Project:
WP A15-Lingewaard

Licensed user:
Solidwinds
A: Toernooiveld 200
NL-6525 EC Nijmegen
+31 (0)6 832 17 832
Dominique Deen / dominique.deen@solidwinds.com
Calculated:
13-12-2017 11:10/3.1.617

SHADOW - Main Result

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR, NO MITIGATION)

Assumptions for shadow calculations

Maximum distance for influence
Calculate only when more than 20 % of sun is covered by the blade
Please look in WTG table

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) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,80	2,50	4,10	5,50	6,70	7,20	6,50	5,90	4,80	3,20	1,80	1,40

Operational hours are calculated from WTGs in calculation and wind distribution:
WAsP object (LT)

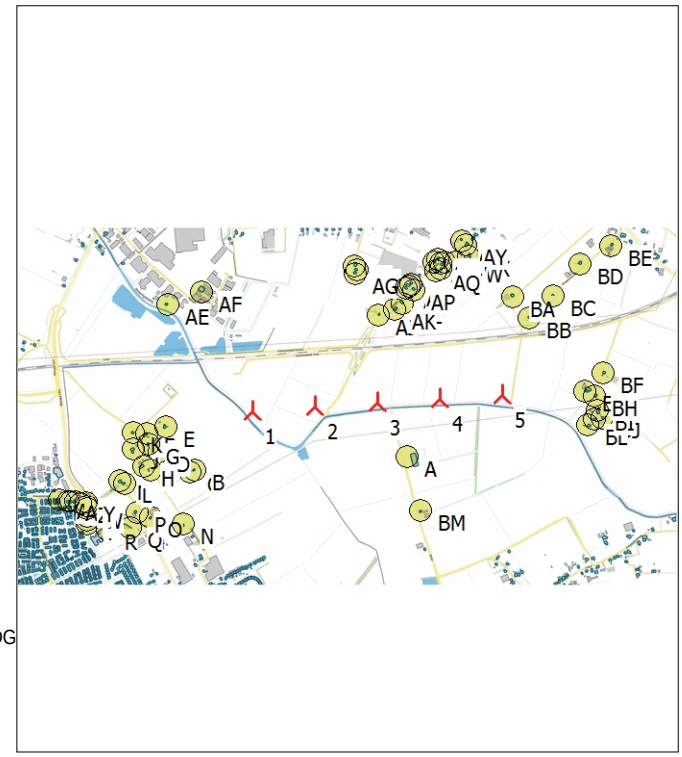
Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
393	430	818	642	394	394	717	1.321	1.489	903	589	370	8.459

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: Elevation Grid Data Object: WP A15-Lingewaard_EMDG
Obstacles used in calculation
Eye height: 1,5 m
Grid resolution: 10,0 m

All coordinates are in
Dutch Stereo-RD/NAP 2000



Scale 1:50.000
New WTG
Shadow receptor

WTGs

	X (east)	Y (north)	Z [m]	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Shadow data Calculation distance [m]	RPM [RPM]
1	192.319	434.749	10,0	WT1	No	VESTAS	V150-4.20 (SW)-4.000	4.000	150,0	166,0	1.812	11,7
2	192.733	434.778	8,0	WT2	No	VESTAS	V150-4.20 (SW)-4.000	4.000	150,0	166,0	1.812	11,7
3	193.147	434.804	7,3	WT3	No	VESTAS	V150-4.20 (SW)-4.000	4.000	150,0	166,0	1.812	11,7
4	193.561	434.831	6,5	WT4	No	VESTAS	V150-4.20 (SW)-4.000	4.000	150,0	166,0	1.812	11,7
5	193.975	434.858	7,7	WT5	No	VESTAS	V150-4.20 (SW)-4.000	4.000	150,0	166,0	1.812	11,7

Shadow receptor-Input

No.	X (east)	Y (north)	Z [m]	Width [m]	Height [m]	Height a.g.l. [m]	Degrees from south cw [°]	Slope of window [°]	Direction mode
A	193.340	434.448	9,7	4,0	4,0	1,0	0,0	90,0	"Green house mode"
B	191.934	434.359	9,9	4,0	4,0	1,0	0,0	90,0	"Green house mode"
C	191.903	434.345	10,0	4,0	4,0	1,0	0,0	90,0	"Green house mode"
D	191.698	434.481	10,7	4,0	4,0	1,0	0,0	90,0	"Green house mode"
E	191.742	434.648	10,2	4,0	4,0	1,0	0,0	90,0	"Green house mode"
F	191.617	434.598	10,2	4,0	4,0	1,0	0,0	90,0	"Green house mode"
G	191.629	434.528	10,0	4,0	4,0	1,0	0,0	90,0	"Green house mode"
H	191.593	434.381	10,7	4,0	4,0	1,0	0,0	90,0	"Green house mode"
I	191.640	434.355	9,7	4,0	4,0	1,0	0,0	90,0	"Green house mode"
J	191.529	434.496	11,0	4,0	4,0	1,0	0,0	90,0	"Green house mode"
K	191.525	434.604	9,9	4,0	4,0	1,0	0,0	90,0	"Green house mode"
L	191.470	434.268	9,9	4,0	4,0	1,0	0,0	90,0	"Green house mode"
M	191.438	434.287	9,6	4,0	4,0	1,0	0,0	90,0	"Green house mode"
N	191.857	433.988	9,6	4,0	4,0	1,0	0,0	90,0	"Green house mode"
O	191.642	434.033	10,1	4,0	4,0	1,0	0,0	90,0	"Green house mode"
P	191.549	434.067	10,1	4,0	4,0	1,0	0,0	90,0	"Green house mode"
Q	191.509	433.967	10,1	4,0	4,0	1,0	0,0	90,0	"Green house mode"
R	191.352	433.953	10,1	4,0	4,0	1,0	0,0	90,0	"Green house mode"

To be continued on next page...

Licensed user:
Solidwinds
A: Toernooiveld 200
NL-6525 EC Nijmegen
+31 (0)6 832 17 832
Dominique Deen / dominique.deen@solidwinds.com
Calculated:
13-12-2017 11:10/3.1.617

SHADOW - Main Result

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR, NO MITIGATION)

...continued from previous page

No.	X (east)	Y (north)	Z [m]	Width [m]	Height [m]	Height a.g.l. [m]	Degrees from south cw [°]	Slope of window [°]	Direction mode
S	191.221	433.987	9,9	4,0	4,0	1,0	0,0	90,0	"Green house mode"
T	191.218	434.014	10,1	4,0	4,0	1,0	0,0	90,0	"Green house mode"
U	191.217	434.041	10,1	4,0	4,0	1,0	0,0	90,0	"Green house mode"
V	191.216	434.063	10,1	4,0	4,0	1,0	0,0	90,0	"Green house mode"
W	191.217	434.090	9,4	4,0	4,0	1,0	0,0	90,0	"Green house mode"
X	191.213	434.112	9,9	4,0	4,0	1,0	0,0	90,0	"Green house mode"
Y	191.214	434.140	9,9	4,0	4,0	1,0	0,0	90,0	"Green house mode"
Z	191.177	434.130	9,8	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AA	191.141	434.143	10,2	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AB	191.113	434.143	10,1	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AC	191.090	434.146	10,1	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AD	191.033	434.155	9,9	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AE	191.756	435.463	9,7	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AF	191.983	435.542	10,1	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AG	192.999	435.668	9,9	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AH	193.013	435.690	9,8	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AI	192.996	435.719	9,8	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AJ	193.155	435.391	9,9	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AK	193.259	435.427	10,0	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AL	193.310	435.469	9,7	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AM	193.337	435.568	9,8	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AN	193.357	435.585	9,8	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AO	193.371	435.598	9,6	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AP	193.387	435.558	9,6	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AQ	193.536	435.685	9,6	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AR	193.524	435.742	10,2	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AS	193.549	435.766	10,2	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AT	193.566	435.698	10,0	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AU	193.571	435.736	9,8	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AV	193.591	435.746	9,8	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AW	193.667	435.744	10,2	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AX	193.751	435.785	10,2	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AY	193.736	435.858	10,6	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AZ	193.706	435.887	10,9	4,0	4,0	1,0	0,0	90,0	"Green house mode"
BA	194.043	435.512	10,2	4,0	4,0	1,0	0,0	90,0	"Green house mode"
BB	194.150	435.373	10,2	4,0	4,0	1,0	0,0	90,0	"Green house mode"
BC	194.311	435.517	10,2	4,0	4,0	1,0	0,0	90,0	"Green house mode"
BD	194.491	435.729	11,2	4,0	4,0	1,0	0,0	90,0	"Green house mode"
BE	194.697	435.856	10,7	4,0	4,0	1,0	0,0	90,0	"Green house mode"
BF	194.642	435.006	10,3	4,0	4,0	1,0	0,0	90,0	"Green house mode"
BG	194.521	434.886	10,2	4,0	4,0	1,0	0,0	90,0	"Green house mode"
BH	194.586	434.854	10,2	4,0	4,0	1,0	0,0	90,0	"Green house mode"
BI	194.601	434.752	10,3	4,0	4,0	1,0	0,0	90,0	"Green house mode"
BJ	194.637	434.703	10,1	4,0	4,0	1,0	0,0	90,0	"Green house mode"
BK	194.583	434.695	10,1	4,0	4,0	1,0	0,0	90,0	"Green house mode"
BL	194.542	434.658	10,6	4,0	4,0	1,0	0,0	90,0	"Green house mode"
BM	193.431	434.081	10,3	4,0	4,0	1,0	0,0	90,0	"Green house mode"

Calculation Results

Shadow receptor

No.	Shadow, expected values Shadow hours per year [h/year]
A	11:26
B	18:41
C	18:28
D	25:09
E	31:50
F	20:26
G	26:23
H	20:06
I	16:19

To be continued on next page...

Licensed user:
Solidwinds
A: Toernooiveld 200
NL-6525 EC Nijmegen
+31 (0)6 832 17 832
Dominique Deen / dominique.deen@solidwinds.com
Calculated:
13-12-2017 11:10/3.1.617

SHADOW - Main Result

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR, NO MITIGATION)

...continued from previous page

Shadow, expected values

No.	Shadow hours per year [h/year]
J	21:47
K	13:15
L	15:57
M	17:28
N	5:31
O	7:35
P	10:23
Q	4:05
R	6:36
S	7:08
T	7:58
U	9:01
V	9:55
W	10:54
X	11:42
Y	12:34
Z	12:30
AA	12:37
AB	12:15
AC	11:49
AD	9:05
AE	9:18
AF	10:26
AG	14:45
AH	13:20
AI	11:05
AJ	37:26
AK	34:22
AL	30:31
AM	23:39
AN	22:42
AO	21:52
AP	24:43
AQ	15:38
AR	11:39
AS	10:33
AT	14:28
AU	12:00
AV	11:29
AW	10:49
AX	8:27
AY	7:10
AZ	6:20
BA	22:19
BB	27:43
BC	18:03
BD	10:01
BE	6:25
BF	12:50
BG	22:01
BH	18:10
BI	25:36
BJ	24:54
BK	27:28
BL	25:43
BM	4:20

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	WT1	447:16	95:43
2	WT2	391:49	77:39

To be continued on next page...

Licensed user:
Solidwinds
A: Toernooiveld 200
NL-6525 EC Nijmegen
+31 (0)6 832 17 832
Dominique Deen / dominique.deen@solidwinds.com
Calculated:
13-12-2017 11:10/3.1.617

SHADOW - Main Result

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR, NO MITIGATION)

...continued from previous page

No.	Name	Worst case [h/year]	Expected [h/year]
3	WT3	424:46	74:48
4	WT4	428:06	63:57
5	WT5	686:18	115:02

Total times in Receptor wise and WTG wise tables can differ, as a WTG can lead to flicker at 2 or more receptors simultaneously and/or receptors may receive flicker from 2 or more WTGs simultaneously.

Project:
WP A15-Lingewaard

Licensed user:
Solidwinds
A: Toernooiveld 200
NL-6525 EC Nijmegen
+31 (0)6 832 17 832
Dominique Deen / dominique.deen@solidwinds.com
Calculated:
13-12-2017 11:10/3.1.617

SHADOW - Calendar per WTG

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR, NO MITIGATION)WTG: 1 - WT1

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,80	2,50	4,10	5,50	6,70	7,20	6,50	5,90	4,80	3,20	1,80	1,40

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
393	430	818	642	394	394	717	1.321	1.489	903	589	370	8.459

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

	January	February	March	April	May	June
1	08:45 14:57-15:35/38 09:43-10:14/31	08:18 16:12-16:50/38	07:25	07:14	06:09 06:54-08:11/77	05:24 20:49-21:08/19
	16:36 10:40-11:22/42	17:24 09:52-10:25/33	18:15	20:09	21:00 19:51-20:20/29	21:46 05:59-08:06/127
2	08:45 14:57-15:36/39 09:43-10:15/32	08:16 16:12-16:50/38	07:22	07:12	06:07 06:52-08:11/79	05:23 20:49-21:09/20
	16:37 10:41-11:23/42	17:25 09:53-10:24/31	18:17	20:11	21:02 19:49-20:20/31	21:47 05:58-08:06/128
3	08:44 14:57-15:35/38 09:43-10:16/33	08:15 16:12-16:51/39	07:20	07:09	06:05 06:50-08:11/81	05:22 20:48-21:09/21
	16:38 10:41-11:22/41	17:27 09:55-10:23/28	18:19	20:12	21:03 19:49-20:20/31	21:48 05:57-08:05/128
4	08:44 14:58-15:36/38 09:43-10:17/34	08:13 16:12-16:51/39	07:18	07:07	06:04 06:48-08:11/83	05:22 20:48-21:10/22
	16:39 10:41-11:23/42	17:29 09:57-10:22/25	18:20	20:14	21:05 19:48-20:20/32	21:49 05:57-08:05/128
5	08:44 14:59-15:37/38 09:44-10:18/34	08:11 16:11-16:51/40	07:16	07:05	06:02 06:48-08:12/84	05:21 20:48-21:11/23
	16:40 10:43-11:24/41	17:31 09:58-10:20/22	18:22	20:16	21:07 19:47-20:20/33	21:50 05:56-08:05/129
6	08:44 14:59-15:37/38 09:43-10:18/35	08:10 16:11-16:50/39	07:14	07:03	06:00 06:47-08:12/85	05:20 20:47-21:11/24
	16:41 10:43-11:23/40	17:33 10:00-10:17/17	18:24	20:18	21:08 19:47-20:21/34	21:51 05:56-08:05/129
7	08:43 15:00-15:38/38 09:44-10:19/35	08:08 16:10-16:50/40	07:11	07:00	05:58 06:45-08:11/86	05:20 20:47-21:12/25
	16:43 10:44-11:24/40	17:35 10:04-10:13/9	18:26	20:19	21:10 19:47-20:21/34	21:52 05:55-08:04/129
8	08:43 15:00-15:38/38 09:44-10:20/36	08:06 16:11-16:51/40	07:09	06:58	05:56 06:27-06:34/7 19:46-20:21/35	05:19 20:48-21:13/25
	16:44 10:44-11:24/40	17:36	18:28	20:21	21:11 06:45-08:12/87	21:53 05:55-08:04/129
9	08:42 15:00-15:38/38 09:43-10:20/37	08:05 16:11-16:51/40	07:07	06:56	05:55 06:24-06:36/12 19:47-20:21/34	05:19 20:47-21:12/25
	16:45 10:44-11:23/39	17:38	18:29	20:23	21:13 06:44-08:12/88	21:53 05:54-08:03/129
10	08:42 15:01-15:39/38 09:44-10:21/37	08:03 16:11-16:51/40	07:05	06:54	05:53 06:21-06:37/16 19:46-20:21/35	05:18 20:47-21:13/26
	16:47 10:46-11:24/38	17:40	18:31	20:24	21:15 06:43-08:11/88	21:54 05:54-08:04/130
11	08:41 15:02-15:39/37 09:44-10:22/38	08:01 16:11-16:51/40	07:02	06:51	05:51 06:21-06:39/18 19:47-20:21/34	05:18 20:47-21:14/27
	16:48 10:46-11:24/38	17:42	18:33	20:26	21:16 06:44-08:12/88	21:55 05:54-08:04/130
12	08:41 15:02-15:40/38 09:44-10:22/38	07:59 16:11-16:51/40	07:00	06:49	05:50 06:19-06:39/20 19:47-20:20/33	05:18 20:47-21:13/26
	16:50 10:47-11:24/37	17:44	18:35	20:28	21:18 06:43-08:11/88	21:56 05:53-08:03/130
13	08:40 15:03-15:40/37 09:44-10:23/39	07:57 16:11-16:51/40	06:58	06:47	05:48 06:18-06:41/23 19:48-20:21/33	05:17 20:47-21:14/27
	16:51 10:48-11:23/35	17:46	18:36	20:29	21:19 06:43-08:12/89	21:56 05:53-08:03/130
14	08:39 15:04-15:40/36 09:44-10:23/39	07:55 16:12-16:51/39	06:55	06:45	05:46 06:16-06:41/25 19:47-20:20/33	05:17 20:47-21:14/27
	16:53 10:49-11:23/34	17:48	18:38	20:31	21:21 06:42-08:11/89	21:57 05:52-08:03/131
15	08:38 15:04-15:40/36 09:44-10:24/40	07:53 16:12-16:50/38	06:53	06:42 07:29-07:37/8	05:45 06:16-08:11/115	05:17 20:47-21:15/28
	16:54 10:50-11:22/32	17:50	18:40	20:33	21:23 19:48-20:20/32	21:58 05:52-08:03/131
16	08:37 15:05-15:40/35 09:44-10:25/41	07:51 16:13-16:49/36	06:51	06:40 07:25-07:42/17	05:43 06:15-08:11/116	05:17 20:48-21:15/27
	16:56 10:51-11:22/31	17:51	18:42	20:35	21:24 19:48-20:19/31	21:58 05:52-08:03/131
17	08:37 16:21-16:24/3 10:52-11:21/29	07:49 16:14-16:49/35	06:49	06:38 07:22-07:44/22	05:42 06:13-08:10/117	05:17 20:48-21:15/27
	16:57 15:06-15:40/34 09:45-10:25/40	17:53	18:43	20:36	21:26 19:49-20:18/29	21:59 05:52-08:03/131
18	08:36 16:18-16:26/8 10:54-11:21/27	07:47 16:15-16:47/32	06:46	06:36 07:19-07:50/31	05:40 06:12-08:11/119	05:17 20:48-21:16/28
	16:59 15:08-15:40/32 09:45-10:26/41	17:55	18:45	20:38	21:27 19:50-20:18/28	21:59 05:52-08:03/131
19	08:35 16:17-16:28/11 10:55-11:20/25	07:45 16:17-16:46/29	06:44	06:34 07:18-07:55/37	05:39 06:12-08:11/119	05:17 20:48-21:16/28
	17:01 15:09-15:40/31 09:45-10:26/41	17:57	18:47	20:40	21:29 19:51-20:18/27	21:59 05:52-08:03/131
20	08:34 16:16-16:30/14 10:58-11:19/21	07:43 16:19-16:44/25	06:42	06:32 07:16-07:58/42	05:37 06:10-08:10/120	05:17 20:48-21:16/28
	17:02 15:11-15:40/29 09:46-10:27/41	17:59	18:49	20:41	21:30 19:51-20:16/25	22:00 05:52-08:03/131
21	08:33 16:15-16:31/16 10:59-11:16/17	07:41 16:21-16:40/19	06:39	06:29 07:15-08:01/46	05:36 06:09-08:09/120	05:17 20:48-21:16/28
	17:04 15:12-15:39/27 09:46-10:26/40	18:01	18:50	20:43	21:31 19:52-20:16/24	22:00 05:52-08:03/131
22	08:31 16:14-16:34/20 11:03-11:13/10	07:39	06:37	06:27 07:13-08:02/49	05:35 06:08-08:09/121	05:17 20:49-21:17/28
	17:06 15:14-15:39/25 09:46-10:27/41	18:02	18:52	20:45	21:33 19:54-20:15/21	22:00 05:53-08:04/131
23	08:30 16:14-16:36/22 09:47-10:28/41	07:37	06:35	06:25 07:12-08:04/52	05:34 06:08-08:09/121	05:17 20:49-21:17/28
	17:07 15:16-15:39/23	18:04	18:54	20:46	21:34 19:55-20:14/19	22:00 05:53-08:04/131
24	08:29 16:13-16:37/24 09:47-10:27/40	07:35	06:32	06:23 07:11-08:05/54	05:32 06:06-08:09/123	05:18 20:49-21:17/28
	17:09 15:17-15:37/20	18:06	18:55	20:48	21:36 19:56-20:13/17	22:00 05:53-08:04/131
25	08:28 16:13-16:39/26 09:48-10:27/39	07:33	06:30	06:21 07:11-08:06/55	05:31 06:05-08:09/124	05:18 20:50-21:17/27
	17:11 15:19-15:37/18	18:08	18:57	20:50 20:02-20:09/7	21:37 19:58-20:12/14	22:00 05:54-08:05/131
26	08:26 16:13-16:41/28 09:49-10:28/39	07:31	06:28	06:19 07:09-08:07/58	05:30 06:05-08:08/123	05:18 20:50-21:17/27
	17:13 15:22-15:35/13	18:10	18:59	20:51 19:58-20:13/15	21:38 20:00-20:10/10	22:00 05:54-08:05/131
27	08:25 16:13-16:43/30 09:49-10:27/38	07:29	06:25	06:17 07:08-08:08/60	05:29 20:56-21:00/4 20:03-20:07/4	05:19 20:50-21:17/27
	17:14 15:25-15:32/7	18:11	19:00	20:53 19:56-20:15/19	21:40 06:03-08:08/125	22:00 05:55-08:06/131
28	08:24 16:13-16:45/32	07:27	06:23	06:15 07:03-08:08/65	05:28 20:53-21:03/10	05:19 20:50-21:18/28
	17:16 09:50-10:28/38	18:13	19:02	20:55 19:54-20:16/22	21:41 06:02-08:07/125	22:00 05:55-08:06/131
29	08:22 16:13-16:47/34		07:21	06:13 06:58-08:09/71	05:27 20:52-21:04/12	05:20 20:50-21:17/27
	17:18 09:50-10:27/37		20:04	20:57 19:52-20:17/25	21:42 06:01-08:07/126	22:00 05:57-08:07/130
30	08:21 16:12-16:49/37		07:19	06:11 06:55-08:09/74	05:26 20:50-21:06/16	05:20 20:51-21:18/27
	17:20 09:50-10:26/36		20:06	20:58 19:51-20:18/27	21:43 06:00-08:07/127	22:00 05:57-08:07/130
31	08:19 16:12-16:50/38		07:16		05:25 20:49-21:06/17	
	17:22 09:52-10:26/34		20:07		21:45 05:59-08:06/127	
Potential sun hours	259	278	367	416	485	499
Sum of minutes with flicker	3108	931	0	856	4182	4679

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-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Project:
WP A15-Lingewaard

Licensed user:
Solidwinds
A: Toernooiveld 200
NL-6525 EC Nijmegen
+31 (0)6 832 17 832
Dominique Deen / dominique.deen@solidwinds.com
Calculated:
13-12-2017 11:10/3.1.617

SHADOW - Calendar per WTG

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR, NO MITIGATION)WTG: 1 - WT1

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,80	2,50	4,10	5,50	6,70	7,20	6,50	5,90	4,80	3,20	1,80	1,40

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
393	430	818	642	394	394	717	1.321	1.489	903	589	370	8.459

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

	July	August	September	October	November	December
1	05:21 20:52-21:18/26	05:57 06:30-06:50/20 19:57-20:31/34	06:47	07:36	07:30 15:40-16:21/41	08:21 14:44-15:22/38 09:26-10:04/38
	22:00 05:58-08:08/130	21:28 06:53-08:22/89	20:26	19:16	17:10	16:30 10:29-11:06/37
2	05:22 20:51-21:17/26	05:59 06:31-06:49/18 19:57-20:32/35	06:49	07:38	07:32 15:39-16:20/41	08:22 14:44-15:21/37 09:26-10:04/38
	21:59 05:58-08:08/130	21:26 06:54-08:22/88	20:24	19:14	17:09	16:29 10:28-11:06/38
3	05:22 20:52-21:18/26	06:01 06:32-06:47/15 19:57-20:31/34	06:50	07:39	07:33 15:40-16:20/40	08:24 14:44-15:22/38 09:28-10:04/36
	21:59 05:59-08:09/130	21:24 06:54-08:22/88	20:21	19:12	17:07	16:29 10:29-11:07/38
4	05:23 20:53-21:18/25	06:02 06:35-06:46/11 19:57-20:32/35	06:52	07:41	07:35 15:40-16:19/39	08:25 14:44-15:22/38 09:28-10:04/36
	21:59 06:00-08:09/129	21:23 06:55-08:22/87	20:19	19:10	17:05 09:33-09:43/10	16:28 10:28-11:08/40
5	05:24 20:53-21:18/25	06:04 06:38-06:41/3 19:57-20:31/34	06:54	07:43	07:37 15:41-16:20/39	08:26 14:45-15:23/38 09:29-10:04/35
	21:58 06:01-08:10/129	21:21 06:55-08:22/87	20:17	19:07	17:03 09:30-09:47/17	16:28 10:29-11:09/40
6	05:25 20:53-21:17/24	06:05 06:56-08:22/86	06:55	07:44	07:39 15:41-16:21/40	08:28 14:45-15:23/38 09:29-10:04/35
	21:58 06:01-08:10/129	21:19 19:56-20:30/34	20:15	19:05	17:01 09:28-09:50/22	16:27 10:29-11:09/40
7	05:26 20:54-21:17/23	06:07 06:56-08:21/85	06:57	07:46	07:41 15:42-16:21/39	08:29 14:45-15:23/38 09:30-10:04/34
	21:57 06:02-08:11/129	21:17 19:57-20:31/34	20:12	19:03	17:00 09:26-09:52/26	16:27 10:29-11:10/41
8	05:27 20:54-21:17/23	06:08 06:58-08:20/82	06:59	07:48	07:42 15:42-16:21/39	08:30 14:46-15:24/38 09:31-10:05/34
	21:56 06:03-08:12/129	21:16 19:57-20:30/33	20:10	19:00	16:58 09:25-09:53/28	16:27 10:30-11:11/41
9	05:28 20:55-21:17/22	06:10 06:58-08:20/82	07:00	07:50	07:44 15:42-16:21/39	08:31 14:46-15:25/39 09:32-10:05/33
	21:56 06:04-08:12/128	21:14 19:57-20:30/33	20:08	18:58	16:56 09:24-09:55/31	16:26 10:30-11:11/41
10	05:29 20:56-21:16/20	06:12 06:59-08:19/80	07:02	07:51	07:46 15:43-16:21/38	08:32 14:46-15:25/39 09:32-10:05/33
	21:55 06:05-08:13/128	21:12 19:57-20:29/32	20:05	18:56	16:55 09:23-09:56/33	16:26 10:30-11:12/42
11	05:30 20:57-21:16/19	06:13 07:01-08:19/78	07:03	07:53	07:48 15:43-16:21/38	08:33 14:47-15:25/38 09:33-10:05/32
	21:54 06:06-08:14/128	21:10 19:58-20:28/30	20:03	18:54	16:53 09:23-09:57/34	16:26 10:30-11:12/42
12	05:31 20:57-21:15/18	06:15 07:03-08:18/75	07:05	07:55	07:49 15:44-16:21/37	08:34 14:47-15:25/38 09:34-10:05/31
	21:53 06:07-08:14/127	21:08 19:58-20:27/29	20:01	18:52	16:52 09:22-09:58/36	16:26 10:30-11:13/43
13	05:32 20:58-21:15/17	06:16 07:04-08:18/74	07:07	07:56	07:51 15:45-16:19/34	08:35 14:47-15:26/39 09:34-10:05/31
	21:52 06:08-08:15/127	21:06 20:00-20:26/26	19:58	18:49	16:50 09:22-09:59/37	16:26 10:31-11:13/42
14	05:33 20:59-21:14/15	06:18 07:07-08:17/70	07:08	07:58	07:53 15:46-16:18/32	08:36 14:48-15:26/38 09:35-10:05/30
	21:51 06:09-08:15/126	21:04 20:00-20:24/24	19:56	18:47	16:49 09:22-10:00/38	16:26 10:31-11:14/43
15	05:34 21:01-21:12/11	06:20 07:15-08:16/61	07:10	08:00	07:55 15:46-16:16/30 09:22-10:00/38	08:37 14:49-15:26/37 09:36-10:05/29
	21:51 06:10-08:16/126	21:02 20:02-20:23/21	19:54	18:45	16:47 14:57-15:05/8	16:26 10:31-11:14/43
16	05:35 21:03-21:10/7	06:21 07:16-08:15/59	07:11	08:01	07:56 15:47-16:15/28 09:21-10:01/40	08:38 14:49-15:27/38 09:37-10:06/29
	21:50 06:11-08:16/125	21:00 20:03-20:21/18	19:51	18:43	16:46 14:55-15:08/13	16:26 10:32-11:15/43
17	05:36 06:14-08:18/124	06:23 07:16-08:13/57	07:13	08:03	07:58 15:46-16:12/26 09:22-10:01/39	08:39 14:50-15:28/38 09:38-10:06/28
	21:48 20:10-20:18/8	20:58 20:05-20:19/14	19:49	18:41	16:44 14:52-15:10/18	16:26 10:33-11:16/43
18	05:38 06:14-08:18/124	06:24 07:17-08:12/55	07:15	08:05	08:00 15:47-16:11/24 09:21-10:01/40	08:40 14:50-15:27/37 09:39-10:07/28
	21:47 20:08-20:21/13	20:56 20:11-20:13/2	19:47	18:38	16:43 14:51-15:11/20	16:26 10:33-11:17/44
19	05:39 06:15-08:18/123	06:26 07:17-08:10/53	07:16	08:07	08:02 15:48-16:10/22 09:21-10:02/41	08:40 14:50-15:28/38 09:38-10:07/29
	21:46 20:07-20:22/15	20:54	19:44	18:36	16:42 14:50-15:13/23	16:27 10:33-11:16/43
20	05:40 06:17-08:19/122	06:28 07:18-08:09/51	07:18	08:08 16:55-17:03/8	08:03 15:49-16:09/20 10:38-10:48/10	08:41 14:51-15:29/38 09:39-10:07/28
	21:45 20:05-20:23/18	20:52	19:42	18:34	16:41 14:49-15:14/25 09:21-10:02/41	16:27 10:34-11:17/43
21	05:42 06:17-08:19/122	06:29 07:18-08:07/49	07:20	08:10 16:51-17:13/22	08:05 15:51-16:07/16 10:35-10:52/17	08:42 14:51-15:29/38 09:39-10:07/28
	21:44 20:04-20:24/20	20:50	19:40	18:32	16:39 14:48-15:15/27 09:22-10:02/40	16:27 10:34-11:17/43
22	05:43 06:19-08:20/121	06:31 07:19-08:05/46	07:21	08:12 16:48-17:14/26	08:07 15:52-16:06/14 10:34-10:55/21	08:42 14:52-15:30/38 09:40-10:08/28
	21:43 20:03-20:26/23	20:48	19:37	18:30	16:38 14:47-15:16/29 09:22-10:03/41	16:28 10:35-11:18/43
23	05:44 06:20-08:20/120	06:33 07:20-08:02/42	07:23	08:14 16:46-17:16/30	08:08 15:53-16:04/11 10:33-10:57/24	08:43 14:52-15:30/38 09:40-10:08/28
	21:41 20:02-20:27/25	20:46	19:35	18:28	16:37 14:46-15:17/31 09:23-10:03/40	16:28 10:35-11:18/43
24	05:46 06:21-08:20/119	06:34 07:22-07:58/36	07:25	08:16 16:44-17:17/33	08:10 15:55-16:03/8 10:31-10:58/27	08:43 14:53-15:31/38 09:41-10:09/28
	21:40 20:01-20:27/26	20:43	19:33	18:26	16:36 14:45-15:17/32 09:22-10:03/41	16:29 10:36-11:19/43
25	05:47 06:23-08:21/118	06:36 07:22-07:52/30	07:26	07:17 15:43-16:18/35	08:12 15:59-16:02/3 10:30-10:59/29	08:44 14:53-15:31/38 09:42-10:10/28
	21:38 20:00-20:28/28	20:41	19:30	17:24	16:35 14:45-15:18/33 09:23-10:03/40	16:30 10:36-11:19/43
26	05:49 06:23-08:21/118	06:37 07:25-07:47/22	07:28	07:19 15:42-16:19/37	08:13 14:44-15:19/35 09:24-10:04/40	08:44 14:54-15:32/38 09:42-10:10/28
	21:37 20:00-20:29/29	20:39	19:28	17:22	16:34 10:30-11:01/31	16:30 10:36-11:20/44
27	05:50 06:24-08:21/117	06:39 07:28-07:44/16	07:29	07:21 15:42-16:20/38	08:15 14:44-15:19/35 09:23-10:03/40	08:44 14:54-15:32/38 09:42-10:11/29
	21:36 19:59-20:29/30	20:37	19:26	17:20	16:33 10:29-11:01/32	16:31 10:37-11:20/43
28	05:51 06:26-08:22/116	06:41 07:32-07:38/6	07:31	07:23 15:41-16:20/39	08:16 14:44-15:20/36 09:24-10:03/39	08:44 14:54-15:32/38 09:42-10:11/29
	21:34 19:59-20:30/31	20:35	19:23	17:18	16:32 10:29-11:03/34	16:32 10:37-11:20/43
29	05:53 06:26-06:52/26 19:58-20:30/32	06:42	07:33	07:24 15:41-16:21/40	08:18 14:44-15:21/37 09:25-10:04/39	08:44 14:55-15:33/38 09:42-10:12/30
	21:33 06:53-08:22/89	20:33	19:21	17:16	16:32 10:29-11:04/35	16:33 10:38-11:21/43
30	05:54 06:27-06:51/24 19:58-20:30/32	06:44	07:34	07:26 15:41-16:21/40	08:19 14:43-15:21/38 09:25-10:03/38	08:45 14:55-15:33/38 09:42-10:13/31
	21:31 06:53-08:21/88	20:30	19:19	17:14	16:31 10:28-11:05/37	16:34 10:38-11:21/43
31	05:56 06:29-06:51/22 19:58-20:31/33	06:46		07:28 15:40-16:21/41		08:45 14:56-15:34/38 09:43-10:13/30
	21:29 06:53-08:22/89	20:28		17:12		16:34 10:39-11:21/42
Potential sun hours	502	454	381	331	266	244
Sum of minutes with flicker	4522	2303	0	389	2424	3442

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-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Project:
WP A15-Lingewaard

Licensed user:
Solidwinds
A: Toernooiveld 200
NL-6525 EC Nijmegen
+31 (0)6 832 17 832
Dominique Deen / dominique.deen@solidwinds.com
Calculated:
13-12-2017 11:10/3.1.617

SHADOW - Calendar per WTG

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR, NO MITIGATION)WTG: 2 - WT2

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,80	2,50	4,10	5,50	6,70	7,20	6,50	5,90	4,80	3,20	1,80	1,40

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
393	430	818	642	394	394	717	1.321	1.489	903	589	370	8.459

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

	January	February	March	April	May	June
1	08:45 14:45-15:57/72	08:18 14:52-16:11/79 08:53-09:14/21	07:24 17:12-17:34/22	07:14 19:15-19:21/6	06:09 06:34-07:43/69	05:24 05:56-06:55/59
	16:36 13:41-14:08/27	17:23 09:27-09:58/31	18:15	20:09	21:00	21:46 20:26-20:42/16
2	08:45 14:46-15:58/72	08:16 16:05-16:06/1 09:28-09:58/30	07:22 17:13-17:33/20	07:12	06:07 06:32-07:41/69	05:23 05:54-06:54/60
	16:37 13:42-14:08/26	17:25 14:52-15:56/64 08:51-09:14/23	18:17	20:11	21:02	21:47 20:24-20:44/20
3	08:44 14:45-16:00/75 09:31-09:36/5	08:15 14:54-15:56/62 08:51-09:16/25	07:20 17:13-17:31/18	07:09	06:05 06:30-07:38/68	05:22 05:53-06:52/59
	16:38 13:43-14:07/24	17:27 09:29-09:58/29	18:19	20:12	21:03	21:48 20:22-20:45/23
4	08:44 14:46-16:02/76 09:29-09:39/10	08:13 14:54-15:55/61 08:50-09:17/27	07:18 17:15-17:29/14	07:07	06:04 06:28-07:27/59	05:22 05:53-06:52/59
	16:39 13:44-14:07/23	17:29 09:30-09:56/26	18:20	20:14	21:05	21:49 20:22-20:47/25
5	08:44 14:46-16:03/77 09:29-09:41/12	08:11 14:55-15:54/59 08:50-09:17/27	07:16 17:18-17:27/9	07:05	06:02 06:27-07:27/60	05:21 05:52-06:50/58
	16:40 13:46-14:07/21	17:31 09:31-09:55/24	18:22	20:16	21:07	21:50 20:21-20:47/26
6	08:44 14:46-16:04/78 09:28-09:42/14	08:10 14:56-15:53/57 08:49-09:18/29	07:13	07:03	06:00 06:25-07:25/60	05:20 05:52-06:51/59
	16:41 13:47-14:06/19	17:33 09:32-09:54/22	18:24	20:18	21:08	21:51 20:20-20:48/28
7	08:43 14:46-16:06/80 09:27-09:44/17	08:08 14:57-15:52/55 08:49-09:18/29	07:11	07:00	05:58 06:23-07:24/61	05:20 05:51-06:51/60
	16:43 13:49-14:06/17	17:35 09:34-09:51/17	18:26	20:19	21:10	21:52 20:20-20:49/29
8	08:43 14:46-16:07/81 09:26-09:45/19	08:06 16:57-17:05/8 09:37-09:50/13	07:09	06:58 07:29-07:42/13	05:56 06:22-07:23/61	05:19 05:52-06:52/60
	16:44 13:50-14:05/15	17:36 15:00-15:51/51 08:49-09:19/30	18:28	20:21	21:11	21:53 20:20-20:50/30
9	08:42 14:46-16:08/82 09:26-09:46/20	08:05 16:56-17:09/13 08:49-09:19/30	07:07	06:56 07:25-07:47/22	05:55 06:20-07:20/60	05:19 05:51-06:51/60
	16:45 13:53-14:03/10	17:38 15:02-15:49/47	18:29	20:23	21:13	21:53 20:19-20:51/32
10	08:42 14:46-16:09/83	08:03 16:54-17:11/17 08:49-09:19/30	07:05	06:53 07:22-07:48/26	05:53 06:18-07:19/61	05:18 05:51-06:52/61
	16:47 09:26-09:48/22	17:40 15:04-15:47/43	18:31	20:24	21:15	21:54 20:19-20:52/33
11	08:41 14:46-16:10/84	08:01 16:53-17:12/19 08:49-09:19/30	07:02	06:51 07:20-07:50/30	05:51 06:17-07:19/62	05:18 05:51-06:53/62
	16:48 09:25-09:49/24	17:42 15:07-15:45/38	18:33	20:26	21:16	21:55 20:19-20:52/33
12	08:41 14:46-16:11/85	07:59 16:52-17:13/21 15:11-15:23/12	07:00	06:49 07:19-07:51/32	05:49 06:15-07:18/63	05:18 05:50-06:52/62
	16:50 09:25-09:50/25	17:44 15:30-15:41/11 08:49-09:19/30	18:35	20:28	21:18	21:56 20:18-20:52/34
13	08:40 14:46-16:11/85	07:57 16:51-17:13/22	06:58	06:47 07:18-07:52/34	05:48 06:14-07:18/64	05:17 05:51-06:53/62
	16:51 09:24-09:50/26	17:46 08:50-09:19/29	18:36	20:29	21:19	21:56 20:18-20:53/35
14	08:39 14:46-16:12/86	07:55 17:15-17:20/5 08:50-09:18/28	06:55	06:45 07:17-07:53/36	05:46 06:12-07:17/65	05:17 05:51-06:53/62
	16:53 09:24-09:51/27	17:48 16:51-17:14/23	18:38	20:31	21:21	21:57 20:18-20:54/36
15	08:38 14:46-16:13/87	07:53 16:50-17:22/32	06:53	06:42 07:15-07:53/38	05:45 06:11-07:16/65	05:17 05:51-06:53/62
	16:54 09:24-09:52/28	17:49 08:51-09:17/26	18:40	20:33	21:23	21:58 20:18-20:54/36
16	08:37 14:46-16:14/88	07:51 16:50-17:24/34	06:51	06:40 07:12-07:53/41	05:43 06:10-07:16/66	05:17 05:51-06:54/63
	16:56 09:24-09:53/29	17:51 08:52-09:17/25	18:42	20:35	21:24	21:58 20:18-20:55/37
17	08:37 14:46-16:14/88	07:49 16:50-17:26/36	06:49	06:38 07:07-07:53/46	05:42 06:08-07:14/66	05:17 05:51-06:54/63
	16:57 09:23-09:54/31	17:53 08:53-09:15/22	18:43	20:36	21:26	21:59 20:18-20:55/37
18	08:36 14:47-16:15/88	07:47 16:51-17:28/37	06:46	06:36 07:05-07:53/48	05:40 06:07-07:13/66	05:17 05:51-06:54/63
	16:59 09:23-09:55/32	17:55 08:54-09:14/20	18:45	20:38	21:27	21:59 20:18-20:55/37
19	08:35 14:47-16:16/89	07:45 16:51-17:29/38	06:44	06:34 07:03-07:53/50	05:39 06:07-07:12/65	05:17 05:51-06:54/63
	17:01 09:24-09:56/32	17:57 08:56-09:12/16	18:47	20:40	21:29	21:59 20:18-20:56/38
20	08:34 14:47-16:16/89	07:43 16:51-17:31/40	06:42 18:18-18:23/5	06:32 07:01-07:53/52	05:37 06:06-07:10/64	05:17 05:52-06:54/62
	17:02 09:24-09:57/33	17:59 09:00-09:08/8	18:48	20:41	21:30	22:00 20:18-20:56/38
21	08:32 14:47-16:16/89	07:41 16:52-17:32/40	06:39 18:16-18:25/9	06:29 07:00-07:53/53	05:36 06:05-07:07/62	05:17 05:52-06:54/62
	17:04 09:23-09:56/33	18:01	18:50	20:43	21:31	22:00 20:18-20:56/38
22	08:31 14:47-16:16/89	07:39 16:53-17:33/40	06:37 18:14-18:27/13	06:27 06:59-07:53/54	05:35 06:02-07:00/58	05:17 05:53-06:55/62
	17:06 09:23-09:57/34	18:02	18:52	20:45	21:33	22:00 20:19-20:57/38
23	08:30 14:48-16:17/89	07:37 16:55-17:34/39	06:35 18:12-18:28/16	06:25 06:58-07:52/54	05:34 06:01-07:00/59	05:17 05:53-06:55/62
	17:07 09:24-09:58/34	18:04	18:54	20:46	21:34	22:00 20:19-20:57/38
24	08:29 14:47-16:16/89	07:35 17:08-17:35/27	06:32 18:11-18:30/19	06:23 06:57-07:52/55	05:32 06:00-06:59/59	05:18 05:52-06:55/63
	17:09 09:23-09:58/35	18:06 16:58-17:06/8	18:55	20:48	21:36	22:00 20:19-20:57/38
25	08:28 14:48-16:17/89	07:33 17:09-17:35/26	06:30 18:11-18:30/19	06:21 06:55-07:51/56	05:31 05:59-06:59/60	05:18 05:53-06:56/63
	17:11 09:24-09:59/35	18:08	18:57	20:50	21:37	22:00 20:20-20:57/37
26	08:26 14:48-16:16/88	07:31 17:10-17:35/25	06:28 18:10-18:29/19	06:19 06:53-07:50/57	05:30 05:58-06:58/60	05:18 05:53-06:56/63
	17:13 09:25-09:59/34	18:10	18:59	20:51	21:38	22:00 20:20-20:57/37
27	08:25 14:49-16:16/87	07:29 17:11-17:34/23	06:25 18:10-18:29/19	06:17 06:41-06:47/6	05:29 05:58-06:58/60	05:19 05:54-06:57/63
	17:14 09:24-09:59/35	18:11	19:00	20:53 06:52-07:49/57	21:40	22:00 20:20-20:56/36
28	08:24 14:49-16:15/86	07:27 17:12-17:34/22	06:23 18:10-18:29/19	06:15 06:39-07:48/69	05:28 05:57-06:57/60	05:19 05:54-06:56/62
	17:16 09:25-10:00/35	18:13	19:02	20:55	21:41	22:00 20:21-20:57/36
29	08:22 14:50-16:15/85 08:58-09:07/9		07:21 19:10-19:27/17	06:13 06:37-07:46/69	05:27 05:57-06:56/59	05:20 05:55-06:57/62
	17:18 09:25-09:59/34		20:04	20:57	21:42	22:00 20:21-20:56/35
30	08:21 14:50-16:14/84 08:55-09:10/15		07:19 19:11-19:26/15	06:11 06:35-07:44/69	05:26 05:57-06:56/59	05:20 05:55-06:56/61
	17:20 09:25-09:59/34		20:06	20:58	21:43 20:32-20:35/3	22:00 20:22-20:57/35
31	08:19 14:51-16:14/83 08:54-09:12/18		07:16 19:13-19:24/11		05:25 05:56-06:55/59	
	17:22 09:27-09:59/32		20:07		21:44 20:27-20:39/12	
Potential sun hours	259	278	367	416	485	499
Sum of minutes with flicker	3608	1932	264	1073	1944	2833

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-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Project:
WP A15-Lingewaard

Licensed user:
Solidwinds
A: Toernooiveld 200
NL-6525 EC Nijmegen
+31 (0)6 832 17 832
Dominique Deen / dominique.deen@solidwinds.com
Calculated:
13-12-2017 11:10/3.1.617

SHADOW - Calendar per WTG

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR, NO MITIGATION)WTG: 2 - WT2

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,80	2,50	4,10	5,50	6,70	7,20	6,50	5,90	4,80	3,20	1,80	1,40

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
393	430	818	642	394	394	717	1.321	1.489	903	589	370	8.459

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

	July	August	September	October	November	December
1	05:21 05:55-06:57/62	05:57 06:26-07:29/63	06:47 07:19-07:49/30	07:36	07:30 16:24-16:40/16 08:19-08:49/30	08:21 14:28-15:52/84
	22:00 20:23-20:57/34	21:28	20:26	19:16	17:10 14:33-15:17/44	16:30 09:07-09:31/24
2	05:22 05:55-06:56/61	05:59 06:28-07:30/62	06:49 07:21-07:47/26	07:38	07:32 16:25-16:37/12 09:12-09:14/2	08:22 14:28-15:51/83
	21:59 20:23-20:56/33	21:26	20:24	19:14	17:08 14:30-15:18/48 08:19-08:49/30	16:29 09:08-09:30/22
3	05:22 05:56-06:57/61	06:01 06:29-07:30/61	06:50 07:22-07:44/22	07:39	07:33 16:27-16:35/8 09:07-09:20/13	08:24 14:30-15:52/82 09:10-09:30/20
	21:59 20:24-20:56/32	21:24	20:21	19:12	17:07 14:28-15:20/52 08:19-08:49/30	16:29 13:37-13:47/10
4	05:23 05:57-06:57/60	06:02 06:31-07:32/61	06:52 07:26-07:39/13	07:41	07:35 14:27-15:22/55 08:18-08:48/30	08:25 14:30-15:51/81 09:10-09:29/19
	21:58 20:25-20:56/31	21:23	20:19	19:10	17:05 09:03-09:21/18	16:28 13:35-13:49/14
5	05:24 05:57-06:57/60	06:04 06:32-07:33/61	06:54	07:43	07:37 14:26-15:23/57 08:19-08:48/29	08:26 14:31-15:51/80 09:12-09:29/17
	21:58 20:26-20:56/30	21:21	20:17	19:07	17:03 09:02-09:24/22	16:28 13:34-13:51/17
6	05:25 05:57-06:56/59	06:05 06:34-07:34/60	06:55	07:44	07:39 14:25-15:24/59 08:19-08:47/28	08:28 14:32-15:50/78 09:14-09:28/14
	21:57 20:26-20:54/28	21:19	20:14	19:05	17:01 09:01-09:25/24	16:27 13:33-13:52/19
7	05:26 05:58-06:57/59	06:07 06:35-07:35/60	06:57	07:46	07:41 14:24-15:25/61 08:20-08:47/27	08:29 14:32-15:50/78 09:15-09:27/12
	21:57 20:27-20:54/27	21:17	20:12	19:03	17:00 09:00-09:26/26	16:27 13:32-13:53/21
8	05:27 05:59-06:57/58	06:08 06:37-07:36/59	06:58	07:48 17:56-17:59/3	07:42 14:23-15:26/63 08:21-08:46/25	08:30 14:34-15:50/76 09:17-09:27/10
	21:56 20:28-20:53/25	21:16	20:10	19:00	16:58 08:59-09:27/28	16:26 13:32-13:55/23
9	05:28 06:00-06:59/59	06:10 06:38-07:37/59	07:00	07:49 17:52-18:03/11	07:44 15:35-15:38/3 08:58-09:28/30	08:31 14:34-15:49/75 09:19-09:25/6
	21:56 20:29-20:53/24	21:14	20:08	18:58	16:56 14:23-15:27/64 08:22-08:45/23	16:26 13:32-13:56/24
10	05:29 06:01-07:01/60	06:12 06:40-07:47/67	07:02	07:51 17:49-18:05/16	07:46 14:22-15:42/80 08:24-08:44/20	08:32 14:35-15:47/72
	21:55 20:31-20:52/21	21:12	20:05	18:56	16:55 08:58-09:29/31	16:26 13:31-13:57/26
11	05:30 06:02-07:02/60	06:13 06:41-07:50/69	07:03 19:09-19:13/4	07:53 17:47-18:05/18	07:48 14:22-15:44/82 08:25-08:43/18	08:33 14:35-15:47/72
	21:54 20:32-20:50/18	21:10	20:03	18:54	16:53 08:58-09:30/32	16:26 13:31-13:58/27
12	05:31 06:04-07:03/59	06:15 06:43-07:51/68	07:05 19:04-19:15/11	07:55 17:46-18:06/20	07:49 14:22-15:46/84 08:27-08:42/15	08:34 14:36-15:47/71
	21:53 20:34-20:49/15	21:08	20:01	18:51	16:52 08:57-09:31/34	16:26 13:31-13:59/28
13	05:32 06:05-07:04/59	06:16 06:44-07:53/69	07:07 19:03-19:17/14	07:56 17:45-18:07/22	07:51 14:22-15:47/85 08:30-08:39/9	08:35 14:37-15:47/70
	21:52 20:37-20:46/9	21:06	19:58	18:49	16:50 08:57-09:31/34	16:26 13:31-14:00/29
14	05:33 06:05-07:05/60	06:18 06:46-07:55/69	07:08 19:00-19:17/17	07:58 17:45-18:07/22	07:53 14:22-15:48/86	08:36 14:37-15:47/70
	21:51	21:04	19:56	18:47	16:49 08:57-09:32/35	16:26 13:31-14:01/30
15	05:34 06:06-07:05/59	06:20 06:47-07:55/68	07:10 19:00-19:18/18	08:00 17:43-18:07/24	07:55 14:22-15:49/87	08:37 14:38-15:48/70
	21:51	21:02	19:54	18:45	16:47 08:57-09:32/35	16:26 13:32-14:01/29
16	05:35 06:06-07:06/60	06:21 06:49-06:54/5	07:11 18:59-19:19/20	08:01 17:42-18:07/25	07:56 14:22-15:50/88	08:38 14:39-15:48/69
	21:49	21:00 06:59-07:57/58	19:51	18:43	16:46 08:58-09:32/34	16:26 13:32-14:02/30
17	05:36 06:08-07:08/60	06:23 07:00-07:57/57	07:13 18:58-19:18/20	08:03 17:40-18:06/26	07:58 14:21-15:50/89	08:39 14:40-15:49/69
	21:48	20:58	19:49	18:41	16:44 08:58-09:33/35	16:26 13:32-14:03/31
18	05:38 06:08-07:08/60	06:24 07:02-07:58/56	07:15 18:58-19:18/20	08:05 17:39-18:06/27	08:00 14:21-15:50/89	08:40 14:40-15:48/68
	21:47	20:56	19:47	18:38 17:28-17:38/10	16:43 08:57-09:32/35	16:26 13:32-14:03/31
19	05:39 06:09-07:09/60	06:26 07:03-07:57/54	07:16 18:58-19:17/19	08:07 17:26-18:05/39	08:02 14:22-15:51/89	08:40 14:41-15:49/68
	21:46	20:54	19:44	18:36	16:42 08:58-09:32/34	16:27 13:33-14:04/31
20	05:40 06:10-07:09/59	06:28 07:04-07:58/54	07:18 18:58-19:15/17	08:08 17:24-18:04/40	08:03 14:22-15:51/89	08:41 14:42-15:50/68
	21:45	20:52	19:42	18:34	16:41 08:58-09:32/34	16:27 13:33-14:05/32
21	05:42 06:11-07:09/58	06:29 07:04-07:57/53	07:20 18:59-19:13/14	08:10 17:23-18:03/40	08:05 14:23-15:52/89	08:42 14:42-15:50/68
	21:44	20:50	19:40	18:32	16:39 08:59-09:32/33	16:27 13:33-14:05/32
22	05:43 06:14-07:11/57	06:31 07:05-07:58/53	07:21 19:00-19:10/10	08:12 17:21-18:00/39	08:07 14:23-15:52/89	08:42 14:43-15:51/68
	21:43 07:12-07:15/3	20:48	19:37	18:30 09:29-09:40/11	16:38 09:00-09:33/33	16:28 13:34-14:06/32
23	05:44 06:17-07:19/62	06:32 07:05-07:57/52	07:23 19:02-19:08/6	08:14 17:20-17:58/38	08:08 14:23-15:52/89	08:43 14:43-15:51/68
	21:41	20:46	19:35	18:28 09:25-09:42/17	16:37 09:01-09:33/32	16:28 13:34-14:06/32
24	05:46 06:17-07:21/64	06:34 07:07-07:57/50	07:24	08:15 17:20-17:57/37	08:10 14:24-15:52/88	08:43 14:44-15:51/67
	21:40	20:43	19:33	18:26 09:23-09:44/21	16:36 09:00-09:32/32	16:29 13:36-14:07/31
25	05:47 06:18-07:23/65	06:36 07:08-07:56/48	07:26	07:17 16:20-16:55/35	08:12 14:25-15:52/87	08:44 14:44-15:52/68
	21:38	20:41	19:30	17:24 08:22-08:45/23	16:35 09:01-09:32/31	16:30 13:36-14:07/31
26	05:49 06:18-07:24/66	06:37 07:10-07:56/46	07:28	07:19 16:20-16:53/33	08:13 14:25-15:53/88	08:44 14:44-15:52/68
	21:37	20:39	19:28	17:22 08:21-08:46/25	16:34 09:03-09:32/29	16:30 13:36-14:07/31
27	05:50 06:19-07:25/66	06:39 07:16-07:55/39	07:29	07:21 16:20-16:51/31	08:15 14:25-15:52/87	08:44 14:44-15:53/69
	21:36	20:37	19:26	17:20 08:20-08:47/27	16:33 09:03-09:31/28	16:31 13:37-14:07/30
28	05:51 06:21-07:27/66	06:41 07:17-07:54/37	07:31	07:23 16:46-16:49/3 08:20-08:48/28	08:16 14:26-15:52/86	08:44 14:44-15:54/70
	21:34	20:35	19:23	17:18 16:20-16:43/23	16:32 09:04-09:31/27	16:32 13:37-14:07/30
29	05:53 06:22-07:27/65	06:42 07:18-07:54/36	07:33	07:24 16:21-16:43/22	08:18 14:27-15:53/86	08:44 14:44-15:54/70
	21:33	20:33	19:21	17:16 08:19-08:48/29	16:32 09:05-09:32/27	16:33 13:38-14:07/29
30	05:54 06:23-07:27/64	06:44 07:18-07:52/34	07:34	07:26 16:22-16:42/20 14:39-14:53/14	08:19 14:27-15:52/85	08:45 14:45-15:55/70
	21:31	20:30	19:19	17:14 14:59-15:12/13 08:19-08:49/30	16:31 09:06-09:31/25	16:33 13:39-14:08/29
31	05:56 06:25-07:29/64	06:45 07:19-07:51/32		07:28 16:23-16:41/18 08:19-08:49/30		08:45 14:45-15:56/71
	21:29	20:28		17:12 14:36-15:15/39		16:34 13:40-14:08/28
Potential sun hours	502	454	381	332	266	244
Sum of minutes with flicker	2222	1720	281	949	3511	3172

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-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Project:
WP A15-Lingewaard

Licensed user:
Solidwinds
A: Toernooiveld 200
NL-6525 EC Nijmegen
+31 (0)6 832 17 832
Dominique Deen / dominique.deen@solidwinds.com
Calculated:
13-12-2017 11:10/3.1.617

SHADOW - Calendar per WTG

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR, NO MITIGATION)WTG: 3 - WT3

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,80	2,50	4,10	5,50	6,70	7,20	6,50	5,90	4,80	3,20	1,80	1,40

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
393	430	818	642	394	394	717	1.321	1.489	903	589	370	8.459

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

	January	February	March	April	May	June
1	08:45 12:12-15:15/183 16:36 11:46-12:08/22	08:18 16:11-16:53/42 12:36-13:11/35 17:23 13:26-13:43/17 08:49-08:54/5	07:24 16:49-17:04/15 18:15	07:14 19:02-19:41/39 20:09	06:09 06:38-07:14/36 21:00	05:24 05:55-06:29/34 21:46
2	08:45 12:13-15:16/183 16:37 11:48-12:08/20	08:16 16:11-16:54/43 08:46-08:57/11 17:25 12:39-13:09/30	07:22 16:53-17:00/7 18:17	07:12 19:03-19:44/41 20:11	06:07 06:36-07:08/32 21:02	05:23 05:54-06:29/35 21:47
3	08:44 12:13-15:15/182 16:38 11:48-12:07/19	08:15 16:11-16:55/44 08:45-09:00/15 17:27 12:43-13:07/24	07:20 18:19	07:09 19:04-19:46/42 20:12	06:05 06:35-07:07/32 21:03	05:22 05:53-06:28/35 21:48
4	08:44 12:13-15:16/183 16:39 11:50-12:07/17	08:13 16:11-16:56/45 08:43-09:01/18 17:29 12:47-13:02/15	07:18 18:20	07:07 19:05-19:47/42 20:14 07:34-07:40/6	06:03 06:34-07:05/31 21:05	05:22 05:54-06:28/34 21:49
5	08:44 12:14-15:17/183 16:40 11:52-12:06/14	08:11 16:10-16:58/48 17:31 08:42-09:02/20	07:16 18:22	07:05 19:06-19:48/42 20:16 07:27-07:42/15	06:02 06:34-07:05/31 21:06	05:21 05:53-06:27/34 21:50
6	08:44 12:14-15:16/182 16:41 11:54-12:04/10	08:10 16:10-17:00/50 17:33 08:41-09:03/22	07:13 18:24	07:02 19:09-19:49/40 20:18 07:25-07:44/19	06:00 06:25-06:30/5 21:08 06:33-07:03/30	05:20 05:53-06:27/34 21:51
7	08:43 12:15-15:17/182 16:43	08:08 16:10-17:02/52 17:35 08:40-09:04/24	07:11 18:26	07:00 19:13-19:51/38 20:19 07:23-07:46/23	05:58 06:23-07:02/39 21:10	05:20 05:53-06:26/33 21:52
8	08:43 12:15-15:17/182 16:44	08:06 16:10-17:03/53 17:36 08:40-09:05/25	07:09 18:28	06:58 19:19-19:53/34 20:21 07:22-07:47/25	05:56 06:22-07:01/39 21:11	05:19 05:53-06:26/33 21:53
9	08:42 12:15-15:17/182 16:45	08:04 16:11-17:05/54 17:38 08:40-09:06/26	07:07 18:29	06:56 19:18-19:52/34 20:23 07:20-07:47/27	05:55 06:20-07:01/41 21:13	05:19 06:17-06:25/8 21:53 05:53-06:16/23
10	08:42 12:17-15:17/180 16:47	08:03 16:12-17:06/54 17:40 08:40-09:06/26	07:05 18:31	06:53 19:19-19:53/34 20:24 07:18-07:47/29	05:53 06:18-07:00/42 21:15	05:18 06:18-06:25/7 21:54 05:53-06:17/24
11	08:41 12:17-15:17/180 16:48	08:01 16:12-17:06/54 17:42 08:39-09:06/27	07:02 18:33	06:51 19:20-19:54/34 20:26 07:14-07:47/33	05:51 06:17-07:01/44 21:16	05:18 06:20-06:24/4 21:55 05:53-06:17/24
12	08:41 12:17-15:17/180 16:50	07:59 16:13-17:08/55 17:44 08:40-09:06/26	07:00 18:35	06:49 19:21-19:54/33 20:28 07:12-07:47/35	05:49 06:15-07:00/45 21:18	05:18 05:53-06:17/24 21:56
13	08:40 12:18-15:16/178 16:51	07:57 16:14-17:09/55 08:23-08:31/8 17:46 08:40-09:06/26	06:58 18:36	06:47 19:23-19:54/31 20:29 07:10-07:47/37	05:48 06:14-07:01/47 21:19	05:17 05:53-06:17/24 21:56
14	08:39 12:18-15:16/178 16:53	07:55 16:40-17:10/30 08:40-09:05/25 17:48 16:15-16:39/24 08:21-08:34/13	06:55 18:05-18:10/5 18:38	06:45 19:24-19:53/29 20:31 07:08-07:46/38	05:46 06:12-07:00/48 21:21	05:17 05:53-06:18/25 21:57
15	08:38 14:23-15:15/52 16:54 12:19-14:21/122	07:53 16:40-17:11/31 08:41-09:05/24 17:49 16:16-16:38/22 08:19-08:35/16	06:53 18:02-18:14/12 18:40	06:42 19:25-19:52/27 20:33 07:06-07:45/39	05:45 06:11-07:00/49 21:22	05:17 05:54-06:18/24 21:58
16	08:37 14:46-15:14/28 12:19-14:20/121 16:56 14:26-14:43/17	07:51 16:40-17:12/32 08:41-09:04/23 17:51 16:18-16:37/19 08:18-08:37/19	06:51 17:59-18:15/16 18:42	06:40 19:26-19:52/26 20:35 07:04-07:44/40	05:43 06:10-07:00/50 21:24	05:17 05:54-06:19/25 21:58
17	08:37 14:49-15:13/24 14:30-14:34/4 16:57 14:35-14:40/5 12:20-14:20/120	07:49 16:41-17:12/31 08:42-09:03/21 17:53 16:20-16:34/14 08:17-08:38/21	06:49 17:57-18:16/19 18:43	06:38 19:28-19:51/23 20:36 07:03-07:43/40	05:42 06:09-06:59/50 21:26	05:17 05:54-06:19/25 21:58
18	08:36 15:02-15:11/9 12:21-14:19/118 16:59 14:54-14:56/2	07:47 16:42-17:13/31 08:44-09:02/18 17:55 16:25-16:30/5 08:16-08:38/22	06:46 17:56-18:17/21 18:45	06:36 19:29-19:50/21 20:38 07:01-07:42/41	05:40 06:09-06:58/49 21:27	05:17 05:54-06:19/25 21:59
19	08:35 12:21-14:19/118 17:01	07:45 16:42-17:13/31 08:16-08:39/23 17:57 08:45-09:00/15	06:44 17:56-18:18/22 18:47	06:34 19:30-19:49/19 20:40 06:57-07:40/43	05:39 06:08-06:58/50 21:29	05:17 05:54-06:19/25 21:59
20	08:34 12:22-14:18/116 17:02	07:43 16:41-17:12/31 08:16-08:39/23 17:59 08:48-08:57/9	06:42 17:54-18:18/24 18:48	06:32 19:31-19:47/16 20:41 06:55-07:38/43	05:37 06:08-06:56/48 21:30	05:17 05:54-06:19/25 22:00
21	08:32 12:22-14:15/113 17:04	07:41 16:41-17:12/31 18:01 08:15-08:38/23	06:39 17:54-18:20/26 18:50	06:29 19:33-19:45/12 07:31-07:32/1 20:43 06:53-07:30/37	05:36 06:08-06:36/28 21:31 06:37-06:56/19	05:17 05:54-06:19/25 22:00
22	08:31 12:23-14:13/110 17:06	07:39 16:41-17:12/31 18:02 08:15-08:38/23	06:37 17:54-18:24/30 18:52	06:27 19:38-19:40/2 20:45 06:51-07:28/37	05:35 06:08-06:35/27 21:33 06:38-06:55/17	05:17 05:55-06:20/25 22:00
23	08:30 12:25-14:09/104 17:07	07:37 16:42-17:12/30 18:04 08:15-08:38/23	06:35 17:54-18:25/31 18:54	06:25 06:49-07:27/38 20:46	05:33 06:08-06:35/27 21:34 06:39-06:54/15	05:17 05:55-06:20/25 22:00
24	08:29 16:21-16:26/5 17:09 12:25-14:06/101	07:35 16:42-17:11/29 18:06 08:16-08:37/21	06:32 17:54-18:28/34 18:55	06:23 06:47-07:25/38 20:48	05:32 06:08-06:34/26 21:36 06:41-06:53/12	05:18 05:55-06:20/25 22:00
25	08:28 16:18-16:30/12 17:11 12:26-14:05/99	07:33 16:43-17:10/27 18:08 08:17-08:36/19	06:30 17:55-18:30/35 18:57	06:21 06:45-07:23/38 20:50	05:31 06:08-06:33/25 21:37 06:43-06:51/8	05:18 05:56-06:21/25 22:00
26	08:26 16:16-16:32/16 17:13 12:27-14:03/96	07:31 16:44-17:09/25 18:10 08:18-08:35/17	06:28 17:55-18:31/36 18:59	06:19 06:43-07:21/38 20:51	05:30 06:09-06:32/23 21:38 06:01-06:05/4	05:18 05:56-06:21/25 22:00
27	08:25 16:15-16:34/19 17:14 12:28-14:02/94	07:29 16:45-17:07/22 18:11 08:19-08:32/13	06:25 17:57-18:32/35 19:00	06:17 06:41-07:21/40 20:53	05:29 06:09-06:31/22 21:40 05:59-06:08/9	05:19 05:57-06:21/24 22:00
28	08:24 16:41-16:45/4 12:29-13:59/90 17:16 16:13-16:35/22	07:27 16:47-17:06/19 18:13 08:21-08:30/9	06:23 17:59-18:33/34 19:02	06:15 06:41-07:19/38 20:55	05:28 05:57-06:30/33 21:41	05:19 05:57-06:21/24 22:00
29	08:22 16:39-16:47/8 13:17-13:57/40 17:18 16:13-16:37/24 12:31-13:16/45		07:21 19:02-19:32/30 20:04	06:13 06:40-07:18/38 20:57	05:27 05:56-06:30/34 21:42	05:20 05:57-06:22/25 22:00
30	08:21 16:12-16:49/37 12:32-13:14/42 17:20 13:19-13:49/30		07:19 19:02-19:38/36 20:06	06:11 06:39-07:16/37 20:58	05:26 05:55-06:29/34 21:43	05:20 05:57-06:21/24 22:00
31	08:19 16:12-16:52/40 12:35-13:14/39 17:22 13:23-13:47/24		07:16 19:03-19:41/38 20:07		05:25 05:54-06:29/35 21:44	
Potential sun hours	259	278	367	416	485	499
Sum of minutes with flicker	4710	1984	506	1572	1236	831

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-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Project:
WP A15-Lingewaard

Licensed user:
Solidwinds
A: Toernooiveld 200
NL-6525 EC Nijmegen
+31 (0)6 832 17 832
Dominique Deen / dominique.deen@solidwinds.com
Calculated:
13-12-2017 11:10/3.1.617

SHADOW - Calendar per WTG

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR, NO MITIGATION)WTG: 3 - WT3

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,80	2,50	4,10	5,50	6,70	7,20	6,50	5,90	4,80	3,20	1,80	1,40

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
393	430	818	642	394	394	717	1.321	1.489	903	589	370	8.459

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

	July	August	September	October	November	December
1	05:21 06:25-06:27/2 22:00 05:58-06:22/24	05:57 06:26-07:11/45 21:28	06:47 19:19-19:52/33 20:26 07:13-07:46/33	07:36 19:16	07:30 15:41-16:34/53 17:10 08:09-08:35/26	08:21 11:59-14:59/180 16:30
2	05:22 06:23-06:28/5 21:59 05:57-06:21/24	05:59 06:28-07:11/43 21:26	06:49 19:18-19:52/34 20:24 07:17-07:46/29	07:38 19:14	07:32 15:40-16:33/53 17:08 08:10-08:35/25	08:22 11:59-14:59/180 16:29
3	05:22 06:22-06:30/8 21:59 05:58-06:21/23	06:00 06:29-07:11/42 21:24	06:50 19:16-19:51/35 20:21 07:17-07:44/27	07:39 19:12	07:33 15:40-16:32/52 17:07 08:10-08:35/25	08:24 11:59-15:01/182 16:29
4	05:23 05:58-06:31/33 21:58	06:02 06:31-07:11/40 21:23	06:52 19:16-19:50/34 20:19 07:19-07:44/25	07:41 19:09	07:35 15:40-16:31/51 17:05 08:10-08:33/23	08:25 11:59-15:01/182 16:28
5	05:24 05:59-06:32/33 21:58	06:04 06:32-07:11/39 21:21	06:54 19:09-19:47/38 20:17 07:19-07:42/23	07:43 19:07	07:37 15:40-16:29/49 17:03 08:10-08:33/23	08:26 12:00-15:02/182 16:28
6	05:25 05:59-06:32/33 21:57	06:05 06:34-06:42/8 21:19 06:43-07:13/30	06:55 19:05-19:46/41 20:14 07:21-07:40/19	07:44 19:05	07:39 15:40-16:27/47 17:01 08:11-08:32/21	08:27 12:00-15:02/182 16:27 11:41-11:49/8
7	05:26 05:59-06:33/34 21:57	06:07 06:36-06:37/1 21:17 06:43-07:13/30	06:57 19:01-19:43/42 20:12 07:23-07:39/16	07:46 19:03	07:41 15:41-16:25/44 08:13-08:31/18 17:00 12:16-12:33/17	08:29 12:00-15:03/183 16:27 11:39-11:52/13
8	05:27 06:00-06:34/34 21:56	06:08 06:43-07:15/32 21:16	06:58 18:59-19:42/43 20:10 07:28-07:34/6	07:48 19:00	07:42 15:41-16:25/44 08:14-08:30/16 16:58 12:12-12:37/25	08:30 12:01-15:04/183 16:26 11:38-11:55/17
9	05:28 06:00-06:35/35 21:56	06:10 06:44-07:15/31 21:14	07:00 18:58-19:40/42 20:08	07:49 18:58	07:44 15:42-16:25/43 08:17-08:28/11 16:56 12:09-12:40/31	08:31 12:02-15:05/183 16:26 11:37-11:56/19
10	05:29 06:01-06:36/35 21:55	06:11 06:44-07:16/32 21:12	07:02 18:56-19:37/41 20:05	07:51 18:56	07:46 15:42-16:24/42 12:07-12:42/35 16:55 12:57-13:14/17 08:21-08:24/3	08:32 12:02-15:05/183 16:26 11:37-11:57/20
11	05:30 06:02-06:37/35 21:54	06:13 06:45-07:19/34 21:10	07:03 18:55-19:35/40 20:03	07:53 18:54	07:48 15:43-16:22/39 12:05-12:44/39 16:53 12:53-13:18/25	08:33 12:02-15:05/183 16:26 11:36-11:58/22
12	05:31 06:02-06:37/35 21:53	06:15 06:46-07:24/38 21:08	07:05 18:54-19:32/38 20:01	07:55 17:24-17:35/11 18:51	07:49 15:44-16:21/37 12:04-12:46/42 16:52 12:51-13:21/30	08:34 12:03-15:06/183 16:26 11:36-12:00/24
13	05:32 06:03-06:38/35 21:52	06:16 06:48-07:25/37 21:06	07:07 18:54-19:30/36 19:58	07:56 17:21-17:38/17 18:49	07:51 16:11-16:19/8 12:49-13:29/40 16:50 15:45-16:09/24 12:03-12:48/45	08:35 12:03-15:06/183 16:26 11:36-12:01/25
14	05:33 06:04-06:38/34 21:51	06:18 06:49-07:27/38 21:04	07:08 18:53-19:23/30 19:56	07:58 17:19-17:40/21 18:47 08:53-09:04/11	07:53 16:14-16:17/3 12:02-13:32/90 16:49 15:46-16:08/22	08:36 12:03-15:07/184 16:26 11:36-12:02/26
15	05:34 06:05-06:38/33 21:50	06:20 06:48-07:27/39 21:02	07:10 18:49-19:22/33 19:54	08:00 17:16-17:40/24 18:45 08:51-09:06/15	07:55 15:48-16:07/19 16:47 12:01-13:35/94	08:37 12:04-15:08/184 16:26 11:36-12:03/27
16	05:35 06:18-06:39/21 21:49 06:06-06:17/11	06:21 06:49-07:28/39 21:00	07:11 18:47-19:22/35 19:51	08:01 17:15-17:41/26 18:43 08:49-09:07/18	07:56 15:50-16:06/16 16:46 12:01-13:37/96	08:38 11:37-15:08/211 16:26
17	05:36 06:18-06:41/23 21:48 06:09-06:16/7	06:23 06:50-07:28/38 20:58	07:13 18:44-19:20/36 19:49	08:03 17:14-17:42/28 18:41 08:48-09:08/20	07:58 15:51-16:03/12 16:44 11:59-13:38/99	08:39 11:37-15:09/212 16:26
18	05:38 06:18-06:42/24 21:47 06:54-06:59/5	06:24 06:52-07:30/38 20:56	07:15 18:43-19:18/35 19:47	08:05 17:14-17:43/29 18:38 08:47-09:09/22	08:00 15:55-16:00/5 16:43 11:59-13:40/101	08:40 11:37-15:09/212 16:26
19	05:39 06:18-06:43/25 21:46 06:51-07:01/10	06:26 06:53-07:31/38 20:54	07:16 18:41-19:15/34 19:44	08:07 17:13-17:43/30 18:36 08:46-09:09/23	08:02 11:59-13:43/104 16:42	08:40 11:37-15:10/213 16:27
20	05:40 06:18-06:44/26 21:45 06:50-07:03/13	06:28 06:55-07:33/38 20:52	07:18 18:40-19:12/32 19:42	08:08 17:13-17:43/30 18:34 08:46-09:09/23	08:03 11:58-13:48/110 16:41	08:41 11:38-15:10/212 16:27
21	05:42 06:17-06:44/27 21:44 06:48-07:04/16	06:29 19:41-19:46/5 20:50 06:56-07:33/37	07:20 18:40-19:10/30 19:40	08:10 17:12-17:43/31 18:32 08:46-09:09/23	08:05 11:58-13:51/113 16:39	08:42 11:38-15:10/212 16:27
22	05:43 06:18-06:46/28 21:42 06:48-07:06/18	06:31 19:38-19:50/12 20:48 06:58-07:39/41	07:21 18:39-19:06/27 19:37	08:12 17:11-17:43/32 08:46-09:09/23 18:30 09:18-09:28/10	08:07 11:58-13:54/116 16:38	08:42 11:39-15:11/212 16:28
23	05:44 06:18-06:46/28 21:41 06:47-07:07/20	06:32 19:35-19:51/16 20:46 06:59-07:42/43	07:23 18:39-19:02/23 19:35	08:14 17:12-17:42/30 08:45-09:08/23 18:28 09:14-09:30/16	08:08 11:57-13:55/118 16:37	08:43 11:39-15:11/212 16:28
24	05:46 06:18-07:07/49 21:40	06:34 19:33-19:52/19 20:43 07:01-07:44/43	07:24 18:38-19:01/23 19:33	08:15 17:11-17:42/31 09:13-09:31/18 18:26 16:53-17:01/8 08:46-09:08/22	08:10 14:39-14:48/9 16:36 11:58-13:56/118	08:43 11:40-15:12/212 16:29
25	05:47 06:19-07:09/50 21:38	06:36 19:32-19:53/21 20:41 07:04-07:45/41	07:26 18:39-19:00/21 19:30	07:17 16:10-16:42/32 08:12-08:33/21 17:24 15:49-16:05/16 07:47-08:07/20	08:12 14:27-14:51/24 14:09-14:12/3 16:35 14:13-14:18/5 11:58-13:58/120	08:43 11:40-15:13/213 16:29
26	05:49 06:19-07:09/50 21:37	06:37 19:31-19:54/23 20:39 07:06-07:46/40	07:28 18:40-18:59/19 19:28	07:19 16:10-16:41/31 08:11-08:34/23 17:22 15:47-16:07/20 07:48-08:06/18	08:13 14:25-14:53/28 11:58-13:59/121 16:34 14:05-14:22/17	08:44 11:41-15:13/212 16:30
27	05:50 06:19-07:09/50 21:36	06:39 19:28-19:53/25 20:37 07:06-07:46/40	07:29 18:40-18:57/17 19:26	07:21 16:10-16:40/30 08:10-08:34/24 17:20 15:45-16:08/23 07:49-08:05/16	08:15 14:02-14:54/52 16:33 11:58-14:00/122	08:44 11:41-15:13/212 16:31
28	05:51 06:21-07:10/49 21:34	06:41 19:27-19:54/27 20:35 07:08-07:47/39	07:31 18:41-18:55/14 19:23	07:23 16:10-16:40/30 08:10-08:35/25 17:18 15:44-16:09/25 07:51-08:03/12	08:16 11:58-14:56/178 16:32	08:44 12:10-15:13/183 16:32 11:42-12:09/27
29	05:53 06:22-07:10/48 21:33	06:42 19:25-19:53/28 20:32 07:09-07:47/38	07:33 18:44-18:53/9 19:21	07:24 15:43-16:38/55 07:54-08:00/6 17:16 08:09-08:35/26	08:18 11:59-14:57/178 16:31	08:44 12:10-15:14/184 16:33 11:43-12:09/26
30	05:54 06:23-07:10/47 21:31	06:44 19:23-19:54/31 20:30 07:10-07:47/37	07:34 19:19	07:26 15:42-16:37/55 17:14 08:09-08:35/26	08:19 11:58-14:58/180 16:31	08:45 12:11-15:14/183 16:33 11:44-12:09/25
31	05:56 06:25-07:11/46 21:29	06:45 19:21-19:54/33 20:28 07:12-07:47/35		07:28 15:42-16:36/54 17:12 08:09-08:35/26		08:45 12:11-15:15/184 16:34 11:45-12:09/24
Potential sun hours	502	454	381	332	266	244
Sum of minutes with flicker	1186	1424	1093	1229	3396	6319

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-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Project:
WP A15-Lingewaard

Licensed user:
Solidwinds
A: Toernooiveld 200
NL-6525 EC Nijmegen
+31 (0)6 832 17 832
Dominique Deen / dominique.deen@solidwinds.com
Calculated:
13-12-2017 11:10/3.1.617

SHADOW - Calendar per WTG

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR, NO MITIGATION)WTG: 4 - WT4

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,80	2,50	4,10	5,50	6,70	7,20	6,50	5,90	4,80	3,20	1,80	1,40

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
393	430	818	642	394	394	717	1.321	1.489	903	589	370	8.459

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

	January	February	March	April	May	June
1	08:45 14:51-15:28/37 09:55-12:06/131	08:18 15:44-16:27/43 09:57-11:31/94	07:24	07:14 18:44-19:31/47	06:09 19:25-19:59/34	05:24
	16:36 12:23-12:48/25	17:23 15:02-15:38/36	18:15	20:09	21:00 06:46-07:06/20	21:46
2	08:44 14:51-15:29/38 09:56-12:07/131	08:16 15:43-16:27/44 09:57-11:27/90	07:22	07:12 18:47-19:31/44	06:07 19:27-20:00/33	05:23
	16:37 12:25-12:47/22	17:25 15:03-15:36/33	18:17	20:11	21:01 06:47-07:05/18	21:47
3	08:44 14:51-15:29/38 09:55-12:06/131	08:15 15:43-16:28/45 09:58-11:22/84	07:20	07:09 18:49-19:32/43	06:05 19:27-19:59/32	05:22
	16:38 12:26-12:41/15	17:27 15:05-15:36/31	18:19	20:12	21:03 06:47-07:04/17	21:48
4	08:44 14:51-15:30/39 09:55-12:07/132	08:13 15:43-16:27/44 09:58-11:17/79	07:18	07:07 18:49-19:37/48	06:03 19:28-19:58/30	05:22
	16:39 12:28-12:40/12	17:29 15:07-15:35/28	18:20	20:14	21:05 06:48-07:02/14	21:49
5	08:44 14:52-15:31/39 09:56-12:07/131	08:11 15:42-16:27/45 09:59-11:15/76	07:16	07:05 18:48-19:40/52	06:02 19:28-19:56/28	05:21
	16:40 12:32-12:38/6	17:31 15:09-15:33/24	18:22	20:16	21:06 06:51-07:01/10	21:50
6	08:44 14:51-15:31/40	08:10 15:42-16:27/45 09:59-11:13/74	07:13	07:02 18:48-19:42/54	06:00 19:30-19:56/26	05:20
	16:41 09:55-12:07/132	17:33 15:11-15:31/20	18:24	20:17	21:08 06:55-06:56/1	21:51
7	08:43 15:57-16:03/6 09:56-12:08/132	08:08 15:42-16:27/45 10:00-11:10/70	07:11	07:00 18:49-19:44/55	05:58 19:31-19:54/23	05:20
	16:43 14:52-15:33/41	17:35 15:14-15:28/14	18:26	20:19	21:10	21:52
8	08:43 15:55-16:05/10 09:55-12:07/132	08:06 15:42-16:27/45 10:02-10:46/44	07:09	06:58 18:49-19:46/57	05:56 19:32-19:53/21	05:19
	16:44 14:52-15:33/41	17:36 10:49-11:08/19	18:28	20:21	21:11	21:53
9	08:42 15:53-16:06/13 09:55-12:07/132	08:04 15:43-16:28/45 10:02-10:44/42	07:07	06:56 18:49-19:48/59	05:55 19:34-19:52/18	05:19
	16:45 14:52-15:33/41	17:38 10:55-11:02/7	18:29	20:23	21:13	21:53
10	08:42 15:53-16:08/15 09:55-12:08/133	08:03 15:43-16:28/45	07:04	06:53 18:50-19:49/59	05:53 19:36-19:49/13	05:18
	16:47 14:53-15:35/42	17:40 10:03-10:43/40	18:31	20:24	21:15	21:54
11	08:41 15:53-16:14/21 09:55-12:07/132	08:01 15:43-16:27/44	07:02	06:51 18:51-19:51/60	05:51 19:41-19:45/4	05:18
	16:48 14:53-15:35/42	17:42 10:05-10:42/37	18:33	20:26	21:16	21:55
12	08:40 15:52-16:16/24 09:55-12:07/132	07:59 15:43-16:27/44	07:00	06:49 18:52-19:52/60	05:49	05:17
	16:50 14:53-15:35/42	17:44 10:06-10:40/34	18:35	20:28	21:18	21:56
13	08:40 15:52-16:17/25 09:55-12:07/132	07:57 15:43-16:27/44	06:58	06:47 18:53-19:53/60	05:48	05:17
	16:51 14:53-15:36/43	17:46 10:08-10:38/30	18:36	20:29	21:19	21:56
14	08:39 15:51-16:19/28 09:54-12:06/132	07:55 15:44-16:26/42 08:20-08:26/6	06:55 17:51-18:04/13	06:45 18:54-19:53/59	05:46	05:17
	16:53 14:53-15:36/43	17:48 10:10-10:36/26	18:38	20:31	21:21	21:57
15	08:38 15:51-16:20/29 09:54-12:06/132	07:53 15:44-16:26/42 08:18-08:28/10	06:53 17:48-18:07/19	06:42 18:57-19:55/58	05:45	05:17
	16:54 14:53-15:37/44	17:49 10:12-10:32/20	18:40	20:33	21:22	21:57
16	08:37 15:51-16:21/30 09:54-12:05/131	07:51 15:45-16:25/40 08:16-08:30/14	06:51 17:46-18:08/22	06:40 19:01-19:57/56	05:43	05:17
	16:56 14:53-15:37/44	17:51 10:17-10:27/10	18:42	20:34	21:24	21:58
17	08:37 15:51-16:22/31 09:54-12:05/131	07:49 15:46-16:25/39	06:49 17:44-18:09/25	06:38 19:06-19:58/52	05:42	05:17
	16:57 14:53-15:38/45	17:53 08:14-08:31/17	18:43	20:36	21:26	21:58
18	08:36 15:51-16:23/32 09:54-12:04/130	07:47 15:47-16:24/37	06:46 17:43-18:10/27	06:36 19:12-19:59/47	05:40	05:17
	16:59 14:54-15:38/44	17:55 08:13-08:32/19	18:45	20:38	21:27	21:59
19	08:35 15:51-16:24/33 09:55-12:03/128	07:45 15:48-16:23/35	06:44 17:42-18:11/29	06:34 19:13-20:00/47	05:39	05:17
	17:01 14:54-15:39/45	17:57 08:12-08:32/20	18:47	20:40	21:28	21:59
20	08:34 15:51-16:25/34 09:55-12:02/127	07:43 15:49-16:21/32	06:42 17:41-18:11/30	06:32 19:13-20:01/48	05:37	05:17
	17:02 14:55-15:39/44	17:59 08:12-08:33/21	18:48	20:41 06:55-07:02/7	21:30	22:00
21	08:32 15:50-16:25/35 09:54-11:59/125	07:41 15:51-16:19/28	06:39 17:40-18:11/31	06:29 19:14-20:02/48	05:36	05:17
	17:04 14:54-15:39/45	18:00 08:11-08:32/21	18:50	20:43 06:53-07:04/11	21:31	22:00
22	08:31 15:51-16:26/35 11:43-11:56/13	07:39 15:53-16:17/24	06:37 17:40-18:12/32	06:27 19:14-20:02/48	05:35	05:17
	17:06 14:55-15:39/44 09:54-11:42/108	18:02 08:11-08:32/21	18:52	20:45 06:51-07:06/15	21:33	22:00
23	08:30 15:51-16:27/36 09:55-11:41/106	07:37 15:56-16:15/19	06:35 17:39-18:11/32	06:25 19:15-20:02/47	05:33	05:17
	17:07 14:56-15:40/44	18:04 08:11-08:31/20	18:54	20:46 06:49-07:07/18	21:34	22:00
24	08:29 15:49-16:26/37 09:54-11:40/106	07:35 16:00-16:11/11	06:32 17:39-18:17/38	06:23 19:17-20:02/45	05:32	05:18
	17:09 14:56-15:39/43	18:06 08:12-08:31/19	18:55	20:48 06:47-07:07/20	21:36	22:00
25	08:28 15:49-16:27/38 09:55-11:40/105	07:33 08:13-08:30/17	06:30 17:39-18:20/41	06:21 19:18-20:02/44	05:31	05:18
	17:11 14:57-15:40/43	18:08	18:57	20:50 06:46-07:07/21	21:37	22:00
26	08:26 15:47-16:27/40 09:55-11:39/104	07:31 08:15-08:28/13	06:28 17:38-18:21/43	06:19 19:20-20:02/42	05:30	05:18
	17:13 14:57-15:39/42	18:10	18:59	20:51 06:46-07:07/21	21:38	22:00
27	08:25 15:47-16:27/40 09:55-11:39/104	07:29 08:16-08:25/9	06:25 17:39-18:25/46	06:17 19:22-20:02/40	05:29	05:19
	17:14 14:58-15:40/42	18:11	19:00	20:53 06:45-07:07/22	21:40	22:00
28	08:24 15:45-16:27/42 09:55-11:37/102	07:27	06:23 17:40-18:27/47	06:15 19:22-20:01/39	05:28	05:19
	17:16 14:58-15:39/41	18:13	19:02	20:55 06:45-07:07/22	21:41	22:00
29	08:22 15:45-16:27/42 09:56-11:37/101		07:21 18:40-19:28/48	06:13 19:23-20:01/38	05:27	05:20
	17:18 14:59-15:39/40		20:04	20:56 06:45-07:07/22	21:42	22:00
30	08:21 15:44-16:26/42 09:56-11:35/99		07:18 18:41-19:30/49	06:11 19:24-20:00/36	05:26	05:20
	17:20 15:00-15:38/38		20:06	20:58 06:45-07:06/21	21:43	22:00
31	08:19 15:45-16:27/42 09:57-11:34/97		07:16 18:43-19:31/48		05:25	
	17:22 15:01-15:38/37		20:07		21:44	
Potential sun hours	259	278	367	416	485	499
Sum of minutes with flicker	5925	2216	620	1692	342	0

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-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Project:
WP A15-Lingewaard

Licensed user:
Solidwinds
A: Toernooiveld 200
NL-6525 EC Nijmegen
+31 (0)6 832 17 832
Dominique Deen / dominique.deen@solidwinds.com
Calculated:
13-12-2017 11:10/3.1.617

SHADOW - Calendar per WTG

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR, NO MITIGATION)WTG: 4 - WT4

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,80	2,50	4,10	5,50	6,70	7,20	6,50	5,90	4,80	3,20	1,80	1,40

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
393	430	818	642	394	394	717	1.321	1.489	903	589	370	8.459

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

	July	August	September	October	November	December
1	05:21	05:57	06:47 18:49-19:50/61	07:36	07:30 15:11-15:56/45	08:21 15:35-15:56/21 09:37-11:50/133
	22:00	21:28	20:26	19:16	17:10 09:33-10:13/40	16:30 14:35-15:17/42
2	05:22	05:59 19:49-19:58/9	06:49 18:49-19:48/59	07:38	07:32 15:11-15:56/45 09:31-10:13/42	08:22 15:35-15:51/16 09:37-11:50/133
	21:59	21:26	20:24	19:14	17:08 10:22-10:32/10	16:29 14:35-15:17/42
3	05:22	06:00 19:46-20:00/14	06:50 18:47-19:46/59	07:39	07:33 15:11-15:56/45 09:30-10:14/44	08:23 15:37-15:50/13 09:39-11:51/132
	21:59	21:24	20:21	19:12	17:07 10:17-10:37/20	16:29 14:36-15:17/41
4	05:23	06:02 19:43-20:02/19	06:52 18:46-19:43/57	07:41	07:35 15:12-15:56/44 09:30-10:41/71	08:25 15:39-15:49/10 09:39-11:52/133
	21:58	21:23	20:19	19:09	17:05 14:43-14:58/15	16:28 14:36-15:17/41
5	05:24	06:04 19:42-20:04/22	06:54 18:45-19:40/55	07:43	07:37 15:12-15:57/45 09:29-10:43/74	08:26 15:42-15:48/6 09:41-11:53/132
	21:58	21:21	20:17	19:07	17:03 14:40-15:01/21	16:28 14:37-15:18/41
6	05:25	06:05 19:40-20:04/24	06:55 18:45-19:38/53	07:44	07:39 15:12-15:57/45 09:29-10:45/76	08:27 14:37-15:18/41
	21:57	21:19	20:14	19:05	17:01 14:38-15:03/25	16:27 09:41-11:53/132
7	05:26	06:07 19:39-20:06/27	06:57 18:43-19:35/52	07:46	07:40 15:13-15:57/44 09:28-10:47/79	08:29 14:38-15:17/39 09:42-11:54/132
	21:57	21:17 07:02-07:08/6	20:12	19:03	17:00 14:36-15:05/29	16:27 12:19-12:24/5
8	05:27	06:08 19:37-20:06/29	06:58 18:43-19:32/49	07:48	07:42 15:13-15:57/44 09:28-10:53/85	08:30 14:39-15:18/39 09:43-11:55/132
	21:56	21:16 06:59-07:10/11	20:10	19:00	16:58 14:35-15:06/31	16:26 12:17-12:28/11
9	05:28	06:10 19:37-20:07/30	07:00 18:43-19:26/43	07:49	07:44 15:14-15:58/44 09:28-10:59/91	08:31 14:40-15:18/38 09:44-11:55/131
	21:56	21:14 06:57-07:12/15	20:08	18:58	16:56 14:34-15:07/33	16:26 12:15-12:30/15
10	05:29	06:11 19:36-20:07/31	07:02 18:41-19:25/44	07:51	07:46 15:15-15:58/43 09:28-11:02/94	08:32 14:40-15:18/38 09:45-11:56/131
	21:55	21:12 06:56-07:13/17	20:05	18:56	16:55 14:33-15:08/35	16:26 12:14-12:36/22
11	05:30	06:13 19:35-20:08/33	07:03 18:37-19:24/47	07:53	07:48 15:15-15:58/43 09:28-11:05/97	08:33 14:41-15:18/37 09:45-11:56/131
	21:54	21:10 06:55-07:14/19	20:03	18:54	16:53 14:32-15:09/37	16:26 12:14-12:38/24
12	05:31	06:15 19:33-20:08/35	07:05 18:34-19:22/48	07:55	07:49 15:16-15:58/42 09:28-11:07/99	08:34 14:41-15:18/37 09:46-11:57/131
	21:53	21:08 06:54-07:14/20	20:01	18:51	16:52 14:32-15:10/38	16:26 12:13-12:40/27
13	05:32	06:16 19:32-20:09/37	07:07 18:33-19:21/48	07:56	07:51 15:17-15:59/42 09:28-11:09/101	08:35 14:42-15:19/37 09:46-11:57/131
	21:52	21:06 06:53-07:15/22	19:58	18:49	16:50 14:31-15:11/40	16:26 12:13-12:41/28
14	05:33	06:18 19:30-20:08/38	07:08 18:30-19:19/49	07:58 08:52-08:56/4	07:53 15:18-16:00/42 09:28-11:10/102	08:36 14:43-15:19/36 09:47-11:58/131
	21:51	21:04 06:53-07:15/22	19:56	18:47	16:49 14:31-15:12/41	16:26 12:13-12:43/30
15	05:34	06:19 19:30-20:09/39	07:10 18:29-19:17/48	08:00 08:48-08:59/11	07:55 15:20-16:00/40 09:28-11:12/104	08:37 14:43-15:19/36 09:47-11:59/132
	21:50	21:02 06:53-07:15/22	19:54	18:45	16:47 14:31-15:12/41	16:26 12:13-12:44/31
16	05:35	06:21 19:28-20:08/40	07:11 18:29-19:15/46	08:01 08:45-09:00/15	07:56 15:21-16:01/40 09:29-11:13/104	08:38 14:44-15:20/36 09:48-11:59/131
	21:49	21:00 06:53-07:15/22	19:51	18:43	16:46 14:31-15:13/42	16:26 12:13-12:45/32
17	05:36	06:23 19:26-20:09/43	07:13 18:27-19:10/43	08:03 08:44-09:01/17	07:58 15:22-16:00/38 09:28-11:13/105	08:39 14:45-15:20/35 09:49-12:00/131
	21:48	20:58 06:52-07:14/22	19:49	18:41	16:44 14:30-15:13/43	16:26 12:14-12:46/32
18	05:38	06:24 19:23-20:08/45	07:15 18:27-19:08/41	08:05 16:30-16:44/14	08:00 15:23-16:00/37 09:28-11:14/106	08:40 14:45-15:20/35 12:13-12:46/33
	21:47	20:56 06:53-07:14/21	19:47	18:38 08:43-09:02/19	16:43 14:30-15:13/43	16:26 13:02-13:06/4 09:48-12:00/132
19	05:39	06:26 19:22-20:08/46	07:16 18:25-19:04/39	08:07 16:26-16:47/21	08:02 15:25-16:01/36 09:29-11:15/106	08:40 14:46-15:21/35 12:14-12:47/33
	21:46	20:54 06:53-07:13/20	19:44	18:36 08:43-09:03/20	16:42 14:30-15:14/44	16:26 13:01-13:07/6 09:49-12:01/132
20	05:40	06:28 19:21-20:08/47	07:18 18:25-18:59/34	08:08 16:24-16:49/25	08:03 15:26-16:01/35 11:18-11:31/13	08:41 14:46-15:21/35 12:14-12:48/34
	21:45	20:52 06:55-07:12/17	19:42	18:34 08:42-09:03/21	16:41 14:30-15:14/44 09:30-11:17/107	16:27 13:02-13:09/7 09:50-12:01/131
21	05:42	06:29 19:19-20:07/48	07:20 18:25-18:57/32	08:10 16:21-16:51/30	08:05 15:26-16:01/35 09:30-11:35/125	08:42 14:46-15:21/35 12:14-12:48/34
	21:44	20:50 06:56-07:10/14	19:40	18:32 08:42-09:03/21	16:39 14:30-15:15/45	16:27 13:01-13:09/8 09:50-12:01/131
22	05:43	06:31 19:18-20:06/48	07:21 18:25-18:56/31	08:12 16:19-16:51/32	08:07 15:27-16:01/34 09:31-11:38/127	08:42 14:47-15:22/35 12:15-12:49/34
	21:42	20:48 06:58-07:09/11	19:37	18:30 08:42-09:03/21	16:38 14:31-15:15/44	16:28 13:02-13:10/8 09:51-12:02/131
23	05:44	06:32 19:17-20:05/48	07:23 18:25-18:56/31	08:14 16:17-16:52/35	08:08 15:27-16:00/33 09:31-11:39/128	08:43 14:47-15:22/35 12:15-12:49/34
	21:41	20:46 06:59-07:05/6	19:35	18:28 08:42-09:02/20	16:37 14:30-15:15/45	16:28 13:02-13:10/8 09:51-12:02/131
24	05:46	06:34 19:16-20:04/48	07:24 18:25-18:54/29	08:15 16:16-16:53/37	08:10 15:28-16:00/32 09:31-11:41/130	08:43 14:47-15:23/36 12:17-12:49/32
	21:40	20:43	19:33	18:26 08:42-09:01/19	16:36 14:31-15:15/44	16:29 13:03-13:10/7 09:52-12:04/132
25	05:47	06:36 19:15-20:02/47	07:26 18:26-18:53/27	07:17 15:15-15:54/39	08:12 15:29-16:00/31 09:32-11:43/131	08:43 14:49-15:24/35 12:17-12:50/33
	21:38	20:41	19:30	17:24 07:44-08:00/16	16:35 14:32-15:16/44	16:29 13:05-13:10/5 09:52-12:04/132
26	05:48	06:37 19:09-20:01/52	07:28 18:27-18:52/25	07:19 15:14-15:55/41 07:46-07:59/13	08:13 15:30-16:00/30 09:33-11:44/131	08:44 14:49-15:24/35 09:52-12:04/132
	21:37	20:39	19:28	17:22 09:45-09:58/13	16:34 14:32-15:16/44	16:30 12:17-12:50/33
27	05:50	06:39 19:02-19:58/56	07:29 18:27-18:50/23	07:21 15:14-15:56/42 07:48-07:57/9	08:15 15:30-15:59/29 09:33-11:45/132	08:44 14:49-15:25/36 09:53-12:04/131
	21:36	20:37	19:26	17:20 09:41-10:03/22	16:33 14:32-15:16/44	16:31 12:18-12:50/32
28	05:51	06:41 18:58-19:56/58	07:31 18:28-18:48/20	07:23 15:13-15:56/43 07:50-07:54/4	08:16 15:31-15:59/28 09:34-11:46/132	08:44 14:49-15:25/36 09:53-12:04/131
	21:34	20:35	19:23	17:18 09:39-10:06/27	16:32 14:33-15:16/43	16:32 12:19-12:50/31
29	05:53	06:42 18:55-19:54/59	07:33 18:31-18:46/15	07:24 15:13-15:56/43	08:18 15:33-15:59/26 09:36-11:48/132	08:44 14:49-15:26/37 09:53-12:05/132
	21:33	20:32	19:21	17:16 09:37-10:08/31	16:31 14:34-15:17/43	16:33 12:19-12:50/31
30	05:54	06:44 18:53-19:53/60	07:34 18:34-18:40/6	07:26 15:13-15:57/44	08:19 15:33-15:57/24 09:36-11:48/132	08:45 14:50-15:26/36 09:54-12:05/131
	21:31	20:30	19:19	17:14 09:35-10:10/35	16:31 14:34-15:16/42	16:33 12:20-12:49/29
31	05:56	06:45 18:52-19:52/60		07:28 15:12-15:57/45		08:45 14:50-15:27/37 09:54-12:06/132
	21:29	20:28		17:12 09:34-10:12/38		16:34 12:22-12:49/27
Potential sun hours	502	454	381	331	266	244
Sum of minutes with flicker	0	1479	1214	887	5251	6060

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-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Project:
WP A15-Lingewaard

Licensed user:
Solidwinds
A: Toernooiveld 200
NL-6525 EC Nijmegen
+31 (0)6 832 17 832
Dominique Deen / dominique.deen@solidwinds.com
Calculated:
13-12-2017 11:10/3.1.617

SHADOW - Calendar per WTG

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR, NO MITIGATION)WTG: 5 - WT5

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,80	2,50	4,10	5,50	6,70	7,20	6,50	5,90	4,80	3,20	1,80	1,40

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
393	430	818	642	394	394	717	1.321	1.489	903	589	370	8.459

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

	January	February	March	April	May	June
1	08:45 12:38-15:33/175 09:35-10:09/34 16:36 10:19-11:30/71	08:18 13:36-15:00/84 17:23 09:04-10:20/76	07:24 18:15	07:14 18:05-19:06/61 20:09	06:09 18:18-20:03/105 21:00	05:24 19:11-20:27/76 21:46
2	08:44 12:38-15:34/176 09:35-10:10/35 16:37 10:20-11:30/70	08:16 13:37-14:59/82 17:25 09:03-10:19/76	07:22 18:17	07:12 18:06-19:08/62 20:11	06:07 18:20-20:04/104 21:01	05:23 19:12-20:28/76 21:47
3	08:44 12:38-15:33/175 09:34-10:10/36 16:38 10:20-11:29/69	08:15 13:38-14:57/79 17:27 09:03-10:19/76	07:20 18:19	07:09 18:06-19:13/67 20:12	06:05 18:20-20:05/105 21:03	05:22 19:13-20:28/75 21:48
4	08:44 12:39-15:34/175 09:34-10:11/37 16:39 10:21-11:30/69	08:13 14:39-14:54/15 08:54-10:17/83 17:29 13:39-14:38/59	07:18 18:20	07:07 18:07-19:17/70 20:14	06:03 18:21-20:05/104 21:05	05:22 19:13-20:28/75 21:49
5	08:44 12:40-15:35/175 09:34-10:13/39 16:40 10:22-11:30/68	08:11 13:40-14:37/57 17:31 08:52-10:16/84	07:16 18:22	07:05 18:07-19:19/72 20:16	06:02 18:22-20:06/104 21:06	05:21 19:14-20:29/75 21:50
6	08:44 12:40-15:35/175 09:34-10:13/39 16:41 10:22-11:29/67	08:10 13:41-14:36/55 17:33 08:49-10:14/85	07:13 18:24	07:02 18:08-19:21/73 20:17	06:00 18:24-20:07/103 21:08	05:20 19:15-20:29/74 21:51
7	08:43 12:41-15:35/174 09:34-10:14/40 16:43 10:23-11:29/66	08:08 13:42-14:35/53 17:35 08:48-10:12/84	07:11 18:26	07:00 18:09-19:23/74 20:19	05:58 18:25-20:08/103 21:10	05:20 19:16-20:30/74 21:52
8	08:43 12:42-15:35/173 09:33-10:14/41 16:44 10:23-11:28/65	08:06 13:43-14:34/51 17:36 08:47-10:10/83	07:09 18:27	06:58 18:11-19:24/73 20:21	05:56 18:26-20:08/102 21:11	05:19 19:16-20:29/73 21:53
9	08:42 12:42-15:35/173 09:33-10:15/42 16:45 10:23-11:26/63	08:04 13:45-14:34/49 17:38 08:46-10:00/74	07:07 18:29	06:56 18:11-19:25/74 20:23	05:54 18:28-20:10/102 21:13	05:19 19:17-20:30/73 21:53
10	08:42 12:43-15:36/173 10:25-11:13/48 16:47 11:14-11:25/11 09:33-10:16/43	08:03 13:47-14:32/45 17:40 08:45-09:55/70	07:04 18:31	06:53 18:13-19:26/73 20:24	05:53 18:29-20:11/102 21:15	05:18 19:19-20:31/72 21:54
11	08:41 12:44-15:36/172 10:25-11:12/47 16:48 11:17-11:22/5 09:33-10:17/44	08:01 13:48-14:31/43 17:42 08:44-09:54/70	07:02 18:33	06:51 18:15-19:27/72 20:26	05:51 18:31-20:13/102 21:16	05:18 19:19-20:31/72 21:55
12	08:40 12:44-15:36/172 09:33-10:17/44 16:50 10:26-11:11/45	07:59 13:51-14:29/38 17:44 08:44-09:53/69	07:00 18:35	06:49 18:18-19:28/70 20:28	05:49 18:33-20:14/101 21:18	05:17 19:20-20:31/71 21:56
13	08:40 12:45-15:36/171 09:32-10:18/46 16:51 10:27-11:10/43 09:17-09:21/4	07:57 13:53-14:27/34 17:46 08:43-09:52/69	06:58 17:27-17:42/15 18:36	06:47 18:18-19:28/70 20:29	05:48 18:36-20:16/100 21:19	05:17 19:20-20:31/71 21:56
14	08:39 12:45-15:36/171 09:32-10:18/46 16:53 10:27-11:07/40 09:14-09:24/10	07:55 13:57-14:24/27 17:48 08:43-09:51/68	06:55 17:24-17:46/22 18:38	06:45 18:16-19:28/72 20:31	05:46 18:39-20:17/98 21:21	05:17 19:21-20:31/70 21:57
15	08:38 12:46-15:36/170 09:32-10:19/47 16:54 10:28-11:06/38 09:13-09:26/13	07:53 14:02-14:20/18 17:49 08:43-09:50/67	06:53 17:21-17:49/28 18:40	06:42 18:16-19:28/72 20:33	05:45 18:58-20:18/80 21:22	05:17 19:22-20:32/70 21:57
16	08:37 12:47-15:35/168 09:32-10:19/47 16:56 10:29-11:05/36 09:12-09:28/16	07:51 08:43-09:48/65 17:51	06:51 17:18-17:50/32 18:41	06:40 18:16-19:29/73 20:34	05:43 19:01-20:19/78 21:24	05:17 19:23-20:32/69 21:58
17	08:36 12:48-15:35/167 09:11-10:20/69 16:57 10:30-11:04/34	07:49 08:43-09:46/63 17:53	06:48 17:16-17:52/36 18:43	06:38 18:15-19:29/74 20:36	05:42 19:01-20:20/79 21:25	05:17 19:23-20:32/69 21:58
18	08:36 12:49-15:35/166 09:11-10:20/69 16:59 10:32-11:03/31	07:47 08:43-09:43/60 17:55	06:46 17:15-17:54/39 18:45	06:36 18:15-19:39/84 20:38	05:40 19:02-20:21/79 21:27	05:17 19:23-20:32/69 21:59
19	08:35 15:15-15:34/19 10:33-11:02/29 17:01 12:50-15:14/144 09:10-10:21/71	07:45 08:43-09:36/53 17:57	06:44 17:14-17:55/41 18:47	06:34 18:15-19:42/87 20:40	05:39 19:02-20:21/79 21:28	05:17 19:23-20:33/70 21:59
20	08:34 15:17-15:34/17 10:35-10:59/24 17:02 12:52-15:13/141 09:09-10:21/72	07:43 08:43-09:35/52 17:59	06:42 17:12-17:55/43 18:48	06:32 18:15-19:45/90 20:41	05:37 19:03-20:22/79 21:30	05:17 19:23-20:33/70 22:00 06:20-06:22/2
21	08:32 15:18-15:32/14 10:36-10:55/19 17:04 12:52-15:11/139 09:07-10:21/74	07:41 08:43-09:32/49 18:00	06:39 17:11-17:56/45 18:50	06:29 18:15-19:47/92 20:43	05:36 19:03-20:23/80 21:31	05:17 19:24-20:33/69 22:00 06:19-06:22/3
22	08:31 15:21-15:30/9 10:39-10:53/14 17:06 12:54-15:10/136 09:06-10:21/75	07:39 08:43-09:30/47 18:02	06:37 17:10-17:57/47 18:52	06:27 18:15-19:48/93 20:45	05:35 19:04-20:24/80 21:33	05:17 19:24-20:34/70 22:00 06:21-06:23/2
23	08:30 12:56-15:08/132 09:06-10:22/76 17:07 10:43-10:50/7	07:37 08:44-09:27/43 18:04	06:35 17:09-17:56/47 18:54	06:25 18:15-19:50/95 20:46	05:33 19:05-20:24/79 21:34	05:17 19:24-20:34/70 22:00
24	08:29 12:57-15:05/128 17:09 09:05-10:21/76	07:35 08:45-09:15/30 18:06	06:32 17:08-17:57/49 18:55	06:23 18:15-19:53/98 20:48	05:32 19:05-20:25/80 21:36	05:18 19:24-20:33/69 22:00
25	08:28 13:33-15:06/93 09:05-10:22/77 17:11 12:59-13:31/32	07:33 08:47-09:14/27 18:08	06:30 17:08-17:57/49 18:57	06:21 18:16-19:55/99 20:50	05:31 19:06-20:26/80 21:37	05:18 19:24-20:33/69 22:00
26	08:26 13:33-15:05/92 09:05-10:21/76 17:13 13:01-13:29/28	07:31 08:48-09:12/24 18:10	06:28 17:06-17:57/51 18:59	06:19 18:16-19:57/101 20:51	05:30 19:07-20:26/79 21:38	05:18 19:25-20:34/69 22:00
27	08:25 13:34-15:05/91 09:04-10:21/77 17:14 13:04-13:27/23	07:29 08:49-09:09/20 18:11	06:25 17:06-17:57/51 19:00	06:17 18:16-19:59/103 20:53	05:29 19:08-20:26/78 21:40	05:19 19:24-20:34/70 22:00
28	08:24 13:34-15:04/90 09:03-10:21/78 17:16 13:07-13:23/16	07:27 08:52-09:06/14 18:13	06:23 17:06-17:57/51 19:02	06:15 18:17-20:00/103 20:55	05:28 19:08-20:27/79 21:41	05:19 19:25-20:35/70 22:00
29	08:22 13:35-15:04/89 17:18 09:04-10:21/77		07:21 18:05-18:56/51 20:04	06:13 18:17-20:01/104 20:56	05:27 19:09-20:27/78 21:42	05:20 19:24-20:34/70 22:00
30	08:21 13:35-15:02/87 17:20 09:04-10:20/76		07:18 18:06-18:59/53 20:06	06:11 18:18-20:02/104 20:58	05:26 19:09-20:27/78 21:43	05:20 19:24-20:35/71 22:00
31	08:19 13:36-15:02/86 17:22 09:04-10:20/76		07:16 18:06-19:04/58 20:07		05:25 19:10-20:27/77 21:44	
Potential sun hours	259	278	367	416	485	499
Sum of minutes with flicker	7608	2470	808	2455	2777	2148

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-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Project:
WP A15-Lingewaard

Licensed user:
Solidwinds
A: Toernooiveld 200
NL-6525 EC Nijmegen
+31 (0)6 832 17 832
Dominique Deen / dominique.deen@solidwinds.com
Calculated:
13-12-2017 11:10/3.1.617

SHADOW - Calendar per WTG

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR, NO MITIGATION)WTG: 5 - WT5

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,80	2,50	4,10	5,50	6,70	7,20	6,50	5,90	4,80	3,20	1,80	1,40

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
393	430	818	642	394	394	717	1.321	1.489	903	589	370	8.459

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

	July	August	September	October	November	December
1	05:21 19:24-20:35/71 22:00	05:57 18:42-20:24/102 21:28	06:47 18:14-19:26/72 20:26	07:36 18:11-18:18/7 19:16	07:30 13:15-14:01/46 17:10 08:15-09:24/69	08:21 12:26-15:18/172 10:07-10:54/47 16:30 11:00-11:03/3 09:15-09:59/44
2	05:22 19:23-20:35/72 21:59	05:59 18:41-20:23/102 21:26	06:49 18:12-19:25/73 20:23	07:38 19:14	07:31 13:13-14:03/50 17:08 08:15-09:34/79	08:22 12:25-15:18/173 10:07-10:55/48 16:29 10:56-11:07/11 09:15-09:58/43
3	05:22 19:23-20:35/72 21:59	06:00 18:39-20:20/101 21:24	06:50 18:09-19:23/74 20:21	07:39 19:12	07:33 13:12-14:04/52 17:07 08:16-09:39/83	08:23 12:26-15:19/173 09:17-09:59/42 16:29 10:08-11:10/62
4	05:23 19:23-20:36/73 21:58	06:02 18:37-20:19/102 21:23	06:52 18:08-19:21/73 20:19	07:41 19:09	07:35 13:11-14:05/54 17:05 08:18-09:42/84	08:25 12:26-15:19/173 09:17-09:58/41 16:28 10:07-11:12/65
5	05:24 19:22-20:35/73 21:58	06:04 18:36-20:18/102 21:21	06:54 18:05-19:19/74 20:17	07:43 19:07	07:37 13:10-14:06/56 17:03 08:19-09:44/85	08:26 12:26-15:21/175 09:19-09:59/40 16:28 10:08-11:14/66
6	05:25 19:21-20:35/74 21:57	06:05 18:34-20:17/103 21:19	06:55 18:04-19:17/73 20:14	07:44 19:05	07:39 13:09-14:07/58 17:01 08:22-09:46/84	08:27 12:26-15:21/175 09:20-09:59/39 16:27 10:08-11:15/67
7	05:26 19:21-20:36/75 21:57	06:07 18:33-20:16/103 21:17	06:57 18:02-19:14/72 20:12	07:46 19:03	07:40 14:09-14:24/15 08:24-09:47/83 17:00 13:09-14:07/58	08:29 12:26-15:21/175 09:20-09:59/39 16:27 10:08-11:16/68
8	05:27 19:21-20:36/75 21:56	06:08 18:31-20:15/104 21:16	06:58 18:01-19:11/70 20:10	07:48 19:00	07:42 13:08-14:27/79 16:58 08:33-09:48/75	08:30 12:27-15:22/175 09:22-10:00/38 16:26 10:09-11:18/69
9	05:27 19:20-20:36/76 21:56	06:10 18:30-20:14/104 21:14	07:00 18:01-19:08/67 20:08	07:49 18:58	07:44 13:08-14:30/82 16:56 08:34-09:49/75	08:31 12:27-15:22/175 09:23-09:59/36 16:26 10:09-11:18/69
10	05:28 19:20-20:36/76 21:55	06:11 18:29-20:13/104 21:12	07:02 17:59-19:02/63 20:05	07:51 18:56	07:46 13:07-14:31/84 16:55 08:35-09:50/75	08:32 12:28-15:23/175 09:24-09:59/35 16:26 10:09-11:19/70
11	05:30 19:19-20:36/77 21:54	06:13 18:28-20:13/105 21:10	07:03 17:59-18:59/60 20:03	07:53 18:54	07:48 13:07-14:33/86 16:53 08:35-09:51/76	08:33 12:28-15:23/175 09:25-09:59/34 16:26 10:09-11:20/71
12	05:31 19:19-20:36/77 21:53	06:15 18:26-20:11/105 21:08	07:05 17:57-18:56/59 20:01	07:55 18:51	07:49 13:07-14:34/87 16:52 08:35-09:52/77	08:34 12:28-15:23/175 10:09-11:21/72 16:26 11:28-11:32/4 09:26-10:00/34
13	05:32 19:18-20:36/78 21:52	06:16 18:26-20:10/104 21:06	07:07 17:57-18:51/54 19:58	07:56 09:27-09:37/10 18:49	07:51 13:07-14:36/89 16:50 08:36-09:53/77	08:35 12:28-15:24/176 10:10-11:22/72 16:26 11:26-11:34/8 09:27-10:00/33
14	05:33 19:18-20:36/78 21:51	06:18 18:24-20:08/104 21:04	07:08 17:56-18:46/50 19:56	07:58 09:24-09:40/16 18:47	07:53 13:07-14:37/90 08:36-09:54/78 16:49 12:40-12:56/16	08:36 12:29-15:24/175 10:10-11:22/72 16:26 11:26-11:36/10 09:28-10:00/32
15	05:34 19:17-20:35/78 21:50	06:19 18:24-20:07/103 21:02	07:10 17:56-18:46/50 19:54	08:00 09:21-09:43/22 18:45	07:55 13:07-14:38/91 08:37-09:54/77 16:47 12:37-13:00/23	08:37 12:29-15:25/176 10:11-11:23/72 16:26 11:25-11:38/13 09:29-10:00/31
16	05:35 19:16-20:35/79 21:49	06:21 18:23-20:05/102 21:00	07:11 17:56-18:46/50 19:51	08:01 09:19-09:44/25 18:43	07:56 13:07-14:39/92 08:38-09:55/77 16:46 12:35-13:03/28	08:38 12:30-15:25/175 10:11-11:24/73 16:26 11:25-11:39/14 09:31-10:01/30
17	05:36 19:16-20:35/79 21:48	06:23 18:22-20:03/101 20:58	07:13 17:55-18:45/50 19:49	08:03 09:17-09:45/28 18:40	07:58 13:06-14:39/93 08:38-09:55/77 16:44 12:32-13:04/32	08:39 12:31-15:26/175 09:32-10:01/29 16:26 10:12-11:40/88
18	05:38 19:16-20:35/79 21:47	06:24 18:21-20:00/99 20:56	07:15 17:55-18:45/50 19:47	08:05 09:48-09:54/6 18:38 09:16-09:46/30	08:00 12:31-14:39/128 16:43 08:39-09:55/76	08:40 12:30-15:26/176 09:32-10:01/29 16:26 10:12-11:41/89
19	05:39 19:15-20:35/80 21:46	06:26 18:21-19:58/97 20:54	07:16 17:54-18:43/49 19:44	08:07 09:15-09:59/44 18:36	08:02 12:30-14:42/132 08:40-09:56/76 16:42 10:17-10:24/7	08:40 12:31-15:27/176 09:33-10:01/28 16:26 10:12-11:42/90
20	05:40 19:15-20:34/79 21:45	06:28 18:21-19:55/94 20:52	07:18 17:55-18:43/48 19:42	08:08 09:15-10:02/47 18:34	08:03 14:56-15:05/9 10:14-10:28/14 16:41 12:29-14:45/136 08:41-09:56/75	08:41 12:32-15:27/175 09:34-10:02/28 16:27 10:13-11:43/90
21	05:42 19:14-20:34/80 21:44	06:29 18:20-19:53/93 20:50	07:20 17:55-18:42/47 19:40	08:10 09:14-10:04/50 18:32	08:05 14:54-15:08/14 10:12-10:31/19 16:39 12:28-14:47/139 08:43-09:57/74	08:42 12:32-15:27/175 09:34-10:02/28 16:27 10:13-11:43/90
22	05:43 19:13-20:33/80 21:42	06:31 18:20-19:51/91 20:48	07:21 17:55-18:41/46 19:37	08:12 09:13-10:05/52 18:30	08:07 14:53-15:10/17 10:11-10:35/24 16:38 12:28-14:49/141 08:45-09:57/72	08:42 12:33-15:28/175 09:35-10:03/28 16:28 10:14-11:44/90
23	05:44 19:13-20:33/80 21:41	06:32 18:19-19:48/89 20:46	07:23 17:56-18:40/44 19:35	08:14 09:12-10:08/56 18:28	08:08 14:51-15:10/19 10:09-10:38/29 16:37 12:26-14:50/144 08:47-09:57/70	08:43 12:33-15:28/175 09:35-10:03/28 16:28 10:14-11:44/90
24	05:46 19:13-20:32/79 21:40	06:34 18:19-19:46/87 20:43	07:24 17:56-18:38/42 19:33	08:15 09:12-10:13/61 18:26	08:10 12:26-15:12/166 08:48-09:57/69 16:36 10:09-10:40/31	08:43 12:33-15:28/175 09:36-10:04/28 16:29 10:15-11:44/89
25	05:47 19:12-20:31/79 21:38	06:36 18:18-19:41/83 20:41	07:26 17:57-18:37/40 19:30	07:17 08:12-09:16/64 17:24	08:11 12:26-15:13/167 08:49-09:58/69 16:35 10:09-10:42/33	08:43 12:34-15:30/176 09:36-10:05/29 16:29 10:16-11:45/89
26	05:48 19:12-20:31/79 21:37	06:37 18:18-19:32/74 20:39	07:28 17:58-18:35/37 19:28	07:19 13:38-13:43/5 17:22 08:12-09:18/66	08:13 12:26-15:15/169 09:11-09:58/47 16:34 10:08-10:44/36 08:51-09:07/16	08:44 12:35-15:30/175 09:36-10:05/29 16:30 10:16-11:45/89
27	05:50 19:12-20:30/78 21:36	06:39 18:18-19:31/73 20:37	07:29 17:59-18:32/33 19:26	07:21 13:30-13:51/21 17:20 08:12-09:20/68	08:15 12:25-15:15/170 09:11-09:58/47 16:33 10:07-10:45/38 08:52-09:05/13	08:44 12:35-15:30/175 10:16-11:29/73 16:31 11:30-11:44/14 09:36-10:05/29
28	05:51 19:11-20:29/78 21:34	06:41 18:18-19:30/72 20:35	07:31 18:01-18:30/29 19:23	07:23 13:25-13:54/29 17:18 08:13-09:21/68	08:16 12:26-15:16/170 09:12-09:58/46 16:32 10:07-10:47/40 08:54-09:04/10	08:44 12:35-15:31/176 10:17-11:29/72 16:32 11:31-11:44/13 09:36-10:06/30
29	05:53 19:05-20:28/83 21:33 18:53-19:01/8	06:42 18:17-19:29/72 20:32	07:33 18:03-18:28/25 19:21	07:24 13:22-13:57/35 17:16 08:13-09:22/69	08:18 12:26-15:17/171 09:13-09:59/46 16:31 10:08-10:51/43 08:57-09:03/6	08:44 12:36-15:31/175 10:17-11:29/72 16:33 11:32-11:44/12 09:35-10:07/32
30	05:54 18:48-20:27/99 21:31	06:44 18:18-19:28/70 20:30	07:34 18:05-18:24/19 19:19	07:26 13:20-13:59/39 17:14 08:14-09:23/69	08:19 12:25-15:17/172 09:14-09:58/44 16:31 10:07-10:52/45	08:44 12:36-15:32/176 10:18-11:29/71 16:33 11:34-11:43/9 09:35-10:07/32
31	05:56 18:45-20:26/101 21:29	06:45 18:18-19:28/70 20:28		07:28 13:18-14:01/43 17:12 08:14-09:24/70		08:45 12:37-15:32/175 10:18-11:30/72 16:34 11:36-11:42/6 09:35-10:08/33
Potential sun hours	502	454	381	331	266	244
Sum of minutes with flicker	2445	2915	1593	1100	5971	8888

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

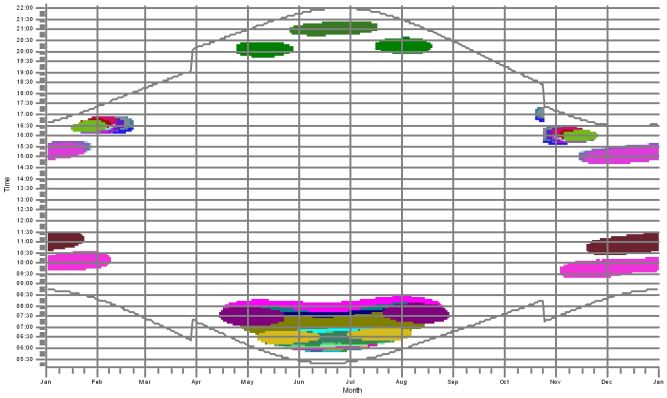
Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
Solidwinds
A: Toernooiveld 200
NL-6525 EC Nijmegen
+31 (0)6 832 17 832
Dominique Deen / dominique.deen@solidwinds.com
Calculated:
13-12-2017 11:10/3.1.617

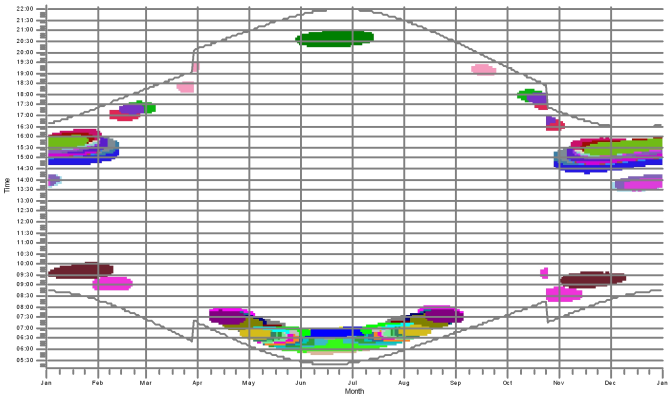
SHADOW - Calendar per WTG, graphical

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR, NO MITIGATION)

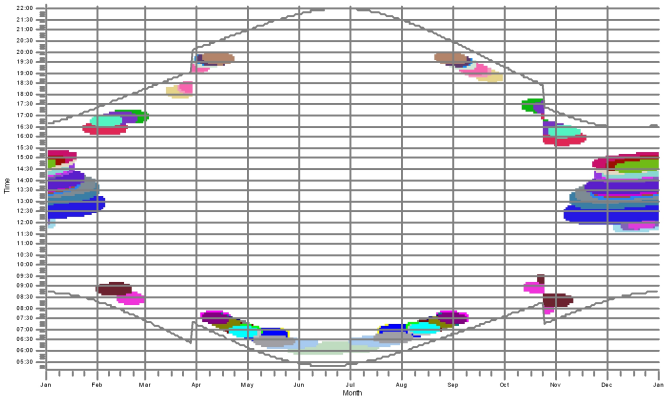
1: WT1



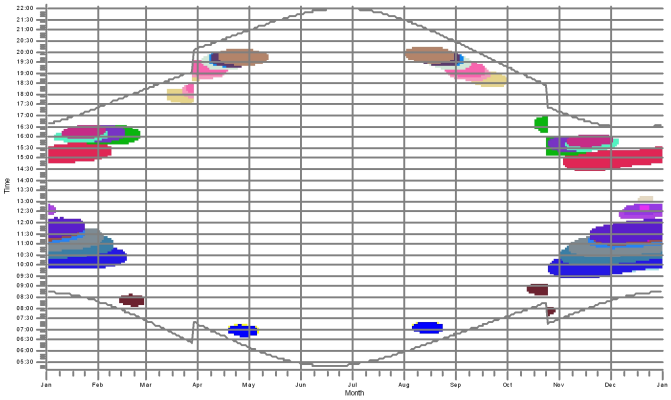
2: WT2



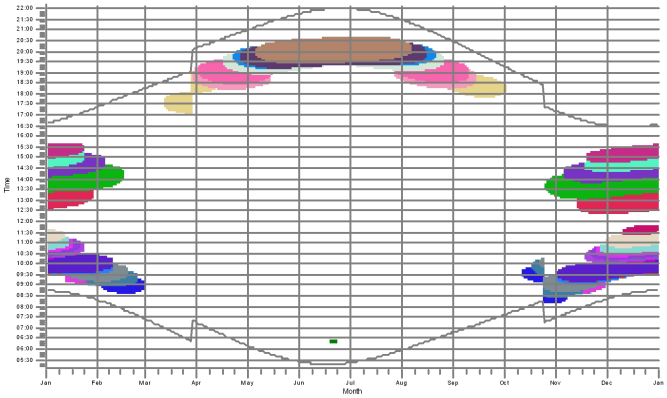
3: WT3



4: WT4



5: WT5



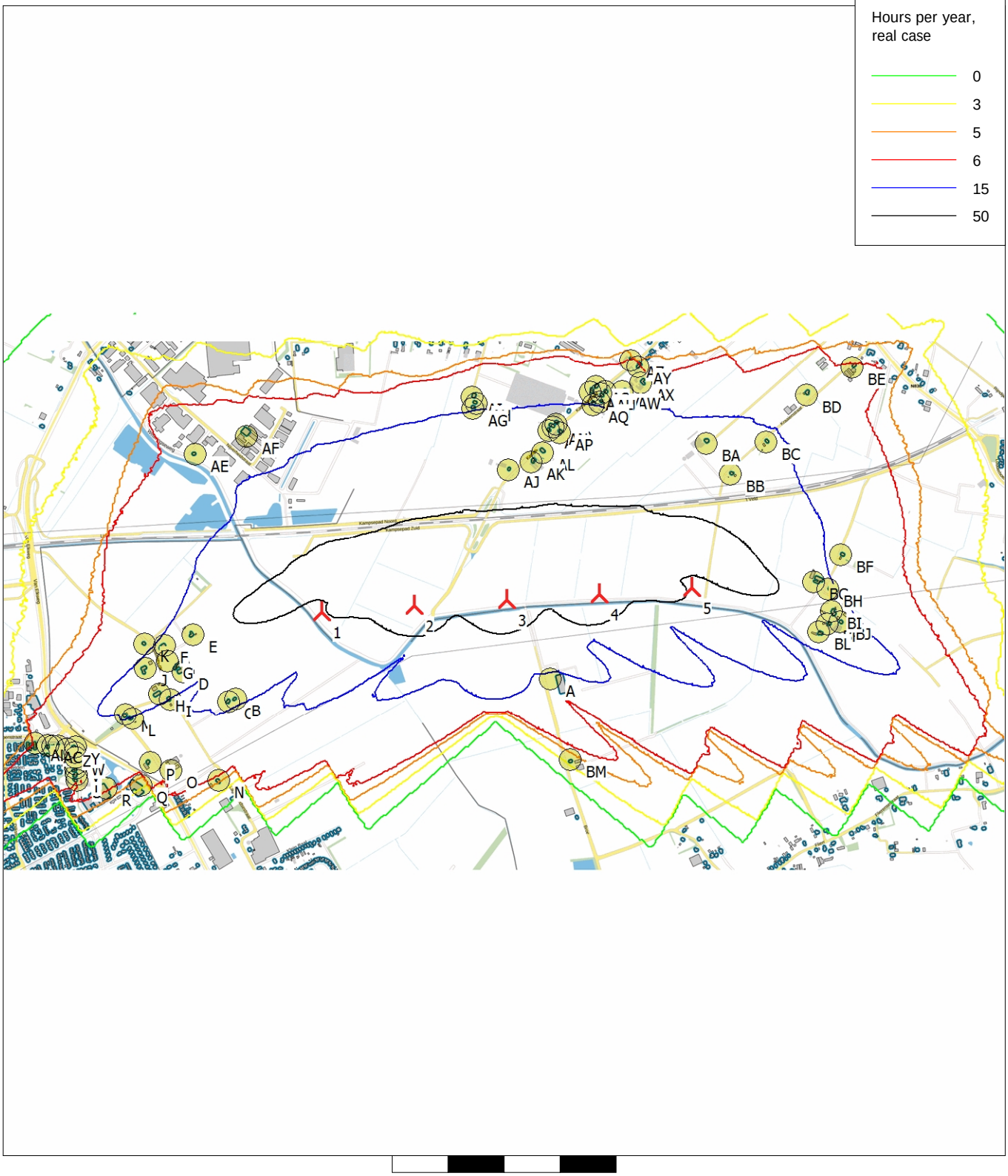
Shadow receptors

- A: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (1)
- B: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (2)
- C: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (3)
- D: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (4)
- E: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (5)
- F: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (6)
- G: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (7)
- H: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (8)
- I: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (9)
- J: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (10)
- K: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (11)
- L: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (12)
- M: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (13)
- N: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (14)
- O: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (15)
- P: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (16)
- Q: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (17)
- R: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (18)
- S: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (19)
- T: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (20)
- U: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (21)
- V: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (22)
- W: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (23)
- X: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (24)
- Y: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (25)
- Z: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (26)
- AA: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (27)
- AB: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (28)
- AC: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (29)
- AD: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (30)
- AE: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (31)
- AF: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (32)
- AG: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (33)
- AH: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (34)
- AI: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (35)
- AJ: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (36)
- AK: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (37)
- AL: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (38)
- AM: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (39)
- AN: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (40)
- AO: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (41)
- AP: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (42)
- AQ: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (43)
- AR: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (44)
- AS: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (45)
- AT: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (46)
- AU: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (47)
- AV: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (48)
- AW: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (49)
- AX: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (50)
- AY: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (51)
- AZ: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (52)
- BA: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (53)
- BB: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (54)
- BC: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (55)
- BD: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (56)
- BE: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (57)
- BF: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (58)
- BG: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (59)
- BH: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (60)
- BI: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (61)
- BJ: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (62)
- BK: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (63)
- BL: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (64)
- BM: Shadow Receptor: 4,0 × 4,0 Azimuth: 0,0° Slope: 90,0° (65)

Licensed user:
Solidwinds
A: Toernooiveld 200
NL-6525 EC Nijmegen
+31 (0)6 832 17 832
Dominique Deen / dominique.deen@solidwinds.com
Calculated:
13-12-2017 11:10/3.1.617

SHADOW - Map

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR, NO MITIGATION)



0 250 500 750 1000m

Map: BAG kaart groot , Print scale 1:25.000, Map center Dutch Stereo-RD/NAP 2000 East: 193.050 North: 434.850

New WTG Shadow receptor

Flicker map level: Elevation Grid Data Object: WP A15-Lingewaard_EMDGrid_0.wpg (1)