

Project:
Hunflen

Licensed user:
Wind Sweden AB
Batterivägen 2
SE-311 39 Falkenberg
+46 723 158788
Wind-Sweden
Calculated:
2021-03-02 12:05/3.4.415



SHADOW - Main Result

Calculation: WS1.0.0 1st V90-2,0MW plus befintliga verk.

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

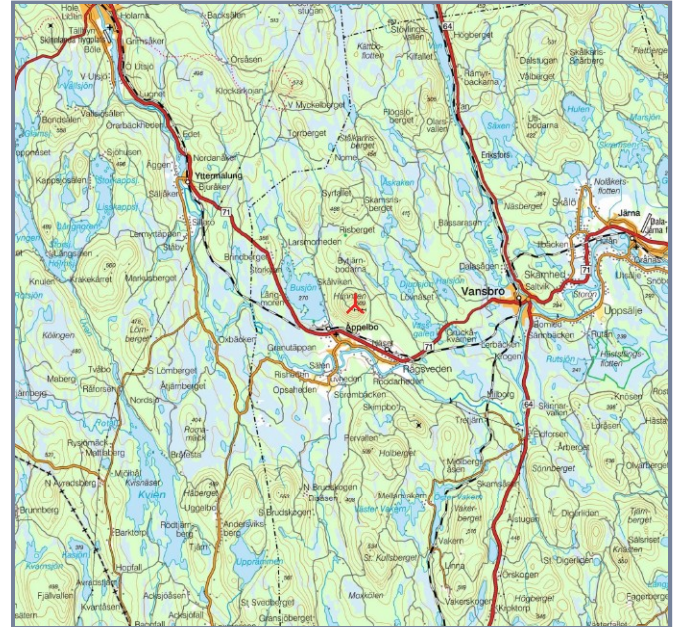
Minimum sun height over horizon for influence 3 °
Day step for calculation 1 days
Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) [BORLANGE]
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
1,76 2,86 3,88 5,64 9,16 8,08 7,55 5,65 4,80 3,10 1,88 1,43

Operational time
N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
589 715 687 532 391 386 615 1 313 1 328 681 454 493 8 184

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: CONTOURLINE_Hunflen_1.wpo (2)
Obstacles used in calculation
Eye height for map: 1,5 m
Grid resolution: 1,0 m

All coordinates are in
Swedish UTM 33-SWREF99 (SE)



Scale 1:500 000
New WTG Existing WTG Shadow receptor

WTGs

Easting	Northing	Z	Row data/Description	WTG type			Shadow data				
				Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM
1	446 678	6 708 198	503,4 VESTAS V90 2000 90.0 !O! hub: 1...	Yes	VESTAS	V90-2 000	2 000	90,0	105,0	1 506	14,9
2	446 077	6 708 113	475,0 VESTAS V52 850 52.0 !O! hub: 65,...	Yes	VESTAS	V52-850	850	52,0	65,0	969	26,0
3	446 218	6 707 845	460,0 VESTAS V52 850 52.0 !O! hub: 65,...	Yes	VESTAS	V52-850	850	52,0	65,0	969	26,0

Shadow receptor-Input

No.	Easting	Northing	Z	Width	Height	Elevation a.g.l.	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
	[m]	[m]	[m]	[m]	[m]	[m]	[°]		[m]
A	447 029	6 706 318	285,0	5,0	5,0	1,0	0,0	"Green house mode"	1,0
B	446 923	6 706 227	284,4	5,0	5,0	1,0	0,0	"Green house mode"	1,0
C	446 723	6 706 187	283,3	5,0	5,0	1,0	0,0	"Green house mode"	1,0
D	445 700	6 706 302	280,0	5,0	5,0	1,0	0,0	"Green house mode"	1,0
E	445 075	6 706 822	275,0	5,0	5,0	1,0	0,0	"Green house mode"	1,0
F	445 044	6 706 916	275,0	5,0	5,0	1,0	0,0	"Green house mode"	1,0
G	444 993	6 707 005	275,0	5,0	5,0	1,0	0,0	"Green house mode"	1,0
H	444 864	6 707 363	275,0	5,0	5,0	1,0	0,0	"Green house mode"	1,0
I	444 688	6 708 353	279,9	5,0	5,0	1,0	0,0	"Green house mode"	1,0
J	444 695	6 708 433	280,3	5,0	5,0	1,0	0,0	"Green house mode"	1,0
K	444 605	6 708 469	275,0	5,0	5,0	1,0	0,0	"Green house mode"	1,0
L	444 596	6 708 546	275,0	5,0	5,0	1,0	0,0	"Green house mode"	1,0
M	444 636	6 708 727	281,9	5,0	5,0	1,0	0,0	"Green house mode"	1,0
N	445 406	6 706 419	275,0	5,0	5,0	1,0	0,0	"Green house mode"	1,0

Calculation Results

No.	Shadow, worst case			Shadow, expected values	
	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow hours per year [h/year]	Shadow hours per year [h/year]
A	0:00	0	0:00	0:00	0:00
B	0:00	0	0:00	0:00	0:00

To be continued on next page...

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SHADOW - Main Result

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No.	Shadow, worst case			Shadow, expected values
	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow hours per year [h/year]
C	0:00	0	0:00	0:00
D	0:00	0	0:00	0:00
E	0:00	0	0:00	0:00
F	0:00	0	0:00	0:00
G	0:00	0	0:00	0:00
H	0:00	0	0:00	0:00
I	0:00	0	0:00	0:00
J	0:00	0	0:00	0:00
K	0:00	0	0:00	0:00
L	0:00	0	0:00	0:00
M	0:00	0	0:00	0:00
N	0:00	0	0:00	0:00

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

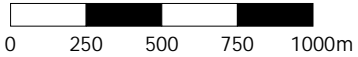
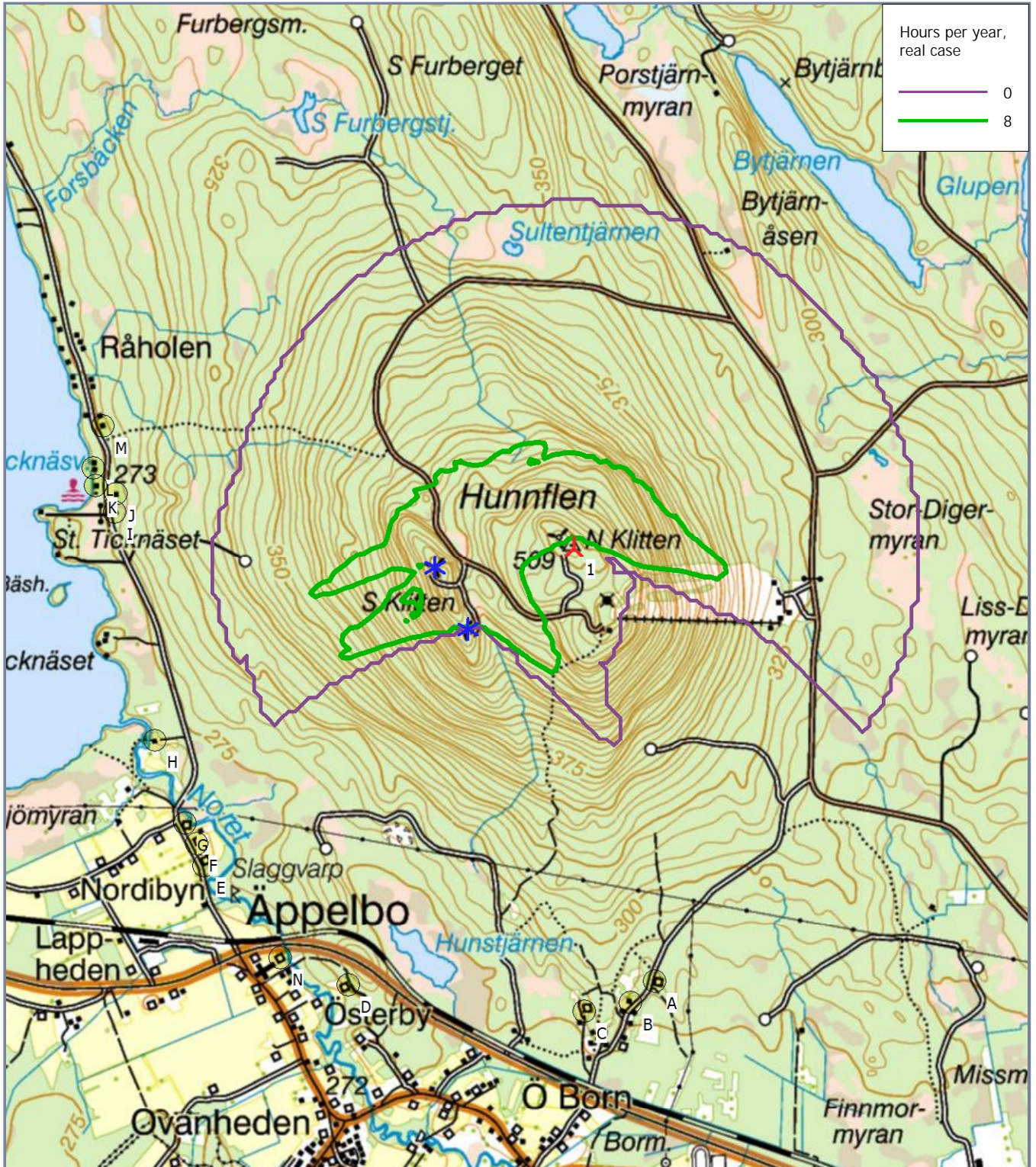
No.	Name	Worst case [h/year]	Expected [h/year]
1	VESTAS V90 2000 90.0 !O! hub: 105,0 m (TOT: 150,0 m) (1)	0:00	0:00
2	VESTAS V52 850 52.0 !O! hub: 65,0 m (TOT: 91,0 m) (1)	0:00	0:00
3	VESTAS V52 850 52.0 !O! hub: 65,0 m (TOT: 91,0 m) (2)	0:00	0:00

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.



SHADOW - Map

Calculation: WS1.0.0 1st V90-2,0MW plus befintliga verk.



Map: Terräng , Print scale 1:25 000, Map center Swedish UTM 33-SWREF99 (SE) East: 446 430 North: 6 708 030

▲ New WTG * Existing WTG ● Shadow receptor

Flicker map level: Height Contours: CONTOURLINE_Hunflen_1.wpo (2)