

Project:
Granåsen

Licensed user:
Wind Sweden AB
Batterivägen 2
SE-311 39 Falkenberg
+46 723 158788
Wind-Sweden
Calculated:
2021-03-09 15:59/3.4.415



SHADOW - Main Result

Calculation: WS2.0.0 6st V162-5,6MW totalhöjd 250m

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) [OSTERSUND]
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
0,82 2,62 3,52 6,46 7,50 8,06 6,92 5,22 4,33 2,52 1,10 0,68

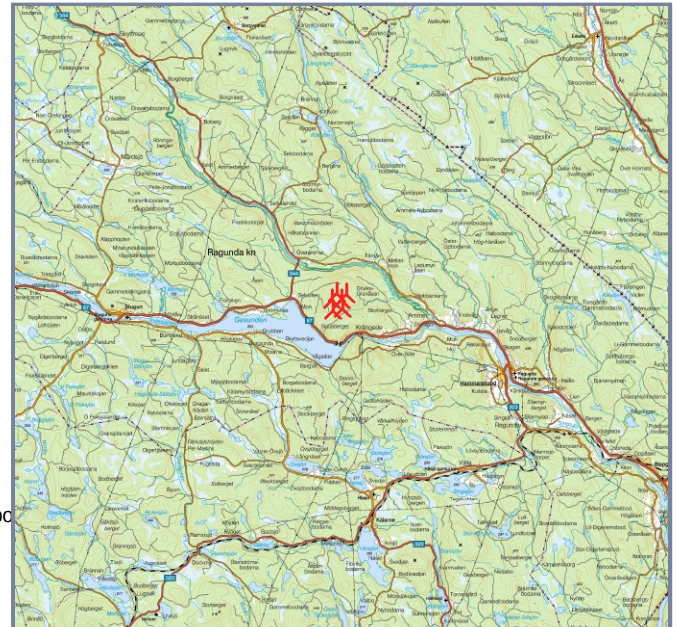
Operational time
N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
355 281 300 407 586 938 802 836 596 810 1 729 961 8 601

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_ONLINEDATA_0.wpd
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)

WTGs

	Easting	Northing	Z	Row data/Description	WTG type			Power, rated	Rotor diameter	Hub height	Shadow data	
					Valid	Manufact.	Type-generator				Calculation distance	RPM
			[m]					[kW]	[m]	[m]	[m]	[RPM]
1	551 752	7 006 509	528,8	1	Yes	VESTAS	V162-5 600	5 600	162,0	169,0	2 041	9,3
2	551 263	7 005 843	521,1	2	Yes	VESTAS	V162-5 600	5 600	162,0	169,0	2 041	9,3
3	551 349	7 004 790	485,0	3	Yes	VESTAS	V162-5 600	5 600	162,0	169,0	2 041	9,3
4	552 688	7 006 461	500,7	4	Yes	VESTAS	V162-5 600	5 600	162,0	169,0	2 041	9,3
5	552 202	7 005 850	540,0	5	Yes	VESTAS	V162-5 600	5 600	162,0	169,0	2 041	9,3
6	552 271	7 005 036	507,4	6	Yes	VESTAS	V162-5 600	5 600	162,0	169,0	2 041	9,3



New WTG

Shadow receptor

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]
A	550 075	7 002 711	225,3	5,0	5,0	1,0	0,0	"Green house mode"	1,0
B	556 293	7 002 872	205,0	5,0	5,0	1,0	0,0	"Green house mode"	1,0
C	556 572	7 006 349	192,8	5,0	5,0	1,0	0,0	"Green house mode"	1,0
D	556 023	7 002 717	210,0	5,0	5,0	1,0	0,0	"Green house mode"	1,0
E	555 743	7 002 514	208,3	5,0	5,0	1,0	0,0	"Green house mode"	1,0
F	554 481	7 002 483	195,7	5,0	5,0	1,0	0,0	"Green house mode"	1,0
G	553 792	7 002 524	211,2	5,0	5,0	1,0	0,0	"Green house mode"	1,0
H	552 740	7 002 089	225,5	5,0	5,0	1,0	0,0	"Green house mode"	1,0
I	552 246	7 001 581	211,0	5,0	5,0	1,0	0,0	"Green house mode"	1,0
J	549 911	7 002 890	230,7	5,0	5,0	1,0	0,0	"Green house mode"	1,0
K	549 312	7 003 159	208,7	5,0	5,0	1,0	0,0	"Green house mode"	1,0
L	547 898	7 005 352	212,2	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	Shadow days per year	Max shadow hours per day	Shadow hours per year	
	[h/year]	[days/year]	[h/day]	[h/year]	
A	0:00	0	0:00	0:00	
B	0:00	0	0:00	0:00	

To be continued on next page...

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Shadow, worst case			Shadow, expected values	
No.	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

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	1	0:00	0:00
2	2	0:00	0:00
3	3	0:00	0:00
4	4	0:00	0:00
5	5	0:00	0:00
6	6	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.

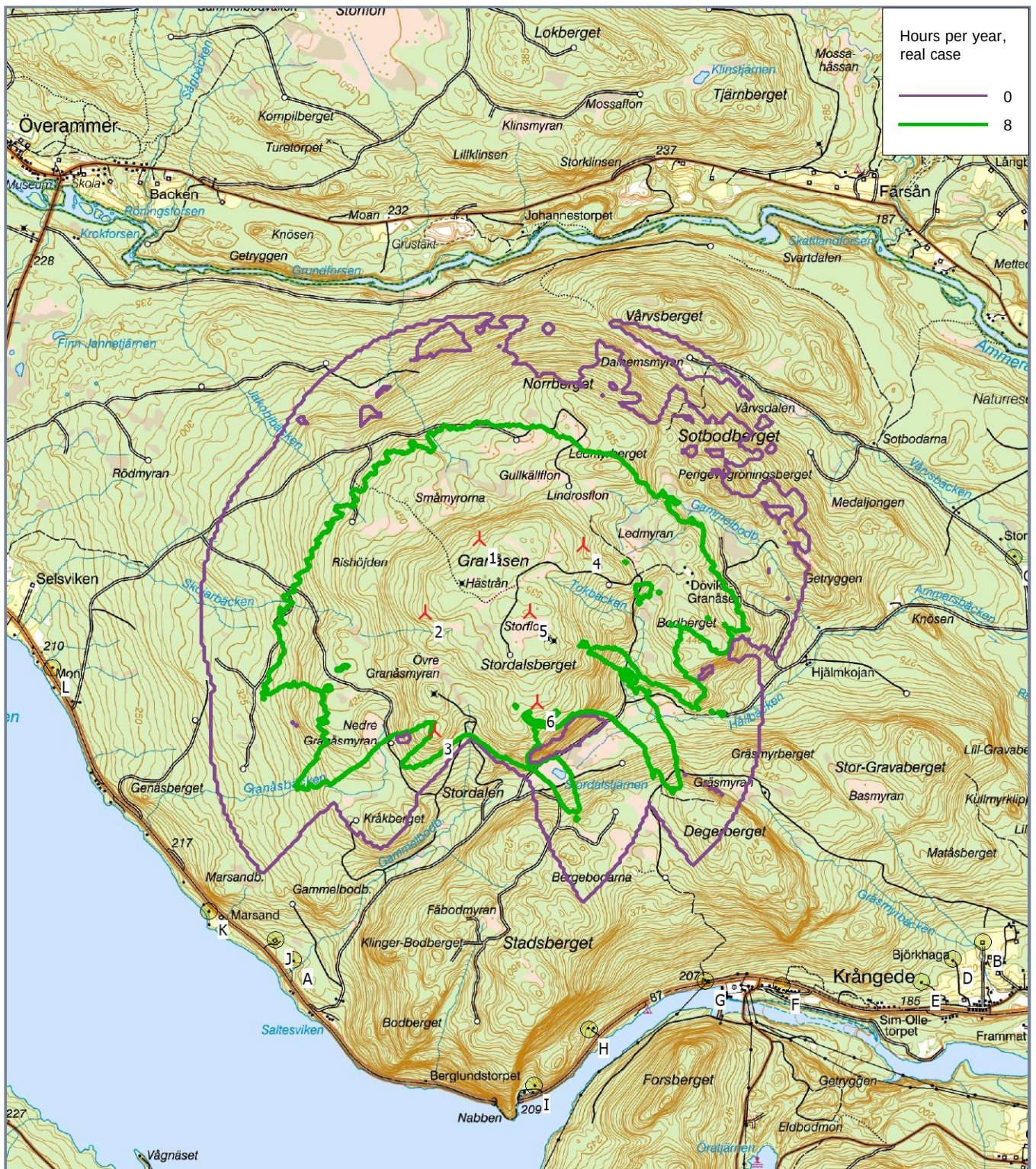
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SHADOW - Map

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Map: Granåsen Terräng, Print scale 1:52 000, Map center Swedish UTM 33-SWREF99 (SE) East: 552 090 North: 7 006 050

▲ New WTG

● Shadow receptor

Flicker map level: Height Contours: CONTOURLINE_ONLINEDATA_0.wpo (1)