

## SHADOW - Main Result

Calculation: varjutus\_real case

### 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

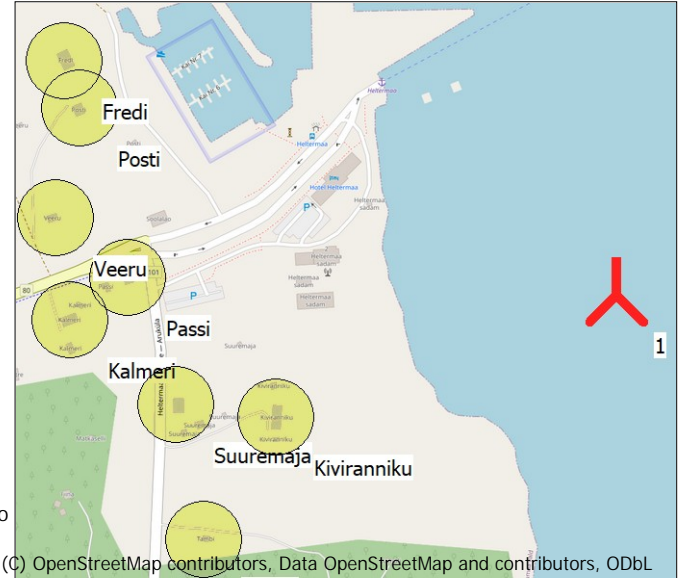
Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []  
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
1,20 2,46 4,85 7,54 10,20 10,45 10,65 8,73 5,86 3,24 1,28 0,77

Operational time  
N NE E SE S SW W NW Sum  
788 670 946 796 1 537 1 561 788 796 7 882

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\_1.wpo  
Receptor grid resolution: 1,0 m

All coordinates are in  
Geo [deg]-WGS84



### WTGs

Longitude	Latitude	Z	Row data/Description	WTG type			Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Shadow data	
				Valid	Manufact.	Type-generator				Calculation distance [m]	RPM [RPM]
1	23,052046° E	58,864438° N	0,0 NORDEX N-54/1000 1...	No	NORDEX	N-54/1000-1 000/200	1 000	54,0	60,0	2 500	21,5

### Shadow receptor-Input

No.	Longitude	Latitude	Z	Width	Height	Elevation	Slope of	Direction mode	Eye height
			[m]	[m]	[m]	a.g.l. [m]	window [°]		(ZVI) a.g.l. [m]
Fredi	23,042525° E	58,866530° N	1,7	1,0	1,0	1,0	0,0	"Green house mode"	1,0
Kalmeri	23,042632° E	58,864211° N	6,2	1,0	1,0	1,0	0,0	"Green house mode"	1,0
Kiviranniku	23,046184° E	58,863357° N	4,7	1,0	1,0	1,0	0,0	"Green house mode"	1,0
Passi	23,043630° E	58,864599° N	4,3	1,0	1,0	1,0	0,0	"Green house mode"	1,0
Posti	23,042793° E	58,866097° N	2,2	1,0	1,0	1,0	0,0	"Green house mode"	1,0
Suuremaja	23,044446° E	58,863457° N	5,7	1,0	1,0	1,0	0,0	"Green house mode"	1,0
Tambi	23,044939° E	58,862253° N	10,0	1,0	1,0	1,0	0,0	"Green house mode"	1,0
Veeru	23,042386° E	58,865121° N	4,6	1,0	1,0	1,0	0,0	"Green house mode"	1,0

### Calculation Results

#### Shadow receptor

No.	Shadow, expected values per year [h/year]
Fredi	1:19
Kalmeri	2:24
Kiviranniku	9:42
Passi	2:51
Posti	1:36
Suuremaja	4:33
Tambi	9:56
Veeru	1:55

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Calculated:  
03.12.2023 18:09/4.0.424

## SHADOW - Main Result

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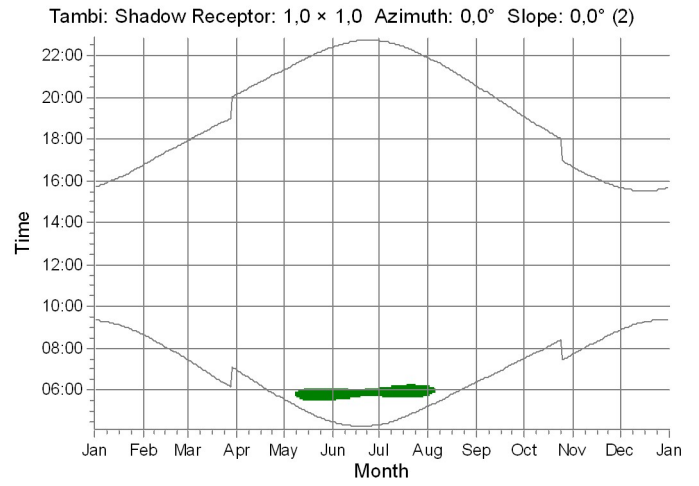
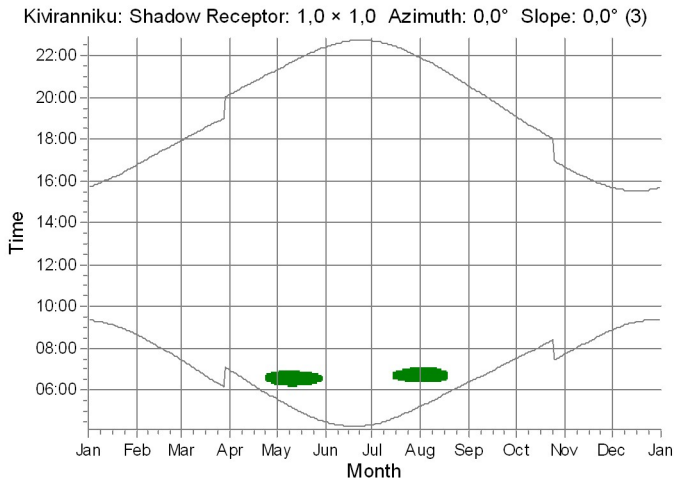
Total amount of flickering on the shadow receptors caused by each WTG

No.	Name	Expected [h/year]
1	NORDEX N-54/1000 1000-200 54.0 !-! hub: 60,0 m (TOT: 87,0 m) (1)	32:57

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 - Calendar, graphical

Calculation: varjutus\_real case



WTGs

1: NORDEX N-54/1000 1000-200 54.0 !-! hub: 60,0 m (TOT: 87,0 m) (1)

## SHADOW - Map

Calculation: varjutus\_real case



0 50 100 150 200 m

Map: Estonian Topographic Map, Print scale 1:5 000, Map center Geo WGS84 East: 23,049791° E North: 58,864744° N

New WTG

Flicker map level: Height Contours: CONTOURLINE\_ONLINEDATA\_1.wpo (3)

Time step: 3 minutes, Day step: 7 days, Map resolution: 20 m, Visibility resolution: 10 m, Eye height: 1,5 m