57
15	08:40 17:24	08:01 18:11	08:07 19:55	07:03 20:41	06:12 21:24	08:05 (34) 21:55	05:50 21:51	06:45 21:10	07:09 (34) 20:08	07:28 19:06	08:11 17:14	07:59 16:57	08:37 16:57
16	08:39 17:25	07:59 18:13	08:05 19:57	07:01 20:43	06:11 21:26	08:06 (34) 21:56	05:49 21:50	06:46 21:08	07:11 (34) 20:06	07:29 19:04	08:13 17:12	08:01 16:57	08:38 16:57
17	08:38 17:27	07:57 18:14	08:03 19:58	06:59 20:44	06:10 21:27	08:03 (34) 21:56	05:49 21:49	06:47 21:06	07:12 (34) 20:04	07:31 19:02	08:14 17:11	08:02 16:57	08:39 16:57
18	08:38 17:28	07:56 18:16	08:01 20:00	06:57 20:46	06:09 21:28	08:09 (34) 21:57	05:50 21:49	06:49 21:04	07:13 (34) 20:02	07:32 19:00	08:16 17:10	08:04 16:58	08:40 16:58
19	08:37 17:30	07:54 18:18	07:59 20:01	06:55 20:47	06:07 21:29	08:07 (34) 21:57	05:50 21:48	06:50 21:03	07:15 (34) 20:00	07:34 18:57	08:17 17:09	08:05 16:58	08:40 16:58
20	08:36 17:31	07:52 18:19	07:57 20:03	06:54 20:48	06:06 21:31	08:07 (34) 21:57	05:50 21:47	06:52 21:01	07:16 (34) 19:58	07:35 18:55	08:19 17:08	08:07 16:58	08:41 16:58
21	08:35 17:33	07:50 18:21	07:54 20:04	06:52 20:50	06:05 21:32	08:08 (34) 21:58	05:50 21:46	06:53 20:59	07:17 (34) 19:56	07:36 18:53	08:20 17:07	08:08 16:59	08:41 16:59
22	08:34 17:34	07:48 18:22	07:52 20:06	06:50 20:51	06:04 21:33	08:12 (34) 21:58	05:50 21:45	06:54 20:57	07:19 (34) 19:54	07:38 18:51	08:22 17:06	08:10 16:59	08:42 16:59
23	08:33 17:36	07:47 18:24	07:50 20:07	06:48 20:53	06:03 21:34	08:13 (34) 21:58	05:50 21:43	06:56 20:55	07:20 (34) 19:52	07:39 18:49	08:23 17:05	08:11 17:00	08:42 17:00
24	08:32 17:37	07:45 18:26	07:48 20:09	06:46 20:54	06:02 21:36	08:14 (34) 21:58	05:51 21:42	06:57 20:53	07:21 (34) 19:49	07:41 18:47	08:25 17:04	08:13 17:00	08:43 17:00
25	08:31 17:39	07:43 18:27	07:46 20:10	06:44 20:56	06:01 21:37	08:15 (34) 21:58	05:51 21:41	06:59 20:51	07:22 (34) 19:47	07:42 18:46	08:27 17:04	08:14 17:01	08:43 17:01
26	08:30 17:40	07:41 18:29	07:44 20:12	06:43 20:57	06:00 21:38	08:16 (34) 21:58	05:51 21:40	07:00 20:49	07:23 (34) 19:45	07:44 18:44	08:28 17:03	08:16 17:02	08:44 17:02
27	08:29 17:42	07:39 18:30	07:42 20:13	06:41 20:59	05:59 21:39	08:17 (34) 21:58	05:52 21:39	07:01 20:47	07:24 (34) 19:43	07:45 18:42	08:30 17:02	08:17 17:02	08:44 17:02
28	08:27 17:43	07:37 18:32	07:40 20:15	06:39 21:00	05:58 21:40	08:18 (34) 21:58	05:52 21:37	07:03 20:45	07:25 (34) 19:41	07:46 18:40	08:31 17:01	08:18 17:03	08:44 17:03
29	08:26 17:45	07:38 20:16	07:38 21:02	06:37 21:02	05:57 21:41	08:19 (34) 21:58	05:53 21:36	07:04 20:43	07:26 (34) 19:39	07:48 18:39	08:33 17:01	08:20 17:04	08:44 17:04
30	08:25 17:47	07:36 20:18	07:36 21:03	06:35 21:03	05:57 21:42	08:20 (34) 21:58	05:53 21:35	07:06 20:41	07:27 (34) 19:37	07:49 18:37	08:34 17:00	08:21 17:05	08:44 17:05
31	08:24 17:48	07:34 20:19	07:34 21:00	06:34 21:00	05:56 21:43	08:21 (34) 21:58	05:56 21:33	07:07 20:39	07:28 (34) 19:36	08:36 18:35	08:34 17:06	08:44 17:06	08:44 17:06
Potential sun hours	273	284	368	410	471	481	486	445	379	336	277	260	
Total, worst case				110	70			185					
Sun reduction				0.59	0.67			0.72					
Oper. time red.				0.98	0.98			0.98					
Wind dir. red.				0.61	0.61			0.61					
Total reduction				0.35	0.40			0.43					
Total, real				39	28			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)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:11 AM / 30

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 4:44 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: O - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
662	334	353	412	609	964	791	576	697	906	1,119	1,195	8,618

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

	January	February	March	April	May	June
1 08:45	08:23	08:55 (20)	07:35	07:58 (22)	07:32	06:34
17:07	17:50	24 09:19 (20)	18:34	19 08:17 (22)	20:21	21:05
2 08:45	08:21	08:55 (20)	07:33	07:56 (22)	07:30	06:32
17:08	17:52	24 09:19 (20)	18:35	21 08:17 (22)	20:22	21:06
3 08:45	08:20	08:56 (20)	07:32	07:56 (22)	07:28	06:31
17:09	17:53	23 09:19 (20)	18:37	20 08:16 (22)	20:24	21:08
4 08:45	08:19	08:56 (20)	07:30	07:56 (22)	07:26	06:29
17:10	17:55	22 09:18 (20)	18:39	20 08:16 (22)	20:25	21:09
5 08:44	08:17	08:57 (20)	07:28	07:57 (22)	07:24	06:27
17:11	17:57	21 09:18 (20)	18:40	17 08:14 (22)	20:27	21:11
6 08:44	08:16	08:58 (20)	07:26	07:58 (22)	07:22	06:26
17:13	17:58	19 09:17 (20)	18:42	15 08:13 (22)	20:28	21:12
7 08:44	08:14	09:00 (20)	07:24	08:00 (22)	07:19	06:24
17:14	18:00	16 09:16 (20)	18:43	11 08:11 (22)	20:30	21:13
8 08:44	08:13	09:01 (20)	08:22	07:17	07:17	06:23
17:15	18:00	13 09:14 (20)	18:45	20:31	21:15	26 07:12 (98)
9 08:43	08:11	09:05 (20)	08:20	07:15	06:21	06:46 (98)
17:16	18:02	6 09:11 (20)	19:46	20:33	21:16	26 07:12 (98)
10 08:43	08:09	08:17	08:17	07:13	06:20	06:45 (98)
17:17	18:03	19:48	20:34	21:18	26 07:11 (98)	21:53
11 08:42	08:08	08:15	07:11	06:18	06:46 (98)	05:50
17:19	18:05	19:49	20:36	21:19	25 07:11 (98)	21:53
12 08:42	08:06	08:13	07:09	06:17	06:47 (98)	05:50
17:20	18:06	19:51	20:37	21:20	24 07:11 (98)	21:54
13 08:41	08:05	08:11	07:07	06:15	06:47 (98)	05:50
17:21	18:08	19:52	20:38	21:22	22 07:09 (98)	21:55
14 08:41	08:03	08:09	07:05	06:14	06:48 (98)	05:50
17:23	18:10	19:54	20:40	21:23	21 07:09 (98)	21:55
15 08:40	08:01	08:07	07:03	06:13	06:49 (98)	05:50
17:24	18:11	19:55	20:41	21:25	20 07:09 (98)	21:56
16 08:39	07:59	08:05	07:02	06:11	06:36 (99)	05:50
17:25	18:13	19:57	20:43	21:26	21 07:08 (98)	21:56
17 08:39	07:58	08:03	07:00	06:10	06:35 (99)	05:50
17:27	18:15	19:58	20:44	21:27	21 07:07 (98)	21:57
18 08:38	07:56	08:01	06:58	06:09	06:33 (99)	05:50
17:28	18:16	20:00	20:46	21:28	20 07:05 (98)	21:57
19 08:37	09:03 (20)	07:54	07:59	06:08	06:32 (99)	05:50
17:30	5 09:08 (20)	18:18	20:01	20:47	21:30	17 07:03 (98)
20 08:36	09:02 (20)	07:52	07:57	06:06	06:31 (99)	05:50
17:31	8 09:10 (20)	18:19	20:03	20:49	21:31	9 06:40 (99)
21 08:35	09:01 (20)	07:51	07:55	06:05	06:30 (99)	05:50
17:33	11 09:12 (20)	18:21	20:04	20:50	21:32	11 06:41 (99)
22 08:34	09:00 (20)	07:49	07:53	06:04	06:29 (99)	05:50
17:34	14 09:14 (20)	18:23	20:06	20:52	21:34	12 06:41 (99)
23 08:33	08:58 (20)	07:47	07:51	06:48	06:03	06:28 (99)
17:36	16 09:14 (20)	18:24	3 08:13 (22)	20:07	20:53	13 06:41 (99)
24 08:32	08:57 (20)	07:45	08:08 (22)	07:48	06:02	06:27 (99)
17:37	18 09:15 (20)	18:26	7 08:15 (22)	20:09	20:55	14 06:41 (99)
25 08:31	08:56 (20)	07:43	08:06 (22)	07:46	06:45	06:01
17:39	20 09:16 (20)	18:27	10 08:16 (22)	20:10	20:56	15 06:41 (99)
26 08:30	08:55 (20)	07:41	08:04 (22)	07:44	06:43	06:00
17:41	22 09:17 (20)	18:29	13 08:17 (22)	20:12	20:58	16 06:42 (99)
27 08:29	08:55 (20)	07:39	08:02 (22)	07:42	06:41	05:59
17:42	23 09:18 (20)	18:31	15 08:17 (22)	20:13	20:59	16 06:41 (99)
28 08:28	08:54 (20)	07:37	08:00 (22)	07:40	06:39	07:02 (98)
17:44	24 09:18 (20)	18:32	17 08:17 (22)	20:15	21:00	5 07:07 (98)
29 08:27	08:54 (20)		07:38	06:37	07:00 (98)	05:58
17:45	25 09:19 (20)		20:16	21:02	8 07:08 (98)	21:42
30 08:25	08:55 (20)		07:36	06:36	06:59 (98)	05:57
17:47	24 09:19 (20)		20:18	21:03	11 07:10 (98)	21:43
31 08:24	08:54 (20)		07:34			05:56
17:48	25 09:19 (20)		20:19			21:44
Potential sun hours	273	284	368	410	472	482
Total, worst case	235	233	123	24	578	96
Sun reduction	0.56	0.50	0.63	0.59	0.67	0.70
Oper. time red.	0.98	0.98	0.98	0.98	0.98	0.98
Wind dir. red.	0.72	0.71	0.70	0.61	0.60	0.59
Total reduction	0.40	0.36	0.44	0.36	0.40	0.41
Total, real	94	84	54	9	233	40

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:11 AM / 31

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 4:44 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: O - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
662	334	353	412	609	964	791	576	697	906	1,119	1,195	8,618

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

	July	August	September	October	November	December
1	05:54	06:26	06:57 (98)	07:09	07:51	07:38
	21:58	21:32	20:38	19:35	17:34	17:00
2	05:55	06:27	06:56 (98)	07:10	07:52	07:39
	21:58	21:31	20:36	19:33	17:32	8 08:41 (20) 16:59
3	05:55	06:29	06:56 (98)	07:11	07:54	07:41
	21:58	21:29	20:34	19:31	17:31	13 08:44 (20) 16:59
4	05:56	06:36 (99)	06:30	06:55 (98)	07:13	07:55
	21:58	5 06:41 (99)	21:28	20:32	19:29	16 08:46 (20) 16:58
5	05:57	06:35 (99)	06:31	06:57 (98)	07:14	07:57
	21:57	8 06:43 (99)	21:26	20:30	19:27	17:28
6	05:57	06:35 (99)	06:33	06:58 (98)	07:16	07:58
	21:57	9 06:44 (99)	21:25	20:27	19:25	8 08:37 (22) 07:46
7	05:58	06:34 (99)	06:34	06:59 (98)	07:17	08:00
	21:56	10 06:44 (99)	21:23	20:25	19:23	13 08:45 (22) 17:26
8	05:59	06:33 (99)	06:35	07:01 (98)	07:18	08:01
	21:56	12 06:45 (99)	21:22	20:23	19:21	17 08:48 (22) 17:25
9	06:00	06:33 (99)	06:37	07:02 (98)	07:20	08:03
	21:55	13 06:46 (99)	21:20	20:21	19:18	19 08:49 (22) 17:23
10	06:01	06:33 (99)	06:38	07:03 (98)	07:21	08:04
	21:55	14 06:47 (99)	21:19	20:19	19:16	20 08:50 (22) 17:22
11	06:02	06:33 (99)	06:39	07:04 (98)	07:23	08:06
	21:54	15 06:48 (99)	21:17	20:17	19:14	21 08:50 (22) 17:20
12	06:03	06:33 (99)	06:41	07:06 (98)	07:24	08:07
	21:54	16 06:49 (99)	21:15	20:15	19:12	22 08:51 (22) 17:19
13	06:04	06:31 (99)	06:42	07:07 (98)	07:25	08:09
	21:53	17 06:48 (99)	21:13	20:13	19:10	23 08:52 (22) 17:18
14	06:05	06:31 (99)	06:44	07:08 (98)	07:27	08:10
	21:52	18 06:49 (99)	21:12	20:11	19:08	24 08:53 (22) 17:17
15	06:06	06:32 (99)	06:45	07:10 (98)	07:28	08:12
	21:51	17 06:49 (99)	21:10	20:09	19:06	25 08:54 (22) 17:16
16	06:07	06:33 (99)	06:46	07:30	08:13	08:26 (20) 08:34
	21:51	17 06:50 (99)	21:08	20:07	19:05	26 08:55 (22) 17:15
17	06:08	06:34 (99)	06:48	07:31	08:15	08:27 (20) 08:35
	21:50	16 06:50 (99)	21:06	20:04	19:03	27 08:56 (22) 17:14
18	06:09	06:35 (99)	06:49	07:32	08:16	08:28 (20) 08:36
	21:49	15 06:50 (99)	21:05	20:02	19:01	28 08:57 (22) 17:13
19	06:10	06:36 (99)	06:50	07:34	08:18	08:29 (20) 08:37
	21:48	14 06:50 (99)	21:03	20:00	18:57	29 08:58 (22) 17:12
20	06:11	06:38 (99)	06:52	07:35	08:19	08:30 (20) 08:38
	21:47	14 06:52 (99)	21:01	19:58	18:55	30 08:59 (22) 17:11
21	06:12	06:39 (99)	06:53	07:37	08:21	08:31 (20) 08:39
	21:46	12 06:51 (99)	20:59	19:56	18:53	31 08:59 (22) 17:10
22	06:13	06:40 (99)	06:55	07:38	08:22	08:32 (20) 08:40
	21:45	11 06:51 (99)	20:57	19:54	18:51	32 08:59 (22) 17:09
23	06:15	06:41 (99)	06:56	07:40	08:24	08:33 (20) 08:41
	21:44	10 06:51 (99)	20:55	19:52	18:49	33 08:59 (22) 17:08
24	06:16	06:42 (99)	06:57	07:41	08:25	08:34 (20) 08:42
	21:43	15 07:12 (98)	20:53	19:50	18:48	34 08:59 (22) 17:07
25	06:17	06:43 (99)	06:59	07:42	08:27	08:35 (20) 08:43
	21:41	18 07:14 (98)	20:51	19:48	18:46	35 08:59 (22) 17:06
26	06:18	06:44 (99)	07:00	07:44	08:28	08:36 (20) 08:44
	21:40	21 07:16 (98)	20:50	19:45	18:44	36 08:59 (22) 17:05
27	06:19	06:46 (99)	07:02	07:45	08:30	08:37 (20) 08:45
	21:39	21 07:18 (98)	20:48	19:43	18:42	37 08:59 (22) 17:04
28	06:21	06:47 (99)	07:03	07:47	08:31	08:38 (20) 08:46
	21:38	21 07:19 (98)	20:46	19:41	18:41	38 08:59 (22) 17:03
29	06:22	06:50 (98)	07:04	07:48	08:33	08:39 (20) 08:47
	21:36	20 07:19 (98)	20:44	19:39	18:39	39 08:59 (22) 17:02
30	06:23	06:58 (98)	07:06	07:49	08:35	08:40 (20) 08:48
	21:35	22 07:20 (98)	20:42	19:37	18:37	40 08:59 (22) 17:01
31	06:25	06:57 (98)	07:07	07:51	08:36	08:41 (20) 08:49
	21:34	23 07:20 (98)	20:40	19:35	18:35	41 08:59 (22) 17:00
Potential sun hours	486	445	379	336	277	260
Total, worst case	424	279	195	152	105	88
Sun reduction	0.75	0.72	0.52	0.43	0.31	0.26
Oper. time red.	0.98	0.98	0.98	0.98	0.98	0.98
Wind dir. red.	0.60	0.61	0.70	0.72	0.72	0.72
Total reduction	0.44	0.44	0.36	0.31	0.26	0.22
Total, real	188	122	71	127	172	172

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:11 AM / 32

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 4:44 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor:** Q - Non-Participating

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
662	334	353	412	609	964	791	576	697	906	1,119	1,195	8,618

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

	January	February	March	April	May	June	July	August	September	October	November	December	
1	08:44 17:07	08:22 17:50	07:35 18:33	07:31 20:20	06:34 21:04	05:55 21:44	05:54 21:58	06:25 21:32	07:08 20:37	07:51 19:35	18:50 (180) 19:07 (180)	07:37 17:33	08:22 16:59
2	08:44 17:08	08:21 17:51	07:33 18:35	07:29 20:22	06:32 21:06	05:54 21:45	05:54 21:58	06:27 21:31	07:10 20:35	07:52 19:32	18:50 (180) 19:06 (180)	07:39 17:32	08:24 16:59
3	08:44 17:09	08:20 17:53	07:31 18:37	07:27 20:23	06:30 21:07	05:53 21:46	05:55 21:58	06:28 21:29	07:11 20:33	07:53 19:30	18:50 (180) 19:03 (180)	07:41 17:30	08:25 16:58
4	08:44 17:10	08:18 17:55	07:29 18:38	07:25 20:25	06:29 21:09	05:53 21:47	05:55 21:57	06:29 21:28	07:12 20:31	07:55 19:28	18:50 (180) 19:01 (180)	07:42 17:29	08:26 16:58
5	08:44 17:11	08:17 17:56	07:27 18:40	07:23 20:26	06:27 21:10	05:52 21:48	05:56 21:57	06:31 21:26	07:14 20:29	07:56 19:26	18:50 (180) 18:59 (180)	07:44 17:27	08:27 16:58
6	08:44 17:12	08:15 17:58	07:25 18:41	18:17 (180) 20:28	06:25 21:12	05:52 21:49	05:57 21:57	06:32 21:25	07:15 20:27	07:58 19:24	18:51 (180) 18:57 (180)	07:45 17:26	08:28 16:57
7	08:44 17:13	08:14 17:59	07:23 18:43	18:15 (180) 20:29	06:24 21:13	05:51 21:50	05:58 21:56	06:33 21:23	07:17 20:25	07:59 19:22	18:52 (180) 18:55 (180)	07:47 17:24	08:29 16:57
8	08:43 17:14	08:12 18:01	08:21 18:44	19:14 (180) 20:31	06:22 21:14	05:51 21:51	05:59 21:56	06:35 21:21	07:18 20:23	08:01 19:20	18:55 (180)	07:48 17:23	08:31 16:57
9	08:43 17:16	08:11 18:01	08:19 19:46	19:13 (180) 20:32	06:21 21:16	05:51 21:51	05:59 21:55	06:36 21:20	07:19 20:21	08:02 19:18	18:51 (180)	07:50 17:21	08:32 16:57
10	08:43 17:17	08:09 18:03	08:17 19:47	19:12 (180) 20:34	06:19 21:17	05:50 21:52	06:00 21:51	06:38 21:18	07:21 20:19	08:04 19:16	18:52 (180)	07:52 17:20	08:33 16:57
11	08:42 17:18	08:07 18:04	08:15 19:49	19:12 (180) 20:35	06:18 21:19	05:50 21:53	06:01 21:54	06:39 21:17	07:22 20:17	08:05 19:14	18:53 (180)	07:53 17:19	08:34 16:56
12	08:42 17:19	08:06 18:06	08:13 19:50	19:12 (180) 20:37	06:16 21:20	05:50 21:54	06:02 21:53	06:40 21:15	07:24 20:15	08:07 19:12	18:54 (180)	07:55 17:17	08:35 16:56
13	08:41 17:21	08:04 18:08	08:11 19:52	19:12 (180) 20:38	06:15 21:21	05:50 21:54	06:03 21:53	06:42 21:13	07:25 20:12	08:08 19:10	18:55 (180)	07:56 17:16	08:36 16:56
14	08:40 17:22	08:03 18:09	08:09 19:53	19:12 (180) 20:40	06:14 21:23	05:49 21:55	06:04 21:52	06:43 21:11	07:26 20:10	08:10 19:08	18:56 (180)	07:58 17:15	08:36 16:57
15	08:40 17:24	08:01 18:11	08:07 19:55	19:13 (180) 20:41	06:12 21:24	05:49 21:55	06:05 21:51	06:44 21:10	07:28 20:08	08:11 19:06	18:57 (180)	07:59 17:13	08:37 16:57
16	08:39 17:25	07:59 18:13	08:05 19:57	19:15 (180) 20:43	06:11 21:25	05:49 21:56	06:06 21:50	06:46 21:08	07:29 20:06	08:13 19:04	18:58 (180)	08:01 17:12	08:38 16:57
17	08:38 17:26	07:57 18:14	08:03 19:58	19:17 (180) 20:44	06:10 21:27	05:49 21:56	06:07 21:49	06:47 21:06	07:31 20:04	08:14 19:02	18:59 (180)	08:02 17:11	08:39 16:57
18	08:37 17:28	07:56 18:16	08:01 20:00	19:20 (180) 20:45	06:08 21:28	05:49 21:57	06:08 21:48	06:49 21:04	07:32 20:02	08:16 19:00	19:00 (180)	08:04 17:10	08:39 16:57
19	08:37 17:29	07:54 18:17	07:59 20:01	06:55 20:47	06:07 21:29	05:49 21:57	06:09 21:48	06:50 21:02	07:33 20:00	08:17 18:56	19:01 (180)	08:05 17:09	08:40 16:58
20	08:36 17:31	07:52 18:19	07:56 20:03	06:53 20:48	06:06 21:31	05:49 21:57	06:11 21:47	06:51 21:01	07:35 19:58	08:19 18:55	19:02 (180)	08:07 17:08	08:41 16:58
21	08:35 17:32	07:50 18:21	07:54 20:04	06:52 20:50	06:05 21:32	05:50 21:58	06:12 21:46	06:53 20:59	07:36 19:56	08:20 18:53	19:03 (180)	08:08 17:07	08:41 16:59
22	08:34 17:34	07:48 18:22	07:52 20:06	06:50 20:51	06:04 21:33	05:50 21:58	06:13 21:44	06:54 20:57	07:38 19:53	08:22 18:51	19:04 (180)	08:10 17:06	08:42 16:59
23	08:33 17:35	07:46 18:24	07:50 20:07	06:48 20:53	06:03 21:34	05:50 21:58	06:14 21:43	06:56 20:55	07:39 19:51	08:23 18:49	19:05 (180)	08:11 17:05	08:42 17:00
24	08:32 17:37	07:45 18:25	07:48 20:09	06:46 20:54	06:02 21:36	05:50 21:58	06:15 21:42	06:57 20:53	07:41 19:49	08:25 18:47	19:06 (180)	08:13 17:04	08:43 17:00
25	08:31 17:38	07:43 18:27	07:46 20:10	06:44 20:56	06:01 21:37	05:51 21:58	06:16 21:41	06:58 20:51	07:42 19:47	08:26 18:45	19:07 (180)	08:14 17:03	08:43 17:01
26	08:30 17:40	07:41 18:29	07:44 20:11	06:42 20:57	06:00 21:38	05:51 21:58	06:18 21:40	07:00 20:49	07:43 19:45	08:28 18:44	19:08 (180)	08:16 17:03	08:43 17:01
27	08:29 17:42	07:39 18:30	07:42 20:13	06:41 20:59	05:59 21:39	05:51 21:58	06:19 21:39	07:01 20:47	07:45 19:43	08:30 18:42	19:09 (180)	08:17 17:02	08:44 17:02
28	08:27 17:43	07:37 18:32	07:40 20:14	06:39 21:00	05:58 21:40	05:52 21:58	06:20 21:37	07:03 20:45	07:46 19:41	08:31 18:40	19:10 (180)	08:18 17:01	08:44 17:03
29	08:26 17:45	07:38 18:25	07:38 20:16	06:37 21:02	05:57 21:41	05:52 21:58	06:22 21:36	07:04 20:43	07:48 19:39	08:33 18:38	19:11 (180)	08:20 17:00	08:44 17:04
30	08:25 17:46	07:36 18:17	07:36 20:17	06:35 21:03	05:56 21:42	05:53 21:58	06:23 21:35	07:05 20:41	07:49 19:37	08:34 18:37	19:12 (180)	08:21 17:00	08:44 17:05
31	08:24 17:48	07:33 18:08	07:33 20:19	06:33 21:03	05:55 21:43	05:53 21:58	06:24 21:33	07:07 20:39	07:47 19:35	08:36 18:35	19:13 (180)	08:22 17:00	08:44 17:06
Potential sun hours	273	284	368	410	472	482	486	445	379	336	277	260	
Total, worst case			125						55		75		
Sun reduction			0.63						0.69		0.52		
Oper. time red.			0.98						0.98		0.98		
Wind dir. red.			0.63						0.63		0.63		
Total reduction			0.39						0.42		0.32		
Total, real			49						23		24		

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

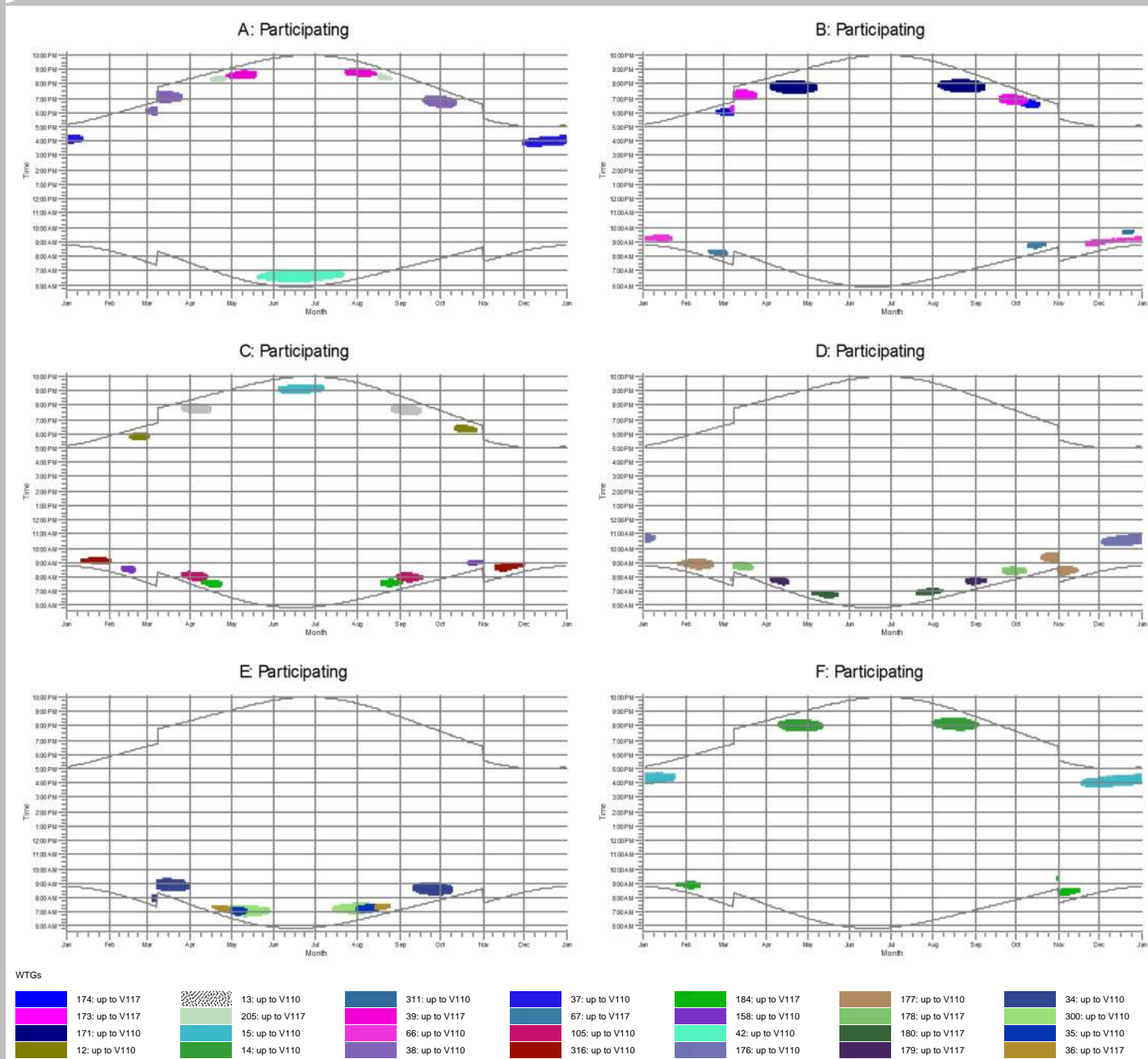
10/2/2015 10:11 AM / 33

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 4:44 PM/2.9.285

SHADOW - Calendar, graphical

Calculation: A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab



Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

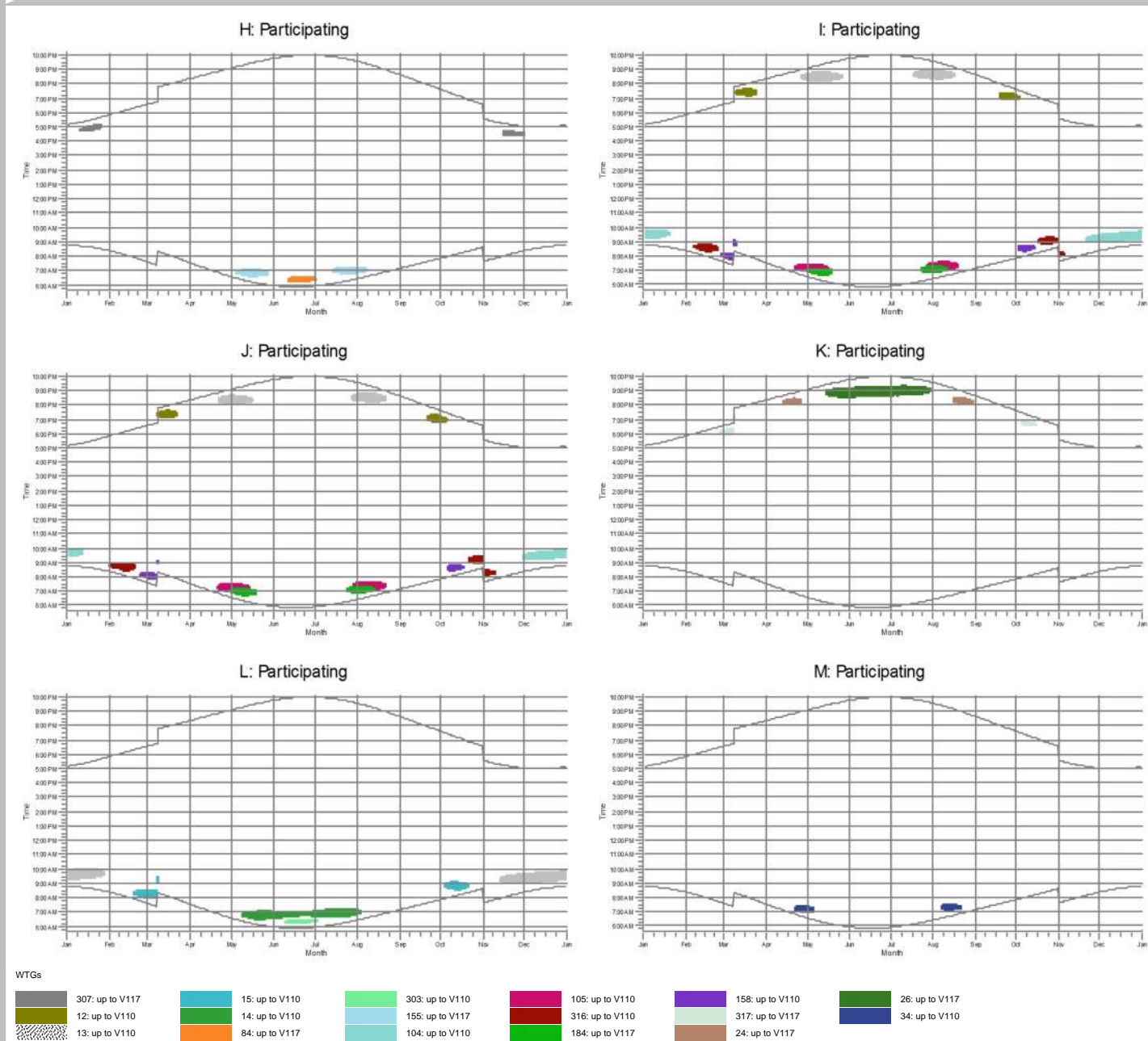
10/2/2015 10:11 AM / 34

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 4:44 PM/2.9.285

SHADOW - Calendar, graphical

Calculation: A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab



Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:11 AM / 35

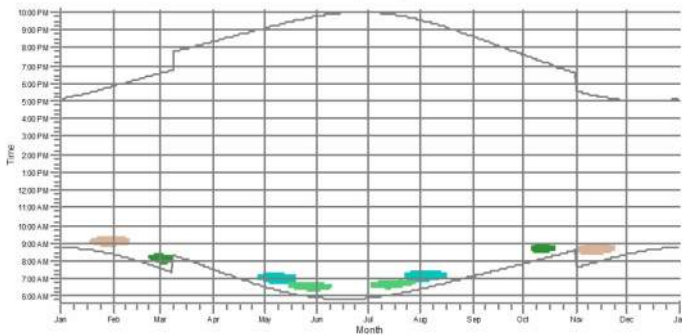
Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 4:44 PM/2.9.285

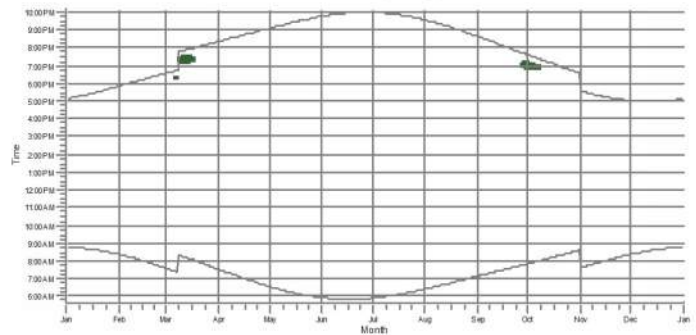
SHADOW - Calendar, graphical

Calculation: A059 V117/V110 Realistic Flicker w/Out Obstacles DNV Tab

O: Participating



Q: Non-Participating



WTGs



Appendix L: windPRO V110 Shadow Flicker Report, No Obstacles

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:25 AM / 1

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 10:00 PM/2.9.285

SHADOW - Main Result

Calculation: A059 V110 Realistic Flicker w/Out Obstacles DNV Tab

Assumptions for shadow calculations

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

Sunshine probability S (Average daily sunshine hours) [BISMARCK]
 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 4.92 5.13 7.45 8.03 10.20 11.21 11.69 10.35 8.68 5.69 4.02 3.69

Operational hours are calculated from WTGs in calculation and wind distribution:

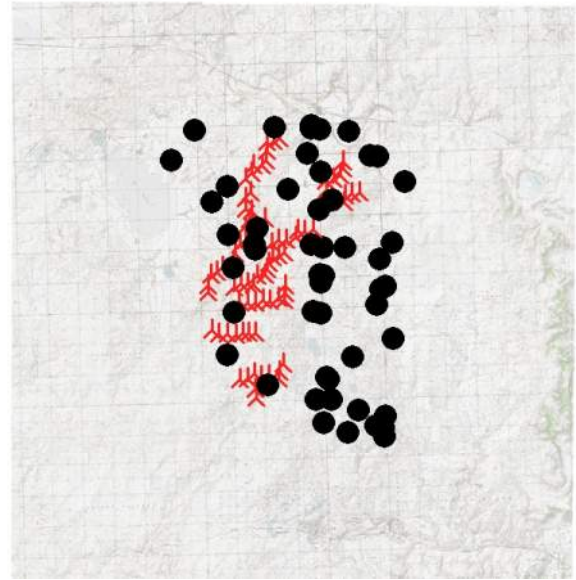
DNV Shadow

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
660	333	352	411	608	961	789	574	695	904	1,116	1,191	8,594

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: 20100616_Lindahl_10ft_HCL.wpo (1)
 Obstacles not used in calculation
 Eye height: 1.5 m
 Grid resolution: 10.0 m



⤴ New WTG

Scale 1:400,000
 📍 Shadow receptor

WTGs

UTM NAD83 Zone: 13			Row data/Description	WTG type							
East	North	Z [m]		Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	RPM [RPM]	
5	646,913	5,375,455	745.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
6	646,888	5,375,080	743.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
12	648,327	5,377,151	750.2 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
13	648,563	5,377,579	749.6 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
14	648,872	5,378,572	753.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
15	648,872	5,377,853	752.9 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
18	649,189	5,379,368	749.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
20	648,867	5,380,033	744.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
22	649,124	5,380,328	729.3 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
24	651,007	5,377,868	749.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
26	651,525	5,378,000	751.5 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
27	651,616	5,378,348	758.6 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
28	651,987	5,378,290	755.5 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
29	652,436	5,378,405	749.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
34	654,047	5,379,834	743.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
35	654,478	5,380,290	740.5 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
36	654,876	5,380,346	731.4 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
37	649,468	5,369,552	735.9 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
38	649,403	5,370,046	745.2 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
39	648,989	5,370,563	740.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
40	649,348	5,370,846	749.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
41	649,714	5,370,690	746.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
42	650,635	5,370,574	746.1 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
43	650,667	5,370,918	744.1 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
45	650,882	5,371,340	743.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
66	649,309	5,375,532	733.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
67	649,484	5,375,990	732.9 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	

To be continued on next page...

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:25 AM / 2

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net

Calculated:

10/1/2015 10:00 PM/2.9.285

SHADOW - Main Result

Calculation: A059 V110 Realistic Flicker w/Out Obstacles DNV Tab

...continued from previous page

UTM NAD83 Zone: 13				WTG type							
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	RPM [RPM]	
68	649,889	5,375,994	741.6 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
69	650,008	5,376,321	740.1 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
70	650,956	5,375,465	751.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
84	648,982	5,374,557	737.6 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
85	648,553	5,374,643	733.1 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
98	648,903	5,381,054	722.4 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
99	649,170	5,381,363	721.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
100	649,950	5,382,038	713.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
101	650,030	5,382,496	712.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
104	650,119	5,376,639	740.5 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
105	650,267	5,377,632	746.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
150	650,663	5,383,159	707.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
151	650,947	5,375,049	753.4 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
152	650,911	5,374,694	758.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
154	650,163	5,374,664	746.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
155	649,378	5,374,555	741.3 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
156	649,818	5,374,694	743.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
158	650,613	5,377,049	737.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
164	649,406	5,372,982	725.6 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
165	647,909	5,372,903	716.3 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
166	647,487	5,372,910	715.6 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
171	647,671	5,376,427	743.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
173	647,364	5,376,192	740.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
174	647,056	5,376,002	741.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
175	653,143	5,380,511	713.2 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
176	653,130	5,380,927	710.2 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
177	653,497	5,381,062	704.1 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
178	653,850	5,381,276	700.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
179	654,022	5,381,604	696.2 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
180	654,011	5,381,966	694.9 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
183	649,728	5,381,758	721.2 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
184	650,599	5,377,842	746.4 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
205	648,594	5,370,523	731.5 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
206	650,092	5,370,737	743.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
300	654,134	5,380,179	734.1 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
302	648,870	5,379,451	759.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
303	649,079	5,378,913	759.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
304	649,308	5,381,738	716.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
305	650,346	5,383,045	709.5 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
306	650,021	5,382,956	710.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
307	647,090	5,373,129	713.2 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
308	649,061	5,372,960	722.4 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
309	648,724	5,372,961	720.3 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
310	648,383	5,372,885	719.3 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
311	648,975	5,375,560	734.6 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
312	648,641	5,375,554	726.9 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
313	648,297	5,375,376	728.5 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
314	649,928	5,378,956	741.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
315	650,591	5,374,779	748.6 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
316	650,301	5,376,922	735.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
317	650,917	5,377,197	740.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:25 AM / 3

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 10:00 PM/2.9.285

SHADOW - Main Result

Calculation: A059 V110 Realistic Flicker w/Out Obstacles DNV Tab

Shadow receptor-Input

UTM NAD83 Zone: 13

No.	Name	East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
				[m]	[m]	[m]	[m]	[°]	[°]	
A	Participating	650,034	5,370,204	742.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
B	Participating	648,222	5,376,376	731.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
C	Participating	649,350	5,377,570	737.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
D	Participating	652,833	5,381,417	705.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
E	Participating	653,476	5,379,925	741.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
F	Participating	649,476	5,378,474	747.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
G	Participating	650,400	5,383,729	711.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
H	Participating	648,263	5,374,042	728.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
I	Participating	649,372	5,377,319	734.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
J	Participating	649,411	5,377,350	734.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
K	Participating	652,350	5,377,616	735.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
L	Participating	647,974	5,378,125	736.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
M	Participating	652,746	5,379,403	722.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
N	Non-Participating	652,934	5,377,454	728.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
O	Participating	647,905	5,380,657	723.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
P	Non-Participating	647,929	5,371,803	716.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
Q	Non-Participating	655,444	5,382,262	682.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R	Non-Participating	654,346	5,383,551	675.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
S	Participating	652,445	5,374,111	759.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
T	Non-Participating	652,124	5,382,382	698.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
U	Non-Participating	652,329	5,383,668	691.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
V	Participating	647,113	5,379,805	712.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
W	Non-Participating	652,318	5,383,827	691.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
X	Non-Participating	655,873	5,382,222	689.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
Y	Non-Participating	651,119	5,380,491	705.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
Z	Non-Participating	652,848	5,375,611	736.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
AA	Participating	654,105	5,377,449	726.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
BB	Non-Participating	652,820	5,375,995	733.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
CC	Participating	652,849	5,373,992	753.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
DD	Non-Participating	652,780	5,383,651	684.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
EE	Non-Participating	653,014	5,375,966	734.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
FF	Non-Participating	652,597	5,369,477	749.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
GG	Participating	653,163	5,370,620	746.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
HH	Non-Participating	657,270	5,380,900	701.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
II	Participating	653,237	5,370,521	746.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
JJ	Non-Participating	653,421	5,369,486	746.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
KK	Non-Participating	656,603	5,377,699	728.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
LL	Non-Participating	652,987	5,368,263	755.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
MM	Non-Participating	655,962	5,376,837	710.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
NN	Non-Participating	646,183	5,383,581	712.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
OO	Participating	654,514	5,371,692	765.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
PP	Non-Participating	644,980	5,381,994	704.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
QQ	Participating	654,816	5,368,880	743.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
RR	Non-Participating	654,290	5,367,724	742.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
SS	Non-Participating	656,021	5,375,274	710.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
TT	Non-Participating	656,242	5,375,429	710.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
UU	Non-Participating	655,800	5,374,456	722.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
VV	Non-Participating	655,758	5,368,066	719.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
WW	Participating	656,662	5,372,675	722.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
XX	Non-Participating	656,251	5,368,598	741.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
YY	Non-Participating	656,161	5,367,989	720.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
ZZ	Non-Participating	656,215	5,367,523	716.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:25 AM / 4

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 10:00 PM/2.9.285

SHADOW - Main Result**Calculation:** A059 V110 Realistic Flicker w/Out Obstacles DNV Tab**Calculation Results**

Shadow receptor

No.	Name	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]
A	Participating	82:53	213	0:39	30:51
B	Participating	72:44	192	0:46	29:37
C	Participating	68:46	174	1:01	28:03
D	Participating	55:27	177	0:35	20:08
E	Participating	63:19	137	0:44	26:53
F	Participating	74:13	164	0:43	25:49
G	Participating	0:00	0	0:00	0:00
H	Participating	17:25	96	0:21	6:42
I	Participating	90:18	214	1:08	36:28
J	Participating	81:08	187	1:06	32:16
K	Participating	41:17	123	0:30	19:56
L	Participating	79:11	199	0:34	29:43
M	Participating	6:05	29	0:19	2:26
N	Non-Participating	0:00	0	0:00	0:00
O	Participating	33:19	144	0:24	12:59
P	Non-Participating	0:00	0	0:00	0:00
Q	Non-Participating	3:12	19	0:15	1:11
R	Non-Participating	0:00	0	0:00	0:00
S	Participating	0:00	0	0:00	0:00
T	Non-Participating	0:00	0	0:00	0:00
U	Non-Participating	0:00	0	0:00	0:00
V	Participating	0:00	0	0:00	0:00
W	Non-Participating	0:00	0	0:00	0:00
X	Non-Participating	0:00	0	0:00	0:00
Y	Non-Participating	0:00	0	0:00	0:00
Z	Non-Participating	0:00	0	0:00	0:00
AA	Participating	0:00	0	0:00	0:00
BB	Non-Participating	0:00	0	0:00	0:00
CC	Participating	0:00	0	0:00	0:00
DD	Non-Participating	0:00	0	0:00	0:00
EE	Non-Participating	0:00	0	0:00	0:00
FF	Non-Participating	0:00	0	0:00	0:00
GG	Participating	0:00	0	0:00	0:00
HH	Non-Participating	0:00	0	0:00	0:00
II	Participating	0:00	0	0:00	0:00
JJ	Non-Participating	0:00	0	0:00	0:00
KK	Non-Participating	0:00	0	0:00	0:00
LL	Non-Participating	0:00	0	0:00	0:00
MM	Non-Participating	0:00	0	0:00	0:00
NN	Non-Participating	0:00	0	0:00	0:00
OO	Participating	0:00	0	0:00	0:00
PP	Non-Participating	0:00	0	0:00	0:00
QQ	Participating	0:00	0	0:00	0:00
RR	Non-Participating	0:00	0	0:00	0:00
SS	Non-Participating	0:00	0	0:00	0:00
TT	Non-Participating	0:00	0	0:00	0:00
UU	Non-Participating	0:00	0	0:00	0:00
VV	Non-Participating	0:00	0	0:00	0:00
WW	Participating	0:00	0	0:00	0:00
XX	Non-Participating	0:00	0	0:00	0:00
YY	Non-Participating	0:00	0	0:00	0:00
ZZ	Non-Participating	0:00	0	0:00	0:00

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:25 AM / 5

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000

wind@eapc.net

Calculated:

10/1/2015 10:00 PM/2.9.285

SHADOW - Main Result

Calculation: A059 V110 Realistic Flicker w/Out Obstacles DNV Tab

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

No.	Name	Worst case [h/year]	Expected [h/year]
5	up to V110	0:00	0:00
6	up to V110	0:00	0:00
12	up to V110	18:15	6:38
13	up to V110	100:07	37:19
14	up to V110	62:23	27:18
15	up to V110	55:58	18:34
18	up to V110	0:00	0:00
20	up to V110	11:31	3:58
22	up to V110	4:59	1:52
24	up to V110	4:50	2:09
26	up to V110	33:49	16:55
27	up to V110	0:00	0:00
28	up to V110	0:00	0:00
29	up to V110	0:00	0:00
34	up to V110	37:13	15:54
35	up to V110	9:57	4:04
36	up to V110	2:33	0:59
37	up to V110	17:09	4:16
38	up to V110	24:17	9:04
39	up to V110	9:16	4:29
40	up to V110	0:00	0:00
41	up to V110	0:00	0:00
42	up to V110	30:03	12:16
43	up to V110	0:00	0:00
45	up to V110	0:00	0:00
66	up to V110	9:14	3:11
67	up to V110	4:08	1:25
68	up to V110	0:00	0:00
69	up to V110	0:00	0:00
70	up to V110	0:00	0:00
84	up to V110	4:10	1:38
85	up to V110	0:00	0:00
98	up to V110	10:22	4:17
99	up to V110	6:27	2:39
100	up to V110	0:00	0:00
101	up to V110	0:00	0:00
104	up to V110	29:35	9:42
105	up to V110	31:51	13:42
150	up to V110	0:00	0:00
151	up to V110	0:00	0:00
152	up to V110	0:00	0:00
154	up to V110	0:00	0:00
155	up to V110	10:12	4:14
156	up to V110	0:00	0:00
158	up to V110	10:44	3:59
164	up to V110	0:00	0:00
165	up to V110	0:00	0:00
166	up to V110	0:00	0:00
171	up to V110	40:35	18:02
173	up to V110	12:48	4:54
174	up to V110	5:39	1:57
175	up to V110	0:00	0:00
176	up to V110	16:29	5:11
177	up to V110	21:23	7:28
178	up to V110	7:29	3:11
179	up to V110	4:38	1:52

To be continued on next page...

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.

Kevin Walter

Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:25 AM / 6

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000

wind@eapc.net

Calculated:

10/1/2015 10:00 PM/2.9.285

SHADOW - Main Result**Calculation:** A059 V110 Realistic Flicker w/Out Obstacles DNV Tab

...continued from previous page

No.	Name	Worst case [h/year]	Expected [h/year]
180	up to V110	8:40	3:27
183	up to V110	0:00	0:00
184	up to V110	19:29	7:52
205	up to V110	2:08	0:57
206	up to V110	0:00	0:00
300	up to V110	30:44	12:46
302	up to V110	0:00	0:00
303	up to V110	1:47	0:43
304	up to V110	0:00	0:00
305	up to V110	0:00	0:00
306	up to V110	0:00	0:00
307	up to V110	3:03	0:50
308	up to V110	0:00	0:00
309	up to V110	0:00	0:00
310	up to V110	0:00	0:00
311	up to V110	0:29	0:08
312	up to V110	0:00	0:00
313	up to V110	0:00	0:00
314	up to V110	0:00	0:00
315	up to V110	0:00	0:00
316	up to V110	24:26	8:36
317	up to V110	2:38	0:53

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:25 AM / 7

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 10:00 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: A - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
660	333	352	411	608	961	789	574	695	904	1,116	1,191	8,594

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

	January	February	March	April	May	June							
1	08:44	15:54 (37)	08:22	07:35	18:03 (38)	07:32	06:34	20:30 (39)	05:56	06:21 (42)			
	17:08	26	16:20 (37)	17:50	18:11 (38)	20:21	21:04	9	20:39 (39)	21:44	27	06:48 (42)	
2	08:44	15:54 (37)	08:21	07:33	17:59 (38)	07:30	06:32	20:29 (39)	05:55	06:21 (42)			
	17:09	26	16:20 (37)	17:52	18:35	20:22	21:06	11	20:40 (39)	21:45	28	06:49 (42)	
3	08:44	15:55 (37)	08:20	07:31	17:57 (38)	07:28	06:31	20:29 (39)	05:54	06:20 (42)			
	17:10	25	16:20 (37)	17:54	18:37	20:24	21:07	13	20:42 (39)	21:46	29	06:49 (42)	
4	08:44	15:56 (37)	08:18	07:29	17:55 (38)	07:26	06:29	20:28 (39)	05:54	06:20 (42)			
	17:11	23	16:19 (37)	17:55	18:38	20:25	21:09	15	20:43 (39)	21:47	30	06:50 (42)	
5	08:44	15:57 (37)	08:17	07:27	17:53 (38)	07:24	06:28	20:28 (39)	05:53	06:19 (42)			
	17:12	23	16:20 (37)	17:57	18:40	20:26	21:10	17	20:45 (39)	21:48	31	06:50 (42)	
6	08:44	15:58 (37)	08:15	07:25	17:50 (38)	07:22	06:26	20:27 (39)	05:53	06:19 (42)			
	17:13	22	16:20 (37)	17:58	18:42	20:28	21:12	19	20:46 (39)	21:49	32	06:51 (42)	
7	08:43	15:58 (37)	08:14	07:23	17:49 (38)	07:20	06:24	20:28 (39)	05:52	06:19 (42)			
	17:14	21	16:19 (37)	18:00	18:43	20:29	21:13	19	20:47 (39)	21:50	33	06:52 (42)	
8	08:43	16:00 (37)	08:12	08:21	18:48 (38)	07:17	06:23	20:28 (39)	05:52	06:18 (42)			
	17:15	19	16:19 (37)	18:00	18:45	20:31	21:14	20	20:48 (39)	21:51	34	06:52 (42)	
9	08:43	16:01 (37)	08:11	08:19	18:47 (38)	07:15	06:21	20:28 (39)	05:51	06:18 (42)			
	17:16	17	16:18 (37)	18:02	19:23 (38)	20:32	21:16	22	20:50 (39)	21:51	34	06:52 (42)	
10	08:42	16:03 (37)	08:09	08:17	18:47 (38)	07:13	06:20	20:29 (39)	05:51	06:18 (42)			
	17:18	15	16:18 (37)	18:03	19:48	20:34	21:17	22	20:51 (39)	21:52	35	06:53 (42)	
11	08:42	16:04 (37)	08:08	08:15	18:46 (38)	07:11	06:18	20:29 (39)	05:51	06:17 (42)			
	17:19	13	16:17 (37)	18:05	19:49	20:35	21:19	21	20:50 (39)	21:53	35	06:52 (42)	
12	08:41	16:07 (37)	08:06	08:13	18:46 (38)	07:09	06:17	20:30 (39)	05:51	06:17 (42)			
	17:20	9	16:16 (37)	18:07	19:51	20:37	21:20	19	20:49 (39)	21:53	36	06:53 (42)	
13	08:41	16:08 (37)	08:04	08:11	18:46 (38)	07:07	06:16	20:31 (39)	05:50	06:17 (42)			
	17:22		18:08	19:52	39	20:38	21:21	18	20:49 (39)	21:54	36	06:53 (42)	
14	08:40	16:09 (37)	08:03	08:09	18:46 (38)	07:05	06:14	20:31 (39)	05:50	06:17 (42)			
	17:23		18:10	19:54	38	20:40	21:23	16	20:47 (39)	21:55	37	06:54 (42)	
15	08:40	16:10 (37)	08:01	08:07	18:46 (38)	07:04	06:13	20:33 (39)	05:50	06:17 (42)			
	17:24		18:11	19:55	38	20:41	21:24	13	20:46 (39)	21:55	37	06:54 (42)	
16	08:39	16:11 (37)	08:00	08:05	18:46 (38)	07:02	06:12	20:35 (39)	05:50	06:17 (42)			
	17:26		18:13	19:57	37	20:43	21:25	9	20:44 (39)	21:56	37	06:54 (42)	
17	08:38	16:12 (37)	08:00	08:03	18:46 (38)	07:00	06:10	20:19 (205)	05:50	06:17 (42)			
	17:27		18:15	19:58	37	20:44	21:27		21:56	38	06:55 (42)		
18	08:37	16:13 (37)	08:00	08:01	18:47 (38)	06:58	06:09	20:18 (205)	05:50	06:17 (42)			
	17:29		18:16	20:00	35	20:46	21:28	4	20:22 (205)	21:28	21:56	38	06:55 (42)
19	08:37	16:14 (37)	08:00	08:01	18:47 (38)	06:56	06:08	20:17 (205)	05:50	06:17 (42)			
	17:30		18:18	20:01	34	20:47	21:29	6	20:23 (205)	21:29	21:57	38	06:55 (42)
20	08:36	16:15 (37)	08:00	08:01	18:47 (38)	06:54	06:07	20:17 (205)	05:50	06:17 (42)			
	17:32		18:20	20:03	32	20:48	21:31	7	20:24 (205)	21:31	21:57	38	06:55 (42)
21	08:35	16:16 (37)	08:00	08:01	18:48 (38)	06:52	06:06	20:17 (205)	05:50	06:17 (42)			
	17:33		18:21	20:04	29	20:50	21:32	4	06:34 (42)	21:57	38	06:55 (42)	
22	08:34	16:17 (37)	08:00	08:01	18:49 (38)	06:50	06:04	20:17 (205)	05:51	06:18 (42)			
	17:35		18:23	20:06	27	20:51	21:33	9	06:38 (42)	21:58	38	06:56 (42)	
23	08:33	16:18 (37)	08:00	08:01	18:51 (38)	06:48	06:03	20:18 (205)	05:51	06:18 (42)			
	17:36		18:24	20:07	23	20:53	21:34	12	06:40 (42)	21:58	38	06:56 (42)	
24	08:32	16:19 (37)	08:00	08:01	18:53 (38)	06:46	06:02	20:19 (205)	05:51	06:18 (42)			
	17:38		18:26	20:09	18	20:54	21:35	14	06:41 (42)	21:58	38	06:56 (42)	
25	08:31	16:20 (37)	08:00	08:01	18:57 (38)	06:45	06:01	20:21 (205)	05:51	06:19 (42)			
	17:39		18:28	20:10	10	20:56	21:37	16	06:43 (42)	21:58	38	06:57 (42)	
26	08:30	16:21 (37)	08:00	08:01	19:07 (38)	06:43	06:00	20:28 (205)	05:52	06:19 (42)			
	17:41		18:29	20:12		20:57	21:38	18	06:44 (42)	21:58	37	06:56 (42)	
27	08:29	16:22 (37)	08:00	08:01	19:11 (38)	06:41	06:00	20:29 (205)	05:52	06:19 (42)			
	17:42		18:31	20:13		20:59	21:39	20	06:45 (42)	21:58	37	06:56 (42)	
28	08:27	16:23 (37)	08:00	08:01	19:20 (38)	06:39	05:59	20:34 (39)	05:53	06:20 (42)			
	17:44		18:32	20:15		21:00	21:40	1	20:35 (39)	21:40	22	06:46 (42)	
29	08:26	16:24 (37)	08:00	08:01	19:29 (38)	06:38	05:58	20:32 (39)	05:53	06:20 (42)			
	17:45		18:33	20:16		21:02	21:41	4	20:36 (39)	21:41	23	06:46 (42)	
30	08:25	16:25 (37)	08:00	08:01	19:38 (38)	06:36	05:57	20:31 (39)	05:54	06:21 (42)			
	17:47		18:34	20:18		21:03	21:42	7	20:38 (39)	21:42	25	06:48 (42)	
31	08:24	16:26 (37)	08:00	08:01	19:47 (38)	06:34	05:56	20:39 (39)	05:54	06:22 (42)			
	17:49		18:35	20:19		21:04	21:43	26	06:48 (42)		36	06:57 (42)	
Potential sun hours	274	285	368	409	471	481							
Total, worst case	239			726	77	452						1057	
Sun reduction	0.56			0.63	0.59	0.67						0.70	
Oper. time red.	0.98			0.98	0.98	0.98						0.98	
Wind dir. red.	0.54			0.62	0.70	0.66						0.59	
Total reduction	0.30			0.38	0.40	0.43						0.40	
Total, real	71			274	31	194						422	

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:25 AM / 8

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 10:00 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor:** A - Participating

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

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

Assumptions for shadow calculations

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
660	333	352	411	608	961	789	574	695	904	1,116	1,191	8,594

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

	July	August	September	October	November	December						
1	05:54	06:21 (42)	06:26	20:40 (39)	07:09	07:51	18:26 (38)	07:37	08:22	15:46 (37)		
	21:58	36 06:57 (42)	21:32	21:00 (39)	20:37	19:35	39 19:05 (38)	17:34	17:00	13 15:59 (37)		
2	05:55	06:22 (42)	06:27	20:39 (39)	07:10	07:52	18:25 (38)	07:39	08:23	15:46 (37)		
	21:58	35 06:57 (42)	21:31	21:00 (39)	20:35	19:33	39 19:04 (38)	17:32	17:00	15 16:01 (37)		
3	05:56	06:23 (42)	06:29	20:38 (39)	07:12	07:54	18:24 (38)	07:41	08:25	15:45 (37)		
	21:57	35 06:58 (42)	21:29	21:01 (39)	20:33	19:31	39 19:03 (38)	17:31	16:59	17 16:02 (37)		
4	05:56	06:23 (42)	06:30	20:39 (39)	07:13	07:55	18:25 (38)	07:42	08:26	15:44 (37)		
	21:57	34 06:57 (42)	21:28	21:00 (39)	20:31	19:29	37 19:02 (38)	17:29	16:59	19 16:03 (37)		
5	05:57	06:24 (42)	06:31	20:38 (39)	07:14	07:57	18:25 (38)	07:44	08:27	15:45 (37)		
	21:57	33 06:57 (42)	21:26	20:58 (39)	20:29	19:27	34 18:59 (38)	17:28	16:58	20 16:05 (37)		
6	05:58	06:25 (42)	06:33	20:37 (39)	07:16	07:58	18:26 (38)	07:45	08:28	15:44 (37)		
	21:56	33 06:58 (42)	21:25	20:56 (39)	20:27	19:25	32 18:58 (38)	17:26	16:58	22 16:06 (37)		
7	05:59	06:26 (42)	06:34	20:37 (39)	07:17	07:59	18:26 (38)	07:47	08:29	15:44 (37)		
	21:56	32 06:58 (42)	21:23	20:55 (39)	20:25	19:23	29 18:55 (38)	17:25	16:58	23 16:07 (37)		
8	05:59	06:26 (42)	06:35	20:38 (39)	07:18	08:01	18:27 (38)	07:48	08:30	15:44 (37)		
	21:55	31 06:57 (42)	21:21	20:54 (39)	20:23	19:20	26 18:53 (38)	17:23	16:58	23 16:07 (37)		
9	06:00	06:27 (42)	06:37	20:37 (39)	07:20	08:02	18:28 (38)	07:50	08:32	15:44 (37)		
	21:55	30 06:57 (42)	21:20	20:52 (39)	20:21	19:18	23 18:51 (38)	17:22	16:57	24 16:08 (37)		
10	06:01	06:28 (42)	06:38	20:37 (39)	07:21	08:04	18:30 (38)	07:52	08:33	15:44 (37)		
	21:54	29 06:57 (42)	21:18	20:50 (39)	20:19	19:16	19 18:49 (38)	17:20	16:57	25 16:09 (37)		
11	06:02	06:29 (42)	06:40	20:38 (39)	07:23	08:05	18:31 (38)	07:53	08:34	15:44 (37)		
	21:54	28 06:57 (42)	21:17	20:49 (39)	20:17	19:14	16 18:47 (38)	17:19	16:57	26 16:10 (37)		
12	06:03	06:30 (42)	06:41	20:39 (39)	07:24	08:07	18:34 (38)	07:55	08:34	15:44 (37)		
	21:53	27 06:57 (42)	21:15	20:47 (39)	20:15	19:12	11 18:45 (38)	17:18	16:57	26 16:10 (37)		
13	06:04	06:31 (42)	06:42	20:39 (39)	07:25	08:08		07:56	08:35	15:44 (37)		
	21:52	25 06:56 (42)	21:13	20:45 (39)	20:13	19:10		17:17	16:57	27 16:11 (37)		
14	06:05	06:32 (42)	06:44	20:40 (39)	07:27	08:10		07:58	08:36	15:45 (37)		
	21:52	24 06:56 (42)	21:11	20:43 (39)	20:11	19:08		17:15	16:57	27 16:12 (37)		
15	06:06	06:33 (42)	06:45		07:28	08:11		07:59	08:37	15:45 (37)		
	21:51	23 06:56 (42)	21:10		20:09	19:06		17:14	16:57	28 16:13 (37)		
16	06:07	06:34 (42)	06:46		07:30	08:13		08:01	08:38	15:45 (37)		
	21:50	21 06:55 (42)	21:08		20:06	19:05		17:13	16:58	27 16:12 (37)		
17	06:08	06:35 (42)	06:48		07:31	08:14		08:02	08:39	15:45 (37)		
	21:49	19 06:54 (42)	21:06		20:04	19:03		17:12	16:58	28 16:13 (37)		
18	06:09	06:36 (42)	06:49		07:32	08:16		08:04	08:39	15:46 (37)		
	21:48	17 06:53 (42)	21:04	8 20:35 (205)	20:02	5 18:52 (38)	19:01	17:11	16:58	28 16:14 (37)		
19	06:10	06:37 (42)	06:51		07:34	08:17		08:05	08:40	15:47 (37)		
	21:47	15 06:52 (42)	21:02	10 20:35 (205)	20:00	16 18:58 (38)	18:57	17:10	16:59	28 16:15 (37)		
20	06:11	06:38 (42)	06:52		07:35	08:38	08:19	08:07	08:41	15:47 (37)		
	21:46	13 06:51 (42)	21:01	10 20:33 (205)	19:58	22 19:00 (38)	18:55	17:09	16:59	28 16:15 (37)		
21	06:12	06:39 (42)	06:53		07:37	08:35	08:20	08:08	08:41	15:47 (37)		
	21:45	10 06:49 (42)	20:59	9 20:32 (205)	19:56	26 19:01 (38)	18:53	17:08	16:59	29 16:16 (37)		
22	06:14	06:40 (42)	06:55		07:38	08:34	08:22	08:10	08:42	15:47 (37)		
	21:44	7 06:47 (42)	20:57	8 20:30 (205)	19:54	29 19:03 (38)	18:51	17:07	17:00	29 16:16 (37)		
23	06:15		06:56		07:39	08:32	08:23	08:11	08:42	15:48 (37)		
	21:43		20:55	7 20:28 (205)	19:52	31 19:03 (38)	18:49	17:06	17:00	29 16:17 (37)		
24	06:16		06:58		07:41	08:31	08:25	08:13	08:43	15:49 (37)		
	21:42		20:53	6 20:27 (205)	19:50	33 19:04 (38)	18:48	17:05	17:01	28 16:17 (37)		
25	06:17		06:59		07:42	08:29	08:27	08:14	08:43	15:49 (37)		
	21:41		20:51	3 20:24 (205)	19:47	35 19:04 (38)	18:46	17:04	17:02	28 16:17 (37)		
26	06:18		07:00		07:44	08:28	08:28	08:15	08:43	15:49 (37)		
	21:40		20:49	2 20:22 (205)	19:45	36 19:04 (38)	18:44	17:03	17:02	28 16:17 (37)		
27	06:20		20:47 (39)		07:02	07:45	18:28 (38)	08:30	08:17	17:02	28 16:17 (37)	
	21:39	6 20:53 (39)	20:47		19:43	37 19:05 (38)	18:42	17:03	17:03	28 16:18 (37)		
28	06:21		20:45 (39)		07:03	07:47	18:26 (38)	08:31	08:18	17:03	28 16:18 (37)	
	21:37	11 20:56 (39)	20:45		19:41	39 19:05 (38)	18:41	17:02	17:04	27 16:18 (37)		
29	06:22		20:43 (39)		07:05	07:48	18:26 (38)	08:33	08:20	17:04	27 16:18 (37)	
	21:36	14 20:57 (39)	20:43		19:39	39 19:05 (38)	18:39	17:01	17:05	28 16:19 (37)		
30	06:23		20:41 (39)		07:06	07:49	18:25 (38)	08:34	08:21	17:05	28 16:19 (37)	
	21:35	17 20:58 (39)	20:41		19:37	39 19:04 (38)	18:37	17:01	9 15:57 (37)	17:05	27 16:19 (37)	
31	06:25		20:41 (39)		07:07		08:36		08:44	17:05	27 16:19 (37)	
	21:33	19 21:00 (39)	20:39				18:36		17:06	26 16:19 (37)		
Potential sun hours	486		445		379		337		278		260	
Total, worst case	624		277		387		344		9		781	
Sun reduction	0.75		0.72		0.69		0.52		0.43		0.44	
Oper. time red.	0.98		0.98		0.98		0.98		0.98		0.98	
Wind dir. red.	0.60		0.70		0.62		0.62		0.54		0.54	
Total reduction	0.44		0.50		0.41		0.31		0.23		0.23	
Total, real	272		137		160		108		2		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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:25 AM / 9

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net

Calculated:

10/1/2015 10:00 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor:** B - Participating

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
660	333	352	411	608	961	789	574	695	904	1,116	1,191	8,594

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

	January	February	March	April	May	June
1 08:45	09:12 (66) 08:23		07:35	08:04 (67) 07:32	06:34	19:27 (171) 05:55
17:07	5 09:17 (66) 17:50		18:34	29 18:11 (174) 20:21	21:05	35 20:02 (171) 21:45
2 08:45	09:12 (66) 08:21		07:33	08:06 (67) 07:30	06:32	19:28 (171) 05:55
17:08	6 09:18 (66) 17:52		18:35	25 18:12 (174) 20:22	21:06	32 20:00 (171) 21:46
3 08:45	09:12 (66) 08:20		07:31	17:54 (174) 07:28	06:31	19:29 (171) 05:54
17:09	7 09:19 (66) 17:53		18:37	20 18:14 (174) 20:24	21:08	30 19:59 (171) 21:47
4 08:44	09:12 (66) 08:18		07:29	17:54 (174) 07:26	06:29	19:30 (171) 05:54
17:10	8 09:20 (66) 17:55		18:39	19 18:13 (174) 20:25	21:09	27 19:57 (171) 21:47
5 08:44	09:11 (66) 08:17		07:28	17:55 (174) 07:24	19:42 (171) 06:27	19:32 (171) 05:53
17:12	9 09:20 (66) 17:57		18:40	22 18:17 (173) 20:27	15 19:57 (171) 21:10	24 19:56 (171) 21:48
6 08:44	09:11 (66) 08:16		07:26	17:56 (174) 07:22	19:38 (171) 06:26	19:34 (171) 05:52
17:13	9 09:20 (66) 17:58		18:42	23 18:19 (173) 20:28	22 20:00 (171) 21:12	20 19:54 (171) 21:49
7 08:44	09:11 (66) 08:14		07:24	17:58 (174) 07:20	19:36 (171) 06:24	19:37 (171) 05:52
17:14	10 09:21 (66) 18:00		18:43	23 18:21 (173) 20:30	26 20:02 (171) 21:13	14 19:51 (171) 21:50
8 08:43	09:10 (66) 08:13		08:21	19:05 (173) 07:17	19:34 (171) 06:23	05:52
17:15	11 09:21 (66) 18:00		18:45	17 19:22 (173) 20:31	30 20:04 (171) 21:15	21:51
9 08:43	09:10 (66) 08:11		08:19	19:04 (173) 07:15	19:32 (171) 06:21	05:51
17:16	12 09:22 (66) 18:02		19:46	20 19:24 (173) 20:33	33 20:05 (171) 21:16	21:52
10 08:43	09:09 (66) 08:09		08:17	19:02 (173) 07:13	19:30 (171) 06:20	05:51
17:17	13 09:22 (66) 18:03		19:48	23 19:25 (173) 20:34	36 20:06 (171) 21:18	21:52
11 08:42	09:09 (66) 08:08		08:15	19:01 (173) 07:11	19:29 (171) 06:18	05:51
17:19	14 09:23 (66) 18:05		19:49	25 19:26 (173) 20:35	38 20:07 (171) 21:19	21:53
12 08:42	09:08 (66) 08:06		08:13	19:01 (173) 07:09	19:27 (171) 06:17	05:50
17:20	15 09:23 (66) 18:07		19:51	27 19:28 (173) 20:37	41 20:08 (171) 21:20	21:54
13 08:41	09:07 (66) 08:04		08:11	19:00 (173) 07:07	19:26 (171) 06:16	05:50
17:21	16 09:23 (66) 18:08		19:52	29 19:29 (173) 20:38	42 20:08 (171) 21:22	21:54
14 08:41	09:07 (66) 08:03		08:09	19:00 (173) 07:05	19:25 (171) 06:14	05:50
17:23	17 09:24 (66) 18:10		19:54	29 19:29 (173) 20:40	44 20:09 (171) 21:23	21:55
15 08:40	09:06 (66) 08:01		08:07	19:00 (173) 07:04	19:25 (171) 06:13	05:50
17:24	18 09:24 (66) 18:11		19:55	29 19:29 (173) 20:41	44 20:09 (171) 21:24	21:55
16 08:39	09:06 (66) 07:59		08:05	19:00 (173) 07:02	19:25 (171) 06:12	05:50
17:26	17 09:23 (66) 18:13		19:57	28 19:28 (173) 20:43	45 20:10 (171) 21:26	21:56
17 08:38	09:07 (66) 07:58		08:03	19:00 (173) 07:00	19:24 (171) 06:10	05:50
17:27	16 09:23 (66) 18:15		19:58	27 19:27 (173) 20:44	46 20:10 (171) 21:27	21:56
18 08:38	09:08 (66) 07:56		08:01	19:01 (173) 06:58	19:24 (171) 06:09	05:50
17:28	14 09:22 (66) 18:16		20:00	25 19:26 (173) 20:46	46 20:10 (171) 21:28	21:57
19 08:37	09:09 (66) 07:54		07:59	19:02 (173) 06:56	19:23 (171) 06:08	05:50
17:30	13 09:22 (66) 18:18		20:01	23 19:25 (173) 20:47	46 20:09 (171) 21:30	21:57
20 08:36	09:10 (66) 07:52		08:15 (67) 07:57	19:03 (173) 06:54	19:23 (171) 06:07	05:50
17:31	11 09:21 (66) 18:20	4	08:19 (67) 20:03	21 19:24 (173) 20:49	46 20:09 (171) 21:31	21:58
21 08:35	09:12 (66) 07:50		08:13 (67) 07:55	19:04 (173) 06:52	19:23 (171) 06:05	05:50
17:33	7 09:19 (66) 18:21	6	08:19 (67) 20:04	17 19:21 (173) 20:50	46 20:09 (171) 21:32	21:58
22 08:34	07:49		08:11 (67) 07:53	19:06 (173) 06:50	19:22 (171) 06:04	05:50
17:34	18:23	9	08:20 (67) 20:06	12 19:18 (173) 20:52	46 20:08 (171) 21:33	21:58
23 08:33	07:47		08:09 (67) 07:51	06:48	19:23 (171) 06:03	05:51
17:36	18:24	11	08:20 (67) 20:07	20:53	45 20:08 (171) 21:35	21:58
24 08:32	07:45		08:08 (67) 07:48	06:46	19:23 (171) 06:02	05:51
17:37	18:26	18	18:03 (174) 20:09	20:55	45 20:08 (171) 21:36	21:58
25 08:31	07:43		08:06 (67) 07:46	06:45	19:23 (171) 06:01	05:51
17:39	18:28	21	18:04 (174) 20:10	20:56	44 20:07 (171) 21:37	21:59
26 08:30	07:41		08:04 (67) 07:44	06:43	19:23 (171) 06:00	05:52
17:41	18:29	26	18:06 (174) 20:12	20:57	43 20:06 (171) 21:38	21:59
27 08:29	07:39		08:02 (67) 07:42	06:41	19:24 (171) 05:59	05:52
17:42	18:31	30	18:08 (174) 20:13	20:59	42 20:06 (171) 21:39	21:59
28 08:28	07:37		08:03 (67) 07:40	06:39	19:25 (171) 05:59	05:53
17:44	18:32	30	18:09 (174) 20:15	21:00	40 20:05 (171) 21:40	21:59
29 08:26	07:38		07:38	06:38	19:25 (171) 05:58	05:53
17:45	20:16		20:16	21:02	39 20:04 (171) 21:41	21:58
30 08:25	07:36		07:36	06:36	19:26 (171) 05:57	05:54
17:47	20:18		20:18	21:03	37 20:03 (171) 21:43	21:58
31 08:24	07:34		07:34	06:34	05:56	
17:49	20:19		20:19	21:04	21:44	
Potential sun hours	273	285	368	410	471	481
Total, worst case	248	155	513	1027	182	
Sun reduction	0.56	0.50	0.63	0.59	0.67	
Oper. time red.	0.98	0.98	0.98	0.98	0.98	
Wind dir. red.	0.72	0.67	0.63	0.69	0.69	
Total reduction	0.39	0.33	0.39	0.40	0.45	
Total, real	97	52	198	408	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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:25 AM / 10

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 10:00 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: B - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
660	333	352	411	608	961	789	574	695	904	1,116	1,191	8,594

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

	July	August	September	October	November	December						
1	05:54 21:58	06:26 21:32	07:09 20:38	19:28 (171) 20:06 (171)	07:51 19:35	18:40 (173) 19:08 (173)	07:38 17:34	08:22 17:00	08:51 (66) 09:05 (66)			
2	05:55 21:58	06:27 21:31	07:10 20:36	19:29 (171) 20:05 (171)	07:52 19:33	18:40 (173) 19:06 (173)	07:39 17:32	08:24 16:59	08:52 (66) 09:05 (66)			
3	05:55 21:58	06:29 21:29	07:12 20:34	19:30 (171) 20:03 (171)	07:54 19:31	18:40 (173) 19:04 (173)	07:41 17:31	08:25 16:59	08:53 (66) 09:05 (66)			
4	05:56 21:57	06:30 21:28	07:13 20:32	19:31 (171) 20:01 (171)	07:55 19:29	18:40 (173) 19:02 (173)	07:42 17:29	08:26 16:59	08:55 (66) 09:06 (66)			
5	05:57 21:57	06:31 21:26	07:14 20:29	19:33 (171) 20:00 (171)	07:57 19:27	18:41 (173) 19:00 (173)	07:44 17:28	08:27 16:58	08:56 (66) 09:06 (66)			
6	05:58 21:57	06:33 21:25	07:16 20:27	19:34 (171) 20:02 (171)	07:58 19:25	18:36 (174) 18:57 (173)	07:46 17:26	08:29 16:58	08:57 (66) 09:07 (66)			
7	05:58 21:56	06:34 21:23	07:17 20:25	19:37 (171) 20:04 (171)	08:00 19:23	18:33 (174) 18:56 (173)	07:47 17:25	08:30 16:58	08:58 (66) 09:07 (66)			
8	05:59 21:56	06:35 21:22	07:19 20:23	19:41 (171) 20:06 (171)	08:01 19:21	18:31 (174) 18:53 (173)	07:49 17:23	08:31 16:57	08:59 (66) 09:07 (66)			
9	06:00 21:55	06:37 21:20	07:20 20:21	19:39 (171) 20:07 (171)	08:03 19:18	18:30 (174) 18:52 (173)	07:50 17:22	08:32 16:57	09:00 (66) 09:07 (66)			
10	06:01 21:55	06:38 21:18	07:21 20:19	19:37 (171) 20:08 (171)	08:04 19:16	18:28 (174) 18:48 (174)	07:52 17:20	08:33 16:57	09:02 (66) 09:08 (66)			
11	06:02 21:54	06:39 21:17	07:23 20:17	19:37 (171) 20:10 (171)	08:05 19:14	18:28 (174) 18:47 (174)	07:53 17:19	08:34 16:57	09:03 (66) 09:09 (66)			
12	06:03 21:53	06:41 21:15	07:24 20:15	19:35 (171) 20:11 (171)	08:07 19:12	08:38 (67) 18:45 (174)	07:55 17:18	08:35 16:57	09:03 (66) 09:08 (66)			
13	06:04 21:53	06:42 21:13	07:25 20:13	19:34 (171) 20:11 (171)	08:08 19:10	08:36 (67) 18:43 (174)	07:56 17:16	08:36 16:57	09:04 (66) 09:08 (66)			
14	06:05 21:52	06:44 21:12	07:27 20:11	19:32 (171) 20:11 (171)	08:10 19:08	08:34 (67) 18:41 (174)	07:58 17:15	08:37 16:57	09:05 (66) 09:09 (66)			
15	06:06 21:51	06:45 21:10	07:28 20:09	19:32 (171) 20:13 (171)	08:11 19:07	08:35 (67) 18:39 (174)	08:00 17:14	08:37 16:57	09:06 (66) 09:09 (66)			
16	06:07 21:50	06:46 21:08	07:30 20:07	19:31 (171) 20:13 (171)	08:13 19:05	08:36 (67) 18:37 (174)	08:01 17:13	08:38 16:58	09:07 (66) 09:10 (66)			
17	06:08 21:50	06:48 21:06	07:31 20:04	19:30 (171) 20:13 (171)	08:14 19:03	08:38 (67) 18:35 (174)	08:03 17:12	08:39 16:58	09:08 (66) 09:10 (66)			
18	06:09 21:49	06:49 21:05	07:32 20:02	19:30 (171) 20:14 (171)	08:16 19:01	08:40 (67) 18:33 (174)	08:04 17:11	08:40 16:58	09:08 (66) 09:10 (66)			
19	06:10 21:48	06:51 21:03	07:34 20:00	19:29 (171) 20:13 (171)	08:17 18:57	08:41 (67) 08:51 (67)	08:06 17:09	08:40 16:58	09:09 (66) 09:42 (311)			
20	06:11 21:47	06:52 21:01	07:35 19:58	19:28 (171) 20:13 (171)	08:19 18:55	08:43 (67) 08:51 (67)	08:07 17:08	08:41 16:59	09:09 (66) 09:42 (311)			
21	06:12 21:46	06:53 20:59	07:37 19:56	19:28 (171) 20:14 (171)	08:21 18:53 (173)	08:44 (67) 19:02 (173)	08:09 17:07	08:41 16:59	09:10 (66) 09:43 (311)			
22	06:13 21:45	06:55 20:57	07:38 19:54	19:27 (171) 20:13 (171)	08:22 18:51 (173)	08:46 (67) 19:05 (173)	08:10 17:07	08:42 17:00	09:10 (66) 09:43 (311)			
23	06:15 21:44	06:56 20:55	07:40 19:52	19:27 (171) 20:13 (171)	08:24 18:47 (173)	08:47 (67) 19:07 (173)	08:12 17:06	08:42 17:00	09:11 (66) 09:44 (311)			
24	06:16 21:42	06:58 20:53	07:41 19:50	19:27 (171) 20:13 (171)	08:25 18:46 (173)	08:48 (67) 19:08 (173)	08:13 17:05	08:43 17:01	09:11 (66) 09:44 (311)			
25	06:17 21:41	06:59 20:51	07:42 19:48	19:27 (171) 20:12 (171)	08:27 18:44 (173)	08:49 (67) 19:09 (173)	08:14 17:04	08:43 17:01	09:12 (66) 09:44 (311)			
26	06:18 21:40	07:00 20:49	07:44 19:45	19:26 (171) 20:12 (171)	08:28 18:43 (173)	08:50 (67) 19:10 (173)	08:16 17:03	08:44 17:02	09:12 (66) 09:14 (66)			
27	06:20 21:39	07:02 20:48	07:45 19:43	19:27 (171) 20:12 (171)	08:30 18:42 (173)	08:51 (67) 19:09 (173)	08:17 17:02	08:44 17:03	09:12 (66) 09:15 (66)			
28	06:21 21:38	07:03 20:46	07:47 19:41	19:26 (171) 20:11 (171)	08:31 18:41 (173)	08:52 (67) 19:09 (173)	08:19 17:02	08:44 17:04	09:12 (66) 09:15 (66)			
29	06:22 21:36	07:05 20:44	07:48 19:39	19:26 (171) 20:09 (171)	08:33 18:41 (173)	08:53 (67) 19:10 (173)	08:20 17:01	08:44 17:04	09:12 (66) 09:15 (66)			
30	06:23 21:35	07:06 20:42	07:49 19:37	19:27 (171) 20:09 (171)	08:35 18:40 (173)	08:54 (67) 19:09 (173)	08:21 17:00	08:45 17:05	09:12 (66) 09:16 (66)			
31	06:25 21:34	07:07 20:40	07:50 19:36	19:27 (171) 20:08 (171)	08:36 18:36	08:55 (67) 19:10 (173)	08:22 17:06	08:45 17:05	09:12 (66) 09:17 (66)			
Potential sun hours	486	445	379	336	277	260						
Total, worst case		1024	433	447	145	190						
Sun reduction		0.72	0.69	0.52	0.43	0.44						
Oper. time red.		0.98	0.98	0.98	0.98	0.98						
Wind dir. red.		0.69	0.66	0.64	0.72	0.71						
Total reduction		0.49	0.44	0.33	0.31	0.31						
Total, real		499	191	147	44	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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:25 AM / 11

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 10:00 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: C - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
660	333	352	411	608	961	789	574	695	904	1,116	1,191	8,594

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

	January	February	March	April	May	June
1 08:45	08:23	09:04 (316)	07:35	17:42 (12)	07:32	07:53 (105) 06:34 05:55
17:07	17:50	8 09:12 (316)	18:34	14 17:56 (12)	20:21	50 19:57 (13) 21:05 21:45
2 08:45	08:21		07:33	17:45 (12)	07:30	07:51 (105) 06:32 05:55
17:08	17:52		18:35	8 17:53 (12)	20:22	55 19:59 (13) 21:06 21:46
3 08:45	08:20		07:31		07:28	07:49 (105) 06:31 05:54
17:09	17:53		18:37		20:24	59 20:00 (13) 21:08 21:47
4 08:44	08:18		07:29		07:26	07:48 (105) 06:29 05:53
17:10	17:55		18:38		20:25	60 20:00 (13) 21:09 21:47
5 08:44	08:17		07:27		07:24	07:48 (105) 06:27 05:53 21:01 (15)
17:11	17:57		18:40		20:27	60 20:00 (13) 21:10 21:48 6 21:07 (15)
6 08:44	08:15		07:25		07:21	07:48 (105) 06:26 05:52 20:59 (15)
17:13	17:58		18:42		20:28	59 19:59 (13) 21:12 21:49 11 21:10 (15)
7 08:44	08:14		07:23		07:19	07:48 (105) 06:24 05:52 20:57 (15)
17:14	18:00		18:43		20:30	58 19:59 (13) 21:13 21:50 15 21:12 (15)
8 08:43	08:12		08:21		07:17	07:48 (105) 06:23 05:51 20:56 (15)
17:15	18:00		18:45		20:31	56 19:58 (13) 21:15 21:51 17 21:13 (15)
9 08:43	08:11		08:19		07:15	07:49 (105) 06:21 05:51 20:56 (15)
17:16	18:02		19:46		20:32	54 19:58 (13) 21:16 21:52 19 21:15 (15)
10 08:43	08:09	08:33 (158)	08:17		07:13	07:35 (184) 06:20 05:51 20:54 (15)
17:17	18:03	3 08:36 (158)	19:48		20:34	51 19:57 (13) 21:18 21:52 21 21:15 (15)
11 08:42	08:08		08:15		07:11	07:33 (184) 06:18 05:50 20:54 (15)
17:19	18:05	5 08:36 (158)	19:49		20:35	51 19:56 (13) 21:19 21:53 22 21:16 (15)
12 08:42	09:08 (316)	08:06	08:29 (158)	08:13	07:09	07:31 (184) 06:17 05:50 20:54 (15)
17:20	2 09:10 (316)	18:06	7 08:36 (158)	19:51	20:37	48 19:55 (13) 21:20 21:54 23 21:17 (15)
13 08:41	09:07 (316)	08:04	08:28 (158)	08:11	07:07	07:29 (184) 06:15 05:50 20:54 (15)
17:21	4 09:11 (316)	18:08	10 08:38 (158)	19:52	20:38	38 19:53 (13) 21:22 21:54 24 21:18 (15)
14 08:41	09:07 (316)	08:03	08:26 (158)	08:09	07:05	07:27 (184) 06:14 05:50 20:54 (15)
17:23	5 09:12 (316)	18:10	11 08:37 (158)	19:54	20:40	32 19:51 (13) 21:23 21:55 25 21:19 (15)
15 08:40	09:06 (316)	08:01	08:24 (158)	08:07	07:03	07:25 (184) 06:13 05:50 20:54 (15)
17:24	7 09:13 (316)	18:11	13 08:37 (158)	19:55	20:41	31 19:49 (13) 21:24 21:55 25 21:19 (15)
16 08:39	09:05 (316)	07:59	08:22 (158)	08:05	07:01	07:23 (184) 06:11 05:50 20:54 (15)
17:25	9 09:14 (316)	18:13	19 17:48 (12)	19:57	20:43	27 19:46 (13) 21:26 21:56 26 21:20 (15)
17 08:38	09:04 (316)	07:58	08:21 (158)	08:03	07:00	07:22 (184) 06:10 05:50 20:54 (15)
17:27	10 09:14 (316)	18:15	25 17:51 (12)	19:58	20:44	17 07:39 (184) 21:27 21:56 26 21:20 (15)
18 08:38	09:03 (316)	07:56	08:20 (158)	08:01	06:58	07:20 (184) 06:09 05:50 20:53 (15)
17:28	12 09:15 (316)	18:16	27 17:52 (12)	20:00	20:46	19 07:39 (184) 21:28 21:57 28 21:21 (15)
19 08:37	09:02 (316)	07:54	08:21 (158)	07:59	06:56	07:20 (184) 06:08 05:50 20:53 (15)
17:30	13 09:15 (316)	18:18	27 17:54 (12)	20:01	20:47	18 07:38 (184) 21:30 21:57 28 21:21 (15)
20 08:36	09:01 (316)	07:52	08:23 (158)	07:57	06:54	07:20 (184) 06:06 05:50 20:53 (15)
17:31	15 09:16 (316)	18:19	25 17:55 (12)	20:03	20:49	17 07:37 (184) 21:31 21:58 28 21:21 (15)
21 08:35	09:00 (316)	07:50	08:24 (158)	07:55	06:52	07:21 (184) 06:05 05:50 20:53 (15)
17:33	16 09:16 (316)	18:21	19 17:57 (12)	20:04	20:50	14 07:35 (184) 21:32 21:58 28 21:21 (15)
22 08:34	08:59 (316)	07:49	08:25 (158)	07:53	06:50	07:22 (184) 06:04 05:50 20:53 (15)
17:34	18 09:17 (316)	18:23	20 17:58 (12)	20:06	20:52	11 07:33 (184) 21:33 21:58 28 21:21 (15)
23 08:33	08:58 (316)	07:47	08:26 (158)	07:51	06:48	07:27 (184) 06:03 05:51 20:54 (15)
17:36	19 09:17 (316)	18:24	22 18:00 (12)	20:07	20:53	2 07:29 (184) 21:35 21:58 28 21:22 (15)
24 08:32	08:57 (316)	07:45	08:27 (158)	07:48	06:46	06:02 05:51 20:54 (15)
17:37	20 09:17 (316)	18:26	23 18:01 (12)	20:09	20:54	21:36 21:58 28 21:22 (15)
25 08:31	08:56 (316)	07:43	08:28 (158)	07:46	06:45	06:01 05:51 20:55 (15)
17:39	21 09:17 (316)	18:27	22 18:01 (12)	20:10	20:56	21:37 21:58 26 21:21 (15)
26 08:30	08:56 (316)	07:41	08:29 (158)	07:44	06:43	06:00 05:52 20:56 (15)
17:41	21 09:17 (316)	18:29	21 18:00 (12)	20:12	20:57	21:38 21:59 26 21:22 (15)
27 08:29	08:56 (316)	07:39	17:40 (12)	07:42	08:04 (105)	06:41 05:59 05:52 20:56 (15)
17:42	20 09:16 (316)	18:31	19 17:59 (12)	20:13	17 19:51 (13)	20:59 21:39 21:59 26 21:22 (15)
28 08:28	08:57 (316)	07:37	17:41 (12)	07:40	08:02 (105)	06:39 05:58 05:52 20:57 (15)
17:44	19 09:16 (316)	18:32	17 17:58 (12)	20:15	26 19:52 (13)	21:00 21:40 21:59 25 21:22 (15)
29 08:26	08:58 (316)			07:38	08:00 (105)	06:37 05:58 05:53 20:57 (15)
17:45	18 09:16 (316)			20:16	34 19:54 (13)	21:02 21:41 21:58 24 21:21 (15)
30 08:25	08:59 (316)			07:36	07:58 (105)	06:36 05:57 05:53 20:58 (15)
17:47	15 09:14 (316)			20:18	39 19:55 (13)	21:03 21:43 21:58 24 21:22 (15)
31 08:24	09:01 (316)			07:34	07:56 (105)	06:34 05:56 05:53 20:58 (15)
17:48	12 09:13 (316)			20:19	46 19:57 (13)	21:44 21:44 21:44 24 21:22 (15)
Potential sun hours	273	285	368	410	471	481
Total, worst case	276	343	184	887	607	
Sun reduction	0.56	0.50	0.63	0.59	0.70	
Oper. time red.	0.98	0.98	0.98	0.98	0.98	
Wind dir. red.	0.72	0.65	0.66	0.66	0.72	
Total reduction	0.39	0.32	0.41	0.38	0.49	
Total, real	109	110	75	339	300	

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:25 AM / 12

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 10:00 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: C - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
660	333	352	411	608	961	789	574	695	904	1,116	1,191	8,594

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

	July	August	September	October	November	December
1	05:54 23 21:58	20:58 (15) 21:21 (15) 06:26	07:09 20:38	07:32 (184) 19:55 (13) 19:35	07:51 17:34	08:03 (158) 08:22
2	05:55 22 21:58	20:59 (15) 21:21 (15) 06:27	07:10 20:36	07:34 (184) 19:56 (13) 19:33	07:52 17:32	08:24 16:59
3	05:55 19 21:58	21:01 (15) 21:20 (15) 06:29	07:11 20:34	07:47 (105) 19:56 (13) 19:31	07:54 17:31	08:25 16:59
4	05:56 18 21:57	21:01 (15) 21:19 (15) 06:30	07:13 20:31	07:46 (105) 19:55 (13) 19:29	07:55 17:29	08:26 16:58
5	05:57 15 21:57	21:03 (15) 21:18 (15) 06:31	07:14 20:29	07:45 (105) 19:56 (13) 19:27	07:57 17:28	08:27 16:58
6	05:57 12 21:57	21:05 (15) 21:17 (15) 06:33	07:16 20:27	07:44 (105) 19:55 (13) 19:25	07:58 17:26	08:29 16:58
7	05:58 9 21:56	21:06 (15) 21:15 (15) 06:34	07:17 20:25	07:43 (105) 19:55 (13) 19:22	08:00 17:25	08:30 16:58
8	05:59 21:56	06:35 21:22	07:18 20:23	07:43 (105) 19:55 (13) 19:20	08:01 17:23	08:31 16:57
9	06:00 21:55	06:37 21:20	07:20 20:21	07:43 (105) 19:54 (13) 19:18	08:02 17:22	08:32 16:57
10	06:01 21:55	06:38 21:18	07:21 20:19	07:44 (105) 19:52 (13) 19:16	08:04 17:20	08:33 16:57
11	06:02 21:54	06:39 21:17	07:23 20:17	07:46 (105) 19:51 (13) 19:14	08:05 17:19	08:34 16:57
12	06:03 21:53	06:41 21:15	07:24 20:15	07:47 (105) 19:48 (13) 19:12	08:07 18:17 (12) 17:18	08:35 08:30 (316) 16:57
13	06:04 21:53	06:42 21:13	07:25 20:13	07:48 (105) 19:46 (13) 19:10	08:08 18:30 (12) 17:16	08:36 08:29 (316) 16:57
14	06:05 21:52	06:44 21:12	07:27 20:11	07:50 (105) 19:44 (13) 19:08	08:10 18:13 (12) 17:15	08:37 08:29 (316) 16:57
15	06:06 21:51	06:45 21:10	07:28 20:09	07:51 (105) 19:42 (13) 19:06	08:11 18:12 (12) 17:14	08:37 08:28 (316) 16:57
16	06:07 21:50	06:46 21:08	07:30 20:06	07:53 (105) 19:40 (13) 19:04	08:13 18:32 (12) 17:13	08:38 08:28 (316) 16:57
17	06:08 21:50	06:48 21:06	07:31 20:04	07:54 (105) 07:57 (105) 19:03	08:14 18:32 (12) 17:12	08:39 08:29 (316) 16:58
18	06:09 21:49	06:49 21:05	07:32 20:02	08:16 19:01	18:09 (12) 18:32 (12) 17:10	08:40 08:31 (316) 16:58
19	06:10 21:48	06:50 21:03	07:34 20:00	08:17 18:57	18:09 (12) 18:31 (12) 17:09	08:40 08:33 (316) 16:58
20	06:11 21:47	06:52 21:01	07:35 19:58	08:19 18:55	18:09 (12) 18:29 (12) 17:08	08:41 08:34 (316) 16:59
21	06:12 21:46	06:53 20:59	07:37 19:56	08:20 18:53	08:57 (158) 18:27 (12) 17:07	08:41 08:36 (316) 16:59
22	06:13 21:45	06:55 20:57	07:38 19:54	08:22 18:51	08:53 (158) 18:25 (12) 17:06	08:42 08:37 (316) 17:00
23	06:15 21:44	06:56 20:55	07:39 19:52	08:24 18:49	08:51 (158) 18:24 (12) 17:06	08:42 08:39 (316) 17:00
24	06:16 21:42	06:57 20:53	07:41 19:50	08:25 18:48	08:49 (158) 18:21 (12) 17:05	08:43 08:41 (316) 17:01
25	06:17 21:41	06:59 20:51	07:42 19:47	08:27 18:46	08:51 (158) 18:20 (12) 17:04	08:43 08:42 (316) 17:01
26	06:18 21:40	07:00 20:49	07:44 19:45	08:28 18:44	08:52 (158) 18:17 (12) 17:03	08:44 08:44 (316) 17:02
27	06:19 21:39	07:02 20:47	07:45 19:43	08:30 18:42	08:54 (158) 09:07 (158) 17:02	08:45 08:45 (316) 17:03
28	06:21 21:38	07:03 20:46	07:47 19:41	08:31 18:41	08:56 (158) 09:07 (158) 17:02	08:46 08:47 (316) 17:03
29	06:22 21:36	07:04 20:44	07:48 19:39	08:33 18:39	08:57 (158) 09:06 (158) 17:01	08:47 08:48 (316) 17:04
30	06:23 21:35	07:06 20:42	07:49 19:37	08:34 18:37	08:59 (158) 09:06 (158) 17:00	08:48 08:49 (316) 17:05
31	06:25 21:34	07:07 20:40	07:31 (184) 19:55 (13)	08:36 18:35	09:01 (158) 09:06 (158)	08:45 17:06
Potential sun hours	486	445	379	336	277	260
Total, worst case	118	279	784	357	291	
Sun reduction	0.75	0.72	0.69	0.52	0.43	
Oper. time red.	0.98	0.98	0.98	0.98	0.98	
Wind dir. red.	0.72	0.65	0.67	0.64	0.72	
Total reduction	0.53	0.46	0.45	0.33	0.31	
Total, real	62	128	354	118	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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:25 AM / 13

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000

wind@eapc.net

Calculated:

10/1/2015 10:00 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor:** D - Participating

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

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

Assumptions for shadow calculations

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
660	333	352	411	608	961	789	574	695	904	1,116	1,191	8,594

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

	January	February	March	April	May	June
1	08:45	10:25 (176)	08:22	08:47 (177)	07:35	07:32
	17:07	28 10:53 (176)	17:50	19 09:06 (177)	18:34	20:21
2	08:45	10:27 (176)	08:21	08:45 (177)	07:33	07:29
	17:08	26 10:53 (176)	17:51	21 09:06 (177)	18:35	20:22
3	08:45	10:28 (176)	08:20	08:44 (177)	07:31	07:27
	17:09	25 10:53 (176)	17:53	23 09:07 (177)	18:37	20:23
4	08:44	10:29 (176)	08:18	08:42 (177)	07:29	07:25
	17:10	24 10:53 (176)	17:55	26 09:08 (177)	18:38	20:25
5	08:44	10:30 (176)	08:17	08:41 (177)	07:27	07:23
	17:11	22 10:52 (176)	17:56	28 09:09 (177)	18:40	20:26
6	08:44	10:32 (176)	08:15	08:39 (177)	07:25	07:21
	17:12	19 10:51 (176)	17:58	30 09:09 (177)	18:41	20:28
7	08:44	10:34 (176)	08:14	08:38 (177)	07:23	07:19
	17:13	17 10:51 (176)	18:00	32 09:10 (177)	18:43	20:29
8	08:43	10:36 (176)	08:12	08:36 (177)	08:21	08:17
	17:15	13 10:49 (176)	18:00	34 09:10 (177)	18:44	20:31
9	08:43	10:39 (176)	08:11	08:35 (177)	08:19	08:15
	17:16	8 10:47 (176)	18:01	35 09:10 (177)	19:46	20:32
10	08:43		08:09	08:36 (177)	08:17	08:13
	17:17		18:03	34 09:10 (177)	19:48	20:34
11	08:42		08:08	08:35 (177)	08:15	08:11
	17:18		18:05	35 09:10 (177)	19:49	20:35
12	08:42		08:06	08:35 (177)	08:13	08:09
	17:20		18:06	35 09:10 (177)	19:51	20:37
13	08:41		08:04	08:36 (177)	08:11	08:07
	17:21		18:08	34 09:10 (177)	19:52	20:38
14	08:40		08:03	08:37 (177)	08:09	08:05
	17:22		18:09	32 09:09 (177)	19:54	20:40
15	08:40		08:01	08:37 (177)	08:07	08:03
	17:24		18:11	31 09:08 (177)	19:55	20:41
16	08:39		07:59	08:37 (177)	08:05	08:01
	17:25		18:13	30 09:07 (177)	19:57	20:43
17	08:38		07:57	08:38 (177)	08:03	08:00
	17:27		18:14	28 09:06 (177)	19:58	20:44
18	08:38		07:56	08:40 (177)	08:01	08:00
	17:28		18:16	26 09:06 (177)	20:00	20:46
19	08:37		07:54	08:41 (177)	07:59	08:00
	17:30		18:18	23 09:04 (177)	20:01	20:47
20	08:36		07:52	08:43 (177)	07:57	08:00
	17:31		18:19	19 09:02 (177)	20:03	20:49
21	08:35		07:50	08:46 (177)	07:54	08:00
	17:32		18:21	13 08:59 (177)	20:04	20:50
22	08:34		07:48		07:52	08:00
	17:34		18:22		20:06	20:51
23	08:33		07:47		07:50	08:00
	17:36		18:24		20:07	20:53
24	08:32		07:45		07:48	08:00
	17:37		18:26		20:09	20:54
25	08:31		07:43		07:46	08:00
	17:39		18:27		20:10	20:56
26	08:30		07:41		07:44	08:00
	17:40		18:29		20:12	20:57
27	08:29	08:53 (177)	07:39		07:42	08:00
	17:42	2 08:55 (177)	18:30		20:13	20:59
28	08:28	08:52 (177)	07:37		07:40	08:00
	17:43	7 08:59 (177)	18:32		20:15	21:00
29	08:26	08:51 (177)			07:38	08:00
	17:45	10 09:01 (177)			20:16	21:02
30	08:25	08:49 (177)			07:36	08:00
	17:47	13 09:02 (177)			20:18	21:04
31	08:24	08:48 (177)			07:34	08:00
	17:48	16 09:04 (177)			20:19	21:06
Potential sun hours	273	284	368	410	472	482
Total, worst case	230	588	223	138	165	
Sun reduction	0.56	0.50	0.63	0.59	0.67	
Oper. time red.	0.98	0.98	0.98	0.98	0.98	
Wind dir. red.	0.70	0.72	0.69	0.64	0.60	
Total reduction	0.39	0.36	0.43	0.37	0.40	
Total, real	89	212	96	51	66	

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)

<p>Project: 20132550- Lindahl Wind Farm</p> <p>TradeWind Energy, Inc. Kevin Walter Southlake Technology Park, 16105 W 113th St, Ste 1 Lenexa, KS, 66219</p>	<p>Description: EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.</p>	<p>Printed/Page: 10/2/2015 10:25 AM / 14</p> <p>Licensed user: EAPC Wind Energy 3100 DeMers Avenue US-GRAND FORKS, ND 58201 +1 701 775 3000 wind@eapc.net</p> <p>Calculated: 10/1/2015 10:00 PM/2.9.285</p>
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

SHADOW - Calendar

Calculation: A059 V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor:** D - Participating

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [BISMARCK]
 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 4.92 5.13 7.45 8.03 10.20 11.21 11.69 10.35 8.68 5.69 4.02 3.69

Operational time
 N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
 660 333 352 411 608 961 789 574 695 904 1,116 1,191 8,594
 Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December										
1	05:54	06:26	06:51 (180)	07:08	07:32 (179)	07:51	08:13 (178)	07:37	08:04 (177)	08:22						
	21:58	21:32	12 07:03 (180)	20:37	16 07:48 (179)	19:35	19 08:32 (178)	17:34	35 08:39 (177)	16:59						
2	05:54	06:27	06:53 (180)	07:10	07:33 (179)	07:52	08:15 (178)	07:39	08:05 (177)	08:24						
	21:58	21:31	11 07:04 (180)	20:35	15 07:48 (179)	19:33	17 08:32 (178)	17:32	34 08:39 (177)	16:59						
3	05:55	06:28	06:54 (180)	07:11	07:35 (179)	07:54	08:16 (178)	07:41	08:06 (177)	08:25			10:23 (176)			
	21:58	21:29	10 07:04 (180)	20:33	13 07:48 (179)	19:31	15 08:31 (178)	17:30	34 08:40 (177)	16:59	7	10:30 (176)				
4	05:56	06:30	06:55 (180)	07:13	07:36 (179)	07:55	08:18 (178)	07:42	08:07 (177)	08:26			10:21 (176)			
	21:57	21:28	9 07:04 (180)	20:31	12 07:48 (179)	19:28	13 08:31 (178)	17:29	32 08:39 (177)	16:58	13	10:34 (176)				
5	05:56	06:31	06:56 (180)	07:14	07:37 (179)	07:56	08:19 (178)	07:44	08:09 (177)	08:27			10:19 (176)			
	21:57	21:26	7 07:03 (180)	20:29	10 07:47 (179)	19:26	10 08:29 (178)	17:27	30 08:39 (177)	16:58	17	10:36 (176)				
6	05:57	06:32	06:58 (180)	07:15	07:39 (179)	07:58	08:21 (178)	07:45	08:11 (177)	08:28			10:18 (176)			
	21:57	21:25	5 07:03 (180)	20:27	8 07:47 (179)	19:24	7 08:28 (178)	17:26	28 08:39 (177)	16:57	19	10:37 (176)				
7	05:58	06:34	06:59 (180)	07:17	07:40 (179)	07:59	08:22 (178)	07:47	08:13 (177)	08:30			10:17 (176)			
	21:56	21:23	3 07:02 (180)	20:25	5 07:45 (179)	19:22	4 08:26 (178)	17:24	25 08:38 (177)	16:57	22	10:39 (176)				
8	05:59	06:35	07:00 (180)	07:18	07:41 (179)	08:01	07:49	08:14 (177)	08:31	10:16 (176)						
	21:56	21:22	1 07:01 (180)	20:23	3 07:44 (179)	19:20	17:23	23 08:37 (177)	16:57	24	10:40 (176)					
9	06:00	06:36	07:20	08:02	08:02	07:50	08:16 (177)	08:32	10:16 (176)							
	21:55	21:20	20:21	19:18	17:21	21 08:37 (177)	16:57	25	10:41 (176)							
10	06:00	06:38	07:21	08:04	07:52	08:18 (177)	08:33	10:16 (176)								
	21:55	21:18	20:19	19:16	17:20	18 08:36 (177)	16:57	26	10:42 (176)							
11	06:01	06:39	07:22	08:05	07:53	08:19 (177)	08:34	10:16 (176)								
	21:54	21:17	20:17	19:14	17:19	16 08:35 (177)	16:57	27	10:43 (176)							
12	06:02	06:40	07:24	08:07	07:55	08:21 (177)	08:35	10:16 (176)								
	21:53	21:15	20:15	19:12	17:17	13 08:34 (177)	16:57	28	10:44 (176)							
13	06:03	06:42	07:25	08:08	07:56	08:23 (177)	08:36	10:16 (176)								
	21:53	21:13	20:13	19:10	17:16	10 08:33 (177)	16:57	29	10:45 (176)							
14	06:04	06:43	07:27	08:10	07:58	08:24 (177)	08:37	10:16 (176)								
	21:52	21:12	20:11	19:08	17:15	6 08:30 (177)	16:57	30	10:46 (176)							
15	06:05	06:45	07:28	08:11	07:59	08:26 (177)	08:37	10:16 (176)								
	21:51	21:10	20:08	19:06	17:14	2 08:28 (177)	16:57	31	10:47 (176)							
16	06:06	06:46	07:29	08:13	08:01	08:38	10:17 (176)									
	21:50	21:08	20:06	19:04	17:12	16:57	31	10:48 (176)								
17	06:07	06:47	07:31	08:14	08:02	08:39	10:17 (176)									
	21:50	21:06	20:04	19:02	17:11	16:57	32	10:49 (176)								
18	06:08	06:49	07:32	08:16	08:04	08:40	10:17 (176)									
	21:49	21:04	20:02	19:00	17:10	16:58	32	10:49 (176)								
19	06:10	06:50	07:34	08:17	08:06	08:40	10:17 (176)									
	21:48	21:03	20:00	18:57	17:09	16:58	33	10:50 (176)								
20	06:11	06:52	07:35	08:19	08:07	08:41	10:17 (176)									
	21:47	21:01	19:58	18:55	7 09:27 (177)	17:08	16:58	33	10:50 (176)							
21	06:12	06:53	07:36	08:20	08:08	08:41	10:18 (176)									
	21:46	20:59	19:56	18:53	15 09:30 (177)	17:07	16:59	33	10:51 (176)							
22	06:13	06:54	07:38	08:22	08:10	08:42	10:18 (176)									
	21:45	20:57	19:54	18:51	20 09:33 (177)	17:06	16:59	33	10:51 (176)							
23	06:14	06:56	07:39	08:23	08:11	08:42	10:19 (176)									
	21:43	20:55	19:52	4 08:25 (178)	18:49	24 09:34 (177)	17:05	17:00	33	10:52 (176)						
24	06:15	06:50 (180)	06:57	07:41	08:16 (178)	08:25	09:09 (177)	08:13	08:43	10:19 (176)						
	21:42	8 06:58 (180)	20:53	19:49	12 08:28 (178)	18:47	27 09:36 (177)	17:04	17:00	33	10:52 (176)					
25	06:17	06:48 (180)	06:59	07:42	08:14 (178)	08:27	09:08 (177)	08:14	08:43	10:21 (176)						
	21:41	11 06:59 (180)	20:51	19:47	17 08:31 (178)	18:46	29 09:37 (177)	17:04	17:01	32	10:53 (176)					
26	06:18	06:47 (180)	07:00	07:43	08:12 (178)	08:28	09:07 (177)	08:16	08:44	10:21 (176)						
	21:40	13 07:00 (180)	20:49	19:45	19 08:31 (178)	18:44	30 09:37 (177)	17:03	17:02	32	10:53 (176)					
27	06:19	06:46 (180)	07:01	07:45	08:11 (178)	08:30	09:06 (177)	08:17	08:44	10:21 (176)						
	21:39	15 07:01 (180)	20:47	19:43	22 08:33 (178)	18:42	32 09:38 (177)	17:02	17:02	32	10:53 (176)					
28	06:20	06:46 (180)	07:03	07:35 (179)	07:46	08:09 (178)	08:31	09:06 (177)	08:18	08:44	10:22 (176)					
	21:38	16 07:02 (180)	20:45	10 07:45 (179)	19:41	24 08:33 (178)	18:40	33 09:39 (177)	17:01	17:03	31	10:53 (176)				
29	06:22	06:48 (180)	07:04	07:32 (179)	07:48	08:11 (178)	08:33	09:05 (177)	08:20	08:44	10:23 (176)					
	21:36	15 07:03 (180)	20:43	14 07:46 (179)	19:39	22 08:33 (178)	18:39	34 09:39 (177)	17:01	17:04	30	10:53 (176)				
30	06:23	06:49 (180)	07:06	07:30 (179)	07:49	08:12 (178)	08:34	09:05 (177)	08:21	08:44	10:23 (176)					
	21:35	14 07:03 (180)	20:41	17 07:47 (179)	19:37	21 08:33 (178)	18:37	34 09:39 (177)	17:00	17:05	30	10:53 (176)				
31	06:24	06:50 (180)	07:07	07:31 (179)	07:49	08:13 (178)	08:36	09:05 (177)	08:22	08:45	10:24 (176)					
	21:34	13 07:03 (180)	20:39	17 07:48 (179)	19:35	35 09:40 (177)	17:06	29	10:53 (176)							
Potential sun hours	486	445	379	336	277	260										
Total, worst case	105	116	223	405	327	807										
Sun reduction	0.75	0.72	0.69	0.52	0.44	0.44										
Oper. time red.	0.98	0.98	0.98	0.98	0.98	0.98										
Wind dir. red.	0.60	0.62	0.67	0.72	0.72	0.69										
Total reduction	0.44	0.44	0.46	0.37	0.31	0.30										
Total, real	46	51	102	150	101	244										

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:25 AM / 15

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net

Calculated:

10/1/2015 10:00 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: E - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
660	333	352	411	608	961	789	574	695	904	1,116	1,191	8,594

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

	January	February	March	April	May	June	
1	08:45	08:22	07:35	07:32	06:34	06:57 (300) 05:55	
	17:07	17:50	18:34	20:20	21:05	24 07:21 (300) 21:44	
2	08:44	08:21	07:33	07:29	06:32	06:55 (300) 05:54	
	17:08	17:51	18:35	20:22	21:06	26 07:21 (300) 21:45	
3	08:44	08:20	07:31	07:27	06:30	06:53 (300) 05:54	
	17:09	17:53	18:37	20:23	21:07	28 07:21 (300) 21:46	
4	08:44	08:18	07:29	07:25	06:29	06:52 (300) 05:53	
	17:10	17:55	18:38	20:25	21:09	30 07:22 (300) 21:47	
5	08:44	08:17	07:27	07:49 (34) 07:23	06:27	06:50 (300) 05:53	
	17:11	17:56	18:40	15 08:04 (34) 20:26	21:10	31 07:21 (300) 21:48	
6	08:44	08:15	07:25	07:47 (34) 07:21	06:26	06:49 (300) 05:52	
	17:12	17:58	18:41	20 08:07 (34) 20:28	21:12	33 07:22 (300) 21:49	
7	08:44	08:14	07:23	07:45 (34) 07:19	06:24	06:47 (300) 05:52	
	17:13	18:00	18:43	24 08:09 (34) 20:29	21:13	35 07:22 (300) 21:50	
8	08:43	08:12	08:21	08:43 (34) 07:17	06:22	06:46 (300) 05:51	
	17:15	18:00	18:44	27 09:10 (34) 20:31	21:15	36 07:22 (300) 21:51	
9	08:43	08:11	08:19	08:41 (34) 07:15	06:21	06:45 (300) 05:51	
	17:16	18:01	19:46	31 09:12 (34) 20:32	21:16	37 07:22 (300) 21:52	
10	08:43	08:09	08:17	08:39 (34) 07:13	06:19	06:44 (300) 05:50	
	17:17	18:03	19:48	34 09:13 (34) 20:34	21:17	38 07:22 (300) 21:52	
11	08:42	08:08	08:15	08:37 (34) 07:11	06:18	06:45 (300) 05:50	
	17:18	18:05	19:49	36 09:13 (34) 20:35	21:19	37 07:22 (300) 21:53	
12	08:42	08:06	08:13	08:35 (34) 07:09	06:17	06:44 (300) 05:50	
	17:20	18:06	19:51	39 09:14 (34) 20:37	21:20	37 07:21 (300) 21:54	
13	08:41	08:04	08:11	08:34 (34) 07:07	06:15	06:45 (300) 05:50	
	17:21	18:08	19:52	41 09:15 (34) 20:38	21:21	36 07:21 (300) 21:54	
14	08:40	08:03	08:09	08:33 (34) 07:05	06:14	06:45 (300) 05:50	
	17:22	18:09	19:54	42 09:15 (34) 20:40	21:23	36 07:21 (300) 21:55	
15	08:40	08:01	08:07	08:32 (34) 07:03	06:12	06:46 (300) 05:49	
	17:24	18:11	19:55	43 09:15 (34) 20:41	21:24	35 07:21 (300) 21:55	
16	08:39	07:59	08:05	08:32 (34) 07:01	06:11	06:45 (300) 05:49	
	17:25	18:13	19:57	43 09:15 (34) 20:43	21:26	35 07:20 (300) 21:56	
17	08:38	07:57	08:03	08:32 (34) 06:59	06:10	06:46 (300) 05:49	
	17:27	18:14	19:58	43 09:15 (34) 20:44	21:27	33 07:19 (300) 21:56	
18	08:38	07:56	08:01	08:30 (34) 06:57	06:09	06:47 (300) 05:49	
	17:28	18:16	20:00	44 09:14 (34) 20:46	21:28	32 07:19 (300) 21:57	
19	08:37	07:54	07:59	08:30 (34) 06:55	07:18 (36) 06:07	06:48 (300) 05:50	
	17:30	18:18	20:01	44 09:14 (34) 20:47	2 07:20 (36) 21:29	30 07:18 (300) 21:57	
20	08:36	07:52	07:57	08:30 (34) 06:54	07:16 (36) 06:06	06:48 (300) 05:50	
	17:31	18:19	20:03	43 09:13 (34) 20:48	4 07:20 (36) 21:31	30 07:18 (300) 21:57	
21	08:35	07:50	07:54	08:30 (34) 06:52	07:14 (36) 06:05	06:49 (300) 05:50	
	17:33	18:21	20:04	43 09:13 (34) 20:50	6 07:20 (36) 21:32	28 07:17 (300) 21:58	
22	08:34	07:48	07:52	08:31 (34) 06:50	07:12 (36) 06:04	06:50 (300) 05:50	
	17:34	18:22	20:06	41 09:12 (34) 20:51	8 07:20 (36) 21:33	26 07:16 (300) 21:58	
23	08:33	07:47	07:50	08:31 (34) 06:48	07:10 (36) 06:03	06:51 (300) 05:50	
	17:36	18:24	20:07	40 09:11 (34) 20:53	9 07:19 (36) 21:34	24 07:15 (300) 21:58	
24	08:32	07:45	07:48	08:31 (34) 06:46	07:09 (300) 06:02	06:52 (300) 05:51	
	17:37	18:26	20:09	39 09:10 (34) 20:54	10 07:19 (36) 21:36	22 07:14 (300) 21:58	
25	08:31	07:43	07:46	08:32 (34) 06:44	07:07 (300) 06:01	06:53 (300) 05:51	
	17:39	18:27	20:10	37 09:09 (34) 20:56	11 07:18 (36) 21:37	20 07:13 (300) 21:58	
26	08:30	07:41	07:44	08:33 (34) 06:42	07:05 (300) 06:00	06:54 (300) 05:51	
	17:40	18:29	20:12	35 09:08 (34) 20:57	12 07:17 (36) 21:38	18 07:12 (300) 21:58	
27	08:29	07:39	07:42	08:34 (34) 06:41	07:03 (300) 05:59	06:55 (300) 05:52	
	17:42	18:30	20:13	32 09:06 (34) 20:59	14 07:17 (300) 21:39	16 07:11 (300) 21:58	
28	08:27	07:37	07:40	08:35 (34) 06:39	07:02 (300) 05:58	06:58 (300) 05:52	
	17:43	18:32	20:15	29 09:04 (34) 21:00	16 07:18 (300) 21:40	12 07:10 (300) 21:58	
29	08:26		07:38	08:36 (34) 06:37	07:00 (300) 05:57	07:01 (300) 05:53	
	17:45		20:16	25 09:01 (34) 21:02	19 07:19 (300) 21:41	6 07:07 (300) 21:58	
30	08:25		07:36	08:38 (34) 06:35	06:58 (300) 05:56		05:53
	17:47		20:18	20 08:58 (34) 21:03	22 07:20 (300) 21:42		21:58
31	08:24		07:34	08:41 (34)			
	17:48		20:19	14 08:55 (34)			
Potential sun hours	273	284	368	410	472		481
Total, worst case			924	133		831	
Sun reduction			0.63	0.59		0.67	
Oper. time red.			0.98	0.98		0.98	
Wind dir. red.			0.69	0.61		0.61	
Total reduction			0.43	0.35		0.40	
Total, real			396	47		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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:25 AM / 16

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 10:00 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: E - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
660	333	352	411	608	961	789	574	695	904	1,116	1,191	8,594

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

	July	August	September	October	November	December
1 05:54	06:26	06:55 (300)	07:08	07:51	08:13 (34)	07:37 08:22
21:58	21:32	37 07:32 (300)	20:37	19:35	40 08:53 (34)	17:34 17:00
2 05:54	06:27	06:55 (300)	07:10	07:52	08:15 (34)	07:39 08:24
21:58	21:31	37 07:32 (300)	20:35	19:33	38 08:53 (34)	17:32 16:59
3 05:55	06:28	06:55 (300)	07:11	07:54	08:16 (34)	07:41 08:25
21:58	21:29	37 07:32 (300)	20:33	19:31	35 08:51 (34)	17:30 16:59
4 05:56	06:30	06:55 (300)	07:13	07:55	08:18 (34)	07:42 08:26
21:57	21:28	37 07:32 (300)	20:31	19:28	32 08:50 (34)	17:29 16:58
5 05:56	06:31	06:56 (300)	07:14	07:56	08:19 (34)	07:44 08:27
21:57	21:26	36 07:32 (300)	20:29	19:26	29 08:48 (34)	17:27 16:58
6 05:57	06:32	06:58 (300)	07:15	07:58	08:21 (34)	07:45 08:28
21:57	21:25	34 07:32 (300)	20:27	19:24	26 08:47 (34)	17:26 16:57
7 05:58	06:34	06:59 (300)	07:17	07:59	08:22 (34)	07:47 08:30
21:56	21:23	33 07:32 (300)	20:25	19:22	22 08:44 (34)	17:24 16:57
8 05:59	06:35	07:00 (300)	07:18	08:01	08:24 (34)	07:48 08:31
21:56	21:21	31 07:31 (300)	20:23	19:20	17 08:41 (34)	17:23 16:57
9 06:00	06:36	07:02 (300)	07:20	08:02	08:25 (34)	07:50 08:32
21:55	21:20	29 07:31 (300)	20:21	19:18	12 08:37 (34)	17:21 16:57
10 06:00	06:38	07:03 (300)	07:21	08:04	07:52 08:33	
21:55	21:18	27 07:30 (300)	20:19	19:16	17:20 16:57	
11 06:01	06:39	07:04 (300)	07:22	08:05	07:53 08:34	
21:54	21:17	25 07:29 (300)	20:17	19:14	17:19 16:57	
12 06:02	06:40	07:05 (300)	07:24	08:34 (34)	08:07 08:35	
21:53	21:15	23 07:28 (300)	20:15	12 08:46 (34)	19:12 17:17 16:57	
13 06:03	06:42	07:07 (300)	07:25	08:29 (34)	08:08 08:36	
21:53	21:13	21 07:28 (300)	20:13	20 08:49 (34)	19:10 17:16 16:57	
14 06:04	06:43	07:08 (300)	07:27	08:27 (34)	08:10 08:36	
21:52	21:11	18 07:26 (300)	20:10	25 08:52 (34)	19:08 17:15 16:57	
15 06:05	07:08 (300)	06:45	07:09 (300)	07:28	08:25 (34)	08:11 07:59 08:37
21:51	9 07:17 (300)	21:10	16 07:25 (300)	20:08	28 08:53 (34)	19:06 17:14 16:57
16 06:06	07:06 (300)	06:46	07:11 (300)	07:29	08:22 (34)	08:13 08:01 08:38
21:50	13 07:19 (300)	21:08	13 07:24 (300)	20:06	32 08:54 (34)	19:04 17:12 16:57
17 06:07	07:04 (300)	06:47	07:12 (300)	07:31	08:21 (34)	08:14 08:02 08:39
21:49	17 07:21 (300)	21:06	11 07:23 (36)	20:04	35 08:56 (34)	19:02 17:11 16:57
18 06:09	07:03 (300)	06:49	07:13 (300)	07:32	08:20 (34)	08:16 08:04 08:39
21:49	19 07:22 (300)	21:04	11 07:24 (36)	20:02	36 08:56 (34)	19:00 17:10 16:58
19 06:10	07:02 (300)	06:50	07:15 (35)	07:34	08:18 (34)	08:17 08:05 08:40
21:48	21 07:23 (300)	21:02	10 07:25 (36)	20:00	38 08:56 (34)	18:57 17:09 16:58
20 06:11	07:01 (300)	06:52	07:16 (36)	07:35	08:17 (34)	08:19 08:07 08:41
21:47	23 07:24 (300)	21:01	9 07:25 (36)	19:58	40 08:57 (34)	18:55 17:08 16:58
21 06:12	07:00 (300)	06:53	07:17 (36)	07:36	08:16 (34)	08:20 08:08 08:41
21:46	25 07:25 (300)	20:59	7 07:24 (36)	19:56	41 08:57 (34)	18:53 17:07 16:59
22 06:13	06:59 (300)	06:54	07:19 (36)	07:38	08:16 (34)	08:22 08:10 08:42
21:45	27 07:26 (300)	20:57	6 07:25 (36)	19:54	42 08:58 (34)	18:51 17:06 16:59
23 06:14	06:59 (300)	06:56	07:20 (36)	07:39	08:15 (34)	08:23 08:11 08:42
21:43	29 07:28 (300)	20:55	4 07:24 (36)	19:51	43 08:58 (34)	18:49 17:05 17:00
24 06:15	06:59 (300)	06:57	07:21 (36)	07:41	08:14 (34)	08:25 08:13 08:43
21:42	30 07:29 (300)	20:53	2 07:23 (36)	19:49	43 08:57 (34)	18:47 17:04 17:00
25 06:17	06:58 (300)	06:59	07:42	07:42	44 08:58 (34)	18:46 17:04 17:01
21:41	31 07:29 (300)	20:51	19:47	44 08:58 (34)	18:46 17:04 17:01	
26 06:18	06:57 (300)	07:00	07:43	07:43	44 08:57 (34)	18:44 17:03 17:02
21:40	33 07:30 (300)	20:49	19:45	44 08:57 (34)	18:44 17:03 17:02	
27 06:19	06:56 (300)	07:01	07:45	07:45	44 08:56 (34)	18:42 17:01 17:00
21:39	34 07:30 (300)	20:47	19:43	43 08:57 (34)	18:42 17:02 17:02	
28 06:20	06:56 (300)	07:03	07:46	07:46	43 08:56 (34)	18:40 17:01 17:03
21:37	34 07:30 (300)	20:45	19:41	43 08:56 (34)	18:40 17:01 17:03	
29 06:22	06:56 (300)	07:04	07:48	07:48	42 08:56 (34)	18:39 17:01 17:04
21:36	35 07:31 (300)	20:43	19:39	42 08:56 (34)	18:39 17:01 17:04	
30 06:23	06:56 (300)	07:06	07:49	07:49	42 08:55 (34)	18:37 17:00 17:05
21:35	36 07:32 (300)	20:41	19:37	42 08:55 (34)	18:37 17:00 17:05	
31 06:24	06:55 (300)	07:07	07:50	07:50	42 08:54 (34)	18:36 17:00 17:06
21:33	37 07:32 (300)	20:39	19:35	42 08:54 (34)	18:36 17:00 17:06	
Potential sun hours	486	445	379	336	277	260
Total, worst case	453	514	693	251		
Sun reduction	0.75	0.72	0.69	0.52		
Oper. time red.	0.98	0.98	0.98	0.98		
Wind dir. red.	0.61	0.61	0.69	0.69		
Total reduction	0.45	0.43	0.47	0.36		
Total, real	202	222	325	90		

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:25 AM / 17

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 10:00 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: F - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
660	333	352	411	608	961	789	574	695	904	1,116	1,191	8,594

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

	January	February	March	April	May	June
1 08:45	16:01 (15) 08:23	08:47 (184) 07:35	07:32		06:34	19:40 (14) 05:55
17:07	34 16:35 (13) 17:50	14 09:01 (184) 18:34	20:21		21:05	39 20:19 (14) 21:45
2 08:45	16:01 (15) 08:21	08:45 (184) 07:33	07:30		06:32	19:40 (14) 05:55
17:08	36 16:37 (13) 17:52	15 09:00 (184) 18:35	20:22		21:06	38 20:18 (14) 21:46
3 08:45	16:02 (15) 08:20	08:44 (184) 07:31	07:28		06:31	19:42 (14) 05:54
17:09	35 16:37 (13) 17:53	16 09:00 (184) 18:37	20:24		21:08	36 20:18 (14) 21:47
4 08:44	16:02 (15) 08:18	08:42 (184) 07:29	07:26		06:29	19:42 (14) 05:53
17:10	36 16:38 (13) 17:55	18 09:00 (184) 18:38	20:25		21:09	34 20:16 (14) 21:48
5 08:44	16:03 (15) 08:17	08:42 (184) 07:27	07:24		06:27	19:43 (14) 05:53
17:11	35 16:38 (13) 17:57	18 09:00 (184) 18:40	20:27		21:10	33 20:16 (14) 21:48
6 08:44	16:03 (15) 08:16	08:42 (184) 07:25	07:21		06:26	19:44 (14) 05:52
17:13	35 16:38 (13) 17:58	17 08:59 (184) 18:42	20:28		21:12	30 20:14 (14) 21:49
7 08:44	16:04 (15) 08:14	08:44 (184) 07:23	07:19		06:24	19:45 (14) 05:52
17:14	34 16:38 (13) 18:00	14 08:58 (184) 18:43	20:30		21:13	29 20:14 (14) 21:50
8 08:43	16:04 (15) 08:12	08:45 (184) 08:21	07:17		06:23	19:46 (14) 05:51
17:15	34 16:38 (13) 18:00	11 08:56 (184) 18:45	20:31		21:15	26 20:12 (14) 21:51
9 08:43	16:05 (15) 08:11	08:48 (184) 08:19	07:15		06:21	19:48 (14) 05:51
17:16	33 16:38 (13) 18:02	4 08:52 (184) 19:46	20:32		21:16	23 20:11 (14) 21:52
10 08:43	16:05 (15) 08:09	08:17	07:13	20:01 (14) 06:20	19:49 (14) 05:51	
17:17	32 16:37 (13) 18:03	19:48	20:34	6 20:07 (14) 21:18	19 20:08 (14) 21:52	
11 08:42	16:06 (15) 08:08	08:15	07:11	19:55 (14) 06:18	19:52 (14) 05:50	
17:19	32 16:38 (13) 18:05	19:49	20:35	17 20:12 (14) 21:19	14 20:06 (14) 21:53	
12 08:42	16:06 (15) 08:06	08:13	07:09	19:52 (14) 06:17	19:57 (14) 05:50	
17:20	31 16:37 (13) 18:06	19:51	20:37	21 20:13 (14) 21:20	4 20:01 (14) 21:54	
13 08:41	16:07 (15) 08:04	08:11	07:07	19:50 (14) 06:15	05:50	
17:21	29 16:36 (15) 18:08	19:52	20:38	24 20:14 (14) 21:22	21:54	
14 08:41	16:08 (15) 08:03	08:09	07:05	19:48 (14) 06:14	05:50	
17:23	29 16:37 (15) 18:10	19:54	20:40	28 20:16 (14) 21:23	21:55	
15 08:40	16:09 (15) 08:01	08:07	07:03	19:46 (14) 06:13	05:50	
17:24	28 16:37 (15) 18:11	19:55	20:41	31 20:17 (14) 21:24	21:55	
16 08:39	16:09 (15) 07:59	08:05	07:01	19:45 (14) 06:11	05:50	
17:25	27 16:36 (15) 18:13	19:57	20:43	33 20:18 (14) 21:26	21:56	
17 08:38	16:10 (15) 07:58	08:03	07:00	19:44 (14) 06:10	05:50	
17:27	26 16:36 (15) 18:15	19:58	20:44	37 20:21 (14) 21:27	21:56	
18 08:38	16:11 (15) 07:56	08:01	06:58	19:43 (14) 06:09	05:50	
17:28	25 16:36 (15) 18:16	20:00	20:46	38 20:21 (14) 21:28	21:57	
19 08:37	16:12 (15) 07:54	07:59	06:56	19:42 (14) 06:08	05:50	
17:30	23 16:35 (15) 18:18	20:01	20:47	40 20:22 (14) 21:30	21:57	
20 08:36	16:13 (15) 07:52	07:57	06:54	19:41 (14) 06:06	05:50	
17:31	22 16:35 (15) 18:19	20:03	20:49	41 20:22 (14) 21:31	21:58	
21 08:35	16:15 (15) 07:50	07:55	06:52	19:41 (14) 06:05	05:50	
17:33	19 16:34 (15) 18:21	20:04	20:50	41 20:22 (14) 21:32	21:58	
22 08:34	16:17 (15) 07:49	07:53	06:50	19:40 (14) 06:04	05:50	
17:34	16 16:33 (15) 18:23	20:06	20:52	42 20:22 (14) 21:33	21:58	
23 08:33	16:19 (15) 07:47	07:50	06:48	19:40 (14) 06:03	05:51	
17:36	12 16:31 (15) 18:24	20:07	20:53	42 20:22 (14) 21:35	21:58	
24 08:32	16:23 (15) 07:45	07:48	06:46	19:40 (14) 06:02	05:51	
17:37	5 16:28 (15) 18:26	20:09	20:55	42 20:22 (14) 21:36	21:58	
25 08:31		07:43	06:45	19:39 (14) 06:01	05:51	
17:39		18:27	20:10	43 20:22 (14) 21:37	21:59	
26 08:30	08:55 (184) 07:41	07:44	06:43	19:39 (14) 06:00	05:52	
17:40	2 08:57 (184) 18:29	20:12	20:57	42 20:21 (14) 21:38	21:59	
27 08:29	08:53 (184) 07:39	07:42	06:41	19:40 (14) 05:59	05:52	
17:42	4 08:57 (184) 18:31	20:13	20:59	41 20:21 (14) 21:39	21:59	
28 08:28	08:52 (184) 07:37	07:40	06:39	19:40 (14) 05:58	05:52	
17:44	6 08:58 (184) 18:32	20:15	21:00	41 20:21 (14) 21:40	21:59	
29 08:26	08:51 (184)	07:38	06:37	19:39 (14) 05:58	05:53	
17:45	8 08:59 (184)	20:16	21:02	41 20:20 (14) 21:41	21:59	
30 08:25	08:50 (184)	07:36	06:36	19:40 (14) 05:57	05:53	
17:47	10 09:00 (184)	20:18	21:03	40 20:20 (14) 21:43	21:58	
31 08:24	08:48 (184)	07:34	06:34	05:56		
17:48	12 09:00 (184)	20:19		21:44		
Potential sun hours	273	284	368	410	471	481
Total, worst case	710	127	731	325		
Sun reduction	0.56	0.50	0.59	0.67		
Oper. time red.	0.98	0.98	0.98	0.98		
Wind dir. red.	0.54	0.72	0.69	0.69		
Total reduction	0.29	0.35	0.39	0.45		
Total, real	208	45	287	146		

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:25 AM / 18

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 10:00 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: F - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
660	333	352	411	608	961	789	574	695	904	1,116	1,191	8,594

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

	July	August	September	October	November	December	
1	05:54 06:26	20:05 (14) 07:09	19:54 (14) 07:51	07:38		08:22	15:48 (15)
	21:58 21:32	9 20:14 (14) 20:38	17 20:11 (14) 19:35	17:34		17:00	32 16:20 (13)
2	05:55 06:27	20:02 (14) 07:10	20:00 (14) 07:52	07:39	08:17 (184)	08:24	15:48 (15)
	21:58 21:31	15 20:17 (14) 20:36	6 20:06 (14) 19:33	17:32	6 08:23 (184) 16:59	32 16:20 (13)	15:48 (15)
3	05:55 06:29	19:59 (14) 07:11	07:54	07:41	08:15 (184) 08:25	15:48 (15)	15:48 (15)
	21:58 21:29	20 20:19 (14) 20:34	19:31	17:31	11 08:26 (184) 16:59	33 16:21 (13)	15:49 (15)
4	05:56 06:30	19:57 (14) 07:13	07:55	07:42	08:13 (184) 08:26	15:49 (15)	15:49 (15)
	21:57 21:28	24 20:21 (14) 20:31	19:29	17:29	15 08:28 (184) 16:58	34 16:23 (13)	15:49 (15)
5	05:57 06:31	19:56 (14) 07:14	07:57	07:44	08:12 (184) 08:27	15:49 (15)	15:49 (15)
	21:57 21:26	27 20:23 (14) 20:29	19:27	17:28	16 08:28 (184) 16:58	34 16:23 (13)	15:49 (15)
6	05:57 06:33	19:54 (14) 07:16	07:58	07:45	08:11 (184) 08:29	15:49 (15)	15:49 (15)
	21:57 21:25	30 20:24 (14) 20:27	19:25	17:26	19 08:30 (184) 16:58	35 16:24 (13)	15:49 (15)
7	05:58 06:34	19:53 (14) 07:17	08:00	07:47	08:13 (184) 08:30	15:49 (15)	15:49 (15)
	21:56 21:23	31 20:24 (14) 20:25	19:22	17:25	18 08:31 (184) 16:57	35 16:24 (13)	15:49 (15)
8	05:59 06:35	19:53 (14) 07:18	08:01	07:49	08:14 (184) 08:31	15:50 (15)	15:50 (15)
	21:56 21:22	33 20:26 (14) 20:23	19:20	17:23	16 08:30 (184) 16:57	35 16:25 (13)	15:50 (15)
9	06:00 06:37	19:51 (14) 07:20	08:02	07:50	08:16 (184) 08:32	15:50 (15)	15:50 (15)
	21:55 21:20	35 20:26 (14) 20:21	19:18	17:22	15 08:31 (184) 16:57	35 16:25 (13)	15:51 (15)
10	06:01 06:38	19:50 (14) 07:21	08:04	07:52	08:18 (184) 08:33	15:51 (15)	15:51 (15)
	21:55 21:18	37 20:27 (14) 20:19	19:16	17:20	13 08:31 (184) 16:57	36 16:27 (13)	15:52 (15)
11	06:02 06:39	19:49 (14) 07:23	08:05	07:53	08:19 (184) 08:34	15:52 (15)	15:52 (15)
	21:54 21:17	38 20:27 (14) 20:17	19:14	17:19	12 08:31 (184) 16:57	35 16:27 (13)	15:52 (15)
12	06:03 06:41	19:49 (14) 07:24	08:07	07:55	08:21 (184) 08:35	15:52 (15)	15:52 (15)
	21:53 21:15	39 20:28 (14) 20:15	19:12	17:18	10 08:31 (184) 16:57	35 16:27 (13)	15:52 (15)
13	06:04 06:42	19:48 (14) 07:25	08:08	07:56	08:23 (184) 08:36	15:52 (15)	15:52 (15)
	21:53 21:13	40 20:28 (14) 20:13	19:10	17:16	8 08:31 (184) 16:57	34 16:26 (13)	15:52 (15)
14	06:05 06:44	19:47 (14) 07:27	08:10	07:58	08:24 (184) 08:37	15:52 (15)	15:52 (15)
	21:52 21:12	41 20:28 (14) 20:11	19:08	17:15	6 08:30 (184) 16:57	34 16:26 (13)	15:53 (15)
15	06:06 06:45	19:47 (14) 07:28	08:11	08:00	08:26 (184) 08:37	15:53 (15)	15:53 (15)
	21:51 21:10	41 20:28 (14) 20:09	19:06	17:14	4 08:30 (184) 16:57	33 16:26 (13)	15:54 (15)
16	06:07 06:46	19:46 (14) 07:30	08:13	08:01	08:28 (184) 08:38	15:54 (15)	15:54 (15)
	21:50 21:08	42 20:28 (14) 20:06	19:04	17:13	2 08:30 (184) 16:57	32 16:26 (13)	15:54 (15)
17	06:08 06:48	19:46 (14) 07:31	08:14	08:03	08:31 (184) 08:39	15:54 (15)	15:54 (15)
	21:50 21:06	42 20:28 (14) 20:04	19:03	17:12	08:33 (184) 08:40	15:54 (15)	15:54 (15)
18	06:09 06:49	19:46 (14) 07:32	08:16	08:04	15:57 (15) 08:40	16:58	33 16:27 (13)
	21:49 21:05	42 20:28 (14) 20:02	19:01	17:10	5 16:02 (15) 16:58	32 16:26 (13)	15:54 (15)
19	06:10 06:50	19:45 (14) 07:34	08:17	08:06	15:54 (15) 08:40	16:58	32 16:27 (13)
	21:48 21:03	43 20:28 (14) 20:00	18:57	17:09	12 16:06 (15) 16:58	32 16:27 (13)	15:55 (15)
20	06:11 06:52	19:45 (14) 07:35	08:19	08:07	15:52 (15) 08:41	16:59	32 16:28 (13)
	21:47 21:01	42 20:27 (14) 19:58	18:55	17:08	16 16:08 (15) 16:59	32 16:28 (13)	15:56 (15)
21	06:12 06:53	19:46 (14) 07:37	08:21	08:09	15:51 (15) 08:41	16:59	32 16:28 (13)
	21:46 20:59	41 20:27 (14) 19:56	18:53	17:07	19 16:10 (15) 16:59	32 16:28 (13)	15:57 (15)
22	06:13 06:55	19:45 (14) 07:38	08:22	08:10	15:49 (15) 08:42	16:59	32 16:28 (13)
	21:45 20:57	41 20:26 (14) 19:54	18:51	17:06	22 16:11 (15) 17:00	32 16:29 (13)	15:57 (15)
23	06:15 06:56	19:45 (14) 07:39	08:24	08:12	15:49 (15) 08:43	16:59	32 16:29 (13)
	21:44 20:55	40 20:25 (14) 19:52	18:49	17:05	23 16:12 (15) 17:00	32 16:29 (13)	15:57 (15)
24	06:16 06:57	19:46 (14) 07:41	08:25	08:13	15:49 (15) 08:43	16:59	32 16:29 (13)
	21:42 20:53	39 20:25 (14) 19:50	18:48	17:05	25 16:14 (15) 17:01	32 16:29 (13)	15:58 (15)
25	06:17 06:59	19:46 (14) 07:42	08:27	08:14	15:48 (15) 08:43	16:59	32 16:29 (13)
	21:41 20:51	38 20:24 (14) 19:47	18:46	17:04	26 16:14 (15) 17:01	32 16:30 (13)	15:58 (15)
26	06:18 07:00	19:46 (14) 07:44	08:28	08:16	15:48 (15) 08:44	16:59	32 16:30 (13)
	21:40 20:49	36 20:22 (14) 19:45	18:44	17:03	27 16:15 (15) 17:02	33 16:31 (13)	15:59 (15)
27	06:19 07:02	19:48 (14) 07:45	08:30	08:17	15:48 (15) 08:44	16:59	33 16:31 (13)
	21:39 20:47	33 20:21 (14) 19:43	18:42	17:02	28 16:16 (15) 17:03	32 16:31 (13)	15:59 (15)
28	06:21 07:03	19:48 (14) 07:47	08:31	08:19	15:48 (15) 08:44	16:59	33 16:32 (13)
	21:38 20:46	31 20:19 (14) 19:41	18:41	17:02	29 16:17 (15) 17:03	33 16:32 (13)	15:59 (15)
29	06:22 07:04	19:49 (14) 07:48	08:33	08:20	15:48 (15) 08:44	16:59	33 16:32 (13)
	21:36 20:44	28 20:17 (14) 19:39	18:39	17:01	29 16:17 (15) 17:04	33 16:32 (13)	16:00 (15)
30	06:23 07:06	19:51 (14) 07:49	08:34	08:21	15:47 (15) 08:45	16:59	33 16:33 (13)
	21:35 20:42	24 20:15 (14) 19:37	18:37	17:00	31 16:18 (13) 17:05	33 16:33 (13)	16:00 (15)
31	06:25 07:07	19:52 (14) 07:50	08:36	08:23	15:47 (15) 08:45	16:59	33 16:33 (13)
	21:34 20:40	21 20:13 (14) 19:35	18:35	16:59	17:06	34 16:34 (13)	16:00 (15)
Potential sun hours	486	445	379	336	277	260	1031
Total, worst case		1043	23		463		0.44
Sun reduction		0.72	0.69		0.43		0.98
Oper. time red.		0.98	0.98		0.98		0.53
Wind dir. red.		0.69	0.69		0.60		0.23
Total reduction		0.48	0.46		0.25		233
Total, real		503	11		117		

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:
20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:
EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page
10/2/2015 10:25 AM / 19
Licensed user:
EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 10:00 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: G - Participating**

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [BISMARCK]
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
4.92 5.13 7.45 8.03 10.20 11.21 11.69 10.35 8.68 5.69 4.02 3.69

Operational time
N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
660 333 352 411 608 961 789 574 695 904 1,116 1,191 8,594
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	08:45	08:23	07:35	07:32	06:34	05:55	05:54	06:26	07:09	07:51	07:38	08:23
	17:07	17:50	18:34	20:21	21:05	21:45	21:58	21:32	20:38	19:35	17:34	17:00
2	08:45	08:21	07:33	07:30	06:32	05:54	05:54	06:27	07:10	07:52	07:39	08:24
	17:08	17:52	18:35	20:22	21:06	21:46	21:58	21:31	20:36	19:33	17:32	16:59
3	08:45	08:20	07:31	07:28	06:30	05:54	05:55	06:28	07:11	07:54	07:41	08:25
	17:09	17:53	18:37	20:24	21:08	21:47	21:58	21:29	20:34	19:31	17:30	16:59
4	08:45	08:18	07:29	07:25	06:29	05:53	05:56	06:30	07:13	07:55	07:42	08:26
	17:10	17:55	18:38	20:25	21:09	21:48	21:58	21:28	20:31	19:29	17:29	16:58
5	08:44	08:17	07:27	07:23	06:27	05:53	05:56	06:31	07:14	07:57	07:44	08:28
	17:11	17:56	18:40	20:27	21:11	21:49	21:57	21:26	20:29	19:27	17:27	16:58
6	08:44	08:16	07:25	07:21	06:26	05:52	05:57	06:32	07:16	07:58	07:46	08:29
	17:12	17:58	18:41	20:28	21:12	21:49	21:57	21:25	20:27	19:24	17:26	16:57
7	08:44	08:14	07:23	07:19	06:24	05:52	05:58	06:34	07:17	08:00	07:47	08:30
	17:13	18:00	18:43	20:30	21:13	21:50	21:56	21:23	20:25	19:22	17:24	16:57
8	08:44	08:13	08:21	07:17	06:22	05:51	05:59	06:35	07:18	08:01	07:49	08:31
	17:15	18:00	18:45	20:31	21:15	21:51	21:56	21:22	20:23	19:20	17:23	16:57
9	08:43	08:11	08:19	07:15	06:21	05:51	06:00	06:36	07:20	08:02	07:50	08:32
	17:16	18:01	19:46	20:32	21:16	21:52	21:55	21:20	20:21	19:18	17:21	16:57
10	08:43	08:09	08:17	07:13	06:19	05:50	06:00	06:38	07:21	08:04	07:52	08:33
	17:17	18:03	19:48	20:34	21:18	21:53	21:55	21:18	20:19	19:16	17:20	16:57
11	08:42	08:08	08:15	07:11	06:18	05:50	06:01	06:39	07:23	08:05	07:53	08:34
	17:18	18:05	19:49	20:35	21:19	21:53	21:54	21:17	20:17	19:14	17:19	16:57
12	08:42	08:06	08:13	07:09	06:17	05:50	06:02	06:41	07:24	08:07	07:55	08:35
	17:20	18:06	19:51	20:37	21:20	21:54	21:54	21:15	20:15	19:12	17:17	16:57
13	08:41	08:05	08:11	07:07	06:15	05:50	06:03	06:42	07:25	08:08	07:57	08:36
	17:21	18:08	19:52	20:38	21:22	21:55	21:53	21:13	20:13	19:10	17:16	16:57
14	08:41	08:03	08:09	07:05	06:14	05:50	06:04	06:43	07:27	08:10	07:58	08:37
	17:22	18:10	19:54	20:40	21:23	21:55	21:52	21:12	20:11	19:08	17:15	16:57
15	08:40	08:01	08:07	07:03	06:12	05:49	06:05	06:45	07:28	08:11	08:00	08:38
	17:24	18:11	19:55	20:41	21:24	21:56	21:51	21:10	20:09	19:06	17:14	16:57
16	08:39	07:59	08:05	07:01	06:11	05:49	06:06	06:46	07:30	08:13	08:01	08:38
	17:25	18:13	19:57	20:43	21:26	21:56	21:51	21:08	20:06	19:04	17:12	16:57
17	08:39	07:58	08:03	06:59	06:10	05:49	06:07	06:48	07:31	08:14	08:03	08:39
	17:27	18:14	19:58	20:44	21:27	21:57	21:50	21:06	20:04	19:02	17:11	16:57
18	08:38	07:56	08:01	06:57	06:09	05:49	06:09	06:49	07:32	08:16	08:04	08:40
	17:28	18:16	20:00	20:46	21:28	21:57	21:49	21:05	20:02	19:00	17:10	16:58
19	08:37	07:54	07:59	06:56	06:07	05:50	06:10	06:50	07:34	08:17	08:06	08:40
	17:30	18:18	20:01	20:47	21:30	21:57	21:48	21:03	20:00	18:57	17:09	16:58
20	08:36	07:52	07:57	06:54	06:06	05:50	06:11	06:52	07:35	08:19	08:07	08:41
	17:31	18:19	20:03	20:49	21:31	21:58	21:47	21:01	19:58	18:55	17:08	16:58
21	08:35	07:50	07:55	06:52	06:05	05:50	06:12	06:53	07:37	08:21	08:09	08:42
	17:33	18:21	20:04	20:50	21:32	21:58	21:46	20:59	19:56	18:53	17:07	16:59
22	08:34	07:49	07:53	06:50	06:04	05:50	06:13	06:54	07:38	08:22	08:10	08:42
	17:34	18:22	20:06	20:52	21:33	21:58	21:45	20:57	19:54	18:51	17:06	16:59
23	08:33	07:47	07:50	06:48	06:03	05:50	06:14	06:56	07:39	08:24	08:12	08:43
	17:36	18:24	20:07	20:53	21:35	21:58	21:44	20:55	19:52	18:49	17:05	17:00
24	08:32	07:45	07:48	06:46	06:02	05:51	06:15	06:57	07:41	08:25	08:13	08:43
	17:37	18:26	20:09	20:55	21:36	21:59	21:43	20:53	19:50	18:47	17:04	17:00
25	08:31	07:43	07:46	06:44	06:01	05:51	06:17	06:59	07:42	08:27	08:14	08:43
	17:39	18:27	20:10	20:56	21:37	21:59	21:41	20:51	19:47	18:46	17:04	17:01
26	08:30	07:41	07:44	06:43	06:00	05:51	06:18	07:00	07:44	08:28	08:16	08:44
	17:40	18:29	20:12	20:57	21:38	21:59	21:40	20:49	19:45	18:44	17:03	17:02
27	08:29	07:39	07:42	06:41	05:59	05:52	06:19	07:01	07:45	08:30	08:17	08:44
	17:42	18:30	20:13	20:59	21:39	21:59	21:39	20:48	19:43	18:42	17:02	17:02
28	08:28	07:37	07:40	06:39	05:58	05:52	06:20	07:03	07:46	08:31	08:19	08:44
	17:43	18:32	20:15	21:00	21:41	21:59	21:38	20:46	19:41	18:40	17:01	17:03
29	08:26		07:38	06:37	05:57	05:53	06:22	07:04	07:48	08:33	08:20	08:45
	17:45		20:16	21:02	21:42	21:59	21:36	20:44	19:39	18:39	17:01	17:04
30	08:25		07:36	06:35	05:56	05:53	06:23	07:06	07:49	08:35	08:21	08:45
	17:47		20:18	21:03	21:43	21:59	21:35	20:42	19:37	18:37	17:00	17:05
31	08:24		07:34		05:56		06:24	07:07		08:36		08:45
	17:48		20:19		21:44		21:34	20:40		18:35		17:06
Potential sun hours												
Total, worst case	273	284	368	410	472	482	487	445	379	336	277	260
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:25 AM / 20

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 10:00 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: H - Participating**

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [BISMARCK]
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
4.92 5.13 7.45 8.03 10.20 11.21 11.69 10.35 8.68 5.69 4.02 3.69

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
660 333 352 411 608 961 789 574 695 904 1,116 1,191 8,594
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	08:45	08:23	07:35	07:32	06:34	05:55
	17:07	17:50	18:34	20:21	21:05	21:45
2	08:45	08:21	07:33	07:30	06:32	05:55
	17:08	17:52	18:35	20:22	21:06	21:46
3	08:44	08:20	07:31	07:28	06:31	05:54
	17:09	17:54	18:37	20:24	21:08	21:46
4	08:44	08:18	07:29	07:26	06:29	05:54
	17:11	17:55	18:39	20:25	21:09	21:47
5	08:44	08:17	07:27	07:24	06:28	06:51 (155)
	17:12	17:57	18:40	20:27	21:10	3 06:54 (155) 21:48
6	08:44	08:15	07:25	07:22	06:26	06:49 (155) 05:53
	17:13	17:58	18:42	20:28	21:12	6 06:55 (155) 21:49
7	08:44	08:14	07:23	07:20	06:24	06:48 (155) 05:52
	17:14	18:00	18:43	20:30	21:13	9 06:57 (155) 21:50
8	08:43	08:12	08:21	07:18	06:23	06:46 (155) 05:52
	17:15	18:00	18:45	20:31	21:15	11 06:57 (155) 21:51 3 06:21 (84)
9	08:43	08:11	08:19	07:16	06:21	06:45 (155) 05:51
	17:16	18:02	19:46	20:33	21:16	13 06:58 (155) 21:52 5 06:23 (84)
10	08:43	08:09	08:17	07:13	06:20	06:44 (155) 05:51
	17:18	18:03	19:48	20:34	21:17	15 06:59 (155) 21:52 6 06:24 (84)
11	08:42	08:08	08:15	07:11	06:18	06:42 (155) 05:51
	17:19	18:05	19:49	20:35	21:19	16 06:58 (155) 21:53 7 06:24 (84)
12	08:42	16:48 (307)	08:06	08:13	07:09	06:17
	17:20	1 16:49 (307)	18:07	19:51	20:37	18 06:59 (155) 21:54 8 06:25 (84)
13	08:41	16:48 (307)	08:04	08:11	07:08	06:16
	17:22	3 16:51 (307)	18:08	19:52	20:38	19 06:59 (155) 21:54 9 06:26 (84)
14	08:40	16:49 (307)	08:03	08:09	07:06	06:14
	17:23	4 16:53 (307)	18:10	19:54	20:40	20 06:58 (155) 21:55 10 06:27 (84)
15	08:40	16:49 (307)	08:01	08:07	07:04	06:13
	17:24	5 16:54 (307)	18:11	19:55	20:41	21 06:58 (155) 21:55 10 06:27 (84)
16	08:39	16:50 (307)	07:59	08:05	07:02	06:12
	17:26	5 16:55 (307)	18:13	19:57	20:43	21 06:58 (155) 21:56 11 06:28 (84)
17	08:38	16:50 (307)	07:58	08:03	07:00	06:10
	17:27	7 16:57 (307)	18:15	19:58	20:44	21 06:58 (155) 21:56 11 06:28 (84)
18	08:38	16:50 (307)	07:56	08:01	06:58	06:09
	17:29	8 16:58 (307)	18:16	20:00	20:46	21 06:58 (155) 21:57 12 06:29 (84)
19	08:37	16:51 (307)	07:54	07:59	06:56	06:08
	17:30	9 17:00 (307)	18:18	20:01	20:47	19 06:57 (155) 21:57 12 06:29 (84)
20	08:36	16:52 (307)	07:52	07:57	06:54	06:07
	17:31	9 17:01 (307)	18:20	20:03	20:49	17 06:56 (155) 21:57 12 06:29 (84)
21	08:35	16:53 (307)	07:50	07:55	06:52	06:06
	17:33	10 17:03 (307)	18:21	20:04	20:50	16 06:55 (155) 21:58 12 06:29 (84)
22	08:34	16:54 (307)	07:49	07:53	06:50	06:04
	17:34	11 17:05 (307)	18:23	20:06	20:52	15 06:55 (155) 21:58 12 06:30 (84)
23	08:33	16:55 (307)	07:47	07:51	06:48	06:03
	17:36	11 17:06 (307)	18:24	20:07	20:53	13 06:54 (155) 21:58 12 06:30 (84)
24	08:32	16:57 (307)	07:45	07:48	06:46	06:02
	17:38	8 17:05 (307)	18:26	20:09	20:54	9 06:52 (155) 21:58 12 06:30 (84)
25	08:31	07:43	07:46	06:45	06:01	06:46 (155) 05:51
	17:39	18:28	20:10	20:56	21:37	5 06:51 (155) 21:58 11 06:30 (84)
26	08:30	07:41	07:44	06:43	06:00	05:52
	17:41	18:29	20:12	20:57	21:38	11 06:30 (84)
27	08:29	07:39	07:42	06:41	05:59	05:52
	17:42	18:31	20:13	20:59	21:39	11 06:30 (84)
28	08:28	07:37	07:40	06:39	05:59	05:53
	17:44	18:32	20:15	21:00	21:40	10 06:30 (84)
29	08:26	07:38	06:38	05:58	05:58	05:53
	17:45	20:16	21:02	21:41	21:58	9 06:29 (84)
30	08:25	07:36	06:36	05:57	05:54	06:21 (84)
	17:47	20:18	21:03	21:42	21:58	9 06:30 (84)
31	08:24	07:34	05:56	05:56	05:56	
	17:49	20:19	21:44	21:44		
Potential sun hours	273	285	368	409	471	481
Total, worst case	91				306	225
Sun reduction	0.56				0.67	0.70
Oper. time red.	0.98				0.98	0.98
Wind dir. red.	0.56				0.60	0.57
Total reduction	0.31				0.40	0.39
Total, real	28				121	88

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:25 AM / 21

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 10:00 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: H - Participating**

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

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

Assumptions for shadow calculations

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
660	333	352	411	608	961	789	574	695	904	1,116	1,191	8,594

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

	July	August	September	October	November	December	
1	05:54	06:21 (84)	06:26	06:52 (155)	07:09	07:51	07:38
	21:58	8 06:29 (84)	21:32	17 07:09 (155)	20:38	19:35	17:34
2	05:55	06:22 (84)	06:27	06:53 (155)	07:10	07:52	07:39
	21:58	7 06:29 (84)	21:31	16 07:09 (155)	20:36	19:33	17:32
3	05:56	06:23 (84)	06:29	06:54 (155)	07:12	07:54	07:41
	21:58	5 06:28 (84)	21:29	14 07:08 (155)	20:34	19:31	17:31
4	05:56	06:23 (84)	06:30	06:56 (155)	07:13	07:55	07:42
	21:57	4 06:27 (84)	21:28	12 07:08 (155)	20:31	19:29	17:29
5	05:57	06:24 (84)	06:31	06:57 (155)	07:14	07:57	07:44
	21:57	1 06:25 (84)	21:26	10 07:07 (155)	20:29	19:27	17:28
6	05:58		06:33	06:58 (155)	07:16	07:58	07:45
	21:57		21:25	8 07:06 (155)	20:27	19:25	17:26
7	05:58		06:34	06:59 (155)	07:17	08:00	07:47
	21:56		21:23	5 07:04 (155)	20:25	19:23	17:25
8	05:59		06:35	07:01 (155)	07:19	08:01	07:49
	21:56		21:22	2 07:03 (155)	20:23	19:21	17:23
9	06:00		06:37		07:20	08:03	07:50
	21:55		21:20		20:21	19:19	17:22
10	06:01		06:38		07:21	08:04	07:52
	21:55		21:18		20:19	19:16	17:20
11	06:02		06:40		07:23	08:05	07:53
	21:54		21:17		20:17	19:14	17:19
12	06:03		06:41		07:24	08:07	07:55
	21:53		21:15		20:15	19:12	17:18
13	06:04		06:42		07:26	08:08	07:56
	21:53		21:13		20:13	19:10	17:17
14	06:05		06:44		07:27	08:10	07:58
	21:52		21:12		20:11	19:09	17:15
15	06:06		06:45		07:28	08:11	07:59
	21:51		21:10		20:09	19:07	17:14
16	06:07		06:46		07:30	08:13	08:01
	21:50		21:08		20:07	19:05	17:13
17	06:08		06:48		07:31	08:14	08:03
	21:49		21:06		20:04	19:03	17:12
18	06:09		06:49		07:32	08:16	08:04
	21:49		21:04		20:02	19:01	17:11
19	06:10	06:54 (155)	06:51		07:34	08:17	08:06
	21:48	8 07:02 (155)	21:03		20:00	18:57	17:10
20	06:11	06:53 (155)	06:52		07:35	08:19	08:07
	21:47	10 07:03 (155)	21:01		19:58	18:55	17:09
21	06:12	06:51 (155)	06:53		07:37	08:21	08:09
	21:46	14 07:05 (155)	20:59		19:56	18:53	17:08
22	06:14	06:50 (155)	06:55		07:38	08:22	08:10
	21:45	16 07:06 (155)	20:57		19:54	18:51	17:07
23	06:15	06:50 (155)	06:56		07:40	08:24	08:11
	21:44	16 07:06 (155)	20:55		19:52	18:50	17:06
24	06:16	06:49 (155)	06:58		07:41	08:25	08:13
	21:42	18 07:07 (155)	20:53		19:50	18:48	17:05
25	06:17	06:48 (155)	06:59		07:42	08:27	08:14
	21:41	19 07:07 (155)	20:51		19:48	18:46	17:04
26	06:18	06:49 (155)	07:00		07:44	08:28	08:16
	21:40	20 07:09 (155)	20:49		19:45	18:44	17:03
27	06:20	06:48 (155)	07:02		07:45	08:30	08:17
	21:39	21 07:09 (155)	20:47		19:43	18:42	17:02
28	06:21	06:48 (155)	07:03		07:47	08:31	08:18
	21:38	21 07:09 (155)	20:46		19:41	18:41	17:02
29	06:22	06:48 (155)	07:05		07:48	08:33	08:20
	21:36	21 07:09 (155)	20:44		19:39	18:39	17:01
30	06:23	06:49 (155)	07:06		07:49	08:34	08:21
	21:35	20 07:09 (155)	20:42		19:37	18:37	17:01
31	06:25	06:51 (155)	07:07			08:36	
	21:34	18 07:09 (155)	20:40			18:36	
Potential sun hours	486	445		379	336	277	260
Total, worst case	247		84			92	
Sun reduction	0.75		0.72			0.43	
Oper. time red.	0.98		0.98			0.98	
Wind dir. red.	0.60		0.60			0.56	
Total reduction	0.44		0.43			0.24	
Total, real	108		36			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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:25 AM / 22

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 10:00 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: I - Participating**

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

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

Assumptions for shadow calculations

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
660	333	352	411	608	961	789	574	695	904	1,116	1,191	8,594

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

	January	February	March	April	May	June
1 08:45	09:14 (104) 08:23		07:35	07:58 (158) 07:32	06:34	06:57 (105) 05:55
17:07	28 09:42 (104) 17:50		18:34	7 08:05 (158) 20:21	21:05	46 20:39 (13) 21:45
2 08:45	09:15 (104) 08:21		07:33	07:56 (158) 07:30	06:32	06:55 (105) 05:55
17:08	27 09:42 (104) 17:52		18:35	9 08:05 (158) 20:22	21:06	50 20:40 (13) 21:46
3 08:45	09:16 (104) 08:20		07:31	07:54 (158) 07:28	06:31	06:54 (184) 05:54
17:09	27 09:43 (104) 17:53		18:37	11 08:05 (158) 20:24	21:08	54 20:42 (13) 21:47
4 08:44	09:16 (104) 08:18		07:29	07:52 (158) 07:26	06:29	06:52 (184) 05:53
17:10	27 09:43 (104) 17:55		18:38	13 08:05 (158) 20:25	21:09	57 20:43 (13) 21:47
5 08:44	09:16 (104) 08:17		07:27	07:50 (158) 07:24	06:27	06:51 (184) 05:53
17:11	27 09:43 (104) 17:57		18:40	15 08:05 (158) 20:27	21:10	61 20:45 (13) 21:48
6 08:44	09:17 (104) 08:15		07:25	07:48 (158) 07:21	06:26	06:49 (184) 05:52
17:13	27 09:44 (104) 17:58		18:42	17 08:05 (158) 20:28	21:12	63 20:45 (13) 21:49
7 08:44	09:18 (104) 08:14		07:23	07:46 (158) 07:19	06:24	06:48 (184) 05:52
17:14	26 09:44 (104) 18:00	1 08:39 (316) 18:43	18 08:04 (158) 20:30	21:13	65 20:46 (13) 21:50	
8 08:43	09:18 (104) 08:12		08:36 (316) 08:21	08:46 (158) 07:17	06:23	06:46 (184) 05:51
17:15	26 09:44 (104) 18:00	5 08:41 (316) 18:45	17 09:03 (158) 20:31	21:15	66 20:45 (13) 21:51	
9 08:43	09:19 (104) 08:11		08:34 (316) 08:19	08:46 (158) 07:15	06:21	06:45 (184) 05:51
17:16	26 09:45 (104) 18:02	8 08:42 (316) 19:46	15 09:01 (158) 20:32	21:16	68 20:46 (13) 21:52	
10 08:43	09:19 (104) 08:09		08:33 (316) 08:17	08:48 (158) 07:13	06:20	06:43 (184) 05:51
17:17	25 09:44 (104) 18:03	11 08:44 (316) 19:48	12 19:25 (12) 20:34	21:17	67 20:45 (13) 21:52	
11 08:42	09:21 (104) 08:08		08:31 (316) 08:15	19:19 (12) 07:11	06:18	06:42 (184) 05:51
17:19	24 09:45 (104) 18:05	13 08:44 (316) 19:49	7 19:26 (12) 20:35	21:19	68 20:45 (13) 21:53	
12 08:42	09:21 (104) 08:06		08:29 (316) 08:13	19:17 (12) 07:09	06:17	06:43 (184) 05:50
17:20	24 09:45 (104) 18:06	16 08:45 (316) 19:51	11 19:28 (12) 20:37	21:20	65 20:45 (13) 21:54	
13 08:41	09:22 (104) 08:04		08:28 (316) 08:11	19:15 (12) 07:07	06:15	06:43 (184) 05:50
17:21	22 09:44 (104) 18:08	18 08:46 (316) 19:52	14 19:29 (12) 20:38	21:22	63 20:44 (13) 21:54	
14 08:41	09:23 (104) 08:03		08:26 (316) 08:09	19:14 (12) 07:05	06:14	06:44 (184) 05:50
17:23	22 09:45 (104) 18:10	20 08:46 (316) 19:54	17 19:31 (12) 20:40	21:23	59 20:44 (13) 21:55	
15 08:40	09:24 (104) 08:01		08:24 (316) 08:07	19:13 (12) 07:03	06:13	06:45 (184) 05:50
17:24	20 09:44 (104) 18:11	22 08:46 (316) 19:55	20 19:33 (12) 20:41	21:24	54 20:44 (13) 21:55	
16 08:39	09:25 (104) 07:59		08:22 (316) 08:05	19:13 (12) 07:02	06:11	06:47 (184) 05:50
17:25	18 09:43 (104) 18:13	24 08:46 (316) 19:57	21 19:34 (12) 20:43	21:26	43 20:44 (13) 21:56	
17 08:38	09:26 (104) 07:58		08:21 (316) 08:03	19:12 (12) 07:00	06:10	06:49 (184) 05:50
17:27	17 09:43 (104) 18:15	25 08:46 (316) 19:58	24 19:36 (12) 20:44	21:27	33 20:44 (13) 21:56	
18 08:38	09:28 (104) 07:56		08:21 (316) 08:01	19:12 (12) 06:58	06:09	20:16 (13) 05:50
17:28	14 09:42 (104) 18:16	25 08:46 (316) 20:00	24 19:36 (12) 20:46	21:28	26 20:42 (13) 21:57	
19 08:37	09:30 (104) 07:54		08:21 (316) 07:59	19:12 (12) 06:56	06:08	20:17 (13) 05:50
17:30	10 09:40 (104) 18:18	24 08:45 (316) 20:01	24 19:36 (12) 20:47	21:30	25 20:42 (13) 21:57	
20 08:36	09:34 (104) 07:52		08:22 (316) 07:57	19:13 (12) 06:54	06:07	20:18 (13) 05:50
17:31	3 09:37 (104) 18:19	22 08:44 (316) 20:03	22 19:35 (12) 20:49	21:31	23 20:41 (13) 21:57	
21 08:35	07:50		08:23 (316) 07:55	19:12 (12) 06:52	06:05	20:19 (13) 05:50
17:33	18:21	19 08:42 (316) 20:04	21 19:33 (12) 20:50	21:32	21 20:40 (13) 21:58	
22 08:34	07:49		08:24 (316) 07:53	19:13 (12) 06:50	06:04	20:20 (13) 05:50
17:34	18:23	17 08:41 (316) 20:06	19 19:32 (12) 20:52	21:33	19 20:39 (13) 21:58	
23 08:33	07:47		08:26 (316) 07:51	19:14 (12) 06:48	06:03	20:21 (13) 05:51
17:36	18:24	13 08:39 (316) 20:07	16 19:30 (12) 20:53	2 07:13 (105) 21:35	17 20:38 (13) 21:58	
24 08:32	07:45		08:29 (316) 07:48	19:16 (12) 06:46	07:09 (105) 06:02	20:23 (13) 05:51
17:37	18:26	6 08:35 (316) 20:09	12 19:28 (12) 20:54	8 07:17 (105) 21:36	14 20:37 (13) 21:58	
25 08:31	07:43		07:46	06:45	07:07 (105) 06:01	20:25 (13) 05:51
17:39	18:27		20:10	12 07:19 (105) 21:37	10 20:35 (13) 21:58	
26 08:30	07:41		07:44	06:43	07:05 (105) 06:00	20:29 (13) 05:52
17:41	18:29		20:12	15 07:20 (105) 21:38	4 20:33 (13) 21:59	
27 08:29	07:39		07:42	06:41	07:04 (105) 05:59	05:52
17:42	18:31		20:13	23 20:34 (13) 21:39		21:59
28 08:28	07:37		08:00 (158) 07:40	06:39	07:02 (105) 05:58	05:52
17:44	18:32	4 08:04 (158) 20:15	21:00	31 20:35 (13) 21:40		21:59
29 08:26			07:38	06:37	07:00 (105) 05:58	05:53
17:45			20:16	37 21:02 (13) 21:41		21:58
30 08:25			07:36	06:36	06:59 (105) 05:57	05:53
17:47			20:18	42 20:38 (13) 21:43		21:58
31 08:24			07:34		05:56	
17:49			20:19		21:44	
Potential sun hours	273	285	368	410	471	481
Total, worst case	440	293	386	170	1141	
Sun reduction	0.56	0.50	0.63	0.59	0.67	
Oper. time red.	0.98	0.98	0.98	0.98	0.98	
Wind dir. red.	0.71	0.72	0.66	0.64	0.64	
Total reduction	0.39	0.36	0.41	0.37	0.44	
Total, real	171	104	158	63	500	

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:25 AM / 23

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 10:00 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: I - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
660	333	352	411	608	961	789	574	695	904	1,116	1,191	8,594

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

	July	August	September	October	November	December						
1	05:54	06:26	06:53 (184)	07:09	07:51	18:56 (12)	07:38	08:02 (316)	08:22	09:03 (104)		
	21:58	21:32	67 20:56 (13)	20:38	19:35	12 19:08 (12)	17:34	10 08:12 (316)	17:00	24 09:27 (104)		
2	05:55	06:27	06:53 (184)	07:10	07:52	18:57 (12)	07:39	08:04 (316)	08:24	09:03 (104)		
	21:58	21:31	68 20:56 (13)	20:36	19:33	9 19:06 (12)	17:32	7 08:11 (316)	16:59	24 09:27 (104)		
3	05:55	06:29	06:54 (184)	07:11	07:54	08:28 (158)	07:41	08:06 (316)	08:25	09:02 (104)		
	21:58	21:29	67 20:55 (13)	20:34	19:31	12 19:04 (12)	17:31	4 08:10 (316)	16:59	26 09:28 (104)		
4	05:56	06:30	06:55 (184)	07:13	07:55	08:25 (158)	07:42	08:08 (316)	08:26	09:03 (104)		
	21:57	21:28	66 20:55 (13)	20:31	19:29	13 08:38 (158)	17:29	1 08:09 (316)	16:58	26 09:29 (104)		
5	05:57	06:31	06:57 (184)	07:14	07:57	08:23 (158)	07:44	08:27	09:03 (104)			
	21:57	21:26	66 20:56 (13)	20:29	19:27	15 08:38 (158)	17:28	16:58	26 09:29 (104)			
6	05:57	06:33	06:58 (184)	07:16	07:58	08:22 (158)	07:45	08:29	09:03 (104)			
	21:57	21:25	65 20:55 (13)	20:27	19:25	18 08:40 (158)	17:26	16:58	27 09:30 (104)			
7	05:58	06:34	06:59 (184)	07:17	08:00	08:22 (158)	07:47	08:30	09:03 (104)			
	21:56	21:23	62 20:54 (13)	20:25	19:22	17 08:39 (158)	17:25	16:58	27 09:30 (104)			
8	05:59	06:35	07:01 (184)	07:18	08:01	08:24 (158)	07:49	08:31	09:04 (104)			
	21:56	21:22	60 20:54 (13)	20:23	19:20	16 08:40 (158)	17:23	16:57	26 09:30 (104)			
9	06:00	06:37	07:02 (184)	07:20	08:02	08:25 (158)	07:50	08:32	09:04 (104)			
	21:55	21:20	57 20:52 (13)	20:21	19:18	14 08:39 (158)	17:22	16:57	27 09:31 (104)			
10	06:01	06:38	07:03 (184)	07:21	08:04	08:27 (158)	07:52	08:33	09:04 (104)			
	21:55	21:18	52 20:50 (13)	20:19	19:16	13 08:40 (158)	17:20	16:57	27 09:31 (104)			
11	06:02	06:39	07:04 (105)	07:23	08:05	08:29 (158)	07:53	08:34	09:06 (104)			
	21:54	21:17	50 20:49 (13)	20:17	19:14	10 08:39 (158)	17:19	16:57	27 09:33 (104)			
12	06:03	06:41	07:06 (105)	07:24	08:07	08:30 (158)	07:55	08:35	09:05 (104)			
	21:53	21:15	45 20:48 (13)	20:15	19:12	8 08:38 (158)	17:18	16:57	27 09:32 (104)			
13	06:04	06:42	07:07 (105)	07:25	08:08	08:32 (158)	07:56	08:36	09:05 (104)			
	21:53	21:13	41 20:46 (13)	20:13	19:10	5 08:37 (158)	17:16	16:57	28 09:33 (104)			
14	06:05	06:44	07:08 (105)	07:27	08:10	08:33 (158)	07:58	08:37	09:06 (104)			
	21:52	21:12	36 20:44 (13)	20:11	19:08	2 08:35 (158)	17:15	16:57	27 09:33 (104)			
15	06:06	06:45	07:10 (105)	07:28	08:11	08:00		08:37	09:07 (104)			
	21:51	21:10	30 20:43 (13)	20:09	19:06	17:14		16:57	27 09:34 (104)			
16	06:07	06:46	07:11 (105)	07:30	08:13	08:01		08:38	09:07 (104)			
	21:50	21:08	21 20:40 (13)	20:06	19:04	17:13		16:57	28 09:35 (104)			
17	06:08	06:48	07:12 (105)	07:31	08:14	08:03		08:39	09:08 (104)			
	21:50	21:06	14 07:26 (105)	20:04	19:03	17:12		16:58	27 09:35 (104)			
18	06:09	20:35 (13)	06:49	07:32	08:16	08:59 (316)	08:04	08:40	09:08 (104)			
	21:49	8 20:43 (13)	21:04	20:02	19:01	9 09:08 (316)	17:10	16:58	27 09:35 (104)			
19	06:10	20:33 (13)	06:50	07:34	19:04 (12)	08:17	08:56 (316)	08:06	08:40	09:09 (104)		
	21:48	13 20:46 (13)	21:03	20:00	11 19:15 (12)	18:57	15 09:11 (316)	17:09	16:58	27 09:36 (104)		
20	06:11	20:33 (13)	06:52	07:35	19:01 (12)	08:19	08:55 (316)	08:07	08:41	09:09 (104)		
	21:47	15 20:48 (13)	21:01	19:58	15 19:16 (12)	18:55	18 09:13 (316)	17:08	16:59	27 09:36 (104)		
21	06:12	20:31 (13)	06:53	07:37	18:59 (12)	08:20	08:53 (316)	08:09	08:41	09:10 (104)		
	21:46	18 20:49 (13)	20:59	19:56	18 19:17 (12)	18:53	20 09:13 (316)	17:07	16:59	27 09:37 (104)		
22	06:13	20:30 (13)	06:55	07:38	18:58 (12)	08:22	08:52 (316)	08:10	08:42	09:10 (104)		
	21:45	20 20:50 (13)	20:57	19:54	20 19:18 (12)	18:51	22 09:14 (316)	17:06	3 09:13 (104)	17:00	27 09:37 (104)	
23	06:15	20:29 (13)	06:56	07:39	18:56 (12)	08:24	08:52 (316)	08:11	09:07 (104)	08:42	09:11 (104)	
	21:44	22 20:51 (13)	20:55	19:52	22 19:18 (12)	18:49	23 09:15 (316)	17:06	10 09:17 (104)	17:00	27 09:38 (104)	
24	06:16	20:28 (13)	06:57	07:41	18:56 (12)	08:25	08:50 (316)	08:13	09:06 (104)	08:43	09:11 (104)	
	21:42	24 20:52 (13)	20:53	19:50	23 19:19 (12)	18:48	25 09:15 (316)	17:05	14 09:20 (104)	17:01	27 09:38 (104)	
25	06:17	20:27 (13)	06:59	07:42	18:55 (12)	08:27	08:51 (316)	08:14	09:04 (104)	08:43	09:12 (104)	
	21:41	25 20:52 (13)	20:51	19:47	24 19:19 (12)	18:46	25 09:16 (316)	17:04	17 09:21 (104)	17:01	27 09:39 (104)	
26	06:18	07:01 (184)	07:00	07:44	18:54 (12)	08:28	08:52 (316)	08:16	09:04 (104)	08:44	09:12 (104)	
	21:40	27 20:53 (13)	20:49	19:45	24 19:18 (12)	18:44	23 09:15 (316)	17:03	18 09:22 (104)	17:02	27 09:39 (104)	
27	06:19	06:58 (184)	07:02	07:45	18:54 (12)	08:30	08:54 (316)	08:17	09:03 (104)	08:44	09:12 (104)	
	21:39	36 20:54 (13)	20:47	19:43	23 19:17 (12)	18:42	21 09:15 (316)	17:02	20 09:23 (104)	17:03	28 09:40 (104)	
28	06:21	06:57 (184)	07:03	07:47	18:54 (12)	08:31	08:56 (316)	08:18	09:03 (104)	08:44	09:13 (104)	
	21:38	48 20:55 (13)	20:46	19:41	20 19:14 (12)	18:41	19 09:15 (316)	17:02	22 09:25 (104)	17:04	27 09:40 (104)	
29	06:22	06:55 (184)	07:04	07:48	18:55 (12)	08:33	08:57 (316)	08:20	09:03 (104)	08:44	09:13 (104)	
	21:36	56 20:55 (13)	20:44	19:39	17 19:12 (12)	18:39	17 09:14 (316)	17:01	22 09:25 (104)	17:04	27 09:40 (104)	
30	06:23	06:54 (184)	07:06	07:49	18:55 (12)	08:34	08:59 (316)	08:21	09:02 (104)	08:44	09:13 (104)	
	21:35	62 20:55 (13)	20:42	19:37	15 19:10 (12)	18:37	15 09:14 (316)	17:00	24 09:26 (104)	17:05	28 09:41 (104)	
31	06:25	06:53 (184)	07:07		08:36	08:01 (316)		08:45	09:14 (104)			
	21:34	65 20:55 (13)	20:40		18:35	13 09:14 (316)		17:06	27 09:41 (104)			
Potential sun hours	486	445	379	336	277	260						
Total, worst case	439	885	232	429	172	831						
Sun reduction	0.75	0.72	0.69	0.52	0.43	0.44						
Oper. time red.	0.98	0.98	0.98	0.98	0.98	0.98						
Wind dir. red.	0.68	0.65	0.64	0.70	0.71	0.71						
Total reduction	0.50	0.46	0.43	0.36	0.30	0.31						
Total, real	218	409	101	156	52	255						

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:25 AM / 24

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 10:00 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: J - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
660	333	352	411	608	961	789	574	695	904	1,116	1,191	8,594

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

	January	February	March	April	May	June
1 08:45	09:27 (104) 08:23		07:35	07:58 (158) 07:32	06:34	06:57 (184) 05:55
17:07	23 09:50 (104) 17:50		18:34	14 08:12 (158) 20:21	21:05	61 20:38 (13) 21:45
2 08:45	09:28 (104) 08:21	08:45 (316) 07:33	07:56 (158) 07:30	06:32	06:55 (184) 05:55	
17:08	23 09:51 (104) 17:52	2 08:47 (316) 18:35	16 08:12 (158) 20:22	21:06	62 20:37 (13) 21:46	
3 08:45	09:29 (104) 08:20	08:44 (316) 07:31	07:54 (158) 07:28	06:31	06:54 (184) 05:54	
17:09	22 09:51 (104) 17:53	5 08:49 (316) 18:37	17 08:11 (158) 20:24	21:08	64 20:38 (13) 21:47	
4 08:44	09:30 (104) 08:18	08:42 (316) 07:29	07:52 (158) 07:26	06:29	06:52 (184) 05:53	
17:10	21 09:51 (104) 17:55	8 08:50 (316) 18:38	19 08:11 (158) 20:25	21:09	65 20:37 (13) 21:47	
5 08:44	09:30 (104) 08:17	08:41 (316) 07:27	07:52 (158) 07:24	06:27	06:51 (184) 05:53	
17:11	21 09:51 (104) 17:57	11 08:52 (316) 18:40	18 08:10 (158) 20:27	21:10	65 20:37 (13) 21:48	
6 08:44	09:31 (104) 08:15	08:39 (316) 07:25	07:53 (158) 07:21	06:26	06:49 (184) 05:52	
17:13	20 09:51 (104) 17:58	13 08:52 (316) 18:42	15 08:08 (158) 20:28	21:12	65 20:36 (13) 21:49	
7 08:44	09:32 (104) 08:14	08:38 (316) 07:23	07:55 (158) 07:19	06:24	06:48 (184) 05:52	
17:14	19 09:51 (104) 18:00	16 08:54 (316) 18:43	12 08:07 (158) 20:30	21:13	66 20:36 (13) 21:50	
8 08:43	09:33 (104) 08:12	08:36 (316) 08:21	08:57 (158) 07:17	06:23	06:46 (184) 05:51	
17:15	18 09:51 (104) 18:00	18 08:54 (316) 18:45	8 19:22 (12) 20:31	21:15	66 20:35 (13) 21:51	
9 08:43	09:34 (104) 08:11	08:34 (316) 08:19	19:16 (12) 07:15	06:21	06:45 (184) 05:51	
17:16	17 09:51 (104) 18:02	20 08:54 (316) 19:46	7 19:23 (12) 20:32	21:16	65 20:35 (13) 21:52	
10 08:43	09:35 (104) 08:09	08:33 (316) 08:17	19:14 (12) 07:13	06:20	06:44 (184) 05:51	
17:17	15 09:50 (104) 18:03	22 08:55 (316) 19:48	11 19:25 (12) 20:34	21:17	64 20:34 (13) 21:52	
11 08:42	09:37 (104) 08:08	08:31 (316) 08:15	19:12 (12) 07:11	06:18	06:45 (184) 05:51	
17:19	12 09:49 (104) 18:05	24 08:55 (316) 19:49	14 19:26 (12) 20:35	21:19	59 20:33 (13) 21:53	
12 08:42	09:39 (104) 08:06	08:29 (316) 08:13	19:11 (12) 07:09	06:17	06:46 (184) 05:50	
17:20	9 09:48 (104) 18:06	25 08:54 (316) 19:51	17 19:28 (12) 20:37	21:20	55 20:32 (13) 21:54	
13 08:41	08:04	08:29 (316) 08:11	19:11 (12) 07:07	06:15	06:46 (184) 05:50	
17:21	18:08	26 08:55 (316) 19:52	18 19:29 (12) 20:38	21:22	48 20:30 (13) 21:54	
14 08:41	08:03	08:29 (316) 08:09	19:10 (12) 07:05	06:14	06:47 (184) 05:50	
17:23	18:10	25 08:54 (316) 19:54	21 19:31 (12) 20:40	21:23	39 20:29 (13) 21:55	
15 08:40	08:01	08:29 (316) 08:07	19:10 (12) 07:03	06:13	06:48 (184) 05:50	
17:24	18:11	24 08:53 (316) 19:55	23 19:33 (12) 20:41	21:24	23 20:27 (13) 21:55	
16 08:39	07:59	08:30 (316) 08:05	19:10 (12) 07:01	06:11	06:50 (184) 05:50	
17:25	18:13	22 08:52 (316) 19:57	23 19:33 (12) 20:43	21:26	12 20:24 (13) 21:56	
17 08:38	07:58	08:32 (316) 08:03	19:10 (12) 07:00	06:10	06:50 (184) 05:50	
17:27	18:15	20 08:52 (316) 19:58	22 19:32 (12) 20:44	21:27	21:56	
18 08:38	07:56	08:33 (316) 08:01	19:11 (12) 06:58	06:09	06:50 (184) 05:50	
17:28	18:16	17 08:50 (316) 20:00	20 19:31 (12) 20:46	21:28	21:57	
19 08:37	07:54	08:34 (316) 07:59	19:11 (12) 06:56	06:08	06:50 (184) 05:50	
17:30	18:18	14 08:48 (316) 20:01	19 19:30 (12) 20:47	21:30	21:57	
20 08:36	07:52	08:37 (316) 07:57	19:12 (12) 06:54	06:07	06:50 (184) 05:50	
17:31	18:19	8 08:45 (316) 20:03	17 19:29 (12) 20:49	21:31	21:57	
21 08:35	07:50	07:55	19:13 (12) 06:52	06:05	06:50 (184) 05:50	
17:33	18:21	20:04	13 19:26 (12) 20:50	3 07:17 (105) 21:32	21:58	
22 08:34	07:49	07:53	19:17 (12) 06:50	07:12 (105) 06:04	06:04	05:50
17:34	18:23	20:06	5 19:22 (12) 20:52	18 20:27 (13) 21:33	21:58	
23 08:33	07:47	07:50	06:48	07:11 (105) 06:03	06:03	05:51
17:36	18:24	20:07	26 20:53 21:35	26 20:29 (13) 21:35	21:58	
24 08:32	07:45	08:07 (158) 07:48	06:46	07:09 (105) 06:02	06:02	05:51
17:37	18:26	1 08:08 (158) 20:09	20:54	32 20:30 (13) 21:36	21:58	
25 08:31	07:43	08:06 (158) 07:46	06:45	07:07 (105) 06:01	06:01	05:51
17:39	18:27	4 08:10 (158) 20:10	20:56	37 20:31 (13) 21:37	21:58	
26 08:30	07:41	08:04 (158) 07:44	06:43	07:05 (105) 06:00	06:00	05:52
17:41	18:29	7 08:11 (158) 20:12	20:57	42 20:32 (13) 21:38	21:59	
27 08:29	07:39	08:02 (158) 07:42	06:41	07:04 (105) 05:59	05:59	05:52
17:42	18:31	10 08:12 (158) 20:13	20:59	47 20:34 (13) 21:39	21:59	
28 08:28	07:37	08:00 (158) 07:40	06:39	07:02 (105) 05:58	05:58	05:52
17:44	18:32	12 08:12 (158) 20:15	21:00	51 20:35 (13) 21:40	21:59	
29 08:26		07:38	06:37	07:00 (105) 05:58	05:58	05:53
17:45		20:16	21:02	55 20:36 (13) 21:41	21:58	
30 08:25		07:36	06:36	06:59 (105) 05:57	05:57	05:53
17:47		20:18	21:03	58 20:38 (13) 21:43	21:58	
31 08:24		07:34		05:56	05:56	
17:49		20:19		21:44	21:44	
Potential sun hours	273	285	368	410	471	481
Total, worst case	220	354	349	369	879	
Sun reduction	0.56	0.50	0.63	0.59	0.67	
Oper. time red.	0.98	0.98	0.98	0.98	0.98	
Wind dir. red.	0.70	0.72	0.66	0.65	0.64	
Total reduction	0.39	0.36	0.41	0.38	0.43	
Total, real	85	127	142	140	376	

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:25 AM / 25

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net

Calculated:

10/1/2015 10:00 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: J - Participating**

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

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

Assumptions for shadow calculations

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
660	333	352	411	608	961	789	574	695	904	1,116	1,191	8,594

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

	July	August	September	October	November	December										
1	05:54	06:26	06:56 (184)	07:09	07:51	18:51 (12)	07:38	08:02 (316)	08:22	09:20 (104)						
	21:58	21:32	57	20:43 (13)	20:38	19:35	17	19:08 (12)	17:34	22	08:24 (316)	17:00	11	09:31 (104)		
2	05:55	06:27	06:55 (184)	07:10	07:52	18:51 (12)	07:39	08:04 (316)	08:24	09:18 (104)						
	21:58	21:31	61	20:44 (13)	20:36	19:33	15	19:06 (12)	17:32	20	08:24 (316)	16:59	15	09:33 (104)		
3	05:55	06:29	06:54 (184)	07:11	07:54	18:52 (12)	07:41	08:06 (316)	08:25	09:17 (104)						
	21:58	21:29	64	20:44 (13)	20:33	19:31	12	19:04 (12)	17:31	18	08:24 (316)	16:59	17	09:34 (104)		
4	05:56	06:30	06:55 (184)	07:13	07:55	18:53 (12)	07:42	08:08 (316)	08:26	09:18 (104)						
	21:57	21:28	66	20:45 (13)	20:31	19:29	9	19:02 (12)	17:29	15	08:23 (316)	16:58	18	09:36 (104)		
5	05:57	06:31	06:57 (184)	07:14	07:57	18:54 (12)	07:44	08:09 (316)	08:27	09:17 (104)						
	21:57	21:26	65	20:46 (13)	20:29	19:27	5	18:59 (12)	17:28	13	08:22 (316)	16:58	19	09:36 (104)		
6	05:57	06:33	06:58 (184)	07:16	07:58	08:32 (158)	07:45	08:11 (316)	08:29	09:17 (104)						
	21:57	21:25	66	20:46 (13)	20:27	19:25	9	08:41 (158)	17:26	11	08:22 (316)	16:58	20	09:37 (104)		
7	05:58	06:34	06:59 (184)	07:17	08:00	08:29 (158)	07:47	08:13 (316)	08:30	09:17 (104)						
	21:56	21:23	66	20:46 (13)	20:25	19:22	14	08:43 (158)	17:25	8	08:21 (316)	16:58	21	09:38 (104)		
8	05:59	06:35	07:01 (184)	07:18	08:01	08:27 (158)	07:49	08:14 (316)	08:31	09:17 (104)						
	21:56	21:22	66	20:47 (13)	20:23	19:20	17	08:44 (158)	17:23	5	08:19 (316)	16:57	21	09:38 (104)		
9	06:00	06:37	07:02 (184)	07:20	08:02	08:26 (158)	07:50	08:16 (316)	08:32	09:17 (104)						
	21:55	21:20	64	20:47 (13)	20:21	19:18	18	08:44 (158)	17:22	1	08:17 (316)	16:57	22	09:39 (104)		
10	06:01	06:38	07:03 (184)	07:21	08:04	08:27 (158)	07:52	08:17 (316)	08:33	09:17 (104)						
	21:55	21:18	63	20:46 (13)	20:19	19:16	18	08:45 (158)	17:20			16:57	23	09:40 (104)		
11	06:02	06:39	07:04 (184)	07:23	08:05	08:29 (158)	07:53	08:18 (316)	08:34	09:18 (104)						
	21:54	21:17	62	20:46 (13)	20:17	19:14	17	08:46 (158)	17:19			16:57	23	09:41 (104)		
12	06:03	06:41	07:06 (184)	07:24	08:07	08:30 (158)	07:55	08:19 (316)	08:35	09:17 (104)						
	21:53	21:15	60	20:46 (13)	20:15	19:12	15	08:45 (158)	17:18			16:57	24	09:41 (104)		
13	06:04	06:42	07:07 (105)	07:25	08:08	08:32 (158)	07:56	08:21 (316)	08:36	09:18 (104)						
	21:53	21:13	58	20:45 (13)	20:13	19:10	13	08:45 (158)	17:16			16:57	24	09:42 (104)		
14	06:05	06:44	07:08 (105)	07:27	08:10	08:33 (158)	07:58	08:22 (316)	08:37	09:18 (104)						
	21:52	21:12	55	20:44 (13)	20:11	19:08	11	08:44 (158)	17:15			16:57	25	09:43 (104)		
15	06:06	06:45	07:10 (105)	07:28	08:11	08:35 (158)	08:00	08:24 (316)	08:37	09:18 (104)						
	21:51	21:10	51	20:43 (13)	20:09	19:06	9	08:44 (158)	17:14			16:57	25	09:43 (104)		
16	06:07	06:46	07:11 (105)	07:30	08:13	08:36 (158)	08:01	08:25 (316)	08:38	09:19 (104)						
	21:50	21:08	47	20:41 (13)	20:06	19:04	6	08:42 (158)	17:13			16:57	25	09:44 (104)		
17	06:08	06:48	07:12 (105)	07:31	08:14	08:38 (158)	08:03	08:27 (316)	08:39	09:20 (104)						
	21:50	21:06	41	20:39 (13)	20:04	19:03	3	08:41 (158)	17:12			16:58	25	09:45 (104)		
18	06:09	06:49	07:14 (105)	07:32	08:16	08:40		08:29 (316)	08:40	09:19 (104)						
	21:49	21:04	37	20:38 (13)	20:02	19:01		17:10	16:58	26	09:45 (104)					
19	06:10	06:50	07:15 (105)	07:34	08:17	08:41		08:06	08:40	09:20 (104)						
	21:48	21:03	31	20:36 (13)	20:00	18:57		17:09	16:58	26	09:46 (104)					
20	06:11	06:52	07:16 (105)	07:35	08:19	08:43		08:07	08:41	09:20 (104)						
	21:47	21:01	24	20:33 (13)	19:58	18:55		17:08	16:59	26	09:46 (104)					
21	06:12	06:53	07:18 (105)	07:37	08:20	08:44		08:09	08:41	09:21 (104)						
	21:46	20:59	16	20:32 (13)	19:56	18:53		17:07	16:59	26	09:47 (104)					
22	06:13	06:55	07:38		18:59 (12)	08:22		09:07 (316)	08:10	08:42	09:21 (104)					
	21:45	20:57	19:54	11	19:10 (12)	18:51	10	09:17 (316)	17:06	17:00	26	09:47 (104)				
23	06:15	06:56	07:39		18:57 (12)	08:24		09:04 (316)	08:11	08:42	09:22 (104)					
	21:44	20:55	19:52	15	19:12 (12)	18:49	15	09:19 (316)	17:06	17:00	26	09:48 (104)				
24	06:16	06:57	07:41		18:55 (12)	08:25		09:02 (316)	08:13	08:43	09:22 (104)					
	21:42	20:53	19:50	18	19:13 (12)	18:48	18	09:20 (316)	17:05	17:01	26	09:48 (104)				
25	06:17	06:59	07:42		18:53 (12)	08:27		09:01 (316)	08:14	08:43	09:23 (104)					
	21:41	20:51	19:47	21	19:14 (12)	18:46	21	09:22 (316)	17:04	17:01	26	09:49 (104)				
26	06:18	07:00	07:44		18:52 (12)	08:28		08:59 (316)	08:16	08:44	09:24 (104)					
	21:40	20:49	19:45	22	19:14 (12)	18:44	23	09:22 (316)	17:03	17:02	25	09:49 (104)				
27	06:19	07:03 (184)	07:02		07:45	18:52 (12)	08:30	08:59 (316)	08:17	08:44	09:24 (104)					
	21:39	4	07:07 (184)	20:47	19:43	22	19:14 (12)	18:42	24	09:23 (316)	17:02	17:03	25	09:49 (104)		
28	06:21	07:00 (184)	07:03		07:47	18:51 (12)	08:31	08:59 (316)	08:18	08:44	09:24 (104)					
	21:38	17	20:37 (13)	20:46	19:41	23	19:14 (12)	18:41	25	09:24 (316)	17:02	17:04	25	09:49 (104)		
29	06:22	06:58 (184)	07:04		07:48	18:51 (12)	08:33	08:57 (316)	08:20	08:44	09:25 (104)					
	21:36	33	20:39 (13)	20:44	19:39	21	19:12 (12)	18:39	27	09:24 (316)	17:01	17:04	25	09:50 (104)		
30	06:23	06:57 (184)	07:06		07:49	18:50 (12)	08:34	08:59 (316)	08:21		09:20 (104)	08:44	09:25 (104)			
	21:35	43	20:40 (13)	20:42	19:37	20	19:10 (12)	18:37	25	09:24 (316)	17:00	9	09:29 (104)	17:05	25	09:50 (104)
31	06:25	06:56 (184)	07:07		07:49	18:50 (12)	08:36	09:01 (316)		08:45	09:26 (104)					
	21:34	51	20:41 (13)	20:40	18:35	23	09:24 (316)			17:06	24	09:50 (104)				
Potential sun hours	486	445	379	336	277	260										
Total, worst case	148	1120	173	419	122	715										
Sun reduction	0.75	0.72	0.69	0.52	0.43	0.44										
Oper. time red.	0.98	0.98	0.98	0.98	0.98	0.98										
Wind dir. red.	0.64	0.65	0.63	0.70	0.72	0.70										
Total reduction	0.47	0.46	0.43	0.36	0.31	0.30										
Total, real	70	517	74	152	38	217										

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:25 AM / 26

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 10:00 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: K - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
660	333	352	411	608	961	789	574	695	904	1,116	1,191	8,594

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

	January	February	March	April	May	June
1	08:44 08:22		07:35	18:03 (317) 07:32		06:34 05:55
	17:07 17:50		18:34	8 18:11 (317) 20:21		21:05 21:44
2	08:44 08:21		07:33	18:03 (317) 07:30		06:32 05:54
	17:08 17:52		18:35	9 18:12 (317) 20:22		21:06 21:45
3	08:44 08:20		07:31	18:03 (317) 07:27		06:30 05:54
	17:09 17:53		18:37	11 18:14 (317) 20:23		21:07 21:46
4	08:44 08:18		07:29	18:02 (317) 07:25		06:29 05:53
	17:10 17:55		18:38	13 18:15 (317) 20:25		21:09 21:47
5	08:44 08:17		07:27	18:03 (317) 07:23		06:27 05:53
	17:11 17:56		18:40	13 18:16 (317) 20:26		21:10 21:48
6	08:44 08:15		07:25	18:04 (317) 07:21		06:26 05:52
	17:12 17:58		18:41	11 18:15 (317) 20:28		21:12 21:49
7	08:44 08:14		07:23	18:07 (317) 07:19		06:24 05:52
	17:14 18:00		18:43	6 18:13 (317) 20:29		21:13 21:50
8	08:43 08:12		08:21		07:17	06:23 05:51
	17:15 18:00		18:45		20:31	21:15 21:51
9	08:43 08:11		08:19		07:15	06:21 05:51
	17:16 18:01		19:46		20:32	21:16 21:51
10	08:43 08:09		08:17		07:13	06:20 05:51
	17:17 18:03		19:48		20:34	21:17 21:52
11	08:42 08:08		08:15		07:11	06:18 05:50
	17:19 18:05		19:49		20:35	21:19 21:53
12	08:42 08:06		08:13		07:09	06:17 05:50
	17:20 18:06		19:51		20:37	21:20 21:54
13	08:41 08:04		08:11		07:07	06:15 05:50
	17:21 18:08		19:52		20:38	21:21 21:54
14	08:40 08:03		08:09		07:05	06:14 05:50
	17:23 18:10		19:54		20:40	21:23 21:55
15	08:40 08:01		08:07		07:03	06:13 05:50
	17:24 18:11		19:55		20:41	21:24 21:55
16	08:39 07:59		08:05		07:01	06:11 05:50
	17:25 18:13		19:57		20:43	21:26 21:56
17	08:38 07:57		08:03		06:59	06:10 05:50
	17:27 18:14		19:58		20:44	21:27 21:56
18	08:38 07:56		08:01		06:57	06:09 05:50
	17:28 18:16		20:00		20:46	21:28 21:57
19	08:37 07:54		07:59		06:56	06:08 05:50
	17:30 18:18		20:01		20:47	21:29 21:57
20	08:36 07:52		07:57		06:54	06:06 05:50
	17:31 18:19		20:03		20:48	21:31 21:57
21	08:35 07:50		07:55		06:52	06:05 05:50
	17:33 18:21		20:04		20:50	21:32 21:58
22	08:34 07:48		07:52		06:50	06:04 05:50
	17:34 18:22		20:06		20:51	21:33 21:58
23	08:33 07:47		07:50		06:48	06:03 05:50
	17:36 18:24		20:07		20:53	21:34 21:58
24	08:32 07:45		07:48		06:46	06:02 05:51
	17:37 18:26		20:09		20:54	21:36 21:58
25	08:31 07:43		07:46		06:44	06:01 05:51
	17:39 18:27		20:10		20:56	21:37 21:58
26	08:30 07:41		07:44		06:43	06:00 05:51
	17:40 18:29		20:12		20:57	21:38 21:58
27	08:29 07:39	18:04 (317)	07:42		06:41	05:59 05:52
	17:42 18:30	3 18:07 (317)	20:13		20:59	21:39 21:58
28	08:27 07:37	18:03 (317)	07:40		06:39	05:58 05:52
	17:44 18:32	5 18:08 (317)	20:15		21:00	21:40 21:58
29	08:26 07:35		07:38		06:37	05:57 05:53
	17:45 18:34		20:16		21:02	21:41 21:58
30	08:25 07:34		07:36		06:36	05:57 05:53
	17:47 18:36		20:18		21:03	21:42 21:58
31	08:24 07:33		07:34		06:34	05:56 05:53
	17:48 18:37		20:19		21:04	21:43 21:58
Potential sun hours	273	285	368	410	471	481
Total, worst case		8	71	142	430	835
Sun reduction		0.50	0.63	0.59	0.67	0.70
Oper. time red.		0.98	0.98	0.98	0.98	0.98
Wind dir. red.		0.61	0.61	0.69	0.72	0.72
Total reduction		0.30	0.38	0.40	0.47	0.49
Total, real		2	27	57	203	410

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:25 AM / 27

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 10:00 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: K - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
660	333	352	411	608	961	789	574	695	904	1,116	1,191	8,594

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

	July	August	September	October	November	December		
1	05:54	20:47 (26)	06:26	07:08	07:51	07:37	08:22	
	21:58	28 21:15 (26)	21:32	20:37	19:35	17:34	17:00	
2	05:55	20:47 (26)	06:27	07:10	07:52	07:39	08:24	
	21:58	28 21:15 (26)	21:31	20:35	19:33	17:32	16:59	
3	05:55	20:47 (26)	06:28	07:11	07:54	07:41	08:25	
	21:58	28 21:15 (26)	21:29	20:33	19:31	17:30	16:59	
4	05:56	20:47 (26)	06:30	07:13	07:55	07:42	08:26	
	21:57	29 21:16 (26)	21:28	20:31	19:29	17:29	16:58	
5	05:57	20:48 (26)	06:31	07:14	07:56	07:44	08:27	
	21:57	28 21:16 (26)	21:26	20:29	19:26	17:27	16:58	
6	05:57	20:47 (26)	06:32	07:15	07:58	07:45	08:28	
	21:57	29 21:16 (26)	21:25	20:27	19:24	17:26	16:58	
7	05:58	20:47 (26)	06:34	07:17	07:59	18:41 (317)	07:47	08:30
	21:56	29 21:16 (26)	21:23	20:25	19:22	9 18:50 (317)	17:24	16:57
8	05:59	20:47 (26)	06:35	07:18	08:01	18:39 (317)	07:48	08:31
	21:56	30 21:17 (26)	21:21	20:23	19:20	13 18:52 (317)	17:23	16:57
9	06:00	20:48 (26)	06:36	07:20	08:02	18:38 (317)	07:50	08:32
	21:55	29 21:17 (26)	21:20	20:21	19:18	13 18:51 (317)	17:22	16:57
10	06:01	20:48 (26)	06:38	07:21	08:04	18:37 (317)	07:52	08:33
	21:55	30 21:18 (26)	21:18	20:19	19:16	12 18:49 (317)	17:20	16:57
11	06:02	20:48 (26)	06:39	07:22	08:05	18:36 (317)	07:53	08:34
	21:54	30 21:18 (26)	21:17	20:17	19:14	10 18:46 (317)	17:19	16:57
12	06:02	20:47 (26)	06:41	07:24	08:07	18:36 (317)	07:55	08:35
	21:53	30 21:17 (26)	21:15	20:15	19:12	9 18:45 (317)	17:17	16:57
13	06:03	20:48 (26)	06:42	07:25	08:08	18:36 (317)	07:56	08:36
	21:53	30 21:18 (26)	21:13	20:13	19:10	6 18:42 (317)	17:16	16:57
14	06:04	20:48 (26)	06:43	07:27	08:10	18:36 (317)	07:58	08:36
	21:52	30 21:18 (26)	21:11	20:11	19:08	5 18:41 (317)	17:15	16:57
15	06:05	20:48 (26)	06:45	07:28	08:11	18:37 (317)	07:59	08:37
	21:51	30 21:18 (26)	21:10	20:08	19:06	2 18:39 (317)	17:14	16:57
16	06:07	20:48 (26)	06:46	07:29	08:13	08:01	08:38	
	21:50	30 21:18 (26)	21:08	20:06	19:04	17:13	16:57	
17	06:08	20:48 (26)	06:48	07:31	08:14	08:02	08:39	
	21:49	30 21:18 (26)	21:06	20:04	19:02	17:11	16:57	
18	06:09	20:49 (26)	06:49	20:18 (24)	07:32	08:16	08:04	08:39
	21:48	29 21:18 (26)	21:04	7 20:25 (24)	20:02	19:00	17:10	16:58
19	06:10	20:49 (26)	06:50	20:16 (24)	07:34	08:17	08:05	08:40
	21:48	29 21:18 (26)	21:03	12 20:28 (24)	20:00	18:57	17:09	16:58
20	06:11	20:49 (26)	06:52	20:14 (24)	07:35	08:19	08:07	08:41
	21:47	28 21:17 (26)	21:01	15 20:29 (24)	19:58	18:55	17:08	16:59
21	06:12	20:49 (26)	06:53	20:13 (24)	07:36	08:20	08:08	08:41
	21:46	27 21:16 (26)	20:59	16 20:29 (24)	19:56	18:53	17:07	16:59
22	06:13	20:51 (26)	06:55	20:12 (24)	07:38	08:22	08:10	08:42
	21:44	25 21:16 (26)	20:57	18 20:30 (24)	19:54	18:51	17:06	16:59
23	06:14	20:51 (26)	06:56	20:11 (24)	07:39	08:23	08:11	08:42
	21:43	23 21:14 (26)	20:55	17 20:28 (24)	19:52	18:49	17:05	17:00
24	06:16	20:52 (26)	06:57	20:11 (24)	07:41	08:25	08:13	08:43
	21:42	21 21:13 (26)	20:53	15 20:26 (24)	19:49	18:47	17:04	17:01
25	06:17	20:52 (26)	06:59	20:11 (24)	07:42	08:27	08:14	08:43
	21:41	20 21:12 (26)	20:51	14 20:25 (24)	19:47	18:46	17:04	17:01
26	06:18	20:53 (26)	07:00	20:11 (24)	07:44	08:28	08:16	08:43
	21:40	18 21:11 (26)	20:49	11 20:22 (24)	19:45	18:44	17:03	17:02
27	06:19	20:54 (26)	07:02	20:10 (24)	07:45	08:30	08:17	08:44
	21:39	15 21:09 (26)	20:47	10 20:20 (24)	19:43	18:42	17:02	17:03
28	06:21	20:56 (26)	07:03	20:12 (24)	07:46	08:31	08:18	08:44
	21:37	13 21:09 (26)	20:45	7 20:19 (24)	19:41	18:40	17:01	17:03
29	06:22	20:57 (26)	07:04	20:12 (24)	07:48	08:33	08:20	08:44
	21:36	11 21:08 (26)	20:43	5 20:17 (24)	19:39	18:39	17:01	17:04
30	06:23	20:59 (26)	07:06	20:13 (24)	07:49	08:34	08:21	08:44
	21:35	7 21:06 (26)	20:41	1 20:14 (24)	19:37	18:37	17:00	17:05
31	06:24	07:07	07:07	08:36	08:36	08:36	08:44	
	21:33	20:39	18:35	17:06	17:06	17:06	17:06	
Potential sun hours	486	445	379	336	277	260		
Total, worst case	764	148	79					
Sun reduction	0.75	0.72	0.52					
Oper. time red.	0.98	0.98	0.98					
Wind dir. red.	0.72	0.69	0.61					
Total reduction	0.52	0.49	0.31					
Total, real	401	73	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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:25 AM / 28

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 10:00 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: L - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
660	333	352	411	608	961	789	574	695	904	1,116	1,191	8,594

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

	January	February	March	April	May	June
1 08:45	09:17 (13) 08:23		07:35	08:02 (15) 07:32	06:34	05:55
17:07	33 09:50 (13) 17:50		18:34	27 08:29 (15) 20:21	21:05	21:45
2 08:45	09:18 (13) 08:21		07:33	08:02 (15) 07:30	06:32	05:55
17:08	33 09:51 (13) 17:52		18:35	27 08:29 (15) 20:22	21:06	21:46
3 08:45	09:18 (13) 08:20		07:31	08:02 (15) 07:28	06:31	05:54
17:09	34 09:52 (13) 17:53		18:37	26 08:28 (15) 20:24	21:08	21:47
4 08:45	09:19 (13) 08:18		07:30	08:02 (15) 07:26	06:29	05:53
17:10	33 09:52 (13) 17:55		18:39	26 08:28 (15) 20:25	21:09	21:48
5 08:44	09:19 (13) 08:17		07:28	08:03 (15) 07:24	06:27	05:53
17:11	34 09:53 (13) 17:57		18:40	24 08:27 (15) 20:27	21:11	21:48
6 08:44	09:19 (13) 08:16		07:26	08:03 (15) 07:22	06:26	05:52
17:13	34 09:53 (13) 17:58		18:42	23 08:26 (15) 20:28	21:12	21:49
7 08:44	09:20 (13) 08:14		07:24	08:04 (15) 07:20	06:24	05:52
17:14	34 09:54 (13) 18:00		18:43	20 08:24 (15) 20:30	21:13	21:50
8 08:44	09:20 (13) 08:13		08:22	09:06 (15) 07:17	06:23	05:52
17:15	34 09:54 (13) 18:00		18:45	16 09:22 (15) 20:31	21:15	21:51
9 08:43	09:21 (13) 08:11		08:19	09:08 (15) 07:15	06:21	05:51
17:16	34 09:55 (13) 18:02		19:46	11 09:19 (15) 20:33	21:16	3 06:48 (14) 21:52
10 08:43	09:21 (13) 08:09		08:17	07:13	06:20	06:43 (14) 05:51
17:17	34 09:55 (13) 18:03		19:48	20:34	21:18	8 06:51 (14) 21:52
11 08:42	09:22 (13) 08:08		08:15	07:11	06:18	06:42 (14) 05:51
17:19	34 09:56 (13) 18:05		19:49	20:36	21:19	11 06:53 (14) 21:53
12 08:42	09:22 (13) 08:06		08:13	07:09	06:17	06:41 (14) 05:50
17:20	33 09:55 (13) 18:07		19:51	20:37	21:20	13 06:54 (14) 21:54
13 08:41	09:23 (13) 08:05		08:11	07:07	06:15	06:39 (14) 05:50
17:21	33 09:56 (13) 18:08		19:52	20:38	21:22	16 06:55 (14) 21:54
14 08:41	09:23 (13) 08:03		08:09	07:05	06:14	06:38 (14) 05:50
17:23	33 09:56 (13) 18:10		19:54	20:40	21:23	18 06:56 (14) 21:55
15 08:40	09:23 (13) 08:01		08:07	07:04	06:13	06:37 (14) 05:50
17:24	33 09:56 (13) 18:11		19:55	20:41	21:24	20 06:57 (14) 21:56
16 08:39	09:24 (13) 07:59		08:05	07:02	06:11	06:36 (14) 05:50
17:26	32 09:56 (13) 18:13		19:57	20:43	21:26	22 06:58 (14) 21:56
17 08:39	09:24 (13) 07:58		08:03	07:00	06:10	06:35 (14) 05:50
17:27	32 09:56 (13) 18:15		19:58	20:44	21:27	23 06:58 (14) 21:56
18 08:38	09:25 (13) 07:56		08:01	06:58	06:09	06:33 (14) 05:50
17:28	31 09:56 (13) 18:16		20:00	20:46	21:28	25 06:58 (14) 21:57
19 08:37	09:25 (13) 07:54		07:59	06:56	06:08	06:32 (14) 05:50
17:30	31 09:56 (13) 18:18		20:01	20:47	21:30	26 06:58 (14) 21:57
20 08:36	09:27 (13) 07:52		08:15 (15) 07:57	06:54	06:07	06:32 (14) 05:50
17:31	30 09:57 (13) 18:19	3	08:18 (15) 20:03	20:49	21:31	26 06:58 (14) 21:58
21 08:35	09:27 (13) 07:51		08:13 (15) 07:55	06:52	06:05	06:32 (14) 05:50
17:33	28 09:55 (13) 18:21	9	08:22 (15) 20:04	20:50	21:32	27 06:59 (14) 21:58
22 08:34	09:28 (13) 07:49		08:11 (15) 07:53	06:50	06:04	06:32 (14) 05:50
17:34	27 09:55 (13) 18:23	13	08:24 (15) 20:06	20:52	21:33	27 06:59 (14) 21:58
23 08:33	09:29 (13) 07:47		08:09 (15) 07:51	06:48	06:03	06:32 (14) 05:51
17:36	26 09:55 (13) 18:24	17	08:26 (15) 20:07	20:53	21:35	27 06:59 (14) 21:58
24 08:32	09:31 (13) 07:45		08:08 (15) 07:48	06:46	06:02	06:32 (14) 05:51
17:37	23 09:54 (13) 18:26	20	08:28 (15) 20:09	20:55	21:36	27 06:59 (14) 21:58
25 08:31	09:32 (13) 07:43		08:06 (15) 07:46	06:45	06:01	06:32 (14) 05:51
17:39	21 09:53 (13) 18:27	22	08:28 (15) 20:10	20:56	21:37	27 06:59 (14) 21:59
26 08:30	09:34 (13) 07:41		08:04 (15) 07:44	06:43	06:00	06:33 (14) 05:52
17:41	18 09:52 (13) 18:29	25	08:29 (15) 20:12	20:58	21:38	26 06:59 (14) 21:59
27 08:29	09:37 (13) 07:39		08:02 (15) 07:42	06:41	05:59	06:33 (14) 05:52
17:42	13 09:50 (13) 18:31	27	08:29 (15) 20:13	20:59	21:39	26 06:59 (14) 21:59
28 08:28	09:40 (13) 07:37		08:02 (15) 07:40	06:39	05:58	06:33 (14) 05:52
17:44	7 09:47 (13) 18:32	27	08:29 (15) 20:15	21:00	21:40	26 06:59 (14) 21:59
29 08:26			07:38	06:37	05:58	06:33 (14) 05:53
17:45			20:16	21:02	21:42	25 06:58 (14) 21:59
30 08:25			07:36	06:36	05:57	06:34 (14) 05:54
17:47			20:18	21:03	21:43	25 06:59 (14) 21:58
31 08:24			07:34		05:56	06:34 (14)
17:49			20:19		21:44	24 06:58 (14)
Potential sun hours	273	284	368	410	471	481
Total, worst case	822	163	200	498	506	0.70
Sun reduction	0.56	0.50	0.63	0.98	0.98	0.98
Oper. time red.	0.98	0.98	0.98	0.60	0.59	0.59
Wind dir. red.	0.71	0.70	0.70	0.40	0.41	0.41
Total reduction	0.39	0.35	0.44	0.40	0.41	0.41
Total, real	322	57	88	199	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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:25 AM / 29

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 10:00 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: L - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
660	333	352	411	608	961	789	574	695	904	1,116	1,191	8,594

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

	July	August	September	October	November	December
1	05:54 17 06:21 (303) 06:26	06:52 (14) 07:09	07:51		07:38	08:23 09:04 (13)
2	05:55 17 06:22 (303) 06:27	07:05 (14) 07:10	07:52		07:39	08:24 09:04 (13)
3	05:55 17 07:00 (14) 21:31	07:03 (14) 07:12	07:54		07:41	08:25 09:04 (13)
4	05:56 17 07:01 (14) 21:29	07:00 (14) 20:34	07:55		07:31	08:26 09:05 (13)
5	05:57 18 07:02 (14) 21:26	07:17 07:55	07:55	08:47 (15) 07:42	07:31	08:26 09:05 (13)
6	05:58 18 06:44 (14) 06:30	07:17 07:55	07:55	08:47 (15) 07:42	07:31	08:26 09:05 (13)
7	05:58 17 07:01 (14) 21:28	07:17 07:55	07:55	08:47 (15) 07:42	07:31	08:26 09:05 (13)
8	05:59 18 06:44 (14) 06:31	07:14 07:57	07:57	08:44 (15) 07:44	07:44	08:27 09:05 (13)
9	05:58 19 07:03 (14) 21:25	07:16 07:58	07:58	08:41 (15) 07:46	07:46	08:29 09:05 (13)
10	06:00 19 06:43 (14) 06:34	07:17 07:58	07:58	08:41 (15) 07:46	07:46	08:29 09:05 (13)
11	06:00 20 07:03 (14) 21:23	07:19 07:59	07:59	08:41 (15) 07:46	07:46	08:29 09:05 (13)
12	06:01 21 06:43 (14) 06:35	07:19 07:59	07:59	08:41 (15) 07:46	07:46	08:29 09:05 (13)
13	06:02 21 07:04 (14) 21:22	07:20 08:00	08:00	08:41 (15) 07:46	07:46	08:29 09:05 (13)
14	06:03 22 07:05 (14) 21:20	07:21 08:01	08:01	08:41 (15) 07:46	07:46	08:29 09:05 (13)
15	06:04 22 06:43 (14) 06:38	07:21 08:01	08:01	08:41 (15) 07:46	07:46	08:29 09:05 (13)
16	06:04 23 07:06 (14) 21:17	07:23 08:06	08:06	08:36 (15) 07:53	07:53	08:34 09:08 (13)
17	06:05 23 06:43 (14) 06:39	07:23 08:06	08:06	08:36 (15) 07:53	07:53	08:34 09:08 (13)
18	06:06 24 07:07 (14) 21:15	07:24 08:07	08:07	08:35 (15) 07:55	07:55	08:35 09:09 (13)
19	06:07 24 06:43 (14) 06:42	07:25 08:08	08:08	08:35 (15) 07:57	07:57	08:36 09:08 (13)
20	06:08 24 07:07 (14) 21:13	07:25 08:08	08:08	08:35 (15) 07:57	07:57	08:36 09:08 (13)
21	06:09 25 06:42 (14) 06:44	07:27 08:10	08:10	08:34 (15) 07:58	07:58	08:37 09:09 (13)
22	06:10 25 07:07 (14) 21:12	07:27 08:10	08:10	08:34 (15) 07:58	07:58	08:37 09:09 (13)
23	06:11 25 06:42 (14) 06:45	07:28 08:11	08:11	08:35 (15) 08:00	08:00	08:37 09:10 (13)
24	06:12 25 07:07 (14) 21:10	07:28 08:11	08:11	08:35 (15) 08:00	08:00	08:37 09:10 (13)
25	06:13 26 06:42 (14) 06:46	07:30 08:13	08:13	08:36 (15) 08:01	08:01	08:38 09:11 (13)
26	06:14 26 07:07 (14) 21:08	07:30 08:13	08:13	08:36 (15) 08:01	08:01	08:38 09:11 (13)
27	06:15 27 06:41 (14) 06:48	07:31 08:14	08:14	08:38 (15) 08:03	08:03	08:39 09:11 (13)
28	06:16 27 07:08 (14) 21:06	07:32 08:16	08:16	08:40 (15) 08:04	08:04	08:40 09:11 (13)
29	06:17 27 06:41 (14) 06:49	07:32 08:16	08:16	08:40 (15) 08:04	08:04	08:40 09:11 (13)
30	06:18 27 07:08 (14) 21:05	07:32 08:16	08:16	08:40 (15) 08:04	08:04	08:40 09:11 (13)
31	06:19 27 06:42 (14) 06:51	07:34 08:18	08:18	08:41 (15) 08:06	08:06	08:40 09:12 (13)
32	06:20 27 07:09 (14) 21:03	07:34 08:18	08:18	08:41 (15) 08:06	08:06	08:40 09:12 (13)
33	06:21 27 06:42 (14) 06:52	07:35 08:19	08:19	08:43 (15) 08:07	08:07	08:41 09:13 (13)
34	06:22 27 07:09 (14) 21:01	07:35 08:19	08:19	08:43 (15) 08:07	08:07	08:41 09:13 (13)
35	06:23 27 06:42 (14) 06:53	07:37 08:21	08:21	08:44 (15) 08:09	08:09	08:42 09:13 (13)
36	06:24 27 07:09 (14) 20:59	07:37 08:21	08:21	08:44 (15) 08:09	08:09	08:42 09:13 (13)
37	06:25 27 06:42 (14) 06:55	07:38 08:22	08:22	08:45 (15) 08:10	08:10	08:42 09:14 (13)
38	06:26 27 07:09 (14) 20:57	07:38 08:22	08:22	08:45 (15) 08:10	08:10	08:42 09:14 (13)
39	06:27 27 06:42 (14) 06:56	07:39 08:23	08:23	08:46 (15) 08:11	08:11	08:43 09:14 (13)
40	06:28 27 07:09 (14) 20:55	07:39 08:23	08:23	08:46 (15) 08:11	08:11	08:43 09:14 (13)
41	06:29 27 06:42 (14) 06:58	07:41 08:25	08:25	08:48 (15) 08:13	08:13	08:43 09:14 (13)
42	06:30 27 07:09 (14) 20:53	07:41 08:25	08:25	08:48 (15) 08:13	08:13	08:43 09:14 (13)
43	06:31 27 06:43 (14) 06:59	07:42 08:27	08:27	08:49 (15) 08:14	08:14	08:43 09:15 (13)
44	06:32 27 07:09 (14) 20:51	07:42 08:27	08:27	08:49 (15) 08:14	08:14	08:43 09:15 (13)
45	06:33 27 06:44 (14) 07:00	07:44 08:28	08:28	08:50 (15) 08:16	08:16	08:44 09:15 (13)
46	06:34 27 07:08 (14) 20:50	07:44 08:28	08:28	08:50 (15) 08:16	08:16	08:44 09:15 (13)
47	06:35 27 06:46 (14) 07:02	07:45 08:30	08:30	08:51 (15) 08:17	08:17	08:44 09:15 (13)
48	06:36 27 07:08 (14) 20:48	07:45 08:30	08:30	08:51 (15) 08:17	08:17	08:44 09:15 (13)
49	06:37 27 06:47 (14) 07:03	07:47 08:31	08:31	08:52 (15) 08:19	08:19	08:44 09:16 (13)
50	06:38 27 07:08 (14) 20:46	07:47 08:31	08:31	08:52 (15) 08:19	08:19	08:44 09:16 (13)
51	06:39 27 06:48 (14) 07:05	07:48 08:33	08:33	08:53 (15) 08:20	08:20	08:44 09:16 (13)
52	06:40 27 07:07 (14) 20:44	07:48 08:33	08:33	08:53 (15) 08:20	08:20	08:44 09:16 (13)
53	06:41 27 06:49 (14) 07:06	07:49 08:35	08:35	08:54 (15) 08:21	08:21	08:45 09:16 (13)
54	06:42 27 07:06 (14) 20:42	07:49 08:35	08:35	08:54 (15) 08:21	08:21	08:45 09:16 (13)
55	06:43 27 06:50 (14) 07:07	07:50 08:36	08:36	08:55 (15) 08:22	08:22	08:45 09:17 (13)
56	06:44 27 07:05 (14) 20:40	07:50 08:36	08:36	08:55 (15) 08:22	08:22	08:45 09:17 (13)
57	Potential sun hours	486				260
58	Total, worst case	695	29	368	453	1017
59	Sun reduction	0.75	0.72	0.52	0.43	0.44
60	Oper. time red.	0.98	0.98	0.98	0.98	0.98
61	Wind dir. red.	0.60	0.60	0.70	0.71	0.71
62	Total reduction	0.44	0.43	0.37	0.31	0.31
63	Total, real	308	12	135	138	314

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:25 AM / 30

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net

Calculated:

10/1/2015 10:00 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: M - Participating**

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

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

Assumptions for shadow calculations

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
660	333	352	411	608	961	789	574	695	904	1,116	1,191	8,594

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

	January	February	March	April	May	June	July	August	September	October	November	December	
1	08:45	08:22	07:35	07:32	06:34	07:00 (34)	05:55	05:54	06:26	07:08	07:51	07:37	08:22
	17:07	17:50	18:34	20:21	21:05	18	07:18 (34)	21:44	21:32	20:37	19:35	17:34	17:00
2	08:45	08:21	07:33	07:30	06:32	07:00 (34)	05:54	05:54	06:27	07:10	07:52	07:39	08:24
	17:08	17:52	18:35	20:22	21:06	16	07:16 (34)	21:45	21:31	20:35	19:33	17:32	16:59
3	08:44	08:20	07:31	07:27	06:30	07:01 (34)	05:54	05:55	06:28	07:11	07:54	07:41	08:25
	17:09	17:53	18:37	20:23	21:07	15	07:16 (34)	21:46	21:29	20:33	19:31	17:30	16:59
4	08:44	08:18	07:29	07:25	06:29	07:02 (34)	05:53	05:56	06:30	07:13	07:55	07:42	08:26
	17:10	17:55	18:38	20:25	21:09	12	07:14 (34)	21:47	21:28	20:31	19:28	17:29	16:58
5	08:44	08:17	07:27	07:23	06:27	07:03 (34)	05:53	05:56	06:31	07:14	07:56	07:44	08:27
	17:11	17:56	18:40	20:26	21:10	9	07:12 (34)	21:48	21:26	20:29	19:26	17:27	16:58
6	08:44	08:15	07:25	07:21	06:26	07:02 (34)	05:52	05:57	06:32	07:15	07:58	07:45	08:28
	17:12	17:58	18:41	20:28	21:12		21:49	21:57	21:25	20:27	19:24	17:26	16:58
7	08:44	08:14	07:23	07:19	06:24	07:03 (34)	05:52	05:58	06:34	07:15 (34)	07:17	07:59	07:47
	17:13	18:00	18:43	20:29	21:13		21:50	21:56	21:23	5	07:20 (34)	20:25	19:22
8	08:43	08:12	08:21	07:17	06:22	07:04 (34)	05:51	05:59	06:35	07:12 (34)	07:18	08:01	07:48
	17:15	18:00	18:44	20:31	21:15		21:51	21:56	21:22	10	07:22 (34)	20:23	19:20
9	08:43	08:11	08:19	07:15	06:21	07:05 (34)	05:51	06:00	06:36	07:11 (34)	07:20	08:02	07:50
	17:16	18:01	19:46	20:32	21:16		21:52	21:55	21:20	13	07:24 (34)	20:21	19:18
10	08:43	08:09	08:17	07:13	06:19	07:06 (34)	05:51	06:01	06:38	07:10 (34)	07:21	08:04	07:52
	17:17	18:03	19:48	20:34	21:17		21:52	21:55	21:18	15	07:25 (34)	20:19	19:16
11	08:42	08:08	08:15	07:11	06:18	07:07 (34)	05:50	06:01	06:39	07:08 (34)	07:22	08:05	07:53
	17:18	18:05	19:49	20:35	21:19		21:53	21:54	21:17	17	07:25 (34)	20:17	19:14
12	08:42	08:06	08:13	07:09	06:17	07:08 (34)	05:50	06:02	06:41	07:08 (34)	07:24	08:07	07:55
	17:20	18:06	19:51	20:37	21:20		21:54	21:53	21:15	18	07:26 (34)	20:15	19:12
13	08:41	08:04	08:11	07:07	06:15	07:09 (34)	05:50	06:03	06:42	07:07 (34)	07:25	08:08	07:56
	17:21	18:08	19:52	20:38	21:22		21:54	21:53	21:13	19	07:26 (34)	20:13	19:10
14	08:40	08:03	08:09	07:05	06:14	07:10 (34)	05:50	06:04	06:43	07:08 (34)	07:27	08:10	07:58
	17:22	18:09	19:54	20:40	21:23		21:55	21:52	21:11	18	07:26 (34)	20:11	19:08
15	08:40	08:01	08:07	07:03	06:12	07:11 (34)	05:50	06:05	06:45	07:09 (34)	07:28	08:11	07:59
	17:24	18:11	19:55	20:41	21:24		21:55	21:51	21:10	16	07:25 (34)	20:08	19:06
16	08:39	07:59	08:05	07:01	06:11	07:12 (34)	05:49	06:06	06:46	07:11 (34)	07:29	08:13	08:01
	17:25	18:13	19:57	20:43	21:26		21:56	21:50	21:08	15	07:26 (34)	20:06	19:04
17	08:38	07:57	08:03	06:59	06:10	07:13 (34)	05:49	06:07	06:47	07:12 (34)	07:31	08:14	08:02
	17:27	18:14	19:58	20:44	21:27		21:56	21:49	21:06	13	07:25 (34)	20:04	19:02
18	08:38	07:56	08:01	06:57	06:09	07:14 (34)	05:50	06:09	06:49	07:13 (34)	07:32	08:16	08:04
	17:28	18:16	20:00	20:46	21:28		21:57	21:49	21:04	11	07:24 (34)	20:02	19:00
19	08:37	07:54	07:59	06:55	06:07	07:15 (34)	05:50	06:10	06:50	07:15 (34)	07:34	08:17	08:05
	17:30	18:18	20:01	20:47	21:29		21:57	21:48	21:03	8	07:23 (34)	20:00	18:57
20	08:36	07:52	07:57	06:54	06:06	07:16 (34)	05:50	06:11	06:52	07:16 (34)	07:35	08:19	08:07
	17:31	18:19	20:03	20:48	21:31		21:57	21:47	21:01	5	07:21 (34)	19:58	18:55
21	08:35	07:50	07:54	06:52	06:05	07:17 (34)	05:50	06:12	06:53	07:17 (34)	07:36	08:20	08:08
	17:33	18:21	20:04	20:50	21:32		21:58	21:46	20:59	2	07:19 (34)	19:56	18:53
22	08:34	07:48	07:52	06:50	06:04	07:18 (34)	05:50	06:13	06:54	07:18 (34)	07:38	08:22	08:10
	17:34	18:22	20:06	20:51	3	07:15 (34)	21:33	21:58	21:45	20:57	19:54	18:51	17:06
23	08:33	07:47	07:50	06:48	06:03	07:19 (34)	05:50	06:14	06:56	07:19 (34)	07:39	08:23	08:11
	17:36	18:24	20:07	20:53	6	07:16 (34)	21:34	21:58	21:43	20:55	19:52	18:49	17:05
24	08:32	07:45	07:48	06:46	06:02	07:19 (34)	05:51	06:16	06:57	07:19 (34)	07:41	08:25	08:13
	17:37	18:26	20:09	20:54	9	07:18 (34)	21:36	21:58	21:42	20:53	19:49	18:47	17:04
25	08:31	07:43	07:46	06:44	06:01	07:20 (34)	05:51	06:17	06:59	07:20 (34)	07:42	08:27	08:14
	17:39	18:27	20:10	20:56	11	07:18 (34)	21:37	21:58	21:41	20:51	19:47	18:46	17:04
26	08:30	07:41	07:44	06:43	06:00	07:21 (34)	05:51	06:18	07:00	07:21 (34)	07:44	08:28	08:16
	17:40	18:29	20:12	20:57	13	07:18 (34)	21:38	21:58	21:40	20:49	19:45	18:44	17:03
27	08:29	07:39	07:42	06:41	06:03	07:22 (34)	05:50	06:19	07:01	07:22 (34)	07:45	08:30	08:17
	17:42	18:30	20:13	20:59	15	07:18 (34)	21:39	21:58	21:39	20:47	19:43	18:42	17:02
28	08:27	07:37	07:40	06:39	06:02	07:23 (34)	05:50	06:20	07:03	07:23 (34)	07:46	08:31	08:18
	17:43	18:32	20:15	21:00	17	07:19 (34)	21:40	21:58	21:37	20:45	19:41	18:40	17:01
29	08:26	07:38	07:38	06:37	06:04	07:24 (34)	05:51	06:22	07:04	07:24 (34)	07:48	08:33	08:20
	17:45	18:34	20:17	21:02	18	07:18 (34)	21:41	21:58	21:36	20:43	19:39	18:39	17:01
30	08:25	07:36	07:36	06:35	06:05	07:25 (34)	05:51	06:23	07:06	07:25 (34)	07:49	08:34	08:21
	17:47	18:36	20:19	21:03	18	07:17 (34)	21:42	21:58	21:35	20:41	19:37	18:37	17:00
31	08:24	07:34	07:34	06:33	06:06	07:26 (34)	05:52	06:24	07:07	07:26 (34)	07:50	08:36	08:24
	17:48	18:37	20:20	21:04	21:43		21:59	21:33	20:39			18:35	17:06
Potential sun hours	273	284	368	410	471	481	486	445		379	336	277	260
Total, worst case				110	70				185				
Sun reduction				0.59	0.67				0.72				
Oper. time red.				0.98	0.98				0.98				
Wind dir. red.				0.61	0.61				0.61				
Total reduction				0.35	0.40				0.43				
Total, real				39	28				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)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:25 AM / 31

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net

Calculated:

10/1/2015 10:00 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V110 Realistic Flicker w/Out Obstacles DNV Tab **Shadow receptor: Q - Non-Participating**

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

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

Assumptions for shadow calculations

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
660	333	352	411	608	961	789	574	695	904	1,116	1,191	8,594

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

	January	February	March	April	May	June	July	August	September	October	November	December	
1	08:44 17:07	08:22 17:50	07:35 18:33	07:31 20:20	06:34 21:04	05:55 21:44	05:54 21:58	06:25 21:32	07:08 20:37	07:51 19:35	18:53 (180) 19:07 (180)	07:37 17:33	08:22 16:59
2	08:44 17:08	08:21 17:51	07:33 18:35	07:29 20:22	06:32 21:06	05:54 21:45	05:54 21:58	06:27 21:31	07:10 20:35	07:52 19:32	18:52 (180) 19:06 (180)	07:39 17:32	08:24 16:59
3	08:44 17:09	08:20 17:53	07:31 18:37	07:27 20:23	06:30 21:07	05:53 21:46	05:55 21:58	06:28 21:29	07:11 20:33	07:53 19:30	18:51 (180) 19:03 (180)	07:41 17:30	08:25 16:58
4	08:44 17:10	08:18 17:55	07:29 18:38	07:25 20:25	06:29 21:09	05:53 21:47	05:55 21:57	06:29 21:28	07:12 20:31	07:55 19:28	18:52 (180) 19:01 (180)	07:42 17:29	08:26 16:58
5	08:44 17:11	08:17 17:56	07:27 18:40	07:23 20:26	06:27 21:10	05:52 21:48	05:56 21:57	06:31 21:26	07:14 20:29	07:56 19:26	18:51 (180) 18:59 (180)	07:44 17:27	08:27 16:58
6	08:44 17:12	08:15 17:58	07:25 18:41	07:21 20:28	06:25 21:12	05:52 21:49	05:57 21:57	06:32 21:25	07:15 20:27	07:58 19:24	18:52 (180) 18:57 (180)	07:45 17:26	08:28 16:57
7	08:44 17:13	08:14 17:59	07:23 18:43	18:16 (180) 20:29	07:19 21:13	06:24 21:50	05:51 21:56	06:33 21:23	07:17 20:25	07:59 19:22	18:53 (180) 18:55 (180)	07:47 17:24	08:29 16:57
8	08:43 17:14	08:12 18:01	08:21 18:44	19:15 (180) 20:31	07:17 21:14	06:22 21:51	05:51 21:56	06:35 21:21	07:18 20:23	08:01 19:20	18:55 (180)	07:48 17:23	08:31 16:57
9	08:43 17:16	08:11 18:01	08:19 19:46	19:14 (180) 20:32	07:15 21:16	06:21 21:51	05:51 21:56	06:36 21:20	07:19 20:21	08:02 19:18		07:50 17:21	08:32 16:57
10	08:43 17:17	08:09 18:03	08:17 19:47	19:14 (180) 20:34	07:13 21:17	06:19 21:52	05:50 21:55	06:38 21:18	07:21 20:19	08:04 19:16		07:52 17:20	08:33 16:57
11	08:42 17:18	08:07 18:04	08:15 19:49	19:13 (180) 20:35	07:11 21:19	06:18 21:53	05:50 21:54	06:39 21:17	07:22 20:17	08:05 19:14		07:53 17:19	08:34 16:56
12	08:42 17:19	08:06 18:06	08:13 19:50	19:14 (180) 20:37	07:09 21:20	06:16 21:54	05:50 21:53	06:40 21:15	07:24 20:15	08:07 19:12		07:55 17:17	08:35 16:56
13	08:41 17:21	08:04 18:08	08:11 19:52	19:14 (180) 20:38	07:07 21:21	06:15 21:54	05:50 21:53	06:42 21:13	07:25 20:12	08:08 19:10		07:56 17:16	08:36 16:56
14	08:40 17:22	08:03 18:09	08:09 19:53	19:15 (180) 20:40	07:05 21:23	06:14 21:55	05:49 21:52	06:43 21:11	07:26 20:10	08:10 19:08		07:58 17:15	08:36 16:57
15	08:40 17:24	08:01 18:11	08:07 19:55	19:17 (180) 20:41	07:03 21:24	06:12 21:55	05:49 21:51	06:44 21:10	07:28 20:08	08:11 19:06		07:59 17:13	08:37 16:57
16	08:39 17:25	07:59 18:13	08:05 19:57	19:26 (180) 20:43	07:01 21:25	06:11 21:56	05:49 21:50	06:46 21:08	07:29 20:06	08:13 19:04		08:01 17:12	08:38 16:57
17	08:38 17:26	07:57 18:14	08:03 19:58	06:59 20:44	06:10 21:27	05:49 21:56	05:49 21:49	06:47 21:06	07:31 20:04	08:14 19:02		08:02 17:11	08:39 16:57
18	08:37 17:28	07:56 18:16	08:01 20:00	06:57 20:45	06:08 21:28	05:49 21:57	05:49 21:48	06:49 21:04	07:32 20:02	08:16 19:00		08:04 17:10	08:39 16:57
19	08:37 17:29	07:54 18:17	07:59 20:01	06:55 20:47	06:07 21:29	05:49 21:57	05:49 21:48	06:50 21:02	07:33 20:00	08:17 18:56		08:05 17:09	08:40 16:58
20	08:36 17:31	07:52 18:19	07:56 20:03	06:53 20:48	06:06 21:31	05:49 21:57	05:49 21:47	06:51 21:01	07:35 19:58	08:19 18:55		08:07 17:08	08:41 16:58
21	08:35 17:32	07:50 18:21	07:54 20:04	06:52 20:50	06:05 21:32	05:50 21:58	05:50 21:46	06:53 20:59	07:36 19:56	08:20 18:53		08:08 17:07	08:41 16:59
22	08:34 17:34	07:48 18:22	07:52 20:06	06:50 20:51	06:04 21:33	05:50 21:58	05:50 21:44	06:54 20:57	07:38 19:53	08:22 18:51		08:10 17:06	08:42 16:59
23	08:33 17:35	07:46 18:24	07:50 20:07	06:48 20:53	06:03 21:34	05:50 21:58	05:50 21:43	06:56 20:55	07:39 19:51	08:23 18:49		08:11 17:05	08:42 17:00
24	08:32 17:37	07:45 18:25	07:48 20:09	06:46 20:54	06:02 21:36	05:50 21:58	05:50 21:42	06:57 20:53	07:41 19:49	08:25 18:47		08:13 17:04	08:43 17:00
25	08:31 17:38	07:43 18:27	07:46 20:10	06:44 20:56	06:01 21:37	05:51 21:58	05:51 21:41	06:58 20:51	07:42 19:47	08:26 18:45		08:14 17:03	08:43 17:01
26	08:30 17:40	07:41 18:29	07:44 20:11	06:42 20:57	06:00 21:38	05:51 21:58	05:51 21:40	06:59 20:49	07:43 19:45	08:28 18:44		08:16 17:03	08:43 17:01
27	08:29 17:42	07:39 18:30	07:42 20:13	06:41 20:59	05:59 21:39	05:51 21:58	05:51 21:39	06:51 20:47	07:45 19:43	08:30 18:42		08:17 17:02	08:44 17:02
28	08:27 17:43	07:37 18:32	07:40 20:14	06:39 21:00	05:58 21:40	05:52 21:58	05:52 21:37	06:52 20:45	07:03 19:41	08:31 18:40	18:58 (180) 19:06 (180)	08:31 17:01	08:44 17:03
29	08:26 17:45	07:38 18:25	07:38 20:16	06:37 21:02	05:57 21:41	05:52 21:58	05:52 21:36	06:52 20:43	07:04 19:39	08:33 18:38	18:55 (180) 19:07 (180)	08:33 17:00	08:44 17:04
30	08:25 17:46	07:36 18:24	07:36 20:17	06:35 21:03	05:56 21:42	05:53 21:58	05:53 21:35	06:53 20:41	07:05 19:37	08:34 18:37	18:54 (180) 19:09 (180)	08:34 17:00	08:44 17:05
31	08:24 17:48	07:33 18:24	07:33 20:19	06:33 21:03	05:55 21:43	05:53 21:58	05:53 21:33	06:54 20:39	07:07 19:37	08:36 18:35		08:36 17:00	08:44 17:06
Potential sun hours	273	284	368	410	472	482	486	445	379	336	277	260	
Total, worst case			93						35		64		
Sun reduction			0.63						0.69		0.52		
Oper. time red.			0.98						0.98		0.98		
Wind dir. red.			0.63						0.63		0.63		
Total reduction			0.39						0.42		0.32		
Total, real			36						15		21		

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.

Kevin Walter

Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:25 AM / 32

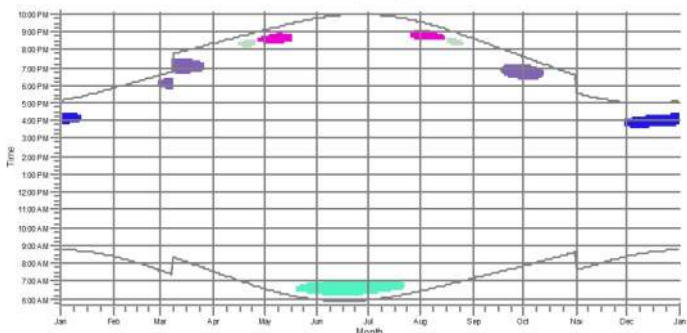
Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 10:00 PM/2.9.285

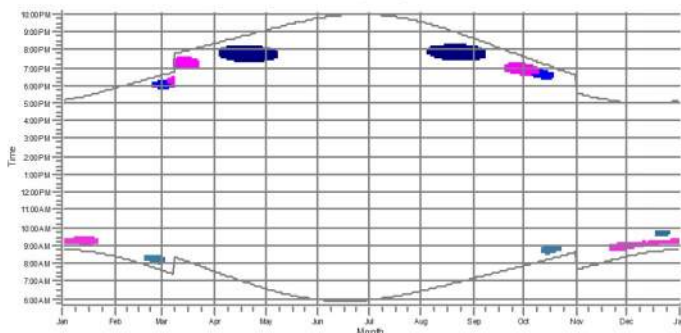
SHADOW - Calendar, graphical

Calculation: A059 V110 Realistic Flicker w/Out Obstacles DNV Tab

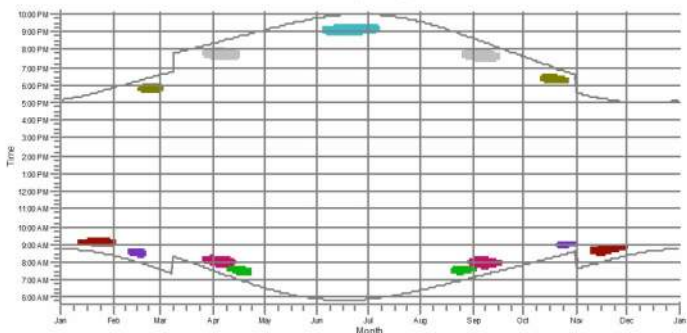
A: Participating



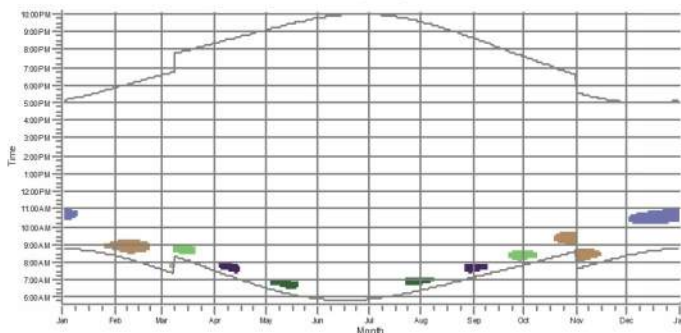
B: Participating



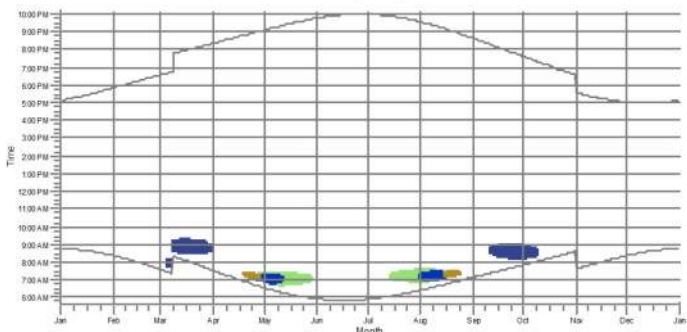
C: Participating



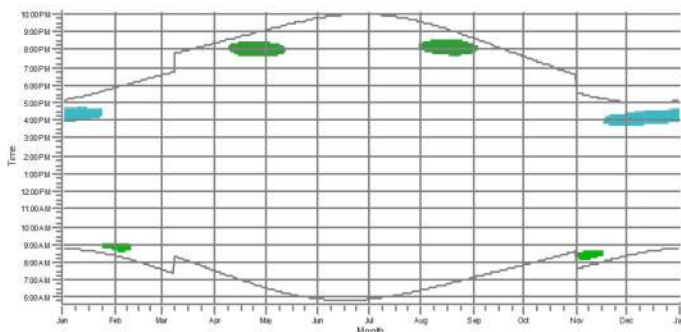
D: Participating



E: Participating



F: Participating



WTGs

174: up to V110	13: up to V110	311: up to V110	37: up to V110	184: up to V110	177: up to V110	34: up to V110
173: up to V110	205: up to V110	39: up to V110	67: up to V110	158: up to V110	178: up to V110	300: up to V110
171: up to V110	15: up to V110	66: up to V110	105: up to V110	42: up to V110	180: up to V110	35: up to V110
12: up to V110	14: up to V110	38: up to V110	316: up to V110	176: up to V110	179: up to V110	36: up to V110

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

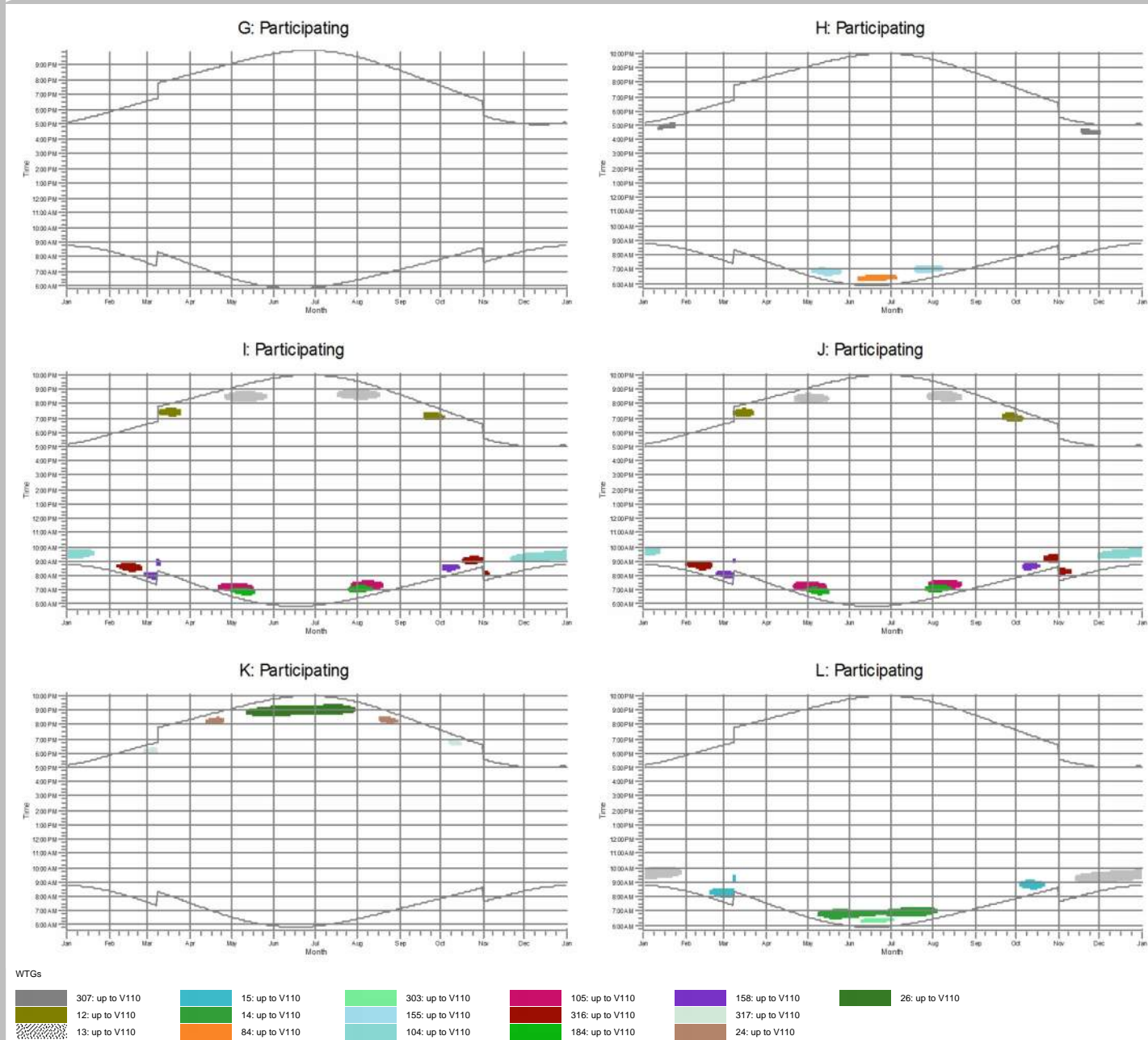
10/2/2015 10:25 AM / 33

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 10:00 PM/2.9.285

SHADOW - Calendar, graphical

Calculation: A059 V110 Realistic Flicker w/Out Obstacles DNV Tab



Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:25 AM / 34

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000

wind@eapc.net

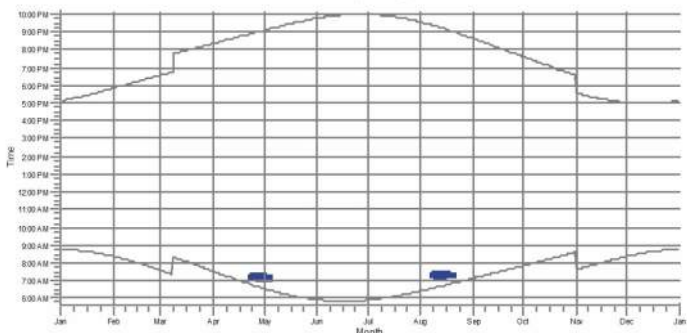
Calculated:

10/1/2015 10:00 PM/2.9.285

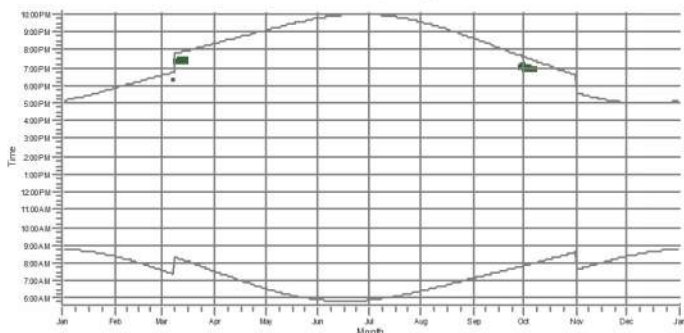
SHADOW - Calendar, graphical

Calculation: A059 V110 Realistic Flicker w/Out Obstacles DNV Tab

Mt: Participating



Q: Non-Participating



WTGs

180: up to V110

34: up to V110

Appendix M: windPRO V117/V110 Shadow Flicker Report, W/ Obstacles for Select Receptors

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:32 AM / 1

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 5:01 PM/2.9.285

SHADOW - Main Result

Calculation: A059 V117/V110 Realistic Flicker w/ Obstacles DNV Tab

Assumptions for shadow calculations

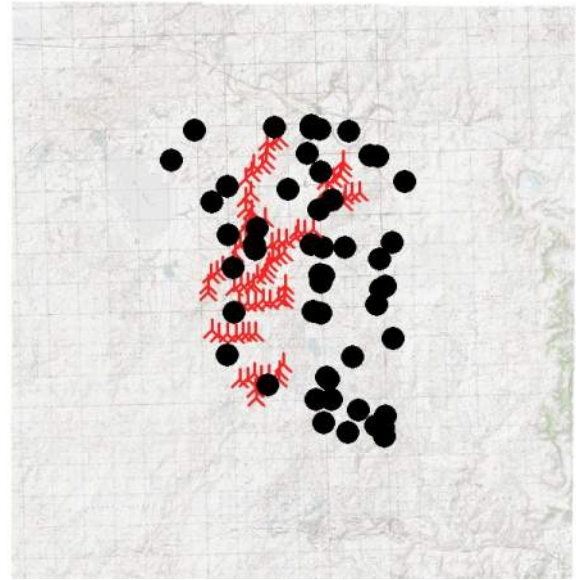
Maximum distance for influence 1,500 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) [BISMARCK]
 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 4.92 5.13 7.45 8.03 10.20 11.21 11.69 10.35 8.68 5.69 4.02 3.69

Operational hours are calculated from WTGs in calculation and wind distribution:
 DNV Shadow

Operational time
 N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
 662 334 353 412 609 964 791 576 697 906 1,119 1,195 8,618
 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: 20100616_Lindahl_10ft_HCL.wpo (1)
 Obstacles used in calculation
 Eye height: 1.5 m
 Grid resolution: 10.0 m



人 New WTG

Scale 1:400,000
 ☞ Shadow receptor

WTGs

UTM NAD83 Zone: 13			Row data/Description	WTG type							
East	North	Z [m]		Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	RPM [RPM]	
5	646,913	5,375,455	745.7 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0	
6	646,888	5,375,080	743.7 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0	
12	648,327	5,377,151	750.2 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
13	648,563	5,377,579	749.6 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
14	648,872	5,378,572	753.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
15	648,872	5,377,853	752.9 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
18	649,189	5,379,368	749.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
20	648,867	5,380,033	744.0 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0	
22	649,124	5,380,328	729.3 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0	
24	651,007	5,377,868	749.0 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0	
26	651,525	5,378,000	751.5 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0	
27	651,616	5,378,348	758.6 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0	
28	651,987	5,378,290	755.5 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0	
29	652,436	5,378,405	749.8 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0	
34	654,047	5,379,834	743.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
35	654,478	5,380,290	740.5 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
36	654,876	5,380,346	731.4 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0	
37	649,468	5,369,552	735.9 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
38	649,403	5,370,046	745.2 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
39	648,989	5,370,563	740.7 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0	
40	649,348	5,370,846	749.8 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0	
41	649,714	5,370,690	746.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
42	650,635	5,370,574	746.1 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
43	650,667	5,370,918	744.1 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0	
45	650,882	5,371,340	743.7 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0	
66	649,309	5,375,532	733.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
67	649,484	5,375,990	732.9 up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0	

To be continued on next page...

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:32 AM / 2

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 5:01 PM/2.9.285

SHADOW - Main Result

Calculation: A059 V117/V110 Realistic Flicker w/ Obstacles DNV Tab

...continued from previous page

UTM NAD83 Zone: 13				WTG type							
	East	North	Z [m]	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	RPM [RPM]
68	649,889	5,375,994	741.6	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
69	650,008	5,376,321	740.1	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
70	650,956	5,375,465	751.0	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
84	648,982	5,374,557	737.6	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
85	648,553	5,374,643	733.1	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
98	648,903	5,381,054	722.4	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
99	649,170	5,381,363	721.7	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
100	649,950	5,382,038	713.8	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
101	650,030	5,382,496	712.8	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
104	650,119	5,376,639	740.5	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
105	650,267	5,377,632	746.8	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
150	650,663	5,383,159	707.7	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
151	650,947	5,375,049	753.4	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
152	650,911	5,374,694	758.8	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
154	650,163	5,374,664	746.8	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
155	649,378	5,374,555	741.3	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
156	649,818	5,374,694	743.7	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
158	650,613	5,377,049	737.8	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
164	649,406	5,372,982	725.6	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
165	647,909	5,372,903	716.3	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
166	647,487	5,372,910	715.6	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
171	647,671	5,376,427	743.7	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
173	647,364	5,376,192	740.7	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
174	647,056	5,376,002	741.8	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
175	653,143	5,380,511	713.2	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
176	653,130	5,380,927	710.2	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
177	653,497	5,381,062	704.1	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
178	653,850	5,381,276	700.7	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
179	654,022	5,381,604	696.2	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
180	654,011	5,381,966	694.9	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
183	649,728	5,381,758	721.2	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
184	650,599	5,377,842	746.4	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
205	648,594	5,370,523	731.5	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
206	650,092	5,370,737	743.7	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
300	654,134	5,380,179	734.1	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
302	648,870	5,379,451	759.0	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
303	649,079	5,378,913	759.0	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
304	649,308	5,381,738	716.8	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
305	650,346	5,383,045	709.5	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
306	650,021	5,382,956	710.0	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
307	647,090	5,373,129	713.2	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
308	649,061	5,372,960	722.4	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
309	648,724	5,372,961	720.3	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
310	648,383	5,372,885	719.3	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
311	648,975	5,375,560	734.6	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
312	648,641	5,375,554	726.9	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
313	648,297	5,375,376	728.5	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0
314	649,928	5,378,956	741.0	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
315	650,591	5,374,779	748.6	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
316	650,301	5,376,922	735.0	up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9
317	650,917	5,377,197	740.0	up to V117	Yes	VESTAS	V117-3.3-3,300	3,300	117.0	91.5	17.0

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:32 AM / 3

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 5:01 PM/2.9.285

SHADOW - Main Result

Calculation: A059 V117/V110 Realistic Flicker w/ Obstacles DNV Tab

Shadow receptor-Input

UTM NAD83 Zone: 13

No.	Name	East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
				[m]	[m]	[m]	[m]	[°]	[°]	
A	Participating	650,034	5,370,204	742.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
B	Participating	648,222	5,376,376	731.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
C	Participating	649,350	5,377,570	737.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
D	Participating	652,833	5,381,417	705.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
E	Participating	653,476	5,379,925	741.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
F	Participating	649,476	5,378,474	747.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
G	Participating	650,400	5,383,729	711.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
H	Participating	648,263	5,374,042	728.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
I	Participating	649,372	5,377,319	734.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
J	Participating	649,411	5,377,350	734.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
K	Participating	652,350	5,377,616	735.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
L	Participating	647,974	5,378,125	736.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
M	Participating	652,746	5,379,403	722.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
N	Non-Participating	652,934	5,377,454	728.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
O	Participating	647,905	5,380,657	723.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
P	Non-Participating	647,929	5,371,803	716.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
Q	Non-Participating	655,444	5,382,262	682.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R	Non-Participating	654,346	5,383,551	675.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
S	Participating	652,445	5,374,111	759.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
T	Non-Participating	652,124	5,382,382	698.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
U	Non-Participating	652,329	5,383,668	691.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
V	Participating	647,113	5,379,805	712.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
W	Non-Participating	652,318	5,383,827	691.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
X	Non-Participating	655,873	5,382,222	689.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
Y	Non-Participating	651,119	5,380,491	705.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
Z	Non-Participating	652,848	5,375,611	736.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
AA	Participating	654,105	5,377,449	726.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
BB	Non-Participating	652,820	5,375,995	733.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
CC	Participating	652,849	5,373,992	753.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
DD	Non-Participating	652,780	5,383,651	684.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
EE	Non-Participating	653,014	5,375,966	734.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
FF	Non-Participating	652,597	5,369,477	749.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
GG	Participating	653,163	5,370,620	746.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
HH	Non-Participating	657,270	5,380,900	701.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
II	Participating	653,237	5,370,521	746.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
JJ	Non-Participating	653,421	5,369,486	746.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
KK	Non-Participating	656,603	5,377,699	728.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
LL	Non-Participating	652,987	5,368,263	755.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
MM	Non-Participating	655,962	5,376,837	710.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
NN	Non-Participating	646,183	5,383,581	712.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
OO	Participating	654,514	5,371,692	765.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
PP	Non-Participating	644,980	5,381,994	704.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
QQ	Participating	654,816	5,368,880	743.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
RR	Non-Participating	654,290	5,367,724	742.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
SS	Non-Participating	656,021	5,375,274	710.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
TT	Non-Participating	656,242	5,375,429	710.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
UU	Non-Participating	655,800	5,374,456	722.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
VV	Non-Participating	655,758	5,368,066	719.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
WW	Participating	656,662	5,372,675	722.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
XX	Non-Participating	656,251	5,368,598	741.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
YY	Non-Participating	656,161	5,367,989	720.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
ZZ	Non-Participating	656,215	5,367,523	716.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.

Kevin Walter

Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:32 AM / 4

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000

wind@eapc.net

Calculated:

10/1/2015 5:01 PM/2.9.285

SHADOW - Main Result**Calculation:** A059 V117/V110 Realistic Flicker w/ Obstacles DNV Tab**Calculation Results**

Shadow receptor

No.	Name	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]
A	Participating	30:03	63	0:38	12:18
B	Participating	15:10	88	0:20	5:20
C	Participating	70:17	176	1:01	28:45
D	Participating	61:33	190	0:35	22:48
E	Participating	63:52	138	0:44	27:10
F	Participating	75:52	167	0:43	26:28
G	Participating	0:00	0	0:00	0:00
H	Participating	20:54	101	0:24	7:57
I	Participating	55:28	150	0:32	22:37
J	Participating	26:29	79	0:30	11:50
K	Participating	46:07	127	0:32	22:09
L	Participating	79:11	199	0:34	29:47
M	Participating	6:05	29	0:19	2:26
N	Non-Participating	0:00	0	0:00	0:00
O	Participating	43:12	157	0:26	17:00
P	Non-Participating	0:00	0	0:00	0:00
Q	Non-Participating	4:15	23	0:17	1:36
R	Non-Participating	0:00	0	0:00	0:00
S	Participating	0:00	0	0:00	0:00
T	Non-Participating	0:00	0	0:00	0:00
U	Non-Participating	0:00	0	0:00	0:00
V	Participating	0:00	0	0:00	0:00
W	Non-Participating	0:00	0	0:00	0:00
X	Non-Participating	0:00	0	0:00	0:00
Y	Non-Participating	0:00	0	0:00	0:00
Z	Non-Participating	0:00	0	0:00	0:00
AA	Participating	0:00	0	0:00	0:00
BB	Non-Participating	0:00	0	0:00	0:00
CC	Participating	0:00	0	0:00	0:00
DD	Non-Participating	0:00	0	0:00	0:00
EE	Non-Participating	0:00	0	0:00	0:00
FF	Non-Participating	0:00	0	0:00	0:00
GG	Participating	0:00	0	0:00	0:00
HH	Non-Participating	0:00	0	0:00	0:00
II	Participating	0:00	0	0:00	0:00
JJ	Non-Participating	0:00	0	0:00	0:00
KK	Non-Participating	0:00	0	0:00	0:00
LL	Non-Participating	0:00	0	0:00	0:00
MM	Non-Participating	0:00	0	0:00	0:00
NN	Non-Participating	0:00	0	0:00	0:00
OO	Participating	0:00	0	0:00	0:00
PP	Non-Participating	0:00	0	0:00	0:00
QQ	Participating	0:00	0	0:00	0:00
RR	Non-Participating	0:00	0	0:00	0:00
SS	Non-Participating	0:00	0	0:00	0:00
TT	Non-Participating	0:00	0	0:00	0:00
UU	Non-Participating	0:00	0	0:00	0:00
VV	Non-Participating	0:00	0	0:00	0:00
WW	Participating	0:00	0	0:00	0:00
XX	Non-Participating	0:00	0	0:00	0:00
YY	Non-Participating	0:00	0	0:00	0:00
ZZ	Non-Participating	0:00	0	0:00	0:00

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.

Kevin Walter

Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:32 AM / 5

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000

wind@eapc.net

Calculated:

10/1/2015 5:01 PM/2.9.285

SHADOW - Main Result**Calculation: A059 V117/V110 Realistic Flicker w/ Obstacles DNV Tab**

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

No.	Name	Worst case [h/year]	Expected [h/year]
5	up to V117	0:00	0:00
6	up to V117	0:00	0:00
12	up to V110	18:15	6:39
13	up to V110	100:07	38:14
14	up to V110	62:23	27:22
15	up to V110	55:58	18:37
18	up to V110	0:00	0:00
20	up to V117	13:28	4:38
22	up to V117	6:23	2:25
24	up to V117	6:15	2:47
26	up to V117	36:10	18:09
27	up to V117	0:00	0:00
28	up to V117	0:00	0:00
29	up to V117	0:00	0:00
34	up to V110	37:13	15:56
35	up to V110	9:57	4:04
36	up to V117	3:43	1:27
37	up to V110	0:00	0:00
38	up to V110	0:00	0:00
39	up to V117	0:00	0:00
40	up to V117	0:00	0:00
41	up to V110	0:00	0:00
42	up to V110	30:03	12:18
43	up to V117	0:00	0:00
45	up to V117	0:00	0:00
66	up to V110	9:14	3:11
67	up to V117	5:27	1:59
68	up to V117	0:00	0:00
69	up to V110	0:00	0:00
70	up to V117	0:00	0:00
84	up to V117	3:04	1:12
85	up to V117	0:00	0:00
98	up to V117	13:37	5:39
99	up to V117	9:44	4:02
100	up to V117	0:00	0:00
101	up to V117	0:00	0:00
104	up to V110	23:41	7:50
105	up to V110	12:03	5:06
150	up to V110	0:00	0:00
151	up to V117	0:00	0:00
152	up to V110	0:00	0:00
154	up to V110	0:00	0:00
155	up to V117	13:07	5:28
156	up to V110	0:00	0:00
158	up to V110	3:54	1:21
164	up to V110	0:00	0:00
165	up to V117	0:00	0:00
166	up to V117	0:00	0:00
171	up to V110	0:00	0:00
173	up to V117	0:00	0:00
174	up to V117	0:00	0:00
175	up to V110	0:00	0:00
176	up to V110	16:29	5:12
177	up to V110	21:23	7:29
178	up to V117	9:30	4:04
179	up to V117	6:20	2:35

To be continued on next page...

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.

Kevin Walter

Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:32 AM / 6

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000

wind@eapc.net

Calculated:

10/1/2015 5:01 PM/2.9.285

SHADOW - Main Result**Calculation:** A059 V117/V110 Realistic Flicker w/ Obstacles DNV Tab

...continued from previous page

No.	Name	Worst case [h/year]	Expected [h/year]
180	up to V117	12:06	4:52
183	up to V117	0:00	0:00
184	up to V117	14:20	5:20
205	up to V117	0:00	0:00
206	up to V110	0:00	0:00
300	up to V110	30:44	12:49
302	up to V110	0:00	0:00
303	up to V110	1:47	0:43
304	up to V117	0:00	0:00
305	up to V110	0:00	0:00
306	up to V117	0:00	0:00
307	up to V117	4:43	1:17
308	up to V110	0:00	0:00
309	up to V110	0:00	0:00
310	up to V110	0:00	0:00
311	up to V110	0:29	0:08
312	up to V110	0:00	0:00
313	up to V117	0:00	0:00
314	up to V110	0:00	0:00
315	up to V110	0:00	0:00
316	up to V110	9:33	3:21
317	up to V117	3:42	1:15

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:32 AM / 7

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 5:01 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V117/V110 Realistic Flicker w/ Obstacles DNV Tab **Shadow receptor: A - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
662	334	353	412	609	964	791	576	697	906	1,119	1,195	8,618

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	08:44	08:22	07:35	07:32	06:34	05:56	06:21 (42) 05:54	06:21 (42) 06:26	07:09	07:51	07:37	08:22
	17:08	17:50	18:34	20:21	21:04	21:44	27 06:48 (42) 21:58	36 06:57 (42) 21:32	20:37	19:35	17:34	17:00
2	08:44	08:21	07:33	07:30	06:32	05:55	06:21 (42) 05:55	06:22 (42) 06:27	07:10	07:52	07:39	08:23
	17:09	17:52	18:35	20:22	21:06	21:45	28 06:49 (42) 21:58	35 06:57 (42) 21:31	20:35	19:33	17:32	17:00
3	08:44	08:20	07:31	07:28	06:31	05:54	06:20 (42) 05:56	06:23 (42) 06:29	07:12	07:54	07:41	08:25
	17:10	17:54	18:37	20:24	21:07	21:46	29 06:49 (42) 21:57	35 06:58 (42) 21:29	20:33	19:31	17:31	16:59
4	08:44	08:18	07:29	07:26	06:29	05:54	06:20 (42) 05:56	06:23 (42) 06:30	07:13	07:55	07:42	08:26
	17:11	17:55	18:38	20:25	21:09	21:47	30 06:50 (42) 21:57	34 06:57 (42) 21:28	20:31	19:29	17:29	16:59
5	08:44	08:17	07:27	07:24	06:28	05:53	06:19 (42) 05:57	06:24 (42) 06:31	07:14	07:57	07:44	08:27
	17:12	17:57	18:40	20:26	21:10	21:48	31 06:50 (42) 21:57	33 06:57 (42) 21:26	20:29	19:27	17:28	16:58
6	08:44	08:15	07:25	07:22	06:26	05:53	06:19 (42) 05:58	06:25 (42) 06:33	07:16	07:58	07:45	08:28
	17:13	17:58	18:42	20:28	21:12	21:49	32 06:51 (42) 21:56	33 06:58 (42) 21:25	20:27	19:25	17:26	16:58
7	08:43	08:14	07:23	07:20	06:24	05:52	06:19 (42) 05:59	06:26 (42) 06:34	07:17	07:59	07:47	08:29
	17:14	18:00	18:43	20:29	21:13	21:50	33 06:52 (42) 21:56	32 06:58 (42) 21:23	20:25	19:23	17:25	16:58
8	08:43	08:12	08:21	07:17	06:23	05:52	06:18 (42) 05:59	06:26 (42) 06:35	07:18	08:01	07:48	08:30
	17:15	18:00	18:45	20:31	21:14	21:51	34 06:52 (42) 21:55	31 06:57 (42) 21:21	20:23	19:20	17:23	16:58
9	08:43	08:11	08:19	07:15	06:21	05:51	06:18 (42) 06:00	06:27 (42) 06:37	07:20	08:02	07:50	08:32
	17:16	18:02	19:46	20:32	21:16	21:51	34 06:52 (42) 21:55	30 06:57 (42) 21:20	20:21	19:18	17:22	16:57
10	08:42	08:09	08:17	07:13	06:20	05:51	06:18 (42) 06:01	06:28 (42) 06:38	07:21	08:04	07:52	08:33
	17:18	18:03	19:48	20:34	21:17	21:52	35 06:53 (42) 21:54	29 06:57 (42) 21:18	20:19	19:16	17:20	16:57
11	08:42	08:08	08:15	07:11	06:18	05:51	06:17 (42) 06:02	06:29 (42) 06:40	07:23	08:05	07:53	08:34
	17:19	18:05	19:49	20:35	21:19	21:53	35 06:52 (42) 21:54	28 06:57 (42) 21:17	20:17	19:14	17:19	16:57
12	08:41	08:06	08:13	07:09	06:17	05:51	06:17 (42) 06:03	06:30 (42) 06:41	07:24	08:07	07:55	08:34
	17:20	18:07	19:51	20:37	21:20	21:53	36 06:53 (42) 21:53	27 06:57 (42) 21:15	20:15	19:12	17:18	16:57
13	08:41	08:04	08:11	07:07	06:16	05:50	06:17 (42) 06:04	06:31 (42) 06:42	07:25	08:08	07:56	08:35
	17:22	18:08	19:52	20:38	21:21	21:54	36 06:53 (42) 21:52	25 06:56 (42) 21:13	20:13	19:10	17:17	16:57
14	08:40	08:03	08:09	07:05	06:14	05:50	06:17 (42) 06:05	06:32 (42) 06:44	07:27	08:10	07:58	08:36
	17:23	18:10	19:54	20:40	21:23	21:55	37 06:54 (42) 21:52	24 06:56 (42) 21:11	20:11	19:08	17:15	16:57
15	08:40	08:01	08:07	07:04	06:13	05:50	06:17 (42) 06:06	06:33 (42) 06:45	07:28	08:11	07:59	08:37
	17:24	18:11	19:55	20:41	21:24	21:55	37 06:54 (42) 21:51	23 06:56 (42) 21:10	20:09	19:06	17:14	16:57
16	08:39	07:59	08:05	07:02	06:12	05:50	06:17 (42) 06:07	06:34 (42) 06:46	07:30	08:13	08:01	08:38
	17:26	18:13	19:57	20:43	21:25	21:56	37 06:54 (42) 21:50	21 06:55 (42) 21:08	20:06	19:05	17:13	16:58
17	08:38	07:57	08:03	07:00	06:10	05:50	06:17 (42) 06:08	06:35 (42) 06:48	07:31	08:14	08:02	08:39
	17:27	18:15	19:58	20:44	21:27	21:56	38 06:55 (42) 21:49	19 06:54 (42) 21:06	20:04	19:03	17:12	16:58
18	08:37	07:56	08:01	06:58	06:09	05:50	06:17 (42) 06:09	06:36 (42) 06:49	07:32	08:16	08:04	08:39
	17:29	18:16	20:00	20:46	21:28	21:56	38 06:55 (42) 21:48	17 06:53 (42) 21:04	20:02	19:01	17:11	16:58
19	08:37	07:54	07:59	06:56	06:08	05:50	06:17 (42) 06:10	06:37 (42) 06:51	07:34	08:17	08:05	08:40
	17:30	18:18	20:01	20:47	21:29	21:57	38 06:55 (42) 21:47	15 06:52 (42) 21:02	20:00	18:57	17:10	16:59
20	08:36	07:52	07:57	06:54	06:07	05:50	06:17 (42) 06:11	06:38 (42) 06:52	07:35	08:19	08:07	08:41
	17:32	18:20	20:03	20:48	21:31	21:57	38 06:55 (42) 21:46	13 06:51 (42) 21:01	19:58	18:55	17:09	16:59
21	08:35	07:50	07:55	06:52	06:06	05:50	06:17 (42) 06:12	06:39 (42) 06:53	07:37	08:20	08:08	08:41
	17:33	18:21	20:04	20:50	21:32	4 06:34 (42) 21:57	38 06:55 (42) 21:45	10 06:49 (42) 20:59	19:56	18:53	17:08	16:59
22	08:34	07:48	07:53	06:50	06:04	05:50	06:29 (42) 06:14	06:40 (42) 06:55	07:38	08:22	08:10	08:42
	17:35	18:23	20:06	20:51	21:33	9 06:38 (42) 21:58	38 06:56 (42) 21:44	7 06:47 (42) 20:57	19:54	18:51	17:07	17:00
23	08:33	07:47	07:50	06:48	06:03	05:50	06:28 (42) 06:15	06:41 (42) 06:15	06:56	07:39	08:23	08:11
	17:36	18:24	20:07	20:53	21:34	12 06:40 (42) 21:58	38 06:56 (42) 21:43	20:55	19:52	18:49	17:06	17:00
24	08:32	07:45	07:48	06:46	06:02	05:50	06:27 (42) 06:16	06:48 (42) 06:16	06:58	07:41	08:25	08:13
	17:38	18:26	20:09	20:54	21:35	14 06:41 (42) 21:58	38 06:56 (42) 21:42	20:53	19:50	18:48	17:05	17:01
25	08:31	07:43	07:46	06:45	06:01	05:50	06:27 (42) 06:17	06:49 (42) 06:17	06:59	07:42	08:27	08:14
	17:39	18:28	20:10	20:56	21:37	16 06:43 (42) 21:58	38 06:57 (42) 21:41	20:51	19:47	18:46	17:04	17:02
26	08:30	07:41	07:44	06:43	06:00	05:50	06:26 (42) 06:18	06:51 (42) 06:18	07:00	07:44	08:28	08:15
	17:41	18:29	20:12	20:57	21:38	18 06:44 (42) 21:58	37 06:56 (42) 21:40	20:49	19:45	18:44	17:03	17:02
27	08:29	07:39	07:42	06:41	06:00	05:50	06:25 (42) 06:18	06:52 (42) 06:20	07:02	07:45	08:30	08:17
	17:42	18:31	20:13	20:59	21:39	20 06:45 (42) 21:58	37 06:56 (42) 21:39	20:47	19:43	18:42	17:03	17:03
28	08:27	07:37	07:40	06:39	05:59	05:50	06:24 (42) 06:19	06:53 (42) 06:21	07:03	07:47	08:31	08:18
	17:44	18:32	20:15	21:00	21:40	22 06:46 (42) 21:58	37 06:57 (42) 21:37	20:45	19:41	18:41	17:02	17:04
29	08:26	07:38	07:38	06:38	05:58	05:50	06:23 (42) 06:19	06:54 (42) 06:22	07:05	07:48	08:33	08:20
	17:45	18:33	20:16	21:02	21:41	23 06:46 (42) 21:58	37 06:57 (42) 21:36	20:43	19:39	18:39	17:01	17:05
30	08:25	07:36	07:36	06:36	05:57	05:50	06:23 (42) 06:19	06:55 (42) 06:23	07:06	07:49	08:34	08:21
	17:47	18:35	20:18	21:03	21:42	25 06:48 (42) 21:58	36 06:57 (42) 21:35	20:41	19:37	18:37	17:01	17:05
31	08:24	07:34	07:34	06:34	05:56	05:50	06:22 (42) 06:19	06:56 (42) 06:23	07:07	07:50	08:36	08:44
	17:49	18:37	20:19	21:03	21:43	26 06:48 (42) 21:58	36 06:57 (42) 21:33	20:39	19:35	18:36	17:06	17:06
Potential sun hours	274	285	368	409	471	481	486	445	379	337	278	260
Total, worst case												

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:32 AM / 8

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 5:01 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V117/V110 Realistic Flicker w/ Obstacles DNV Tab **Shadow receptor: B - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
662	334	353	412	609	964	791	576	697	906	1,119	1,195	8,618

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

	January	February	March	April	May	June
1 08:45	09:12 (66) 08:23		07:35	08:03 (67) 07:32	06:34	05:55
17:07	5 09:17 (66) 17:50		18:34	17 08:20 (67) 20:21	21:05	21:45
2 08:45	09:12 (66) 08:21		07:33	08:04 (67) 07:30	06:32	05:55
17:08	6 09:18 (66) 17:52		18:35	14 08:18 (67) 20:22	21:06	21:46
3 08:45	09:12 (66) 08:20		07:31	08:06 (67) 07:28	06:31	05:54
17:09	7 09:19 (66) 17:53		18:37	10 08:16 (67) 20:24	21:08	21:47
4 08:44	09:12 (66) 08:18		07:29		07:26	06:29
17:10	8 09:20 (66) 17:55		18:39		20:25	21:09
5 08:44	09:11 (66) 08:17		07:28		07:24	06:27
17:12	9 09:20 (66) 17:57		18:40		20:27	21:10
6 08:44	09:11 (66) 08:16		07:26		07:22	06:26
17:13	9 09:20 (66) 17:58		18:42		20:28	21:12
7 08:44	09:11 (66) 08:14		07:24		07:20	06:24
17:14	10 09:21 (66) 18:00		18:43		20:30	21:13
8 08:43	09:10 (66) 08:13		08:21		07:17	06:23
17:15	11 09:21 (66) 18:00		18:45		20:31	21:15
9 08:43	09:10 (66) 08:11		08:19		07:15	06:21
17:16	12 09:22 (66) 18:02		19:46		20:33	21:16
10 08:43	09:09 (66) 08:09		08:17		07:13	06:20
17:17	13 09:22 (66) 18:03		19:48		20:34	21:18
11 08:42	09:09 (66) 08:08		08:15		07:11	06:18
17:19	14 09:23 (66) 18:05		19:49		20:35	21:19
12 08:42	09:08 (66) 08:06		08:13		07:09	06:17
17:20	15 09:23 (66) 18:07		19:51		20:37	21:20
13 08:41	09:07 (66) 08:04		08:11		07:07	06:16
17:21	16 09:23 (66) 18:08		19:52		20:38	21:22
14 08:41	09:07 (66) 08:03		08:09		07:05	06:14
17:23	17 09:24 (66) 18:10		19:54		20:40	21:23
15 08:40	09:06 (66) 08:01		08:07		07:04	06:13
17:24	18 09:24 (66) 18:11		19:55		20:41	21:24
16 08:39	09:06 (66) 07:59		08:05		07:02	06:12
17:26	17 09:23 (66) 18:13		19:57		20:43	21:26
17 08:38	09:07 (66) 07:58		08:03		07:00	06:10
17:27	16 09:23 (66) 18:15		19:58		20:44	21:27
18 08:38	09:08 (66) 07:56		08:01		06:58	06:09
17:28	14 09:22 (66) 18:16		20:00		20:46	21:28
19 08:37	09:09 (66) 07:54		08:17 (67) 07:59		06:56	06:08
17:30	13 09:22 (66) 18:18	1	08:18 (67) 20:01		20:47	21:30
20 08:36	09:10 (66) 07:52		08:15 (67) 07:57		06:54	06:07
17:31	11 09:21 (66) 18:20	4	08:19 (67) 20:03		20:49	21:31
21 08:35	09:12 (66) 07:50		08:13 (67) 07:55		06:52	06:05
17:33	7 09:19 (66) 18:21	7	08:20 (67) 20:04		20:50	21:32
22 08:34	07:49		08:11 (67) 07:53		06:50	06:04
17:34	18:23	10	08:21 (67) 20:06		20:52	21:33
23 08:33	07:47		08:09 (67) 07:51		06:48	06:03
17:36	18:24	12	08:21 (67) 20:07		20:53	21:35
24 08:32	07:45		08:08 (67) 07:48		06:46	06:02
17:37	18:26	14	08:22 (67) 20:09		20:55	21:36
25 08:31	07:43		08:06 (67) 07:46		06:45	06:01
17:39	18:28	16	08:22 (67) 20:10		20:56	21:37
26 08:30	07:41		08:04 (67) 07:44		06:43	06:00
17:41	18:29	18	08:22 (67) 20:12		20:57	21:38
27 08:29	07:39		08:02 (67) 07:42		06:41	05:59
17:42	18:31	20	08:22 (67) 20:13		20:59	21:39
28 08:28	07:37		08:02 (67) 07:40		06:39	05:59
17:44	18:32	19	08:21 (67) 20:15		21:00	21:40
29 08:26			07:38		06:38	05:58
17:45			20:16		21:02	21:41
30 08:25			07:36		06:36	05:57
17:47			20:18		21:03	21:43
31 08:24			07:34			05:56
17:49			20:19			21:44
Potential sun hours	273	285	368		410	471
Total, worst case	248	121	41			481
Sun reduction	0.56	0.50	0.63			
Oper. time red.	0.98	0.98	0.98			
Wind dir. red.	0.72	0.70	0.70			
Total reduction	0.39	0.35	0.43			
Total, real	98	42	18			

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:32 AM / 9

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 5:01 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V117/V110 Realistic Flicker w/ Obstacles DNV Tab **Shadow receptor: B - Participating**

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

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

Assumptions for shadow calculations

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
662	334	353	412	609	964	791	576	697	906	1,119	1,195	8,618

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

	July	August	September	October	November	December			
1	05:54	06:26	07:09	07:51	07:38	08:22	08:51 (66)		
	21:58	21:32	20:38	19:35	17:34	17:00	14 09:05 (66)		
2	05:55	06:27	07:10	07:52	07:39	08:24	08:52 (66)		
	21:58	21:31	20:36	19:33	17:32	16:59	13 09:05 (66)		
3	05:55	06:29	07:12	07:54	07:41	08:25	08:53 (66)		
	21:58	21:29	20:34	19:31	17:31	16:59	12 09:05 (66)		
4	05:56	06:30	07:13	07:55	07:42	08:26	08:55 (66)		
	21:57	21:28	20:32	19:29	17:29	16:59	11 09:06 (66)		
5	05:57	06:31	07:14	07:57	07:44	08:27	08:56 (66)		
	21:57	21:26	20:29	19:27	17:28	16:58	10 09:06 (66)		
6	05:58	06:33	07:16	07:58	07:46	08:29	08:57 (66)		
	21:57	21:25	20:27	19:25	17:26	16:58	10 09:07 (66)		
7	05:58	06:34	07:17	08:00	07:47	08:30	08:58 (66)		
	21:56	21:23	20:25	19:23	17:25	16:58	9 09:07 (66)		
8	05:59	06:35	07:19	08:01	07:49	08:31	08:59 (66)		
	21:56	21:22	20:23	19:21	17:23	16:57	8 09:07 (66)		
9	06:00	06:37	07:20	08:03	07:50	08:32	09:00 (66)		
	21:55	21:20	20:21	19:18	17:22	16:57	7 09:07 (66)		
10	06:01	06:38	07:21	08:04	08:42 (67)	07:52	08:33	09:02 (66)	
	21:55	21:18	20:19	19:16	6 08:48 (67)	17:20	16:57	6 09:08 (66)	
11	06:02	06:39	07:23	08:05	08:39 (67)	07:53	08:34	09:03 (66)	
	21:54	21:17	20:17	19:14	12 08:51 (67)	17:19	16:57	6 09:09 (66)	
12	06:03	06:41	07:24	08:07	08:37 (67)	07:55	08:35	09:03 (66)	
	21:53	21:15	20:15	19:12	15 08:52 (67)	17:18	16:57	5 09:08 (66)	
13	06:04	06:42	07:25	08:08	08:36 (67)	07:56	08:36	09:04 (66)	
	21:53	21:13	20:13	19:10	17 08:53 (67)	17:16	16:57	4 09:08 (66)	
14	06:05	06:44	07:27	08:10	08:34 (67)	07:58	08:37	09:05 (66)	
	21:52	21:12	20:11	19:08	19 08:53 (67)	17:15	16:57	4 09:09 (66)	
15	06:06	06:45	07:28	08:11	08:35 (67)	08:00	08:37	09:06 (66)	
	21:51	21:10	20:09	19:07	19 08:54 (67)	17:14	16:57	3 09:09 (66)	
16	06:07	06:46	07:30	08:13	08:36 (67)	08:01	08:38	09:07 (66)	
	21:50	21:08	20:07	19:05	17 08:53 (67)	17:13	16:58	3 09:10 (66)	
17	06:08	06:48	07:31	08:14	08:38 (67)	08:03	08:39	09:08 (66)	
	21:50	21:06	20:04	19:03	16 08:54 (67)	17:12	16:58	2 09:10 (66)	
18	06:09	06:49	07:32	08:16	08:40 (67)	08:04	08:40	09:08 (66)	
	21:49	21:05	20:02	19:01	14 08:54 (67)	17:11	16:58	2 09:10 (66)	
19	06:10	06:51	07:34	08:17	08:41 (67)	08:06	08:40	09:09 (66)	
	21:48	21:03	20:00	18:57	12 08:53 (67)	17:09	16:58	6 09:42 (311)	
20	06:11	06:52	07:35	08:19	08:43 (67)	08:07	08:41	09:09 (66)	
	21:47	21:01	19:58	18:55	9 08:52 (67)	17:08	16:59	6 09:42 (311)	
21	06:12	06:53	07:37	08:21	08:44 (67)	08:09	08:41	09:10 (66)	
	21:46	20:59	19:56	18:53	6 08:50 (67)	17:07	7 08:55 (66)	16:59	6 09:43 (311)
22	06:13	06:55	07:38	08:22	08:46 (67)	08:10	08:42	09:10 (66)	
	21:45	20:57	19:54	18:51	3 08:49 (67)	17:07	11 08:57 (66)	17:00	6 09:43 (311)
23	06:15	06:56	07:40	08:24	08:12	08:46 (66)	08:42	09:11 (66)	
	21:44	20:55	19:52	18:49	17:06	13 08:59 (66)	17:00	7 09:44 (311)	
24	06:16	06:58	07:41	08:25	08:13	08:46 (66)	08:43	09:11 (66)	
	21:42	20:53	19:50	18:48	17:05	15 09:01 (66)	17:01	6 09:44 (311)	
25	06:17	06:59	07:42	08:27	08:14	08:45 (66)	08:43	09:12 (66)	
	21:41	20:51	19:48	18:46	17:04	16 09:01 (66)	17:01	4 09:44 (311)	
26	06:18	07:00	07:44	08:28	08:16	08:45 (66)	08:44	09:12 (66)	
	21:40	20:49	19:45	18:44	17:03	17 09:02 (66)	17:02	2 09:14 (66)	
27	06:20	07:02	07:45	08:30	08:17	08:45 (66)	08:44	09:12 (66)	
	21:39	20:48	19:43	18:42	17:02	18 09:03 (66)	17:03	3 09:15 (66)	
28	06:21	07:03	07:47	08:31	08:19	08:47 (66)	08:44	09:12 (66)	
	21:38	20:46	19:41	18:41	17:02	17 09:04 (66)	17:04	3 09:15 (66)	
29	06:22	07:05	07:48	08:33	08:20	08:48 (66)	08:44	09:12 (66)	
	21:36	20:44	19:39	18:39	17:01	16 09:04 (66)	17:04	3 09:15 (66)	
30	06:23	07:06	07:49	08:35	08:21	08:49 (66)	08:45	09:12 (66)	
	21:35	20:42	19:37	18:37	17:00	15 09:04 (66)	17:05	4 09:16 (66)	
31	06:25	07:07	07:51	08:36	08:18	08:48 (66)	08:45	09:12 (66)	
	21:34	20:40	19:35	18:36	17:00	15 09:04 (66)	17:06	5 09:17 (66)	
Potential sun hours	486	445	379	336	277	260			
Total, worst case				165	145	190			
Sun reduction				0.52	0.43	0.44			
Oper. time red.				0.98	0.98	0.98			
Wind dir. red.				0.70	0.72	0.71			
Total reduction				0.36	0.31	0.31			
Total, real				60	44	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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:32 AM / 10

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 5:01 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V117/V110 Realistic Flicker w/ Obstacles DNV Tab **Shadow receptor: I - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
662	334	353	412	609	964	791	576	697	906	1,119	1,195	8,618

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

	January	February	March	April	May	June
1 08:45	09:14 (104) 08:23	07:35		07:32	06:34	20:19 (13) 05:55
17:07	28 09:42 (104) 17:50	18:34		20:21	21:05	20 20:39 (13) 21:45
2 08:45	09:15 (104) 08:21	07:33		07:30	06:32	20:17 (13) 05:55
17:08	27 09:42 (104) 17:52	18:35		20:22	21:06	23 20:40 (13) 21:46
3 08:45	09:16 (104) 08:20	07:31		07:28	06:31	20:17 (13) 05:54
17:09	27 09:43 (104) 17:53	18:37		20:24	21:08	25 20:42 (13) 21:47
4 08:44	09:16 (104) 08:18	07:29		07:26	06:29	20:16 (13) 05:53
17:10	27 09:43 (104) 17:55	18:38		20:25	21:09	27 20:43 (13) 21:47
5 08:44	09:16 (104) 08:17	07:27		07:24	06:27	20:16 (13) 05:53
17:11	27 09:43 (104) 17:57	18:40		20:27	21:10	29 20:45 (13) 21:48
6 08:44	09:17 (104) 08:15	07:25		07:21	06:26	20:15 (13) 05:52
17:13	27 09:44 (104) 17:58	18:42		20:28	21:12	30 20:45 (13) 21:49
7 08:44	09:18 (104) 08:14	07:23		07:19	06:24	20:15 (13) 05:52
17:14	26 09:44 (104) 18:00	18:43		20:30	21:13	31 20:46 (13) 21:50
8 08:43	09:18 (104) 08:12	08:21		07:17	06:23	20:14 (13) 05:51
17:15	26 09:44 (104) 18:00	18:45		20:31	21:15	31 20:45 (13) 21:51
9 08:43	09:19 (104) 08:11	08:19		07:15	06:21	20:14 (13) 05:51
17:16	26 09:45 (104) 18:02	19:46		20:32	21:16	32 20:46 (13) 21:52
10 08:43	09:19 (104) 08:09	08:17	19:23 (12) 07:13	06:20	20:14 (13) 05:51	
17:17	25 09:44 (104) 18:03	19:48	2 19:25 (12) 20:34	21:17	31 20:45 (13) 21:52	
11 08:42	09:21 (104) 08:08	08:15	19:19 (12) 07:11	06:18	20:14 (13) 05:51	
17:19	24 09:45 (104) 18:05	19:49	7 19:26 (12) 20:35	21:19	31 20:45 (13) 21:53	
12 08:42	09:21 (104) 08:06	08:13	19:17 (12) 07:09	06:17	20:15 (13) 05:50	
17:20	24 09:45 (104) 18:06	19:51	11 19:28 (12) 20:37	21:20	30 20:45 (13) 21:54	
13 08:41	09:22 (104) 08:04	08:11	19:15 (12) 07:07	06:15	20:14 (13) 05:50	
17:21	22 09:44 (104) 18:08	19:52	14 19:29 (12) 20:38	21:22	30 20:44 (13) 21:54	
14 08:41	09:23 (104) 08:03	08:09	19:14 (12) 07:05	06:14	20:15 (13) 05:50	
17:23	22 09:45 (104) 18:10	19:54	17 19:31 (12) 20:40	21:23	29 20:44 (13) 21:55	
15 08:40	09:24 (104) 08:01	08:07	19:13 (12) 07:03	06:13	20:15 (13) 05:50	
17:24	20 09:44 (104) 18:11	19:55	20 19:33 (12) 20:41	21:24	29 20:44 (13) 21:55	
16 08:39	09:25 (104) 07:59	08:05	19:13 (12) 07:02	06:11	20:16 (13) 05:50	
17:25	18 09:43 (104) 18:13	19:57	21 19:34 (12) 20:43	21:26	28 20:44 (13) 21:56	
17 08:38	09:26 (104) 07:58	08:03	19:12 (12) 07:00	06:10	20:17 (13) 05:50	
17:27	17 09:43 (104) 18:15	19:58	24 19:36 (12) 20:44	21:27	27 20:44 (13) 21:56	
18 08:38	09:28 (104) 07:56	08:01	19:12 (12) 06:58	06:09	20:16 (13) 05:50	
17:28	14 09:42 (104) 18:16	20:00	24 19:36 (12) 20:46	21:28	26 20:42 (13) 21:57	
19 08:37	09:30 (104) 07:54	07:59	19:12 (12) 06:56	06:08	20:17 (13) 05:50	
17:30	10 09:40 (104) 18:18	20:01	24 19:36 (12) 20:47	21:30	25 20:42 (13) 21:57	
20 08:36	09:34 (104) 07:52	07:57	19:13 (12) 06:54	06:07	20:18 (13) 05:50	
17:31	3 09:37 (104) 18:19	20:03	22 19:35 (12) 20:49	21:31	23 20:41 (13) 21:57	
21 08:35	07:50 07:55		19:12 (12) 06:52	06:05	20:19 (13) 05:50	
17:33	18:21 20:04	21 19:33 (12) 20:50	21:32	21 20:40 (13) 21:58		
22 08:34	07:49 07:53		19:13 (12) 06:50	06:04	20:20 (13) 05:50	
17:34	18:23 20:06	19 19:32 (12) 20:52	21:33	19 20:39 (13) 21:58		
23 08:33	07:47 07:51		19:14 (12) 06:48	06:03	20:21 (13) 05:51	
17:36	18:24 20:07	16 19:30 (12) 20:53	21:35	17 20:38 (13) 21:58		
24 08:32	07:45 07:48		19:16 (12) 06:46	06:02	20:23 (13) 05:51	
17:37	18:26 20:09	12 19:28 (12) 20:54	21:36	14 20:37 (13) 21:58		
25 08:31	07:43 07:46		06:45	06:01	20:25 (13) 05:51	
17:39	18:27 20:10		20:56	21:37	10 20:35 (13) 21:58	
26 08:30	07:41 07:44		06:43	06:00	20:29 (13) 05:52	
17:41	18:29 20:12		20:57	21:38	4 20:33 (13) 21:59	
27 08:29	07:39 07:42		06:41	20:28 (13) 05:59	05:52	
17:42	18:31 20:13		20:59	6 20:34 (13) 21:39	21:59	
28 08:28	07:37 07:40		06:39	20:24 (13) 05:58	05:52	
17:44	18:32 20:15		21:00	11 20:35 (13) 21:40	21:59	
29 08:26	07:38		06:37	20:21 (13) 05:58	05:53	
17:45	20:16		21:02	15 20:36 (13) 21:41	21:58	
30 08:25	07:36		06:36	20:20 (13) 05:57	05:53	
17:47	20:18		21:03	18 20:38 (13) 21:43	21:58	
31 08:24	07:34			05:56		
17:49	20:19			21:44		
Potential sun hours	273	285	368	410	471	481
Total, worst case	440		254	50	642	
Sun reduction	0.56		0.63	0.59	0.67	
Oper. time red.	0.98		0.98	0.98	0.98	
Wind dir. red.	0.71		0.64	0.70	0.70	
Total reduction	0.39		0.40	0.41	0.47	
Total, real	171		101	20	299	

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: 20132550- Lindahl Wind Farm TradeWind Energy, Inc. Kevin Walter Southlake Technology Park, 16105 W 113th St, Ste 1 Lenexa, KS, 66219	Description: EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.	Printed/Page: 10/2/2015 10:32 AM / 11 Licensed user: EAPC Wind Energy 3100 DeMers Avenue US-GRAND FORKS, ND 58201 +1 701 775 3000 wind@eapc.net Calculated: 10/1/2015 5:01 PM/2.9.285
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

SHADOW - Calendar

Calculation: A059 V117/V110 Realistic Flicker w/ Obstacles DNV Tab **Shadow receptor:** I - Participating

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [BISMARCK]
 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 4.92 5.13 7.45 8.03 10.20 11.21 11.69 10.35 8.68 5.69 4.02 3.69

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
 662 334 353 412 609 964 791 576 697 906 1,119 1,195 8,618
 Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December				
1	05:54	06:26	20:25 (13)	07:09	07:51	18:56 (12) 07:38	08:22	09:03 (104)		
	21:58	21:32	31 20:56 (13)	20:38	19:35	12 19:08 (12) 17:34	17:00	24 09:27 (104)		
2	05:55	06:27	20:25 (13)	07:10	07:52	18:57 (12) 07:39	08:24	09:03 (104)		
	21:58	21:31	31 20:56 (13)	20:36	19:33	9 19:06 (12) 17:32	16:59	24 09:27 (104)		
3	05:55	06:29	20:24 (13)	07:11	07:54	19:00 (12) 07:41	08:25	09:02 (104)		
	21:58	21:29	31 20:55 (13)	20:34	19:31	4 19:04 (12) 17:31	16:59	26 09:28 (104)		
4	05:56	06:30	20:24 (13)	07:13	07:55	07:42	08:26	09:03 (104)		
	21:57	21:28	31 20:55 (13)	20:31	19:29	17:29	16:58	26 09:29 (104)		
5	05:57	06:31	20:25 (13)	07:14	07:57	07:44	08:27	09:03 (104)		
	21:57	21:26	31 20:56 (13)	20:29	19:27	17:28	16:58	26 09:29 (104)		
6	05:57	06:33	20:24 (13)	07:16	07:58	07:45	08:29	09:03 (104)		
	21:57	21:25	31 20:55 (13)	20:27	19:25	17:26	16:58	27 09:30 (104)		
7	05:58	06:34	20:24 (13)	07:17	08:00	07:47	08:30	09:03 (104)		
	21:56	21:23	30 20:54 (13)	20:25	19:22	17:25	16:58	27 09:30 (104)		
8	05:59	06:35	20:25 (13)	07:18	08:01	07:49	08:31	09:04 (104)		
	21:56	21:22	29 20:54 (13)	20:23	19:20	17:23	16:57	26 09:30 (104)		
9	06:00	06:37	20:25 (13)	07:20	08:02	07:50	08:32	09:04 (104)		
	21:55	21:20	27 20:52 (13)	20:21	19:18	17:22	16:57	27 09:31 (104)		
10	06:01	06:38	20:26 (13)	07:21	08:04	07:52	08:33	09:04 (104)		
	21:55	21:18	24 20:50 (13)	20:19	19:16	17:20	16:57	27 09:31 (104)		
11	06:02	06:39	20:26 (13)	07:23	08:05	07:53	08:34	09:06 (104)		
	21:54	21:17	23 20:49 (13)	20:17	19:14	17:19	16:57	27 09:33 (104)		
12	06:03	06:41	20:28 (13)	07:24	08:07	07:55	08:35	09:05 (104)		
	21:53	21:15	20 20:48 (13)	20:15	19:12	17:18	16:57	27 09:32 (104)		
13	06:04	06:42	20:28 (13)	07:25	08:08	07:56	08:36	09:05 (104)		
	21:53	21:13	18 20:46 (13)	20:13	19:10	17:16	16:57	28 09:33 (104)		
14	06:05	06:44	20:29 (13)	07:27	08:10	07:58	08:37	09:06 (104)		
	21:52	21:12	15 20:44 (13)	20:11	19:08	17:15	16:57	27 09:33 (104)		
15	06:06	06:45	20:32 (13)	07:28	08:11	08:00	08:37	09:07 (104)		
	21:51	21:10	11 20:43 (13)	20:09	19:06	17:14	16:57	27 09:34 (104)		
16	06:07	06:46	20:36 (13)	07:30	08:13	08:01	08:38	09:07 (104)		
	21:50	21:08	4 20:40 (13)	20:06	19:04	17:13	16:57	28 09:35 (104)		
17	06:08	06:48	07:31	08:14	08:03	08:14	08:39	09:08 (104)		
	21:50	21:06	20:04	19:03	17:12	16:58	27 09:35 (104)			
18	06:09	20:35 (13)	06:49	07:32	08:04	08:16	08:40	09:08 (104)		
	21:49	8 20:43 (13)	21:04	20:02	19:01	17:10	16:58	27 09:35 (104)		
19	06:10	20:33 (13)	06:50	07:34	19:04 (12)	08:17	08:06	08:40	09:09 (104)	
	21:48	13 20:46 (13)	21:03	20:00	11 19:15 (12)	18:57	17:09	16:58	27 09:36 (104)	
20	06:11	20:33 (13)	06:52	07:35	19:01 (12)	08:19	08:07	08:41	09:09 (104)	
	21:47	15 20:48 (13)	21:01	19:58	15 19:16 (12)	18:55	17:08	16:59	27 09:36 (104)	
21	06:12	20:31 (13)	06:53	07:37	18:59 (12)	08:20	08:09	08:41	09:10 (104)	
	21:46	18 20:49 (13)	20:59	19:56	18 19:17 (12)	18:53	17:07	16:59	27 09:37 (104)	
22	06:13	20:30 (13)	06:55	07:38	18:58 (12)	08:22	08:10	09:10 (104)	08:42	09:10 (104)
	21:45	20 20:50 (13)	20:57	19:54	20 19:18 (12)	18:51	17:06	3 09:13 (104)	17:00	27 09:37 (104)
23	06:15	20:29 (13)	06:56	07:39	18:56 (12)	08:24	08:11	09:07 (104)	08:42	09:11 (104)
	21:44	22 20:51 (13)	20:55	19:52	22 19:18 (12)	18:49	17:06	10 09:17 (104)	17:00	27 09:38 (104)
24	06:16	20:28 (13)	06:57	07:41	18:56 (12)	08:25	08:13	09:06 (104)	08:43	09:11 (104)
	21:42	24 20:52 (13)	20:53	19:50	23 19:19 (12)	18:48	17:05	14 09:20 (104)	17:01	27 09:38 (104)
25	06:17	20:27 (13)	06:59	07:42	18:55 (12)	08:27	08:14	09:04 (104)	08:43	09:12 (104)
	21:41	25 20:52 (13)	20:51	19:47	24 19:19 (12)	18:46	17:04	17 09:21 (104)	17:01	27 09:39 (104)
26	06:18	20:27 (13)	07:00	07:44	18:54 (12)	08:28	08:16	09:04 (104)	08:44	09:12 (104)
	21:40	26 20:53 (13)	20:49	19:45	24 19:18 (12)	18:44	17:03	18 09:22 (104)	17:02	27 09:39 (104)
27	06:19	20:27 (13)	07:02	07:45	18:54 (12)	08:30	08:17	09:03 (104)	08:44	09:12 (104)
	21:39	27 20:54 (13)	20:47	19:43	23 19:17 (12)	18:42	17:02	20 09:23 (104)	17:03	28 09:40 (104)
28	06:21	20:26 (13)	07:03	07:47	18:54 (12)	08:31	08:18	09:03 (104)	08:44	09:13 (104)
	21:38	29 20:55 (13)	20:46	19:41	20 19:14 (12)	18:41	17:02	22 09:25 (104)	17:04	27 09:40 (104)
29	06:22	20:26 (13)	07:04	07:48	18:55 (12)	08:33	08:20	09:03 (104)	08:44	09:13 (104)
	21:36	29 20:55 (13)	20:44	19:39	17 19:12 (12)	18:39	17:01	22 09:25 (104)	17:04	27 09:40 (104)
30	06:23	20:25 (13)	07:06	07:49	18:55 (12)	08:34	08:21	09:02 (104)	08:44	09:13 (104)
	21:35	30 20:55 (13)	20:42	19:37	15 19:10 (12)	18:37	17:00	24 09:26 (104)	17:05	28 09:41 (104)
31	06:25	20:24 (13)	07:07	07:50	18:56 (12)	08:35	08:22	09:03 (104)	08:45	09:14 (104)
	21:34	31 20:55 (13)	20:40	18:35	08:36	17:06	27 09:41 (104)			
Potential sun hours	486	445	379	336	277	260				
Total, worst case	317	387	232	25	150	831				
Sun reduction	0.75	0.72	0.69	0.52	0.43	0.44				
Oper. time red.	0.98	0.98	0.98	0.98	0.98	0.98				
Wind dir. red.	0.70	0.70	0.64	0.64	0.71	0.71				
Total reduction	0.52	0.50	0.43	0.33	0.30	0.31				
Total, real	164	194	101	8	45	255				

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:32 AM / 12

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 5:01 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V117/V110 Realistic Flicker w/ Obstacles DNV Tab **Shadow receptor: J - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
662	334	353	412	609	964	791	576	697	906	1,119	1,195	8,618

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

	January	February	March	April	May	June
1	08:45	08:23	07:35	07:32	06:34	20:08 (13) 05:55
	17:07	17:50	18:34	20:21	21:05	30 20:38 (13) 21:45
2	08:45	08:21	07:33	07:30	06:32	20:07 (13) 05:55
	17:08	17:52	18:35	20:22	21:06	30 20:37 (13) 21:46
3	08:45	08:20	07:31	07:28	06:31	20:08 (13) 05:54
	17:09	17:53	18:37	20:24	21:08	30 20:38 (13) 21:47
4	08:44	08:18	07:29	07:26	06:29	20:07 (13) 05:53
	17:10	17:55	18:38	20:25	21:09	30 20:37 (13) 21:47
5	08:44	08:17	07:27	07:24	06:27	20:08 (13) 05:53
	17:11	17:57	18:40	20:27	21:10	29 20:37 (13) 21:48
6	08:44	08:15	07:25	07:21	06:26	20:08 (13) 05:52
	17:13	17:58	18:42	20:28	21:12	28 20:36 (13) 21:49
7	08:44	08:14	07:23	07:19	06:24	20:08 (13) 05:52
	17:14	18:00	18:43	20:30	21:13	28 20:36 (13) 21:50
8	08:43	08:12	08:21	19:20 (12) 07:17	06:23	20:08 (13) 05:51
	17:15	18:00	18:45	2 19:22 (12) 20:31	21:15	27 20:35 (13) 21:51
9	08:43	08:11	08:19	19:16 (12) 07:15	06:21	20:09 (13) 05:51
	17:16	18:02	19:46	7 19:23 (12) 20:32	21:16	26 20:35 (13) 21:52
10	08:43	08:09	08:17	19:14 (12) 07:13	06:20	20:09 (13) 05:51
	17:17	18:03	19:48	11 19:25 (12) 20:34	21:17	25 20:34 (13) 21:52
11	08:42	08:08	08:15	19:12 (12) 07:11	06:18	20:11 (13) 05:51
	17:19	18:05	19:49	14 19:26 (12) 20:35	21:19	22 20:33 (13) 21:53
12	08:42	08:06	08:13	19:11 (12) 07:09	06:17	20:12 (13) 05:50
	17:20	18:06	19:51	17 19:28 (12) 20:37	21:20	20 20:32 (13) 21:54
13	08:41	08:04	08:11	19:11 (12) 07:07	06:15	20:12 (13) 05:50
	17:21	18:08	19:52	18 19:29 (12) 20:38	21:22	18 20:30 (13) 21:54
14	08:41	08:03	08:09	19:10 (12) 07:05	06:14	20:14 (13) 05:50
	17:23	18:10	19:54	21 19:31 (12) 20:40	21:23	15 20:29 (13) 21:55
15	08:40	08:01	08:07	19:10 (12) 07:03	06:13	20:16 (13) 05:50
	17:24	18:11	19:55	23 19:33 (12) 20:41	21:24	11 20:27 (13) 21:55
16	08:39	07:59	08:05	19:10 (12) 07:01	06:11	20:20 (13) 05:50
	17:25	18:13	19:57	23 19:33 (12) 20:43	21:26	4 20:24 (13) 21:56
17	08:38	07:58	08:03	19:10 (12) 07:00	06:10	20:20 (13) 05:50
	17:27	18:15	19:58	22 19:32 (12) 20:44	21:27	21:56
18	08:38	07:56	08:01	19:11 (12) 06:58	06:09	20:20 (13) 05:50
	17:28	18:16	20:00	20 19:31 (12) 20:46	21:28	21:57
19	08:37	07:54	07:59	19:11 (12) 06:56	06:08	20:20 (13) 05:50
	17:30	18:18	20:01	19 19:30 (12) 20:47	21:30	21:57
20	08:36	07:52	07:57	19:12 (12) 06:54	06:07	20:20 (13) 05:50
	17:31	18:19	20:03	17 19:29 (12) 20:49	21:31	21:57
21	08:35	07:50	07:55	19:13 (12) 06:52	06:05	20:20 (13) 05:50
	17:33	18:21	20:04	13 19:26 (12) 20:50	21:32	21:58
22	08:34	07:49	07:53	19:17 (12) 06:50	20:18 (13) 06:04	20:20 (13) 05:50
	17:34	18:23	20:06	5 19:22 (12) 20:52	9 20:27 (13) 21:33	21:58
23	08:33	07:47	07:50	06:48	20:16 (13) 06:03	20:20 (13) 05:51
	17:36	18:24	20:07	20:53	13 20:29 (13) 21:35	21:58
24	08:32	07:45	07:48	06:46	20:14 (13) 06:02	20:20 (13) 05:51
	17:37	18:26	20:09	20:54	16 20:30 (13) 21:36	21:58
25	08:31	07:43	07:46	06:45	20:12 (13) 06:01	20:20 (13) 05:51
	17:39	18:27	20:10	20:56	19 20:31 (13) 21:37	21:58
26	08:30	07:41	07:44	06:43	20:11 (13) 06:00	20:20 (13) 05:52
	17:41	18:29	20:12	20:57	21 20:32 (13) 21:38	21:59
27	08:29	07:39	07:42	06:41	20:10 (13) 05:59	20:20 (13) 05:52
	17:42	18:31	20:13	20:59	24 20:34 (13) 21:39	21:59
28	08:28	07:37	07:40	06:39	20:09 (13) 05:58	20:20 (13) 05:52
	17:44	18:32	20:15	21:00	26 20:35 (13) 21:40	21:59
29	08:26		07:38	06:37	20:08 (13) 05:58	20:20 (13) 05:53
	17:45		20:16	21:02	28 20:36 (13) 21:41	21:58
30	08:25		07:36	06:36	20:09 (13) 05:57	20:20 (13) 05:53
	17:47		20:18	21:03	29 20:38 (13) 21:43	21:58
31	08:24		07:34			05:56
	17:49		20:19			21:44
Potential sun hours	273	285	368	410	471	481
Total, worst case			232	185	373	
Sun reduction			0.63	0.59	0.67	
Oper. time red.			0.98	0.98	0.98	
Wind dir. red.			0.63	0.70	0.70	
Total reduction			0.39	0.40	0.46	
Total, real			91	74	171	

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:32 AM / 13

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 5:01 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V117/V110 Realistic Flicker w/ Obstacles DNV Tab **Shadow receptor: J - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
662	334	353	412	609	964	791	576	697	906	1,119	1,195	8,618

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

	July	August	September	October	November	December	
1	05:54	06:26	20:22 (13)	07:09	07:51	18:51 (12) 07:38 08:22	
	21:58	21:32	21	20:43 (13) 20:38	19:35	17 19:08 (12) 17:34 17:00	
2	05:55	06:27	20:21 (13)	07:10	07:52	18:51 (12) 07:39 08:24	
	21:58	21:31	23	20:44 (13) 20:36	19:33	15 19:06 (12) 17:32 16:59	
3	05:55	06:29	20:20 (13)	07:11	07:54	18:52 (12) 07:41 08:25	
	21:58	21:29	24	20:44 (13) 20:33	19:31	12 19:04 (12) 17:31 16:59	
4	05:56	06:30	20:18 (13)	07:13	07:55	18:53 (12) 07:42 08:26	
	21:57	21:28	27	20:45 (13) 20:31	19:29	9 19:02 (12) 17:29 16:58	
5	05:57	06:31	20:19 (13)	07:14	07:57	18:54 (12) 07:44 08:27	
	21:57	21:26	27	20:46 (13) 20:29	19:27	5 18:59 (12) 17:28 16:58	
6	05:57	06:33	20:18 (13)	07:16	07:58	07:45 08:29	
	21:57	21:25	28	20:46 (13) 20:27	19:25	17:26 16:58	
7	05:58	06:34	20:17 (13)	07:17	08:00	07:47 08:30	
	21:56	21:23	29	20:46 (13) 20:25	19:22	17:25 16:58	
8	05:59	06:35	20:17 (13)	07:18	08:01	07:49 08:31	
	21:56	21:22	30	20:47 (13) 20:23	19:20	17:23 16:57	
9	06:00	06:37	20:17 (13)	07:20	08:02	07:50 08:32	
	21:55	21:20	30	20:47 (13) 20:21	19:18	17:22 16:57	
10	06:01	06:38	20:16 (13)	07:21	08:04	07:52 08:33	
	21:55	21:18	30	20:46 (13) 20:19	19:16	17:20 16:57	
11	06:02	06:39	20:16 (13)	07:23	08:05	07:53 08:34	
	21:54	21:17	30	20:46 (13) 20:17	19:14	17:19 16:57	
12	06:03	06:41	20:16 (13)	07:24	08:07	07:55 08:35	
	21:53	21:15	30	20:46 (13) 20:15	19:12	17:18 16:57	
13	06:04	06:42	20:16 (13)	07:25	08:08	07:56 08:36	
	21:53	21:13	29	20:45 (13) 20:13	19:10	17:16 16:57	
14	06:05	06:44	20:16 (13)	07:27	08:10	07:58 08:37	
	21:52	21:12	28	20:44 (13) 20:11	19:08	17:15 16:57	
15	06:06	06:45	20:17 (13)	07:28	08:11	08:00 08:37	
	21:51	21:10	26	20:43 (13) 20:09	19:06	17:14 16:57	
16	06:07	06:46	20:17 (13)	07:30	08:13	08:01 08:38	
	21:50	21:08	24	20:41 (13) 20:06	19:04	17:13 16:57	
17	06:08	06:48	20:18 (13)	07:31	08:14	08:03 08:39	
	21:50	21:06	21	20:39 (13) 20:04	19:03	17:12 16:58	
18	06:09	06:49	20:19 (13)	07:32	08:16	08:04 08:40	
	21:49	21:04	19	20:38 (13) 20:02	19:01	17:10 16:58	
19	06:10	06:50	20:20 (13)	07:34	08:17	08:06 08:40	
	21:48	21:03	16	20:36 (13) 20:00	18:57	17:09 16:58	
20	06:11	06:52	20:21 (13)	07:35	08:19	08:07 08:41	
	21:47	21:01	12	20:33 (13) 19:58	18:55	17:08 16:59	
21	06:12	06:53	20:24 (13)	07:37	08:20	08:09 08:41	
	21:46	20:59	8	20:32 (13) 19:56	18:53	17:07 16:59	
22	06:13	06:55	07:38	18:59 (12)	08:22	08:10 08:42	
	21:45	20:57	19:54	11	19:10 (12) 18:51	17:06 17:00	
23	06:15	06:56	07:39	18:57 (12)	08:24	08:11 08:42	
	21:44	20:55	19:52	15	19:12 (12) 18:49	17:06 17:00	
24	06:16	06:57	07:41	18:55 (12)	08:25	08:13 08:43	
	21:42	20:53	19:50	18	19:13 (12) 18:48	17:05 17:01	
25	06:17	06:59	07:42	18:53 (12)	08:27	08:14 08:43	
	21:41	20:51	19:47	21	19:14 (12) 18:46	17:04 17:01	
26	06:18	07:00	07:44	18:52 (12)	08:28	08:16 08:44	
	21:40	20:49	19:45	22	19:14 (12) 18:44	17:03 17:02	
27	06:19	07:02	07:45	18:52 (12)	08:30	08:17 08:44	
	21:39	20:47	19:43	22	19:14 (12) 18:42	17:02 17:03	
28	06:21	20:29 (13)	07:47	18:51 (12)	08:31	08:18 08:44	
	21:38	8	20:37 (13)	19:41	23	19:14 (12) 18:41	17:02 17:04
29	06:22	20:26 (13)	07:48	18:51 (12)	08:33	08:20 08:44	
	21:36	13	20:39 (13)	19:39	21	19:12 (12) 18:39	17:01 17:04
30	06:23	20:24 (13)	07:49	18:50 (12)	08:34	08:21 08:44	
	21:35	16	20:40 (13)	19:37	20	19:10 (12) 18:37	17:00 17:05
31	06:25	20:22 (13)	07:49	18:50 (12)	08:34	08:21 08:44	
	21:34	19	20:41 (13)	19:37	20	19:10 (12) 18:37	17:00 17:05
Potential sun hours	486	445	379	336	277	260	
Total, worst case	56	512	173	58			
Sun reduction	0.75	0.72	0.69	0.52			
Oper. time red.	0.98	0.98	0.98	0.98			
Wind dir. red.	0.70	0.70	0.63	0.63			
Total reduction	0.51	0.49	0.43	0.33			
Total, real	29	252	74	19			

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:32 AM / 14

Licensed user:

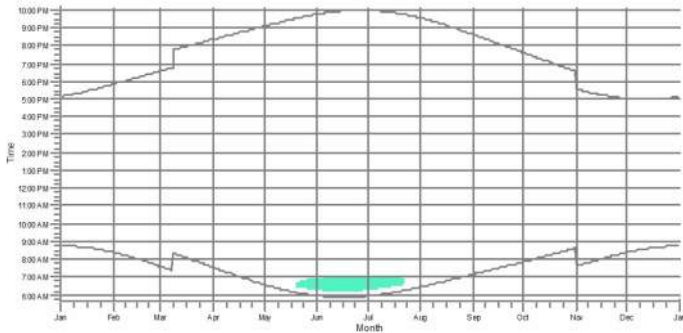
EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net

Calculated:
 10/1/2015 5:01 PM/2.9.285

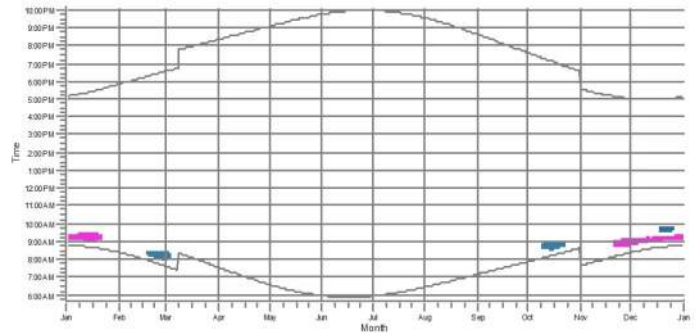
SHADOW - Calendar, graphical

Calculation: A059 V117/V110 Realistic Flicker w/ Obstacles DNV Tab

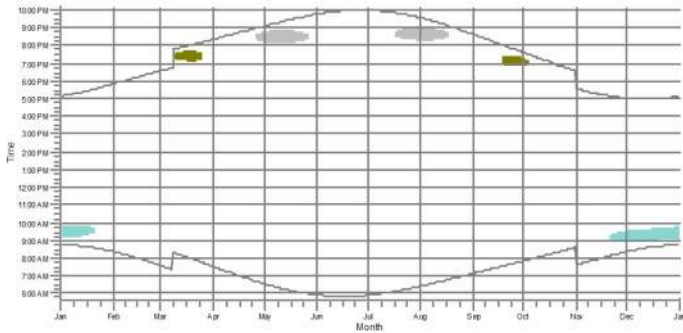
A: Participating



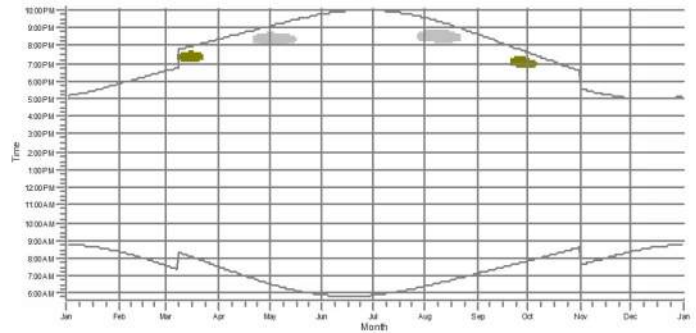
B: Participating



I: Participating



J: Participating



WTGs

- 12: up to V110
- 13: up to V110
- 311: up to V110
- 66: up to V110
- 67: up to V117
- 104: up to V110
- 42: up to V110

Appendix N: windPRO V110 Shadow Flicker Report, W/ Obstacles for Select Receptors

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:36 AM / 1

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 10:15 PM/2.9.285

SHADOW - Main Result

Calculation: A059 V110 80m HH Realistic Flicker w/ Obstacles DNV Tab

Assumptions for shadow calculations

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

Sunshine probability S (Average daily sunshine hours) [BISMARCK]
 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 4.92 5.13 7.45 8.03 10.20 11.21 11.69 10.35 8.68 5.69 4.02 3.69

Operational hours are calculated from WTGs in calculation and wind distribution:

DNV Shadow

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
660	333	352	411	608	961	789	574	695	904	1,116	1,191	8,594

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

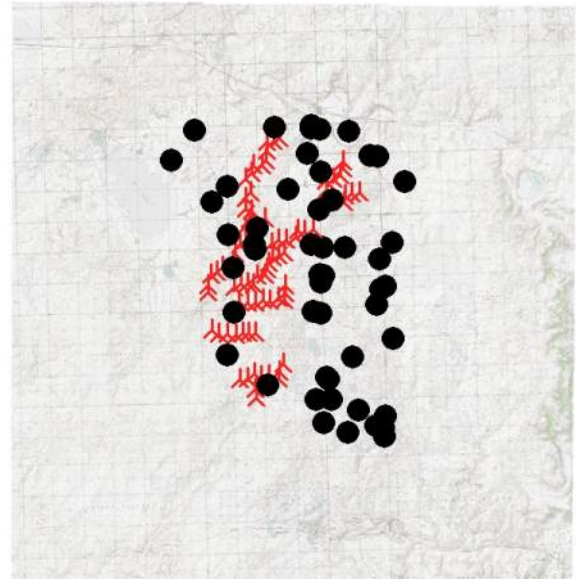
A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:

Height contours used: Height Contours: 20100616_Lindahl_10ft_HCL.wpo (1)

Obstacles used in calculation

Eye height: 1.5 m

Grid resolution: 10.0 m



人 New WTG

Scale 1:400,000
 ☾ Shadow receptor

WTGs

UTM NAD83 Zone: 13			Row data/Description	WTG type							
East	North	Z [m]		Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	RPM [RPM]	
5	646,913	5,375,455	745.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
6	646,888	5,375,080	743.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
12	648,327	5,377,151	750.2 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
13	648,563	5,377,579	749.6 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
14	648,872	5,378,572	753.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
15	648,872	5,377,853	752.9 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
18	649,189	5,379,368	749.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
20	648,867	5,380,033	744.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
22	649,124	5,380,328	729.3 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
24	651,007	5,377,868	749.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
26	651,525	5,378,000	751.5 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
27	651,616	5,378,348	758.6 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
28	651,987	5,378,290	755.5 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
29	652,436	5,378,405	749.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
34	654,047	5,379,834	743.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
35	654,478	5,380,290	740.5 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
36	654,876	5,380,346	731.4 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
37	649,468	5,369,552	735.9 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
38	649,403	5,370,046	745.2 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
39	648,989	5,370,563	740.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
40	649,348	5,370,846	749.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
41	649,714	5,370,690	746.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
42	650,635	5,370,574	746.1 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
43	650,667	5,370,918	744.1 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
45	650,882	5,371,340	743.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
66	649,309	5,375,532	733.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
67	649,484	5,375,990	732.9 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	

To be continued on next page...

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:36 AM / 2

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net

Calculated:
 10/1/2015 10:15 PM/2.9.285

SHADOW - Main Result

Calculation: A059 V110 80m HH Realistic Flicker w/ Obstacles DNV Tab

...continued from previous page

UTM NAD83 Zone: 13				WTG type							
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	RPM	
			[m]								[RPM]
68	649,889	5,375,994	741.6 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
69	650,008	5,376,321	740.1 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
70	650,956	5,375,465	751.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
84	648,982	5,374,557	737.6 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
85	648,553	5,374,643	733.1 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
98	648,903	5,381,054	722.4 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
99	649,170	5,381,363	721.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
100	649,950	5,382,038	713.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
101	650,030	5,382,496	712.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
104	650,119	5,376,639	740.5 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
105	650,267	5,377,632	746.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
150	650,663	5,383,159	707.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
151	650,947	5,375,049	753.4 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
152	650,911	5,374,694	758.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
154	650,163	5,374,664	746.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
155	649,378	5,374,555	741.3 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
156	649,818	5,374,694	743.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
158	650,613	5,377,049	737.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
164	649,406	5,372,982	725.6 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
165	647,909	5,372,903	716.3 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
166	647,487	5,372,910	715.6 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
171	647,671	5,376,427	743.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
173	647,364	5,376,192	740.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
174	647,056	5,376,002	741.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
175	653,143	5,380,511	713.2 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
176	653,130	5,380,927	710.2 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
177	653,497	5,381,062	704.1 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
178	653,850	5,381,276	700.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
179	654,022	5,381,604	696.2 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
180	654,011	5,381,966	694.9 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
183	649,728	5,381,758	721.2 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
184	650,599	5,377,842	746.4 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
205	648,594	5,370,523	731.5 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
206	650,092	5,370,737	743.7 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
300	654,134	5,380,179	734.1 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
302	648,870	5,379,451	759.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
303	649,079	5,378,913	759.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
304	649,308	5,381,738	716.8 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
305	650,346	5,383,045	709.5 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
306	650,021	5,382,956	710.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
307	647,090	5,373,129	713.2 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
308	649,061	5,372,960	722.4 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
309	648,724	5,372,961	720.3 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
310	648,383	5,372,885	719.3 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
311	648,975	5,375,560	734.6 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
312	648,641	5,375,554	726.9 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
313	648,297	5,375,376	728.5 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
314	649,928	5,378,956	741.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
315	650,591	5,374,779	748.6 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
316	650,301	5,376,922	735.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	
317	650,917	5,377,197	740.0 up to V110	Yes	VESTAS	V110-2,000	2,000	110.0	80.0	14.9	

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:36 AM / 3

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 10:15 PM/2.9.285

SHADOW - Main Result

Calculation: A059 V110 80m HH Realistic Flicker w/ Obstacles DNV Tab

Shadow receptor-Input

UTM NAD83 Zone: 13

No.	Name	East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
				[m]	[m]	[m]	[m]	[°]	[°]	
A	Participating	650,034	5,370,204	742.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
B	Participating	648,222	5,376,376	731.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
C	Participating	649,350	5,377,570	737.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
D	Participating	652,833	5,381,417	705.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
E	Participating	653,476	5,379,925	741.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
F	Participating	649,476	5,378,474	747.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
G	Participating	650,400	5,383,729	711.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
H	Participating	648,263	5,374,042	728.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
I	Participating	649,372	5,377,319	734.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
J	Participating	649,411	5,377,350	734.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
K	Participating	652,350	5,377,616	735.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
L	Participating	647,974	5,378,125	736.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
M	Participating	652,746	5,379,403	722.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
N	Non-Participating	652,934	5,377,454	728.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
O	Participating	647,905	5,380,657	723.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
P	Non-Participating	647,929	5,371,803	716.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
Q	Non-Participating	655,444	5,382,262	682.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
R	Non-Participating	654,346	5,383,551	675.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
S	Participating	652,445	5,374,111	759.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
T	Non-Participating	652,124	5,382,382	698.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
U	Non-Participating	652,329	5,383,668	691.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
V	Participating	647,113	5,379,805	712.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
W	Non-Participating	652,318	5,383,827	691.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
X	Non-Participating	655,873	5,382,222	689.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
Y	Non-Participating	651,119	5,380,491	705.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
Z	Non-Participating	652,848	5,375,611	736.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
AA	Participating	654,105	5,377,449	726.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
BB	Non-Participating	652,820	5,375,995	733.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
CC	Participating	652,849	5,373,992	753.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
DD	Non-Participating	652,780	5,383,651	684.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
EE	Non-Participating	653,014	5,375,966	734.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
FF	Non-Participating	652,597	5,369,477	749.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
GG	Participating	653,163	5,370,620	746.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
HH	Non-Participating	657,270	5,380,900	701.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
II	Participating	653,237	5,370,521	746.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
JJ	Non-Participating	653,421	5,369,486	746.6	1.0	1.0	1.0	0.0	90.0	"Green house mode"
KK	Non-Participating	656,603	5,377,699	728.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
LL	Non-Participating	652,987	5,368,263	755.9	1.0	1.0	1.0	0.0	90.0	"Green house mode"
MM	Non-Participating	655,962	5,376,837	710.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
NN	Non-Participating	646,183	5,383,581	712.5	1.0	1.0	1.0	0.0	90.0	"Green house mode"
OO	Participating	654,514	5,371,692	765.0	1.0	1.0	1.0	0.0	90.0	"Green house mode"
PP	Non-Participating	644,980	5,381,994	704.1	1.0	1.0	1.0	0.0	90.0	"Green house mode"
QQ	Participating	654,816	5,368,880	743.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
RR	Non-Participating	654,290	5,367,724	742.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
SS	Non-Participating	656,021	5,375,274	710.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
TT	Non-Participating	656,242	5,375,429	710.2	1.0	1.0	1.0	0.0	90.0	"Green house mode"
UU	Non-Participating	655,800	5,374,456	722.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
VV	Non-Participating	655,758	5,368,066	719.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"
WW	Participating	656,662	5,372,675	722.4	1.0	1.0	1.0	0.0	90.0	"Green house mode"
XX	Non-Participating	656,251	5,368,598	741.7	1.0	1.0	1.0	0.0	90.0	"Green house mode"
YY	Non-Participating	656,161	5,367,989	720.8	1.0	1.0	1.0	0.0	90.0	"Green house mode"
ZZ	Non-Participating	656,215	5,367,523	716.3	1.0	1.0	1.0	0.0	90.0	"Green house mode"

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:36 AM / 4

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000

wind@eapc.net

Calculated:

10/1/2015 10:15 PM/2.9.285

SHADOW - Main Result

Calculation: A059 V110 80m HH Realistic Flicker w/ Obstacles DNV Tab

Calculation Results

Shadow receptor

No.	Name	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]
A	Participating	30:03	63	0:38	12:16
B	Participating	13:51	84	0:18	4:49
C	Participating	68:46	174	1:01	28:03
D	Participating	55:27	177	0:35	20:08
E	Participating	63:19	137	0:44	26:53
F	Participating	74:13	164	0:43	25:49
G	Participating	0:00	0	0:00	0:00
H	Participating	17:25	96	0:21	6:42
I	Participating	55:28	150	0:32	22:33
J	Participating	26:29	79	0:30	11:48
K	Participating	41:17	123	0:30	19:56
L	Participating	79:11	199	0:34	29:43
M	Participating	6:05	29	0:19	2:26
N	Non-Participating	0:00	0	0:00	0:00
O	Participating	33:19	144	0:24	12:59
P	Non-Participating	0:00	0	0:00	0:00
Q	Non-Participating	3:12	19	0:15	1:11
R	Non-Participating	0:00	0	0:00	0:00
S	Participating	0:00	0	0:00	0:00
T	Non-Participating	0:00	0	0:00	0:00
U	Non-Participating	0:00	0	0:00	0:00
V	Participating	0:00	0	0:00	0:00
W	Non-Participating	0:00	0	0:00	0:00
X	Non-Participating	0:00	0	0:00	0:00
Y	Non-Participating	0:00	0	0:00	0:00
Z	Non-Participating	0:00	0	0:00	0:00
AA	Participating	0:00	0	0:00	0:00
BB	Non-Participating	0:00	0	0:00	0:00
CC	Participating	0:00	0	0:00	0:00
DD	Non-Participating	0:00	0	0:00	0:00
EE	Non-Participating	0:00	0	0:00	0:00
FF	Non-Participating	0:00	0	0:00	0:00
GG	Participating	0:00	0	0:00	0:00
HH	Non-Participating	0:00	0	0:00	0:00
II	Participating	0:00	0	0:00	0:00
JJ	Non-Participating	0:00	0	0:00	0:00
KK	Non-Participating	0:00	0	0:00	0:00
LL	Non-Participating	0:00	0	0:00	0:00
MM	Non-Participating	0:00	0	0:00	0:00
NN	Non-Participating	0:00	0	0:00	0:00
OO	Participating	0:00	0	0:00	0:00
PP	Non-Participating	0:00	0	0:00	0:00
QQ	Participating	0:00	0	0:00	0:00
RR	Non-Participating	0:00	0	0:00	0:00
SS	Non-Participating	0:00	0	0:00	0:00
TT	Non-Participating	0:00	0	0:00	0:00
UU	Non-Participating	0:00	0	0:00	0:00
VV	Non-Participating	0:00	0	0:00	0:00
WW	Participating	0:00	0	0:00	0:00
XX	Non-Participating	0:00	0	0:00	0:00
YY	Non-Participating	0:00	0	0:00	0:00
ZZ	Non-Participating	0:00	0	0:00	0:00

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.

Kevin Walter

Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:36 AM / 5

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000

wind@eapc.net

Calculated:

10/1/2015 10:15 PM/2.9.285

SHADOW - Main Result**Calculation:** A059 V110 80m HH Realistic Flicker w/ Obstacles DNV Tab

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

No.	Name	Worst case [h/year]	Expected [h/year]
5	up to V110	0:00	0:00
6	up to V110	0:00	0:00
12	up to V110	18:15	6:38
13	up to V110	100:07	38:07
14	up to V110	62:23	27:18
15	up to V110	55:58	18:34
18	up to V110	0:00	0:00
20	up to V110	11:31	3:58
22	up to V110	4:59	1:52
24	up to V110	4:50	2:09
26	up to V110	33:49	16:55
27	up to V110	0:00	0:00
28	up to V110	0:00	0:00
29	up to V110	0:00	0:00
34	up to V110	37:13	15:54
35	up to V110	9:57	4:04
36	up to V110	2:33	0:59
37	up to V110	0:00	0:00
38	up to V110	0:00	0:00
39	up to V110	0:00	0:00
40	up to V110	0:00	0:00
41	up to V110	0:00	0:00
42	up to V110	30:03	12:16
43	up to V110	0:00	0:00
45	up to V110	0:00	0:00
66	up to V110	9:14	3:11
67	up to V110	4:08	1:29
68	up to V110	0:00	0:00
69	up to V110	0:00	0:00
70	up to V110	0:00	0:00
84	up to V110	4:10	1:38
85	up to V110	0:00	0:00
98	up to V110	10:22	4:17
99	up to V110	6:27	2:39
100	up to V110	0:00	0:00
101	up to V110	0:00	0:00
104	up to V110	23:41	7:49
105	up to V110	12:03	5:05
150	up to V110	0:00	0:00
151	up to V110	0:00	0:00
152	up to V110	0:00	0:00
154	up to V110	0:00	0:00
155	up to V110	10:12	4:14
156	up to V110	0:00	0:00
158	up to V110	3:54	1:21
164	up to V110	0:00	0:00
165	up to V110	0:00	0:00
166	up to V110	0:00	0:00
171	up to V110	0:00	0:00
173	up to V110	0:00	0:00
174	up to V110	0:00	0:00
175	up to V110	0:00	0:00
176	up to V110	16:29	5:11
177	up to V110	21:23	7:28
178	up to V110	7:29	3:11
179	up to V110	4:38	1:52

To be continued on next page...

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.

Kevin Walter

Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:36 AM / 6

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000

wind@eapc.net

Calculated:

10/1/2015 10:15 PM/2.9.285

SHADOW - Main Result**Calculation:** A059 V110 80m HH Realistic Flicker w/ Obstacles DNV Tab

...continued from previous page

No.	Name	Worst case [h/year]	Expected [h/year]
180	up to V110	8:40	3:27
183	up to V110	0:00	0:00
184	up to V110	11:10	4:09
205	up to V110	0:00	0:00
206	up to V110	0:00	0:00
300	up to V110	30:44	12:46
302	up to V110	0:00	0:00
303	up to V110	1:47	0:43
304	up to V110	0:00	0:00
305	up to V110	0:00	0:00
306	up to V110	0:00	0:00
307	up to V110	3:03	0:50
308	up to V110	0:00	0:00
309	up to V110	0:00	0:00
310	up to V110	0:00	0:00
311	up to V110	0:29	0:08
312	up to V110	0:00	0:00
313	up to V110	0:00	0:00
314	up to V110	0:00	0:00
315	up to V110	0:00	0:00
316	up to V110	9:33	3:20
317	up to V110	2:38	0:53

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:36 AM / 7

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 10:15 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V110 80m HH Realistic Flicker w/ Obstacles DNV Tab **Shadow receptor: A - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
660	333	352	411	608	961	789	574	695	904	1,116	1,191	8,594

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	08:44	08:22	07:35	07:32	06:34	05:56	06:21 (42) 05:54	06:21 (42) 06:26	07:09	07:51	07:37	08:22
	17:08	17:50	18:34	20:21	21:04	21:44	27 06:48 (42) 21:58	36 06:57 (42) 21:32	20:37	19:35	17:34	17:00
2	08:44	08:21	07:33	07:30	06:32	05:55	06:21 (42) 05:55	06:22 (42) 06:27	07:10	07:52	07:39	08:23
	17:09	17:52	18:35	20:22	21:06	21:45	28 06:49 (42) 21:58	35 06:57 (42) 21:31	20:35	19:33	17:32	17:00
3	08:44	08:20	07:31	07:28	06:31	05:54	06:20 (42) 05:56	06:23 (42) 06:29	07:12	07:54	07:41	08:25
	17:10	17:54	18:37	20:24	21:07	21:46	29 06:49 (42) 21:57	35 06:58 (42) 21:29	20:33	19:31	17:31	16:59
4	08:44	08:18	07:29	07:26	06:29	05:54	06:20 (42) 05:56	06:23 (42) 06:30	07:13	07:55	07:42	08:26
	17:11	17:55	18:38	20:25	21:09	21:47	30 06:50 (42) 21:57	34 06:57 (42) 21:28	20:31	19:29	17:29	16:59
5	08:44	08:17	07:27	07:24	06:28	05:53	06:19 (42) 05:57	06:24 (42) 06:31	07:14	07:57	07:44	08:27
	17:12	17:57	18:40	20:26	21:10	21:48	31 06:50 (42) 21:57	33 06:57 (42) 21:26	20:29	19:27	17:28	16:58
6	08:44	08:15	07:25	07:22	06:26	05:53	06:19 (42) 05:58	06:25 (42) 06:33	07:16	07:58	07:45	08:28
	17:13	17:58	18:42	20:28	21:12	21:49	32 06:51 (42) 21:56	33 06:58 (42) 21:25	20:27	19:25	17:26	16:58
7	08:43	08:14	07:23	07:20	06:24	05:52	06:19 (42) 05:59	06:26 (42) 06:34	07:17	07:59	07:47	08:29
	17:14	18:00	18:43	20:29	21:13	21:50	33 06:52 (42) 21:56	32 06:58 (42) 21:23	20:25	19:23	17:25	16:58
8	08:43	08:12	08:21	07:17	06:23	05:52	06:18 (42) 05:59	06:26 (42) 06:35	07:18	08:01	07:48	08:30
	17:15	18:00	18:45	20:31	21:14	21:51	34 06:52 (42) 21:55	31 06:57 (42) 21:21	20:23	19:20	17:23	16:58
9	08:43	08:11	08:19	07:15	06:21	05:51	06:18 (42) 06:00	06:27 (42) 06:37	07:20	08:02	07:50	08:32
	17:16	18:02	19:46	20:32	21:16	21:51	34 06:52 (42) 21:55	30 06:57 (42) 21:20	20:21	19:18	17:22	16:57
10	08:42	08:09	08:17	07:13	06:20	05:51	06:18 (42) 06:01	06:28 (42) 06:38	07:21	08:04	07:52	08:33
	17:18	18:03	19:48	20:34	21:17	21:52	35 06:53 (42) 21:54	29 06:57 (42) 21:18	20:19	19:16	17:20	16:57
11	08:42	08:08	08:15	07:11	06:18	05:51	06:17 (42) 06:02	06:29 (42) 06:40	07:23	08:05	07:53	08:34
	17:19	18:05	19:49	20:35	21:19	21:53	35 06:52 (42) 21:54	28 06:57 (42) 21:17	20:17	19:14	17:19	16:57
12	08:41	08:06	08:13	07:09	06:17	05:51	06:17 (42) 06:03	06:30 (42) 06:41	07:24	08:07	07:55	08:34
	17:20	18:07	19:51	20:37	21:20	21:53	36 06:53 (42) 21:53	27 06:57 (42) 21:15	20:15	19:12	17:18	16:57
13	08:41	08:04	08:11	07:07	06:16	05:50	06:17 (42) 06:04	06:31 (42) 06:42	07:25	08:08	07:56	08:35
	17:22	18:08	19:52	20:38	21:21	21:54	36 06:53 (42) 21:52	25 06:56 (42) 21:13	20:13	19:10	17:17	16:57
14	08:40	08:03	08:09	07:05	06:14	05:50	06:17 (42) 06:05	06:32 (42) 06:44	07:27	08:10	07:58	08:36
	17:23	18:10	19:54	20:40	21:23	21:55	37 06:54 (42) 21:52	24 06:56 (42) 21:11	20:11	19:08	17:15	16:57
15	08:40	08:01	08:07	07:04	06:13	05:50	06:17 (42) 06:06	06:33 (42) 06:45	07:28	08:11	07:59	08:37
	17:24	18:11	19:55	20:41	21:24	21:55	37 06:54 (42) 21:51	23 06:56 (42) 21:10	20:09	19:06	17:14	16:57
16	08:39	07:59	08:05	07:02	06:12	05:50	06:17 (42) 06:07	06:34 (42) 06:46	07:30	08:13	08:01	08:38
	17:26	18:13	19:57	20:43	21:25	21:56	37 06:54 (42) 21:50	21 06:55 (42) 21:08	20:06	19:05	17:13	16:58
17	08:38	07:57	08:03	07:00	06:10	05:50	06:17 (42) 06:08	06:35 (42) 06:48	07:31	08:14	08:02	08:39
	17:27	18:15	19:58	20:44	21:27	21:56	38 06:55 (42) 21:49	19 06:54 (42) 21:06	20:04	19:03	17:12	16:58
18	08:37	07:56	08:01	06:58	06:09	05:50	06:17 (42) 06:09	06:36 (42) 06:49	07:32	08:16	08:04	08:39
	17:29	18:16	20:00	20:46	21:28	21:56	38 06:55 (42) 21:48	17 06:53 (42) 21:04	20:02	19:01	17:11	16:58
19	08:37	07:54	07:59	06:56	06:08	05:50	06:17 (42) 06:10	06:37 (42) 06:51	07:34	08:17	08:05	08:40
	17:30	18:18	20:01	20:47	21:29	21:57	38 06:55 (42) 21:47	15 06:52 (42) 21:02	20:00	18:57	17:10	16:59
20	08:36	07:52	07:57	06:54	06:07	05:50	06:17 (42) 06:11	06:38 (42) 06:52	07:35	08:19	08:07	08:41
	17:32	18:20	20:03	20:48	21:31	21:57	38 06:55 (42) 21:46	13 06:51 (42) 21:01	19:58	18:55	17:09	16:59
21	08:35	07:50	07:55	06:52	06:06	05:50	06:17 (42) 06:12	06:39 (42) 06:53	07:37	08:20	08:08	08:41
	17:33	18:21	20:04	20:50	21:32	4 06:34 (42) 21:57	38 06:55 (42) 21:45	10 06:49 (42) 20:59	19:56	18:53	17:08	16:59
22	08:34	07:48	07:53	06:50	06:04	05:50	06:29 (42) 06:14	06:40 (42) 06:55	07:38	08:22	08:10	08:42
	17:35	18:23	20:06	20:51	21:33	9 06:38 (42) 21:58	38 06:56 (42) 21:44	7 06:47 (42) 20:57	19:54	18:51	17:07	17:00
23	08:33	07:47	07:50	06:48	06:03	05:50	06:28 (42) 06:15	06:41 (42) 06:56	07:39	08:23	08:11	08:42
	17:36	18:24	20:07	20:53	21:34	12 06:40 (42) 21:58	38 06:56 (42) 21:43	20:55	19:52	18:49	17:06	17:00
24	08:32	07:45	07:48	06:46	06:02	05:50	06:27 (42) 06:16	06:42 (42) 06:57	07:41	08:25	08:13	08:43
	17:38	18:26	20:09	20:54	21:35	14 06:41 (42) 21:58	38 06:56 (42) 21:42	20:53	19:50	18:48	17:05	17:01
25	08:31	07:43	07:46	06:45	06:01	05:50	06:27 (42) 06:17	06:43 (42) 06:58	07:42	08:27	08:14	08:43
	17:39	18:28	20:10	20:56	21:37	16 06:43 (42) 21:58	38 06:57 (42) 21:41	20:51	19:47	18:46	17:04	17:02
26	08:30	07:41	07:44	06:43	06:00	05:50	06:26 (42) 06:18	06:44 (42) 06:59	07:44	08:28	08:15	08:43
	17:41	18:29	20:12	20:57	21:38	18 06:44 (42) 21:58	37 06:56 (42) 21:40	20:49	19:45	18:44	17:03	17:02
27	08:29	07:39	07:42	06:41	06:00	05:50	06:25 (42) 06:18	06:45 (42) 06:60	07:45	08:30	08:17	08:44
	17:42	18:31	20:13	20:59	21:39	20 06:45 (42) 21:58	37 06:56 (42) 21:39	20:47	19:43	18:42	17:03	17:03
28	08:27	07:37	07:40	06:39	05:59	05:50	06:24 (42) 06:19	06:46 (42) 06:61	07:47	08:31	08:18	08:44
	17:44	18:32	20:15	21:00	21:40	22 06:46 (42) 21:58	37 06:57 (42) 21:37	20:45	19:41	18:41	17:02	17:04
29	08:26	07:38	07:38	06:38	05:58	05:50	06:23 (42) 06:14	06:47 (42) 06:62	07:48	08:33	08:20	08:44
	17:45	18:33	20:16	21:02	21:41	23 06:46 (42) 21:58	37 06:57 (42) 21:36	20:43	19:39	18:39	17:01	17:05
30	08:25	07:36	07:36	06:36	05:57	05:50	06:23 (42) 06:14	06:48 (42) 06:63	07:49	08:34	08:21	08:44
	17:47	18:35	20:18	21:03	21:42	25 06:48 (42) 21:58	36 06:57 (42) 21:35	20:41	19:37	18:37	17:01	17:05
31	08:24	07:34	07:34	06:34	05:56	05:50	06:22 (42) 06:15	06:49 (42) 06:64	07:49	08:34	08:21	08:44
	17:49	18:37	20:20	21:05	21:43	26 06:48 (42) 21:58	36 06:57 (42) 21:33	20:39	19:35	18:36	17:01	17:06
Potential sun hours	274	285	368	409	471	481	486	445	379	337	278	260
Total, worst case					189	1057						

Project:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:36 AM / 8

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 10:15 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V110 80m HH Realistic Flicker w/ Obstacles DNV Tab **Shadow receptor: B - Participating**

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [BISMARCK]
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
4.92 5.13 7.45 8.03 10.20 11.21 11.69 10.35 8.68 5.69 4.02 3.69

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
660 333 352 411 608 961 789 574 695 904 1,116 1,191 8,594
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	
1 08:45	09:12 (66) 08:23		07:35	08:04 (67) 07:32	06:34	05:55	
17:07	5 09:17 (66) 17:50		18:34	12 08:16 (67) 20:21	21:05	21:45	
2 08:45	09:12 (66) 08:21		07:33	08:06 (67) 07:30	06:32	05:55	
17:08	6 09:18 (66) 17:52		18:35	7 08:13 (67) 20:22	21:06	21:46	
3 08:45	09:12 (66) 08:20		07:31		07:28	06:31	05:54
17:09	7 09:19 (66) 17:53		18:37		20:24	21:08	21:47
4 08:44	09:12 (66) 08:18		07:29		07:26	06:29	05:54
17:10	8 09:20 (66) 17:55		18:39		20:25	21:09	21:47
5 08:44	09:11 (66) 08:17		07:28		07:24	06:27	05:53
17:12	9 09:20 (66) 17:57		18:40		20:27	21:10	21:48
6 08:44	09:11 (66) 08:16		07:26		07:22	06:26	05:52
17:13	9 09:20 (66) 17:58		18:42		20:28	21:12	21:49
7 08:44	09:11 (66) 08:14		07:24		07:20	06:24	05:52
17:14	10 09:21 (66) 18:00		18:43		20:30	21:13	21:50
8 08:43	09:10 (66) 08:13		08:21		07:17	06:23	05:52
17:15	11 09:21 (66) 18:00		18:45		20:31	21:15	21:51
9 08:43	09:10 (66) 08:11		08:19		07:15	06:21	05:51
17:16	12 09:22 (66) 18:02		19:46		20:33	21:16	21:52
10 08:43	09:09 (66) 08:09		08:17		07:13	06:20	05:51
17:17	13 09:22 (66) 18:03		19:48		20:34	21:18	21:52
11 08:42	09:09 (66) 08:08		08:15		07:11	06:18	05:51
17:19	14 09:23 (66) 18:05		19:49		20:35	21:19	21:53
12 08:42	09:08 (66) 08:06		08:13		07:09	06:17	05:50
17:20	15 09:23 (66) 18:07		19:51		20:37	21:20	21:54
13 08:41	09:07 (66) 08:04		08:11		07:07	06:16	05:50
17:21	16 09:23 (66) 18:08		19:52		20:38	21:22	21:54
14 08:41	09:07 (66) 08:03		08:09		07:05	06:14	05:50
17:23	17 09:24 (66) 18:10		19:54		20:40	21:23	21:55
15 08:40	09:06 (66) 08:01		08:07		07:04	06:13	05:50
17:24	18 09:24 (66) 18:11		19:55		20:41	21:24	21:55
16 08:39	09:06 (66) 07:59		08:05		07:02	06:12	05:50
17:26	17 09:23 (66) 18:13		19:57		20:43	21:26	21:56
17 08:38	09:07 (66) 07:58		08:03		07:00	06:10	05:50
17:27	16 09:23 (66) 18:15		19:58		20:44	21:27	21:56
18 08:38	09:08 (66) 07:56		08:01		06:58	06:09	05:50
17:28	14 09:22 (66) 18:16		20:00		20:46	21:28	21:57
19 08:37	09:09 (66) 07:54		07:59		06:56	06:08	05:50
17:30	13 09:22 (66) 18:18		20:01		20:47	21:30	21:57
20 08:36	09:10 (66) 07:52	08:15 (67) 07:57		06:54	06:07	05:50	
17:31	11 09:21 (66) 18:20	4 08:19 (67) 20:03		20:49	21:31	21:58	
21 08:35	09:12 (66) 07:50	08:13 (67) 07:55		06:52	06:05	05:50	
17:33	7 09:19 (66) 18:21	6 08:19 (67) 20:04		20:50	21:32	21:58	
22 08:34	07:49	08:11 (67) 07:53		06:50	06:04	05:50	
17:34	18:23	9 08:20 (67) 20:06		20:52	21:33	21:58	
23 08:33	07:47	08:09 (67) 07:51		06:48	06:03	05:51	
17:36	18:24	11 08:20 (67) 20:07		20:53	21:35	21:58	
24 08:32	07:45	08:08 (67) 07:48		06:46	06:02	05:51	
17:37	18:26	13 08:21 (67) 20:09		20:55	21:36	21:58	
25 08:31	07:43	08:06 (67) 07:46		06:45	06:01	05:51	
17:39	18:28	14 08:20 (67) 20:10		20:56	21:37	21:59	
26 08:30	07:41	08:04 (67) 07:44		06:43	06:00	05:52	
17:41	18:29	16 08:20 (67) 20:12		20:57	21:38	21:59	
27 08:29	07:39	08:02 (67) 07:42		06:41	05:59	05:52	
17:42	18:31	17 08:19 (67) 20:13		20:59	21:39	21:59	
28 08:28	07:37	08:03 (67) 07:40		06:39	05:59	05:53	
17:44	18:32	15 08:18 (67) 20:15		21:00	21:40	21:59	
29 08:26			07:38		06:38	05:58	05:53
17:45			20:16		21:02	21:41	21:58
30 08:25			07:36		06:36	05:57	05:54
17:47			20:18		21:03	21:43	21:58
31 08:24			07:34			05:56	
17:49			20:19			21:44	
Potential sun hours	273	285	368	410	471	481	
Total, worst case	248	105	19				
Sun reduction	0.56	0.50	0.63				
Oper. time red.	0.98	0.98	0.98				
Wind dir. red.	0.72	0.70	0.70				
Total reduction	0.39	0.35	0.43				
Total, real	97	36	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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:36 AM / 9

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 10:15 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V110 80m HH Realistic Flicker w/ Obstacles DNV Tab **Shadow receptor: B - Participating**

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

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

Assumptions for shadow calculations

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
660	333	352	411	608	961	789	574	695	904	1,116	1,191	8,594

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

	July	August	September	October	November	December	
1	05:54	06:26	07:09	07:51	07:38	08:22	08:51 (66)
	21:58	21:32	20:38	19:35	17:34	17:00	14 09:05 (66)
2	05:55	06:27	07:10	07:52	07:39	08:24	08:52 (66)
	21:58	21:31	20:36	19:33	17:32	16:59	13 09:05 (66)
3	05:55	06:29	07:12	07:54	07:41	08:25	08:53 (66)
	21:58	21:29	20:34	19:31	17:31	16:59	12 09:05 (66)
4	05:56	06:30	07:13	07:55	07:42	08:26	08:55 (66)
	21:57	21:28	20:32	19:29	17:29	16:59	11 09:06 (66)
5	05:57	06:31	07:14	07:57	07:44	08:27	08:56 (66)
	21:57	21:26	20:29	19:27	17:28	16:58	10 09:06 (66)
6	05:58	06:33	07:16	07:58	07:46	08:29	08:57 (66)
	21:57	21:25	20:27	19:25	17:26	16:58	10 09:07 (66)
7	05:58	06:34	07:17	08:00	07:47	08:30	08:58 (66)
	21:56	21:23	20:25	19:23	17:25	16:58	9 09:07 (66)
8	05:59	06:35	07:19	08:01	07:49	08:31	08:59 (66)
	21:56	21:22	20:23	19:21	17:23	16:57	8 09:07 (66)
9	06:00	06:37	07:20	08:03	07:50	08:32	09:00 (66)
	21:55	21:20	20:21	19:18	17:22	16:57	7 09:07 (66)
10	06:01	06:38	07:21	08:04	07:52	08:33	09:02 (66)
	21:55	21:18	20:19	19:16	17:20	16:57	6 09:08 (66)
11	06:02	06:39	07:23	08:05	07:53	08:34	09:03 (66)
	21:54	21:17	20:17	19:14	17:19	16:57	6 09:09 (66)
12	06:03	06:41	07:24	08:07	08:38 (67)	07:55	08:35
	21:53	21:15	20:15	19:12	10 08:48 (67)	17:18	16:57
13	06:04	06:42	07:25	08:08	08:36 (67)	07:56	08:36
	21:53	21:13	20:13	19:10	14 08:50 (67)	17:16	16:57
14	06:05	06:44	07:27	08:10	08:34 (67)	07:58	08:37
	21:52	21:12	20:11	19:08	16 08:50 (67)	17:15	16:57
15	06:06	06:45	07:28	08:11	08:35 (67)	08:00	08:37
	21:51	21:10	20:09	19:07	17 08:52 (67)	17:14	16:57
16	06:07	06:46	07:30	08:13	08:36 (67)	08:01	08:38
	21:50	21:08	20:07	19:05	15 08:51 (67)	17:13	16:58
17	06:08	06:48	07:31	08:14	08:38 (67)	08:03	08:39
	21:50	21:06	20:04	19:03	14 08:52 (67)	17:12	16:58
18	06:09	06:49	07:32	08:16	08:40 (67)	08:04	08:40
	21:49	21:05	20:02	19:01	12 08:52 (67)	17:11	16:58
19	06:10	06:51	07:34	08:17	08:41 (67)	08:06	08:40
	21:48	21:03	20:00	18:57	10 08:51 (67)	17:09	16:58
20	06:11	06:52	07:35	08:19	08:43 (67)	08:07	08:41
	21:47	21:01	19:58	18:55	8 08:51 (67)	17:08	16:59
21	06:12	06:53	07:37	08:21	08:44 (67)	08:09	08:41
	21:46	20:59	19:56	18:53	5 08:49 (67)	17:07	7 08:55 (66)
22	06:13	06:55	07:38	08:22	08:46 (67)	08:10	08:42
	21:45	20:57	19:54	18:51	3 08:49 (67)	17:07	11 08:57 (66)
23	06:15	06:56	07:40	08:24	08:12	08:46 (66)	08:42
	21:44	20:55	19:52	18:49	17:06	13 08:59 (66)	17:00
24	06:16	06:58	07:41	08:25	08:13	08:46 (66)	08:43
	21:42	20:53	19:50	18:48	17:05	15 09:01 (66)	17:01
25	06:17	06:59	07:42	08:27	08:14	08:45 (66)	08:43
	21:41	20:51	19:48	18:46	17:04	16 09:01 (66)	17:01
26	06:18	07:00	07:44	08:28	08:16	08:45 (66)	08:44
	21:40	20:49	19:45	18:44	17:03	17 09:02 (66)	17:02
27	06:20	07:02	07:45	08:30	08:17	08:45 (66)	08:44
	21:39	20:48	19:43	18:42	17:02	18 09:03 (66)	17:03
28	06:21	07:03	07:47	08:31	08:19	08:47 (66)	08:44
	21:38	20:46	19:41	18:41	17:02	17 09:04 (66)	17:04
29	06:22	07:05	07:48	08:33	08:20	08:48 (66)	08:44
	21:36	20:44	19:39	18:39	17:01	16 09:04 (66)	17:04
30	06:23	07:06	07:49	08:35	08:21	08:49 (66)	08:45
	21:35	20:42	19:37	18:37	17:00	15 09:04 (66)	17:05
31	06:25	07:07		08:36			08:45
	21:34	20:40		18:36			09:17 (66)
Potential sun hours	486	445	379	336	277	260	
Total, worst case				124	145	190	
Sun reduction				0.52	0.43	0.44	
Oper. time red.				0.98	0.98	0.98	
Wind dir. red.				0.70	0.72	0.71	
Total reduction				0.36	0.31	0.31	
Total, real				45	44	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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:36 AM / 10

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 10:15 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V110 80m HH Realistic Flicker w/ Obstacles DNV Tab **Shadow receptor: I - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
660	333	352	411	608	961	789	574	695	904	1,116	1,191	8,594

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

	January	February	March	April	May	June
1 08:45	09:14 (104) 08:23	07:35		07:32	06:34	20:19 (13) 05:55
17:07	28 09:42 (104) 17:50	18:34		20:21	21:05	20 20:39 (13) 21:45
2 08:45	09:15 (104) 08:21	07:33		07:30	06:32	20:17 (13) 05:55
17:08	27 09:42 (104) 17:52	18:35		20:22	21:06	23 20:40 (13) 21:46
3 08:45	09:16 (104) 08:20	07:31		07:28	06:31	20:17 (13) 05:54
17:09	27 09:43 (104) 17:53	18:37		20:24	21:08	25 20:42 (13) 21:47
4 08:44	09:16 (104) 08:18	07:29		07:26	06:29	20:16 (13) 05:53
17:10	27 09:43 (104) 17:55	18:38		20:25	21:09	27 20:43 (13) 21:47
5 08:44	09:16 (104) 08:17	07:27		07:24	06:27	20:16 (13) 05:53
17:11	27 09:43 (104) 17:57	18:40		20:27	21:10	29 20:45 (13) 21:48
6 08:44	09:17 (104) 08:15	07:25		07:21	06:26	20:15 (13) 05:52
17:13	27 09:44 (104) 17:58	18:42		20:28	21:12	30 20:45 (13) 21:49
7 08:44	09:18 (104) 08:14	07:23		07:19	06:24	20:15 (13) 05:52
17:14	26 09:44 (104) 18:00	18:43		20:30	21:13	31 20:46 (13) 21:50
8 08:43	09:18 (104) 08:12	08:21		07:17	06:23	20:14 (13) 05:51
17:15	26 09:44 (104) 18:00	18:45		20:31	21:15	31 20:45 (13) 21:51
9 08:43	09:19 (104) 08:11	08:19		07:15	06:21	20:14 (13) 05:51
17:16	26 09:45 (104) 18:02	19:46		20:32	21:16	32 20:46 (13) 21:52
10 08:43	09:19 (104) 08:09	08:17	19:23 (12) 07:13		06:20	20:14 (13) 05:51
17:17	25 09:44 (104) 18:03	19:48	2 19:25 (12) 20:34		21:17	31 20:45 (13) 21:52
11 08:42	09:21 (104) 08:08	08:15	19:19 (12) 07:11		06:18	20:14 (13) 05:51
17:19	24 09:45 (104) 18:05	19:49	7 19:26 (12) 20:35		21:19	31 20:45 (13) 21:53
12 08:42	09:21 (104) 08:06	08:13	19:17 (12) 07:09		06:17	20:15 (13) 05:50
17:20	24 09:45 (104) 18:06	19:51	11 19:28 (12) 20:37		21:20	30 20:45 (13) 21:54
13 08:41	09:22 (104) 08:04	08:11	19:15 (12) 07:07		06:15	20:14 (13) 05:50
17:21	22 09:44 (104) 18:08	19:52	14 19:29 (12) 20:38		21:22	30 20:44 (13) 21:54
14 08:41	09:23 (104) 08:03	08:09	19:14 (12) 07:05		06:14	20:15 (13) 05:50
17:23	22 09:45 (104) 18:10	19:54	17 19:31 (12) 20:40		21:23	29 20:44 (13) 21:55
15 08:40	09:24 (104) 08:01	08:07	19:13 (12) 07:03		06:13	20:15 (13) 05:50
17:24	20 09:44 (104) 18:11	19:55	20 19:33 (12) 20:41		21:24	29 20:44 (13) 21:55
16 08:39	09:25 (104) 07:59	08:05	19:13 (12) 07:02		06:11	20:16 (13) 05:50
17:25	18 09:43 (104) 18:13	19:57	21 19:34 (12) 20:43		21:26	28 20:44 (13) 21:56
17 08:38	09:26 (104) 07:58	08:03	19:12 (12) 07:00		06:10	20:17 (13) 05:50
17:27	17 09:43 (104) 18:15	19:58	24 19:36 (12) 20:44		21:27	27 20:44 (13) 21:56
18 08:38	09:28 (104) 07:56	08:01	19:12 (12) 06:58		06:09	20:16 (13) 05:50
17:28	14 09:42 (104) 18:16	20:00	24 19:36 (12) 20:46		21:28	26 20:42 (13) 21:57
19 08:37	09:30 (104) 07:54	07:59	19:12 (12) 06:56		06:08	20:17 (13) 05:50
17:30	10 09:40 (104) 18:18	20:01	24 19:36 (12) 20:47		21:30	25 20:42 (13) 21:57
20 08:36	09:34 (104) 07:52	07:57	19:13 (12) 06:54		06:07	20:18 (13) 05:50
17:31	3 09:37 (104) 18:19	20:03	22 19:35 (12) 20:49		21:31	23 20:41 (13) 21:57
21 08:35	07:50	07:55	19:12 (12) 06:52		06:05	20:19 (13) 05:50
17:33	18:21	20:04	21 19:33 (12) 20:50		21:32	21 20:40 (13) 21:58
22 08:34	07:49	07:53	19:13 (12) 06:50		06:04	20:20 (13) 05:50
17:34	18:23	20:06	19 19:32 (12) 20:52		21:33	19 20:39 (13) 21:58
23 08:33	07:47	07:51	19:14 (12) 06:48		06:03	20:21 (13) 05:51
17:36	18:24	20:07	16 19:30 (12) 20:53		21:35	17 20:38 (13) 21:58
24 08:32	07:45	07:48	19:16 (12) 06:46		06:02	20:23 (13) 05:51
17:37	18:26	20:09	12 19:28 (12) 20:54		21:36	14 20:37 (13) 21:58
25 08:31	07:43	07:46	06:45		06:01	20:25 (13) 05:51
17:39	18:27	20:10	20:56		21:37	10 20:35 (13) 21:58
26 08:30	07:41	07:44	06:43		06:00	20:29 (13) 05:52
17:41	18:29	20:12	20:57		21:38	4 20:33 (13) 21:59
27 08:29	07:39	07:42	06:41	20:28 (13) 05:59		05:52
17:42	18:31	20:13	20:59	6 20:34 (13) 21:39		21:59
28 08:28	07:37	07:40	06:39	20:24 (13) 05:58		05:52
17:44	18:32	20:15	21:00	11 20:35 (13) 21:40		21:59
29 08:26	07:38	07:38	06:37	20:21 (13) 05:58		05:53
17:45	20:16	21:02	15 20:36 (13) 21:41			21:58
30 08:25	07:36	07:36	06:36	20:20 (13) 05:57		05:53
17:47	20:18	21:03	18 20:38 (13) 21:43			21:58
31 08:24	07:34	07:34	05:56			05:56
17:49	20:19	21:44				
Potential sun hours	273	285	368	410	471	481
Total, worst case	440		254	50	642	
Sun reduction	0.56		0.63	0.59	0.67	
Oper. time red.	0.98		0.98	0.98	0.98	
Wind dir. red.	0.71		0.64	0.70	0.70	
Total reduction	0.39		0.40	0.41	0.46	
Total, real	171		100	20	298	

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
Kevin Walter
Southlake Technology Park, 16105 W 113th St, Ste 1
Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:36 AM / 11

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
10/1/2015 10:15 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V110 80m HH Realistic Flicker w/ Obstacles DNV Tab **Shadow receptor: I - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
660	333	352	411	608	961	789	574	695	904	1,116	1,191	8,594

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

	July	August	September	October	November	December					
1	05:54	06:26	20:25 (13)	07:09	07:51	18:56 (12)	07:38	08:22	09:03 (104)		
	21:58	21:32	31 20:56 (13)	20:38	19:35	19:08 (12)	17:34	17:00	24 09:27 (104)		
2	05:55	06:27	20:25 (13)	07:10	07:52	18:57 (12)	07:39	08:24	09:03 (104)		
	21:58	21:31	31 20:56 (13)	20:36	19:33	19:06 (12)	17:32	16:59	24 09:27 (104)		
3	05:55	06:29	20:24 (13)	07:11	07:54	19:00 (12)	07:41	08:25	09:02 (104)		
	21:58	21:29	31 20:55 (13)	20:34	19:31	19:04 (12)	17:31	16:59	26 09:28 (104)		
4	05:56	06:30	20:24 (13)	07:13	07:55	07:42	07:42	08:26	09:03 (104)		
	21:57	21:28	31 20:55 (13)	20:31	19:29	17:29	17:29	16:58	26 09:29 (104)		
5	05:57	06:31	20:25 (13)	07:14	07:57	07:44	07:44	08:27	09:03 (104)		
	21:57	21:26	31 20:56 (13)	20:29	19:27	17:28	17:28	16:58	26 09:29 (104)		
6	05:57	06:33	20:24 (13)	07:16	07:58	07:45	07:45	08:29	09:03 (104)		
	21:57	21:25	31 20:55 (13)	20:27	19:25	17:26	17:26	16:58	27 09:30 (104)		
7	05:58	06:34	20:24 (13)	07:17	08:00	07:47	07:47	08:30	09:03 (104)		
	21:56	21:23	30 20:54 (13)	20:25	19:22	17:25	17:25	16:58	27 09:30 (104)		
8	05:59	06:35	20:25 (13)	07:18	08:01	07:49	07:49	08:31	09:04 (104)		
	21:56	21:22	29 20:54 (13)	20:23	19:20	17:23	17:23	16:57	26 09:30 (104)		
9	06:00	06:37	20:25 (13)	07:20	08:02	07:50	08:02	08:32	09:04 (104)		
	21:55	21:20	27 20:52 (13)	20:21	19:18	17:22	17:22	16:57	27 09:31 (104)		
10	06:01	06:38	20:26 (13)	07:21	08:04	07:52	08:04	08:33	09:04 (104)		
	21:55	21:18	24 20:50 (13)	20:19	19:16	17:20	17:20	16:57	27 09:31 (104)		
11	06:02	06:39	20:26 (13)	07:23	08:05	07:53	08:05	08:34	09:06 (104)		
	21:54	21:17	23 20:49 (13)	20:17	19:14	17:19	17:19	16:57	27 09:33 (104)		
12	06:03	06:41	20:28 (13)	07:24	08:07	07:55	08:07	08:35	09:05 (104)		
	21:53	21:15	20 20:48 (13)	20:15	19:12	17:18	17:18	16:57	27 09:32 (104)		
13	06:04	06:42	20:28 (13)	07:25	08:08	07:56	08:08	08:36	09:05 (104)		
	21:53	21:13	18 20:46 (13)	20:13	19:10	17:16	17:16	16:57	28 09:33 (104)		
14	06:05	06:44	20:29 (13)	07:27	08:10	07:58	08:10	08:37	09:06 (104)		
	21:52	21:12	15 20:44 (13)	20:11	19:08	17:15	17:15	16:57	27 09:33 (104)		
15	06:06	06:45	20:32 (13)	07:28	08:11	08:00	08:11	08:37	09:07 (104)		
	21:51	21:10	11 20:43 (13)	20:09	19:06	17:14	17:14	16:57	27 09:34 (104)		
16	06:07	06:46	20:36 (13)	07:30	08:13	08:01	08:13	08:38	09:07 (104)		
	21:50	21:08	4 20:40 (13)	20:06	19:04	17:13	17:13	16:57	28 09:35 (104)		
17	06:08	06:48	07:31	07:31	08:14	08:03	08:14	08:39	09:08 (104)		
	21:50	21:06	20:04	20:04	19:03	17:12	17:12	16:58	27 09:35 (104)		
18	06:09	20:35 (13)	06:49	07:32	08:16	08:04	08:16	08:40	09:08 (104)		
	21:49	8 20:43 (13)	21:04	20:02	19:01	17:10	17:10	16:58	27 09:35 (104)		
19	06:10	20:33 (13)	06:50	07:34	19:04 (12)	08:17	08:17	08:40	09:09 (104)		
	21:48	13 20:46 (13)	21:03	20:00	11 19:15 (12)	18:57	17:09	16:58	27 09:36 (104)		
20	06:11	20:33 (13)	06:52	07:35	19:01 (12)	08:19	08:07	08:41	09:09 (104)		
	21:47	15 20:48 (13)	21:01	19:58	15 19:16 (12)	18:55	17:08	16:59	27 09:36 (104)		
21	06:12	20:31 (13)	06:53	07:37	18:59 (12)	08:20	08:09	08:41	09:10 (104)		
	21:46	18 20:49 (13)	20:59	19:56	18 19:17 (12)	18:53	17:07	16:59	27 09:37 (104)		
22	06:13	20:30 (13)	06:55	07:38	18:58 (12)	08:22	08:10	09:10 (104)	08:42	09:10 (104)	
	21:45	20 20:50 (13)	20:57	19:54	20 19:18 (12)	18:51	17:06	3 09:13 (104)	17:00	27 09:37 (104)	
23	06:15	20:29 (13)	06:56	07:39	18:56 (12)	08:24	08:11	09:07 (104)	08:42	09:11 (104)	
	21:44	22 20:51 (13)	20:55	19:52	22 19:18 (12)	18:49	17:06	10 09:17 (104)	17:00	27 09:38 (104)	
24	06:16	20:28 (13)	06:57	07:41	18:56 (12)	08:25	08:13	09:06 (104)	08:43	09:11 (104)	
	21:42	24 20:52 (13)	20:53	19:50	23 19:19 (12)	18:48	17:05	14 09:20 (104)	17:01	27 09:38 (104)	
25	06:17	20:27 (13)	06:59	07:42	18:55 (12)	08:27	08:14	09:04 (104)	08:43	09:12 (104)	
	21:41	25 20:52 (13)	20:51	19:47	24 19:19 (12)	18:46	17:04	17 09:21 (104)	17:01	27 09:39 (104)	
26	06:18	20:27 (13)	07:00	07:44	18:54 (12)	08:28	08:16	09:04 (104)	08:44	09:12 (104)	
	21:40	26 20:53 (13)	20:49	19:45	24 19:18 (12)	18:44	17:03	18 09:22 (104)	17:02	27 09:39 (104)	
27	06:19	20:27 (13)	07:02	07:45	18:54 (12)	08:30	08:17	09:03 (104)	08:44	09:12 (104)	
	21:39	27 20:54 (13)	20:47	19:43	23 19:17 (12)	18:42	17:02	20 09:23 (104)	17:03	28 09:40 (104)	
28	06:21	20:26 (13)	07:03	07:47	18:54 (12)	08:31	08:18	09:03 (104)	08:44	09:13 (104)	
	21:38	29 20:55 (13)	20:46	19:41	20 19:14 (12)	18:41	17:02	22 09:25 (104)	17:04	27 09:40 (104)	
29	06:22	20:26 (13)	07:04	07:48	18:55 (12)	08:33	08:20	09:03 (104)	08:44	09:13 (104)	
	21:36	29 20:55 (13)	20:44	19:39	17 19:12 (12)	18:39	17:01	22 09:25 (104)	17:04	27 09:40 (104)	
30	06:23	20:25 (13)	07:06	07:49	18:55 (12)	08:34	08:21	09:02 (104)	08:44	09:13 (104)	
	21:35	30 20:55 (13)	20:42	19:37	15 19:10 (12)	18:37	17:00	24 09:26 (104)	17:05	28 09:41 (104)	
31	06:25	20:24 (13)	07:07	07:50	18:56 (12)	08:35	08:22	09:03 (104)	08:45	09:14 (104)	
	21:34	31 20:55 (13)	20:40	18:35	08:36	17:06	17:06	27 09:41 (104)			
Potential sun hours	486	445	379	336	277	260					
Total, worst case	317	387	232	25	150	831					
Sun reduction	0.75	0.72	0.69	0.52	0.43	0.44					
Oper. time red.	0.98	0.98	0.98	0.98	0.98	0.98					
Wind dir. red.	0.70	0.70	0.64	0.64	0.71	0.71					
Total reduction	0.52	0.50	0.43	0.33	0.30	0.31					
Total, real	163	193	100	8	45	254					

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:36 AM / 12

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 10:15 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V110 80m HH Realistic Flicker w/ Obstacles DNV Tab **Shadow receptor: J - Participating**

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [BISMARCK]
 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 4.92 5.13 7.45 8.03 10.20 11.21 11.69 10.35 8.68 5.69 4.02 3.69

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
 660 333 352 411 608 961 789 574 695 904 1,116 1,191 8,594
 Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	08:45	08:23	07:35	07:32	06:34	20:08 (13) 05:55
	17:07	17:50	18:34	20:21	21:05	30 20:38 (13) 21:45
2	08:45	08:21	07:33	07:30	06:32	20:07 (13) 05:55
	17:08	17:52	18:35	20:22	21:06	30 20:37 (13) 21:46
3	08:45	08:20	07:31	07:28	06:31	20:08 (13) 05:54
	17:09	17:53	18:37	20:24	21:08	30 20:38 (13) 21:47
4	08:44	08:18	07:29	07:26	06:29	20:07 (13) 05:53
	17:10	17:55	18:38	20:25	21:09	30 20:37 (13) 21:47
5	08:44	08:17	07:27	07:24	06:27	20:08 (13) 05:53
	17:11	17:57	18:40	20:27	21:10	29 20:37 (13) 21:48
6	08:44	08:15	07:25	07:21	06:26	20:08 (13) 05:52
	17:13	17:58	18:42	20:28	21:12	28 20:36 (13) 21:49
7	08:44	08:14	07:23	07:19	06:24	20:08 (13) 05:52
	17:14	18:00	18:43	20:30	21:13	28 20:36 (13) 21:50
8	08:43	08:12	08:21	19:20 (12) 07:17	06:23	20:08 (13) 05:51
	17:15	18:00	18:45	2 19:22 (12) 20:31	21:15	27 20:35 (13) 21:51
9	08:43	08:11	08:19	19:16 (12) 07:15	06:21	20:09 (13) 05:51
	17:16	18:02	19:46	7 19:23 (12) 20:32	21:16	26 20:35 (13) 21:52
10	08:43	08:09	08:17	19:14 (12) 07:13	06:20	20:09 (13) 05:51
	17:17	18:03	19:48	11 19:25 (12) 20:34	21:17	25 20:34 (13) 21:52
11	08:42	08:08	08:15	19:12 (12) 07:11	06:18	20:11 (13) 05:51
	17:19	18:05	19:49	14 19:26 (12) 20:35	21:19	22 20:33 (13) 21:53
12	08:42	08:06	08:13	19:11 (12) 07:09	06:17	20:12 (13) 05:50
	17:20	18:06	19:51	17 19:28 (12) 20:37	21:20	20 20:32 (13) 21:54
13	08:41	08:04	08:11	19:11 (12) 07:07	06:15	20:12 (13) 05:50
	17:21	18:08	19:52	18 19:29 (12) 20:38	21:22	18 20:30 (13) 21:54
14	08:41	08:03	08:09	19:10 (12) 07:05	06:14	20:14 (13) 05:50
	17:23	18:10	19:54	21 19:31 (12) 20:40	21:23	15 20:29 (13) 21:55
15	08:40	08:01	08:07	19:10 (12) 07:03	06:13	20:16 (13) 05:50
	17:24	18:11	19:55	23 19:33 (12) 20:41	21:24	11 20:27 (13) 21:55
16	08:39	07:59	08:05	19:10 (12) 07:01	06:11	20:20 (13) 05:50
	17:25	18:13	19:57	23 19:33 (12) 20:43	21:26	4 20:24 (13) 21:56
17	08:38	07:58	08:03	19:10 (12) 07:00	06:10	20:20 (13) 05:50
	17:27	18:15	19:58	22 19:32 (12) 20:44	21:27	21:56
18	08:38	07:56	08:01	19:11 (12) 06:58	06:09	20:20 (13) 05:50
	17:28	18:16	20:00	20 19:31 (12) 20:46	21:28	21:57
19	08:37	07:54	07:59	19:11 (12) 06:56	06:08	20:20 (13) 05:50
	17:30	18:18	20:01	19 19:30 (12) 20:47	21:30	21:57
20	08:36	07:52	07:57	19:12 (12) 06:54	06:07	20:20 (13) 05:50
	17:31	18:19	20:03	17 19:29 (12) 20:49	21:31	21:57
21	08:35	07:50	07:55	19:13 (12) 06:52	06:05	20:20 (13) 05:50
	17:33	18:21	20:04	13 19:26 (12) 20:50	21:32	21:58
22	08:34	07:49	07:53	19:17 (12) 06:50	20:18 (13) 06:04	20:20 (13) 05:50
	17:34	18:23	20:06	5 19:22 (12) 20:52	9 20:27 (13) 21:33	21:58
23	08:33	07:47	07:50	06:48	20:16 (13) 06:03	20:20 (13) 05:51
	17:36	18:24	20:07	20:53	13 20:29 (13) 21:35	21:58
24	08:32	07:45	07:48	06:46	20:14 (13) 06:02	20:20 (13) 05:51
	17:37	18:26	20:09	20:54	16 20:30 (13) 21:36	21:58
25	08:31	07:43	07:46	06:45	20:12 (13) 06:01	20:20 (13) 05:51
	17:39	18:27	20:10	20:56	19 20:31 (13) 21:37	21:58
26	08:30	07:41	07:44	06:43	20:11 (13) 06:00	20:20 (13) 05:52
	17:41	18:29	20:12	20:57	21 20:32 (13) 21:38	21:59
27	08:29	07:39	07:42	06:41	20:10 (13) 05:59	20:20 (13) 05:52
	17:42	18:31	20:13	20:59	24 20:34 (13) 21:39	21:59
28	08:28	07:37	07:40	06:39	20:09 (13) 05:58	20:20 (13) 05:52
	17:44	18:32	20:15	21:00	26 20:35 (13) 21:40	21:59
29	08:26		07:38	06:37	20:08 (13) 05:58	20:20 (13) 05:53
	17:45		20:16	21:02	28 20:36 (13) 21:41	21:58
30	08:25		07:36	06:36	20:09 (13) 05:57	20:20 (13) 05:53
	17:47		20:18	21:03	29 20:38 (13) 21:43	21:58
31	08:24		07:34			05:56
	17:49		20:19			21:44
Potential sun hours	273	285	368	410	471	481
Total, worst case			232	185	373	
Sun reduction			0.63	0.59	0.67	
Oper. time red.			0.98	0.98	0.98	
Wind dir. red.			0.63	0.70	0.70	
Total reduction			0.39	0.40	0.46	
Total, real			91	74	171	

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:36 AM / 13

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 10:15 PM/2.9.285

SHADOW - Calendar

Calculation: A059 V110 80m HH Realistic Flicker w/ Obstacles DNV Tab **Shadow receptor: J - Participating**

Assumptions for shadow calculations

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

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

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
660	333	352	411	608	961	789	574	695	904	1,116	1,191	8,594

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

	July	August	September	October	November	December	
1	05:54	06:26	20:22 (13)	07:09	07:51	18:51 (12) 07:38 08:22	
	21:58	21:32	21	20:43 (13) 20:38	19:35	17 19:08 (12) 17:34 17:00	
2	05:55	06:27	20:21 (13)	07:10	07:52	18:51 (12) 07:39 08:24	
	21:58	21:31	23	20:44 (13) 20:36	19:33	15 19:06 (12) 17:32 16:59	
3	05:55	06:29	20:20 (13)	07:11	07:54	18:52 (12) 07:41 08:25	
	21:58	21:29	24	20:44 (13) 20:33	19:31	12 19:04 (12) 17:31 16:59	
4	05:56	06:30	20:18 (13)	07:13	07:55	18:53 (12) 07:42 08:26	
	21:57	21:28	27	20:45 (13) 20:31	19:29	9 19:02 (12) 17:29 16:58	
5	05:57	06:31	20:19 (13)	07:14	07:57	18:54 (12) 07:44 08:27	
	21:57	21:26	27	20:46 (13) 20:29	19:27	5 18:59 (12) 17:28 16:58	
6	05:57	06:33	20:18 (13)	07:16	07:58	07:45 08:29	
	21:57	21:25	28	20:46 (13) 20:27	19:25	17:26 16:58	
7	05:58	06:34	20:17 (13)	07:17	08:00	07:47 08:30	
	21:56	21:23	29	20:46 (13) 20:25	19:22	17:25 16:58	
8	05:59	06:35	20:17 (13)	07:18	08:01	07:49 08:31	
	21:56	21:22	30	20:47 (13) 20:23	19:20	17:23 16:57	
9	06:00	06:37	20:17 (13)	07:20	08:02	07:50 08:32	
	21:55	21:20	30	20:47 (13) 20:21	19:18	17:22 16:57	
10	06:01	06:38	20:16 (13)	07:21	08:04	07:52 08:33	
	21:55	21:18	30	20:46 (13) 20:19	19:16	17:20 16:57	
11	06:02	06:39	20:16 (13)	07:23	08:05	07:53 08:34	
	21:54	21:17	30	20:46 (13) 20:17	19:14	17:19 16:57	
12	06:03	06:41	20:16 (13)	07:24	08:07	07:55 08:35	
	21:53	21:15	30	20:46 (13) 20:15	19:12	17:18 16:57	
13	06:04	06:42	20:16 (13)	07:25	08:08	07:56 08:36	
	21:53	21:13	29	20:45 (13) 20:13	19:10	17:16 16:57	
14	06:05	06:44	20:16 (13)	07:27	08:10	07:58 08:37	
	21:52	21:12	28	20:44 (13) 20:11	19:08	17:15 16:57	
15	06:06	06:45	20:17 (13)	07:28	08:11	08:00 08:37	
	21:51	21:10	26	20:43 (13) 20:09	19:06	17:14 16:57	
16	06:07	06:46	20:17 (13)	07:30	08:13	08:01 08:38	
	21:50	21:08	24	20:41 (13) 20:06	19:04	17:13 16:57	
17	06:08	06:48	20:18 (13)	07:31	08:14	08:03 08:39	
	21:50	21:06	21	20:39 (13) 20:04	19:03	17:12 16:58	
18	06:09	06:49	20:19 (13)	07:32	08:16	08:04 08:40	
	21:49	21:04	19	20:38 (13) 20:02	19:01	17:10 16:58	
19	06:10	06:50	20:20 (13)	07:34	08:17	08:06 08:40	
	21:48	21:03	16	20:36 (13) 20:00	18:57	17:09 16:58	
20	06:11	06:52	20:21 (13)	07:35	08:19	08:07 08:41	
	21:47	21:01	12	20:33 (13) 19:58	18:55	17:08 16:59	
21	06:12	06:53	20:24 (13)	07:37	08:20	08:09 08:41	
	21:46	20:59	8	20:32 (13) 19:56	18:53	17:07 16:59	
22	06:13	06:55	07:38	18:59 (12)	08:22	08:10 08:42	
	21:45	20:57	19:54	11	19:10 (12) 18:51	17:06 17:00	
23	06:15	06:56	07:39	18:57 (12)	08:24	08:11 08:42	
	21:44	20:55	19:52	15	19:12 (12) 18:49	17:06 17:00	
24	06:16	06:57	07:41	18:55 (12)	08:25	08:13 08:43	
	21:42	20:53	19:50	18	19:13 (12) 18:48	17:05 17:01	
25	06:17	06:59	07:42	18:53 (12)	08:27	08:14 08:43	
	21:41	20:51	19:47	21	19:14 (12) 18:46	17:04 17:01	
26	06:18	07:00	07:44	18:52 (12)	08:28	08:16 08:44	
	21:40	20:49	19:45	22	19:14 (12) 18:44	17:03 17:02	
27	06:19	07:02	07:45	18:52 (12)	08:30	08:17 08:44	
	21:39	20:47	19:43	22	19:14 (12) 18:42	17:02 17:03	
28	06:21	20:29 (13)	07:47	18:51 (12)	08:31	08:18 08:44	
	21:38	8	20:37 (13)	19:41	23	19:14 (12) 18:41	17:02 17:04
29	06:22	20:26 (13)	07:48	18:51 (12)	08:33	08:20 08:44	
	21:36	13	20:39 (13)	19:39	21	19:12 (12) 18:39	17:01 17:04
30	06:23	20:24 (13)	07:49	18:50 (12)	08:34	08:21 08:44	
	21:35	16	20:40 (13)	19:37	20	19:10 (12) 18:37	17:00 17:05
31	06:25	20:22 (13)	07:49	18:50 (12)	08:34	08:21 08:44	
	21:34	19	20:41 (13)	20:40	18:35	17:06 17:06	
Potential sun hours	486	445	379	336	277	260	
Total, worst case	56	512	173	58			
Sun reduction	0.75	0.72	0.69	0.52			
Oper. time red.	0.98	0.98	0.98	0.98			
Wind dir. red.	0.70	0.70	0.63	0.63			
Total reduction	0.51	0.49	0.43	0.33			
Total, real	28	252	74	19			

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:

20132550- Lindahl Wind Farm

TradeWind Energy, Inc.
 Kevin Walter
 Southlake Technology Park, 16105 W 113th St, Ste 1
 Lenexa, KS, 66219

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

Printed/Page

10/2/2015 10:36 AM / 14

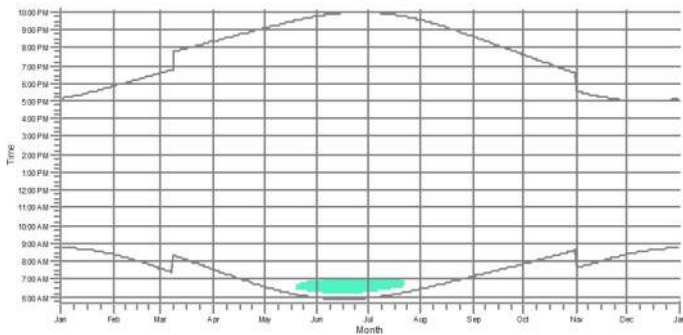
Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 10/1/2015 10:15 PM/2.9.285

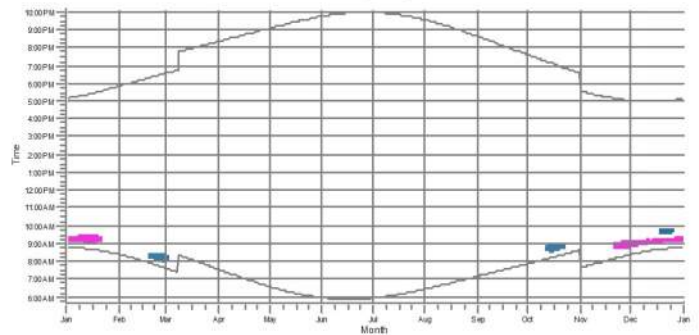
SHADOW - Calendar, graphical

Calculation: A059 V110 80m HH Realistic Flicker w/ Obstacles DNV Tab

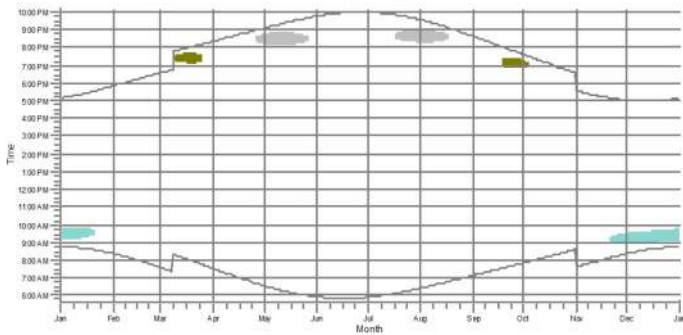
A: Participating



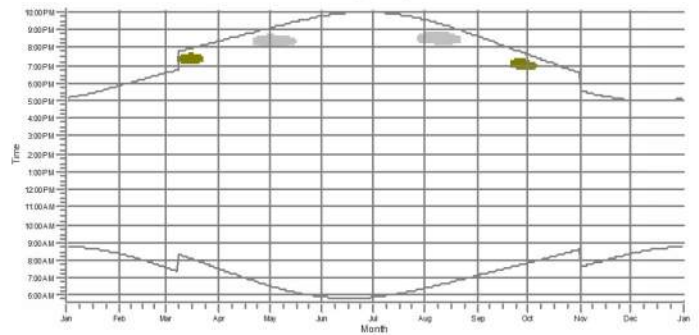
B: Participating



I: Participating



J: Participating



WTGs

- 12: up to V110
- 13: up to V110
- 311: up to V110
- 66: up to V110
- 67: up to V110
- 104: up to V110
- 42: up to V110