

# Bilaga 6 rev. 2.2 - Skuggberäkningar

Project:

Skuggberäkning

Licensed user:

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Calculated:

2025-02-25 17:21/3.5.587

## SHADOW - Main Result

Calculation: Skuggberäkning LV: Stormossen

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
748	960	581	372	415	413	600	1 002	1 137	838	688	880	8 634

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: GSD50

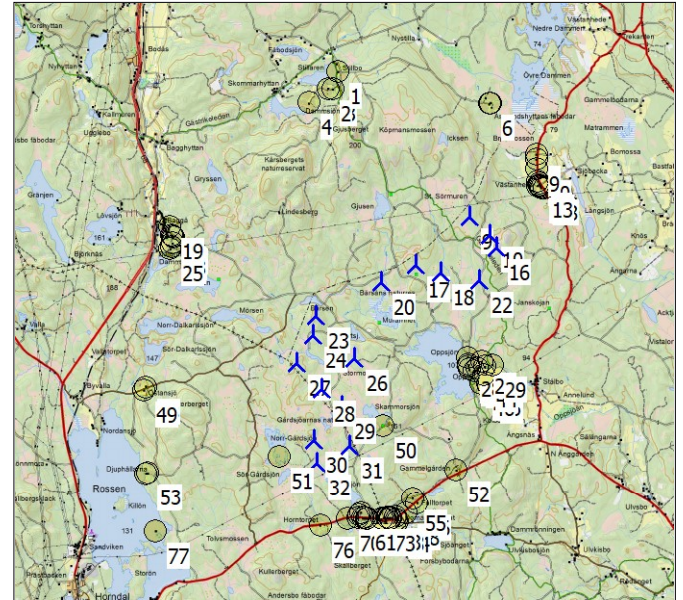
Obstacles used in calculation

Receptor grid resolution: 1,0 m

All coordinates are in

Swedish UTM 33-SWREF99 (SE)

WTGs



New WTG

Scale 1:200 000  
Shadow receptor

	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	
			[m]										
9	588 495	6 695 747	134,1	USER F200 8500 200.0 IO! hub: 1...	Yes	USER	F200-8 500	8 500	200,0	190,0	1 898	9,8	
10	589 006	6 695 252	126,3	USER F200 8500 200.0 IO! hub: 1...	Yes	USER	F200-8 500	8 500	200,0	190,0	1 898	9,8	
16	589 207	6 694 937	135,8	USER F200 8500 200.0 IO! hub: 1...	Yes	USER	F200-8 500	8 500	200,0	190,0	1 898	9,8	
17	587 051	6 694 460	128,2	USER F200 8500 200.0 IO! hub: 1...	Yes	USER	F200-8 500	8 500	200,0	190,0	1 898	9,8	
18	587 721	6 694 277	118,9	USER F200 8500 200.0 IO! hub: 1...	Yes	USER	F200-8 500	8 500	200,0	190,0	1 898	9,8	
20	586 153	6 694 024	118,4	USER F200 8500 200.0 IO! hub: 1...	Yes	USER	F200-8 500	8 500	200,0	190,0	1 898	9,8	
22	588 741	6 694 058	115,1	USER F200 8500 200.0 IO! hub: 1...	Yes	USER	F200-8 500	8 500	200,0	190,0	1 898	9,8	
23	584 410	6 693 123	149,5	USER F200 8500 200.0 IO! hub: 1...	Yes	USER	F200-8 500	8 500	200,0	190,0	1 898	9,8	
24	584 349	6 692 613	144,3	USER F200 8500 200.0 IO! hub: 1...	Yes	USER	F200-8 500	8 500	200,0	190,0	1 898	9,8	
26	585 445	6 691 999	143,3	USER F200 8500 200.0 IO! hub: 1...	Yes	USER	F200-8 500	8 500	200,0	190,0	1 898	9,8	
27	583 901	6 691 867	148,0	USER F200 8500 200.0 IO! hub: 1...	Yes	USER	F200-8 500	8 500	200,0	190,0	1 898	9,8	
28	584 565	6 691 187	152,0	USER F200 8500 200.0 IO! hub: 1...	Yes	USER	F200-8 500	8 500	200,0	190,0	1 898	9,8	
29	585 102	6 690 725	146,4	USER F200 8500 200.0 IO! hub: 1...	Yes	USER	F200-8 500	8 500	200,0	190,0	1 898	9,8	
30	584 363	6 689 852	147,1	USER F200 8500 200.0 IO! hub: 1...	Yes	USER	F200-8 500	8 500	200,0	190,0	1 898	9,8	
31	585 304	6 689 700	143,5	USER F200 8500 200.0 IO! hub: 1...	Yes	USER	F200-8 500	8 500	200,0	190,0	1 898	9,8	
32	584 451	6 689 240	141,5	USER F200 8500 200.0 IO! hub: 1...	Yes	USER	F200-8 500	8 500	200,0	190,0	1 898	9,8	

## Shadow receptor-Input

No.	Name	Easting	Northing	Z	Width	Height	Elevation a.g.l.	Slope of window	Direction mode
				[m]	[m]	[m]	[m]	[°]	
1	STILLBO 1:2>1	584 995	6 699 573	107,2	5,0	5,0	0,0	0,0	"Green house mode"
2	SKOMMARHYTTAN 2:3>1	584 756	6 699 128	111,9	5,0	5,0	0,0	0,0	"Green house mode"
3	SKOMMARHYTTAN 2:6>1	584 865	6 699 110	106,6	5,0	5,0	0,0	0,0	"Green house mode"
4	ÖSTERHÅSTBO 11:13>2	584 235	6 698 759	115,1	5,0	5,0	0,0	0,0	"Green house mode"
5	ÅSMUNDSHYTTAN S:1>1	589 040	6 698 745	81,7	5,0	5,0	0,0	0,0	"Green house mode"
6	ÅSMUNDSHYTTAN S:1>1	589 018	6 698 731	82,1	5,0	5,0	0,0	0,0	"Green house mode"
7	AXELSBERG 1:5>1	590 250	6 697 397	77,6	5,0	5,0	0,0	0,0	"Green house mode"
9	FÄRNEBO-VÄSTANHEDE 2:1>1	590 256	6 697 262	77,0	5,0	5,0	0,0	0,0	"Green house mode"
10	FÄRNEBO-VÄSTANHEDE 2:1>1	590 269	6 697 001	80,5	5,0	5,0	0,0	0,0	"Green house mode"
11	FÄRNEBO-VÄSTANHEDE 2:1>1	590 293	6 696 681	83,1	5,0	5,0	0,0	0,0	"Green house mode"
12	FÄRNEBO-VÄSTANHEDE 2:1>1	590 340	6 696 634	84,5	5,0	5,0	0,0	0,0	"Green house mode"
13	FÄRNEBO-VÄSTANHEDE 1:4>1	590 341	6 696 582	87,8	5,0	5,0	0,0	0,0	"Green house mode"
14	FÄRNEBO-VÄSTANHEDE 1:4>1	590 334	6 696 564	88,3	5,0	5,0	0,0	0,0	"Green house mode"
15	BACKAN 1:10>2	590 291	6 696 561	87,2	5,0	5,0	0,0	0,0	"Green house mode"

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## SHADOW - Main Result

Calculation: Skuggberäkning LV: Stormossen

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No.	Name	Eastings	Northing	Z	Width	Height	Elevation a.g.l.	Slope of window	Direction mode
				[m]	[m]	[m]	[m]	[°]	
16	FÄRNEBO-VÄSTANHEDE 1:3>4	590 364	6 696 516	88,0	5,0	5,0	0,0	0,0	"Green house mode"
17	FÄRNEBO-VÄSTANHEDE 1:3>4	590 383	6 696 511	87,2	5,0	5,0	0,0	0,0	"Green house mode"
18	FÄRNEBO-VÄSTANHEDE 1:5>1	590 472	6 696 501	82,1	5,0	5,0	0,0	0,0	"Green house mode"
19	BAGGHYTTAN 11:6>1	580 554	6 695 487	139,6	5,0	5,0	0,0	0,0	"Green house mode"
20	BAGGHYTTAN 11:44>1	580 618	6 695 261	136,4	5,0	5,0	0,0	0,0	"Green house mode"
21	BAGGHYTTAN 11:45>1	580 629	6 695 228	135,2	5,0	5,0	0,0	0,0	"Green house mode"
22	BAGGHYTTAN 11:46>1	580 648	6 695 196	135,5	5,0	5,0	0,0	0,0	"Green house mode"
23	BAGGHYTTAN 7:26>1	580 625	6 695 043	134,9	5,0	5,0	0,0	0,0	"Green house mode"
24	BAGGHYTTAN 7:30>1	580 611	6 694 951	134,6	5,0	5,0	0,0	0,0	"Green house mode"
25	BAGGHYTTAN 7:31>1	580 567	6 694 909	134,1	5,0	5,0	0,0	0,0	"Green house mode"
26	STÅLBO 1:2>1	588 432	6 692 040	107,7	5,0	5,0	0,0	0,0	"Green house mode"
27	STÅLBO 1:19>1	588 810	6 691 923	98,5	5,0	5,0	0,0	0,0	"Green house mode"
28	STÅLBO 1:2>1	588 465	6 691 849	108,2	5,0	5,0	0,0	0,0	"Green house mode"
29	STÅLBO 1:18>1	589 091	6 691 835	93,6	5,0	5,0	0,0	0,0	"Green house mode"
30	STÅLBO 2:16>1	588 461	6 691 803	108,2	5,0	5,0	0,0	0,0	"Green house mode"
31	STÅLBO 1:28>1	588 899	6 691 796	95,4	5,0	5,0	0,0	0,0	"Green house mode"
41	STÅLBO 1:15>1	588 697	6 691 749	101,6	5,0	5,0	0,0	0,0	"Green house mode"
42	STÅLBO 2:4>7	588 489	6 691 714	108,1	5,0	5,0	0,0	0,0	"Green house mode"
43	SKAMMORA 6:4>1	588 605	6 691 675	105,3	5,0	5,0	0,0	0,0	"Green house mode"
44	SKAMMORA 6:3>1	588 866	6 691 562	103,4	5,0	5,0	0,0	0,0	"Green house mode"
45	SKAMMORA 6:5>1	588 974	6 691 348	101,8	5,0	5,0	0,0	0,0	"Green house mode"
46	SKAMMORA 6:6>1	588 790	6 691 348	103,7	5,0	5,0	0,0	0,0	"Green house mode"
47	SKAMMORA 6:5>1	588 992	6 691 279	98,9	5,0	5,0	0,0	0,0	"Green house mode"
48	ÖSTANSJÖ 1:3>1	579 934	6 691 247	145,9	5,0	5,0	0,0	0,0	"Green house mode"
49	ÖSTANSJÖ 1:2>1	579 882	6 691 173	144,3	5,0	5,0	0,0	0,0	"Green house mode"
50	AXELSBERG 1:8>2	586 189	6 690 235	142,4	5,0	5,0	0,0	0,0	"Green house mode"
51	ÖVRE FORNBY 1:2>1	583 443	6 689 420	144,0	5,0	5,0	0,0	0,0	"Green house mode"
52	SKAMMORA 6:9>1	588 139	6 689 051	111,0	5,0	5,0	0,0	0,0	"Green house mode"
53	ÖVRE FORNBY 1:5>1	579 976	6 688 976	133,3	5,0	5,0	0,0	0,0	"Green house mode"
54	ÖVRE FORNBY 1:5>1	579 933	6 688 969	131,3	5,0	5,0	0,0	0,0	"Green house mode"
55	AXELSBERG 1:9>1	586 988	6 688 300	114,3	5,0	5,0	0,0	0,0	"Green house mode"
56	AXELSBERG 1:11>1	587 094	6 688 175	105,8	5,0	5,0	0,0	0,0	"Green house mode"
57	HORNTORPSSKOGEN 1:10>1	585 605	6 687 911	133,3	5,0	5,0	0,0	0,0	"Green house mode"
58	AXELSBERG 1:6>1	586 805	6 687 904	111,4	5,0	5,0	0,0	0,0	"Green house mode"
59	HORNTORPSSKOGEN 1:9>1	585 552	6 687 866	131,8	5,0	5,0	0,0	0,0	"Green house mode"
60	AXELSBERG 1:17>1	586 531	6 687 803	116,9	5,0	5,0	0,0	0,0	"Green house mode"
61	HORNTORPSSKOGEN 1:2>1	585 664	6 687 780	127,8	5,0	5,0	0,0	0,0	"Green house mode"
62	HORNTORPSSKOGEN 1:4>1	585 535	6 687 779	127,9	5,0	5,0	0,0	0,0	"Green house mode"
63	AXELSBERG 1:16>1	586 314	6 687 778	121,4	5,0	5,0	0,0	0,0	"Green house mode"
64	AXELSBERG 1:12>1	586 383	6 687 778	117,7	5,0	5,0	0,0	0,0	"Green house mode"
65	AXELSBERG 1:13>1	586 406	6 687 778	117,3	5,0	5,0	0,0	0,0	"Green house mode"
66	HORNTORPSSKOGEN 1:5>1	585 710	6 687 777	127,6	5,0	5,0	0,0	0,0	"Green house mode"
67	AXELSBERG 1:16>1	586 307	6 687 777	121,8	5,0	5,0	0,0	0,0	"Green house mode"
68	AXELSBERG 1:13>1	586 406	6 687 775	117,2	5,0	5,0	0,0	0,0	"Green house mode"
69	HORNTORPSSKOGEN 1:6>1	585 754	6 687 774	126,9	5,0	5,0	0,0	0,0	"Green house mode"
70	HORNTORPSSKOGEN 1:13>1	585 258	6 687 772	128,0	5,0	5,0	0,0	0,0	"Green house mode"
71	HORNTORPSSKOGEN 1:7>1	585 797	6 687 772	125,9	5,0	5,0	0,0	0,0	"Green house mode"
72	HORNTORPSSKOGEN 1:3>1	586 216	6 687 771	126,5	5,0	5,0	0,0	0,0	"Green house mode"
73	HORNTORPSSKOGEN 1:8>1	586 164	6 687 757	127,0	5,0	5,0	0,0	0,0	"Green house mode"
74	AXELSBERG 1:10>1	586 553	6 687 742	114,2	5,0	5,0	0,0	0,0	"Green house mode"
75	AXELSBERG 1:7>1	586 568	6 687 678	113,5	5,0	5,0	0,0	0,0	"Green house mode"
76	HORNTORPSSKOGEN 1:11>1	584 540	6 687 596	130,8	5,0	5,0	0,0	0,0	"Green house mode"
77	ÖVRE FORNBY 1:4>1	580 180	6 687 431	130,5	5,0	5,0	0,0	0,0	"Green house mode"

### Calculation Results

Shadow receptor

No.	Name	Shadow, expected values Shadow hours per year [h/year]
1	STILLBO 1:2>1	0:00
2	SKOMMARHYTTAN 2:3>1	0:00
3	SKOMMARHYTTAN 2:6>1	0:00

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## SHADOW - Main Result

Calculation: Skuggberäkning LV: Stormossen

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No.	Name	Shadow, expected values	
		Shadow hours	per year [h/year]
4	ÖSTERHÄSTBO 11:13>2	0:00	0:00
5	ÅSMUNDSHYTTAN S:1>1	0:00	0:00
6	ÅSMUNDSHYTTAN S:1>1	0:00	0:00
7	AXELSBERG 1:5>1	0:00	0:00
9	FÄRNEBO-VÄSTANHEDE 2:1>1	0:00	0:00
10	FÄRNEBO-VÄSTANHEDE 2:1>1	0:00	0:00
11	FÄRNEBO-VÄSTANHEDE 2:1>1	0:00	0:00
12	FÄRNEBO-VÄSTANHEDE 2:1>1	0:00	0:00
13	FÄRNEBO-VÄSTANHEDE 1:4>1	2:22	2:22
14	FÄRNEBO-VÄSTANHEDE 1:4>1	2:25	2:25
15	BACKAN 1:10>2	2:30	2:30
16	FÄRNEBO-VÄSTANHEDE 1:3>4	2:25	2:25
17	FÄRNEBO-VÄSTANHEDE 1:3>4	2:23	2:23
18	FÄRNEBO-VÄSTANHEDE 1:5>1	0:00	0:00
19	BAGGHYTTAN 11:6>1	0:00	0:00
20	BAGGHYTTAN 11:44>1	0:00	0:00
21	BAGGHYTTAN 11:45>1	0:00	0:00
22	BAGGHYTTAN 11:46>1	0:00	0:00
23	BAGGHYTTAN 7:26>1	0:00	0:00
24	BAGGHYTTAN 7:30>1	0:00	0:00
25	BAGGHYTTAN 7:31>1	0:00	0:00
26	STÅLBO 1:2>1	0:00	0:00
27	STÅLBO 1:19>1	0:00	0:00
28	STÅLBO 1:2>1	0:00	0:00
29	STÅLBO 1:18>1	0:00	0:00
30	STÅLBO 2:16>1	0:00	0:00
31	STÅLBO 1:28>1	0:00	0:00
41	STÅLBO 1:15>1	0:00	0:00
42	STÅLBO 2:4>7	0:00	0:00
43	SKAMMORA 6:4>1	0:00	0:00
44	SKAMMORA 6:3>1	0:00	0:00
45	SKAMMORA 6:5>1	0:00	0:00
46	SKAMMORA 6:6>1	0:00	0:00
47	SKAMMORA 6:5>1	0:00	0:00
48	ÖSTANSJÖ 1:3>1	0:00	0:00
49	ÖSTANSJÖ 1:2>1	0:00	0:00
50	AXELSBERG 1:8>2	30:52	30:52
51	ÖVRE FORNBY 1:2>1	29:48	29:48
52	SKAMMORA 6:9>1	0:00	0:00
53	ÖVRE FORNBY 1:5>1	0:00	0:00
54	ÖVRE FORNBY 1:5>1	0:00	0:00
55	AXELSBERG 1:9>1	0:00	0:00
56	AXELSBERG 1:11>1	0:00	0:00
57	HORNTORPSSKOGEN 1:10>1	0:00	0:00
58	AXELSBERG 1:6>1	0:00	0:00
59	HORNTORPSSKOGEN 1:9>1	0:00	0:00
60	AXELSBERG 1:17>1	0:00	0:00
61	HORNTORPSSKOGEN 1:2>1	0:00	0:00
62	HORNTORPSSKOGEN 1:4>1	0:00	0:00
63	AXELSBERG 1:16>1	0:00	0:00
64	AXELSBERG 1:12>1	0:00	0:00
65	AXELSBERG 1:13>1	0:00	0:00
66	HORNTORPSSKOGEN 1:5>1	0:00	0:00
67	AXELSBERG 1:16>1	0:00	0:00
68	AXELSBERG 1:13>1	0:00	0:00
69	HORNTORPSSKOGEN 1:6>1	0:00	0:00
70	HORNTORPSSKOGEN 1:13>1	0:00	0:00
71	HORNTORPSSKOGEN 1:7>1	0:00	0:00
72	HORNTORPSSKOGEN 1:3>1	0:00	0:00
73	HORNTORPSSKOGEN 1:8>1	0:00	0:00
74	AXELSBERG 1:10>1	0:00	0:00
75	AXELSBERG 1:7>1	0:00	0:00
76	HORNTORPSSKOGEN 1:11>1	0:00	0:00
77	ÖVRE FORNBY 1:4>1	0:00	0:00

## SHADOW - Main Result

Calculation: Skuggberäkning LV: Stormossen

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

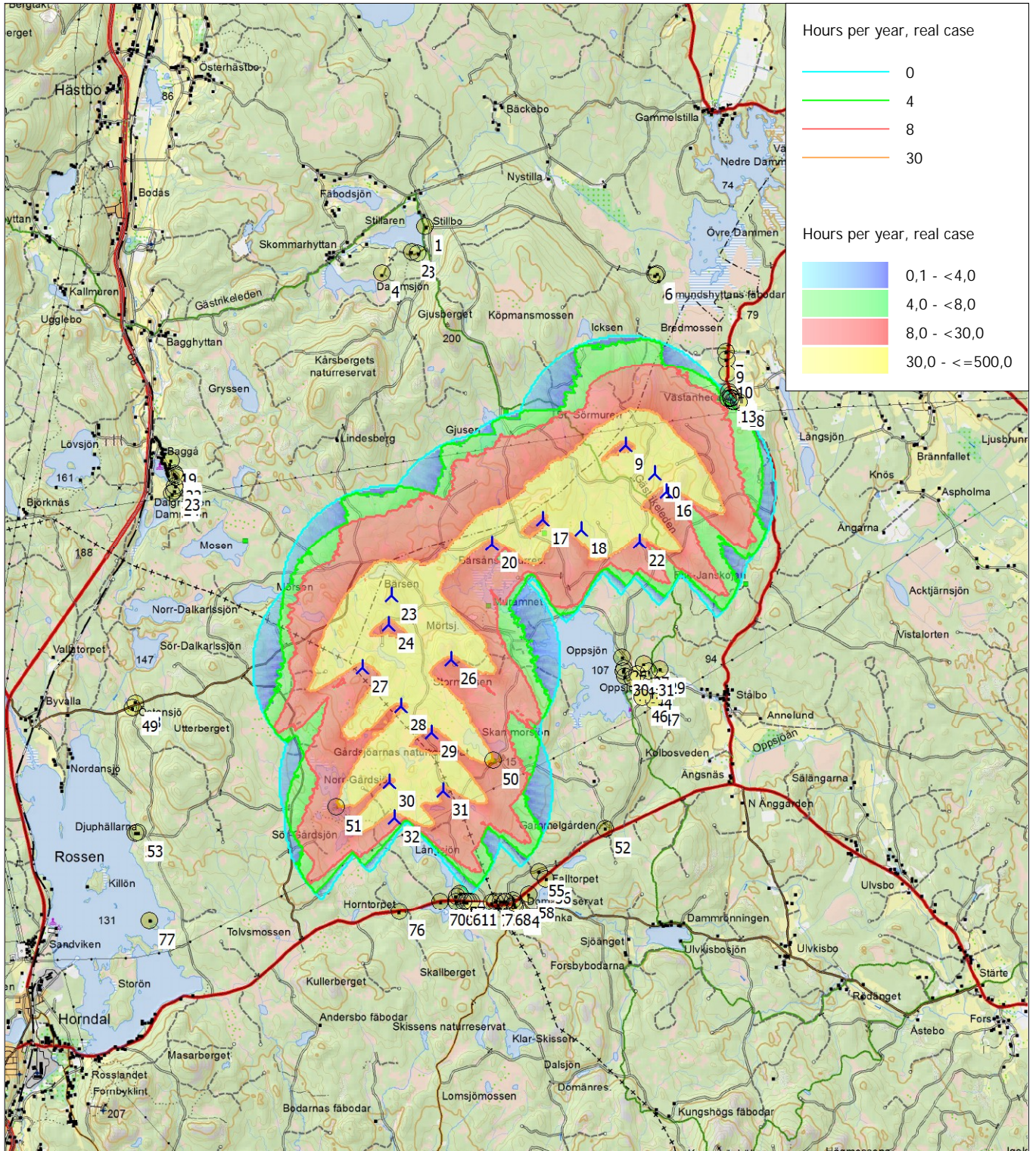
No.	Name	Expected [h/year]
9	USER F200 8500 200.0 !O! hub: 190,0 m (TOT: 290,0 m) (1955)	0:00
10	USER F200 8500 200.0 !O! hub: 190,0 m (TOT: 290,0 m) (1947)	3:58
16	USER F200 8500 200.0 !O! hub: 190,0 m (TOT: 290,0 m) (1941)	0:00
17	USER F200 8500 200.0 !O! hub: 190,0 m (TOT: 290,0 m) (1954)	0:00
18	USER F200 8500 200.0 !O! hub: 190,0 m (TOT: 290,0 m) (1956)	0:00
20	USER F200 8500 200.0 !O! hub: 190,0 m (TOT: 290,0 m) (1945)	0:00
22	USER F200 8500 200.0 !O! hub: 190,0 m (TOT: 290,0 m) (1942)	0:00
23	USER F200 8500 200.0 !O! hub: 190,0 m (TOT: 290,0 m) (1946)	0:00
24	USER F200 8500 200.0 !O! hub: 190,0 m (TOT: 290,0 m) (1951)	0:00
26	USER F200 8500 200.0 !O! hub: 190,0 m (TOT: 290,0 m) (1950)	0:00
27	USER F200 8500 200.0 !O! hub: 190,0 m (TOT: 290,0 m) (1943)	0:00
28	USER F200 8500 200.0 !O! hub: 190,0 m (TOT: 290,0 m) (1952)	7:06
29	USER F200 8500 200.0 !O! hub: 190,0 m (TOT: 290,0 m) (1953)	14:58
30	USER F200 8500 200.0 !O! hub: 190,0 m (TOT: 290,0 m) (1949)	22:42
31	USER F200 8500 200.0 !O! hub: 190,0 m (TOT: 290,0 m) (1944)	9:27
32	USER F200 8500 200.0 !O! hub: 190,0 m (TOT: 290,0 m) (1948)	6:56

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.

The calculation of the total expected values for a given receptor assumes a weighted average directional reduction for all WTGs contributing to shadow flicker within the same day. In the case where shadow flicker from different WTGs is not concurrent within the day, the total expected time at a given receptor may deviate marginally from the individual flicker time caused by each turbine separately.

## SHADOW - Map

Calculation: Skuggberäkning LV: Stormossen



0 1 2 3 4 km

Map: Bitmap map: STOR\_Grundkarta.jpg , Print scale 1:100 000, Map center Swedish UTM 33-SWREF99 (SE) East: 586 590 North: 6 693 420  
 ▲ New WTG      ● Shadow receptor

Flicker map level: GSD50

Time step: 4 minutes, Day step: 14 days, Map resolution: 30 m, Visibility resolution: 15 m, Eye height: 1,5 m