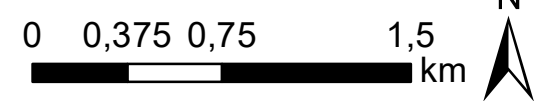
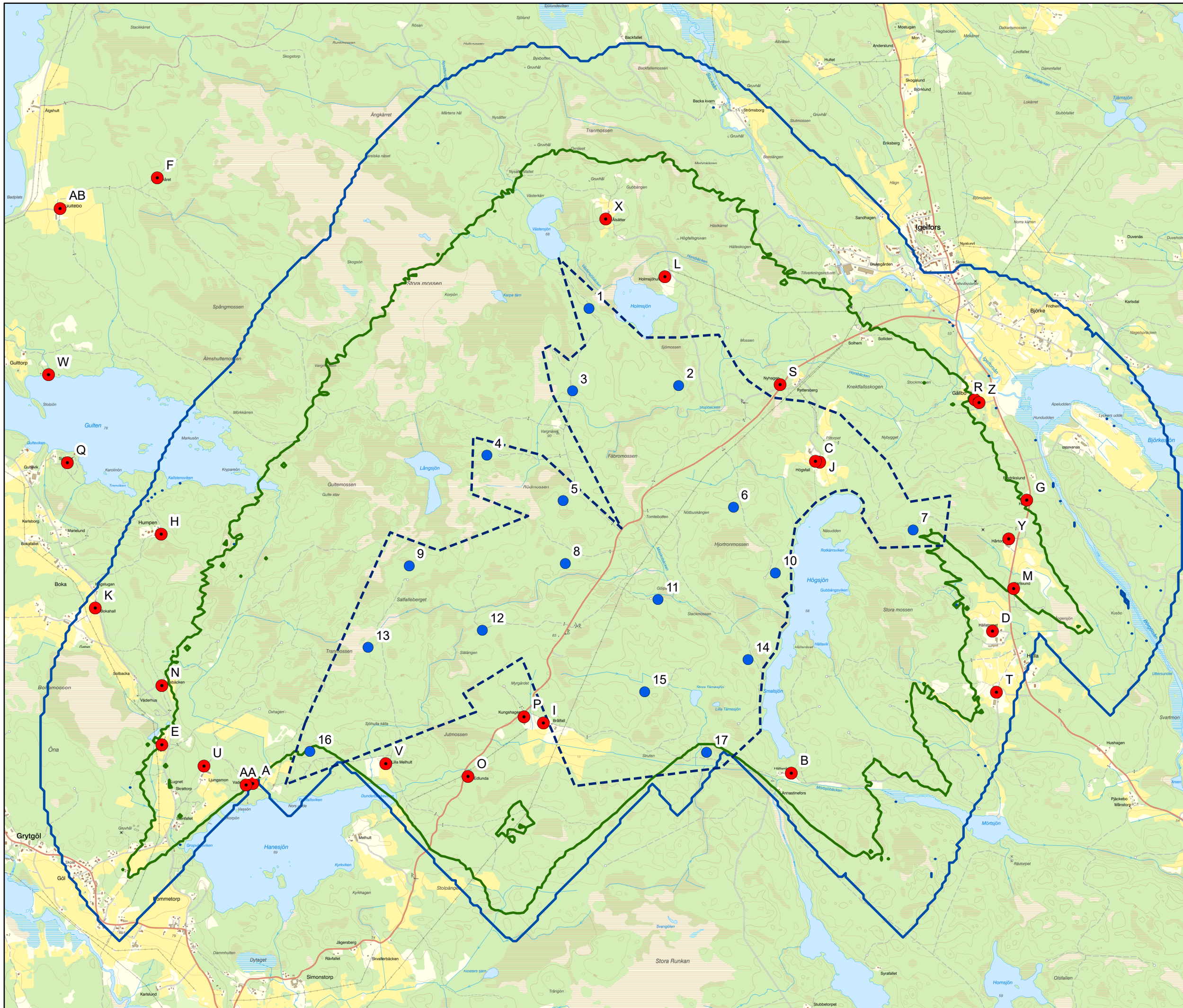


- Skuggkänsliga objekt
- ▭ Utredningsområde
- Exempel på verksplacering

Skuggning (Sannolikt fall)

- 0 h/år
- 8 h/år



Sweco Energy AB/seaubo
Datum: 2020-09-21
© Lantmäteriet



SHADOW - Main Result

Calculation: 20200824

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) [NORRKOPING]
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
1,92 2,22 3,42 6,16 9,78 8,52 7,67 6,33 5,05 3,02 1,57 1,25

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

EmdEuropeEra5_N58.815895_E015.652222 (3)

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
596 629 501 420 543 688 654 878 1455 1105 638 569 8676
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: GSD Grid2+/Grid50+

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

WTG	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	537171	6522022	77,0	Sweco SW180 7400 180.0 !-! hub: ... No	No	Sweco	SW180-7400	7400	180,0	200,0	2250	0,0
2	537112	6520575	75,3	Sweco SW180 7400 180.0 !-! hub: ... No	No	Sweco	SW180-7400	7400	180,0	200,0	2250	0,0
3	534969	6518998	70,8	Sweco SW180 7400 180.0 !-! hub: ... No	No	Sweco	SW180-7400	7400	180,0	200,0	2250	0,0
4	538296	6518992	70,7	Sweco SW180 7400 180.0 !-! hub: ... No	No	Sweco	SW180-7400	7400	180,0	200,0	2250	0,0
5	535802	6520556	79,2	Sweco SW180 7400 180.0 !-! hub: ... No	No	Sweco	SW180-7400	7400	180,0	200,0	2250	0,0
6	538520	6521048	70,8	Sweco SW180 7400 180.0 !-! hub: ... No	No	Sweco	SW180-7400	7400	180,0	200,0	2250	0,0
7	536453	6521483	80,7	Sweco SW180 7400 180.0 !-! hub: ... No	No	Sweco	SW180-7400	7400	180,0	200,0	2250	0,0
8	537776	6519500	70,5	Sweco SW180 7400 180.0 !-! hub: ... No	No	Sweco	SW180-7400	7400	180,0	200,0	2250	0,0
9	537092	6521102	79,6	Sweco SW180 7400 180.0 !-! hub: ... No	No	Sweco	SW180-7400	7400	180,0	200,0	2250	0,0
10	538872	6520497	62,7	Sweco SW180 7400 180.0 !-! hub: ... No	No	Sweco	SW180-7400	7400	180,0	200,0	2250	0,0
11	536414	6520017	79,2	Sweco SW180 7400 180.0 !-! hub: ... No	No	Sweco	SW180-7400	7400	180,0	200,0	2250	0,0
12	537889	6520276	72,7	Sweco SW180 7400 180.0 !-! hub: ... No	No	Sweco	SW180-7400	7400	180,0	200,0	2250	0,0
13	535456	6519872	77,2	Sweco SW180 7400 180.0 !-! hub: ... No	No	Sweco	SW180-7400	7400	180,0	200,0	2250	0,0
14	538061	6522066	75,1	Sweco SW180 7400 180.0 !-! hub: ... No	No	Sweco	SW180-7400	7400	180,0	200,0	2250	0,0
15	538644	6519769	62,3	Sweco SW180 7400 180.0 !-! hub: ... No	No	Sweco	SW180-7400	7400	180,0	200,0	2250	0,0
16	540028	6520857	63,2	Sweco SW180 7400 180.0 !-! hub: ... No	No	Sweco	SW180-7400	7400	180,0	200,0	2250	0,0
17	537309	6522715	73,4	Sweco SW180 7400 180.0 !-! hub: ... No	No	Sweco	SW180-7400	7400	180,0	200,0	2250	0,0



Scale 1:125 000
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]	[m]	[°]		[m]
A	534491	6518731	71,6	5,0	5,0	1,0	0,0	"Green house mode"	1,0
B	539006	6518817	58,4	5,0	5,0	1,0	0,0	"Green house mode"	1,0
C	539245	6521425	69,1	5,0	5,0	1,0	0,0	"Green house mode"	1,0
D	540692	6520008	68,3	5,0	5,0	1,0	0,0	"Green house mode"	1,0
E	533730	6519056	79,4	5,0	5,0	1,0	0,0	"Green house mode"	1,0
F	533692	6523808	90,6	5,0	5,0	1,0	0,0	"Green house mode"	1,0
G	540979	6521108	64,5	5,0	5,0	1,0	0,0	"Green house mode"	1,0

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SHADOW - Main Result

Calculation: 20200824

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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]
H	533725	6520820	82,1	5,0	5,0	1,0	0,0	"Green house mode"	1,0
I	536928	6519237	78,3	5,0	5,0	1,0	0,0	"Green house mode"	1,0
J	539209	6521434	69,3	5,0	5,0	1,0	0,0	"Green house mode"	1,0
K	533170	6520201	86,7	5,0	5,0	1,0	0,0	"Green house mode"	1,0
L	537947	6522978	77,3	5,0	5,0	1,0	0,0	"Green house mode"	1,0
M	540871	6520365	64,4	5,0	5,0	1,0	0,0	"Green house mode"	1,0
N	533729	6519551	82,9	5,0	5,0	1,0	0,0	"Green house mode"	1,0
O	536296	6518790	77,6	5,0	5,0	1,0	0,0	"Green house mode"	1,0
P	536765	6519288	75,9	5,0	5,0	1,0	0,0	"Green house mode"	1,0
Q	532937	6521420	85,3	5,0	5,0	1,0	0,0	"Green house mode"	1,0
R	540546	6521946	61,0	5,0	5,0	1,0	0,0	"Green house mode"	1,0
S	538911	6522074	71,2	5,0	5,0	1,0	0,0	"Green house mode"	1,0
T	540726	6519495	71,2	5,0	5,0	1,0	0,0	"Green house mode"	1,0
U	534082	6518878	77,8	5,0	5,0	1,0	0,0	"Green house mode"	1,0
V	535607	6518897	77,1	5,0	5,0	1,0	0,0	"Green house mode"	1,0
W	532778	6522156	79,2	5,0	5,0	1,0	0,0	"Green house mode"	1,0
X	537450	6523463	78,9	5,0	5,0	1,0	0,0	"Green house mode"	1,0
Y	540831	6520783	68,2	5,0	5,0	1,0	0,0	"Green house mode"	1,0
Z	540582	6521926	59,4	5,0	5,0	1,0	0,0	"Green house mode"	1,0
AA	534435	6518719	74,1	5,0	5,0	1,0	0,0	"Green house mode"	1,0
AB	532876	6523553	90,7	5,0	5,0	1,0	0,0	"Green house mode"	1,0

Calculation Results

Shadow receptor

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]	
A	11:17	28	0:30	3:30	
B	130:16	108	1:31	37:28	
C	197:27	311	1:17	40:07	
D	17:00	60	0:23	4:06	
E	32:27	88	0:34	9:09	
F	0:00	0	0:00	0:00	
G	34:27	71	0:42	7:48	
H	27:53	106	0:22	4:30	
I	124:37	168	1:17	36:19	
J	198:52	308	1:20	40:19	
K	6:47	27	0:20	1:03	
L	189:24	197	1:37	32:54	
M	44:06	90	0:43	12:09	
N	26:48	73	0:31	5:40	
O	50:42	145	0:38	14:53	
P	96:24	170	1:02	26:49	
Q	0:00	0	0:00	0:00	
R	48:24	110	0:47	7:46	
S	175:17	247	1:12	34:57	
T	18:50	71	0:22	5:22	
U	69:44	136	0:48	21:00	
V	118:41	126	1:06	34:56	
W	0:00	0	0:00	0:00	
X	138:31	126	1:27	20:28	
Y	65:20	115	0:53	18:23	
Z	45:38	102	0:47	7:22	
AA	36:59	53	0:52	11:32	
AB	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	Sweco SW180 7400 180.0 !-! hub: 200,0 m (TOT: 290,0 m) (183)	73:13	12:56
2	Sweco SW180 7400 180.0 !-! hub: 200,0 m (TOT: 290,0 m) (184)	0:00	0:00

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SHADOW - Main Result

Calculation: 20200824

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No.	Name	Worst case [h/year]	Expected [h/year]
3	Sweco SW180 7400 180.0 !-! hub: 200,0 m (TOT: 290,0 m) (185)	281:48	76:25
4	Sweco SW180 7400 180.0 !-! hub: 200,0 m (TOT: 290,0 m) (186)	117:52	32:35
5	Sweco SW180 7400 180.0 !-! hub: 200,0 m (TOT: 290,0 m) (187)	6:41	1:25
6	Sweco SW180 7400 180.0 !-! hub: 200,0 m (TOT: 290,0 m) (188)	114:25	20:42
7	Sweco SW180 7400 180.0 !-! hub: 200,0 m (TOT: 290,0 m) (189)	27:09	4:03
8	Sweco SW180 7400 180.0 !-! hub: 200,0 m (TOT: 290,0 m) (190)	149:05	45:34
9	Sweco SW180 7400 180.0 !-! hub: 200,0 m (TOT: 290,0 m) (191)	33:57	5:47
10	Sweco SW180 7400 180.0 !-! hub: 200,0 m (TOT: 290,0 m) (192)	137:07	25:12
11	Sweco SW180 7400 180.0 !-! hub: 200,0 m (TOT: 290,0 m) (193)	0:00	0:00
12	Sweco SW180 7400 180.0 !-! hub: 200,0 m (TOT: 290,0 m) (194)	42:03	7:56
13	Sweco SW180 7400 180.0 !-! hub: 200,0 m (TOT: 290,0 m) (195)	86:33	25:16
14	Sweco SW180 7400 180.0 !-! hub: 200,0 m (TOT: 290,0 m) (196)	186:12	38:06
15	Sweco SW180 7400 180.0 !-! hub: 200,0 m (TOT: 290,0 m) (197)	58:22	11:58
16	Sweco SW180 7400 180.0 !-! hub: 200,0 m (TOT: 290,0 m) (198)	216:12	48:00
17	Sweco SW180 7400 180.0 !-! hub: 200,0 m (TOT: 290,0 m) (199)	144:04	29:23

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.