

SHADOW - Main Result

Calculation: 202309_22xSW180_7.4MW_210mHH_L6D_Forest_SG_15m_RC

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

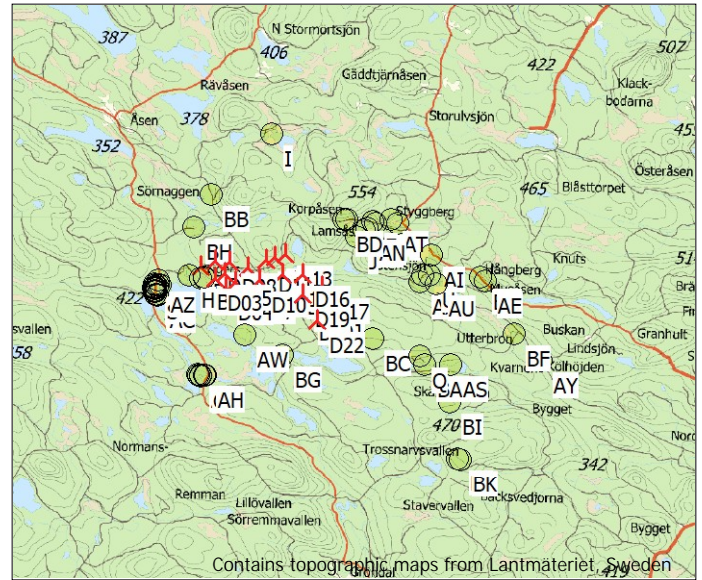
Minimum sun height over horizon for influence 3 °
Day step for calculation 1 days
Time step for calculation 1 minutes

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
841 510 450 441 484 684 760 1,064 836 659 770 1,261 8,760

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: DTM - 50x50m
Area object(s) used in calculation:
Forest Data - SG - 15 m (202309)
Receptor grid resolution: 1.0 m

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



Scale 1:400,000
New WTG Shadow receptor

WTGs

Row data/Description	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 [RPM]
			[m]									
D01	556,349	6,897,487	316.1	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 3... No	No	Sweco	SW180-7,400	7,400	180.0	210.0	2,249	8.2
D02	557,098	6,897,827	333.4	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 3... No	No	Sweco	SW180-7,400	7,400	180.0	210.0	2,249	8.2
D03	557,139	6,896,855	315.9	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 3... No	No	Sweco	SW180-7,400	7,400	180.0	210.0	2,249	8.2
D04	557,730	6,896,375	319.9	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 3... No	No	Sweco	SW180-7,400	7,400	180.0	210.0	2,249	8.2
D05	557,587	6,897,193	354.0	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 3... No	No	Sweco	SW180-7,400	7,400	180.0	210.0	2,249	8.2
D06	558,179	6,896,714	386.9	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 3... No	No	Sweco	SW180-7,400	7,400	180.0	210.0	2,249	8.2
D07	558,806	6,896,497	369.5	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 3... No	No	Sweco	SW180-7,400	7,400	180.0	210.0	2,249	8.2
D08	557,896	6,897,731	375.4	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 3... No	No	Sweco	SW180-7,400	7,400	180.0	210.0	2,249	8.2
D09	558,807	6,897,463	365.8	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 3... No	No	Sweco	SW180-7,400	7,400	180.0	210.0	2,249	8.2
D10	559,444	6,896,856	370.8	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 3... No	No	Sweco	SW180-7,400	7,400	180.0	210.0	2,249	8.2
D11	559,787	6,897,901	386.7	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 3... No	No	Sweco	SW180-7,400	7,400	180.0	210.0	2,249	8.2
D12	560,247	6,898,102	396.4	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 3... No	No	Sweco	SW180-7,400	7,400	180.0	210.0	2,249	8.2
D13	560,820	6,898,252	375.6	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 3... No	No	Sweco	SW180-7,400	7,400	180.0	210.0	2,249	8.2
D14	560,713	6,897,151	380.6	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 3... No	No	Sweco	SW180-7,400	7,400	180.0	210.0	2,249	8.2
D15	561,336	6,896,771	409.5	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 3... No	No	Sweco	SW180-7,400	7,400	180.0	210.0	2,249	8.2
D16	561,740	6,897,147	370.2	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 3... No	No	Sweco	SW180-7,400	7,400	180.0	210.0	2,249	8.2
D17	562,745	6,896,572	409.9	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 3... No	No	Sweco	SW180-7,400	7,400	180.0	210.0	2,249	8.2
D18	562,206	6,896,578	412.1	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 3... No	No	Sweco	SW180-7,400	7,400	180.0	210.0	2,249	8.2
D19	561,743	6,896,083	375.2	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 3... No	No	Sweco	SW180-7,400	7,400	180.0	210.0	2,249	8.2
D20	562,015	6,895,398	387.8	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 3... No	No	Sweco	SW180-7,400	7,400	180.0	210.0	2,249	8.2
D21	562,576	6,895,551	397.2	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 3... No	No	Sweco	SW180-7,400	7,400	180.0	210.0	2,249	8.2
D22	562,556	6,894,791	375.3	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 3... No	No	Sweco	SW180-7,400	7,400	180.0	210.0	2,249	8.2

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	553,899	6,896,107	303.2	5.0	5.0	1.0	0.0	"Green house mode"	1.0
B	554,137	6,896,484	294.4	5.0	5.0	1.0	0.0	"Green house mode"	1.0
C	556,386	6,891,670	292.2	5.0	5.0	1.0	0.0	"Green house mode"	1.0
D	566,778	6,899,970	393.0	5.0	5.0	1.0	0.0	"Green house mode"	1.0
E	565,397	6,900,029	370.0	5.0	5.0	1.0	0.0	"Green house mode"	1.0
F	554,034	6,895,974	298.3	5.0	5.0	1.0	0.0	"Green house mode"	1.0
G	553,867	6,896,326	300.7	5.0	5.0	1.0	0.0	"Green house mode"	1.0

To be continued on next page...

SHADOW - Main Result

Calculation: 202309_22xSW180_7.4MW_210mHH_L6D_Forest_SG_15m_RC

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No.	Easting	Northing	Z	Width	Height	Elevation	Slope of	Direction mode	Eye height
			[m]	[m]	[m]	a.g.l.	window		(ZVI) a.g.l.
			[m]	[m]	[m]	[m]	[°]		[m]
H	555,760	6,897,018	293.8	5.0	5.0	1.0	0.0	"Green house mode"	1.0
I	559,973	6,904,546	398.9	5.0	5.0	1.0	0.0	"Green house mode"	1.0
J	564,542	6,899,197	356.8	5.0	5.0	1.0	0.0	"Green house mode"	1.0
K	568,122	6,897,243	302.4	5.0	5.0	1.0	0.0	"Green house mode"	1.0
L	553,917	6,896,512	300.8	5.0	5.0	1.0	0.0	"Green house mode"	1.0
M	553,969	6,896,094	298.8	5.0	5.0	1.0	0.0	"Green house mode"	1.0
N	554,014	6,896,008	297.8	5.0	5.0	1.0	0.0	"Green house mode"	1.0
O	554,035	6,896,396	296.1	5.0	5.0	1.0	0.0	"Green house mode"	1.0
P	554,183	6,896,461	293.3	5.0	5.0	1.0	0.0	"Green house mode"	1.0
Q	568,088	6,892,927	320.2	5.0	5.0	1.0	0.0	"Green house mode"	1.0
R	564,060	6,900,157	442.5	5.0	5.0	1.0	0.0	"Green house mode"	1.0
S	553,901	6,896,411	299.8	5.0	5.0	1.0	0.0	"Green house mode"	1.0
T	553,906	6,896,152	303.6	5.0	5.0	1.0	0.0	"Green house mode"	1.0
U	568,466	6,897,249	300.6	5.0	5.0	1.0	0.0	"Green house mode"	1.0
V	556,635	6,891,732	292.2	5.0	5.0	1.0	0.0	"Green house mode"	1.0
W	565,533	6,899,956	362.8	5.0	5.0	1.0	0.0	"Green house mode"	1.0
X	556,362	6,891,705	293.0	5.0	5.0	1.0	0.0	"Green house mode"	1.0
Y	556,374	6,891,750	293.6	5.0	5.0	1.0	0.0	"Green house mode"	1.0
Z	556,401	6,891,726	293.3	5.0	5.0	1.0	0.0	"Green house mode"	1.0
AA	553,951	6,896,332	298.9	5.0	5.0	1.0	0.0	"Green house mode"	1.0
AB	553,972	6,896,447	298.0	5.0	5.0	1.0	0.0	"Green house mode"	1.0
AC	554,053	6,895,936	296.4	5.0	5.0	1.0	0.0	"Green house mode"	1.0
AD	564,967	6,899,565	373.3	5.0	5.0	1.0	0.0	"Green house mode"	1.0
AE	571,468	6,896,991	355.7	5.0	5.0	1.0	0.0	"Green house mode"	1.0
AF	553,889	6,896,370	300.6	5.0	5.0	1.0	0.0	"Green house mode"	1.0
AG	554,004	6,896,239	296.1	5.0	5.0	1.0	0.0	"Green house mode"	1.0
AH	556,676	6,891,726	293.3	5.0	5.0	1.0	0.0	"Green house mode"	1.0
AI	568,568	6,898,310	333.1	5.0	5.0	1.0	0.0	"Green house mode"	1.0
AJ	556,401	6,891,708	292.8	5.0	5.0	1.0	0.0	"Green house mode"	1.0
AK	553,905	6,896,188	303.0	5.0	5.0	1.0	0.0	"Green house mode"	1.0
AL	553,994	6,896,170	296.4	5.0	5.0	1.0	0.0	"Green house mode"	1.0
AM	556,303	6,891,772	293.5	5.0	5.0	1.0	0.0	"Green house mode"	1.0
AN	565,141	6,899,647	369.3	5.0	5.0	1.0	0.0	"Green house mode"	1.0
AO	553,904	6,896,226	302.3	5.0	5.0	1.0	0.0	"Green house mode"	1.0
AP	553,943	6,896,399	298.6	5.0	5.0	1.0	0.0	"Green house mode"	1.0
AQ	553,971	6,896,264	298.1	5.0	5.0	1.0	0.0	"Green house mode"	1.0
AR	556,334	6,891,742	293.5	5.0	5.0	1.0	0.0	"Green house mode"	1.0
AS	569,711	6,892,528	294.7	5.0	5.0	1.0	0.0	"Green house mode"	1.0
AT	566,449	6,900,219	408.4	5.0	5.0	1.0	0.0	"Green house mode"	1.0
AU	568,845	6,896,836	291.3	5.0	5.0	1.0	0.0	"Green house mode"	1.0
AV	556,566	6,896,886	296.2	5.0	5.0	1.0	0.0	"Green house mode"	1.0
AW	558,749	6,893,937	295.9	5.0	5.0	1.0	0.0	"Green house mode"	1.0
AX	567,978	6,896,881	288.5	5.0	5.0	1.0	0.0	"Green house mode"	1.0
AY	574,497	6,892,902	243.5	5.0	5.0	1.0	0.0	"Green house mode"	1.0
AZ	554,144	6,896,729	297.4	5.0	5.0	1.0	0.0	"Green house mode"	1.0
BA	568,369	6,892,511	303.1	5.0	5.0	1.0	0.0	"Green house mode"	1.0
BB	556,796	6,901,282	324.7	5.0	5.0	1.0	0.0	"Green house mode"	1.0
BC	565,509	6,893,818	343.9	5.0	5.0	1.0	0.0	"Green house mode"	1.0
BD	563,942	6,900,152	449.4	5.0	5.0	1.0	0.0	"Green house mode"	1.0
BE	556,304	6,896,874	292.9	5.0	5.0	1.0	0.0	"Green house mode"	1.0
BF	573,051	6,894,237	270.4	5.0	5.0	1.0	0.0	"Green house mode"	1.0
BG	560,738	6,892,897	300.7	5.0	5.0	1.0	0.0	"Green house mode"	1.0
BH	555,899	6,899,575	323.0	5.0	5.0	1.0	0.0	"Green house mode"	1.0
BI	569,704	6,890,584	381.0	5.0	5.0	1.0	0.0	"Green house mode"	1.0
BJ	556,511	6,896,916	294.7	5.0	5.0	1.0	0.0	"Green house mode"	1.0
BK	570,300	6,887,492	395.2	5.0	5.0	1.0	0.0	"Green house mode"	1.0
BL	570,185	6,887,554	392.8	5.0	5.0	1.0	0.0	"Green house mode"	1.0
BM	571,200	6,897,206	345.8	5.0	5.0	1.0	0.0	"Green house mode"	1.0

SHADOW - Main Result

Calculation: 202309_22xSW180_7.4MW_210mHH_L6D_Forest_SG_15m_RC

Calculation Results

Shadow receptor

No.	Shadow, worst case		Max shadow hours per day [h/day]	Shadow, expected values
	Shadow hours per year [h/year]	Shadow days per year [days/year]		Shadow hours per year [h/year]
A	0:00	0	0:00	0:00
B	0:00	0	0:00	0:00
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
O	0:00	0	0:00	0:00
P	0:00	0	0:00	0:00
Q	0:00	0	0:00	0:00
R	0:00	0	0:00	0:00
S	0:00	0	0:00	0:00
T	0:00	0	0:00	0:00
U	0:00	0	0:00	0:00
V	0:00	0	0:00	0:00
W	0:00	0	0:00	0:00
X	0:00	0	0:00	0:00
Y	0:00	0	0:00	0:00
Z	0:00	0	0:00	0:00
AA	0:00	0	0:00	0:00
AB	0:00	0	0:00	0:00
AC	0:00	0	0:00	0:00
AD	0:00	0	0:00	0:00
AE	0:00	0	0:00	0:00
AF	0:00	0	0:00	0:00
AG	0:00	0	0:00	0:00
AH	0:00	0	0:00	0:00
AI	0:00	0	0:00	0:00
AJ	0:00	0	0:00	0:00
AK	0:00	0	0:00	0:00
AL	0:00	0	0:00	0:00
AM	0:00	0	0:00	0:00
AN	0:00	0	0:00	0:00
AO	0:00	0	0:00	0:00
AP	0:00	0	0:00	0:00
AQ	0:00	0	0:00	0:00
AR	0:00	0	0:00	0:00
AS	0:00	0	0:00	0:00
AT	0:00	0	0:00	0:00
AU	0:00	0	0:00	0:00
AV	0:00	0	0:00	0:00
AW	0:00	0	0:00	0:00
AX	0:00	0	0:00	0:00
AY	0:00	0	0:00	0:00
AZ	0:00	0	0:00	0:00
BA	0:00	0	0:00	0:00
BB	0:00	0	0:00	0:00
BC	0:00	0	0:00	0:00
BD	0:00	0	0:00	0:00
BE	0:00	0	0:00	0:00
BF	0:00	0	0:00	0:00
BG	0:00	0	0:00	0:00
BH	0:00	0	0:00	0:00
BI	0:00	0	0:00	0:00
BJ	0:00	0	0:00	0:00
BK	0:00	0	0:00	0:00

To be continued on next page...

SHADOW - Main Result

Calculation: 202309_22xSW180_7.4MW_210mHH_L6D_Forest_SG_15m_RC

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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]	
BL	0:00	0	0:00	0:00	
BM	0:00	0	0:00	0:00	

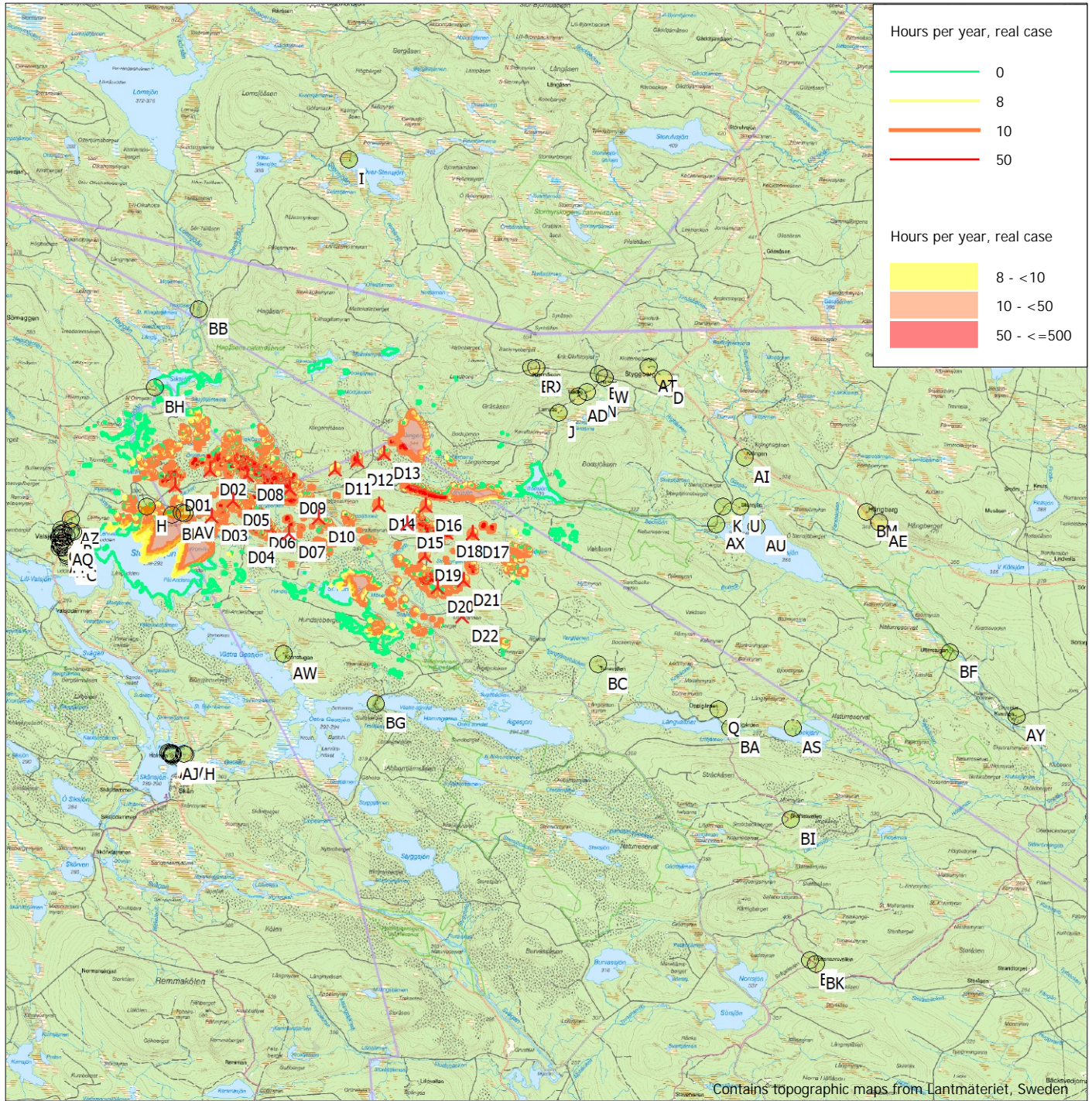
Total amount of flickering on the shadow receptors caused by each WTG

No.	Name				Worst case [h/year]	Expected [h/year]
D01	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 300.0 m) (2241)				0:00	0:00
D02	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 300.0 m) (2242)				0:00	0:00
D03	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 300.0 m) (2243)				0:00	0:00
D04	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 300.0 m) (2244)				0:00	0:00
D05	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 300.0 m) (2245)				0:00	0:00
D06	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 300.0 m) (2246)				0:00	0:00
D07	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 300.0 m) (2247)				0:00	0:00
D08	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 300.0 m) (2248)				0:00	0:00
D09	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 300.0 m) (2249)				0:00	0:00
D10	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 300.0 m) (2250)				0:00	0:00
D11	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 300.0 m) (2251)				0:00	0:00
D12	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 300.0 m) (2252)				0:00	0:00
D13	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 300.0 m) (2253)				0:00	0:00
D14	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 300.0 m) (2254)				0:00	0:00
D15	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 300.0 m) (2255)				0:00	0:00
D16	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 300.0 m) (2256)				0:00	0:00
D17	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 300.0 m) (2257)				0:00	0:00
D18	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 300.0 m) (2258)				0:00	0:00
D19	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 300.0 m) (2259)				0:00	0:00
D20	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 300.0 m) (2260)				0:00	0:00
D21	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 300.0 m) (2261)				0:00	0:00
D22	Sweco SW180 7400 180.0 !-! hub: 210.0 m (TOT: 300.0 m) (2262)				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: 202309_22xSW180_7.4MW_210mHH_L6D_Forest_SG_15m_RC



0 2.5 5 7.5 10km

Map: Swedish Topographic Map , Print scale 1:125,000, Map center Swedish UTM 33-SWREF99 (SE) East: 564,100 North: 6,896,019

New WTG Shadow receptor

Flicker map level: DTM - 50x50m

Time step: 3 minutes, Day step: 7 days, Map resolution: 20 m, Visibility resolution: 10 m, Eye height: 1.5 m