

Project:

Korvenneva layout

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FCG Suunnittelu ja tekniikka Oy

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Hans Vadbäck / hans.vadbäck@fcg.fi

Calculated:

4.12.2013 15:25/2.8.579

FCG
 SUUNNITTELU JA TEKNIikka

SHADOW - Main Result

Calculation: Korvenneva V126 x 12 x HH120

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) [JOKIOINEN]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,16	2,61	3,94	5,80	8,65	8,98	8,14	6,70	4,15	2,67	1,18	0,89

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

MERRA_basic_E21.335_N62.000

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
784	634	517	463	534	722	1064	1162	715	566	706	775	8642

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

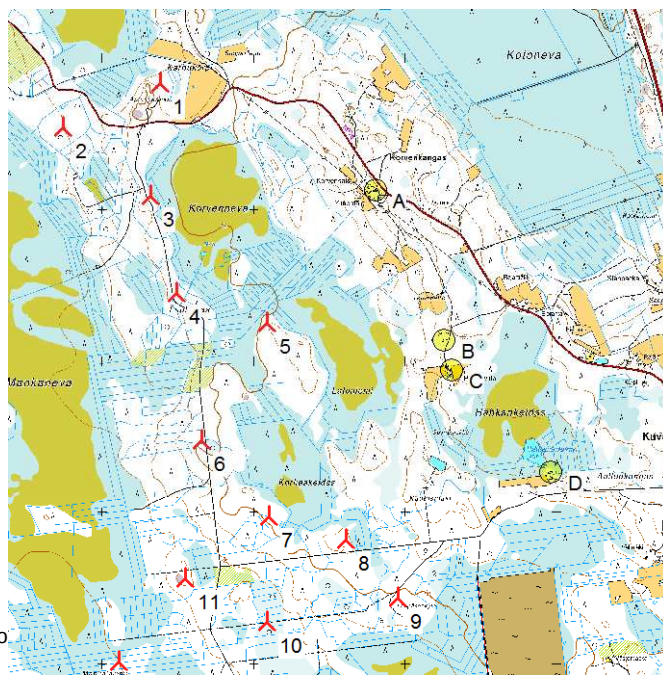
A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:

Height contours used: Height Contours: Korvenneva height contour lines.wpo

Obstacles used in calculation

Eye height: 1,5 m

Grid resolution: 10,0 m


 Scale 1:50 000
 New WTG
 Shadow receptor

WTGs

Finish TM ETRS-TM35FIN-ETRS89				WTG type			Shadow data				
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Calculation distance	RPM
		[m]					[kW]	[m]	[m]	[m]	[RPM]
1	214 381	6 881 832	37,1 VESTAS V126-3.3 G...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	120,0	2 000	0,0
2	213 741	6 881 542	32,5 VESTAS V126-3.3 G...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	120,0	2 000	0,0
3	214 317	6 881 090	38,3 VESTAS V126-3.3 G...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	120,0	2 000	0,0
4	214 489	6 880 449	37,9 VESTAS V126-3.3 G...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	120,0	2 000	0,0
5	215 087	6 880 252	41,1 VESTAS V126-3.3 G...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	120,0	2 000	0,0
6	214 650	6 879 474	39,0 VESTAS V126-3.3 G...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	120,0	2 000	0,0
7	215 100	6 878 968	40,6 VESTAS V126-3.3 G...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	120,0	2 000	0,0
8	215 604	6 878 816	42,5 VESTAS V126-3.3 G...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	120,0	2 000	0,0
9	215 948	6 878 435	39,5 VESTAS V126-3.3 G...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	120,0	2 000	0,0
10	215 084	6 878 275	34,4 VESTAS V126-3.3 G...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	120,0	2 000	0,0
11	214 545	6 878 560	35,0 VESTAS V126-3.3 G...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	120,0	2 000	0,0
12	214 105	6 878 012	30,0 VESTAS V126-3.3 G...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	120,0	2 000	0,0

Shadow receptor-Input

Finish TM ETRS-TM35FIN-ETRS89											
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	Asuinrakennus (Ylinentalo)	215 801	6 881 127	49,1	1,0	1,0	1,0	0,0	0,0	"Green house mode"	
B	Lomarakennus	216 253	6 880 135	48,1	1,0	1,0	1,0	0,0	0,0	"Green house mode"	
C	Asuinrakennus (Pihlajaviita)	216 302	6 879 940	47,6	1,0	1,0	1,0	0,0	0,0	"Green house mode"	
D	Lomarakennus (Hahkamanlammmi)	216 960	6 879 268	46,2	1,0	1,0	1,0	0,0	0,0	"Green house mode"	

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SHADOW - Main Result

Calculation: Korvenneva V126 x 12 x HH120

Calculation Results

Shadow receptor

No.	Name	Shadow, expected values
		Shadow hours per year [h/year]
A	Asuinrakennus (Ylinentalo)	5:11
B	Lomarakenus	6:38
C	Asuinrakennus (Pihlajaviita)	6:49
D	Lomarakenus (Hahkamanlammi)	2:53

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

No.	Name	Worst case	Expected
		[h/year]	[h/year]
1	VESTAS V126-3.3 GridStreame 3300 126.0 !O! hub: 120,0 m (TOT: 183,0 m) (205)	5:12	1:16
2	VESTAS V126-3.3 GridStreame 3300 126.0 !O! hub: 120,0 m (TOT: 183,0 m) (206)	0:00	0:00
3	VESTAS V126-3.3 GridStreame 3300 126.0 !O! hub: 120,0 m (TOT: 183,0 m) (207)	5:03	0:56
4	VESTAS V126-3.3 GridStreame 3300 126.0 !O! hub: 120,0 m (TOT: 183,0 m) (208)	10:57	2:05
5	VESTAS V126-3.3 GridStreame 3300 126.0 !O! hub: 120,0 m (TOT: 183,0 m) (209)	34:45	6:02
6	VESTAS V126-3.3 GridStreame 3300 126.0 !O! hub: 120,0 m (TOT: 183,0 m) (210)	6:41	1:08
7	VESTAS V126-3.3 GridStreame 3300 126.0 !O! hub: 120,0 m (TOT: 183,0 m) (211)	13:57	2:00
8	VESTAS V126-3.3 GridStreame 3300 126.0 !O! hub: 120,0 m (TOT: 183,0 m) (212)	34:30	4:18
9	VESTAS V126-3.3 GridStreame 3300 126.0 !O! hub: 120,0 m (TOT: 183,0 m) (213)	29:00	3:39
10	VESTAS V126-3.3 GridStreame 3300 126.0 !O! hub: 120,0 m (TOT: 183,0 m) (214)	0:00	0:00
11	VESTAS V126-3.3 GridStreame 3300 126.0 !O! hub: 120,0 m (TOT: 183,0 m) (215)	0:00	0:00
12	VESTAS V126-3.3 GridStreame 3300 126.0 !O! hub: 120,0 m (TOT: 183,0 m) (216)	0:00	0:00

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Calculated:

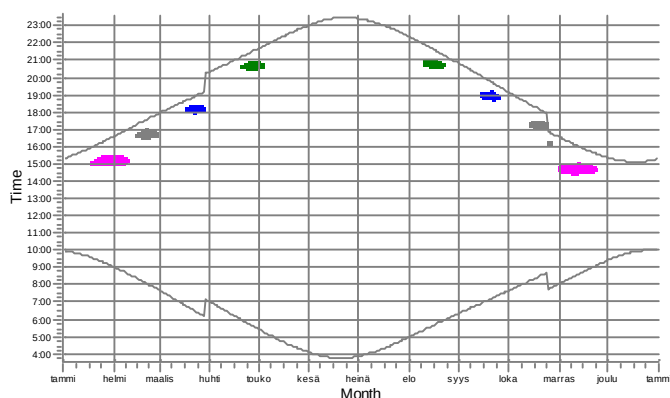
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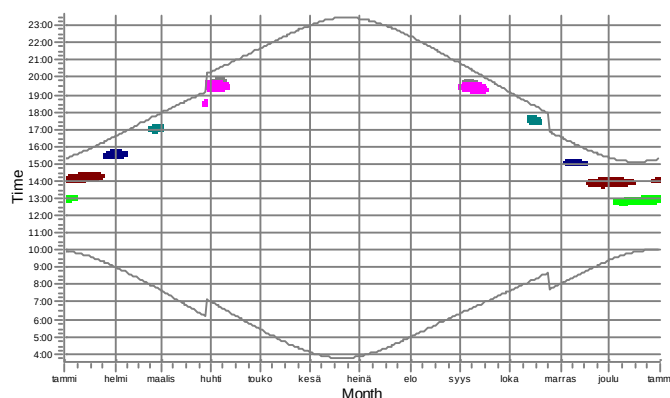
SHADOW - Calendar, graphical

Calculation: Korvenneva V126 x 12 x HH120

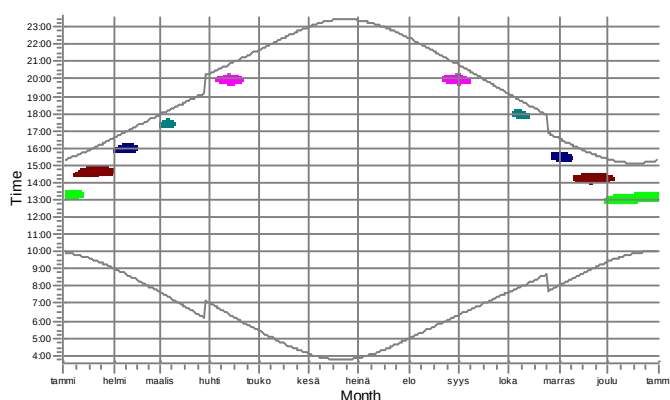
A: Asuinrakennus (Ylinentalo)



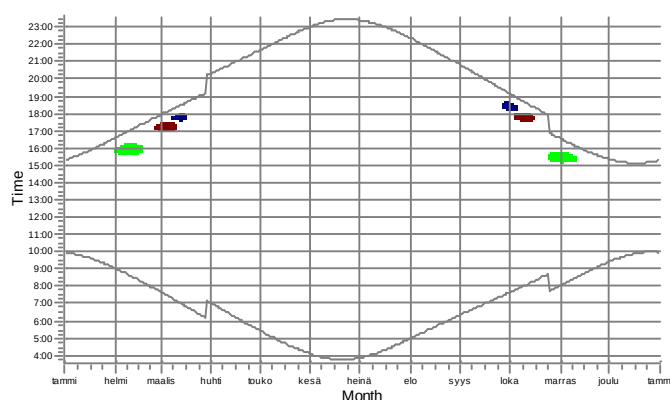
B: Lomarakenus



C: Asuinrakennus (Pihlajaviita)



D: Lomarakenus (Hahkamanlammi)



WTGs

- | | |
|---|---|
| <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="width: 20px; height: 10px; background-color: #90EE90; border: 1px solid black; margin-right: 5px;"></div> <div>1: VESTAS V126-3.3 GridStreame 3300 126.0 !O! hub: 120,0 m (TOT: 183,0 m) (205)</div> </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="width: 20px; height: 10px; background-color: #6495ED; border: 1px solid black; margin-right: 5px;"></div> <div>3: VESTAS V126-3.3 GridStreame 3300 126.0 !O! hub: 120,0 m (TOT: 183,0 m) (207)</div> </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="width: 20px; height: 10px; background-color: #A9A9A9; border: 1px solid black; margin-right: 5px;"></div> <div>4: VESTAS V126-3.3 GridStreame 3300 126.0 !O! hub: 120,0 m (TOT: 183,0 m) (208)</div> </div> <div style="display: flex; align-items: center;"> <div style="width: 20px; height: 10px; background-color: #FF69B4; border: 1px solid black; margin-right: 5px;"></div> <div>5: VESTAS V126-3.3 GridStreame 3300 126.0 !O! hub: 120,0 m (TOT: 183,0 m) (209)</div> </div> | <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="width: 20px; height: 10px; background-color: #4682B4; border: 1px solid black; margin-right: 5px;"></div> <div>6: VESTAS V126-3.3 GridStreame 3300 126.0 !O! hub: 120,0 m (TOT: 183,0 m) (210)</div> </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="width: 20px; height: 10px; background-color: #4169E1; border: 1px solid black; margin-right: 5px;"></div> <div>7: VESTAS V126-3.3 GridStreame 3300 126.0 !O! hub: 120,0 m (TOT: 183,0 m) (211)</div> </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="width: 20px; height: 10px; background-color: #CD5C5C; border: 1px solid black; margin-right: 5px;"></div> <div>8: VESTAS V126-3.3 GridStreame 3300 126.0 !O! hub: 120,0 m (TOT: 183,0 m) (212)</div> </div> <div style="display: flex; align-items: center;"> <div style="width: 20px; height: 10px; background-color: #32CD32; border: 1px solid black; margin-right: 5px;"></div> <div>9: VESTAS V126-3.3 GridStreame 3300 126.0 !O! hub: 120,0 m (TOT: 183,0 m) (213)</div> </div> |
|---|---|

WindPRO version 2.8.579 joulou 2012

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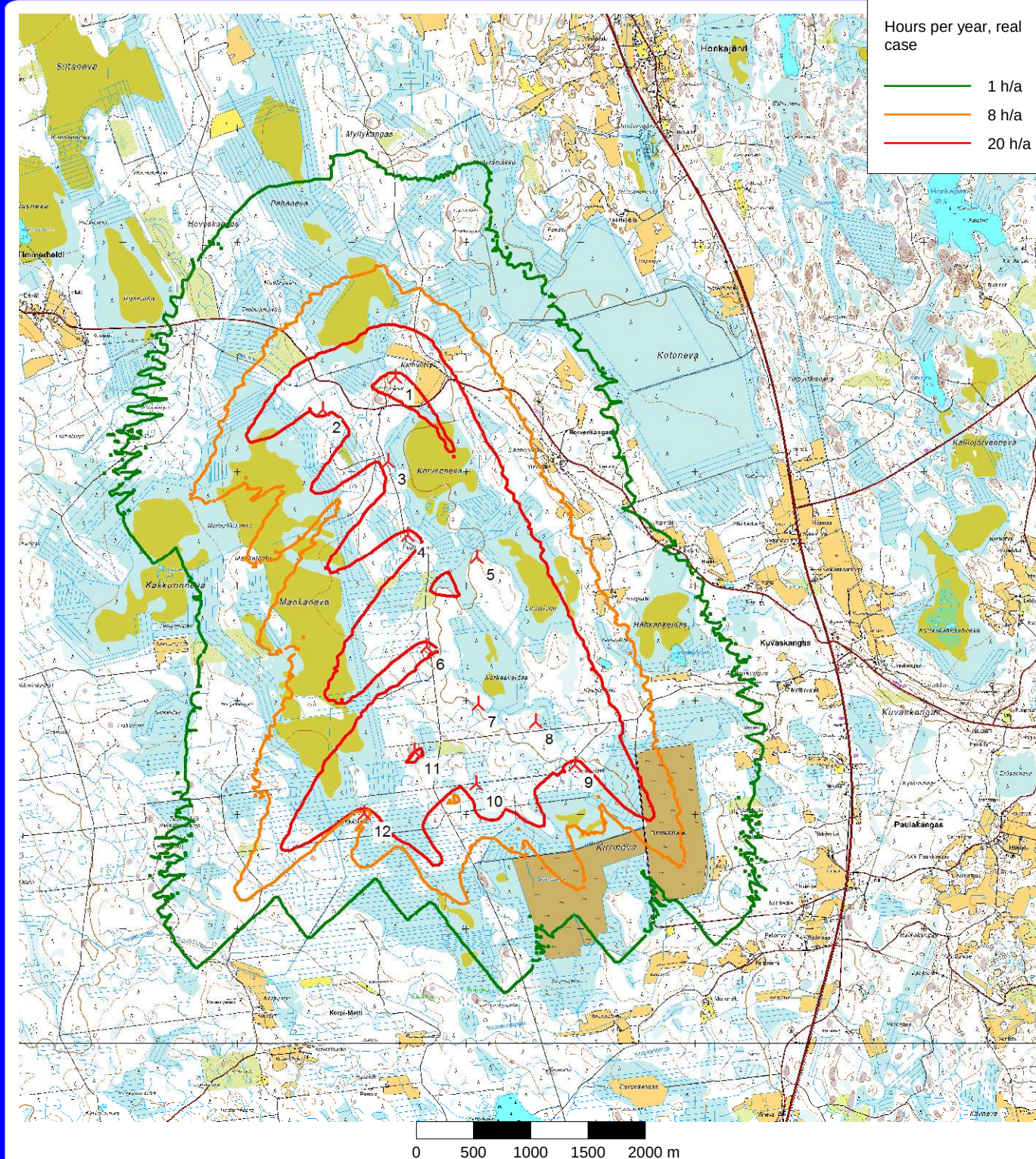
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SHADOW - Map

Calculation: Korvenneva V126 x 12 x HH120



Map: Peruskarttarasteri, Print scale 1:50 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 215 100 North: 6 879 760

New WTG

Flicker map level: Height Contours: Korvenneva height contour lines.wpo (1)

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Calculated:

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FCG
 SUUNNITTELU JA TEKNIikka

SHADOW - Main Result

Calculation: Korvenneva V126 x 12 x HH137 + Korpi-Matti G128 x 33 x HH160

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) [JOKIOINEN]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,16	2,61	3,94	5,80	8,65	8,98	8,14	6,70	4,15	2,67	1,18	0,89

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

MERRA_basic_E21.335_N62.000

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
789	638	520	465	537	727	1071	1169	720	570	711	780	8697

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

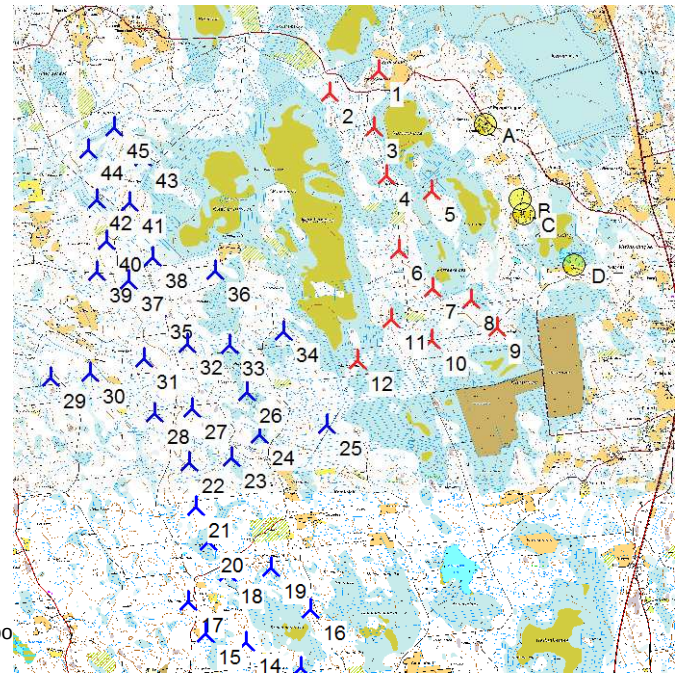
A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:

Height contours used: Height Contours: Korvenneva height contour lines.wpo

Obstacles used in calculation

Eye height: 1,5 m

Grid resolution: 10,0 m



Scale 1:100 000

New WTG

Shadow receptor

WTGs

Finish TM ETRS-TM35FIN-ETRS89				WTG type			Shadow data					
	East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM [RPM]
			[m]									
1	214 381	6 881 832	37,1	VESTAS V126-3.3 G...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	2 000	0,0
2	213 741	6 881 542	32,5	VESTAS V126-3.3 G...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	2 000	0,0
3	214 317	6 881 090	38,3	VESTAS V126-3.3 G...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	2 000	0,0
4	214 489	6 880 449	37,9	VESTAS V126-3.3 G...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	2 000	0,0
5	215 087	6 880 252	41,1	VESTAS V126-3.3 G...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	2 000	0,0
6	214 650	6 879 474	39,0	VESTAS V126-3.3 G...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	2 000	0,0
7	215 100	6 878 968	40,6	VESTAS V126-3.3 G...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	2 000	0,0
8	215 604	6 878 816	42,5	VESTAS V126-3.3 G...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	2 000	0,0
9	215 948	6 878 435	39,5	VESTAS V126-3.3 G...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	2 000	0,0
10	215 084	6 878 275	34,4	VESTAS V126-3.3 G...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	2 000	0,0
11	214 545	6 878 560	35,0	VESTAS V126-3.3 G...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	2 000	0,0
12	214 105	6 878 012	30,0	VESTAS V126-3.3 G...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	2 000	0,0
13	213 349	6 873 961	22,5	GAMESA G128 4500...	Yes	GAMESA	G128-4 500	4 500	128,0	160,0	2 000	12,0
14	212 625	6 874 289	25,0	GAMESA G128 4500...	Yes	GAMESA	G128-4 500	4 500	128,0	160,0	2 000	12,0
15	212 091	6 874 404	22,5	GAMESA G128 4500...	Yes	GAMESA	G128-4 500	4 500	128,0	160,0	2 000	12,0
16	213 480	6 874 713	26,4	GAMESA G128 4500...	Yes	GAMESA	G128-4 500	4 500	128,0	160,0	2 000	12,0
17	211 867	6 874 823	21,3	GAMESA G128 4500...	Yes	GAMESA	G128-4 500	4 500	128,0	160,0	2 000	12,0
18	212 394	6 875 202	24,4	GAMESA G128 4500...	Yes	GAMESA	G128-4 500	4 500	128,0	160,0	2 000	12,0
19	212 961	6 875 263	25,0	GAMESA G128 4500...	Yes	GAMESA	G128-4 500	4 500	128,0	160,0	2 000	12,0
20	212 134	6 875 608	25,2	GAMESA G128 4500...	Yes	GAMESA	G128-4 500	4 500	128,0	160,0	2 000	12,0
21	211 971	6 876 061	25,3	GAMESA G128 4500...	Yes	GAMESA	G128-4 500	4 500	128,0	160,0	2 000	12,0
22	211 886	6 876 668	20,4	GAMESA G128 4500...	Yes	GAMESA	G128-4 500	4 500	128,0	160,0	2 000	12,0
23	212 445	6 876 732	22,7	GAMESA G128 4500...	Yes	GAMESA	G128-4 500	4 500	128,0	160,0	2 000	12,0
24	212 811	6 877 037	25,0	GAMESA G128 4500...	Yes	GAMESA	G128-4 500	4 500	128,0	160,0	2 000	12,0
25	213 700	6 877 153	27,5	GAMESA G128 4500...	Yes	GAMESA	G128-4 500	4 500	128,0	160,0	2 000	12,0
26	212 639	6 877 593	25,8	GAMESA G128 4500...	Yes	GAMESA	G128-4 500	4 500	128,0	160,0	2 000	12,0
27	211 920	6 877 378	21,6	GAMESA G128 4500...	Yes	GAMESA	G128-4 500	4 500	128,0	160,0	2 000	12,0
28	211 427	6 877 312	17,5	GAMESA G128 4500...	Yes	GAMESA	G128-4 500	4 500	128,0	160,0	2 000	12,0
29	210 050	6 877 783	13,5	GAMESA G128 4500...	Yes	GAMESA	G128-4 500	4 500	128,0	160,0	2 000	12,0
30	210 569	6 877 842	12,5	GAMESA G128 4500...	Yes	GAMESA	G128-4 500	4 500	128,0	160,0	2 000	12,0

To be continued on next page...

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SHADOW - Main Result

Calculation: Korvenneva V126 x 12 x HH137 + Korpi-Matti G128 x 33 x HH160

...continued from previous page

Finish TM ETRS-TM35FIN-ETRS89				WTG type			Shadow data				
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM
		[m]									[RPM]
31	211 278	6 878 040	17,0 GAMESA G128 4500...Yes	GAMESA	G128-4 500		4 500	128,0	160,0	2 000	12,0
32	211 857	6 878 228	23,6 GAMESA G128 4500...Yes	GAMESA	G128-4 500		4 500	128,0	160,0	2 000	12,0
33	212 413	6 878 215	27,5 GAMESA G128 4500...Yes	GAMESA	G128-4 500		4 500	128,0	160,0	2 000	12,0
34	213 125	6 878 392	30,0 GAMESA G128 4500...Yes	GAMESA	G128-4 500		4 500	128,0	160,0	2 000	12,0
35	211 463	6 878 696	22,1 GAMESA G128 4500...Yes	GAMESA	G128-4 500		4 500	128,0	160,0	2 000	12,0
36	212 220	6 879 191	26,6 GAMESA G128 4500...Yes	GAMESA	G128-4 500		4 500	128,0	160,0	2 000	12,0
37	211 085	6 879 067	21,6 GAMESA G128 4500...Yes	GAMESA	G128-4 500		4 500	128,0	160,0	2 000	12,0
38	211 402	6 879 374	23,3 GAMESA G128 4500...Yes	GAMESA	G128-4 500		4 500	128,0	160,0	2 000	12,0
39	210 664	6 879 178	15,3 GAMESA G128 4500...Yes	GAMESA	G128-4 500		4 500	128,0	160,0	2 000	12,0
40	210 786	6 879 585	20,0 GAMESA G128 4500...Yes	GAMESA	G128-4 500		4 500	128,0	160,0	2 000	12,0
41	211 095	6 880 088	22,3 GAMESA G128 4500...Yes	GAMESA	G128-4 500		4 500	128,0	160,0	2 000	12,0
42	210 667	6 880 136	14,8 GAMESA G128 4500...Yes	GAMESA	G128-4 500		4 500	128,0	160,0	2 000	12,0
43	211 270	6 880 694	22,5 GAMESA G128 4500...Yes	GAMESA	G128-4 500		4 500	128,0	160,0	2 000	12,0
44	210 550	6 880 794	15,7 GAMESA G128 4500...Yes	GAMESA	G128-4 500		4 500	128,0	160,0	2 000	12,0
45	210 886	6 881 088	16,9 GAMESA G128 4500...Yes	GAMESA	G128-4 500		4 500	128,0	160,0	2 000	12,0

Shadow receptor-Input

Finish TM ETRS-TM35FIN-ETRS89										
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	Asuinrakennus (Ylinentalo)	215 801	6 881 127	49,1	1,0	1,0	1,0	0,0	0,0	"Green house mode"
B	Lomarakenus	216 253	6 880 135	48,1	1,0	1,0	1,0	0,0	0,0	"Green house mode"
C	Asuinrakennus (Pihlajaviita)	216 302	6 879 940	47,6	1,0	1,0	1,0	0,0	0,0	"Green house mode"
D	Lomarakenus (Hahkamanlammmi)	216 960	6 879 268	46,2	1,0	1,0	1,0	0,0	0,0	"Green house mode"

Calculation Results

Shadow receptor

		Shadow, expected values	
No.	Name	Shadow hours per year	[h/year]
A	Asuinrakennus (Ylinentalo)	5:54	
B	Lomarakenus	7:44	
C	Asuinrakennus (Pihlajaviita)	7:55	
D	Lomarakenus (Hahkamanlammmi)	3:17	

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	VESTAS V126-3.3 GridStreame 3300 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (115)	6:15	1:34
2	VESTAS V126-3.3 GridStreame 3300 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (116)	0:00	0:00
3	VESTAS V126-3.3 GridStreame 3300 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (117)	5:52	1:06
4	VESTAS V126-3.3 GridStreame 3300 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (118)	13:24	2:35
5	VESTAS V126-3.3 GridStreame 3300 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (119)	36:04	6:32
6	VESTAS V126-3.3 GridStreame 3300 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (120)	8:10	1:24
7	VESTAS V126-3.3 GridStreame 3300 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (121)	16:24	2:25
8	VESTAS V126-3.3 GridStreame 3300 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (122)	36:24	4:38
9	VESTAS V126-3.3 GridStreame 3300 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (123)	34:08	4:20
10	VESTAS V126-3.3 GridStreame 3300 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (124)	0:00	0:00
11	VESTAS V126-3.3 GridStreame 3300 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (125)	0:00	0:00
12	VESTAS V126-3.3 GridStreame 3300 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (126)	0:00	0:00
13	GAMESA G128 4500 128.0 !O! hub: 160,0 m (TOT: 224,0 m) (172)	0:00	0:00
14	GAMESA G128 4500 128.0 !O! hub: 160,0 m (TOT: 224,0 m) (173)	0:00	0:00
15	GAMESA G128 4500 128.0 !O! hub: 160,0 m (TOT: 224,0 m) (174)	0:00	0:00
16	GAMESA G128 4500 128.0 !O! hub: 160,0 m (TOT: 224,0 m) (175)	0:00	0:00

To be continued on next page...

Project:

Korvenneva layout

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Calculated:

4.12.2013 13:25/2.8.579



SHADOW - Main Result

Calculation: Korvenneva V126 x 12 x HH137 + Korpi-Matti G128 x 33 x HH160

...continued from previous page

No.	Name	Worst case		Expected	
		[h/year]		[h/year]	
17	GAMESA G128 4500 128.0 !O! hub: 160,0 m (TOT: 224,0 m) (176)	0:00	0:00	0:00	0:00
18	GAMESA G128 4500 128.0 !O! hub: 160,0 m (TOT: 224,0 m) (177)	0:00	0:00	0:00	0:00
19	GAMESA G128 4500 128.0 !O! hub: 160,0 m (TOT: 224,0 m) (178)	0:00	0:00	0:00	0:00
20	GAMESA G128 4500 128.0 !O! hub: 160,0 m (TOT: 224,0 m) (179)	0:00	0:00	0:00	0:00
21	GAMESA G128 4500 128.0 !O! hub: 160,0 m (TOT: 224,0 m) (180)	0:00	0:00	0:00	0:00
22	GAMESA G128 4500 128.0 !O! hub: 160,0 m (TOT: 224,0 m) (181)	0:00	0:00	0:00	0:00
23	GAMESA G128 4500 128.0 !O! hub: 160,0 m (TOT: 224,0 m) (182)	0:00	0:00	0:00	0:00
24	GAMESA G128 4500 128.0 !O! hub: 160,0 m (TOT: 224,0 m) (183)	0:00	0:00	0:00	0:00
25	GAMESA G128 4500 128.0 !O! hub: 160,0 m (TOT: 224,0 m) (184)	0:00	0:00	0:00	0:00
26	GAMESA G128 4500 128.0 !O! hub: 160,0 m (TOT: 224,0 m) (185)	0:00	0:00	0:00	0:00
27	GAMESA G128 4500 128.0 !O! hub: 160,0 m (TOT: 224,0 m) (186)	0:00	0:00	0:00	0:00
28	GAMESA G128 4500 128.0 !O! hub: 160,0 m (TOT: 224,0 m) (187)	0:00	0:00	0:00	0:00
29	GAMESA G128 4500 128.0 !O! hub: 160,0 m (TOT: 224,0 m) (188)	0:00	0:00	0:00	0:00
30	GAMESA G128 4500 128.0 !O! hub: 160,0 m (TOT: 224,0 m) (189)	0:00	0:00	0:00	0:00
31	GAMESA G128 4500 128.0 !O! hub: 160,0 m (TOT: 224,0 m) (190)	0:00	0:00	0:00	0:00
32	GAMESA G128 4500 128.0 !O! hub: 160,0 m (TOT: 224,0 m) (191)	0:00	0:00	0:00	0:00
33	GAMESA G128 4500 128.0 !O! hub: 160,0 m (TOT: 224,0 m) (192)	0:00	0:00	0:00	0:00
34	GAMESA G128 4500 128.0 !O! hub: 160,0 m (TOT: 224,0 m) (193)	0:00	0:00	0:00	0:00
35	GAMESA G128 4500 128.0 !O! hub: 160,0 m (TOT: 224,0 m) (194)	0:00	0:00	0:00	0:00
36	GAMESA G128 4500 128.0 !O! hub: 160,0 m (TOT: 224,0 m) (195)	0:00	0:00	0:00	0:00
37	GAMESA G128 4500 128.0 !O! hub: 160,0 m (TOT: 224,0 m) (196)	0:00	0:00	0:00	0:00
38	GAMESA G128 4500 128.0 !O! hub: 160,0 m (TOT: 224,0 m) (197)	0:00	0:00	0:00	0:00
39	GAMESA G128 4500 128.0 !O! hub: 160,0 m (TOT: 224,0 m) (198)	0:00	0:00	0:00	0:00
40	GAMESA G128 4500 128.0 !O! hub: 160,0 m (TOT: 224,0 m) (199)	0:00	0:00	0:00	0:00
41	GAMESA G128 4500 128.0 !O! hub: 160,0 m (TOT: 224,0 m) (200)	0:00	0:00	0:00	0:00
42	GAMESA G128 4500 128.0 !O! hub: 160,0 m (TOT: 224,0 m) (201)	0:00	0:00	0:00	0:00
43	GAMESA G128 4500 128.0 !O! hub: 160,0 m (TOT: 224,0 m) (202)	0:00	0:00	0:00	0:00
44	GAMESA G128 4500 128.0 !O! hub: 160,0 m (TOT: 224,0 m) (203)	0:00	0:00	0:00	0:00
45	GAMESA G128 4500 128.0 !O! hub: 160,0 m (TOT: 224,0 m) (204)	0:00	0:00	0:00	0:00

Project:

Korvenneva layout

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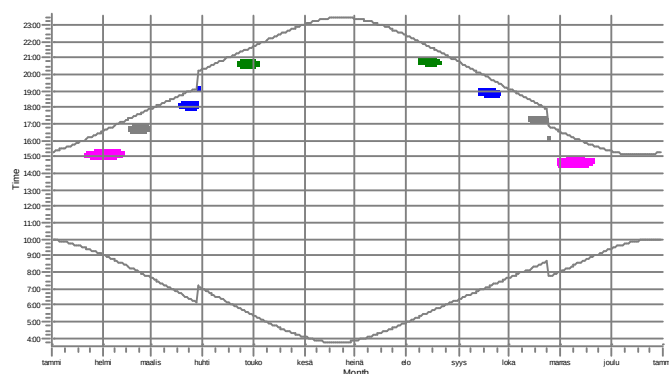
4.12.2013 13:25/2.8.579



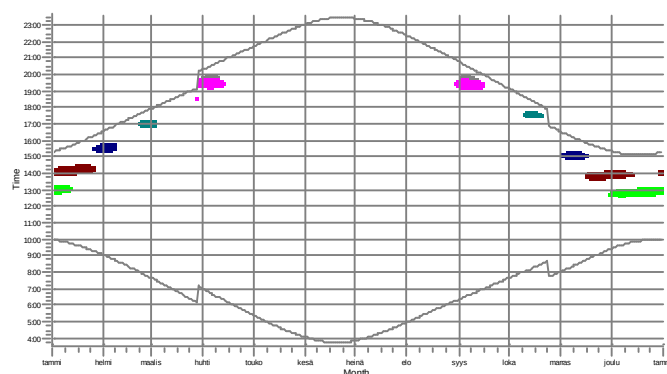
SHADOW - Calendar, graphical

Calculation: Korvenneva V126 x 12 x HH137 + Korpi-Matti G128 x 33 x HH160

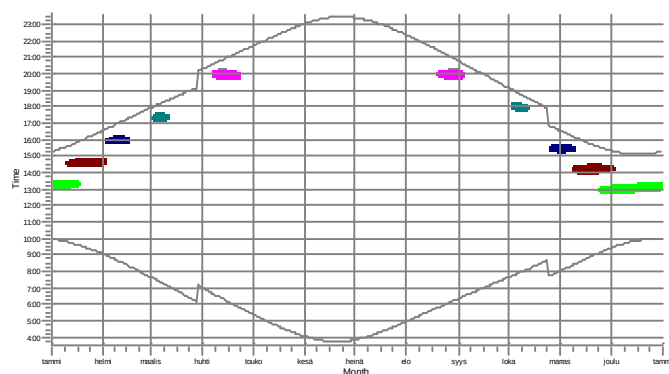
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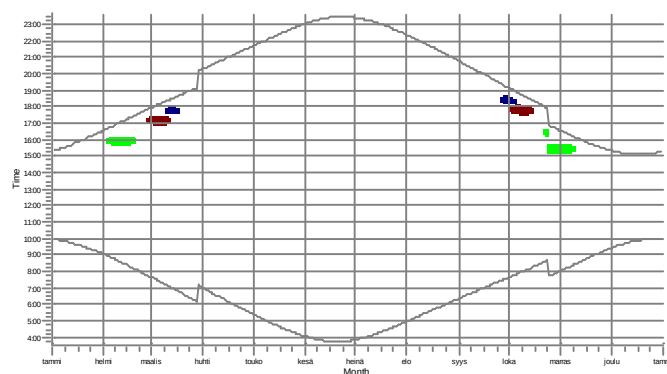
B: Lomarakennus



C: Asuinrakennus (Pihlajaviita)



D: Lomarakennus (Hahkamanlammi)



WTGs

1: VESTAS V126-3.3 GridStream 3300 126.0 IO! hub: 137.0 m (TOT: 200.0 m) (115)
 3: VESTAS V126-3.3 GridStream 3300 126.0 IO! hub: 137.0 m (TOT: 200.0 m) (117)
 4: VESTAS V126-3.3 GridStream 3300 126.0 IO! hub: 137.0 m (TOT: 200.0 m) (118)

5: VESTAS V126-3.3 GridStream 3300 126.0 IO! hub: 137.0 m (TOT: 200.0 m) (119)
 6: VESTAS V126-3.3 GridStream 3300 126.0 IO! hub: 137.0 m (TOT: 200.0 m) (120)
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8: VESTAS V126-3.3 GridStream 3300 126.0 IO! hub: 137.0 m (TOT: 200.0 m) (122)
 9: VESTAS V126-3.3 GridStream 3300 126.0 IO! hub: 137.0 m (TOT: 200.0 m) (123)

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Project:

Korvenneva layout

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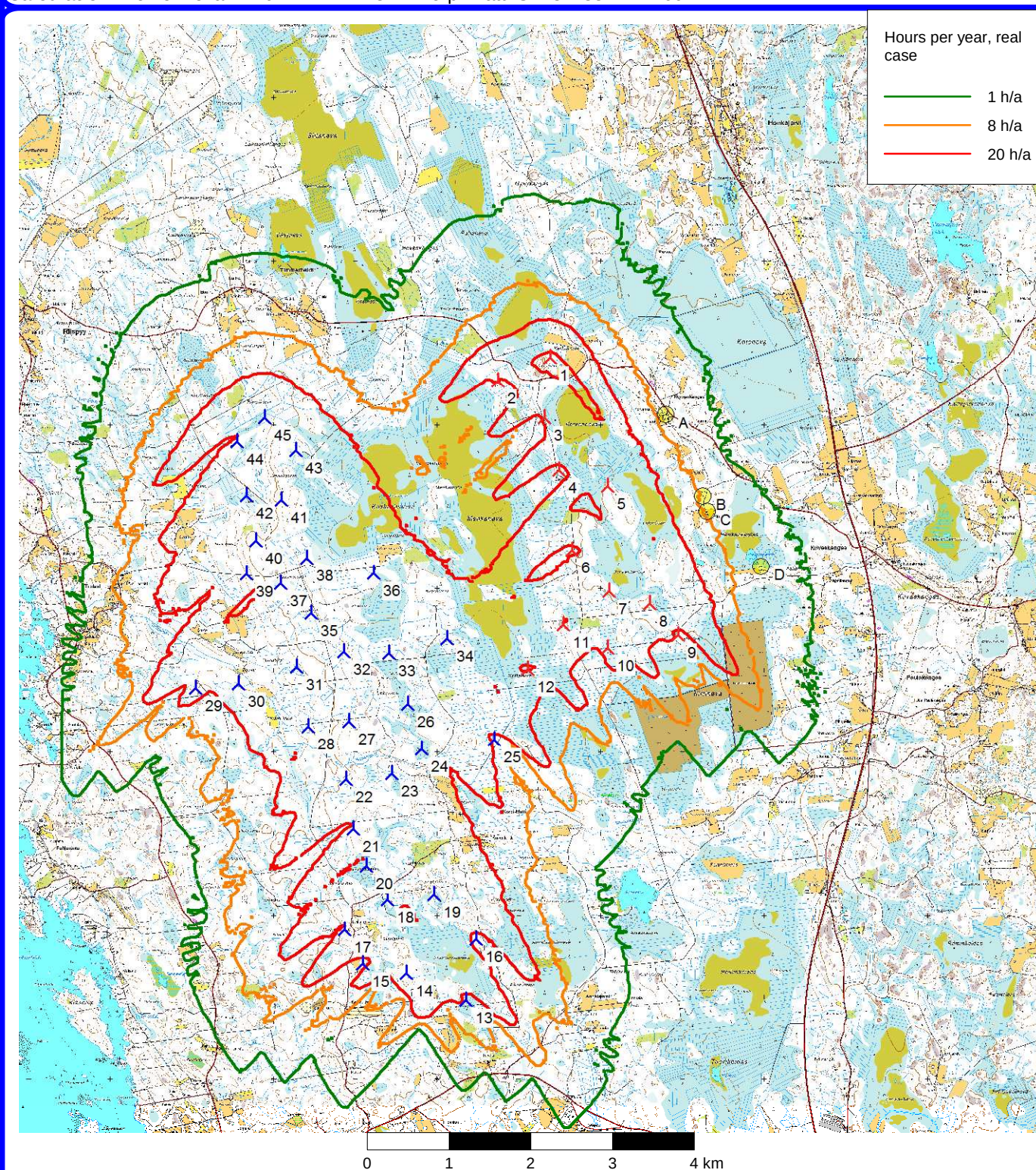
Hans Vadback / hans.vadback@fcg.fi

Calculated:

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SHADOW - Map

Calculation: Korvenneva V126 x 12 x HH137 + Korpi-Matti G128 x 33 x HH160


New WTG

Shadow receptor

Flicker map level: Height Contours: Korvenneva height contour lines.wpo (1)