Lasorin tuulivoimapuisto, Vöyri

Melu- ja varjostusmallinnusraportti

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Lasorin tuulivoimapuisto, Vöyri

1 MELU- JA VARJOSTUSMALLINNUKSEN TAVOITTEET

Lasor Vind Oy Ab suunnittelee tuulivoimapuistoa Vöyrin kunnan keskiosaan. Hankealueelle suunnitellaan 19 tuulivoimalan rakentamista vaihtoehdossa 1 (VE1) ja 9 tuulivoimalan rakentamista vaihtoehdossa 2 (VE2). Tuulivoimahankkeen aiheuttamia melu- ja varjostusvaikutuksia on arvioitu laatimalla mallinnukset tuulivoimaloiden aiheuttamista äänenpainetasoista ja varjostuksista. Mallinnusten tavoitteena on osoittaa, kuinka laajalle alueelle kyseiset vaikutukset ulottuvat ja arvioida vaikutukset lähiseudun ympärivuotiselle ja vapaa-ajan asutukselle.

Tuulivoimaloiden aiheuttamia melu- ja varjostusvaikutuksia on arvioitu WindPRO-ohjelmalla YVA-selostusvaiheen kahden hankevaihtoehdon voimaloiden sijoitussuunnitelmien mukaisesti. Melu- ja varjostusmallinnukset on laatinut Miikka Saranpää FCG Finnish Consulting Group Oy:stä. Laaduntarkastuksen on tehnyt Johanna Harju (FCG).

2 LÄHTÖTIEDOT JA MENETELMÄT

2.1 Melu

2.1.1 Melumallinnus ISO 9613-2

Tuulivoimaloiden aiheuttamat äänenpainetasot on mallinnettu WindPRO-laskentaohjelman Decibel-moduulilla ISO 9613-2 standardin mukaisesti. Ympäristöhallinnon tuulivoimaloiden melun mallintamista koskevan ohjeen 2/2014 mukaisesti tuulen nopeutena käytettiin 10 m korkeudella mitattuna 8 m/s, ilman lämpötilana 15 °C, ilmanpaineena 101,325 kPa, ilman suhteellisena kosteutena 70 % ja maanpinnan kovuutena arvoa 0,4. Laskenta on tehty 4,0 m maan pinnan tasosta.

Tuulivoimaloiden äänenpainetasot on mallinnettu käyttäen Vestas V172- 7.2 MW -voimalaitosta. Voimalaitoksen lähtömelutaso $L_{W,A}$ on 106,9 dB, mikä on voimalan valmistajan antama takuuarvo, kun voimalassa käytetään ääntä vaimentavaa siipityyppiä (Taulukko 1).

Yhteismelun mallinnuksissa on huomioitu Lasorin suunniteltujen tuulivoimaloiden lisäksi Lålaxin tuulivoimahankkeen suunnitellut voimalat (4 kpl) (Taulukko 2), Lotlaxin suunnitellut voimalat (3 kpl) (Taulukko 3), Söderskogenin suunnitellut voimalat (8 kpl) (Taulukko 4), Mörknässkogenin rakenteilla olevat voimalat (4 kpl) (Taulukko 5) sekä Tuotannossa olevat Storbackenin voimalat (7 kpl) (Taulukko 6).

Melumallinnusten laskentatuloksia on havainnollistettu ns. keskiäänitasokarttojen avulla. Keskiäänitasokartoissa on esitetty melun keskiäänitaso- eli ekvivalenttiäänitasokäyrät (L_{Aeq}) 5 dB välein.

Taulukko 1. Lasorin tuulivoimapuiston mallinnusohjelma ja tuulivoimaloiden äänitehotasot sekä melun erityispiirteet.

MALLINNUSOHJELMAN TIEDOT							
Mallinnusohjelma ja versio: WindPRO version 3.5.576				Mallinnusmenetelmä: ISO 9613-2			
TUULIVOIMALAN (TUULIVOIMALOIDEN TIEDOT)							
Tuulivoimalan valmistaja: Vestas				Tyyppi: V172-7.2MW (EnVentus)		Sarjanumero/t:-	
Nimellisteho: 7,2 MW		Napakorkeus: 194 m		Roottorin halkaisija: 172 m		Tornin tyyppi: teräs/hybridi	
Mahdollisuudet vaikuttaa tuulivoimalan melupäästöön käytön aikana ja sen vaikutus meluun							
Lapakulman säätö		Pyörimisnopeus		Muu, mikä			
Kyllä	- dB	Kyllä	- dB	Noise mode säätö: STE			
~~Ei~~		~~Ei~~		Noise mode, lähtömelutaso		106,9 dB	

AKUSTISET TIEDOT/LASKENNAN LÄHTÖTIEDOT							
Asiakirja nro: 0128-4336_00, 30.6.2022 (Original instruction T05 0128-4336 VER 00)							
Oktaaveittain [Hz], L_{WA} [dB]		1/3-oktaaveittain [Hz], L_{WA} [dB]					
		20	61,7	200	96	1600	92,4
63	90,4	25	66,9	250	96,6	2000	90,4
125	98	31,5	71,8	315	96,8	2500	88,1
250	101,3	40	76,6	400	96,9	3150	85,5
500	101,5	50	81	500	96,7	4000	82,5
1000	99,9	63	84,8	630	96,6	5000	79,1
2000	95,4	80	88,2	800	96,1	6300	75,4
4000	87,9	100	90,9	1000	95,2	8000	71,3
8000	77,2	125	93,2	1250	93,9	10000	66,9
$L_{WA,tot}$ = 106,9 dB		160	94,8				

Melun erityispiirteiden mittaus ja havainnot:							
Kapeakaistaisuus / Tonaalisuus		Impulssimaisuus		Merkityksellinen sykintä (amplitudimodulaatio)		Muu, Mikä:	
~~kyllä~~	ei	~~kyllä~~	ei	~~kyllä~~	ei	~~kyllä~~	ei

Taulukko 2. Lålaxin tuulivoimapuiston mallinnusohjelma ja tuulivoimaloiden äänitehotasot sekä melun erityispiirteet.

MALLINNUSOHJELMAN TIEDOT							
Mallinnusohjelma ja versio: WindPRO version 3.5.576				Mallinnusmenetelmä: ISO 9613-2			
TUULIVOIMALAN (TUULIVOIMALOIDEN TIEDOT)							
Tuulivoimalan valmistaja: Vestas				Tyyppi: V150 Serrated trailing edges		Sarjanumero/t:-	
Nimellisteho: 4,2 MW		Napakorkeus: 140 m		Roottorin halkaisija:150 m		Tornin tyyppi: teräs	
Mahdollisuudet vaikuttaa tuulivoimalan melupäästöön käytön aikana ja sen vaikutus meluun							
Lapakulman säätö		Pyörimisnopeus		Muu, mikä;”Serrated Trailing Edges”			
Kyllä	- dB	Kyllä	- dB	Noise mode säätötasot:		Mode PO1	
~~Ei~~		~~Ei~~		Noise mode, lähtömelutaso:			

AKUSTISET TIEDOT/LASKENNAN LÄHTÖTIEDOT							
Melupäästötiedot perustuvat valmistajan dokumenttiin ” DMS no: 0067-4767_V01, V150-4.0/4.2 MW Third octave noise emission, Date 2017-09-22”. Käytetty lähtömelutaso vastaa laitetoimittajan tietojen mukaan ylempi 95% CL.							
Oktaaveittain [Hz], dB(A)		1/3-oktaaveittain, LWA dB [Hz]					
		20	62,2	200	92,2	2000	90,2
63	86,5	25	66,5	250	93,4	2500	88,4
125	93,7	31,5	70,7	315	94,3	3150	86,1
250	98,2	40	74,6	400	94,9	4000	83,4
500	99,9	50	78	500	95,2	5000	80,6
1000	98,9	63	81,1	630	95,2	6300	77,3
2000	95,1	80	84,1	800	94,8	8000	73,7
4000	88,7	100	86,5	1000	94,2	10000	69,9
8000	79,4	125	88,7	1250	93,2		
104,9 dB(A)		160	90,7	1600	91,8		
Melun erityispiirteiden mittaus ja havainnot:							
Kapeakaistaisuus / Tonaalisuus		Impulssimaisuus		Merkityksellinen sykintä (amplitudimodulaatio)		Muu, Mikä:	
~~kyllä~~	ei	~~kyllä~~	ei	~~kyllä~~	ei	~~kyllä~~	ei

Taulukko 3. Lotlaxin tuulivoimapuiston mallinnusohjelma ja tuulivoimaloiden äänitehotasot sekä melun erityispiirteet.

MALLINNUSOHJELMAN TIEDOT	
Mallinnusohjelma ja versio: WindPRO version 3.5.576	Mallinnusmenetelmä: ISO 9613-2

TUULIVOIMALAN (TUULIVOIMALOIDEN TIEDOT)					
Tuulivoimalan valmistaja: Prokon				Tyyppi: P3000	Sarjanumero/t:-
Nimellisteho: 3,0 MW		Napakorkeus: 122 m		Roottorin halkaisija:116,7 m	Tornin tyyppi: hybridi
Mahdollisuudet vaikuttaa tuulivoimalan melupäästöön käytön aikana ja sen vaikutus meluun					
Lapakulman säätö		Pyörimisnopeus		Muu, mikä;	
Kyllä	- dB	Kyllä	- dB	Noise mode säätötasot:	
~~Ei~~		~~Ei~~		Noise mode, lähtömelutaso:	106,5 dB(A)

AKUSTISET TIEDOT/LASKENNAN LÄHTÖTIEDOT
Äänidata perustuu dokumenttiin ” Prokon Mode 0 - 106,5 dB(A) (manufacturer's warranty),7.3.2013”.

Oktaaveittain [Hz], dB(A)		1/3-oktaaveittain, LWA dB [Hz]					
		20	65,7	200	92,8	2000	93,2
63	88,6	25	70,2	250	93,7	2500	91,8
125	95,1	31,5	74,1	315	94,8	3150	90,2
250	98,6	40	77,6	400	95,7	4000	88,4
500	101,0	50	80,7	500	96,3	5000	85,5
1000	100,8	63	83,3	630	96,5	6300	82,4
2000	98,0	80	86	800	96,5	8000	78,9
4000	93,2	100	88,4	1000	96,1	10000	75,1
8000	84,5	125	90,3	1250	95,4		
106,5 dB(A)		160	91,7	1600	94,4		

Melun erityispiirteiden mittaus ja havainnot:							
Kapeakaistaisuus / Tonaalisuus		Impulssimaisuus		Merkityksellinen sykintä (amplitudimodulaatio)		Muu, Mikä	
~~kyllä~~	ei	~~kyllä~~	ei	~~kyllä~~	ei	~~kyllä~~	ei

Taulukko 4. Söderskogenin tuulivoimapuiston mallinnusohjelma ja tuulivoimaloiden äänitehotasot sekä melun erityispiirteet.

MALLINNUSOHJELMAN TIEDOT							
Mallinnusohjelma ja versio: WindPRO version 3.5.576				Mallinnusmenetelmä: ISO 9613-2			
TUULIVOIMALAN (TUULIVOIMALOIDEN TIEDOT)							
Tuulivoimalan valmistaja: Nordex				Tyyppi: N163-5.6MW		Sarjanumero/t:-	
Nimellisteho: 5,6 MW		Napakorkeus: 210 m		Roottorin halkaisija: 180 m		Tornin tyyppi: teräs/hybridi	
Mahdollisuudet vaikuttaa tuulivoimalan melupäästöön käytön aikana ja sen vaikutus meluun							
Lapakulman säätö		Pyörimisnopeus		Muu, mikä			
Kyllä	- dB	Kyllä	- dB	Noise mode säätö:			
~~Ei~~		~~Ei~~		Noise mode, lähtömelutaso		109,2 dB	

AKUSTISET TIEDOT/LASKENNAN LÄHTÖTIEDOT							
Äänitehotaso 109,2 dB ja taajuusjakauma 1/3 oktaaveittain välillä 10 Hz – 10 kHz ovat voimalavalmistaja Nordexin ilmoittamia dokumentissa F008_276_A17_EN Revision 00 (wpd Finland oy 27.8.2021)							
Oktaaveittain [Hz], L_{WA} [dB]		1/3-oktaaveittain [Hz], L_{WA} [dB]					
		20	64,5	200	92,8	1600	99
63	89,5	25	68,5	250	93,9	2000	97,4
125	95,7	31,5	74	315	97,4	2500	95,2
250	99,9	40	77,5	400	97,1	3150	91,8
500	103,2	50	82,6	500	97,6	4000	87,2
1000	104,6	63	83,9	630	100	5000	82,1
2000	102,2	80	86,7	800	99,3	6300	81,8
4000	93,4	100	91,4	1000	100,3	8000	79,9
8000	84,6	125	89,9	1250	997	10000	95,7
$L_{WA,tot}$ = 109,2 dB		160	91,2				

Melun erityispiirteiden mittaus ja havainnot:							
Kapeakaistaisuus / Tonaalisuus		Impulssimaisuus		Merkityksellinen sykintä (amplitudimodulaatio)		Muu, Mikä:	
~~kyllä~~	ei	~~kyllä~~	ei	~~kyllä~~	ei	~~kyllä~~	ei

Taulukko 5. Mörknässkogenin tuulivoimapuiston mallinnusohjelma ja tuulivoimaloiden äänitehotasot sekä melun erityispiirteet.

MALLINNUSOHJELMAN TIEDOT							
Mallinnusohjelma ja versio: WindPRO version 3.5.576				Mallinnusmenetelmä: ISO 9613-2			
TUULIVOIMALAN (TUULIVOIMALOIDEN TIEDOT)							
Tuulivoimalan valmistaja: Nordex				Tyyppi: N163		Sarjanumero/t:-	
Nimellisteho: 5,7 MW		Napakorkeus: 158 m		Roottorin halkaisija: 163 m		Tornin tyyppi: teräs/hybridi	
Mahdollisuudet vaikuttaa tuulivoimalan melupäästöön käytön aikana ja sen vaikutus meluun							
Lapakulman säätö		Pyörimisnopeus		Muu, mikä			
Kyllä	- dB	Kyllä	- dB	Noise mode säätö:		Kyllä	
~~Ei~~		~~Ei~~		Noise mode, lähtömelutaso		107,2 +2 dB(A)	

AKUSTISET TIEDOT/LASKENNAN LÄHTÖTIEDOT

Melupäästötiedot perustuvat dokumenttiin ”Third octave sound power levels Nordex N163/5.X F008_276_A17_EN”.

Valmistajan ilmoittama tuulivoimalan tuottama äänitehotaso vastaa keskiäänitasoa, jolloin voimalan lähtöarvoihin on lisätty mallinnuksissa +2 dB vastaamaan ylempää luottamusväliä 95%.

Oktaaveittain [Hz], L_{WA} [dB]		1/3-oktaaveittain [Hz], L_{WA} [dB]					
		20	65,9	200	93,9	1600	98,1
63	90,9	25	69,8	250	94,8	2000	96,9
125	97,1	31,5	75,3	315	98,1	2500	94,9
250	100,8	40	78,9	400	97,7	3150	92,2
500	103,4	50	84,0	500	97,9	4000	88,2
1000	104,1	63	85,3	630	99,9	5000	83,4
2000	101,6	80	88,1	800	99,0	6300	83,2
4000	94,0	100	92,8	1000	99,8	8000	81,3
8000	86,0	125	91,3	1250	99,1	10000	77,1
$L_{WA,tot}$ = 109,2 dB		160	92,6				

Melun erityispiirteiden mittaus ja havainnot:							
Kapeakaistaisuus / Tonaalisuus		Impulssimaisuus		Merkityksellinen sykintä (amplitudimodulaatio)		Muu, Mikä:	
~~kyllä~~	ei	~~kyllä~~	ei	~~kyllä~~	ei	~~kyllä~~	ei

Taulukko 6. Storbackenin tuulivoimapuiston mallinnusohjelma ja tuulivoimaloiden äänitehotasot sekä melun erityispiirteet.

MALLINNUSOHJELMAN TIEDOT							
Mallinnusohjelma ja versio: WindPRO version 3.5.576				Mallinnusmenetelmä: ISO 9613-2			
TUULIVOIMALAN (TUULIVOIMALOIDEN TIEDOT)							
Tuulivoimalan valmistaja: Vestas				Tyyppi: V150-4.2MW		Sarjanumero/t:-	
Nimellisteho: 4,2 MW		Napakorkeus: 145 m		Roottorin halkaisija: 150 m		Tornin tyyppi: teräs/hybridi	
Mahdollisuudet vaikuttaa tuulivoimalan melupäästöön käytön aikana ja sen vaikutus meluun							
Lapakulman säätö		Pyörimisnopeus		Muu, mikä			
Kyllä	- dB	Kyllä	- dB	Noise mode säätö:			
~~Ei~~		~~Ei~~		Noise mode, lähtömelutaso		104,9 dB	

AKUSTISET TIEDOT/LASKENNAN LÄHTÖTIEDOT
Melupäästötiedot perustuvat dokumenttiin ” DMS 0067-4767_V03_V150-4.0/4.2 MW- Third Octave noise emission. Valmistajan ilmoittama tuulivoimalan tuottaman äänitehotaso perustuu todellisiin mittaustuloksiin ja vastaa ylempää luottamusväliä 95%

Oktaaveittain [Hz], L_{WA} [dB]		1/3-oktaaveittain [Hz], L_{WA} [dB]					
		20	62,2	200	92,2	1600	91,8
63	86,5	25	66,5	250	93,4	2000	90,2
125	93,7	31,5	70,7	315	94,3	2500	88,3
250	98,2	40	74,6	400	94,9	3150	86,1
500	99,9	50	78	500	95,2	4000	83,4
1000	98,9	63	81,1	630	95,2	5000	80,6
2000	95,1	80	84,1	800	94,8	6300	77,3
4000	88,7	100	86,5	1000	94,2	8000	73,7
8000	79,4	125	88,7	1250	93,2	10000	69,9
$L_{WA,tot}$ = 104,9 dB		160	90,7				

Melun erityispiirteiden mittaus ja havainnot:							
Kapeakaistaisuus / Tonaalisuus		Impulssimaisuus		Merkityksellinen sykintä (amplitudimodulaatio)		Muu, Mikä:	
~~kyllä~~	ei	~~kyllä~~	ei	~~kyllä~~	ei	~~kyllä~~	ei

Taulukko 7. Käytetyt mallinnusparametrit ISO 9613-2 laskelmissa sekä melulle altistuvat kohteet.

AKUSTISET TIEDOT/LASKENNAN LÄHTÖTIEDOT			
Laskenta korkeus		Laskentaruudun koko [m·m]	
ISO 9613-2: 4,0 m		25x25 m	
Suhteellinen kosteus		Lämpötila	
70 %	Muu, mikä ja miksi:	ISO 9613-2: 15 C°	
Maastomallin lähde ja tarkkuus			
Maastomallin lähde: MML maastotietokanta		Vaakaresoluutio:1,0	Pystyresoluutio:0,5
Maan- ja vedenpinnan absorption ja heijastuksen huomioiminen, käytetyt kertoimet			
ISO 9613-2	Maa 0,4 Vedenpinta 0		HUOM
Ilmakehän stabiilius laskennassa/meteorologinen korjaus			
Neutraali, (0): Neutraali		Muu, mikä ja miksi:	
Sääolosuhteiden huomiointi; laskennassa käytetty tuulen suunnat ja nopeus			
Tuulen suunta: 0-360°		Tuulen nopeus: 10 metrin korkeudella mitattuna 8 m/s	
Voimalan äänen suuntaavuus ja vaimentuminen			
Vapaa avaruus: kyllä		Muu, mikä, miksi:	

2.1.2 Matalataajuinen melu

Matalataajuinen melu laskettiin Ympäristöministeriön ohjeen 2/2014 mukaisin menetelmin käyttäen voimalavalmistajilta saatuja arvioita niiden äänitehotasoista.

Ohje 2/2014 antaa menetelmän matalataajuisen melun laskentaan rakennusten ulkopuolelle. Sosiaali- ja terveysministeriön Asumisterveysasetus 2015 antaa matalataajuiselle melulle toimenpiderajat asuinhuoneissa. Rakennusten sisälle kantautuva äänitaso arvioitiin Turun AMK:n (Keränen, Hakala ja Hongisto, 2018) julkistamien Anojanssi projektin tulosten mukaisten ääneneristävyysarvoin ja tuloksia verrattiin toimenpiderajoihin.

Taulukko 8. Suomalaisen pientalon julkisivun äänitasoeron alalikiarvo Anojanssi projektin tulosten mukaisesti.

f [Hz]	20	25	31.5	40	50	63	80	100	125	160	200
DLσ [dB]	7.6	8.3	9.2	10.3	11.5	13.0	14.8	16.8	18.8	21.1	22.8

Matalataajuinen melu laskettiin ohjeen YM 2/2014 mukaisesti. Laskennan lähtökohta on standardi ISO 9613-2, jossa huomioidaan äänen geometrinen etäisyysvaimennus sekä maanpinnan ja ilmakehän absorption aiheuttamat vakioidut vahvistukset ja vaimennukset. Tulokset on esitetty taajuuskohtaisena taulukkona hankealuetta ympäröiville asuin- ja lomarakennuksille.

2.2 Varjostusmallinnus

Tuulivoimaloiden varjostusvaikutukset on mallinnettu molemmissa hankevaihtoehdoissa käyttäen roottorinhalkaisijaltaan 180 metristä voimalaitosta, jonka napakorkeus on 190 metriä. Kokonaiskorkeudeltaan voimalat ovat tällöin 280 metriä korkeita.

Taulukko 9. Lasorin tuulivoimahankkeen mallinnusohjelma ja tuulivoimaloiden koko varjostusmallinnuksissa.

MALLINNUSOHJELMAN TIEDOT			
Mallinnusohjelma ja versio: WindPRO versiot 3.5.584		Mallinnusmenetelmä: ISO 9613-2	
TUULIVOIMALAN (TUULIVOIMALOIDEN TIEDOT)			
Tuulivoimalan valmistaja: Generic		Tyyppi: Generic RD180xHH190	Sarjanumero/t:-
Nimellisteho: -	Napakorkeus: 190 m	Roottorin halkaisija: 180 m	Tornin tyyppi: teräs/hybridi
Lavan maksimi leveys: 4,35 m	90 % säteelle laskettu lapaleveys: 1,26 m	Maksimivälke-etäisyys 1902 m	

Varjostuksen yhteismallinnuksissa on huomioitu Lasorin suunniteltujen tuulivoimaloiden lisäksi Lålaxin tuulivoimahankkeen suunnitellut voimalat (4 kpl), Lotlaxin suunnitellut voimalat (3 kpl), Söderskogenin suunnitellut voimalat (8 kpl), Mörknässkogenin rakenteilla olevat voimalat (4 kpl) sekä tuotannossa olevat Storbackenin voimalat (7 kpl).

Varjostusvaikutuksia mallinnettiin WindPRO-ohjelman Shadow-moduulilla. Laskennassa varjot huomioidaan, kun aurinko on yli 3 astetta horisontin yläpuolella. Varjoksi lasketaan tilanne, jossa siipi peittää vähintään 20 % auringosta.

Auringon keskimääräiset paistetunnit perustuvat Uumajan sääaseman mitattuihin säätietoihin 1988 - 1993. Laskentojen tuulen suunta ja nopeusjakaumana käytettiin NASA:n MERRA-dataa (Modern Era Retrospective-analysis for Research and Applications) (1992-2023) hankealueen läheisyydestä (Lon: 22,50, Lat: 63,00).

Varjostusmallin laskennassa on huomioitu hankealueen korkeustiedot, tuulivoimaloiden sijainnit, tuulivoimalan napakorkeudet ja roottorin halkaisija sekä hankealueen aikavyöhyke. Lisäksi myös lavan muoto ja leveys vaikuttavat maksimivälke-etäisyyteen, joka mallinnusohjelman mukaan on tälle voimalaitosmallille noin 1902 metriä. Mallinnuksessa otettiin huomioon auringon asema horisontissa eri kellon- ja vuodenaikoina, pilvisyys kuukausittain eli kuinka paljon aurinko paistaa ollessaan horisontin yläpuolella sekä tuulivoimalaitosten arvioitu vuotuinen käyntiaika.

Varjostuksen tarkastelukorkeutena lähialueen asuin- tai lomarakennusten pihapiirissä käytettiin 1,0 metriä ja laskenta-alueen kokoa 5,0 x 5,0 metriä. Laskentaikkunoiden suunnat asennettiin voimaloita kohti (ns. ”greenhouse mode”). Mallinnus tehtiin niin sanotulle todelliselle tilanteelle (Real Case), jossa puuston suojaavaa vaikutusta ei huomioitu (Real Case, No forest) sekä tilanteelle, jossa puuston suojaavan vaikutus otetaan huomioon (Real Case, Luke forest).

Varjostusmallinnusten tuloksia on havainnollistettu karttojen avulla. Kartoilla esitetään varjostusvaikutuksen (1, 8 ja 20 tuntia vuodessa) laajuus. Sen lisäksi mallinnuksessa on erikseen laskettu vaikutus tuulivoimahankealueen ympäristössä oleviin herkkiin kohteisiin.

2.3 Raja- ja ohjearvot

2.3.1 Melu

Valtioneuvoston asetuksessa (1107/2015) tuulivoimaloille on määritelty suunnitteluarvot päivä- ja yöajan keskiäänitasojen maksimiarvolle. Jos tuulivoimalan melu sisältää tonaalisia, kapeakaistaisia tai impulssimaisia komponentteja, tai se on selvästi amplitudimoduloitunutta, mallinnustuloksiin tulee ohjeen mukaan lisätä viisi desibeliä ennen ohjearvoon vertaamista. Koska ohjearvo sisältää jo tyypillisen tuulivoimamelun piirteet, edellä mainitut äänenpiirteiden tulee olla tuulivoimalalle epätyypillisen voimakkaita, jotta mallinnustuloksissa täytyy huomioida viiden desibelin lisä äänitasoon.

Taulukko 10. Valtioneuvoston asetuksen mukaiset tuulivoimaloiden melutason toimenpiderajat (Valtioneuvoston asetus 27.8.2015).

Vaikutuskohde	Päivä (7-22)	Yö (22-7)
Pysyvä asutus	45 dB	40 dB
Loma-asutus	45 dB	40 dB
Hoitolaitokset	45 dB	40 dB
Oppilaitokset	45 dB	—
Virkistysalueet	45 dB	—
Leirintäalueet	45 dB	40 dB
Kansallispuistot	40 dB	40 dB

Sosiaali- ja terveysministeriön asetuksessa (545/2015) on annettu matalataajuiselle melulle toimenpiderajoja. Toimenpiderajat koskevat asuinhuoneita ja ne on annettu taajuuspainottamattomina yhden tunnin keskiäänitasoina tersseittäin. Toimenpiderajat koskevat yöaikaa ja päivällä sallitaan 5 dB suuremmat arvot.

Taulukko 11. Matalataajuisen sisämelun tunnin keskiäänitason toimenpiderajat nukkumiseen tarkoitetuissa tiloissa.

Terssikaista Hz	20	25	31,5	40	50	63	80	100	125	160	200
Keskiäänitaso LZeq,1h, dB	74	64	56	49	44	42	40	38	36	34	32
Edellisestä laskettu keskiäänitaso A-painotettuna LAeq,1h, dB	24	19	17	14	14	16	18	19	20	21	21

Lisäksi yöaikainen mahdollisesti unihäiriötä aiheuttava melu, joka erottuu selvästi taustamelusta, ei saa ylittää 25 dB yhden tunnin keskiäänitasona $L_{Aeq,1h}$ mitattuna niissä tiloissa, jotka on tarkoitettu nukkumiseen.

2.3.2 Varjostus

Suomessa ei ole viranomaisten antamia yleisiä määräyksiä tuulivoimaloiden muodostaman varjostuksen enimmäiskestoista eikä varjonmuodostuksen arviointiperusteista. Ympäristöministeriön tuulivoimarakentamisen suunnitteluohjeistuksessa esitetään käytettäväksi muiden maiden suosituksia välkkeen rajoittamisesta (Ympäristöministeriö 2016).

Useissa maissa on annettu raja-arvoja tai suosituksia hyväksyttävän välkevaikutuksen määrästä. Esimerkiksi Tanskassa sovelletaan yleensä enintään 10 tunnin vuotuista todellisentilanteen raja-arvoa. Ruotsissa todellisen tilanteen raja-arvon suositus on kahdeksan tuntia vuodessa ja 30 minuuttia päivässä. Suomessa välkevaikutukselle ei ole määritelty omia suosituksia tai raja-arvoja.

Arvioinnissa on tarkasteltu vaikutuksia alueella, jossa varjoja tai välkettä mallinnuksen mukaisessa todellisessa tilanteessa (”Real Case”) esiintyy vähintään kahdeksan tuntia vuodessa.

3 MELU- JA VARJOSTUSMALLINNUSTEN TULOKSET

3.1 Melu

3.1.1 Melun laskentatulokset ISO 9613-2

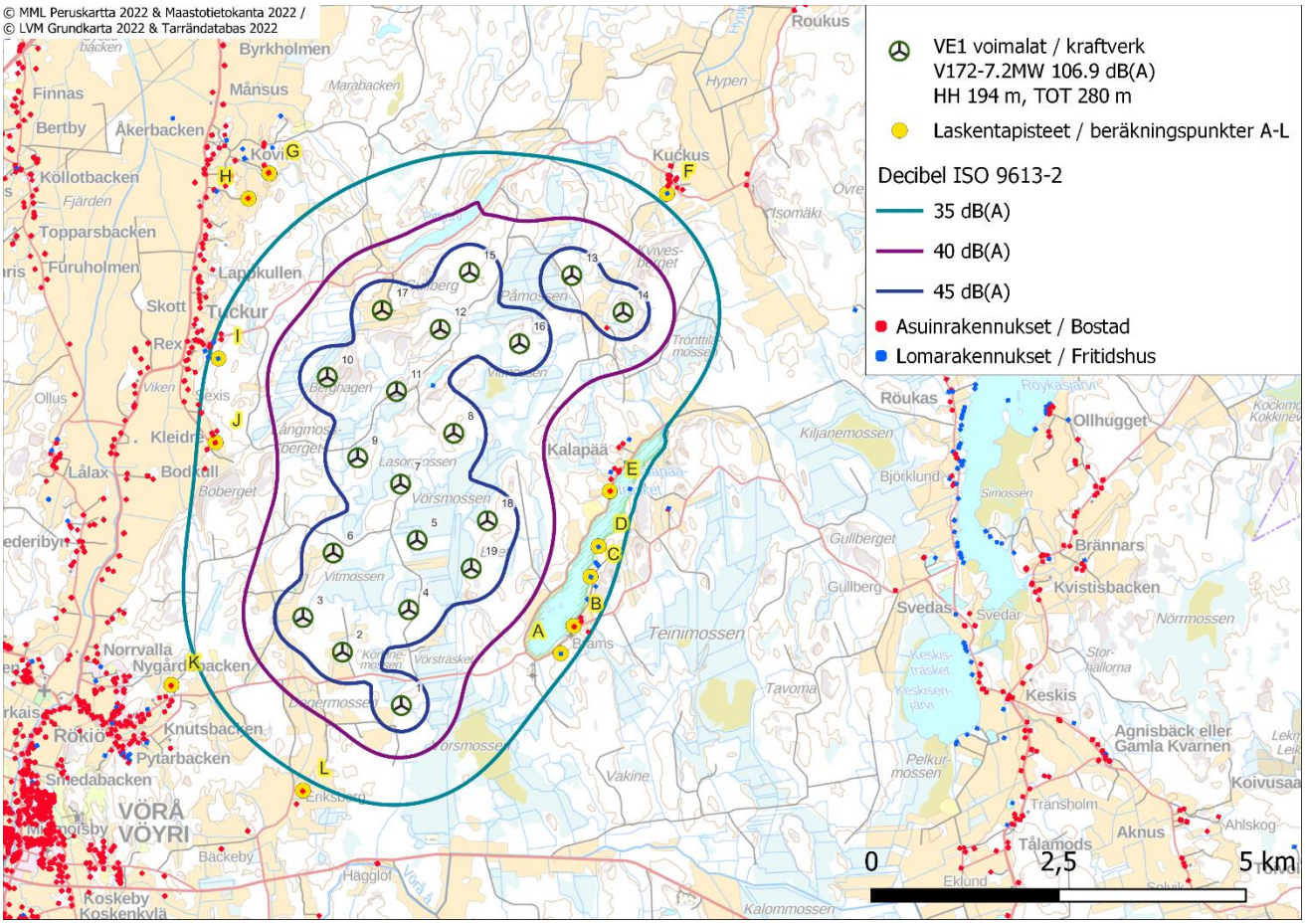
Maanmittauslaitoksen maastotietokannan mukaan hankealueelle sijoittuu yksi vapaa-ajanrakennus sekä yksi asuinrakennus. Vapaa-ajanrakennus on kunnan tietojen mukaan muussa kuin lomarakennuskäytössä. Asuinrakennus on Lasor Vind Oy:n omistuksessa ja sen muuttamiseksi varastorakennukseksi on hankevastaavan mukaan myönnetty rakennuslupa. Tämän vuoksi näitä rakennuksia ei ole huomioitu häiriintyvinä kohteina.

Vaihtoehdon 1 (VE1) melumallinnuksen mukaan melutaso 40 dB(A) ei ylity lähimpien asuin- ja lomarakennusten alueella (Kuva 1 ja Taulukko 12).

Tarkemmat laskentatulokset ja käytetyt lähtötiedot on esitetty tarkemmin liitteessä 1.

Taulukko 12. Laskennalliset melutasot Lasorin tuulivoimahankkeessa lähtömelutason olleessa 106,9 dB(A).

Laskentapiste	ETRS89-TM35 Itä	ETRS89-TM35 Pohjoinen	Z (m)	Laskenta-korkeus (m)	Melutaso dB(A)
A Lomarakennus (Söderändan 49)	267 990	7 011 759	42,5	4	35,8
B Asuinrakennus (Söderändan 81)	268 161	7 012 123	37,5	4	36,6
C Lomarakennus (Säderändan 166)	268 388	7 012 783	39,1	4	37,3
D Lomarakennus (Söderändan 188)	268 493	7 013 188	37,8	4	37,6
E Asuinrakennus (Rökiöntie 930)	268 646	7 013 924	38,1	4	36,2
F Asuinrakennus (Kukkusintie 474)	269 409	7 017 903	25	4	34,2
G Asuinrakennus (Kovik byväg 53)	264 096	7 018 174	10	4	32
H Asuinrakennus (Vöyrintie 1021)	263 817	7 017 837	8,5	4	32,2
I Lomarakennus (Ehrsbackavägen 29)	263 418	7 015 700	21,7	4	35,6
J Asuinrakennus (Kleidersvägen 118)	263 377	7 014 578	13,7	4	36
K Asuinrakennus (Rökiöntie 154)	262 790	7 011 335	27,5	4	33
L Asuinrakennus (Bjurbäcksvägen 231)	264 546	7 009 923	27,8	4	34,2



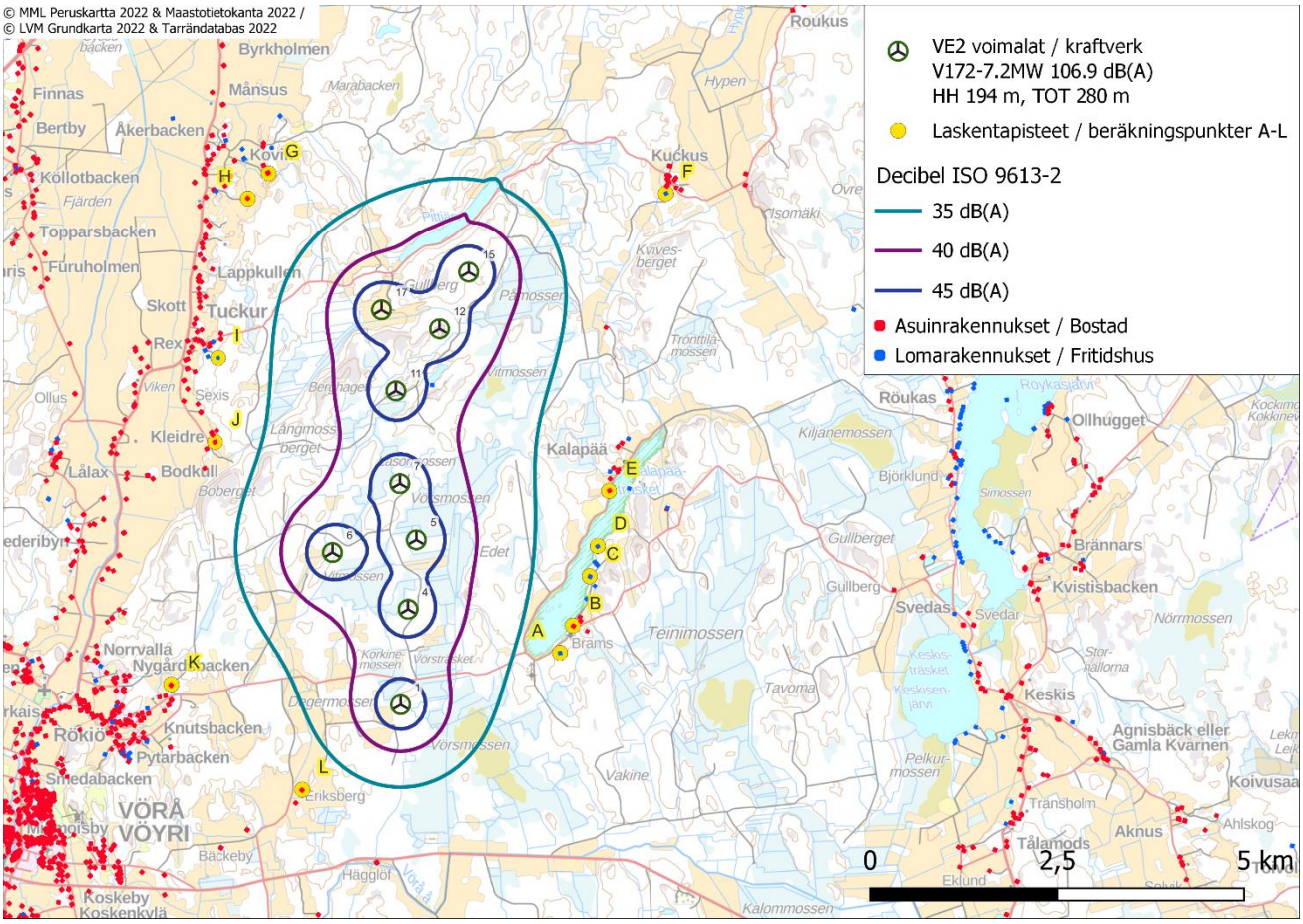
Kuva 1 Melumallinnuksen tulos hankevaihtoehdon 1 voimalasijoittelulla.

Vaihtoehdon 2 (VE2) melumallinnuksen mukaan melutaso 40 dB(A) ei ylity lähimpien asuin- ja lomarakennusten alueella (Kuva 2 ja Taulukko 13).

Tarkemmat laskentatulokset ja käytetyt lähtötiedot on esitetty tarkemmin liitteessä 2.

Taulukko 13. Laskennalliset melutasot Lasorin tuulivoimahankkeessa lähtömelutason olleessa 106,9 dB(A).

Laskentapiste	ETRS89-TM35 Itä	ETRS89-TM35 Pohjoinen	Z (m)	Laskenta-korkeus (m)	Melutaso dB(A)
A Lomarakennus (Söderändan 49)	267 990	7 011 759	42,5	4	32,2
B Asuinrakennus (Söderändan 81)	268 161	7 012 123	37,5	4	32,4
C Lomarakennus (Säderändan 166)	268 388	7 012 783	39,1	4	32,5
D Lomarakennus (Söderändan 188)	268 493	7 013 188	37,8	4	32,6
E Asuinrakennus (Rökiöntie 930)	268 646	7 013 924	38,1	4	31,1
F Asuinrakennus (Kukkusintie 474)	269 409	7 017 903	25	4	27,4
G Asuinrakennus (Kovik byväg 53)	264 096	7 018 174	10	4	29,8
H Asuinrakennus (Vöyrintie 1021)	263 817	7 017 837	8,5	4	30
I Lomarakennus (Ehrsbackavägen 29)	263 418	7 015 700	21,7	4	31,9
J Asuinrakennus (Kleidersvägen 118)	263 377	7 014 578	13,7	4	32,5
K Asuinrakennus (Rökiöntie 154)	262 790	7 011 335	27,5	4	28,9
L Asuinrakennus (Bjurbäcksvägen 231)	264 546	7 009 923	27,8	4	31,4



Kuva 2 Melumallinnuksen tulos voimalasijoittelulla VE2.

3.1.2 Matalataajuiset melutasot

Sisätilojen laskennallisia tuloksia on verrattu Sosiaali- ja terveysministeriön (STM) Asumisterveysasetuksessa (545/2015) annettuihin toimenpiderajoihin. Nämä ovat enimmäisarvoja, jotka on laadittu yöaikaiselle melulle nukkumiseen tarkoitettuihin tiloihin. Toimenpiderajaa on verrattu myös äänitasoon tarkasteltujen rakennusten ulkopuolella.

Mallinnettaessa Lasorin tuulivoimahankkeen matalataajuisia melutasoja voimalaitostyypillä Vestas V172 -7.2 MW vaihtoehdossa 1 (VE 1) matalataajuinen melu ei ylitä Sosiaali- ja terveysministeriön asumisterveysohjearvoa minkään laskentapisteen sisätiloissa.

Taulukossa 14 on esitetty toimenpiderajan alitus (negatiivinen arvo) tai ylitys (positiivinen arvo) sekä rakennusten sisätiloissa että ulkona hankevaihtoehdossa 1. Rakennusten sisätiloissa melu on enimmilläänkin 7,0 dB alle toimenpiderajan taajuudella 50 Hz (Asuinrakennus F).

Tarkemmat matalataajuisen melun rakennuskohtaiset laskentatulokset on esitetty kuvaajilla liitteissä 3 ja 4.

Taulukko 14. Matalataajuisen melun laskentatulokset vaihtoehdossa 1 (VE1).

Laskentapiste	Äänitaso ulkona		Äänitaso sisällä	
	L eq,1h – Asumisterveys ohje sisällä	Hz	L eq,1h – Asumis-terveys ohje sisällä	Hz
A Lomarakennus (Söderändan 49)	6,6	100	-7,5	50
B Asuinrakennus (Söderändan 81)	6,8	100	-7,4	50
C Lomarakennus (Säderändan 166)	7,0	100	-7,1	50
D Lomarakennus (Söderändan 188)	7,1	100	-7,0	50
E Asuinrakennus (Rökiöntie 930)	7,0	100	-7,1	50
F Asuinrakennus (Kukkusintie 474)	5,0	100	-9,1	50
G Asuinrakennus (Kovik byväg 53)	3,7	100	-10,2	50
H Asuinrakennus (Vöyrintie 1021)	3,9	100	-10,0	50
I Lomarakennus (Ehrsbackavägen 29)	6,4	100	-7,7	50
J Asuinrakennus (Kleidersvägen 118)	6,8	100	-7,3	50
K Asuinrakennus (Rökiöntie 154)	4,3	100	-9,7	50
L Asuinrakennus (Bjurbäcksvägen 231)	5,1	100	-9,0	50

Mallinnettaessa Lasorin tuulivoimahankkeen matalataajuisia melutasoja voimalaitostyypillä Vestas V12 -7.2 MW vaihtoehdossa 2 (VE 2) matalataajuinen melu ei ylitä Sosiaali- ja terveysministeriön asumisterveysohjearvoa minkään laskentapisteen sisätiloissa.

Taulukossa 15 on esitetty toimenpiderajan alitus (negatiivinen arvo) tai ylitys (positiivinen arvo) sekä rakennusten sisätiloissa että ulkona hankevaihtoehdossa 2. Rakennusten sisätiloissa melu on enimmilläänkin 10,6 dB alle toimenpiderajan taajuudella 50 Hz (Asuinrakennus B).

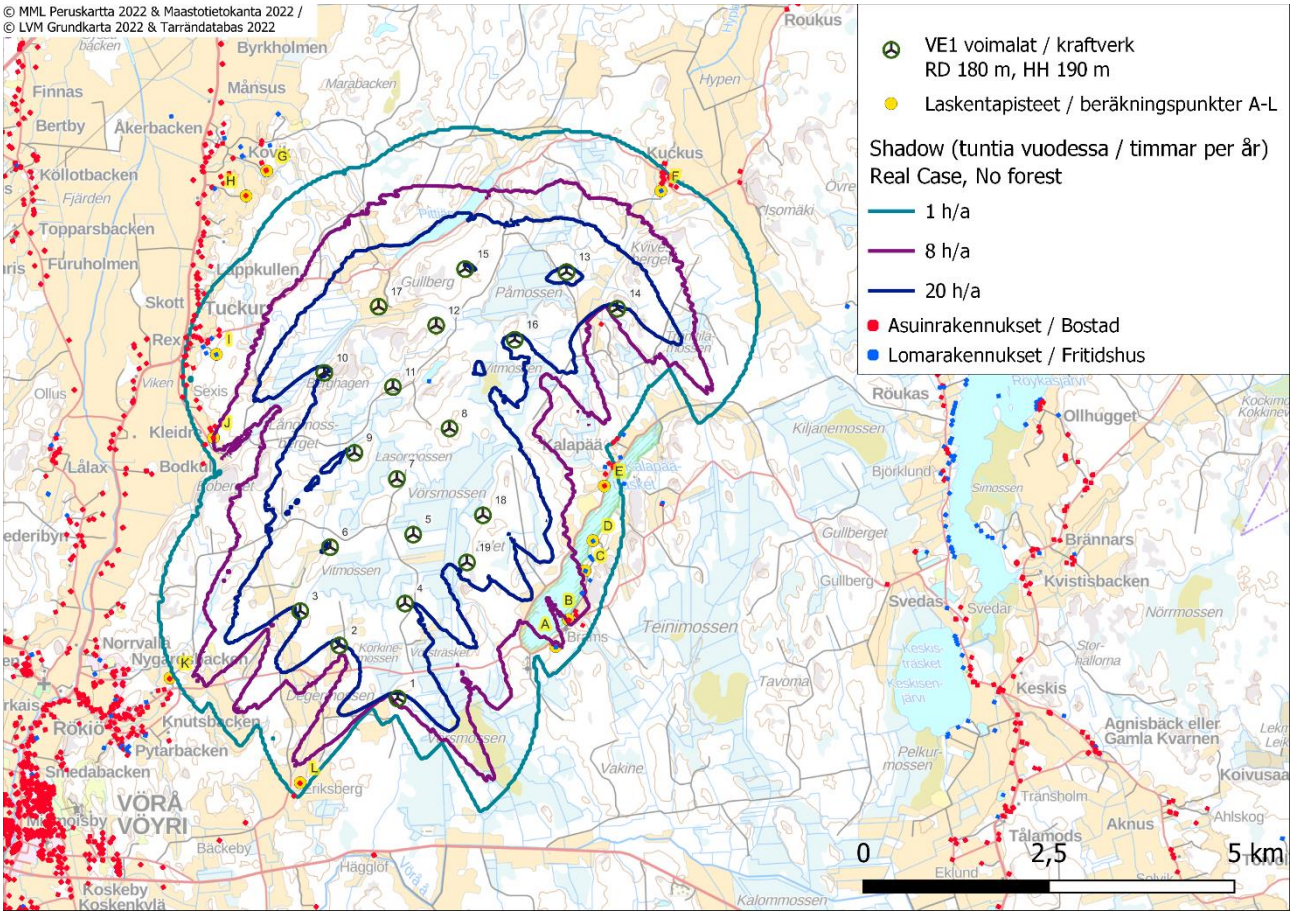
Taulukko 15. Matalataajuisen melun laskentatulokset vaihtoehdossa 2 (VE2).

Laskentapiste	Äänitaso ulkona		Äänitaso sisällä	
	L eq,1h – Asumisterveys ohje sisällä	Hz	L eq,1h – Asumis-terveys ohje sisällä	Hz
A Lomarakennus (Söderändan 49)	3,1	100	-11,0	50
B Asuinrakennus (Söderändan 81)	3,0	100	-11,1	50
C Lomarakennus (Säderändan 166)	2,8	100	-11,3	50
D Lomarakennus (Söderändan 188)	2,7	100	-11,4	50
E Asuinrakennus (Rökiöntie 930)	2,5	100	-11,5	50
F Asuinrakennus (Kukkusintie 474)	-0,6	100	-14,4	50
G Asuinrakennus (Kovik byväg 53)	1,2	100	-12,7	50
H Asuinrakennus (Vöyrintie 1021)	1,4	100	-12,6	50
I Lomarakennus (Ehrsbackavägen 29)	3,0	100	-11,1	50
J Asuinrakennus (Kleidersvägen 118)	3,5	100	-10,6	50
K Asuinrakennus (Rökiöntie 154)	0,6	100	-13,3	50
L Asuinrakennus (Bjurbäcksvägen 231)	2,2	100	-11,9	50

3.2 Varjostus

3.2.1 Hankevaihtoehto VE1, “Real Case, No forest”

Hankevaihtoehdossa 1 varjostusvaikutusalueelle 8 h/a sijoittuu 3 asuinrakennusta ja 2 lomarakennusta (lomarakennus A ja asuinrakennus B, sekä näiden laskentapisteiden läheisyydessä olevat 2 asuinrakennusta ja 1 lomarakennus, jotka eivät ole laskentapisteinä). Mallinnustulosten mukaan varjostusta ilmenee enimmillään 8 h 39 min vuodessa hankealueen itäpuolella sijaitsevan asuinrakennuksen (laskentapiste B) alueella (Kuva 3, Taulukko 16). Tarkemmat laskentatulokset on esitetty liitteessä 5.



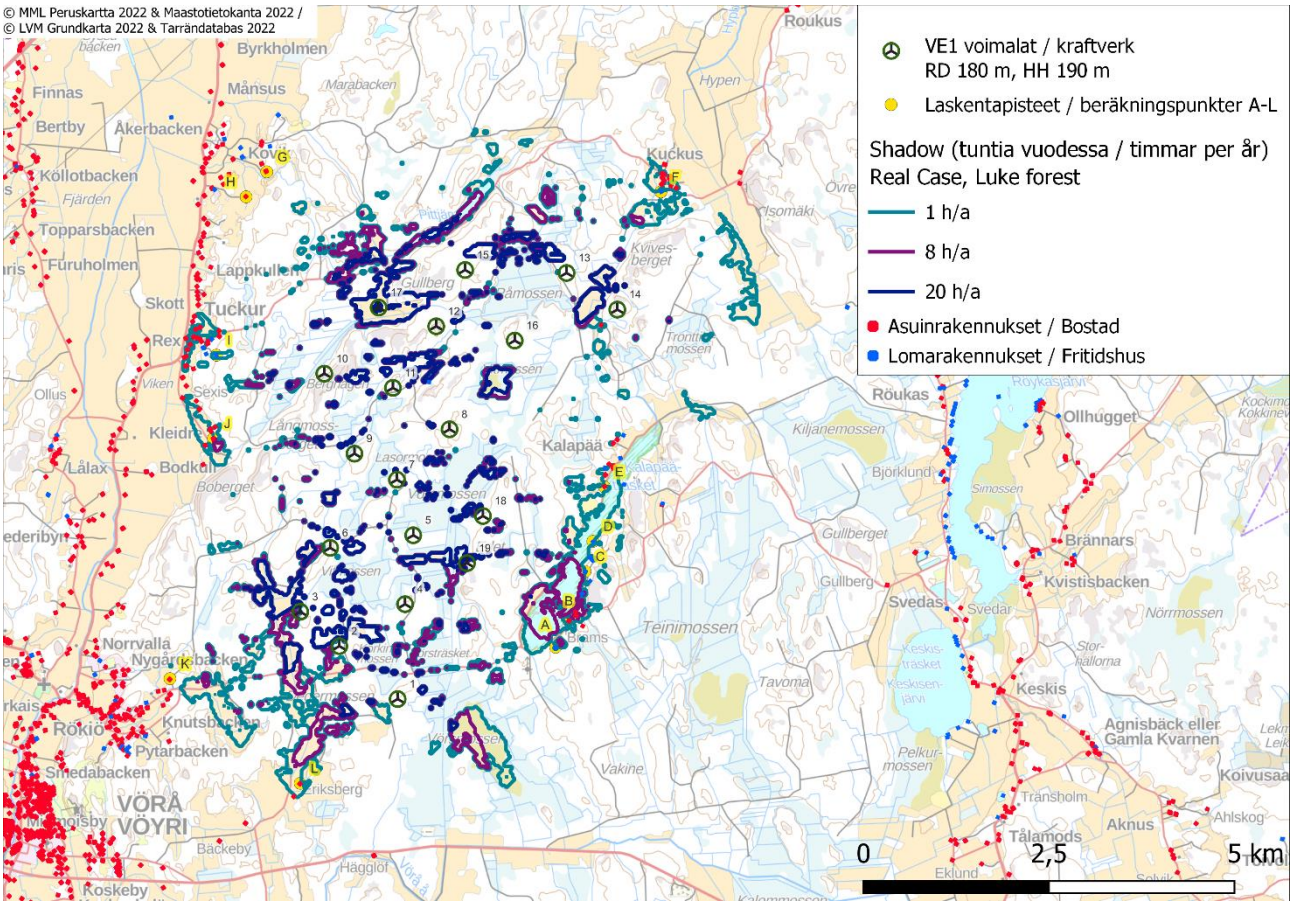
Kuva 3. Varjostusmallinnuksen tulos hankevaihtoehdossa 1 (puuston suojaavaa vaikutusta ei ole huomioitu)

Taulukko 16. Varjostusmallinnuksen tulos VE1, kun puuston suojaavaa vaikutusta ei ole huomioitu "Real Case, No forest".

Rakennus	ETRS89-TM35 Itä	ETRS89-TM35 Pohjoinen	Z (m)	Laskentaikkuna (m)	Varjostus (h/a)
A Lomarakennus (Söderändan 49)	267 990	7 011 759	42,5	5,0 x 5,0	8:13
B Asuinrakennus (Söderändan 81)	268 161	7 012 123	37,5	5,0 x 5,0	8:39
C Lomarakennus (Säderändan 166)	268 388	7 012 783	39,1	5,0 x 5,0	7:01
D Lomarakennus (Söderändan 188)	268 493	7 013 188	37,8	5,0 x 5,0	4:54
E Asuinrakennus (Rökiöntie 930)	268 646	7 013 924	38,1	5,0 x 5,0	1:59
F Asuinrakennus (Kukkusintie 474)	269 409	7 017 903	25	5,0 x 5,0	5:12
G Asuinrakennus (Kovik byväg 53)	264 096	7 018 174	10	5,0 x 5,0	0:00
H Asuinrakennus (Vöyrintie 1021)	263 817	7 017 837	8,5	5,0 x 5,0	0:00
I Lomarakennus (Ehrsbackavägen 29)	263 418	7 015 700	21,7	5,0 x 5,0	2:49
J Asuinrakennus (Kleidersvägen 118)	263 377	7 014 578	13,7	5,0 x 5,0	7:57
K Asuinrakennus (Rökiöntie 154)	262 790	7 011 335	27,5	5,0 x 5,0	0:00
L Asuinrakennus (Bjurbäcksvägen 231)	264 546	7 009 923	27,8	5,0 x 5,0	4:17

3.2.2 Hankevaihtoehto VE1, "Real Case, Luke forest"

Hankevaihtoehdossa 1 varjostusvaikutusalueelle 8 h/a sijoittuu 1 asuinrakennus ja 1 lomarakennus (lomarakennus A sekä tämän laskentapisteen läheisyydessä oleva asuinrakennus, joka ei ole laskentapisteenä). Mallinnustulosten mukaan varjostusta ilmenee enimmillään 8 h 13 min vuodessa, hankealueen itäpuolella sijaitsevan Lomarakennuksen (laskentapiste A) alueella (Kuva 4, Taulukko 17). Tarkemmat laskentatulokset on esitetty liitteessä 6.



Kuva 4. Varjostusmallinnuksen tulos hankevaihtoehdossa 1 (puuston suojaava vaikutus huomioitu)

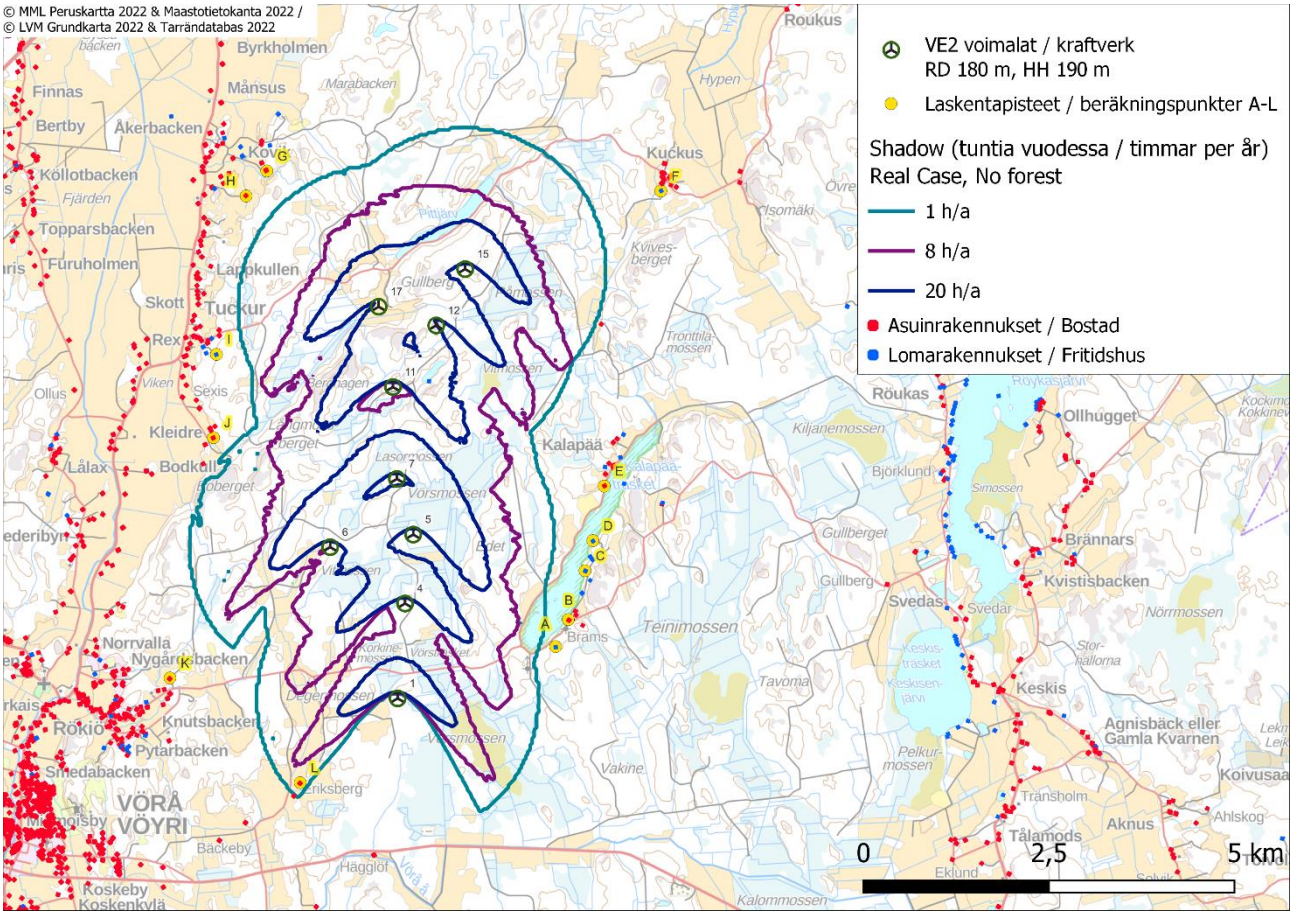
Taulukko 17. Varjostusmallinnuksen tulos VE1, kun puuston suojaavaa vaikutus otetaan huomioon "Real Case, Luke forest".

Rakennus	ETRS89-TM35 Itä	ETRS89-TM35 Pohjoinen	Z (m)	Laskentaikkuna (m)	Varjostus (h/a)
A Lomarakennus (Söderändan 49)	267 990	7 011 759	42,5	5,0 x 5,0	8:13
B Asuinrakennus (Söderändan 81)	268 161	7 012 123	37,5	5,0 x 5,0	0:00
C Lomarakennus (Säderändan 166)	268 388	7 012 783	39,1	5,0 x 5,0	0:00
D Lomarakennus (Söderändan 188)	268 493	7 013 188	37,8	5,0 x 5,0	4:54
E Asuinrakennus (Rökiöntie 930)	268 646	7 013 924	38,1	5,0 x 5,0	1:59
F Asuinrakennus (Kukkusintie 474)	269 409	7 017 903	25	5,0 x 5,0	0:00
G Asuinrakennus (Kovik byväg 53)	264 096	7 018 174	10	5,0 x 5,0	0:00
H Asuinrakennus (Vöyrintie 1021)	263 817	7 017 837	8,5	5,0 x 5,0	0:00
I Lomarakennus (Ehrsbackavägen 29)	263 418	7 015 700	21,7	5,0 x 5,0	2:49
J Asuinrakennus (Kleidersvägen 118)	263 377	7 014 578	13,7	5,0 x 5,0	7:57
K Asuinrakennus (Rökiöntie 154)	262 790	7 011 335	27,5	5,0 x 5,0	0:00

L Asuinrakennus (Bjurbäcksvägen 231)	264 546	7 009 923	27,8	5,0 x 5,0	0:00

3.2.3 Hankevaihtoehto VE2, “Real Case, No forest”

Hankevaihtoehdossa 2 varjostusvaikutusalueelle 8 h/a ei sijoitu asuin- tai lomarakennuksia. Mallinnustulosten mukaan varjostusta ilmenee enimmillään 4 h 17 min vuodessa hankealueen eteläpuolella sijaitsevan asuinrakennuksen (laskentapiste L) alueella (Kuva 3, Taulukko 18). Tarkemmat laskentatulokset on esitetty liitteessä 7.



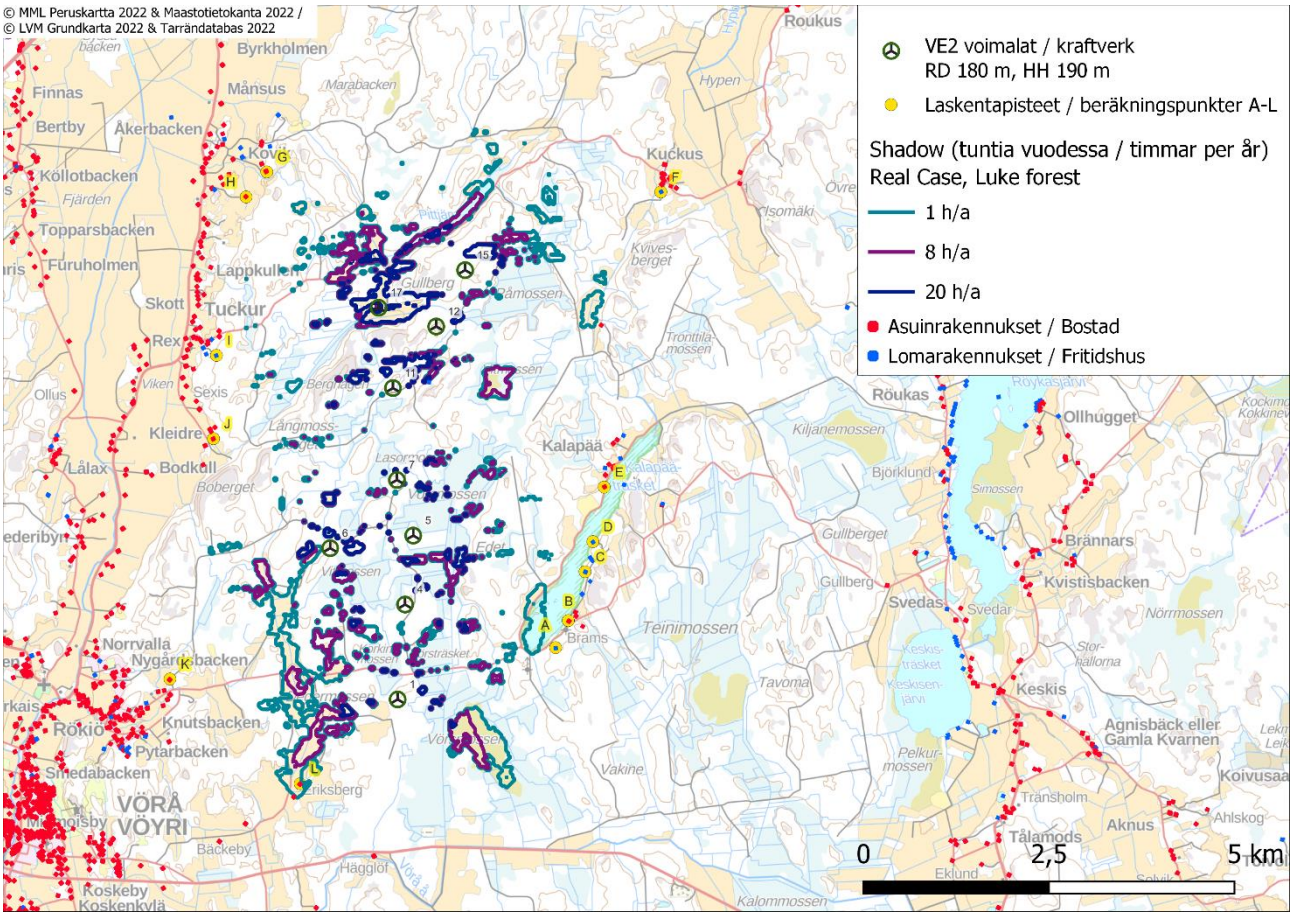
Kuva 3. Varjostusmallinnuksen tulos hankevaihtoehdossa 2 (puuston suojaavaa vaikutusta ei ole huomioitu)

Taulukko 18. Varjostusmallinnuksen tulos VE2, kun puuston suojaavaa vaikutusta ei ole huomioitu "Real Case, No forest".

Rakennus	ETRS89-TM35 Itä	ETRS89-TM35 Pohjoinen	Z (m)	Laskentaikkuna (m)	Varjostus (h/a)
A Lomarakennus (Söderändan 49)	267 990	7 011 759	42,5	5,0 x 5,0	0:00
B Asuinrakennus (Söderändan 81)	268 161	7 012 123	37,5	5,0 x 5,0	0:00
C Lomarakennus (Säderändan 166)	268 388	7 012 783	39,1	5,0 x 5,0	0:00
D Lomarakennus (Söderändan 188)	268 493	7 013 188	37,8	5,0 x 5,0	0:00
E Asuinrakennus (Rökiöntie 930)	268 646	7 013 924	38,1	5,0 x 5,0	0:00
F Asuinrakennus (Kukkusintie 474)	269 409	7 017 903	25	5,0 x 5,0	0:00
G Asuinrakennus (Kovik byväg 53)	264 096	7 018 174	10	5,0 x 5,0	0:00
H Asuinrakennus (Vöyrintie 1021)	263 817	7 017 837	8,5	5,0 x 5,0	0:00
I Lomarakennus (Ehrsbackavägen 29)	263 418	7 015 700	21,7	5,0 x 5,0	0:00
J Asuinrakennus (Kleidersvägen 118)	263 377	7 014 578	13,7	5,0 x 5,0	0:00
K Asuinrakennus (Rökiöntie 154)	262 790	7 011 335	27,5	5,0 x 5,0	0:00
L Asuinrakennus (Bjurbäcksvägen 231)	264 546	7 009 923	27,8	5,0 x 5,0	4:17

3.2.4 Hankevaihtoehto VE2, "Real Case, Luke forest"

Hankevaihtoehdossa 2 varjostusvaikutusalueelle 8 h/a ei sijoitu asuin- tai lomarakennuksia (Kuva 4, Taulukko 19). Tarkemmat laskentatulokset on esitetty liitteessä 8.



Kuva 4. Varjostusmallinnuksen tulos hankevaihtoehdossa 2 (puuston suojaava vaikutus huomioitu)

Taulukko 19. Varjostusmallinnuksen tulos VE2, kun puuston suojaavaa vaikutus otetaan huomioon "Real case, Luke forest".

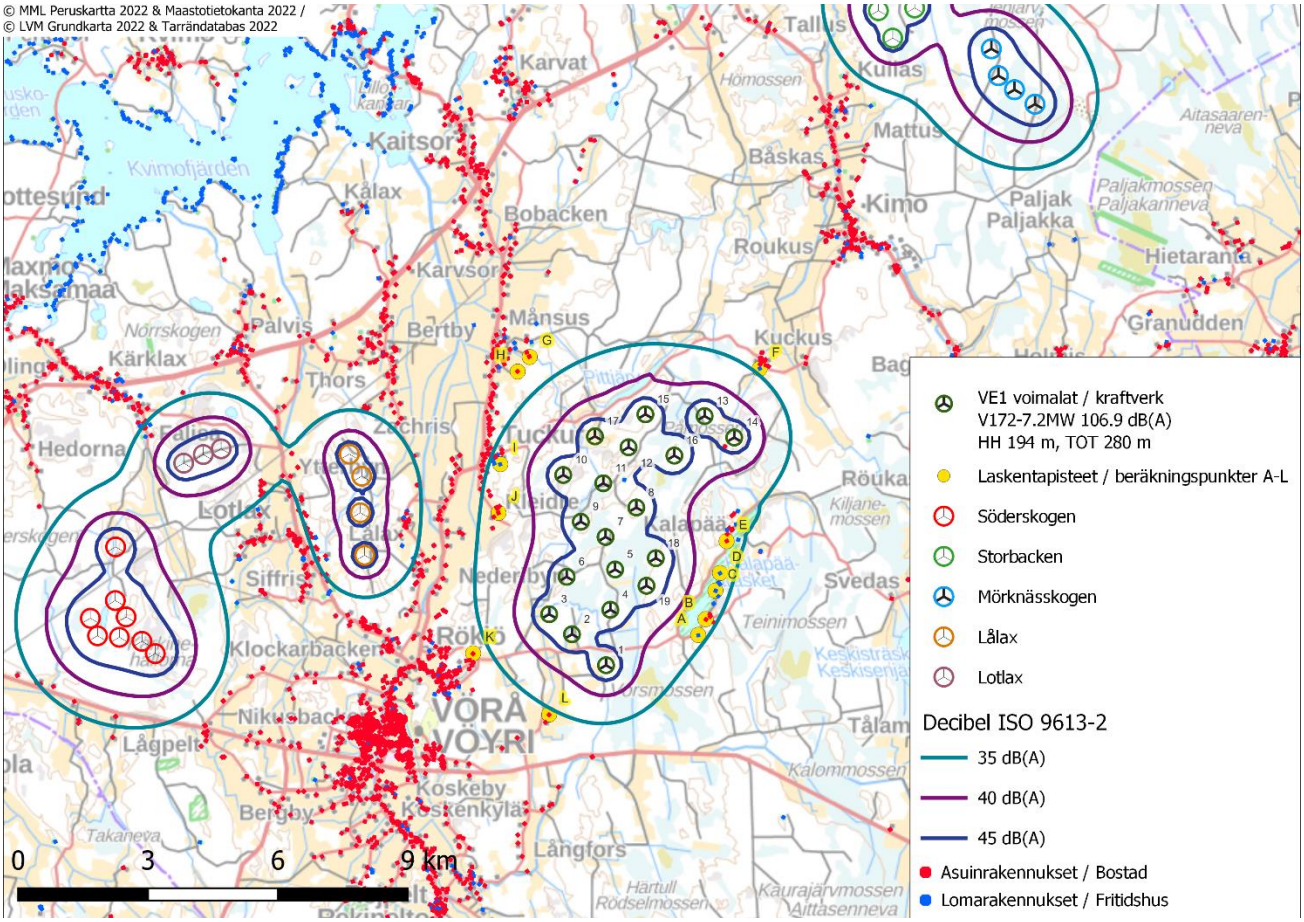
Rakennus	ETRS89-TM35 Itä	ETRS89-TM35 Pohjoinen	Z (m)	Laskentaikkuna (m)	Varjostus (h/a)
A Lomarakennus (Söderändan 49)	267 990	7 011 759	42,5	5,0 x 5,0	0:00
B Asuinrakennus (Söderändan 81)	268 161	7 012 123	37,5	5,0 x 5,0	0:00
C Lomarakennus (Säderändan 166)	268 388	7 012 783	39,1	5,0 x 5,0	0:00
D Lomarakennus (Söderändan 188)	268 493	7 013 188	37,8	5,0 x 5,0	0:00
E Asuinrakennus (Rökiöntie 930)	268 646	7 013 924	38,1	5,0 x 5,0	0:00
F Asuinrakennus (Kukkusintie 474)	269 409	7 017 903	25	5,0 x 5,0	0:00
G Asuinrakennus (Kovik byväg 53)	264 096	7 018 174	10	5,0 x 5,0	0:00
H Asuinrakennus (Vöyrintie 1021)	263 817	7 017 837	8,5	5,0 x 5,0	0:00
I Lomarakennus (Ehrsbackavägen 29)	263 418	7 015 700	21,7	5,0 x 5,0	0:00
J Asuinrakennus (Kleidersvägen 118)	263 377	7 014 578	13,7	5,0 x 5,0	0:00
K Asuinrakennus (Rökiöntie 154)	262 790	7 011 335	27,5	5,0 x 5,0	0:00
L Asuinrakennus (Bjurbäcksvägen 231)	264 546	7 009 923	27,8	5,0 x 5,0	0:00

4 MELUN JA VARJOSTUKSEN YHTEISMALLINNUSTEN TULOKSET

4.1 Melu

4.1.1 VE1: Yhteismelun laskentatulokset (ISO 9613-2)

Hankevaihtoehdon 1 (VE1) yhteismelun mallinnuksen mukaan melutaso 40 dB(A) ei ylity Lasorin tuulivoimahankkeen lähimmillä asuin- ja lomarakennuksilla (Kuva 7, Taulukko 20). Katso tarkemmat laskentatulokset liitteestä 9.



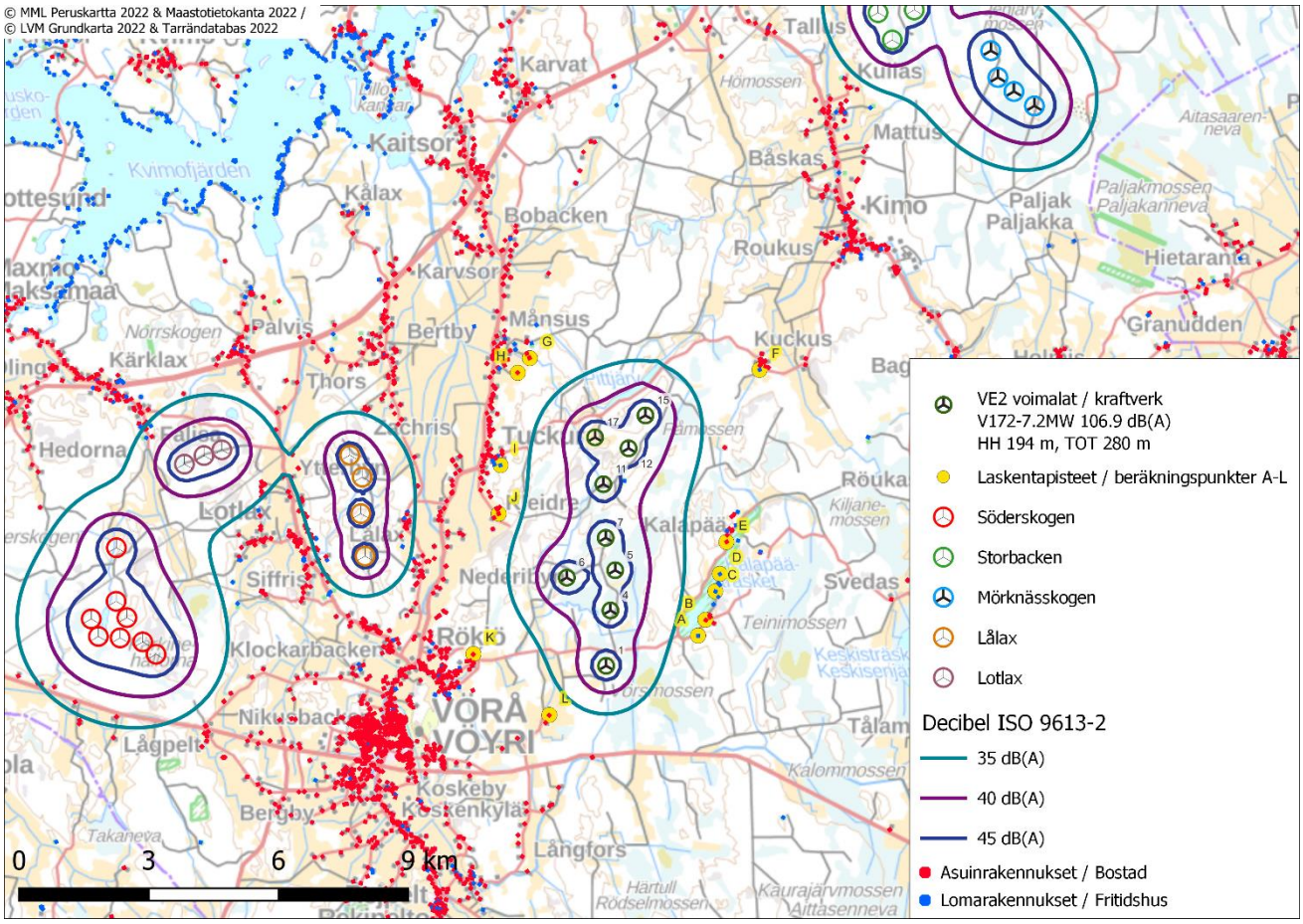
Kuva 7. Melun yhteisvaikutuksen mallinnuksen tulos hankevaihtoehdossa VE1.

Taulukko 20. Laskennalliset yhteismelun tasot Lasorin tuulivoimahankkeen ympäristössä hankevaihtoehdossa 1

Laskentapiste	ETRS89-TM35 Itä	ETRS89-TM35 Pohjoinen	Z (m)	Laskenta-korkeus (m)	Melutaso dB(A)
A Lomarakennus (Söderändan 49)	267 990	7 011 759	42,5	4	35,9
B Asuinrakennus (Söderändan 81)	268 161	7 012 123	37,5	4	36,6
C Lomarakennus (Säderändan 166)	268 388	7 012 783	39,1	4	37,3
D Lomarakennus (Söderändan 188)	268 493	7 013 188	37,8	4	37,7
E Asuinrakennus (Rökiöntie 930)	268 646	7 013 924	38,1	4	36,3
F Asuinrakennus (Kukkusintie 474)	269 409	7 017 903	25	4	34,4
G Asuinrakennus (Kovik byväg 53)	264 096	7 018 174	10	4	32,3
H Asuinrakennus (Vöyrintie 1021)	263 817	7 017 837	8,5	4	32,6
I Lomarakennus (Ehrsbackavägen 29)	263 418	7 015 700	21,7	4	36
J Asuinrakennus (Kleidersvägen 118)	263 377	7 014 578	13,7	4	36,4
K Asuinrakennus (Rökiöntie 154)	262 790	7 011 335	27,5	4	33,5
L Asuinrakennus (Bjurbäcksvägen 231)	264 546	7 009 923	27,8	4	34,3

4.1.2 VE2: Yhteismelun laskentatulokset (ISO 9613-2)

Hankevaihtoehdon 2 (VE2) yhteismelun mallinnuksen mukaan melutaso 40 dB(A) ei ylity Lasorin tuulivoimahankkeen lähimmillä asuin- ja lomarakennuksilla (Kuva 8, Taulukko 21). Katso tarkemmat laskentatulokset liitteestä 10.



Kuva 8. Melumallinnuksen tulos vaihtoehdossa VE 2.

Taulukko 21. Laskennalliset yhteismelun tasot Lasorin tuulivoimahankkeen ympäristössä hankevaihtoehdossa 2

Laskentapiste	ETRS89-TM35 Itä	ETRS89-TM35 Pohjoinen	Z (m)	Laskenta-korkeus (m)	Melutaso dB(A)
A Lomarakennus (Söderändan 49)	267 990	7 011 759	42,5	4	32,3
B Asuinrakennus (Söderändan 81)	268 161	7 012 123	37,5	4	32,5
C Lomarakennus (Säderändan 166)	268 388	7 012 783	39,1	4	32,6
D Lomarakennus (Söderändan 188)	268 493	7 013 188	37,8	4	32,8
E Asuinrakennus (Rökiöntie 930)	268 646	7 013 924	38,1	4	31,3
F Asuinrakennus (Kukkusintie 474)	269 409	7 017 903	25	4	28
G Asuinrakennus (Kovik byväg 53)	264 096	7 018 174	10	4	30,4
H Asuinrakennus (Vöyrintie 1021)	263 817	7 017 837	8,5	4	30,6
I Lomarakennus (Ehrsbackavägen 29)	263 418	7 015 700	21,7	4	32,7
J Asuinrakennus (Kleidersvägen 118)	263 377	7 014 578	13,7	4	33,2
K Asuinrakennus (Rökiöntie 154)	262 790	7 011 335	27,5	4	30
L Asuinrakennus (Bjurbäcksvägen 231)	264 546	7 009 923	27,8	4	31,6

4.1.3 Matalataajuiset melutasot (yhteisvaikutus)

Lasorin ja lähellä olevien tuulivoimahankkeiden aiheuttama matalataajuinen yhteismelu ei Lasorin kummassakaan hankevaihtoehdossa ylitä Sosiaali- ja terveysministeriön asumisterveysohjearvoa laskentapisteiden sisätiloissa.

Lasorin hankevaihtoehdon 1 tulokset laskentapisteittäin on esitetty taulukossa 22 ja hankevaihtoehdon 2 tulokset taulukossa 23. Taulukoissa esitetään toimenpiderajan alitus (negatiivinen arvo) tai ylitys (positiivinen arvo).

Tarkemmat matalataajuisen yhteismelun laskentatulokset ja kuvaajat on esitetty liitteessä 11 ja 12.

Taulukko 22. Matalataajuisen yhteismelun laskentatulokset VE1

Laskentapiste	Äänitaso ulkona		Äänitaso sisällä	
	L eq,1h – Asumisterveys ohje sisällä	Hz	L eq,1h – Asumis-terveys ohje sisällä	Hz
A Lomarakennus (Söderändan 49)	6,7	100	-7,3	50
B Asuinrakennus (Söderändan 81)	6,9	100	-7,1	50
C Lomarakennus (Säderändan 166)	7,2	100	-6,8	50
D Lomarakennus (Söderändan 188)	7,2	100	-6,8	50
E Asuinrakennus (Rökiöntie 930)	7,2	100	-6,8	50
F Asuinrakennus (Kukkusintie 474)	5,3	100	-8,5	50
G Asuinrakennus (Kovik byväg 53)	4,2	100	-9,3	50
H Asuinrakennus (Vöyrintie 1021)	4,5	100	-9,1	50
I Lomarakennus (Ehrsbackavägen 29)	6,9	100	-6,9	50
J Asuinrakennus (Kleidersvägen 118)	7,3	100	-6,6	50
K Asuinrakennus (Rökiöntie 154)	5,0	100	-8,6	50
L Asuinrakennus (Bjurbäcksvägen 231)	5,4	100	-8,4	50

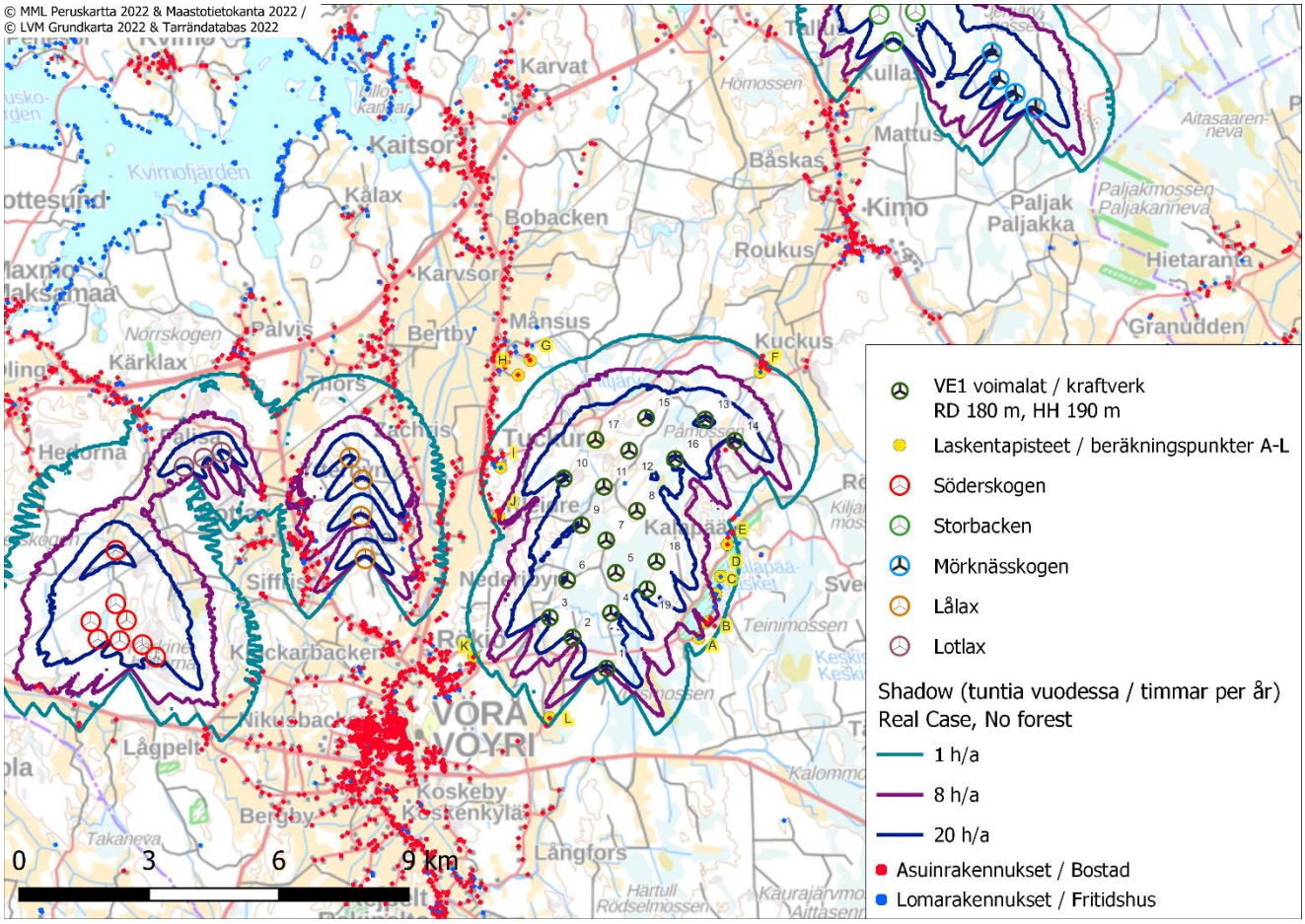
Taulukko 23. Matalataajuisen yhteismelun laskentatulokset VE2

Laskentapiste	Äänitaso ulkona		Äänitaso sisällä	
	L eq,1h – Asumisterveys ohje sisällä	Hz	L eq,1h – Asumis-terveys ohje sisällä	Hz
A Lomarakennus (Söderändan 49)	3,4	100	-10,4	50
B Asuinrakennus (Söderändan 81)	3,3	100	-10,5	50
C Lomarakennus (Säderändan 166)	3,1	100	-10,6	50
D Lomarakennus (Söderändan 188)	3,0	100	-10,7	50
E Asuinrakennus (Rökiöntie 930)	2,9	100	-10,8	50
F Asuinrakennus (Kukkusintie 474)	0,4	100	-12,8	50
G Asuinrakennus (Kovik byväg 53)	2,2	100	-11,3	50
H Asuinrakennus (Vöyrintie 1021)	2,3	100	-11,1	50
I Lomarakennus (Ehrsbackavägen 29)	4,0	100	-9,6	50
J Asuinrakennus (Kleidersvägen 118)	4,4	100	-9,2	50
K Asuinrakennus (Rökiöntie 154)	2,0	100	-11,2	50
L Asuinrakennus (Bjurbäcksvägen 231)	2,7	100	-10,9	50

4.2 Varjostus

4.2.1 VE 1: Varjostuksen yhteisvaikutus, ”Real Case, No forest”

Hankevaihtoehdon 1 yhteisvaikutusmallinnuksessa varjostusvaikutusalueelle 8 h/a sijoittuu 3 asuinrakennusta ja 2 lomarakennus (lomarakennus A ja asuinrakennus B, sekä näiden laskentapisteiden läheisyydessä olevat 2 asuinrakennusta ja 1 lomarakennus, jotka eivät ole laskentapisteinä). Mallinnustulosten mukaan varjostusta ilmenee enimmillään 8 h 35 min vuodessa hankealueen itäpuolella sijaitsevan asuinrakennuksen (laskentapiste B) alueella (Kuva 9, Taulukko 24). Tarkemmat laskentatulokset on esitetty liitteessä 13.



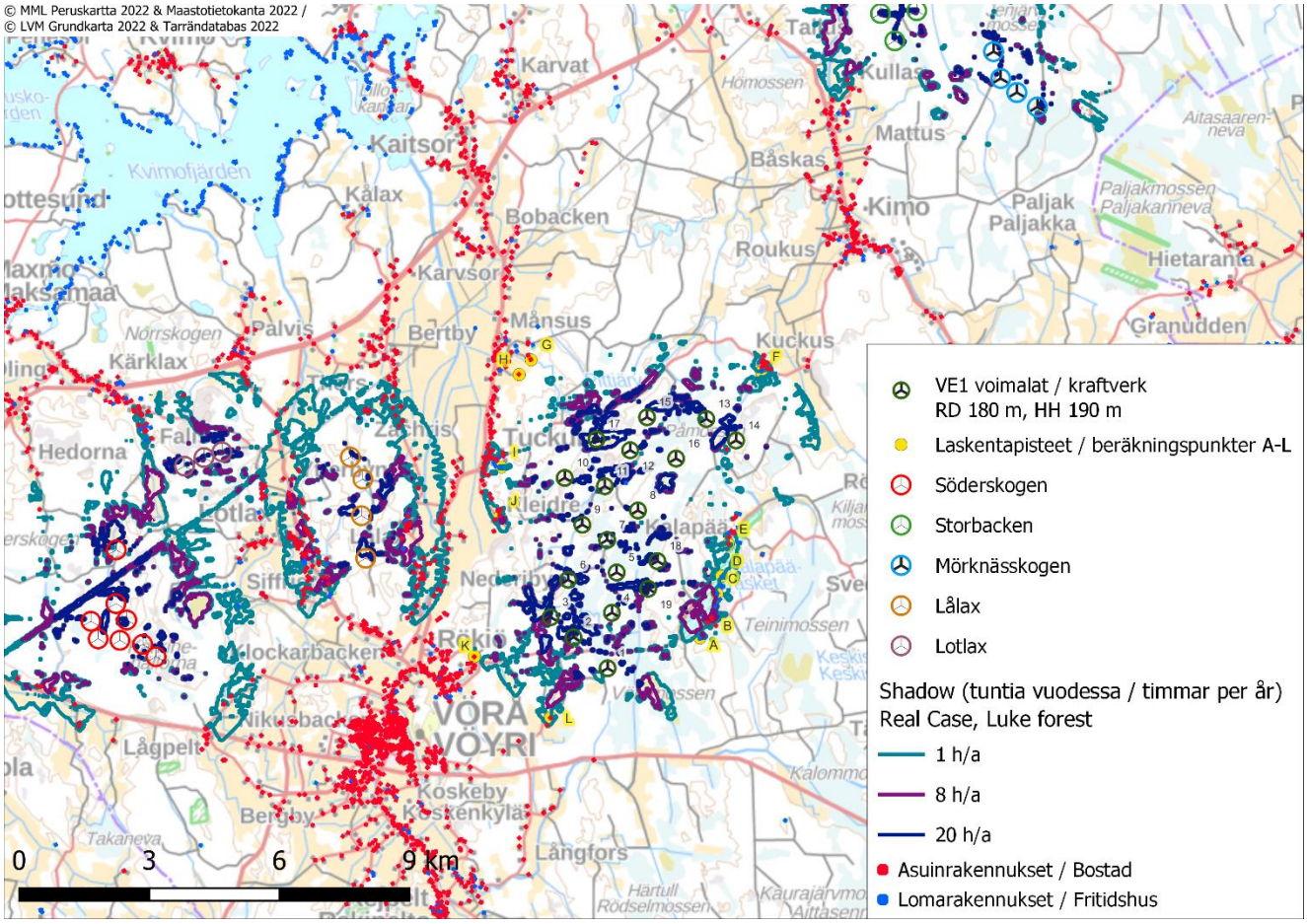
Kuva 9. Varjostuksen yhteismallinnuksen tulos hankevaihtoehdossa 1 (puuston suojaavaa vaikutusta ei ole huomioitu)

Taulukko 24. Varjostuksen yhteismallinnuksen tulos VE1, kun puuston suojaavaa vaikutusta ei ole huomioitu "Real Case, No forest".

Rakennus	ETRS89-TM35 Itä	ETRS89-TM35 Pohjoinen	Z (m)	Laskentaikkuna (m)	Varjostus (h/a)
A Lomarakennus (Söderändan 49)	267 990	7 011 759	42,5	5,0 x 5,0	8:09
B Asuinrakennus (Söderändan 81)	268 161	7 012 123	37,5	5,0 x 5,0	8:35
C Lomarakennus (Säderändan 166)	268 388	7 012 783	39,1	5,0 x 5,0	6:58
D Lomarakennus (Söderändan 188)	268 493	7 013 188	37,8	5,0 x 5,0	4:52
E Asuinrakennus (Rökiöntie 930)	268 646	7 013 924	38,1	5,0 x 5,0	1:58
F Asuinrakennus (Kukkusintie 474)	269 409	7 017 903	25	5,0 x 5,0	5:10
G Asuinrakennus (Kovik byväg 53)	264 096	7 018 174	10	5,0 x 5,0	0:00
H Asuinrakennus (Vöyrintie 1021)	263 817	7 017 837	8,5	5,0 x 5,0	0:00
I Lomarakennus (Ehrsbackavägen 29)	263 418	7 015 700	21,7	5,0 x 5,0	2:48
J Asuinrakennus (Kleidersvägen 118)	263 377	7 014 578	13,7	5,0 x 5,0	7:54
K Asuinrakennus (Rökiöntie 154)	262 790	7 011 335	27,5	5,0 x 5,0	0:00
L Asuinrakennus (Bjurbäcksvägen 231)	264 546	7 009 923	27,8	5,0 x 5,0	4:15

4.2.2 VE 1: Varjostuksen yhteisvaikutus, ”Real Case, Luke forest”

Huomioitaessa puuston suojaava vaikutus hankevaihtoehdossa 1, sijoittuu 8 h/a varjostusvaikutusalueelle 1 asuinrakennus ja 1 lomarakennus (lomarakennus A sekä tämän laskentapisteen läheisyydessä oleva asuinrakennus, joka ei ole laskentapisteenä). Mallinnustulosten mukaan varjostusta ilmenee enimmillään 8 h 9 min vuodessa, hankealueen itäpuolella sijaitsevan lomarakennuksen (laskentapiste A) alueella (Kuva 10, Taulukko 25). Tarkemmat varjostuksen yhteisvaikutuksen laskentatulokset on esitetty liitteessä 14.



Kuva 10. Varjostuksen yhteismallinnuksen tulos hankevaihtoehdossa 1 (puuston suojaava vaikutus on huomioitu)

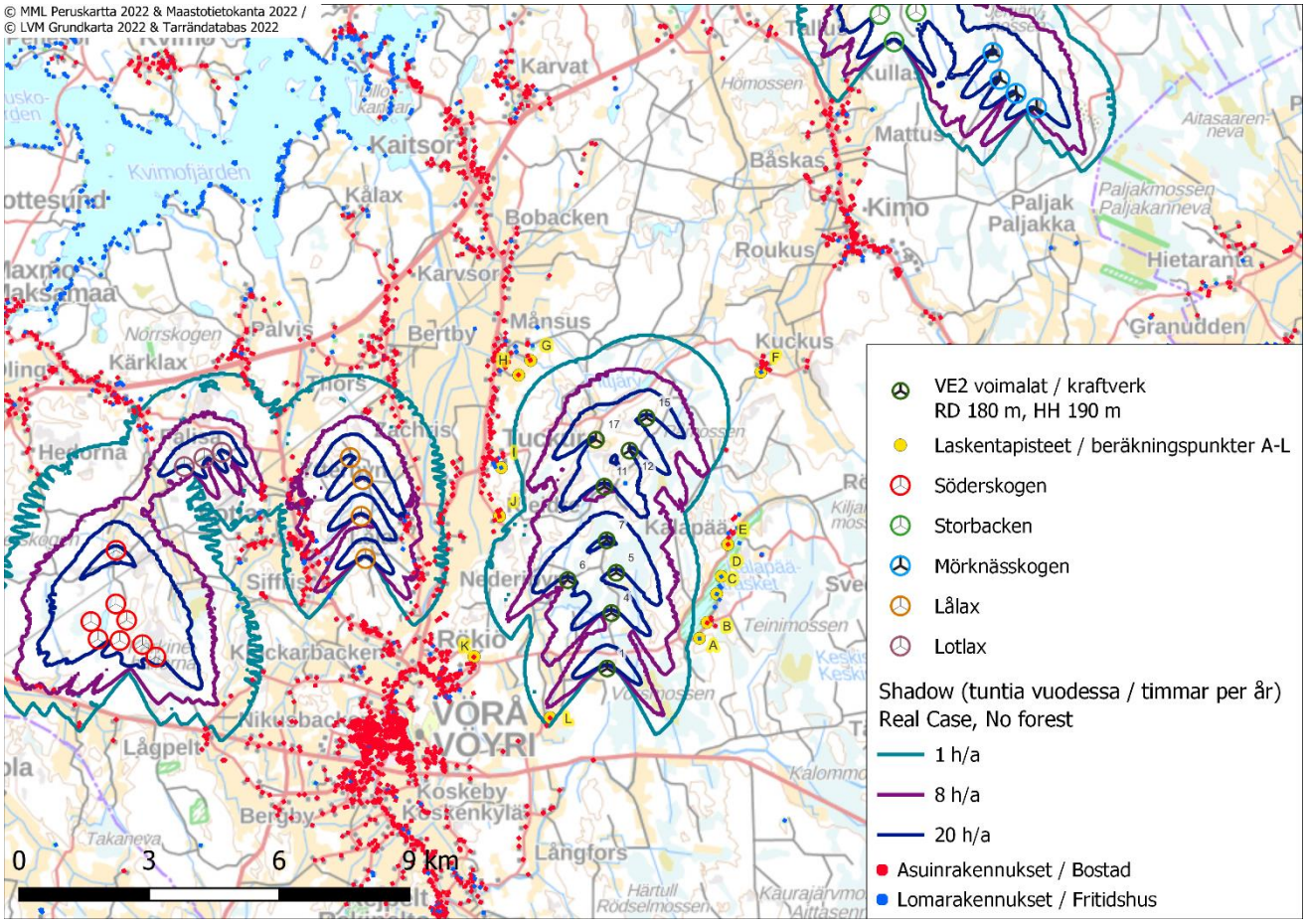
Taulukko 25. Varjostuksen yhteismallinnuksen tulos VE1, kun puuston suojaava vaikutus on huomioitu "Real Case, Luke Forest".

Rakennus	ETRS89-TM35 Itä	ETRS89-TM35 Pohjoinen	Z (m)	Laskentaikkuna (m)	Varjostus (h/a)
A Lomarakennus (Söderändan 49)	267 990	7 011 759	42,5	5,0 x 5,0	8:09
B Asuinrakennus (Söderändan 81)	268 161	7 012 123	37,5	5,0 x 5,0	0:00
C Lomarakennus (Säderändan 166)	268 388	7 012 783	39,1	5,0 x 5,0	0:00
D Lomarakennus (Söderändan 188)	268 493	7 013 188	37,8	5,0 x 5,0	4:52
E Asuinrakennus (Rökiöntie 930)	268 646	7 013 924	38,1	5,0 x 5,0	1:58
F Asuinrakennus (Kukkusintie 474)	269 409	7 017 903	25	5,0 x 5,0	0:00
G Asuinrakennus (Kovik byväg 53)	264 096	7 018 174	10	5,0 x 5,0	0:00
H Asuinrakennus (Vöyrintie 1021)	263 817	7 017 837	8,5	5,0 x 5,0	0:00
I Lomarakennus (Ehrsbackavägen 29)	263 418	7 015 700	21,7	5,0 x 5,0	2:48
J Asuinrakennus (Kleidersvägen 118)	263 377	7 014 578	13,7	5,0 x 5,0	7:54
K Asuinrakennus (Rökiöntie 154)	262 790	7 011 335	27,5	5,0 x 5,0	0:00
L Asuinrakennus (Bjurbäcksvägen 231)	264 546	7 009 923	27,8	5,0 x 5,0	0:00

4.2.3 VE 2: Varjostuksen yhteisvaikutus ”Real Case, No forest”

Hankevaihtoehdossa 2 varjostuksen yhteisvaikutusalueelle 8 h/a ei sijoitu asuin- tai lomarakennuksia. Mallinnustulosten mukaan varjostusta ilmenee enimmillään 4 h 15 min vuodessa hankealueen eteläpuolella sijaitsevan asuinrakennuksen (laskentapiste L) alueella (Kuva 11, Taulukko 26).

Tarkemmat varjostuksen yhteisvaikutuksen laskentatulokset on esitetty liitteessä 15.



Kuva 11. Varjostuksen yhteismallinnuksen tulos hankevaihtoehdossa 2 (puuston suojaavaa vaikutusta ei ole huomioitu)

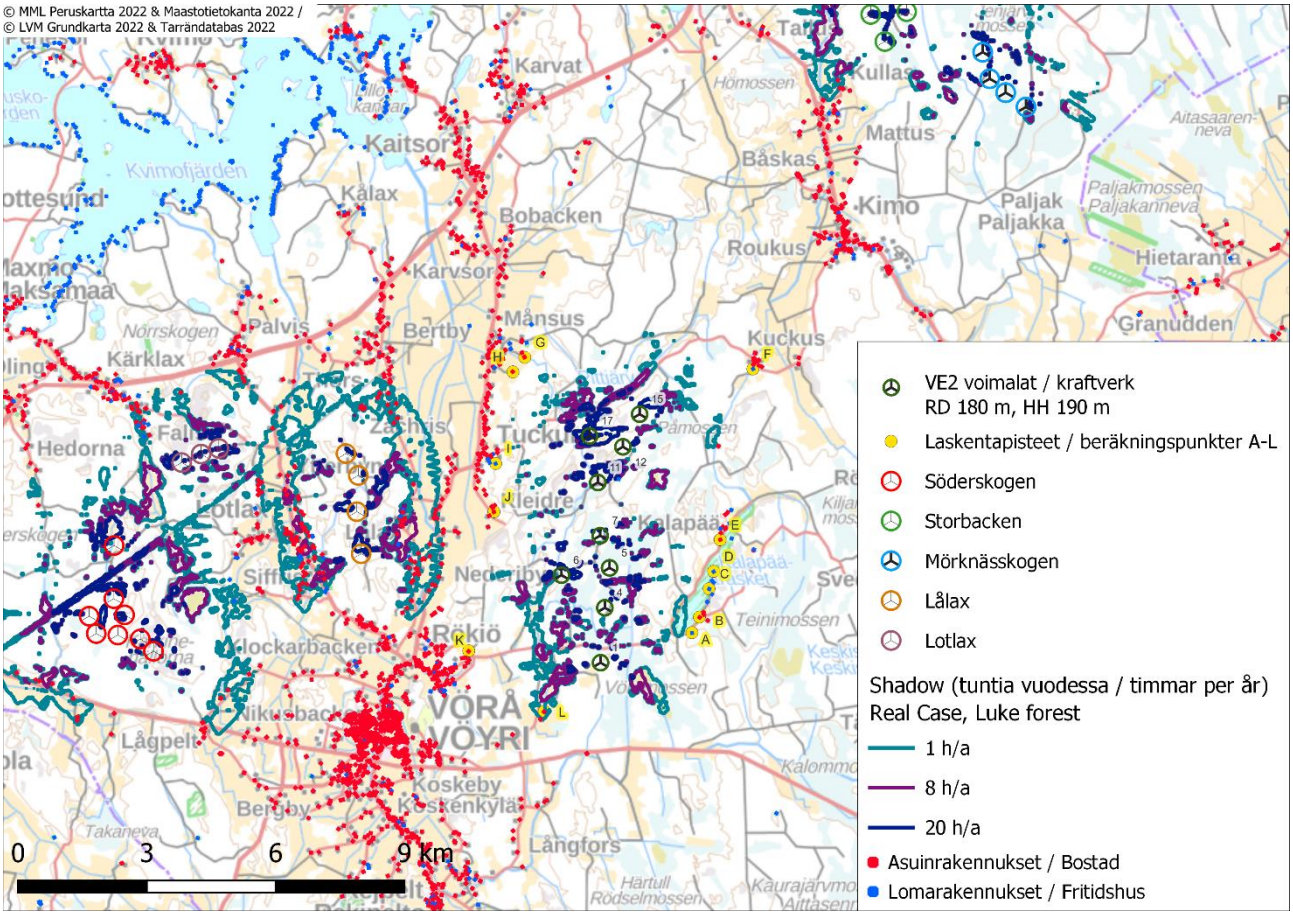
Taulukko 26. Varjostuksen yhteismallinnuksen tulos VE2, kun puuston suojaavaa vaikutusta ei ole huomioitu "Real Case, No forest".

Rakennus	ETRS89-TM35 Itä	ETRS89-TM35 Pohjoinen	Z (m)	Laskentaikkuna (m)	Varjostus (h/a)
A Lomarakennus (Söderändan 49)	267 990	7 011 759	42,5	5,0 x 5,0	0:00
B Asuinrakennus (Söderändan 81)	268 161	7 012 123	37,5	5,0 x 5,0	0:00
C Lomarakennus (Säderändan 166)	268 388	7 012 783	39,1	5,0 x 5,0	0:00
D Lomarakennus (Söderändan 188)	268 493	7 013 188	37,8	5,0 x 5,0	0:00
E Asuinrakennus (Rökiöntie 930)	268 646	7 013 924	38,1	5,0 x 5,0	0:00
F Asuinrakennus (Kukkusintie 474)	269 409	7 017 903	25	5,0 x 5,0	0:00
G Asuinrakennus (Kovik byväg 53)	264 096	7 018 174	10	5,0 x 5,0	0:00
H Asuinrakennus (Vöyrintie 1021)	263 817	7 017 837	8,5	5,0 x 5,0	0:00
I Lomarakennus (Ehrsbackavägen 29)	263 418	7 015 700	21,7	5,0 x 5,0	0:00
J Asuinrakennus (Kleidersvägen 118)	263 377	7 014 578	13,7	5,0 x 5,0	0:00
K Asuinrakennus (Rökiöntie 154)	262 790	7 011 335	27,5	5,0 x 5,0	0:00
L Asuinrakennus (Bjurbäcksvägen 231)	264 546	7 009 923	27,8	5,0 x 5,0	4:15

4.2.4 VE 2: Varjostuksen yhteisvaikutus ”Real Case, Luke forest”

Huomioitaessa puuston suojaava vaikutus, ei hankevaihtoehdossa 2 sijoitu yli 8 h/a varjostuksen yhteisvaikutusalueelle Lasorin voimaloiden läheisyydessä asuin- tai loma-ajanrakennuksia (Kuva 12, Taulukko 27).

Tarkemmat hankevaihtoehdon 2 varjostuksen yhteisvaikutuksen laskentatulokset on esitetty liitteessä 16.



Kuva 12. Varjostuksen yhteismallinnuksen tulos hankevaihtoehdossa 2 (puuston suojaava vaikutus on huomioitu)

Taulukko 27. Varjostuksen yhteismallinnuksen tulos VE2, kun puuston suojaava vaikutus on huomioitu "Real Case, Luke forest".

Rakennus	ETRS89-TM35 Itä	ETRS89-TM35 Pohjoinen	Z (m)	Laskentaikkuna (m)	Varjostus (h/a)
A Lomarakennus (Söderändan 49)	267 990	7 011 759	42,5	5,0 x 5,0	0:00
B Asuinrakennus (Söderändan 81)	268 161	7 012 123	37,5	5,0 x 5,0	0:00
C Lomarakennus (Säderändan 166)	268 388	7 012 783	39,1	5,0 x 5,0	0:00
D Lomarakennus (Söderändan 188)	268 493	7 013 188	37,8	5,0 x 5,0	0:00
E Asuinrakennus (Rökiöntie 930)	268 646	7 013 924	38,1	5,0 x 5,0	0:00
F Asuinrakennus (Kukkusintie 474)	269 409	7 017 903	25	5,0 x 5,0	0:00
G Asuinrakennus (Kovik byväg 53)	264 096	7 018 174	10	5,0 x 5,0	0:00
H Asuinrakennus (Vöyrintie 1021)	263 817	7 017 837	8,5	5,0 x 5,0	0:00
I Lomarakennus (Ehrsbackavägen 29)	263 418	7 015 700	21,7	5,0 x 5,0	0:00
J Asuinrakennus (Kleidersvägen 118)	263 377	7 014 578	13,7	5,0 x 5,0	0:00
K Asuinrakennus (Rökiöntie 154)	262 790	7 011 335	27,5	5,0 x 5,0	0:00
L Asuinrakennus (Bjurbäcksvägen 231)	264 546	7 009 923	27,8	5,0 x 5,0	0:00

FCG Finnish Consulting Group Oy

Miikka Saranpää, Ins.
Laatija

Johanna Harju, ins.
Tarkastaja

Liite 1. Melun leviämismallinnuksen tulokset ISO 9613-2, YM 2 /2014 - Hankevaihtoehto 1

Licensed user:
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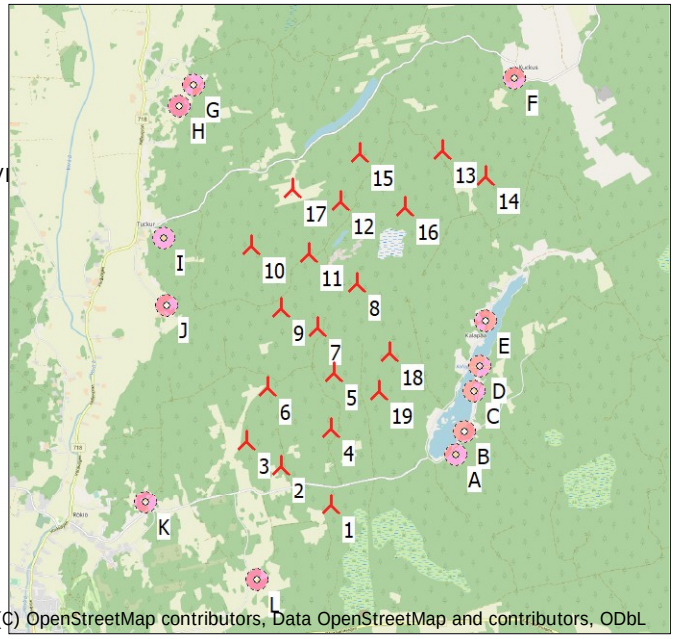
+358104095666
Miikka Saranpää / miikka.saranpaa@fcg.fi
Calculated:
14.7.2023 9.12/3.5.584

DECIBEL - Main Result

Calculation: Lasor_VE1_19xV172xHH194

Noise calculation model:
ISO 9613-2 General
Wind speed (in 10 m height):
8,0 m/s
Ground attenuation:
General, terrain specific
Ground factor for porous ground: 0,4
Area object with hard ground: Area object (Roughness): REGIONS_Lasor_ZVI
Area type with hard ground: vesistöt
Ground factor for hard ground: 0,0
Meteorological coefficient, C0:
0,0 dB
Type of demand in calculation:
1: WTG noise is compared to demand (DK, DE, SE, NL etc.)
Noise values in calculation:
All noise values are mean values (Lwa) (Normal)
Pure tones:
Ignore pure tones setting on WTG
Height above ground level, when no value in NSA object:
4,0 m; Don't allow override of model height with height from NSA object
Uncertainty margin:
0,0 dB; Uncertainty margin in model has priority
Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:
0,0 dB(A)

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89



Scale 1:125 000
New WTG
Noise sensitive area

WTGs

	East	North	Z [m]	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Noise data Creator	Name	Wind speed [m/s]	LwA,ref [dB(A)]
1	265 860	7 011 060	40,0	VESTAS V172-7.2 7200 ...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
2	265 074	7 011 774	34,4	VESTAS V172-7.2 7200 ...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
3	264 546	7 012 237	34,4	VESTAS V172-7.2 7200 ...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
4	265 960	7 012 340	40,0	VESTAS V172-7.2 7200 ...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
5	266 070	7 013 270	35,0	VESTAS V172-7.2 7200 ...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
6	264 950	7 013 100	40,0	VESTAS V172-7.2 7200 ...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
7	265 850	7 014 020	40,0	VESTAS V172-7.2 7200 ...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
8	266 560	7 014 700	40,0	VESTAS V172-7.2 7200 ...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
9	265 278	7 014 371	40,2	VESTAS V172-7.2 7200 ...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
10	264 871	7 015 451	34,5	VESTAS V172-7.2 7200 ...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
11	265 796	7 015 259	39,8	VESTAS V172-7.2 7200 ...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
12	266 380	7 016 090	44,5	VESTAS V172-7.2 7200 ...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
13	268 137	7 016 809	31,7	VESTAS V172-7.2 7200 ...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
14	268 822	7 016 315	40,0	VESTAS V172-7.2 7200 ...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
15	266 770	7 016 850	43,5	VESTAS V172-7.2 7200 ...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
16	267 439	7 015 897	37,5	VESTAS V172-7.2 7200 ...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
17	265 604	7 016 343	20,0	VESTAS V172-7.2 7200 ...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
18	267 010	7 013 530	40,8	VESTAS V172-7.2 7200 ...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
19	266 794	7 012 894	40,4	VESTAS V172-7.2 7200 ...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9

Calculation Results

Sound level

Noise sensitive area No.	Name	East	North	Z [m]	Immission height [m]	Demands Noise [dB(A)]	Sound level From WTGs [dB(A)]	Distance to noise demand [m]	2 dB penalty applied for one or more WTGs
A	A Lomarakennus (Söderändan 49)	267 990	7 011 759	42,5	4,0	40,0	35,8	742	No
B	B Asuinrakennus (Söderändan 81)	268 161	7 012 123	37,5	4,0	40,0	36,6	663	No
C	C Lomarakennus (Säderändan 166)	268 388	7 012 783	39,1	4,0	40,0	37,3	598	No
D	D Lomarakennus (Söderändan 188)	268 493	7 013 188	37,8	4,0	40,0	37,6	611	No
E	E Asuinrakennus (Rökiöntie 930)	268 646	7 013 924	38,1	4,0	40,0	36,2	773	No
F	F Asuinrakennus (Kukkusintie 474)	269 409	7 017 903	25,0	4,0	40,0	34,2	851	No
G	G Asuinrakennus (Kovik byväg 53)	264 096	7 018 174	10,0	4,0	40,0	32,0	1 552	No
H	H Asuinrakennus (Vöyrintie 1021)	263 817	7 017 837	8,5	4,0	40,0	32,2	1 498	No

To be continued on next page...

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Calculated:
14.7.2023 9.12/3.5.584

DECIBEL - Main Result

Calculation: Lasor_VE1_19xV172xHH194

...continued from previous page

Noise sensitive area

No.	Name	East	North	Z	Immission height	Demands Noise	Sound level From WTGs	Distance to noise demand	2 dB penalty applied for one or more WTGs
				[m]	[m]	[dB(A)]	[dB(A)]	[m]	
I	I Lomarakennus (Ehrsbackavägen 29)	263 418	7 015 700	21,7	4,0	40,0	35,6	686	No
J	J Asuinrakennus (Kleidersvägen 118)	263 377	7 014 578	13,7	4,0	40,0	36,0	806	No
K	K Asuinrakennus (Rökiöntie 154)	262 790	7 011 335	27,5	4,0	40,0	33,0	1 174	No
L	L Asuinrakennus (Bjurbäcksvägen 231)	264 546	7 009 923	27,8	4,0	40,0	34,2	947	No

Distances (m)

WTG	A	B	C	D	E	F	G	H	I	J	K	L
1	2240	2533	3057	3383	3993	7704	7325	7073	5240	4303	3080	1736
2	2915	3105	3462	3698	4166	7503	6470	6187	4258	3275	2324	1923
3	3475	3614	3877	4057	4430	7462	5950	5643	3640	2615	1973	2313
4	2110	2210	2466	2670	3116	6542	6121	5896	4211	3416	3323	2798
5	2442	2383	2367	2423	2656	5708	5283	5089	3595	2992	3805	3675
6	3321	3354	3450	3542	3784	6550	5142	4867	3016	2157	2787	3200
7	3111	2988	2822	2769	2796	5265	4506	4321	2954	2534	4068	4296
8	3268	3032	2647	2453	2224	4285	4257	4164	3295	3184	5050	5181
9	3763	3654	3490	3424	3396	5433	3980	3758	2284	1911	3922	4505
10	4830	4676	4411	4268	4069	5155	2830	2607	1474	1730	4609	5533
11	4128	3925	3582	3398	3145	4474	3373	3248	2418	2512	4940	5477
12	4618	4345	3867	3588	3133	3529	3090	3099	2986	3361	5954	6430
13	5050	4683	4032	3637	2928	1677	4263	4438	4845	5255	7648	7762
14	4629	4241	3557	3143	2396	1692	5076	5228	5436	5712	7817	7685
15	5232	4924	4375	4045	3474	2840	2982	3111	3542	4081	6796	7270
16	4172	3840	3254	2906	2312	2810	4042	4106	4024	4269	6509	6634
17	5164	4931	4516	4275	3884	4111	2371	2327	2277	2840	5740	6502
18	2023	1816	1566	1521	1681	4985	5479	5358	4194	3779	4753	4365
19	1647	1568	1596	1723	2117	5648	5926	5767	4388	3808	4294	3723

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DECIBEL - Detailed results

Calculation: Lasor_VE1_19xV172xHH194Noise calculation model: ISO 9613-2 General 8,0 m/s

Assumptions

Calculated L(DW) = LWA,ref + K + Dc - (Adiv + Aatm + Agr + Abar + Amisc) - Cmet
(when calculated with ground attenuation, then Dc = Domega)

LWA,ref:	Sound pressure level at WTG
K:	Pure tone
Dc:	Directivity correction
Adiv:	the attenuation due to geometrical divergence
Aatm:	the attenuation due to atmospheric absorption
Agr:	the attenuation due to ground effect
Abar:	the attenuation due to a barrier
Amisc:	the attenuation due to miscellaneous other effects
Cmet:	Meteorological correction

Calculation Results

Noise sensitive area: A A Lomarakennus (Söderändan 49)

Wind speed: 8,0 m/s
WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	2 240	2 248	0	25,95	106,9	0,00	78,04	-	-	0,00	0,00	-
10	4 830	4 833	0	16,43	106,9	0,00	84,68	-	-	0,00	0,00	-
11	4 128	4 132	0	18,47	106,9	0,00	83,32	-	-	0,00	0,00	-
12	4 618	4 622	0	17,02	106,9	0,00	84,30	-	-	0,00	0,00	-
13	5 050	5 053	0	15,88	106,9	0,00	85,07	-	-	0,00	0,00	-
14	4 629	4 632	0	17,04	106,9	0,00	84,32	-	-	0,00	0,00	-
15	5 232	5 235	0	15,40	106,9	0,00	85,38	-	-	0,00	0,00	-
16	4 172	4 176	0	18,36	106,9	0,00	83,42	-	-	0,00	0,00	-
17	5 164	5 167	0	15,56	106,9	0,00	85,26	-	-	0,00	0,00	-
18	2 023	2 032	0	27,25	106,9	0,00	77,16	-	-	0,00	0,00	-
19	1 647	1 658	0	29,60	106,9	0,00	75,39	-	-	0,00	0,00	-
2	2 915	2 920	0	22,79	106,9	0,00	80,31	-	-	0,00	0,00	-
3	3 475	3 479	0	20,61	106,9	0,00	81,83	-	-	0,00	0,00	-
4	2 110	2 119	0	26,72	106,9	0,00	77,52	-	-	0,00	0,00	-
5	2 442	2 449	0	25,00	106,9	0,00	78,78	-	-	0,00	0,00	-
6	3 321	3 326	0	21,22	106,9	0,00	81,44	-	-	0,00	0,00	-
7	3 111	3 117	0	22,04	106,9	0,00	80,87	-	-	0,00	0,00	-
8	3 268	3 274	0	21,43	106,9	0,00	81,30	-	-	0,00	0,00	-
9	3 763	3 768	0	19,64	106,9	0,00	82,52	-	-	0,00	0,00	-
Sum				35,85								

- Data undefined due to calculation with octave data

Noise sensitive area: B B Asuinrakennus (Söderändan 81)

Wind speed: 8,0 m/s
WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	2 533	2 540	0	24,95	106,9	0,00	79,10	-	-	0,00	0,00	-
10	4 676	4 680	0	17,39	106,9	0,00	84,40	-	-	0,00	0,00	-
11	3 925	3 930	0	19,68	106,9	0,00	82,89	-	-	0,00	0,00	-
12	4 345	4 350	0	18,44	106,9	0,00	83,77	-	-	0,00	0,00	-
13	4 683	4 687	0	17,57	106,9	0,00	84,42	-	-	0,00	0,00	-
14	4 241	4 246	0	18,50	106,9	0,00	83,56	-	-	0,00	0,00	-
15	4 924	4 928	0	16,97	106,9	0,00	84,85	-	-	0,00	0,00	-
16	3 840	3 845	0	20,07	106,9	0,00	82,70	-	-	0,00	0,00	-
17	4 931	4 934	0	16,77	106,9	0,00	84,86	-	-	0,00	0,00	-
18	1 816	1 827	0	28,99	106,9	0,00	76,23	-	-	0,00	0,00	-
19	1 568	1 580	0	30,54	106,9	0,00	74,97	-	-	0,00	0,00	-
2	3 105	3 111	0	22,51	106,9	0,00	80,86	-	-	0,00	0,00	-
3	3 614	3 619	0	20,58	106,9	0,00	82,17	-	-	0,00	0,00	-
4	2 210	2 219	0	26,57	106,9	0,00	77,92	-	-	0,00	0,00	-
5	2 383	2 391	0	25,70	106,9	0,00	78,57	-	-	0,00	0,00	-
6	3 354	3 360	0	21,55	106,9	0,00	81,53	-	-	0,00	0,00	-

To be continued on next page...

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DECIBEL - Detailed results

Calculation: Lasor_VE1_19xV172xHH194Noise calculation model: ISO 9613-2 General 8,0 m/s

...continued from previous page

WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
7	2 988	2 994	0	23,01	106,9	0,00	80,52	-	-	0,00	0,00	-
8	3 032	3 038	0	22,93	106,9	0,00	80,65	-	-	0,00	0,00	-
9	3 654	3 659	0	20,49	106,9	0,00	82,27	-	-	0,00	0,00	-
Sum				36,58								

- Data undefined due to calculation with octave data

Noise sensitive area: C C Lomarakennus (Säderändan 166)

Wind speed: 8,0 m/s

WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	3 057	3 063	0	23,39	106,9	0,00	80,72	-	-	0,00	0,00	-
10	4 411	4 415	0	18,46	106,9	0,00	83,90	-	-	0,00	0,00	-
11	3 582	3 587	0	20,99	106,9	0,00	82,10	-	-	0,00	0,00	-
12	3 867	3 872	0	19,61	106,9	0,00	82,76	-	-	0,00	0,00	-
13	4 032	4 036	0	18,77	106,9	0,00	83,12	-	-	0,00	0,00	-
14	3 557	3 562	0	20,41	106,9	0,00	82,03	-	-	0,00	0,00	-
15	4 375	4 379	0	17,70	106,9	0,00	83,83	-	-	0,00	0,00	-
16	3 254	3 260	0	21,48	106,9	0,00	81,26	-	-	0,00	0,00	-
17	4 516	4 520	0	17,81	106,9	0,00	84,10	-	-	0,00	0,00	-
18	1 566	1 578	0	30,96	106,9	0,00	74,96	-	-	0,00	0,00	-
19	1 596	1 608	0	30,81	106,9	0,00	75,12	-	-	0,00	0,00	-
2	3 462	3 467	0	21,73	106,9	0,00	81,80	-	-	0,00	0,00	-
3	3 877	3 882	0	20,30	106,9	0,00	82,78	-	-	0,00	0,00	-
4	2 466	2 474	0	25,84	106,9	0,00	78,87	-	-	0,00	0,00	-
5	2 367	2 374	0	26,29	106,9	0,00	78,51	-	-	0,00	0,00	-
6	3 450	3 455	0	21,74	106,9	0,00	81,77	-	-	0,00	0,00	-
7	2 822	2 828	0	24,15	106,9	0,00	80,03	-	-	0,00	0,00	-
8	2 647	2 654	0	24,66	106,9	0,00	79,48	-	-	0,00	0,00	-
9	3 490	3 495	0	21,54	106,9	0,00	81,87	-	-	0,00	0,00	-
Sum				37,25								

- Data undefined due to calculation with octave data

Noise sensitive area: D D Lomarakennus (Söderändan 188)

Wind speed: 8,0 m/s

WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	3 383	3 389	0	22,18	106,9	0,00	81,60	-	-	0,00	0,00	-
10	4 268	4 272	0	19,33	106,9	0,00	83,61	-	-	0,00	0,00	-
11	3 398	3 404	0	22,17	106,9	0,00	81,64	-	-	0,00	0,00	-
12	3 588	3 593	0	21,44	106,9	0,00	82,11	-	-	0,00	0,00	-
13	3 637	3 641	0	21,16	106,9	0,00	82,23	-	-	0,00	0,00	-
14	3 143	3 148	0	22,93	106,9	0,00	80,96	-	-	0,00	0,00	-
15	4 045	4 049	0	19,88	106,9	0,00	83,15	-	-	0,00	0,00	-
16	2 906	2 912	0	23,95	106,9	0,00	80,28	-	-	0,00	0,00	-
17	4 275	4 279	0	19,28	106,9	0,00	83,63	-	-	0,00	0,00	-
18	1 521	1 533	0	31,56	106,9	0,00	74,71	-	-	0,00	0,00	-
19	1 723	1 734	0	30,17	106,9	0,00	75,78	-	-	0,00	0,00	-
2	3 698	3 703	0	21,13	106,9	0,00	82,37	-	-	0,00	0,00	-
3	4 057	4 061	0	19,97	106,9	0,00	83,17	-	-	0,00	0,00	-
4	2 670	2 677	0	25,11	106,9	0,00	79,55	-	-	0,00	0,00	-
5	2 423	2 430	0	26,26	106,9	0,00	78,71	-	-	0,00	0,00	-
6	3 542	3 547	0	21,67	106,9	0,00	82,00	-	-	0,00	0,00	-
7	2 769	2 776	0	24,67	106,9	0,00	79,87	-	-	0,00	0,00	-
8	2 453	2 460	0	26,11	106,9	0,00	78,82	-	-	0,00	0,00	-
9	3 424	3 430	0	22,09	106,9	0,00	81,70	-	-	0,00	0,00	-
Sum				37,61								

- Data undefined due to calculation with octave data

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Calculated:
14.7.2023 9.12/3.5.584

DECIBEL - Detailed results

Calculation: Lasor_VE1_19xV172xHH194Noise calculation model: ISO 9613-2 General 8,0 m/s

Noise sensitive area: E E Asuinrakennus (Rökiöntie 930)

Wind speed: 8,0 m/s
WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	3 993	3 997	0	18,85	106,9	0,00	83,04	-	-	0,00	0,00	-
10	4 069	4 073	0	18,60	106,9	0,00	83,20	-	-	0,00	0,00	-
11	3 145	3 150	0	21,85	106,9	0,00	80,97	-	-	0,00	0,00	-
12	3 133	3 139	0	21,90	106,9	0,00	80,94	-	-	0,00	0,00	-
13	2 928	2 934	0	22,73	106,9	0,00	80,35	-	-	0,00	0,00	-
14	2 396	2 404	0	25,15	106,9	0,00	78,62	-	-	0,00	0,00	-
15	3 474	3 479	0	20,61	106,9	0,00	81,83	-	-	0,00	0,00	-
16	2 312	2 320	0	25,58	106,9	0,00	78,31	-	-	0,00	0,00	-
17	3 884	3 888	0	19,20	106,9	0,00	82,79	-	-	0,00	0,00	-
18	1 681	1 692	0	29,25	106,9	0,00	75,57	-	-	0,00	0,00	-
19	2 117	2 126	0	26,61	106,9	0,00	77,55	-	-	0,00	0,00	-
2	4 166	4 171	0	18,30	106,9	0,00	83,40	-	-	0,00	0,00	-
3	4 430	4 434	0	17,51	106,9	0,00	83,94	-	-	0,00	0,00	-
4	3 116	3 122	0	21,96	106,9	0,00	80,89	-	-	0,00	0,00	-
5	2 656	2 662	0	23,92	106,9	0,00	79,51	-	-	0,00	0,00	-
6	3 784	3 789	0	19,53	106,9	0,00	82,57	-	-	0,00	0,00	-
7	2 796	2 802	0	23,30	106,9	0,00	79,95	-	-	0,00	0,00	-
8	2 224	2 232	0	26,04	106,9	0,00	77,97	-	-	0,00	0,00	-
9	3 396	3 401	0	20,89	106,9	0,00	81,63	-	-	0,00	0,00	-
Sum				36,22								

- Data undefined due to calculation with octave data

Noise sensitive area: F F Asuinrakennus (Kukkusintie 474)

Wind speed: 8,0 m/s
WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	7 704	7 707	0	10,68	106,9	0,00	88,74	-	-	0,00	0,00	-
10	5 155	5 159	0	15,54	106,9	0,00	85,25	-	-	0,00	0,00	-
11	4 474	4 479	0	17,38	106,9	0,00	84,02	-	-	0,00	0,00	-
12	3 529	3 535	0	20,41	106,9	0,00	81,97	-	-	0,00	0,00	-
13	1 677	1 688	0	29,28	106,9	0,00	75,55	-	-	0,00	0,00	-
14	1 692	1 705	0	29,17	106,9	0,00	75,63	-	-	0,00	0,00	-
15	2 840	2 848	0	23,10	106,9	0,00	80,09	-	-	0,00	0,00	-
16	2 810	2 817	0	23,23	106,9	0,00	80,00	-	-	0,00	0,00	-
17	4 111	4 115	0	18,47	106,9	0,00	83,29	-	-	0,00	0,00	-
18	4 985	4 990	0	15,98	106,9	0,00	84,96	-	-	0,00	0,00	-
19	5 648	5 651	0	14,34	106,9	0,00	86,04	-	-	0,00	0,00	-
2	7 503	7 506	0	10,99	106,9	0,00	88,51	-	-	0,00	0,00	-
3	7 462	7 465	0	11,05	106,9	0,00	88,46	-	-	0,00	0,00	-
4	6 542	6 545	0	12,58	106,9	0,00	87,32	-	-	0,00	0,00	-
5	5 708	5 711	0	14,20	106,9	0,00	86,13	-	-	0,00	0,00	-
6	6 550	6 554	0	12,56	106,9	0,00	87,33	-	-	0,00	0,00	-
7	5 265	5 269	0	15,26	106,9	0,00	85,43	-	-	0,00	0,00	-
8	4 285	4 290	0	17,94	106,9	0,00	83,65	-	-	0,00	0,00	-
9	5 433	5 436	0	14,85	106,9	0,00	85,71	-	-	0,00	0,00	-
Sum				34,24								

- Data undefined due to calculation with octave data

Noise sensitive area: G G Asuinrakennus (Kovik byväg 53)

Wind speed: 8,0 m/s
WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	7 325	7 328	0	11,27	106,9	0,00	88,30	-	-	0,00	0,00	-
10	2 830	2 838	0	23,14	106,9	0,00	80,06	-	-	0,00	0,00	-
11	3 373	3 380	0	20,97	106,9	0,00	81,58	-	-	0,00	0,00	-
12	3 090	3 098	0	22,06	106,9	0,00	80,82	-	-	0,00	0,00	-
13	4 263	4 269	0	18,02	106,9	0,00	83,61	-	-	0,00	0,00	-
14	5 076	5 080	0	15,76	106,9	0,00	85,12	-	-	0,00	0,00	-
15	2 982	2 991	0	22,51	106,9	0,00	80,52	-	-	0,00	0,00	-
16	4 042	4 048	0	18,69	106,9	0,00	83,15	-	-	0,00	0,00	-
17	2 371	2 379	0	25,28	106,9	0,00	78,53	-	-	0,00	0,00	-

To be continued on next page...

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Calculated:
14.7.2023 9.12/3.5.584

DECIBEL - Detailed results

Calculation: Lasor_VE1_19xV172xHH194Noise calculation model: ISO 9613-2 General 8,0 m/s

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WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
18	5 479	5 484	0	14,74	106,9	0,00	85,78	-	-	0,00	0,00	-
19	5 926	5 930	0	13,70	106,9	0,00	86,46	-	-	0,00	0,00	-
2	6 470	6 474	0	12,70	106,9	0,00	87,22	-	-	0,00	0,00	-
3	5 950	5 954	0	13,65	106,9	0,00	86,50	-	-	0,00	0,00	-
4	6 121	6 125	0	13,34	106,9	0,00	86,74	-	-	0,00	0,00	-
5	5 283	5 288	0	15,22	106,9	0,00	85,47	-	-	0,00	0,00	-
6	5 142	5 147	0	15,57	106,9	0,00	85,23	-	-	0,00	0,00	-
7	4 506	4 512	0	17,29	106,9	0,00	84,09	-	-	0,00	0,00	-
8	4 257	4 262	0	18,02	106,9	0,00	83,59	-	-	0,00	0,00	-
9	3 980	3 986	0	18,88	106,9	0,00	83,01	-	-	0,00	0,00	-
Sum				31,97								

- Data undefined due to calculation with octave data

Noise sensitive area: H H Asuinrakennus (Vöyrintie 1021)

Wind speed: 8,0 m/s

WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	7 073	7 077	0	11,68	106,9	0,00	88,00	-	-	0,00	0,00	-
10	2 607	2 616	0	24,14	106,9	0,00	79,35	-	-	0,00	0,00	-
11	3 248	3 255	0	21,44	106,9	0,00	81,25	-	-	0,00	0,00	-
12	3 099	3 108	0	22,02	106,9	0,00	80,85	-	-	0,00	0,00	-
13	4 438	4 443	0	17,51	106,9	0,00	83,95	-	-	0,00	0,00	-
14	5 228	5 232	0	15,36	106,9	0,00	85,37	-	-	0,00	0,00	-
15	3 111	3 119	0	21,99	106,9	0,00	80,88	-	-	0,00	0,00	-
16	4 106	4 111	0	18,48	106,9	0,00	83,28	-	-	0,00	0,00	-
17	2 327	2 336	0	25,49	106,9	0,00	78,37	-	-	0,00	0,00	-
18	5 358	5 362	0	15,03	106,9	0,00	85,59	-	-	0,00	0,00	-
19	5 767	5 771	0	14,06	106,9	0,00	86,22	-	-	0,00	0,00	-
2	6 187	6 191	0	13,21	106,9	0,00	86,84	-	-	0,00	0,00	-
3	5 643	5 647	0	14,35	106,9	0,00	86,04	-	-	0,00	0,00	-
4	5 896	5 900	0	13,77	106,9	0,00	86,42	-	-	0,00	0,00	-
5	5 089	5 093	0	15,71	106,9	0,00	85,14	-	-	0,00	0,00	-
6	4 867	4 872	0	16,29	106,9	0,00	84,75	-	-	0,00	0,00	-
7	4 321	4 327	0	17,83	106,9	0,00	83,72	-	-	0,00	0,00	-
8	4 164	4 170	0	18,30	106,9	0,00	83,40	-	-	0,00	0,00	-
9	3 758	3 765	0	19,61	106,9	0,00	82,51	-	-	0,00	0,00	-
Sum				32,24								

- Data undefined due to calculation with octave data

Noise sensitive area: I I Lomarakennus (Ehrsbackavägen 29)

Wind speed: 8,0 m/s

WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	5 240	5 244	0	15,32	106,9	0,00	85,39	-	-	0,00	0,00	-
10	1 474	1 487	0	30,71	106,9	0,00	74,45	-	-	0,00	0,00	-
11	2 418	2 427	0	25,04	106,9	0,00	78,70	-	-	0,00	0,00	-
12	2 986	2 993	0	22,48	106,9	0,00	80,52	-	-	0,00	0,00	-
13	4 845	4 849	0	16,35	106,9	0,00	84,71	-	-	0,00	0,00	-
14	5 436	5 440	0	14,84	106,9	0,00	85,71	-	-	0,00	0,00	-
15	3 542	3 548	0	20,36	106,9	0,00	82,00	-	-	0,00	0,00	-
16	4 024	4 029	0	18,74	106,9	0,00	83,10	-	-	0,00	0,00	-
17	2 277	2 285	0	25,76	106,9	0,00	78,18	-	-	0,00	0,00	-
18	4 194	4 199	0	18,21	106,9	0,00	83,46	-	-	0,00	0,00	-
19	4 388	4 393	0	17,63	106,9	0,00	83,85	-	-	0,00	0,00	-
2	4 258	4 263	0	18,02	106,9	0,00	83,59	-	-	0,00	0,00	-
3	3 640	3 645	0	20,02	106,9	0,00	82,23	-	-	0,00	0,00	-
4	4 211	4 216	0	18,16	106,9	0,00	83,50	-	-	0,00	0,00	-
5	3 595	3 601	0	20,18	106,9	0,00	82,13	-	-	0,00	0,00	-
6	3 016	3 023	0	22,36	106,9	0,00	80,61	-	-	0,00	0,00	-
7	2 954	2 961	0	22,62	106,9	0,00	80,43	-	-	0,00	0,00	-
8	3 295	3 302	0	21,26	106,9	0,00	81,38	-	-	0,00	0,00	-
9	2 284	2 294	0	25,71	106,9	0,00	78,21	-	-	0,00	0,00	-
Sum				35,64								

- Data undefined due to calculation with octave data

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14.7.2023 9.12/3.5.584

DECIBEL - Detailed results

Calculation: Lasor_VE1_19xV172xHH194Noise calculation model: ISO 9613-2 General 8,0 m/s

Noise sensitive area: J J Asuinrakennus (Kleidersvägen 118)

Wind speed: 8,0 m/s
WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	4 303	4 309	0	17,88	106,9	0,00	83,69	-	-	0,00	0,00	-
10	1 730	1 743	0	28,92	106,9	0,00	75,82	-	-	0,00	0,00	-
11	2 512	2 522	0	24,58	106,9	0,00	79,03	-	-	0,00	0,00	-
12	3 361	3 368	0	21,02	106,9	0,00	81,55	-	-	0,00	0,00	-
13	5 255	5 259	0	15,29	106,9	0,00	85,42	-	-	0,00	0,00	-
14	5 712	5 717	0	14,19	106,9	0,00	86,14	-	-	0,00	0,00	-
15	4 081	4 087	0	18,56	106,9	0,00	83,23	-	-	0,00	0,00	-
16	4 269	4 274	0	18,00	106,9	0,00	83,62	-	-	0,00	0,00	-
17	2 840	2 847	0	23,10	106,9	0,00	80,09	-	-	0,00	0,00	-
18	3 779	3 785	0	19,54	106,9	0,00	82,56	-	-	0,00	0,00	-
19	3 808	3 814	0	19,44	106,9	0,00	82,63	-	-	0,00	0,00	-
2	3 275	3 282	0	21,34	106,9	0,00	81,32	-	-	0,00	0,00	-
3	2 615	2 623	0	24,10	106,9	0,00	79,38	-	-	0,00	0,00	-
4	3 416	3 422	0	20,81	106,9	0,00	81,69	-	-	0,00	0,00	-
5	2 992	3 000	0	22,46	106,9	0,00	80,54	-	-	0,00	0,00	-
6	2 157	2 168	0	26,38	106,9	0,00	77,72	-	-	0,00	0,00	-
7	2 534	2 543	0	24,48	106,9	0,00	79,11	-	-	0,00	0,00	-
8	3 184	3 191	0	21,69	106,9	0,00	81,08	-	-	0,00	0,00	-
9	1 911	1 923	0	27,78	106,9	0,00	76,68	-	-	0,00	0,00	-
Sum				36,00								

- Data undefined due to calculation with octave data

Noise sensitive area: K K Asuinrakennus (Rökiöntie 154)

Wind speed: 8,0 m/s
WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	3 080	3 087	0	22,10	106,9	0,00	80,79	-	-	0,00	0,00	-
10	4 609	4 613	0	17,00	106,9	0,00	84,28	-	-	0,00	0,00	-
11	4 940	4 944	0	16,10	106,9	0,00	84,88	-	-	0,00	0,00	-
12	5 954	5 957	0	13,65	106,9	0,00	86,50	-	-	0,00	0,00	-
13	7 648	7 650	0	10,77	106,9	0,00	88,67	-	-	0,00	0,00	-
14	7 817	7 820	0	10,51	106,9	0,00	88,86	-	-	0,00	0,00	-
15	6 796	6 799	0	12,14	106,9	0,00	87,65	-	-	0,00	0,00	-
16	6 509	6 512	0	12,64	106,9	0,00	87,27	-	-	0,00	0,00	-
17	5 740	5 743	0	14,13	106,9	0,00	86,18	-	-	0,00	0,00	-
18	4 753	4 758	0	16,60	106,9	0,00	84,55	-	-	0,00	0,00	-
19	4 294	4 299	0	17,91	106,9	0,00	83,67	-	-	0,00	0,00	-
2	2 324	2 332	0	25,52	106,9	0,00	78,35	-	-	0,00	0,00	-
3	1 973	1 983	0	27,43	106,9	0,00	76,95	-	-	0,00	0,00	-
4	3 323	3 329	0	21,16	106,9	0,00	81,45	-	-	0,00	0,00	-
5	3 805	3 810	0	19,46	106,9	0,00	82,62	-	-	0,00	0,00	-
6	2 787	2 794	0	23,33	106,9	0,00	79,93	-	-	0,00	0,00	-
7	4 068	4 073	0	18,61	106,9	0,00	83,20	-	-	0,00	0,00	-
8	5 050	5 054	0	15,81	106,9	0,00	85,07	-	-	0,00	0,00	-
9	3 922	3 927	0	19,07	106,9	0,00	82,88	-	-	0,00	0,00	-
Sum				33,02								

- Data undefined due to calculation with octave data

Noise sensitive area: L L Asuinrakennus (Bjurbäcksvägen 231)

Wind speed: 8,0 m/s
WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	1 736	1 748	0	28,89	106,9	0,00	75,85	-	-	0,00	0,00	-
10	5 533	5 537	0	14,61	106,9	0,00	85,87	-	-	0,00	0,00	-
11	5 477	5 481	0	14,74	106,9	0,00	85,78	-	-	0,00	0,00	-
12	6 430	6 433	0	12,78	106,9	0,00	87,17	-	-	0,00	0,00	-
13	7 762	7 764	0	10,59	106,9	0,00	88,80	-	-	0,00	0,00	-
14	7 685	7 688	0	10,71	106,9	0,00	88,72	-	-	0,00	0,00	-
15	7 270	7 273	0	11,37	106,9	0,00	88,23	-	-	0,00	0,00	-
16	6 634	6 637	0	12,42	106,9	0,00	87,44	-	-	0,00	0,00	-
17	6 502	6 504	0	12,65	106,9	0,00	87,26	-	-	0,00	0,00	-

To be continued on next page...

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DECIBEL - Detailed results

Calculation: Lasor_VE1_19xV172xHH194Noise calculation model: ISO 9613-2 General 8,0 m/s

...continued from previous page

WTG No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
18	4 365	4 370	0	17,70	106,9	0,00	83,81	-	-	0,00	0,00	-
19	3 723	3 729	0	19,73	106,9	0,00	82,43	-	-	0,00	0,00	-
2	1 923	1 933	0	27,72	106,9	0,00	76,73	-	-	0,00	0,00	-
3	2 313	2 321	0	25,57	106,9	0,00	78,31	-	-	0,00	0,00	-
4	2 798	2 805	0	23,28	106,9	0,00	79,96	-	-	0,00	0,00	-
5	3 675	3 680	0	19,90	106,9	0,00	82,32	-	-	0,00	0,00	-
6	3 200	3 207	0	21,63	106,9	0,00	81,12	-	-	0,00	0,00	-
7	4 296	4 301	0	17,90	106,9	0,00	83,67	-	-	0,00	0,00	-
8	5 181	5 185	0	15,47	106,9	0,00	85,29	-	-	0,00	0,00	-
9	4 505	4 509	0	17,29	106,9	0,00	84,08	-	-	0,00	0,00	-
Sum				34,21								

- Data undefined due to calculation with octave data

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DECIBEL - Assumptions for noise calculation

Calculation: Lasor_VE1_19xV172xHH194

Noise calculation model:
ISO 9613-2 General
Wind speed (in 10 m height):
8,0 m/s
Ground attenuation:
General, terrain specific
Ground factor for porous ground: 0,4
Area object with hard ground: Area object (Roughness): REGIONS_Lasor_ZVI_4.w2r (27)
Area type with hard ground: vesistöt
Ground factor for hard ground: 0,0
Meteorological coefficient, C0:
0,0 dB
Type of demand in calculation:
1: WTG noise is compared to demand (DK, DE, SE, NL etc.)
Noise values in calculation:
All noise values are mean values (Lwa) (Normal)
Pure tones:
Ignore pure tones setting on WTG
Height above ground level, when no value in NSA object:
4,0 m; Don't allow override of model height with height from NSA object
Uncertainty margin:
0,0 dB; Uncertainty margin in model has priority
Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:
0,0 dB(A)
Octave data required
Frequency dependent air absorption

63	125	250	500	1 000	2 000	4 000	8 000
[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]
0,10	0,38	1,12	2,36	4,08	8,78	26,60	95,00

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89

WTG: VESTAS V172-7.2 7200 172.0 !O!
Noise: V172 - 7,2 MW PO7200 STE

Source	Source/Date	Creator	Edited
Vestas	15.11.2022	USER	20.6.2023 9.21

DMS no.: 0128-4336_00

					Octave data							
Status	Hub height [m]	Wind speed [m/s]	LwA,ref [dB(A)]	Pure tones	63 [dB]	125 [dB]	250 [dB]	500 [dB]	1000 [dB]	2000 [dB]	4000 [dB]	8000 [dB]
From Windcat	194,0	8,0	106,9	No	90,4	98,0	101,3	101,5	99,9	95,4	87,9	77,2

Noise sensitive area: A A Lomarakennus (Söderändan 49)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: B B Asuinrakennus (Söderändan 81)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: C C Lomarakennus (Säderändan 166)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

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DECIBEL - Assumptions for noise calculation

Calculation: Lasor_VE1_19xV172xHH194

Noise sensitive area: D D Lomarakennus (Söderändan 188)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: E E Asuinrakennus (Rökiöntie 930)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: F F Asuinrakennus (Kukkusintie 474)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: G G Asuinrakennus (Kovik byväg 53)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: H H Asuinrakennus (Vöyrintie 1021)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: I I Lomarakennus (Ehrsbackavägen 29)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: J J Asuinrakennus (Kleidersvägen 118)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: K K Asuinrakennus (Rökiöntie 154)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: L L Asuinrakennus (Bjurbäcksvägen 231)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

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DECIBEL - Assumptions for noise calculation

Calculation: Lasor_VE1_19xV172xHH194

Noise demand: 40,0 dB(A)
No distance demand

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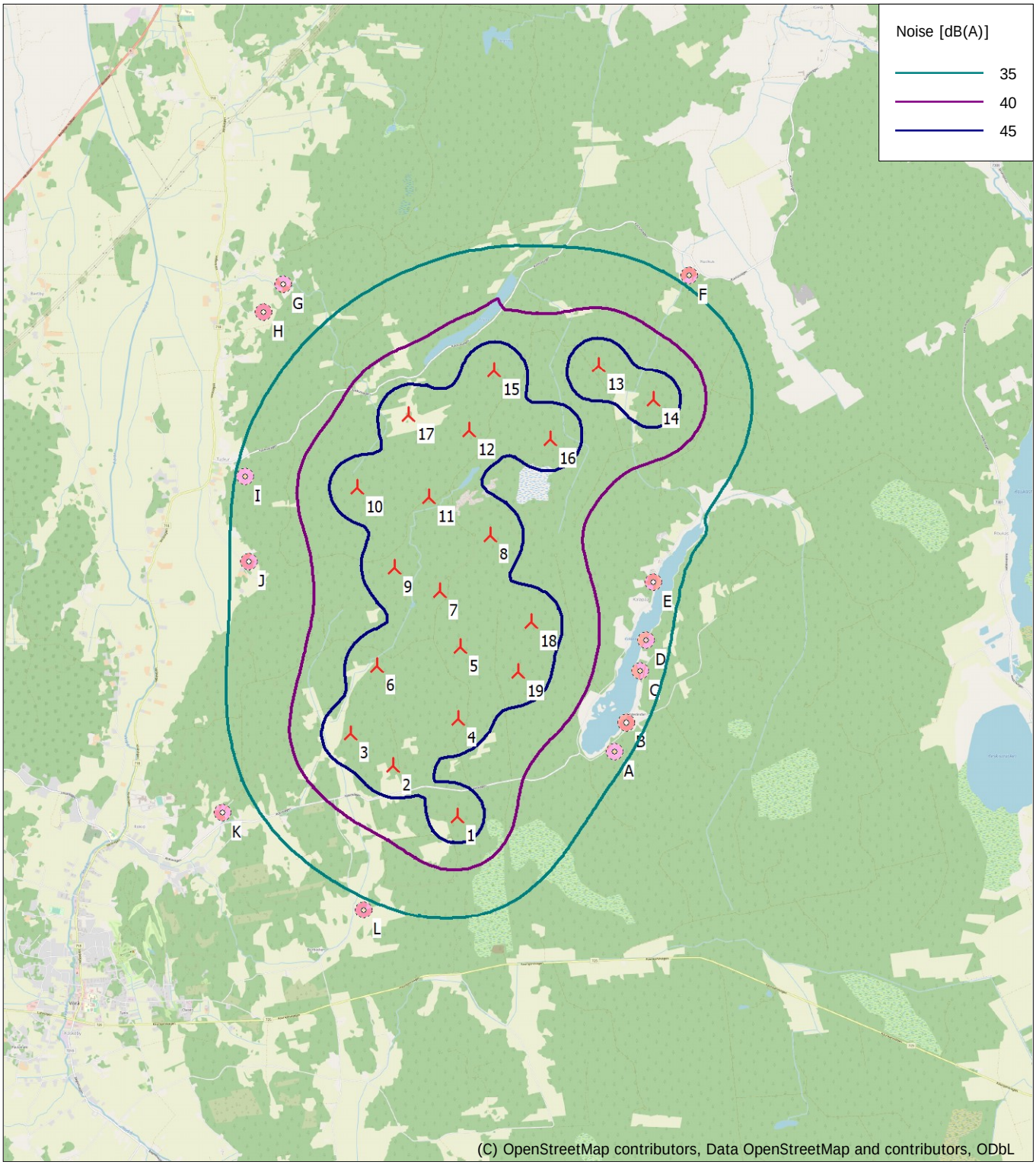
Calculated:
14.7.2023 9.12/3.5.584

DECIBEL - Map 8,0 m/s

Calculation: Lasor_VE1_19xV172xHH194



0 1 2 3 4 km

Map: EMD OpenStreetMap , Print scale 1:75 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 266 684 North: 7 013 955

New WTG Noise sensitive area

Noise calculation model: ISO 9613-2 General. Wind speed: 8,0 m/s
Height above sea level from active line object

Liite 2. Melun leviämismallinnuksen tulokset ISO 9613-2, YM 2 /2014 - Hankevaihtoehto 2

Project:
Lasor tuulivoimahanke 2023

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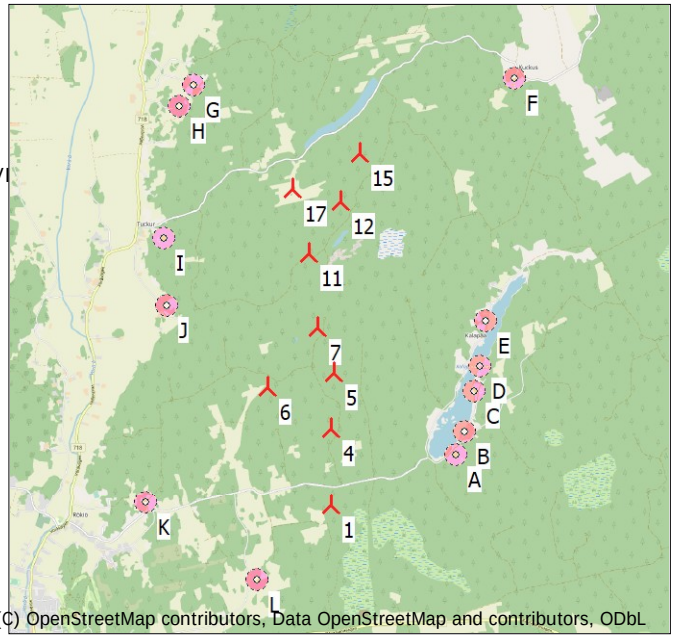
Calculated:
14.7.2023 9.13/3.5.584

DECIBEL - Main Result

Calculation: Lasor_VE2_9xV172xHH194

Noise calculation model:
ISO 9613-2 General
Wind speed (in 10 m height):
8,0 m/s
Ground attenuation:
General, terrain specific
Ground factor for porous ground: 0,4
Area object with hard ground: Area object (Roughness): REGIONS_Lasor_ZVI
Area type with hard ground: vesistöt
Ground factor for hard ground: 0,0
Meteorological coefficient, C0:
0,0 dB
Type of demand in calculation:
1: WTG noise is compared to demand (DK, DE, SE, NL etc.)
Noise values in calculation:
All noise values are mean values (Lwa) (Normal)
Pure tones:
Ignore pure tones setting on WTG
Height above ground level, when no value in NSA object:
4,0 m; Don't allow override of model height with height from NSA object
Uncertainty margin:
0,0 dB; Uncertainty margin in model has priority
Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:
0,0 dB(A)

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89



Scale 1:125 000
New WTG
Noise sensitive area

WTGs

	East	North	Z [m]	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Noise data Creator	Name	Wind speed [m/s]	LwA,ref [dB(A)]
1	265 860	7 011 060	40,0	VESTAS V172-7.2 7200 ...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
4	265 960	7 012 340	40,0	VESTAS V172-7.2 7200 ...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
5	266 070	7 013 270	35,0	VESTAS V172-7.2 7200 ...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
6	264 950	7 013 100	40,0	VESTAS V172-7.2 7200 ...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
7	265 850	7 014 020	40,0	VESTAS V172-7.2 7200 ...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
11	265 796	7 015 259	39,8	VESTAS V172-7.2 7200 ...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
12	266 380	7 016 090	44,5	VESTAS V172-7.2 7200 ...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
15	266 770	7 016 850	43,5	VESTAS V172-7.2 7200 ...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
17	265 604	7 016 343	20,0	VESTAS V172-7.2 7200 ...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9

Calculation Results

Sound level

Noise sensitive area No.	Name	East	North	Z [m]	Immission height [m]	Demands Noise [dB(A)]	Sound level From WTGs [dB(A)]	Distance to noise demand [m]	2 dB penalty applied for one or more WTGs
A	A Lomarakennus (Söderändan 49)	267 990	7 011 759	42,5	4,0	40,0	32,2	1 343	No
B	B Asuinrakennus (Söderändan 81)	268 161	7 012 123	37,5	4,0	40,0	32,4	1 426	No
C	C Lomarakennus (Säderändan 166)	268 388	7 012 783	39,1	4,0	40,0	32,5	1 546	No
D	D Lomarakennus (Söderändan 188)	268 493	7 013 188	37,8	4,0	40,0	32,6	1 614	No
E	E Asuinrakennus (Rökiöntie 930)	268 646	7 013 924	38,1	4,0	40,0	31,1	1 824	No
F	F Asuinrakennus (Kukkusintie 474)	269 409	7 017 903	25,0	4,0	40,0	27,4	2 173	No
G	G Asuinrakennus (Kovik byväg 53)	264 096	7 018 174	10,0	4,0	40,0	29,8	1 662	No
H	H Asuinrakennus (Vöyrintie 1021)	263 817	7 017 837	8,5	4,0	40,0	30,0	1 623	No
I	I Lomarakennus (Ehrsbackavägen 29)	263 418	7 015 700	21,7	4,0	40,0	31,9	1 508	No
J	J Asuinrakennus (Kleidersvägen 118)	263 377	7 014 578	13,7	4,0	40,0	32,5	1 430	No
K	K Asuinrakennus (Rökiöntie 154)	262 790	7 011 335	27,5	4,0	40,0	28,9	2 089	No
L	L Asuinrakennus (Bjurbäcksvägen 231)	264 546	7 009 923	27,8	4,0	40,0	31,4	1 104	No

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Calculated:
14.7.2023 9.13/3.5.584

DECIBEL - Main Result

Calculation: Lasor_VE2_9xV172xHH194

Distances (m)

	WTG								
NSA	1	4	5	6	7	11	12	15	17
A	2240	2110	2442	3321	3111	4128	4618	5232	5164
B	2533	2210	2383	3354	2988	3925	4345	4924	4931
C	3057	2466	2367	3450	2822	3582	3867	4375	4516
D	3383	2670	2423	3542	2769	3398	3588	4045	4275
E	3993	3116	2656	3784	2796	3145	3133	3474	3884
F	7704	6542	5708	6550	5265	4474	3529	2840	4111
G	7325	6121	5283	5142	4506	3373	3090	2982	2371
H	7073	5896	5089	4867	4321	3248	3099	3111	2327
I	5240	4211	3595	3016	2954	2418	2986	3542	2277
J	4303	3416	2992	2157	2534	2512	3361	4081	2840
K	3080	3323	3805	2787	4068	4940	5954	6796	5740
L	1736	2798	3675	3200	4296	5477	6430	7270	6502

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Calculated:
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DECIBEL - Detailed results

Calculation: Lasor_VE2_9xV172xHH194Noise calculation model: ISO 9613-2 General 8,0 m/s

Assumptions

Calculated L(DW) = LWA,ref + K + Dc - (Adiv + Aatm + Agr + Abar + Amisc) - Cmet
(when calculated with ground attenuation, then Dc = Domega)

LWA,ref:	Sound pressure level at WTG
K:	Pure tone
Dc:	Directivity correction
Adiv:	the attenuation due to geometrical divergence
Aatm:	the attenuation due to atmospheric absorption
Agr:	the attenuation due to ground effect
Abar:	the attenuation due to a barrier
Amisc:	the attenuation due to miscellaneous other effects
Cmet:	Meteorological correction

Calculation Results

Noise sensitive area: A A Lomarakennus (Söderändan 49)

Wind speed: 8,0 m/s
WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	2 240	2 248	0	25,95	106,9	0,00	78,04	-	-	0,00	0,00	-
11	4 128	4 132	0	18,47	106,9	0,00	83,32	-	-	0,00	0,00	-
12	4 618	4 622	0	17,02	106,9	0,00	84,30	-	-	0,00	0,00	-
15	5 232	5 235	0	15,40	106,9	0,00	85,38	-	-	0,00	0,00	-
17	5 164	5 167	0	15,56	106,9	0,00	85,26	-	-	0,00	0,00	-
4	2 110	2 119	0	26,72	106,9	0,00	77,52	-	-	0,00	0,00	-
5	2 442	2 449	0	25,00	106,9	0,00	78,78	-	-	0,00	0,00	-
6	3 321	3 326	0	21,22	106,9	0,00	81,44	-	-	0,00	0,00	-
7	3 111	3 117	0	22,04	106,9	0,00	80,87	-	-	0,00	0,00	-
Sum				32,21								

- Data undefined due to calculation with octave data

Noise sensitive area: B B Asuinrakennus (Söderändan 81)

Wind speed: 8,0 m/s
WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	2 533	2 540	0	24,95	106,9	0,00	79,10	-	-	0,00	0,00	-
11	3 925	3 930	0	19,68	106,9	0,00	82,89	-	-	0,00	0,00	-
12	4 345	4 350	0	18,44	106,9	0,00	83,77	-	-	0,00	0,00	-
15	4 924	4 928	0	16,97	106,9	0,00	84,85	-	-	0,00	0,00	-
17	4 931	4 934	0	16,77	106,9	0,00	84,86	-	-	0,00	0,00	-
4	2 210	2 219	0	26,57	106,9	0,00	77,92	-	-	0,00	0,00	-
5	2 383	2 391	0	25,70	106,9	0,00	78,57	-	-	0,00	0,00	-
6	3 354	3 360	0	21,55	106,9	0,00	81,53	-	-	0,00	0,00	-
7	2 988	2 994	0	23,01	106,9	0,00	80,52	-	-	0,00	0,00	-
Sum				32,41								

- Data undefined due to calculation with octave data

Noise sensitive area: C C Lomarakennus (Säderändan 166)

Wind speed: 8,0 m/s
WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	3 057	3 063	0	23,39	106,9	0,00	80,72	-	-	0,00	0,00	-
11	3 582	3 587	0	20,99	106,9	0,00	82,10	-	-	0,00	0,00	-
12	3 867	3 872	0	19,61	106,9	0,00	82,76	-	-	0,00	0,00	-
15	4 375	4 379	0	17,70	106,9	0,00	83,83	-	-	0,00	0,00	-
17	4 516	4 520	0	17,81	106,9	0,00	84,10	-	-	0,00	0,00	-
4	2 466	2 474	0	25,84	106,9	0,00	78,87	-	-	0,00	0,00	-
5	2 367	2 374	0	26,29	106,9	0,00	78,51	-	-	0,00	0,00	-
6	3 450	3 455	0	21,74	106,9	0,00	81,77	-	-	0,00	0,00	-
7	2 822	2 828	0	24,15	106,9	0,00	80,03	-	-	0,00	0,00	-
Sum				32,49								

- Data undefined due to calculation with octave data

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Calculated:
14.7.2023 9.13/3.5.584

DECIBEL - Detailed results

Calculation: Lasor_VE2_9xV172xHH194Noise calculation model: ISO 9613-2 General 8,0 m/s

Noise sensitive area: D D Lomarakennus (Söderändan 188)

Wind speed: 8,0 m/s
WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	3 383	3 389	0	22,18	106,9	0,00	81,60	-	-	0,00	0,00	-
11	3 398	3 404	0	22,17	106,9	0,00	81,64	-	-	0,00	0,00	-
12	3 588	3 593	0	21,44	106,9	0,00	82,11	-	-	0,00	0,00	-
15	4 045	4 049	0	19,88	106,9	0,00	83,15	-	-	0,00	0,00	-
17	4 275	4 279	0	19,28	106,9	0,00	83,63	-	-	0,00	0,00	-
4	2 670	2 677	0	25,11	106,9	0,00	79,55	-	-	0,00	0,00	-
5	2 423	2 430	0	26,26	106,9	0,00	78,71	-	-	0,00	0,00	-
6	3 542	3 547	0	21,67	106,9	0,00	82,00	-	-	0,00	0,00	-
7	2 769	2 776	0	24,67	106,9	0,00	79,87	-	-	0,00	0,00	-
Sum				32,65								

- Data undefined due to calculation with octave data

Noise sensitive area: E E Asuinrakennus (Rökiöntie 930)

Wind speed: 8,0 m/s
WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	3 993	3 997	0	18,85	106,9	0,00	83,04	-	-	0,00	0,00	-
11	3 145	3 150	0	21,85	106,9	0,00	80,97	-	-	0,00	0,00	-
12	3 133	3 139	0	21,90	106,9	0,00	80,94	-	-	0,00	0,00	-
15	3 474	3 479	0	20,61	106,9	0,00	81,83	-	-	0,00	0,00	-
17	3 884	3 888	0	19,20	106,9	0,00	82,79	-	-	0,00	0,00	-
4	3 116	3 122	0	21,96	106,9	0,00	80,89	-	-	0,00	0,00	-
5	2 656	2 662	0	23,92	106,9	0,00	79,51	-	-	0,00	0,00	-
6	3 784	3 789	0	19,53	106,9	0,00	82,57	-	-	0,00	0,00	-
7	2 796	2 802	0	23,30	106,9	0,00	79,95	-	-	0,00	0,00	-
Sum				31,11								

- Data undefined due to calculation with octave data

Noise sensitive area: F F Asuinrakennus (Kukkusintie 474)

Wind speed: 8,0 m/s
WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	7 704	7 707	0	10,68	106,9	0,00	88,74	-	-	0,00	0,00	-
11	4 474	4 479	0	17,38	106,9	0,00	84,02	-	-	0,00	0,00	-
12	3 529	3 535	0	20,41	106,9	0,00	81,97	-	-	0,00	0,00	-
15	2 840	2 848	0	23,10	106,9	0,00	80,09	-	-	0,00	0,00	-
17	4 111	4 115	0	18,47	106,9	0,00	83,29	-	-	0,00	0,00	-
4	6 542	6 545	0	12,58	106,9	0,00	87,32	-	-	0,00	0,00	-
5	5 708	5 711	0	14,20	106,9	0,00	86,13	-	-	0,00	0,00	-
6	6 550	6 554	0	12,56	106,9	0,00	87,33	-	-	0,00	0,00	-
7	5 265	5 269	0	15,26	106,9	0,00	85,43	-	-	0,00	0,00	-
Sum				27,38								

- Data undefined due to calculation with octave data

Noise sensitive area: G G Asuinrakennus (Kovik byväg 53)

Wind speed: 8,0 m/s
WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	7 325	7 328	0	11,27	106,9	0,00	88,30	-	-	0,00	0,00	-
11	3 373	3 380	0	20,97	106,9	0,00	81,58	-	-	0,00	0,00	-
12	3 090	3 098	0	22,06	106,9	0,00	80,82	-	-	0,00	0,00	-
15	2 982	2 991	0	22,51	106,9	0,00	80,52	-	-	0,00	0,00	-
17	2 371	2 379	0	25,28	106,9	0,00	78,53	-	-	0,00	0,00	-
4	6 121	6 125	0	13,34	106,9	0,00	86,74	-	-	0,00	0,00	-
5	5 283	5 288	0	15,22	106,9	0,00	85,47	-	-	0,00	0,00	-
6	5 142	5 147	0	15,57	106,9	0,00	85,23	-	-	0,00	0,00	-
7	4 506	4 512	0	17,29	106,9	0,00	84,09	-	-	0,00	0,00	-
Sum				29,82								

- Data undefined due to calculation with octave data

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Calculated:
14.7.2023 9.13/3.5.584

DECIBEL - Detailed results

Calculation: Lasor_VE2_9xV172xHH194Noise calculation model: ISO 9613-2 General 8,0 m/s

Noise sensitive area: H H Asuinrakennus (Vöyrintie 1021)

Wind speed: 8,0 m/s
WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	7 073	7 077	0	11,68	106,9	0,00	88,00	-	-	0,00	0,00	-
11	3 248	3 255	0	21,44	106,9	0,00	81,25	-	-	0,00	0,00	-
12	3 099	3 108	0	22,02	106,9	0,00	80,85	-	-	0,00	0,00	-
15	3 111	3 119	0	21,99	106,9	0,00	80,88	-	-	0,00	0,00	-
17	2 327	2 336	0	25,49	106,9	0,00	78,37	-	-	0,00	0,00	-
4	5 896	5 900	0	13,77	106,9	0,00	86,42	-	-	0,00	0,00	-
5	5 089	5 093	0	15,71	106,9	0,00	85,14	-	-	0,00	0,00	-
6	4 867	4 872	0	16,29	106,9	0,00	84,75	-	-	0,00	0,00	-
7	4 321	4 327	0	17,83	106,9	0,00	83,72	-	-	0,00	0,00	-
Sum				29,96								

- Data undefined due to calculation with octave data

Noise sensitive area: I I Lomarakennus (Ehrsbackavägen 29)

Wind speed: 8,0 m/s
WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	5 240	5 244	0	15,32	106,9	0,00	85,39	-	-	0,00	0,00	-
11	2 418	2 427	0	25,04	106,9	0,00	78,70	-	-	0,00	0,00	-
12	2 986	2 993	0	22,48	106,9	0,00	80,52	-	-	0,00	0,00	-
15	3 542	3 548	0	20,36	106,9	0,00	82,00	-	-	0,00	0,00	-
17	2 277	2 285	0	25,76	106,9	0,00	78,18	-	-	0,00	0,00	-
4	4 211	4 216	0	18,16	106,9	0,00	83,50	-	-	0,00	0,00	-
5	3 595	3 601	0	20,18	106,9	0,00	82,13	-	-	0,00	0,00	-
6	3 016	3 023	0	22,36	106,9	0,00	80,61	-	-	0,00	0,00	-
7	2 954	2 961	0	22,62	106,9	0,00	80,43	-	-	0,00	0,00	-
Sum				31,88								

- Data undefined due to calculation with octave data

Noise sensitive area: J J Asuinrakennus (Kleidersvägen 118)

Wind speed: 8,0 m/s
WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	4 303	4 309	0	17,88	106,9	0,00	83,69	-	-	0,00	0,00	-
11	2 512	2 522	0	24,58	106,9	0,00	79,03	-	-	0,00	0,00	-
12	3 361	3 368	0	21,02	106,9	0,00	81,55	-	-	0,00	0,00	-
15	4 081	4 087	0	18,56	106,9	0,00	83,23	-	-	0,00	0,00	-
17	2 840	2 847	0	23,10	106,9	0,00	80,09	-	-	0,00	0,00	-
4	3 416	3 422	0	20,81	106,9	0,00	81,69	-	-	0,00	0,00	-
5	2 992	3 000	0	22,46	106,9	0,00	80,54	-	-	0,00	0,00	-
6	2 157	2 168	0	26,38	106,9	0,00	77,72	-	-	0,00	0,00	-
7	2 534	2 543	0	24,48	106,9	0,00	79,11	-	-	0,00	0,00	-
Sum				32,46								

- Data undefined due to calculation with octave data

Noise sensitive area: K K Asuinrakennus (Rökiöntie 154)

Wind speed: 8,0 m/s
WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	3 080	3 087	0	22,10	106,9	0,00	80,79	-	-	0,00	0,00	-
11	4 940	4 944	0	16,10	106,9	0,00	84,88	-	-	0,00	0,00	-
12	5 954	5 957	0	13,65	106,9	0,00	86,50	-	-	0,00	0,00	-
15	6 796	6 799	0	12,14	106,9	0,00	87,65	-	-	0,00	0,00	-
17	5 740	5 743	0	14,13	106,9	0,00	86,18	-	-	0,00	0,00	-
4	3 323	3 329	0	21,16	106,9	0,00	81,45	-	-	0,00	0,00	-
5	3 805	3 810	0	19,46	106,9	0,00	82,62	-	-	0,00	0,00	-
6	2 787	2 794	0	23,33	106,9	0,00	79,93	-	-	0,00	0,00	-
7	4 068	4 073	0	18,61	106,9	0,00	83,20	-	-	0,00	0,00	-
Sum				28,89								

- Data undefined due to calculation with octave data

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Calculated:
14.7.2023 9.13/3.5.584

DECIBEL - Detailed results

Calculation: Lasor_VE2_9xV172xHH194Noise calculation model: ISO 9613-2 General 8,0 m/s

Noise sensitive area: L L Asuinrakennus (Bjurbäcksvägen 231)

Wind speed: 8,0 m/s
WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	1 736	1 748	0	28,89	106,9	0,00	75,85	-	-	0,00	0,00	-
11	5 477	5 481	0	14,74	106,9	0,00	85,78	-	-	0,00	0,00	-
12	6 430	6 433	0	12,78	106,9	0,00	87,17	-	-	0,00	0,00	-
15	7 270	7 273	0	11,37	106,9	0,00	88,23	-	-	0,00	0,00	-
17	6 502	6 504	0	12,65	106,9	0,00	87,26	-	-	0,00	0,00	-
4	2 798	2 805	0	23,28	106,9	0,00	79,96	-	-	0,00	0,00	-
5	3 675	3 680	0	19,90	106,9	0,00	82,32	-	-	0,00	0,00	-
6	3 200	3 207	0	21,63	106,9	0,00	81,12	-	-	0,00	0,00	-
7	4 296	4 301	0	17,90	106,9	0,00	83,67	-	-	0,00	0,00	-
Sum				31,37								

- Data undefined due to calculation with octave data

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Calculated:
14.7.2023 9.13/3.5.584

DECIBEL - Assumptions for noise calculation

Calculation: Lasor_VE2_9xV172xHH194

Noise calculation model:
ISO 9613-2 General
Wind speed (in 10 m height):
8,0 m/s
Ground attenuation:
General, terrain specific
Ground factor for porous ground: 0,4
Area object with hard ground: Area object (Roughness): REGIONS_Lasor_ZVI_4.w2r (27)
Area type with hard ground: vesistöt
Ground factor for hard ground: 0,0
Meteorological coefficient, C0:
0,0 dB
Type of demand in calculation:
1: WTG noise is compared to demand (DK, DE, SE, NL etc.)
Noise values in calculation:
All noise values are mean values (Lwa) (Normal)
Pure tones:
Ignore pure tones setting on WTG
Height above ground level, when no value in NSA object:
4,0 m; Don't allow override of model height with height from NSA object
Uncertainty margin:
0,0 dB; Uncertainty margin in model has priority
Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:
0,0 dB(A)
Octave data required
Frequency dependent air absorption

63	125	250	500	1 000	2 000	4 000	8 000
[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]
0,10	0,38	1,12	2,36	4,08	8,78	26,60	95,00

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89

WTG: VESTAS V172-7.2 7200 172.0 !O!
Noise: V172 - 7,2 MW PO7200 STE

Source	Source/Date	Creator	Edited
Vestas	15.11.2022	USER	20.6.2023 9.21

DMS no.: 0128-4336_00

					Octave data							
Status	Hub height [m]	Wind speed [m/s]	LwA,ref [dB(A)]	Pure tones	63 [dB]	125 [dB]	250 [dB]	500 [dB]	1000 [dB]	2000 [dB]	4000 [dB]	8000 [dB]
From Windcat	194,0	8,0	106,9	No	90,4	98,0	101,3	101,5	99,9	95,4	87,9	77,2

Noise sensitive area: A A Lomarakennus (Söderändan 49)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: B B Asuinrakennus (Söderändan 81)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: C C Lomarakennus (Säderändan 166)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

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DECIBEL - Assumptions for noise calculation

Calculation: Lasor_VE2_9xV172xHH194

Noise sensitive area: D D Lomarakennus (Söderändan 188)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: E E Asuinrakennus (Rökiöntie 930)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: F F Asuinrakennus (Kukkusintie 474)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: G G Asuinrakennus (Kovik byväg 53)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: H H Asuinrakennus (Vöyrintie 1021)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: I I Lomarakennus (Ehrsbackavägen 29)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: J J Asuinrakennus (Kleidersvägen 118)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: K K Asuinrakennus (Rökiöntie 154)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: L L Asuinrakennus (Bjurbäcksvägen 231)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

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DECIBEL - Assumptions for noise calculation

Calculation: Lasor_VE2_9xV172xHH194

Noise demand: 40,0 dB(A)
No distance demand

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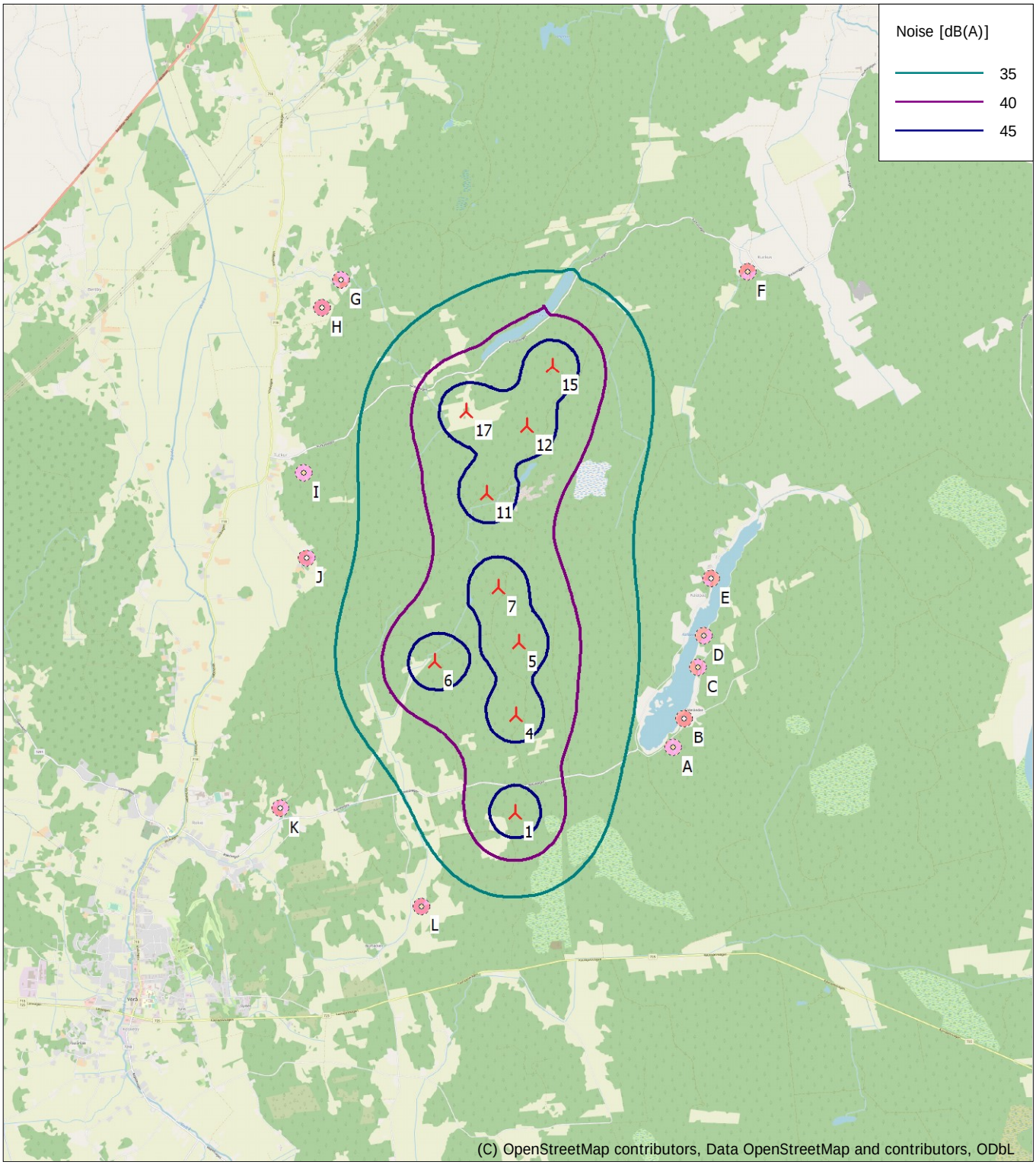
Calculated:
14.7.2023 9.13/3.5.584

DECIBEL - Map 8,0 m/s

Calculation: Lasor_VE2_9xV172xHH194



0 1 2 3 4 km

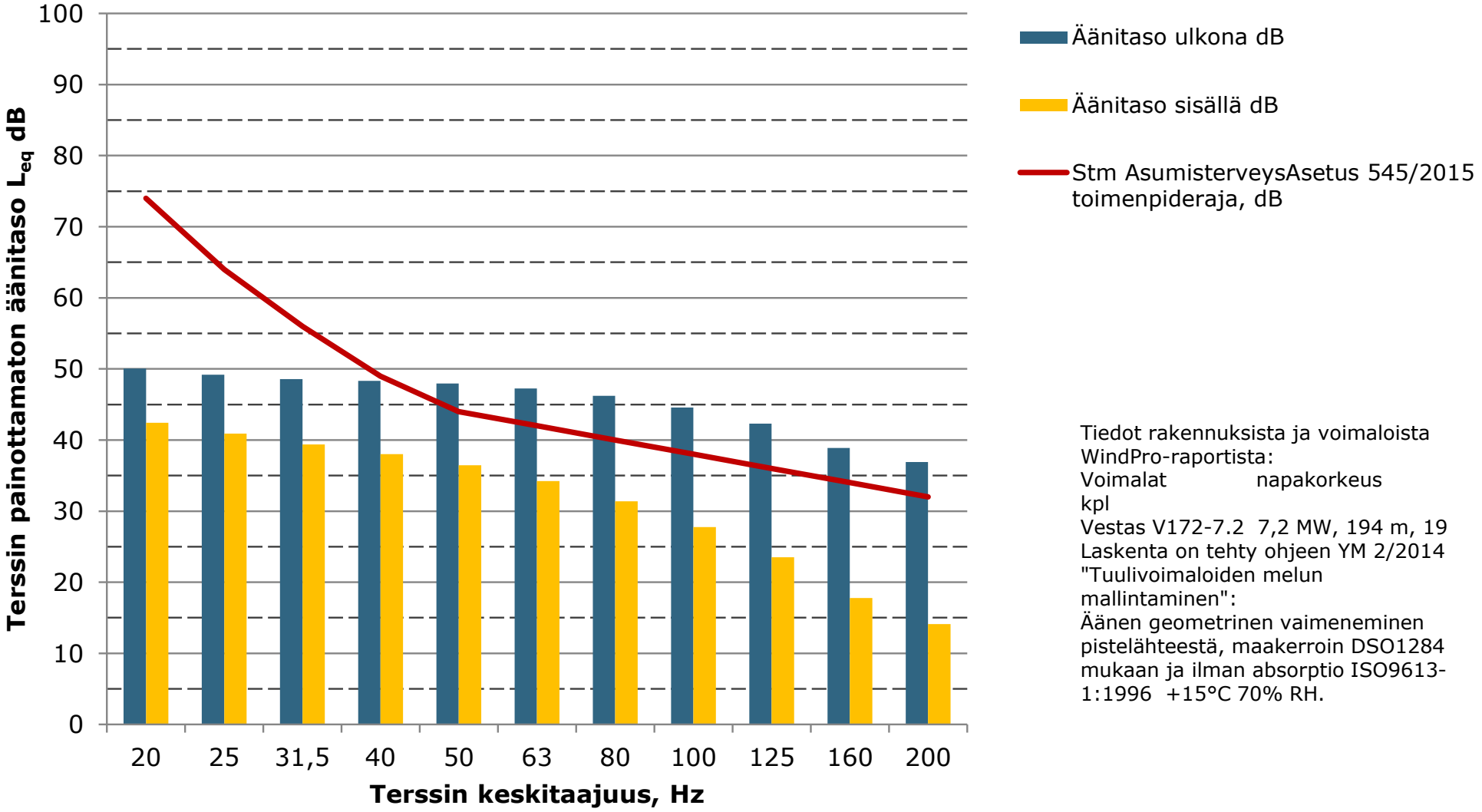
Map: EMD OpenStreetMap , Print scale 1:75 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 265 930 North: 7 013 955

New WTG Noise sensitive area

Noise calculation model: ISO 9613-2 General. Wind speed: 8,0 m/s
Height above sea level from active line object

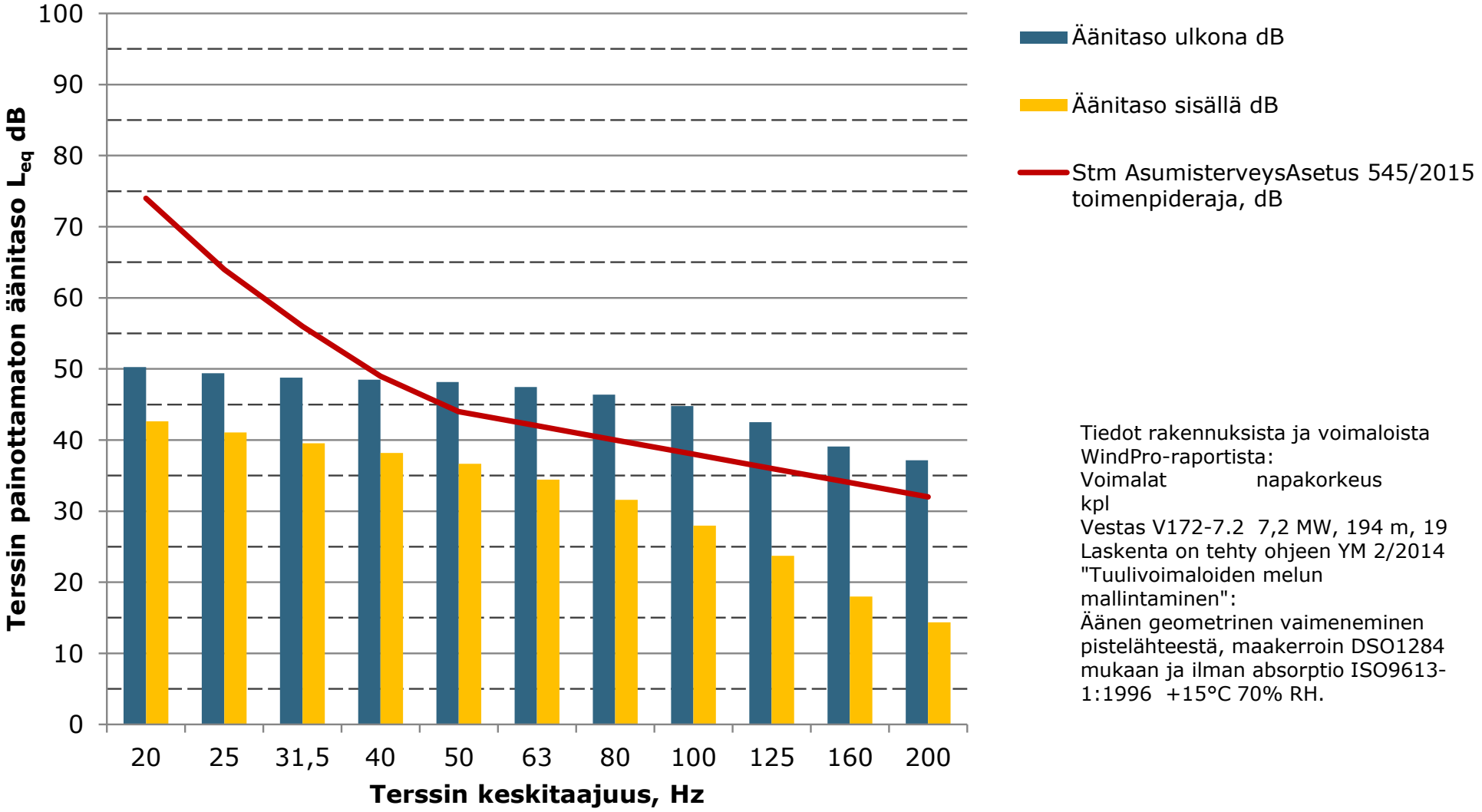
Liite 3. Matalataajuisen melun rakennuskohtaiset arvot - Hankevaihtoehto 1

Matalien taajuuksien äänitasot ulkona ja sisällä, A Lomarakennus (Söderändan 49), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



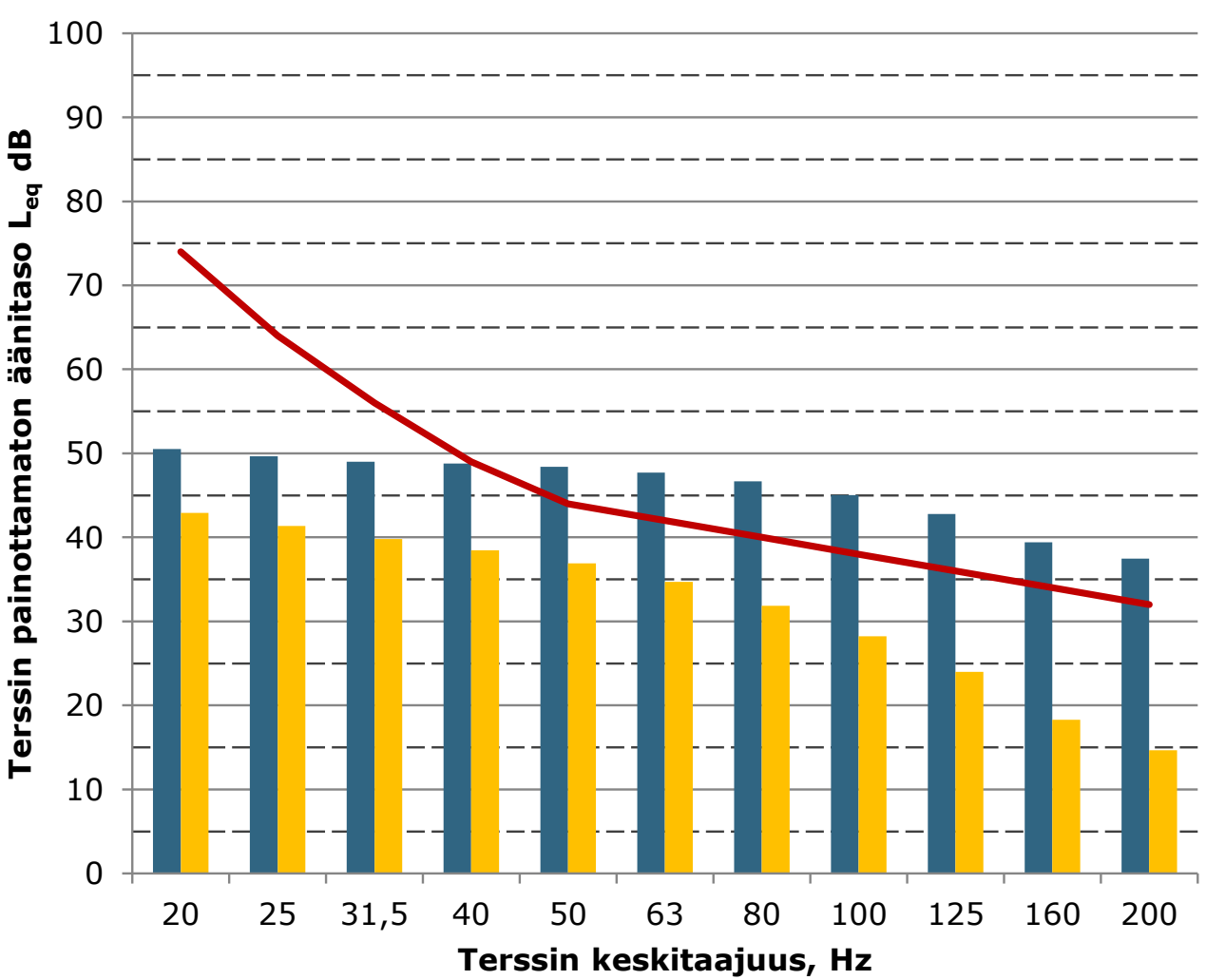
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V172-7.2 7,2 MW, 194 m, 19
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

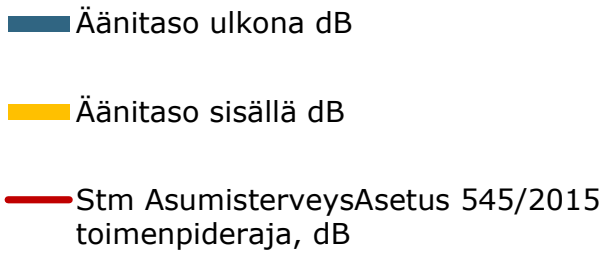
Matalien taajuuksien äänitasot ulkona ja sisällä, B Asuinrakennus (Söderändan 81), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 7,2 MW, 194 m, 19
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

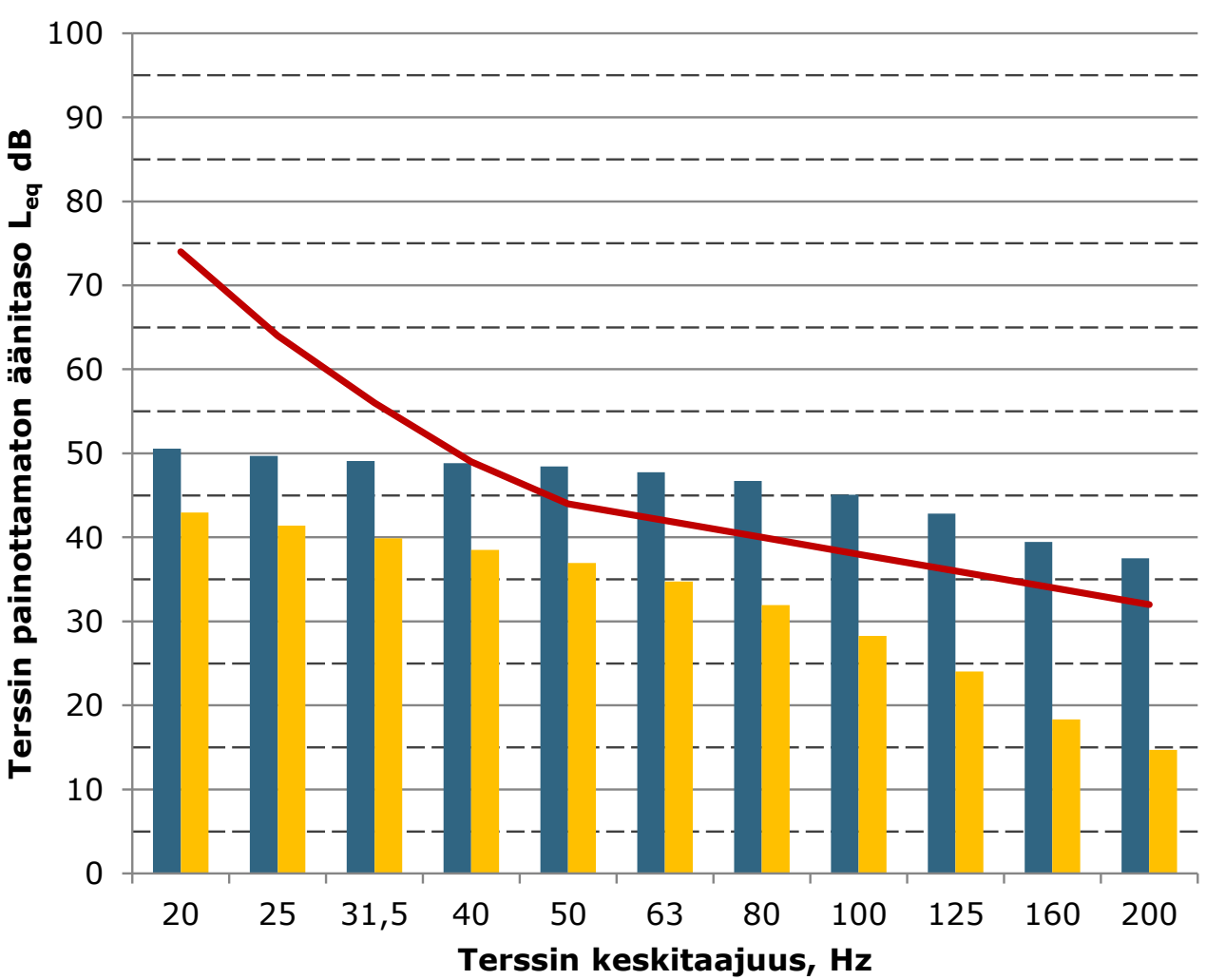
Matalien taajuuksien äänitasot ulkona ja sisällä, C Lomarakennus (Säderändan 166), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

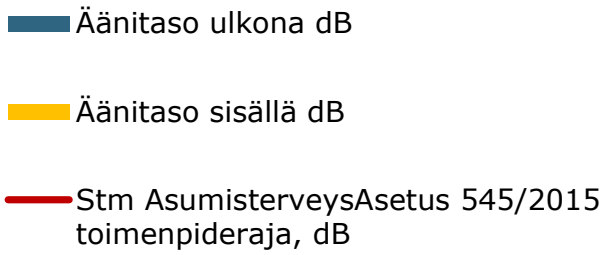




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 7,2 MW, 194 m, 19
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

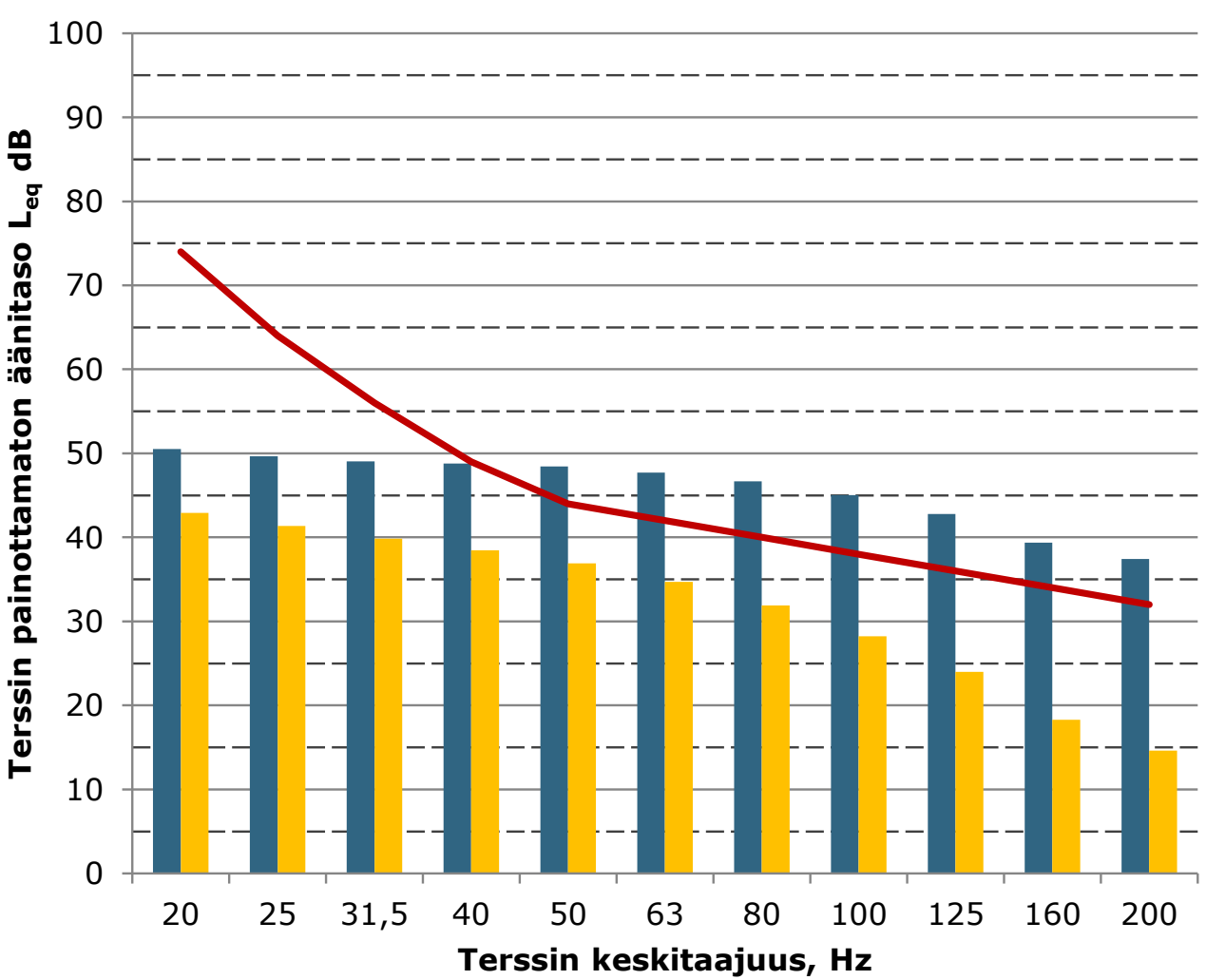
Matalien taajuuksien äänitasot ulkona ja sisällä, D Lomarakennus (Söderändan 188), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

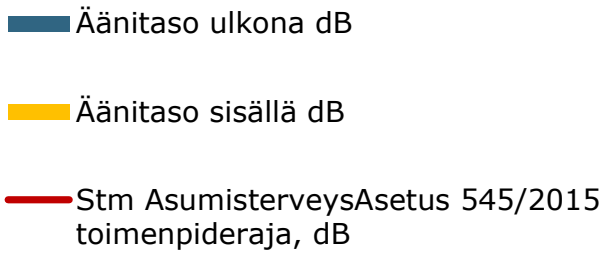




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 7,2 MW, 194 m, 19
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

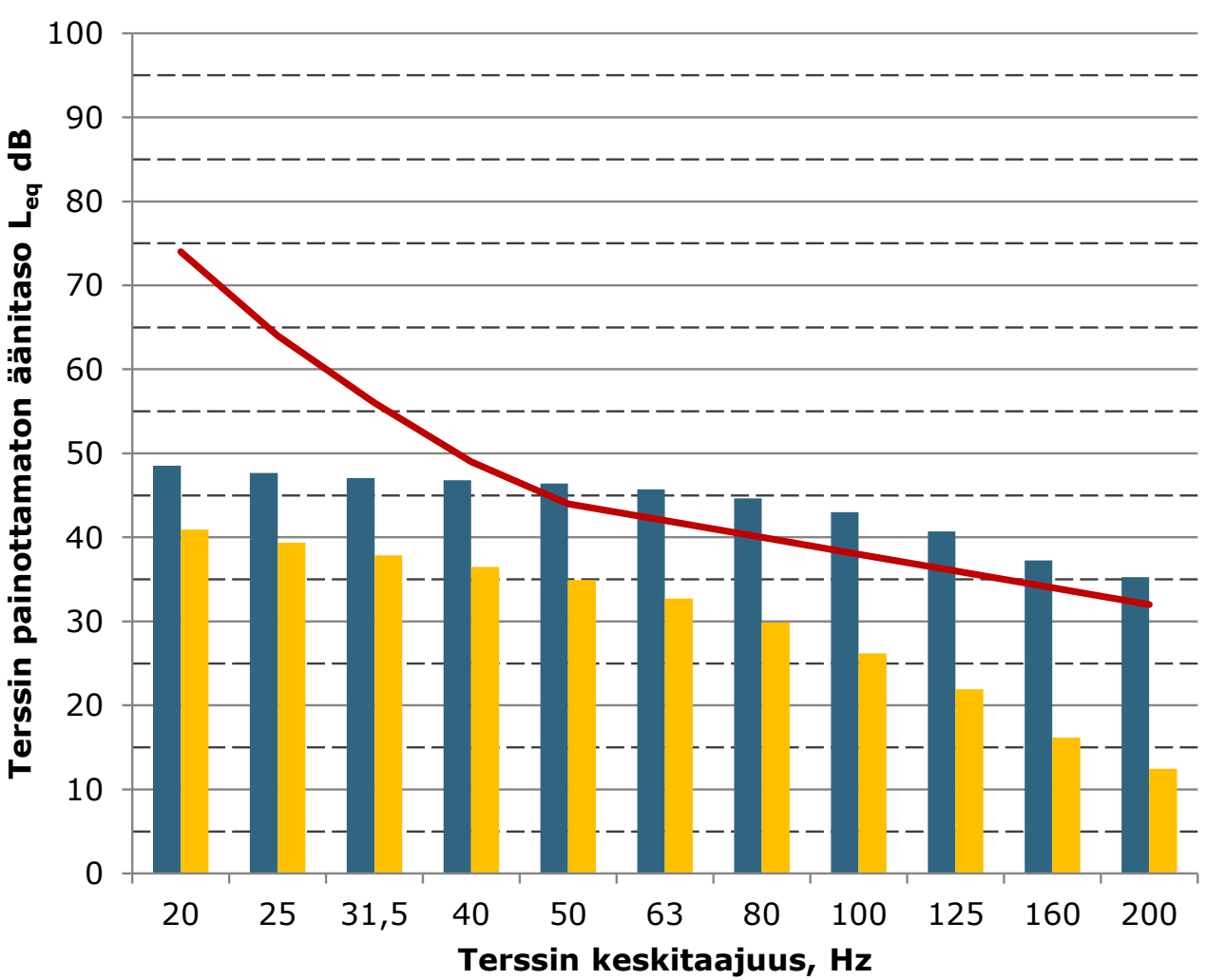
Matalien taajuuksien äänitasot ulkona ja sisällä, E Asuinrakennus (Rökiöntie 930), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

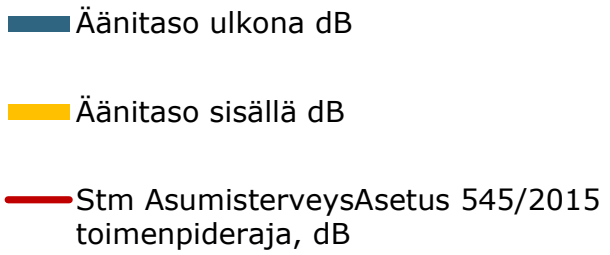




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 7,2 MW, 194 m, 19
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

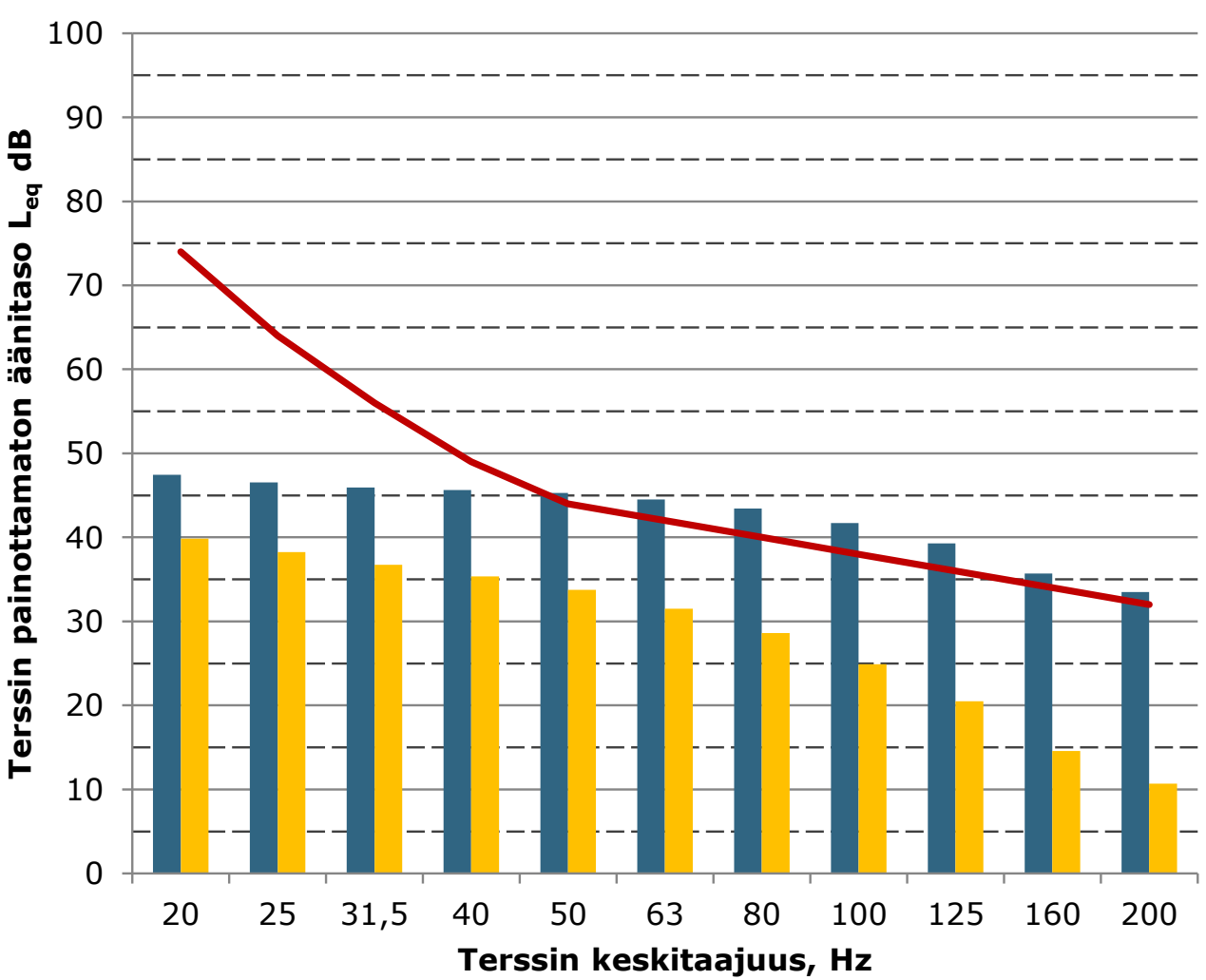
Matalien taajuuksien äänitasot ulkona ja sisällä, F Asuinrakennus (Kukkusintie 474), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

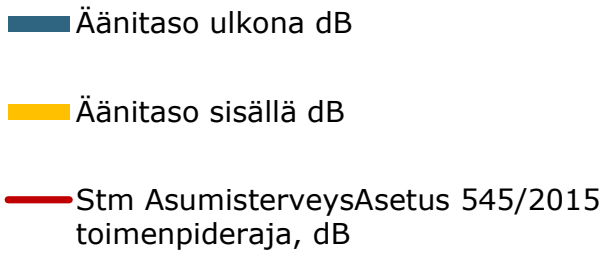




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V172-7.2 7,2 MW, 194 m, 19
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

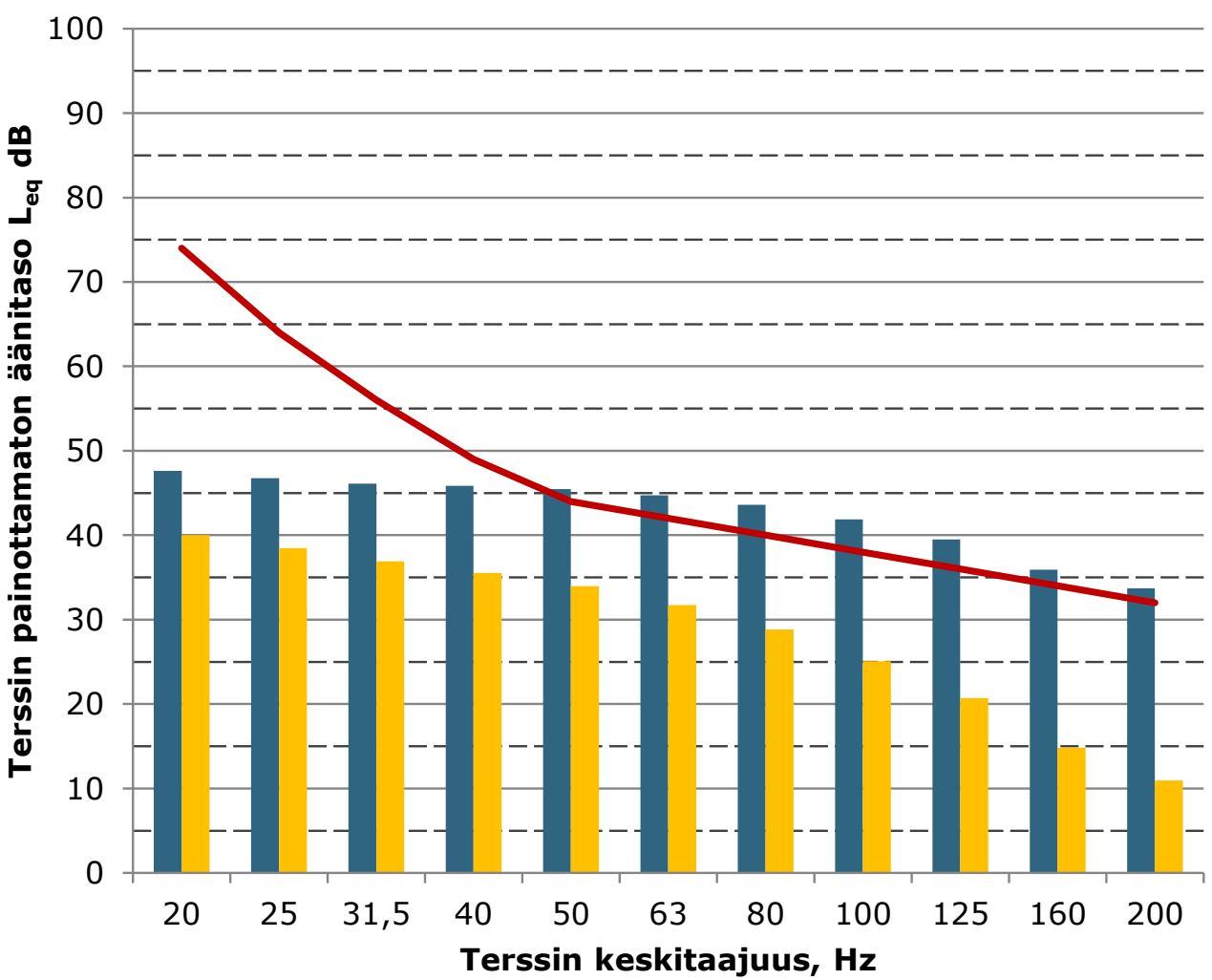
Matalien taajuuksien äänitasot ulkona ja sisällä, G Asuinrakennus (Kovik byväg 53), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

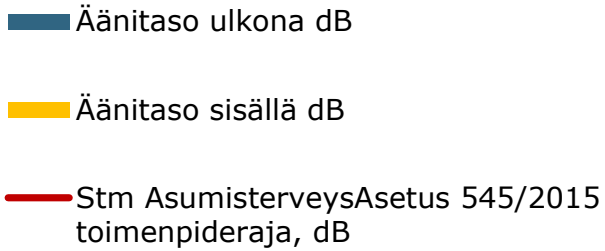




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 7,2 MW, 194 m, 19
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

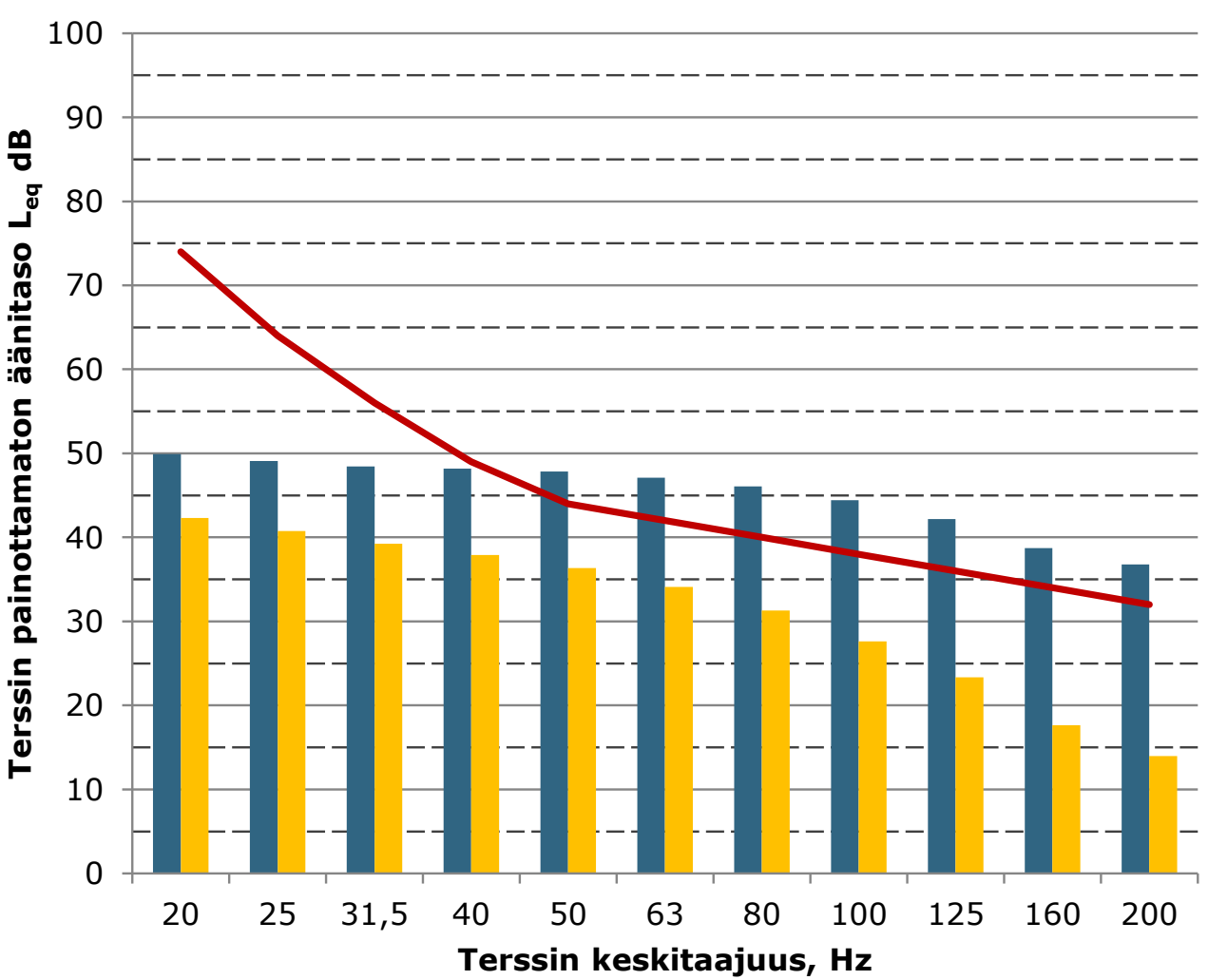
Matalien taajuuksien äänitasot ulkona ja sisällä, H Asuinrakennus (Vöyrintie 1021), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

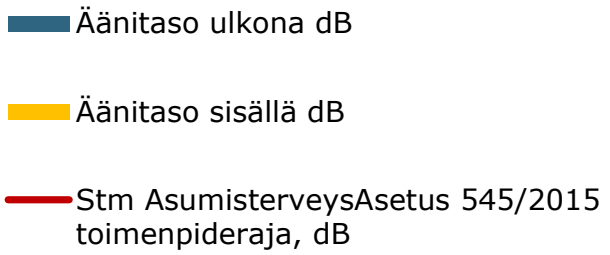




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V172-7.2 7,2 MW, 194 m, 19
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

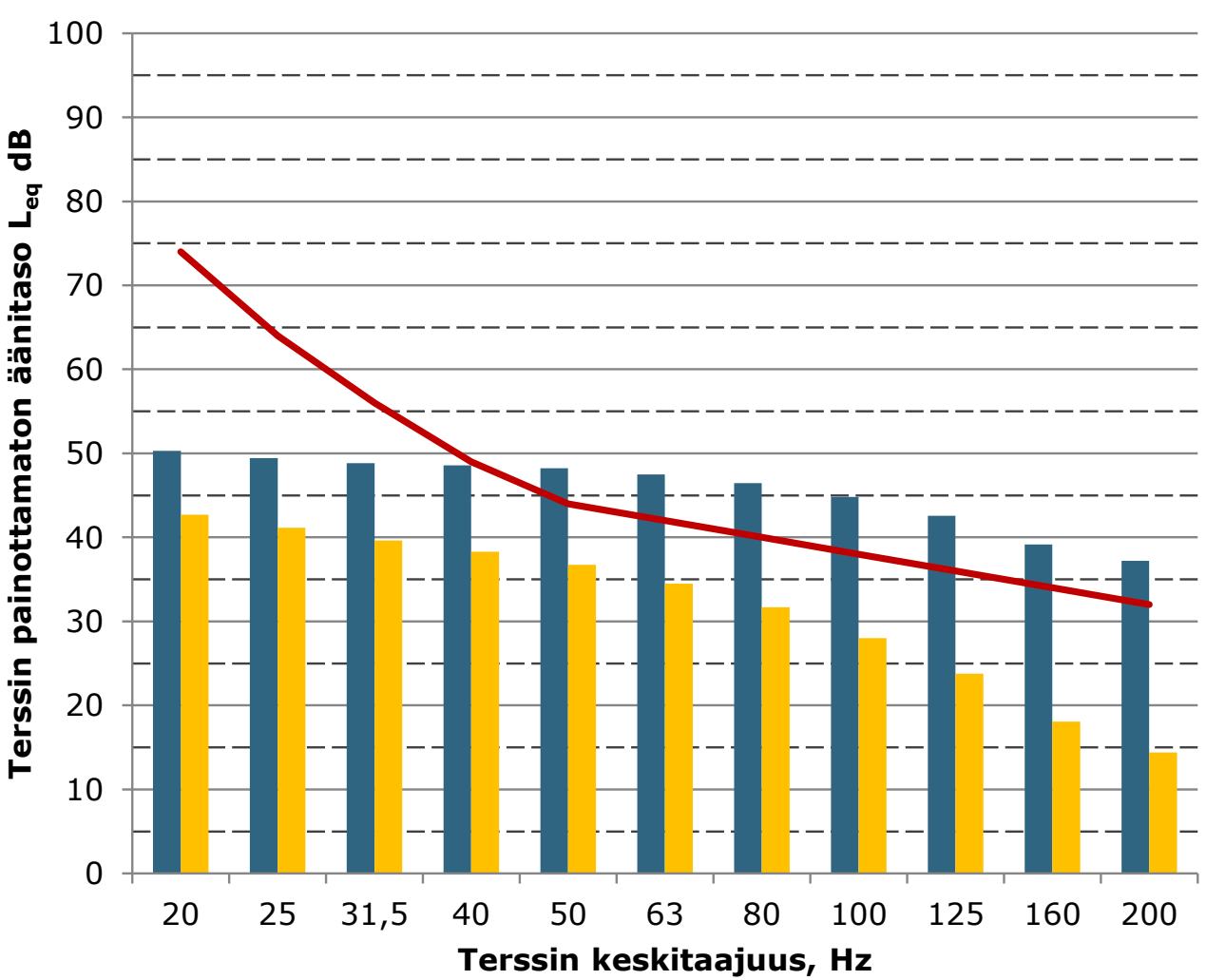
Matalien taajuuksien äänitasot ulkona ja sisällä, I Lomarakennus (Ehrsbackavägen 29), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

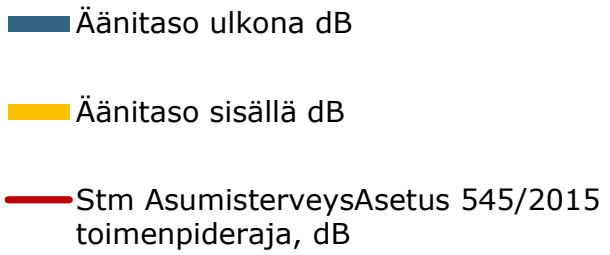




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 7,2 MW, 194 m, 19
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

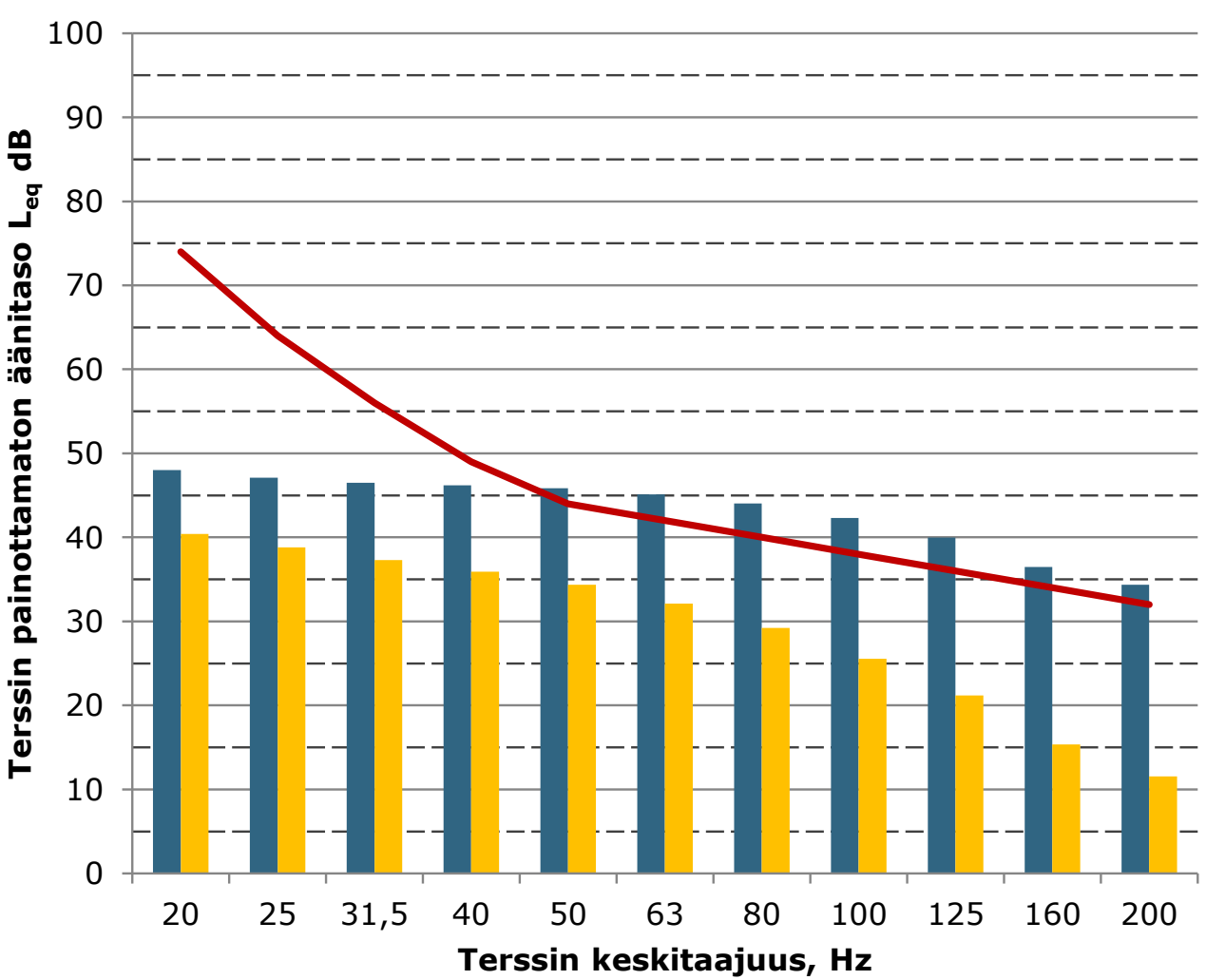
Matalien taajuuksien äänitasot ulkona ja sisällä, J Asuinrakennus (Kleidersvägen 118), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

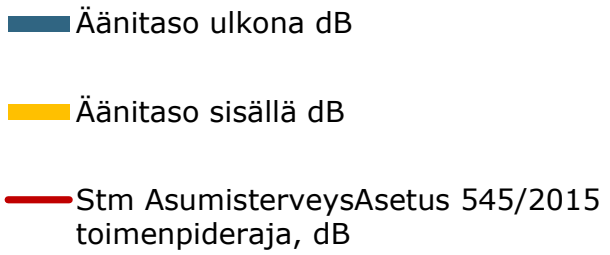




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 7,2 MW, 194 m, 19
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

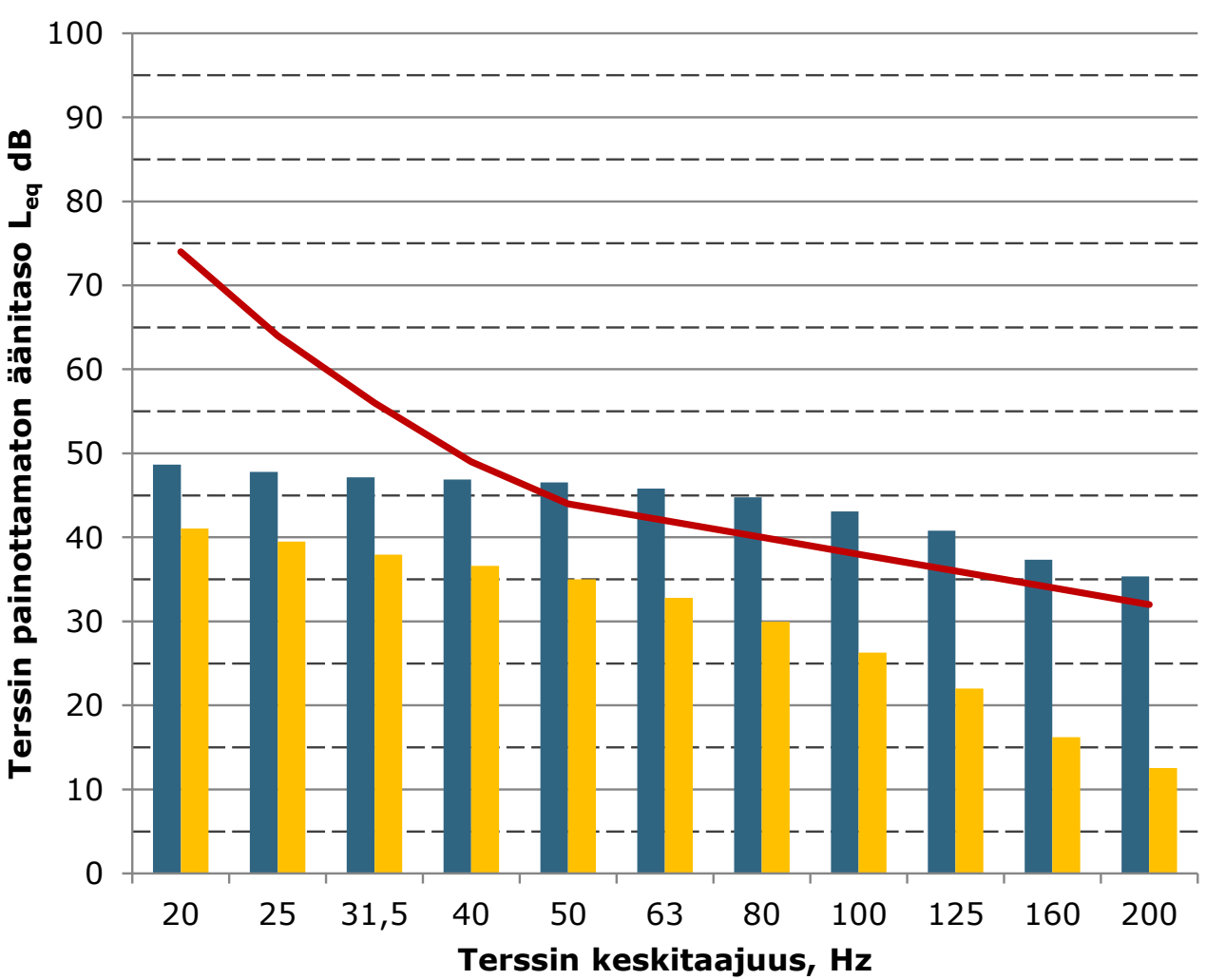
Matalien taajuuksien äänitasot ulkona ja sisällä, K Asuinrakennus (Rökiöntie 154), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

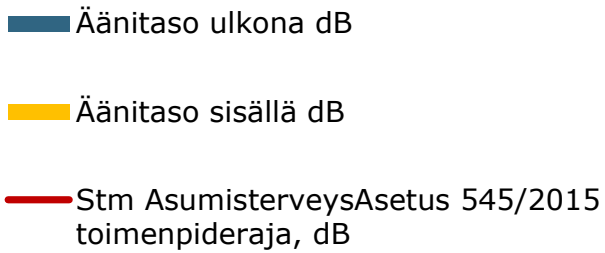




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V172-7.2 7,2 MW, 194 m, 19
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Matalien taajuuksien äänitasot ulkona ja sisällä, L Asuinrakennus (Bjurbäcksvägen 231), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

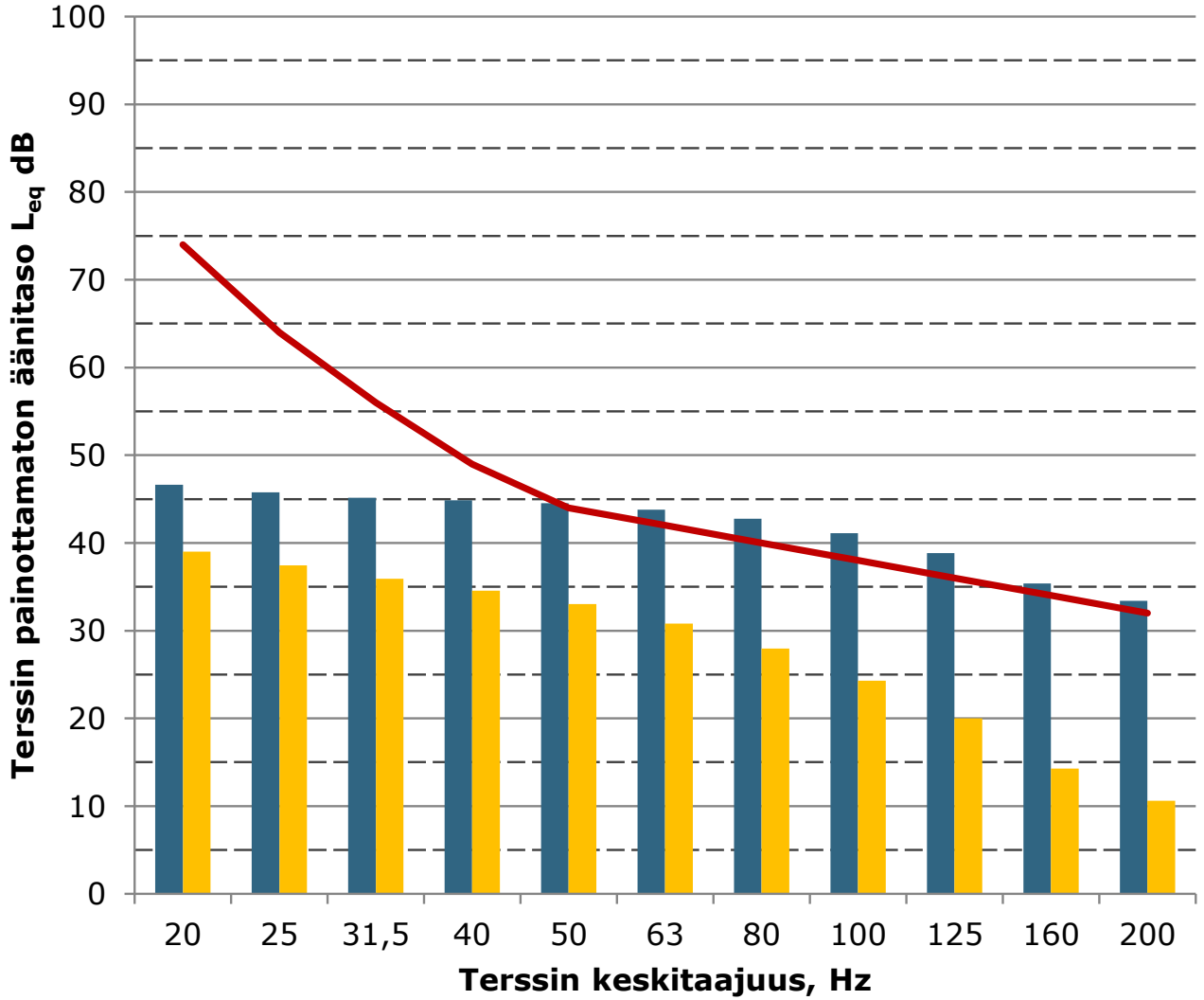


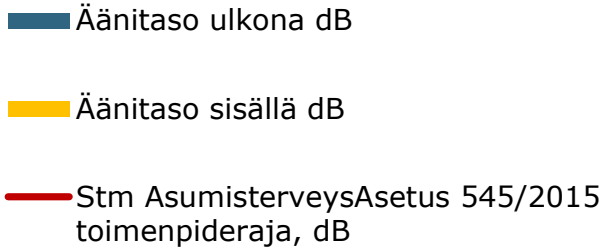


Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 7,2 MW, 194 m, 19
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Liite 4. Matalataajuisen melun rakennuskohtaiset arvot - Hankevaihtoehto 2

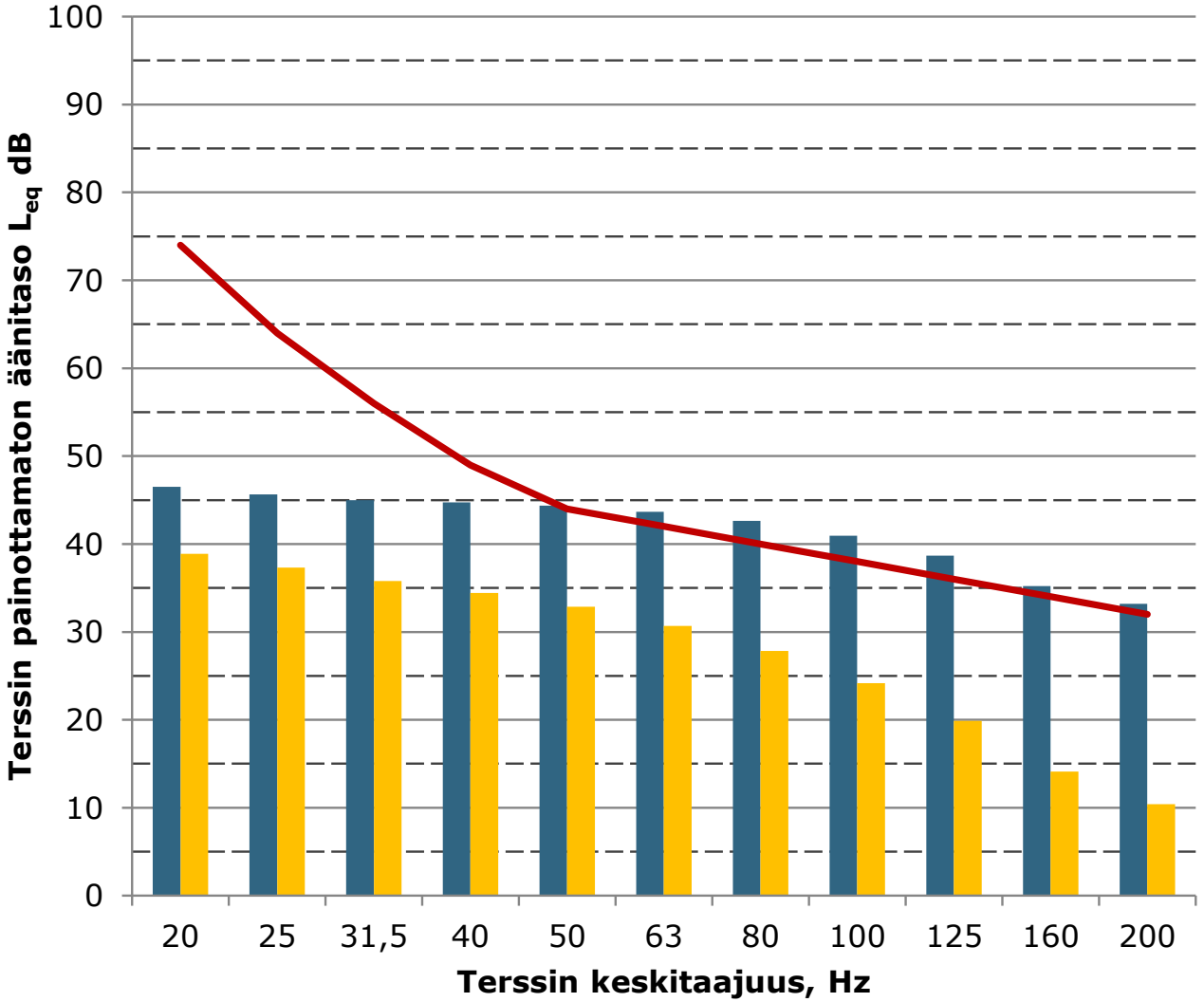
Matalien taajuuksien äänitasot ulkona ja sisällä, A Lomarakennus (Söderändan 49), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

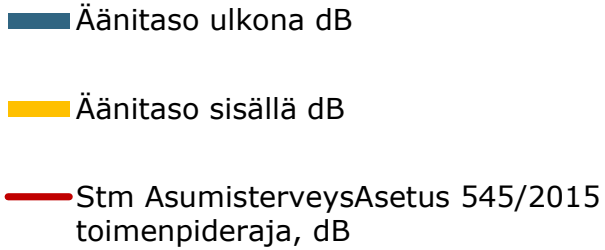




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 7,2 MW, 194 m, 9
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

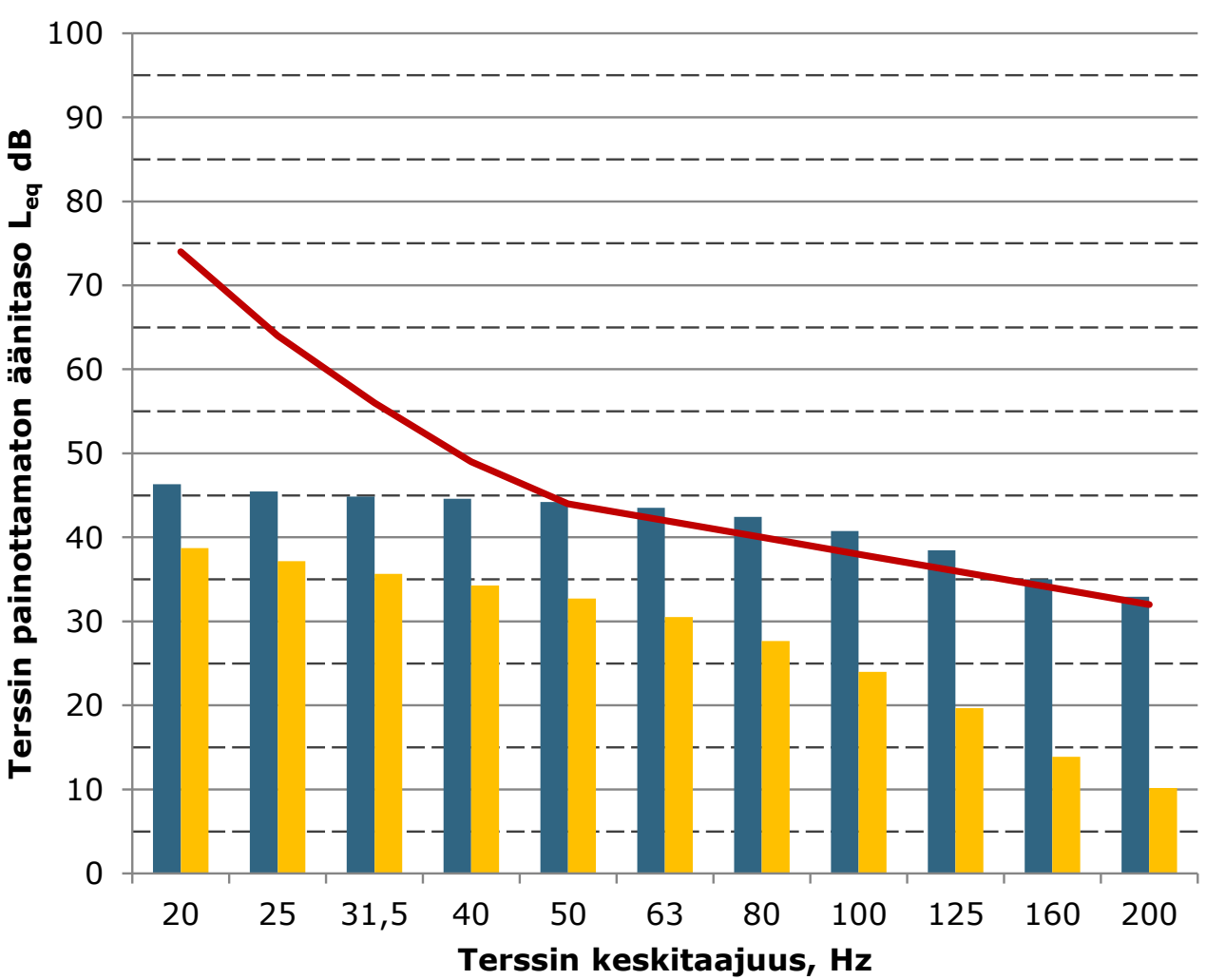
Matalien taajuuksien äänitasot ulkona ja sisällä, B Asuinrakennus (Söderändan 81), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

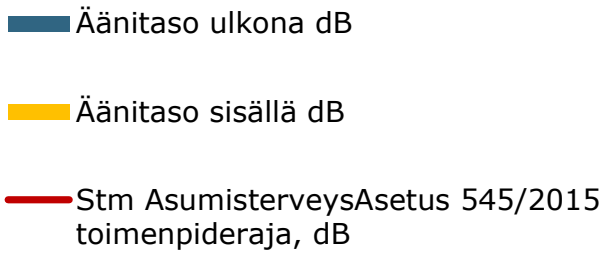




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V172-7.2 7,2 MW, 194 m, 9
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

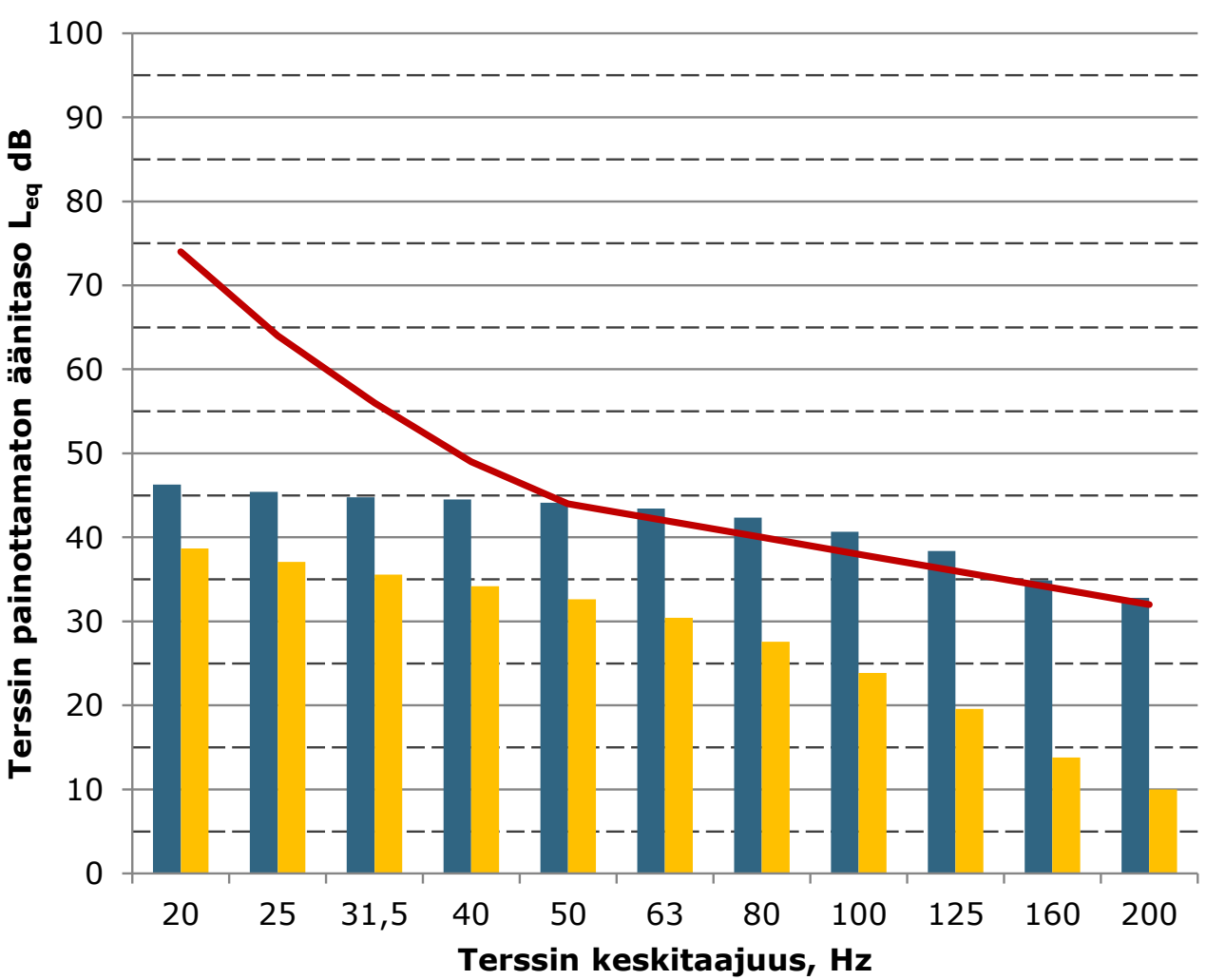
Matalien taajuuksien äänitasot ulkona ja sisällä, C Lomarakennus (Säderändan 166), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

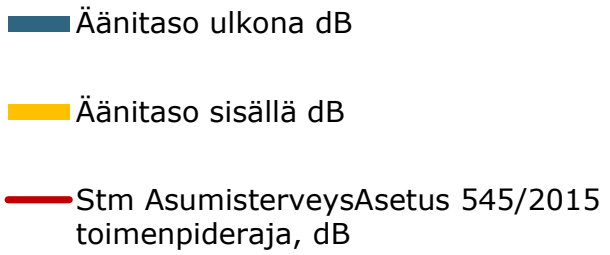




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V172-7.2 7,2 MW, 194 m, 9
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

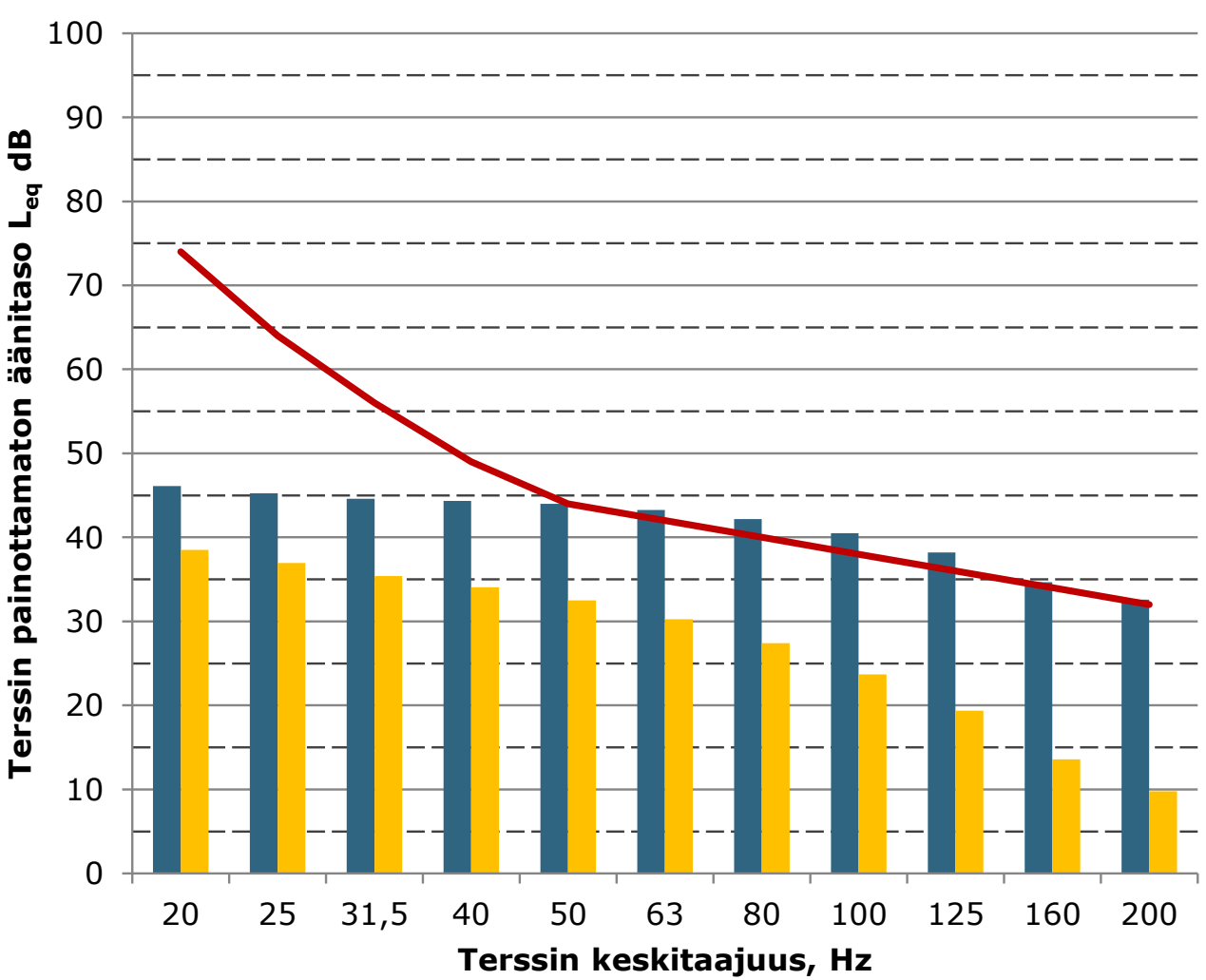
Matalien taajuuksien äänitasot ulkona ja sisällä, D Lomarakennus (Söderändan 188), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

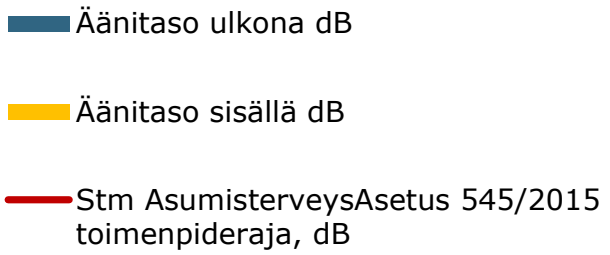




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V172-7.2 7,2 MW, 194 m, 9
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

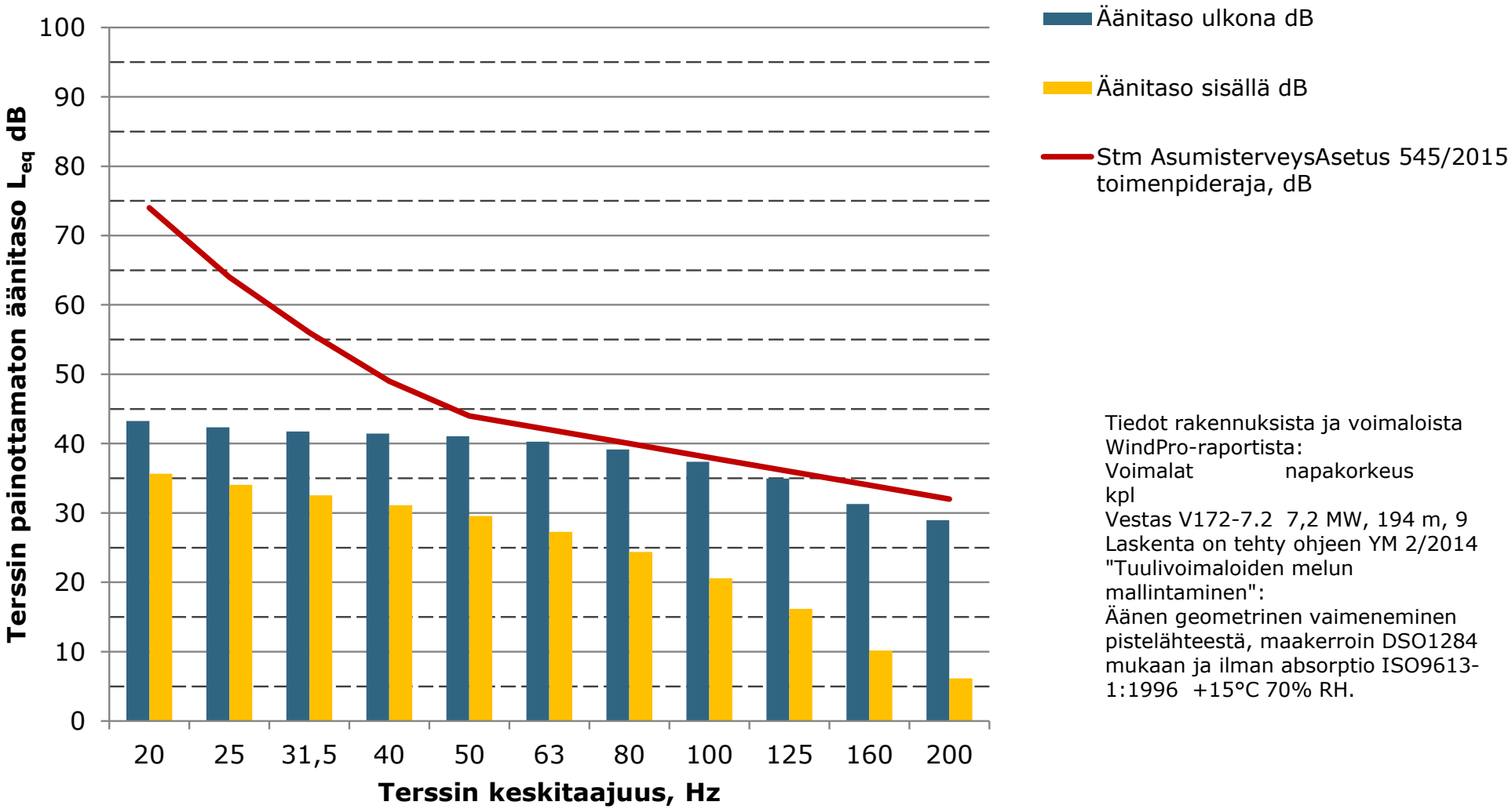
Matalien taajuuksien äänitasot ulkona ja sisällä, E Asuinrakennus (Rökiöntie 930), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan





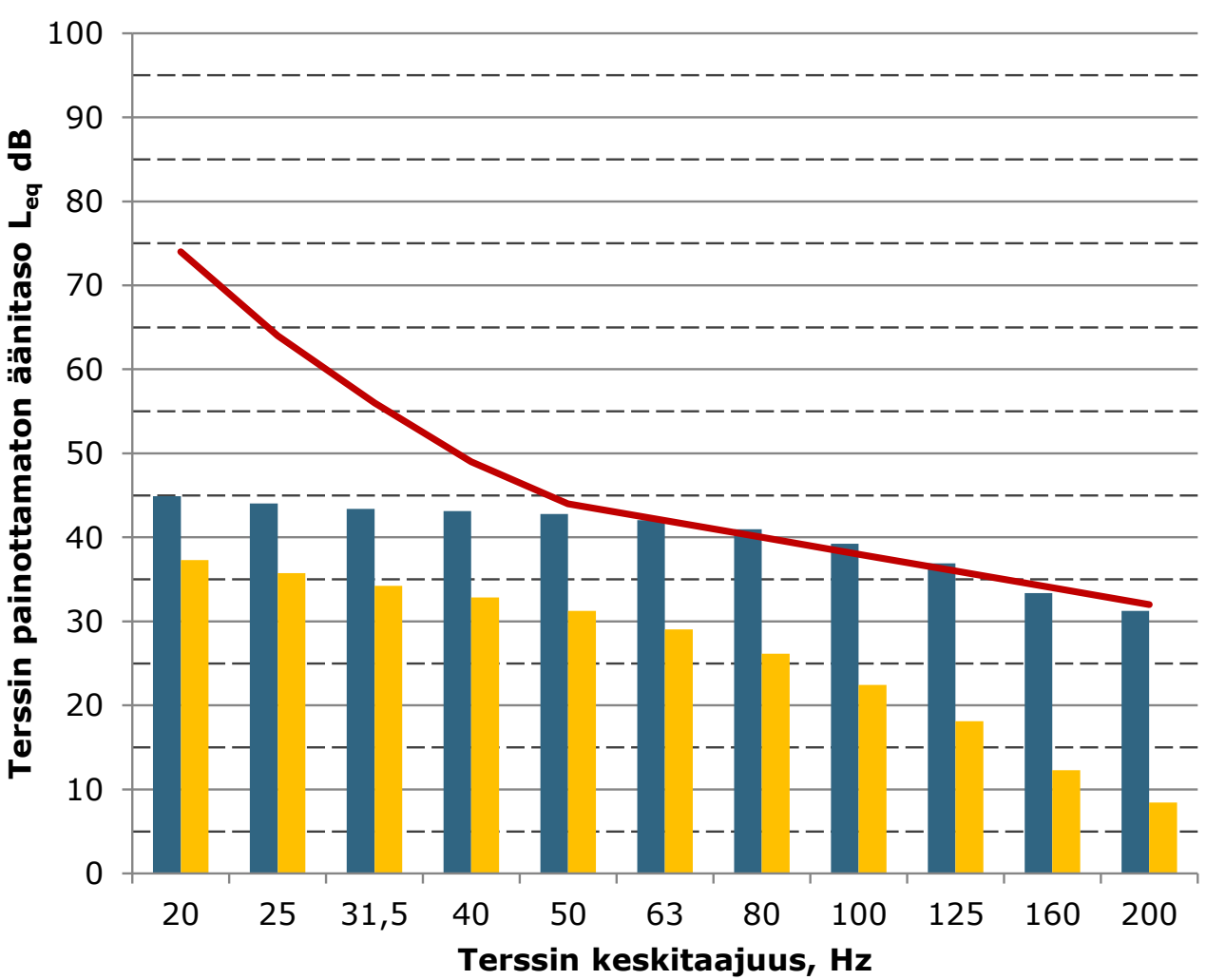
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 7,2 MW, 194 m, 9
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

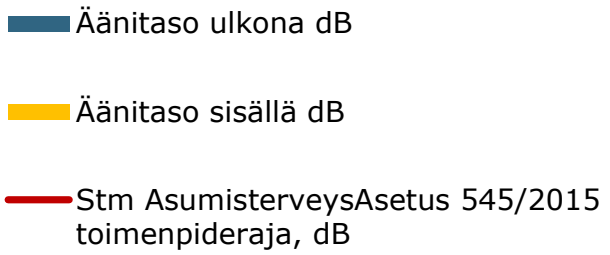
Matalien taajuuksien äänitasot ulkona ja sisällä, F Asuinrakennus (Kukkusintie 474), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 7,2 MW, 194 m, 9
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

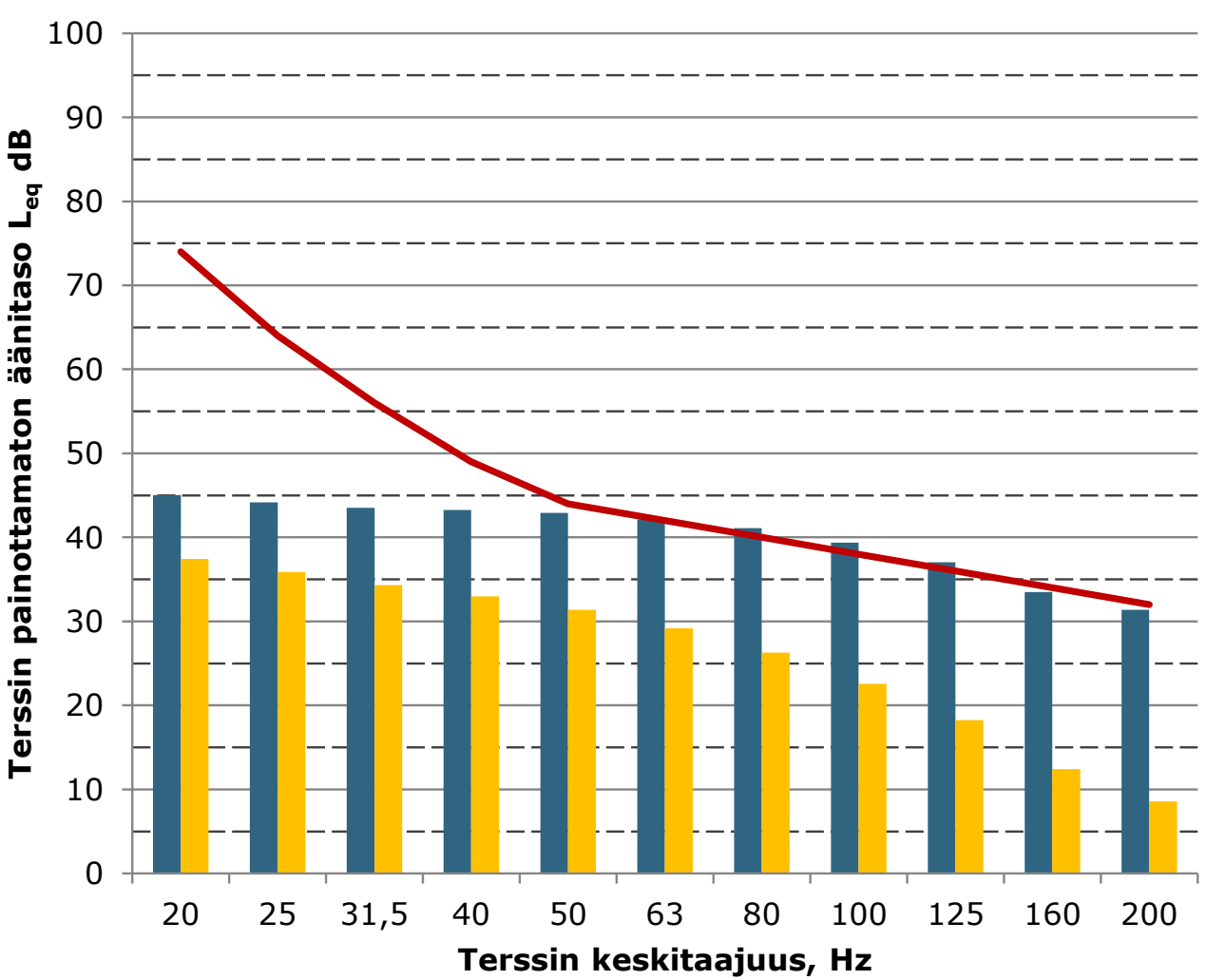
Matalien taajuuksien äänitasot ulkona ja sisällä, G Asuinrakennus (Kovik byväg 53), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

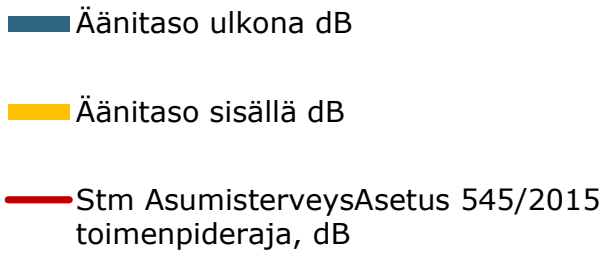




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 7,2 MW, 194 m, 9
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

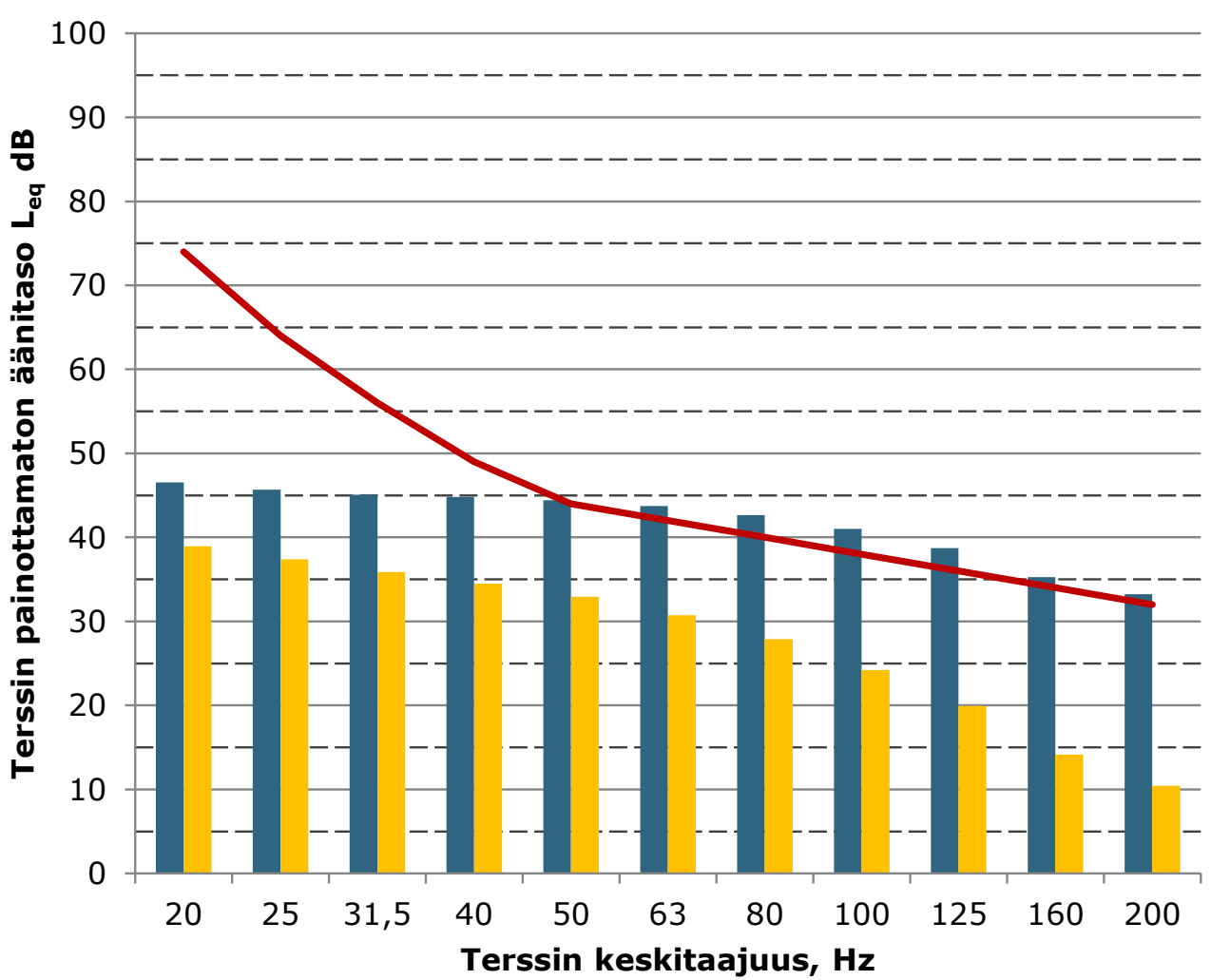
Matalien taajuuksien äänitasot ulkona ja sisällä, H Asuinrakennus (Vöyrintie 1021), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

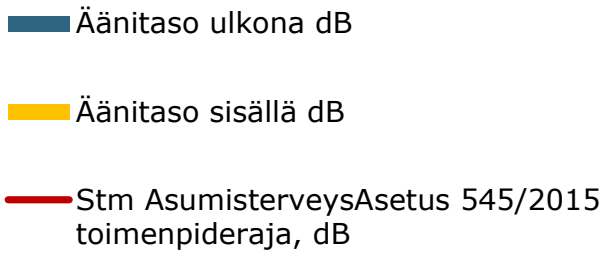




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 7,2 MW, 194 m, 9
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

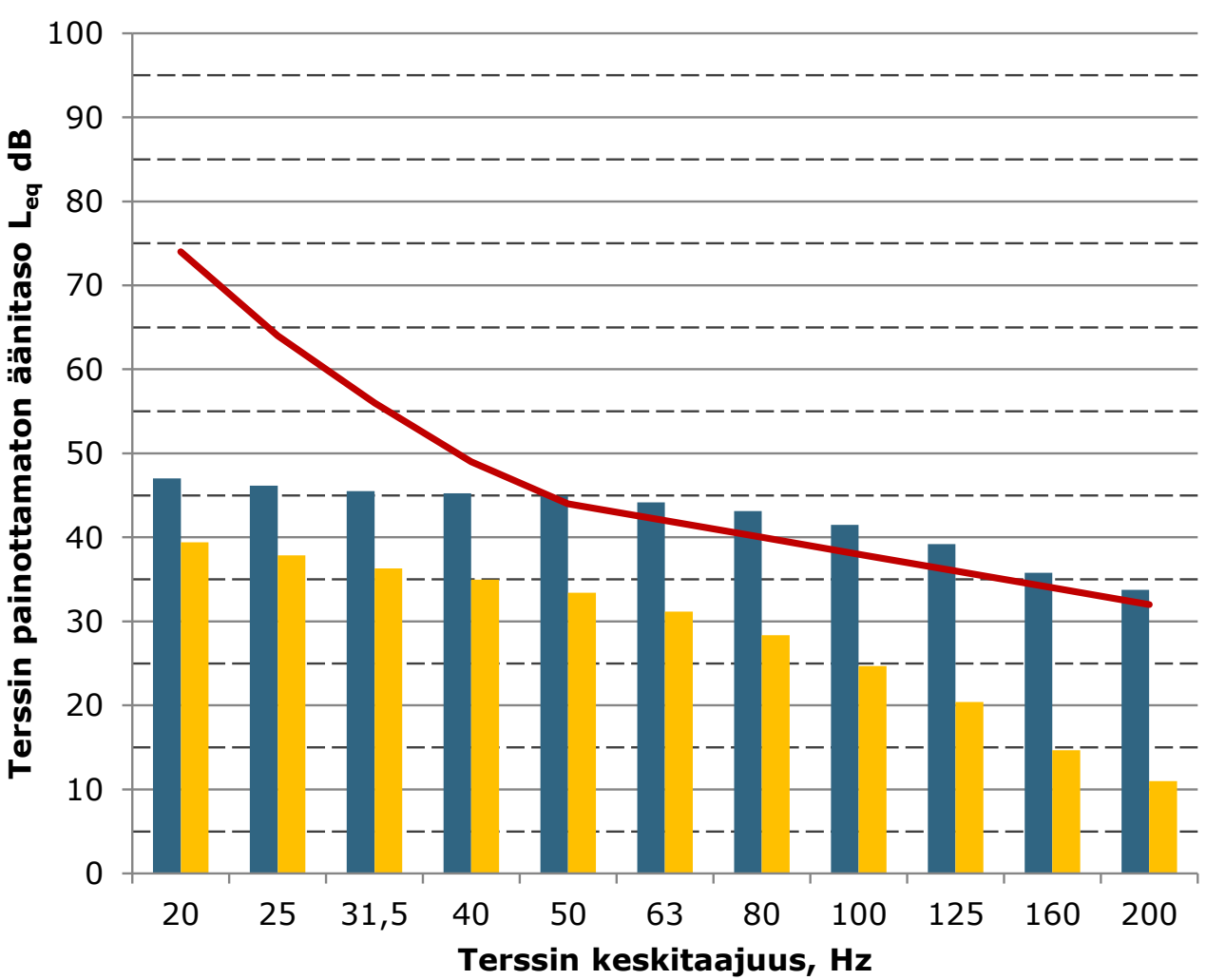
Matalien taajuuksien äänitasot ulkona ja sisällä, I Lomarakennus (Ehrsbackavägen 29), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

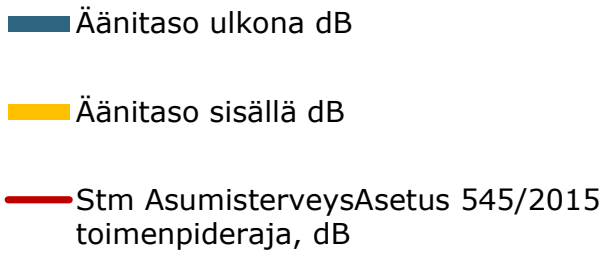




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 7,2 MW, 194 m, 9
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

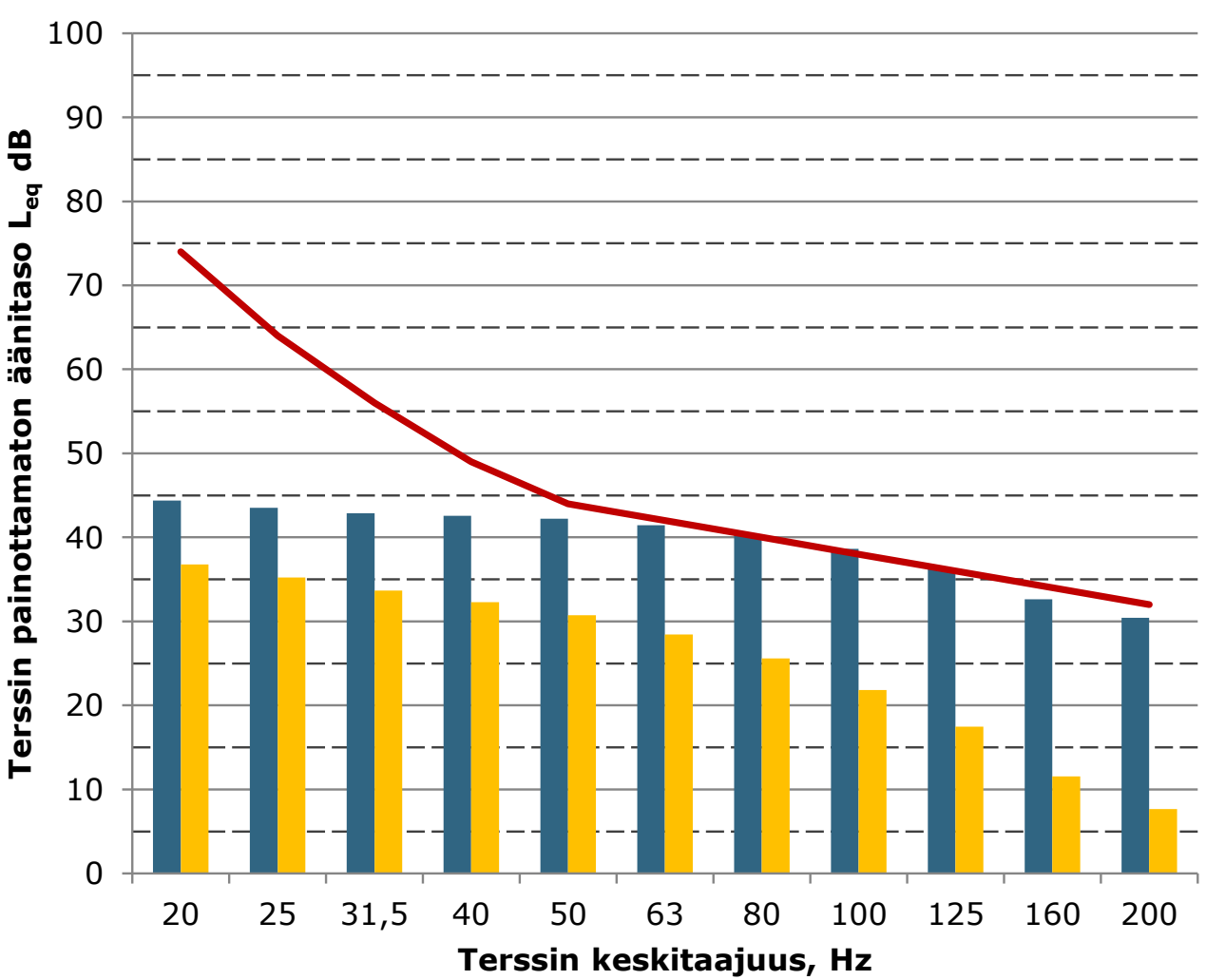
Matalien taajuuksien äänitasot ulkona ja sisällä, J Asuinrakennus (Kleidersvägen 118), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

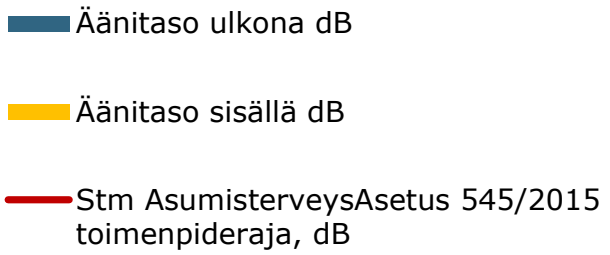




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V172-7.2 7,2 MW, 194 m, 9
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

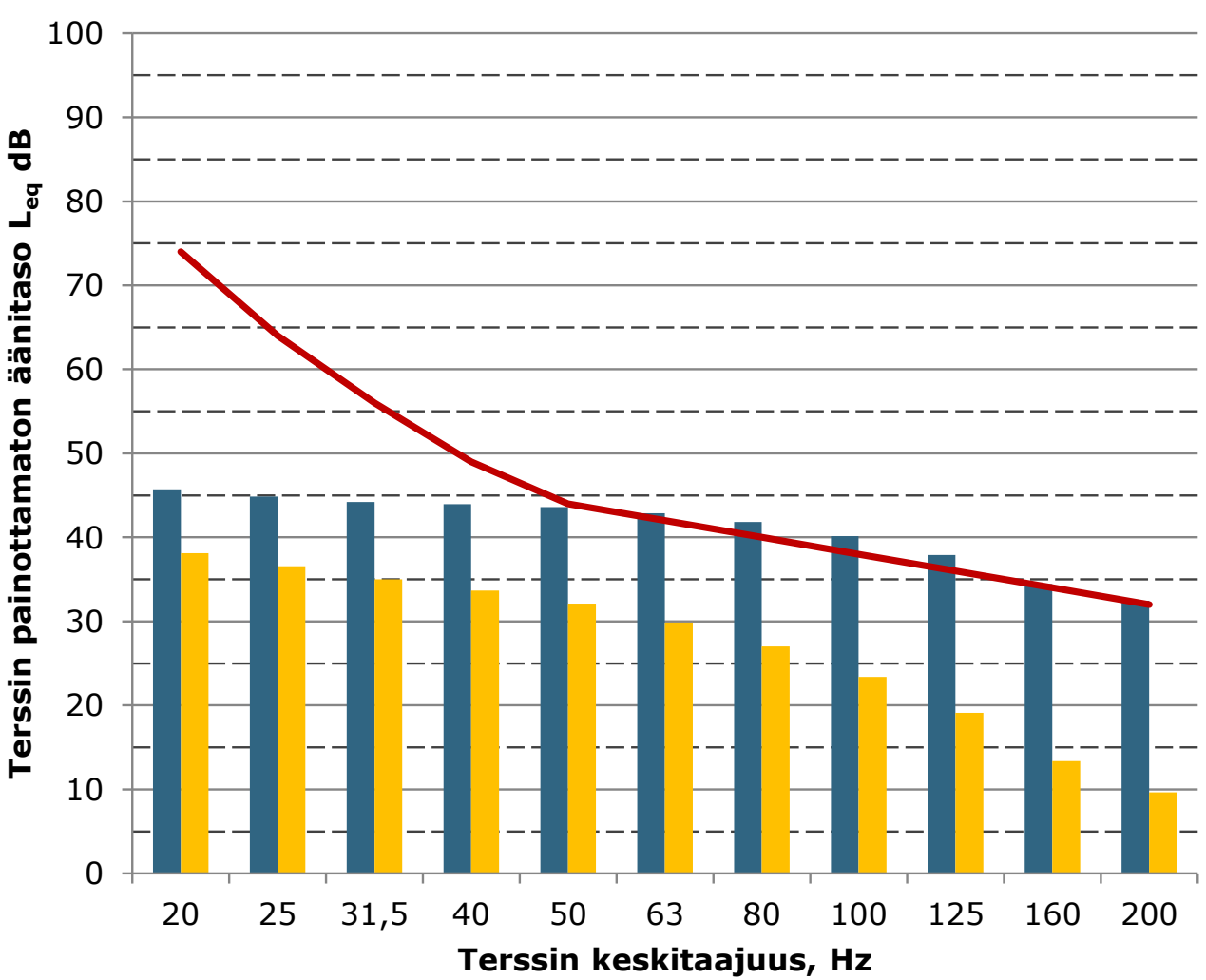
Matalien taajuuksien äänitasot ulkona ja sisällä, K Asuinrakennus (Rökiöntie 154), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

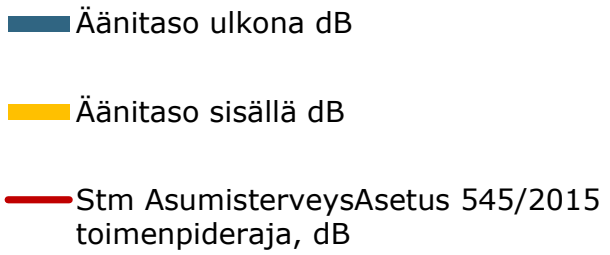




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 7,2 MW, 194 m, 9
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Matalien taajuuksien äänitasot ulkona ja sisällä, L Asuinrakennus (Bjurbäcksvägen 231), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan





Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 7,2 MW, 194 m, 9
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Liite 5. Varjostusmallinnuksen tulokset ”Real Case, No forest” - Hankevaihtoehto 1

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Calculated:
14.7.2023 9.55/3.5.584

SHADOW - Main Result

Calculation: VE1_19xRD180xHH190_No Forest

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) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational hours are calculated from WTGs in calculation and wind distribution:
MERRA-2_N63,00_E022,50 (41)

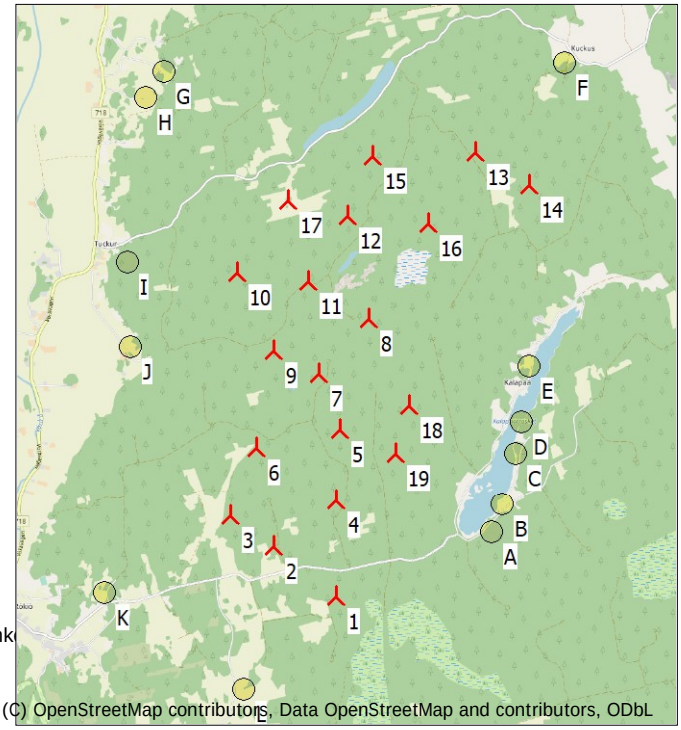
Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

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: Height Contours: CONTOURLINE_Lasor tuulivoimahank
Obstacles used in calculation
Receptor grid resolution: 1,0 m

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89



Scale 1:100 000
New WTG
Shadow receptor

WTGs

	East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
			[m]					[kW]	[m]	[m]	[m]	[RPM]
1	265 860	7 011 060	40,0	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
2	265 074	7 011 774	34,4	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
3	264 546	7 012 237	34,4	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
4	265 960	7 012 340	40,0	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
5	266 070	7 013 270	35,0	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
6	264 950	7 013 100	40,0	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
7	265 850	7 014 020	40,0	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
8	266 560	7 014 700	40,0	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
9	265 278	7 014 371	40,2	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
10	264 871	7 015 451	34,5	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
11	265 796	7 015 259	39,8	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
12	266 380	7 016 090	44,5	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
13	268 137	7 016 809	31,7	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
14	268 822	7 016 315	40,0	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
15	266 770	7 016 850	43,5	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
16	267 439	7 015 897	37,5	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
17	265 604	7 016 343	20,0	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
18	267 010	7 013 530	40,8	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
19	266 794	7 012 894	40,4	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4

Shadow receptor-Input

No.	Name	East	North	Z	Width	Height	Elevation a.g.l.	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
				[m]	[m]	[m]	[m]	[°]		[m]
A	A Lomarakennus (Söderändan 49)	267 990	7 011 759	42,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
B	B Asuinrakennus (Söderändan 81)	268 161	7 012 123	37,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
C	C Lomarakennus (Säderändan 166)	268 388	7 012 783	39,1	5,0	5,0	1,0	90,0	"Green house mode"	6,0
D	D Lomarakennus (Söderändan 188)	268 493	7 013 188	37,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0
E	E Asuinrakennus (Rökiöntie 930)	268 646	7 013 924	38,1	5,0	5,0	1,0	90,0	"Green house mode"	6,0
F	F Asuinrakennus (Kukkusintie 474)	269 409	7 017 903	25,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0

To be continued on next page...

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Calculated:
14.7.2023 9.55/3.5.584

SHADOW - Main Result

Calculation: VE1_19xRD180xHH190_No Forest

...continued from previous page

No.	Name	East	North	Z	Width	Height	Elevation a.g.l.	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
				[m]	[m]	[m]	[m]	[°]		[m]
G	G Asuinrakennus (Kovik byväg 53)	264 096	7 018 174	10,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
H	H Asuinrakennus (Vöyrintie 1021)	263 817	7 017 837	8,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
I	I Lomarakennus (Ehrsbackavägen 29)	263 418	7 015 700	21,7	5,0	5,0	1,0	90,0	"Green house mode"	6,0
J	J Asuinrakennus (Kleidersvägen 118)	263 380	7 014 576	13,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0
K	K Asuinrakennus (Rökiöntie 154)	262 790	7 011 335	27,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
L	L Asuinrakennus (Bjurbäcksvägen 231)	264 546	7 009 923	27,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0

Calculation Results

Shadow receptor

No.	Name	Shadow, expected values Shadow hours per year [h/year]
A	A Lomarakennus (Söderändan 49)	8:13
B	B Asuinrakennus (Söderändan 81)	8:39
C	C Lomarakennus (Säderändan 166)	7:01
D	D Lomarakennus (Söderändan 188)	4:54
E	E Asuinrakennus (Rökiöntie 930)	1:59
F	F Asuinrakennus (Kukkusintie 474)	5:12
G	G Asuinrakennus (Kovik byväg 53)	0:00
H	H Asuinrakennus (Vöyrintie 1021)	0:00
I	I Lomarakennus (Ehrsbackavägen 29)	2:49
J	J Asuinrakennus (Kleidersvägen 118)	7:57
K	K Asuinrakennus (Rökiöntie 154)	0:00
L	L Asuinrakennus (Bjurbäcksvägen 231)	4:17

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

No.	Name	Expected [h/year]
1	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8836)	4:17
2	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8835)	0:00
3	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8834)	0:00
4	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8833)	0:00
5	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8831)	0:00
6	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8832)	0:00
7	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8828)	0:00
8	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8826)	0:00
9	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8829)	0:00
10	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8824)	10:47
11	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8825)	0:00
12	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8823)	0:00
13	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8822)	2:32
14	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8818)	2:37
15	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8821)	0:00
16	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8819)	0:00
17	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8820)	0:00
18	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8827)	13:27
19	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8830)	17:22

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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Calculated:
14.7.2023 9.55/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190_No ForestShadow receptor: A - A Lomarakennus (Söderändan 49)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May		June		July		August	September	October	November	December
1	10.09	09.07	07.39	06.54	05.13		03.44	21.28 (19)	03.27	21.34 (19)	04.44	06.14	07.36	08.06	09.34
	15.00	16.23	17.49	20.18	21.45		23.15	28 21.56 (19)	23.41	28 22.02 (19)	22.28	20.47	19.04	16.22	15.04
2	10.08	09.04	07.36	06.51	05.10		03.42	21.29 (19)	03.29	21.34 (19)	04.47	06.17	07.39	08.09	09.37
	15.01	16.26	17.52	20.21	21.48		23.17	27 21.56 (19)	23.40	28 22.02 (19)	22.25	20.43	19.01	16.19	15.03
3	10.07	09.01	07.33	06.47	05.07		03.40	21.29 (19)	03.30	21.34 (19)	04.50	06.19	07.42	08.12	09.40
	15.03	16.29	17.55	20.23	21.51		23.20	28 21.57 (19)	23.38	28 22.02 (19)	22.22	20.40	18.57	16.16	15.01
4	10.06	08.58	07.29	06.44	05.04		03.38	21.29 (19)	03.32	21.35 (19)	04.53	06.22	07.45	08.15	09.42
	15.05	16.32	17.58	20.26	21.54		23.22	27 21.56 (19)	23.37	28 22.03 (19)	22.19	20.37	18.54	16.13	14.59
5	10.05	08.55	07.26	06.41	05.00		03.36	21.29 (19)	03.34	21.35 (19)	04.56	06.25	07.47	08.18	09.44
	15.07	16.36	18.01	20.29	21.57		23.24	28 21.57 (19)	23.35	28 22.03 (19)	22.16	20.33	18.51	16.10	14.58
6	10.04	08.52	07.23	06.37	04.57		03.34	21.29 (19)	03.36	21.35 (19)	04.59	06.28	07.50	08.21	09.47
	15.09	16.39	18.04	20.32	22.00		23.26	28 21.57 (19)	23.34	28 22.03 (19)	22.13	20.30	18.47	16.07	14.56
7	10.03	08.49	07.19	06.34	04.54		03.32	21.30 (19)	03.38	21.36 (19)	05.02	06.30	07.53	08.24	09.49
	15.12	16.42	18.07	20.35	22.03		23.28	27 21.57 (19)	23.32	27 22.03 (19)	22.10	20.26	18.44	16.04	14.55
8	10.01	08.46	07.16	06.30	04.51		03.31	21.30 (19)	03.40	21.35 (19)	05.05	06.33	07.56	08.27	09.51
	15.14	16.45	18.09	20.38	22.06		23.30	28 21.58 (19)	23.30	28 22.03 (19)	22.06	20.23	18.40	16.01	14.54
9	10.00	08.43	07.13	06.27	04.48		03.29	21.30 (19)	03.42	21.36 (19)	05.08	06.36	07.58	08.30	09.53
	15.16	16.48	18.12	20.41	22.09		23.32	28 21.58 (19)	23.28	28 22.04 (19)	22.03	20.19	18.37	15.58	14.53
10	09.58	08.40	07.09	06.24	04.45		03.28	21.30 (19)	03.44	21.36 (19)	05.11	06.39	08.01	08.33	09.55
	15.19	16.51	18.15	20.43	22.12		23.34	28 21.58 (19)	23.26	28 22.04 (19)	22.00	20.16	18.34	15.56	14.52
11	09.57	08.37	07.06	06.20	04.42		03.26	21.30 (19)	03.47	21.36 (19)	05.14	06.41	08.04	08.36	09.57
	15.21	16.54	18.18	20.46	22.15		23.36	28 21.58 (19)	23.24	27 22.03 (19)	21.57	20.13	18.30	15.53	14.51
12	09.55	08.34	07.03	06.17	04.39		03.25	21.30 (19)	03.49	21.36 (19)	05.17	06.44	08.07	08.39	09.59
	15.24	16.57	18.21	20.49	22.18		23.37	27 21.57 (19)	23.22	28 22.04 (19)	21.54	20.09	18.27	15.50	14.50
13	09.53	08.31	06.59	06.13	04.35		03.24	21.31 (19)	03.51	21.37 (19)	05.19	06.47	08.10	08.42	10.00
	15.27	17.01	18.24	20.52	22.21		23.39	27 21.58 (19)	23.20	27 22.04 (19)	21.50	20.06	18.24	15.47	14.49
14	09.51	08.28	06.56	06.10	04.32		03.23	21.31 (19)	03.54	21.37 (19)	05.22	06.50	08.13	08.45	10.02
	15.29	17.04	18.27	20.55	22.24		23.40	27 21.58 (19)	23.18	27 22.04 (19)	21.47	20.02	18.20	15.44	14.48
15	09.49	08.25	06.52	06.07	04.29		03.22	21.31 (19)	03.56	21.38 (19)	05.25	06.52	08.16	08.48	10.03
	15.32	17.07	18.30	20.58	22.27		23.41	27 21.58 (19)	23.15	26 22.04 (19)	21.44	19.59	18.17	15.42	14.48
16	09.47	08.22	06.49	06.03	04.26		03.22	21.32 (19)	03.59	21.38 (19)	05.28	06.55	08.18	08.51	10.05
	15.35	17.10	18.32	21.01	22.30		23.42	27 21.59 (19)	23.13	26 22.04 (19)	21.40	19.55	18.14	15.39	14.48
17	09.45	08.18	06.46	06.00	04.24		03.21	21.31 (19)	04.01	21.38 (19)	05.31	06.58	08.21	08.55	10.06
	15.38	17.13	18.35	21.04	22.33		23.43	27 21.58 (19)	23.10	25 22.03 (19)	21.37	19.52	18.10	15.36	14.47
18	09.43	08.15	06.42	05.56	04.21	21.37 (19)	03.21	21.32 (19)	04.04	21.39 (19)	05.34	07.01	08.24	08.58	10.07
	15.40	17.16	18.38	21.07	22.36	9 21.46 (19)	23.44	27 21.59 (19)	23.08	24 22.03 (19)	21.34	19.49	18.07	15.34	14.47
19	09.40	08.12	06.39	05.53	04.18	21.34 (19)	03.20	21.32 (19)	04.07	21.39 (19)	05.37	07.03	08.27	09.01	10.08
	15.43	17.19	18.41	21.10	22.39	13 21.47 (19)	23.44	27 21.59 (19)	23.05	23 22.02 (19)	21.31	19.45	18.04	15.31	14.47
20	09.38	08.09	06.35	05.50	04.15	21.33 (19)	03.20	21.32 (19)	04.10	21.39 (19)	05.40	07.06	08.30	09.04	10.09
	15.46	17.22	18.44	21.12	22.42	16 21.49 (19)	23.45	27 21.59 (19)	23.03	23 22.02 (19)	21.27	19.42	18.01	15.29	14.47
21	09.36	08.06	06.32	05.46	04.12	21.32 (19)	03.20	21.33 (19)	04.12	21.41 (19)	05.43	07.09	08.33	09.06	10.10
	15.49	17.25	18.47	21.15	22.45	18 21.50 (19)	23.45	27 22.00 (19)	23.00	21 22.02 (19)	21.24	19.38	17.57	15.26	14.48
22	09.33	08.02	06.28	05.43	04.09	21.31 (19)	03.20	21.33 (19)	04.15	21.42 (19)	05.46	07.11	08.36	09.09	10.10
	15.52	17.28	18.49	21.18	22.48	20 21.51 (19)	23.45	27 22.00 (19)	22.57	19 22.01 (19)	21.21	19.35	17.54	15.24	14.48
23	09.31	07.59	06.25	05.40	04.07	21.31 (19)	03.20	21.33 (19)	04.18	21.42 (19)	05.48	07.14	08.39	09.12	10.11
	15.55	17.31	18.52	21.21	22.51	21 21.52 (19)	23.45	27 22.00 (19)	22.55	18 22.00 (19)	21.17	19.31	17.51	15.21	14.49
24	09.28	07.56	06.22	05.36	04.04	21.30 (19)	03.21	21.34 (19)	04.21	21.43 (19)	05.51	07.17	08.42	09.15	10.11
	15.58	17.34	18.55	21.24	22.54	23 21.53 (19)	23.45	27 22.01 (19)	22.52	15 21.58 (19)	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.18	05.33	04.01	21.30 (19)	03.21	21.33 (19)	04.24	21.46 (19)	05.54	07.20	07.45	09.18	10.11
	16.01	17.37	18.58	21.27	22.56	24 21.54 (19)	23.45	27 22.00 (19)	22.49	11 21.57 (19)	21.10	19.25	16.44	15.17	14.50
26	09.23	07.49	06.15	05.30	03.59	21.29 (19)	03.22	21.34 (19)	04.27	21.48 (19)	05.57	07.22	07.48	09.21	10.11
	16.04	17.40	19.01	21.30	22.59	25 21.54 (19)	23.45	27 22.01 (19)	22.46	6 21.54 (19)	21.07	19.21	16.41	15.14	14.51
27	09.21	07.46	06.11	05.26	03.56	21.29 (19)	03.23	21.33 (19)	04.29		06.00	07.25	07.51	09.24	10.11
	16.07	17.43	19.04	21.33	23.02	26 21.55 (19)	23.44	28 22.01 (19)	22.43		21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.54	21.29 (19)	03.24	21.34 (19)	04.32		06.03	07.28	07.54	09.26	10.11
	16.11	17.46	19.06	21.36	23.05	26 21.55 (19)	23.43	27 22.01 (19)	22.40		21.00	19.14	16.35	15.10	14.53
29	09.15		07.05	05.20	03.51	21.28 (19)	03.25	21.34 (19)	04.35		06.05	07.31	07.57	09.29	10.11
	16.14		20.09	21.39	23.07	27 21.55 (19)	23.43	27 22.01 (19)	22.37		20.57	19.11	16.32	15.08	14.55
30	09.12		07.01	05.17	03.49	21.29 (19)	03.26	21.34 (19)	04.38		06.08	07.33	08.00	09.32	10.10
	16.17		20.12	21.42	23.10	27 21.56 (19)	23.42	28 22.02 (19)	22.34		20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.47	21.29 (19)			04.41		06.11		08.03		10.10
	16.20		20.15		23.12	27 21.56 (19)			22.31		20.50		16.26		14.58
Potential sun hours	182	242	363	447	559		605		594		502	392	308	206	151
Total, worst case						302		820		625					
Sun reduction						0,48		0,49		0,39					
Oper. time red.						0,99		0,99		0,99					
Wind dir. red.						0,63		0,63		0,63					
Total reduction						0,30		0,31		0,24					
Total, real						90		252		151					

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)		First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker	(WTG causing flicker last time)

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14.7.2023 9.55/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190_No ForestShadow receptor: B - B Asuinrakennus (Söderändan 81)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April			May			June		
1	10.09	09.07	07.39	06.54			05.13		20.37 (19)	03.44		22.07 (18)
	15.00	16.23	17.49	20.18			21.45	20	20.57 (19)	23.15	9	22.16 (18)
2	10.08	09.04	07.36	06.51			05.10		20.35 (19)	03.42		22.06 (18)
	15.01	16.26	17.52	20.21			21.48	23	20.58 (19)	23.17	12	22.18 (18)
3	10.07	09.01	07.33	06.47			05.07		20.34 (19)	03.40		22.05 (18)
	15.03	16.29	17.55	20.23			21.51	25	20.59 (19)	23.20	14	22.19 (18)
4	10.06	08.58	07.29	06.44			05.04		20.33 (19)	03.38		22.05 (18)
	15.05	16.32	17.58	20.26			21.54	26	20.59 (19)	23.22	15	22.20 (18)
5	10.05	08.55	07.26	06.41			05.00		20.33 (19)	03.36		22.04 (18)
	15.07	16.36	18.01	20.29			21.57	26	20.59 (19)	23.24	17	22.21 (18)
6	10.04	08.52	07.23	06.37			04.57		20.32 (19)	03.34		22.04 (18)
	15.09	16.39	18.04	20.32			22.00	27	20.59 (19)	23.26	18	22.22 (18)
7	10.03	08.49	07.19	06.34			04.54		20.32 (19)	03.32		22.04 (18)
	15.12	16.42	18.07	20.35			22.03	28	21.00 (19)	23.28	19	22.23 (18)
8	10.01	08.46	07.16	06.30			04.51		20.32 (19)	03.31		22.04 (18)
	15.14	16.45	18.09	20.38			22.06	28	21.00 (19)	23.30	19	22.23 (18)
9	10.00	08.43	07.13	06.27			04.48		20.31 (19)	03.29		22.04 (18)
	15.16	16.48	18.12	20.41			22.09	29	21.00 (19)	23.32	20	22.24 (18)
10	09.58	08.40	07.09	06.24			04.45		20.32 (19)	03.28		22.04 (18)
	15.19	16.51	18.15	20.43			22.12	28	21.00 (19)	23.34	20	22.24 (18)
11	09.57	08.37	07.06	06.20			04.42		20.32 (19)	03.26		22.03 (18)
	15.21	16.54	18.18	20.46			22.15	28	21.00 (19)	23.36	21	22.24 (18)
12	09.55	08.34	07.03	06.17			04.38		20.31 (19)	03.25		22.03 (18)
	15.24	16.57	18.21	20.49			22.18	28	20.59 (19)	23.37	21	22.24 (18)
13	09.53	08.31	06.59	06.13			04.35		20.32 (19)	03.24		22.04 (18)
	15.26	17.01	18.24	20.52			22.21	27	20.59 (19)	23.39	21	22.25 (18)
14	09.51	08.28	06.56	06.10			04.32		20.32 (19)	03.23		22.03 (18)
	15.29	17.04	18.27	20.55			22.24	26	20.58 (19)	23.40	22	22.25 (18)
15	09.49	08.25	06.52	06.07			04.29		20.33 (19)	03.22		22.04 (18)
	15.32	17.07	18.30	20.58			22.27	25	20.58 (19)	23.41	22	22.26 (18)
16	09.47	08.22	06.49	06.03			04.26		20.33 (19)	03.21		22.04 (18)
	15.35	17.10	18.32	21.01			22.30	24	20.57 (19)	23.42	22	22.26 (18)
17	09.45	08.18	06.46	06.00			04.23		20.34 (19)	03.21		22.03 (18)
	15.37	17.13	18.35	21.04			22.33	23	20.57 (19)	23.43	23	22.26 (18)
18	09.43	08.15	06.42	05.56			04.21		20.35 (19)	03.20		22.04 (18)
	15.40	17.16	18.38	21.07			22.36	22	20.57 (19)	23.44	22	22.26 (18)
19	09.40	08.12	06.39	05.53			04.18		20.35 (19)	03.20		22.04 (18)
	15.43	17.19	18.41	21.10			22.39	20	20.55 (19)	23.44	23	22.27 (18)
20	09.38	08.09	06.35	05.50			04.15		20.37 (19)	03.20		22.04 (18)
	15.46	17.22	18.44	21.12			22.42	18	20.55 (19)	23.45	23	22.27 (18)
21	09.36	08.06	06.32	05.46			04.12		20.38 (19)	03.20		22.04 (18)
	15.49	17.25	18.47	21.15			22.45	16	20.54 (19)	23.45	23	22.27 (18)
22	09.33	08.02	06.28	05.43			04.09		20.40 (19)	03.20		22.05 (18)
	15.52	17.28	18.49	21.18			22.48	13	20.53 (19)	23.45	23	22.28 (18)
23	09.31	07.59	06.25	05.40			04.07		20.42 (19)	03.20		22.05 (18)
	15.55	17.31	18.52	21.21			22.51	9	20.51 (19)	23.45	23	22.28 (18)
24	09.28	07.56	06.22	05.36			04.04			03.21		22.05 (18)
	15.58	17.34	18.55	21.24			22.54			23.45	23	22.28 (18)
25	09.26	07.53	06.18	05.33			04.01			03.21		22.06 (18)
	16.01	17.37	18.58	21.27			22.56			23.45	22	22.28 (18)
26	09.23	07.49	06.15	05.30			03.59			03.22		22.06 (18)
	16.04	17.40	19.01	21.30			22.59			23.45	23	22.29 (18)
27	09.21	07.46	06.11	05.26			03.56			03.23		22.06 (18)
	16.07	17.43	19.04	21.33			23.02			23.44	22	22.28 (18)
28	09.18	07.43	06.08	05.23		20.42 (19)	03.54			03.24		22.06 (18)
	16.11	17.46	19.06	21.36	8	20.50 (19)	23.05			23.44	22	22.28 (18)
29	09.15		07.05	05.20		20.39 (19)	03.51			03.25		22.07 (18)
	16.14		20.09	21.39	14	20.53 (19)	23.07			23.43	22	22.29 (18)
30	09.12		07.01	05.17		20.38 (19)	03.49			03.26		22.07 (18)
	16.17		20.12	21.42	18	20.56 (19)	23.10			23.42	22	22.29 (18)
31	09.10		06.58				03.46		22.09 (18)			
	16.20		20.15				23.12	5	22.14 (18)			
Potential sun hours	182	242	363	447			559			605		
Total, worst case					40			544			608	
Sun reduction					0,41			0,48			0,49	
Oper. time red.					0,99			0,99			0,99	
Wind dir. red.					0,60			0,60			0,63	
Total reduction					0,25			0,29			0,31	
Total, real					10			155			187	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.55/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190_No ForestShadow receptor: B - B Asuinrakennus (Söderändan 81)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	July		August		September	October	November	December
1	03.27		22.08 (18)	04.44	20.42 (19)	06.14	07.36	08.06	09.35
	23.41	21	22.29 (18)	22.28	28	21.10 (19)	20.47	19.04	16.22	15.04
2	03.29		22.08 (18)	04.47	20.42 (19)	06.17	07.39	08.09	09.37
	23.40	21	22.29 (18)	22.25	28	21.10 (19)	20.43	19.01	16.19	15.03
3	03.30		22.08 (18)	04.50	20.42 (19)	06.19	07.42	08.12	09.40
	23.38	20	22.28 (18)	22.22	28	21.10 (19)	20.40	18.57	16.16	15.01
4	03.32		22.09 (18)	04.53	20.41 (19)	06.22	07.44	08.15	09.42
	23.37	20	22.29 (18)	22.19	29	21.10 (19)	20.37	18.54	16.13	14.59
5	03.34		22.10 (18)	04.56	20.42 (19)	06.25	07.47	08.18	09.44
	23.35	18	22.28 (18)	22.16	28	21.10 (19)	20.33	18.51	16.10	14.58
6	03.36		22.10 (18)	04.59	20.41 (19)	06.28	07.50	08.21	09.47
	23.34	18	22.28 (18)	22.13	28	21.09 (19)	20.30	18.47	16.07	14.56
7	03.38		22.11 (18)	05.02	20.42 (19)	06.30	07.53	08.24	09.49
	23.32	17	22.28 (18)	22.10	27	21.09 (19)	20.26	18.44	16.04	14.55
8	03.40		22.11 (18)	05.05	20.42 (19)	06.33	07.56	08.27	09.51
	23.30	16	22.27 (18)	22.06	26	21.08 (19)	20.23	18.40	16.01	14.54
9	03.42		22.12 (18)	05.08	20.43 (19)	06.36	07.58	08.30	09.53
	23.28	15	22.27 (18)	22.03	25	21.08 (19)	20.19	18.37	15.58	14.52
10	03.44		22.14 (18)	05.11	20.44 (19)	06.39	08.01	08.33	09.55
	23.26	12	22.26 (18)	22.00	24	21.08 (19)	20.16	18.34	15.56	14.51
11	03.46		22.14 (18)	05.14	20.44 (19)	06.41	08.04	08.36	09.57
	23.24	11	22.25 (18)	21.57	22	21.06 (19)	20.13	18.30	15.53	14.51
12	03.49		22.16 (18)	05.16	20.45 (19)	06.44	08.07	08.39	09.59
	23.22	7	22.23 (18)	21.54	20	21.05 (19)	20.09	18.27	15.50	14.50
13	03.51			05.19	20.46 (19)	06.47	08.10	08.42	10.00
	23.20			21.50	17	21.03 (19)	20.06	18.24	15.47	14.49
14	03.54			05.22	20.48 (19)	06.50	08.13	08.45	10.02
	23.18			21.47	13	21.01 (19)	20.02	18.20	15.44	14.48
15	03.56			05.25	20.52 (19)	06.52	08.16	08.48	10.03
	23.15			21.44	6	20.58 (19)	19.59	18.17	15.42	14.48
16	03.59			05.28		06.55	08.18	08.52	10.05
	23.13			21.40		19.55	18.14	15.39	14.48
17	04.01			05.31		06.58	08.21	08.55	10.06
	23.11			21.37		19.52	18.10	15.36	14.47
18	04.04			05.34		07.01	08.24	08.58	10.07
	23.08			21.34		19.49	18.07	15.34	14.47
19	04.07			05.37		07.03	08.27	09.01	10.08
	23.05			21.31		19.45	18.04	15.31	14.47
20	04.10		20.53 (19)	05.40		07.06	08.30	09.04	10.09
	23.03	5	20.58 (19)	21.27		19.42	18.01	15.29	14.47
21	04.12		20.51 (19)	05.43		07.09	08.33	09.07	10.10
	23.00	11	21.02 (19)	21.24		19.38	17.57	15.26	14.48
22	04.15		20.49 (19)	05.45		07.11	08.36	09.09	10.10
	22.57	14	21.03 (19)	21.21		19.35	17.54	15.24	14.48
23	04.18		20.48 (19)	05.48		07.14	08.39	09.12	10.11
	22.55	16	21.04 (19)	21.17		19.31	17.51	15.21	14.49
24	04.21		20.46 (19)	05.51		07.17	08.42	09.15	10.11
	22.52	19	21.05 (19)	21.14		19.28	17.48	15.19	14.49
25	04.24		20.46 (19)	05.54		07.20	07.45	09.18	10.11
	22.49	21	21.07 (19)	21.10		19.25	16.44	15.17	14.50
26	04.26		20.45 (19)	05.57		07.22	07.48	09.21	10.11
	22.46	22	21.07 (19)	21.07		19.21	16.41	15.14	14.51
27	04.29		20.45 (19)	06.00		07.25	07.51	09.24	10.11
	22.43	23	21.08 (19)	21.04		19.18	16.38	15.12	14.52
28	04.32		20.44 (19)	06.03		07.28	07.54	09.27	10.11
	22.40	25	21.09 (19)	21.00		19.14	16.35	15.10	14.53
29	04.35		20.43 (19)	06.05		07.31	07.57	09.29	10.11
	22.37	26	21.09 (19)	20.57		19.11	16.32	15.08	14.55
30	04.38		20.43 (19)	06.08		07.33	08.00	09.32	10.10
	22.34	27	21.10 (19)	20.54		19.08	16.29	15.06	14.56
31	04.41		20.42 (19)	06.11			08.03		10.10
	22.31	27	21.09 (19)	20.50			16.26		14.57
Potential sun hours	594			502		392	308	206	151
Total, worst case		432			349				
Sun reduction		0,39			0,32				
Oper. time red.		0,99			0,99				
Wind dir. red.		0,62			0,60				
Total reduction		0,24			0,19				
Total, real		102			66				

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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SHADOW - Calendar

Calculation: VE1_19xRD180xHH190_No ForestShadow receptor: C - C Lomarakennus (Säderändan 166)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March		April		May		June
1	10.09	09.07	07.39		06.54		19.10 (19)	05.13	20.32 (18)	03.44
	14.59	16.23	17.49		20.18	24	19.34 (19)	21.45	23	20.55 (18)	23.15
2	10.08	09.04	07.36		06.51		19.09 (19)	05.10	20.31 (18)	03.42
	15.01	16.26	17.52		20.21	25	19.34 (19)	21.48	25	20.56 (18)	23.17
3	10.08	09.01	07.33		06.47		19.08 (19)	05.07	20.30 (18)	03.40
	15.03	16.29	17.55		20.23	26	19.34 (19)	21.51	26	20.56 (18)	23.20
4	10.06	08.58	07.29		06.44		19.07 (19)	05.04	20.29 (18)	03.38
	15.05	16.32	17.58		20.26	27	19.34 (19)	21.54	27	20.56 (18)	23.22
5	10.05	08.55	07.26		06.41		19.07 (19)	05.00	20.29 (18)	03.36
	15.07	16.36	18.01		20.29	27	19.34 (19)	21.57	27	20.56 (18)	23.24
6	10.04	08.52	07.23		06.37		19.07 (19)	04.57	20.28 (18)	03.34
	15.09	16.39	18.04		20.32	26	19.33 (19)	22.00	28	20.56 (18)	23.26
7	10.03	08.49	07.19		06.34		19.07 (19)	04.54	20.29 (18)	03.32
	15.11	16.42	18.06		20.35	26	19.33 (19)	22.03	28	20.57 (18)	23.28
8	10.01	08.46	07.16		06.30		19.08 (19)	04.51	20.28 (18)	03.31
	15.14	16.45	18.09		20.38	24	19.32 (19)	22.06	29	20.57 (18)	23.30
9	10.00	08.43	07.13		06.27		19.07 (19)	04.48	20.28 (18)	03.29
	15.16	16.48	18.12		20.41	23	19.30 (19)	22.09	28	20.56 (18)	23.32
10	09.58	08.40	07.09		06.24		19.08 (19)	04.45	20.28 (18)	03.28
	15.19	16.51	18.15		20.43	22	19.30 (19)	22.12	28	20.56 (18)	23.34
11	09.57	08.37	07.06		06.20		19.10 (19)	04.41	20.29 (18)	03.26
	15.21	16.54	18.18		20.46	18	19.28 (19)	22.15	27	20.56 (18)	23.36
12	09.55	08.34	07.03		06.17		19.12 (19)	04.38	20.29 (18)	03.25
	15.24	16.57	18.21		20.49	14	19.26 (19)	22.18	26	20.55 (18)	23.37
13	09.53	08.31	06.59		06.13		19.14 (19)	04.35	20.30 (18)	03.24
	15.26	17.01	18.24		20.52	9	19.23 (19)	22.21	25	20.55 (18)	23.39
14	09.51	08.28	06.56		06.10			04.32	20.30 (18)	03.23
	15.29	17.04	18.27		20.55			22.24	24	20.54 (18)	23.40
15	09.49	08.25	06.52		06.07			04.29	20.31 (18)	03.22
	15.32	17.07	18.30		20.58			22.27	23	20.54 (18)	23.41
16	09.47	08.22	06.49		06.03			04.26	20.31 (18)	03.21
	15.35	17.10	18.32		21.01			22.30	22	20.53 (18)	23.42
17	09.45	08.18	06.46		06.00			04.23	20.32 (18)	03.21
	15.37	17.13	18.35		21.04			22.33	20	20.52 (18)	23.43
18	09.43	08.15	06.42		05.56			04.20	20.34 (18)	03.20
	15.40	17.16	18.38		21.07			22.36	18	20.52 (18)	23.44
19	09.40	08.12	06.39		05.53			04.18	20.35 (18)	03.20
	15.43	17.19	18.41		21.10			22.39	15	20.50 (18)	23.44
20	09.38	08.09	06.35		05.50			04.15	20.37 (18)	03.20
	15.46	17.22	18.44		21.12			22.42	11	20.48 (18)	23.45
21	09.36	08.06	06.32		05.46			04.12	20.39 (18)	03.20
	15.49	17.25	18.47		21.15			22.45	7	20.46 (18)	23.45
22	09.33	08.02	06.28		05.43			04.09		03.20
	15.52	17.28	18.49		21.18			22.48		23.45
23	09.31	07.59	06.25		05.40			04.06		03.20
	15.55	17.31	18.52		21.21			22.51		23.46
24	09.28	07.56	06.22		05.36			04.04		03.21
	15.58	17.34	18.55		21.24			22.54		23.45
25	09.26	07.53	06.18		05.33			04.01		03.21
	16.01	17.37	18.58		21.27			22.57		23.45
26	09.23	07.49	06.15		05.30			03.59		03.22
	16.04	17.40	19.01		21.30			22.59		23.45
27	09.21	07.46	06.11		05.26		20.38 (18)	03.56		03.23
	16.07	17.43	19.04		21.33	10	20.48 (18)	23.02		23.44
28	09.18	07.43	06.08	18.17 (19)	05.23		20.35 (18)	03.53		03.24
	16.10	17.46	19.06	12	18.29 (19)	21.36	16	20.51 (18)	23.05		23.44
29	09.15		07.05	19.14 (19)	05.20		20.33 (18)	03.51		03.25
	16.14		20.09	17	19.31 (19)	21.39	19	20.52 (18)	23.07		23.43
30	09.13		07.01	19.12 (19)	05.17		20.32 (18)	03.49		03.26
	16.17		20.12	21	19.33 (19)	21.42	21	20.53 (18)	23.10		23.42
31	09.10		06.58	19.10 (19)				03.46		
	16.20		20.15	23	19.33 (19)			23.13		
Potential sun hours	182	242	363		447			559		605
Total, worst case				73		357			487	
Sun reduction				0,32		0,41			0,48	
Oper. time red.				0,99		0,99			0,99	
Wind dir. red.				0,59		0,59			0,60	
Total reduction				0,19		0,24			0,28	
Total, real				14		86			138	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.55/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190_No ForestShadow receptor: C - C Lomarakennus (Säderändan 166)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	July			August			September			October	November	December
1	03.27			04.44		20.39 (18)	06.14		19.09 (19)	07.36	08.06	09.35
	23.41			22.28	27	21.06 (18)	20.47	18	19.27 (19)	19.04	16.22	15.04
2	03.29			04.47		20.39 (18)	06.17		19.07 (19)	07.39	08.09	09.37
	23.40			22.25	27	21.06 (18)	20.43	22	19.29 (19)	19.01	16.19	15.02
3	03.30			04.50		20.39 (18)	06.19		19.05 (19)	07.42	08.12	09.40
	23.38			22.22	28	21.07 (18)	20.40	23	19.28 (19)	18.57	16.16	15.01
4	03.32			04.53		20.38 (18)	06.22		19.05 (19)	07.44	08.15	09.42
	23.37			22.19	28	21.06 (18)	20.37	24	19.29 (19)	18.54	16.13	14.59
5	03.34			04.56		20.38 (18)	06.25		19.03 (19)	07.47	08.18	09.44
	23.36			22.16	29	21.07 (18)	20.33	26	19.29 (19)	18.51	16.10	14.58
6	03.36			04.59		20.38 (18)	06.28		19.03 (19)	07.50	08.21	09.47
	23.34			22.13	28	21.06 (18)	20.30	26	19.29 (19)	18.47	16.07	14.56
7	03.38			05.02		20.38 (18)	06.30		19.03 (19)	07.53	08.24	09.49
	23.32			22.10	28	21.06 (18)	20.26	26	19.29 (19)	18.44	16.04	14.55
8	03.40			05.05		20.38 (18)	06.33		19.02 (19)	07.56	08.27	09.51
	23.30			22.06	27	21.05 (18)	20.23	26	19.28 (19)	18.40	16.01	14.54
9	03.42			05.08		20.39 (18)	06.36		19.02 (19)	07.58	08.30	09.53
	23.28			22.03	26	21.05 (18)	20.19	26	19.28 (19)	18.37	15.58	14.52
10	03.44			05.11		20.39 (18)	06.39		19.02 (19)	08.01	08.33	09.55
	23.27			22.00	26	21.05 (18)	20.16	26	19.28 (19)	18.34	15.55	14.51
11	03.46			05.13		20.39 (18)	06.41		19.02 (19)	08.04	08.36	09.57
	23.24			21.57	25	21.04 (18)	20.13	24	19.26 (19)	18.30	15.53	14.50
12	03.49			05.16		20.40 (18)	06.44		19.03 (19)	08.07	08.39	09.59
	23.22			21.54	23	21.03 (18)	20.09	22	19.25 (19)	18.27	15.50	14.50
13	03.51			05.19		20.40 (18)	06.47		19.04 (19)	08.10	08.42	10.00
	23.20			21.50	21	21.01 (18)	20.06	20	19.24 (19)	18.24	15.47	14.49
14	03.54			05.22		20.42 (18)	06.50		19.04 (19)	08.13	08.45	10.02
	23.18			21.47	18	21.00 (18)	20.02	18	19.22 (19)	18.20	15.44	14.48
15	03.56			05.25		20.44 (18)	06.52		19.06 (19)	08.16	08.49	10.03
	23.15			21.44	15	20.59 (18)	19.59	13	19.19 (19)	18.17	15.41	14.48
16	03.59			05.28		20.46 (18)	06.55		19.10 (19)	08.18	08.52	10.05
	23.13			21.41	9	20.55 (18)	19.55	5	19.15 (19)	18.14	15.39	14.47
17	04.01			05.31			06.58			08.21	08.55	10.06
	23.11			21.37			19.52			18.10	15.36	14.47
18	04.04			05.34			07.01			08.24	08.58	10.07
	23.08			21.34			19.49			18.07	15.34	14.47
19	04.07			05.37			07.03			08.27	09.01	10.08
	23.05			21.31			19.45			18.04	15.31	14.47
20	04.09			05.40			07.06			08.30	09.04	10.09
	23.03			21.27			19.42			18.01	15.28	14.47
21	04.12			05.43			07.09			08.33	09.07	10.10
	23.00			21.24			19.38			17.57	15.26	14.48
22	04.15		20.52 (18)	05.45			07.11			08.36	09.09	10.10
	22.57	2	20.54 (18)	21.21			19.35			17.54	15.24	14.48
23	04.18		20.48 (18)	05.48			07.14			08.39	09.12	10.11
	22.55	10	20.58 (18)	21.17			19.31			17.51	15.21	14.49
24	04.21		20.46 (18)	05.51			07.17			08.42	09.15	10.11
	22.52	13	20.59 (18)	21.14			19.28			17.48	15.19	14.49
25	04.24		20.45 (18)	05.54			07.20			07.45	09.18	10.11
	22.49	16	21.01 (18)	21.10			19.25			16.44	15.17	14.50
26	04.26		20.43 (18)	05.57			07.22			07.48	09.21	10.11
	22.46	19	21.02 (18)	21.07			19.21			16.41	15.14	14.51
27	04.29		20.42 (18)	06.00			07.25			07.51	09.24	10.11
	22.43	21	21.03 (18)	21.04			19.18			16.38	15.12	14.52
28	04.32		20.42 (18)	06.03			07.28			07.54	09.27	10.11
	22.40	22	21.04 (18)	21.00			19.14			16.35	15.10	14.53
29	04.35		20.40 (18)	06.05			07.31			07.57	09.29	10.11
	22.37	24	21.04 (18)	20.57			19.11			16.32	15.08	14.54
30	04.38		20.40 (18)	06.08		19.14 (19)	07.33			08.00	09.32	10.11
	22.34	25	21.05 (18)	20.54	10	19.24 (19)	19.08			16.29	15.06	14.56
31	04.41		20.39 (18)	06.11		19.11 (19)				08.03		10.10
	22.31	26	21.05 (18)	20.50	14	19.25 (19)				16.25		14.57
Potential sun hours	594			502			392			308	206	151
Total, worst case		178			409			345				
Sun reduction		0,39			0,32			0,33				
Oper. time red.		0,99			0,99			0,99				
Wind dir. red.		0,60			0,60			0,59				
Total reduction		0,23			0,19			0,19				
Total, real		41			77			66				

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.55/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190_No ForestShadow receptor: D - D Lomarakennus (Söderändan 188)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March		April		May	June
1	10.09	09.07	07.39		06.54		05.13	03.44
	14.59	16.23	17.49		20.18		21.45	23.15
2	10.08	09.04	07.36		06.51		05.10	03.42
	15.01	16.26	17.52		20.21		21.48	23.17
3	10.08	09.01	07.33		06.47		05.07	03.40
	15.03	16.29	17.55		20.23		21.51	23.20
4	10.07	08.58	07.29		06.44		05.04	03.38
	15.05	16.32	17.58		20.26		21.54	23.22
5	10.05	08.55	07.26		06.41		05.00	03.36
	15.07	16.36	18.01		20.29		21.57	23.24
6	10.04	08.52	07.23		06.37		04.57	03.34
	15.09	16.39	18.04		20.32		22.00	23.27
7	10.03	08.49	07.19		06.34		04.54	03.32
	15.11	16.42	18.06		20.35		22.03	23.29
8	10.01	08.46	07.16		06.30	19.45 (18)	04.51	03.31
	15.14	16.45	18.09		20.38	12 19.57 (18)	22.06	23.31
9	10.00	08.43	07.13		06.27	19.42 (18)	04.48	03.29
	15.16	16.48	18.12		20.41	17 19.59 (18)	22.09	23.32
10	09.58	08.40	07.09		06.23	19.40 (18)	04.45	03.28
	15.19	16.51	18.15		20.43	21 20.01 (18)	22.12	23.34
11	09.57	08.37	07.06		06.20	19.39 (18)	04.41	03.26
	15.21	16.54	18.18		20.46	23 20.02 (18)	22.15	23.36
12	09.55	08.34	07.03	17.34 (19)	06.17	19.38 (18)	04.38	03.25
	15.24	16.57	18.21	11 17.45 (19)	20.49	25 20.03 (18)	22.18	23.37
13	09.53	08.31	06.59	17.31 (19)	06.13	19.36 (18)	04.35	03.24
	15.26	17.00	18.24	16 17.47 (19)	20.52	26 20.02 (18)	22.21	23.39
14	09.51	08.28	06.56	17.29 (19)	06.10	19.36 (18)	04.32	03.23
	15.29	17.04	18.27	20 17.49 (19)	20.55	27 20.03 (18)	22.24	23.40
15	09.49	08.25	06.52	17.28 (19)	06.06	19.35 (18)	04.29	03.22
	15.32	17.07	18.29	21 17.49 (19)	20.58	28 20.03 (18)	22.27	23.41
16	09.47	08.22	06.49	17.27 (19)	06.03	19.35 (18)	04.26	03.21
	15.35	17.10	18.32	23 17.50 (19)	21.01	28 20.03 (18)	22.30	23.42
17	09.45	08.18	06.46	17.26 (19)	06.00	19.34 (18)	04.23	03.21
	15.37	17.13	18.35	24 17.50 (19)	21.04	28 20.02 (18)	22.33	23.43
18	09.43	08.15	06.42	17.25 (19)	05.56	19.34 (18)	04.20	03.20
	15.40	17.16	18.38	25 17.50 (19)	21.07	28 20.02 (18)	22.36	23.44
19	09.41	08.12	06.39	17.26 (19)	05.53	19.34 (18)	04.18	03.20
	15.43	17.19	18.41	24 17.50 (19)	21.10	28 20.02 (18)	22.39	23.45
20	09.38	08.09	06.35	17.25 (19)	05.50	19.35 (18)	04.15	03.20
	15.46	17.22	18.44	24 17.49 (19)	21.12	26 20.01 (18)	22.42	23.45
21	09.36	08.06	06.32	17.25 (19)	05.46	19.35 (18)	04.12	03.20
	15.49	17.25	18.47	24 17.49 (19)	21.15	25 20.00 (18)	22.45	23.45
22	09.33	08.02	06.28	17.25 (19)	05.43	19.36 (18)	04.09	03.20
	15.52	17.28	18.49	23 17.48 (19)	21.18	24 20.00 (18)	22.48	23.46
23	09.31	07.59	06.25	17.26 (19)	05.40	19.37 (18)	04.06	03.20
	15.55	17.31	18.52	21 17.47 (19)	21.21	22 19.59 (18)	22.51	23.46
24	09.28	07.56	06.22	17.26 (19)	05.36	19.37 (18)	04.04	03.21
	15.58	17.34	18.55	19 17.45 (19)	21.24	19 19.56 (18)	22.54	23.45
25	09.26	07.53	06.18	17.28 (19)	05.33	19.39 (18)	04.01	03.21
	16.01	17.37	18.58	15 17.43 (19)	21.27	16 19.55 (18)	22.57	23.45
26	09.23	07.49	06.15	17.30 (19)	05.30	19.41 (18)	03.58	03.22
	16.04	17.40	19.01	10 17.40 (19)	21.30	11 19.52 (18)	22.59	23.45
27	09.21	07.46	06.11		05.26		03.56	03.23
	16.07	17.43	19.04		21.33		23.02	23.44
28	09.18	07.43	06.08		05.23		03.53	03.24
	16.10	17.46	19.06		21.36		23.05	23.44
29	09.15		07.05		05.20		03.51	03.25
	16.14		20.09		21.39		23.07	23.43
30	09.13		07.01		05.16		03.49	03.26
	16.17		20.12		21.42		23.10	23.42
31	09.10		06.58				03.46	
	16.20		20.15				23.13	
Potential sun hours	182	242	363		447		559	605
Total, worst case				300		434		
Sun reduction				0,32		0,41		
Oper. time red.				0,99		0,99		
Wind dir. red.				0,57		0,58		
Total reduction				0,18		0,24		
Total, real				54		103		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.55/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190_No ForestShadow receptor: D - D Lomarakennus (Söderändan 188)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October		November	December
1	03.27	04.44		06.14		19.38 (18)	07.36	18.12 (19)	08.06	09.35
	23.41	22.28		20.47	23	20.01 (18)	19.04	14 18.26 (19)	16.22	15.04
2	03.29	04.47		06.17		19.39 (18)	07.39	18.15 (19)	08.09	09.37
	23.40	22.25		20.43	21	20.00 (18)	19.01	7 18.22 (19)	16.19	15.02
3	03.30	04.50		06.19		19.40 (18)	07.42		08.12	09.40
	23.38	22.22		20.40	17	19.57 (18)	18.57		16.16	15.01
4	03.32	04.53		06.22		19.42 (18)	07.44		08.15	09.42
	23.37	22.19		20.37	12	19.54 (18)	18.54		16.13	14.59
5	03.34	04.56		06.25			07.47		08.18	09.44
	23.36	22.16		20.33			18.51		16.10	14.58
6	03.36	04.59		06.28			07.50		08.21	09.47
	23.34	22.13		20.30			18.47		16.07	14.56
7	03.38	05.02		06.30			07.53		08.24	09.49
	23.32	22.10		20.26			18.44		16.04	14.55
8	03.40	05.05		06.33			07.56		08.27	09.51
	23.30	22.07		20.23			18.40		16.01	14.54
9	03.42	05.08		06.36			07.58		08.30	09.53
	23.29	22.03		20.19			18.37		15.58	14.52
10	03.44	05.11		06.39			08.01		08.33	09.55
	23.27	22.00		20.16			18.34		15.55	14.51
11	03.46	05.13		06.41			08.04		08.36	09.57
	23.24	21.57		20.13			18.30		15.53	14.50
12	03.49	05.16		06.44			08.07		08.39	09.59
	23.22	21.54		20.09			18.27		15.50	14.50
13	03.51	05.19		06.47			08.10		08.42	10.00
	23.20	21.50		20.06			18.24		15.47	14.49
14	03.54	05.22		06.50			08.13		08.45	10.02
	23.18	21.47		20.02			18.20		15.44	14.48
15	03.56	05.25		06.52			08.16		08.49	10.03
	23.16	21.44		19.59			18.17		15.41	14.48
16	03.59	05.28	19.52 (18)	06.55			08.18		08.52	10.05
	23.13	21.41	4 19.56 (18)	19.55			18.14		15.39	14.47
17	04.01	05.31	19.48 (18)	06.58		18.20 (19)	08.21		08.55	10.06
	23.11	21.37	12 20.00 (18)	19.52	8	18.28 (19)	18.10		15.36	14.47
18	04.04	05.34	19.45 (18)	07.01		18.17 (19)	08.24		08.58	10.07
	23.08	21.34	16 20.01 (18)	19.49	14	18.31 (19)	18.07		15.33	14.47
19	04.07	05.37	19.43 (18)	07.03		18.15 (19)	08.27		09.01	10.08
	23.06	21.31	20 20.03 (18)	19.45	17	18.32 (19)	18.04		15.31	14.47
20	04.09	05.40	19.42 (18)	07.06		18.12 (19)	08.30		09.04	10.09
	23.03	21.27	22 20.04 (18)	19.42	20	18.32 (19)	18.01		15.28	14.47
21	04.12	05.43	19.40 (18)	07.09		18.11 (19)	08.33		09.07	10.10
	23.00	21.24	24 20.04 (18)	19.38	22	18.33 (19)	17.57		15.26	14.48
22	04.15	05.45	19.40 (18)	07.11		18.10 (19)	08.36		09.10	10.10
	22.58	21.21	25 20.05 (18)	19.35	24	18.34 (19)	17.54		15.23	14.48
23	04.18	05.48	19.38 (18)	07.14		18.09 (19)	08.39		09.12	10.11
	22.55	21.17	27 20.05 (18)	19.31	24	18.33 (19)	17.51		15.21	14.48
24	04.21	05.51	19.38 (18)	07.17		18.09 (19)	08.42		09.15	10.11
	22.52	21.14	27 20.05 (18)	19.28	24	18.33 (19)	17.48		15.19	14.49
25	04.23	05.54	19.38 (18)	07.20		18.08 (19)	07.45		09.18	10.11
	22.49	21.10	28 20.06 (18)	19.25	25	18.33 (19)	16.44		15.17	14.50
26	04.26	05.57	19.37 (18)	07.22		18.09 (19)	07.48		09.21	10.11
	22.46	21.07	28 20.05 (18)	19.21	24	18.33 (19)	16.41		15.14	14.51
27	04.29	06.00	19.37 (18)	07.25		18.08 (19)	07.51		09.24	10.11
	22.43	21.04	28 20.05 (18)	19.18	23	18.31 (19)	16.38		15.12	14.52
28	04.32	06.02	19.36 (18)	07.28		18.08 (19)	07.54		09.27	10.11
	22.40	21.00	28 20.04 (18)	19.14	22	18.30 (19)	16.35		15.10	14.53
29	04.35	06.05	19.37 (18)	07.31		18.09 (19)	07.57		09.29	10.11
	22.37	20.57	27 20.04 (18)	19.11	20	18.29 (19)	16.32		15.08	14.54
30	04.38	06.08	19.37 (18)	07.33		18.10 (19)	08.00		09.32	10.11
	22.34	20.54	26 20.03 (18)	19.07	18	18.28 (19)	16.29		15.06	14.56
31	04.41	06.11	19.37 (18)				08.03			10.10
	22.31	20.50	25 20.02 (18)				16.25			14.57
Potential sun hours	594	502		392			308		206	151
Total, worst case			367		358			21		
Sun reduction			0,32		0,33			0,35		
Oper. time red.			0,99		0,99			0,99		
Wind dir. red.			0,58		0,57			0,57		
Total reduction			0,18		0,19			0,19		
Total, real			67		67			4		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.55/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190_No ForestShadow receptor: E - E Asuinrakennus (Rökiöntie 930)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March		April	May	June	July	August	September		October		November	December
1	10.09	09.07	07.39		06.54	05.13	03.44	03.27	04.44	06.14		07.36	17.54 (18)	08.06	09.35
	14.59	16.23	17.49		20.18	21.45	23.15	23.41	22.28	20.47		19.04	23 18.17 (18)	16.22	15.04
2	10.09	09.04	07.36		06.51	05.10	03.42	03.29	04.47	06.16		07.39	17.54 (18)	08.09	09.37
	15.01	16.26	17.52		20.21	21.48	23.18	23.40	22.25	20.43		19.01	22 18.16 (18)	16.19	15.02
3	10.08	09.01	07.33		06.47	05.07	03.40	03.30	04.50	06.19		07.42	17.54 (18)	08.12	09.40
	15.03	16.29	17.55		20.23	21.51	23.20	23.39	22.22	20.40		18.57	20 18.14 (18)	16.16	15.01
4	10.07	08.58	07.29		06.44	05.03	03.38	03.32	04.53	06.22		07.44	17.55 (18)	08.15	09.42
	15.05	16.32	17.58		20.26	21.54	23.22	23.37	22.19	20.37		18.54	18 18.13 (18)	16.13	14.59
5	10.06	08.55	07.26		06.41	05.00	03.36	03.34	04.56	06.25		07.47	17.57 (18)	08.18	09.45
	15.07	16.35	18.01		20.29	21.57	23.24	23.36	22.16	20.33		18.51	13 18.10 (18)	16.10	14.57
6	10.04	08.52	07.23		06.37	04.57	03.34	03.35	04.59	06.28		07.50	18.00 (18)	08.21	09.47
	15.09	16.39	18.04		20.32	22.00	23.27	23.34	22.13	20.30		18.47	7 18.07 (18)	16.07	14.56
7	10.03	08.49	07.19		06.34	04.54	03.32	03.37	05.02	06.30		07.53		08.24	09.49
	15.11	16.42	18.06		20.35	22.03	23.29	23.32	22.10	20.26		18.44		16.04	14.55
8	10.02	08.46	07.16		17.21 (18)	06.30	04.51	03.30	03.40	05.05		06.33		07.56	08.27	09.51
	15.14	16.45	18.09	11	17.32 (18)	20.38	22.06	23.31	23.31	22.07		20.23		18.40	16.01	14.53
9	10.00	08.43	07.13		17.18 (18)	06.27	04.48	03.29	03.42	05.08		06.36		07.58	08.30	09.53
	15.16	16.48	18.12	16	17.34 (18)	20.41	22.09	23.32	23.29	22.03		20.19		18.37	15.58	14.52
10	09.58	08.40	07.09		17.17 (18)	06.23	04.44	03.27	03.44	05.10		06.39		08.01	08.33	09.55
	15.18	16.51	18.15	19	17.36 (18)	20.43	22.12	23.34	23.27	22.00		20.16		18.34	15.55	14.51
11	09.57	08.37	07.06		17.15 (18)	06.20	04.41	03.26	03.46	05.13		06.41		08.04	08.36	09.57
	15.21	16.54	18.18	22	17.37 (18)	20.46	22.15	23.36	23.25	21.57		20.13		18.30	15.53	14.50
12	09.55	08.34	07.02		17.14 (18)	06.17	04.38	03.25	03.49	05.16		06.44		08.07	08.39	09.59
	15.24	16.57	18.21	24	17.38 (18)	20.49	22.19	23.37	23.22	21.54		20.09		18.27	15.50	14.49
13	09.53	08.31	06.59		17.13 (18)	06.13	04.35	03.24	03.51	05.19		06.47		08.10	08.42	10.01
	15.26	17.00	18.24	24	17.37 (18)	20.52	22.22	23.39	23.20	21.50		20.06		18.24	15.47	14.49
14	09.51	08.28	06.56		17.13 (18)	06.10	04.32	03.23	03.53	05.22		06.50		08.13	08.46	10.02
	15.29	17.04	18.27	25	17.38 (18)	20.55	22.25	23.40	23.18	21.47		20.02		18.20	15.44	14.48
15	09.49	08.25	06.52		17.12 (18)	06.06	04.29	03.22	03.56	05.25		06.52		08.16	08.49	10.04
	15.32	17.07	18.29	25	17.37 (18)	20.58	22.28	23.41	23.16	21.44		19.59		18.17	15.41	14.48
16	09.47	08.22	06.49		17.12 (18)	06.03	04.26	03.21	03.59	05.28		06.55		08.18	08.52	10.05
	15.34	17.10	18.32	25	17.37 (18)	21.01	22.31	23.42	23.13	21.41		19.55		18.14	15.39	14.47
17	09.45	08.18	06.46		17.12 (18)	06.00	04.23	03.21	04.01	05.31		06.58		08.21	08.55	10.06
	15.37	17.13	18.35	24	17.36 (18)	21.04	22.34	23.43	23.11	21.37		19.52		18.10	15.36	14.47
18	09.43	08.15	06.42		17.12 (18)	05.56	04.20	03.20	04.04	05.34		07.01		08.24	08.58	10.07
	15.40	17.16	18.38	24	17.36 (18)	21.07	22.36	23.44	23.08	21.34		19.49		18.07	15.33	14.47
19	09.41	08.12	06.39		17.13 (18)	05.53	04.17	03.20	04.07	05.37		07.03		08.27	09.01	10.08
	15.43	17.19	18.41	22	17.35 (18)	21.10	22.39	23.45	23.06	21.31		19.45		18.04	15.31	14.47
20	09.38	08.09	06.35		17.13 (18)	05.50	04.15	03.20	04.09	05.40		07.06		08.30	09.04	10.09
	15.46	17.22	18.44	20	17.33 (18)	21.12	22.42	23.45	23.03	21.27		19.42		18.01	15.28	14.47
21	09.36	08.06	06.32		17.15 (18)	05.46	04.12	03.20	04.12	05.42		07.09	18.03 (18)	08.33	09.07	10.10
	15.49	17.25	18.47	17	17.32 (18)	21.15	22.45	23.45	23.00	21.24		19.38	11 18.14 (18)	17.57	15.26	14.47
22	09.33	08.02	06.28		17.17 (18)	05.43	04.09	03.20	04.15	05.45		07.11	18.01 (18)	08.36	09.10	10.10
	15.52	17.28	18.49	12	17.29 (18)	21.18	22.48	23.46	22.58	21.21		19.35	16 18.17 (18)	17.54	15.23	14.48
23	09.31	07.59	06.25		17.21 (18)	05.40	04.06	03.20	04.18	05.48		07.14	17.58 (18)	08.39	09.13	10.11
	15.55	17.31	18.52	4	17.25 (18)	21.21	22.51	23.46	22.55	21.17		19.31	19 18.17 (18)	17.51	15.21	14.48
24	09.29	07.56	06.22			05.36	04.04	03.20	04.21	05.51		07.17	17.57 (18)	08.42	09.15	10.11
	15.58	17.34	18.55			21.24	22.54	23.46	22.52	21.14		19.28	21 18.18 (18)	17.48	15.19	14.49
25	09.26	07.53	06.18			05.33	04.01	03.21	04.23	05.54		07.20	17.56 (18)	07.45	09.18	10.11
	16.01	17.37	18.58			21.27	22.57	23.45	22.49	21.11		19.25	23 18.19 (18)	16.44	15.16	14.50
26	09.23	07.49	06.15			05.30	03.58	03.22	04.26	05.57		07.22	17.55 (18)	07.48	09.21	10.12
	16.04	17.40	19.01			21.30	22.59	23.45	22.46	21.07		19.21	24 18.19 (18)	16.41	15.14	14.51
27	09.21	07.46	06.11			05.26	03.56	03.22	04.29	06.00		07.25	17.53 (18)	07.51	09.24	10.12
	16.07	17.43	19.04			21.33	23.02	23.44	22.43	21.04		19.18	25 18.18 (18)	16.38	15.12	14.52
28	09.18	07.43	06.08			05.23	03.53	03.23	04.32	06.02		07.28	17.53 (18)	07.54	09.27	10.11
	16.10	17.46	19.06			21.36	23.05	23.44	22.40	21.00		19.14	25 18.18 (18)	16.35	15.10	14.53
29	09.15		07.04			05.20	03.51	03.24	04.35	06.05		07.31	17.53 (18)	07.57	09.29	10.11
	16.13		20.09			21.39	23.08	23.43	22.38	20.57		19.11	25 18.18 (18)	16.32	15.08	14.54
30	09.13		07.01			05.16	03.49	03.26	04.38	06.08		07.33	17.53 (18)	08.00	09.32	10.11
	16.17		20.12			21.42	23.10	23.42	22.35	20.54		19.07	25 18.18 (18)	16.29	15.06	14.56
31	09.10		06.58				03.46		04.41	06.11				08.03		10.10
	16.20		20.15				23.13		22.32	20.50				16.25		14.57
Potential sun hours	182	242	363		447	559	605	594	502	392		308		206	151	
Total, worst case				314							214		103			
Sun reduction				0,32							0,33		0,35			
Oper. time red.				0,99							0,99		0,99			
Wind dir. red.				0,58							0,58		0,58			
Total reduction				0,19							0,19		0,20			
Total, real				58							41		21			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.55/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190_No ForestShadow receptor: F - F Asuinrakennus (Kukkusintie 474)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January			February			March	April	May	June
1	10.10			09.07		13.40 (14)	07.39	06.54	05.13	03.43
	14.59			16.23	22	14.02 (14)	17.49	20.18	21.45	23.16
2	10.09			09.04		13.41 (14)	07.36	06.51	05.10	03.41
	15.01			16.26	20	14.01 (14)	17.52	20.21	21.48	23.18
3	10.08			09.01		13.43 (14)	07.33	06.47	05.06	03.39
	15.02			16.29	17	14.00 (14)	17.55	20.23	21.51	23.20
4	10.07			08.59		13.45 (14)	07.29	06.44	05.03	03.37
	15.04			16.32	13	13.58 (14)	17.58	20.26	21.55	23.23
5	10.06			08.56		13.49 (14)	07.26	06.40	05.00	03.35
	15.06			16.35	6	13.55 (14)	18.01	20.29	21.58	23.25
6	10.05			08.53			07.23	06.37	04.57	03.33
	15.09			16.38			18.03	20.32	22.01	23.27
7	10.03			08.50		15.44 (13)	07.19	06.34	04.54	03.31
	15.11			16.41	8	15.52 (13)	18.06	20.35	22.04	23.29
8	10.02			08.47		15.41 (13)	07.16	06.30	04.50	03.30
	15.13			16.45	14	15.55 (13)	18.09	20.38	22.07	23.31
9	10.00			08.44		15.40 (13)	07.13	06.27	04.47	03.28
	15.16			16.48	17	15.57 (13)	18.12	20.41	22.10	23.33
10	09.59		13.42 (14)	08.41		15.38 (13)	07.09	06.23	04.44	03.27
	15.18	6	13.48 (14)	16.51	20	15.58 (13)	18.15	20.43	22.13	23.35
11	09.57		13.39 (14)	08.37		15.38 (13)	07.06	06.20	04.41	03.25
	15.21	11	13.50 (14)	16.54	22	16.00 (13)	18.18	20.46	22.16	23.37
12	09.55		13.39 (14)	08.34		15.37 (13)	07.02	06.16	04.38	03.24
	15.23	13	13.52 (14)	16.57	23	16.00 (13)	18.21	20.49	22.19	23.38
13	09.53		13.38 (14)	08.31		15.37 (13)	06.59	06.13	04.35	03.23
	15.26	16	13.54 (14)	17.00	24	16.01 (13)	18.24	20.52	22.22	23.39
14	09.52		13.37 (14)	08.28		15.36 (13)	06.56	06.10	04.32	03.22
	15.28	17	13.54 (14)	17.03	25	16.01 (13)	18.27	20.55	22.25	23.41
15	09.50		13.37 (14)	08.25		15.36 (13)	06.52	06.06	04.29	03.21
	15.31	19	13.56 (14)	17.06	26	16.02 (13)	18.29	20.58	22.28	23.42
16	09.47		13.37 (14)	08.22		15.36 (13)	06.49	06.03	04.26	03.20
	15.34	21	13.58 (14)	17.10	26	16.02 (13)	18.32	21.01	22.31	23.43
17	09.45		13.36 (14)	08.19		15.36 (13)	06.45	06.00	04.23	03.20
	15.37	22	13.58 (14)	17.13	26	16.02 (13)	18.35	21.04	22.34	23.44
18	09.43		13.36 (14)	08.15		15.36 (13)	06.42	05.56	04.20	03.19
	15.40	23	13.59 (14)	17.16	25	16.01 (13)	18.38	21.07	22.37	23.45
19	09.41		13.36 (14)	08.12		15.37 (13)	06.39	05.53	04.17	03.19
	15.43	23	13.59 (14)	17.19	24	16.01 (13)	18.41	21.10	22.40	23.45
20	09.39		13.36 (14)	08.09		15.37 (13)	06.35	05.49	04.14	03.19
	15.46	25	14.01 (14)	17.22	23	16.00 (13)	18.44	21.13	22.43	23.46
21	09.36		13.36 (14)	08.06		15.38 (13)	06.32	05.46	04.11	03.19
	15.49	25	14.01 (14)	17.25	22	16.00 (13)	18.47	21.16	22.46	23.46
22	09.34		13.36 (14)	08.02		15.39 (13)	06.28	05.43	04.09	03.19
	15.52	26	14.02 (14)	17.28	19	15.58 (13)	18.49	21.19	22.49	23.46
23	09.31		13.36 (14)	07.59		15.41 (13)	06.25	05.39	04.06	03.19
	15.55	26	14.02 (14)	17.31	16	15.57 (13)	18.52	21.21	22.51	23.46
24	09.29		13.36 (14)	07.56		15.43 (13)	06.22	05.36	04.03	03.20
	15.58	27	14.03 (14)	17.34	11	15.54 (13)	18.55	21.24	22.54	23.46
25	09.26		13.37 (14)	07.53			06.18	05.33	04.00	03.20
	16.01	26	14.03 (14)	17.37			18.58	21.27	22.57	23.46
26	09.24		13.37 (14)	07.49			06.15	05.29	03.58	03.21
	16.04	26	14.03 (14)	17.40			19.01	21.30	23.00	23.46
27	09.21		13.38 (14)	07.46			06.11	05.26	03.55	03.22
	16.07	26	14.04 (14)	17.43			19.04	21.33	23.03	23.45
28	09.18		13.37 (14)	07.43			06.08	05.23	03.53	03.23
	16.10	26	14.03 (14)	17.46			19.06	21.36	23.05	23.44
29	09.16		13.38 (14)				07.04	05.19	03.50	03.24
	16.13	26	14.04 (14)				20.09	21.39	23.08	23.44
30	09.13		13.39 (14)				07.01	05.16	03.48	03.25
	16.16	24	14.03 (14)				20.12	21.42	23.11	23.43
31	09.10		13.40 (14)				06.58		03.46	
	16.19	23	14.03 (14)				20.15		23.13	
Potential sun hours	181			242			363	447	560	606
Total, worst case		477			449					
Sun reduction		0,17			0,33					
Oper. time red.		0,99			0,99					
Wind dir. red.		0,67			0,63					
Total reduction		0,12			0,21					
Total, real		56			93					

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.55/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190_No ForestShadow receptor: F - F Asuinrakennus (Kukkusintie 474)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October			November			December		
1	03.26		04.43		06.14		07.36			08.06		15.08 (13)	09.35		13.22 (14)
	23.42		22.29		20.47		19.04			16.22	19	15.27 (13)	15.04	10	13.32 (14)
2	03.28		04.46		06.16		07.39			08.09		15.10 (13)	09.38		13.24 (14)
	23.40		22.26		20.43		19.01			16.19	17	15.27 (13)	15.02	6	13.30 (14)
3	03.29		04.49		06.19		07.42			08.12		15.12 (13)	09.40		
	23.39		22.23		20.40		18.57			16.16	13	15.25 (13)	15.00		
4	03.31		04.52		06.22		07.44			08.15		15.14 (13)	09.43		
	23.38		22.19		20.37		18.54			16.13	7	15.21 (13)	14.59		
5	03.33		04.55		06.25		07.47			08.18			09.45		
	23.36		22.16		20.33		18.50			16.10			14.57		
6	03.35		04.58		06.27		07.50			08.21		13.18 (14)	09.47		
	23.35		22.13		20.30		18.47			16.07	7	13.25 (14)	14.56		
7	03.37		05.01		06.30		07.53			08.24		13.15 (14)	09.49		
	23.33		22.10		20.26		18.44			16.04	14	13.29 (14)	14.54		
8	03.39		05.04		06.33		07.56			08.27		13.14 (14)	09.52		
	23.31		22.07		20.23		18.40			16.01	17	13.31 (14)	14.53		
9	03.41		05.07		06.36		07.59			08.30		13.12 (14)	09.54		
	23.29		22.04		20.19		18.37			15.58	19	13.31 (14)	14.52		
10	03.43		05.10		06.39		08.01			08.33		13.11 (14)	09.56		
	23.27		22.00		20.16		18.34			15.55	22	13.33 (14)	14.51		
11	03.46		05.13		06.41		08.04			08.37		13.11 (14)	09.58		
	23.25		21.57		20.13		18.30			15.52	23	13.34 (14)	14.50		
12	03.48		05.16		06.44		08.07			08.40		13.10 (14)	09.59		
	23.23		21.54		20.09		18.27			15.49	25	13.35 (14)	14.49		
13	03.50		05.19		06.47		08.10			08.43		13.10 (14)	10.01		
	23.21		21.51		20.06		18.24			15.47	25	13.35 (14)	14.48		
14	03.53		05.22		06.49		08.13			08.46		13.09 (14)	10.03		
	23.18		21.47		20.02		18.20			15.44	26	13.35 (14)	14.48		
15	03.55		05.25		06.52		08.16			08.49		13.09 (14)	10.04		
	23.16		21.44		19.59		18.17			15.41	26	13.35 (14)	14.47		
16	03.58		05.28		06.55		08.18			08.52		13.10 (14)	10.05		
	23.14		21.41		19.55		18.14			15.38	26	13.36 (14)	14.47		
17	04.01		05.31		06.58		08.21		16.17 (13)	08.55		13.10 (14)	10.07		
	23.11		21.37		19.52		18.10	5	16.22 (13)	15.36	26	13.36 (14)	14.46		
18	04.03		05.34		07.00		08.24		16.14 (13)	08.58		13.10 (14)	10.08		
	23.09		21.34		19.49		18.07	13	16.27 (13)	15.33	27	13.37 (14)	14.46		
19	04.06		05.36		07.03		08.27		16.11 (13)	09.01		13.11 (14)	10.09		
	23.06		21.31		19.45		18.04	17	16.28 (13)	15.31	26	13.37 (14)	14.46		
20	04.09		05.39		07.06		08.30		16.09 (13)	09.04		13.11 (14)	10.10		
	23.03		21.27		19.42		18.00	20	16.29 (13)	15.28	26	13.37 (14)	14.47		
21	04.12		05.42		07.09		08.33		16.08 (13)	09.07		13.12 (14)	10.10		
	23.01		21.24		19.38		17.57	22	16.30 (13)	15.25	25	13.37 (14)	14.47		
22	04.14		05.45		07.11		08.36		16.07 (13)	09.10		13.12 (14)	10.11		
	22.58		21.21		19.35		17.54	23	16.30 (13)	15.23	25	13.37 (14)	14.47		
23	04.17		05.48		07.14		08.39		16.07 (13)	09.13		13.13 (14)	10.11		
	22.55		21.17		19.31		17.51	24	16.31 (13)	15.21	24	13.37 (14)	14.48		
24	04.20		05.51		07.17		08.42		16.06 (13)	09.16		13.14 (14)	10.12		
	22.52		21.14		19.28		17.47	25	16.31 (13)	15.18	22	13.36 (14)	14.48		
25	04.23		05.54		07.20		07.45		15.05 (13)	09.19		13.14 (14)	10.12		
	22.50		21.11		19.25		16.44	26	15.31 (13)	15.16	22	13.36 (14)	14.49		
26	04.26		05.57		07.22		07.48		15.06 (13)	09.21		13.15 (14)	10.12		
	22.47		21.07		19.21		16.41	26	15.32 (13)	15.14	21	13.36 (14)	14.50		
27	04.29		05.59		07.25		07.51		15.05 (13)	09.24		13.16 (14)	10.12		
	22.44		21.04		19.18		16.38	26	15.31 (13)	15.12	19	13.35 (14)	14.51		
28	04.32		06.02		07.28		07.54		15.06 (13)	09.27		13.17 (14)	10.12		
	22.41		21.00		19.14		16.35	25	15.31 (13)	15.10	18	13.35 (14)	14.52		
29	04.35		06.05		07.31		07.57		15.06 (13)	09.30		13.19 (14)	10.12		
	22.38		20.57		19.11		16.31	24	15.30 (13)	15.08	15	13.34 (14)	14.54		
30	04.38		06.08		07.33		08.00		15.06 (13)	09.32		13.20 (14)	10.11		
	22.35		20.54		19.07		16.28	23	15.29 (13)	15.06	13	13.33 (14)	14.55		
31	04.41		06.11				08.03		15.08 (13)				10.11		
	22.32		20.50				16.25	21	15.29 (13)				14.57		
Potential sun hours	595		503		392		307			206			150		
Total, worst case								320			595			16	
Sun reduction								0,35			0,23			0,20	
Oper. time red.								0,99			0,99			0,99	
Wind dir. red.								0,63			0,67			0,67	
Total reduction								0,22			0,15			0,13	
Total, real								69			92			2	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.55/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190_No ForestShadow receptor: G - G Asuinrakennus (Kovik byväg 53)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.08	07.40	06.55	05.13	03.44	03.27	04.44	06.14	07.37	08.06	09.35
	14.59	16.23	17.49	20.18	21.46	23.16	23.42	22.29	20.47	19.04	16.22	15.04
2	10.09	09.05	07.37	06.51	05.10	03.42	03.28	04.47	06.17	07.39	08.09	09.38
	15.01	16.26	17.52	20.21	21.49	23.19	23.41	22.26	20.44	19.01	16.19	15.02
3	10.08	09.02	07.33	06.48	05.07	03.40	03.30	04.50	06.20	07.42	08.12	09.41
	15.03	16.29	17.55	20.24	21.52	23.21	23.40	22.23	20.40	18.58	16.16	15.01
4	10.07	08.59	07.30	06.44	05.04	03.37	03.32	04.53	06.22	07.45	08.15	09.43
	15.05	16.32	17.58	20.27	21.55	23.23	23.38	22.20	20.37	18.54	16.13	14.59
5	10.06	08.56	07.27	06.41	05.00	03.36	03.33	04.56	06.25	07.48	08.19	09.45
	15.07	16.36	18.01	20.30	21.58	23.25	23.37	22.17	20.34	18.51	16.10	14.57
6	10.05	08.53	07.23	06.37	04.57	03.34	03.35	04.59	06.28	07.51	08.22	09.48
	15.09	16.39	18.04	20.32	22.01	23.28	23.35	22.14	20.30	18.47	16.07	14.56
7	10.04	08.50	07.20	06.34	04.54	03.32	03.37	05.02	06.31	07.53	08.25	09.50
	15.11	16.42	18.07	20.35	22.04	23.30	23.33	22.10	20.27	18.44	16.04	14.55
8	10.02	08.47	07.16	06.31	04.51	03.30	03.39	05.05	06.33	07.56	08.28	09.52
	15.14	16.45	18.10	20.38	22.07	23.32	23.31	22.07	20.23	18.41	16.01	14.53
9	10.01	08.44	07.13	06.27	04.48	03.29	03.41	05.08	06.36	07.59	08.31	09.54
	15.16	16.48	18.13	20.41	22.10	23.33	23.30	22.04	20.20	18.37	15.58	14.52
10	09.59	08.41	07.10	06.24	04.45	03.27	03.44	05.11	06.39	08.02	08.34	09.56
	15.18	16.51	18.15	20.44	22.13	23.35	23.28	22.01	20.16	18.34	15.56	14.51
11	09.58	08.38	07.06	06.20	04.41	03.26	03.46	05.14	06.42	08.05	08.37	09.58
	15.21	16.54	18.18	20.47	22.16	23.37	23.26	21.58	20.13	18.31	15.53	14.50
12	09.56	08.35	07.03	06.17	04.38	03.25	03.48	05.16	06.44	08.07	08.40	10.00
	15.24	16.58	18.21	20.50	22.19	23.38	23.23	21.54	20.10	18.27	15.50	14.49
13	09.54	08.32	07.00	06.14	04.35	03.23	03.51	05.19	06.47	08.10	08.43	10.01
	15.26	17.01	18.24	20.53	22.22	23.40	23.21	21.51	20.06	18.24	15.47	14.49
14	09.52	08.29	06.56	06.10	04.32	03.22	03.53	05.22	06.50	08.13	08.46	10.03
	15.29	17.04	18.27	20.55	22.25	23.41	23.19	21.48	20.03	18.21	15.44	14.48
15	09.50	08.25	06.53	06.07	04.29	03.22	03.56	05.25	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	23.42	23.16	21.44	19.59	18.17	15.41	14.48
16	09.48	08.22	06.49	06.03	04.26	03.21	03.58	05.28	06.55	08.19	08.52	10.06
	15.34	17.10	18.33	21.01	22.31	23.43	23.14	21.41	19.56	18.14	15.39	14.47
17	09.46	08.19	06.46	06.00	04.23	03.20	04.01	05.31	06.58	08.22	08.55	10.07
	15.37	17.13	18.36	21.04	22.34	23.44	23.12	21.38	19.52	18.11	15.36	14.47
18	09.44	08.16	06.42	05.57	04.20	03.20	04.04	05.34	07.01	08.25	08.58	10.08
	15.40	17.16	18.38	21.07	22.37	23.45	23.09	21.35	19.49	18.07	15.34	14.47
19	09.41	08.13	06.39	05.53	04.17	03.19	04.06	05.37	07.04	08.28	09.01	10.09
	15.43	17.19	18.41	21.10	22.40	23.46	23.06	21.31	19.46	18.04	15.31	14.47
20	09.39	08.09	06.36	05.50	04.15	03.19	04.09	05.40	07.06	08.30	09.04	10.10
	15.46	17.22	18.44	21.13	22.43	23.46	23.04	21.28	19.42	18.01	15.28	14.47
21	09.37	08.06	06.32	05.46	04.12	03.19	04.12	05.43	07.09	08.33	09.07	10.11
	15.49	17.25	18.47	21.16	22.46	23.47	23.01	21.25	19.39	17.58	15.26	14.47
22	09.34	08.03	06.29	05.43	04.09	03.19	04.15	05.46	07.12	08.36	09.10	10.11
	15.52	17.28	18.50	21.19	22.49	23.47	22.58	21.21	19.35	17.54	15.23	14.48
23	09.32	08.00	06.25	05.40	04.06	03.20	04.18	05.48	07.15	08.39	09.13	10.12
	15.55	17.31	18.53	21.22	22.52	23.47	22.56	21.18	19.32	17.51	15.21	14.48
24	09.29	07.56	06.22	05.36	04.04	03.20	04.21	05.51	07.17	08.42	09.16	10.12
	15.58	17.34	18.55	21.25	22.55	23.47	22.53	21.14	19.28	17.48	15.19	14.49
25	09.27	07.53	06.19	05.33	04.01	03.21	04.23	05.54	07.20	07.45	09.19	10.12
	16.01	17.37	18.58	21.28	22.57	23.46	22.50	21.11	19.25	16.45	15.16	14.50
26	09.24	07.50	06.15	05.30	03.58	03.21	04.26	05.57	07.23	07.48	09.22	10.12
	16.04	17.40	19.01	21.31	23.00	23.46	22.47	21.08	19.22	16.41	15.14	14.51
27	09.21	07.47	06.12	05.26	03.56	03.22	04.29	06.00	07.26	07.51	09.25	10.12
	16.07	17.43	19.04	21.34	23.03	23.46	22.44	21.04	19.18	16.38	15.12	14.52
28	09.19	07.43	06.08	05.23	03.53	03.23	04.32	06.03	07.28	07.54	09.27	10.12
	16.10	17.46	19.07	21.37	23.06	23.45	22.41	21.01	19.15	16.35	15.10	14.53
29	09.16		07.05	05.20	03.51	03.24	04.35	06.06	07.31	07.57	09.30	10.12
	16.14		20.10	21.40	23.08	23.44	22.38	20.57	19.11	16.32	15.08	14.54
30	09.13		07.01	05.17	03.48	03.25	04.38	06.08	07.34	08.00	09.33	10.12
	16.17		20.12	21.43	23.11	23.43	22.35	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.11
	16.20		20.15		23.14		22.32	20.51		16.26		14.57
Potential sun hours	181	242	363	447	560	606	595	503	392	307	206	150
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.55/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190_No ForestShadow receptor: H - H Asuinrakennus (Vöyrintie 1021)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.08	07.40	06.55	05.13	03.44	03.27	04.44	06.14	07.37	08.06	09.35
	14.59	16.23	17.49	20.18	21.46	23.16	23.42	22.29	20.47	19.04	16.23	15.04
2	10.09	09.05	07.37	06.51	05.10	03.42	03.28	04.47	06.17	07.39	08.09	09.38
	15.01	16.26	17.52	20.21	21.49	23.18	23.41	22.26	20.44	19.01	16.19	15.02
3	10.08	09.02	07.33	06.48	05.07	03.40	03.30	04.50	06.20	07.42	08.12	09.41
	15.03	16.29	17.55	20.24	21.52	23.21	23.40	22.23	20.40	18.58	16.16	15.01
4	10.07	08.59	07.30	06.44	05.04	03.38	03.32	04.53	06.22	07.45	08.15	09.43
	15.05	16.33	17.58	20.27	21.55	23.23	23.38	22.20	20.37	18.54	16.13	14.59
5	10.06	08.56	07.27	06.41	05.00	03.36	03.33	04.56	06.25	07.48	08.19	09.45
	15.07	16.36	18.01	20.30	21.58	23.25	23.37	22.17	20.34	18.51	16.10	14.57
6	10.05	08.53	07.23	06.37	04.57	03.34	03.35	04.59	06.28	07.51	08.22	09.48
	15.09	16.39	18.04	20.32	22.01	23.28	23.35	22.14	20.30	18.47	16.07	14.56
7	10.04	08.50	07.20	06.34	04.54	03.32	03.37	05.02	06.31	07.53	08.25	09.50
	15.11	16.42	18.07	20.35	22.04	23.30	23.33	22.10	20.27	18.44	16.04	14.55
8	10.02	08.47	07.16	06.31	04.51	03.30	03.39	05.05	06.33	07.56	08.28	09.52
	15.14	16.45	18.10	20.38	22.07	23.32	23.31	22.07	20.23	18.41	16.01	14.53
9	10.01	08.44	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.59	08.31	09.54
	15.16	16.48	18.13	20.41	22.10	23.33	23.30	22.04	20.20	18.37	15.58	14.52
10	09.59	08.41	07.10	06.24	04.45	03.27	03.44	05.11	06.39	08.02	08.34	09.56
	15.19	16.51	18.16	20.44	22.13	23.35	23.28	22.01	20.16	18.34	15.56	14.51
11	09.58	08.38	07.06	06.20	04.42	03.26	03.46	05.14	06.42	08.05	08.37	09.58
	15.21	16.54	18.18	20.47	22.16	23.37	23.25	21.58	20.13	18.31	15.53	14.50
12	09.56	08.35	07.03	06.17	04.38	03.25	03.48	05.17	06.44	08.07	08.40	10.00
	15.24	16.58	18.21	20.50	22.19	23.38	23.23	21.54	20.10	18.27	15.50	14.49
13	09.54	08.32	07.00	06.14	04.35	03.24	03.51	05.19	06.47	08.10	08.43	10.01
	15.26	17.01	18.24	20.53	22.22	23.40	23.21	21.51	20.06	18.24	15.47	14.49
14	09.52	08.29	06.56	06.10	04.32	03.23	03.53	05.22	06.50	08.13	08.46	10.03
	15.29	17.04	18.27	20.56	22.25	23.41	23.19	21.48	20.03	18.21	15.44	14.48
15	09.50	08.25	06.53	06.07	04.29	03.22	03.56	05.25	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	23.42	23.16	21.44	19.59	18.17	15.42	14.48
16	09.48	08.22	06.49	06.03	04.26	03.21	03.59	05.28	06.55	08.19	08.52	10.06
	15.35	17.10	18.33	21.01	22.31	23.43	23.14	21.41	19.56	18.14	15.39	14.47
17	09.46	08.19	06.46	06.00	04.23	03.20	04.01	05.31	06.58	08.22	08.55	10.07
	15.37	17.13	18.36	21.04	22.34	23.44	23.12	21.38	19.52	18.11	15.36	14.47
18	09.44	08.16	06.43	05.57	04.20	03.20	04.04	05.34	07.01	08.25	08.58	10.08
	15.40	17.16	18.38	21.07	22.37	23.45	23.09	21.35	19.49	18.07	15.34	14.47
19	09.41	08.13	06.39	05.53	04.18	03.20	04.07	05.37	07.04	08.28	09.01	10.09
	15.43	17.19	18.41	21.10	22.40	23.46	23.06	21.31	19.46	18.04	15.31	14.47
20	09.39	08.09	06.36	05.50	04.15	03.19	04.09	05.40	07.06	08.31	09.04	10.10
	15.46	17.22	18.44	21.13	22.43	23.46	23.04	21.28	19.42	18.01	15.28	14.47
21	09.37	08.06	06.32	05.46	04.12	03.19	04.12	05.43	07.09	08.33	09.07	10.11
	15.49	17.25	18.47	21.16	22.46	23.46	23.01	21.25	19.39	17.58	15.26	14.47
22	09.34	08.03	06.29	05.43	04.09	03.19	04.15	05.46	07.12	08.36	09.10	10.11
	15.52	17.28	18.50	21.19	22.49	23.47	22.58	21.21	19.35	17.54	15.24	14.48
23	09.32	08.00	06.25	05.40	04.06	03.20	04.18	05.48	07.15	08.39	09.13	10.12
	15.55	17.31	18.53	21.22	22.52	23.47	22.56	21.18	19.32	17.51	15.21	14.48
24	09.29	07.56	06.22	05.36	04.04	03.20	04.21	05.51	07.17	08.42	09.16	10.12
	15.58	17.34	18.55	21.25	22.55	23.47	22.53	21.14	19.28	17.48	15.19	14.49
25	09.27	07.53	06.19	05.33	04.01	03.21	04.23	05.54	07.20	07.45	09.19	10.12
	16.01	17.37	18.58	21.28	22.57	23.46	22.50	21.11	19.25	16.45	15.17	14.50
26	09.24	07.50	06.15	05.30	03.58	03.21	04.26	05.57	07.23	07.48	09.22	10.12
	16.04	17.40	19.01	21.31	23.00	23.46	22.47	21.08	19.22	16.41	15.14	14.51
27	09.21	07.47	06.12	05.26	03.56	03.22	04.29	06.00	07.26	07.51	09.25	10.12
	16.07	17.43	19.04	21.34	23.03	23.45	22.44	21.04	19.18	16.38	15.12	14.52
28	09.19	07.43	06.08	05.23	03.53	03.23	04.32	06.03	07.28	07.54	09.27	10.12
	16.11	17.46	19.07	21.37	23.06	23.45	22.41	21.01	19.15	16.35	15.10	14.53
29	09.16		07.05	05.20	03.51	03.24	04.35	06.06	07.31	07.57	09.30	10.12
	16.14		20.10	21.40	23.08	23.44	22.38	20.57	19.11	16.32	15.08	14.54
30	09.13		07.01	05.17	03.48	03.26	04.38	06.08	07.34	08.00	09.33	10.12
	16.17		20.12	21.43	23.11	23.43	22.35	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.11
	16.20		20.15		23.14		22.32	20.51		16.26		14.57
Potential sun hours	181	242	363	447	560	606	595	503	392	307	206	150
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.55/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190_No ForestShadow receptor: I - I Lomarakennus (Ehrsbackavägen 29)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March			April			May	June	July	August	September			October	November	December
1	10.10	09.07	07.40			06.55		07.53 (10)	05.14	03.44	03.27	04.44	06.14			07.37	08.06	09.35
	15.00	16.23	17.49			20.18	29	08.22 (10)	21.46	23.16	23.42	22.29	20.47			19.04	16.23	15.04
2	10.09	09.05	07.37			06.51		07.54 (10)	05.10	03.42	03.29	04.47	06.17		08.03 (10)	07.39	08.09	09.38
	15.01	16.26	17.52			20.21	28	08.22 (10)	21.49	23.18	23.41	22.26	20.44	2	08.05 (10)	19.01	16.20	15.03
3	10.08	09.02	07.33			06.48		07.54 (10)	05.07	03.40	03.30	04.50	06.20		07.57 (10)	07.42	08.12	09.40
	15.03	16.30	17.55			20.24	28	08.22 (10)	21.52	23.21	23.39	22.23	20.40	13	08.10 (10)	18.58	16.17	15.01
4	10.07	08.59	07.30			06.44		07.54 (10)	05.04	03.38	03.32	04.53	06.22		07.54 (10)	07.45	08.15	09.43
	15.05	16.33	17.58			20.27	26	08.20 (10)	21.55	23.23	23.38	22.20	20.37	18	08.12 (10)	18.54	16.13	14.59
5	10.06	08.56	07.27			06.41		07.54 (10)	05.01	03.36	03.34	04.56	06.25		07.53 (10)	07.48	08.18	09.45
	15.07	16.36	18.01			20.30	26	08.20 (10)	21.58	23.25	23.36	22.17	20.34	20	08.13 (10)	18.51	16.10	14.58
6	10.05	08.53	07.23			06.37		07.55 (10)	04.57	03.34	03.36	04.59	06.28		07.51 (10)	07.51	08.22	09.47
	15.09	16.39	18.04			20.32	24	08.19 (10)	22.01	23.27	23.35	22.13	20.30	23	08.14 (10)	18.48	16.07	14.56
7	10.04	08.50	07.20			06.34		07.56 (10)	04.54	03.32	03.38	05.02	06.31		07.50 (10)	07.53	08.25	09.50
	15.12	16.42	18.07			20.35	20	08.16 (10)	22.04	23.29	23.33	22.10	20.27	25	08.15 (10)	18.44	16.04	14.55
8	10.02	08.47	07.16			06.31		07.57 (10)	04.51	03.31	03.40	05.05	06.34		07.49 (10)	07.56	08.28	09.52
	15.14	16.45	18.10			20.38	18	08.15 (10)	22.07	23.31	23.31	22.07	20.23	27	08.16 (10)	18.41	16.02	14.54
9	10.01	08.44	07.13			06.27		07.59 (10)	04.48	03.29	03.42	05.08	06.36		07.47 (10)	07.59	08.31	09.54
	15.16	16.48	18.13			20.41	13	08.12 (10)	22.10	23.33	23.29	22.04	20.20	28	08.15 (10)	18.37	15.59	14.53
10	09.59	08.41	07.10			06.24		08.04 (10)	04.45	03.28	03.44	05.11	06.39		07.47 (10)	08.02	08.34	09.56
	15.19	16.51	18.16			20.44	1	08.05 (10)	22.13	23.35	23.27	22.01	20.16	28	08.15 (10)	18.34	15.56	14.51
11	09.57	08.38	07.06			06.20			04.42	03.26	03.46	05.14	06.42		07.47 (10)	08.05	08.37	09.58
	15.21	16.55	18.18			20.47			22.16	23.37	23.25	21.57	20.13	29	08.16 (10)	18.31	15.53	14.51
12	09.56	08.35	07.03			06.17			04.39	03.25	03.49	05.17	06.45		07.46 (10)	08.07	08.40	09.59
	15.24	16.58	18.21			20.50			22.19	23.38	23.23	21.54	20.10	29	08.15 (10)	18.27	15.50	14.50
13	09.54	08.32	07.00			06.14			04.36	03.24	03.51	05.20	06.47		07.46 (10)	08.10	08.43	10.01
	15.27	17.01	18.24			20.53			22.22	23.40	23.21	21.51	20.06	28	08.14 (10)	18.24	15.47	14.49
14	09.52	08.28	06.56			06.10			04.33	03.23	03.54	05.23	06.50		07.46 (10)	08.13	08.46	10.03
	15.29	17.04	18.27			20.55			22.25	23.41	23.19	21.48	20.03	28	08.14 (10)	18.21	15.44	14.48
15	09.50	08.25	06.53			06.07			04.30	03.22	03.56	05.25	06.53		07.46 (10)	08.16	08.49	10.04
	15.32	17.07	18.30			20.58			22.28	23.42	23.16	21.44	19.59	26	08.12 (10)	18.17	15.42	14.48
16	09.48	08.22	06.49			06.03			04.27	03.21	03.59	05.28	06.55		07.46 (10)	08.19	08.52	10.05
	15.35	17.10	18.33			21.01			22.31	23.43	23.14	21.41	19.56	26	08.12 (10)	18.14	15.39	14.48
17	09.46	08.19	06.46			06.00			04.24	03.21	04.01	05.31	06.58		07.47 (10)	08.22	08.55	10.07
	15.38	17.13	18.36			21.04			22.34	23.44	23.11	21.38	19.52	24	08.11 (10)	18.11	15.36	14.47
18	09.43	08.16	06.43			05.57			04.21	03.20	04.04	05.34	07.01		07.48 (10)	08.25	08.58	10.08
	15.40	17.16	18.38			21.07			22.37	23.45	23.09	21.34	19.49	20	08.08 (10)	18.07	15.34	14.47
19	09.41	08.13	06.39			05.53			04.18	03.20	04.07	05.37	07.04		07.49 (10)	08.28	09.01	10.09
	15.43	17.19	18.41			21.10			22.40	23.45	23.06	21.31	19.46	17	08.06 (10)	18.04	15.31	14.47
20	09.39	08.09	06.36			05.50			04.15	03.20	04.10	05.40	07.06		07.52 (10)	08.30	09.04	10.10
	15.46	17.22	18.44			21.13			22.43	23.46	23.04	21.28	19.42	12	08.04 (10)	18.01	15.29	14.47
21	09.36	08.06	06.32			05.47			04.12	03.20	04.12	05.43	07.09			08.33	09.07	10.10
	15.49	17.25	18.47			21.16			22.46	23.46	23.01	21.24	19.39			17.58	15.26	14.48
22	09.34	08.03	06.29			05.43			04.09	03.20	04.15	05.46	07.12			08.36	09.10	10.11
	15.52	17.28	18.50			21.19			22.49	23.46	22.58	21.21	19.35			17.54	15.24	14.48
23	09.32	08.00	06.25		07.06 (10)	05.40			04.07	03.20	04.18	05.49	07.15			08.39	09.13	10.11
	15.55	17.31	18.53	10	07.16 (10)	21.22			22.52	23.46	22.55	21.18	19.32			17.51	15.21	14.49
24	09.29	07.56	06.22		07.03 (10)	05.37			04.04	03.21	04.21	05.51	07.17			08.42	09.16	10.12
	15.58	17.34	18.55	16	07.19 (10)	21.25			22.54	23.46	22.53	21.14	19.28			17.48	15.19	14.49
25	09.26	07.53	06.19		07.00 (10)	05.33			04.01	03.21	04.24	05.54	07.20			07.45	09.19	10.12
	16.01	17.37	18.58	20	07.20 (10)	21.28			22.57	23.46	22.50	21.11	19.25			16.45	15.17	14.50
26	09.24	07.50	06.15		06.59 (10)	05.30			03.59	03.22	04.27	05.57	07.23			07.48	09.22	10.12
	16.05	17.40	19.01	23	07.22 (10)	21.31			23.00	23.46	22.47	21.08	19.22			16.42	15.15	14.51
27	09.21	07.46	06.12		06.57 (10)	05.27			03.56	03.23	04.29	06.00	07.26			07.51	09.24	10.12
	16.08	17.43	19.04	25	07.22 (10)	21.34			23.03	23.45	22.44	21.04	19.18			16.38	15.12	14.52
28	09.19	07.43	06.08		06.56 (10)	05.23			03.54	03.24	04.32	06.03	07.28			07.54	09.27	10.12
	16.11	17.46	19.07	27	07.23 (10)	21.37			23.05	23.44	22.41	21.01	19.15			16.35	15.10	14.53
29	09.16		07.05		07.56 (10)	05.20			03.51	03.25	04.35	06.06	07.31			07.57	09.30	10.12
	16.14		20.10	27	08.23 (10)	21.40			23.08	23.44	22.38	20.57	19.11			16.32	15.08	14.55
30	09.13		07.01		07.55 (10)	05.17			03.49	03.26	04.38	06.08	07.34			08.00	09.33	10.11
	16.17		20.12	28	08.23 (10)	21.43			23.11	23.43	22.35	20.54	19.08			16.29	15.06	14.56
31	09.10		06.58		07.54 (10)				03.46		04.41	06.11				08.03		10.11
	16.20		20.15	29	08.23 (10)				23.13		22.32	20.51				16.26		14.57
Potential sun hours	182	242	363			447			559	606	595	502	392			308	206	151
Total, worst case				205			213							423				
Sun reduction				0,32			0,41							0,33				
Oper. time red.				0,99			0,99							0,99				
Wind dir. red.				0,58			0,58							0,58				
Total reduction				0,19			0,24							0,19				
Total, real				38			51							81				

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)		First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker	(WTG causing flicker last time)

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Calculated:
14.7.2023 9.55/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190_No ForestShadow receptor: J - J Asuinrakennus (Kleidersvägen 118)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.07	07.40	06.55	05.14	03.44	05.20 (10)	03.27	05.28 (10)	04.44	06.14	07.37	08.06	09.35
	15.00	16.23	17.49	20.18	21.46	23.16	26 05.46 (10)	23.42	20 05.48 (10)	22.29	20.47	19.04	16.23	15.05
2	10.09	09.05	07.37	06.51	05.10	03.42	05.20 (10)	03.29	05.28 (10)	04.47	06.17	07.39	08.09	09.38
	15.01	16.26	17.52	20.21	21.49	23.18	25 05.45 (10)	23.40	21 05.49 (10)	22.26	20.44	19.01	16.20	15.03
3	10.08	09.02	07.33	06.48	05.07	03.40	05.21 (10)	03.30	05.28 (10)	04.50	06.20	07.42	08.12	09.40
	15.03	16.30	17.55	20.24	21.52	23.20	24 05.45 (10)	23.39	21 05.49 (10)	22.23	20.40	18.58	16.17	15.01
4	10.07	08.59	07.30	06.44	05.04	03.38	05.21 (10)	03.32	05.29 (10)	04.53	06.22	07.45	08.15	09.43
	15.05	16.33	17.58	20.27	21.55	23.23	24 05.45 (10)	23.38	21 05.50 (10)	22.20	20.37	18.54	16.14	14.59
5	10.06	08.56	07.27	06.41	05.01	03.36	05.21 (10)	03.34	05.28 (10)	04.56	06.25	07.48	08.18	09.45
	15.07	16.36	18.01	20.30	21.58	23.25	24 05.45 (10)	23.36	22 05.50 (10)	22.17	20.34	18.51	16.11	14.58
6	10.05	08.53	07.23	06.38	04.57	03.34	05.22 (10)	03.36	05.29 (10)	04.59	06.28	07.50	08.21	09.47
	15.10	16.39	18.04	20.32	22.01	23.27	23 05.45 (10)	23.35	22 05.51 (10)	22.13	20.30	18.48	16.08	14.56
7	10.03	08.50	07.20	06.34	04.54	03.32	05.22 (10)	03.38	05.28 (10)	05.02	06.31	07.53	08.25	09.50
	15.12	16.42	18.07	20.35	22.04	23.29	23 05.45 (10)	23.33	23 05.51 (10)	22.10	20.27	18.44	16.05	14.55
8	10.02	08.47	07.16	06.31	04.51	03.31	05.23 (10)	03.40	05.28 (10)	05.05	06.34	07.56	08.28	09.52
	15.14	16.45	18.10	20.38	22.07	23.31	22 05.45 (10)	23.31	24 05.52 (10)	22.07	20.23	18.41	16.02	14.54
9	10.00	08.44	07.13	06.27	04.48	03.29	05.23 (10)	03.42	05.28 (10)	05.08	06.36	07.59	08.31	09.54
	15.16	16.48	18.13	20.41	22.10	23.33	22 05.45 (10)	23.29	24 05.52 (10)	22.04	20.20	18.37	15.59	14.53
10	09.59	08.41	07.10	06.24	04.45	03.28	05.24 (10)	03.44	05.28 (10)	05.11	06.39	08.02	08.34	09.56
	15.19	16.52	18.16	20.44	22.13	23.35	20 05.44 (10)	23.27	25 05.53 (10)	22.01	20.16	18.34	15.56	14.52
11	09.57	08.38	07.06	06.20	04.42	03.26	05.24 (10)	03.47	05.28 (10)	05.14	06.42	08.05	08.37	09.58
	15.21	16.55	18.18	20.47	22.16	23.36	20 05.44 (10)	23.25	25 05.53 (10)	21.57	20.13	18.31	15.53	14.51
12	09.55	08.35	07.03	06.17	04.39	05.29 (10)	03.25	05.25 (10)	03.49	05.27 (10)	05.17	06.45	08.07	08.40	09.59
	15.24	16.58	18.21	20.50	22.19	5 05.34 (10)	23.38	20 05.45 (10)	23.23	26 05.53 (10)	21.54	20.10	18.27	15.50	14.50
13	09.54	08.32	07.00	06.14	04.36	05.26 (10)	03.24	05.25 (10)	03.51	05.28 (10)	05.20	06.47	08.10	08.43	10.01
	15.27	17.01	18.24	20.53	22.22	11 05.37 (10)	23.39	19 05.44 (10)	23.21	25 05.53 (10)	21.51	20.06	18.24	15.47	14.49
14	09.52	08.28	06.56	06.10	04.33	05.24 (10)	03.23	05.26 (10)	03.54	05.28 (10)	05.23	06.50	08.13	08.46	10.03
	15.29	17.04	18.27	20.55	22.25	15 05.39 (10)	23.41	19 05.45 (10)	23.18	26 05.54 (10)	21.48	20.03	18.21	15.45	14.48
15	09.50	08.25	06.53	06.07	04.30	05.22 (10)	03.22	05.26 (10)	03.56	05.28 (10)	05.26	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	18 05.40 (10)	23.42	18 05.44 (10)	23.16	26 05.54 (10)	21.44	19.59	18.17	15.42	14.48
16	09.48	08.22	06.49	06.03	04.27	05.22 (10)	03.22	05.26 (10)	03.59	05.28 (10)	05.28	06.55	08.19	08.52	10.05
	15.35	17.10	18.33	21.01	22.31	19 05.41 (10)	23.43	18 05.44 (10)	23.14	26 05.54 (10)	21.41	19.56	18.14	15.39	14.48
17	09.45	08.19	06.46	06.00	04.24	05.20 (10)	03.21	05.27 (10)	04.02	05.28 (10)	05.31	06.58	08.22	08.55	10.07
	15.38	17.13	18.36	21.04	22.34	21 05.41 (10)	23.44	18 05.45 (10)	23.11	26 05.54 (10)	21.38	19.52	18.11	15.36	14.47
18	09.43	08.16	06.43	05.57	04.21	05.20 (10)	03.20	05.26 (10)	04.04	05.28 (10)	05.34	07.01	08.25	08.58	10.08
	15.41	17.16	18.38	21.07	22.37	22 05.42 (10)	23.44	18 05.44 (10)	23.09	26 05.54 (10)	21.34	19.49	18.07	15.34	14.47
19	09.41	08.13	06.39	05.53	04.18	05.20 (10)	03.20	05.27 (10)	04.07	05.28 (10)	05.37	07.04	08.28	09.01	10.09
	15.43	17.19	18.41	21.10	22.40	23 05.43 (10)	23.45	17 05.44 (10)	23.06	26 05.54 (10)	21.31	19.46	18.04	15.31	14.47
20	09.39	08.09	06.36	05.50	04.15	05.19 (10)	03.20	05.27 (10)	04.10	05.29 (10)	05.40	07.06	08.30	09.04	10.10
	15.46	17.22	18.44	21.13	22.43	24 05.43 (10)	23.46	17 05.44 (10)	23.03	26 05.55 (10)	21.28	19.42	18.01	15.29	14.48
21	09.36	08.06	06.32	05.47	04.12	05.19 (10)	03.20	05.28 (10)	04.12	05.29 (10)	05.43	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.16	22.46	25 05.44 (10)	23.46	17 05.45 (10)	23.01	25 05.54 (10)	21.24	19.39	17.58	15.26	14.48
22	09.34	08.03	06.29	05.43	04.09	05.19 (10)	03.20	05.28 (10)	04.15	05.29 (10)	05.46	07.12	08.36	09.10	10.11
	15.52	17.28	18.50	21.19	22.49	25 05.44 (10)	23.46	17 05.45 (10)	22.58	25 05.54 (10)	21.21	19.35	17.54	15.24	14.48
23	09.31	08.00	06.25	05.40	04.07	05.19 (10)	03.20	05.28 (10)	04.18	05.29 (10)	05.49	07.15	08.39	09.13	10.11
	15.55	17.31	18.53	21.22	22.51	26 05.45 (10)	23.46	17 05.45 (10)	22.55	24 05.53 (10)	21.18	19.32	17.51	15.21	14.49
24	09.29	07.56	06.22	05.37	04.04	05.19 (10)	03.21	05.28 (10)	04.21	05.30 (10)	05.52	07.17	08.42	09.16	10.12
	15.58	17.34	18.55	21.25	22.54	26 05.45 (10)	23.46	18 05.46 (10)	22.52	24 05.54 (10)	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.19	05.33	04.01	05.19 (10)	03.21	05.28 (10)	04.24	05.30 (10)	05.54	07.20	07.45	09.19	10.12
	16.02	17.37	18.58	21.28	22.57	26 05.45 (10)	23.46	18 05.46 (10)	22.50	23 05.53 (10)	21.11	19.25	16.45	15.17	14.50
26	09.24	07.50	06.15	05.30	03.59	05.19 (10)	03.22	05.29 (10)	04.27	05.30 (10)	05.57	07.23	07.48	09.22	10.12
	16.05	17.40	19.01	21.31	23.00	26 05.45 (10)	23.45	18 05.47 (10)	22.47	22 05.52 (10)	21.08	19.22	16.42	15.15	14.51
27	09.21	07.46	06.12	05.27	03.56	05.19 (10)	03.23	05.28 (10)	04.30	05.32 (10)	06.00	07.26	07.51	09.24	10.12
	16.08	17.43	19.04	21.34	23.03	26 05.45 (10)	23.45	18 05.46 (10)	22.44	20 05.52 (10)	21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.54	05.19 (10)	03.24	05.28 (10)	04.33	05.32 (10)	06.03	07.28	07.54	09.27	10.12
	16.11	17.46	19.07	21.37	23.05	26 05.45 (10)	23.44	19 05.47 (10)	22.41	19 05.51 (10)	21.01	19.15	16.35	15.10	14.53
29	09.16		07.05	05.20	03.51	05.19 (10)	03.25	05.28 (10)	04.35	05.34 (10)	06.06	07.31	07.57	09.30	10.12
	16.14		20.10	21.40	23.08	26 05.45 (10)	23.43	19 05.47 (10)	22.38	16 05.50 (10)	20.57	19.11	16.32	15.08	14.55
30	09.13		07.01	05.17	03.49	05.20 (10)	03.26	05.28 (10)	04.38	05.35 (10)	06.08	07.34	08.00	09.33	10.11
	16.17		20.12	21.43	23.11	25 05.45 (10)	23.43	20 05.48 (10)	22.35	13 05.48 (10)	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.47	05.20 (10)			04.41	05.38 (10)	06.11		08.03		10.11
	16.20		20.15		23.13	25 05.45 (10)			22.32	9 05.47 (10)	20.51		16.26		14.58
Potential sun hours	182	242	363	447	559	605		594		502	392	308	206	151	
Total, worst case					440	598		701							
Sun reduction					0,48	0,49		0,39							
Oper. time red.					0,99	0,99		0,99							
Wind dir. red.					0,62	0,62		0,62							
Total reduction					0,29	0,30		0,24							
Total, real					129	181		167							

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)		First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker	(WTG causing flicker last time)

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Calculated:
14.7.2023 9.55/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190_No ForestShadow receptor: K - K Asuinrakennus (Rökiöntie 154)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.40	06.55	05.14	03.45	03.28	04.45	06.14	07.37	08.06	09.35
	15.00	16.24	17.49	20.18	21.46	23.15	23.41	22.29	20.47	19.05	16.23	15.05
2	10.09	09.04	07.36	06.51	05.11	03.43	03.29	04.48	06.17	07.39	08.09	09.37
	15.02	16.27	17.52	20.21	21.49	23.18	23.40	22.26	20.44	19.01	16.20	15.03
3	10.08	09.02	07.33	06.48	05.07	03.41	03.31	04.50	06.20	07.42	08.12	09.40
	15.04	16.30	17.55	20.24	21.52	23.20	23.39	22.23	20.40	18.58	16.17	15.01
4	10.07	08.59	07.30	06.44	05.04	03.39	03.33	04.53	06.23	07.45	08.15	09.42
	15.06	16.33	17.58	20.27	21.55	23.22	23.37	22.19	20.37	18.54	16.14	15.00
5	10.06	08.56	07.26	06.41	05.01	03.37	03.34	04.56	06.25	07.48	08.18	09.45
	15.08	16.36	18.01	20.29	21.58	23.24	23.36	22.16	20.33	18.51	16.11	14.58
6	10.04	08.53	07.23	06.38	04.58	03.35	03.36	04.59	06.28	07.50	08.21	09.47
	15.10	16.39	18.04	20.32	22.01	23.27	23.34	22.13	20.30	18.48	16.08	14.57
7	10.03	08.50	07.20	06.34	04.55	03.33	03.38	05.02	06.31	07.53	08.24	09.49
	15.12	16.42	18.07	20.35	22.04	23.29	23.32	22.10	20.27	18.44	16.05	14.55
8	10.02	08.47	07.16	06.31	04.51	03.31	03.40	05.05	06.34	07.56	08.27	09.51
	15.14	16.45	18.10	20.38	22.07	23.31	23.31	22.07	20.23	18.41	16.02	14.54
9	10.00	08.44	07.13	06.27	04.48	03.30	03.43	05.08	06.36	07.59	08.30	09.53
	15.17	16.49	18.13	20.41	22.10	23.32	23.29	22.04	20.20	18.38	15.59	14.53
10	09.59	08.41	07.10	06.24	04.45	03.28	03.45	05.11	06.39	08.02	08.34	09.55
	15.19	16.52	18.16	20.44	22.13	23.34	23.27	22.00	20.16	18.34	15.56	14.52
11	09.57	08.38	07.06	06.21	04.42	03.27	03.47	05.14	06.42	08.05	08.37	09.57
	15.22	16.55	18.18	20.47	22.16	23.36	23.25	21.57	20.13	18.31	15.53	14.51
12	09.55	08.35	07.03	06.17	04.39	03.26	03.49	05.17	06.45	08.07	08.40	09.59
	15.24	16.58	18.21	20.50	22.19	23.37	23.22	21.54	20.10	18.27	15.50	14.50
13	09.53	08.31	07.00	06.14	04.36	03.25	03.52	05.20	06.47	08.10	08.43	10.01
	15.27	17.01	18.24	20.52	22.22	23.39	23.20	21.51	20.06	18.24	15.48	14.50
14	09.51	08.28	06.56	06.10	04.33	03.24	03.54	05.23	06.50	08.13	08.46	10.02
	15.30	17.04	18.27	20.55	22.25	23.40	23.18	21.47	20.03	18.21	15.45	14.49
15	09.49	08.25	06.53	06.07	04.30	03.23	03.57	05.26	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	23.41	23.16	21.44	19.59	18.18	15.42	14.48
16	09.47	08.22	06.49	06.04	04.27	03.22	03.59	05.29	06.56	08.19	08.52	10.05
	15.35	17.10	18.33	21.01	22.31	23.42	23.13	21.41	19.56	18.14	15.39	14.48
17	09.45	08.19	06.46	06.00	04.24	03.22	04.02	05.32	06.58	08.22	08.55	10.06
	15.38	17.13	18.36	21.04	22.34	23.43	23.11	21.38	19.52	18.11	15.37	14.48
18	09.43	08.16	06.43	05.57	04.21	03.21	04.05	05.34	07.01	08.25	08.58	10.07
	15.41	17.16	18.38	21.07	22.37	23.44	23.08	21.34	19.49	18.08	15.34	14.48
19	09.41	08.12	06.39	05.54	04.18	03.21	04.07	05.37	07.04	08.27	09.01	10.08
	15.44	17.19	18.41	21.10	22.40	23.45	23.06	21.31	19.46	18.04	15.32	14.48
20	09.38	08.09	06.36	05.50	04.15	03.21	04.10	05.40	07.06	08.30	09.04	10.09
	15.47	17.22	18.44	21.13	22.42	23.45	23.03	21.28	19.42	18.01	15.29	14.48
21	09.36	08.06	06.32	05.47	04.13	03.21	04.13	05.43	07.09	08.33	09.07	10.10
	15.50	17.26	18.47	21.16	22.45	23.45	23.00	21.24	19.39	17.58	15.27	14.48
22	09.34	08.03	06.29	05.43	04.10	03.21	04.16	05.46	07.12	08.36	09.10	10.10
	15.53	17.29	18.50	21.19	22.48	23.46	22.58	21.21	19.35	17.55	15.24	14.49
23	09.31	08.00	06.25	05.40	04.07	03.21	04.18	05.49	07.15	08.39	09.13	10.11
	15.56	17.32	18.53	21.22	22.51	23.46	22.55	21.18	19.32	17.51	15.22	14.49
24	09.29	07.56	06.22	05.37	04.04	03.21	04.21	05.52	07.17	08.42	09.16	10.11
	15.59	17.35	18.55	21.25	22.54	23.46	22.52	21.14	19.28	17.48	15.19	14.50
25	09.26	07.53	06.19	05.33	04.02	03.22	04.24	05.55	07.20	07.45	09.18	10.12
	16.02	17.38	18.58	21.28	22.57	23.45	22.49	21.11	19.25	16.45	15.17	14.51
26	09.24	07.50	06.15	05.30	03.59	03.23	04.27	05.57	07.23	07.48	09.21	10.12
	16.05	17.41	19.01	21.31	23.00	23.45	22.46	21.07	19.22	16.42	15.15	14.52
27	09.21	07.46	06.12	05.27	03.57	03.23	04.30	06.00	07.26	07.51	09.24	10.12
	16.08	17.43	19.04	21.34	23.02	23.44	22.44	21.04	19.18	16.39	15.13	14.53
28	09.18	07.43	06.08	05.24	03.54	03.24	04.33	06.03	07.28	07.54	09.27	10.11
	16.11	17.46	19.07	21.37	23.05	23.44	22.41	21.01	19.15	16.35	15.11	14.54
29	09.16		07.05	05.20	03.52	03.25	04.36	06.06	07.31	07.57	09.30	10.11
	16.14		20.10	21.40	23.08	23.43	22.38	20.57	19.11	16.32	15.09	14.55
30	09.13		07.02	05.17	03.49	03.27	04.39	06.09	07.34	08.00	09.32	10.11
	16.17		20.12	21.43	23.10	23.42	22.35	20.54	19.08	16.29	15.07	14.57
31	09.10		06.58		03.47		04.42	06.11		08.03		10.10
	16.20		20.15		23.13		22.32	20.51		16.26		14.58
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.55/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190_No ForestShadow receptor: L - L Asuinrakennus (Bjurbäcksvägen 231)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.40	06.55	05.14	03.45	04.44 (1)	03.28	04.44 (1)	04.45	06.14	07.36	08.06	09.35
	15.00	16.23	17.49	20.18	21.45	23.15 12	04.56 (1)	23.41 23	05.07 (1)	22.28	20.47	19.04	16.23	15.05
2	10.08	09.04	07.36	06.51	05.10	03.43	04.43 (1)	03.30	04.46 (1)	04.47	06.17	07.39	08.09	09.37
	15.02	16.27	17.52	20.21	21.48	23.17 14	04.57 (1)	23.39 22	05.08 (1)	22.25	20.44	19.01	16.20	15.03
3	10.07	09.01	07.33	06.48	05.07	03.41	04.43 (1)	03.31	04.46 (1)	04.50	06.20	07.42	08.12	09.40
	15.04	16.30	17.55	20.24	21.51	23.20 15	04.58 (1)	23.38 22	05.08 (1)	22.22	20.40	18.58	16.17	15.01
4	10.06	08.58	07.30	06.44	05.04	03.39	04.42 (1)	03.33	04.46 (1)	04.53	06.22	07.45	08.15	09.42
	15.06	16.33	17.58	20.26	21.54	23.22 18	05.00 (1)	23.37 21	05.07 (1)	22.19	20.37	18.54	16.14	15.00
5	10.05	08.55	07.26	06.41	05.01	03.37	04.41 (1)	03.35	04.46 (1)	04.56	06.25	07.48	08.18	09.44
	15.08	16.36	18.01	20.29	21.57	23.24 19	05.00 (1)	23.35 21	05.07 (1)	22.16	20.33	18.51	16.11	14.58
6	10.04	08.52	07.23	06.38	04.58	03.35	04.41 (1)	03.36	04.48 (1)	04.59	06.28	07.50	08.21	09.47
	15.10	16.39	18.04	20.32	22.00	23.26 19	05.00 (1)	23.34 19	05.07 (1)	22.13	20.30	18.47	16.08	14.57
7	10.03	08.50	07.20	06.34	04.54	03.33	04.41 (1)	03.38	04.48 (1)	05.02	06.31	07.53	08.24	09.49
	15.12	16.42	18.07	20.35	22.03	23.28 20	05.01 (1)	23.32 18	05.06 (1)	22.10	20.26	18.44	16.05	14.55
8	10.01	08.47	07.16	06.31	04.51	03.31	04.41 (1)	03.40	04.49 (1)	05.05	06.34	07.56	08.27	09.51
	15.14	16.45	18.10	20.38	22.06	23.30 21	05.02 (1)	23.30 17	05.06 (1)	22.07	20.23	18.41	16.02	14.54
9	10.00	08.44	07.13	06.27	04.48	03.30	04.41 (1)	03.43	04.49 (1)	05.08	06.36	07.59	08.30	09.53
	15.17	16.49	18.13	20.41	22.09	23.32 21	05.02 (1)	23.28 16	05.05 (1)	22.03	20.20	18.37	15.59	14.53
10	09.58	08.40	07.10	06.24	04.45	03.28	04.40 (1)	03.45	04.50 (1)	05.11	06.39	08.02	08.33	09.55
	15.19	16.52	18.15	20.44	22.12	23.34 22	05.02 (1)	23.26 15	05.05 (1)	22.00	20.16	18.34	15.56	14.52
11	09.57	08.37	07.06	06.20	04.42	03.27	04.41 (1)	03.47	04.52 (1)	05.14	06.42	08.04	08.36	09.57
	15.22	16.55	18.18	20.46	22.15	23.35 22	05.03 (1)	23.24 13	05.05 (1)	21.57	20.13	18.31	15.53	14.51
12	09.55	08.34	07.03	06.17	04.39	03.26	04.41 (1)	03.49	04.53 (1)	05.17	06.44	08.07	08.39	09.59
	15.24	16.58	18.21	20.49	22.18	23.37 23	05.04 (1)	23.22 11	05.04 (1)	21.54	20.09	18.27	15.50	14.50
13	09.53	08.31	06.59	06.14	04.36	03.25	04.40 (1)	03.52	04.55 (1)	05.20	06.47	08.10	08.42	10.00
	15.27	17.01	18.24	20.52	22.21	23.38 23	05.03 (1)	23.20 7	05.02 (1)	21.50	20.06	18.24	15.47	14.50
14	09.51	08.28	06.56	06.10	04.33	03.24	04.41 (1)	03.54		05.23	06.50	08.13	08.46	10.02
	15.30	17.04	18.27	20.55	22.24	23.40 23	05.04 (1)	23.18		21.47	20.03	18.21	15.45	14.49
15	09.49	08.25	06.53	06.07	04.30	03.23	04.41 (1)	03.57		05.26	06.53	08.16	08.49	10.03
	15.32	17.07	18.30	20.58	22.27	23.41 23	05.04 (1)	23.15		21.44	19.59	18.17	15.42	14.48
16	09.47	08.22	06.49	06.04	04.27	03.22	04.41 (1)	03.59		05.29	06.55	08.19	08.52	10.05
	15.35	17.10	18.33	21.01	22.30	23.42 24	05.05 (1)	23.13		21.41	19.56	18.14	15.39	14.48
17	09.45	08.19	06.46	06.00	04.24	03.22	04.41 (1)	04.02		05.31	06.58	08.21	08.55	10.06
	15.38	17.13	18.35	21.04	22.33	23.43 24	05.05 (1)	23.11		21.37	19.52	18.11	15.37	14.48
18	09.43	08.15	06.42	05.57	04.21	03.21	04.42 (1)	04.05		05.34	07.01	08.24	08.58	10.07
	15.41	17.16	18.38	21.07	22.36	23.44 24	05.06 (1)	23.08		21.34	19.49	18.07	15.34	14.48
19	09.40	08.12	06.39	05.53	04.18	03.21	04.42 (1)	04.07		05.37	07.04	08.27	09.01	10.08
	15.44	17.19	18.41	21.10	22.39	23.44 24	05.06 (1)	23.05		21.31	19.45	18.04	15.31	14.48
20	09.38	08.09	06.36	05.50	04.15	03.21	04.42 (1)	04.10		05.40	07.06	08.30	09.04	10.09
	15.47	17.22	18.44	21.13	22.42	23.45 24	05.06 (1)	23.03		21.27	19.42	18.01	15.29	14.48
21	09.36	08.06	06.32	05.47	04.13	03.21	04.42 (1)	04.13		05.43	07.09	08.33	09.07	10.10
	15.50	17.25	18.47	21.16	22.45	23.45 24	05.06 (1)	23.00		21.24	19.39	17.58	15.27	14.48
22	09.33	08.03	06.29	05.43	04.10	03.21	04.42 (1)	04.16		05.46	07.12	08.36	09.10	10.10
	15.53	17.28	18.50	21.18	22.48	23.45 24	05.06 (1)	22.57		21.21	19.35	17.54	15.24	14.49
23	09.31	07.59	06.25	05.40	04.07	03.21	04.43 (1)	04.18		05.49	07.14	08.39	09.12	10.11
	15.56	17.31	18.52	21.21	22.51	23.45 24	05.07 (1)	22.55		21.17	19.32	17.51	15.22	14.49
24	09.28	07.56	06.22	05.37	04.04	03.21	04.43 (1)	04.21		05.52	07.17	08.42	09.15	10.11
	15.59	17.34	18.55	21.24	22.54	23.45 24	05.07 (1)	22.52		21.14	19.28	17.48	15.19	14.50
25	09.26	07.53	06.19	05.33	04.02	03.22	04.43 (1)	04.24		05.54	07.20	07.45	09.18	10.11
	16.02	17.37	18.58	21.27	22.56	23.45 24	05.07 (1)	22.49		21.11	19.25	16.45	15.17	14.51
26	09.23	07.50	06.15	05.30	03.59	03.23	04.43 (1)	04.27		05.57	07.23	07.48	09.21	10.11
	16.05	17.40	19.01	21.30	22.59	23.45 24	05.07 (1)	22.46		21.07	19.21	16.42	15.15	14.52
27	09.21	07.46	06.12	05.27	03.57	03.23	04.44 (1)	04.30		06.00	07.25	07.51	09.24	10.11
	16.08	17.43	19.04	21.33	23.02	23.44 23	05.07 (1)	22.43		21.04	19.18	16.38	15.13	14.53
28	09.18	07.43	06.08	05.24	03.54	03.24	04.44 (1)	04.33		06.03	07.28	07.54	09.27	10.11
	16.11	17.46	19.07	21.36	23.05	23.43 24	05.08 (1)	22.40		21.01	19.15	16.35	15.11	14.54
29	09.15		07.05	05.20	03.52	03.26	04.44 (1)	04.36		06.06	07.31	07.57	09.29	10.11
	16.14		20.09	21.39	23.07	23.43 23	05.07 (1)	22.37		20.57	19.11	16.32	15.09	14.55
30	09.13		07.01	05.17	03.49 04.48 (1)	03.27	04.44 (1)	04.39		06.09	07.34	08.00	09.32	10.10
	16.17		20.12	21.42	23.10 4 04.52 (1)	23.42 23	05.07 (1)	22.34		20.54	19.08	16.29	15.07	14.57
31	09.10		06.58		03.47 04.45 (1)			04.42		06.11		08.03		10.10
	16.20		20.15		23.12 9 04.54 (1)			22.31		20.50		16.26		14.58
Potential sun hours	182	242	363	447	559	605		594		502	392	308	206	151
Total, worst case					13	652		225						
Sun reduction					0,48	0,49		0,39						
Oper. time red.					0,99	0,99		0,99						
Wind dir. red.					0,63	0,63		0,63						
Total reduction					0,30	0,31		0,24						
Total, real					4	200		54						

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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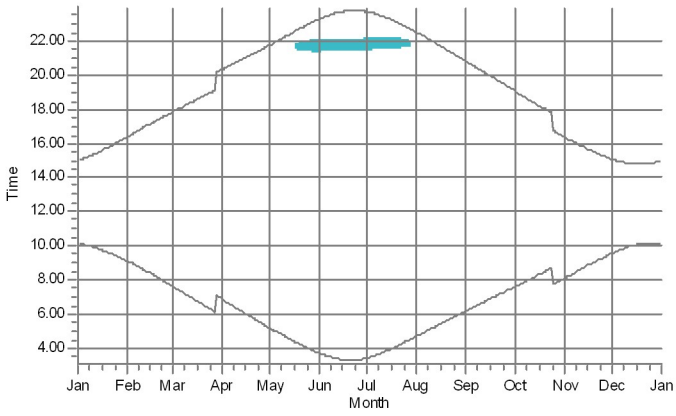
Calculated:
14.7.2023 9.55/3.5.584

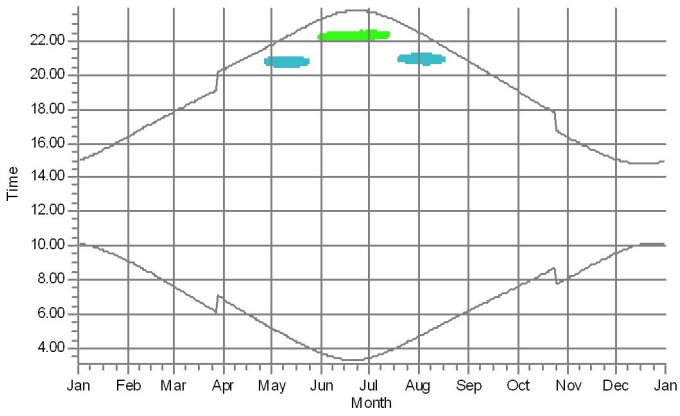
SHADOW - Calendar, graphical

Calculation: VE1_19xRD180xHH190_No Forest

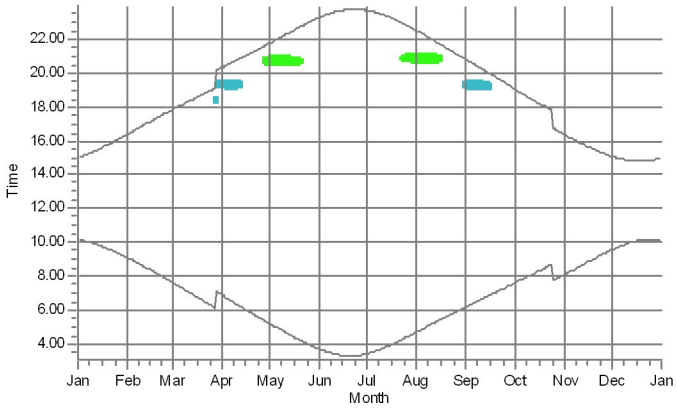
A: A Lomarakennus (Söderändan 49)



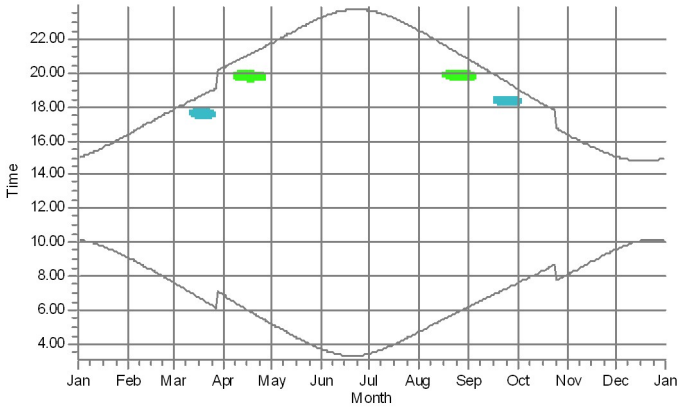
B: B Asuinrakennus (Söderändan 81)



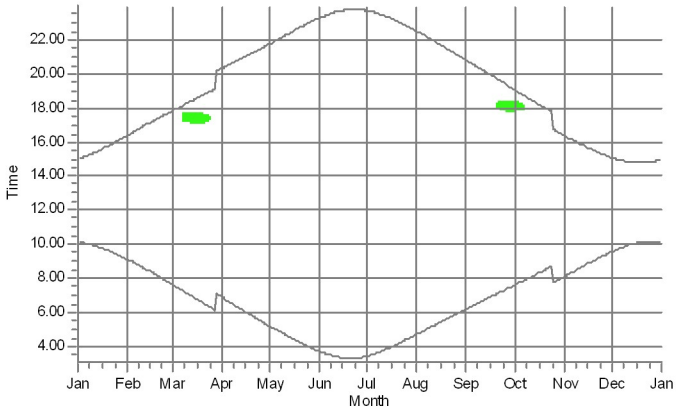
C: C Lomarakennus (Säderändan 166)



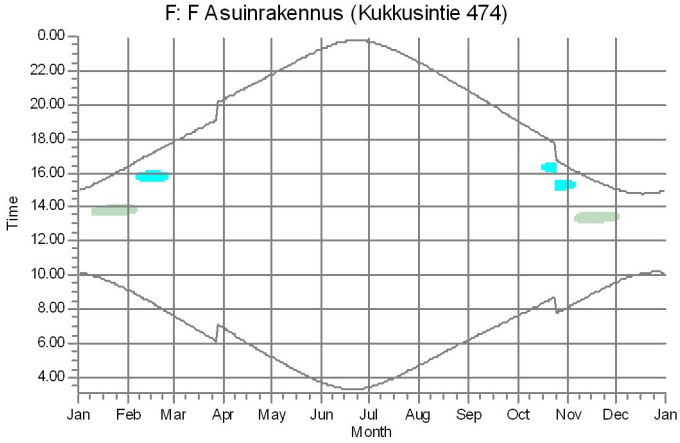
D: D Lomarakennus (Söderändan 188)



E: E Asuinrakennus (Rökiöntie 930)



F: F Asuinrakennus (Kukkusintie 474)



WTGs

13: Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8822)
14: Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8818)
18: Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8827)
19: Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8830)

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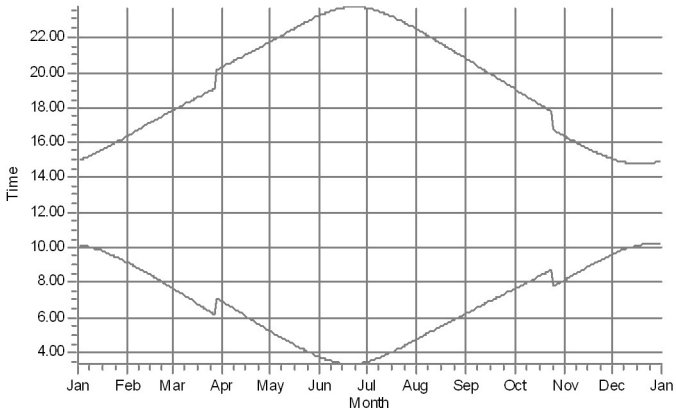
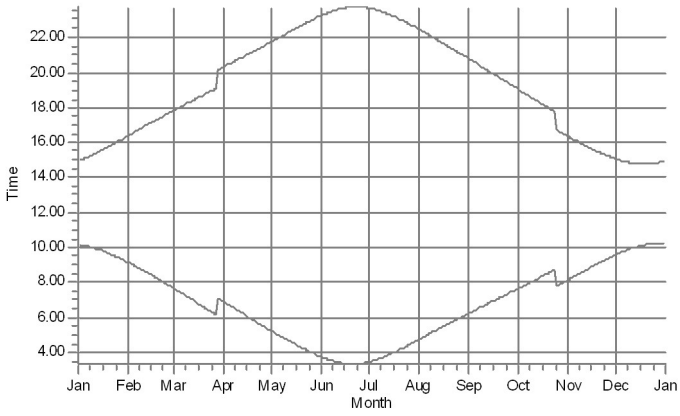
SHADOW - Calendar, graphical

Calculation: VE1_19xRD180xHH190_No Forest

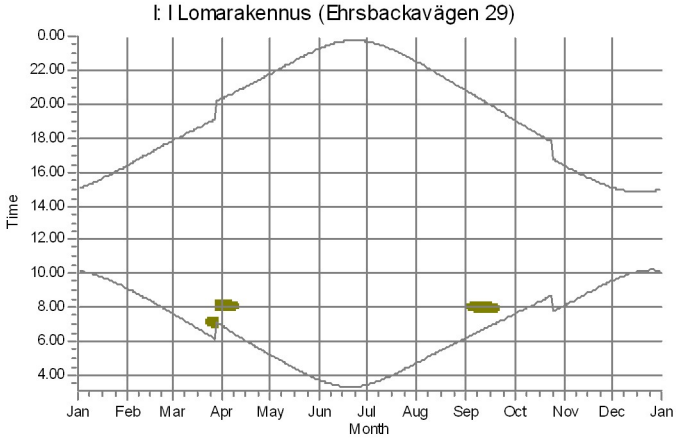
G: G Asuinrakennus (Kovik byväg 53)



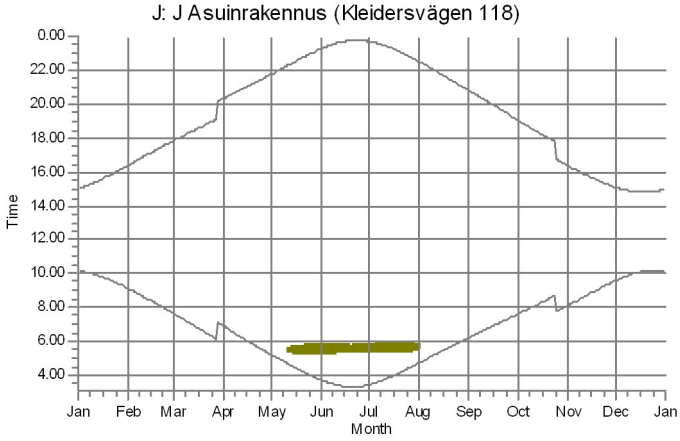
H: H Asuinrakennus (Vöyrintie 1021)



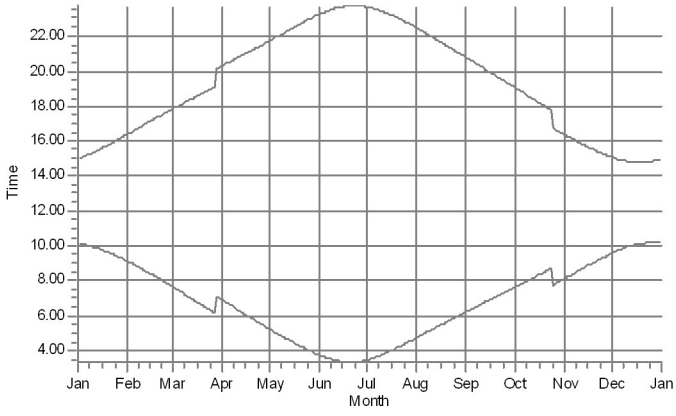
I: I Lomarakennus (Ehrsbackavägen 29)



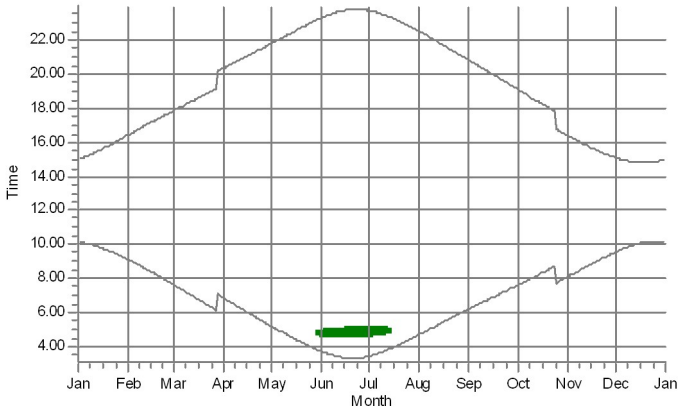
J: J Asuinrakennus (Kleidersvägen 118)



K: K Asuinrakennus (Rökiöntie 154)



L: L Asuinrakennus (Bjurbäcksvägen 231)



WTGs

1: Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8836)

10: Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8824)

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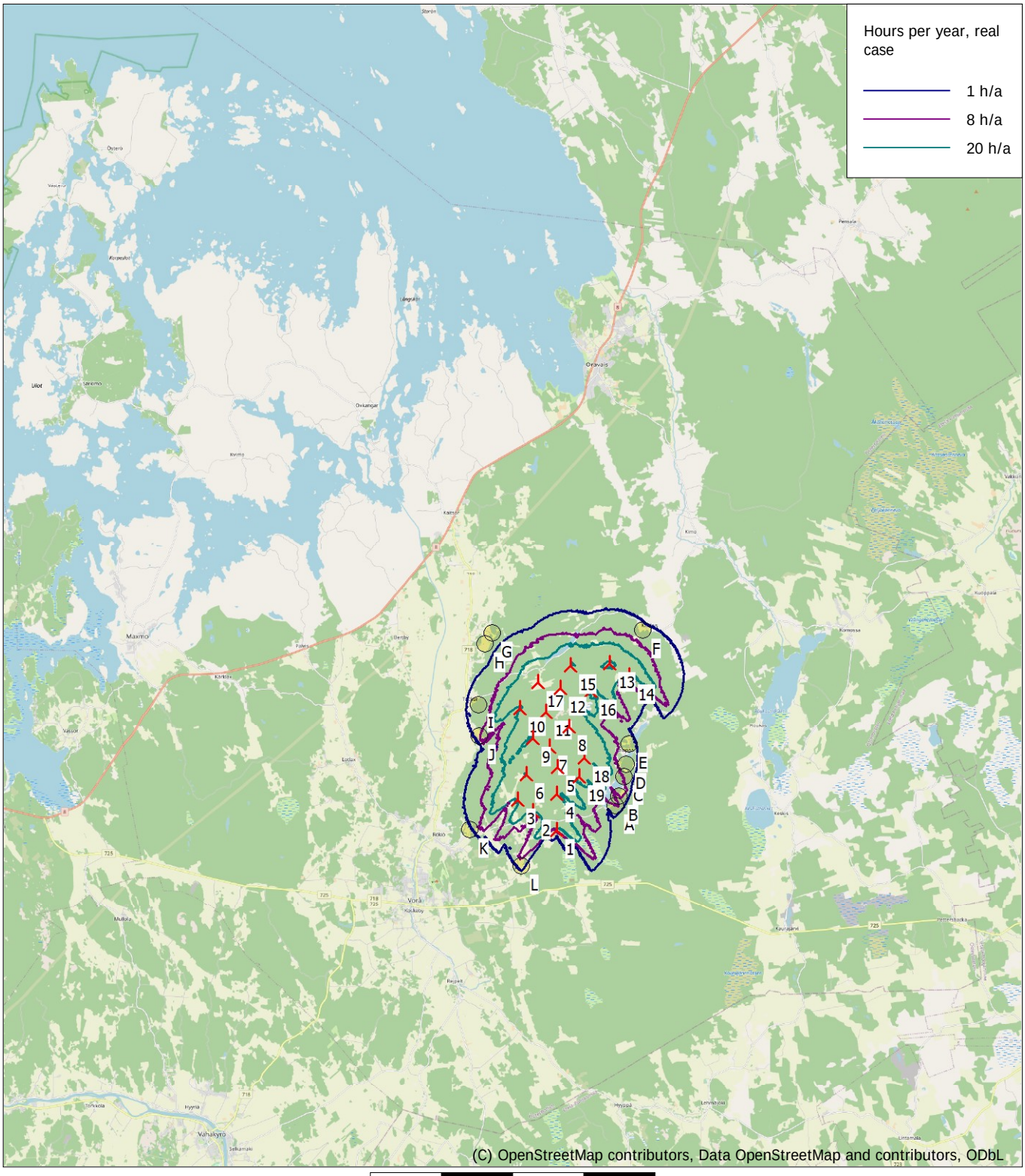
Calculated:
14.7.2023 9.55/3.5.584

SHADOW - Map

Calculation: VE1_19xRD180xHH190_No Forest



0 2,5 5 7,5 10km

Map: EMD OpenStreetMap , Print scale 1:200 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 264 510 North: 7 019 520

New WTG Shadow receptor

Flicker map level: Height Contours: CONTOURLINE_Lasor tuulivoimahanke 2022_0.wpo (3)

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

Liite 6. Varjostusmallinnuksen tulokset ”Real Case, Luke forest” - Hankevaihtoehto 1

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Calculated:
14.7.2023 10.34/3.5.584

SHADOW - Main Result

Calculation: VE1_19xRD180xHH190_Luke Forest

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) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational hours are calculated from WTGs in calculation and wind distribution:
MERRA-2_N63,00_E022,50 (41)

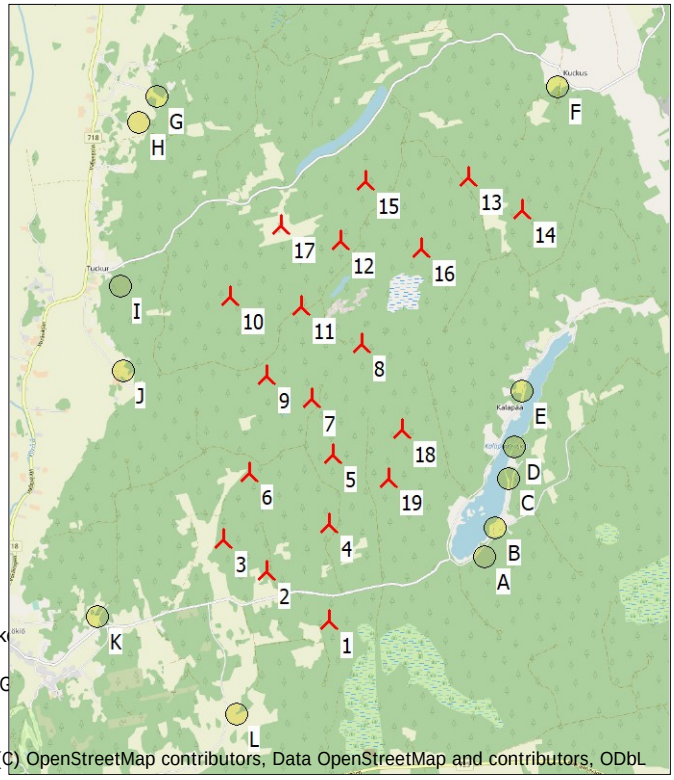
Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

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: Height Contours: CONTOURLINE_Lasor tuulivoimahank
Area object(s) used in calculation:
Area object (Heights a.g.l. for e.g. Forest (ORA tool) or ZVI obstructions): REC
Obstacles used in calculation
Receptor grid resolution: 1,0 m

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89



Scale 1:100 000
New WTG
Shadow receptor

WTGs

	East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
			[m]					[kW]	[m]	[m]	[m]	[RPM]
1	265 860	7 011 060	40,0	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
2	265 074	7 011 774	34,4	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
3	264 546	7 012 237	34,4	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
4	265 960	7 012 340	40,0	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
5	266 070	7 013 270	35,0	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
6	264 950	7 013 100	40,0	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
7	265 850	7 014 020	40,0	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
8	266 560	7 014 700	40,0	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
9	265 278	7 014 371	40,2	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
10	264 871	7 015 451	34,5	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
11	265 796	7 015 259	39,8	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
12	266 380	7 016 090	44,5	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
13	268 137	7 016 809	31,7	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
14	268 822	7 016 315	40,0	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
15	266 770	7 016 850	43,5	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
16	267 439	7 015 897	37,5	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
17	265 604	7 016 343	20,0	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
18	267 010	7 013 530	40,8	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
19	266 794	7 012 894	40,4	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4

Shadow receptor-Input

No.	Name	East	North	Z	Width	Height	Elevation a.g.l.	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
				[m]	[m]	[m]	[m]	[°]		[m]
A	A Lomarakennus (Söderändan 49)	267 990	7 011 759	42,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
B	B Asuinrakennus (Söderändan 81)	268 161	7 012 123	37,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
C	C Lomarakennus (Säderändan 166)	268 388	7 012 783	39,1	5,0	5,0	1,0	90,0	"Green house mode"	6,0
D	D Lomarakennus (Söderändan 188)	268 493	7 013 188	37,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0

To be continued on next page...

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Calculated:
14.7.2023 10.34/3.5.584

SHADOW - Main Result

Calculation: VE1_19xRD180xHH190_Luke Forest

...continued from previous page

No.	Name	East	North	Z	Width	Height	Elevation a.g.l.	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
				[m]	[m]	[m]	[m]	[°]		[m]
E	E Asuinrakennus (Rökiöntie 930)	268 646	7 013 924	38,1	5,0	5,0	1,0	90,0	"Green house mode"	6,0
F	F Asuinrakennus (Kukkusintie 474)	269 409	7 017 903	25,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
G	G Asuinrakennus (Kovik byväg 53)	264 096	7 018 174	10,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
H	H Asuinrakennus (Vöyrintie 1021)	263 817	7 017 837	8,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
I	I Lomarakennus (Ehrsbackavägen 29)	263 418	7 015 700	21,7	5,0	5,0	1,0	90,0	"Green house mode"	6,0
J	J Asuinrakennus (Kleidersvägen 118)	263 380	7 014 576	13,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0
K	K Asuinrakennus (Rökiöntie 154)	262 790	7 011 335	27,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
L	L Asuinrakennus (Bjurbäcksvägen 231)	264 546	7 009 923	27,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0

Calculation Results

Shadow receptor

No.	Name	Shadow, expected values Shadow hours per year [h/year]
A	A Lomarakennus (Söderändan 49)	8:13
B	B Asuinrakennus (Söderändan 81)	0:00
C	C Lomarakennus (Säderändan 166)	0:00
D	D Lomarakennus (Söderändan 188)	4:54
E	E Asuinrakennus (Rökiöntie 930)	1:59
F	F Asuinrakennus (Kukkusintie 474)	0:00
G	G Asuinrakennus (Kovik byväg 53)	0:00
H	H Asuinrakennus (Vöyrintie 1021)	0:00
I	I Lomarakennus (Ehrsbackavägen 29)	2:49
J	J Asuinrakennus (Kleidersvägen 118)	7:57
K	K Asuinrakennus (Rökiöntie 154)	0:00
L	L Asuinrakennus (Bjurbäcksvägen 231)	0:00

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

No.	Name	Expected [h/year]
1	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8836)	0:00
2	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8835)	0:00
3	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8834)	0:00
4	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8833)	0:00
5	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8831)	0:00
6	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8832)	0:00
7	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8828)	0:00
8	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8826)	0:00
9	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8829)	0:00
10	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8824)	10:47
11	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8825)	0:00
12	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8823)	0:00
13	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8822)	0:00
14	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8818)	0:00
15	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8821)	0:00
16	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8819)	0:00
17	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8820)	0:00
18	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8827)	5:03
19	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8830)	10:04

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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Calculated:
14.7.2023 10.34/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190_Luke ForestShadow receptor: A - A Lomarakennus (Söderändan 49)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May		June		July		August	September	October	November	December
1	10.09	09.07	07.39	06.54	05.13		03.44	21.28 (19)	03.27	21.34 (19)	04.44	06.14	07.36	08.06	09.34
	15.00	16.23	17.49	20.18	21.45		23.15	28 21.56 (19)	23.41	28 22.02 (19)	22.28	20.47	19.04	16.22	15.04
2	10.08	09.04	07.36	06.51	05.10		03.42	21.29 (19)	03.29	21.34 (19)	04.47	06.17	07.39	08.09	09.37
	15.01	16.26	17.52	20.21	21.48		23.17	27 21.56 (19)	23.40	28 22.02 (19)	22.25	20.43	19.01	16.19	15.03
3	10.07	09.01	07.33	06.47	05.07		03.40	21.29 (19)	03.30	21.34 (19)	04.50	06.19	07.42	08.12	09.40
	15.03	16.29	17.55	20.23	21.51		23.20	28 21.57 (19)	23.38	28 22.02 (19)	22.22	20.40	18.57	16.16	15.01
4	10.06	08.58	07.29	06.44	05.04		03.38	21.29 (19)	03.32	21.35 (19)	04.53	06.22	07.45	08.15	09.42
	15.05	16.32	17.58	20.26	21.54		23.22	27 21.56 (19)	23.37	28 22.03 (19)	22.19	20.37	18.54	16.13	14.59
5	10.05	08.55	07.26	06.41	05.00		03.36	21.29 (19)	03.34	21.35 (19)	04.56	06.25	07.47	08.18	09.44
	15.07	16.36	18.01	20.29	21.57		23.24	28 21.57 (19)	23.35	28 22.03 (19)	22.16	20.33	18.51	16.10	14.58
6	10.04	08.52	07.23	06.37	04.57		03.34	21.29 (19)	03.36	21.35 (19)	04.59	06.28	07.50	08.21	09.47
	15.09	16.39	18.04	20.32	22.00		23.26	28 21.57 (19)	23.34	28 22.03 (19)	22.13	20.30	18.47	16.07	14.56
7	10.03	08.49	07.19	06.34	04.54		03.32	21.30 (19)	03.38	21.36 (19)	05.02	06.30	07.53	08.24	09.49
	15.12	16.42	18.07	20.35	22.03		23.28	27 21.57 (19)	23.32	27 22.03 (19)	22.10	20.26	18.44	16.04	14.55
8	10.01	08.46	07.16	06.30	04.51		03.31	21.30 (19)	03.40	21.35 (19)	05.05	06.33	07.56	08.27	09.51
	15.14	16.45	18.09	20.38	22.06		23.30	28 21.58 (19)	23.30	28 22.03 (19)	22.06	20.23	18.40	16.01	14.54
9	10.00	08.43	07.13	06.27	04.48		03.29	21.30 (19)	03.42	21.36 (19)	05.08	06.36	07.58	08.30	09.53
	15.16	16.48	18.12	20.41	22.09		23.32	28 21.58 (19)	23.28	28 22.04 (19)	22.03	20.19	18.37	15.58	14.53
10	09.58	08.40	07.09	06.24	04.45		03.28	21.30 (19)	03.44	21.36 (19)	05.11	06.39	08.01	08.33	09.55
	15.19	16.51	18.15	20.43	22.12		23.34	28 21.58 (19)	23.26	28 22.04 (19)	22.00	20.16	18.34	15.56	14.52
11	09.57	08.37	07.06	06.20	04.42		03.26	21.30 (19)	03.47	21.36 (19)	05.14	06.41	08.04	08.36	09.57
	15.21	16.54	18.18	20.46	22.15		23.36	28 21.58 (19)	23.24	27 22.03 (19)	21.57	20.13	18.30	15.53	14.51
12	09.55	08.34	07.03	06.17	04.39		03.25	21.30 (19)	03.49	21.36 (19)	05.17	06.44	08.07	08.39	09.59
	15.24	16.57	18.21	20.49	22.18		23.37	27 21.57 (19)	23.22	28 22.04 (19)	21.54	20.09	18.27	15.50	14.50
13	09.53	08.31	06.59	06.13	04.35		03.24	21.31 (19)	03.51	21.37 (19)	05.19	06.47	08.10	08.42	10.00
	15.27	17.01	18.24	20.52	22.21		23.39	27 21.58 (19)	23.20	27 22.04 (19)	21.50	20.06	18.24	15.47	14.49
14	09.51	08.28	06.56	06.10	04.32		03.23	21.31 (19)	03.54	21.37 (19)	05.22	06.50	08.13	08.45	10.02
	15.29	17.04	18.27	20.55	22.24		23.40	27 21.58 (19)	23.18	27 22.04 (19)	21.47	20.02	18.20	15.44	14.48
15	09.49	08.25	06.52	06.07	04.29		03.22	21.31 (19)	03.56	21.38 (19)	05.25	06.52	08.16	08.48	10.03
	15.32	17.07	18.30	20.58	22.27		23.41	27 21.58 (19)	23.15	26 22.04 (19)	21.44	19.59	18.17	15.42	14.48
16	09.47	08.22	06.49	06.03	04.26		03.22	21.32 (19)	03.59	21.38 (19)	05.28	06.55	08.18	08.51	10.05
	15.35	17.10	18.32	21.01	22.30		23.42	27 21.59 (19)	23.13	26 22.04 (19)	21.40	19.55	18.14	15.39	14.48
17	09.45	08.18	06.46	06.00	04.24		03.21	21.31 (19)	04.01	21.38 (19)	05.31	06.58	08.21	08.55	10.06
	15.38	17.13	18.35	21.04	22.33		23.43	27 21.58 (19)	23.10	25 22.03 (19)	21.37	19.52	18.10	15.36	14.47
18	09.43	08.15	06.42	05.56	04.21	21.37 (19)	03.21	21.32 (19)	04.04	21.39 (19)	05.34	07.01	08.24	08.58	10.07
	15.40	17.16	18.38	21.07	22.36	9 21.46 (19)	23.44	27 21.59 (19)	23.08	24 22.03 (19)	21.34	19.49	18.07	15.34	14.47
19	09.40	08.12	06.39	05.53	04.18	21.34 (19)	03.20	21.32 (19)	04.07	21.39 (19)	05.37	07.03	08.27	09.01	10.08
	15.43	17.19	18.41	21.10	22.39	13 21.47 (19)	23.44	27 21.59 (19)	23.05	23 22.02 (19)	21.31	19.45	18.04	15.31	14.47
20	09.38	08.09	06.35	05.50	04.15	21.33 (19)	03.20	21.32 (19)	04.10	21.39 (19)	05.40	07.06	08.30	09.04	10.09
	15.46	17.22	18.44	21.12	22.42	16 21.49 (19)	23.45	27 21.59 (19)	23.03	23 22.02 (19)	21.27	19.42	18.01	15.29	14.47
21	09.36	08.06	06.32	05.46	04.12	21.32 (19)	03.20	21.33 (19)	04.12	21.41 (19)	05.43	07.09	08.33	09.06	10.10
	15.49	17.25	18.47	21.15	22.45	18 21.50 (19)	23.45	27 22.00 (19)	23.00	21 22.02 (19)	21.24	19.38	17.57	15.26	14.48
22	09.33	08.02	06.28	05.43	04.09	21.31 (19)	03.20	21.33 (19)	04.15	21.42 (19)	05.46	07.11	08.36	09.09	10.10
	15.52	17.28	18.49	21.18	22.48	20 21.51 (19)	23.45	27 22.00 (19)	22.57	19 22.01 (19)	21.21	19.35	17.54	15.24	14.48
23	09.31	07.59	06.25	05.40	04.07	21.31 (19)	03.20	21.33 (19)	04.18	21.42 (19)	05.48	07.14	08.39	09.12	10.11
	15.55	17.31	18.52	21.21	22.51	21 21.52 (19)	23.45	27 22.00 (19)	22.55	18 22.00 (19)	21.17	19.31	17.51	15.21	14.49
24	09.28	07.56	06.22	05.36	04.04	21.30 (19)	03.21	21.34 (19)	04.21	21.43 (19)	05.51	07.17	08.42	09.15	10.11
	15.58	17.34	18.55	21.24	22.54	23 21.53 (19)	23.45	27 22.01 (19)	22.52	15 21.58 (19)	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.18	05.33	04.01	21.30 (19)	03.21	21.33 (19)	04.24	21.46 (19)	05.54	07.20	07.45	09.18	10.11
	16.01	17.37	18.58	21.27	22.56	24 21.54 (19)	23.45	27 22.00 (19)	22.49	11 21.57 (19)	21.10	19.25	16.44	15.17	14.50
26	09.23	07.49	06.15	05.30	03.59	21.29 (19)	03.22	21.34 (19)	04.27	21.48 (19)	05.57	07.22	07.48	09.21	10.11
	16.04	17.40	19.01	21.30	22.59	25 21.54 (19)	23.45	27 22.01 (19)	22.46	6 21.54 (19)	21.07	19.21	16.41	15.14	14.51
27	09.21	07.46	06.11	05.26	03.56	21.29 (19)	03.23	21.33 (19)	04.29		06.00	07.25	07.51	09.24	10.11
	16.07	17.43	19.04	21.33	23.02	26 21.55 (19)	23.44	28 22.01 (19)	22.43		21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.54	21.29 (19)	03.24	21.34 (19)	04.32		06.03	07.28	07.54	09.26	10.11
	16.11	17.46	19.06	21.36	23.05	26 21.55 (19)	23.43	27 22.01 (19)	22.40		21.00	19.14	16.35	15.10	14.53
29	09.15		07.05	05.20	03.51	21.28 (19)	03.25	21.34 (19)	04.35		06.05	07.31	07.57	09.29	10.11
	16.14		20.09	21.39	23.07	27 21.55 (19)	23.43	27 22.01 (19)	22.37		20.57	19.11	16.32	15.08	14.55
30	09.12		07.01	05.17	03.49	21.29 (19)	03.26	21.34 (19)	04.38		06.08	07.33	08.00	09.32	10.10
	16.17		20.12	21.42	23.10	27 21.56 (19)	23.42	28 22.02 (19)	22.34		20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.47	21.29 (19)			04.41		06.11		08.03		10.10
	16.20		20.15		23.12	27 21.56 (19)			22.31		20.50		16.26		14.58
Potential sun hours	182	242	363	447	559		605		594		502	392	308	206	151
Total, worst case						302		820		625					
Sun reduction						0,48		0,49		0,39					
Oper. time red.						0,99		0,99		0,99					
Wind dir. red.						0,63		0,63		0,63					
Total reduction						0,30		0,31		0,24					
Total, real						90		252		151					

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)		First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker	(WTG causing flicker last time)

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Calculated:
14.7.2023 10.34/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190_Luke ForestShadow receptor: B - B Asuinrakennus (Söderändan 81)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.39	06.54	05.13	03.44	03.27	04.44	06.14	07.36	08.06	09.35
	15.00	16.23	17.49	20.18	21.45	23.15	23.41	22.28	20.47	19.04	16.22	15.04
2	10.08	09.04	07.36	06.51	05.10	03.42	03.29	04.47	06.17	07.39	08.09	09.37
	15.01	16.26	17.52	20.21	21.48	23.17	23.40	22.25	20.43	19.01	16.19	15.03
3	10.07	09.01	07.33	06.47	05.07	03.40	03.30	04.50	06.19	07.42	08.12	09.40
	15.03	16.29	17.55	20.23	21.51	23.20	23.38	22.22	20.40	18.57	16.16	15.01
4	10.06	08.58	07.29	06.44	05.04	03.38	03.32	04.53	06.22	07.44	08.15	09.42
	15.05	16.32	17.58	20.26	21.54	23.22	23.37	22.19	20.37	18.54	16.13	14.59
5	10.05	08.55	07.26	06.41	05.00	03.36	03.34	04.56	06.25	07.47	08.18	09.44
	15.07	16.36	18.01	20.29	21.57	23.24	23.35	22.16	20.33	18.51	16.10	14.58
6	10.04	08.52	07.23	06.37	04.57	03.34	03.36	04.59	06.28	07.50	08.21	09.47
	15.09	16.39	18.04	20.32	22.00	23.26	23.34	22.13	20.30	18.47	16.07	14.56
7	10.03	08.49	07.19	06.34	04.54	03.32	03.38	05.02	06.30	07.53	08.24	09.49
	15.12	16.42	18.07	20.35	22.03	23.28	23.32	22.10	20.26	18.44	16.04	14.55
8	10.01	08.46	07.16	06.30	04.51	03.31	03.40	05.05	06.33	07.56	08.27	09.51
	15.14	16.45	18.09	20.38	22.06	23.30	23.30	22.06	20.23	18.40	16.01	14.54
9	10.00	08.43	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.58	08.30	09.53
	15.16	16.48	18.12	20.41	22.09	23.32	23.28	22.03	20.19	18.37	15.58	14.52
10	09.58	08.40	07.09	06.24	04.45	03.28	03.44	05.11	06.39	08.01	08.33	09.55
	15.19	16.51	18.15	20.43	22.12	23.34	23.26	22.00	20.16	18.34	15.56	14.51
11	09.57	08.37	07.06	06.20	04.42	03.26	03.46	05.14	06.41	08.04	08.36	09.57
	15.21	16.54	18.18	20.46	22.15	23.36	23.24	21.57	20.13	18.30	15.53	14.51
12	09.55	08.34	07.03	06.17	04.38	03.25	03.49	05.16	06.44	08.07	08.39	09.59
	15.24	16.57	18.21	20.49	22.18	23.37	23.22	21.54	20.09	18.27	15.50	14.50
13	09.53	08.31	06.59	06.13	04.35	03.24	03.51	05.19	06.47	08.10	08.42	10.00
	15.26	17.01	18.24	20.52	22.21	23.39	23.20	21.50	20.06	18.24	15.47	14.49
14	09.51	08.28	06.56	06.10	04.32	03.23	03.54	05.22	06.50	08.13	08.45	10.02
	15.29	17.04	18.27	20.55	22.24	23.40	23.18	21.47	20.02	18.20	15.44	14.48
15	09.49	08.25	06.52	06.07	04.29	03.22	03.56	05.25	06.52	08.16	08.48	10.03
	15.32	17.07	18.30	20.58	22.27	23.41	23.15	21.44	19.59	18.17	15.42	14.48
16	09.47	08.22	06.49	06.03	04.26	03.21	03.59	05.28	06.55	08.18	08.52	10.05
	15.35	17.10	18.32	21.01	22.30	23.42	23.13	21.40	19.55	18.14	15.39	14.48
17	09.45	08.18	06.46	06.00	04.23	03.21	04.01	05.31	06.58	08.21	08.55	10.06
	15.37	17.13	18.35	21.04	22.33	23.43	23.11	21.37	19.52	18.10	15.36	14.47
18	09.43	08.15	06.42	05.56	04.21	03.20	04.04	05.34	07.01	08.24	08.58	10.07
	15.40	17.16	18.38	21.07	22.36	23.44	23.08	21.34	19.49	18.07	15.34	14.47
19	09.40	08.12	06.39	05.53	04.18	03.20	04.07	05.37	07.03	08.27	09.01	10.08
	15.43	17.19	18.41	21.10	22.39	23.44	23.05	21.31	19.45	18.04	15.31	14.47
20	09.38	08.09	06.35	05.50	04.15	03.20	04.10	05.40	07.06	08.30	09.04	10.09
	15.46	17.22	18.44	21.12	22.42	23.45	23.03	21.27	19.42	18.01	15.29	14.47
21	09.36	08.06	06.32	05.46	04.12	03.20	04.12	05.43	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.15	22.45	23.45	23.00	21.24	19.38	17.57	15.26	14.48
22	09.33	08.02	06.28	05.43	04.09	03.20	04.15	05.45	07.11	08.36	09.09	10.10
	15.52	17.28	18.49	21.18	22.48	23.45	22.57	21.21	19.35	17.54	15.24	14.48
23	09.31	07.59	06.25	05.40	04.07	03.20	04.18	05.48	07.14	08.39	09.12	10.11
	15.55	17.31	18.52	21.21	22.51	23.45	22.55	21.17	19.31	17.51	15.21	14.49
24	09.28	07.56	06.22	05.36	04.04	03.21	04.21	05.51	07.17	08.42	09.15	10.11
	15.58	17.34	18.55	21.24	22.54	23.45	22.52	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.18	05.33	04.01	03.21	04.24	05.54	07.20	07.45	09.18	10.11
	16.01	17.37	18.58	21.27	22.56	23.45	22.49	21.10	19.25	16.44	15.17	14.50
26	09.23	07.49	06.15	05.30	03.59	03.22	04.26	05.57	07.22	07.48	09.21	10.11
	16.04	17.40	19.01	21.30	22.59	23.45	22.46	21.07	19.21	16.41	15.14	14.51
27	09.21	07.46	06.11	05.26	03.56	03.23	04.29	06.00	07.25	07.51	09.24	10.11
	16.07	17.43	19.04	21.33	23.02	23.44	22.43	21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.54	03.24	04.32	06.03	07.28	07.54	09.27	10.11
	16.11	17.46	19.06	21.36	23.05	23.44	22.40	21.00	19.14	16.35	15.10	14.53
29	09.15		07.05	05.20	03.51	03.25	04.35	06.05	07.31	07.57	09.29	10.11
	16.14		20.09	21.39	23.07	23.43	22.37	20.57	19.11	16.32	15.08	14.55
30	09.12		07.01	05.17	03.49	03.26	04.38	06.08	07.33	08.00	09.32	10.10
	16.17		20.12	21.42	23.10	23.42	22.34	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.10
	16.20		20.15		23.12		22.31	20.50		16.26		14.57
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 10.34/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190_Luke ForestShadow receptor: C - C Lomarakennus (Säderändan 166)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.39	06.54	05.13	03.44	03.27	04.44	06.14	07.36	08.06	09.35
	14.59	16.23	17.49	20.18	21.45	23.15	23.41	22.28	20.47	19.04	16.22	15.04
2	10.08	09.04	07.36	06.51	05.10	03.42	03.29	04.47	06.17	07.39	08.09	09.37
	15.01	16.26	17.52	20.21	21.48	23.17	23.40	22.25	20.43	19.01	16.19	15.02
3	10.08	09.01	07.33	06.47	05.07	03.40	03.30	04.50	06.19	07.42	08.12	09.40
	15.03	16.29	17.55	20.23	21.51	23.20	23.38	22.22	20.40	18.57	16.16	15.01
4	10.06	08.58	07.29	06.44	05.04	03.38	03.32	04.53	06.22	07.44	08.15	09.42
	15.05	16.32	17.58	20.26	21.54	23.22	23.37	22.19	20.37	18.54	16.13	14.59
5	10.05	08.55	07.26	06.41	05.00	03.36	03.34	04.56	06.25	07.47	08.18	09.44
	15.07	16.36	18.01	20.29	21.57	23.24	23.36	22.16	20.33	18.51	16.10	14.58
6	10.04	08.52	07.23	06.37	04.57	03.34	03.36	04.59	06.28	07.50	08.21	09.47
	15.09	16.39	18.04	20.32	22.00	23.26	23.34	22.13	20.30	18.47	16.07	14.56
7	10.03	08.49	07.19	06.34	04.54	03.32	03.38	05.02	06.30	07.53	08.24	09.49
	15.11	16.42	18.06	20.35	22.03	23.28	23.32	22.10	20.26	18.44	16.04	14.55
8	10.01	08.46	07.16	06.30	04.51	03.31	03.40	05.05	06.33	07.56	08.27	09.51
	15.14	16.45	18.09	20.38	22.06	23.30	23.30	22.06	20.23	18.40	16.01	14.54
9	10.00	08.43	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.58	08.30	09.53
	15.16	16.48	18.12	20.41	22.09	23.32	23.28	22.03	20.19	18.37	15.58	14.52
10	09.58	08.40	07.09	06.24	04.45	03.28	03.44	05.11	06.39	08.01	08.33	09.55
	15.19	16.51	18.15	20.43	22.12	23.34	23.27	22.00	20.16	18.34	15.55	14.51
11	09.57	08.37	07.06	06.20	04.41	03.26	03.46	05.13	06.41	08.04	08.36	09.57
	15.21	16.54	18.18	20.46	22.15	23.36	23.24	21.57	20.13	18.30	15.53	14.50
12	09.55	08.34	07.03	06.17	04.38	03.25	03.49	05.16	06.44	08.07	08.39	09.59
	15.24	16.57	18.21	20.49	22.18	23.37	23.22	21.54	20.09	18.27	15.50	14.50
13	09.53	08.31	06.59	06.13	04.35	03.24	03.51	05.19	06.47	08.10	08.42	10.00
	15.26	17.01	18.24	20.52	22.21	23.39	23.20	21.50	20.06	18.24	15.47	14.49
14	09.51	08.28	06.56	06.10	04.32	03.23	03.54	05.22	06.50	08.13	08.45	10.02
	15.29	17.04	18.27	20.55	22.24	23.40	23.18	21.47	20.02	18.20	15.44	14.48
15	09.49	08.25	06.52	06.07	04.29	03.22	03.56	05.25	06.52	08.16	08.49	10.03
	15.32	17.07	18.30	20.58	22.27	23.41	23.15	21.44	19.59	18.17	15.41	14.48
16	09.47	08.22	06.49	06.03	04.26	03.21	03.59	05.28	06.55	08.18	08.52	10.05
	15.35	17.10	18.32	21.01	22.30	23.42	23.13	21.41	19.55	18.14	15.39	14.47
17	09.45	08.18	06.46	06.00	04.23	03.21	04.01	05.31	06.58	08.21	08.55	10.06
	15.37	17.13	18.35	21.04	22.33	23.43	23.11	21.37	19.52	18.10	15.36	14.47
18	09.43	08.15	06.42	05.56	04.20	03.20	04.04	05.34	07.01	08.24	08.58	10.07
	15.40	17.16	18.38	21.07	22.36	23.44	23.08	21.34	19.49	18.07	15.34	14.47
19	09.40	08.12	06.39	05.53	04.18	03.20	04.07	05.37	07.03	08.27	09.01	10.08
	15.43	17.19	18.41	21.10	22.39	23.44	23.05	21.31	19.45	18.04	15.31	14.47
20	09.38	08.09	06.35	05.50	04.15	03.20	04.09	05.40	07.06	08.30	09.04	10.09
	15.46	17.22	18.44	21.12	22.42	23.45	23.03	21.27	19.42	18.01	15.28	14.47
21	09.36	08.06	06.32	05.46	04.12	03.20	04.12	05.43	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.15	22.45	23.45	23.00	21.24	19.38	17.57	15.26	14.48
22	09.33	08.02	06.28	05.43	04.09	03.20	04.15	05.45	07.11	08.36	09.09	10.10
	15.52	17.28	18.49	21.18	22.48	23.45	22.57	21.21	19.35	17.54	15.24	14.48
23	09.31	07.59	06.25	05.40	04.06	03.20	04.18	05.48	07.14	08.39	09.12	10.11
	15.55	17.31	18.52	21.21	22.51	23.46	22.55	21.17	19.31	17.51	15.21	14.49
24	09.28	07.56	06.22	05.36	04.04	03.21	04.21	05.51	07.17	08.42	09.15	10.11
	15.58	17.34	18.55	21.24	22.54	23.45	22.52	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.18	05.33	04.01	03.21	04.24	05.54	07.20	07.45	09.18	10.11
	16.01	17.37	18.58	21.27	22.57	23.45	22.49	21.10	19.25	16.44	15.17	14.50
26	09.23	07.49	06.15	05.30	03.59	03.22	04.26	05.57	07.22	07.48	09.21	10.11
	16.04	17.40	19.01	21.30	22.59	23.45	22.46	21.07	19.21	16.41	15.14	14.51
27	09.21	07.46	06.11	05.26	03.56	03.23	04.29	06.00	07.25	07.51	09.24	10.11
	16.07	17.43	19.04	21.33	23.02	23.44	22.43	21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.53	03.24	04.32	06.03	07.28	07.54	09.27	10.11
	16.10	17.46	19.06	21.36	23.05	23.44	22.40	21.00	19.14	16.35	15.10	14.53
29	09.15		07.05	05.20	03.51	03.25	04.35	06.05	07.31	07.57	09.29	10.11
	16.14		20.09	21.39	23.07	23.43	22.37	20.57	19.11	16.32	15.08	14.54
30	09.13		07.01	05.17	03.49	03.26	04.38	06.08	07.33	08.00	09.32	10.11
	16.17		20.12	21.42	23.10	23.42	22.34	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.10
	16.20		20.15		23.13		22.31	20.50		16.25		14.57
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 10.34/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190_Luke ForestShadow receptor: D - D Lomarakennus (Söderändan 188)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March		April		May	June
1	10.09	09.07	07.39		06.54		05.13	03.44
	14.59	16.23	17.49		20.18		21.45	23.15
2	10.08	09.04	07.36		06.51		05.10	03.42
	15.01	16.26	17.52		20.21		21.48	23.17
3	10.08	09.01	07.33		06.47		05.07	03.40
	15.03	16.29	17.55		20.23		21.51	23.20
4	10.07	08.58	07.29		06.44		05.04	03.38
	15.05	16.32	17.58		20.26		21.54	23.22
5	10.05	08.55	07.26		06.41		05.00	03.36
	15.07	16.36	18.01		20.29		21.57	23.24
6	10.04	08.52	07.23		06.37		04.57	03.34
	15.09	16.39	18.04		20.32		22.00	23.27
7	10.03	08.49	07.19		06.34		04.54	03.32
	15.11	16.42	18.06		20.35		22.03	23.29
8	10.01	08.46	07.16		06.30	19.45 (18)	04.51	03.31
	15.14	16.45	18.09		20.38	12 19.57 (18)	22.06	23.31
9	10.00	08.43	07.13		06.27	19.42 (18)	04.48	03.29
	15.16	16.48	18.12		20.41	17 19.59 (18)	22.09	23.32
10	09.58	08.40	07.09		06.23	19.40 (18)	04.45	03.28
	15.19	16.51	18.15		20.43	21 20.01 (18)	22.12	23.34
11	09.57	08.37	07.06		06.20	19.39 (18)	04.41	03.26
	15.21	16.54	18.18		20.46	23 20.02 (18)	22.15	23.36
12	09.55	08.34	07.03	17.34 (19)	06.17	19.38 (18)	04.38	03.25
	15.24	16.57	18.21	11 17.45 (19)	20.49	25 20.03 (18)	22.18	23.37
13	09.53	08.31	06.59	17.31 (19)	06.13	19.36 (18)	04.35	03.24
	15.26	17.00	18.24	16 17.47 (19)	20.52	26 20.02 (18)	22.21	23.39
14	09.51	08.28	06.56	17.29 (19)	06.10	19.36 (18)	04.32	03.23
	15.29	17.04	18.27	20 17.49 (19)	20.55	27 20.03 (18)	22.24	23.40
15	09.49	08.25	06.52	17.28 (19)	06.06	19.35 (18)	04.29	03.22
	15.32	17.07	18.29	21 17.49 (19)	20.58	28 20.03 (18)	22.27	23.41
16	09.47	08.22	06.49	17.27 (19)	06.03	19.35 (18)	04.26	03.21
	15.35	17.10	18.32	23 17.50 (19)	21.01	28 20.03 (18)	22.30	23.42
17	09.45	08.18	06.46	17.26 (19)	06.00	19.34 (18)	04.23	03.21
	15.37	17.13	18.35	24 17.50 (19)	21.04	28 20.02 (18)	22.33	23.43
18	09.43	08.15	06.42	17.25 (19)	05.56	19.34 (18)	04.20	03.20
	15.40	17.16	18.38	25 17.50 (19)	21.07	28 20.02 (18)	22.36	23.44
19	09.41	08.12	06.39	17.26 (19)	05.53	19.34 (18)	04.18	03.20
	15.43	17.19	18.41	24 17.50 (19)	21.10	28 20.02 (18)	22.39	23.45
20	09.38	08.09	06.35	17.25 (19)	05.50	19.35 (18)	04.15	03.20
	15.46	17.22	18.44	24 17.49 (19)	21.12	26 20.01 (18)	22.42	23.45
21	09.36	08.06	06.32	17.25 (19)	05.46	19.35 (18)	04.12	03.20
	15.49	17.25	18.47	24 17.49 (19)	21.15	25 20.00 (18)	22.45	23.45
22	09.33	08.02	06.28	17.25 (19)	05.43	19.36 (18)	04.09	03.20
	15.52	17.28	18.49	23 17.48 (19)	21.18	24 20.00 (18)	22.48	23.46
23	09.31	07.59	06.25	17.26 (19)	05.40	19.37 (18)	04.06	03.20
	15.55	17.31	18.52	21 17.47 (19)	21.21	22 19.59 (18)	22.51	23.46
24	09.28	07.56	06.22	17.26 (19)	05.36	19.37 (18)	04.04	03.21
	15.58	17.34	18.55	19 17.45 (19)	21.24	19 19.56 (18)	22.54	23.45
25	09.26	07.53	06.18	17.28 (19)	05.33	19.39 (18)	04.01	03.21
	16.01	17.37	18.58	15 17.43 (19)	21.27	16 19.55 (18)	22.57	23.45
26	09.23	07.49	06.15	17.30 (19)	05.30	19.41 (18)	03.58	03.22
	16.04	17.40	19.01	10 17.40 (19)	21.30	11 19.52 (18)	22.59	23.45
27	09.21	07.46	06.11		05.26		03.56	03.23
	16.07	17.43	19.04		21.33		23.02	23.44
28	09.18	07.43	06.08		05.23		03.53	03.24
	16.10	17.46	19.06		21.36		23.05	23.44
29	09.15		07.05		05.20		03.51	03.25
	16.14		20.09		21.39		23.07	23.43
30	09.13		07.01		05.16		03.49	03.26
	16.17		20.12		21.42		23.10	23.42
31	09.10		06.58				03.46	
	16.20		20.15				23.13	
Potential sun hours	182	242	363		447		559	605
Total, worst case				300		434		
Sun reduction				0,32		0,41		
Oper. time red.				0,99		0,99		
Wind dir. red.				0,57		0,58		
Total reduction				0,18		0,24		
Total, real				54		103		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 10.34/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190_Luke ForestShadow receptor: D - D Lomarakennus (Söderändan 188)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October		November	December
1	03.27	04.44		06.14		19.38 (18)	07.36	18.12 (19)	08.06	09.35
	23.41	22.28		20.47	23	20.01 (18)	19.04	14 18.26 (19)	16.22	15.04
2	03.29	04.47		06.17		19.39 (18)	07.39	18.15 (19)	08.09	09.37
	23.40	22.25		20.43	21	20.00 (18)	19.01	7 18.22 (19)	16.19	15.02
3	03.30	04.50		06.19		19.40 (18)	07.42		08.12	09.40
	23.38	22.22		20.40	17	19.57 (18)	18.57		16.16	15.01
4	03.32	04.53		06.22		19.42 (18)	07.44		08.15	09.42
	23.37	22.19		20.37	12	19.54 (18)	18.54		16.13	14.59
5	03.34	04.56		06.25			07.47		08.18	09.44
	23.36	22.16		20.33			18.51		16.10	14.58
6	03.36	04.59		06.28			07.50		08.21	09.47
	23.34	22.13		20.30			18.47		16.07	14.56
7	03.38	05.02		06.30			07.53		08.24	09.49
	23.32	22.10		20.26			18.44		16.04	14.55
8	03.40	05.05		06.33			07.56		08.27	09.51
	23.30	22.07		20.23			18.40		16.01	14.54
9	03.42	05.08		06.36			07.58		08.30	09.53
	23.29	22.03		20.19			18.37		15.58	14.52
10	03.44	05.11		06.39			08.01		08.33	09.55
	23.27	22.00		20.16			18.34		15.55	14.51
11	03.46	05.13		06.41			08.04		08.36	09.57
	23.24	21.57		20.13			18.30		15.53	14.50
12	03.49	05.16		06.44			08.07		08.39	09.59
	23.22	21.54		20.09			18.27		15.50	14.50
13	03.51	05.19		06.47			08.10		08.42	10.00
	23.20	21.50		20.06			18.24		15.47	14.49
14	03.54	05.22		06.50			08.13		08.45	10.02
	23.18	21.47		20.02			18.20		15.44	14.48
15	03.56	05.25		06.52			08.16		08.49	10.03
	23.16	21.44		19.59			18.17		15.41	14.48
16	03.59	05.28	19.52 (18)	06.55			08.18		08.52	10.05
	23.13	21.41	4 19.56 (18)	19.55			18.14		15.39	14.47
17	04.01	05.31	19.48 (18)	06.58		18.20 (19)	08.21		08.55	10.06
	23.11	21.37	12 20.00 (18)	19.52	8	18.28 (19)	18.10		15.36	14.47
18	04.04	05.34	19.45 (18)	07.01		18.17 (19)	08.24		08.58	10.07
	23.08	21.34	16 20.01 (18)	19.49	14	18.31 (19)	18.07		15.33	14.47
19	04.07	05.37	19.43 (18)	07.03		18.15 (19)	08.27		09.01	10.08
	23.06	21.31	20 20.03 (18)	19.45	17	18.32 (19)	18.04		15.31	14.47
20	04.09	05.40	19.42 (18)	07.06		18.12 (19)	08.30		09.04	10.09
	23.03	21.27	22 20.04 (18)	19.42	20	18.32 (19)	18.01		15.28	14.47
21	04.12	05.43	19.40 (18)	07.09		18.11 (19)	08.33		09.07	10.10
	23.00	21.24	24 20.04 (18)	19.38	22	18.33 (19)	17.57		15.26	14.48
22	04.15	05.45	19.40 (18)	07.11		18.10 (19)	08.36		09.10	10.10
	22.58	21.21	25 20.05 (18)	19.35	24	18.34 (19)	17.54		15.23	14.48
23	04.18	05.48	19.38 (18)	07.14		18.09 (19)	08.39		09.12	10.11
	22.55	21.17	27 20.05 (18)	19.31	24	18.33 (19)	17.51		15.21	14.48
24	04.21	05.51	19.38 (18)	07.17		18.09 (19)	08.42		09.15	10.11
	22.52	21.14	27 20.05 (18)	19.28	24	18.33 (19)	17.48		15.19	14.49
25	04.23	05.54	19.38 (18)	07.20		18.08 (19)	07.45		09.18	10.11
	22.49	21.10	28 20.06 (18)	19.25	25	18.33 (19)	16.44		15.17	14.50
26	04.26	05.57	19.37 (18)	07.22		18.09 (19)	07.48		09.21	10.11
	22.46	21.07	28 20.05 (18)	19.21	24	18.33 (19)	16.41		15.14	14.51
27	04.29	06.00	19.37 (18)	07.25		18.08 (19)	07.51		09.24	10.11
	22.43	21.04	28 20.05 (18)	19.18	23	18.31 (19)	16.38		15.12	14.52
28	04.32	06.02	19.36 (18)	07.28		18.08 (19)	07.54		09.27	10.11
	22.40	21.00	28 20.04 (18)	19.14	22	18.30 (19)	16.35		15.10	14.53
29	04.35	06.05	19.37 (18)	07.31		18.09 (19)	07.57		09.29	10.11
	22.37	20.57	27 20.04 (18)	19.11	20	18.29 (19)	16.32		15.08	14.54
30	04.38	06.08	19.37 (18)	07.33		18.10 (19)	08.00		09.32	10.11
	22.34	20.54	26 20.03 (18)	19.07	18	18.28 (19)	16.29		15.06	14.56
31	04.41	06.11	19.37 (18)				08.03			10.10
	22.31	20.50	25 20.02 (18)				16.25			14.57
Potential sun hours	594	502		392			308		206	151
Total, worst case			367		358			21		
Sun reduction			0,32		0,33			0,35		
Oper. time red.			0,99		0,99			0,99		
Wind dir. red.			0,58		0,57			0,57		
Total reduction			0,18		0,19			0,19		
Total, real			67		67			4		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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14.7.2023 10.34/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190_Luke ForestShadow receptor: E - E Asuinrakennus (Rökiöntie 930)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March		April	May	June	July	August	September		October		November	December
1	10.09	09.07	07.39		06.54	05.13	03.44	03.27	04.44	06.14		07.36		08.06	09.35
	14.59	16.23	17.49		20.18	21.45	23.15	23.41	22.28	20.47		19.04	23	18.17 (18)	16.22	15.04
2	10.09	09.04	07.36		06.51	05.10	03.42	03.29	04.47	06.16		07.39		08.09	09.37
	15.01	16.26	17.52		20.21	21.48	23.18	23.40	22.25	20.43		19.01	22	16.19	15.02
3	10.08	09.01	07.33		06.47	05.07	03.40	03.30	04.50	06.19		07.42		08.12	09.40
	15.03	16.29	17.55		20.23	21.51	23.20	23.39	22.22	20.40		18.57	20	16.16	15.01
4	10.07	08.58	07.29		06.44	05.03	03.38	03.32	04.53	06.22		07.44		08.15	09.42
	15.05	16.32	17.58		20.26	21.54	23.22	23.37	22.19	20.37		18.54	18	16.13	14.59
5	10.06	08.55	07.26		06.41	05.00	03.36	03.34	04.56	06.25		07.47		08.18	09.45
	15.07	16.35	18.01		20.29	21.57	23.24	23.36	22.16	20.33		18.51	13	16.10	14.57
6	10.04	08.52	07.23		06.37	04.57	03.34	03.35	04.59	06.28		07.50		08.21	09.47
	15.09	16.39	18.04		20.32	22.00	23.27	23.34	22.13	20.30		18.47	7	16.07	14.56
7	10.03	08.49	07.19		06.34	04.54	03.32	03.37	05.02	06.30		07.53		08.24	09.49
	15.11	16.42	18.06		20.35	22.03	23.29	23.32	22.10	20.26		18.44		16.04	14.55
8	10.02	08.46	07.16		17.21 (18)	06.30	04.51	03.30	03.40	05.05		06.33		07.56	08.27	09.51
	15.14	16.45	18.09	11	17.32 (18)	20.38	22.06	23.31	23.31	22.07		20.23		18.40	16.01	14.53
9	10.00	08.43	07.13		17.18 (18)	06.27	04.48	03.29	03.42	05.08		06.36		07.58	08.30	09.53
	15.16	16.48	18.12	16	17.34 (18)	20.41	22.09	23.32	23.29	22.03		20.19		18.37	15.58	14.52
10	09.58	08.40	07.09		17.17 (18)	06.23	04.44	03.27	03.44	05.10		06.39		08.01	08.33	09.55
	15.18	16.51	18.15	19	17.36 (18)	20.43	22.12	23.34	23.27	22.00		20.16		18.34	15.55	14.51
11	09.57	08.37	07.06		17.15 (18)	06.20	04.41	03.26	03.46	05.13		06.41		08.04	08.36	09.57
	15.21	16.54	18.18	22	17.37 (18)	20.46	22.15	23.36	23.25	21.57		20.13		18.30	15.53	14.50
12	09.55	08.34	07.02		17.14 (18)	06.17	04.38	03.25	03.49	05.16		06.44		08.07	08.39	09.59
	15.24	16.57	18.21	24	17.38 (18)	20.49	22.19	23.37	23.22	21.54		20.09		18.27	15.50	14.49
13	09.53	08.31	06.59		17.13 (18)	06.13	04.35	03.24	03.51	05.19		06.47		08.10	08.42	10.01
	15.26	17.00	18.24	24	17.37 (18)	20.52	22.22	23.39	23.20	21.50		20.06		18.24	15.47	14.49
14	09.51	08.28	06.56		17.13 (18)	06.10	04.32	03.23	03.53	05.22		06.50		08.13	08.46	10.02
	15.29	17.04	18.27	25	17.38 (18)	20.55	22.25	23.40	23.18	21.47		20.02		18.20	15.44	14.48
15	09.49	08.25	06.52		17.12 (18)	06.06	04.29	03.22	03.56	05.25		06.52		08.16	08.49	10.04
	15.32	17.07	18.29	25	17.37 (18)	20.58	22.28	23.41	23.16	21.44		19.59		18.17	15.41	14.48
16	09.47	08.22	06.49		17.12 (18)	06.03	04.26	03.21	03.59	05.28		06.55		08.18	08.52	10.05
	15.34	17.10	18.32	25	17.37 (18)	21.01	22.31	23.42	23.13	21.41		19.55		18.14	15.39	14.47
17	09.45	08.18	06.46		17.12 (18)	06.00	04.23	03.21	04.01	05.31		06.58		08.21	08.55	10.06
	15.37	17.13	18.35	24	17.36 (18)	21.04	22.34	23.43	23.11	21.37		19.52		18.10	15.36	14.47
18	09.43	08.15	06.42		17.12 (18)	05.56	04.20	03.20	04.04	05.34		07.01		08.24	08.58	10.07
	15.40	17.16	18.38	24	17.36 (18)	21.07	22.36	23.44	23.08	21.34		19.49		18.07	15.33	14.47
19	09.41	08.12	06.39		17.13 (18)	05.53	04.17	03.20	04.07	05.37		07.03		08.27	09.01	10.08
	15.43	17.19	18.41	22	17.35 (18)	21.10	22.39	23.45	23.06	21.31		19.45		18.04	15.31	14.47
20	09.38	08.09	06.35		17.13 (18)	05.50	04.15	03.20	04.09	05.40		07.06		08.30	09.04	10.09
	15.46	17.22	18.44	20	17.33 (18)	21.12	22.42	23.45	23.03	21.27		19.42		18.01	15.28	14.47
21	09.36	08.06	06.32		17.15 (18)	05.46	04.12	03.20	04.12	05.42		07.09	18.03 (18)	08.33	09.07	10.10
	15.49	17.25	18.47	17	17.32 (18)	21.15	22.45	23.45	23.00	21.24		19.38	11 18.14 (18)	17.57	15.26	14.47
22	09.33	08.02	06.28		17.17 (18)	05.43	04.09	03.20	04.15	05.45		07.11	18.01 (18)	08.36	09.10	10.10
	15.52	17.28	18.49	12	17.29 (18)	21.18	22.48	23.46	22.58	21.21		19.35	16 18.17 (18)	17.54	15.23	14.48
23	09.31	07.59	06.25		17.21 (18)	05.40	04.06	03.20	04.18	05.48		07.14	17.58 (18)	08.39	09.13	10.11
	15.55	17.31	18.52	4	17.25 (18)	21.21	22.51	23.46	22.55	21.17		19.31	19 18.17 (18)	17.51	15.21	14.48
24	09.29	07.56	06.22			05.36	04.04	03.20	04.21	05.51		07.17	17.57 (18)	08.42	09.15	10.11
	15.58	17.34	18.55			21.24	22.54	23.46	22.52	21.14		19.28	21 18.18 (18)	17.48	15.19	14.49
25	09.26	07.53	06.18			05.33	04.01	03.21	04.23	05.54		07.20	17.56 (18)	07.45	09.18	10.11
	16.01	17.37	18.58			21.27	22.57	23.45	22.49	21.11		19.25	23 18.19 (18)	16.44	15.16	14.50
26	09.23	07.49	06.15			05.30	03.58	03.22	04.26	05.57		07.22	17.55 (18)	07.48	09.21	10.12
	16.04	17.40	19.01			21.30	22.59	23.45	22.46	21.07		19.21	24 18.19 (18)	16.41	15.14	14.51
27	09.21	07.46	06.11			05.26	03.56	03.22	04.29	06.00		07.25	17.53 (18)	07.51	09.24	10.12
	16.07	17.43	19.04			21.33	23.02	23.44	22.43	21.04		19.18	25 18.18 (18)	16.38	15.12	14.52
28	09.18	07.43	06.08			05.23	03.53	03.23	04.32	06.02		07.28	17.53 (18)	07.54	09.27	10.11
	16.10	17.46	19.06			21.36	23.05	23.44	22.40	21.00		19.14	25 18.18 (18)	16.35	15.10	14.53
29	09.15		07.04			05.20	03.51	03.24	04.35	06.05		07.31	17.53 (18)	07.57	09.29	10.11
	16.13		20.09			21.39	23.08	23.43	22.38	20.57		19.11	25 18.18 (18)	16.32	15.08	14.54
30	09.13		07.01			05.16	03.49	03.26	04.38	06.08		07.33	17.53 (18)	08.00	09.32	10.11
	16.17		20.12			21.42	23.10	23.42	22.35	20.54		19.07	25 18.18 (18)	16.29	15.06	14.56
31	09.10		06.58				03.46		04.41	06.11				08.03		10.10
	16.20		20.15				23.13		22.32	20.50				16.25		14.57
Potential sun hours	182	242	363		447	559	605	594	502	392		308		206	151	
Total, worst case				314							214		103			
Sun reduction				0,32							0,33		0,35			
Oper. time red.				0,99							0,99		0,99			
Wind dir. red.				0,58							0,58		0,58			
Total reduction				0,19							0,19		0,20			
Total, real				58							41		21			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 10.34/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190_Luke ForestShadow receptor: F - F Asuinrakennus (Kukkusintie 474)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.07	07.39	06.54	05.13	03.43	03.26	04.43	06.14	07.36	08.06	09.35
	14.59	16.23	17.49	20.18	21.45	23.16	23.42	22.29	20.47	19.04	16.22	15.04
2	10.09	09.04	07.36	06.51	05.10	03.41	03.28	04.46	06.16	07.39	08.09	09.38
	15.01	16.26	17.52	20.21	21.48	23.18	23.40	22.26	20.43	19.01	16.19	15.02
3	10.08	09.01	07.33	06.47	05.06	03.39	03.29	04.49	06.19	07.42	08.12	09.40
	15.02	16.29	17.55	20.23	21.51	23.20	23.39	22.23	20.40	18.57	16.16	15.00
4	10.07	08.59	07.29	06.44	05.03	03.37	03.31	04.52	06.22	07.44	08.15	09.43
	15.04	16.32	17.58	20.26	21.55	23.23	23.38	22.19	20.37	18.54	16.13	14.59
5	10.06	08.56	07.26	06.40	05.00	03.35	03.33	04.55	06.25	07.47	08.18	09.45
	15.06	16.35	18.01	20.29	21.58	23.25	23.36	22.16	20.33	18.50	16.10	14.57
6	10.05	08.53	07.23	06.37	04.57	03.33	03.35	04.58	06.27	07.50	08.21	09.47
	15.09	16.38	18.03	20.32	22.01	23.27	23.35	22.13	20.30	18.47	16.07	14.56
7	10.03	08.50	07.19	06.34	04.54	03.31	03.37	05.01	06.30	07.53	08.24	09.49
	15.11	16.41	18.06	20.35	22.04	23.29	23.33	22.10	20.26	18.44	16.04	14.54
8	10.02	08.47	07.16	06.30	04.50	03.30	03.39	05.04	06.33	07.56	08.27	09.52
	15.13	16.45	18.09	20.38	22.07	23.31	23.31	22.07	20.23	18.40	16.01	14.53
9	10.00	08.44	07.13	06.27	04.47	03.28	03.41	05.07	06.36	07.59	08.30	09.54
	15.16	16.48	18.12	20.41	22.10	23.33	23.29	22.04	20.19	18.37	15.58	14.52
10	09.59	08.41	07.09	06.23	04.44	03.27	03.43	05.10	06.39	08.01	08.33	09.56
	15.18	16.51	18.15	20.43	22.13	23.35	23.27	22.00	20.16	18.34	15.55	14.51
11	09.57	08.37	07.06	06.20	04.41	03.25	03.46	05.13	06.41	08.04	08.37	09.58
	15.21	16.54	18.18	20.46	22.16	23.37	23.25	21.57	20.13	18.30	15.52	14.50
12	09.55	08.34	07.02	06.16	04.38	03.24	03.48	05.16	06.44	08.07	08.40	09.59
	15.23	16.57	18.21	20.49	22.19	23.38	23.23	21.54	20.09	18.27	15.49	14.49
13	09.53	08.31	06.59	06.13	04.35	03.23	03.50	05.19	06.47	08.10	08.43	10.01
	15.26	17.00	18.24	20.52	22.22	23.39	23.21	21.51	20.06	18.24	15.47	14.48
14	09.52	08.28	06.56	06.10	04.32	03.22	03.53	05.22	06.49	08.13	08.46	10.03
	15.28	17.03	18.27	20.55	22.25	23.41	23.18	21.47	20.02	18.20	15.44	14.48
15	09.50	08.25	06.52	06.06	04.29	03.21	03.55	05.25	06.52	08.16	08.49	10.04
	15.31	17.06	18.29	20.58	22.28	23.42	23.16	21.44	19.59	18.17	15.41	14.47
16	09.47	08.22	06.49	06.03	04.26	03.20	03.58	05.28	06.55	08.18	08.52	10.05
	15.34	17.10	18.32	21.01	22.31	23.43	23.14	21.41	19.55	18.14	15.38	14.47
17	09.45	08.19	06.45	06.00	04.23	03.20	04.01	05.31	06.58	08.21	08.55	10.07
	15.37	17.13	18.35	21.04	22.34	23.44	23.11	21.37	19.52	18.10	15.36	14.46
18	09.43	08.15	06.42	05.56	04.20	03.19	04.03	05.34	07.00	08.24	08.58	10.08
	15.40	17.16	18.38	21.07	22.37	23.45	23.09	21.34	19.49	18.07	15.33	14.46
19	09.41	08.12	06.39	05.53	04.17	03.19	04.06	05.36	07.03	08.27	09.01	10.09
	15.43	17.19	18.41	21.10	22.40	23.45	23.06	21.31	19.45	18.04	15.31	14.46
20	09.39	08.09	06.35	05.49	04.14	03.19	04.09	05.39	07.06	08.30	09.04	10.10
	15.46	17.22	18.44	21.13	22.43	23.46	23.03	21.27	19.42	18.00	15.28	14.47
21	09.36	08.06	06.32	05.46	04.11	03.19	04.12	05.42	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.16	22.46	23.46	23.01	21.24	19.38	17.57	15.25	14.47
22	09.34	08.02	06.28	05.43	04.09	03.19	04.14	05.45	07.11	08.36	09.10	10.11
	15.52	17.28	18.49	21.19	22.49	23.46	22.58	21.21	19.35	17.54	15.23	14.47
23	09.31	07.59	06.25	05.39	04.06	03.19	04.17	05.48	07.14	08.39	09.13	10.11
	15.55	17.31	18.52	21.21	22.51	23.46	22.55	21.17	19.31	17.51	15.21	14.48
24	09.29	07.56	06.22	05.36	04.03	03.20	04.20	05.51	07.17	08.42	09.16	10.12
	15.58	17.34	18.55	21.24	22.54	23.46	22.52	21.14	19.28	17.47	15.18	14.48
25	09.26	07.53	06.18	05.33	04.00	03.20	04.23	05.54	07.20	07.45	09.19	10.12
	16.01	17.37	18.58	21.27	22.57	23.46	22.50	21.11	19.25	16.44	15.16	14.49
26	09.24	07.49	06.15	05.29	03.58	03.21	04.26	05.57	07.22	07.48	09.21	10.12
	16.04	17.40	19.01	21.30	23.00	23.46	22.47	21.07	19.21	16.41	15.14	14.50
27	09.21	07.46	06.11	05.26	03.55	03.22	04.29	05.59	07.25	07.51	09.24	10.12
	16.07	17.43	19.04	21.33	23.03	23.45	22.44	21.04	19.18	16.38	15.12	14.51
28	09.18	07.43	06.08	05.23	03.53	03.23	04.32	06.02	07.28	07.54	09.27	10.12
	16.10	17.46	19.06	21.36	23.05	23.44	22.41	21.00	19.14	16.35	15.10	14.52
29	09.16		07.04	05.19	03.50	03.24	04.35	06.05	07.31	07.57	09.30	10.12
	16.13		20.09	21.39	23.08	23.44	22.38	20.57	19.11	16.31	15.08	14.54
30	09.13		07.01	05.16	03.48	03.25	04.38	06.08	07.33	08.00	09.32	10.11
	16.16		20.12	21.42	23.11	23.43	22.35	20.54	19.07	16.28	15.06	14.55
31	09.10		06.58		03.46		04.41	06.11		08.03		10.11
	16.19		20.15		23.13		22.32	20.50		16.25		14.57
Potential sun hours	181	242	363	447	560	606	595	503	392	307	206	150
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 10.34/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190_Luke ForestShadow receptor: G - G Asuinrakennus (Kovik byväg 53)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.08	07.40	06.55	05.13	03.44	03.27	04.44	06.14	07.37	08.06	09.35
	14.59	16.23	17.49	20.18	21.46	23.16	23.42	22.29	20.47	19.04	16.22	15.04
2	10.09	09.05	07.37	06.51	05.10	03.42	03.28	04.47	06.17	07.39	08.09	09.38
	15.01	16.26	17.52	20.21	21.49	23.19	23.41	22.26	20.44	19.01	16.19	15.02
3	10.08	09.02	07.33	06.48	05.07	03.40	03.30	04.50	06.20	07.42	08.12	09.41
	15.03	16.29	17.55	20.24	21.52	23.21	23.40	22.23	20.40	18.58	16.16	15.01
4	10.07	08.59	07.30	06.44	05.04	03.37	03.32	04.53	06.22	07.45	08.15	09.43
	15.05	16.32	17.58	20.27	21.55	23.23	23.38	22.20	20.37	18.54	16.13	14.59
5	10.06	08.56	07.27	06.41	05.00	03.36	03.33	04.56	06.25	07.48	08.19	09.45
	15.07	16.36	18.01	20.30	21.58	23.25	23.37	22.17	20.34	18.51	16.10	14.57
6	10.05	08.53	07.23	06.37	04.57	03.34	03.35	04.59	06.28	07.51	08.22	09.48
	15.09	16.39	18.04	20.32	22.01	23.28	23.35	22.14	20.30	18.47	16.07	14.56
7	10.04	08.50	07.20	06.34	04.54	03.32	03.37	05.02	06.31	07.53	08.25	09.50
	15.11	16.42	18.07	20.35	22.04	23.30	23.33	22.10	20.27	18.44	16.04	14.55
8	10.02	08.47	07.16	06.31	04.51	03.30	03.39	05.05	06.33	07.56	08.28	09.52
	15.14	16.45	18.10	20.38	22.07	23.32	23.31	22.07	20.23	18.41	16.01	14.53
9	10.01	08.44	07.13	06.27	04.48	03.29	03.41	05.08	06.36	07.59	08.31	09.54
	15.16	16.48	18.13	20.41	22.10	23.33	23.30	22.04	20.20	18.37	15.58	14.52
10	09.59	08.41	07.10	06.24	04.45	03.27	03.44	05.11	06.39	08.02	08.34	09.56
	15.18	16.51	18.15	20.44	22.13	23.35	23.28	22.01	20.16	18.34	15.56	14.51
11	09.58	08.38	07.06	06.20	04.41	03.26	03.46	05.14	06.42	08.05	08.37	09.58
	15.21	16.54	18.18	20.47	22.16	23.37	23.26	21.58	20.13	18.31	15.53	14.50
12	09.56	08.35	07.03	06.17	04.38	03.25	03.48	05.16	06.44	08.07	08.40	10.00
	15.24	16.58	18.21	20.50	22.19	23.38	23.23	21.54	20.10	18.27	15.50	14.49
13	09.54	08.32	07.00	06.14	04.35	03.23	03.51	05.19	06.47	08.10	08.43	10.01
	15.26	17.01	18.24	20.53	22.22	23.40	23.21	21.51	20.06	18.24	15.47	14.49
14	09.52	08.29	06.56	06.10	04.32	03.22	03.53	05.22	06.50	08.13	08.46	10.03
	15.29	17.04	18.27	20.55	22.25	23.41	23.19	21.48	20.03	18.21	15.44	14.48
15	09.50	08.25	06.53	06.07	04.29	03.22	03.56	05.25	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	23.42	23.16	21.44	19.59	18.17	15.41	14.48
16	09.48	08.22	06.49	06.03	04.26	03.21	03.58	05.28	06.55	08.19	08.52	10.06
	15.34	17.10	18.33	21.01	22.31	23.43	23.14	21.41	19.56	18.14	15.39	14.47
17	09.46	08.19	06.46	06.00	04.23	03.20	04.01	05.31	06.58	08.22	08.55	10.07
	15.37	17.13	18.36	21.04	22.34	23.44	23.12	21.38	19.52	18.11	15.36	14.47
18	09.44	08.16	06.42	05.57	04.20	03.20	04.04	05.34	07.01	08.25	08.58	10.08
	15.40	17.16	18.38	21.07	22.37	23.45	23.09	21.35	19.49	18.07	15.34	14.47
19	09.41	08.13	06.39	05.53	04.17	03.19	04.06	05.37	07.04	08.28	09.01	10.09
	15.43	17.19	18.41	21.10	22.40	23.46	23.06	21.31	19.46	18.04	15.31	14.47
20	09.39	08.09	06.36	05.50	04.15	03.19	04.09	05.40	07.06	08.30	09.04	10.10
	15.46	17.22	18.44	21.13	22.43	23.46	23.04	21.28	19.42	18.01	15.28	14.47
21	09.37	08.06	06.32	05.46	04.12	03.19	04.12	05.43	07.09	08.33	09.07	10.11
	15.49	17.25	18.47	21.16	22.46	23.47	23.01	21.25	19.39	17.58	15.26	14.47
22	09.34	08.03	06.29	05.43	04.09	03.19	04.15	05.46	07.12	08.36	09.10	10.11
	15.52	17.28	18.50	21.19	22.49	23.47	22.58	21.21	19.35	17.54	15.23	14.48
23	09.32	08.00	06.25	05.40	04.06	03.20	04.18	05.48	07.15	08.39	09.13	10.12
	15.55	17.31	18.53	21.22	22.52	23.47	22.56	21.18	19.32	17.51	15.21	14.48
24	09.29	07.56	06.22	05.36	04.04	03.20	04.21	05.51	07.17	08.42	09.16	10.12
	15.58	17.34	18.55	21.25	22.55	23.47	22.53	21.14	19.28	17.48	15.19	14.49
25	09.27	07.53	06.19	05.33	04.01	03.21	04.23	05.54	07.20	07.45	09.19	10.12
	16.01	17.37	18.58	21.28	22.57	23.46	22.50	21.11	19.25	16.45	15.16	14.50
26	09.24	07.50	06.15	05.30	03.58	03.21	04.26	05.57	07.23	07.48	09.22	10.12
	16.04	17.40	19.01	21.31	23.00	23.46	22.47	21.08	19.22	16.41	15.14	14.51
27	09.21	07.47	06.12	05.26	03.56	03.22	04.29	06.00	07.26	07.51	09.25	10.12
	16.07	17.43	19.04	21.34	23.03	23.46	22.44	21.04	19.18	16.38	15.12	14.52
28	09.19	07.43	06.08	05.23	03.53	03.23	04.32	06.03	07.28	07.54	09.27	10.12
	16.10	17.46	19.07	21.37	23.06	23.45	22.41	21.01	19.15	16.35	15.10	14.53
29	09.16		07.05	05.20	03.51	03.24	04.35	06.06	07.31	07.57	09.30	10.12
	16.14		20.10	21.40	23.08	23.44	22.38	20.57	19.11	16.32	15.08	14.54
30	09.13		07.01	05.17	03.48	03.25	04.38	06.08	07.34	08.00	09.33	10.12
	16.17		20.12	21.43	23.11	23.43	22.35	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.11
	16.20		20.15		23.14		22.32	20.51		16.26		14.57
Potential sun hours	181	242	363	447	560	606	595	503	392	307	206	150
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 10.34/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190_Luke ForestShadow receptor: H - H Asuinrakennus (Vöyrintie 1021)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.08	07.40	06.55	05.13	03.44	03.27	04.44	06.14	07.37	08.06	09.35
	14.59	16.23	17.49	20.18	21.46	23.16	23.42	22.29	20.47	19.04	16.23	15.04
2	10.09	09.05	07.37	06.51	05.10	03.42	03.28	04.47	06.17	07.39	08.09	09.38
	15.01	16.26	17.52	20.21	21.49	23.18	23.41	22.26	20.44	19.01	16.19	15.02
3	10.08	09.02	07.33	06.48	05.07	03.40	03.30	04.50	06.20	07.42	08.12	09.41
	15.03	16.29	17.55	20.24	21.52	23.21	23.40	22.23	20.40	18.58	16.16	15.01
4	10.07	08.59	07.30	06.44	05.04	03.38	03.32	04.53	06.22	07.45	08.15	09.43
	15.05	16.33	17.58	20.27	21.55	23.23	23.38	22.20	20.37	18.54	16.13	14.59
5	10.06	08.56	07.27	06.41	05.00	03.36	03.33	04.56	06.25	07.48	08.19	09.45
	15.07	16.36	18.01	20.30	21.58	23.25	23.37	22.17	20.34	18.51	16.10	14.57
6	10.05	08.53	07.23	06.37	04.57	03.34	03.35	04.59	06.28	07.51	08.22	09.48
	15.09	16.39	18.04	20.32	22.01	23.28	23.35	22.14	20.30	18.47	16.07	14.56
7	10.04	08.50	07.20	06.34	04.54	03.32	03.37	05.02	06.31	07.53	08.25	09.50
	15.11	16.42	18.07	20.35	22.04	23.30	23.33	22.10	20.27	18.44	16.04	14.55
8	10.02	08.47	07.16	06.31	04.51	03.30	03.39	05.05	06.33	07.56	08.28	09.52
	15.14	16.45	18.10	20.38	22.07	23.32	23.31	22.07	20.23	18.41	16.01	14.53
9	10.01	08.44	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.59	08.31	09.54
	15.16	16.48	18.13	20.41	22.10	23.33	23.30	22.04	20.20	18.37	15.58	14.52
10	09.59	08.41	07.10	06.24	04.45	03.27	03.44	05.11	06.39	08.02	08.34	09.56
	15.19	16.51	18.16	20.44	22.13	23.35	23.28	22.01	20.16	18.34	15.56	14.51
11	09.58	08.38	07.06	06.20	04.42	03.26	03.46	05.14	06.42	08.05	08.37	09.58
	15.21	16.54	18.18	20.47	22.16	23.37	23.25	21.58	20.13	18.31	15.53	14.50
12	09.56	08.35	07.03	06.17	04.38	03.25	03.48	05.17	06.44	08.07	08.40	10.00
	15.24	16.58	18.21	20.50	22.19	23.38	23.23	21.54	20.10	18.27	15.50	14.49
13	09.54	08.32	07.00	06.14	04.35	03.24	03.51	05.19	06.47	08.10	08.43	10.01
	15.26	17.01	18.24	20.53	22.22	23.40	23.21	21.51	20.06	18.24	15.47	14.49
14	09.52	08.29	06.56	06.10	04.32	03.23	03.53	05.22	06.50	08.13	08.46	10.03
	15.29	17.04	18.27	20.56	22.25	23.41	23.19	21.48	20.03	18.21	15.44	14.48
15	09.50	08.25	06.53	06.07	04.29	03.22	03.56	05.25	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	23.42	23.16	21.44	19.59	18.17	15.42	14.48
16	09.48	08.22	06.49	06.03	04.26	03.21	03.59	05.28	06.55	08.19	08.52	10.06
	15.35	17.10	18.33	21.01	22.31	23.43	23.14	21.41	19.56	18.14	15.39	14.47
17	09.46	08.19	06.46	06.00	04.23	03.20	04.01	05.31	06.58	08.22	08.55	10.07
	15.37	17.13	18.36	21.04	22.34	23.44	23.12	21.38	19.52	18.11	15.36	14.47
18	09.44	08.16	06.43	05.57	04.20	03.20	04.04	05.34	07.01	08.25	08.58	10.08
	15.40	17.16	18.38	21.07	22.37	23.45	23.09	21.35	19.49	18.07	15.34	14.47
19	09.41	08.13	06.39	05.53	04.18	03.20	04.07	05.37	07.04	08.28	09.01	10.09
	15.43	17.19	18.41	21.10	22.40	23.46	23.06	21.31	19.46	18.04	15.31	14.47
20	09.39	08.09	06.36	05.50	04.15	03.19	04.09	05.40	07.06	08.31	09.04	10.10
	15.46	17.22	18.44	21.13	22.43	23.46	23.04	21.28	19.42	18.01	15.28	14.47
21	09.37	08.06	06.32	05.46	04.12	03.19	04.12	05.43	07.09	08.33	09.07	10.11
	15.49	17.25	18.47	21.16	22.46	23.46	23.01	21.25	19.39	17.58	15.26	14.47
22	09.34	08.03	06.29	05.43	04.09	03.19	04.15	05.46	07.12	08.36	09.10	10.11
	15.52	17.28	18.50	21.19	22.49	23.47	22.58	21.21	19.35	17.54	15.24	14.48
23	09.32	08.00	06.25	05.40	04.06	03.20	04.18	05.48	07.15	08.39	09.13	10.12
	15.55	17.31	18.53	21.22	22.52	23.47	22.56	21.18	19.32	17.51	15.21	14.48
24	09.29	07.56	06.22	05.36	04.04	03.20	04.21	05.51	07.17	08.42	09.16	10.12
	15.58	17.34	18.55	21.25	22.55	23.47	22.53	21.14	19.28	17.48	15.19	14.49
25	09.27	07.53	06.19	05.33	04.01	03.21	04.23	05.54	07.20	07.45	09.19	10.12
	16.01	17.37	18.58	21.28	22.57	23.46	22.50	21.11	19.25	16.45	15.17	14.50
26	09.24	07.50	06.15	05.30	03.58	03.21	04.26	05.57	07.23	07.48	09.22	10.12
	16.04	17.40	19.01	21.31	23.00	23.46	22.47	21.08	19.22	16.41	15.14	14.51
27	09.21	07.47	06.12	05.26	03.56	03.22	04.29	06.00	07.26	07.51	09.25	10.12
	16.07	17.43	19.04	21.34	23.03	23.45	22.44	21.04	19.18	16.38	15.12	14.52
28	09.19	07.43	06.08	05.23	03.53	03.23	04.32	06.03	07.28	07.54	09.27	10.12
	16.11	17.46	19.07	21.37	23.06	23.45	22.41	21.01	19.15	16.35	15.10	14.53
29	09.16		07.05	05.20	03.51	03.24	04.35	06.06	07.31	07.57	09.30	10.12
	16.14		20.10	21.40	23.08	23.44	22.38	20.57	19.11	16.32	15.08	14.54
30	09.13		07.01	05.17	03.48	03.26	04.38	06.08	07.34	08.00	09.33	10.12
	16.17		20.12	21.43	23.11	23.43	22.35	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.11
	16.20		20.15		23.14		22.32	20.51		16.26		14.57
Potential sun hours	181	242	363	447	560	606	595	503	392	307	206	150
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 10.34/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190_Luke ForestShadow receptor: I - I Lomarakennus (Ehrsbackavägen 29)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March		April		May	June	July	August	September		October	November	December
1	10.10	09.07	07.40		06.55	07.53 (10)	05.14	03.44	03.27	04.44	06.14		07.37	08.06	09.35
	15.00	16.23	17.49		20.18	29 08.22 (10)	21.46	23.16	23.42	22.29	20.47		19.04	16.23	15.04
2	10.09	09.05	07.37		06.51	07.54 (10)	05.10	03.42	03.29	04.47	06.17	08.03 (10)	07.39	08.09	09.38
	15.01	16.26	17.52		20.21	28 08.22 (10)	21.49	23.18	23.41	22.26	20.44	2 08.05 (10)	19.01	16.20	15.03
3	10.08	09.02	07.33		06.48	07.54 (10)	05.07	03.40	03.30	04.50	06.20	07.57 (10)	07.42	08.12	09.40
	15.03	16.30	17.55		20.24	28 08.22 (10)	21.52	23.21	23.39	22.23	20.40	13 08.10 (10)	18.58	16.17	15.01
4	10.07	08.59	07.30		06.44	07.54 (10)	05.04	03.38	03.32	04.53	06.22	07.54 (10)	07.45	08.15	09.43
	15.05	16.33	17.58		20.27	26 08.20 (10)	21.55	23.23	23.38	22.20	20.37	18 08.12 (10)	18.54	16.13	14.59
5	10.06	08.56	07.27		06.41	07.54 (10)	05.01	03.36	03.34	04.56	06.25	07.53 (10)	07.48	08.18	09.45
	15.07	16.36	18.01		20.30	26 08.20 (10)	21.58	23.25	23.36	22.17	20.34	20 08.13 (10)	18.51	16.10	14.58
6	10.05	08.53	07.23		06.37	07.55 (10)	04.57	03.34	03.36	04.59	06.28	07.51 (10)	07.51	08.22	09.47
	15.09	16.39	18.04		20.32	24 08.19 (10)	22.01	23.27	23.35	22.13	20.30	23 08.14 (10)	18.48	16.07	14.56
7	10.04	08.50	07.20		06.34	07.56 (10)	04.54	03.32	03.38	05.02	06.31	07.50 (10)	07.53	08.25	09.50
	15.12	16.42	18.07		20.35	20 08.16 (10)	22.04	23.29	23.33	22.10	20.27	25 08.15 (10)	18.44	16.04	14.55
8	10.02	08.47	07.16		06.31	07.57 (10)	04.51	03.31	03.40	05.05	06.34	07.49 (10)	07.56	08.28	09.52
	15.14	16.45	18.10		20.38	18 08.15 (10)	22.07	23.31	23.31	22.07	20.23	27 08.16 (10)	18.41	16.02	14.54
9	10.01	08.44	07.13		06.27	07.59 (10)	04.48	03.29	03.42	05.08	06.36	07.47 (10)	07.59	08.31	09.54
	15.16	16.48	18.13		20.41	13 08.12 (10)	22.10	23.33	23.29	22.04	20.20	28 08.15 (10)	18.37	15.59	14.53
10	09.59	08.41	07.10		06.24	08.04 (10)	04.45	03.28	03.44	05.11	06.39	07.47 (10)	08.02	08.34	09.56
	15.19	16.51	18.16		20.44	1 08.05 (10)	22.13	23.35	23.27	22.01	20.16	28 08.15 (10)	18.34	15.56	14.51
11	09.57	08.38	07.06		06.20		04.42	03.26	03.46	05.14	06.42	07.47 (10)	08.05	08.37	09.58
	15.21	16.55	18.18		20.47		22.16	23.37	23.25	21.57	20.13	29 08.16 (10)	18.31	15.53	14.51
12	09.56	08.35	07.03		06.17		04.39	03.25	03.49	05.17	06.45	07.46 (10)	08.07	08.40	09.59
	15.24	16.58	18.21		20.50		22.19	23.38	23.23	21.54	20.10	29 08.15 (10)	18.27	15.50	14.50
13	09.54	08.32	07.00		06.14		04.36	03.24	03.51	05.20	06.47	07.46 (10)	08.10	08.43	10.01
	15.27	17.01	18.24		20.53		22.22	23.40	23.21	21.51	20.06	28 08.14 (10)	18.24	15.47	14.49
14	09.52	08.28	06.56		06.10		04.33	03.23	03.54	05.23	06.50	07.46 (10)	08.13	08.46	10.03
	15.29	17.04	18.27		20.55		22.25	23.41	23.19	21.48	20.03	28 08.14 (10)	18.21	15.44	14.48
15	09.50	08.25	06.53		06.07		04.30	03.22	03.56	05.25	06.53	07.46 (10)	08.16	08.49	10.04
	15.32	17.07	18.30		20.58		22.28	23.42	23.16	21.44	19.59	26 08.12 (10)	18.17	15.42	14.48
16	09.48	08.22	06.49		06.03		04.27	03.21	03.59	05.28	06.55	07.46 (10)	08.19	08.52	10.05
	15.35	17.10	18.33		21.01		22.31	23.43	23.14	21.41	19.56	26 08.12 (10)	18.14	15.39	14.48
17	09.46	08.19	06.46		06.00		04.24	03.21	04.01	05.31	06.58	07.47 (10)	08.22	08.55	10.07
	15.38	17.13	18.36		21.04		22.34	23.44	23.11	21.38	19.52	24 08.11 (10)	18.11	15.36	14.47
18	09.43	08.16	06.43		05.57		04.21	03.20	04.04	05.34	07.01	07.48 (10)	08.25	08.58	10.08
	15.40	17.16	18.38		21.07		22.37	23.45	23.09	21.34	19.49	20 08.08 (10)	18.07	15.34	14.47
19	09.41	08.13	06.39		05.53		04.18	03.20	04.07	05.37	07.04	07.49 (10)	08.28	09.01	10.09
	15.43	17.19	18.41		21.10		22.40	23.45	23.06	21.31	19.46	17 08.06 (10)	18.04	15.31	14.47
20	09.39	08.09	06.36		05.50		04.15	03.20	04.10	05.40	07.06	07.52 (10)	08.30	09.04	10.10
	15.46	17.22	18.44		21.13		22.43	23.46	23.04	21.28	19.42	12 08.04 (10)	18.01	15.29	14.47
21	09.36	08.06	06.32		05.47		04.12	03.20	04.12	05.43	07.09		08.33	09.07	10.10
	15.49	17.25	18.47		21.16		22.46	23.46	23.01	21.24	19.39		17.58	15.26	14.48
22	09.34	08.03	06.29		05.43		04.09	03.20	04.15	05.46	07.12		08.36	09.10	10.11
	15.52	17.28	18.50		21.19		22.49	23.46	22.58	21.21	19.35		17.54	15.24	14.48
23	09.32	08.00	06.25	07.06 (10)	05.40		04.07	03.20	04.18	05.49	07.15		08.39	09.13	10.11
	15.55	17.31	18.53	10 07.16 (10)	21.22		22.52	23.46	22.55	21.18	19.32		17.51	15.21	14.49
24	09.29	07.56	06.22	07.03 (10)	05.37		04.04	03.21	04.21	05.51	07.17		08.42	09.16	10.12
	15.58	17.34	18.55	16 07.19 (10)	21.25		22.54	23.46	22.53	21.14	19.28		17.48	15.19	14.49
25	09.26	07.53	06.19	07.00 (10)	05.33		04.01	03.21	04.24	05.54	07.20		07.45	09.19	10.12
	16.01	17.37	18.58	20 07.20 (10)	21.28		22.57	23.46	22.50	21.11	19.25		16.45	15.17	14.50
26	09.24	07.50	06.15	06.59 (10)	05.30		03.59	03.22	04.27	05.57	07.23		07.48	09.22	10.12
	16.05	17.40	19.01	23 07.22 (10)	21.31		23.00	23.46	22.47	21.08	19.22		16.42	15.15	14.51
27	09.21	07.46	06.12	06.57 (10)	05.27		03.56	03.23	04.29	06.00	07.26		07.51	09.24	10.12
	16.08	17.43	19.04	25 07.22 (10)	21.34		23.03	23.45	22.44	21.04	19.18		16.38	15.12	14.52
28	09.19	07.43	06.08	06.56 (10)	05.23		03.54	03.24	04.32	06.03	07.28		07.54	09.27	10.12
	16.11	17.46	19.07	27 07.23 (10)	21.37		23.05	23.44	22.41	21.01	19.15		16.35	15.10	14.53
29	09.16		07.05	07.56 (10)	05.20		03.51	03.25	04.35	06.06	07.31		07.57	09.30	10.12
	16.14		20.10	27 08.23 (10)	21.40		23.08	23.44	22.38	20.57	19.11		16.32	15.08	14.55
30	09.13		07.01	07.55 (10)	05.17		03.49	03.26	04.38	06.08	07.34		08.00	09.33	10.11
	16.17		20.12	28 08.23 (10)	21.43		23.11	23.43	22.35	20.54	19.08		16.29	15.06	14.56
31	09.10		06.58	07.54 (10)			03.46		04.41	06.11			08.03		10.11
	16.20		20.15	29 08.23 (10)			23.13		22.32	20.51			16.26		14.57
Potential sun hours	182	242	363		447		559	606	595	502	392		308	206	151
Total, worst case				205		213						423			
Sun reduction				0,32		0,41						0,33			
Oper. time red.				0,99		0,99						0,99			
Wind dir. red.				0,58		0,58						0,58			
Total reduction				0,19		0,24						0,19			
Total, real				38		51						81			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 10.34/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190_Luke ForestShadow receptor: J - J Asuinrakennus (Kleidersvägen 118)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.07	07.40	06.55	05.14	03.44	05.20 (10)	03.27	05.28 (10)	04.44	06.14	07.37	08.06	09.35
	15.00	16.23	17.49	20.18	21.46	23.16	05.46 (10)	23.42	05.48 (10)	22.29	20.47	19.04	16.23	15.05
2	10.09	09.05	07.37	06.51	05.10	03.42	05.20 (10)	03.29	05.28 (10)	04.47	06.17	07.39	08.09	09.38
	15.01	16.26	17.52	20.21	21.49	23.18	05.45 (10)	23.40	05.49 (10)	22.26	20.44	19.01	16.20	15.03
3	10.08	09.02	07.33	06.48	05.07	03.40	05.21 (10)	03.30	05.28 (10)	04.50	06.20	07.42	08.12	09.40
	15.03	16.30	17.55	20.24	21.52	23.20	05.45 (10)	23.39	05.49 (10)	22.23	20.40	18.58	16.17	15.01
4	10.07	08.59	07.30	06.44	05.04	03.38	05.21 (10)	03.32	05.29 (10)	04.53	06.22	07.45	08.15	09.43
	15.05	16.33	17.58	20.27	21.55	23.23	05.45 (10)	23.38	05.50 (10)	22.20	20.37	18.54	16.14	14.59
5	10.06	08.56	07.27	06.41	05.01	03.36	05.21 (10)	03.34	05.28 (10)	04.56	06.25	07.48	08.18	09.45
	15.07	16.36	18.01	20.30	21.58	23.25	05.45 (10)	23.36	05.50 (10)	22.17	20.34	18.51	16.11	14.58
6	10.05	08.53	07.23	06.38	04.57	03.34	05.22 (10)	03.36	05.29 (10)	04.59	06.28	07.50	08.21	09.47
	15.10	16.39	18.04	20.32	22.01	23.27	05.45 (10)	23.35	05.51 (10)	22.13	20.30	18.48	16.08	14.56
7	10.03	08.50	07.20	06.34	04.54	03.32	05.22 (10)	03.38	05.28 (10)	05.02	06.31	07.53	08.25	09.50
	15.12	16.42	18.07	20.35	22.04	23.29	05.45 (10)	23.33	05.51 (10)	22.10	20.27	18.44	16.05	14.55
8	10.02	08.47	07.16	06.31	04.51	03.31	05.23 (10)	03.40	05.28 (10)	05.05	06.34	07.56	08.28	09.52
	15.14	16.45	18.10	20.38	22.07	23.31	05.45 (10)	23.31	05.52 (10)	22.07	20.23	18.41	16.02	14.54
9	10.00	08.44	07.13	06.27	04.48	03.29	05.23 (10)	03.42	05.28 (10)	05.08	06.36	07.59	08.31	09.54
	15.16	16.48	18.13	20.41	22.10	23.33	05.45 (10)	23.29	05.52 (10)	22.04	20.20	18.37	15.59	14.53
10	09.59	08.41	07.10	06.24	04.45	03.28	05.24 (10)	03.44	05.28 (10)	05.11	06.39	08.02	08.34	09.56
	15.19	16.52	18.16	20.44	22.13	23.35	05.44 (10)	23.27	05.53 (10)	22.01	20.16	18.34	15.56	14.52
11	09.57	08.38	07.06	06.20	04.42	03.26	05.24 (10)	03.47	05.28 (10)	05.14	06.42	08.05	08.37	09.58
	15.21	16.55	18.18	20.47	22.16	23.36	05.44 (10)	23.25	05.53 (10)	21.57	20.13	18.31	15.53	14.51
12	09.55	08.35	07.03	06.17	04.39	05.29 (10) 03.25	05.25 (10)	03.49	05.27 (10)	05.17	06.45	08.07	08.40	09.59
	15.24	16.58	18.21	20.50	22.19 5	05.34 (10) 23.38	05.45 (10)	23.23	05.53 (10)	21.54	20.10	18.27	15.50	14.50
13	09.54	08.32	07.00	06.14	04.36	05.26 (10) 03.24	05.25 (10)	03.51	05.28 (10)	05.20	06.47	08.10	08.43	10.01
	15.27	17.01	18.24	20.53	22.22 11	05.37 (10) 23.39	05.44 (10)	23.21	05.53 (10)	21.51	20.06	18.24	15.47	14.49
14	09.52	08.28	06.56	06.10	04.33	05.24 (10) 03.23	05.26 (10)	03.54	05.28 (10)	05.23	06.50	08.13	08.46	10.03
	15.29	17.04	18.27	20.55	22.25 15	05.39 (10) 23.41	05.45 (10)	23.18	05.54 (10)	21.48	20.03	18.21	15.45	14.48
15	09.50	08.25	06.53	06.07	04.30	05.22 (10) 03.22	05.26 (10)	03.56	05.28 (10)	05.26	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28 18	05.40 (10) 23.42	05.44 (10)	23.16	05.54 (10)	21.44	19.59	18.17	15.42	14.48
16	09.48	08.22	06.49	06.03	04.27	05.22 (10) 03.22	05.26 (10)	03.59	05.28 (10)	05.28	06.55	08.19	08.52	10.05
	15.35	17.10	18.33	21.01	22.31 19	05.41 (10) 23.43	05.44 (10)	23.14	05.54 (10)	21.41	19.56	18.14	15.39	14.48
17	09.45	08.19	06.46	06.00	04.24	05.20 (10) 03.21	05.27 (10)	04.02	05.28 (10)	05.31	06.58	08.22	08.55	10.07
	15.38	17.13	18.36	21.04	22.34 21	05.41 (10) 23.44	05.45 (10)	23.11	05.54 (10)	21.38	19.52	18.11	15.36	14.47
18	09.43	08.16	06.43	05.57	04.21	05.20 (10) 03.20	05.26 (10)	04.04	05.28 (10)	05.34	07.01	08.25	08.58	10.08
	15.41	17.16	18.38	21.07	22.37 22	05.42 (10) 23.44	05.44 (10)	23.09	05.54 (10)	21.34	19.49	18.07	15.34	14.47
19	09.41	08.13	06.39	05.53	04.18	05.20 (10) 03.20	05.27 (10)	04.07	05.28 (10)	05.37	07.04	08.28	09.01	10.09
	15.43	17.19	18.41	21.10	22.40 23	05.43 (10) 23.45	05.44 (10)	23.06	05.54 (10)	21.31	19.46	18.04	15.31	14.47
20	09.39	08.09	06.36	05.50	04.15	05.19 (10) 03.20	05.27 (10)	04.10	05.29 (10)	05.40	07.06	08.30	09.04	10.10
	15.46	17.22	18.44	21.13	22.43 24	05.43 (10) 23.46	05.44 (10)	23.03	05.55 (10)	21.28	19.42	18.01	15.29	14.48
21	09.36	08.06	06.32	05.47	04.12	05.19 (10) 03.20	05.28 (10)	04.12	05.29 (10)	05.43	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.16	22.46 25	05.44 (10) 23.46	05.45 (10)	23.01	05.54 (10)	21.24	19.39	17.58	15.26	14.48
22	09.34	08.03	06.29	05.43	04.09	05.19 (10) 03.20	05.28 (10)	04.15	05.29 (10)	05.46	07.12	08.36	09.10	10.11
	15.52	17.28	18.50	21.19	22.49 25	05.44 (10) 23.46	05.45 (10)	22.58	05.54 (10)	21.21	19.35	17.54	15.24	14.48
23	09.31	08.00	06.25	05.40	04.07	05.19 (10) 03.20	05.28 (10)	04.18	05.29 (10)	05.49	07.15	08.39	09.13	10.11
	15.55	17.31	18.53	21.22	22.51 26	05.45 (10) 23.46	05.45 (10)	22.55	05.53 (10)	21.18	19.32	17.51	15.21	14.49
24	09.29	07.56	06.22	05.37	04.04	05.19 (10) 03.21	05.28 (10)	04.21	05.30 (10)	05.52	07.17	08.42	09.16	10.12
	15.58	17.34	18.55	21.25	22.54 26	05.45 (10) 23.46	05.46 (10)	22.52	05.54 (10)	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.19	05.33	04.01	05.19 (10) 03.21	05.28 (10)	04.24	05.30 (10)	05.54	07.20	07.45	09.19	10.12
	16.02	17.37	18.58	21.28	22.57 26	05.45 (10) 23.46	05.46 (10)	22.50	05.53 (10)	21.11	19.25	16.45	15.17	14.50
26	09.24	07.50	06.15	05.30	03.59	05.19 (10) 03.22	05.29 (10)	04.27	05.30 (10)	05.57	07.23	07.48	09.22	10.12
	16.05	17.40	19.01	21.31	23.00 26	05.45 (10) 23.45	05.47 (10)	22.47	05.52 (10)	21.08	19.22	16.42	15.15	14.51
27	09.21	07.46	06.12	05.27	03.56	05.19 (10) 03.23	05.28 (10)	04.30	05.32 (10)	06.00	07.26	07.51	09.24	10.12
	16.08	17.43	19.04	21.34	23.03 26	05.45 (10) 23.45	05.46 (10)	22.44	05.52 (10)	21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.54	05.19 (10) 03.24	05.28 (10)	04.33	05.32 (10)	06.03	07.28	07.54	09.27	10.12
	16.11	17.46	19.07	21.37	23.05 26	05.45 (10) 23.44	05.47 (10)	22.41	05.51 (10)	21.01	19.15	16.35	15.10	14.53
29	09.16		07.05	05.20	03.51	05.19 (10) 03.25	05.28 (10)	04.35	05.34 (10)	06.06	07.31	07.57	09.30	10.12
	16.14		20.10	21.40	23.08 26	05.45 (10) 23.43	05.47 (10)	22.38	05.50 (10)	20.57	19.11	16.32	15.08	14.55
30	09.13		07.01	05.17	03.49	05.20 (10) 03.26	05.28 (10)	04.38	05.35 (10)	06.08	07.34	08.00	09.33	10.11
	16.17		20.12	21.43	23.11 25	05.45 (10) 23.43	05.48 (10)	22.35	05.48 (10)	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.47	05.20 (10)		04.41	05.38 (10)	06.11		08.03		10.11
	16.20		20.15		23.13 25	05.45 (10)		22.32	05.47 (10)	20.51		16.26		14.58
Potential sun hours	182	242	363	447	559	605		594		502	392	308	206	151
Total, worst case					440	598		701						
Sun reduction					0,48	0,49		0,39						
Oper. time red.					0,99	0,99		0,99						
Wind dir. red.					0,62	0,62		0,62						
Total reduction					0,29	0,30		0,24						
Total, real					129	181		167						

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 10.34/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190_Luke ForestShadow receptor: K - K Asuinrakennus (Rökiöntie 154)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.40	06.55	05.14	03.45	03.28	04.45	06.14	07.37	08.06	09.35
	15.00	16.24	17.49	20.18	21.46	23.15	23.41	22.29	20.47	19.05	16.23	15.05
2	10.09	09.04	07.36	06.51	05.11	03.43	03.29	04.48	06.17	07.39	08.09	09.37
	15.02	16.27	17.52	20.21	21.49	23.18	23.40	22.26	20.44	19.01	16.20	15.03
3	10.08	09.02	07.33	06.48	05.07	03.41	03.31	04.50	06.20	07.42	08.12	09.40
	15.04	16.30	17.55	20.24	21.52	23.20	23.39	22.23	20.40	18.58	16.17	15.01
4	10.07	08.59	07.30	06.44	05.04	03.39	03.33	04.53	06.23	07.45	08.15	09.42
	15.06	16.33	17.58	20.27	21.55	23.22	23.37	22.19	20.37	18.54	16.14	15.00
5	10.06	08.56	07.26	06.41	05.01	03.37	03.34	04.56	06.25	07.48	08.18	09.45
	15.08	16.36	18.01	20.29	21.58	23.24	23.36	22.16	20.33	18.51	16.11	14.58
6	10.04	08.53	07.23	06.38	04.58	03.35	03.36	04.59	06.28	07.50	08.21	09.47
	15.10	16.39	18.04	20.32	22.01	23.27	23.34	22.13	20.30	18.48	16.08	14.57
7	10.03	08.50	07.20	06.34	04.55	03.33	03.38	05.02	06.31	07.53	08.24	09.49
	15.12	16.42	18.07	20.35	22.04	23.29	23.32	22.10	20.27	18.44	16.05	14.55
8	10.02	08.47	07.16	06.31	04.51	03.31	03.40	05.05	06.34	07.56	08.27	09.51
	15.14	16.45	18.10	20.38	22.07	23.31	23.31	22.07	20.23	18.41	16.02	14.54
9	10.00	08.44	07.13	06.27	04.48	03.30	03.43	05.08	06.36	07.59	08.30	09.53
	15.17	16.49	18.13	20.41	22.10	23.32	23.29	22.04	20.20	18.38	15.59	14.53
10	09.59	08.41	07.10	06.24	04.45	03.28	03.45	05.11	06.39	08.02	08.34	09.55
	15.19	16.52	18.16	20.44	22.13	23.34	23.27	22.00	20.16	18.34	15.56	14.52
11	09.57	08.38	07.06	06.21	04.42	03.27	03.47	05.14	06.42	08.05	08.37	09.57
	15.22	16.55	18.18	20.47	22.16	23.36	23.25	21.57	20.13	18.31	15.53	14.51
12	09.55	08.35	07.03	06.17	04.39	03.26	03.49	05.17	06.45	08.07	08.40	09.59
	15.24	16.58	18.21	20.50	22.19	23.37	23.22	21.54	20.10	18.27	15.50	14.50
13	09.53	08.31	07.00	06.14	04.36	03.25	03.52	05.20	06.47	08.10	08.43	10.01
	15.27	17.01	18.24	20.52	22.22	23.39	23.20	21.51	20.06	18.24	15.48	14.50
14	09.51	08.28	06.56	06.10	04.33	03.24	03.54	05.23	06.50	08.13	08.46	10.02
	15.30	17.04	18.27	20.55	22.25	23.40	23.18	21.47	20.03	18.21	15.45	14.49
15	09.49	08.25	06.53	06.07	04.30	03.23	03.57	05.26	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	23.41	23.16	21.44	19.59	18.18	15.42	14.48
16	09.47	08.22	06.49	06.04	04.27	03.22	03.59	05.29	06.56	08.19	08.52	10.05
	15.35	17.10	18.33	21.01	22.31	23.42	23.13	21.41	19.56	18.14	15.39	14.48
17	09.45	08.19	06.46	06.00	04.24	03.22	04.02	05.32	06.58	08.22	08.55	10.06
	15.38	17.13	18.36	21.04	22.34	23.43	23.11	21.38	19.52	18.11	15.37	14.48
18	09.43	08.16	06.43	05.57	04.21	03.21	04.05	05.34	07.01	08.25	08.58	10.07
	15.41	17.16	18.38	21.07	22.37	23.44	23.08	21.34	19.49	18.08	15.34	14.48
19	09.41	08.12	06.39	05.54	04.18	03.21	04.07	05.37	07.04	08.27	09.01	10.08
	15.44	17.19	18.41	21.10	22.40	23.45	23.06	21.31	19.46	18.04	15.32	14.48
20	09.38	08.09	06.36	05.50	04.15	03.21	04.10	05.40	07.06	08.30	09.04	10.09
	15.47	17.22	18.44	21.13	22.42	23.45	23.03	21.28	19.42	18.01	15.29	14.48
21	09.36	08.06	06.32	05.47	04.13	03.21	04.13	05.43	07.09	08.33	09.07	10.10
	15.50	17.26	18.47	21.16	22.45	23.45	23.00	21.24	19.39	17.58	15.27	14.48
22	09.34	08.03	06.29	05.43	04.10	03.21	04.16	05.46	07.12	08.36	09.10	10.10
	15.53	17.29	18.50	21.19	22.48	23.46	22.58	21.21	19.35	17.55	15.24	14.49
23	09.31	08.00	06.25	05.40	04.07	03.21	04.18	05.49	07.15	08.39	09.13	10.11
	15.56	17.32	18.53	21.22	22.51	23.46	22.55	21.18	19.32	17.51	15.22	14.49
24	09.29	07.56	06.22	05.37	04.04	03.21	04.21	05.52	07.17	08.42	09.16	10.11
	15.59	17.35	18.55	21.25	22.54	23.46	22.52	21.14	19.28	17.48	15.19	14.50
25	09.26	07.53	06.19	05.33	04.02	03.22	04.24	05.55	07.20	07.45	09.18	10.12
	16.02	17.38	18.58	21.28	22.57	23.45	22.49	21.11	19.25	16.45	15.17	14.51
26	09.24	07.50	06.15	05.30	03.59	03.23	04.27	05.57	07.23	07.48	09.21	10.12
	16.05	17.41	19.01	21.31	23.00	23.45	22.46	21.07	19.22	16.42	15.15	14.52
27	09.21	07.46	06.12	05.27	03.57	03.23	04.30	06.00	07.26	07.51	09.24	10.12
	16.08	17.43	19.04	21.34	23.02	23.44	22.44	21.04	19.18	16.39	15.13	14.53
28	09.18	07.43	06.08	05.24	03.54	03.24	04.33	06.03	07.28	07.54	09.27	10.11
	16.11	17.46	19.07	21.37	23.05	23.44	22.41	21.01	19.15	16.35	15.11	14.54
29	09.16		07.05	05.20	03.52	03.25	04.36	06.06	07.31	07.57	09.30	10.11
	16.14		20.10	21.40	23.08	23.43	22.38	20.57	19.11	16.32	15.09	14.55
30	09.13		07.02	05.17	03.49	03.27	04.39	06.09	07.34	08.00	09.32	10.11
	16.17		20.12	21.43	23.10	23.42	22.35	20.54	19.08	16.29	15.07	14.57
31	09.10		06.58		03.47		04.42	06.11		08.03		10.10
	16.20		20.15		23.13		22.32	20.51		16.26		14.58
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 10.34/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190_Luke ForestShadow receptor: L - L Asuinrakennus (Bjurbäcksvägen 231)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.40	06.55	05.14	03.45	03.28	04.45	06.14	07.36	08.06	09.35
	15.00	16.23	17.49	20.18	21.45	23.15	23.41	22.28	20.47	19.04	16.23	15.05
2	10.08	09.04	07.36	06.51	05.10	03.43	03.30	04.47	06.17	07.39	08.09	09.37
	15.02	16.27	17.52	20.21	21.48	23.17	23.39	22.25	20.44	19.01	16.20	15.03
3	10.07	09.01	07.33	06.48	05.07	03.41	03.31	04.50	06.20	07.42	08.12	09.40
	15.04	16.30	17.55	20.24	21.51	23.20	23.38	22.22	20.40	18.58	16.17	15.01
4	10.06	08.58	07.30	06.44	05.04	03.39	03.33	04.53	06.22	07.45	08.15	09.42
	15.06	16.33	17.58	20.26	21.54	23.22	23.37	22.19	20.37	18.54	16.14	15.00
5	10.05	08.55	07.26	06.41	05.01	03.37	03.35	04.56	06.25	07.48	08.18	09.44
	15.08	16.36	18.01	20.29	21.57	23.24	23.35	22.16	20.33	18.51	16.11	14.58
6	10.04	08.52	07.23	06.38	04.58	03.35	03.36	04.59	06.28	07.50	08.21	09.47
	15.10	16.39	18.04	20.32	22.00	23.26	23.34	22.13	20.30	18.47	16.08	14.57
7	10.03	08.50	07.20	06.34	04.54	03.33	03.38	05.02	06.31	07.53	08.24	09.49
	15.12	16.42	18.07	20.35	22.03	23.28	23.32	22.10	20.26	18.44	16.05	14.55
8	10.01	08.47	07.16	06.31	04.51	03.31	03.40	05.05	06.34	07.56	08.27	09.51
	15.14	16.45	18.10	20.38	22.06	23.30	23.30	22.07	20.23	18.41	16.02	14.54
9	10.00	08.44	07.13	06.27	04.48	03.30	03.43	05.08	06.36	07.59	08.30	09.53
	15.17	16.49	18.13	20.41	22.09	23.32	23.28	22.03	20.20	18.37	15.59	14.53
10	09.58	08.40	07.10	06.24	04.45	03.28	03.45	05.11	06.39	08.02	08.33	09.55
	15.19	16.52	18.15	20.44	22.12	23.34	23.26	22.00	20.16	18.34	15.56	14.52
11	09.57	08.37	07.06	06.20	04.42	03.27	03.47	05.14	06.42	08.04	08.36	09.57
	15.22	16.55	18.18	20.46	22.15	23.35	23.24	21.57	20.13	18.31	15.53	14.51
12	09.55	08.34	07.03	06.17	04.39	03.26	03.49	05.17	06.44	08.07	08.39	09.59
	15.24	16.58	18.21	20.49	22.18	23.37	23.22	21.54	20.09	18.27	15.50	14.50
13	09.53	08.31	06.59	06.14	04.36	03.25	03.52	05.20	06.47	08.10	08.42	10.00
	15.27	17.01	18.24	20.52	22.21	23.38	23.20	21.50	20.06	18.24	15.47	14.50
14	09.51	08.28	06.56	06.10	04.33	03.24	03.54	05.23	06.50	08.13	08.46	10.02
	15.30	17.04	18.27	20.55	22.24	23.40	23.18	21.47	20.03	18.21	15.45	14.49
15	09.49	08.25	06.53	06.07	04.30	03.23	03.57	05.26	06.53	08.16	08.49	10.03
	15.32	17.07	18.30	20.58	22.27	23.41	23.15	21.44	19.59	18.17	15.42	14.48
16	09.47	08.22	06.49	06.04	04.27	03.22	03.59	05.29	06.55	08.19	08.52	10.05
	15.35	17.10	18.33	21.01	22.30	23.42	23.13	21.41	19.56	18.14	15.39	14.48
17	09.45	08.19	06.46	06.00	04.24	03.22	04.02	05.31	06.58	08.21	08.55	10.06
	15.38	17.13	18.35	21.04	22.33	23.43	23.11	21.37	19.52	18.11	15.37	14.48
18	09.43	08.15	06.42	05.57	04.21	03.21	04.05	05.34	07.01	08.24	08.58	10.07
	15.41	17.16	18.38	21.07	22.36	23.44	23.08	21.34	19.49	18.07	15.34	14.48
19	09.40	08.12	06.39	05.53	04.18	03.21	04.07	05.37	07.04	08.27	09.01	10.08
	15.44	17.19	18.41	21.10	22.39	23.44	23.05	21.31	19.45	18.04	15.31	14.48
20	09.38	08.09	06.36	05.50	04.15	03.21	04.10	05.40	07.06	08.30	09.04	10.09
	15.47	17.22	18.44	21.13	22.42	23.45	23.03	21.27	19.42	18.01	15.29	14.48
21	09.36	08.06	06.32	05.47	04.13	03.21	04.13	05.43	07.09	08.33	09.07	10.10
	15.50	17.25	18.47	21.16	22.45	23.45	23.00	21.24	19.39	17.58	15.27	14.48
22	09.33	08.03	06.29	05.43	04.10	03.21	04.16	05.46	07.12	08.36	09.10	10.10
	15.53	17.28	18.50	21.18	22.48	23.45	22.57	21.21	19.35	17.54	15.24	14.49
23	09.31	07.59	06.25	05.40	04.07	03.21	04.18	05.49	07.14	08.39	09.12	10.11
	15.56	17.31	18.52	21.21	22.51	23.45	22.55	21.17	19.32	17.51	15.22	14.49
24	09.28	07.56	06.22	05.37	04.04	03.21	04.21	05.52	07.17	08.42	09.15	10.11
	15.59	17.34	18.55	21.24	22.54	23.45	22.52	21.14	19.28	17.48	15.19	14.50
25	09.26	07.53	06.19	05.33	04.02	03.22	04.24	05.54	07.20	07.45	09.18	10.11
	16.02	17.37	18.58	21.27	22.56	23.45	22.49	21.11	19.25	16.45	15.17	14.51
26	09.23	07.50	06.15	05.30	03.59	03.23	04.27	05.57	07.23	07.48	09.21	10.11
	16.05	17.40	19.01	21.30	22.59	23.45	22.46	21.07	19.21	16.42	15.15	14.52
27	09.21	07.46	06.12	05.27	03.57	03.23	04.30	06.00	07.25	07.51	09.24	10.11
	16.08	17.43	19.04	21.33	23.02	23.44	22.43	21.04	19.18	16.38	15.13	14.53
28	09.18	07.43	06.08	05.24	03.54	03.24	04.33	06.03	07.28	07.54	09.27	10.11
	16.11	17.46	19.07	21.36	23.05	23.43	22.40	21.01	19.15	16.35	15.11	14.54
29	09.15		07.05	05.20	03.52	03.26	04.36	06.06	07.31	07.57	09.29	10.11
	16.14		20.09	21.39	23.07	23.43	22.37	20.57	19.11	16.32	15.09	14.55
30	09.13		07.01	05.17	03.49	03.27	04.39	06.09	07.34	08.00	09.32	10.10
	16.17		20.12	21.42	23.10	23.42	22.34	20.54	19.08	16.29	15.07	14.57
31	09.10		06.58		03.47		04.42	06.11		08.03		10.10
	16.20		20.15		23.12		22.31	20.50		16.26		14.58
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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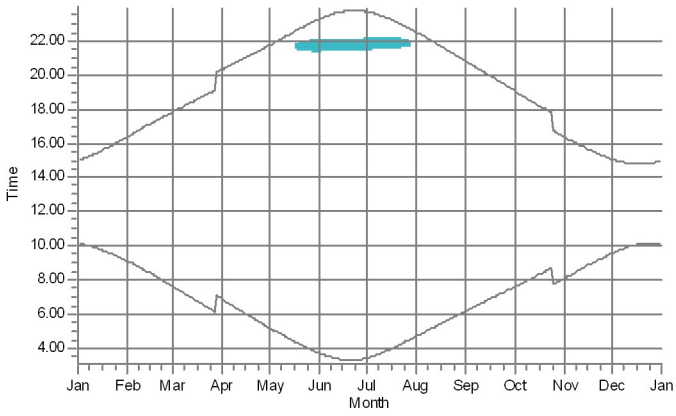
Calculated:
14.7.2023 10.34/3.5.584

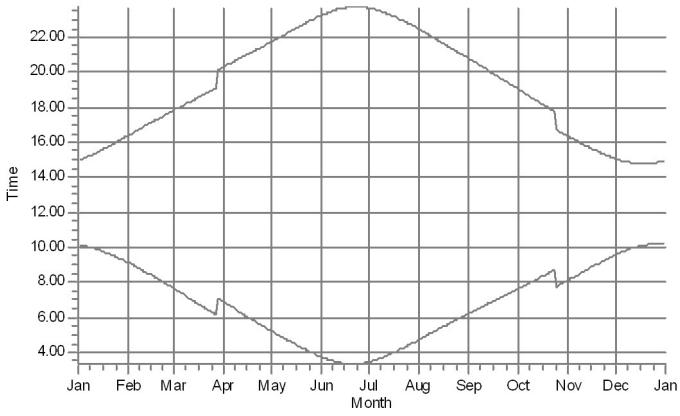
SHADOW - Calendar, graphical

Calculation: VE1_19xRD180xHH190_Luke Forest

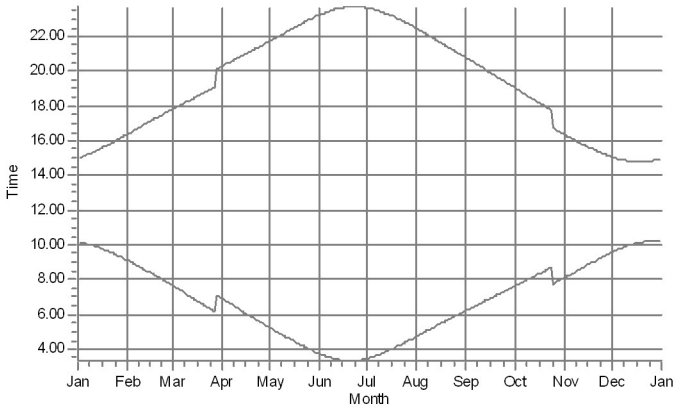
A: A Lomarakennus (Söderändan 49)



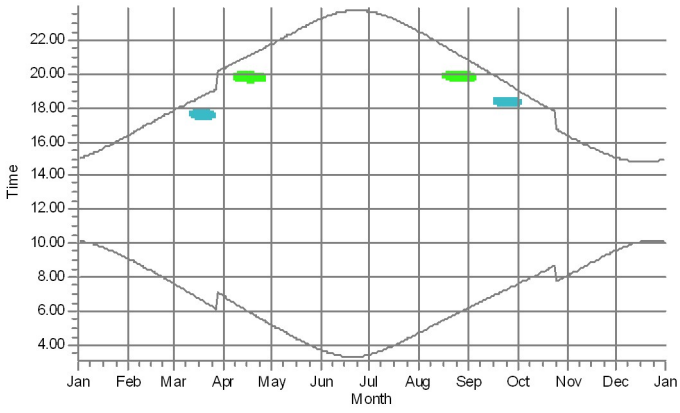
B: B Asuinrakennus (Söderändan 81)



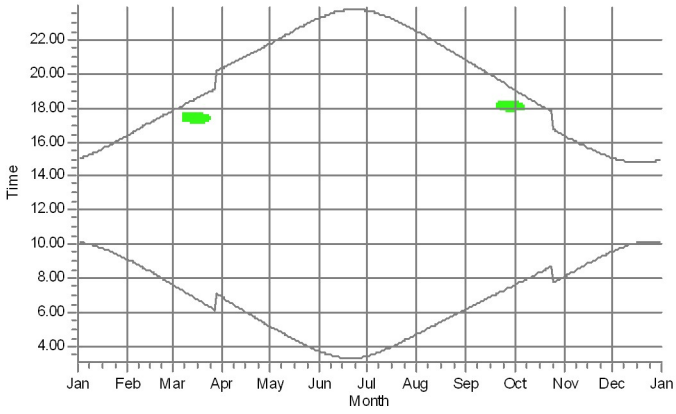
C: C Lomarakennus (Säderändan 166)



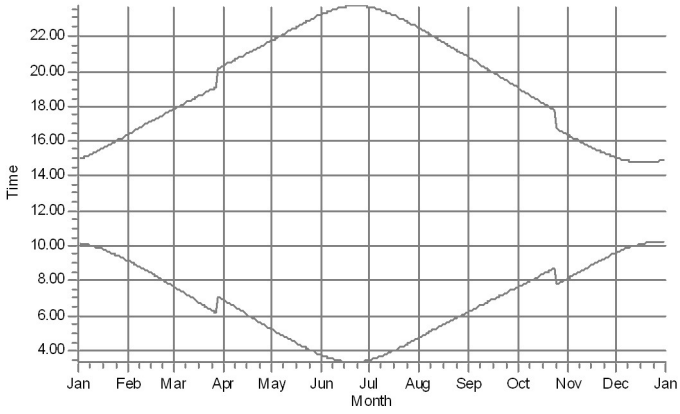
D: D Lomarakennus (Söderändan 188)



E: E Asuinrakennus (Rökiöntie 930)



F: F Asuinrakennus (Kukkusintie 474)



WTGs

18: Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8827)

19: Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8830)

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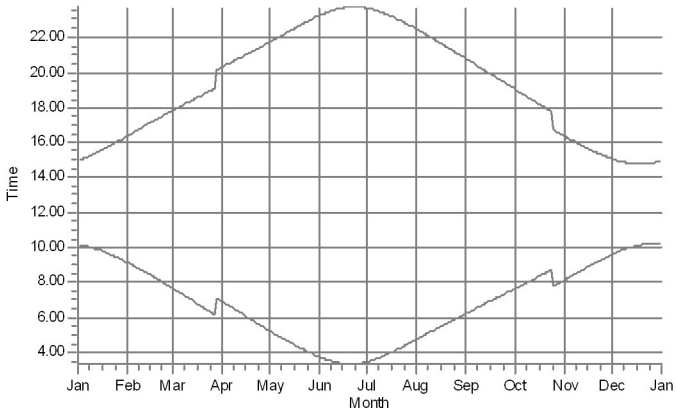
Calculated:
14.7.2023 10.34/3.5.584

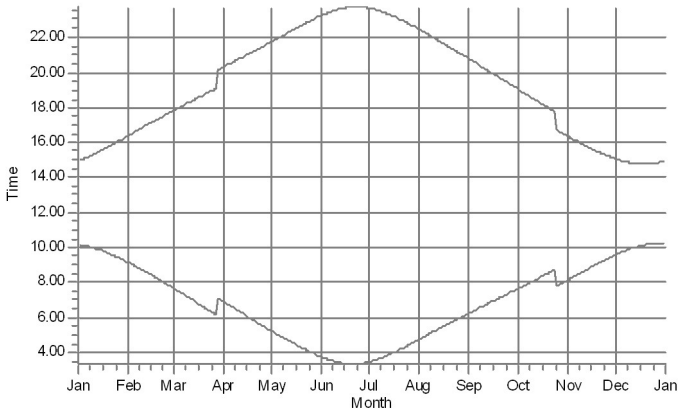
SHADOW - Calendar, graphical

Calculation: VE1_19xRD180xHH190_Luke Forest

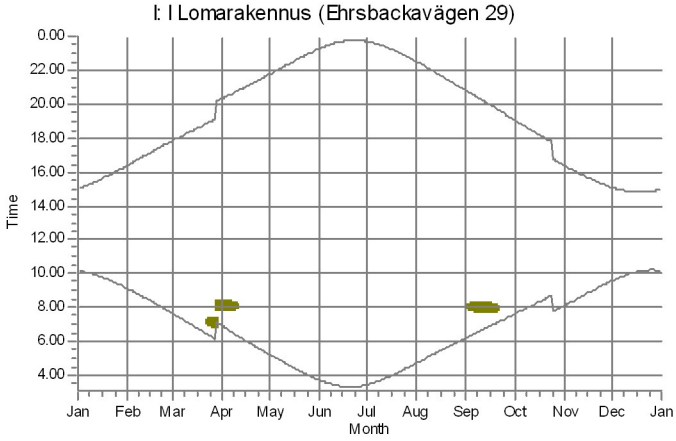
G: G Asuinrakennus (Kovik byväg 53)



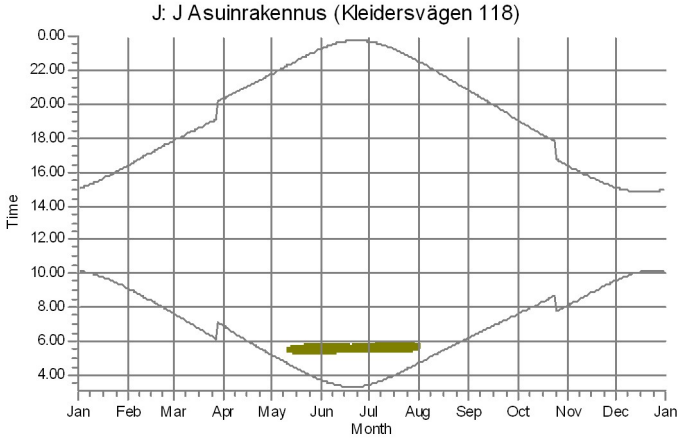
H: H Asuinrakennus (Vöyrintie 1021)



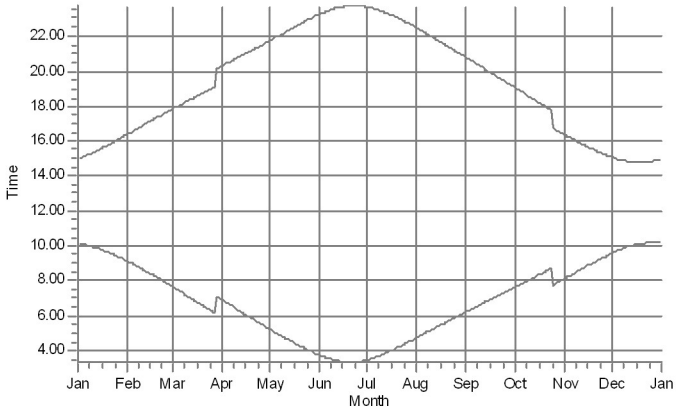
I: I Lomarakennus (Ehrsbackavägen 29)



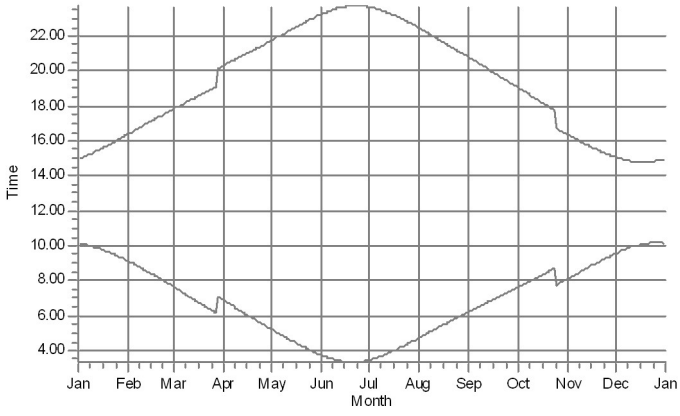
J: J Asuinrakennus (Kleidersvägen 118)



K: K Asuinrakennus (Rökiöntie 154)



L: L Asuinrakennus (Bjurbäcksvägen 231)



WTGs

10: Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8824)

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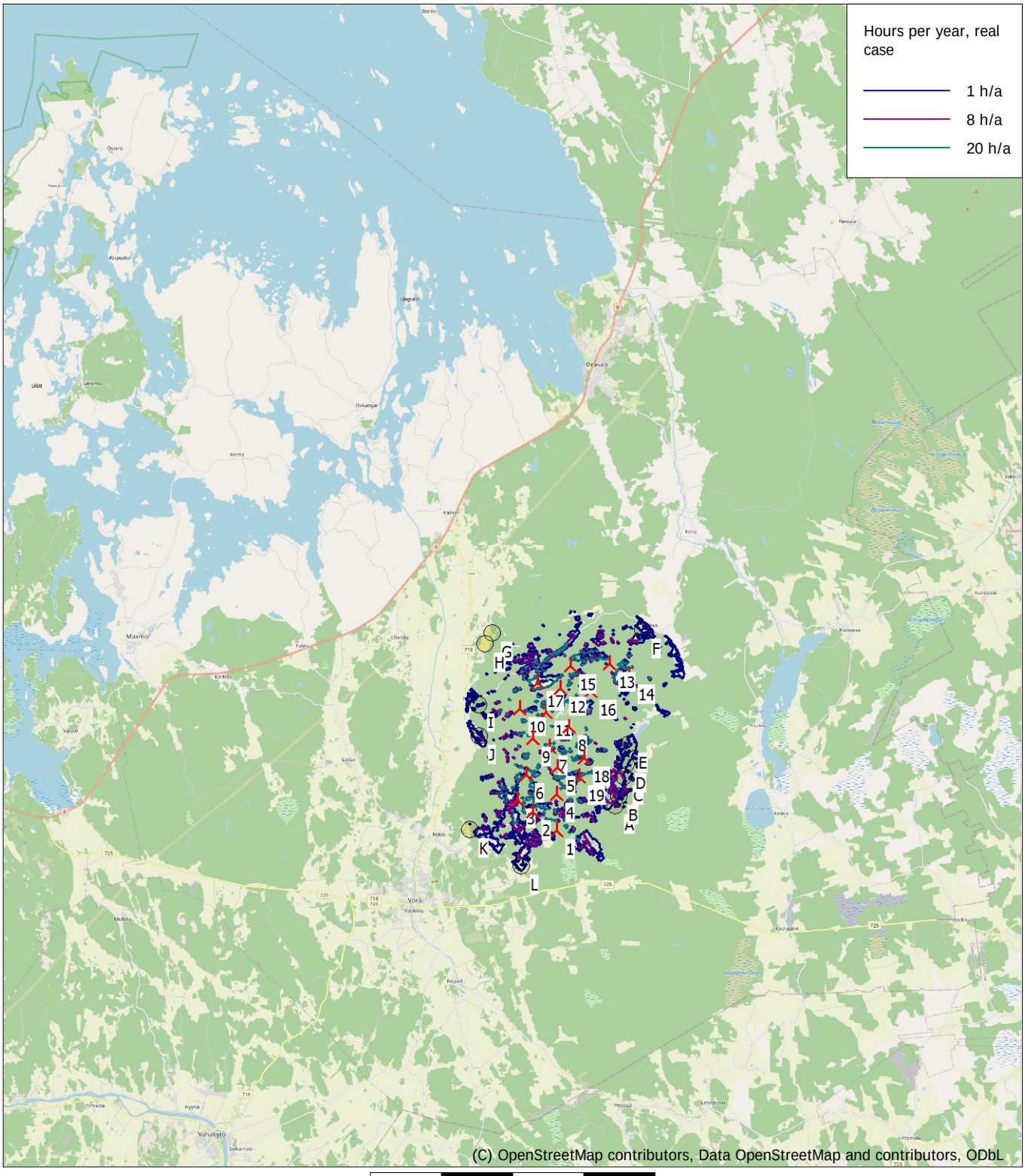
Calculated:
14.7.2023 10.34/3.5.584

SHADOW - Map

Calculation: VE1_19xRD180xHH190_Luke Forest



0 2,5 5 7,5 10km

Map: EMD OpenStreetMap , Print scale 1:200 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 264 510 North: 7 019 520

New WTG Shadow receptor

Flicker map level: Height Contours: CONTOURLINE_Lasor tuulivoimahanke 2022_0.wpo (3)

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

Liite 7. Varjostusmallinnuksen tulokset ”Real Case, No forest” - Hankevaihtoehto 2

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Calculated:
14.7.2023 10.03/3.5.584

SHADOW - Main Result

Calculation: VE2_9xRD180xHH190_No Forest

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) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational hours are calculated from WTGs in calculation and wind distribution:
MERRA-2_N63,00_E022,50 (41)

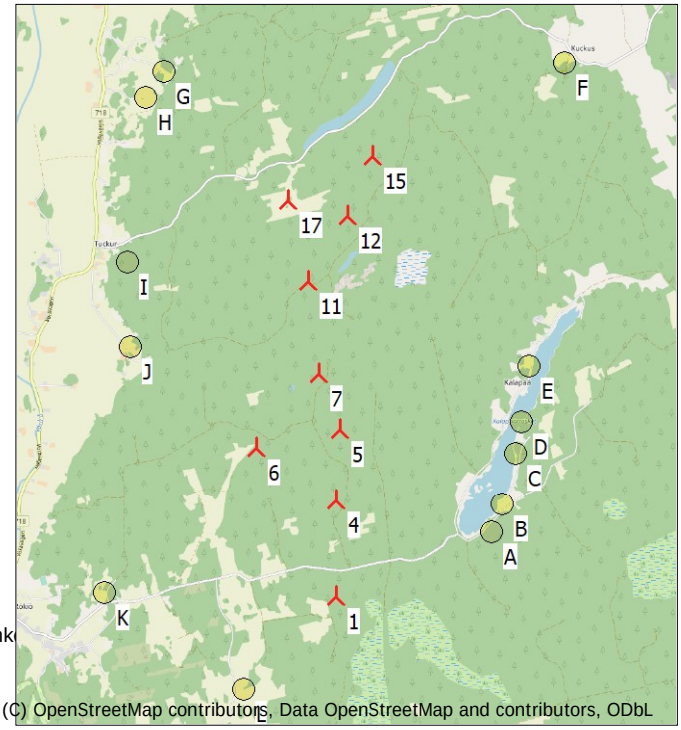
Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

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: Height Contours: CONTOURLINE_Lasor tuulivoimahank
Obstacles used in calculation
Receptor grid resolution: 1,0 m

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89



Scale 1:100 000

New WTG Shadow receptor

WTGs

	East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
			[m]					[kW]	[m]	[m]	[m]	[RPM]
1	265 860	7 011 060	40,0	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
4	265 960	7 012 340	40,0	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
5	266 070	7 013 270	35,0	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
6	264 950	7 013 100	40,0	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
7	265 850	7 014 020	40,0	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
11	265 796	7 015 259	39,8	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
12	266 380	7 016 090	44,5	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
15	266 770	7 016 850	43,5	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
17	265 604	7 016 343	20,0	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4

Shadow receptor-Input

No.	Name	East	North	Z	Width	Height	Elevation a.g.l.	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
				[m]	[m]	[m]	[m]	[°]		[m]
A	A Lomarakennus (Söderändan 49)	267 990	7 011 759	42,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
B	B Asuinrakennus (Söderändan 81)	268 161	7 012 123	37,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
C	C Lomarakennus (Säderändan 166)	268 388	7 012 783	39,1	5,0	5,0	1,0	90,0	"Green house mode"	6,0
D	D Lomarakennus (Söderändan 188)	268 493	7 013 188	37,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0
E	E Asuinrakennus (Rökiöntie 930)	268 646	7 013 924	38,1	5,0	5,0	1,0	90,0	"Green house mode"	6,0
F	F Asuinrakennus (Kukkusintie 474)	269 409	7 017 903	25,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
G	G Asuinrakennus (Kovik byväg 53)	264 096	7 018 174	10,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
H	H Asuinrakennus (Vöyrintie 1021)	263 817	7 017 837	8,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
I	I Lomarakennus (Ehrsbackavägen 29)	263 418	7 015 700	21,7	5,0	5,0	1,0	90,0	"Green house mode"	6,0
J	J Asuinrakennus (Kleidersvägen 118)	263 380	7 014 576	13,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0
K	K Asuinrakennus (Rökiöntie 154)	262 790	7 011 335	27,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
L	L Asuinrakennus (Bjurbäcksvägen 231)	264 546	7 009 923	27,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0

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Calculated:
14.7.2023 10.03/3.5.584

SHADOW - Main Result

Calculation: VE2_9xRD180xHH190_No Forest

Calculation Results

Shadow receptor

No.	Name	Shadow, expected values Shadow hours per year [h/year]
A	A Lomarakennus (Söderändan 49)	0:00
B	B Asuinrakennus (Söderändan 81)	0:00
C	C Lomarakennus (Säderändan 166)	0:00
D	D Lomarakennus (Söderändan 188)	0:00
E	E Asuinrakennus (Rökiöntie 930)	0:00
F	F Asuinrakennus (Kukkusintie 474)	0:00
G	G Asuinrakennus (Kovik byväg 53)	0:00
H	H Asuinrakennus (Vöyrintie 1021)	0:00
I	I Lomarakennus (Ehrsbackavägen 29)	0:00
J	J Asuinrakennus (Kleidersvägen 118)	0:00
K	K Asuinrakennus (Rökiöntie 154)	0:00
L	L Asuinrakennus (Bjurbäcksvägen 231)	4:17

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

No.	Name	Expected [h/year]
1	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8816)	4:17
4	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8815)	0:00
5	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8813)	0:00
6	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8814)	0:00
7	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8812)	0:00
11	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8811)	0:00
12	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8810)	0:00
15	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8809)	0:00
17	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8817)	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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14.7.2023 10.03/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190_No ForestShadow receptor: A - A Lomarakennus (Söderändan 49)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.39	06.54	05.13	03.44	03.27	04.44	06.14	07.36	08.06	09.34
	15.00	16.23	17.49	20.18	21.45	23.15	23.41	22.28	20.47	19.04	16.22	15.04
2	10.08	09.04	07.36	06.51	05.10	03.42	03.29	04.47	06.17	07.39	08.09	09.37
	15.01	16.26	17.52	20.21	21.48	23.17	23.40	22.25	20.43	19.01	16.19	15.03
3	10.07	09.01	07.33	06.47	05.07	03.40	03.30	04.50	06.19	07.42	08.12	09.40
	15.03	16.29	17.55	20.23	21.51	23.20	23.38	22.22	20.40	18.57	16.16	15.01
4	10.06	08.58	07.29	06.44	05.04	03.38	03.32	04.53	06.22	07.45	08.15	09.42
	15.05	16.32	17.58	20.26	21.54	23.22	23.37	22.19	20.37	18.54	16.13	14.59
5	10.05	08.55	07.26	06.41	05.00	03.36	03.34	04.56	06.25	07.47	08.18	09.44
	15.07	16.36	18.01	20.29	21.57	23.24	23.35	22.16	20.33	18.51	16.10	14.58
6	10.04	08.52	07.23	06.37	04.57	03.34	03.36	04.59	06.28	07.50	08.21	09.47
	15.09	16.39	18.04	20.32	22.00	23.26	23.34	22.13	20.30	18.47	16.07	14.56
7	10.03	08.49	07.19	06.34	04.54	03.32	03.38	05.02	06.30	07.53	08.24	09.49
	15.12	16.42	18.07	20.35	22.03	23.28	23.32	22.10	20.26	18.44	16.04	14.55
8	10.01	08.46	07.16	06.30	04.51	03.31	03.40	05.05	06.33	07.56	08.27	09.51
	15.14	16.45	18.09	20.38	22.06	23.30	23.30	22.06	20.23	18.40	16.01	14.54
9	10.00	08.43	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.58	08.30	09.53
	15.16	16.48	18.12	20.41	22.09	23.32	23.28	22.03	20.19	18.37	15.58	14.53
10	09.58	08.40	07.09	06.24	04.45	03.28	03.44	05.11	06.39	08.01	08.33	09.55
	15.19	16.51	18.15	20.43	22.12	23.34	23.26	22.00	20.16	18.34	15.56	14.52
11	09.57	08.37	07.06	06.20	04.42	03.26	03.47	05.14	06.41	08.04	08.36	09.57
	15.21	16.54	18.18	20.46	22.15	23.36	23.24	21.57	20.13	18.30	15.53	14.51
12	09.55	08.34	07.03	06.17	04.39	03.25	03.49	05.17	06.44	08.07	08.39	09.59
	15.24	16.57	18.21	20.49	22.18	23.37	23.22	21.54	20.09	18.27	15.50	14.50
13	09.53	08.31	06.59	06.13	04.35	03.24	03.51	05.19	06.47	08.10	08.42	10.00
	15.27	17.01	18.24	20.52	22.21	23.39	23.20	21.50	20.06	18.24	15.47	14.49
14	09.51	08.28	06.56	06.10	04.32	03.23	03.54	05.22	06.50	08.13	08.45	10.02
	15.29	17.04	18.27	20.55	22.24	23.40	23.18	21.47	20.02	18.20	15.44	14.48
15	09.49	08.25	06.52	06.07	04.29	03.22	03.56	05.25	06.52	08.16	08.48	10.03
	15.32	17.07	18.30	20.58	22.27	23.41	23.15	21.44	19.59	18.17	15.42	14.48
16	09.47	08.22	06.49	06.03	04.26	03.22	03.59	05.28	06.55	08.18	08.51	10.05
	15.35	17.10	18.32	21.01	22.30	23.42	23.13	21.40	19.55	18.14	15.39	14.48
17	09.45	08.18	06.46	06.00	04.24	03.21	04.01	05.31	06.58	08.21	08.55	10.06
	15.38	17.13	18.35	21.04	22.33	23.43	23.10	21.37	19.52	18.10	15.36	14.47
18	09.43	08.15	06.42	05.56	04.21	03.21	04.04	05.34	07.01	08.24	08.58	10.07
	15.40	17.16	18.38	21.07	22.36	23.44	23.08	21.34	19.49	18.07	15.34	14.47
19	09.40	08.12	06.39	05.53	04.18	03.20	04.07	05.37	07.03	08.27	09.01	10.08
	15.43	17.19	18.41	21.10	22.39	23.44	23.05	21.31	19.45	18.04	15.31	14.47
20	09.38	08.09	06.35	05.50	04.15	03.20	04.10	05.40	07.06	08.30	09.04	10.09
	15.46	17.22	18.44	21.12	22.42	23.45	23.03	21.27	19.42	18.01	15.29	14.47
21	09.36	08.06	06.32	05.46	04.12	03.20	04.12	05.43	07.09	08.33	09.06	10.10
	15.49	17.25	18.47	21.15	22.45	23.45	23.00	21.24	19.38	17.57	15.26	14.48
22	09.33	08.02	06.28	05.43	04.09	03.20	04.15	05.46	07.11	08.36	09.09	10.10
	15.52	17.28	18.49	21.18	22.48	23.45	22.57	21.21	19.35	17.54	15.24	14.48
23	09.31	07.59	06.25	05.40	04.07	03.20	04.18	05.48	07.14	08.39	09.12	10.11
	15.55	17.31	18.52	21.21	22.51	23.45	22.55	21.17	19.31	17.51	15.21	14.49
24	09.28	07.56	06.22	05.36	04.04	03.21	04.21	05.51	07.17	08.42	09.15	10.11
	15.58	17.34	18.55	21.24	22.54	23.45	22.52	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.18	05.33	04.01	03.21	04.24	05.54	07.20	07.45	09.18	10.11
	16.01	17.37	18.58	21.27	22.56	23.45	22.49	21.10	19.25	16.44	15.17	14.50
26	09.23	07.49	06.15	05.30	03.59	03.22	04.27	05.57	07.22	07.48	09.21	10.11
	16.04	17.40	19.01	21.30	22.59	23.45	22.46	21.07	19.21	16.41	15.14	14.51
27	09.21	07.46	06.11	05.26	03.56	03.23	04.29	06.00	07.25	07.51	09.24	10.11
	16.07	17.43	19.04	21.33	23.02	23.44	22.43	21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.54	03.24	04.32	06.03	07.28	07.54	09.26	10.11
	16.11	17.46	19.06	21.36	23.05	23.43	22.40	21.00	19.14	16.35	15.10	14.53
29	09.15		07.05	05.20	03.51	03.25	04.35	06.05	07.31	07.57	09.29	10.11
	16.14		20.09	21.39	23.07	23.43	22.37	20.57	19.11	16.32	15.08	14.55
30	09.12		07.01	05.17	03.49	03.26	04.38	06.08	07.33	08.00	09.32	10.10
	16.17		20.12	21.42	23.10	23.42	22.34	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.47		04.41	06.11		08.03		10.10
	16.20		20.15		23.12		22.31	20.50		16.26		14.58
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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14.7.2023 10.03/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190_No ForestShadow receptor: B - B Asuinrakennus (Söderändan 81)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.39	06.54	05.13	03.44	03.27	04.44	06.14	07.36	08.06	09.35
	15.00	16.23	17.49	20.18	21.45	23.15	23.41	22.28	20.47	19.04	16.22	15.04
2	10.08	09.04	07.36	06.51	05.10	03.42	03.29	04.47	06.17	07.39	08.09	09.37
	15.01	16.26	17.52	20.21	21.48	23.17	23.40	22.25	20.43	19.01	16.19	15.03
3	10.07	09.01	07.33	06.47	05.07	03.40	03.30	04.50	06.19	07.42	08.12	09.40
	15.03	16.29	17.55	20.23	21.51	23.20	23.38	22.22	20.40	18.57	16.16	15.01
4	10.06	08.58	07.29	06.44	05.04	03.38	03.32	04.53	06.22	07.44	08.15	09.42
	15.05	16.32	17.58	20.26	21.54	23.22	23.37	22.19	20.37	18.54	16.13	14.59
5	10.05	08.55	07.26	06.41	05.00	03.36	03.34	04.56	06.25	07.47	08.18	09.44
	15.07	16.36	18.01	20.29	21.57	23.24	23.35	22.16	20.33	18.51	16.10	14.58
6	10.04	08.52	07.23	06.37	04.57	03.34	03.36	04.59	06.28	07.50	08.21	09.47
	15.09	16.39	18.04	20.32	22.00	23.26	23.34	22.13	20.30	18.47	16.07	14.56
7	10.03	08.49	07.19	06.34	04.54	03.32	03.38	05.02	06.30	07.53	08.24	09.49
	15.12	16.42	18.07	20.35	22.03	23.28	23.32	22.10	20.26	18.44	16.04	14.55
8	10.01	08.46	07.16	06.30	04.51	03.31	03.40	05.05	06.33	07.56	08.27	09.51
	15.14	16.45	18.09	20.38	22.06	23.30	23.30	22.06	20.23	18.40	16.01	14.54
9	10.00	08.43	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.58	08.30	09.53
	15.16	16.48	18.12	20.41	22.09	23.32	23.28	22.03	20.19	18.37	15.58	14.52
10	09.58	08.40	07.09	06.24	04.45	03.28	03.44	05.11	06.39	08.01	08.33	09.55
	15.19	16.51	18.15	20.43	22.12	23.34	23.26	22.00	20.16	18.34	15.56	14.51
11	09.57	08.37	07.06	06.20	04.42	03.26	03.46	05.14	06.41	08.04	08.36	09.57
	15.21	16.54	18.18	20.46	22.15	23.36	23.24	21.57	20.13	18.30	15.53	14.51
12	09.55	08.34	07.03	06.17	04.38	03.25	03.49	05.16	06.44	08.07	08.39	09.59
	15.24	16.57	18.21	20.49	22.18	23.37	23.22	21.54	20.09	18.27	15.50	14.50
13	09.53	08.31	06.59	06.13	04.35	03.24	03.51	05.19	06.47	08.10	08.42	10.00
	15.26	17.01	18.24	20.52	22.21	23.39	23.20	21.50	20.06	18.24	15.47	14.49
14	09.51	08.28	06.56	06.10	04.32	03.23	03.54	05.22	06.50	08.13	08.45	10.02
	15.29	17.04	18.27	20.55	22.24	23.40	23.18	21.47	20.02	18.20	15.44	14.48
15	09.49	08.25	06.52	06.07	04.29	03.22	03.56	05.25	06.52	08.16	08.48	10.03
	15.32	17.07	18.30	20.58	22.27	23.41	23.15	21.44	19.59	18.17	15.42	14.48
16	09.47	08.22	06.49	06.03	04.26	03.21	03.59	05.28	06.55	08.18	08.52	10.05
	15.35	17.10	18.32	21.01	22.30	23.42	23.13	21.40	19.55	18.14	15.39	14.48
17	09.45	08.18	06.46	06.00	04.23	03.21	04.01	05.31	06.58	08.21	08.55	10.06
	15.37	17.13	18.35	21.04	22.33	23.43	23.11	21.37	19.52	18.10	15.36	14.47
18	09.43	08.15	06.42	05.56	04.21	03.20	04.04	05.34	07.01	08.24	08.58	10.07
	15.40	17.16	18.38	21.07	22.36	23.44	23.08	21.34	19.49	18.07	15.34	14.47
19	09.40	08.12	06.39	05.53	04.18	03.20	04.07	05.37	07.03	08.27	09.01	10.08
	15.43	17.19	18.41	21.10	22.39	23.44	23.05	21.31	19.45	18.04	15.31	14.47
20	09.38	08.09	06.35	05.50	04.15	03.20	04.10	05.40	07.06	08.30	09.04	10.09
	15.46	17.22	18.44	21.12	22.42	23.45	23.03	21.27	19.42	18.01	15.29	14.47
21	09.36	08.06	06.32	05.46	04.12	03.20	04.12	05.43	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.15	22.45	23.45	23.00	21.24	19.38	17.57	15.26	14.48
22	09.33	08.02	06.28	05.43	04.09	03.20	04.15	05.45	07.11	08.36	09.09	10.10
	15.52	17.28	18.49	21.18	22.48	23.45	22.57	21.21	19.35	17.54	15.24	14.48
23	09.31	07.59	06.25	05.40	04.07	03.20	04.18	05.48	07.14	08.39	09.12	10.11
	15.55	17.31	18.52	21.21	22.51	23.45	22.55	21.17	19.31	17.51	15.21	14.49
24	09.28	07.56	06.22	05.36	04.04	03.21	04.21	05.51	07.17	08.42	09.15	10.11
	15.58	17.34	18.55	21.24	22.54	23.45	22.52	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.18	05.33	04.01	03.21	04.24	05.54	07.20	07.45	09.18	10.11
	16.01	17.37	18.58	21.27	22.56	23.45	22.49	21.10	19.25	16.44	15.17	14.50
26	09.23	07.49	06.15	05.30	03.59	03.22	04.26	05.57	07.22	07.48	09.21	10.11
	16.04	17.40	19.01	21.30	22.59	23.45	22.46	21.07	19.21	16.41	15.14	14.51
27	09.21	07.46	06.11	05.26	03.56	03.23	04.29	06.00	07.25	07.51	09.24	10.11
	16.07	17.43	19.04	21.33	23.02	23.44	22.43	21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.54	03.24	04.32	06.03	07.28	07.54	09.27	10.11
	16.11	17.46	19.06	21.36	23.05	23.44	22.40	21.00	19.14	16.35	15.10	14.53
29	09.15		07.05	05.20	03.51	03.25	04.35	06.05	07.31	07.57	09.29	10.11
	16.14		20.09	21.39	23.07	23.43	22.37	20.57	19.11	16.32	15.08	14.55
30	09.12		07.01	05.17	03.49	03.26	04.38	06.08	07.33	08.00	09.32	10.10
	16.17		20.12	21.42	23.10	23.42	22.34	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.10
	16.20		20.15		23.12		22.31	20.50		16.26		14.57
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 10.03/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190_No ForestShadow receptor: C - C Lomarakennus (Säderändan 166)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.39	06.54	05.13	03.44	03.27	04.44	06.14	07.36	08.06	09.35
	14.59	16.23	17.49	20.18	21.45	23.15	23.41	22.28	20.47	19.04	16.22	15.04
2	10.08	09.04	07.36	06.51	05.10	03.42	03.29	04.47	06.17	07.39	08.09	09.37
	15.01	16.26	17.52	20.21	21.48	23.17	23.40	22.25	20.43	19.01	16.19	15.02
3	10.08	09.01	07.33	06.47	05.07	03.40	03.30	04.50	06.19	07.42	08.12	09.40
	15.03	16.29	17.55	20.23	21.51	23.20	23.38	22.22	20.40	18.57	16.16	15.01
4	10.06	08.58	07.29	06.44	05.04	03.38	03.32	04.53	06.22	07.44	08.15	09.42
	15.05	16.32	17.58	20.26	21.54	23.22	23.37	22.19	20.37	18.54	16.13	14.59
5	10.05	08.55	07.26	06.41	05.00	03.36	03.34	04.56	06.25	07.47	08.18	09.44
	15.07	16.36	18.01	20.29	21.57	23.24	23.36	22.16	20.33	18.51	16.10	14.58
6	10.04	08.52	07.23	06.37	04.57	03.34	03.36	04.59	06.28	07.50	08.21	09.47
	15.09	16.39	18.04	20.32	22.00	23.26	23.34	22.13	20.30	18.47	16.07	14.56
7	10.03	08.49	07.19	06.34	04.54	03.32	03.38	05.02	06.30	07.53	08.24	09.49
	15.11	16.42	18.06	20.35	22.03	23.28	23.32	22.10	20.26	18.44	16.04	14.55
8	10.01	08.46	07.16	06.30	04.51	03.31	03.40	05.05	06.33	07.56	08.27	09.51
	15.14	16.45	18.09	20.38	22.06	23.30	23.30	22.06	20.23	18.40	16.01	14.54
9	10.00	08.43	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.58	08.30	09.53
	15.16	16.48	18.12	20.41	22.09	23.32	23.28	22.03	20.19	18.37	15.58	14.52
10	09.58	08.40	07.09	06.24	04.45	03.28	03.44	05.11	06.39	08.01	08.33	09.55
	15.19	16.51	18.15	20.43	22.12	23.34	23.27	22.00	20.16	18.34	15.55	14.51
11	09.57	08.37	07.06	06.20	04.41	03.26	03.46	05.13	06.41	08.04	08.36	09.57
	15.21	16.54	18.18	20.46	22.15	23.36	23.24	21.57	20.13	18.30	15.53	14.50
12	09.55	08.34	07.03	06.17	04.38	03.25	03.49	05.16	06.44	08.07	08.39	09.59
	15.24	16.57	18.21	20.49	22.18	23.37	23.22	21.54	20.09	18.27	15.50	14.50
13	09.53	08.31	06.59	06.13	04.35	03.24	03.51	05.19	06.47	08.10	08.42	10.00
	15.26	17.01	18.24	20.52	22.21	23.39	23.20	21.50	20.06	18.24	15.47	14.49
14	09.51	08.28	06.56	06.10	04.32	03.23	03.54	05.22	06.50	08.13	08.45	10.02
	15.29	17.04	18.27	20.55	22.24	23.40	23.18	21.47	20.02	18.20	15.44	14.48
15	09.49	08.25	06.52	06.07	04.29	03.22	03.56	05.25	06.52	08.16	08.49	10.03
	15.32	17.07	18.30	20.58	22.27	23.41	23.15	21.44	19.59	18.17	15.41	14.48
16	09.47	08.22	06.49	06.03	04.26	03.21	03.59	05.28	06.55	08.18	08.52	10.05
	15.35	17.10	18.32	21.01	22.30	23.42	23.13	21.41	19.55	18.14	15.39	14.47
17	09.45	08.18	06.46	06.00	04.23	03.21	04.01	05.31	06.58	08.21	08.55	10.06
	15.37	17.13	18.35	21.04	22.33	23.43	23.11	21.37	19.52	18.10	15.36	14.47
18	09.43	08.15	06.42	05.56	04.20	03.20	04.04	05.34	07.01	08.24	08.58	10.07
	15.40	17.16	18.38	21.07	22.36	23.44	23.08	21.34	19.49	18.07	15.34	14.47
19	09.40	08.12	06.39	05.53	04.18	03.20	04.07	05.37	07.03	08.27	09.01	10.08
	15.43	17.19	18.41	21.10	22.39	23.44	23.05	21.31	19.45	18.04	15.31	14.47
20	09.38	08.09	06.35	05.50	04.15	03.20	04.09	05.40	07.06	08.30	09.04	10.09
	15.46	17.22	18.44	21.12	22.42	23.45	23.03	21.27	19.42	18.01	15.28	14.47
21	09.36	08.06	06.32	05.46	04.12	03.20	04.12	05.43	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.15	22.45	23.45	23.00	21.24	19.38	17.57	15.26	14.48
22	09.33	08.02	06.28	05.43	04.09	03.20	04.15	05.45	07.11	08.36	09.09	10.10
	15.52	17.28	18.49	21.18	22.48	23.45	22.57	21.21	19.35	17.54	15.24	14.48
23	09.31	07.59	06.25	05.40	04.06	03.20	04.18	05.48	07.14	08.39	09.12	10.11
	15.55	17.31	18.52	21.21	22.51	23.46	22.55	21.17	19.31	17.51	15.21	14.49
24	09.28	07.56	06.22	05.36	04.04	03.21	04.21	05.51	07.17	08.42	09.15	10.11
	15.58	17.34	18.55	21.24	22.54	23.45	22.52	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.18	05.33	04.01	03.21	04.24	05.54	07.20	07.45	09.18	10.11
	16.01	17.37	18.58	21.27	22.57	23.45	22.49	21.10	19.25	16.44	15.17	14.50
26	09.23	07.49	06.15	05.30	03.59	03.22	04.26	05.57	07.22	07.48	09.21	10.11
	16.04	17.40	19.01	21.30	22.59	23.45	22.46	21.07	19.21	16.41	15.14	14.51
27	09.21	07.46	06.11	05.26	03.56	03.23	04.29	06.00	07.25	07.51	09.24	10.11
	16.07	17.43	19.04	21.33	23.02	23.44	22.43	21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.53	03.24	04.32	06.03	07.28	07.54	09.27	10.11
	16.10	17.46	19.06	21.36	23.05	23.44	22.40	21.00	19.14	16.35	15.10	14.53
29	09.15		07.05	05.20	03.51	03.25	04.35	06.05	07.31	07.57	09.29	10.11
	16.14		20.09	21.39	23.07	23.43	22.37	20.57	19.11	16.32	15.08	14.54
30	09.13		07.01	05.17	03.49	03.26	04.38	06.08	07.33	08.00	09.32	10.11
	16.17		20.12	21.42	23.10	23.42	22.34	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.10
	16.20		20.15		23.13		22.31	20.50		16.25		14.57
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 10.03/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190_No ForestShadow receptor: D - D Lomarakennus (Söderändan 188)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.39	06.54	05.13	03.44	03.27	04.44	06.14	07.36	08.06	09.35
	14.59	16.23	17.49	20.18	21.45	23.15	23.41	22.28	20.47	19.04	16.22	15.04
2	10.08	09.04	07.36	06.51	05.10	03.42	03.29	04.47	06.17	07.39	08.09	09.37
	15.01	16.26	17.52	20.21	21.48	23.17	23.40	22.25	20.43	19.01	16.19	15.02
3	10.08	09.01	07.33	06.47	05.07	03.40	03.30	04.50	06.19	07.42	08.12	09.40
	15.03	16.29	17.55	20.23	21.51	23.20	23.38	22.22	20.40	18.57	16.16	15.01
4	10.07	08.58	07.29	06.44	05.04	03.38	03.32	04.53	06.22	07.44	08.15	09.42
	15.05	16.32	17.58	20.26	21.54	23.22	23.37	22.19	20.37	18.54	16.13	14.59
5	10.05	08.55	07.26	06.41	05.00	03.36	03.34	04.56	06.25	07.47	08.18	09.44
	15.07	16.36	18.01	20.29	21.57	23.24	23.36	22.16	20.33	18.51	16.10	14.58
6	10.04	08.52	07.23	06.37	04.57	03.34	03.36	04.59	06.28	07.50	08.21	09.47
	15.09	16.39	18.04	20.32	22.00	23.27	23.34	22.13	20.30	18.47	16.07	14.56
7	10.03	08.49	07.19	06.34	04.54	03.32	03.38	05.02	06.30	07.53	08.24	09.49
	15.11	16.42	18.06	20.35	22.03	23.29	23.32	22.10	20.26	18.44	16.04	14.55
8	10.01	08.46	07.16	06.30	04.51	03.31	03.40	05.05	06.33	07.56	08.27	09.51
	15.14	16.45	18.09	20.38	22.06	23.31	23.30	22.07	20.23	18.40	16.01	14.54
9	10.00	08.43	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.58	08.30	09.53
	15.16	16.48	18.12	20.41	22.09	23.32	23.29	22.03	20.19	18.37	15.58	14.52
10	09.58	08.40	07.09	06.23	04.45	03.28	03.44	05.11	06.39	08.01	08.33	09.55
	15.19	16.51	18.15	20.43	22.12	23.34	23.27	22.00	20.16	18.34	15.55	14.51
11	09.57	08.37	07.06	06.20	04.41	03.26	03.46	05.13	06.41	08.04	08.36	09.57
	15.21	16.54	18.18	20.46	22.15	23.36	23.24	21.57	20.13	18.30	15.53	14.50
12	09.55	08.34	07.03	06.17	04.38	03.25	03.49	05.16	06.44	08.07	08.39	09.59
	15.24	16.57	18.21	20.49	22.18	23.37	23.22	21.54	20.09	18.27	15.50	14.50
13	09.53	08.31	06.59	06.13	04.35	03.24	03.51	05.19	06.47	08.10	08.42	10.00
	15.26	17.00	18.24	20.52	22.21	23.39	23.20	21.50	20.06	18.24	15.47	14.49
14	09.51	08.28	06.56	06.10	04.32	03.23	03.54	05.22	06.50	08.13	08.45	10.02
	15.29	17.04	18.27	20.55	22.24	23.40	23.18	21.47	20.02	18.20	15.44	14.48
15	09.49	08.25	06.52	06.06	04.29	03.22	03.56	05.25	06.52	08.16	08.49	10.03
	15.32	17.07	18.29	20.58	22.27	23.41	23.16	21.44	19.59	18.17	15.41	14.48
16	09.47	08.22	06.49	06.03	04.26	03.21	03.59	05.28	06.55	08.18	08.52	10.05
	15.35	17.10	18.32	21.01	22.30	23.42	23.13	21.41	19.55	18.14	15.39	14.47
17	09.45	08.18	06.46	06.00	04.23	03.21	04.01	05.31	06.58	08.21	08.55	10.06
	15.37	17.13	18.35	21.04	22.33	23.43	23.11	21.37	19.52	18.10	15.36	14.47
18	09.43	08.15	06.42	05.56	04.20	03.20	04.04	05.34	07.01	08.24	08.58	10.07
	15.40	17.16	18.38	21.07	22.36	23.44	23.08	21.34	19.49	18.07	15.33	14.47
19	09.41	08.12	06.39	05.53	04.18	03.20	04.07	05.37	07.03	08.27	09.01	10.08
	15.43	17.19	18.41	21.10	22.39	23.45	23.06	21.31	19.45	18.04	15.31	14.47
20	09.38	08.09	06.35	05.50	04.15	03.20	04.09	05.40	07.06	08.30	09.04	10.09
	15.46	17.22	18.44	21.12	22.42	23.45	23.03	21.27	19.42	18.01	15.28	14.47
21	09.36	08.06	06.32	05.46	04.12	03.20	04.12	05.43	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.15	22.45	23.45	23.00	21.24	19.38	17.57	15.26	14.48
22	09.33	08.02	06.28	05.43	04.09	03.20	04.15	05.45	07.11	08.36	09.10	10.10
	15.52	17.28	18.49	21.18	22.48	23.46	22.58	21.21	19.35	17.54	15.23	14.48
23	09.31	07.59	06.25	05.40	04.06	03.20	04.18	05.48	07.14	08.39	09.12	10.11
	15.55	17.31	18.52	21.21	22.51	23.46	22.55	21.17	19.31	17.51	15.21	14.48
24	09.28	07.56	06.22	05.36	04.04	03.21	04.21	05.51	07.17	08.42	09.15	10.11
	15.58	17.34	18.55	21.24	22.54	23.45	22.52	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.18	05.33	04.01	03.21	04.23	05.54	07.20	07.45	09.18	10.11
	16.01	17.37	18.58	21.27	22.57	23.45	22.49	21.10	19.25	16.44	15.17	14.50
26	09.23	07.49	06.15	05.30	03.58	03.22	04.26	05.57	07.22	07.48	09.21	10.11
	16.04	17.40	19.01	21.30	22.59	23.45	22.46	21.07	19.21	16.41	15.14	14.51
27	09.21	07.46	06.11	05.26	03.56	03.23	04.29	06.00	07.25	07.51	09.24	10.11
	16.07	17.43	19.04	21.33	23.02	23.44	22.43	21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.53	03.24	04.32	06.02	07.28	07.54	09.27	10.11
	16.10	17.46	19.06	21.36	23.05	23.44	22.40	21.00	19.14	16.35	15.10	14.53
29	09.15		07.05	05.20	03.51	03.25	04.35	06.05	07.31	07.57	09.29	10.11
	16.14		20.09	21.39	23.07	23.43	22.37	20.57	19.11	16.32	15.08	14.54
30	09.13		07.01	05.16	03.49	03.26	04.38	06.08	07.33	08.00	09.32	10.11
	16.17		20.12	21.42	23.10	23.42	22.34	20.54	19.07	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.10
	16.20		20.15		23.13		22.31	20.50		16.25		14.57
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Miikka Saranpää / miikka.saranpaa@fcg.fi
Calculated:
14.7.2023 10.03/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190_No ForestShadow receptor: E - E Asuinrakennus (Rökiöntie 930)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.39	06.54	05.13	03.44	03.27	04.44	06.14	07.36	08.06	09.35
	14.59	16.23	17.49	20.18	21.45	23.15	23.41	22.28	20.47	19.04	16.22	15.04
2	10.09	09.04	07.36	06.51	05.10	03.42	03.29	04.47	06.16	07.39	08.09	09.37
	15.01	16.26	17.52	20.21	21.48	23.18	23.40	22.25	20.43	19.01	16.19	15.02
3	10.08	09.01	07.33	06.47	05.07	03.40	03.30	04.50	06.19	07.42	08.12	09.40
	15.03	16.29	17.55	20.23	21.51	23.20	23.39	22.22	20.40	18.57	16.16	15.01
4	10.07	08.58	07.29	06.44	05.03	03.38	03.32	04.53	06.22	07.44	08.15	09.42
	15.05	16.32	17.58	20.26	21.54	23.22	23.37	22.19	20.37	18.54	16.13	14.59
5	10.06	08.55	07.26	06.41	05.00	03.36	03.34	04.56	06.25	07.47	08.18	09.45
	15.07	16.35	18.01	20.29	21.57	23.24	23.36	22.16	20.33	18.51	16.10	14.57
6	10.04	08.52	07.23	06.37	04.57	03.34	03.35	04.59	06.28	07.50	08.21	09.47
	15.09	16.39	18.04	20.32	22.00	23.27	23.34	22.13	20.30	18.47	16.07	14.56
7	10.03	08.49	07.19	06.34	04.54	03.32	03.37	05.02	06.30	07.53	08.24	09.49
	15.11	16.42	18.06	20.35	22.03	23.29	23.32	22.10	20.26	18.44	16.04	14.55
8	10.02	08.46	07.16	06.30	04.51	03.30	03.40	05.05	06.33	07.56	08.27	09.51
	15.14	16.45	18.09	20.38	22.06	23.31	23.31	22.07	20.23	18.40	16.01	14.53
9	10.00	08.43	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.58	08.30	09.53
	15.16	16.48	18.12	20.41	22.09	23.32	23.29	22.03	20.19	18.37	15.58	14.52
10	09.58	08.40	07.09	06.23	04.44	03.27	03.44	05.10	06.39	08.01	08.33	09.55
	15.18	16.51	18.15	20.43	22.12	23.34	23.27	22.00	20.16	18.34	15.55	14.51
11	09.57	08.37	07.06	06.20	04.41	03.26	03.46	05.13	06.41	08.04	08.36	09.57
	15.21	16.54	18.18	20.46	22.15	23.36	23.25	21.57	20.13	18.30	15.53	14.50
12	09.55	08.34	07.02	06.17	04.38	03.25	03.49	05.16	06.44	08.07	08.39	09.59
	15.24	16.57	18.21	20.49	22.19	23.37	23.22	21.54	20.09	18.27	15.50	14.49
13	09.53	08.31	06.59	06.13	04.35	03.24	03.51	05.19	06.47	08.10	08.42	10.01
	15.26	17.00	18.24	20.52	22.22	23.39	23.20	21.50	20.06	18.24	15.47	14.49
14	09.51	08.28	06.56	06.10	04.32	03.23	03.53	05.22	06.50	08.13	08.46	10.02
	15.29	17.04	18.27	20.55	22.25	23.40	23.18	21.47	20.02	18.20	15.44	14.48
15	09.49	08.25	06.52	06.06	04.29	03.22	03.56	05.25	06.52	08.16	08.49	10.04
	15.32	17.07	18.29	20.58	22.28	23.41	23.16	21.44	19.59	18.17	15.41	14.48
16	09.47	08.22	06.49	06.03	04.26	03.21	03.59	05.28	06.55	08.18	08.52	10.05
	15.34	17.10	18.32	21.01	22.31	23.42	23.13	21.41	19.55	18.14	15.39	14.47
17	09.45	08.18	06.46	06.00	04.23	03.21	04.01	05.31	06.58	08.21	08.55	10.06
	15.37	17.13	18.35	21.04	22.34	23.43	23.11	21.37	19.52	18.10	15.36	14.47
18	09.43	08.15	06.42	05.56	04.20	03.20	04.04	05.34	07.01	08.24	08.58	10.07
	15.40	17.16	18.38	21.07	22.36	23.44	23.08	21.34	19.49	18.07	15.33	14.47
19	09.41	08.12	06.39	05.53	04.17	03.20	04.07	05.37	07.03	08.27	09.01	10.08
	15.43	17.19	18.41	21.10	22.39	23.45	23.06	21.31	19.45	18.04	15.31	14.47
20	09.38	08.09	06.35	05.50	04.15	03.20	04.09	05.40	07.06	08.30	09.04	10.09
	15.46	17.22	18.44	21.12	22.42	23.45	23.03	21.27	19.42	18.01	15.28	14.47
21	09.36	08.06	06.32	05.46	04.12	03.20	04.12	05.42	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.15	22.45	23.45	23.00	21.24	19.38	17.57	15.26	14.47
22	09.33	08.02	06.28	05.43	04.09	03.20	04.15	05.45	07.11	08.36	09.10	10.10
	15.52	17.28	18.49	21.18	22.48	23.46	22.58	21.21	19.35	17.54	15.23	14.48
23	09.31	07.59	06.25	05.40	04.06	03.20	04.18	05.48	07.14	08.39	09.13	10.11
	15.55	17.31	18.52	21.21	22.51	23.46	22.55	21.17	19.31	17.51	15.21	14.48
24	09.29	07.56	06.22	05.36	04.04	03.20	04.21	05.51	07.17	08.42	09.15	10.11
	15.58	17.34	18.55	21.24	22.54	23.46	22.52	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.18	05.33	04.01	03.21	04.23	05.54	07.20	07.45	09.18	10.11
	16.01	17.37	18.58	21.27	22.57	23.45	22.49	21.11	19.25	16.44	15.16	14.50
26	09.23	07.49	06.15	05.30	03.58	03.22	04.26	05.57	07.22	07.48	09.21	10.12
	16.04	17.40	19.01	21.30	22.59	23.45	22.46	21.07	19.21	16.41	15.14	14.51
27	09.21	07.46	06.11	05.26	03.56	03.22	04.29	06.00	07.25	07.51	09.24	10.12
	16.07	17.43	19.04	21.33	23.02	23.44	22.43	21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.53	03.23	04.32	06.02	07.28	07.54	09.27	10.11
	16.10	17.46	19.06	21.36	23.05	23.44	22.40	21.00	19.14	16.35	15.10	14.53
29	09.15		07.04	05.20	03.51	03.24	04.35	06.05	07.31	07.57	09.29	10.11
	16.13		20.09	21.39	23.08	23.43	22.38	20.57	19.11	16.32	15.08	14.54
30	09.13		07.01	05.16	03.49	03.26	04.38	06.08	07.33	08.00	09.32	10.11
	16.17		20.12	21.42	23.10	23.42	22.35	20.54	19.07	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.10
	16.20		20.15		23.13		22.32	20.50		16.25		14.57
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 10.03/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190_No ForestShadow receptor: F - F Asuinrakennus (Kukkusintie 474)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.07	07.39	06.54	05.13	03.43	03.26	04.43	06.14	07.36	08.06	09.35
	14.59	16.23	17.49	20.18	21.45	23.16	23.42	22.29	20.47	19.04	16.22	15.04
2	10.09	09.04	07.36	06.51	05.10	03.41	03.28	04.46	06.16	07.39	08.09	09.38
	15.01	16.26	17.52	20.21	21.48	23.18	23.40	22.26	20.43	19.01	16.19	15.02
3	10.08	09.01	07.33	06.47	05.06	03.39	03.29	04.49	06.19	07.42	08.12	09.40
	15.02	16.29	17.55	20.23	21.51	23.20	23.39	22.23	20.40	18.57	16.16	15.00
4	10.07	08.59	07.29	06.44	05.03	03.37	03.31	04.52	06.22	07.44	08.15	09.43
	15.04	16.32	17.58	20.26	21.55	23.23	23.38	22.19	20.37	18.54	16.13	14.59
5	10.06	08.56	07.26	06.40	05.00	03.35	03.33	04.55	06.25	07.47	08.18	09.45
	15.06	16.35	18.01	20.29	21.58	23.25	23.36	22.16	20.33	18.50	16.10	14.57
6	10.05	08.53	07.23	06.37	04.57	03.33	03.35	04.58	06.27	07.50	08.21	09.47
	15.09	16.38	18.03	20.32	22.01	23.27	23.35	22.13	20.30	18.47	16.07	14.56
7	10.03	08.50	07.19	06.34	04.54	03.31	03.37	05.01	06.30	07.53	08.24	09.49
	15.11	16.41	18.06	20.35	22.04	23.29	23.33	22.10	20.26	18.44	16.04	14.54
8	10.02	08.47	07.16	06.30	04.50	03.30	03.39	05.04	06.33	07.56	08.27	09.52
	15.13	16.45	18.09	20.38	22.07	23.31	23.31	22.07	20.23	18.40	16.01	14.53
9	10.00	08.44	07.13	06.27	04.47	03.28	03.41	05.07	06.36	07.59	08.30	09.54
	15.16	16.48	18.12	20.41	22.10	23.33	23.29	22.04	20.19	18.37	15.58	14.52
10	09.59	08.41	07.09	06.23	04.44	03.27	03.43	05.10	06.39	08.01	08.33	09.56
	15.18	16.51	18.15	20.43	22.13	23.35	23.27	22.00	20.16	18.34	15.55	14.51
11	09.57	08.37	07.06	06.20	04.41	03.25	03.46	05.13	06.41	08.04	08.37	09.58
	15.21	16.54	18.18	20.46	22.16	23.37	23.25	21.57	20.13	18.30	15.52	14.50
12	09.55	08.34	07.02	06.16	04.38	03.24	03.48	05.16	06.44	08.07	08.40	09.59
	15.23	16.57	18.21	20.49	22.19	23.38	23.23	21.54	20.09	18.27	15.49	14.49
13	09.53	08.31	06.59	06.13	04.35	03.23	03.50	05.19	06.47	08.10	08.43	10.01
	15.26	17.00	18.24	20.52	22.22	23.39	23.21	21.51	20.06	18.24	15.47	14.48
14	09.52	08.28	06.56	06.10	04.32	03.22	03.53	05.22	06.49	08.13	08.46	10.03
	15.28	17.03	18.27	20.55	22.25	23.41	23.18	21.47	20.02	18.20	15.44	14.48
15	09.50	08.25	06.52	06.06	04.29	03.21	03.55	05.25	06.52	08.16	08.49	10.04
	15.31	17.06	18.29	20.58	22.28	23.42	23.16	21.44	19.59	18.17	15.41	14.47
16	09.47	08.22	06.49	06.03	04.26	03.20	03.58	05.28	06.55	08.18	08.52	10.05
	15.34	17.10	18.32	21.01	22.31	23.43	23.14	21.41	19.55	18.14	15.38	14.47
17	09.45	08.19	06.45	06.00	04.23	03.20	04.01	05.31	06.58	08.21	08.55	10.07
	15.37	17.13	18.35	21.04	22.34	23.44	23.11	21.37	19.52	18.10	15.36	14.46
18	09.43	08.15	06.42	05.56	04.20	03.19	04.03	05.34	07.00	08.24	08.58	10.08
	15.40	17.16	18.38	21.07	22.37	23.45	23.09	21.34	19.49	18.07	15.33	14.46
19	09.41	08.12	06.39	05.53	04.17	03.19	04.06	05.36	07.03	08.27	09.01	10.09
	15.43	17.19	18.41	21.10	22.40	23.45	23.06	21.31	19.45	18.04	15.31	14.46
20	09.39	08.09	06.35	05.49	04.14	03.19	04.09	05.39	07.06	08.30	09.04	10.10
	15.46	17.22	18.44	21.13	22.43	23.46	23.03	21.27	19.42	18.00	15.28	14.47
21	09.36	08.06	06.32	05.46	04.11	03.19	04.12	05.42	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.16	22.46	23.46	23.01	21.24	19.38	17.57	15.25	14.47
22	09.34	08.02	06.28	05.43	04.09	03.19	04.14	05.45	07.11	08.36	09.10	10.11
	15.52	17.28	18.49	21.19	22.49	23.46	22.58	21.21	19.35	17.54	15.23	14.47
23	09.31	07.59	06.25	05.39	04.06	03.19	04.17	05.48	07.14	08.39	09.13	10.11
	15.55	17.31	18.52	21.21	22.51	23.46	22.55	21.17	19.31	17.51	15.21	14.48
24	09.29	07.56	06.22	05.36	04.03	03.20	04.20	05.51	07.17	08.42	09.16	10.12
	15.58	17.34	18.55	21.24	22.54	23.46	22.52	21.14	19.28	17.47	15.18	14.48
25	09.26	07.53	06.18	05.33	04.00	03.20	04.23	05.54	07.20	07.45	09.19	10.12
	16.01	17.37	18.58	21.27	22.57	23.46	22.50	21.11	19.25	16.44	15.16	14.49
26	09.24	07.49	06.15	05.29	03.58	03.21	04.26	05.57	07.22	07.48	09.21	10.12
	16.04	17.40	19.01	21.30	23.00	23.46	22.47	21.07	19.21	16.41	15.14	14.50
27	09.21	07.46	06.11	05.26	03.55	03.22	04.29	05.59	07.25	07.51	09.24	10.12
	16.07	17.43	19.04	21.33	23.03	23.45	22.44	21.04	19.18	16.38	15.12	14.51
28	09.18	07.43	06.08	05.23	03.53	03.23	04.32	06.02	07.28	07.54	09.27	10.12
	16.10	17.46	19.06	21.36	23.05	23.44	22.41	21.00	19.14	16.35	15.10	14.52
29	09.16		07.04	05.19	03.50	03.24	04.35	06.05	07.31	07.57	09.30	10.12
	16.13		20.09	21.39	23.08	23.44	22.38	20.57	19.11	16.31	15.08	14.54
30	09.13		07.01	05.16	03.48	03.25	04.38	06.08	07.33	08.00	09.32	10.11
	16.16		20.12	21.42	23.11	23.43	22.35	20.54	19.07	16.28	15.06	14.55
31	09.10		06.58		03.46		04.41	06.11		08.03		10.11
	16.19		20.15		23.13		22.32	20.50		16.25		14.57
Potential sun hours	181	242	363	447	560	606	595	503	392	307	206	150
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Miikka Saranpää / miikka.saranpaa@fcg.fi
Calculated:
14.7.2023 10.03/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190_No ForestShadow receptor: G - G Asuinrakennus (Kovik byväg 53)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.08	07.40	06.55	05.13	03.44	03.27	04.44	06.14	07.37	08.06	09.35
	14.59	16.23	17.49	20.18	21.46	23.16	23.42	22.29	20.47	19.04	16.22	15.04
2	10.09	09.05	07.37	06.51	05.10	03.42	03.28	04.47	06.17	07.39	08.09	09.38
	15.01	16.26	17.52	20.21	21.49	23.19	23.41	22.26	20.44	19.01	16.19	15.02
3	10.08	09.02	07.33	06.48	05.07	03.40	03.30	04.50	06.20	07.42	08.12	09.41
	15.03	16.29	17.55	20.24	21.52	23.21	23.40	22.23	20.40	18.58	16.16	15.01
4	10.07	08.59	07.30	06.44	05.04	03.37	03.32	04.53	06.22	07.45	08.15	09.43
	15.05	16.32	17.58	20.27	21.55	23.23	23.38	22.20	20.37	18.54	16.13	14.59
5	10.06	08.56	07.27	06.41	05.00	03.36	03.33	04.56	06.25	07.48	08.19	09.45
	15.07	16.36	18.01	20.30	21.58	23.25	23.37	22.17	20.34	18.51	16.10	14.57
6	10.05	08.53	07.23	06.37	04.57	03.34	03.35	04.59	06.28	07.51	08.22	09.48
	15.09	16.39	18.04	20.32	22.01	23.28	23.35	22.14	20.30	18.47	16.07	14.56
7	10.04	08.50	07.20	06.34	04.54	03.32	03.37	05.02	06.31	07.53	08.25	09.50
	15.11	16.42	18.07	20.35	22.04	23.30	23.33	22.10	20.27	18.44	16.04	14.55
8	10.02	08.47	07.16	06.31	04.51	03.30	03.39	05.05	06.33	07.56	08.28	09.52
	15.14	16.45	18.10	20.38	22.07	23.32	23.31	22.07	20.23	18.41	16.01	14.53
9	10.01	08.44	07.13	06.27	04.48	03.29	03.41	05.08	06.36	07.59	08.31	09.54
	15.16	16.48	18.13	20.41	22.10	23.33	23.30	22.04	20.20	18.37	15.58	14.52
10	09.59	08.41	07.10	06.24	04.45	03.27	03.44	05.11	06.39	08.02	08.34	09.56
	15.18	16.51	18.15	20.44	22.13	23.35	23.28	22.01	20.16	18.34	15.56	14.51
11	09.58	08.38	07.06	06.20	04.41	03.26	03.46	05.14	06.42	08.05	08.37	09.58
	15.21	16.54	18.18	20.47	22.16	23.37	23.26	21.58	20.13	18.31	15.53	14.50
12	09.56	08.35	07.03	06.17	04.38	03.25	03.48	05.16	06.44	08.07	08.40	10.00
	15.24	16.58	18.21	20.50	22.19	23.38	23.23	21.54	20.10	18.27	15.50	14.49
13	09.54	08.32	07.00	06.14	04.35	03.23	03.51	05.19	06.47	08.10	08.43	10.01
	15.26	17.01	18.24	20.53	22.22	23.40	23.21	21.51	20.06	18.24	15.47	14.49
14	09.52	08.29	06.56	06.10	04.32	03.22	03.53	05.22	06.50	08.13	08.46	10.03
	15.29	17.04	18.27	20.55	22.25	23.41	23.19	21.48	20.03	18.21	15.44	14.48
15	09.50	08.25	06.53	06.07	04.29	03.22	03.56	05.25	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	23.42	23.16	21.44	19.59	18.17	15.41	14.48
16	09.48	08.22	06.49	06.03	04.26	03.21	03.58	05.28	06.55	08.19	08.52	10.06
	15.34	17.10	18.33	21.01	22.31	23.43	23.14	21.41	19.56	18.14	15.39	14.47
17	09.46	08.19	06.46	06.00	04.23	03.20	04.01	05.31	06.58	08.22	08.55	10.07
	15.37	17.13	18.36	21.04	22.34	23.44	23.12	21.38	19.52	18.11	15.36	14.47
18	09.44	08.16	06.42	05.57	04.20	03.20	04.04	05.34	07.01	08.25	08.58	10.08
	15.40	17.16	18.38	21.07	22.37	23.45	23.09	21.35	19.49	18.07	15.34	14.47
19	09.41	08.13	06.39	05.53	04.17	03.19	04.06	05.37	07.04	08.28	09.01	10.09
	15.43	17.19	18.41	21.10	22.40	23.46	23.06	21.31	19.46	18.04	15.31	14.47
20	09.39	08.09	06.36	05.50	04.15	03.19	04.09	05.40	07.06	08.30	09.04	10.10
	15.46	17.22	18.44	21.13	22.43	23.46	23.04	21.28	19.42	18.01	15.28	14.47
21	09.37	08.06	06.32	05.46	04.12	03.19	04.12	05.43	07.09	08.33	09.07	10.11
	15.49	17.25	18.47	21.16	22.46	23.47	23.01	21.25	19.39	17.58	15.26	14.47
22	09.34	08.03	06.29	05.43	04.09	03.19	04.15	05.46	07.12	08.36	09.10	10.11
	15.52	17.28	18.50	21.19	22.49	23.47	22.58	21.21	19.35	17.54	15.23	14.48
23	09.32	08.00	06.25	05.40	04.06	03.20	04.18	05.48	07.15	08.39	09.13	10.12
	15.55	17.31	18.53	21.22	22.52	23.47	22.56	21.18	19.32	17.51	15.21	14.48
24	09.29	07.56	06.22	05.36	04.04	03.20	04.21	05.51	07.17	08.42	09.16	10.12
	15.58	17.34	18.55	21.25	22.55	23.47	22.53	21.14	19.28	17.48	15.19	14.49
25	09.27	07.53	06.19	05.33	04.01	03.21	04.23	05.54	07.20	07.45	09.19	10.12
	16.01	17.37	18.58	21.28	22.57	23.46	22.50	21.11	19.25	16.45	15.16	14.50
26	09.24	07.50	06.15	05.30	03.58	03.21	04.26	05.57	07.23	07.48	09.22	10.12
	16.04	17.40	19.01	21.31	23.00	23.46	22.47	21.08	19.22	16.41	15.14	14.51
27	09.21	07.47	06.12	05.26	03.56	03.22	04.29	06.00	07.26	07.51	09.25	10.12
	16.07	17.43	19.04	21.34	23.03	23.46	22.44	21.04	19.18	16.38	15.12	14.52
28	09.19	07.43	06.08	05.23	03.53	03.23	04.32	06.03	07.28	07.54	09.27	10.12
	16.10	17.46	19.07	21.37	23.06	23.45	22.41	21.01	19.15	16.35	15.10	14.53
29	09.16		07.05	05.20	03.51	03.24	04.35	06.06	07.31	07.57	09.30	10.12
	16.14		20.10	21.40	23.08	23.44	22.38	20.57	19.11	16.32	15.08	14.54
30	09.13		07.01	05.17	03.48	03.25	04.38	06.08	07.34	08.00	09.33	10.12
	16.17		20.12	21.43	23.11	23.43	22.35	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.11
	16.20		20.15		23.14		22.32	20.51		16.26		14.57
Potential sun hours	181	242	363	447	560	606	595	503	392	307	206	150
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 10.03/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190_No ForestShadow receptor: H - H Asuinrakennus (Vöyrintie 1021)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.08	07.40	06.55	05.13	03.44	03.27	04.44	06.14	07.37	08.06	09.35
	14.59	16.23	17.49	20.18	21.46	23.16	23.42	22.29	20.47	19.04	16.23	15.04
2	10.09	09.05	07.37	06.51	05.10	03.42	03.28	04.47	06.17	07.39	08.09	09.38
	15.01	16.26	17.52	20.21	21.49	23.18	23.41	22.26	20.44	19.01	16.19	15.02
3	10.08	09.02	07.33	06.48	05.07	03.40	03.30	04.50	06.20	07.42	08.12	09.41
	15.03	16.29	17.55	20.24	21.52	23.21	23.40	22.23	20.40	18.58	16.16	15.01
4	10.07	08.59	07.30	06.44	05.04	03.38	03.32	04.53	06.22	07.45	08.15	09.43
	15.05	16.33	17.58	20.27	21.55	23.23	23.38	22.20	20.37	18.54	16.13	14.59
5	10.06	08.56	07.27	06.41	05.00	03.36	03.33	04.56	06.25	07.48	08.19	09.45
	15.07	16.36	18.01	20.30	21.58	23.25	23.37	22.17	20.34	18.51	16.10	14.57
6	10.05	08.53	07.23	06.37	04.57	03.34	03.35	04.59	06.28	07.51	08.22	09.48
	15.09	16.39	18.04	20.32	22.01	23.28	23.35	22.14	20.30	18.47	16.07	14.56
7	10.04	08.50	07.20	06.34	04.54	03.32	03.37	05.02	06.31	07.53	08.25	09.50
	15.11	16.42	18.07	20.35	22.04	23.30	23.33	22.10	20.27	18.44	16.04	14.55
8	10.02	08.47	07.16	06.31	04.51	03.30	03.39	05.05	06.33	07.56	08.28	09.52
	15.14	16.45	18.10	20.38	22.07	23.32	23.31	22.07	20.23	18.41	16.01	14.53
9	10.01	08.44	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.59	08.31	09.54
	15.16	16.48	18.13	20.41	22.10	23.33	23.30	22.04	20.20	18.37	15.58	14.52
10	09.59	08.41	07.10	06.24	04.45	03.27	03.44	05.11	06.39	08.02	08.34	09.56
	15.19	16.51	18.16	20.44	22.13	23.35	23.28	22.01	20.16	18.34	15.56	14.51
11	09.58	08.38	07.06	06.20	04.42	03.26	03.46	05.14	06.42	08.05	08.37	09.58
	15.21	16.54	18.18	20.47	22.16	23.37	23.25	21.58	20.13	18.31	15.53	14.50
12	09.56	08.35	07.03	06.17	04.38	03.25	03.48	05.17	06.44	08.07	08.40	10.00
	15.24	16.58	18.21	20.50	22.19	23.38	23.23	21.54	20.10	18.27	15.50	14.49
13	09.54	08.32	07.00	06.14	04.35	03.24	03.51	05.19	06.47	08.10	08.43	10.01
	15.26	17.01	18.24	20.53	22.22	23.40	23.21	21.51	20.06	18.24	15.47	14.49
14	09.52	08.29	06.56	06.10	04.32	03.23	03.53	05.22	06.50	08.13	08.46	10.03
	15.29	17.04	18.27	20.56	22.25	23.41	23.19	21.48	20.03	18.21	15.44	14.48
15	09.50	08.25	06.53	06.07	04.29	03.22	03.56	05.25	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	23.42	23.16	21.44	19.59	18.17	15.42	14.48
16	09.48	08.22	06.49	06.03	04.26	03.21	03.59	05.28	06.55	08.19	08.52	10.06
	15.35	17.10	18.33	21.01	22.31	23.43	23.14	21.41	19.56	18.14	15.39	14.47
17	09.46	08.19	06.46	06.00	04.23	03.20	04.01	05.31	06.58	08.22	08.55	10.07
	15.37	17.13	18.36	21.04	22.34	23.44	23.12	21.38	19.52	18.11	15.36	14.47
18	09.44	08.16	06.43	05.57	04.20	03.20	04.04	05.34	07.01	08.25	08.58	10.08
	15.40	17.16	18.38	21.07	22.37	23.45	23.09	21.35	19.49	18.07	15.34	14.47
19	09.41	08.13	06.39	05.53	04.18	03.20	04.07	05.37	07.04	08.28	09.01	10.09
	15.43	17.19	18.41	21.10	22.40	23.46	23.06	21.31	19.46	18.04	15.31	14.47
20	09.39	08.09	06.36	05.50	04.15	03.19	04.09	05.40	07.06	08.31	09.04	10.10
	15.46	17.22	18.44	21.13	22.43	23.46	23.04	21.28	19.42	18.01	15.28	14.47
21	09.37	08.06	06.32	05.46	04.12	03.19	04.12	05.43	07.09	08.33	09.07	10.11
	15.49	17.25	18.47	21.16	22.46	23.46	23.01	21.25	19.39	17.58	15.26	14.47
22	09.34	08.03	06.29	05.43	04.09	03.19	04.15	05.46	07.12	08.36	09.10	10.11
	15.52	17.28	18.50	21.19	22.49	23.47	22.58	21.21	19.35	17.54	15.24	14.48
23	09.32	08.00	06.25	05.40	04.06	03.20	04.18	05.48	07.15	08.39	09.13	10.12
	15.55	17.31	18.53	21.22	22.52	23.47	22.56	21.18	19.32	17.51	15.21	14.48
24	09.29	07.56	06.22	05.36	04.04	03.20	04.21	05.51	07.17	08.42	09.16	10.12
	15.58	17.34	18.55	21.25	22.55	23.47	22.53	21.14	19.28	17.48	15.19	14.49
25	09.27	07.53	06.19	05.33	04.01	03.21	04.23	05.54	07.20	07.45	09.19	10.12
	16.01	17.37	18.58	21.28	22.57	23.46	22.50	21.11	19.25	16.45	15.17	14.50
26	09.24	07.50	06.15	05.30	03.58	03.21	04.26	05.57	07.23	07.48	09.22	10.12
	16.04	17.40	19.01	21.31	23.00	23.46	22.47	21.08	19.22	16.41	15.14	14.51
27	09.21	07.47	06.12	05.26	03.56	03.22	04.29	06.00	07.26	07.51	09.25	10.12
	16.07	17.43	19.04	21.34	23.03	23.45	22.44	21.04	19.18	16.38	15.12	14.52
28	09.19	07.43	06.08	05.23	03.53	03.23	04.32	06.03	07.28	07.54	09.27	10.12
	16.11	17.46	19.07	21.37	23.06	23.45	22.41	21.01	19.15	16.35	15.10	14.53
29	09.16		07.05	05.20	03.51	03.24	04.35	06.06	07.31	07.57	09.30	10.12
	16.14		20.10	21.40	23.08	23.44	22.38	20.57	19.11	16.32	15.08	14.54
30	09.13		07.01	05.17	03.48	03.26	04.38	06.08	07.34	08.00	09.33	10.12
	16.17		20.12	21.43	23.11	23.43	22.35	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.11
	16.20		20.15		23.14		22.32	20.51		16.26		14.57
Potential sun hours	181	242	363	447	560	606	595	503	392	307	206	150
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 10.03/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190_No ForestShadow receptor: I - I Lomarakennus (Ehrsbackavägen 29)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.07	07.40	06.55	05.14	03.44	03.27	04.44	06.14	07.37	08.06	09.35
	15.00	16.23	17.49	20.18	21.46	23.16	23.42	22.29	20.47	19.04	16.23	15.04
2	10.09	09.05	07.37	06.51	05.10	03.42	03.29	04.47	06.17	07.39	08.09	09.38
	15.01	16.26	17.52	20.21	21.49	23.18	23.41	22.26	20.44	19.01	16.20	15.03
3	10.08	09.02	07.33	06.48	05.07	03.40	03.30	04.50	06.20	07.42	08.12	09.40
	15.03	16.30	17.55	20.24	21.52	23.21	23.39	22.23	20.40	18.58	16.17	15.01
4	10.07	08.59	07.30	06.44	05.04	03.38	03.32	04.53	06.22	07.45	08.15	09.43
	15.05	16.33	17.58	20.27	21.55	23.23	23.38	22.20	20.37	18.54	16.13	14.59
5	10.06	08.56	07.27	06.41	05.01	03.36	03.34	04.56	06.25	07.48	08.18	09.45
	15.07	16.36	18.01	20.30	21.58	23.25	23.36	22.17	20.34	18.51	16.10	14.58
6	10.05	08.53	07.23	06.37	04.57	03.34	03.36	04.59	06.28	07.51	08.22	09.47
	15.09	16.39	18.04	20.32	22.01	23.27	23.35	22.13	20.30	18.48	16.07	14.56
7	10.04	08.50	07.20	06.34	04.54	03.32	03.38	05.02	06.31	07.53	08.25	09.50
	15.12	16.42	18.07	20.35	22.04	23.29	23.33	22.10	20.27	18.44	16.04	14.55
8	10.02	08.47	07.16	06.31	04.51	03.31	03.40	05.05	06.34	07.56	08.28	09.52
	15.14	16.45	18.10	20.38	22.07	23.31	23.31	22.07	20.23	18.41	16.02	14.54
9	10.01	08.44	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.59	08.31	09.54
	15.16	16.48	18.13	20.41	22.10	23.33	23.29	22.04	20.20	18.37	15.59	14.53
10	09.59	08.41	07.10	06.24	04.45	03.28	03.44	05.11	06.39	08.02	08.34	09.56
	15.19	16.51	18.16	20.44	22.13	23.35	23.27	22.01	20.16	18.34	15.56	14.51
11	09.57	08.38	07.06	06.20	04.42	03.26	03.46	05.14	06.42	08.05	08.37	09.58
	15.21	16.55	18.18	20.47	22.16	23.37	23.25	21.57	20.13	18.31	15.53	14.51
12	09.56	08.35	07.03	06.17	04.39	03.25	03.49	05.17	06.45	08.07	08.40	09.59
	15.24	16.58	18.21	20.50	22.19	23.38	23.23	21.54	20.10	18.27	15.50	14.50
13	09.54	08.32	07.00	06.14	04.36	03.24	03.51	05.20	06.47	08.10	08.43	10.01
	15.27	17.01	18.24	20.53	22.22	23.40	23.21	21.51	20.06	18.24	15.47	14.49
14	09.52	08.28	06.56	06.10	04.33	03.23	03.54	05.23	06.50	08.13	08.46	10.03
	15.29	17.04	18.27	20.55	22.25	23.41	23.19	21.48	20.03	18.21	15.44	14.48
15	09.50	08.25	06.53	06.07	04.30	03.22	03.56	05.25	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	23.42	23.16	21.44	19.59	18.17	15.42	14.48
16	09.48	08.22	06.49	06.03	04.27	03.21	03.59	05.28	06.55	08.19	08.52	10.05
	15.35	17.10	18.33	21.01	22.31	23.43	23.14	21.41	19.56	18.14	15.39	14.48
17	09.46	08.19	06.46	06.00	04.24	03.21	04.01	05.31	06.58	08.22	08.55	10.07
	15.38	17.13	18.36	21.04	22.34	23.44	23.11	21.38	19.52	18.11	15.36	14.47
18	09.43	08.16	06.43	05.57	04.21	03.20	04.04	05.34	07.01	08.25	08.58	10.08
	15.40	17.16	18.38	21.07	22.37	23.45	23.09	21.34	19.49	18.07	15.34	14.47
19	09.41	08.13	06.39	05.53	04.18	03.20	04.07	05.37	07.04	08.28	09.01	10.09
	15.43	17.19	18.41	21.10	22.40	23.45	23.06	21.31	19.46	18.04	15.31	14.47
20	09.39	08.09	06.36	05.50	04.15	03.20	04.10	05.40	07.06	08.30	09.04	10.10
	15.46	17.22	18.44	21.13	22.43	23.46	23.04	21.28	19.42	18.01	15.29	14.47
21	09.36	08.06	06.32	05.47	04.12	03.20	04.12	05.43	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.16	22.46	23.46	23.01	21.24	19.39	17.58	15.26	14.48
22	09.34	08.03	06.29	05.43	04.09	03.20	04.15	05.46	07.12	08.36	09.10	10.11
	15.52	17.28	18.50	21.19	22.49	23.46	22.58	21.21	19.35	17.54	15.24	14.48
23	09.32	08.00	06.25	05.40	04.07	03.20	04.18	05.49	07.15	08.39	09.13	10.11
	15.55	17.31	18.53	21.22	22.52	23.46	22.55	21.18	19.32	17.51	15.21	14.49
24	09.29	07.56	06.22	05.37	04.04	03.21	04.21	05.51	07.17	08.42	09.16	10.12
	15.58	17.34	18.55	21.25	22.54	23.46	22.53	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.19	05.33	04.01	03.21	04.24	05.54	07.20	07.45	09.19	10.12
	16.01	17.37	18.58	21.28	22.57	23.46	22.50	21.11	19.25	16.45	15.17	14.50
26	09.24	07.50	06.15	05.30	03.59	03.22	04.27	05.57	07.23	07.48	09.22	10.12
	16.05	17.40	19.01	21.31	23.00	23.46	22.47	21.08	19.22	16.42	15.15	14.51
27	09.21	07.46	06.12	05.27	03.56	03.23	04.29	06.00	07.26	07.51	09.24	10.12
	16.08	17.43	19.04	21.34	23.03	23.45	22.44	21.04	19.18	16.38	15.12	14.52
28	09.19	07.43	06.08	05.23	03.54	03.24	04.32	06.03	07.28	07.54	09.27	10.12
	16.11	17.46	19.07	21.37	23.05	23.44	22.41	21.01	19.15	16.35	15.10	14.53
29	09.16		07.05	05.20	03.51	03.25	04.35	06.06	07.31	07.57	09.30	10.12
	16.14		20.10	21.40	23.08	23.44	22.38	20.57	19.11	16.32	15.08	14.55
30	09.13		07.01	05.17	03.49	03.26	04.38	06.08	07.34	08.00	09.33	10.11
	16.17		20.12	21.43	23.11	23.43	22.35	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.11
	16.20		20.15		23.13		22.32	20.51		16.26		14.57
Potential sun hours	182	242	363	447	559	606	595	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 10.03/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190_No ForestShadow receptor: J - J Asuinrakennus (Kleidersvägen 118)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.07	07.40	06.55	05.14	03.44	03.27	04.44	06.14	07.37	08.06	09.35
	15.00	16.23	17.49	20.18	21.46	23.16	23.42	22.29	20.47	19.04	16.23	15.05
2	10.09	09.05	07.37	06.51	05.10	03.42	03.29	04.47	06.17	07.39	08.09	09.38
	15.01	16.26	17.52	20.21	21.49	23.18	23.40	22.26	20.44	19.01	16.20	15.03
3	10.08	09.02	07.33	06.48	05.07	03.40	03.30	04.50	06.20	07.42	08.12	09.40
	15.03	16.30	17.55	20.24	21.52	23.20	23.39	22.23	20.40	18.58	16.17	15.01
4	10.07	08.59	07.30	06.44	05.04	03.38	03.32	04.53	06.22	07.45	08.15	09.43
	15.05	16.33	17.58	20.27	21.55	23.23	23.38	22.20	20.37	18.54	16.14	14.59
5	10.06	08.56	07.27	06.41	05.01	03.36	03.34	04.56	06.25	07.48	08.18	09.45
	15.07	16.36	18.01	20.30	21.58	23.25	23.36	22.17	20.34	18.51	16.11	14.58
6	10.05	08.53	07.23	06.38	04.57	03.34	03.36	04.59	06.28	07.50	08.21	09.47
	15.10	16.39	18.04	20.32	22.01	23.27	23.35	22.13	20.30	18.48	16.08	14.56
7	10.03	08.50	07.20	06.34	04.54	03.32	03.38	05.02	06.31	07.53	08.25	09.50
	15.12	16.42	18.07	20.35	22.04	23.29	23.33	22.10	20.27	18.44	16.05	14.55
8	10.02	08.47	07.16	06.31	04.51	03.31	03.40	05.05	06.34	07.56	08.28	09.52
	15.14	16.45	18.10	20.38	22.07	23.31	23.31	22.07	20.23	18.41	16.02	14.54
9	10.00	08.44	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.59	08.31	09.54
	15.16	16.48	18.13	20.41	22.10	23.33	23.29	22.04	20.20	18.37	15.59	14.53
10	09.59	08.41	07.10	06.24	04.45	03.28	03.44	05.11	06.39	08.02	08.34	09.56
	15.19	16.52	18.16	20.44	22.13	23.35	23.27	22.01	20.16	18.34	15.56	14.52
11	09.57	08.38	07.06	06.20	04.42	03.26	03.47	05.14	06.42	08.05	08.37	09.58
	15.21	16.55	18.18	20.47	22.16	23.36	23.25	21.57	20.13	18.31	15.53	14.51
12	09.55	08.35	07.03	06.17	04.39	03.25	03.49	05.17	06.45	08.07	08.40	09.59
	15.24	16.58	18.21	20.50	22.19	23.38	23.23	21.54	20.10	18.27	15.50	14.50
13	09.54	08.32	07.00	06.14	04.36	03.24	03.51	05.20	06.47	08.10	08.43	10.01
	15.27	17.01	18.24	20.53	22.22	23.39	23.21	21.51	20.06	18.24	15.47	14.49
14	09.52	08.28	06.56	06.10	04.33	03.23	03.54	05.23	06.50	08.13	08.46	10.03
	15.29	17.04	18.27	20.55	22.25	23.41	23.18	21.48	20.03	18.21	15.45	14.48
15	09.50	08.25	06.53	06.07	04.30	03.22	03.56	05.26	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	23.42	23.16	21.44	19.59	18.17	15.42	14.48
16	09.48	08.22	06.49	06.03	04.27	03.22	03.59	05.28	06.55	08.19	08.52	10.05
	15.35	17.10	18.33	21.01	22.31	23.43	23.14	21.41	19.56	18.14	15.39	14.48
17	09.45	08.19	06.46	06.00	04.24	03.21	04.02	05.31	06.58	08.22	08.55	10.07
	15.38	17.13	18.36	21.04	22.34	23.44	23.11	21.38	19.52	18.11	15.36	14.47
18	09.43	08.16	06.43	05.57	04.21	03.20	04.04	05.34	07.01	08.25	08.58	10.08
	15.41	17.16	18.38	21.07	22.37	23.44	23.09	21.34	19.49	18.07	15.34	14.47
19	09.41	08.13	06.39	05.53	04.18	03.20	04.07	05.37	07.04	08.28	09.01	10.09
	15.43	17.19	18.41	21.10	22.40	23.45	23.06	21.31	19.46	18.04	15.31	14.47
20	09.39	08.09	06.36	05.50	04.15	03.20	04.10	05.40	07.06	08.30	09.04	10.10
	15.46	17.22	18.44	21.13	22.43	23.46	23.03	21.28	19.42	18.01	15.29	14.48
21	09.36	08.06	06.32	05.47	04.12	03.20	04.12	05.43	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.16	22.46	23.46	23.01	21.24	19.39	17.58	15.26	14.48
22	09.34	08.03	06.29	05.43	04.09	03.20	04.15	05.46	07.12	08.36	09.10	10.11
	15.52	17.28	18.50	21.19	22.49	23.46	22.58	21.21	19.35	17.54	15.24	14.48
23	09.31	08.00	06.25	05.40	04.07	03.20	04.18	05.49	07.15	08.39	09.13	10.11
	15.55	17.31	18.53	21.22	22.51	23.46	22.55	21.18	19.32	17.51	15.21	14.49
24	09.29	07.56	06.22	05.37	04.04	03.21	04.21	05.52	07.17	08.42	09.16	10.12
	15.58	17.34	18.55	21.25	22.54	23.46	22.52	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.19	05.33	04.01	03.21	04.24	05.54	07.20	07.45	09.19	10.12
	16.02	17.37	18.58	21.28	22.57	23.46	22.50	21.11	19.25	16.45	15.17	14.50
26	09.24	07.50	06.15	05.30	03.59	03.22	04.27	05.57	07.23	07.48	09.22	10.12
	16.05	17.40	19.01	21.31	23.00	23.45	22.47	21.08	19.22	16.42	15.15	14.51
27	09.21	07.46	06.12	05.27	03.56	03.23	04.30	06.00	07.26	07.51	09.24	10.12
	16.08	17.43	19.04	21.34	23.03	23.45	22.44	21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.54	03.24	04.33	06.03	07.28	07.54	09.27	10.12
	16.11	17.46	19.07	21.37	23.05	23.44	22.41	21.01	19.15	16.35	15.10	14.53
29	09.16		07.05	05.20	03.51	03.25	04.35	06.06	07.31	07.57	09.30	10.12
	16.14		20.10	21.40	23.08	23.43	22.38	20.57	19.11	16.32	15.08	14.55
30	09.13		07.01	05.17	03.49	03.26	04.38	06.08	07.34	08.00	09.33	10.11
	16.17		20.12	21.43	23.11	23.43	22.35	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.47		04.41	06.11		08.03		10.11
	16.20		20.15		23.13		22.32	20.51		16.26		14.58
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 10.03/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190_No ForestShadow receptor: K - K Asuinrakennus (Rökiöntie 154)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.40	06.55	05.14	03.45	03.28	04.45	06.14	07.37	08.06	09.35
	15.00	16.24	17.49	20.18	21.46	23.15	23.41	22.29	20.47	19.05	16.23	15.05
2	10.09	09.04	07.36	06.51	05.11	03.43	03.29	04.48	06.17	07.39	08.09	09.37
	15.02	16.27	17.52	20.21	21.49	23.18	23.40	22.26	20.44	19.01	16.20	15.03
3	10.08	09.02	07.33	06.48	05.07	03.41	03.31	04.50	06.20	07.42	08.12	09.40
	15.04	16.30	17.55	20.24	21.52	23.20	23.39	22.23	20.40	18.58	16.17	15.01
4	10.07	08.59	07.30	06.44	05.04	03.39	03.33	04.53	06.23	07.45	08.15	09.42
	15.06	16.33	17.58	20.27	21.55	23.22	23.37	22.19	20.37	18.54	16.14	15.00
5	10.06	08.56	07.26	06.41	05.01	03.37	03.34	04.56	06.25	07.48	08.18	09.45
	15.08	16.36	18.01	20.29	21.58	23.24	23.36	22.16	20.33	18.51	16.11	14.58
6	10.04	08.53	07.23	06.38	04.58	03.35	03.36	04.59	06.28	07.50	08.21	09.47
	15.10	16.39	18.04	20.32	22.01	23.27	23.34	22.13	20.30	18.48	16.08	14.57
7	10.03	08.50	07.20	06.34	04.55	03.33	03.38	05.02	06.31	07.53	08.24	09.49
	15.12	16.42	18.07	20.35	22.04	23.29	23.32	22.10	20.27	18.44	16.05	14.55
8	10.02	08.47	07.16	06.31	04.51	03.31	03.40	05.05	06.34	07.56	08.27	09.51
	15.14	16.45	18.10	20.38	22.07	23.31	23.31	22.07	20.23	18.41	16.02	14.54
9	10.00	08.44	07.13	06.27	04.48	03.30	03.43	05.08	06.36	07.59	08.30	09.53
	15.17	16.49	18.13	20.41	22.10	23.32	23.29	22.04	20.20	18.38	15.59	14.53
10	09.59	08.41	07.10	06.24	04.45	03.28	03.45	05.11	06.39	08.02	08.34	09.55
	15.19	16.52	18.16	20.44	22.13	23.34	23.27	22.00	20.16	18.34	15.56	14.52
11	09.57	08.38	07.06	06.21	04.42	03.27	03.47	05.14	06.42	08.05	08.37	09.57
	15.22	16.55	18.18	20.47	22.16	23.36	23.25	21.57	20.13	18.31	15.53	14.51
12	09.55	08.35	07.03	06.17	04.39	03.26	03.49	05.17	06.45	08.07	08.40	09.59
	15.24	16.58	18.21	20.50	22.19	23.37	23.22	21.54	20.10	18.27	15.50	14.50
13	09.53	08.31	07.00	06.14	04.36	03.25	03.52	05.20	06.47	08.10	08.43	10.01
	15.27	17.01	18.24	20.52	22.22	23.39	23.20	21.51	20.06	18.24	15.48	14.50
14	09.51	08.28	06.56	06.10	04.33	03.24	03.54	05.23	06.50	08.13	08.46	10.02
	15.30	17.04	18.27	20.55	22.25	23.40	23.18	21.47	20.03	18.21	15.45	14.49
15	09.49	08.25	06.53	06.07	04.30	03.23	03.57	05.26	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	23.41	23.16	21.44	19.59	18.18	15.42	14.48
16	09.47	08.22	06.49	06.04	04.27	03.22	03.59	05.29	06.56	08.19	08.52	10.05
	15.35	17.10	18.33	21.01	22.31	23.42	23.13	21.41	19.56	18.14	15.39	14.48
17	09.45	08.19	06.46	06.00	04.24	03.22	04.02	05.32	06.58	08.22	08.55	10.06
	15.38	17.13	18.36	21.04	22.34	23.43	23.11	21.38	19.52	18.11	15.37	14.48
18	09.43	08.16	06.43	05.57	04.21	03.21	04.05	05.34	07.01	08.25	08.58	10.07
	15.41	17.16	18.38	21.07	22.37	23.44	23.08	21.34	19.49	18.08	15.34	14.48
19	09.41	08.12	06.39	05.54	04.18	03.21	04.07	05.37	07.04	08.27	09.01	10.08
	15.44	17.19	18.41	21.10	22.40	23.45	23.06	21.31	19.46	18.04	15.32	14.48
20	09.38	08.09	06.36	05.50	04.15	03.21	04.10	05.40	07.06	08.30	09.04	10.09
	15.47	17.22	18.44	21.13	22.42	23.45	23.03	21.28	19.42	18.01	15.29	14.48
21	09.36	08.06	06.32	05.47	04.13	03.21	04.13	05.43	07.09	08.33	09.07	10.10
	15.50	17.26	18.47	21.16	22.45	23.45	23.00	21.24	19.39	17.58	15.27	14.48
22	09.34	08.03	06.29	05.43	04.10	03.21	04.16	05.46	07.12	08.36	09.10	10.10
	15.53	17.29	18.50	21.19	22.48	23.46	22.58	21.21	19.35	17.55	15.24	14.49
23	09.31	08.00	06.25	05.40	04.07	03.21	04.18	05.49	07.15	08.39	09.13	10.11
	15.56	17.32	18.53	21.22	22.51	23.46	22.55	21.18	19.32	17.51	15.22	14.49
24	09.29	07.56	06.22	05.37	04.04	03.21	04.21	05.52	07.17	08.42	09.16	10.11
	15.59	17.35	18.55	21.25	22.54	23.46	22.52	21.14	19.28	17.48	15.19	14.50
25	09.26	07.53	06.19	05.33	04.02	03.22	04.24	05.55	07.20	07.45	09.18	10.12
	16.02	17.38	18.58	21.28	22.57	23.45	22.49	21.11	19.25	16.45	15.17	14.51
26	09.24	07.50	06.15	05.30	03.59	03.23	04.27	05.57	07.23	07.48	09.21	10.12
	16.05	17.41	19.01	21.31	23.00	23.45	22.46	21.07	19.22	16.42	15.15	14.52
27	09.21	07.46	06.12	05.27	03.57	03.23	04.30	06.00	07.26	07.51	09.24	10.12
	16.08	17.43	19.04	21.34	23.02	23.44	22.44	21.04	19.18	16.39	15.13	14.53
28	09.18	07.43	06.08	05.24	03.54	03.24	04.33	06.03	07.28	07.54	09.27	10.11
	16.11	17.46	19.07	21.37	23.05	23.44	22.41	21.01	19.15	16.35	15.11	14.54
29	09.16		07.05	05.20	03.52	03.25	04.36	06.06	07.31	07.57	09.30	10.11
	16.14		20.10	21.40	23.08	23.43	22.38	20.57	19.11	16.32	15.09	14.55
30	09.13		07.02	05.17	03.49	03.27	04.39	06.09	07.34	08.00	09.32	10.11
	16.17		20.12	21.43	23.10	23.42	22.35	20.54	19.08	16.29	15.07	14.57
31	09.10		06.58		03.47		04.42	06.11		08.03		10.10
	16.20		20.15		23.13		22.32	20.51		16.26		14.58
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 10.03/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190_No ForestShadow receptor: L - L Asuinrakennus (Bjurbäcksvägen 231)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.40	06.55	05.14	03.45	04.44 (1)	03.28	04.44 (1)	04.45	06.14	07.36	08.06	09.35
	15.00	16.23	17.49	20.18	21.45	23.15 12	04.56 (1)	23.41 23	05.07 (1)	22.28	20.47	19.04	16.23	15.05
2	10.08	09.04	07.36	06.51	05.10	03.43	04.43 (1)	03.30	04.46 (1)	04.47	06.17	07.39	08.09	09.37
	15.02	16.27	17.52	20.21	21.48	23.17 14	04.57 (1)	23.39 22	05.08 (1)	22.25	20.44	19.01	16.20	15.03
3	10.07	09.01	07.33	06.48	05.07	03.41	04.43 (1)	03.31	04.46 (1)	04.50	06.20	07.42	08.12	09.40
	15.04	16.30	17.55	20.24	21.51	23.20 15	04.58 (1)	23.38 22	05.08 (1)	22.22	20.40	18.58	16.17	15.01
4	10.06	08.58	07.30	06.44	05.04	03.39	04.42 (1)	03.33	04.46 (1)	04.53	06.22	07.45	08.15	09.42
	15.06	16.33	17.58	20.26	21.54	23.22 18	05.00 (1)	23.37 21	05.07 (1)	22.19	20.37	18.54	16.14	15.00
5	10.05	08.55	07.26	06.41	05.01	03.37	04.41 (1)	03.35	04.46 (1)	04.56	06.25	07.48	08.18	09.44
	15.08	16.36	18.01	20.29	21.57	23.24 19	05.00 (1)	23.35 21	05.07 (1)	22.16	20.33	18.51	16.11	14.58
6	10.04	08.52	07.23	06.38	04.58	03.35	04.41 (1)	03.36	04.48 (1)	04.59	06.28	07.50	08.21	09.47
	15.10	16.39	18.04	20.32	22.00	23.26 19	05.00 (1)	23.34 19	05.07 (1)	22.13	20.30	18.47	16.08	14.57
7	10.03	08.50	07.20	06.34	04.54	03.33	04.41 (1)	03.38	04.48 (1)	05.02	06.31	07.53	08.24	09.49
	15.12	16.42	18.07	20.35	22.03	23.28 20	05.01 (1)	23.32 18	05.06 (1)	22.10	20.26	18.44	16.05	14.55
8	10.01	08.47	07.16	06.31	04.51	03.31	04.41 (1)	03.40	04.49 (1)	05.05	06.34	07.56	08.27	09.51
	15.14	16.45	18.10	20.38	22.06	23.30 21	05.02 (1)	23.30 17	05.06 (1)	22.07	20.23	18.41	16.02	14.54
9	10.00	08.44	07.13	06.27	04.48	03.30	04.41 (1)	03.43	04.49 (1)	05.08	06.36	07.59	08.30	09.53
	15.17	16.49	18.13	20.41	22.09	23.32 21	05.02 (1)	23.28 16	05.05 (1)	22.03	20.20	18.37	15.59	14.53
10	09.58	08.40	07.10	06.24	04.45	03.28	04.40 (1)	03.45	04.50 (1)	05.11	06.39	08.02	08.33	09.55
	15.19	16.52	18.15	20.44	22.12	23.34 22	05.02 (1)	23.26 15	05.05 (1)	22.00	20.16	18.34	15.56	14.52
11	09.57	08.37	07.06	06.20	04.42	03.27	04.41 (1)	03.47	04.52 (1)	05.14	06.42	08.04	08.36	09.57
	15.22	16.55	18.18	20.46	22.15	23.35 22	05.03 (1)	23.24 13	05.05 (1)	21.57	20.13	18.31	15.53	14.51
12	09.55	08.34	07.03	06.17	04.39	03.26	04.41 (1)	03.49	04.53 (1)	05.17	06.44	08.07	08.39	09.59
	15.24	16.58	18.21	20.49	22.18	23.37 23	05.04 (1)	23.22 11	05.04 (1)	21.54	20.09	18.27	15.50	14.50
13	09.53	08.31	06.59	06.14	04.36	03.25	04.40 (1)	03.52	04.55 (1)	05.20	06.47	08.10	08.42	10.00
	15.27	17.01	18.24	20.52	22.21	23.38 23	05.03 (1)	23.20 7	05.02 (1)	21.50	20.06	18.24	15.47	14.50
14	09.51	08.28	06.56	06.10	04.33	03.24	04.41 (1)	03.54		05.23	06.50	08.13	08.46	10.02
	15.30	17.04	18.27	20.55	22.24	23.40 23	05.04 (1)	23.18		21.47	20.03	18.21	15.45	14.49
15	09.49	08.25	06.53	06.07	04.30	03.23	04.41 (1)	03.57		05.26	06.53	08.16	08.49	10.03
	15.32	17.07	18.30	20.58	22.27	23.41 23	05.04 (1)	23.15		21.44	19.59	18.17	15.42	14.48
16	09.47	08.22	06.49	06.04	04.27	03.22	04.41 (1)	03.59		05.29	06.55	08.19	08.52	10.05
	15.35	17.10	18.33	21.01	22.30	23.42 24	05.05 (1)	23.13		21.41	19.56	18.14	15.39	14.48
17	09.45	08.19	06.46	06.00	04.24	03.22	04.41 (1)	04.02		05.31	06.58	08.21	08.55	10.06
	15.38	17.13	18.35	21.04	22.33	23.43 24	05.05 (1)	23.11		21.37	19.52	18.11	15.37	14.48
18	09.43	08.15	06.42	05.57	04.21	03.21	04.42 (1)	04.05		05.34	07.01	08.24	08.58	10.07
	15.41	17.16	18.38	21.07	22.36	23.44 24	05.06 (1)	23.08		21.34	19.49	18.07	15.34	14.48
19	09.40	08.12	06.39	05.53	04.18	03.21	04.42 (1)	04.07		05.37	07.04	08.27	09.01	10.08
	15.44	17.19	18.41	21.10	22.39	23.44 24	05.06 (1)	23.05		21.31	19.45	18.04	15.31	14.48
20	09.38	08.09	06.36	05.50	04.15	03.21	04.42 (1)	04.10		05.40	07.06	08.30	09.04	10.09
	15.47	17.22	18.44	21.13	22.42	23.45 24	05.06 (1)	23.03		21.27	19.42	18.01	15.29	14.48
21	09.36	08.06	06.32	05.47	04.13	03.21	04.42 (1)	04.13		05.43	07.09	08.33	09.07	10.10
	15.50	17.25	18.47	21.16	22.45	23.45 24	05.06 (1)	23.00		21.24	19.39	17.58	15.27	14.48
22	09.33	08.03	06.29	05.43	04.10	03.21	04.42 (1)	04.16		05.46	07.12	08.36	09.10	10.10
	15.53	17.28	18.50	21.18	22.48	23.45 24	05.06 (1)	22.57		21.21	19.35	17.54	15.24	14.49
23	09.31	07.59	06.25	05.40	04.07	03.21	04.43 (1)	04.18		05.49	07.14	08.39	09.12	10.11
	15.56	17.31	18.52	21.21	22.51	23.45 24	05.07 (1)	22.55		21.17	19.32	17.51	15.22	14.49
24	09.28	07.56	06.22	05.37	04.04	03.21	04.43 (1)	04.21		05.52	07.17	08.42	09.15	10.11
	15.59	17.34	18.55	21.24	22.54	23.45 24	05.07 (1)	22.52		21.14	19.28	17.48	15.19	14.50
25	09.26	07.53	06.19	05.33	04.02	03.22	04.43 (1)	04.24		05.54	07.20	07.45	09.18	10.11
	16.02	17.37	18.58	21.27	22.56	23.45 24	05.07 (1)	22.49		21.11	19.25	16.45	15.17	14.51
26	09.23	07.50	06.15	05.30	03.59	03.23	04.43 (1)	04.27		05.57	07.23	07.48	09.21	10.11
	16.05	17.40	19.01	21.30	22.59	23.45 24	05.07 (1)	22.46		21.07	19.21	16.42	15.15	14.52
27	09.21	07.46	06.12	05.27	03.57	03.23	04.44 (1)	04.30		06.00	07.25	07.51	09.24	10.11
	16.08	17.43	19.04	21.33	23.02	23.44 23	05.07 (1)	22.43		21.04	19.18	16.38	15.13	14.53
28	09.18	07.43	06.08	05.24	03.54	03.24	04.44 (1)	04.33		06.03	07.28	07.54	09.27	10.11
	16.11	17.46	19.07	21.36	23.05	23.43 24	05.08 (1)	22.40		21.01	19.15	16.35	15.11	14.54
29	09.15		07.05	05.20	03.52	03.26	04.44 (1)	04.36		06.06	07.31	07.57	09.29	10.11
	16.14		20.09	21.39	23.07	23.43 23	05.07 (1)	22.37		20.57	19.11	16.32	15.09	14.55
30	09.13		07.01	05.17	03.49 04.48 (1)	03.27	04.44 (1)	04.39		06.09	07.34	08.00	09.32	10.10
	16.17		20.12	21.42	23.10 4 04.52 (1)	23.42 23	05.07 (1)	22.34		20.54	19.08	16.29	15.07	14.57
31	09.10		06.58		03.47 04.45 (1)			04.42		06.11		08.03		10.10
	16.20		20.15		23.12 9 04.54 (1)			22.31		20.50		16.26		14.58
Potential sun hours	182	242	363	447	559	605		594		502	392	308	206	151
Total, worst case					13	652		225						
Sun reduction					0,48	0,49		0,39						
Oper. time red.					0,99	0,99		0,99						
Wind dir. red.					0,63	0,63		0,63						
Total reduction					0,30	0,31		0,24						
Total, real					4	200		54						

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)		First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker	(WTG causing flicker last time)

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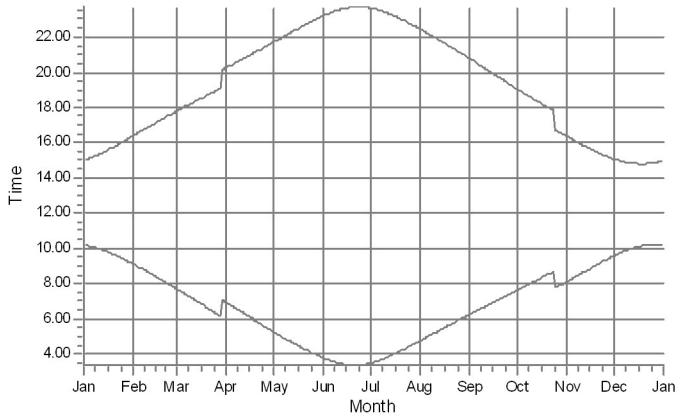
Calculated:
14.7.2023 10.03/3.5.584

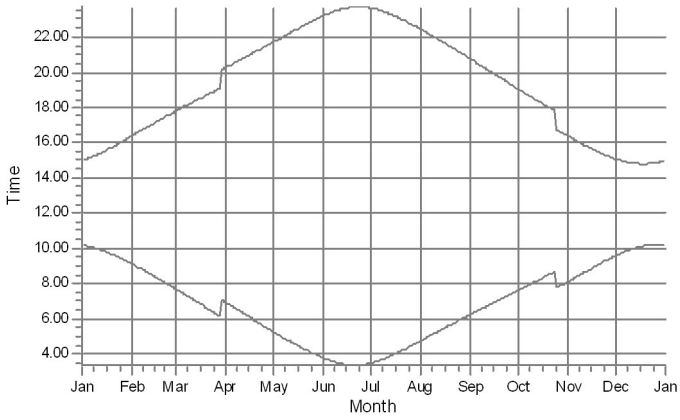
SHADOW - Calendar, graphical

Calculation: VE2_9xRD180xHH190_No Forest

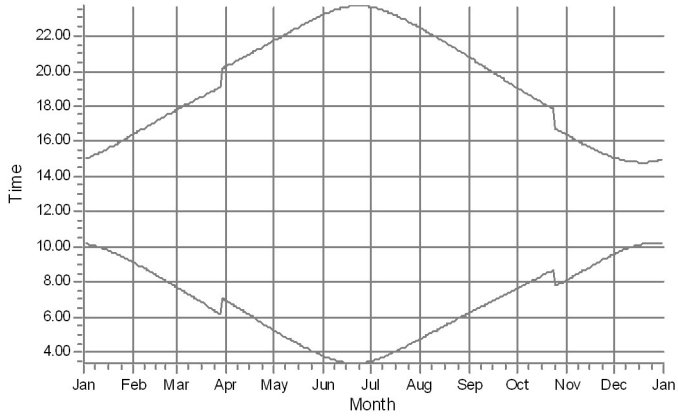
A: A Lomarakennus (Söderändan 49)



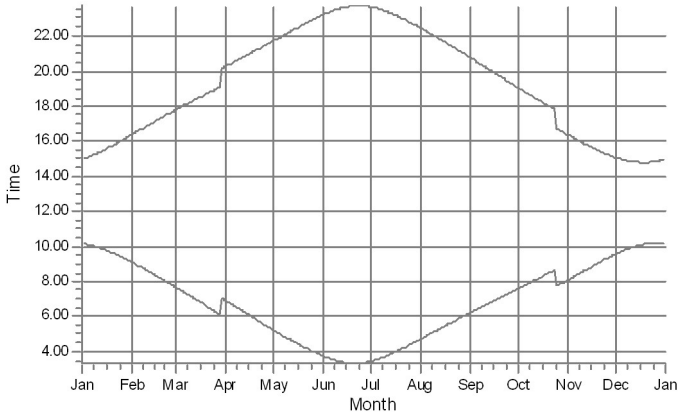
B: B Asuinrakennus (Söderändan 81)



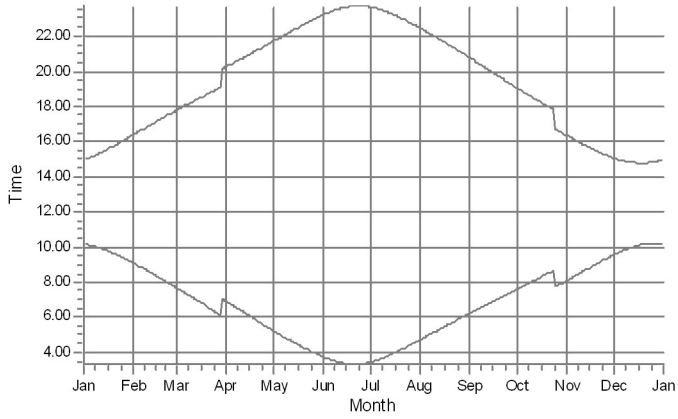
C: C Lomarakennus (Säderändan 166)



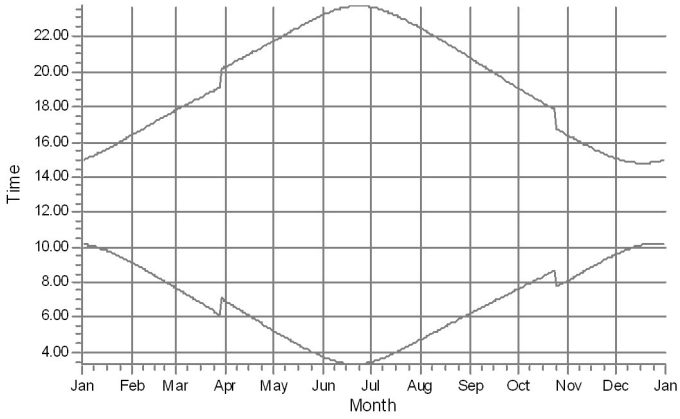
D: D Lomarakennus (Söderändan 188)



E: E Asuinrakennus (Rökiöntie 930)



F: F Asuinrakennus (Kukkusintie 474)



WTGs

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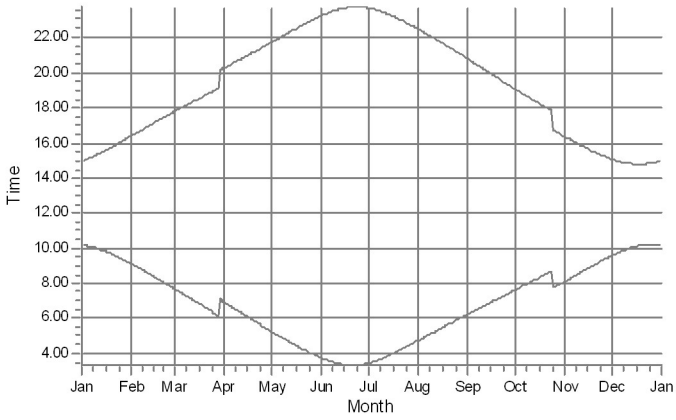
Calculated:
14.7.2023 10.03/3.5.584

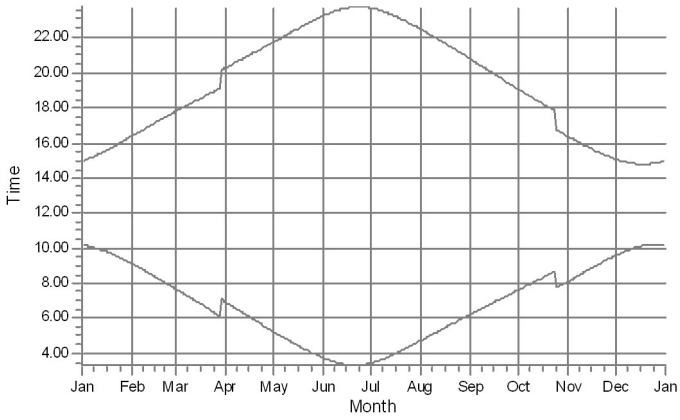
SHADOW - Calendar, graphical

Calculation: VE2_9xRD180xHH190_No Forest

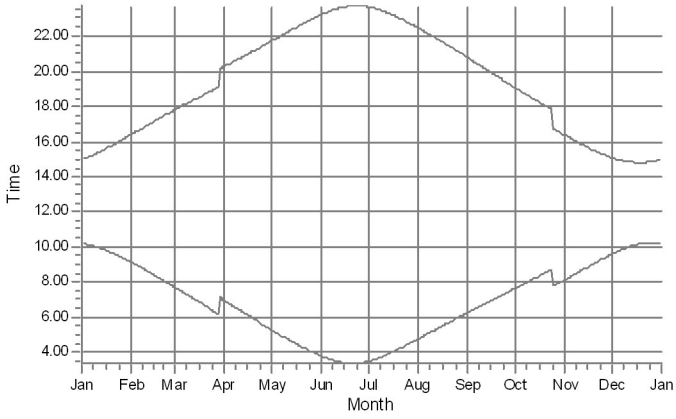
G: G Asuinrakennus (Kovik byväg 53)



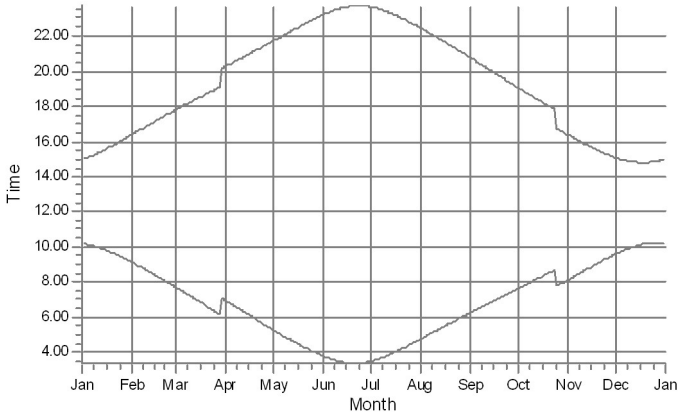
H: H Asuinrakennus (Vöyrintie 1021)



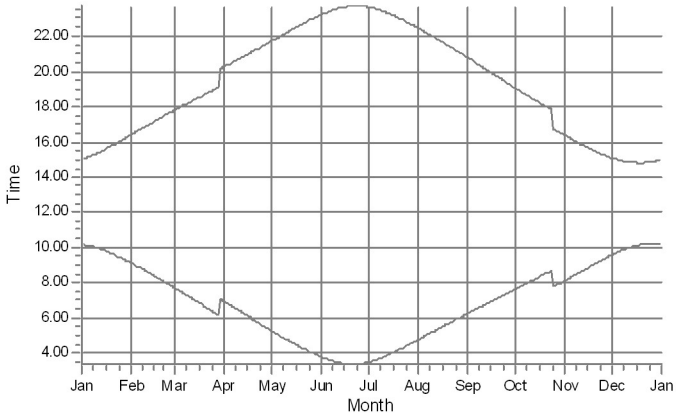
I: I Lomarakennus (Ehrsbackavägen 29)



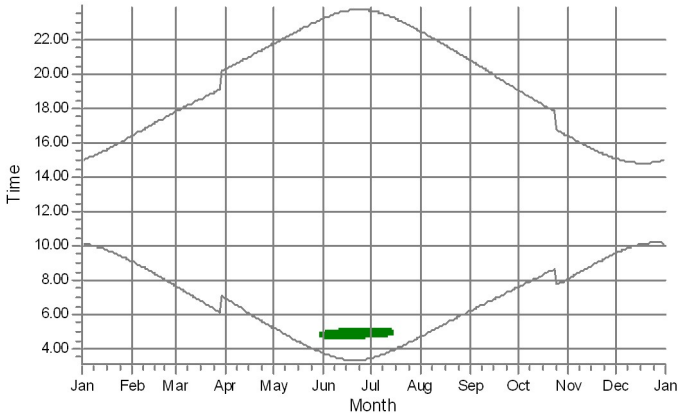
J: J Asuinrakennus (Kleidersvägen 118)



K: K Asuinrakennus (Rökiöntie 154)



L: L Asuinrakennus (Bjurbäcksvägen 231)



WTGs

1: Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8816)

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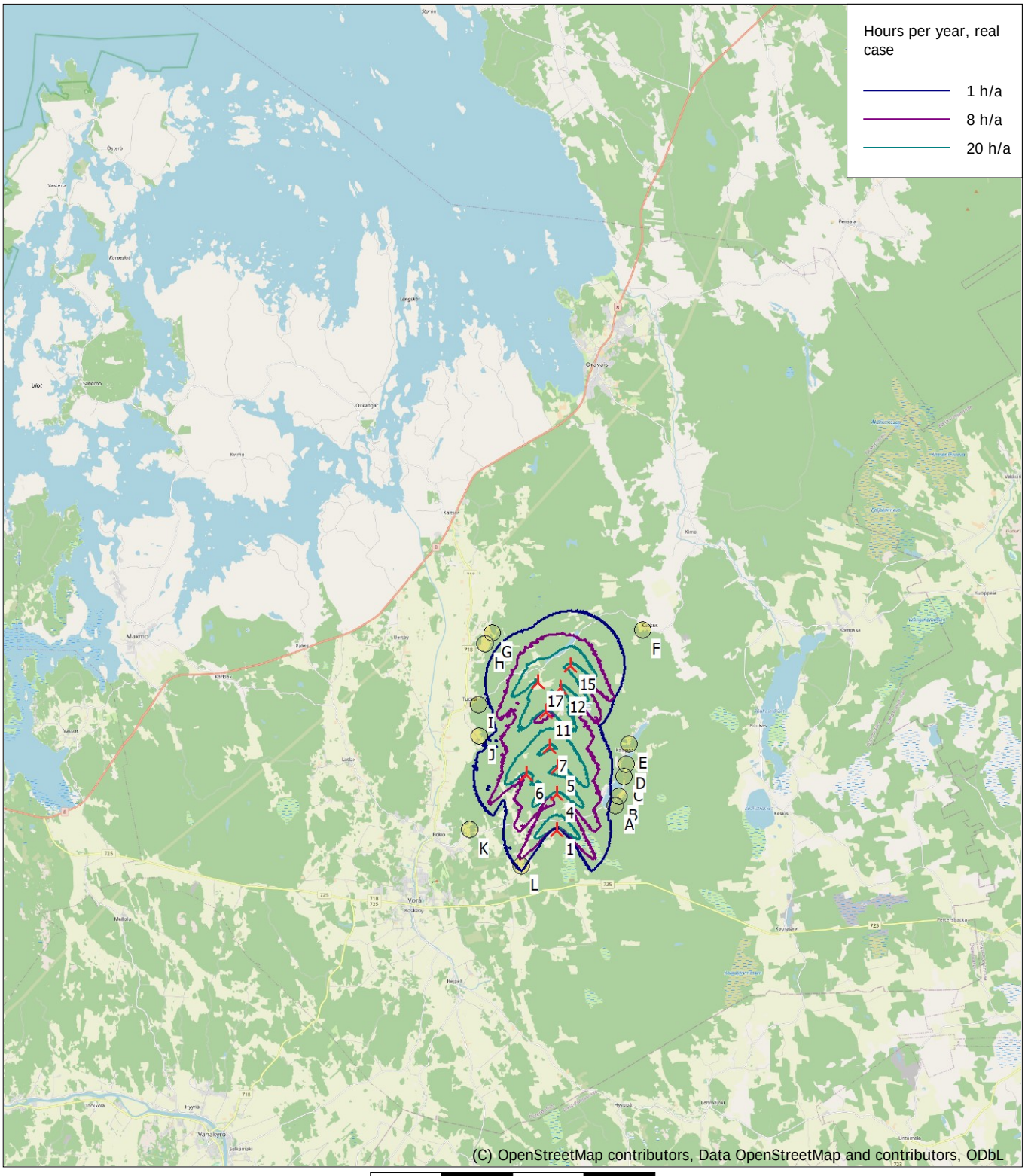
Calculated:
14.7.2023 10.03/3.5.584

SHADOW - Map

Calculation: VE2_9xRD180xHH190_No Forest



0 2,5 5 7,5 10km

Map: EMD OpenStreetMap , Print scale 1:200 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 264 510 North: 7 019 520

New WTG Shadow receptor

Flicker map level: Height Contours: CONTOURLINE_Lasor tuulivoimahanke 2022_0.wpo (3)

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

Liite 8. Varjostusmallinnuksen tulokset ”Real Case, Luke forest” - Hankevaihtoehto 2

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14.7.2023 10.08/3.5.584

SHADOW - Main Result

Calculation: VE2_9xRD180xHH190_Luke Forest

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) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational hours are calculated from WTGs in calculation and wind distribution:
MERRA-2_N63,00_E022,50 (41)

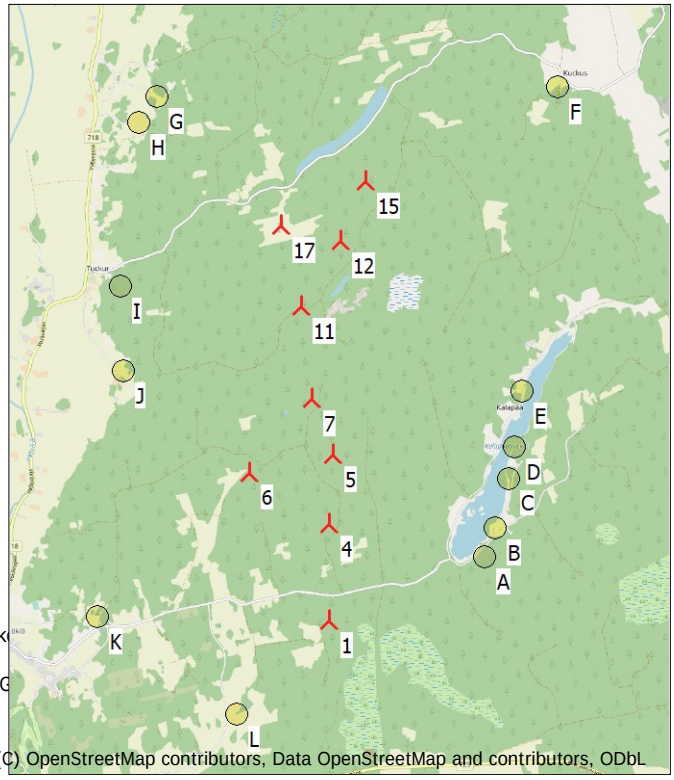
Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

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: Height Contours: CONTOURLINE_Lasor tuulivoimahank
Area object(s) used in calculation:
Area object (Heights a.g.l. for e.g. Forest (ORA tool) or ZVI obstructions): REC
Obstacles used in calculation
Receptor grid resolution: 1,0 m

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89



Scale 1:100 000
New WTG
Shadow receptor

WTGs

	East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
			[m]					[kW]	[m]	[m]	[m]	[RPM]
1	265 860	7 011 060	40,0	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
4	265 960	7 012 340	40,0	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
5	266 070	7 013 270	35,0	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
6	264 950	7 013 100	40,0	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
7	265 850	7 014 020	40,0	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
11	265 796	7 015 259	39,8	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
12	266 380	7 016 090	44,5	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
15	266 770	7 016 850	43,5	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
17	265 604	7 016 343	20,0	Generic RD180 7000 180.0 !O! hub...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4

Shadow receptor-Input

No.	Name	East	North	Z	Width	Height	Elevation a.g.l.	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
				[m]	[m]	[m]	[m]	[°]		[m]
A	A Lomarakennus (Söderändan 49)	267 990	7 011 759	42,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
B	B Asuinrakennus (Söderändan 81)	268 161	7 012 123	37,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
C	C Lomarakennus (Säderändan 166)	268 388	7 012 783	39,1	5,0	5,0	1,0	90,0	"Green house mode"	6,0
D	D Lomarakennus (Söderändan 188)	268 493	7 013 188	37,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0
E	E Asuinrakennus (Rökiöntie 930)	268 646	7 013 924	38,1	5,0	5,0	1,0	90,0	"Green house mode"	6,0
F	F Asuinrakennus (Kukkusintie 474)	269 409	7 017 903	25,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
G	G Asuinrakennus (Kovik byväg 53)	264 096	7 018 174	10,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
H	H Asuinrakennus (Vöyrintie 1021)	263 817	7 017 837	8,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
I	I Lomarakennus (Ehrsbackavägen 29)	263 418	7 015 700	21,7	5,0	5,0	1,0	90,0	"Green house mode"	6,0
J	J Asuinrakennus (Kleidersvägen 118)	263 380	7 014 576	13,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0
K	K Asuinrakennus (Rökiöntie 154)	262 790	7 011 335	27,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
L	L Asuinrakennus (Bjurbäcksvägen 231)	264 546	7 009 923	27,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0

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Calculated:
14.7.2023 10.08/3.5.584

SHADOW - Main Result

Calculation: VE2_9xRD180xHH190_Luke Forest

Calculation Results

Shadow receptor

No.	Name	Shadow, expected values Shadow hours per year [h/year]
A	A Lomarakennus (Söderändan 49)	0:00
B	B Asuinrakennus (Söderändan 81)	0:00
C	C Lomarakennus (Säderändan 166)	0:00
D	D Lomarakennus (Söderändan 188)	0:00
E	E Asuinrakennus (Rökiöntie 930)	0:00
F	F Asuinrakennus (Kukkusintie 474)	0:00
G	G Asuinrakennus (Kovik byväg 53)	0:00
H	H Asuinrakennus (Vöyrintie 1021)	0:00
I	I Lomarakennus (Ehrsbackavägen 29)	0:00
J	J Asuinrakennus (Kleidersvägen 118)	0:00
K	K Asuinrakennus (Rökiöntie 154)	0:00
L	L Asuinrakennus (Bjurbäcksvägen 231)	0:00

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

No.	Name	Expected [h/year]
1	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8816)	0:00
4	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8815)	0:00
5	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8813)	0:00
6	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8814)	0:00
7	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8812)	0:00
11	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8811)	0:00
12	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8810)	0:00
15	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8809)	0:00
17	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8817)	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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Calculated:
14.7.2023 10.08/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190_Luke ForestShadow receptor: A - A Lomarakennus (Söderändan 49)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.39	06.54	05.13	03.44	03.27	04.44	06.14	07.36	08.06	09.34
	15.00	16.23	17.49	20.18	21.45	23.15	23.41	22.28	20.47	19.04	16.22	15.04
2	10.08	09.04	07.36	06.51	05.10	03.42	03.29	04.47	06.17	07.39	08.09	09.37
	15.01	16.26	17.52	20.21	21.48	23.17	23.40	22.25	20.43	19.01	16.19	15.03
3	10.07	09.01	07.33	06.47	05.07	03.40	03.30	04.50	06.19	07.42	08.12	09.40
	15.03	16.29	17.55	20.23	21.51	23.20	23.38	22.22	20.40	18.57	16.16	15.01
4	10.06	08.58	07.29	06.44	05.04	03.38	03.32	04.53	06.22	07.45	08.15	09.42
	15.05	16.32	17.58	20.26	21.54	23.22	23.37	22.19	20.37	18.54	16.13	14.59
5	10.05	08.55	07.26	06.41	05.00	03.36	03.34	04.56	06.25	07.47	08.18	09.44
	15.07	16.36	18.01	20.29	21.57	23.24	23.35	22.16	20.33	18.51	16.10	14.58
6	10.04	08.52	07.23	06.37	04.57	03.34	03.36	04.59	06.28	07.50	08.21	09.47
	15.09	16.39	18.04	20.32	22.00	23.26	23.34	22.13	20.30	18.47	16.07	14.56
7	10.03	08.49	07.19	06.34	04.54	03.32	03.38	05.02	06.30	07.53	08.24	09.49
	15.12	16.42	18.07	20.35	22.03	23.28	23.32	22.10	20.26	18.44	16.04	14.55
8	10.01	08.46	07.16	06.30	04.51	03.31	03.40	05.05	06.33	07.56	08.27	09.51
	15.14	16.45	18.09	20.38	22.06	23.30	23.30	22.06	20.23	18.40	16.01	14.54
9	10.00	08.43	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.58	08.30	09.53
	15.16	16.48	18.12	20.41	22.09	23.32	23.28	22.03	20.19	18.37	15.58	14.53
10	09.58	08.40	07.09	06.24	04.45	03.28	03.44	05.11	06.39	08.01	08.33	09.55
	15.19	16.51	18.15	20.43	22.12	23.34	23.26	22.00	20.16	18.34	15.56	14.52
11	09.57	08.37	07.06	06.20	04.42	03.26	03.47	05.14	06.41	08.04	08.36	09.57
	15.21	16.54	18.18	20.46	22.15	23.36	23.24	21.57	20.13	18.30	15.53	14.51
12	09.55	08.34	07.03	06.17	04.39	03.25	03.49	05.17	06.44	08.07	08.39	09.59
	15.24	16.57	18.21	20.49	22.18	23.37	23.22	21.54	20.09	18.27	15.50	14.50
13	09.53	08.31	06.59	06.13	04.35	03.24	03.51	05.19	06.47	08.10	08.42	10.00
	15.27	17.01	18.24	20.52	22.21	23.39	23.20	21.50	20.06	18.24	15.47	14.49
14	09.51	08.28	06.56	06.10	04.32	03.23	03.54	05.22	06.50	08.13	08.45	10.02
	15.29	17.04	18.27	20.55	22.24	23.40	23.18	21.47	20.02	18.20	15.44	14.48
15	09.49	08.25	06.52	06.07	04.29	03.22	03.56	05.25	06.52	08.16	08.48	10.03
	15.32	17.07	18.30	20.58	22.27	23.41	23.15	21.44	19.59	18.17	15.42	14.48
16	09.47	08.22	06.49	06.03	04.26	03.22	03.59	05.28	06.55	08.18	08.51	10.05
	15.35	17.10	18.32	21.01	22.30	23.42	23.13	21.40	19.55	18.14	15.39	14.48
17	09.45	08.18	06.46	06.00	04.24	03.21	04.01	05.31	06.58	08.21	08.55	10.06
	15.38	17.13	18.35	21.04	22.33	23.43	23.10	21.37	19.52	18.10	15.36	14.47
18	09.43	08.15	06.42	05.56	04.21	03.21	04.04	05.34	07.01	08.24	08.58	10.07
	15.40	17.16	18.38	21.07	22.36	23.44	23.08	21.34	19.49	18.07	15.34	14.47
19	09.40	08.12	06.39	05.53	04.18	03.20	04.07	05.37	07.03	08.27	09.01	10.08
	15.43	17.19	18.41	21.10	22.39	23.44	23.05	21.31	19.45	18.04	15.31	14.47
20	09.38	08.09	06.35	05.50	04.15	03.20	04.10	05.40	07.06	08.30	09.04	10.09
	15.46	17.22	18.44	21.12	22.42	23.45	23.03	21.27	19.42	18.01	15.29	14.47
21	09.36	08.06	06.32	05.46	04.12	03.20	04.12	05.43	07.09	08.33	09.06	10.10
	15.49	17.25	18.47	21.15	22.45	23.45	23.00	21.24	19.38	17.57	15.26	14.48
22	09.33	08.02	06.28	05.43	04.09	03.20	04.15	05.46	07.11	08.36	09.09	10.10
	15.52	17.28	18.49	21.18	22.48	23.45	22.57	21.21	19.35	17.54	15.24	14.48
23	09.31	07.59	06.25	05.40	04.07	03.20	04.18	05.48	07.14	08.39	09.12	10.11
	15.55	17.31	18.52	21.21	22.51	23.45	22.55	21.17	19.31	17.51	15.21	14.49
24	09.28	07.56	06.22	05.36	04.04	03.21	04.21	05.51	07.17	08.42	09.15	10.11
	15.58	17.34	18.55	21.24	22.54	23.45	22.52	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.18	05.33	04.01	03.21	04.24	05.54	07.20	07.45	09.18	10.11
	16.01	17.37	18.58	21.27	22.56	23.45	22.49	21.10	19.25	16.44	15.17	14.50
26	09.23	07.49	06.15	05.30	03.59	03.22	04.27	05.57	07.22	07.48	09.21	10.11
	16.04	17.40	19.01	21.30	22.59	23.45	22.46	21.07	19.21	16.41	15.14	14.51
27	09.21	07.46	06.11	05.26	03.56	03.23	04.29	06.00	07.25	07.51	09.24	10.11
	16.07	17.43	19.04	21.33	23.02	23.44	22.43	21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.54	03.24	04.32	06.03	07.28	07.54	09.26	10.11
	16.11	17.46	19.06	21.36	23.05	23.43	22.40	21.00	19.14	16.35	15.10	14.53
29	09.15		07.05	05.20	03.51	03.25	04.35	06.05	07.31	07.57	09.29	10.11
	16.14		20.09	21.39	23.07	23.43	22.37	20.57	19.11	16.32	15.08	14.55
30	09.12		07.01	05.17	03.49	03.26	04.38	06.08	07.33	08.00	09.32	10.10
	16.17		20.12	21.42	23.10	23.42	22.34	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.47		04.41	06.11		08.03		10.10
	16.20		20.15		23.12		22.31	20.50		16.26		14.58
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 10.08/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190_Luke ForestShadow receptor: B - B Asuinrakennus (Söderändan 81)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.39	06.54	05.13	03.44	03.27	04.44	06.14	07.36	08.06	09.35
	15.00	16.23	17.49	20.18	21.45	23.15	23.41	22.28	20.47	19.04	16.22	15.04
2	10.08	09.04	07.36	06.51	05.10	03.42	03.29	04.47	06.17	07.39	08.09	09.37
	15.01	16.26	17.52	20.21	21.48	23.17	23.40	22.25	20.43	19.01	16.19	15.03
3	10.07	09.01	07.33	06.47	05.07	03.40	03.30	04.50	06.19	07.42	08.12	09.40
	15.03	16.29	17.55	20.23	21.51	23.20	23.38	22.22	20.40	18.57	16.16	15.01
4	10.06	08.58	07.29	06.44	05.04	03.38	03.32	04.53	06.22	07.44	08.15	09.42
	15.05	16.32	17.58	20.26	21.54	23.22	23.37	22.19	20.37	18.54	16.13	14.59
5	10.05	08.55	07.26	06.41	05.00	03.36	03.34	04.56	06.25	07.47	08.18	09.44
	15.07	16.36	18.01	20.29	21.57	23.24	23.35	22.16	20.33	18.51	16.10	14.58
6	10.04	08.52	07.23	06.37	04.57	03.34	03.36	04.59	06.28	07.50	08.21	09.47
	15.09	16.39	18.04	20.32	22.00	23.26	23.34	22.13	20.30	18.47	16.07	14.56
7	10.03	08.49	07.19	06.34	04.54	03.32	03.38	05.02	06.30	07.53	08.24	09.49
	15.12	16.42	18.07	20.35	22.03	23.28	23.32	22.10	20.26	18.44	16.04	14.55
8	10.01	08.46	07.16	06.30	04.51	03.31	03.40	05.05	06.33	07.56	08.27	09.51
	15.14	16.45	18.09	20.38	22.06	23.30	23.30	22.06	20.23	18.40	16.01	14.54
9	10.00	08.43	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.58	08.30	09.53
	15.16	16.48	18.12	20.41	22.09	23.32	23.28	22.03	20.19	18.37	15.58	14.52
10	09.58	08.40	07.09	06.24	04.45	03.28	03.44	05.11	06.39	08.01	08.33	09.55
	15.19	16.51	18.15	20.43	22.12	23.34	23.26	22.00	20.16	18.34	15.56	14.51
11	09.57	08.37	07.06	06.20	04.42	03.26	03.46	05.14	06.41	08.04	08.36	09.57
	15.21	16.54	18.18	20.46	22.15	23.36	23.24	21.57	20.13	18.30	15.53	14.51
12	09.55	08.34	07.03	06.17	04.38	03.25	03.49	05.16	06.44	08.07	08.39	09.59
	15.24	16.57	18.21	20.49	22.18	23.37	23.22	21.54	20.09	18.27	15.50	14.50
13	09.53	08.31	06.59	06.13	04.35	03.24	03.51	05.19	06.47	08.10	08.42	10.00
	15.26	17.01	18.24	20.52	22.21	23.39	23.20	21.50	20.06	18.24	15.47	14.49
14	09.51	08.28	06.56	06.10	04.32	03.23	03.54	05.22	06.50	08.13	08.45	10.02
	15.29	17.04	18.27	20.55	22.24	23.40	23.18	21.47	20.02	18.20	15.44	14.48
15	09.49	08.25	06.52	06.07	04.29	03.22	03.56	05.25	06.52	08.16	08.48	10.03
	15.32	17.07	18.30	20.58	22.27	23.41	23.15	21.44	19.59	18.17	15.42	14.48
16	09.47	08.22	06.49	06.03	04.26	03.21	03.59	05.28	06.55	08.18	08.52	10.05
	15.35	17.10	18.32	21.01	22.30	23.42	23.13	21.40	19.55	18.14	15.39	14.48
17	09.45	08.18	06.46	06.00	04.23	03.21	04.01	05.31	06.58	08.21	08.55	10.06
	15.37	17.13	18.35	21.04	22.33	23.43	23.11	21.37	19.52	18.10	15.36	14.47
18	09.43	08.15	06.42	05.56	04.21	03.20	04.04	05.34	07.01	08.24	08.58	10.07
	15.40	17.16	18.38	21.07	22.36	23.44	23.08	21.34	19.49	18.07	15.34	14.47
19	09.40	08.12	06.39	05.53	04.18	03.20	04.07	05.37	07.03	08.27	09.01	10.08
	15.43	17.19	18.41	21.10	22.39	23.44	23.05	21.31	19.45	18.04	15.31	14.47
20	09.38	08.09	06.35	05.50	04.15	03.20	04.10	05.40	07.06	08.30	09.04	10.09
	15.46	17.22	18.44	21.12	22.42	23.45	23.03	21.27	19.42	18.01	15.29	14.47
21	09.36	08.06	06.32	05.46	04.12	03.20	04.12	05.43	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.15	22.45	23.45	23.00	21.24	19.38	17.57	15.26	14.48
22	09.33	08.02	06.28	05.43	04.09	03.20	04.15	05.45	07.11	08.36	09.09	10.10
	15.52	17.28	18.49	21.18	22.48	23.45	22.57	21.21	19.35	17.54	15.24	14.48
23	09.31	07.59	06.25	05.40	04.07	03.20	04.18	05.48	07.14	08.39	09.12	10.11
	15.55	17.31	18.52	21.21	22.51	23.45	22.55	21.17	19.31	17.51	15.21	14.49
24	09.28	07.56	06.22	05.36	04.04	03.21	04.21	05.51	07.17	08.42	09.15	10.11
	15.58	17.34	18.55	21.24	22.54	23.45	22.52	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.18	05.33	04.01	03.21	04.24	05.54	07.20	07.45	09.18	10.11
	16.01	17.37	18.58	21.27	22.56	23.45	22.49	21.10	19.25	16.44	15.17	14.50
26	09.23	07.49	06.15	05.30	03.59	03.22	04.26	05.57	07.22	07.48	09.21	10.11
	16.04	17.40	19.01	21.30	22.59	23.45	22.46	21.07	19.21	16.41	15.14	14.51
27	09.21	07.46	06.11	05.26	03.56	03.23	04.29	06.00	07.25	07.51	09.24	10.11
	16.07	17.43	19.04	21.33	23.02	23.44	22.43	21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.54	03.24	04.32	06.03	07.28	07.54	09.27	10.11
	16.11	17.46	19.06	21.36	23.05	23.44	22.40	21.00	19.14	16.35	15.10	14.53
29	09.15		07.05	05.20	03.51	03.25	04.35	06.05	07.31	07.57	09.29	10.11
	16.14		20.09	21.39	23.07	23.43	22.37	20.57	19.11	16.32	15.08	14.55
30	09.12		07.01	05.17	03.49	03.26	04.38	06.08	07.33	08.00	09.32	10.10
	16.17		20.12	21.42	23.10	23.42	22.34	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.10
	16.20		20.15		23.12		22.31	20.50		16.26		14.57
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 10.08/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190_Luke ForestShadow receptor: C - C Lomarakennus (Säderändan 166)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.39	06.54	05.13	03.44	03.27	04.44	06.14	07.36	08.06	09.35
	14.59	16.23	17.49	20.18	21.45	23.15	23.41	22.28	20.47	19.04	16.22	15.04
2	10.08	09.04	07.36	06.51	05.10	03.42	03.29	04.47	06.17	07.39	08.09	09.37
	15.01	16.26	17.52	20.21	21.48	23.17	23.40	22.25	20.43	19.01	16.19	15.02
3	10.08	09.01	07.33	06.47	05.07	03.40	03.30	04.50	06.19	07.42	08.12	09.40
	15.03	16.29	17.55	20.23	21.51	23.20	23.38	22.22	20.40	18.57	16.16	15.01
4	10.06	08.58	07.29	06.44	05.04	03.38	03.32	04.53	06.22	07.44	08.15	09.42
	15.05	16.32	17.58	20.26	21.54	23.22	23.37	22.19	20.37	18.54	16.13	14.59
5	10.05	08.55	07.26	06.41	05.00	03.36	03.34	04.56	06.25	07.47	08.18	09.44
	15.07	16.36	18.01	20.29	21.57	23.24	23.36	22.16	20.33	18.51	16.10	14.58
6	10.04	08.52	07.23	06.37	04.57	03.34	03.36	04.59	06.28	07.50	08.21	09.47
	15.09	16.39	18.04	20.32	22.00	23.26	23.34	22.13	20.30	18.47	16.07	14.56
7	10.03	08.49	07.19	06.34	04.54	03.32	03.38	05.02	06.30	07.53	08.24	09.49
	15.11	16.42	18.06	20.35	22.03	23.28	23.32	22.10	20.26	18.44	16.04	14.55
8	10.01	08.46	07.16	06.30	04.51	03.31	03.40	05.05	06.33	07.56	08.27	09.51
	15.14	16.45	18.09	20.38	22.06	23.30	23.30	22.06	20.23	18.40	16.01	14.54
9	10.00	08.43	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.58	08.30	09.53
	15.16	16.48	18.12	20.41	22.09	23.32	23.28	22.03	20.19	18.37	15.58	14.52
10	09.58	08.40	07.09	06.24	04.45	03.28	03.44	05.11	06.39	08.01	08.33	09.55
	15.19	16.51	18.15	20.43	22.12	23.34	23.27	22.00	20.16	18.34	15.55	14.51
11	09.57	08.37	07.06	06.20	04.41	03.26	03.46	05.13	06.41	08.04	08.36	09.57
	15.21	16.54	18.18	20.46	22.15	23.36	23.24	21.57	20.13	18.30	15.53	14.50
12	09.55	08.34	07.03	06.17	04.38	03.25	03.49	05.16	06.44	08.07	08.39	09.59
	15.24	16.57	18.21	20.49	22.18	23.37	23.22	21.54	20.09	18.27	15.50	14.50
13	09.53	08.31	06.59	06.13	04.35	03.24	03.51	05.19	06.47	08.10	08.42	10.00
	15.26	17.01	18.24	20.52	22.21	23.39	23.20	21.50	20.06	18.24	15.47	14.49
14	09.51	08.28	06.56	06.10	04.32	03.23	03.54	05.22	06.50	08.13	08.45	10.02
	15.29	17.04	18.27	20.55	22.24	23.40	23.18	21.47	20.02	18.20	15.44	14.48
15	09.49	08.25	06.52	06.07	04.29	03.22	03.56	05.25	06.52	08.16	08.49	10.03
	15.32	17.07	18.30	20.58	22.27	23.41	23.15	21.44	19.59	18.17	15.41	14.48
16	09.47	08.22	06.49	06.03	04.26	03.21	03.59	05.28	06.55	08.18	08.52	10.05
	15.35	17.10	18.32	21.01	22.30	23.42	23.13	21.41	19.55	18.14	15.39	14.47
17	09.45	08.18	06.46	06.00	04.23	03.21	04.01	05.31	06.58	08.21	08.55	10.06
	15.37	17.13	18.35	21.04	22.33	23.43	23.11	21.37	19.52	18.10	15.36	14.47
18	09.43	08.15	06.42	05.56	04.20	03.20	04.04	05.34	07.01	08.24	08.58	10.07
	15.40	17.16	18.38	21.07	22.36	23.44	23.08	21.34	19.49	18.07	15.34	14.47
19	09.40	08.12	06.39	05.53	04.18	03.20	04.07	05.37	07.03	08.27	09.01	10.08
	15.43	17.19	18.41	21.10	22.39	23.44	23.05	21.31	19.45	18.04	15.31	14.47
20	09.38	08.09	06.35	05.50	04.15	03.20	04.09	05.40	07.06	08.30	09.04	10.09
	15.46	17.22	18.44	21.12	22.42	23.45	23.03	21.27	19.42	18.01	15.28	14.47
21	09.36	08.06	06.32	05.46	04.12	03.20	04.12	05.43	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.15	22.45	23.45	23.00	21.24	19.38	17.57	15.26	14.48
22	09.33	08.02	06.28	05.43	04.09	03.20	04.15	05.45	07.11	08.36	09.09	10.10
	15.52	17.28	18.49	21.18	22.48	23.45	22.57	21.21	19.35	17.54	15.24	14.48
23	09.31	07.59	06.25	05.40	04.06	03.20	04.18	05.48	07.14	08.39	09.12	10.11
	15.55	17.31	18.52	21.21	22.51	23.46	22.55	21.17	19.31	17.51	15.21	14.49
24	09.28	07.56	06.22	05.36	04.04	03.21	04.21	05.51	07.17	08.42	09.15	10.11
	15.58	17.34	18.55	21.24	22.54	23.45	22.52	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.18	05.33	04.01	03.21	04.24	05.54	07.20	07.45	09.18	10.11
	16.01	17.37	18.58	21.27	22.57	23.45	22.49	21.10	19.25	16.44	15.17	14.50
26	09.23	07.49	06.15	05.30	03.59	03.22	04.26	05.57	07.22	07.48	09.21	10.11
	16.04	17.40	19.01	21.30	22.59	23.45	22.46	21.07	19.21	16.41	15.14	14.51
27	09.21	07.46	06.11	05.26	03.56	03.23	04.29	06.00	07.25	07.51	09.24	10.11
	16.07	17.43	19.04	21.33	23.02	23.44	22.43	21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.53	03.24	04.32	06.03	07.28	07.54	09.27	10.11
	16.10	17.46	19.06	21.36	23.05	23.44	22.40	21.00	19.14	16.35	15.10	14.53
29	09.15		07.05	05.20	03.51	03.25	04.35	06.05	07.31	07.57	09.29	10.11
	16.14		20.09	21.39	23.07	23.43	22.37	20.57	19.11	16.32	15.08	14.54
30	09.13		07.01	05.17	03.49	03.26	04.38	06.08	07.33	08.00	09.32	10.11
	16.17		20.12	21.42	23.10	23.42	22.34	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.10
	16.20		20.15		23.13		22.31	20.50		16.25		14.57
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 10.08/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190_Luke ForestShadow receptor: D - D Lomarakennus (Söderändan 188)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.39	06.54	05.13	03.44	03.27	04.44	06.14	07.36	08.06	09.35
	14.59	16.23	17.49	20.18	21.45	23.15	23.41	22.28	20.47	19.04	16.22	15.04
2	10.08	09.04	07.36	06.51	05.10	03.42	03.29	04.47	06.17	07.39	08.09	09.37
	15.01	16.26	17.52	20.21	21.48	23.17	23.40	22.25	20.43	19.01	16.19	15.02
3	10.08	09.01	07.33	06.47	05.07	03.40	03.30	04.50	06.19	07.42	08.12	09.40
	15.03	16.29	17.55	20.23	21.51	23.20	23.38	22.22	20.40	18.57	16.16	15.01
4	10.07	08.58	07.29	06.44	05.04	03.38	03.32	04.53	06.22	07.44	08.15	09.42
	15.05	16.32	17.58	20.26	21.54	23.22	23.37	22.19	20.37	18.54	16.13	14.59
5	10.05	08.55	07.26	06.41	05.00	03.36	03.34	04.56	06.25	07.47	08.18	09.44
	15.07	16.36	18.01	20.29	21.57	23.24	23.36	22.16	20.33	18.51	16.10	14.58
6	10.04	08.52	07.23	06.37	04.57	03.34	03.36	04.59	06.28	07.50	08.21	09.47
	15.09	16.39	18.04	20.32	22.00	23.27	23.34	22.13	20.30	18.47	16.07	14.56
7	10.03	08.49	07.19	06.34	04.54	03.32	03.38	05.02	06.30	07.53	08.24	09.49
	15.11	16.42	18.06	20.35	22.03	23.29	23.32	22.10	20.26	18.44	16.04	14.55
8	10.01	08.46	07.16	06.30	04.51	03.31	03.40	05.05	06.33	07.56	08.27	09.51
	15.14	16.45	18.09	20.38	22.06	23.31	23.30	22.07	20.23	18.40	16.01	14.54
9	10.00	08.43	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.58	08.30	09.53
	15.16	16.48	18.12	20.41	22.09	23.32	23.29	22.03	20.19	18.37	15.58	14.52
10	09.58	08.40	07.09	06.23	04.45	03.28	03.44	05.11	06.39	08.01	08.33	09.55
	15.19	16.51	18.15	20.43	22.12	23.34	23.27	22.00	20.16	18.34	15.55	14.51
11	09.57	08.37	07.06	06.20	04.41	03.26	03.46	05.13	06.41	08.04	08.36	09.57
	15.21	16.54	18.18	20.46	22.15	23.36	23.24	21.57	20.13	18.30	15.53	14.50
12	09.55	08.34	07.03	06.17	04.38	03.25	03.49	05.16	06.44	08.07	08.39	09.59
	15.24	16.57	18.21	20.49	22.18	23.37	23.22	21.54	20.09	18.27	15.50	14.50
13	09.53	08.31	06.59	06.13	04.35	03.24	03.51	05.19	06.47	08.10	08.42	10.00
	15.26	17.00	18.24	20.52	22.21	23.39	23.20	21.50	20.06	18.24	15.47	14.49
14	09.51	08.28	06.56	06.10	04.32	03.23	03.54	05.22	06.50	08.13	08.45	10.02
	15.29	17.04	18.27	20.55	22.24	23.40	23.18	21.47	20.02	18.20	15.44	14.48
15	09.49	08.25	06.52	06.06	04.29	03.22	03.56	05.25	06.52	08.16	08.49	10.03
	15.32	17.07	18.29	20.58	22.27	23.41	23.16	21.44	19.59	18.17	15.41	14.48
16	09.47	08.22	06.49	06.03	04.26	03.21	03.59	05.28	06.55	08.18	08.52	10.05
	15.35	17.10	18.32	21.01	22.30	23.42	23.13	21.41	19.55	18.14	15.39	14.47
17	09.45	08.18	06.46	06.00	04.23	03.21	04.01	05.31	06.58	08.21	08.55	10.06
	15.37	17.13	18.35	21.04	22.33	23.43	23.11	21.37	19.52	18.10	15.36	14.47
18	09.43	08.15	06.42	05.56	04.20	03.20	04.04	05.34	07.01	08.24	08.58	10.07
	15.40	17.16	18.38	21.07	22.36	23.44	23.08	21.34	19.49	18.07	15.33	14.47
19	09.41	08.12	06.39	05.53	04.18	03.20	04.07	05.37	07.03	08.27	09.01	10.08
	15.43	17.19	18.41	21.10	22.39	23.45	23.06	21.31	19.45	18.04	15.31	14.47
20	09.38	08.09	06.35	05.50	04.15	03.20	04.09	05.40	07.06	08.30	09.04	10.09
	15.46	17.22	18.44	21.12	22.42	23.45	23.03	21.27	19.42	18.01	15.28	14.47
21	09.36	08.06	06.32	05.46	04.12	03.20	04.12	05.43	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.15	22.45	23.45	23.00	21.24	19.38	17.57	15.26	14.48
22	09.33	08.02	06.28	05.43	04.09	03.20	04.15	05.45	07.11	08.36	09.10	10.10
	15.52	17.28	18.49	21.18	22.48	23.46	22.58	21.21	19.35	17.54	15.23	14.48
23	09.31	07.59	06.25	05.40	04.06	03.20	04.18	05.48	07.14	08.39	09.12	10.11
	15.55	17.31	18.52	21.21	22.51	23.46	22.55	21.17	19.31	17.51	15.21	14.48
24	09.28	07.56	06.22	05.36	04.04	03.21	04.21	05.51	07.17	08.42	09.15	10.11
	15.58	17.34	18.55	21.24	22.54	23.45	22.52	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.18	05.33	04.01	03.21	04.23	05.54	07.20	07.45	09.18	10.11
	16.01	17.37	18.58	21.27	22.57	23.45	22.49	21.10	19.25	16.44	15.17	14.50
26	09.23	07.49	06.15	05.30	03.58	03.22	04.26	05.57	07.22	07.48	09.21	10.11
	16.04	17.40	19.01	21.30	22.59	23.45	22.46	21.07	19.21	16.41	15.14	14.51
27	09.21	07.46	06.11	05.26	03.56	03.23	04.29	06.00	07.25	07.51	09.24	10.11
	16.07	17.43	19.04	21.33	23.02	23.44	22.43	21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.53	03.24	04.32	06.02	07.28	07.54	09.27	10.11
	16.10	17.46	19.06	21.36	23.05	23.44	22.40	21.00	19.14	16.35	15.10	14.53
29	09.15		07.05	05.20	03.51	03.25	04.35	06.05	07.31	07.57	09.29	10.11
	16.14		20.09	21.39	23.07	23.43	22.37	20.57	19.11	16.32	15.08	14.54
30	09.13		07.01	05.16	03.49	03.26	04.38	06.08	07.33	08.00	09.32	10.11
	16.17		20.12	21.42	23.10	23.42	22.34	20.54	19.07	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.10
	16.20		20.15		23.13		22.31	20.50		16.25		14.57
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 10.08/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190_Luke ForestShadow receptor: E - E Asuinrakennus (Rökiöntie 930)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.39	06.54	05.13	03.44	03.27	04.44	06.14	07.36	08.06	09.35
	14.59	16.23	17.49	20.18	21.45	23.15	23.41	22.28	20.47	19.04	16.22	15.04
2	10.09	09.04	07.36	06.51	05.10	03.42	03.29	04.47	06.16	07.39	08.09	09.37
	15.01	16.26	17.52	20.21	21.48	23.18	23.40	22.25	20.43	19.01	16.19	15.02
3	10.08	09.01	07.33	06.47	05.07	03.40	03.30	04.50	06.19	07.42	08.12	09.40
	15.03	16.29	17.55	20.23	21.51	23.20	23.39	22.22	20.40	18.57	16.16	15.01
4	10.07	08.58	07.29	06.44	05.03	03.38	03.32	04.53	06.22	07.44	08.15	09.42
	15.05	16.32	17.58	20.26	21.54	23.22	23.37	22.19	20.37	18.54	16.13	14.59
5	10.06	08.55	07.26	06.41	05.00	03.36	03.34	04.56	06.25	07.47	08.18	09.45
	15.07	16.35	18.01	20.29	21.57	23.24	23.36	22.16	20.33	18.51	16.10	14.57
6	10.04	08.52	07.23	06.37	04.57	03.34	03.35	04.59	06.28	07.50	08.21	09.47
	15.09	16.39	18.04	20.32	22.00	23.27	23.34	22.13	20.30	18.47	16.07	14.56
7	10.03	08.49	07.19	06.34	04.54	03.32	03.37	05.02	06.30	07.53	08.24	09.49
	15.11	16.42	18.06	20.35	22.03	23.29	23.32	22.10	20.26	18.44	16.04	14.55
8	10.02	08.46	07.16	06.30	04.51	03.30	03.40	05.05	06.33	07.56	08.27	09.51
	15.14	16.45	18.09	20.38	22.06	23.31	23.31	22.07	20.23	18.40	16.01	14.53
9	10.00	08.43	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.58	08.30	09.53
	15.16	16.48	18.12	20.41	22.09	23.32	23.29	22.03	20.19	18.37	15.58	14.52
10	09.58	08.40	07.09	06.23	04.44	03.27	03.44	05.10	06.39	08.01	08.33	09.55
	15.18	16.51	18.15	20.43	22.12	23.34	23.27	22.00	20.16	18.34	15.55	14.51
11	09.57	08.37	07.06	06.20	04.41	03.26	03.46	05.13	06.41	08.04	08.36	09.57
	15.21	16.54	18.18	20.46	22.15	23.36	23.25	21.57	20.13	18.30	15.53	14.50
12	09.55	08.34	07.02	06.17	04.38	03.25	03.49	05.16	06.44	08.07	08.39	09.59
	15.24	16.57	18.21	20.49	22.19	23.37	23.22	21.54	20.09	18.27	15.50	14.49
13	09.53	08.31	06.59	06.13	04.35	03.24	03.51	05.19	06.47	08.10	08.42	10.01
	15.26	17.00	18.24	20.52	22.22	23.39	23.20	21.50	20.06	18.24	15.47	14.49
14	09.51	08.28	06.56	06.10	04.32	03.23	03.53	05.22	06.50	08.13	08.46	10.02
	15.29	17.04	18.27	20.55	22.25	23.40	23.18	21.47	20.02	18.20	15.44	14.48
15	09.49	08.25	06.52	06.06	04.29	03.22	03.56	05.25	06.52	08.16	08.49	10.04
	15.32	17.07	18.29	20.58	22.28	23.41	23.16	21.44	19.59	18.17	15.41	14.48
16	09.47	08.22	06.49	06.03	04.26	03.21	03.59	05.28	06.55	08.18	08.52	10.05
	15.34	17.10	18.32	21.01	22.31	23.42	23.13	21.41	19.55	18.14	15.39	14.47
17	09.45	08.18	06.46	06.00	04.23	03.21	04.01	05.31	06.58	08.21	08.55	10.06
	15.37	17.13	18.35	21.04	22.34	23.43	23.11	21.37	19.52	18.10	15.36	14.47
18	09.43	08.15	06.42	05.56	04.20	03.20	04.04	05.34	07.01	08.24	08.58	10.07
	15.40	17.16	18.38	21.07	22.36	23.44	23.08	21.34	19.49	18.07	15.33	14.47
19	09.41	08.12	06.39	05.53	04.17	03.20	04.07	05.37	07.03	08.27	09.01	10.08
	15.43	17.19	18.41	21.10	22.39	23.45	23.06	21.31	19.45	18.04	15.31	14.47
20	09.38	08.09	06.35	05.50	04.15	03.20	04.09	05.40	07.06	08.30	09.04	10.09
	15.46	17.22	18.44	21.12	22.42	23.45	23.03	21.27	19.42	18.01	15.28	14.47
21	09.36	08.06	06.32	05.46	04.12	03.20	04.12	05.42	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.15	22.45	23.45	23.00	21.24	19.38	17.57	15.26	14.47
22	09.33	08.02	06.28	05.43	04.09	03.20	04.15	05.45	07.11	08.36	09.10	10.10
	15.52	17.28	18.49	21.18	22.48	23.46	22.58	21.21	19.35	17.54	15.23	14.48
23	09.31	07.59	06.25	05.40	04.06	03.20	04.18	05.48	07.14	08.39	09.13	10.11
	15.55	17.31	18.52	21.21	22.51	23.46	22.55	21.17	19.31	17.51	15.21	14.48
24	09.29	07.56	06.22	05.36	04.04	03.20	04.21	05.51	07.17	08.42	09.15	10.11
	15.58	17.34	18.55	21.24	22.54	23.46	22.52	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.18	05.33	04.01	03.21	04.23	05.54	07.20	07.45	09.18	10.11
	16.01	17.37	18.58	21.27	22.57	23.45	22.49	21.11	19.25	16.44	15.16	14.50
26	09.23	07.49	06.15	05.30	03.58	03.22	04.26	05.57	07.22	07.48	09.21	10.12
	16.04	17.40	19.01	21.30	22.59	23.45	22.46	21.07	19.21	16.41	15.14	14.51
27	09.21	07.46	06.11	05.26	03.56	03.22	04.29	06.00	07.25	07.51	09.24	10.12
	16.07	17.43	19.04	21.33	23.02	23.44	22.43	21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.53	03.23	04.32	06.02	07.28	07.54	09.27	10.11
	16.10	17.46	19.06	21.36	23.05	23.44	22.40	21.00	19.14	16.35	15.10	14.53
29	09.15		07.04	05.20	03.51	03.24	04.35	06.05	07.31	07.57	09.29	10.11
	16.13		20.09	21.39	23.08	23.43	22.38	20.57	19.11	16.32	15.08	14.54
30	09.13		07.01	05.16	03.49	03.26	04.38	06.08	07.33	08.00	09.32	10.11
	16.17		20.12	21.42	23.10	23.42	22.35	20.54	19.07	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.10
	16.20		20.15		23.13		22.32	20.50		16.25		14.57
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 10.08/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190_Luke ForestShadow receptor: F - F Asuinrakennus (Kukkusintie 474)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.07	07.39	06.54	05.13	03.43	03.26	04.43	06.14	07.36	08.06	09.35
	14.59	16.23	17.49	20.18	21.45	23.16	23.42	22.29	20.47	19.04	16.22	15.04
2	10.09	09.04	07.36	06.51	05.10	03.41	03.28	04.46	06.16	07.39	08.09	09.38
	15.01	16.26	17.52	20.21	21.48	23.18	23.40	22.26	20.43	19.01	16.19	15.02
3	10.08	09.01	07.33	06.47	05.06	03.39	03.29	04.49	06.19	07.42	08.12	09.40
	15.02	16.29	17.55	20.23	21.51	23.20	23.39	22.23	20.40	18.57	16.16	15.00
4	10.07	08.59	07.29	06.44	05.03	03.37	03.31	04.52	06.22	07.44	08.15	09.43
	15.04	16.32	17.58	20.26	21.55	23.23	23.38	22.19	20.37	18.54	16.13	14.59
5	10.06	08.56	07.26	06.40	05.00	03.35	03.33	04.55	06.25	07.47	08.18	09.45
	15.06	16.35	18.01	20.29	21.58	23.25	23.36	22.16	20.33	18.50	16.10	14.57
6	10.05	08.53	07.23	06.37	04.57	03.33	03.35	04.58	06.27	07.50	08.21	09.47
	15.09	16.38	18.03	20.32	22.01	23.27	23.35	22.13	20.30	18.47	16.07	14.56
7	10.03	08.50	07.19	06.34	04.54	03.31	03.37	05.01	06.30	07.53	08.24	09.49
	15.11	16.41	18.06	20.35	22.04	23.29	23.33	22.10	20.26	18.44	16.04	14.54
8	10.02	08.47	07.16	06.30	04.50	03.30	03.39	05.04	06.33	07.56	08.27	09.52
	15.13	16.45	18.09	20.38	22.07	23.31	23.31	22.07	20.23	18.40	16.01	14.53
9	10.00	08.44	07.13	06.27	04.47	03.28	03.41	05.07	06.36	07.59	08.30	09.54
	15.16	16.48	18.12	20.41	22.10	23.33	23.29	22.04	20.19	18.37	15.58	14.52
10	09.59	08.41	07.09	06.23	04.44	03.27	03.43	05.10	06.39	08.01	08.33	09.56
	15.18	16.51	18.15	20.43	22.13	23.35	23.27	22.00	20.16	18.34	15.55	14.51
11	09.57	08.37	07.06	06.20	04.41	03.25	03.46	05.13	06.41	08.04	08.37	09.58
	15.21	16.54	18.18	20.46	22.16	23.37	23.25	21.57	20.13	18.30	15.52	14.50
12	09.55	08.34	07.02	06.16	04.38	03.24	03.48	05.16	06.44	08.07	08.40	09.59
	15.23	16.57	18.21	20.49	22.19	23.38	23.23	21.54	20.09	18.27	15.49	14.49
13	09.53	08.31	06.59	06.13	04.35	03.23	03.50	05.19	06.47	08.10	08.43	10.01
	15.26	17.00	18.24	20.52	22.22	23.39	23.21	21.51	20.06	18.24	15.47	14.48
14	09.52	08.28	06.56	06.10	04.32	03.22	03.53	05.22	06.49	08.13	08.46	10.03
	15.28	17.03	18.27	20.55	22.25	23.41	23.18	21.47	20.02	18.20	15.44	14.48
15	09.50	08.25	06.52	06.06	04.29	03.21	03.55	05.25	06.52	08.16	08.49	10.04
	15.31	17.06	18.29	20.58	22.28	23.42	23.16	21.44	19.59	18.17	15.41	14.47
16	09.47	08.22	06.49	06.03	04.26	03.20	03.58	05.28	06.55	08.18	08.52	10.05
	15.34	17.10	18.32	21.01	22.31	23.43	23.14	21.41	19.55	18.14	15.38	14.47
17	09.45	08.19	06.45	06.00	04.23	03.20	04.01	05.31	06.58	08.21	08.55	10.07
	15.37	17.13	18.35	21.04	22.34	23.44	23.11	21.37	19.52	18.10	15.36	14.46
18	09.43	08.15	06.42	05.56	04.20	03.19	04.03	05.34	07.00	08.24	08.58	10.08
	15.40	17.16	18.38	21.07	22.37	23.45	23.09	21.34	19.49	18.07	15.33	14.46
19	09.41	08.12	06.39	05.53	04.17	03.19	04.06	05.36	07.03	08.27	09.01	10.09
	15.43	17.19	18.41	21.10	22.40	23.45	23.06	21.31	19.45	18.04	15.31	14.46
20	09.39	08.09	06.35	05.49	04.14	03.19	04.09	05.39	07.06	08.30	09.04	10.10
	15.46	17.22	18.44	21.13	22.43	23.46	23.03	21.27	19.42	18.00	15.28	14.47
21	09.36	08.06	06.32	05.46	04.11	03.19	04.12	05.42	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.16	22.46	23.46	23.01	21.24	19.38	17.57	15.25	14.47
22	09.34	08.02	06.28	05.43	04.09	03.19	04.14	05.45	07.11	08.36	09.10	10.11
	15.52	17.28	18.49	21.19	22.49	23.46	22.58	21.21	19.35	17.54	15.23	14.47
23	09.31	07.59	06.25	05.39	04.06	03.19	04.17	05.48	07.14	08.39	09.13	10.11
	15.55	17.31	18.52	21.21	22.51	23.46	22.55	21.17	19.31	17.51	15.21	14.48
24	09.29	07.56	06.22	05.36	04.03	03.20	04.20	05.51	07.17	08.42	09.16	10.12
	15.58	17.34	18.55	21.24	22.54	23.46	22.52	21.14	19.28	17.47	15.18	14.48
25	09.26	07.53	06.18	05.33	04.00	03.20	04.23	05.54	07.20	07.45	09.19	10.12
	16.01	17.37	18.58	21.27	22.57	23.46	22.50	21.11	19.25	16.44	15.16	14.49
26	09.24	07.49	06.15	05.29	03.58	03.21	04.26	05.57	07.22	07.48	09.21	10.12
	16.04	17.40	19.01	21.30	23.00	23.46	22.47	21.07	19.21	16.41	15.14	14.50
27	09.21	07.46	06.11	05.26	03.55	03.22	04.29	05.59	07.25	07.51	09.24	10.12
	16.07	17.43	19.04	21.33	23.03	23.45	22.44	21.04	19.18	16.38	15.12	14.51
28	09.18	07.43	06.08	05.23	03.53	03.23	04.32	06.02	07.28	07.54	09.27	10.12
	16.10	17.46	19.06	21.36	23.05	23.44	22.41	21.00	19.14	16.35	15.10	14.52
29	09.16		07.04	05.19	03.50	03.24	04.35	06.05	07.31	07.57	09.30	10.12
	16.13		20.09	21.39	23.08	23.44	22.38	20.57	19.11	16.31	15.08	14.54
30	09.13		07.01	05.16	03.48	03.25	04.38	06.08	07.33	08.00	09.32	10.11
	16.16		20.12	21.42	23.11	23.43	22.35	20.54	19.07	16.28	15.06	14.55
31	09.10		06.58		03.46		04.41	06.11		08.03		10.11
	16.19		20.15		23.13		22.32	20.50		16.25		14.57
Potential sun hours	181	242	363	447	560	606	595	503	392	307	206	150
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 10.08/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190_Luke ForestShadow receptor: G - G Asuinrakennus (Kovik byväg 53)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.08	07.40	06.55	05.13	03.44	03.27	04.44	06.14	07.37	08.06	09.35
	14.59	16.23	17.49	20.18	21.46	23.16	23.42	22.29	20.47	19.04	16.22	15.04
2	10.09	09.05	07.37	06.51	05.10	03.42	03.28	04.47	06.17	07.39	08.09	09.38
	15.01	16.26	17.52	20.21	21.49	23.19	23.41	22.26	20.44	19.01	16.19	15.02
3	10.08	09.02	07.33	06.48	05.07	03.40	03.30	04.50	06.20	07.42	08.12	09.41
	15.03	16.29	17.55	20.24	21.52	23.21	23.40	22.23	20.40	18.58	16.16	15.01
4	10.07	08.59	07.30	06.44	05.04	03.37	03.32	04.53	06.22	07.45	08.15	09.43
	15.05	16.32	17.58	20.27	21.55	23.23	23.38	22.20	20.37	18.54	16.13	14.59
5	10.06	08.56	07.27	06.41	05.00	03.36	03.33	04.56	06.25	07.48	08.19	09.45
	15.07	16.36	18.01	20.30	21.58	23.25	23.37	22.17	20.34	18.51	16.10	14.57
6	10.05	08.53	07.23	06.37	04.57	03.34	03.35	04.59	06.28	07.51	08.22	09.48
	15.09	16.39	18.04	20.32	22.01	23.28	23.35	22.14	20.30	18.47	16.07	14.56
7	10.04	08.50	07.20	06.34	04.54	03.32	03.37	05.02	06.31	07.53	08.25	09.50
	15.11	16.42	18.07	20.35	22.04	23.30	23.33	22.10	20.27	18.44	16.04	14.55
8	10.02	08.47	07.16	06.31	04.51	03.30	03.39	05.05	06.33	07.56	08.28	09.52
	15.14	16.45	18.10	20.38	22.07	23.32	23.31	22.07	20.23	18.41	16.01	14.53
9	10.01	08.44	07.13	06.27	04.48	03.29	03.41	05.08	06.36	07.59	08.31	09.54
	15.16	16.48	18.13	20.41	22.10	23.33	23.30	22.04	20.20	18.37	15.58	14.52
10	09.59	08.41	07.10	06.24	04.45	03.27	03.44	05.11	06.39	08.02	08.34	09.56
	15.18	16.51	18.15	20.44	22.13	23.35	23.28	22.01	20.16	18.34	15.56	14.51
11	09.58	08.38	07.06	06.20	04.41	03.26	03.46	05.14	06.42	08.05	08.37	09.58
	15.21	16.54	18.18	20.47	22.16	23.37	23.26	21.58	20.13	18.31	15.53	14.50
12	09.56	08.35	07.03	06.17	04.38	03.25	03.48	05.16	06.44	08.07	08.40	10.00
	15.24	16.58	18.21	20.50	22.19	23.38	23.23	21.54	20.10	18.27	15.50	14.49
13	09.54	08.32	07.00	06.14	04.35	03.23	03.51	05.19	06.47	08.10	08.43	10.01
	15.26	17.01	18.24	20.53	22.22	23.40	23.21	21.51	20.06	18.24	15.47	14.49
14	09.52	08.29	06.56	06.10	04.32	03.22	03.53	05.22	06.50	08.13	08.46	10.03
	15.29	17.04	18.27	20.55	22.25	23.41	23.19	21.48	20.03	18.21	15.44	14.48
15	09.50	08.25	06.53	06.07	04.29	03.22	03.56	05.25	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	23.42	23.16	21.44	19.59	18.17	15.41	14.48
16	09.48	08.22	06.49	06.03	04.26	03.21	03.58	05.28	06.55	08.19	08.52	10.06
	15.34	17.10	18.33	21.01	22.31	23.43	23.14	21.41	19.56	18.14	15.39	14.47
17	09.46	08.19	06.46	06.00	04.23	03.20	04.01	05.31	06.58	08.22	08.55	10.07
	15.37	17.13	18.36	21.04	22.34	23.44	23.12	21.38	19.52	18.11	15.36	14.47
18	09.44	08.16	06.42	05.57	04.20	03.20	04.04	05.34	07.01	08.25	08.58	10.08
	15.40	17.16	18.38	21.07	22.37	23.45	23.09	21.35	19.49	18.07	15.34	14.47
19	09.41	08.13	06.39	05.53	04.17	03.19	04.06	05.37	07.04	08.28	09.01	10.09
	15.43	17.19	18.41	21.10	22.40	23.46	23.06	21.31	19.46	18.04	15.31	14.47
20	09.39	08.09	06.36	05.50	04.15	03.19	04.09	05.40	07.06	08.30	09.04	10.10
	15.46	17.22	18.44	21.13	22.43	23.46	23.04	21.28	19.42	18.01	15.28	14.47
21	09.37	08.06	06.32	05.46	04.12	03.19	04.12	05.43	07.09	08.33	09.07	10.11
	15.49	17.25	18.47	21.16	22.46	23.47	23.01	21.25	19.39	17.58	15.26	14.47
22	09.34	08.03	06.29	05.43	04.09	03.19	04.15	05.46	07.12	08.36	09.10	10.11
	15.52	17.28	18.50	21.19	22.49	23.47	22.58	21.21	19.35	17.54	15.23	14.48
23	09.32	08.00	06.25	05.40	04.06	03.20	04.18	05.48	07.15	08.39	09.13	10.12
	15.55	17.31	18.53	21.22	22.52	23.47	22.56	21.18	19.32	17.51	15.21	14.48
24	09.29	07.56	06.22	05.36	04.04	03.20	04.21	05.51	07.17	08.42	09.16	10.12
	15.58	17.34	18.55	21.25	22.55	23.47	22.53	21.14	19.28	17.48	15.19	14.49
25	09.27	07.53	06.19	05.33	04.01	03.21	04.23	05.54	07.20	07.45	09.19	10.12
	16.01	17.37	18.58	21.28	22.57	23.46	22.50	21.11	19.25	16.45	15.16	14.50
26	09.24	07.50	06.15	05.30	03.58	03.21	04.26	05.57	07.23	07.48	09.22	10.12
	16.04	17.40	19.01	21.31	23.00	23.46	22.47	21.08	19.22	16.41	15.14	14.51
27	09.21	07.47	06.12	05.26	03.56	03.22	04.29	06.00	07.26	07.51	09.25	10.12
	16.07	17.43	19.04	21.34	23.03	23.46	22.44	21.04	19.18	16.38	15.12	14.52
28	09.19	07.43	06.08	05.23	03.53	03.23	04.32	06.03	07.28	07.54	09.27	10.12
	16.10	17.46	19.07	21.37	23.06	23.45	22.41	21.01	19.15	16.35	15.10	14.53
29	09.16		07.05	05.20	03.51	03.24	04.35	06.06	07.31	07.57	09.30	10.12
	16.14		20.10	21.40	23.08	23.44	22.38	20.57	19.11	16.32	15.08	14.54
30	09.13		07.01	05.17	03.48	03.25	04.38	06.08	07.34	08.00	09.33	10.12
	16.17		20.12	21.43	23.11	23.43	22.35	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.11
	16.20		20.15		23.14		22.32	20.51		16.26		14.57
Potential sun hours	181	242	363	447	560	606	595	503	392	307	206	150
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 10.08/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190_Luke ForestShadow receptor: H - H Asuinrakennus (Vöyrintie 1021)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.08	07.40	06.55	05.13	03.44	03.27	04.44	06.14	07.37	08.06	09.35
	14.59	16.23	17.49	20.18	21.46	23.16	23.42	22.29	20.47	19.04	16.23	15.04
2	10.09	09.05	07.37	06.51	05.10	03.42	03.28	04.47	06.17	07.39	08.09	09.38
	15.01	16.26	17.52	20.21	21.49	23.18	23.41	22.26	20.44	19.01	16.19	15.02
3	10.08	09.02	07.33	06.48	05.07	03.40	03.30	04.50	06.20	07.42	08.12	09.41
	15.03	16.29	17.55	20.24	21.52	23.21	23.40	22.23	20.40	18.58	16.16	15.01
4	10.07	08.59	07.30	06.44	05.04	03.38	03.32	04.53	06.22	07.45	08.15	09.43
	15.05	16.33	17.58	20.27	21.55	23.23	23.38	22.20	20.37	18.54	16.13	14.59
5	10.06	08.56	07.27	06.41	05.00	03.36	03.33	04.56	06.25	07.48	08.19	09.45
	15.07	16.36	18.01	20.30	21.58	23.25	23.37	22.17	20.34	18.51	16.10	14.57
6	10.05	08.53	07.23	06.37	04.57	03.34	03.35	04.59	06.28	07.51	08.22	09.48
	15.09	16.39	18.04	20.32	22.01	23.28	23.35	22.14	20.30	18.47	16.07	14.56
7	10.04	08.50	07.20	06.34	04.54	03.32	03.37	05.02	06.31	07.53	08.25	09.50
	15.11	16.42	18.07	20.35	22.04	23.30	23.33	22.10	20.27	18.44	16.04	14.55
8	10.02	08.47	07.16	06.31	04.51	03.30	03.39	05.05	06.33	07.56	08.28	09.52
	15.14	16.45	18.10	20.38	22.07	23.32	23.31	22.07	20.23	18.41	16.01	14.53
9	10.01	08.44	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.59	08.31	09.54
	15.16	16.48	18.13	20.41	22.10	23.33	23.30	22.04	20.20	18.37	15.58	14.52
10	09.59	08.41	07.10	06.24	04.45	03.27	03.44	05.11	06.39	08.02	08.34	09.56
	15.19	16.51	18.16	20.44	22.13	23.35	23.28	22.01	20.16	18.34	15.56	14.51
11	09.58	08.38	07.06	06.20	04.42	03.26	03.46	05.14	06.42	08.05	08.37	09.58
	15.21	16.54	18.18	20.47	22.16	23.37	23.25	21.58	20.13	18.31	15.53	14.50
12	09.56	08.35	07.03	06.17	04.38	03.25	03.48	05.17	06.44	08.07	08.40	10.00
	15.24	16.58	18.21	20.50	22.19	23.38	23.23	21.54	20.10	18.27	15.50	14.49
13	09.54	08.32	07.00	06.14	04.35	03.24	03.51	05.19	06.47	08.10	08.43	10.01
	15.26	17.01	18.24	20.53	22.22	23.40	23.21	21.51	20.06	18.24	15.47	14.49
14	09.52	08.29	06.56	06.10	04.32	03.23	03.53	05.22	06.50	08.13	08.46	10.03
	15.29	17.04	18.27	20.56	22.25	23.41	23.19	21.48	20.03	18.21	15.44	14.48
15	09.50	08.25	06.53	06.07	04.29	03.22	03.56	05.25	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	23.42	23.16	21.44	19.59	18.17	15.42	14.48
16	09.48	08.22	06.49	06.03	04.26	03.21	03.59	05.28	06.55	08.19	08.52	10.06
	15.35	17.10	18.33	21.01	22.31	23.43	23.14	21.41	19.56	18.14	15.39	14.47
17	09.46	08.19	06.46	06.00	04.23	03.20	04.01	05.31	06.58	08.22	08.55	10.07
	15.37	17.13	18.36	21.04	22.34	23.44	23.12	21.38	19.52	18.11	15.36	14.47
18	09.44	08.16	06.43	05.57	04.20	03.20	04.04	05.34	07.01	08.25	08.58	10.08
	15.40	17.16	18.38	21.07	22.37	23.45	23.09	21.35	19.49	18.07	15.34	14.47
19	09.41	08.13	06.39	05.53	04.18	03.20	04.07	05.37	07.04	08.28	09.01	10.09
	15.43	17.19	18.41	21.10	22.40	23.46	23.06	21.31	19.46	18.04	15.31	14.47
20	09.39	08.09	06.36	05.50	04.15	03.19	04.09	05.40	07.06	08.31	09.04	10.10
	15.46	17.22	18.44	21.13	22.43	23.46	23.04	21.28	19.42	18.01	15.28	14.47
21	09.37	08.06	06.32	05.46	04.12	03.19	04.12	05.43	07.09	08.33	09.07	10.11
	15.49	17.25	18.47	21.16	22.46	23.46	23.01	21.25	19.39	17.58	15.26	14.47
22	09.34	08.03	06.29	05.43	04.09	03.19	04.15	05.46	07.12	08.36	09.10	10.11
	15.52	17.28	18.50	21.19	22.49	23.47	22.58	21.21	19.35	17.54	15.24	14.48
23	09.32	08.00	06.25	05.40	04.06	03.20	04.18	05.48	07.15	08.39	09.13	10.12
	15.55	17.31	18.53	21.22	22.52	23.47	22.56	21.18	19.32	17.51	15.21	14.48
24	09.29	07.56	06.22	05.36	04.04	03.20	04.21	05.51	07.17	08.42	09.16	10.12
	15.58	17.34	18.55	21.25	22.55	23.47	22.53	21.14	19.28	17.48	15.19	14.49
25	09.27	07.53	06.19	05.33	04.01	03.21	04.23	05.54	07.20	07.45	09.19	10.12
	16.01	17.37	18.58	21.28	22.57	23.46	22.50	21.11	19.25	16.45	15.17	14.50
26	09.24	07.50	06.15	05.30	03.58	03.21	04.26	05.57	07.23	07.48	09.22	10.12
	16.04	17.40	19.01	21.31	23.00	23.46	22.47	21.08	19.22	16.41	15.14	14.51
27	09.21	07.47	06.12	05.26	03.56	03.22	04.29	06.00	07.26	07.51	09.25	10.12
	16.07	17.43	19.04	21.34	23.03	23.45	22.44	21.04	19.18	16.38	15.12	14.52
28	09.19	07.43	06.08	05.23	03.53	03.23	04.32	06.03	07.28	07.54	09.27	10.12
	16.11	17.46	19.07	21.37	23.06	23.45	22.41	21.01	19.15	16.35	15.10	14.53
29	09.16		07.05	05.20	03.51	03.24	04.35	06.06	07.31	07.57	09.30	10.12
	16.14		20.10	21.40	23.08	23.44	22.38	20.57	19.11	16.32	15.08	14.54
30	09.13		07.01	05.17	03.48	03.26	04.38	06.08	07.34	08.00	09.33	10.12
	16.17		20.12	21.43	23.11	23.43	22.35	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.11
	16.20		20.15		23.14		22.32	20.51		16.26		14.57
Potential sun hours	181	242	363	447	560	606	595	503	392	307	206	150
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Miikka Saranpää / miikka.saranpaa@fcg.fi
Calculated:
14.7.2023 10.08/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190_Luke ForestShadow receptor: I - I Lomarakennus (Ehrsbackavägen 29)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEÅ]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.07	07.40	06.55	05.14	03.44	03.27	04.44	06.14	07.37	08.06	09.35
	15.00	16.23	17.49	20.18	21.46	23.16	23.42	22.29	20.47	19.04	16.23	15.04
2	10.09	09.05	07.37	06.51	05.10	03.42	03.29	04.47	06.17	07.39	08.09	09.38
	15.01	16.26	17.52	20.21	21.49	23.18	23.41	22.26	20.44	19.01	16.20	15.03
3	10.08	09.02	07.33	06.48	05.07	03.40	03.30	04.50	06.20	07.42	08.12	09.40
	15.03	16.30	17.55	20.24	21.52	23.21	23.39	22.23	20.40	18.58	16.17	15.01
4	10.07	08.59	07.30	06.44	05.04	03.38	03.32	04.53	06.22	07.45	08.15	09.43
	15.05	16.33	17.58	20.27	21.55	23.23	23.38	22.20	20.37	18.54	16.13	14.59
5	10.06	08.56	07.27	06.41	05.01	03.36	03.34	04.56	06.25	07.48	08.18	09.45
	15.07	16.36	18.01	20.30	21.58	23.25	23.36	22.17	20.34	18.51	16.10	14.58
6	10.05	08.53	07.23	06.37	04.57	03.34	03.36	04.59	06.28	07.51	08.22	09.47
	15.09	16.39	18.04	20.32	22.01	23.27	23.35	22.13	20.30	18.48	16.07	14.56
7	10.04	08.50	07.20	06.34	04.54	03.32	03.38	05.02	06.31	07.53	08.25	09.50
	15.12	16.42	18.07	20.35	22.04	23.29	23.33	22.10	20.27	18.44	16.04	14.55
8	10.02	08.47	07.16	06.31	04.51	03.31	03.40	05.05	06.34	07.56	08.28	09.52
	15.14	16.45	18.10	20.38	22.07	23.31	23.31	22.07	20.23	18.41	16.02	14.54
9	10.01	08.44	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.59	08.31	09.54
	15.16	16.48	18.13	20.41	22.10	23.33	23.29	22.04	20.20	18.37	15.59	14.53
10	09.59	08.41	07.10	06.24	04.45	03.28	03.44	05.11	06.39	08.02	08.34	09.56
	15.19	16.51	18.16	20.44	22.13	23.35	23.27	22.01	20.16	18.34	15.56	14.51
11	09.57	08.38	07.06	06.20	04.42	03.26	03.46	05.14	06.42	08.05	08.37	09.58
	15.21	16.55	18.18	20.47	22.16	23.37	23.25	21.57	20.13	18.31	15.53	14.51
12	09.56	08.35	07.03	06.17	04.39	03.25	03.49	05.17	06.45	08.07	08.40	09.59
	15.24	16.58	18.21	20.50	22.19	23.38	23.23	21.54	20.10	18.27	15.50	14.50
13	09.54	08.32	07.00	06.14	04.36	03.24	03.51	05.20	06.47	08.10	08.43	10.01
	15.27	17.01	18.24	20.53	22.22	23.40	23.21	21.51	20.06	18.24	15.47	14.49
14	09.52	08.28	06.56	06.10	04.33	03.23	03.54	05.23	06.50	08.13	08.46	10.03
	15.29	17.04	18.27	20.55	22.25	23.41	23.19	21.48	20.03	18.21	15.44	14.48
15	09.50	08.25	06.53	06.07	04.30	03.22	03.56	05.25	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	23.42	23.16	21.44	19.59	18.17	15.42	14.48
16	09.48	08.22	06.49	06.03	04.27	03.21	03.59	05.28	06.55	08.19	08.52	10.05
	15.35	17.10	18.33	21.01	22.31	23.43	23.14	21.41	19.56	18.14	15.39	14.48
17	09.46	08.19	06.46	06.00	04.24	03.21	04.01	05.31	06.58	08.22	08.55	10.07
	15.38	17.13	18.36	21.04	22.34	23.44	23.11	21.38	19.52	18.11	15.36	14.47
18	09.43	08.16	06.43	05.57	04.21	03.20	04.04	05.34	07.01	08.25	08.58	10.08
	15.40	17.16	18.38	21.07	22.37	23.45	23.09	21.34	19.49	18.07	15.34	14.47
19	09.41	08.13	06.39	05.53	04.18	03.20	04.07	05.37	07.04	08.28	09.01	10.09
	15.43	17.19	18.41	21.10	22.40	23.45	23.06	21.31	19.46	18.04	15.31	14.47
20	09.39	08.09	06.36	05.50	04.15	03.20	04.10	05.40	07.06	08.30	09.04	10.10
	15.46	17.22	18.44	21.13	22.43	23.46	23.04	21.28	19.42	18.01	15.29	14.47
21	09.36	08.06	06.32	05.47	04.12	03.20	04.12	05.43	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.16	22.46	23.46	23.01	21.24	19.39	17.58	15.26	14.48
22	09.34	08.03	06.29	05.43	04.09	03.20	04.15	05.46	07.12	08.36	09.10	10.11
	15.52	17.28	18.50	21.19	22.49	23.46	22.58	21.21	19.35	17.54	15.24	14.48
23	09.32	08.00	06.25	05.40	04.07	03.20	04.18	05.49	07.15	08.39	09.13	10.11
	15.55	17.31	18.53	21.22	22.52	23.46	22.55	21.18	19.32	17.51	15.21	14.49
24	09.29	07.56	06.22	05.37	04.04	03.21	04.21	05.51	07.17	08.42	09.16	10.12
	15.58	17.34	18.55	21.25	22.54	23.46	22.53	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.19	05.33	04.01	03.21	04.24	05.54	07.20	07.45	09.19	10.12
	16.01	17.37	18.58	21.28	22.57	23.46	22.50	21.11	19.25	16.45	15.17	14.50
26	09.24	07.50	06.15	05.30	03.59	03.22	04.27	05.57	07.23	07.48	09.22	10.12
	16.05	17.40	19.01	21.31	23.00	23.46	22.47	21.08	19.22	16.42	15.15	14.51
27	09.21	07.46	06.12	05.27	03.56	03.23	04.29	06.00	07.26	07.51	09.24	10.12
	16.08	17.43	19.04	21.34	23.03	23.45	22.44	21.04	19.18	16.38	15.12	14.52
28	09.19	07.43	06.08	05.23	03.54	03.24	04.32	06.03	07.28	07.54	09.27	10.12
	16.11	17.46	19.07	21.37	23.05	23.44	22.41	21.01	19.15	16.35	15.10	14.53
29	09.16		07.05	05.20	03.51	03.25	04.35	06.06	07.31	07.57	09.30	10.12
	16.14		20.10	21.40	23.08	23.44	22.38	20.57	19.11	16.32	15.08	14.55
30	09.13		07.01	05.17	03.49	03.26	04.38	06.08	07.34	08.00	09.33	10.11
	16.17		20.12	21.43	23.11	23.43	22.35	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.11
	16.20		20.15		23.13		22.32	20.51		16.26		14.57
Potential sun hours	182	242	363	447	559	606	595	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 10.08/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190_Luke ForestShadow receptor: J - J Asuinrakennus (Kleidersvägen 118)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.07	07.40	06.55	05.14	03.44	03.27	04.44	06.14	07.37	08.06	09.35
	15.00	16.23	17.49	20.18	21.46	23.16	23.42	22.29	20.47	19.04	16.23	15.05
2	10.09	09.05	07.37	06.51	05.10	03.42	03.29	04.47	06.17	07.39	08.09	09.38
	15.01	16.26	17.52	20.21	21.49	23.18	23.40	22.26	20.44	19.01	16.20	15.03
3	10.08	09.02	07.33	06.48	05.07	03.40	03.30	04.50	06.20	07.42	08.12	09.40
	15.03	16.30	17.55	20.24	21.52	23.20	23.39	22.23	20.40	18.58	16.17	15.01
4	10.07	08.59	07.30	06.44	05.04	03.38	03.32	04.53	06.22	07.45	08.15	09.43
	15.05	16.33	17.58	20.27	21.55	23.23	23.38	22.20	20.37	18.54	16.14	14.59
5	10.06	08.56	07.27	06.41	05.01	03.36	03.34	04.56	06.25	07.48	08.18	09.45
	15.07	16.36	18.01	20.30	21.58	23.25	23.36	22.17	20.34	18.51	16.11	14.58
6	10.05	08.53	07.23	06.38	04.57	03.34	03.36	04.59	06.28	07.50	08.21	09.47
	15.10	16.39	18.04	20.32	22.01	23.27	23.35	22.13	20.30	18.48	16.08	14.56
7	10.03	08.50	07.20	06.34	04.54	03.32	03.38	05.02	06.31	07.53	08.25	09.50
	15.12	16.42	18.07	20.35	22.04	23.29	23.33	22.10	20.27	18.44	16.05	14.55
8	10.02	08.47	07.16	06.31	04.51	03.31	03.40	05.05	06.34	07.56	08.28	09.52
	15.14	16.45	18.10	20.38	22.07	23.31	23.31	22.07	20.23	18.41	16.02	14.54
9	10.00	08.44	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.59	08.31	09.54
	15.16	16.48	18.13	20.41	22.10	23.33	23.29	22.04	20.20	18.37	15.59	14.53
10	09.59	08.41	07.10	06.24	04.45	03.28	03.44	05.11	06.39	08.02	08.34	09.56
	15.19	16.52	18.16	20.44	22.13	23.35	23.27	22.01	20.16	18.34	15.56	14.52
11	09.57	08.38	07.06	06.20	04.42	03.26	03.47	05.14	06.42	08.05	08.37	09.58
	15.21	16.55	18.18	20.47	22.16	23.36	23.25	21.57	20.13	18.31	15.53	14.51
12	09.55	08.35	07.03	06.17	04.39	03.25	03.49	05.17	06.45	08.07	08.40	09.59
	15.24	16.58	18.21	20.50	22.19	23.38	23.23	21.54	20.10	18.27	15.50	14.50
13	09.54	08.32	07.00	06.14	04.36	03.24	03.51	05.20	06.47	08.10	08.43	10.01
	15.27	17.01	18.24	20.53	22.22	23.39	23.21	21.51	20.06	18.24	15.47	14.49
14	09.52	08.28	06.56	06.10	04.33	03.23	03.54	05.23	06.50	08.13	08.46	10.03
	15.29	17.04	18.27	20.55	22.25	23.41	23.18	21.48	20.03	18.21	15.45	14.48
15	09.50	08.25	06.53	06.07	04.30	03.22	03.56	05.26	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	23.42	23.16	21.44	19.59	18.17	15.42	14.48
16	09.48	08.22	06.49	06.03	04.27	03.22	03.59	05.28	06.55	08.19	08.52	10.05
	15.35	17.10	18.33	21.01	22.31	23.43	23.14	21.41	19.56	18.14	15.39	14.48
17	09.45	08.19	06.46	06.00	04.24	03.21	04.02	05.31	06.58	08.22	08.55	10.07
	15.38	17.13	18.36	21.04	22.34	23.44	23.11	21.38	19.52	18.11	15.36	14.47
18	09.43	08.16	06.43	05.57	04.21	03.20	04.04	05.34	07.01	08.25	08.58	10.08
	15.41	17.16	18.38	21.07	22.37	23.44	23.09	21.34	19.49	18.07	15.34	14.47
19	09.41	08.13	06.39	05.53	04.18	03.20	04.07	05.37	07.04	08.28	09.01	10.09
	15.43	17.19	18.41	21.10	22.40	23.45	23.06	21.31	19.46	18.04	15.31	14.47
20	09.39	08.09	06.36	05.50	04.15	03.20	04.10	05.40	07.06	08.30	09.04	10.10
	15.46	17.22	18.44	21.13	22.43	23.46	23.03	21.28	19.42	18.01	15.29	14.48
21	09.36	08.06	06.32	05.47	04.12	03.20	04.12	05.43	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.16	22.46	23.46	23.01	21.24	19.39	17.58	15.26	14.48
22	09.34	08.03	06.29	05.43	04.09	03.20	04.15	05.46	07.12	08.36	09.10	10.11
	15.52	17.28	18.50	21.19	22.49	23.46	22.58	21.21	19.35	17.54	15.24	14.48
23	09.31	08.00	06.25	05.40	04.07	03.20	04.18	05.49	07.15	08.39	09.13	10.11
	15.55	17.31	18.53	21.22	22.51	23.46	22.55	21.18	19.32	17.51	15.21	14.49
24	09.29	07.56	06.22	05.37	04.04	03.21	04.21	05.52	07.17	08.42	09.16	10.12
	15.58	17.34	18.55	21.25	22.54	23.46	22.52	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.19	05.33	04.01	03.21	04.24	05.54	07.20	07.45	09.19	10.12
	16.02	17.37	18.58	21.28	22.57	23.46	22.50	21.11	19.25	16.45	15.17	14.50
26	09.24	07.50	06.15	05.30	03.59	03.22	04.27	05.57	07.23	07.48	09.22	10.12
	16.05	17.40	19.01	21.31	23.00	23.45	22.47	21.08	19.22	16.42	15.15	14.51
27	09.21	07.46	06.12	05.27	03.56	03.23	04.30	06.00	07.26	07.51	09.24	10.12
	16.08	17.43	19.04	21.34	23.03	23.45	22.44	21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.54	03.24	04.33	06.03	07.28	07.54	09.27	10.12
	16.11	17.46	19.07	21.37	23.05	23.44	22.41	21.01	19.15	16.35	15.10	14.53
29	09.16		07.05	05.20	03.51	03.25	04.35	06.06	07.31	07.57	09.30	10.12
	16.14		20.10	21.40	23.08	23.43	22.38	20.57	19.11	16.32	15.08	14.55
30	09.13		07.01	05.17	03.49	03.26	04.38	06.08	07.34	08.00	09.33	10.11
	16.17		20.12	21.43	23.11	23.43	22.35	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.47		04.41	06.11		08.03		10.11
	16.20		20.15		23.13		22.32	20.51		16.26		14.58
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 10.08/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190_Luke ForestShadow receptor: K - K Asuinrakennus (Rökiöntie 154)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.40	06.55	05.14	03.45	03.28	04.45	06.14	07.37	08.06	09.35
	15.00	16.24	17.49	20.18	21.46	23.15	23.41	22.29	20.47	19.05	16.23	15.05
2	10.09	09.04	07.36	06.51	05.11	03.43	03.29	04.48	06.17	07.39	08.09	09.37
	15.02	16.27	17.52	20.21	21.49	23.18	23.40	22.26	20.44	19.01	16.20	15.03
3	10.08	09.02	07.33	06.48	05.07	03.41	03.31	04.50	06.20	07.42	08.12	09.40
	15.04	16.30	17.55	20.24	21.52	23.20	23.39	22.23	20.40	18.58	16.17	15.01
4	10.07	08.59	07.30	06.44	05.04	03.39	03.33	04.53	06.23	07.45	08.15	09.42
	15.06	16.33	17.58	20.27	21.55	23.22	23.37	22.19	20.37	18.54	16.14	15.00
5	10.06	08.56	07.26	06.41	05.01	03.37	03.34	04.56	06.25	07.48	08.18	09.45
	15.08	16.36	18.01	20.29	21.58	23.24	23.36	22.16	20.33	18.51	16.11	14.58
6	10.04	08.53	07.23	06.38	04.58	03.35	03.36	04.59	06.28	07.50	08.21	09.47
	15.10	16.39	18.04	20.32	22.01	23.27	23.34	22.13	20.30	18.48	16.08	14.57
7	10.03	08.50	07.20	06.34	04.55	03.33	03.38	05.02	06.31	07.53	08.24	09.49
	15.12	16.42	18.07	20.35	22.04	23.29	23.32	22.10	20.27	18.44	16.05	14.55
8	10.02	08.47	07.16	06.31	04.51	03.31	03.40	05.05	06.34	07.56	08.27	09.51
	15.14	16.45	18.10	20.38	22.07	23.31	23.31	22.07	20.23	18.41	16.02	14.54
9	10.00	08.44	07.13	06.27	04.48	03.30	03.43	05.08	06.36	07.59	08.30	09.53
	15.17	16.49	18.13	20.41	22.10	23.32	23.29	22.04	20.20	18.38	15.59	14.53
10	09.59	08.41	07.10	06.24	04.45	03.28	03.45	05.11	06.39	08.02	08.34	09.55
	15.19	16.52	18.16	20.44	22.13	23.34	23.27	22.00	20.16	18.34	15.56	14.52
11	09.57	08.38	07.06	06.21	04.42	03.27	03.47	05.14	06.42	08.05	08.37	09.57
	15.22	16.55	18.18	20.47	22.16	23.36	23.25	21.57	20.13	18.31	15.53	14.51
12	09.55	08.35	07.03	06.17	04.39	03.26	03.49	05.17	06.45	08.07	08.40	09.59
	15.24	16.58	18.21	20.50	22.19	23.37	23.22	21.54	20.10	18.27	15.50	14.50
13	09.53	08.31	07.00	06.14	04.36	03.25	03.52	05.20	06.47	08.10	08.43	10.01
	15.27	17.01	18.24	20.52	22.22	23.39	23.20	21.51	20.06	18.24	15.48	14.50
14	09.51	08.28	06.56	06.10	04.33	03.24	03.54	05.23	06.50	08.13	08.46	10.02
	15.30	17.04	18.27	20.55	22.25	23.40	23.18	21.47	20.03	18.21	15.45	14.49
15	09.49	08.25	06.53	06.07	04.30	03.23	03.57	05.26	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	23.41	23.16	21.44	19.59	18.18	15.42	14.48
16	09.47	08.22	06.49	06.04	04.27	03.22	03.59	05.29	06.56	08.19	08.52	10.05
	15.35	17.10	18.33	21.01	22.31	23.42	23.13	21.41	19.56	18.14	15.39	14.48
17	09.45	08.19	06.46	06.00	04.24	03.22	04.02	05.32	06.58	08.22	08.55	10.06
	15.38	17.13	18.36	21.04	22.34	23.43	23.11	21.38	19.52	18.11	15.37	14.48
18	09.43	08.16	06.43	05.57	04.21	03.21	04.05	05.34	07.01	08.25	08.58	10.07
	15.41	17.16	18.38	21.07	22.37	23.44	23.08	21.34	19.49	18.08	15.34	14.48
19	09.41	08.12	06.39	05.54	04.18	03.21	04.07	05.37	07.04	08.27	09.01	10.08
	15.44	17.19	18.41	21.10	22.40	23.45	23.06	21.31	19.46	18.04	15.32	14.48
20	09.38	08.09	06.36	05.50	04.15	03.21	04.10	05.40	07.06	08.30	09.04	10.09
	15.47	17.22	18.44	21.13	22.42	23.45	23.03	21.28	19.42	18.01	15.29	14.48
21	09.36	08.06	06.32	05.47	04.13	03.21	04.13	05.43	07.09	08.33	09.07	10.10
	15.50	17.26	18.47	21.16	22.45	23.45	23.00	21.24	19.39	17.58	15.27	14.48
22	09.34	08.03	06.29	05.43	04.10	03.21	04.16	05.46	07.12	08.36	09.10	10.10
	15.53	17.29	18.50	21.19	22.48	23.46	22.58	21.21	19.35	17.55	15.24	14.49
23	09.31	08.00	06.25	05.40	04.07	03.21	04.18	05.49	07.15	08.39	09.13	10.11
	15.56	17.32	18.53	21.22	22.51	23.46	22.55	21.18	19.32	17.51	15.22	14.49
24	09.29	07.56	06.22	05.37	04.04	03.21	04.21	05.52	07.17	08.42	09.16	10.11
	15.59	17.35	18.55	21.25	22.54	23.46	22.52	21.14	19.28	17.48	15.19	14.50
25	09.26	07.53	06.19	05.33	04.02	03.22	04.24	05.55	07.20	07.45	09.18	10.12
	16.02	17.38	18.58	21.28	22.57	23.45	22.49	21.11	19.25	16.45	15.17	14.51
26	09.24	07.50	06.15	05.30	03.59	03.23	04.27	05.57	07.23	07.48	09.21	10.12
	16.05	17.41	19.01	21.31	23.00	23.45	22.46	21.07	19.22	16.42	15.15	14.52
27	09.21	07.46	06.12	05.27	03.57	03.23	04.30	06.00	07.26	07.51	09.24	10.12
	16.08	17.43	19.04	21.34	23.02	23.44	22.44	21.04	19.18	16.39	15.13	14.53
28	09.18	07.43	06.08	05.24	03.54	03.24	04.33	06.03	07.28	07.54	09.27	10.11
	16.11	17.46	19.07	21.37	23.05	23.44	22.41	21.01	19.15	16.35	15.11	14.54
29	09.16		07.05	05.20	03.52	03.25	04.36	06.06	07.31	07.57	09.30	10.11
	16.14		20.10	21.40	23.08	23.43	22.38	20.57	19.11	16.32	15.09	14.55
30	09.13		07.02	05.17	03.49	03.27	04.39	06.09	07.34	08.00	09.32	10.11
	16.17		20.12	21.43	23.10	23.42	22.35	20.54	19.08	16.29	15.07	14.57
31	09.10		06.58		03.47		04.42	06.11		08.03		10.10
	16.20		20.15		23.13		22.32	20.51		16.26		14.58
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 10.08/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190_Luke ForestShadow receptor: L - L Asuinrakennus (Bjurbäcksvägen 231)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
723	551	431	413	545	818	1 095	1 297	897	724	588	597	8 679

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.40	06.55	05.14	03.45	03.28	04.45	06.14	07.36	08.06	09.35
	15.00	16.23	17.49	20.18	21.45	23.15	23.41	22.28	20.47	19.04	16.23	15.05
2	10.08	09.04	07.36	06.51	05.10	03.43	03.30	04.47	06.17	07.39	08.09	09.37
	15.02	16.27	17.52	20.21	21.48	23.17	23.39	22.25	20.44	19.01	16.20	15.03
3	10.07	09.01	07.33	06.48	05.07	03.41	03.31	04.50	06.20	07.42	08.12	09.40
	15.04	16.30	17.55	20.24	21.51	23.20	23.38	22.22	20.40	18.58	16.17	15.01
4	10.06	08.58	07.30	06.44	05.04	03.39	03.33	04.53	06.22	07.45	08.15	09.42
	15.06	16.33	17.58	20.26	21.54	23.22	23.37	22.19	20.37	18.54	16.14	15.00
5	10.05	08.55	07.26	06.41	05.01	03.37	03.35	04.56	06.25	07.48	08.18	09.44
	15.08	16.36	18.01	20.29	21.57	23.24	23.35	22.16	20.33	18.51	16.11	14.58
6	10.04	08.52	07.23	06.38	04.58	03.35	03.36	04.59	06.28	07.50	08.21	09.47
	15.10	16.39	18.04	20.32	22.00	23.26	23.34	22.13	20.30	18.47	16.08	14.57
7	10.03	08.50	07.20	06.34	04.54	03.33	03.38	05.02	06.31	07.53	08.24	09.49
	15.12	16.42	18.07	20.35	22.03	23.28	23.32	22.10	20.26	18.44	16.05	14.55
8	10.01	08.47	07.16	06.31	04.51	03.31	03.40	05.05	06.34	07.56	08.27	09.51
	15.14	16.45	18.10	20.38	22.06	23.30	23.30	22.07	20.23	18.41	16.02	14.54
9	10.00	08.44	07.13	06.27	04.48	03.30	03.43	05.08	06.36	07.59	08.30	09.53
	15.17	16.49	18.13	20.41	22.09	23.32	23.28	22.03	20.20	18.37	15.59	14.53
10	09.58	08.40	07.10	06.24	04.45	03.28	03.45	05.11	06.39	08.02	08.33	09.55
	15.19	16.52	18.15	20.44	22.12	23.34	23.26	22.00	20.16	18.34	15.56	14.52
11	09.57	08.37	07.06	06.20	04.42	03.27	03.47	05.14	06.42	08.04	08.36	09.57
	15.22	16.55	18.18	20.46	22.15	23.35	23.24	21.57	20.13	18.31	15.53	14.51
12	09.55	08.34	07.03	06.17	04.39	03.26	03.49	05.17	06.44	08.07	08.39	09.59
	15.24	16.58	18.21	20.49	22.18	23.37	23.22	21.54	20.09	18.27	15.50	14.50
13	09.53	08.31	06.59	06.14	04.36	03.25	03.52	05.20	06.47	08.10	08.42	10.00
	15.27	17.01	18.24	20.52	22.21	23.38	23.20	21.50	20.06	18.24	15.47	14.50
14	09.51	08.28	06.56	06.10	04.33	03.24	03.54	05.23	06.50	08.13	08.46	10.02
	15.30	17.04	18.27	20.55	22.24	23.40	23.18	21.47	20.03	18.21	15.45	14.49
15	09.49	08.25	06.53	06.07	04.30	03.23	03.57	05.26	06.53	08.16	08.49	10.03
	15.32	17.07	18.30	20.58	22.27	23.41	23.15	21.44	19.59	18.17	15.42	14.48
16	09.47	08.22	06.49	06.04	04.27	03.22	03.59	05.29	06.55	08.19	08.52	10.05
	15.35	17.10	18.33	21.01	22.30	23.42	23.13	21.41	19.56	18.14	15.39	14.48
17	09.45	08.19	06.46	06.00	04.24	03.22	04.02	05.31	06.58	08.21	08.55	10.06
	15.38	17.13	18.35	21.04	22.33	23.43	23.11	21.37	19.52	18.11	15.37	14.48
18	09.43	08.15	06.42	05.57	04.21	03.21	04.05	05.34	07.01	08.24	08.58	10.07
	15.41	17.16	18.38	21.07	22.36	23.44	23.08	21.34	19.49	18.07	15.34	14.48
19	09.40	08.12	06.39	05.53	04.18	03.21	04.07	05.37	07.04	08.27	09.01	10.08
	15.44	17.19	18.41	21.10	22.39	23.44	23.05	21.31	19.45	18.04	15.31	14.48
20	09.38	08.09	06.36	05.50	04.15	03.21	04.10	05.40	07.06	08.30	09.04	10.09
	15.47	17.22	18.44	21.13	22.42	23.45	23.03	21.27	19.42	18.01	15.29	14.48
21	09.36	08.06	06.32	05.47	04.13	03.21	04.13	05.43	07.09	08.33	09.07	10.10
	15.50	17.25	18.47	21.16	22.45	23.45	23.00	21.24	19.39	17.58	15.27	14.48
22	09.33	08.03	06.29	05.43	04.10	03.21	04.16	05.46	07.12	08.36	09.10	10.10
	15.53	17.28	18.50	21.18	22.48	23.45	22.57	21.21	19.35	17.54	15.24	14.49
23	09.31	07.59	06.25	05.40	04.07	03.21	04.18	05.49	07.14	08.39	09.12	10.11
	15.56	17.31	18.52	21.21	22.51	23.45	22.55	21.17	19.32	17.51	15.22	14.49
24	09.28	07.56	06.22	05.37	04.04	03.21	04.21	05.52	07.17	08.42	09.15	10.11
	15.59	17.34	18.55	21.24	22.54	23.45	22.52	21.14	19.28	17.48	15.19	14.50
25	09.26	07.53	06.19	05.33	04.02	03.22	04.24	05.54	07.20	07.45	09.18	10.11
	16.02	17.37	18.58	21.27	22.56	23.45	22.49	21.11	19.25	16.45	15.17	14.51
26	09.23	07.50	06.15	05.30	03.59	03.23	04.27	05.57	07.23	07.48	09.21	10.11
	16.05	17.40	19.01	21.30	22.59	23.45	22.46	21.07	19.21	16.42	15.15	14.52
27	09.21	07.46	06.12	05.27	03.57	03.23	04.30	06.00	07.25	07.51	09.24	10.11
	16.08	17.43	19.04	21.33	23.02	23.44	22.43	21.04	19.18	16.38	15.13	14.53
28	09.18	07.43	06.08	05.24	03.54	03.24	04.33	06.03	07.28	07.54	09.27	10.11
	16.11	17.46	19.07	21.36	23.05	23.43	22.40	21.01	19.15	16.35	15.11	14.54
29	09.15		07.05	05.20	03.52	03.26	04.36	06.06	07.31	07.57	09.29	10.11
	16.14		20.09	21.39	23.07	23.43	22.37	20.57	19.11	16.32	15.09	14.55
30	09.13		07.01	05.17	03.49	03.27	04.39	06.09	07.34	08.00	09.32	10.10
	16.17		20.12	21.42	23.10	23.42	22.34	20.54	19.08	16.29	15.07	14.57
31	09.10		06.58		03.47		04.42	06.11		08.03		10.10
	16.20		20.15		23.12		22.31	20.50		16.26		14.58
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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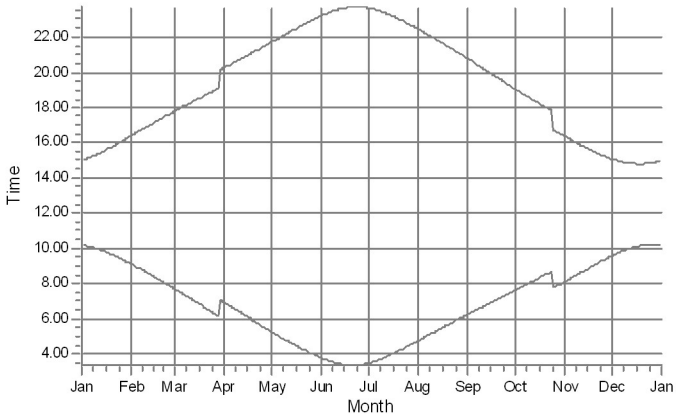
Calculated:
14.7.2023 10.08/3.5.584

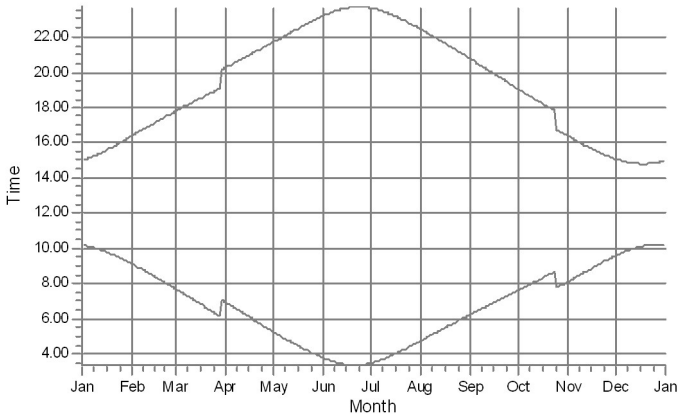
SHADOW - Calendar, graphical

Calculation: VE2_9xRD180xHH190_Luke Forest

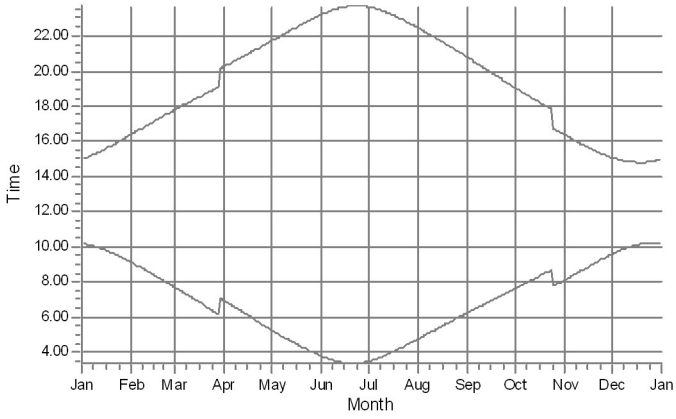
A: A Lomarakennus (Söderändan 49)



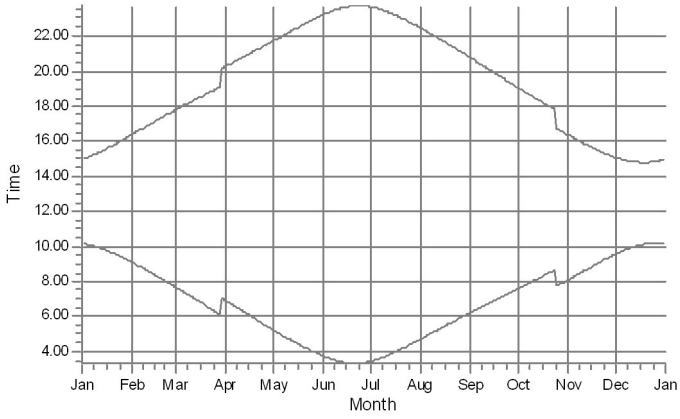
B: B Asuinrakennus (Söderändan 81)



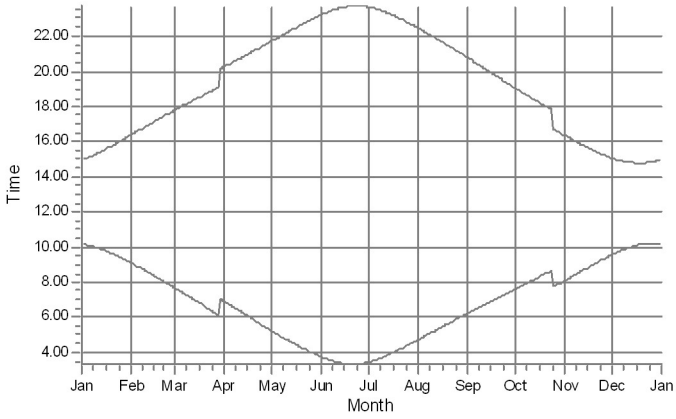
C: C Lomarakennus (Säderändan 166)



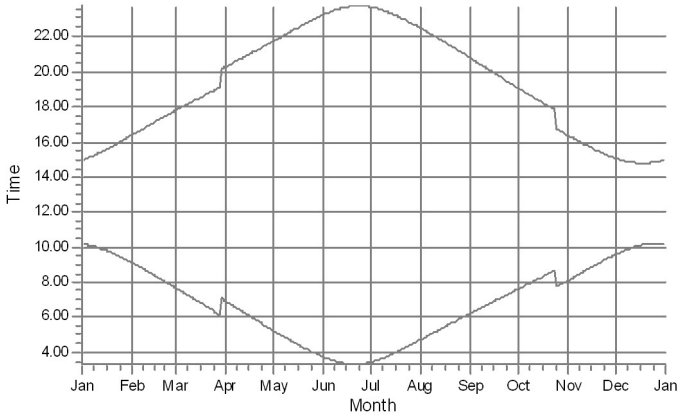
D: D Lomarakennus (Söderändan 188)



E: E Asuinrakennus (Rökiöntie 930)



F: F Asuinrakennus (Kukkusintie 474)



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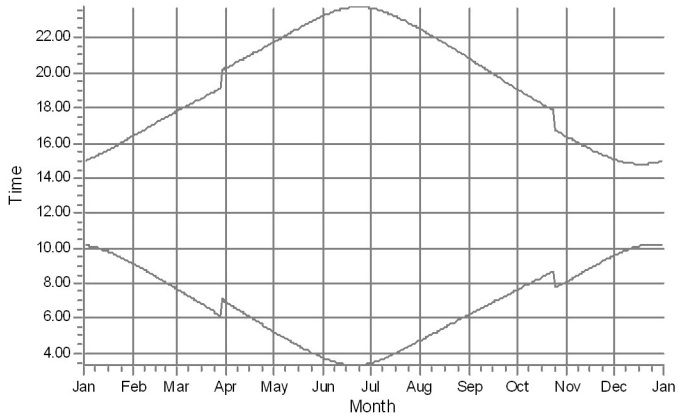
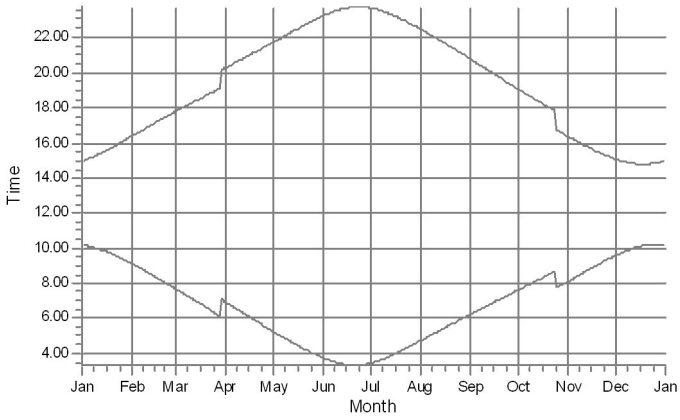
SHADOW - Calendar, graphical

Calculation: VE2_9xRD180xHH190_Luke Forest

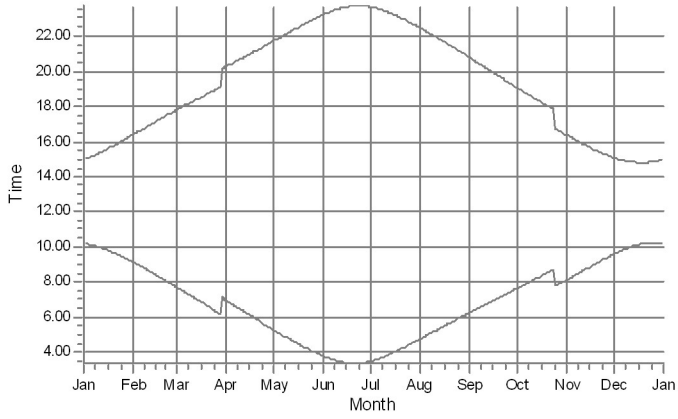
G: G Asuinrakennus (Kovik byväg 53)



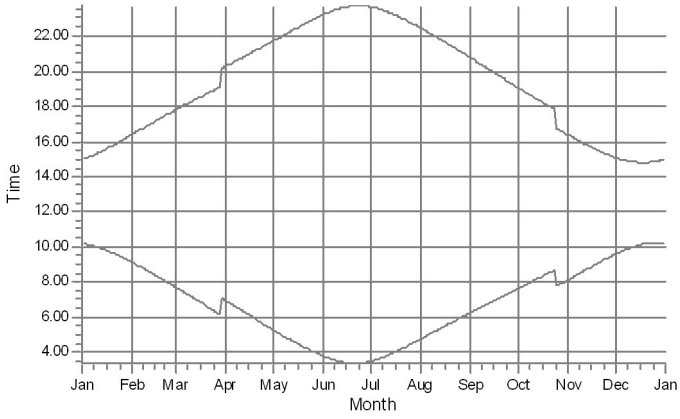
H: H Asuinrakennus (Vöyrintie 1021)



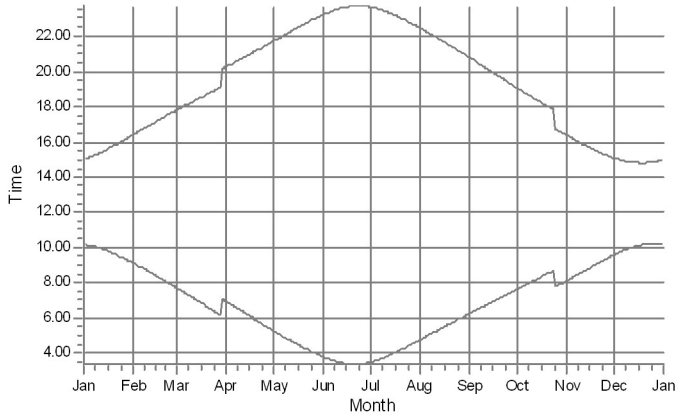
I: I Lomarakennus (Ehrsbackavägen 29)



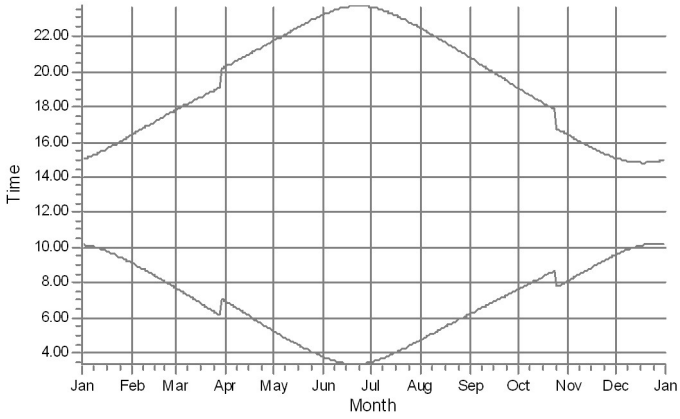
J: J Asuinrakennus (Kleidersvägen 118)



K: K Asuinrakennus (Rökiöntie 154)



L: L Asuinrakennus (Bjurbäcksvägen 231)



WTGs

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Calculated:
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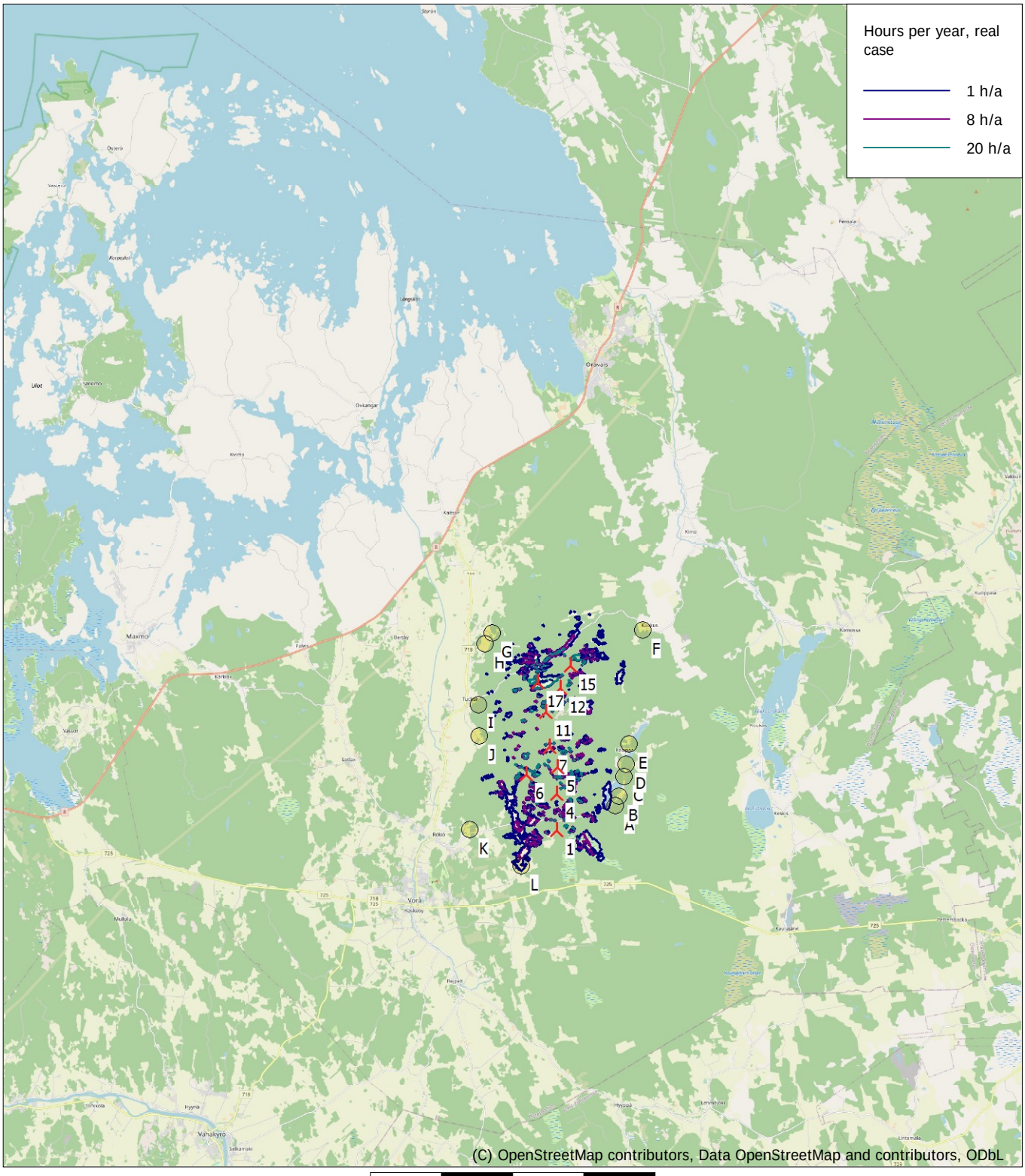
SHADOW - Map

Calculation: VE2_9xRD180xHH190_Luke Forest



0 2,5 5 7,5 10km

Map: EMD OpenStreetMap , Print scale 1:200 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 264 510 North: 7 019 520

New WTG Shadow receptor

Flicker map level: Height Contours: CONTOURLINE_Lasor tuulivoimahanke 2022_0.wpo (3)

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

Liite 9. Melun yhteismallinnuksen tulokset VE1

Project:

Lasor tuulivoimahanke 2023

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Miikka Saranpää / miikka.saranpaa@fcg.fi

Calculated:

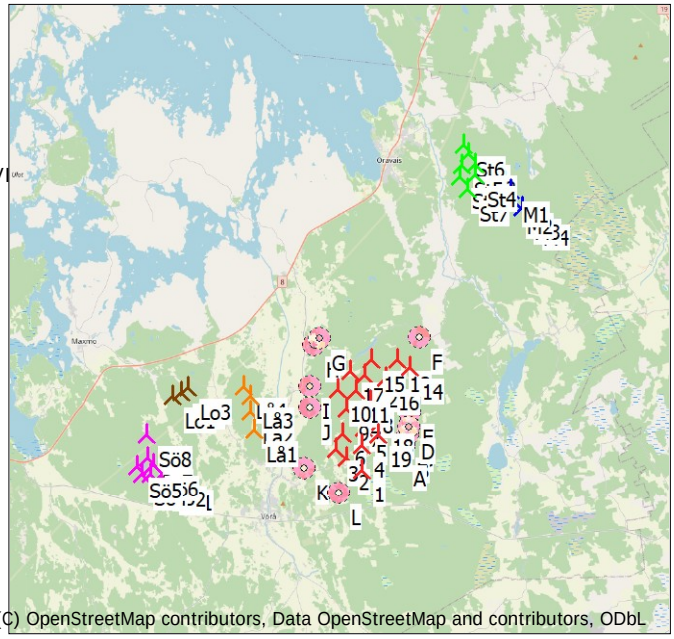
14.7.2023 9.04/3.5.584

DECIBEL - Main Result

Calculation: Lasor_VE1_19xV172xHH194 + Låtlax + Lotlax + Söderskogen + Storbacken + Mörknässkogen

Noise calculation model:
ISO 9613-2 General
Wind speed (in 10 m height):
8,0 m/s
Ground attenuation:
General, terrain specific
Ground factor for porous ground: 0,4
Area object with hard ground: Area object (Roughness): REGIONS_Lasor_ZVI
Area type with hard ground: vesistöt
Ground factor for hard ground: 0,0
Meteorological coefficient, C0:
0,0 dB
Type of demand in calculation:
1: WTG noise is compared to demand (DK, DE, SE, NL etc.)
Noise values in calculation:
All noise values are mean values (Lwa) (Normal)
Pure tones:
Ignore pure tones setting on WTG
Height above ground level, when no value in NSA object:
4,0 m; Don't allow override of model height with height from NSA object
Uncertainty margin:
0,0 dB; Uncertainty margin in model has priority
Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:
0,0 dB(A)

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89



Scale 1:400 000

New WTG

Noise sensitive area

WTGs

	East	North	Z [m]	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Noise data Creator	Name	Wind speed [m/s]	LwA,ref [dB(A)]
1	265 860	7 011 060	40,0	VESTAS V172-7.2 7200 172.0...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
10	264 871	7 015 451	34,5	VESTAS V172-7.2 7200 172.0...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
11	265 796	7 015 259	39,8	VESTAS V172-7.2 7200 172.0...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
12	266 380	7 016 090	44,5	VESTAS V172-7.2 7200 172.0...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
13	268 137	7 016 809	31,7	VESTAS V172-7.2 7200 172.0...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
14	268 822	7 016 315	40,0	VESTAS V172-7.2 7200 172.0...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
15	266 770	7 016 850	43,5	VESTAS V172-7.2 7200 172.0...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
16	267 439	7 015 897	37,5	VESTAS V172-7.2 7200 172.0...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
17	265 604	7 016 343	20,0	VESTAS V172-7.2 7200 172.0...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
18	267 010	7 013 530	40,8	VESTAS V172-7.2 7200 172.0...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
19	266 794	7 012 894	40,4	VESTAS V172-7.2 7200 172.0...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
2	265 074	7 011 774	34,4	VESTAS V172-7.2 7200 172.0...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
3	264 546	7 012 237	34,4	VESTAS V172-7.2 7200 172.0...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
4	265 960	7 012 340	40,0	VESTAS V172-7.2 7200 172.0...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
5	266 070	7 013 270	35,0	VESTAS V172-7.2 7200 172.0...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
6	264 950	7 013 100	40,0	VESTAS V172-7.2 7200 172.0...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
7	265 850	7 014 020	40,0	VESTAS V172-7.2 7200 172.0...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
8	266 560	7 014 700	40,0	VESTAS V172-7.2 7200 172.0...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
9	265 278	7 014 371	40,2	VESTAS V172-7.2 7200 172.0...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
Lo1	256 101	7 015 724	26,7	PROKON P3000-116 3030 11...	Yes	PROKON	P3000-116-3 030	3 030	116,7	122,0	USER	Mode 0 - 106,5 dB(A) (manufacturer's warranty)	8,0	106,5
Lo2	256 554	7 015 922	32,5	PROKON P3000-116 3030 11...	Yes	PROKON	P3000-116-3 030	3 030	116,7	122,0	USER	Mode 0 - 106,5 dB(A) (manufacturer's warranty)	8,0	106,5
Lo3	256 967	7 016 054	29,3	PROKON P3000-116 3030 11...	Yes	PROKON	P3000-116-3 030	3 030	116,7	122,0	USER	Mode 0 - 106,5 dB(A) (manufacturer's warranty)	8,0	106,5
Lå1	260 282	7 013 598	20,0	VESTAS V150-4.2 4200 150.0...	Yes	VESTAS	V150-4.2-4 200	4 200	150,0	140,0	USER	Copy of Mode PO1 STE	8,0	104,9
Lå2	260 183	7 014 579	27,2	VESTAS V150-4.2 4200 150.0...	Yes	VESTAS	V150-4.2-4 200	4 200	150,0	140,0	USER	Copy of Mode PO1 STE	8,0	104,9
Lå3	260 216	7 015 423	20,0	VESTAS V150-4.2 4200 150.0...	Yes	VESTAS	V150-4.2-4 200	4 200	150,0	140,0	USER	Copy of Mode PO1 STE	8,0	104,9
Lå4	259 928	7 015 932	27,5	VESTAS V150-4.2 4200 150.0...	Yes	VESTAS	V150-4.2-4 200	4 200	150,0	140,0	USER	Copy of Mode PO1 STE	8,0	104,9
M1	274 763	7 025 285	32,5	NORDEX N163/5,7MW 5700 1...	Yes	NORDEX	N163/5,7MW-5 700	5 700	163,0	158,0	USER	N163-5,7MW Mode 00 - 107.2 dB(A) + 2 dB	8,0	109,2
M2	274 926	7 024 666	32,8	NORDEX N163/5,7MW 5700 1...	Yes	NORDEX	N163/5,7MW-5 700	5 700	163,0	158,0	USER	N163-5,7MW Mode 00 - 107.2 dB(A) + 2 dB	8,0	109,2
M3	275 298	7 024 342	35,0	NORDEX N163/5,7MW 5700 1...	Yes	NORDEX	N163/5,7MW-5 700	5 700	163,0	158,0	USER	N163-5,7MW Mode 00 - 107.2 dB(A) + 2 dB	8,0	109,2
M4	275 772	7 024 008	40,0	NORDEX N163/5,7MW 5700 1...	Yes	NORDEX	N163/5,7MW-5 700	5 700	163,0	158,0	USER	N163-5,7MW Mode 00 - 107.2 dB(A) + 2 dB	8,0	109,2
St1	272 700	7 027 390	30,0	VESTAS V150-4.2 HH145 420...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	USER	Level 0 - - Mode 0/PO1 - 10-2017	8,0	104,9
St2	273 002	7 026 818	30,0	VESTAS V150-4.2 HH145 420...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	USER	Level 0 - - Mode 0/PO1 - 10-2017	8,0	104,9
St3	272 153	7 026 165	30,0	VESTAS V150-4.2 HH145 420...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	USER	Level 0 - - Mode 0/PO1 - 10-2017	8,0	104,9
St4	272 991	7 026 229	30,0	VESTAS V150-4.2 HH145 420...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	USER	Level 0 - - Mode 0/PO1 - 10-2017	8,0	104,9
St5	272 290	7 026 760	26,1	VESTAS V150-4.2 HH145 420...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	USER	Level 0 - - Mode 0/PO1 - 10-2017	8,0	104,9
St6	272 494	7 027 846	25,1	VESTAS V150-4.2 HH145 420...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	USER	Level 0 - - Mode 0/PO1 - 10-2017	8,0	104,9
St7	272 483	7 025 533	30,2	VESTAS V150-4.2 HH145 420...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	USER	Level 0 - - Mode 0/PO1 - 10-2017	8,0	104,9
Sö1	255 445	7 011 327	45,9	Generic RD180 7700 180.0 IO...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	USER	Mode 0.a No STE	8,0	109,2
Sö2	255 137	7 011 612	50,0	Generic RD180 7700 180.0 IO...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	USER	Mode 0.a No STE	8,0	109,2
Sö3	254 614	7 011 705	37,5	Generic RD180 7700 180.0 IO...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	USER	Mode 0.a No STE	8,0	109,2
Sö4	254 111	7 011 739	25,0	Generic RD180 7700 180.0 IO...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	USER	Mode 0.a No STE	8,0	109,2
Sö5	253 945	7 012 144	32,5	Generic RD180 7700 180.0 IO...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	USER	Mode 0.a No STE	8,0	109,2
Sö6	254 771	7 012 174	40,0	Generic RD180 7700 180.0 IO...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	USER	Mode 0.a No STE	8,0	109,2
Sö7	254 521	7 012 552	32,9	Generic RD180 7700 180.0 IO...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	USER	Mode 0.a No STE	8,0	109,2
Sö8	254 528	7 013 790	20,0	Generic RD180 7700 180.0 IO...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	USER	Mode 0.a No STE	8,0	109,2

Calculation Results

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Calculated:
14.7.2023 9.04/3.5.584

DECIBEL - Main Result

Calculation: Lasor_VE1_19xV172xHH194 + Låtlax + Lotlax + Söderskogen + Storbacken + Mörknässkogen

Sound level

Noise sensitive area No.	Name	East	North	Z	Immission height	Demands Noise	Sound level From WTGs	Distance to noise demand	2 dB penalty applied for one or more WTGs
				[m]	[m]	[dB(A)]	[dB(A)]	[m]	
A	A Lomarakennus (Söderändan 49)	267 990	7 011 759	42,5	4,0	40,0	35,9	740	No
B	B Asuinrakennus (Söderändan 81)	268 161	7 012 123	37,5	4,0	40,0	36,6	660	No
C	C Lomarakennus (Säderändan 166)	268 388	7 012 783	39,1	4,0	40,0	37,3	594	No
D	D Lomarakennus (Söderändan 188)	268 493	7 013 188	37,8	4,0	40,0	37,7	608	No
E	E Asuinrakennus (Rökiöntie 930)	268 646	7 013 924	38,1	4,0	40,0	36,3	770	No
F	F Asuinrakennus (Kukkusintie 474)	269 409	7 017 903	25,0	4,0	40,0	34,4	846	No
G	G Asuinrakennus (Kovik byväg 53)	264 096	7 018 174	10,0	4,0	40,0	32,3	1 546	No
H	H Asuinrakennus (Vöyrintie 1021)	263 817	7 017 837	8,5	4,0	40,0	32,6	1 490	No
I	I Lomarakennus (Ehrsbackavägen 29)	263 418	7 015 700	21,7	4,0	40,0	36,0	672	No
J	J Asuinrakennus (Kleidersvägen 118)	263 377	7 014 578	13,7	4,0	40,0	36,4	790	No
K	K Asuinrakennus (Rökiöntie 154)	262 790	7 011 335	27,5	4,0	40,0	33,5	1 165	No
L	L Asuinrakennus (Bjurbäcksvägen 231)	264 546	7 009 923	27,8	4,0	40,0	34,3	939	No

Distances (m)

WTG	A	B	C	D	E	F	G	H	I	J	K	L
1	2240	2533	3057	3383	3993	7704	7325	7073	5240	4303	3080	1736
10	4830	4676	4411	4268	4069	5155	2830	2607	1474	1730	4609	5533
11	4128	3925	3582	3398	3145	4474	3373	3248	2418	2512	4940	5477
12	4618	4345	3867	3588	3133	3529	3090	3099	2986	3361	5954	6430
13	5050	4683	4032	3637	2928	1677	4263	4438	4845	5255	7648	7762
14	4629	4241	3557	3143	2396	1692	5076	5228	5436	5712	7817	7685
15	5232	4924	4375	4045	3474	2840	2982	3111	3542	4081	6796	7270
16	4172	3840	3254	2906	2312	2810	4042	4106	4024	4269	6509	6634
17	5164	4931	4516	4275	3884	4111	2371	2327	2277	2840	5740	6502
18	2023	1816	1566	1521	1681	4985	5479	5358	4194	3779	4753	4365
19	1647	1568	1596	1723	2117	5648	5926	5767	4388	3808	4294	3723
2	2915	3105	3462	3698	4166	7503	6470	6187	4258	3275	2324	1923
3	3475	3614	3877	4057	4430	7462	5950	5643	3640	2615	1973	2313
4	2110	2210	2466	2670	3116	6542	6121	5896	4211	3416	3323	2798
5	2442	2383	2367	2423	2656	5708	5283	5089	3595	2992	3805	3675
6	3321	3354	3450	3542	3784	6550	5142	4867	3016	2157	2787	3200
7	3111	2988	2822	2769	2796	5265	4506	4321	2954	2534	4068	4296
8	3268	3032	2647	2453	2224	4285	4257	4164	3295	3184	5050	5181
9	3763	3654	3490	3424	3396	5433	3980	3758	2284	1911	3922	4505
Lo1	12524	12577	12625	12640	12665	13477	8356	7995	7312	7360	7995	10238
Lo2	12163	12205	12235	12241	12248	12999	7866	7507	6863	6949	7737	9987
Lo3	11823	11857	11873	11870	11864	12571	7433	7074	6457	6574	7491	9743
Lå1	7919	8011	8142	8216	8365	10086	5953	5516	3773	3244	3376	5626
Lå2	8296	8342	8394	8421	8483	9801	5310	4877	3421	3192	4159	6377
Lå3	8589	8598	8582	8568	8557	9516	4753	4333	3212	3270	4828	6995
Lå4	9072	9066	9021	8988	8940	9678	4729	4328	3495	3703	5412	7574
M1	15118	14716	14026	13618	12896	9113	12813	13232	14843	15621	18372	18438
M2	14644	14243	13556	13150	12436	8722	12620	13032	14580	15326	18016	18019
M3	14543	14142	13460	13058	12354	8720	12781	13188	14682	15401	18034	17975
M4	14504	14105	13429	13033	12341	8813	13045	13446	14879	15566	18131	18000
St1	16316	15918	15222	14803	14055	10035	12601	13037	14918	15836	18855	19265
St2	15862	15463	14766	14348	13602	9606	12404	12839	14670	15562	18536	18881
St3	14987	14590	13894	13475	12726	8700	11341	11776	13623	14527	17527	17924
St4	15301	14901	14204	13787	13042	9058	11993	12426	14222	15097	18041	18352
St5	15595	15199	14503	14084	13335	9307	11861	12297	14170	15086	18104	18521
St6	16696	16299	15604	15185	14436	10404	12802	13239	15153	16089	19139	19594
St7	14480	14081	13384	12966	12220	8221	11151	11583	13366	14237	17180	17501
Sö1	12544	12733	13016	13172	13445	15426	11025	10598	9087	8566	7340	9203
Sö2	12846	13026	13294	13440	13696	15587	11097	10674	9229	8751	7653	9553
Sö3	13367	13545	13807	13949	14197	16031	11471	11051	9661	9215	8179	10084
Sö4	13870	14046	14305	14446	14688	16483	11871	11455	10108	9684	8683	10585
Sö5	14041	14207	14447	14576	14798	16491	11799	11388	10112	9734	8876	10824
Sö6	13217	13381	13621	13751	13975	15710	11081	10665	9332	8929	8058	10024
Sö7	13484	13638	13860	13978	14182	15811	11096	10686	9431	9078	8353	10357
Sö8	13606	13725	13887	13969	14109	15429	10517	10126	9087	8878	8614	10731

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Calculated:
14.7.2023 9.04/3.5.584

DECIBEL - Detailed results

Calculation: Lasor_VE1_19xV172xHH194 + Låtlax + Lotlax + Söderskogen + Storbacken + Mörknässkogen Noise calculation model: ISO 9613-2 General 8,0 m/s

Assumptions

Calculated L(DW) = LWA,ref + K + Dc - (Adiv + Aatm + Agr + Abar + Amisc) - Cmet
(when calculated with ground attenuation, then Dc = Domega)

LWA,ref:	Sound pressure level at WTG
K:	Pure tone
Dc:	Directivity correction
Adiv:	the attenuation due to geometrical divergence
Aatm:	the attenuation due to atmospheric absorption
Agr:	the attenuation due to ground effect
Abar:	the attenuation due to a barrier
Amisc:	the attenuation due to miscellaneous other effects
Cmet:	Meteorological correction

Calculation Results

Noise sensitive area: A A Lomarakennus (Söderändan 49)

Wind speed: 8,0 m/s
WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	2 240	2 248	0	25,95	106,9	0,00	78,04	-	-	0,00	0,00	-
10	4 830	4 833	0	16,43	106,9	0,00	84,68	-	-	0,00	0,00	-
11	4 128	4 132	0	18,47	106,9	0,00	83,32	-	-	0,00	0,00	-
12	4 618	4 622	0	17,02	106,9	0,00	84,30	-	-	0,00	0,00	-
13	5 050	5 053	0	15,88	106,9	0,00	85,07	-	-	0,00	0,00	-
14	4 629	4 632	0	17,04	106,9	0,00	84,32	-	-	0,00	0,00	-
15	5 232	5 235	0	15,40	106,9	0,00	85,38	-	-	0,00	0,00	-
16	4 172	4 176	0	18,36	106,9	0,00	83,42	-	-	0,00	0,00	-
17	5 164	5 167	0	15,56	106,9	0,00	85,26	-	-	0,00	0,00	-
18	2 023	2 032	0	27,25	106,9	0,00	77,16	-	-	0,00	0,00	-
19	1 647	1 658	0	29,60	106,9	0,00	75,39	-	-	0,00	0,00	-
2	2 915	2 920	0	22,79	106,9	0,00	80,31	-	-	0,00	0,00	-
3	3 475	3 479	0	20,61	106,9	0,00	81,83	-	-	0,00	0,00	-
4	2 110	2 119	0	26,72	106,9	0,00	77,52	-	-	0,00	0,00	-
5	2 442	2 449	0	25,00	106,9	0,00	78,78	-	-	0,00	0,00	-
6	3 321	3 326	0	21,22	106,9	0,00	81,44	-	-	0,00	0,00	-
7	3 111	3 117	0	22,04	106,9	0,00	80,87	-	-	0,00	0,00	-
8	3 268	3 274	0	21,43	106,9	0,00	81,30	-	-	0,00	0,00	-
9	3 763	3 768	0	19,64	106,9	0,00	82,52	-	-	0,00	0,00	-
Lo1	12 524	12 525	0	2,84	106,5	0,00	92,96	-	-	0,00	0,00	-
Lo2	12 163	12 163	0	3,20	106,5	0,00	92,70	-	-	0,00	0,00	-
Lo3	11 823	11 824	0	3,57	106,5	0,00	92,46	-	-	0,00	0,00	-
Lå1	7 919	7 920	0	7,13	104,9	0,00	88,97	-	-	0,00	0,00	-
Lå2	8 296	8 296	0	6,53	104,9	0,00	89,38	-	-	0,00	0,00	-
Lå3	8 589	8 590	0	6,08	104,9	0,00	89,68	-	-	0,00	0,00	-
Lå4	9 072	9 073	0	5,38	104,9	0,00	90,16	-	-	0,00	0,00	-
M1	15 118	15 119	0	2,44	109,2	0,00	94,59	-	-	0,00	0,00	-
M2	14 644	14 645	0	2,83	109,2	0,00	94,31	-	-	0,00	0,00	-
M3	14 543	14 544	0	2,92	109,2	0,00	94,25	-	-	0,00	0,00	-
M4	14 504	14 504	0	2,95	109,2	0,00	94,23	-	-	0,00	0,00	-
St1	16 316	16 316	0	-2,24	104,9	0,00	95,25	-	-	0,00	0,00	-
St2	15 862	15 862	0	-1,87	104,9	0,00	95,01	-	-	0,00	0,00	-
St3	14 987	14 987	0	-1,12	104,9	0,00	94,51	-	-	0,00	0,00	-
St4	15 301	15 301	0	-1,38	104,9	0,00	94,69	-	-	0,00	0,00	-
St5	15 595	15 596	0	-1,65	104,9	0,00	94,86	-	-	0,00	0,00	-
St6	16 696	16 696	0	-2,54	104,9	0,00	95,45	-	-	0,00	0,00	-
St7	14 480	14 480	0	-0,68	104,9	0,00	94,22	-	-	0,00	0,00	-
Sö1	12 544	12 546	0	3,13	109,2	0,00	92,97	-	-	0,00	0,00	-
Sö2	12 846	12 847	0	2,84	109,2	0,00	93,18	-	-	0,00	0,00	-
Sö3	13 367	13 369	0	2,35	109,2	0,00	93,52	-	-	0,00	0,00	-
Sö4	13 870	13 871	0	1,90	109,2	0,00	93,84	-	-	0,00	0,00	-
Sö5	14 041	14 043	0	1,76	109,2	0,00	93,95	-	-	0,00	0,00	-
Sö6	13 217	13 219	0	2,50	109,2	0,00	93,42	-	-	0,00	0,00	-

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14.7.2023 9.04/3.5.584

DECIBEL - Detailed results

Calculation: Lasor_VE1_19xV172xHH194 + Låtlax + Lotlax + Söderskogen + Storbacken + Mörknässkogen Noise calculation model: ISO 9613-2 General 8,0 m/s

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WTG No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
Sö7	13 484	13 485	0	2,25	109,2	0,00	93,60	-	-	0,00	0,00	-
Sö8	13 606	13 607	0	2,15	109,2	0,00	93,68	-	-	0,00	0,00	-
Sum				35,90								

- Data undefined due to calculation with octave data

Noise sensitive area: B B Asuinrakennus (Söderändan 81)

Wind speed: 8,0 m/s

WTG No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	2 533	2 540	0	24,95	106,9	0,00	79,10	-	-	0,00	0,00	-
10	4 676	4 680	0	17,39	106,9	0,00	84,40	-	-	0,00	0,00	-
11	3 925	3 930	0	19,68	106,9	0,00	82,89	-	-	0,00	0,00	-
12	4 345	4 350	0	18,44	106,9	0,00	83,77	-	-	0,00	0,00	-
13	4 683	4 687	0	17,57	106,9	0,00	84,42	-	-	0,00	0,00	-
14	4 241	4 246	0	18,50	106,9	0,00	83,56	-	-	0,00	0,00	-
15	4 924	4 928	0	16,97	106,9	0,00	84,85	-	-	0,00	0,00	-
16	3 840	3 845	0	20,07	106,9	0,00	82,70	-	-	0,00	0,00	-
17	4 931	4 934	0	16,77	106,9	0,00	84,86	-	-	0,00	0,00	-
18	1 816	1 827	0	28,99	106,9	0,00	76,23	-	-	0,00	0,00	-
19	1 568	1 580	0	30,54	106,9	0,00	74,97	-	-	0,00	0,00	-
2	3 105	3 111	0	22,51	106,9	0,00	80,86	-	-	0,00	0,00	-
3	3 614	3 619	0	20,58	106,9	0,00	82,17	-	-	0,00	0,00	-
4	2 210	2 219	0	26,57	106,9	0,00	77,92	-	-	0,00	0,00	-
5	2 383	2 391	0	25,70	106,9	0,00	78,57	-	-	0,00	0,00	-
6	3 354	3 360	0	21,55	106,9	0,00	81,53	-	-	0,00	0,00	-
7	2 988	2 994	0	23,01	106,9	0,00	80,52	-	-	0,00	0,00	-
8	3 032	3 038	0	22,93	106,9	0,00	80,65	-	-	0,00	0,00	-
9	3 654	3 659	0	20,49	106,9	0,00	82,27	-	-	0,00	0,00	-
Lo1	12 577	12 578	0	3,16	106,5	0,00	92,99	-	-	0,00	0,00	-
Lo2	12 205	12 206	0	3,54	106,5	0,00	92,73	-	-	0,00	0,00	-
Lo3	11 857	11 857	0	3,92	106,5	0,00	92,48	-	-	0,00	0,00	-
Lå1	8 011	8 012	0	7,38	104,9	0,00	89,07	-	-	0,00	0,00	-
Lå2	8 342	8 343	0	6,91	104,9	0,00	89,43	-	-	0,00	0,00	-
Lå3	8 598	8 598	0	6,52	104,9	0,00	89,69	-	-	0,00	0,00	-
Lå4	9 066	9 066	0	5,83	104,9	0,00	90,15	-	-	0,00	0,00	-
M1	14 716	14 717	0	2,77	109,2	0,00	94,36	-	-	0,00	0,00	-
M2	14 243	14 243	0	3,17	109,2	0,00	94,07	-	-	0,00	0,00	-
M3	14 142	14 143	0	3,26	109,2	0,00	94,01	-	-	0,00	0,00	-
M4	14 105	14 106	0	3,29	109,2	0,00	93,99	-	-	0,00	0,00	-
St1	15 918	15 918	0	-1,93	104,9	0,00	95,04	-	-	0,00	0,00	-
St2	15 463	15 463	0	-1,53	104,9	0,00	94,79	-	-	0,00	0,00	-
St3	14 590	14 590	0	-0,79	104,9	0,00	94,28	-	-	0,00	0,00	-
St4	14 901	14 902	0	-1,05	104,9	0,00	94,46	-	-	0,00	0,00	-
St5	15 199	15 199	0	-1,32	104,9	0,00	94,64	-	-	0,00	0,00	-
St6	16 299	16 300	0	-2,13	104,9	0,00	95,24	-	-	0,00	0,00	-
St7	14 081	14 081	0	-0,31	104,9	0,00	93,97	-	-	0,00	0,00	-
Sö1	12 733	12 734	0	3,32	109,2	0,00	93,10	-	-	0,00	0,00	-
Sö2	13 026	13 027	0	3,04	109,2	0,00	93,30	-	-	0,00	0,00	-
Sö3	13 545	13 546	0	2,55	109,2	0,00	93,64	-	-	0,00	0,00	-
Sö4	14 046	14 047	0	2,09	109,2	0,00	93,95	-	-	0,00	0,00	-
Sö5	14 207	14 208	0	1,95	109,2	0,00	94,05	-	-	0,00	0,00	-
Sö6	13 381	13 383	0	2,69	109,2	0,00	93,53	-	-	0,00	0,00	-
Sö7	13 638	13 639	0	2,45	109,2	0,00	93,70	-	-	0,00	0,00	-
Sö8	13 725	13 727	0	2,35	109,2	0,00	93,75	-	-	0,00	0,00	-
Sum				36,63								

- Data undefined due to calculation with octave data

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DECIBEL - Detailed results

Calculation: Lasor_VE1_19xV172xHH194 + Låtlax + Lotlax + Söderskogen + Storbacken + Mörknässkogen Noise calculation model: ISO 9613-2 General 8,0 m/s

Noise sensitive area: C C Lomarakennus (Säderändan 166)

Wind speed: 8,0 m/s
WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	3 057	3 063	0	23,39	106,9	0,00	80,72	-	-	0,00	0,00	-
10	4 411	4 415	0	18,46	106,9	0,00	83,90	-	-	0,00	0,00	-
11	3 582	3 587	0	20,99	106,9	0,00	82,10	-	-	0,00	0,00	-
12	3 867	3 872	0	19,61	106,9	0,00	82,76	-	-	0,00	0,00	-
13	4 032	4 036	0	18,77	106,9	0,00	83,12	-	-	0,00	0,00	-
14	3 557	3 562	0	20,41	106,9	0,00	82,03	-	-	0,00	0,00	-
15	4 375	4 379	0	17,70	106,9	0,00	83,83	-	-	0,00	0,00	-
16	3 254	3 260	0	21,48	106,9	0,00	81,26	-	-	0,00	0,00	-
17	4 516	4 520	0	17,81	106,9	0,00	84,10	-	-	0,00	0,00	-
18	1 566	1 578	0	30,96	106,9	0,00	74,96	-	-	0,00	0,00	-
19	1 596	1 608	0	30,81	106,9	0,00	75,12	-	-	0,00	0,00	-
2	3 462	3 467	0	21,73	106,9	0,00	81,80	-	-	0,00	0,00	-
3	3 877	3 882	0	20,30	106,9	0,00	82,78	-	-	0,00	0,00	-
4	2 466	2 474	0	25,84	106,9	0,00	78,87	-	-	0,00	0,00	-
5	2 367	2 374	0	26,29	106,9	0,00	78,51	-	-	0,00	0,00	-
6	3 450	3 455	0	21,74	106,9	0,00	81,77	-	-	0,00	0,00	-
7	2 822	2 828	0	24,15	106,9	0,00	80,03	-	-	0,00	0,00	-
8	2 647	2 654	0	24,66	106,9	0,00	79,48	-	-	0,00	0,00	-
9	3 490	3 495	0	21,54	106,9	0,00	81,87	-	-	0,00	0,00	-
Lo1	12 625	12 626	0	3,59	106,5	0,00	93,03	-	-	0,00	0,00	-
Lo2	12 235	12 236	0	3,99	106,5	0,00	92,75	-	-	0,00	0,00	-
Lo3	11 873	11 873	0	4,38	106,5	0,00	92,49	-	-	0,00	0,00	-
Lå1	8 142	8 142	0	7,78	104,9	0,00	89,22	-	-	0,00	0,00	-
Lå2	8 394	8 395	0	7,37	104,9	0,00	89,48	-	-	0,00	0,00	-
Lå3	8 582	8 583	0	7,07	104,9	0,00	89,67	-	-	0,00	0,00	-
Lå4	9 021	9 022	0	6,41	104,9	0,00	90,11	-	-	0,00	0,00	-
M1	14 026	14 027	0	3,37	109,2	0,00	93,94	-	-	0,00	0,00	-
M2	13 556	13 556	0	3,79	109,2	0,00	93,64	-	-	0,00	0,00	-
M3	13 460	13 461	0	3,87	109,2	0,00	93,58	-	-	0,00	0,00	-
M4	13 429	13 430	0	3,90	109,2	0,00	93,56	-	-	0,00	0,00	-
St1	15 222	15 222	0	-1,35	104,9	0,00	94,65	-	-	0,00	0,00	-
St2	14 766	14 766	0	-0,95	104,9	0,00	94,39	-	-	0,00	0,00	-
St3	13 894	13 895	0	-0,16	104,9	0,00	93,86	-	-	0,00	0,00	-
St4	14 204	14 205	0	-0,44	104,9	0,00	94,05	-	-	0,00	0,00	-
St5	14 503	14 504	0	-0,72	104,9	0,00	94,23	-	-	0,00	0,00	-
St6	15 604	15 605	0	-1,68	104,9	0,00	94,87	-	-	0,00	0,00	-
St7	13 384	13 385	0	0,33	104,9	0,00	93,53	-	-	0,00	0,00	-
Sö1	13 016	13 018	0	3,55	109,2	0,00	93,29	-	-	0,00	0,00	-
Sö2	13 294	13 295	0	3,28	109,2	0,00	93,47	-	-	0,00	0,00	-
Sö3	13 807	13 808	0	2,80	109,2	0,00	93,80	-	-	0,00	0,00	-
Sö4	14 305	14 307	0	2,35	109,2	0,00	94,11	-	-	0,00	0,00	-
Sö5	14 447	14 449	0	2,23	109,2	0,00	94,20	-	-	0,00	0,00	-
Sö6	13 621	13 623	0	2,97	109,2	0,00	93,69	-	-	0,00	0,00	-
Sö7	13 860	13 861	0	2,75	109,2	0,00	93,84	-	-	0,00	0,00	-
Sö8	13 887	13 888	0	2,72	109,2	0,00	93,85	-	-	0,00	0,00	-
Sum				37,30								

- Data undefined due to calculation with octave data

Noise sensitive area: D D Lomarakennus (Söderändan 188)

Wind speed: 8,0 m/s
WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	3 383	3 389	0	22,18	106,9	0,00	81,60	-	-	0,00	0,00	-
10	4 268	4 272	0	19,33	106,9	0,00	83,61	-	-	0,00	0,00	-
11	3 398	3 404	0	22,17	106,9	0,00	81,64	-	-	0,00	0,00	-
12	3 588	3 593	0	21,44	106,9	0,00	82,11	-	-	0,00	0,00	-
13	3 637	3 641	0	21,16	106,9	0,00	82,23	-	-	0,00	0,00	-
14	3 143	3 148	0	22,93	106,9	0,00	80,96	-	-	0,00	0,00	-
15	4 045	4 049	0	19,88	106,9	0,00	83,15	-	-	0,00	0,00	-
16	2 906	2 912	0	23,95	106,9	0,00	80,28	-	-	0,00	0,00	-
17	4 275	4 279	0	19,28	106,9	0,00	83,63	-	-	0,00	0,00	-
18	1 521	1 533	0	31,56	106,9	0,00	74,71	-	-	0,00	0,00	-

To be continued on next page...

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DECIBEL - Detailed results

Calculation: Lasor_VE1_19xV172xHH194 + Låtlax + Lotlax + Söderskogen + Storbacken + Mörknässkogen Noise calculation model: ISO 9613-2 General 8,0 m/s

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WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
19	1 723	1 734	0	30,17	106,9	0,00	75,78	-	-	0,00	0,00	-
2	3 698	3 703	0	21,13	106,9	0,00	82,37	-	-	0,00	0,00	-
3	4 057	4 061	0	19,97	106,9	0,00	83,17	-	-	0,00	0,00	-
4	2 670	2 677	0	25,11	106,9	0,00	79,55	-	-	0,00	0,00	-
5	2 423	2 430	0	26,26	106,9	0,00	78,71	-	-	0,00	0,00	-
6	3 542	3 547	0	21,67	106,9	0,00	82,00	-	-	0,00	0,00	-
7	2 769	2 776	0	24,67	106,9	0,00	79,87	-	-	0,00	0,00	-
8	2 453	2 460	0	26,11	106,9	0,00	78,82	-	-	0,00	0,00	-
9	3 424	3 430	0	22,09	106,9	0,00	81,70	-	-	0,00	0,00	-
Lo1	12 640	12 641	0	3,84	106,5	0,00	93,04	-	-	0,00	0,00	-
Lo2	12 241	12 241	0	4,25	106,5	0,00	92,76	-	-	0,00	0,00	-
Lo3	11 870	11 871	0	4,66	106,5	0,00	92,49	-	-	0,00	0,00	-
Lå1	8 216	8 217	0	7,94	104,9	0,00	89,29	-	-	0,00	0,00	-
Lå2	8 421	8 421	0	7,62	104,9	0,00	89,51	-	-	0,00	0,00	-
Lå3	8 568	8 569	0	7,40	104,9	0,00	89,66	-	-	0,00	0,00	-
Lå4	8 988	8 989	0	6,77	104,9	0,00	90,07	-	-	0,00	0,00	-
M1	13 618	13 618	0	4,45	109,2	0,00	93,68	-	-	0,00	0,00	-
M2	13 150	13 151	0	4,86	109,2	0,00	93,38	-	-	0,00	0,00	-
M3	13 058	13 059	0	4,89	109,2	0,00	93,32	-	-	0,00	0,00	-
M4	13 033	13 034	0	4,87	109,2	0,00	93,30	-	-	0,00	0,00	-
St1	14 803	14 804	0	-0,17	104,9	0,00	94,41	-	-	0,00	0,00	-
St2	14 348	14 349	0	0,24	104,9	0,00	94,14	-	-	0,00	0,00	-
St3	13 475	13 476	0	1,09	104,9	0,00	93,59	-	-	0,00	0,00	-
St4	13 787	13 788	0	0,77	104,9	0,00	93,79	-	-	0,00	0,00	-
St5	14 084	14 085	0	0,50	104,9	0,00	93,98	-	-	0,00	0,00	-
St6	15 185	15 186	0	-0,51	104,9	0,00	94,63	-	-	0,00	0,00	-
St7	12 966	12 967	0	1,59	104,9	0,00	93,26	-	-	0,00	0,00	-
Sö1	13 172	13 173	0	3,63	109,2	0,00	93,39	-	-	0,00	0,00	-
Sö2	13 440	13 442	0	3,37	109,2	0,00	93,57	-	-	0,00	0,00	-
Sö3	13 949	13 951	0	2,89	109,2	0,00	93,89	-	-	0,00	0,00	-
Sö4	14 446	14 447	0	2,45	109,2	0,00	94,20	-	-	0,00	0,00	-
Sö5	14 576	14 577	0	2,34	109,2	0,00	94,27	-	-	0,00	0,00	-
Sö6	13 751	13 752	0	3,08	109,2	0,00	93,77	-	-	0,00	0,00	-
Sö7	13 978	13 979	0	2,87	109,2	0,00	93,91	-	-	0,00	0,00	-
Sö8	13 969	13 970	0	2,88	109,2	0,00	93,90	-	-	0,00	0,00	-
Sum				37,66								

- Data undefined due to calculation with octave data

Noise sensitive area: E E Asuinrakennus (Rökiöntie 930)

Wind speed: 8,0 m/s

WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	3 993	3 997	0	18,85	106,9	0,00	83,04	-	-	0,00	0,00	-
10	4 069	4 073	0	18,60	106,9	0,00	83,20	-	-	0,00	0,00	-
11	3 145	3 150	0	21,85	106,9	0,00	80,97	-	-	0,00	0,00	-
12	3 133	3 139	0	21,90	106,9	0,00	80,94	-	-	0,00	0,00	-
13	2 928	2 934	0	22,73	106,9	0,00	80,35	-	-	0,00	0,00	-
14	2 396	2 404	0	25,15	106,9	0,00	78,62	-	-	0,00	0,00	-
15	3 474	3 479	0	20,61	106,9	0,00	81,83	-	-	0,00	0,00	-
16	2 312	2 320	0	25,58	106,9	0,00	78,31	-	-	0,00	0,00	-
17	3 884	3 888	0	19,20	106,9	0,00	82,79	-	-	0,00	0,00	-
18	1 681	1 692	0	29,25	106,9	0,00	75,57	-	-	0,00	0,00	-
19	2 117	2 126	0	26,61	106,9	0,00	77,55	-	-	0,00	0,00	-
2	4 166	4 171	0	18,30	106,9	0,00	83,40	-	-	0,00	0,00	-
3	4 430	4 434	0	17,51	106,9	0,00	83,94	-	-	0,00	0,00	-
4	3 116	3 122	0	21,96	106,9	0,00	80,89	-	-	0,00	0,00	-
5	2 656	2 662	0	23,92	106,9	0,00	79,51	-	-	0,00	0,00	-
6	3 784	3 789	0	19,53	106,9	0,00	82,57	-	-	0,00	0,00	-
7	2 796	2 802	0	23,30	106,9	0,00	79,95	-	-	0,00	0,00	-
8	2 224	2 232	0	26,04	106,9	0,00	77,97	-	-	0,00	0,00	-
9	3 396	3 401	0	20,89	106,9	0,00	81,63	-	-	0,00	0,00	-
Lo1	12 665	12 665	0	2,68	106,5	0,00	93,05	-	-	0,00	0,00	-
Lo2	12 248	12 249	0	3,10	106,5	0,00	92,76	-	-	0,00	0,00	-

To be continued on next page...

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14.7.2023 9.04/3.5.584

DECIBEL - Detailed results

Calculation: Lasor_VE1_19xV172xHH194 + Låtlax + Lotlax + Söderskogen + Storbacken + Mörknässkogen Noise calculation model: ISO 9613-2 General 8,0 m/s

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WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
Lo3	11 864	11 865	0	3,52	106,5	0,00	92,49	-	-	0,00	0,00	-
Lå1	8 365	8 366	0	6,39	104,9	0,00	89,45	-	-	0,00	0,00	-
Lå2	8 483	8 484	0	6,21	104,9	0,00	89,57	-	-	0,00	0,00	-
Lå3	8 557	8 557	0	6,10	104,9	0,00	89,65	-	-	0,00	0,00	-
Lå4	8 940	8 941	0	5,54	104,9	0,00	90,03	-	-	0,00	0,00	-
M1	12 896	12 897	0	4,40	109,2	0,00	93,21	-	-	0,00	0,00	-
M2	12 436	12 437	0	4,85	109,2	0,00	92,89	-	-	0,00	0,00	-
M3	12 354	12 355	0	5,01	109,2	0,00	92,84	-	-	0,00	0,00	-
M4	12 341	12 342	0	5,26	109,2	0,00	92,83	-	-	0,00	0,00	-
St1	14 055	14 056	0	-0,35	104,9	0,00	93,96	-	-	0,00	0,00	-
St2	13 602	13 603	0	0,07	104,9	0,00	93,67	-	-	0,00	0,00	-
St3	12 726	12 727	0	0,93	104,9	0,00	93,09	-	-	0,00	0,00	-
St4	13 042	13 043	0	0,61	104,9	0,00	93,31	-	-	0,00	0,00	-
St5	13 335	13 336	0	0,33	104,9	0,00	93,50	-	-	0,00	0,00	-
St6	14 436	14 436	0	-0,70	104,9	0,00	94,19	-	-	0,00	0,00	-
St7	12 220	12 221	0	1,46	104,9	0,00	92,74	-	-	0,00	0,00	-
Sö1	13 445	13 447	0	2,28	109,2	0,00	93,57	-	-	0,00	0,00	-
Sö2	13 696	13 698	0	2,05	109,2	0,00	93,73	-	-	0,00	0,00	-
Sö3	14 197	14 198	0	1,61	109,2	0,00	94,04	-	-	0,00	0,00	-
Sö4	14 688	14 690	0	1,19	109,2	0,00	94,34	-	-	0,00	0,00	-
Sö5	14 798	14 800	0	1,11	109,2	0,00	94,41	-	-	0,00	0,00	-
Sö6	13 975	13 977	0	1,80	109,2	0,00	93,91	-	-	0,00	0,00	-
Sö7	14 182	14 183	0	1,62	109,2	0,00	94,04	-	-	0,00	0,00	-
Sö8	14 109	14 110	0	1,69	109,2	0,00	93,99	-	-	0,00	0,00	-
Sum				36,28								

- Data undefined due to calculation with octave data

Noise sensitive area: F F Asuinrakennus (Kukkusintie 474)

Wind speed: 8,0 m/s

WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	7 704	7 707	0	10,68	106,9	0,00	88,74	-	-	0,00	0,00	-
10	5 155	5 159	0	15,54	106,9	0,00	85,25	-	-	0,00	0,00	-
11	4 474	4 479	0	17,38	106,9	0,00	84,02	-	-	0,00	0,00	-
12	3 529	3 535	0	20,41	106,9	0,00	81,97	-	-	0,00	0,00	-
13	1 677	1 688	0	29,28	106,9	0,00	75,55	-	-	0,00	0,00	-
14	1 692	1 705	0	29,17	106,9	0,00	75,63	-	-	0,00	0,00	-
15	2 840	2 848	0	23,10	106,9	0,00	80,09	-	-	0,00	0,00	-
16	2 810	2 817	0	23,23	106,9	0,00	80,00	-	-	0,00	0,00	-
17	4 111	4 115	0	18,47	106,9	0,00	83,29	-	-	0,00	0,00	-
18	4 985	4 990	0	15,98	106,9	0,00	84,96	-	-	0,00	0,00	-
19	5 648	5 651	0	14,34	106,9	0,00	86,04	-	-	0,00	0,00	-
2	7 503	7 506	0	10,99	106,9	0,00	88,51	-	-	0,00	0,00	-
3	7 462	7 465	0	11,05	106,9	0,00	88,46	-	-	0,00	0,00	-
4	6 542	6 545	0	12,58	106,9	0,00	87,32	-	-	0,00	0,00	-
5	5 708	5 711	0	14,20	106,9	0,00	86,13	-	-	0,00	0,00	-
6	6 550	6 554	0	12,56	106,9	0,00	87,33	-	-	0,00	0,00	-
7	5 265	5 269	0	15,26	106,9	0,00	85,43	-	-	0,00	0,00	-
8	4 285	4 290	0	17,94	106,9	0,00	83,65	-	-	0,00	0,00	-
9	5 433	5 436	0	14,85	106,9	0,00	85,71	-	-	0,00	0,00	-
Lo1	13 477	13 477	0	1,93	106,5	0,00	93,59	-	-	0,00	0,00	-
Lo2	12 999	13 000	0	2,38	106,5	0,00	93,28	-	-	0,00	0,00	-
Lo3	12 571	12 572	0	2,79	106,5	0,00	92,99	-	-	0,00	0,00	-
Lå1	10 086	10 086	0	3,98	104,9	0,00	91,07	-	-	0,00	0,00	-
Lå2	9 801	9 802	0	4,35	104,9	0,00	90,83	-	-	0,00	0,00	-
Lå3	9 516	9 517	0	4,73	104,9	0,00	90,57	-	-	0,00	0,00	-
Lå4	9 678	9 679	0	4,53	104,9	0,00	90,72	-	-	0,00	0,00	-
M1	9 113	9 115	0	8,66	109,2	0,00	90,19	-	-	0,00	0,00	-
M2	8 722	8 724	0	9,20	109,2	0,00	89,81	-	-	0,00	0,00	-
M3	8 720	8 722	0	9,20	109,2	0,00	89,81	-	-	0,00	0,00	-
M4	8 813	8 814	0	9,07	109,2	0,00	89,90	-	-	0,00	0,00	-
St1	10 035	10 036	0	4,01	104,9	0,00	91,03	-	-	0,00	0,00	-
St2	9 606	9 607	0	4,57	104,9	0,00	90,65	-	-	0,00	0,00	-

To be continued on next page...

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DECIBEL - Detailed results

Calculation: Lasor_VE1_19xV172xHH194 + Låtlax + Lotlax + Söderskogen + Storbacken + Mörknässkogen Noise calculation model: ISO 9613-2 General 8,0 m/s

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WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
St3	8 700	8 701	0	5,85	104,9	0,00	89,79	-	-	0,00	0,00	-
St4	9 058	9 059	0	5,33	104,9	0,00	90,14	-	-	0,00	0,00	-
St5	9 307	9 308	0	4,98	104,9	0,00	90,38	-	-	0,00	0,00	-
St6	10 404	10 405	0	3,54	104,9	0,00	91,34	-	-	0,00	0,00	-
St7	8 221	8 222	0	6,58	104,9	0,00	89,30	-	-	0,00	0,00	-
Sö1	15 426	15 427	0	0,59	109,2	0,00	94,77	-	-	0,00	0,00	-
Sö2	15 587	15 589	0	0,46	109,2	0,00	94,86	-	-	0,00	0,00	-
Sö3	16 031	16 032	0	0,12	109,2	0,00	95,10	-	-	0,00	0,00	-
Sö4	16 483	16 484	0	-0,22	109,2	0,00	95,34	-	-	0,00	0,00	-
Sö5	16 491	16 493	0	-0,23	109,2	0,00	95,35	-	-	0,00	0,00	-
Sö6	15 710	15 711	0	0,37	109,2	0,00	94,92	-	-	0,00	0,00	-
Sö7	15 811	15 812	0	0,29	109,2	0,00	94,98	-	-	0,00	0,00	-
Sö8	15 429	15 431	0	0,59	109,2	0,00	94,77	-	-	0,00	0,00	-
Sum				34,36								

- Data undefined due to calculation with octave data

Noise sensitive area: G G Asuinrakennus (Kovik byväg 53)

Wind speed: 8,0 m/s

WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	7 325	7 328	0	11,27	106,9	0,00	88,30	-	-	0,00	0,00	-
10	2 830	2 838	0	23,14	106,9	0,00	80,06	-	-	0,00	0,00	-
11	3 373	3 380	0	20,97	106,9	0,00	81,58	-	-	0,00	0,00	-
12	3 090	3 098	0	22,06	106,9	0,00	80,82	-	-	0,00	0,00	-
13	4 263	4 269	0	18,02	106,9	0,00	83,61	-	-	0,00	0,00	-
14	5 076	5 080	0	15,76	106,9	0,00	85,12	-	-	0,00	0,00	-
15	2 982	2 991	0	22,51	106,9	0,00	80,52	-	-	0,00	0,00	-
16	4 042	4 048	0	18,69	106,9	0,00	83,15	-	-	0,00	0,00	-
17	2 371	2 379	0	25,28	106,9	0,00	78,53	-	-	0,00	0,00	-
18	5 479	5 484	0	14,74	106,9	0,00	85,78	-	-	0,00	0,00	-
19	5 926	5 930	0	13,70	106,9	0,00	86,46	-	-	0,00	0,00	-
2	6 470	6 474	0	12,70	106,9	0,00	87,22	-	-	0,00	0,00	-
3	5 950	5 954	0	13,65	106,9	0,00	86,50	-	-	0,00	0,00	-
4	6 121	6 125	0	13,34	106,9	0,00	86,74	-	-	0,00	0,00	-
5	5 283	5 288	0	15,22	106,9	0,00	85,47	-	-	0,00	0,00	-
6	5 142	5 147	0	15,57	106,9	0,00	85,23	-	-	0,00	0,00	-
7	4 506	4 512	0	17,29	106,9	0,00	84,09	-	-	0,00	0,00	-
8	4 257	4 262	0	18,02	106,9	0,00	83,59	-	-	0,00	0,00	-
9	3 980	3 986	0	18,88	106,9	0,00	83,01	-	-	0,00	0,00	-
Lo1	8 356	8 357	0	7,88	106,5	0,00	89,44	-	-	0,00	0,00	-
Lo2	7 866	7 867	0	8,63	106,5	0,00	88,92	-	-	0,00	0,00	-
Lo3	7 433	7 434	0	9,33	106,5	0,00	88,42	-	-	0,00	0,00	-
Lå1	5 953	5 955	0	10,72	104,9	0,00	86,50	-	-	0,00	0,00	-
Lå2	5 310	5 312	0	12,13	104,9	0,00	85,51	-	-	0,00	0,00	-
Lå3	4 753	4 755	0	13,48	104,9	0,00	84,54	-	-	0,00	0,00	-
Lå4	4 729	4 732	0	13,54	104,9	0,00	84,50	-	-	0,00	0,00	-
M1	12 813	12 814	0	4,47	109,2	0,00	93,15	-	-	0,00	0,00	-
M2	12 620	12 621	0	4,66	109,2	0,00	93,02	-	-	0,00	0,00	-
M3	12 781	12 782	0	4,51	109,2	0,00	93,13	-	-	0,00	0,00	-
M4	13 045	13 046	0	4,25	109,2	0,00	93,31	-	-	0,00	0,00	-
St1	12 601	12 602	0	1,06	104,9	0,00	93,01	-	-	0,00	0,00	-
St2	12 404	12 405	0	1,28	104,9	0,00	92,87	-	-	0,00	0,00	-
St3	11 341	11 342	0	2,44	104,9	0,00	92,09	-	-	0,00	0,00	-
St4	11 993	11 994	0	1,71	104,9	0,00	92,58	-	-	0,00	0,00	-
St5	11 861	11 862	0	1,85	104,9	0,00	92,48	-	-	0,00	0,00	-
St6	12 802	12 803	0	0,86	104,9	0,00	93,15	-	-	0,00	0,00	-
St7	11 151	11 153	0	2,65	104,9	0,00	91,95	-	-	0,00	0,00	-
Sö1	11 025	11 028	0	4,72	109,2	0,00	91,85	-	-	0,00	0,00	-
Sö2	11 097	11 100	0	4,64	109,2	0,00	91,91	-	-	0,00	0,00	-
Sö3	11 471	11 473	0	4,23	109,2	0,00	92,19	-	-	0,00	0,00	-
Sö4	11 871	11 873	0	3,81	109,2	0,00	92,49	-	-	0,00	0,00	-
Sö5	11 799	11 801	0	3,89	109,2	0,00	92,44	-	-	0,00	0,00	-
Sö6	11 081	11 083	0	4,66	109,2	0,00	91,89	-	-	0,00	0,00	-

To be continued on next page...

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DECIBEL - Detailed results

Calculation: Lasor_VE1_19xV172xHH194 + Låtlax + Lotlax + Söderskogen + Storbacken + Mörknässkogen Noise calculation model: ISO 9613-2 General 8,0 m/s

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WTG No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
Sö7	11 096	11 098	0	4,64	109,2	0,00	91,91	-	-	0,00	0,00	-
Sö8	10 517	10 519	0	5,30	109,2	0,00	91,44	-	-	0,00	0,00	-
Sum				32,34								

- Data undefined due to calculation with octave data

Noise sensitive area: H H Asuinrakennus (Vöyrintie 1021)

Wind speed: 8,0 m/s

WTG No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	7 073	7 077	0	11,68	106,9	0,00	88,00	-	-	0,00	0,00	-
10	2 607	2 616	0	24,14	106,9	0,00	79,35	-	-	0,00	0,00	-
11	3 248	3 255	0	21,44	106,9	0,00	81,25	-	-	0,00	0,00	-
12	3 099	3 108	0	22,02	106,9	0,00	80,85	-	-	0,00	0,00	-
13	4 438	4 443	0	17,51	106,9	0,00	83,95	-	-	0,00	0,00	-
14	5 228	5 232	0	15,36	106,9	0,00	85,37	-	-	0,00	0,00	-
15	3 111	3 119	0	21,99	106,9	0,00	80,88	-	-	0,00	0,00	-
16	4 106	4 111	0	18,48	106,9	0,00	83,28	-	-	0,00	0,00	-
17	2 327	2 336	0	25,49	106,9	0,00	78,37	-	-	0,00	0,00	-
18	5 358	5 362	0	15,03	106,9	0,00	85,59	-	-	0,00	0,00	-
19	5 767	5 771	0	14,06	106,9	0,00	86,22	-	-	0,00	0,00	-
2	6 187	6 191	0	13,21	106,9	0,00	86,84	-	-	0,00	0,00	-
3	5 643	5 647	0	14,35	106,9	0,00	86,04	-	-	0,00	0,00	-
4	5 896	5 900	0	13,77	106,9	0,00	86,42	-	-	0,00	0,00	-
5	5 089	5 093	0	15,71	106,9	0,00	85,14	-	-	0,00	0,00	-
6	4 867	4 872	0	16,29	106,9	0,00	84,75	-	-	0,00	0,00	-
7	4 321	4 327	0	17,83	106,9	0,00	83,72	-	-	0,00	0,00	-
8	4 164	4 170	0	18,30	106,9	0,00	83,40	-	-	0,00	0,00	-
9	3 758	3 765	0	19,61	106,9	0,00	82,51	-	-	0,00	0,00	-
Lo1	7 995	7 996	0	8,44	106,5	0,00	89,06	-	-	0,00	0,00	-
Lo2	7 507	7 508	0	9,21	106,5	0,00	88,51	-	-	0,00	0,00	-
Lo3	7 074	7 075	0	9,94	106,5	0,00	88,00	-	-	0,00	0,00	-
Lå1	5 516	5 518	0	11,66	104,9	0,00	85,84	-	-	0,00	0,00	-
Lå2	4 877	4 880	0	13,17	104,9	0,00	84,77	-	-	0,00	0,00	-
Lå3	4 333	4 335	0	14,58	104,9	0,00	83,74	-	-	0,00	0,00	-
Lå4	4 328	4 331	0	14,59	104,9	0,00	83,73	-	-	0,00	0,00	-
M1	13 232	13 233	0	4,08	109,2	0,00	93,43	-	-	0,00	0,00	-
M2	13 032	13 034	0	4,27	109,2	0,00	93,30	-	-	0,00	0,00	-
M3	13 188	13 189	0	4,12	109,2	0,00	93,40	-	-	0,00	0,00	-
M4	13 446	13 447	0	3,88	109,2	0,00	93,57	-	-	0,00	0,00	-
St1	13 037	13 038	0	0,62	104,9	0,00	93,30	-	-	0,00	0,00	-
St2	12 839	12 840	0	0,83	104,9	0,00	93,17	-	-	0,00	0,00	-
St3	11 776	11 777	0	1,95	104,9	0,00	92,42	-	-	0,00	0,00	-
St4	12 426	12 427	0	1,25	104,9	0,00	92,89	-	-	0,00	0,00	-
St5	12 297	12 298	0	1,39	104,9	0,00	92,80	-	-	0,00	0,00	-
St6	13 239	13 240	0	0,42	104,9	0,00	93,44	-	-	0,00	0,00	-
St7	11 583	11 584	0	2,15	104,9	0,00	92,28	-	-	0,00	0,00	-
Sö1	10 598	10 601	0	5,20	109,2	0,00	91,51	-	-	0,00	0,00	-
Sö2	10 674	10 677	0	5,12	109,2	0,00	91,57	-	-	0,00	0,00	-
Sö3	11 051	11 054	0	4,69	109,2	0,00	91,87	-	-	0,00	0,00	-
Sö4	11 455	11 457	0	4,25	109,2	0,00	92,18	-	-	0,00	0,00	-
Sö5	11 388	11 391	0	4,33	109,2	0,00	92,13	-	-	0,00	0,00	-
Sö6	10 665	10 668	0	5,13	109,2	0,00	91,56	-	-	0,00	0,00	-
Sö7	10 686	10 689	0	5,11	109,2	0,00	91,58	-	-	0,00	0,00	-
Sö8	10 126	10 128	0	5,77	109,2	0,00	91,11	-	-	0,00	0,00	-
Sum				32,64								

- Data undefined due to calculation with octave data

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14.7.2023 9.04/3.5.584

DECIBEL - Detailed results

Calculation: Lasor_VE1_19xV172xHH194 + Låtlax + Lotlax + Söderskogen + Storbacken + Mörknässkogen Noise calculation model: ISO 9613-2 General 8,0 m/s

Noise sensitive area: I I Lomarakennus (Ehrsbackavägen 29)

Wind speed: 8,0 m/s
WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	5 240	5 244	0	15,32	106,9	0,00	85,39	-	-	0,00	0,00	-
10	1 474	1 487	0	30,71	106,9	0,00	74,45	-	-	0,00	0,00	-
11	2 418	2 427	0	25,04	106,9	0,00	78,70	-	-	0,00	0,00	-
12	2 986	2 993	0	22,48	106,9	0,00	80,52	-	-	0,00	0,00	-
13	4 845	4 849	0	16,35	106,9	0,00	84,71	-	-	0,00	0,00	-
14	5 436	5 440	0	14,84	106,9	0,00	85,71	-	-	0,00	0,00	-
15	3 542	3 548	0	20,36	106,9	0,00	82,00	-	-	0,00	0,00	-
16	4 024	4 029	0	18,74	106,9	0,00	83,10	-	-	0,00	0,00	-
17	2 277	2 285	0	25,76	106,9	0,00	78,18	-	-	0,00	0,00	-
18	4 194	4 199	0	18,21	106,9	0,00	83,46	-	-	0,00	0,00	-
19	4 388	4 393	0	17,63	106,9	0,00	83,85	-	-	0,00	0,00	-
2	4 258	4 263	0	18,02	106,9	0,00	83,59	-	-	0,00	0,00	-
3	3 640	3 645	0	20,02	106,9	0,00	82,23	-	-	0,00	0,00	-
4	4 211	4 216	0	18,16	106,9	0,00	83,50	-	-	0,00	0,00	-
5	3 595	3 601	0	20,18	106,9	0,00	82,13	-	-	0,00	0,00	-
6	3 016	3 023	0	22,36	106,9	0,00	80,61	-	-	0,00	0,00	-
7	2 954	2 961	0	22,62	106,9	0,00	80,43	-	-	0,00	0,00	-
8	3 295	3 302	0	21,26	106,9	0,00	81,38	-	-	0,00	0,00	-
9	2 284	2 294	0	25,71	106,9	0,00	78,21	-	-	0,00	0,00	-
Lo1	7 312	7 313	0	9,53	106,5	0,00	88,28	-	-	0,00	0,00	-
Lo2	6 863	6 864	0	10,33	106,5	0,00	87,73	-	-	0,00	0,00	-
Lo3	6 457	6 458	0	11,08	106,5	0,00	87,20	-	-	0,00	0,00	-
Lå1	3 773	3 775	0	16,45	104,9	0,00	82,54	-	-	0,00	0,00	-
Lå2	3 421	3 424	0	17,76	104,9	0,00	81,69	-	-	0,00	0,00	-
Lå3	3 212	3 215	0	18,60	104,9	0,00	81,14	-	-	0,00	0,00	-
Lå4	3 495	3 498	0	17,47	104,9	0,00	81,88	-	-	0,00	0,00	-
M1	14 843	14 844	0	2,67	109,2	0,00	94,43	-	-	0,00	0,00	-
M2	14 580	14 581	0	2,89	109,2	0,00	94,28	-	-	0,00	0,00	-
M3	14 682	14 683	0	2,80	109,2	0,00	94,34	-	-	0,00	0,00	-
M4	14 879	14 880	0	2,64	109,2	0,00	94,45	-	-	0,00	0,00	-
St1	14 918	14 919	0	-1,13	104,9	0,00	94,47	-	-	0,00	0,00	-
St2	14 670	14 671	0	-0,91	104,9	0,00	94,33	-	-	0,00	0,00	-
St3	13 623	13 624	0	0,05	104,9	0,00	93,69	-	-	0,00	0,00	-
St4	14 222	14 223	0	-0,51	104,9	0,00	94,06	-	-	0,00	0,00	-
St5	14 170	14 171	0	-0,46	104,9	0,00	94,03	-	-	0,00	0,00	-
St6	15 153	15 154	0	-1,33	104,9	0,00	94,61	-	-	0,00	0,00	-
St7	13 366	13 367	0	0,30	104,9	0,00	93,52	-	-	0,00	0,00	-
Sö1	9 087	9 090	0	7,10	109,2	0,00	90,17	-	-	0,00	0,00	-
Sö2	9 229	9 232	0	6,91	109,2	0,00	90,31	-	-	0,00	0,00	-
Sö3	9 661	9 664	0	6,35	109,2	0,00	90,70	-	-	0,00	0,00	-
Sö4	10 108	10 110	0	5,79	109,2	0,00	91,10	-	-	0,00	0,00	-
Sö5	10 112	10 114	0	5,79	109,2	0,00	91,10	-	-	0,00	0,00	-
Sö6	9 332	9 335	0	6,77	109,2	0,00	90,40	-	-	0,00	0,00	-
Sö7	9 431	9 434	0	6,64	109,2	0,00	90,49	-	-	0,00	0,00	-
Sö8	9 087	9 089	0	7,10	109,2	0,00	90,17	-	-	0,00	0,00	-
Sum				35,99								

- Data undefined due to calculation with octave data

Noise sensitive area: J J Asuinrakennus (Kleidersvägen 118)

Wind speed: 8,0 m/s
WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	4 303	4 309	0	17,88	106,9	0,00	83,69	-	-	0,00	0,00	-
10	1 730	1 743	0	28,92	106,9	0,00	75,82	-	-	0,00	0,00	-
11	2 512	2 522	0	24,58	106,9	0,00	79,03	-	-	0,00	0,00	-
12	3 361	3 368	0	21,02	106,9	0,00	81,55	-	-	0,00	0,00	-
13	5 255	5 259	0	15,29	106,9	0,00	85,42	-	-	0,00	0,00	-
14	5 712	5 717	0	14,19	106,9	0,00	86,14	-	-	0,00	0,00	-
15	4 081	4 087	0	18,56	106,9	0,00	83,23	-	-	0,00	0,00	-
16	4 269	4 274	0	18,00	106,9	0,00	83,62	-	-	0,00	0,00	-
17	2 840	2 847	0	23,10	106,9	0,00	80,09	-	-	0,00	0,00	-
18	3 779	3 785	0	19,54	106,9	0,00	82,56	-	-	0,00	0,00	-

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14.7.2023 9.04/3.5.584

DECIBEL - Detailed results

Calculation: Lasor_VE1_19xV172xHH194 + Låtlax + Lotlax + Söderskogen + Storbacken + Mörknässkogen Noise calculation model: ISO 9613-2 General 8,0 m/s

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WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
19	3 808	3 814	0	19,44	106,9	0,00	82,63	-	-	0,00	0,00	-
2	3 275	3 282	0	21,34	106,9	0,00	81,32	-	-	0,00	0,00	-
3	2 615	2 623	0	24,10	106,9	0,00	79,38	-	-	0,00	0,00	-
4	3 416	3 422	0	20,81	106,9	0,00	81,69	-	-	0,00	0,00	-
5	2 992	3 000	0	22,46	106,9	0,00	80,54	-	-	0,00	0,00	-
6	2 157	2 168	0	26,38	106,9	0,00	77,72	-	-	0,00	0,00	-
7	2 534	2 543	0	24,48	106,9	0,00	79,11	-	-	0,00	0,00	-
8	3 184	3 191	0	21,69	106,9	0,00	81,08	-	-	0,00	0,00	-
9	1 911	1 923	0	27,78	106,9	0,00	76,68	-	-	0,00	0,00	-
Lo1	7 360	7 361	0	9,45	106,5	0,00	88,34	-	-	0,00	0,00	-
Lo2	6 949	6 951	0	10,17	106,5	0,00	87,84	-	-	0,00	0,00	-
Lo3	6 574	6 575	0	10,87	106,5	0,00	87,36	-	-	0,00	0,00	-
Lå1	3 244	3 247	0	18,47	104,9	0,00	81,23	-	-	0,00	0,00	-
Lå2	3 192	3 195	0	18,68	104,9	0,00	81,09	-	-	0,00	0,00	-
Lå3	3 270	3 273	0	18,36	104,9	0,00	81,30	-	-	0,00	0,00	-
Lå4	3 703	3 706	0	16,70	104,9	0,00	82,38	-	-	0,00	0,00	-
M1	15 621	15 622	0	2,05	109,2	0,00	94,87	-	-	0,00	0,00	-
M2	15 326	15 327	0	2,30	109,2	0,00	94,71	-	-	0,00	0,00	-
M3	15 401	15 402	0	2,21	109,2	0,00	94,75	-	-	0,00	0,00	-
M4	15 566	15 567	0	2,08	109,2	0,00	94,84	-	-	0,00	0,00	-
St1	15 836	15 837	0	-1,90	104,9	0,00	94,99	-	-	0,00	0,00	-
St2	15 562	15 563	0	-1,68	104,9	0,00	94,84	-	-	0,00	0,00	-
St3	14 527	14 528	0	-0,78	104,9	0,00	94,24	-	-	0,00	0,00	-
St4	15 097	15 098	0	-1,28	104,9	0,00	94,58	-	-	0,00	0,00	-
St5	15 086	15 086	0	-1,27	104,9	0,00	94,57	-	-	0,00	0,00	-
St6	16 089	16 090	0	-2,11	104,9	0,00	95,13	-	-	0,00	0,00	-
St7	14 237	14 238	0	-0,52	104,9	0,00	94,07	-	-	0,00	0,00	-
Sö1	8 566	8 570	0	7,83	109,2	0,00	89,66	-	-	0,00	0,00	-
Sö2	8 751	8 755	0	7,57	109,2	0,00	89,84	-	-	0,00	0,00	-
Sö3	9 215	9 218	0	6,93	109,2	0,00	90,29	-	-	0,00	0,00	-
Sö4	9 684	9 687	0	6,32	109,2	0,00	90,72	-	-	0,00	0,00	-
Sö5	9 734	9 737	0	6,26	109,2	0,00	90,77	-	-	0,00	0,00	-
Sö6	8 929	8 932	0	7,32	109,2	0,00	90,02	-	-	0,00	0,00	-
Sö7	9 078	9 081	0	7,11	109,2	0,00	90,16	-	-	0,00	0,00	-
Sö8	8 878	8 880	0	7,39	109,2	0,00	89,97	-	-	0,00	0,00	-
Sum				36,36								

- Data undefined due to calculation with octave data

Noise sensitive area: K K Asuinrakennus (Rökiöntie 154)

Wind speed: 8,0 m/s

WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	3 080	3 087	0	22,10	106,9	0,00	80,79	-	-	0,00	0,00	-
10	4 609	4 613	0	17,00	106,9	0,00	84,28	-	-	0,00	0,00	-
11	4 940	4 944	0	16,10	106,9	0,00	84,88	-	-	0,00	0,00	-
12	5 954	5 957	0	13,65	106,9	0,00	86,50	-	-	0,00	0,00	-
13	7 648	7 650	0	10,77	106,9	0,00	88,67	-	-	0,00	0,00	-
14	7 817	7 820	0	10,51	106,9	0,00	88,86	-	-	0,00	0,00	-
15	6 796	6 799	0	12,14	106,9	0,00	87,65	-	-	0,00	0,00	-
16	6 509	6 512	0	12,64	106,9	0,00	87,27	-	-	0,00	0,00	-
17	5 740	5 743	0	14,13	106,9	0,00	86,18	-	-	0,00	0,00	-
18	4 753	4 758	0	16,60	106,9	0,00	84,55	-	-	0,00	0,00	-
19	4 294	4 299	0	17,91	106,9	0,00	83,67	-	-	0,00	0,00	-
2	2 324	2 332	0	25,52	106,9	0,00	78,35	-	-	0,00	0,00	-
3	1 973	1 983	0	27,43	106,9	0,00	76,95	-	-	0,00	0,00	-
4	3 323	3 329	0	21,16	106,9	0,00	81,45	-	-	0,00	0,00	-
5	3 805	3 810	0	19,46	106,9	0,00	82,62	-	-	0,00	0,00	-
6	2 787	2 794	0	23,33	106,9	0,00	79,93	-	-	0,00	0,00	-
7	4 068	4 073	0	18,61	106,9	0,00	83,20	-	-	0,00	0,00	-
8	5 050	5 054	0	15,81	106,9	0,00	85,07	-	-	0,00	0,00	-
9	3 922	3 927	0	19,07	106,9	0,00	82,88	-	-	0,00	0,00	-
Lo1	7 995	7 996	0	8,42	106,5	0,00	89,06	-	-	0,00	0,00	-
Lo2	7 737	7 738	0	8,83	106,5	0,00	88,77	-	-	0,00	0,00	-

To be continued on next page...

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DECIBEL - Detailed results

Calculation: Lasor_VE1_19xV172xHH194 + Låtlax + Lotlax + Söderskogen + Storbacken + Mörknässkogen Noise calculation model: ISO 9613-2 General 8,0 m/s

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WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
Lo3	7 491	7 492	0	9,23	106,5	0,00	88,49	-	-	0,00	0,00	-
Lå1	3 376	3 378	0	17,94	104,9	0,00	81,57	-	-	0,00	0,00	-
Lå2	4 159	4 161	0	15,13	104,9	0,00	83,38	-	-	0,00	0,00	-
Lå3	4 828	4 829	0	13,29	104,9	0,00	84,68	-	-	0,00	0,00	-
Lå4	5 412	5 413	0	11,90	104,9	0,00	85,67	-	-	0,00	0,00	-
M1	18 372	18 373	0	0,03	109,2	0,00	96,28	-	-	0,00	0,00	-
M2	18 016	18 017	0	0,27	109,2	0,00	96,11	-	-	0,00	0,00	-
M3	18 034	18 035	0	0,26	109,2	0,00	96,12	-	-	0,00	0,00	-
M4	18 131	18 132	0	0,19	109,2	0,00	96,17	-	-	0,00	0,00	-
St1	18 855	18 856	0	-4,17	104,9	0,00	96,51	-	-	0,00	0,00	-
St2	18 536	18 536	0	-3,94	104,9	0,00	96,36	-	-	0,00	0,00	-
St3	17 527	17 528	0	-3,21	104,9	0,00	95,87	-	-	0,00	0,00	-
St4	18 041	18 042	0	-3,60	104,9	0,00	96,13	-	-	0,00	0,00	-
St5	18 104	18 104	0	-3,64	104,9	0,00	96,16	-	-	0,00	0,00	-
St6	19 139	19 140	0	-4,36	104,9	0,00	96,64	-	-	0,00	0,00	-
St7	17 180	17 181	0	-2,96	104,9	0,00	95,70	-	-	0,00	0,00	-
Sö1	7 340	7 344	0	9,74	109,2	0,00	88,32	-	-	0,00	0,00	-
Sö2	7 653	7 657	0	9,22	109,2	0,00	88,68	-	-	0,00	0,00	-
Sö3	8 179	8 182	0	8,40	109,2	0,00	89,26	-	-	0,00	0,00	-
Sö4	8 683	8 685	0	7,66	109,2	0,00	89,78	-	-	0,00	0,00	-
Sö5	8 876	8 879	0	7,40	109,2	0,00	89,97	-	-	0,00	0,00	-
Sö6	8 058	8 061	0	8,59	109,2	0,00	89,13	-	-	0,00	0,00	-
Sö7	8 353	8 355	0	8,14	109,2	0,00	89,44	-	-	0,00	0,00	-
Sö8	8 614	8 616	0	7,76	109,2	0,00	89,71	-	-	0,00	0,00	-
Sum				33,46								

- Data undefined due to calculation with octave data

Noise sensitive area: L L Asuinrakennus (Bjurbäcksvägen 231)

Wind speed: 8,0 m/s

WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	1 736	1 748	0	28,89	106,9	0,00	75,85	-	-	0,00	0,00	-
10	5 533	5 537	0	14,61	106,9	0,00	85,87	-	-	0,00	0,00	-
11	5 477	5 481	0	14,74	106,9	0,00	85,78	-	-	0,00	0,00	-
12	6 430	6 433	0	12,78	106,9	0,00	87,17	-	-	0,00	0,00	-
13	7 762	7 764	0	10,59	106,9	0,00	88,80	-	-	0,00	0,00	-
14	7 685	7 688	0	10,71	106,9	0,00	88,72	-	-	0,00	0,00	-
15	7 270	7 273	0	11,37	106,9	0,00	88,23	-	-	0,00	0,00	-
16	6 634	6 637	0	12,42	106,9	0,00	87,44	-	-	0,00	0,00	-
17	6 502	6 504	0	12,65	106,9	0,00	87,26	-	-	0,00	0,00	-
18	4 365	4 370	0	17,70	106,9	0,00	83,81	-	-	0,00	0,00	-
19	3 723	3 729	0	19,73	106,9	0,00	82,43	-	-	0,00	0,00	-
2	1 923	1 933	0	27,72	106,9	0,00	76,73	-	-	0,00	0,00	-
3	2 313	2 321	0	25,57	106,9	0,00	78,31	-	-	0,00	0,00	-
4	2 798	2 805	0	23,28	106,9	0,00	79,96	-	-	0,00	0,00	-
5	3 675	3 680	0	19,90	106,9	0,00	82,32	-	-	0,00	0,00	-
6	3 200	3 207	0	21,63	106,9	0,00	81,12	-	-	0,00	0,00	-
7	4 296	4 301	0	17,90	106,9	0,00	83,67	-	-	0,00	0,00	-
8	5 181	5 185	0	15,47	106,9	0,00	85,29	-	-	0,00	0,00	-
9	4 505	4 509	0	17,29	106,9	0,00	84,08	-	-	0,00	0,00	-
Lo1	10 238	10 239	0	5,34	106,5	0,00	91,21	-	-	0,00	0,00	-
Lo2	9 987	9 987	0	5,65	106,5	0,00	90,99	-	-	0,00	0,00	-
Lo3	9 743	9 743	0	5,96	106,5	0,00	90,77	-	-	0,00	0,00	-
Lå1	5 626	5 627	0	11,42	104,9	0,00	86,01	-	-	0,00	0,00	-
Lå2	6 377	6 378	0	9,86	104,9	0,00	87,09	-	-	0,00	0,00	-
Lå3	6 995	6 997	0	8,68	104,9	0,00	87,90	-	-	0,00	0,00	-
Lå4	7 574	7 575	0	7,67	104,9	0,00	88,59	-	-	0,00	0,00	-
M1	18 438	18 439	0	-0,02	109,2	0,00	96,31	-	-	0,00	0,00	-
M2	18 019	18 020	0	0,27	109,2	0,00	96,12	-	-	0,00	0,00	-
M3	17 975	17 976	0	0,30	109,2	0,00	96,09	-	-	0,00	0,00	-
M4	18 000	18 001	0	0,28	109,2	0,00	96,11	-	-	0,00	0,00	-
St1	19 265	19 265	0	-4,45	104,9	0,00	96,70	-	-	0,00	0,00	-
St2	18 881	18 882	0	-4,19	104,9	0,00	96,52	-	-	0,00	0,00	-

To be continued on next page...

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Calculated:
14.7.2023 9.04/3.5.584

DECIBEL - Detailed results

Calculation: Lasor_VE1_19xV172xHH194 + Låtlax + Lotlax + Söderskogen + Storbacken + Mörknässkogen Noise calculation model: ISO 9613-2 General 8,0 m/s

...continued from previous page

WTG No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
St3	17 924	17 925	0	-3,51	104,9	0,00	96,07	-	-	0,00	0,00	-
St4	18 352	18 352	0	-3,82	104,9	0,00	96,27	-	-	0,00	0,00	-
St5	18 521	18 521	0	-3,94	104,9	0,00	96,35	-	-	0,00	0,00	-
St6	19 594	19 595	0	-4,68	104,9	0,00	96,84	-	-	0,00	0,00	-
St7	17 501	17 502	0	-3,20	104,9	0,00	95,86	-	-	0,00	0,00	-
Sö1	9 203	9 206	0	6,95	109,2	0,00	90,28	-	-	0,00	0,00	-
Sö2	9 553	9 556	0	6,48	109,2	0,00	90,61	-	-	0,00	0,00	-
Sö3	10 084	10 086	0	5,82	109,2	0,00	91,07	-	-	0,00	0,00	-
Sö4	10 585	10 587	0	5,22	109,2	0,00	91,50	-	-	0,00	0,00	-
Sö5	10 824	10 826	0	4,95	109,2	0,00	91,69	-	-	0,00	0,00	-
Sö6	10 024	10 027	0	5,89	109,2	0,00	91,02	-	-	0,00	0,00	-
Sö7	10 357	10 359	0	5,49	109,2	0,00	91,31	-	-	0,00	0,00	-
Sö8	10 731	10 733	0	5,05	109,2	0,00	91,61	-	-	0,00	0,00	-
Sum				34,35								

- Data undefined due to calculation with octave data

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DECIBEL - Assumptions for noise calculation

Calculation: Lasor_VE1_19xV172xHH194 + Låtlax + Lotlax + Söderskogen + Storbacken + Mörknässkogen

Noise calculation model:
ISO 9613-2 General
Wind speed (in 10 m height):
8,0 m/s
Ground attenuation:
General, terrain specific
Ground factor for porous ground: 0,4
Area object with hard ground: Area object (Roughness): REGIONS_Lasor_ZVI_4.w2r (27)
Area type with hard ground: vesistöt
Ground factor for hard ground: 0,0
Meteorological coefficient, C0:
0,0 dB
Type of demand in calculation:
1: WTG noise is compared to demand (DK, DE, SE, NL etc.)
Noise values in calculation:
All noise values are mean values (Lwa) (Normal)
Pure tones:
Ignore pure tones setting on WTG
Height above ground level, when no value in NSA object:
4,0 m; Don't allow override of model height with height from NSA object
Uncertainty margin:
0,0 dB; Uncertainty margin in model has priority
Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:
0,0 dB(A)
Octave data required
Frequency dependent air absorption

63	125	250	500	1 000	2 000	4 000	8 000
[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]
0,10	0,38	1,12	2,36	4,08	8,78	26,60	95,00

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89

WTG: VESTAS V150-4.2 HH145 4200 150.0 !O!
Noise: Level 0 - - Mode 0/PO1 - 10-2017

Source	Source/Date	Creator	Edited
Manufacturer	18.10.2017	USER	23.11.2022 20.09

Performance Specification 0067-7067 V05

					Octave data							
Status	Hub height [m]	Wind speed [m/s]	LwA,ref [dB(A)]	Pure tones	63 [dB]	125 [dB]	250 [dB]	500 [dB]	1000 [dB]	2000 [dB]	4000 [dB]	8000 [dB]
From Windcat	145,0	8,0	104,9	No	86,5	93,7	98,2	99,9	98,9	95,1	88,7	79,4

WTG: PROKON P3000-116 3030 116.7 !O!
Noise: Mode 0 - 106,5 dB(A) (manufacturer's warranty)

Source	Source/Date	Creator	Edited
PROKON	2.2.2012	USER	21.8.2020 12.25

				Octave data							
Status	Wind speed [m/s]	LwA,ref [dB(A)]	Pure tones	63 [dB]	125 [dB]	250 [dB]	500 [dB]	1000 [dB]	2000 [dB]	4000 [dB]	8000 [dB]
From Windcat	8,0	106,5	No	88,6	95,1	98,6	101,0	100,8	98,0	93,2	84,5

WTG: VESTAS V150-4.2 4200 150.0 !O!
Noise: Copy of Mode PO1 STE

Source	Source/Date	Creator	Edited
DMS 0067-4767 V03	13.11.2017	USER	25.10.2022 17.50

					Octave data							
Status	Hub height [m]	Wind speed [m/s]	LwA,ref [dB(A)]	Pure tones	63 [dB]	125 [dB]	250 [dB]	500 [dB]	1000 [dB]	2000 [dB]	4000 [dB]	8000 [dB]
From Windcat	140,0	8,0	104,9	No	86,5	93,7	98,2	99,9	98,9	95,1	88,7	79,4

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DECIBEL - Assumptions for noise calculation

Calculation: Lasor_VE1_19xV172xHH194 + Låtlax + Lotlax + Söderskogen + Storbacken + Mörknässkogen

WTG: Generic RD180 7700 180.0 !O!
Noise: Mode 0.a No STE

Source	Source/Date	Creator	Edited
F008_276_A17_EN Revision 00	13.9.2021	USER	20.6.2023 12.47

Nordex

					Octave data							
Status	Hub height [m]	Wind speed [m/s]	LwA,ref [dB(A)]	Pure tones	63 [dB]	125 [dB]	250 [dB]	500 [dB]	1000 [dB]	2000 [dB]	4000 [dB]	8000 [dB]
From Windcat	210,0	8,0	109,2	No	89,5	95,7	99,9	103,2	104,6	102,2	93,4	84,6

WTG: VESTAS V172-7.2 7200 172.0 !O!
Noise: V172 - 7,2 MW PO7200 STE

Source	Source/Date	Creator	Edited
Vestas	15.11.2022	USER	20.6.2023 9.21

DMS no.: 0128-4336_00

					Octave data							
Status	Hub height [m]	Wind speed [m/s]	LwA,ref [dB(A)]	Pure tones	63 [dB]	125 [dB]	250 [dB]	500 [dB]	1000 [dB]	2000 [dB]	4000 [dB]	8000 [dB]
From Windcat	194,0	8,0	106,9	No	90,4	98,0	101,3	101,5	99,9	95,4	87,9	77,2

WTG: NORDEX N163/5,7MW 5700 163.0 !O!
Noise: N163-5,7MW Mode 00 - 107.2 dB(A) + 2 dB

Source	Source/Date	Creator	Edited
F008_276_A14_EN	20.3.2020	USER	20.6.2023 13.12

					Octave data							
Status	Hub height [m]	Wind speed [m/s]	LwA,ref [dB(A)]	Pure tones	63 [dB]	125 [dB]	250 [dB]	500 [dB]	1000 [dB]	2000 [dB]	4000 [dB]	8000 [dB]
From Windcat	158,0	8,0	109,2	No	90,9	97,1	100,8	103,4	104,1	101,6	94,0	86,0

Noise sensitive area: A A Lomarakennus (Söderändan 49)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: B B Asuinrakennus (Söderändan 81)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: C C Lomarakennus (Säderändan 166)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: D D Lomarakennus (Söderändan 188)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

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DECIBEL - Assumptions for noise calculation

Calculation: Lasor_VE1_19xV172xHH194 + Låtlax + Lotlax + Söderskogen + Storbacken + Mörknässkogen

Noise sensitive area: E E Asuinrakennus (Rökiöntie 930)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: F F Asuinrakennus (Kukkusintie 474)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: G G Asuinrakennus (Kovik byväg 53)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: H H Asuinrakennus (Vöyrintie 1021)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: I I Lomarakennus (Ehrsbackavägen 29)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: J J Asuinrakennus (Kleidersvägen 118)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: K K Asuinrakennus (Rökiöntie 154)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: L L Asuinrakennus (Bjurbäcksvägen 231)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

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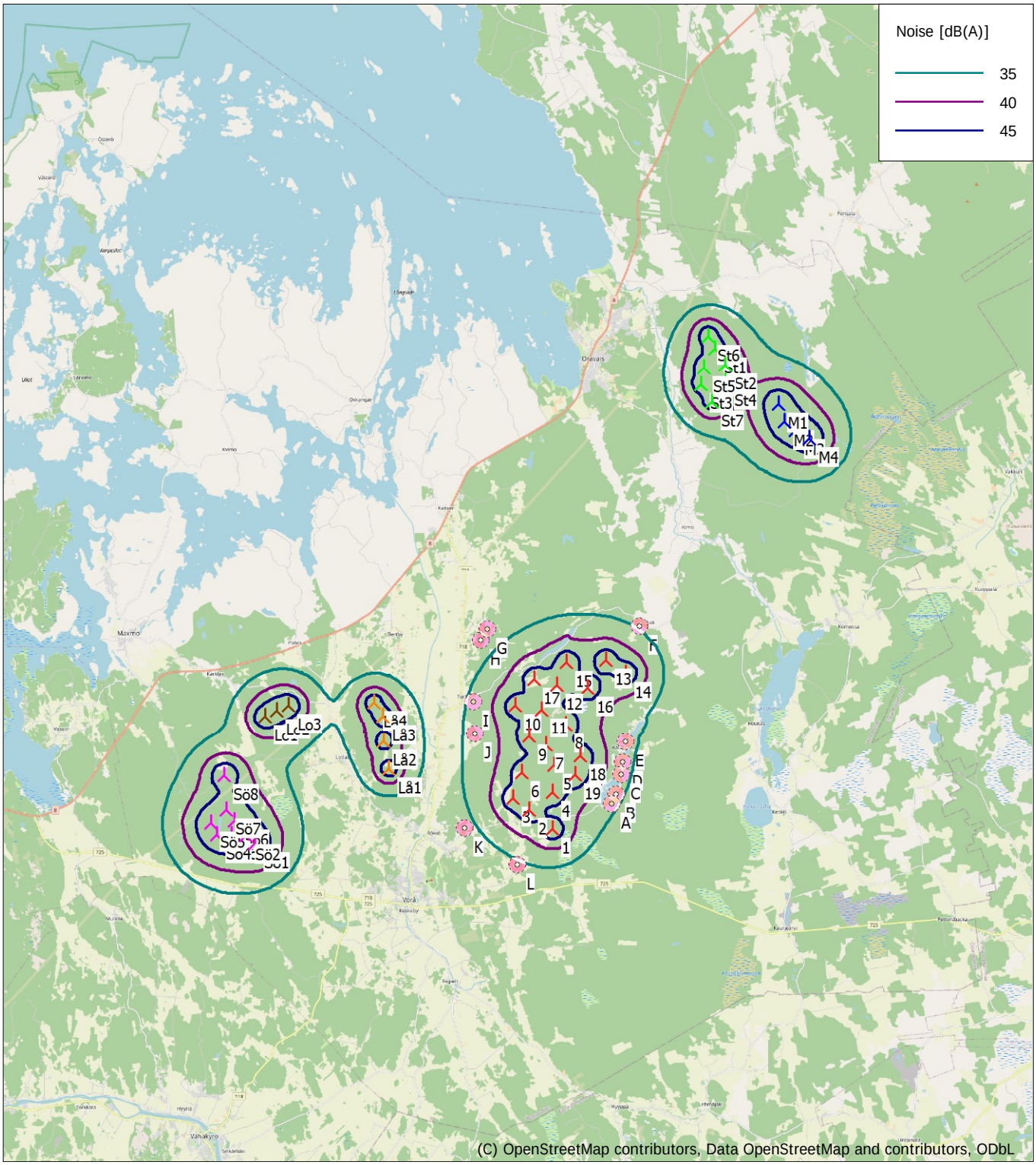
DECIBEL - Map 8,0 m/s

Calculation: Lasor_VE1_19xV172xHH194 + Låtlax + Lotlax + Söderskogen + Storbacken + Mörknässkogen



0 2,5 5 7,5 10km

Map: EMD OpenStreetMap , Print scale 1:200 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 264 858 North: 7 019 453

New WTG Noise sensitive area

Noise calculation model: ISO 9613-2 General. Wind speed: 8,0 m/s
Height above sea level from active line object

Liite 10. Melun yhteismallinnuksen tulokset VE2

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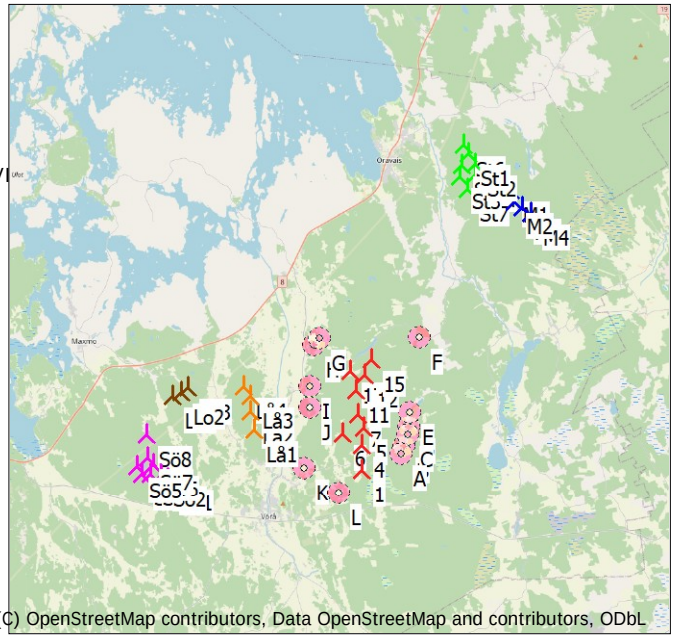
DECIBEL - Main Result

Calculation: Lasor_VE2_9xV172xHH194 + Låtlax + Lotlax + Söderskogen + Storbacken + Mörknässkogen

Noise calculation model:
ISO 9613-2 General
Wind speed (in 10 m height):
8,0 m/s
Ground attenuation:
General, terrain specific
Ground factor for porous ground: 0,4
Area object with hard ground: Area object (Roughness): REGIONS_Lasor_ZVI
Area type with hard ground: vesistöt
Ground factor for hard ground: 0,0
Meteorological coefficient, C0:
0,0 dB
Type of demand in calculation:
1: WTG noise is compared to demand (DK, DE, SE, NL etc.)
Noise values in calculation:
All noise values are mean values (Lwa) (Normal)
Pure tones:
Ignore pure tones setting on WTG
Height above ground level, when no value in NSA object:
4,0 m; Don't allow override of model height with height from NSA object
Uncertainty margin:
0,0 dB; Uncertainty margin in model has priority
Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:
0,0 dB(A)

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89



Scale 1:400 000

New WTG
Noise sensitive area

WTGs

	East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Noise data Creator	Name	Wind speed	LwA,ref
			[m]					[kW]	[m]	[m]			[m/s]	[dB(A)]
1	265 860	7 011 060	40,0	VESTAS V172-7.2 7200 172.0...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
11	265 796	7 015 259	39,8	VESTAS V172-7.2 7200 172.0...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
12	266 380	7 016 090	44,5	VESTAS V172-7.2 7200 172.0...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
15	266 770	7 016 850	43,5	VESTAS V172-7.2 7200 172.0...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
17	265 604	7 016 343	20,0	VESTAS V172-7.2 7200 172.0...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
4	265 960	7 012 340	40,0	VESTAS V172-7.2 7200 172.0...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
5	266 070	7 013 270	35,0	VESTAS V172-7.2 7200 172.0...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
6	264 950	7 013 100	40,0	VESTAS V172-7.2 7200 172.0...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
7	265 850	7 014 020	40,0	VESTAS V172-7.2 7200 172.0...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	194,0	USER	V172 - 7,2 MW PO7200 STE	8,0	106,9
Lo1	256 101	7 015 724	26,7	PROKON P3000-116 3030 11...	Yes	PROKON	P3000-116-3 030	3 030	116,7	122,0	USER	Mode 0 - 106,5 dB(A) (manufacturer's warranty)	8,0	106,5
Lo2	256 554	7 015 922	32,5	PROKON P3000-116 3030 11...	Yes	PROKON	P3000-116-3 030	3 030	116,7	122,0	USER	Mode 0 - 106,5 dB(A) (manufacturer's warranty)	8,0	106,5
Lo3	256 967	7 016 054	29,3	PROKON P3000-116 3030 11...	Yes	PROKON	P3000-116-3 030	3 030	116,7	122,0	USER	Mode 0 - 106,5 dB(A) (manufacturer's warranty)	8,0	106,5
Lå1	260 282	7 013 598	20,0	VESTAS V150-4.2 4200 150.0...	Yes	VESTAS	V150-4.2-4 200	4 200	150,0	140,0	USER	Copy of Mode PO1 STE	8,0	104,9
Lå2	260 183	7 014 579	27,2	VESTAS V150-4.2 4200 150.0...	Yes	VESTAS	V150-4.2-4 200	4 200	150,0	140,0	USER	Copy of Mode PO1 STE	8,0	104,9
Lå3	260 216	7 015 423	20,0	VESTAS V150-4.2 4200 150.0...	Yes	VESTAS	V150-4.2-4 200	4 200	150,0	140,0	USER	Copy of Mode PO1 STE	8,0	104,9
Lå4	259 928	7 015 932	27,5	VESTAS V150-4.2 4200 150.0...	Yes	VESTAS	V150-4.2-4 200	4 200	150,0	140,0	USER	Copy of Mode PO1 STE	8,0	104,9
M1	274 763	7 025 285	32,5	NORDEX N163/5,7MW 5700 1...	Yes	NORDEX	N163/5,7MW-5 700	5 700	163,0	158,0	USER	N163-5,7MW Mode 00 - 107.2 dB(A) + 2 dB	8,0	109,2
M2	274 926	7 024 666	32,8	NORDEX N163/5,7MW 5700 1...	Yes	NORDEX	N163/5,7MW-5 700	5 700	163,0	158,0	USER	N163-5,7MW Mode 00 - 107.2 dB(A) + 2 dB	8,0	109,2
M3	275 298	7 024 342	35,0	NORDEX N163/5,7MW 5700 1...	Yes	NORDEX	N163/5,7MW-5 700	5 700	163,0	158,0	USER	N163-5,7MW Mode 00 - 107.2 dB(A) + 2 dB	8,0	109,2
M4	275 772	7 024 008	40,0	NORDEX N163/5,7MW 5700 1...	Yes	NORDEX	N163/5,7MW-5 700	5 700	163,0	158,0	USER	N163-5,7MW Mode 00 - 107.2 dB(A) + 2 dB	8,0	109,2
St1	272 700	7 027 390	30,0	VESTAS V150-4.2 HH145 420...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	USER	Level 0 - - Mode 0/PO1 - 10-2017	8,0	104,9
St2	273 002	7 026 818	30,0	VESTAS V150-4.2 HH145 420...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	USER	Level 0 - - Mode 0/PO1 - 10-2017	8,0	104,9
St3	272 153	7 026 165	30,0	VESTAS V150-4.2 HH145 420...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	USER	Level 0 - - Mode 0/PO1 - 10-2017	8,0	104,9
St4	272 991	7 026 229	30,0	VESTAS V150-4.2 HH145 420...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	USER	Level 0 - - Mode 0/PO1 - 10-2017	8,0	104,9
St5	272 290	7 026 760	26,1	VESTAS V150-4.2 HH145 420...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	USER	Level 0 - - Mode 0/PO1 - 10-2017	8,0	104,9
St6	272 494	7 027 846	25,1	VESTAS V150-4.2 HH145 420...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	USER	Level 0 - - Mode 0/PO1 - 10-2017	8,0	104,9
St7	272 483	7 025 533	30,2	VESTAS V150-4.2 HH145 420...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	USER	Level 0 - - Mode 0/PO1 - 10-2017	8,0	104,9
Sö1	255 445	7 011 327	45,9	Generic RD180 7700 180.0 !O...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	USER	Mode 0.a No STE	8,0	109,2
Sö2	255 137	7 011 612	50,0	Generic RD180 7700 180.0 !O...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	USER	Mode 0.a No STE	8,0	109,2
Sö3	254 614	7 011 705	37,5	Generic RD180 7700 180.0 !O...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	USER	Mode 0.a No STE	8,0	109,2
Sö4	254 111	7 011 739	25,0	Generic RD180 7700 180.0 !O...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	USER	Mode 0.a No STE	8,0	109,2
Sö5	253 945	7 012 144	32,5	Generic RD180 7700 180.0 !O...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	USER	Mode 0.a No STE	8,0	109,2
Sö6	254 771	7 012 174	40,0	Generic RD180 7700 180.0 !O...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	USER	Mode 0.a No STE	8,0	109,2
Sö7	254 521	7 012 552	32,9	Generic RD180 7700 180.0 !O...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	USER	Mode 0.a No STE	8,0	109,2
Sö8	254 528	7 013 790	20,0	Generic RD180 7700 180.0 !O...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	USER	Mode 0.a No STE	8,0	109,2

Calculation Results

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Calculated:
14.7.2023 9.09/3.5.584

DECIBEL - Main Result

Calculation: Lasor_VE2_9xV172xHH194 + Låtlax + Lotlax + Söderskogen + Storbacken + Mörknässkogen

Sound level

Noise sensitive area No.	Name	East	North	Z	Immission height	Demands Noise	Sound level From WTGs	Distance to noise demand	2 dB penalty applied for one or more WTGs
				[m]	[m]	[dB(A)]	[dB(A)]	[m]	
A	A Lomarakennus (Söderändan 49)	267 990	7 011 759	42,5	4,0	40,0	32,3	1 341	No
B	B Asuinrakennus (Söderändan 81)	268 161	7 012 123	37,5	4,0	40,0	32,5	1 420	No
C	C Lomarakennus (Säderändan 166)	268 388	7 012 783	39,1	4,0	40,0	32,6	1 542	No
D	D Lomarakennus (Söderändan 188)	268 493	7 013 188	37,8	4,0	40,0	32,8	1 610	No
E	E Asuinrakennus (Rökiöntie 930)	268 646	7 013 924	38,1	4,0	40,0	31,3	1 820	No
F	F Asuinrakennus (Kukkusintie 474)	269 409	7 017 903	25,0	4,0	40,0	28,0	2 173	No
G	G Asuinrakennus (Kovik byväg 53)	264 096	7 018 174	10,0	4,0	40,0	30,4	1 656	No
H	H Asuinrakennus (Vöyrintie 1021)	263 817	7 017 837	8,5	4,0	40,0	30,6	1 618	No
I	I Lomarakennus (Ehrsbackavägen 29)	263 418	7 015 700	21,7	4,0	40,0	32,7	1 500	No
J	J Asuinrakennus (Kleidersvägen 118)	263 377	7 014 578	13,7	4,0	40,0	33,2	1 421	No
K	K Asuinrakennus (Rökiöntie 154)	262 790	7 011 335	27,5	4,0	40,0	30,0	2 088	No
L	L Asuinrakennus (Bjurbäcksvägen 231)	264 546	7 009 923	27,8	4,0	40,0	31,6	1 101	No

Distances (m)

WTG	A	B	C	D	E	F	G	H	I	J	K	L
1	2240	2533	3057	3383	3993	7704	7325	7073	5240	4303	3080	1736
11	4128	3925	3582	3398	3145	4474	3373	3248	2418	2512	4940	5477
12	4618	4345	3867	3588	3133	3529	3090	3099	2986	3361	5954	6430
15	5232	4924	4375	4045	3474	2840	2982	3111	3542	4081	6796	7270
17	5164	4931	4516	4275	3884	4111	2371	2327	2277	2840	5740	6502
4	2110	2210	2466	2670	3116	6542	6121	5896	4211	3416	3323	2798
5	2442	2383	2367	2423	2656	5708	5283	5089	3595	2992	3805	3675
6	3321	3354	3450	3542	3784	6550	5142	4867	3016	2157	2787	3200
7	3111	2988	2822	2769	2796	5265	4506	4321	2954	2534	4068	4296
Lo1	12524	12577	12625	12640	12665	13477	8356	7995	7312	7360	7995	10238
Lo2	12163	12205	12235	12241	12248	12999	7866	7507	6863	6949	7737	9987
Lo3	11823	11857	11873	11870	11864	12571	7433	7074	6457	6574	7491	9743
Lå1	7919	8011	8142	8216	8365	10086	5953	5516	3773	3244	3376	5626
Lå2	8296	8342	8394	8421	8483	9801	5310	4877	3421	3192	4159	6377
Lå3	8589	8598	8582	8568	8557	9516	4753	4333	3212	3270	4828	6995
Lå4	9072	9066	9021	8988	8940	9678	4729	4328	3495	3703	5412	7574
M1	15118	14716	14026	13618	12896	9113	12813	13232	14843	15621	18372	18438
M2	14644	14243	13556	13150	12436	8722	12620	13032	14580	15326	18016	18019
M3	14543	14142	13460	13058	12354	8720	12781	13188	14682	15401	18034	17975
M4	14504	14105	13429	13033	12341	8813	13045	13446	14879	15566	18131	18000
St1	16316	15918	15222	14803	14055	10035	12601	13037	14918	15836	18855	19265
St2	15862	15463	14766	14348	13602	9606	12404	12839	14670	15562	18536	18881
St3	14987	14590	13894	13475	12726	8700	11341	11776	13623	14527	17527	17924
St4	15301	14901	14204	13787	13042	9058	11993	12426	14222	15097	18041	18352
St5	15595	15199	14503	14084	13335	9307	11861	12297	14170	15086	18104	18521
St6	16696	16299	15604	15185	14436	10404	12802	13239	15153	16089	19139	19594
St7	14480	14081	13384	12966	12220	8221	11151	11583	13366	14237	17180	17501
Sö1	12544	12733	13016	13172	13445	15426	11025	10598	9087	8566	7340	9203
Sö2	12846	13026	13294	13440	13696	15587	11097	10674	9229	8751	7653	9553
Sö3	13367	13545	13807	13949	14197	16031	11471	11051	9661	9215	8179	10084
Sö4	13870	14046	14305	14446	14688	16483	11871	11455	10108	9684	8683	10585
Sö5	14041	14207	14447	14576	14798	16491	11799	11388	10112	9734	8876	10824
Sö6	13217	13381	13621	13751	13975	15710	11081	10665	9332	8929	8058	10024
Sö7	13484	13638	13860	13978	14182	15811	11096	10686	9431	9078	8353	10357
Sö8	13606	13725	13887	13969	14109	15429	10517	10126	9087	8878	8614	10731

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Calculated:
14.7.2023 9.09/3.5.584

DECIBEL - Detailed results

Calculation: Lasor_VE2_9xV172xHH194 + Låtlax + Lotlax + Söderskogen + Storbacken + Mörknässkogen Noise calculation model: ISO 9613-2 General 8,0 m/s

Assumptions

Calculated L(DW) = LWA,ref + K + Dc - (Adiv + Aatm + Agr + Abar + Amisc) - Cmet
(when calculated with ground attenuation, then Dc = Domega)

LWA,ref:	Sound pressure level at WTG
K:	Pure tone
Dc:	Directivity correction
Adiv:	the attenuation due to geometrical divergence
Aatm:	the attenuation due to atmospheric absorption
Agr:	the attenuation due to ground effect
Abar:	the attenuation due to a barrier
Amisc:	the attenuation due to miscellaneous other effects
Cmet:	Meteorological correction

Calculation Results

Noise sensitive area: A A Lomarakennus (Söderändan 49)

Wind speed: 8,0 m/s
WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	2 240	2 248	0	25,95	106,9	0,00	78,04	-	-	0,00	0,00	-
11	4 128	4 132	0	18,47	106,9	0,00	83,32	-	-	0,00	0,00	-
12	4 618	4 622	0	17,02	106,9	0,00	84,30	-	-	0,00	0,00	-
15	5 232	5 235	0	15,40	106,9	0,00	85,38	-	-	0,00	0,00	-
17	5 164	5 167	0	15,56	106,9	0,00	85,26	-	-	0,00	0,00	-
4	2 110	2 119	0	26,72	106,9	0,00	77,52	-	-	0,00	0,00	-
5	2 442	2 449	0	25,00	106,9	0,00	78,78	-	-	0,00	0,00	-
6	3 321	3 326	0	21,22	106,9	0,00	81,44	-	-	0,00	0,00	-
7	3 111	3 117	0	22,04	106,9	0,00	80,87	-	-	0,00	0,00	-
Lo1	12 524	12 525	0	2,84	106,5	0,00	92,96	-	-	0,00	0,00	-
Lo2	12 163	12 163	0	3,20	106,5	0,00	92,70	-	-	0,00	0,00	-
Lo3	11 823	11 824	0	3,57	106,5	0,00	92,46	-	-	0,00	0,00	-
Lå1	7 919	7 920	0	7,13	104,9	0,00	88,97	-	-	0,00	0,00	-
Lå2	8 296	8 296	0	6,53	104,9	0,00	89,38	-	-	0,00	0,00	-
Lå3	8 589	8 590	0	6,08	104,9	0,00	89,68	-	-	0,00	0,00	-
Lå4	9 072	9 073	0	5,38	104,9	0,00	90,16	-	-	0,00	0,00	-
M1	15 118	15 119	0	2,44	109,2	0,00	94,59	-	-	0,00	0,00	-
M2	14 644	14 645	0	2,83	109,2	0,00	94,31	-	-	0,00	0,00	-
M3	14 543	14 544	0	2,92	109,2	0,00	94,25	-	-	0,00	0,00	-
M4	14 504	14 504	0	2,95	109,2	0,00	94,23	-	-	0,00	0,00	-
St1	16 316	16 316	0	-2,24	104,9	0,00	95,25	-	-	0,00	0,00	-
St2	15 862	15 862	0	-1,87	104,9	0,00	95,01	-	-	0,00	0,00	-
St3	14 987	14 987	0	-1,12	104,9	0,00	94,51	-	-	0,00	0,00	-
St4	15 301	15 301	0	-1,38	104,9	0,00	94,69	-	-	0,00	0,00	-
St5	15 595	15 596	0	-1,65	104,9	0,00	94,86	-	-	0,00	0,00	-
St6	16 696	16 696	0	-2,54	104,9	0,00	95,45	-	-	0,00	0,00	-
St7	14 480	14 480	0	-0,68	104,9	0,00	94,22	-	-	0,00	0,00	-
Sö1	12 544	12 546	0	3,13	109,2	0,00	92,97	-	-	0,00	0,00	-
Sö2	12 846	12 847	0	2,84	109,2	0,00	93,18	-	-	0,00	0,00	-
Sö3	13 367	13 369	0	2,35	109,2	0,00	93,52	-	-	0,00	0,00	-
Sö4	13 870	13 871	0	1,90	109,2	0,00	93,84	-	-	0,00	0,00	-
Sö5	14 041	14 043	0	1,76	109,2	0,00	93,95	-	-	0,00	0,00	-
Sö6	13 217	13 219	0	2,50	109,2	0,00	93,42	-	-	0,00	0,00	-
Sö7	13 484	13 485	0	2,25	109,2	0,00	93,60	-	-	0,00	0,00	-
Sö8	13 606	13 607	0	2,15	109,2	0,00	93,68	-	-	0,00	0,00	-
Sum				32,34								

- Data undefined due to calculation with octave data

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14.7.2023 9.09/3.5.584

DECIBEL - Detailed results

Calculation: Lasor_VE2_9xV172xHH194 + Låtlax + Lotlax + Söderskogen + Storbacken + Mörknässkogen Noise calculation model: ISO 9613-2 General 8,0 m/s

Noise sensitive area: B B Asuinrakennus (Söderändan 81)

Wind speed: 8,0 m/s
WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	2 533	2 540	0	24,95	106,9	0,00	79,10	-	-	0,00	0,00	-
11	3 925	3 930	0	19,68	106,9	0,00	82,89	-	-	0,00	0,00	-
12	4 345	4 350	0	18,44	106,9	0,00	83,77	-	-	0,00	0,00	-
15	4 924	4 928	0	16,97	106,9	0,00	84,85	-	-	0,00	0,00	-
17	4 931	4 934	0	16,77	106,9	0,00	84,86	-	-	0,00	0,00	-
4	2 210	2 219	0	26,57	106,9	0,00	77,92	-	-	0,00	0,00	-
5	2 383	2 391	0	25,70	106,9	0,00	78,57	-	-	0,00	0,00	-
6	3 354	3 360	0	21,55	106,9	0,00	81,53	-	-	0,00	0,00	-
7	2 988	2 994	0	23,01	106,9	0,00	80,52	-	-	0,00	0,00	-
Lo1	12 577	12 578	0	3,16	106,5	0,00	92,99	-	-	0,00	0,00	-
Lo2	12 205	12 206	0	3,54	106,5	0,00	92,73	-	-	0,00	0,00	-
Lo3	11 857	11 857	0	3,92	106,5	0,00	92,48	-	-	0,00	0,00	-
Lå1	8 011	8 012	0	7,38	104,9	0,00	89,07	-	-	0,00	0,00	-
Lå2	8 342	8 343	0	6,91	104,9	0,00	89,43	-	-	0,00	0,00	-
Lå3	8 598	8 598	0	6,52	104,9	0,00	89,69	-	-	0,00	0,00	-
Lå4	9 066	9 066	0	5,83	104,9	0,00	90,15	-	-	0,00	0,00	-
M1	14 716	14 717	0	2,77	109,2	0,00	94,36	-	-	0,00	0,00	-
M2	14 243	14 243	0	3,17	109,2	0,00	94,07	-	-	0,00	0,00	-
M3	14 142	14 143	0	3,26	109,2	0,00	94,01	-	-	0,00	0,00	-
M4	14 105	14 106	0	3,29	109,2	0,00	93,99	-	-	0,00	0,00	-
St1	15 918	15 918	0	-1,93	104,9	0,00	95,04	-	-	0,00	0,00	-
St2	15 463	15 463	0	-1,53	104,9	0,00	94,79	-	-	0,00	0,00	-
St3	14 590	14 590	0	-0,79	104,9	0,00	94,28	-	-	0,00	0,00	-
St4	14 901	14 902	0	-1,05	104,9	0,00	94,46	-	-	0,00	0,00	-
St5	15 199	15 199	0	-1,32	104,9	0,00	94,64	-	-	0,00	0,00	-
St6	16 299	16 300	0	-2,13	104,9	0,00	95,24	-	-	0,00	0,00	-
St7	14 081	14 081	0	-0,31	104,9	0,00	93,97	-	-	0,00	0,00	-
Sö1	12 733	12 734	0	3,32	109,2	0,00	93,10	-	-	0,00	0,00	-
Sö2	13 026	13 027	0	3,04	109,2	0,00	93,30	-	-	0,00	0,00	-
Sö3	13 545	13 546	0	2,55	109,2	0,00	93,64	-	-	0,00	0,00	-
Sö4	14 046	14 047	0	2,09	109,2	0,00	93,95	-	-	0,00	0,00	-
Sö5	14 207	14 208	0	1,95	109,2	0,00	94,05	-	-	0,00	0,00	-
Sö6	13 381	13 383	0	2,69	109,2	0,00	93,53	-	-	0,00	0,00	-
Sö7	13 638	13 639	0	2,45	109,2	0,00	93,70	-	-	0,00	0,00	-
Sö8	13 725	13 727	0	2,35	109,2	0,00	93,75	-	-	0,00	0,00	-
Sum				32,54								

- Data undefined due to calculation with octave data

Noise sensitive area: C C Lomarakennus (Säderändan 166)

Wind speed: 8,0 m/s
WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	3 057	3 063	0	23,39	106,9	0,00	80,72	-	-	0,00	0,00	-
11	3 582	3 587	0	20,99	106,9	0,00	82,10	-	-	0,00	0,00	-
12	3 867	3 872	0	19,61	106,9	0,00	82,76	-	-	0,00	0,00	-
15	4 375	4 379	0	17,70	106,9	0,00	83,83	-	-	0,00	0,00	-
17	4 516	4 520	0	17,81	106,9	0,00	84,10	-	-	0,00	0,00	-
4	2 466	2 474	0	25,84	106,9	0,00	78,87	-	-	0,00	0,00	-
5	2 367	2 374	0	26,29	106,9	0,00	78,51	-	-	0,00	0,00	-
6	3 450	3 455	0	21,74	106,9	0,00	81,77	-	-	0,00	0,00	-
7	2 822	2 828	0	24,15	106,9	0,00	80,03	-	-	0,00	0,00	-
Lo1	12 625	12 626	0	3,59	106,5	0,00	93,03	-	-	0,00	0,00	-
Lo2	12 235	12 236	0	3,99	106,5	0,00	92,75	-	-	0,00	0,00	-
Lo3	11 873	11 873	0	4,38	106,5	0,00	92,49	-	-	0,00	0,00	-
Lå1	8 142	8 142	0	7,78	104,9	0,00	89,22	-	-	0,00	0,00	-
Lå2	8 394	8 395	0	7,37	104,9	0,00	89,48	-	-	0,00	0,00	-
Lå3	8 582	8 583	0	7,07	104,9	0,00	89,67	-	-	0,00	0,00	-
Lå4	9 021	9 022	0	6,41	104,9	0,00	90,11	-	-	0,00	0,00	-
M1	14 026	14 027	0	3,37	109,2	0,00	93,94	-	-	0,00	0,00	-
M2	13 556	13 556	0	3,79	109,2	0,00	93,64	-	-	0,00	0,00	-
M3	13 460	13 461	0	3,87	109,2	0,00	93,58	-	-	0,00	0,00	-
M4	13 429	13 430	0	3,90	109,2	0,00	93,56	-	-	0,00	0,00	-

To be continued on next page...

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DECIBEL - Detailed results

Calculation: Lasor_VE2_9xV172xHH194 + Låtlax + Lotlax + Söderskogen + Storbacken + Mörknässkogen Noise calculation model: ISO 9613-2 General 8,0 m/s

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WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
St1	15 222	15 222	0	-1,35	104,9	0,00	94,65	-	-	0,00	0,00	-
St2	14 766	14 766	0	-0,95	104,9	0,00	94,39	-	-	0,00	0,00	-
St3	13 894	13 895	0	-0,16	104,9	0,00	93,86	-	-	0,00	0,00	-
St4	14 204	14 205	0	-0,44	104,9	0,00	94,05	-	-	0,00	0,00	-
St5	14 503	14 504	0	-0,72	104,9	0,00	94,23	-	-	0,00	0,00	-
St6	15 604	15 605	0	-1,68	104,9	0,00	94,87	-	-	0,00	0,00	-
St7	13 384	13 385	0	0,33	104,9	0,00	93,53	-	-	0,00	0,00	-
Sö1	13 016	13 018	0	3,55	109,2	0,00	93,29	-	-	0,00	0,00	-
Sö2	13 294	13 295	0	3,28	109,2	0,00	93,47	-	-	0,00	0,00	-
Sö3	13 807	13 808	0	2,80	109,2	0,00	93,80	-	-	0,00	0,00	-
Sö4	14 305	14 307	0	2,35	109,2	0,00	94,11	-	-	0,00	0,00	-
Sö5	14 447	14 449	0	2,23	109,2	0,00	94,20	-	-	0,00	0,00	-
Sö6	13 621	13 623	0	2,97	109,2	0,00	93,69	-	-	0,00	0,00	-
Sö7	13 860	13 861	0	2,75	109,2	0,00	93,84	-	-	0,00	0,00	-
Sö8	13 887	13 888	0	2,72	109,2	0,00	93,85	-	-	0,00	0,00	-
Sum				32,63								

- Data undefined due to calculation with octave data

Noise sensitive area: D D Lomarakennus (Söderändan 188)

Wind speed: 8,0 m/s

WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	3 383	3 389	0	22,18	106,9	0,00	81,60	-	-	0,00	0,00	-
11	3 398	3 404	0	22,17	106,9	0,00	81,64	-	-	0,00	0,00	-
12	3 588	3 593	0	21,44	106,9	0,00	82,11	-	-	0,00	0,00	-
15	4 045	4 049	0	19,88	106,9	0,00	83,15	-	-	0,00	0,00	-
17	4 275	4 279	0	19,28	106,9	0,00	83,63	-	-	0,00	0,00	-
4	2 670	2 677	0	25,11	106,9	0,00	79,55	-	-	0,00	0,00	-
5	2 423	2 430	0	26,26	106,9	0,00	78,71	-	-	0,00	0,00	-
6	3 542	3 547	0	21,67	106,9	0,00	82,00	-	-	0,00	0,00	-
7	2 769	2 776	0	24,67	106,9	0,00	79,87	-	-	0,00	0,00	-
Lo1	12 640	12 641	0	3,84	106,5	0,00	93,04	-	-	0,00	0,00	-
Lo2	12 241	12 241	0	4,25	106,5	0,00	92,76	-	-	0,00	0,00	-
Lo3	11 870	11 871	0	4,66	106,5	0,00	92,49	-	-	0,00	0,00	-
Lå1	8 216	8 217	0	7,94	104,9	0,00	89,29	-	-	0,00	0,00	-
Lå2	8 421	8 421	0	7,62	104,9	0,00	89,51	-	-	0,00	0,00	-
Lå3	8 568	8 569	0	7,40	104,9	0,00	89,66	-	-	0,00	0,00	-
Lå4	8 988	8 989	0	6,77	104,9	0,00	90,07	-	-	0,00	0,00	-
M1	13 618	13 618	0	4,45	109,2	0,00	93,68	-	-	0,00	0,00	-
M2	13 150	13 151	0	4,86	109,2	0,00	93,38	-	-	0,00	0,00	-
M3	13 058	13 059	0	4,89	109,2	0,00	93,32	-	-	0,00	0,00	-
M4	13 033	13 034	0	4,87	109,2	0,00	93,30	-	-	0,00	0,00	-
St1	14 803	14 804	0	-0,17	104,9	0,00	94,41	-	-	0,00	0,00	-
St2	14 348	14 349	0	0,24	104,9	0,00	94,14	-	-	0,00	0,00	-
St3	13 475	13 476	0	1,09	104,9	0,00	93,59	-	-	0,00	0,00	-
St4	13 787	13 788	0	0,77	104,9	0,00	93,79	-	-	0,00	0,00	-
St5	14 084	14 085	0	0,50	104,9	0,00	93,98	-	-	0,00	0,00	-
St6	15 185	15 186	0	-0,51	104,9	0,00	94,63	-	-	0,00	0,00	-
St7	12 966	12 967	0	1,59	104,9	0,00	93,26	-	-	0,00	0,00	-
Sö1	13 172	13 173	0	3,63	109,2	0,00	93,39	-	-	0,00	0,00	-
Sö2	13 440	13 442	0	3,37	109,2	0,00	93,57	-	-	0,00	0,00	-
Sö3	13 949	13 951	0	2,89	109,2	0,00	93,89	-	-	0,00	0,00	-
Sö4	14 446	14 447	0	2,45	109,2	0,00	94,20	-	-	0,00	0,00	-
Sö5	14 576	14 577	0	2,34	109,2	0,00	94,27	-	-	0,00	0,00	-
Sö6	13 751	13 752	0	3,08	109,2	0,00	93,77	-	-	0,00	0,00	-
Sö7	13 978	13 979	0	2,87	109,2	0,00	93,91	-	-	0,00	0,00	-
Sö8	13 969	13 970	0	2,88	109,2	0,00	93,90	-	-	0,00	0,00	-
Sum				32,80								

- Data undefined due to calculation with octave data

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14.7.2023 9.09/3.5.584

DECIBEL - Detailed results

Calculation: Lasor_VE2_9xV172xHH194 + Låtlax + Lotlax + Söderskogen + Storbacken + Mörknässkogen Noise calculation model: ISO 9613-2 General 8,0 m/s

Noise sensitive area: E E Asuinrakennus (Rökiöntie 930)

Wind speed: 8,0 m/s
WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	3 993	3 997	0	18,85	106,9	0,00	83,04	-	-	0,00	0,00	-
11	3 145	3 150	0	21,85	106,9	0,00	80,97	-	-	0,00	0,00	-
12	3 133	3 139	0	21,90	106,9	0,00	80,94	-	-	0,00	0,00	-
15	3 474	3 479	0	20,61	106,9	0,00	81,83	-	-	0,00	0,00	-
17	3 884	3 888	0	19,20	106,9	0,00	82,79	-	-	0,00	0,00	-
4	3 116	3 122	0	21,96	106,9	0,00	80,89	-	-	0,00	0,00	-
5	2 656	2 662	0	23,92	106,9	0,00	79,51	-	-	0,00	0,00	-
6	3 784	3 789	0	19,53	106,9	0,00	82,57	-	-	0,00	0,00	-
7	2 796	2 802	0	23,30	106,9	0,00	79,95	-	-	0,00	0,00	-
Lo1	12 665	12 665	0	2,68	106,5	0,00	93,05	-	-	0,00	0,00	-
Lo2	12 248	12 249	0	3,10	106,5	0,00	92,76	-	-	0,00	0,00	-
Lo3	11 864	11 865	0	3,52	106,5	0,00	92,49	-	-	0,00	0,00	-
Lå1	8 365	8 366	0	6,39	104,9	0,00	89,45	-	-	0,00	0,00	-
Lå2	8 483	8 484	0	6,21	104,9	0,00	89,57	-	-	0,00	0,00	-
Lå3	8 557	8 557	0	6,10	104,9	0,00	89,65	-	-	0,00	0,00	-
Lå4	8 940	8 941	0	5,54	104,9	0,00	90,03	-	-	0,00	0,00	-
M1	12 896	12 897	0	4,40	109,2	0,00	93,21	-	-	0,00	0,00	-
M2	12 436	12 437	0	4,85	109,2	0,00	92,89	-	-	0,00	0,00	-
M3	12 354	12 355	0	5,01	109,2	0,00	92,84	-	-	0,00	0,00	-
M4	12 341	12 342	0	5,26	109,2	0,00	92,83	-	-	0,00	0,00	-
St1	14 055	14 056	0	-0,35	104,9	0,00	93,96	-	-	0,00	0,00	-
St2	13 602	13 603	0	0,07	104,9	0,00	93,67	-	-	0,00	0,00	-
St3	12 726	12 727	0	0,93	104,9	0,00	93,09	-	-	0,00	0,00	-
St4	13 042	13 043	0	0,61	104,9	0,00	93,31	-	-	0,00	0,00	-
St5	13 335	13 336	0	0,33	104,9	0,00	93,50	-	-	0,00	0,00	-
St6	14 436	14 436	0	-0,70	104,9	0,00	94,19	-	-	0,00	0,00	-
St7	12 220	12 221	0	1,46	104,9	0,00	92,74	-	-	0,00	0,00	-
Sö1	13 445	13 447	0	2,28	109,2	0,00	93,57	-	-	0,00	0,00	-
Sö2	13 696	13 698	0	2,05	109,2	0,00	93,73	-	-	0,00	0,00	-
Sö3	14 197	14 198	0	1,61	109,2	0,00	94,04	-	-	0,00	0,00	-
Sö4	14 688	14 690	0	1,19	109,2	0,00	94,34	-	-	0,00	0,00	-
Sö5	14 798	14 800	0	1,11	109,2	0,00	94,41	-	-	0,00	0,00	-
Sö6	13 975	13 977	0	1,80	109,2	0,00	93,91	-	-	0,00	0,00	-
Sö7	14 182	14 183	0	1,62	109,2	0,00	94,04	-	-	0,00	0,00	-
Sö8	14 109	14 110	0	1,69	109,2	0,00	93,99	-	-	0,00	0,00	-
Sum				31,28								

- Data undefined due to calculation with octave data

Noise sensitive area: F F Asuinrakennus (Kukkusintie 474)

Wind speed: 8,0 m/s
WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	7 704	7 707	0	10,68	106,9	0,00	88,74	-	-	0,00	0,00	-
11	4 474	4 479	0	17,38	106,9	0,00	84,02	-	-	0,00	0,00	-
12	3 529	3 535	0	20,41	106,9	0,00	81,97	-	-	0,00	0,00	-
15	2 840	2 848	0	23,10	106,9	0,00	80,09	-	-	0,00	0,00	-
17	4 111	4 115	0	18,47	106,9	0,00	83,29	-	-	0,00	0,00	-
4	6 542	6 545	0	12,58	106,9	0,00	87,32	-	-	0,00	0,00	-
5	5 708	5 711	0	14,20	106,9	0,00	86,13	-	-	0,00	0,00	-
6	6 550	6 554	0	12,56	106,9	0,00	87,33	-	-	0,00	0,00	-
7	5 265	5 269	0	15,26	106,9	0,00	85,43	-	-	0,00	0,00	-
Lo1	13 477	13 477	0	1,93	106,5	0,00	93,59	-	-	0,00	0,00	-
Lo2	12 999	13 000	0	2,38	106,5	0,00	93,28	-	-	0,00	0,00	-
Lo3	12 571	12 572	0	2,79	106,5	0,00	92,99	-	-	0,00	0,00	-
Lå1	10 086	10 086	0	3,98	104,9	0,00	91,07	-	-	0,00	0,00	-
Lå2	9 801	9 802	0	4,35	104,9	0,00	90,83	-	-	0,00	0,00	-
Lå3	9 516	9 517	0	4,73	104,9	0,00	90,57	-	-	0,00	0,00	-
Lå4	9 678	9 679	0	4,53	104,9	0,00	90,72	-	-	0,00	0,00	-
M1	9 113	9 115	0	8,66	109,2	0,00	90,19	-	-	0,00	0,00	-
M2	8 722	8 724	0	9,20	109,2	0,00	89,81	-	-	0,00	0,00	-
M3	8 720	8 722	0	9,20	109,2	0,00	89,81	-	-	0,00	0,00	-
M4	8 813	8 814	0	9,07	109,2	0,00	89,90	-	-	0,00	0,00	-

To be continued on next page...

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DECIBEL - Detailed results

Calculation: Lasor_VE2_9xV172xHH194 + Låtlax + Lotlax + Söderskogen + Storbacken + Mörknässkogen Noise calculation model: ISO 9613-2 General 8,0 m/s

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WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
St1	10 035	10 036	0	4,01	104,9	0,00	91,03	-	-	0,00	0,00	-
St2	9 606	9 607	0	4,57	104,9	0,00	90,65	-	-	0,00	0,00	-
St3	8 700	8 701	0	5,85	104,9	0,00	89,79	-	-	0,00	0,00	-
St4	9 058	9 059	0	5,33	104,9	0,00	90,14	-	-	0,00	0,00	-
St5	9 307	9 308	0	4,98	104,9	0,00	90,38	-	-	0,00	0,00	-
St6	10 404	10 405	0	3,54	104,9	0,00	91,34	-	-	0,00	0,00	-
St7	8 221	8 222	0	6,58	104,9	0,00	89,30	-	-	0,00	0,00	-
Sö1	15 426	15 427	0	0,59	109,2	0,00	94,77	-	-	0,00	0,00	-
Sö2	15 587	15 589	0	0,46	109,2	0,00	94,86	-	-	0,00	0,00	-
Sö3	16 031	16 032	0	0,12	109,2	0,00	95,10	-	-	0,00	0,00	-
Sö4	16 483	16 484	0	-0,22	109,2	0,00	95,34	-	-	0,00	0,00	-
Sö5	16 491	16 493	0	-0,23	109,2	0,00	95,35	-	-	0,00	0,00	-
Sö6	15 710	15 711	0	0,37	109,2	0,00	94,92	-	-	0,00	0,00	-
Sö7	15 811	15 812	0	0,29	109,2	0,00	94,98	-	-	0,00	0,00	-
Sö8	15 429	15 431	0	0,59	109,2	0,00	94,77	-	-	0,00	0,00	-
Sum				27,97								

- Data undefined due to calculation with octave data

Noise sensitive area: G G Asuinrakennus (Kovik byväg 53)

Wind speed: 8,0 m/s

WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	7 325	7 328	0	11,27	106,9	0,00	88,30	-	-	0,00	0,00	-
11	3 373	3 380	0	20,97	106,9	0,00	81,58	-	-	0,00	0,00	-
12	3 090	3 098	0	22,06	106,9	0,00	80,82	-	-	0,00	0,00	-
15	2 982	2 991	0	22,51	106,9	0,00	80,52	-	-	0,00	0,00	-
17	2 371	2 379	0	25,28	106,9	0,00	78,53	-	-	0,00	0,00	-
4	6 121	6 125	0	13,34	106,9	0,00	86,74	-	-	0,00	0,00	-
5	5 283	5 288	0	15,22	106,9	0,00	85,47	-	-	0,00	0,00	-
6	5 142	5 147	0	15,57	106,9	0,00	85,23	-	-	0,00	0,00	-
7	4 506	4 512	0	17,29	106,9	0,00	84,09	-	-	0,00	0,00	-
Lo1	8 356	8 357	0	7,88	106,5	0,00	89,44	-	-	0,00	0,00	-
Lo2	7 866	7 867	0	8,63	106,5	0,00	88,92	-	-	0,00	0,00	-
Lo3	7 433	7 434	0	9,33	106,5	0,00	88,42	-	-	0,00	0,00	-
Lå1	5 953	5 955	0	10,72	104,9	0,00	86,50	-	-	0,00	0,00	-
Lå2	5 310	5 312	0	12,13	104,9	0,00	85,51	-	-	0,00	0,00	-
Lå3	4 753	4 755	0	13,48	104,9	0,00	84,54	-	-	0,00	0,00	-
Lå4	4 729	4 732	0	13,54	104,9	0,00	84,50	-	-	0,00	0,00	-
M1	12 813	12 814	0	4,47	109,2	0,00	93,15	-	-	0,00	0,00	-
M2	12 620	12 621	0	4,66	109,2	0,00	93,02	-	-	0,00	0,00	-
M3	12 781	12 782	0	4,51	109,2	0,00	93,13	-	-	0,00	0,00	-
M4	13 045	13 046	0	4,25	109,2	0,00	93,31	-	-	0,00	0,00	-
St1	12 601	12 602	0	1,06	104,9	0,00	93,01	-	-	0,00	0,00	-
St2	12 404	12 405	0	1,28	104,9	0,00	92,87	-	-	0,00	0,00	-
St3	11 341	11 342	0	2,44	104,9	0,00	92,09	-	-	0,00	0,00	-
St4	11 993	11 994	0	1,71	104,9	0,00	92,58	-	-	0,00	0,00	-
St5	11 861	11 862	0	1,85	104,9	0,00	92,48	-	-	0,00	0,00	-
St6	12 802	12 803	0	0,86	104,9	0,00	93,15	-	-	0,00	0,00	-
St7	11 151	11 153	0	2,65	104,9	0,00	91,95	-	-	0,00	0,00	-
Sö1	11 025	11 028	0	4,72	109,2	0,00	91,85	-	-	0,00	0,00	-
Sö2	11 097	11 100	0	4,64	109,2	0,00	91,91	-	-	0,00	0,00	-
Sö3	11 471	11 473	0	4,23	109,2	0,00	92,19	-	-	0,00	0,00	-
Sö4	11 871	11 873	0	3,81	109,2	0,00	92,49	-	-	0,00	0,00	-
Sö5	11 799	11 801	0	3,89	109,2	0,00	92,44	-	-	0,00	0,00	-
Sö6	11 081	11 083	0	4,66	109,2	0,00	91,89	-	-	0,00	0,00	-
Sö7	11 096	11 098	0	4,64	109,2	0,00	91,91	-	-	0,00	0,00	-
Sö8	10 517	10 519	0	5,30	109,2	0,00	91,44	-	-	0,00	0,00	-
Sum				30,41								

- Data undefined due to calculation with octave data

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DECIBEL - Detailed results

Calculation: Lasor_VE2_9xV172xHH194 + Låtlax + Lotlax + Söderskogen + Storbacken + Mörknässkogen Noise calculation model: ISO 9613-2 General 8,0 m/s

Noise sensitive area: H H Asuinrakennus (Vöyrintie 1021)

Wind speed: 8,0 m/s
WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	7 073	7 077	0	11,68	106,9	0,00	88,00	-	-	0,00	0,00	-
11	3 248	3 255	0	21,44	106,9	0,00	81,25	-	-	0,00	0,00	-
12	3 099	3 108	0	22,02	106,9	0,00	80,85	-	-	0,00	0,00	-
15	3 111	3 119	0	21,99	106,9	0,00	80,88	-	-	0,00	0,00	-
17	2 327	2 336	0	25,49	106,9	0,00	78,37	-	-	0,00	0,00	-
4	5 896	5 900	0	13,77	106,9	0,00	86,42	-	-	0,00	0,00	-
5	5 089	5 093	0	15,71	106,9	0,00	85,14	-	-	0,00	0,00	-
6	4 867	4 872	0	16,29	106,9	0,00	84,75	-	-	0,00	0,00	-
7	4 321	4 327	0	17,83	106,9	0,00	83,72	-	-	0,00	0,00	-
Lo1	7 995	7 996	0	8,44	106,5	0,00	89,06	-	-	0,00	0,00	-
Lo2	7 507	7 508	0	9,21	106,5	0,00	88,51	-	-	0,00	0,00	-
Lo3	7 074	7 075	0	9,94	106,5	0,00	88,00	-	-	0,00	0,00	-
Lå1	5 516	5 518	0	11,66	104,9	0,00	85,84	-	-	0,00	0,00	-
Lå2	4 877	4 880	0	13,17	104,9	0,00	84,77	-	-	0,00	0,00	-
Lå3	4 333	4 335	0	14,58	104,9	0,00	83,74	-	-	0,00	0,00	-
Lå4	4 328	4 331	0	14,59	104,9	0,00	83,73	-	-	0,00	0,00	-
M1	13 232	13 233	0	4,08	109,2	0,00	93,43	-	-	0,00	0,00	-
M2	13 032	13 034	0	4,27	109,2	0,00	93,30	-	-	0,00	0,00	-
M3	13 188	13 189	0	4,12	109,2	0,00	93,40	-	-	0,00	0,00	-
M4	13 446	13 447	0	3,88	109,2	0,00	93,57	-	-	0,00	0,00	-
St1	13 037	13 038	0	0,62	104,9	0,00	93,30	-	-	0,00	0,00	-
St2	12 839	12 840	0	0,83	104,9	0,00	93,17	-	-	0,00	0,00	-
St3	11 776	11 777	0	1,95	104,9	0,00	92,42	-	-	0,00	0,00	-
St4	12 426	12 427	0	1,25	104,9	0,00	92,89	-	-	0,00	0,00	-
St5	12 297	12 298	0	1,39	104,9	0,00	92,80	-	-	0,00	0,00	-
St6	13 239	13 240	0	0,42	104,9	0,00	93,44	-	-	0,00	0,00	-
St7	11 583	11 584	0	2,15	104,9	0,00	92,28	-	-	0,00	0,00	-
Sö1	10 598	10 601	0	5,20	109,2	0,00	91,51	-	-	0,00	0,00	-
Sö2	10 674	10 677	0	5,12	109,2	0,00	91,57	-	-	0,00	0,00	-
Sö3	11 051	11 054	0	4,69	109,2	0,00	91,87	-	-	0,00	0,00	-
Sö4	11 455	11 457	0	4,25	109,2	0,00	92,18	-	-	0,00	0,00	-
Sö5	11 388	11 391	0	4,33	109,2	0,00	92,13	-	-	0,00	0,00	-
Sö6	10 665	10 668	0	5,13	109,2	0,00	91,56	-	-	0,00	0,00	-
Sö7	10 686	10 689	0	5,11	109,2	0,00	91,58	-	-	0,00	0,00	-
Sö8	10 126	10 128	0	5,77	109,2	0,00	91,11	-	-	0,00	0,00	-
Sum				30,62								

- Data undefined due to calculation with octave data

Noise sensitive area: I I Lomarakennus (Ehrsbackavägen 29)

Wind speed: 8,0 m/s
WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	5 240	5 244	0	15,32	106,9	0,00	85,39	-	-	0,00	0,00	-
11	2 418	2 427	0	25,04	106,9	0,00	78,70	-	-	0,00	0,00	-
12	2 986	2 993	0	22,48	106,9	0,00	80,52	-	-	0,00	0,00	-
15	3 542	3 548	0	20,36	106,9	0,00	82,00	-	-	0,00	0,00	-
17	2 277	2 285	0	25,76	106,9	0,00	78,18	-	-	0,00	0,00	-
4	4 211	4 216	0	18,16	106,9	0,00	83,50	-	-	0,00	0,00	-
5	3 595	3 601	0	20,18	106,9	0,00	82,13	-	-	0,00	0,00	-
6	3 016	3 023	0	22,36	106,9	0,00	80,61	-	-	0,00	0,00	-
7	2 954	2 961	0	22,62	106,9	0,00	80,43	-	-	0,00	0,00	-
Lo1	7 312	7 313	0	9,53	106,5	0,00	88,28	-	-	0,00	0,00	-
Lo2	6 863	6 864	0	10,33	106,5	0,00	87,73	-	-	0,00	0,00	-
Lo3	6 457	6 458	0	11,08	106,5	0,00	87,20	-	-	0,00	0,00	-
Lå1	3 773	3 775	0	16,45	104,9	0,00	82,54	-	-	0,00	0,00	-
Lå2	3 421	3 424	0	17,76	104,9	0,00	81,69	-	-	0,00	0,00	-
Lå3	3 212	3 215	0	18,60	104,9	0,00	81,14	-	-	0,00	0,00	-
Lå4	3 495	3 498	0	17,47	104,9	0,00	81,88	-	-	0,00	0,00	-
M1	14 843	14 844	0	2,67	109,2	0,00	94,43	-	-	0,00	0,00	-
M2	14 580	14 581	0	2,89	109,2	0,00	94,28	-	-	0,00	0,00	-
M3	14 682	14 683	0	2,80	109,2	0,00	94,34	-	-	0,00	0,00	-
M4	14 879	14 880	0	2,64	109,2	0,00	94,45	-	-	0,00	0,00	-

To be continued on next page...

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Calculated:
14.7.2023 9.09/3.5.584

DECIBEL - Detailed results

Calculation: Lasor_VE2_9xV172xHH194 + Låtlax + Lotlax + Söderskogen + Storbacken + Mörknässkogen Noise calculation model: ISO 9613-2 General 8,0 m/s

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WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
St1	14 918	14 919	0	-1,13	104,9	0,00	94,47	-	-	0,00	0,00	-
St2	14 670	14 671	0	-0,91	104,9	0,00	94,33	-	-	0,00	0,00	-
St3	13 623	13 624	0	0,05	104,9	0,00	93,69	-	-	0,00	0,00	-
St4	14 222	14 223	0	-0,51	104,9	0,00	94,06	-	-	0,00	0,00	-
St5	14 170	14 171	0	-0,46	104,9	0,00	94,03	-	-	0,00	0,00	-
St6	15 153	15 154	0	-1,33	104,9	0,00	94,61	-	-	0,00	0,00	-
St7	13 366	13 367	0	0,30	104,9	0,00	93,52	-	-	0,00	0,00	-
Sö1	9 087	9 090	0	7,10	109,2	0,00	90,17	-	-	0,00	0,00	-
Sö2	9 229	9 232	0	6,91	109,2	0,00	90,31	-	-	0,00	0,00	-
Sö3	9 661	9 664	0	6,35	109,2	0,00	90,70	-	-	0,00	0,00	-
Sö4	10 108	10 110	0	5,79	109,2	0,00	91,10	-	-	0,00	0,00	-
Sö5	10 112	10 114	0	5,79	109,2	0,00	91,10	-	-	0,00	0,00	-
Sö6	9 332	9 335	0	6,77	109,2	0,00	90,40	-	-	0,00	0,00	-
Sö7	9 431	9 434	0	6,64	109,2	0,00	90,49	-	-	0,00	0,00	-
Sö8	9 087	9 089	0	7,10	109,2	0,00	90,17	-	-	0,00	0,00	-
Sum				32,68								

- Data undefined due to calculation with octave data

Noise sensitive area: J J Asuinrakennus (Kleidersvägen 118)

Wind speed: 8,0 m/s

WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	4 303	4 309	0	17,88	106,9	0,00	83,69	-	-	0,00	0,00	-
11	2 512	2 522	0	24,58	106,9	0,00	79,03	-	-	0,00	0,00	-
12	3 361	3 368	0	21,02	106,9	0,00	81,55	-	-	0,00	0,00	-
15	4 081	4 087	0	18,56	106,9	0,00	83,23	-	-	0,00	0,00	-
17	2 840	2 847	0	23,10	106,9	0,00	80,09	-	-	0,00	0,00	-
4	3 416	3 422	0	20,81	106,9	0,00	81,69	-	-	0,00	0,00	-
5	2 992	3 000	0	22,46	106,9	0,00	80,54	-	-	0,00	0,00	-
6	2 157	2 168	0	26,38	106,9	0,00	77,72	-	-	0,00	0,00	-
7	2 534	2 543	0	24,48	106,9	0,00	79,11	-	-	0,00	0,00	-
Lo1	7 360	7 361	0	9,45	106,5	0,00	88,34	-	-	0,00	0,00	-
Lo2	6 949	6 951	0	10,17	106,5	0,00	87,84	-	-	0,00	0,00	-
Lo3	6 574	6 575	0	10,87	106,5	0,00	87,36	-	-	0,00	0,00	-
Lå1	3 244	3 247	0	18,47	104,9	0,00	81,23	-	-	0,00	0,00	-
Lå2	3 192	3 195	0	18,68	104,9	0,00	81,09	-	-	0,00	0,00	-
Lå3	3 270	3 273	0	18,36	104,9	0,00	81,30	-	-	0,00	0,00	-
Lå4	3 703	3 706	0	16,70	104,9	0,00	82,38	-	-	0,00	0,00	-
M1	15 621	15 622	0	2,05	109,2	0,00	94,87	-	-	0,00	0,00	-
M2	15 326	15 327	0	2,30	109,2	0,00	94,71	-	-	0,00	0,00	-
M3	15 401	15 402	0	2,21	109,2	0,00	94,75	-	-	0,00	0,00	-
M4	15 566	15 567	0	2,08	109,2	0,00	94,84	-	-	0,00	0,00	-
St1	15 836	15 837	0	-1,90	104,9	0,00	94,99	-	-	0,00	0,00	-
St2	15 562	15 563	0	-1,68	104,9	0,00	94,84	-	-	0,00	0,00	-
St3	14 527	14 528	0	-0,78	104,9	0,00	94,24	-	-	0,00	0,00	-
St4	15 097	15 098	0	-1,28	104,9	0,00	94,58	-	-	0,00	0,00	-
St5	15 086	15 086	0	-1,27	104,9	0,00	94,57	-	-	0,00	0,00	-
St6	16 089	16 090	0	-2,11	104,9	0,00	95,13	-	-	0,00	0,00	-
St7	14 237	14 238	0	-0,52	104,9	0,00	94,07	-	-	0,00	0,00	-
Sö1	8 566	8 570	0	7,83	109,2	0,00	89,66	-	-	0,00	0,00	-
Sö2	8 751	8 755	0	7,57	109,2	0,00	89,84	-	-	0,00	0,00	-
Sö3	9 215	9 218	0	6,93	109,2	0,00	90,29	-	-	0,00	0,00	-
Sö4	9 684	9 687	0	6,32	109,2	0,00	90,72	-	-	0,00	0,00	-
Sö5	9 734	9 737	0	6,26	109,2	0,00	90,77	-	-	0,00	0,00	-
Sö6	8 929	8 932	0	7,32	109,2	0,00	90,02	-	-	0,00	0,00	-
Sö7	9 078	9 081	0	7,11	109,2	0,00	90,16	-	-	0,00	0,00	-
Sö8	8 878	8 880	0	7,39	109,2	0,00	89,97	-	-	0,00	0,00	-
Sum				33,23								

- Data undefined due to calculation with octave data

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14.7.2023 9.09/3.5.584

DECIBEL - Detailed results

Calculation: Lasor_VE2_9xV172xHH194 + Låtlax + Lotlax + Söderskogen + Storbacken + Mörknässkogen Noise calculation model: ISO 9613-2 General 8,0 m/s

Noise sensitive area: K K Asuinrakennus (Rökiöntie 154)

Wind speed: 8,0 m/s
WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	3 080	3 087	0	22,10	106,9	0,00	80,79	-	-	0,00	0,00	-
11	4 940	4 944	0	16,10	106,9	0,00	84,88	-	-	0,00	0,00	-
12	5 954	5 957	0	13,65	106,9	0,00	86,50	-	-	0,00	0,00	-
15	6 796	6 799	0	12,14	106,9	0,00	87,65	-	-	0,00	0,00	-
17	5 740	5 743	0	14,13	106,9	0,00	86,18	-	-	0,00	0,00	-
4	3 323	3 329	0	21,16	106,9	0,00	81,45	-	-	0,00	0,00	-
5	3 805	3 810	0	19,46	106,9	0,00	82,62	-	-	0,00	0,00	-
6	2 787	2 794	0	23,33	106,9	0,00	79,93	-	-	0,00	0,00	-
7	4 068	4 073	0	18,61	106,9	0,00	83,20	-	-	0,00	0,00	-
Lo1	7 995	7 996	0	8,42	106,5	0,00	89,06	-	-	0,00	0,00	-
Lo2	7 737	7 738	0	8,83	106,5	0,00	88,77	-	-	0,00	0,00	-
Lo3	7 491	7 492	0	9,23	106,5	0,00	88,49	-	-	0,00	0,00	-
Lå1	3 376	3 378	0	17,94	104,9	0,00	81,57	-	-	0,00	0,00	-
Lå2	4 159	4 161	0	15,13	104,9	0,00	83,38	-	-	0,00	0,00	-
Lå3	4 828	4 829	0	13,29	104,9	0,00	84,68	-	-	0,00	0,00	-
Lå4	5 412	5 413	0	11,90	104,9	0,00	85,67	-	-	0,00	0,00	-
M1	18 372	18 373	0	0,03	109,2	0,00	96,28	-	-	0,00	0,00	-
M2	18 016	18 017	0	0,27	109,2	0,00	96,11	-	-	0,00	0,00	-
M3	18 034	18 035	0	0,26	109,2	0,00	96,12	-	-	0,00	0,00	-
M4	18 131	18 132	0	0,19	109,2	0,00	96,17	-	-	0,00	0,00	-
St1	18 855	18 856	0	-4,17	104,9	0,00	96,51	-	-	0,00	0,00	-
St2	18 536	18 536	0	-3,94	104,9	0,00	96,36	-	-	0,00	0,00	-
St3	17 527	17 528	0	-3,21	104,9	0,00	95,87	-	-	0,00	0,00	-
St4	18 041	18 042	0	-3,60	104,9	0,00	96,13	-	-	0,00	0,00	-
St5	18 104	18 104	0	-3,64	104,9	0,00	96,16	-	-	0,00	0,00	-
St6	19 139	19 140	0	-4,36	104,9	0,00	96,64	-	-	0,00	0,00	-
St7	17 180	17 181	0	-2,96	104,9	0,00	95,70	-	-	0,00	0,00	-
Sö1	7 340	7 344	0	9,74	109,2	0,00	88,32	-	-	0,00	0,00	-
Sö2	7 653	7 657	0	9,22	109,2	0,00	88,68	-	-	0,00	0,00	-
Sö3	8 179	8 182	0	8,40	109,2	0,00	89,26	-	-	0,00	0,00	-
Sö4	8 683	8 685	0	7,66	109,2	0,00	89,78	-	-	0,00	0,00	-
Sö5	8 876	8 879	0	7,40	109,2	0,00	89,97	-	-	0,00	0,00	-
Sö6	8 058	8 061	0	8,59	109,2	0,00	89,13	-	-	0,00	0,00	-
Sö7	8 353	8 355	0	8,14	109,2	0,00	89,44	-	-	0,00	0,00	-
Sö8	8 614	8 616	0	7,76	109,2	0,00	89,71	-	-	0,00	0,00	-
Sum				29,97								

- Data undefined due to calculation with octave data

Noise sensitive area: L L Asuinrakennus (Bjurbäcksvägen 231)

Wind speed: 8,0 m/s
WTG

No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	1 736	1 748	0	28,89	106,9	0,00	75,85	-	-	0,00	0,00	-
11	5 477	5 481	0	14,74	106,9	0,00	85,78	-	-	0,00	0,00	-
12	6 430	6 433	0	12,78	106,9	0,00	87,17	-	-	0,00	0,00	-
15	7 270	7 273	0	11,37	106,9	0,00	88,23	-	-	0,00	0,00	-
17	6 502	6 504	0	12,65	106,9	0,00	87,26	-	-	0,00	0,00	-
4	2 798	2 805	0	23,28	106,9	0,00	79,96	-	-	0,00	0,00	-
5	3 675	3 680	0	19,90	106,9	0,00	82,32	-	-	0,00	0,00	-
6	3 200	3 207	0	21,63	106,9	0,00	81,12	-	-	0,00	0,00	-
7	4 296	4 301	0	17,90	106,9	0,00	83,67	-	-	0,00	0,00	-
Lo1	10 238	10 239	0	5,34	106,5	0,00	91,21	-	-	0,00	0,00	-
Lo2	9 987	9 987	0	5,65	106,5	0,00	90,99	-	-	0,00	0,00	-
Lo3	9 743	9 743	0	5,96	106,5	0,00	90,77	-	-	0,00	0,00	-
Lå1	5 626	5 627	0	11,42	104,9	0,00	86,01	-	-	0,00	0,00	-
Lå2	6 377	6 378	0	9,86	104,9	0,00	87,09	-	-	0,00	0,00	-
Lå3	6 995	6 997	0	8,68	104,9	0,00	87,90	-	-	0,00	0,00	-
Lå4	7 574	7 575	0	7,67	104,9	0,00	88,59	-	-	0,00	0,00	-
M1	18 438	18 439	0	-0,02	109,2	0,00	96,31	-	-	0,00	0,00	-
M2	18 019	18 020	0	0,27	109,2	0,00	96,12	-	-	0,00	0,00	-
M3	17 975	17 976	0	0,30	109,2	0,00	96,09	-	-	0,00	0,00	-
M4	18 000	18 001	0	0,28	109,2	0,00	96,11	-	-	0,00	0,00	-

To be continued on next page...

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DECIBEL - Detailed results

Calculation: Lasor_VE2_9xV172xHH194 + Låtlax + Lotlax + Söderskogen + Storbacken + Mörknässkogen Noise calculation model: ISO 9613-2 General 8,0 m/s

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WTG No.	Distance [m]	Sound distance [m]	Penalty [dB]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
St1	19 265	19 265	0	-4,45	104,9	0,00	96,70	-	-	0,00	0,00	-
St2	18 881	18 882	0	-4,19	104,9	0,00	96,52	-	-	0,00	0,00	-
St3	17 924	17 925	0	-3,51	104,9	0,00	96,07	-	-	0,00	0,00	-
St4	18 352	18 352	0	-3,82	104,9	0,00	96,27	-	-	0,00	0,00	-
St5	18 521	18 521	0	-3,94	104,9	0,00	96,35	-	-	0,00	0,00	-
St6	19 594	19 595	0	-4,68	104,9	0,00	96,84	-	-	0,00	0,00	-
St7	17 501	17 502	0	-3,20	104,9	0,00	95,86	-	-	0,00	0,00	-
Sö1	9 203	9 206	0	6,95	109,2	0,00	90,28	-	-	0,00	0,00	-
Sö2	9 553	9 556	0	6,48	109,2	0,00	90,61	-	-	0,00	0,00	-
Sö3	10 084	10 086	0	5,82	109,2	0,00	91,07	-	-	0,00	0,00	-
Sö4	10 585	10 587	0	5,22	109,2	0,00	91,50	-	-	0,00	0,00	-
Sö5	10 824	10 826	0	4,95	109,2	0,00	91,69	-	-	0,00	0,00	-
Sö6	10 024	10 027	0	5,89	109,2	0,00	91,02	-	-	0,00	0,00	-
Sö7	10 357	10 359	0	5,49	109,2	0,00	91,31	-	-	0,00	0,00	-
Sö8	10 731	10 733	0	5,05	109,2	0,00	91,61	-	-	0,00	0,00	-
Sum				31,64								

- Data undefined due to calculation with octave data

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Miikka Saranpää / miikka.saranpaa@fcg.fi
Calculated:
14.7.2023 9.09/3.5.584

DECIBEL - Assumptions for noise calculation

Calculation: Lasor_VE2_9xV172xHH194 + Låtlax + Lotlax + Söderskogen + Storbacken + Mörknässkogen

Noise calculation model:
ISO 9613-2 General
Wind speed (in 10 m height):
8,0 m/s
Ground attenuation:
General, terrain specific
Ground factor for porous ground: 0,4
Area object with hard ground: Area object (Roughness): REGIONS_Lasor_ZVI_4.w2r (27)
Area type with hard ground: vesistöt
Ground factor for hard ground: 0,0
Meteorological coefficient, C0:
0,0 dB
Type of demand in calculation:
1: WTG noise is compared to demand (DK, DE, SE, NL etc.)
Noise values in calculation:
All noise values are mean values (Lwa) (Normal)
Pure tones:
Ignore pure tones setting on WTG
Height above ground level, when no value in NSA object:
4,0 m; Don't allow override of model height with height from NSA object
Uncertainty margin:
0,0 dB; Uncertainty margin in model has priority
Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:
0,0 dB(A)
Octave data required
Frequency dependent air absorption

63	125	250	500	1 000	2 000	4 000	8 000
[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]
0,10	0,38	1,12	2,36	4,08	8,78	26,60	95,00

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89

WTG: VESTAS V150-4.2 HH145 4200 150.0 !O!
Noise: Level 0 - - Mode 0/PO1 - 10-2017

Source	Source/Date	Creator	Edited
Manufacturer	18.10.2017	USER	23.11.2022 20.09

Performance Specification 0067-7067 V05

					Octave data							
Status	Hub height [m]	Wind speed [m/s]	LwA,ref [dB(A)]	Pure tones	63 [dB]	125 [dB]	250 [dB]	500 [dB]	1000 [dB]	2000 [dB]	4000 [dB]	8000 [dB]
From Windcat	145,0	8,0	104,9	No	86,5	93,7	98,2	99,9	98,9	95,1	88,7	79,4

WTG: PROKON P3000-116 3030 116.7 !O!
Noise: Mode 0 - 106,5 dB(A) (manufacturer's warranty)

Source	Source/Date	Creator	Edited
PROKON	2.2.2012	USER	21.8.2020 12.25

				Octave data							
Status	Wind speed [m/s]	LwA,ref [dB(A)]	Pure tones	63 [dB]	125 [dB]	250 [dB]	500 [dB]	1000 [dB]	2000 [dB]	4000 [dB]	8000 [dB]
From Windcat	8,0	106,5	No	88,6	95,1	98,6	101,0	100,8	98,0	93,2	84,5

WTG: VESTAS V150-4.2 4200 150.0 !O!
Noise: Copy of Mode PO1 STE

Source	Source/Date	Creator	Edited
DMS 0067-4767 V03	13.11.2017	USER	25.10.2022 17.50

					Octave data							
Status	Hub height [m]	Wind speed [m/s]	LwA,ref [dB(A)]	Pure tones	63 [dB]	125 [dB]	250 [dB]	500 [dB]	1000 [dB]	2000 [dB]	4000 [dB]	8000 [dB]
From Windcat	140,0	8,0	104,9	No	86,5	93,7	98,2	99,9	98,9	95,1	88,7	79,4

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Calculated:
14.7.2023 9.09/3.5.584

DECIBEL - Assumptions for noise calculation

Calculation: Lasor_VE2_9xV172xHH194 + Låtlax + Lotlax + Söderskogen + Storbacken + Mörknässkogen

WTG: Generic RD180 7700 180.0 !O!
Noise: Mode 0.a No STE

Source	Source/Date	Creator	Edited
F008_276_A17_EN Revision 00	13.9.2021	USER	20.6.2023 12.47

Nordex

					Octave data							
Status	Hub height [m]	Wind speed [m/s]	LwA,ref [dB(A)]	Pure tones	63 [dB]	125 [dB]	250 [dB]	500 [dB]	1000 [dB]	2000 [dB]	4000 [dB]	8000 [dB]
From Windcat	210,0	8,0	109,2	No	89,5	95,7	99,9	103,2	104,6	102,2	93,4	84,6

WTG: NORDEX N163/5,7MW 5700 163.0 !O!
Noise: N163-5,7MW Mode 00 - 107.2 dB(A) + 2 dB

Source	Source/Date	Creator	Edited
F008_276_A14_EN	20.3.2020	USER	20.6.2023 13.12

					Octave data							
Status	Hub height [m]	Wind speed [m/s]	LwA,ref [dB(A)]	Pure tones	63 [dB]	125 [dB]	250 [dB]	500 [dB]	1000 [dB]	2000 [dB]	4000 [dB]	8000 [dB]
From Windcat	158,0	8,0	109,2	No	90,9	97,1	100,8	103,4	104,1	101,6	94,0	86,0

WTG: VESTAS V172-7.2 7200 172.0 !O!
Noise: V172 - 7,2 MW PO7200 STE

Source	Source/Date	Creator	Edited
Vestas	15.11.2022	USER	20.6.2023 9.21

DMS no.: 0128-4336_00

					Octave data							
Status	Hub height [m]	Wind speed [m/s]	LwA,ref [dB(A)]	Pure tones	63 [dB]	125 [dB]	250 [dB]	500 [dB]	1000 [dB]	2000 [dB]	4000 [dB]	8000 [dB]
From Windcat	194,0	8,0	106,9	No	90,4	98,0	101,3	101,5	99,9	95,4	87,9	77,2

Noise sensitive area: A A Lomarakennus (Söderändan 49)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: B B Asuinrakennus (Söderändan 81)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: C C Lomarakennus (Säderändan 166)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: D D Lomarakennus (Söderändan 188)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

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DECIBEL - Assumptions for noise calculation

Calculation: Lasor_VE2_9xV172xHH194 + Låtlax + Lotlax + Söderskogen + Storbacken + Mörknässkogen

Noise sensitive area: E E Asuinrakennus (Rökiöntie 930)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: F F Asuinrakennus (Kukkusintie 474)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: G G Asuinrakennus (Kovik byväg 53)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: H H Asuinrakennus (Vöyrintie 1021)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: I I Lomarakennus (Ehrsbackavägen 29)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: J J Asuinrakennus (Kleidersvägen 118)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: K K Asuinrakennus (Rökiöntie 154)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

Noise sensitive area: L L Asuinrakennus (Bjurbäcksvägen 231)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand

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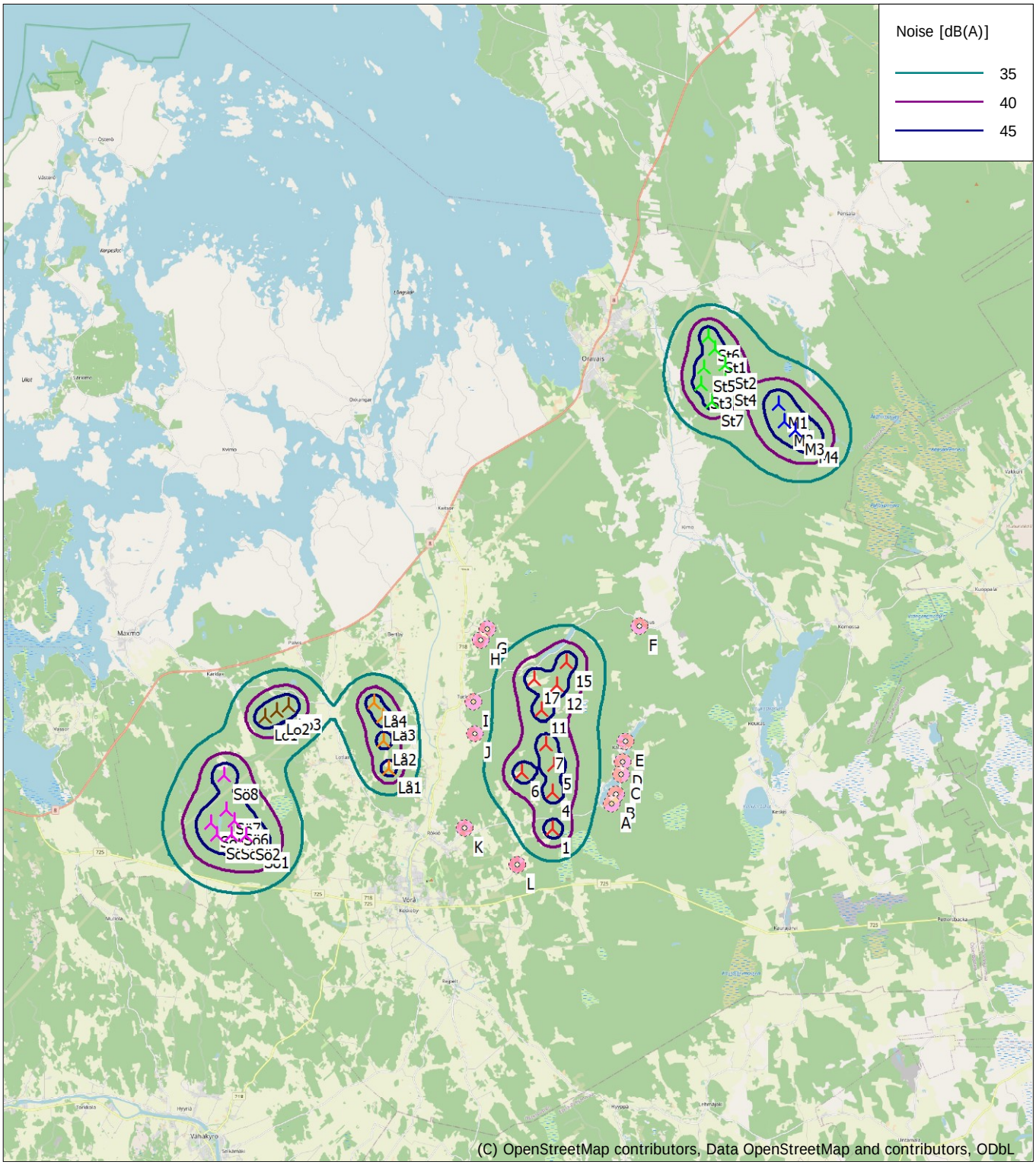
Miikka Saranpää / miikka.saranpaa@fcg.fi
Calculated:
14.7.2023 9.09/3.5.584

DECIBEL - Map 8,0 m/s

Calculation: Lasor_VE2_9xV172xHH194 + Låtlax + Lotlax + Söderskogen + Storbacken + Mörknässkogen



0 2,5 5 7,5 10km

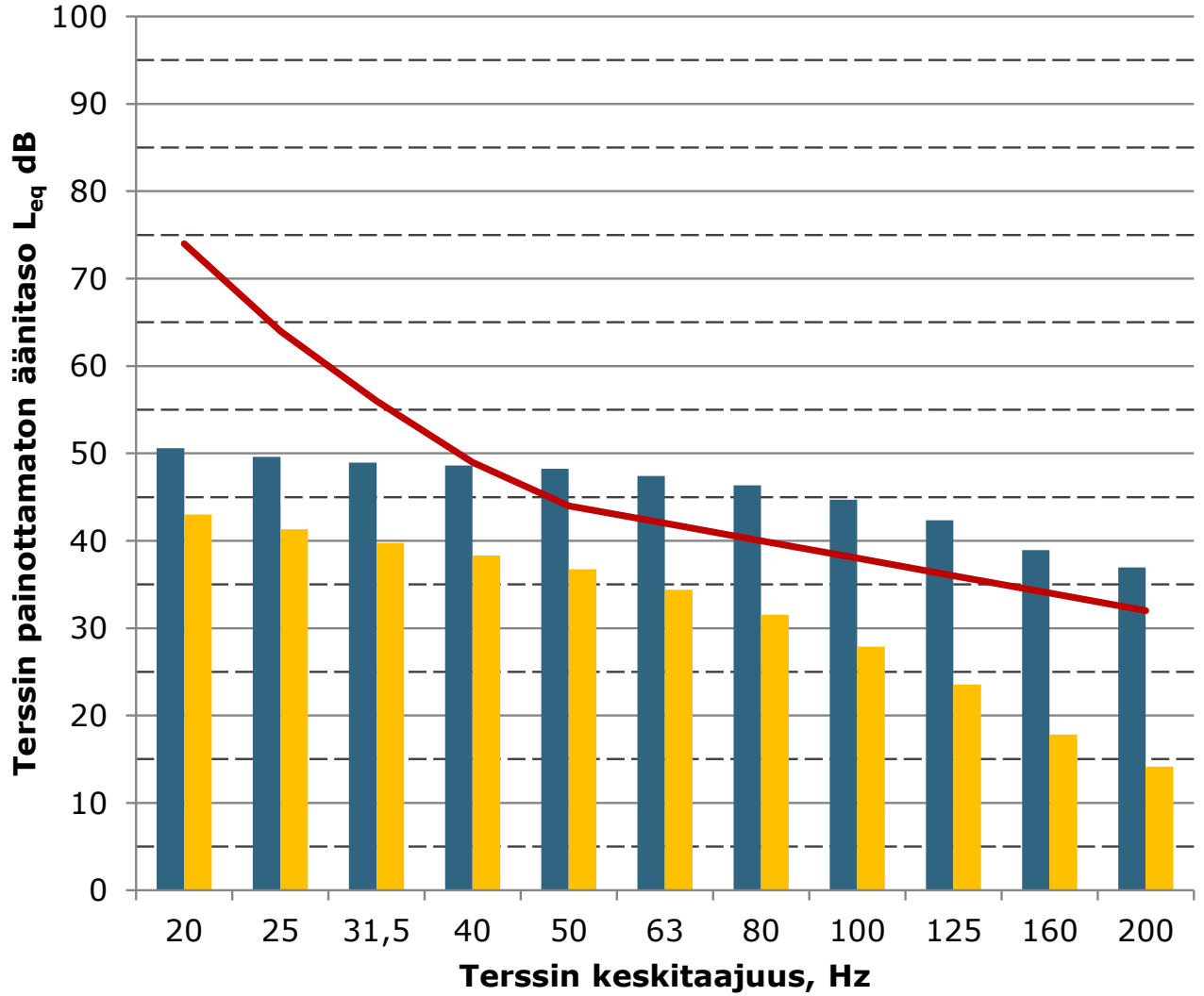
Map: EMD OpenStreetMap , Print scale 1:200 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 264 858 North: 7 019 453

New WTG Noise sensitive area

Noise calculation model: ISO 9613-2 General. Wind speed: 8,0 m/s
Height above sea level from active line object

Liite 11. Matalataajuisen melun yhteisvaikutuksen rakennuskohtaiset arvot – VE1

Matalien taajuuksien äänitasot ulkona ja sisällä, A Lomarakennus (Söderändan 49), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



Äänitaso ulkona dB

Äänitaso sisällä dB

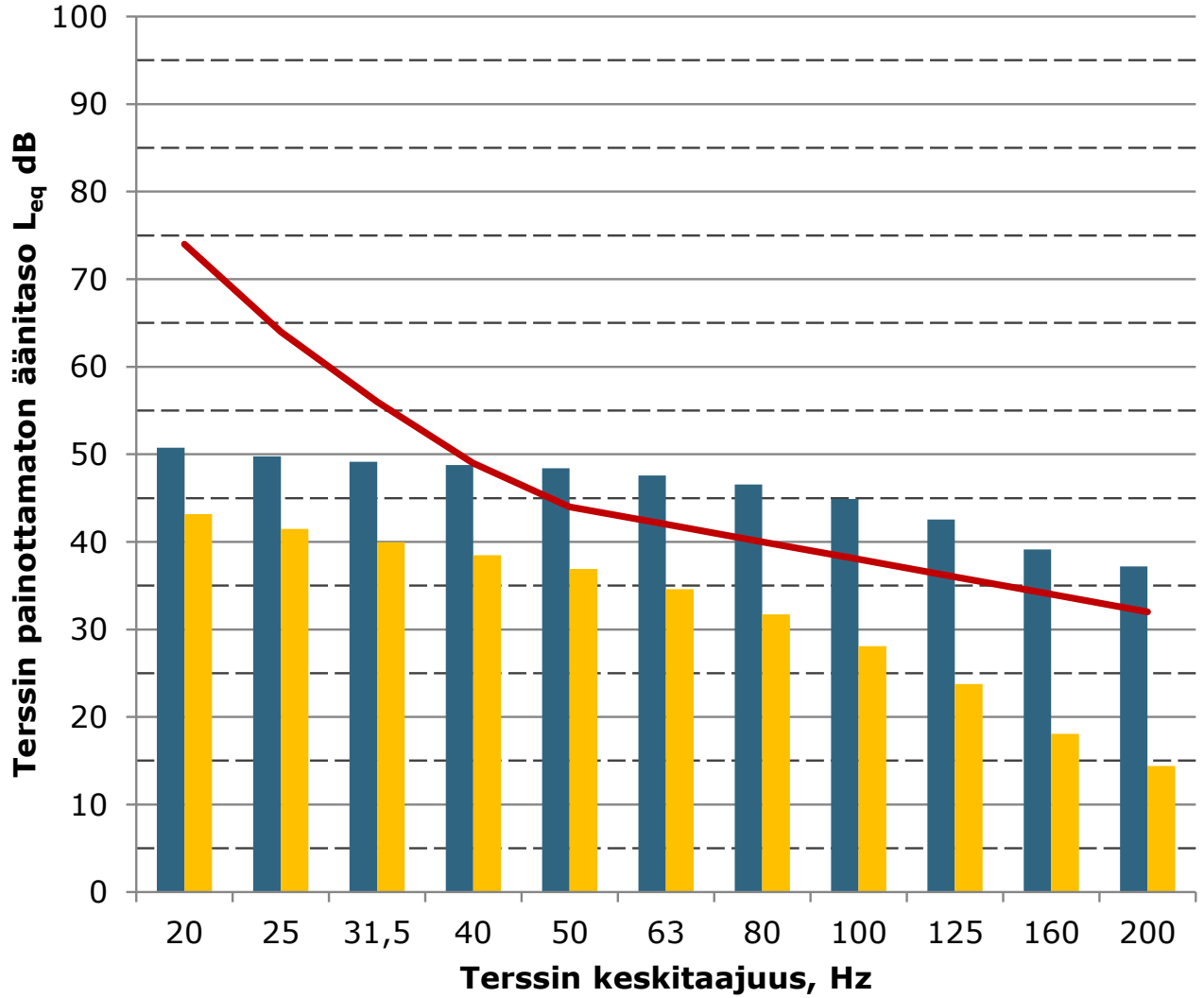
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB

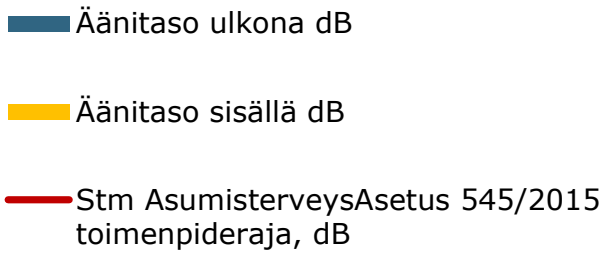
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2	7,2 MW, 194 m,	19
Vestas V150-4.2	4,2 MW, 140 m,	4
Prokon P3000-116 3030 116.7	3,03 MW, 122 m,	3
Nordex N163 5600	5,6 MW, 210 m,	8
Vestas V150-4.2	4,2 MW, 145 m,	7
Nordex N163-5,7MW	5,7 MW, 158 m,	4

Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284

Matalien taajuuksien äänitasot ulkona ja sisällä, B Asuinrakennus (Söderändan 81), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



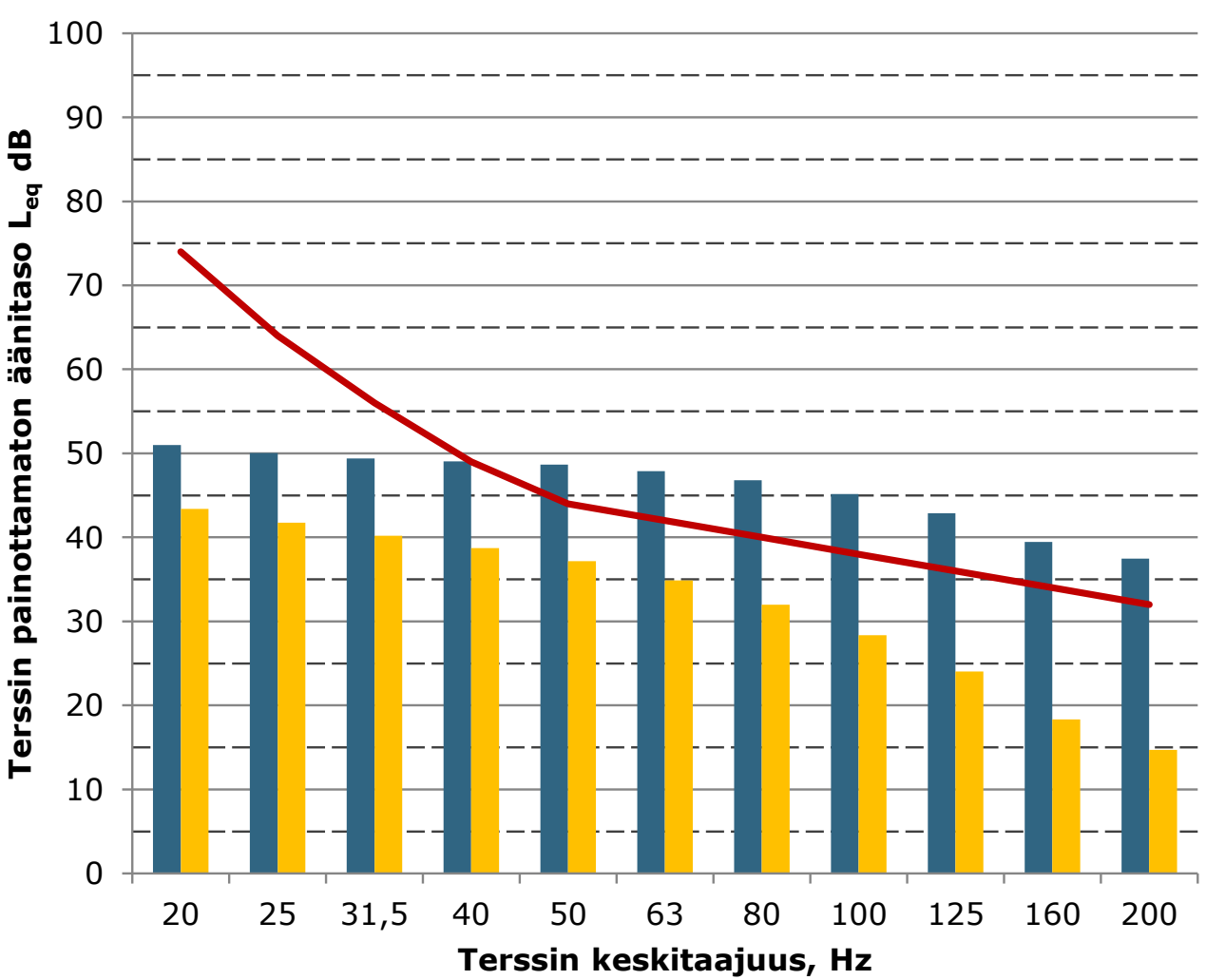


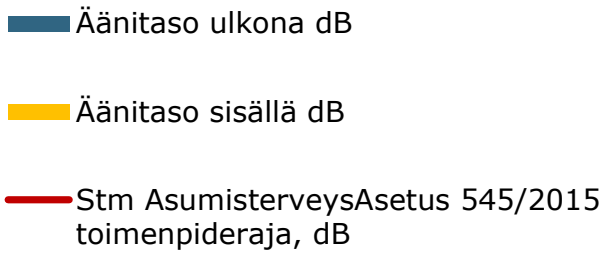
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2	7,2 MW, 194 m,	19
Vestas V150-4.2	4,2 MW, 140 m,	4
Prokon P3000-116 3030 116.7	3,03 MW, 122 m,	3
Nordex N163 5600	5,6 MW, 210 m,	8
Vestas V150-4.2	4,2 MW, 145 m,	7
Nordex N163-5,7MW	5,7 MW, 158 m,	4

Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284

Matalien taajuuksien äänitasot ulkona ja sisällä, C Lomarakennus (Säderändan 166), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



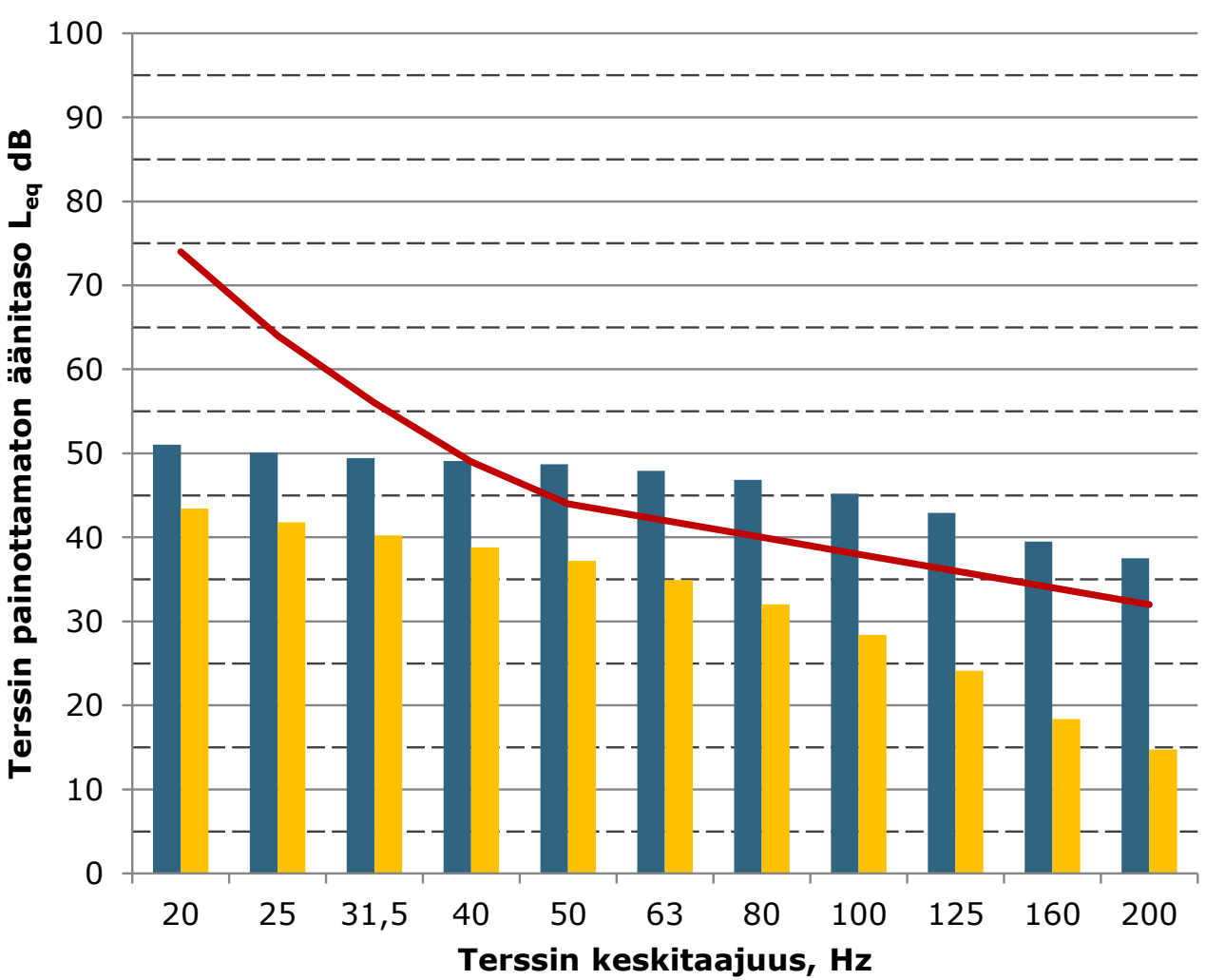


Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2	7,2 MW, 194 m,	19
Vestas V150-4.2	4,2 MW, 140 m,	4
Prokon P3000-116 3030 116.7	3,03 MW, 122 m,	3
Nordex N163 5600	5,6 MW, 210 m,	8
Vestas V150-4.2	4,2 MW, 145 m,	7
Nordex N163-5,7MW	5,7 MW, 158 m,	4

Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284

Matalien taajuuksien äänitasot ulkona ja sisällä, D Lomarakennus (Söderändan 188), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



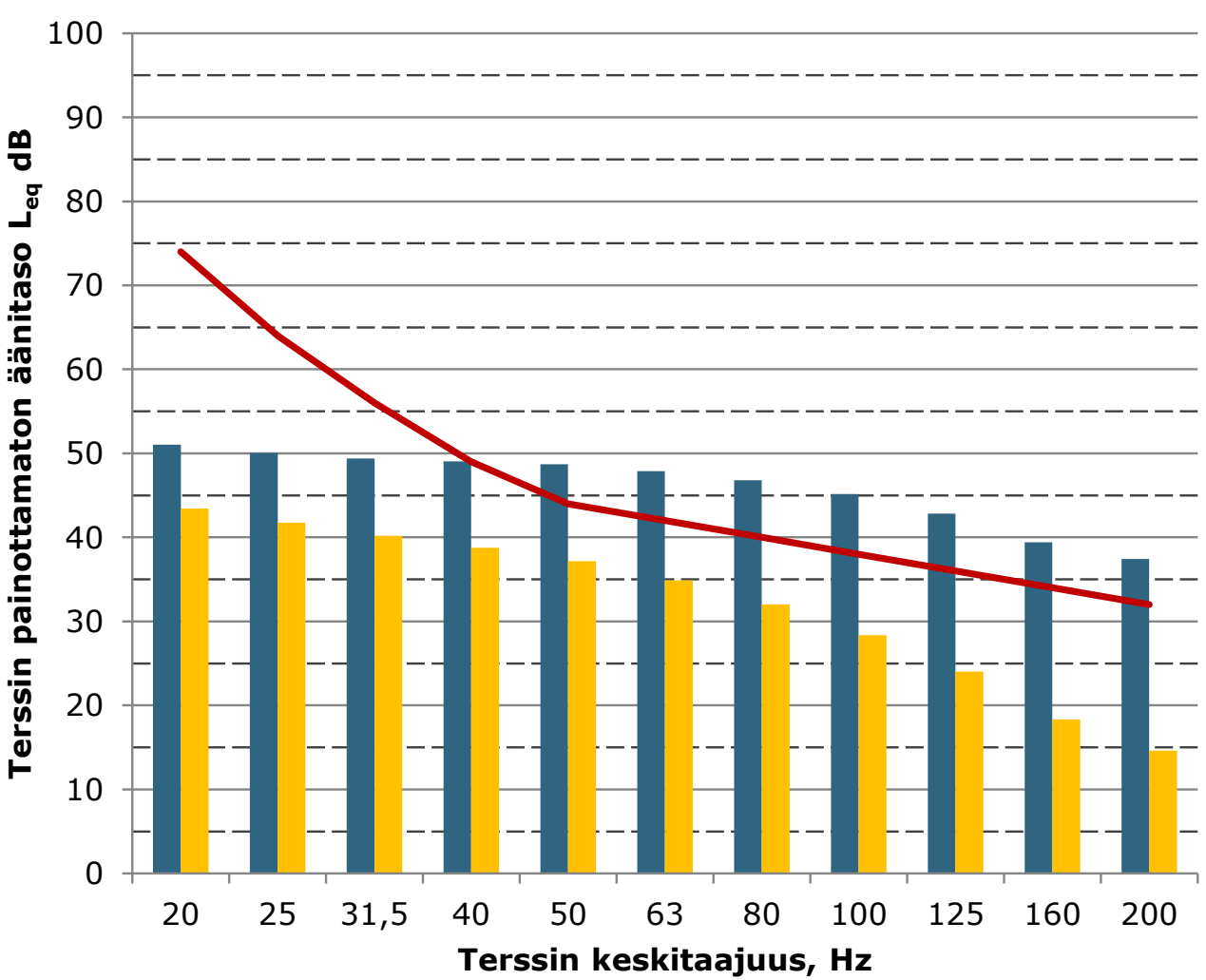
Äänitaso ulkona dB

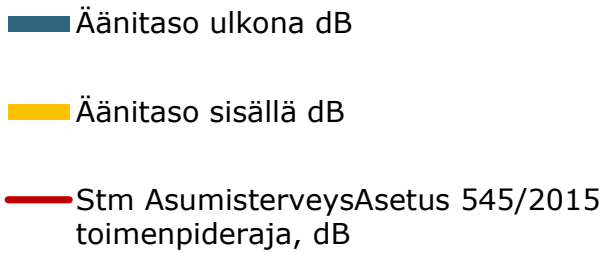
Äänitaso sisällä dB

Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB

Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 7,2 MW, 194 m, 19
Vestas V150-4.2 4,2 MW, 140 m, 4
Prokon P3000-116 3030 116.7 3,03 MW, 122 m, 3
Nordex N163 5600 5,6 MW, 210 m, 8
Vestas V150-4.2 4,2 MW, 145 m, 7
Nordex N163-5,7MW 5,7 MW, 158 m, 4
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284

Matalien taajuuksien äänitasot ulkona ja sisällä, E Asuinrakennus (Rökiöntie 930), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



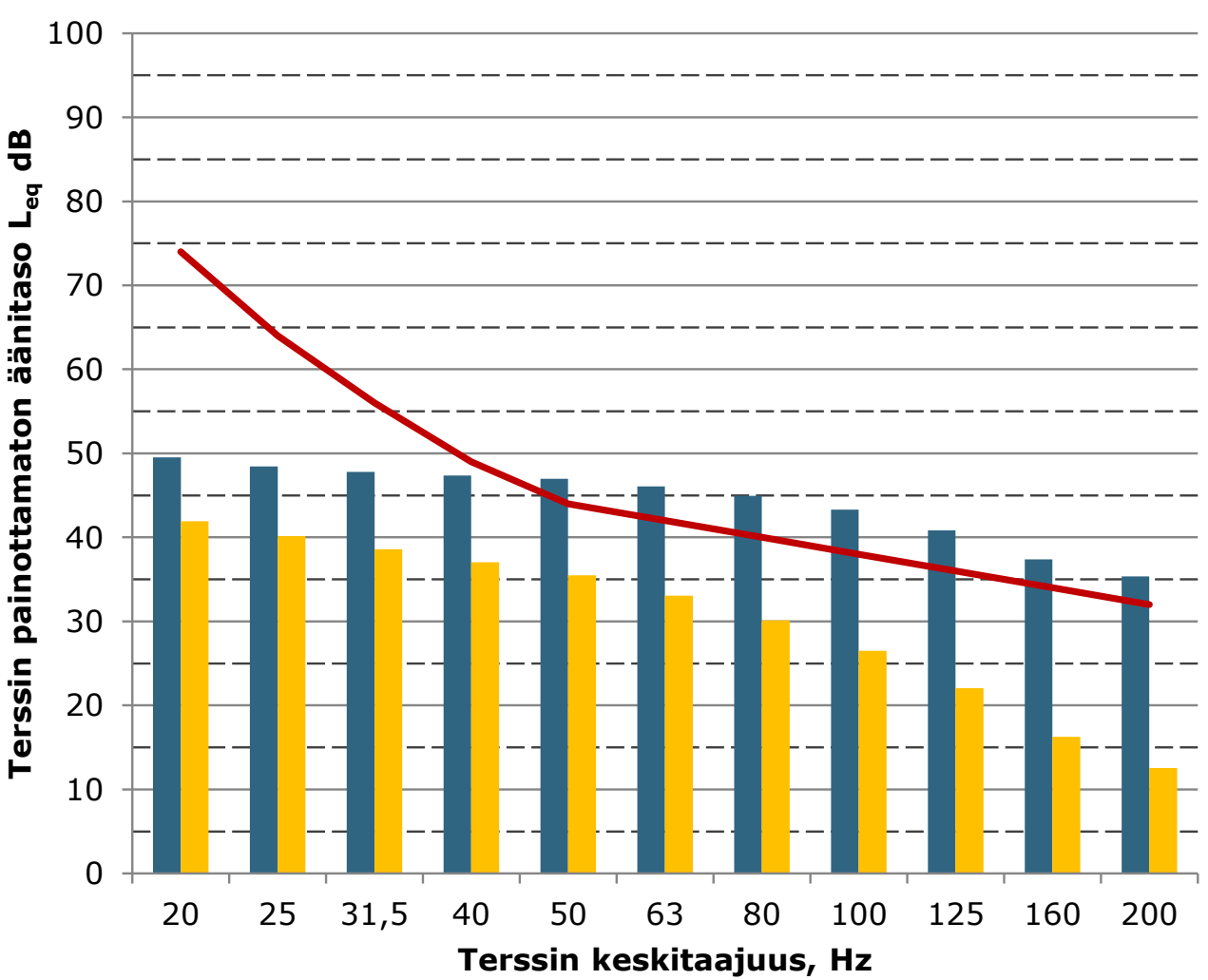


Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2	7,2 MW, 194 m,	19
Vestas V150-4.2	4,2 MW, 140 m,	4
Prokon P3000-116 3030 116.7	3,03 MW, 122 m,	3
Nordex N163 5600	5,6 MW, 210 m,	8
Vestas V150-4.2	4,2 MW, 145 m,	7
Nordex N163-5,7MW	5,7 MW, 158 m,	4

Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284

Matalien taajuuksien äänitasot ulkona ja sisällä, F Asuinrakennus (Kukkusintie 474), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



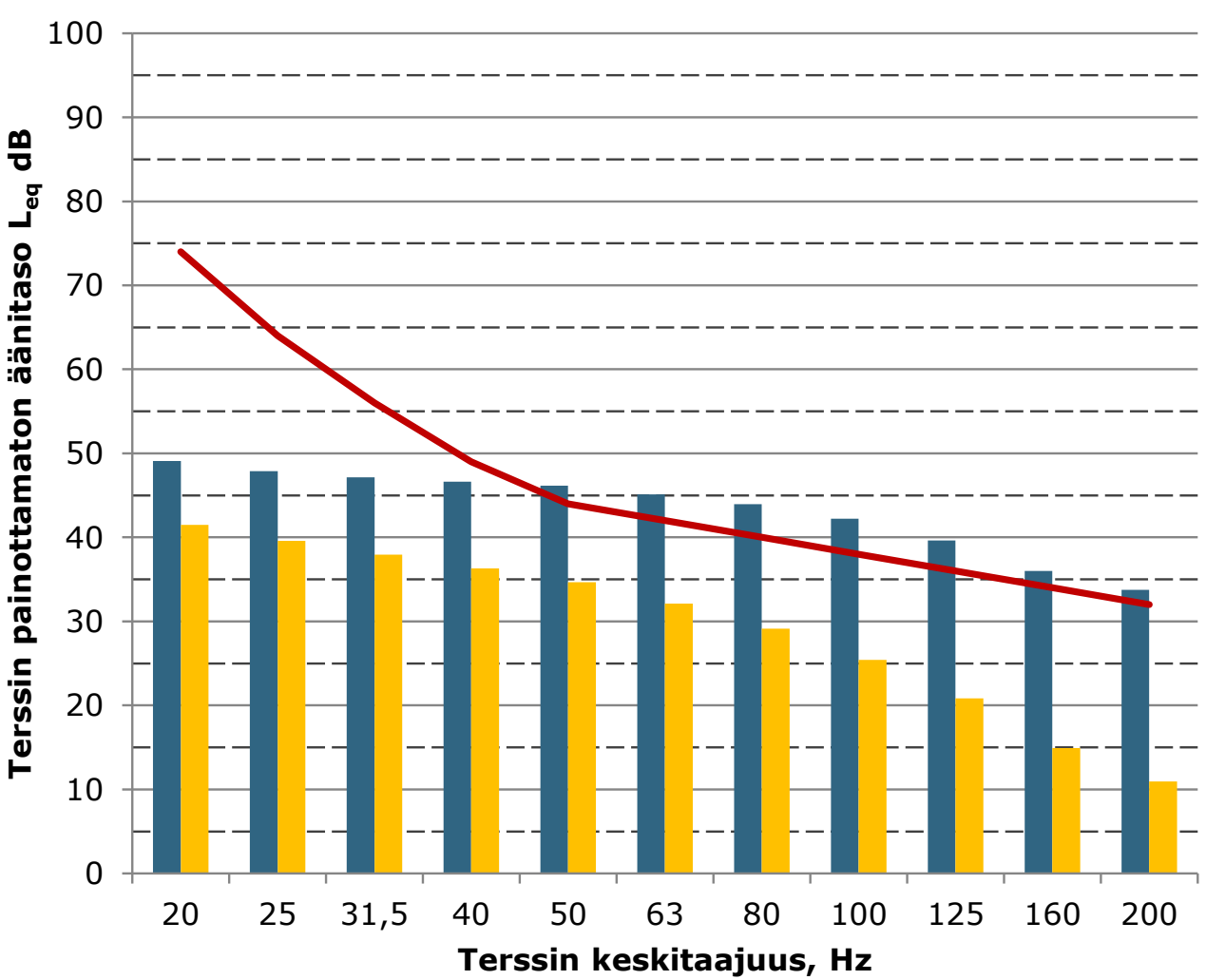
Äänitaso ulkona dB

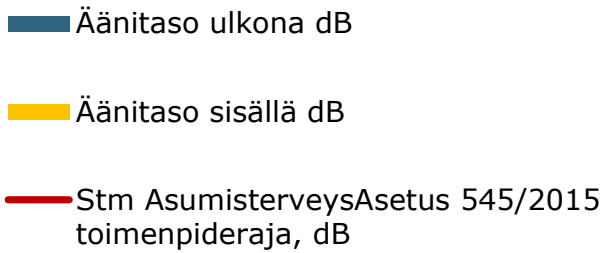
Äänitaso sisällä dB

Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB

Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 7,2 MW, 194 m, 19
Vestas V150-4.2 4,2 MW, 140 m, 4
Prokon P3000-116 3030 116.7 3,03 MW, 122 m, 3
Nordex N163 5600 5,6 MW, 210 m, 8
Vestas V150-4.2 4,2 MW, 145 m, 7
Nordex N163-5,7MW 5,7 MW, 158 m, 4
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284

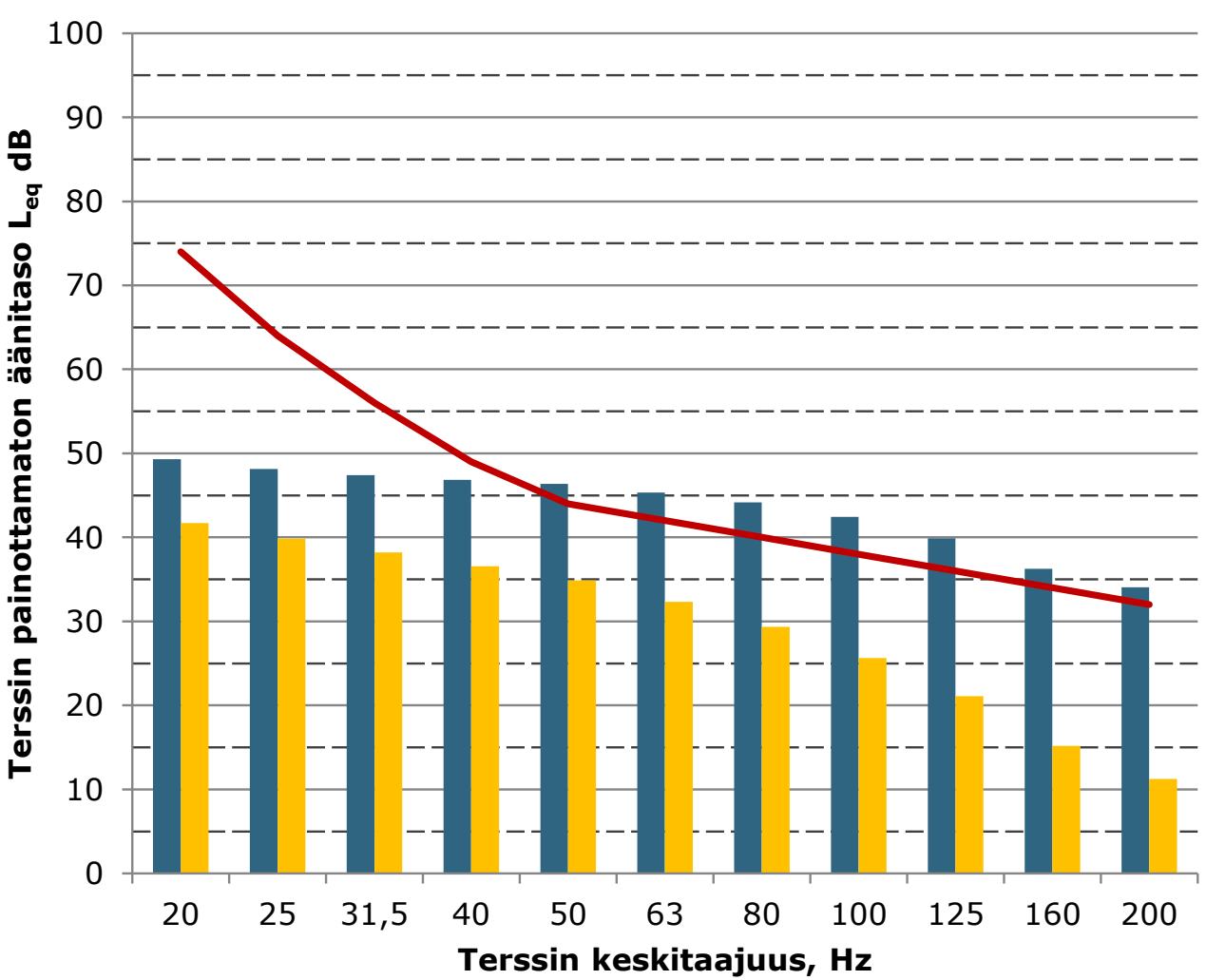
Matalien taajuuksien äänitasot ulkona ja sisällä, G Asuinrakennus (Kovik byväg 53), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

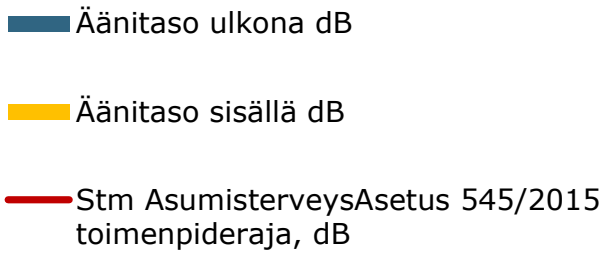




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 7,2 MW, 194 m, 19
Vestas V150-4.2 4,2 MW, 140 m, 4
Prokon P3000-116 3030 116.7 3,03 MW, 122 m, 3
Nordex N163 5600 5,6 MW, 210 m, 8
Vestas V150-4.2 4,2 MW, 145 m, 7
Nordex N163-5,7MW 5,7 MW, 158 m, 4
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284

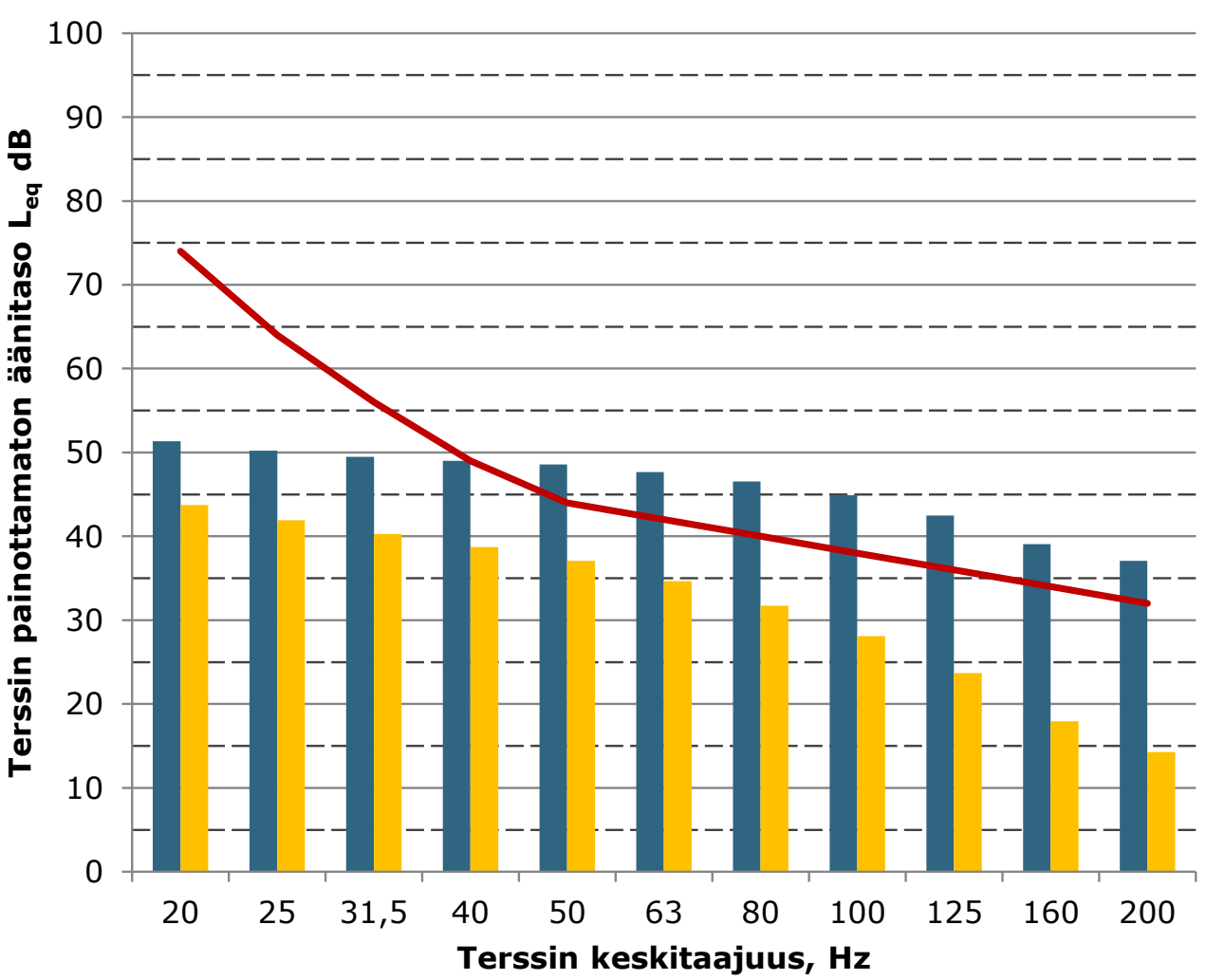
Matalien taajuuksien äänitasot ulkona ja sisällä, H Asuinrakennus (Vöyrintie 1021), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

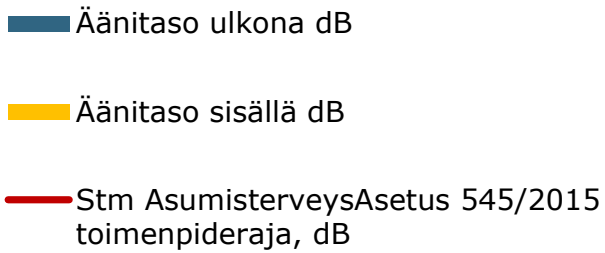




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 7,2 MW, 194 m, 19
Vestas V150-4.2 4,2 MW, 140 m, 4
Prokon P3000-116 3030 116.7 3,03 MW, 122 m, 3
Nordex N163 5600 5,6 MW, 210 m, 8
Vestas V150-4.2 4,2 MW, 145 m, 7
Nordex N163-5,7MW 5,7 MW, 158 m, 4
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284

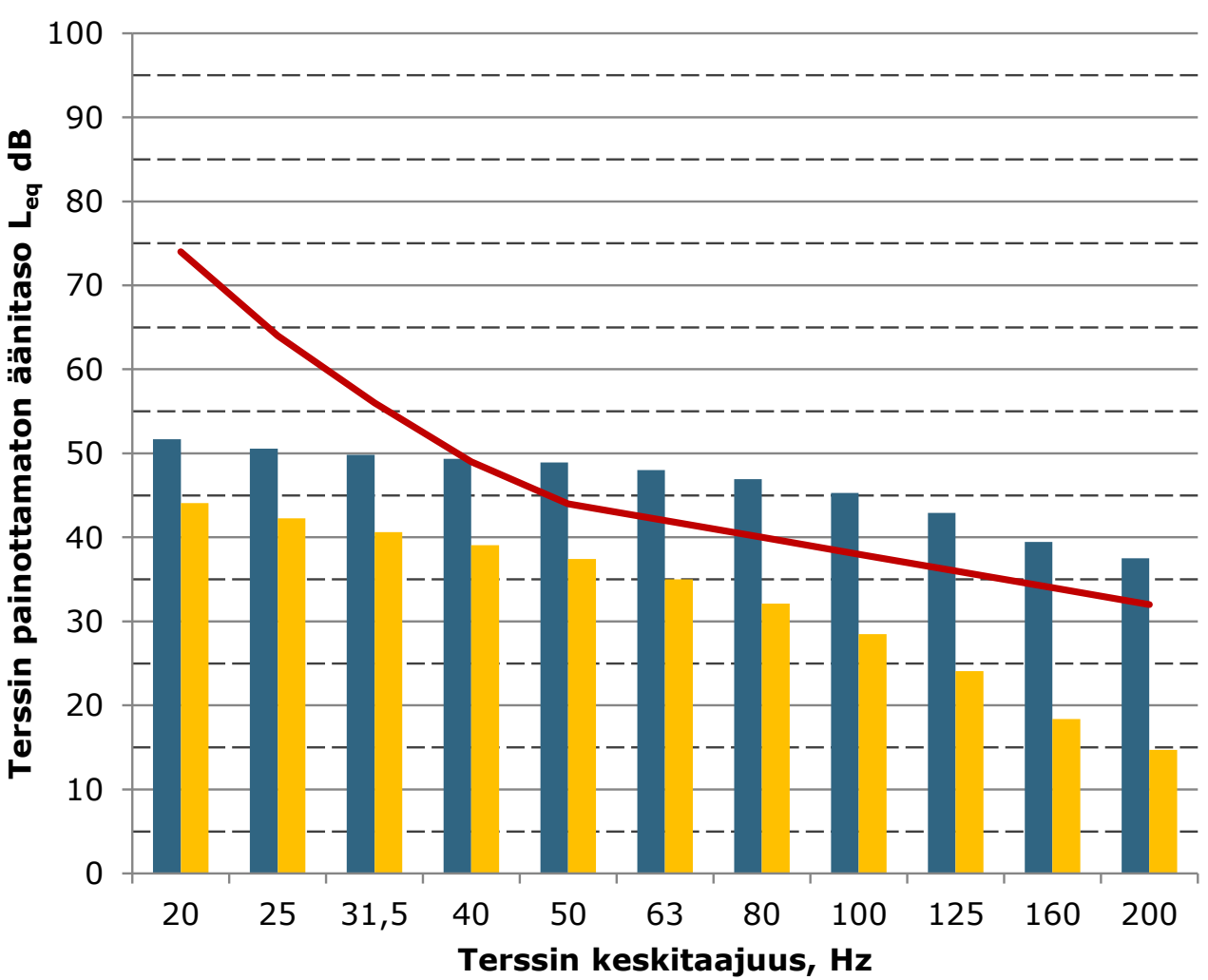
Matalien taajuuksien äänitasot ulkona ja sisällä, I Lomarakennus (Ehrsbackavägen 29), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

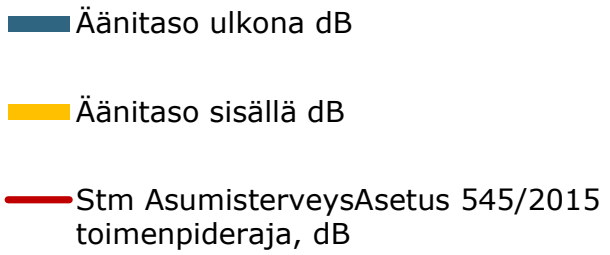




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 7,2 MW, 194 m, 19
Vestas V150-4.2 4,2 MW, 140 m, 4
Prokon P3000-116 3030 116.7 3,03 MW, 122 m, 3
Nordex N163 5600 5,6 MW, 210 m, 8
Vestas V150-4.2 4,2 MW, 145 m, 7
Nordex N163-5,7MW 5,7 MW, 158 m, 4
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284

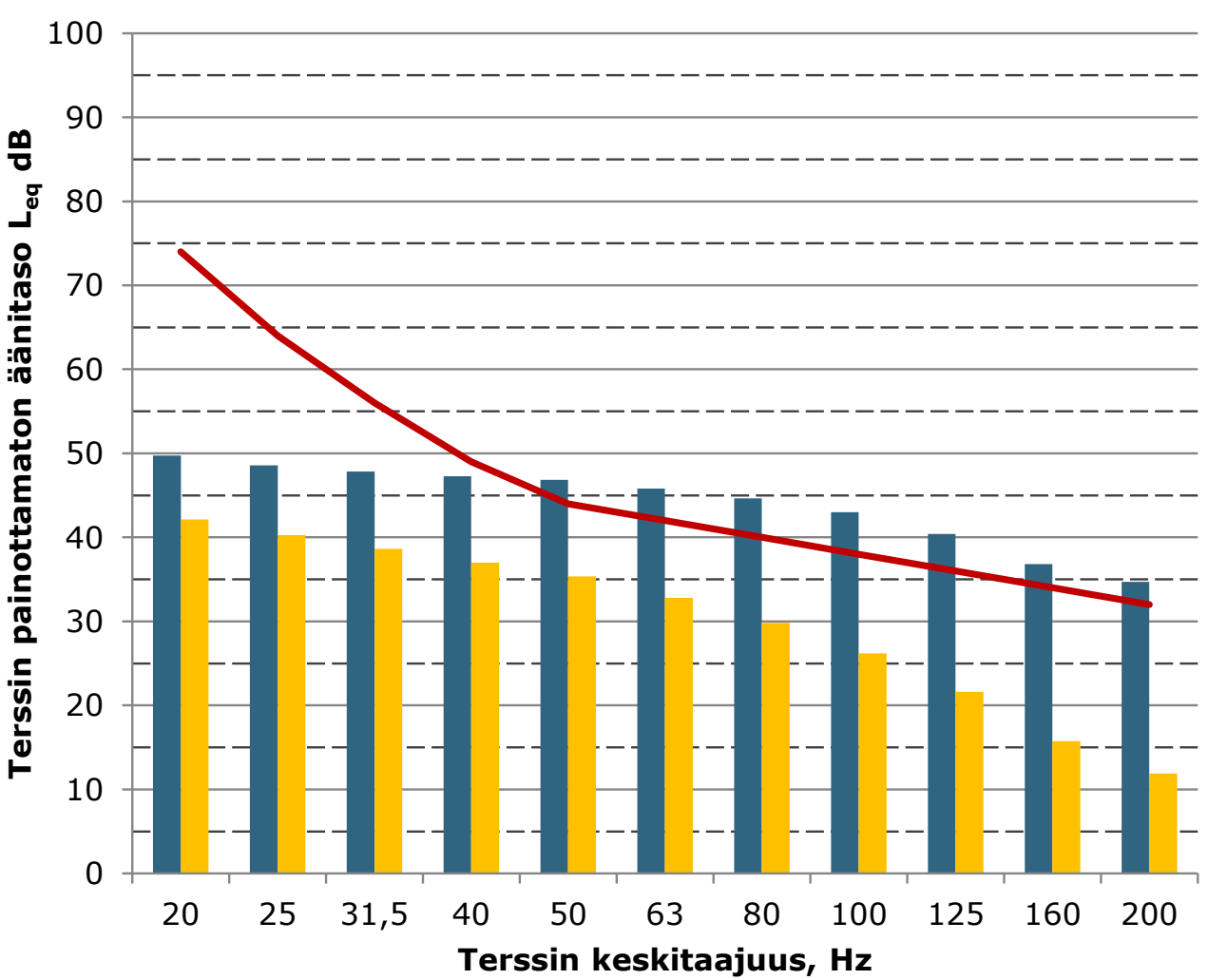
Matalien taajuuksien äänitasot ulkona ja sisällä, J Asuinrakennus (Kleidersvägen 118), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

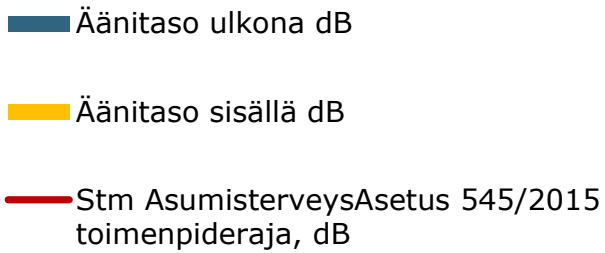




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 7,2 MW, 194 m, 19
Vestas V150-4.2 4,2 MW, 140 m, 4
Prokon P3000-116 3030 116.7 3,03 MW, 122 m, 3
Nordex N163 5600 5,6 MW, 210 m, 8
Vestas V150-4.2 4,2 MW, 145 m, 7
Nordex N163-5,7MW 5,7 MW, 158 m, 4
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284

Matalien taajuuksien äänitasot ulkona ja sisällä, K Asuinrakennus (Rökiöntie 154), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



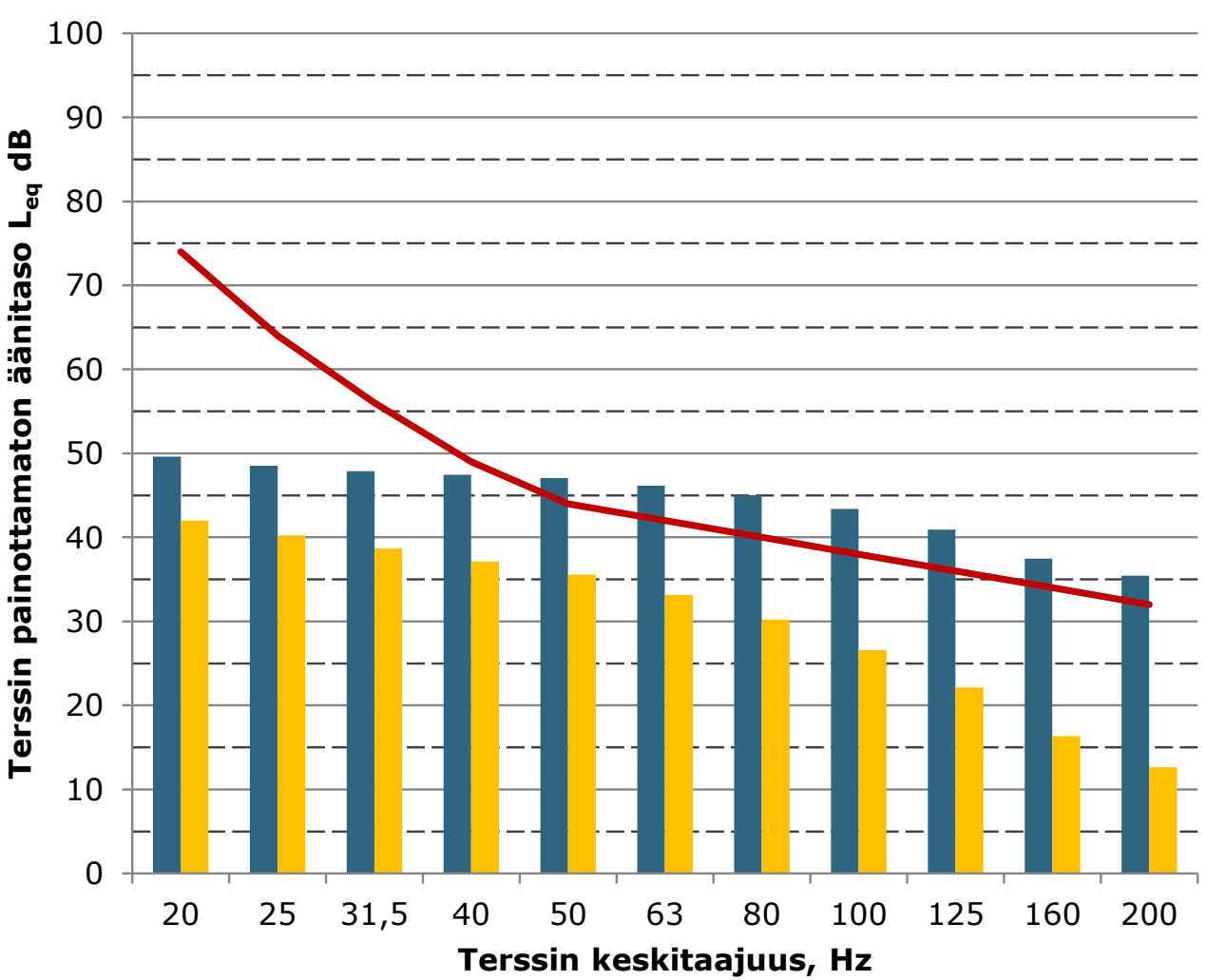


Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2	7,2 MW, 194 m,	19
Vestas V150-4.2	4,2 MW, 140 m,	4
Prokon P3000-116 3030 116.7	3,03 MW, 122 m,	3
Nordex N163 5600	5,6 MW, 210 m,	8
Vestas V150-4.2	4,2 MW, 145 m,	7
Nordex N163-5,7MW	5,7 MW, 158 m,	4

Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284

Matalien taajuuksien äänitasot ulkona ja sisällä, L Asuinrakennus (Bjurbäcksvägen 231), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



Äänitaso ulkona dB

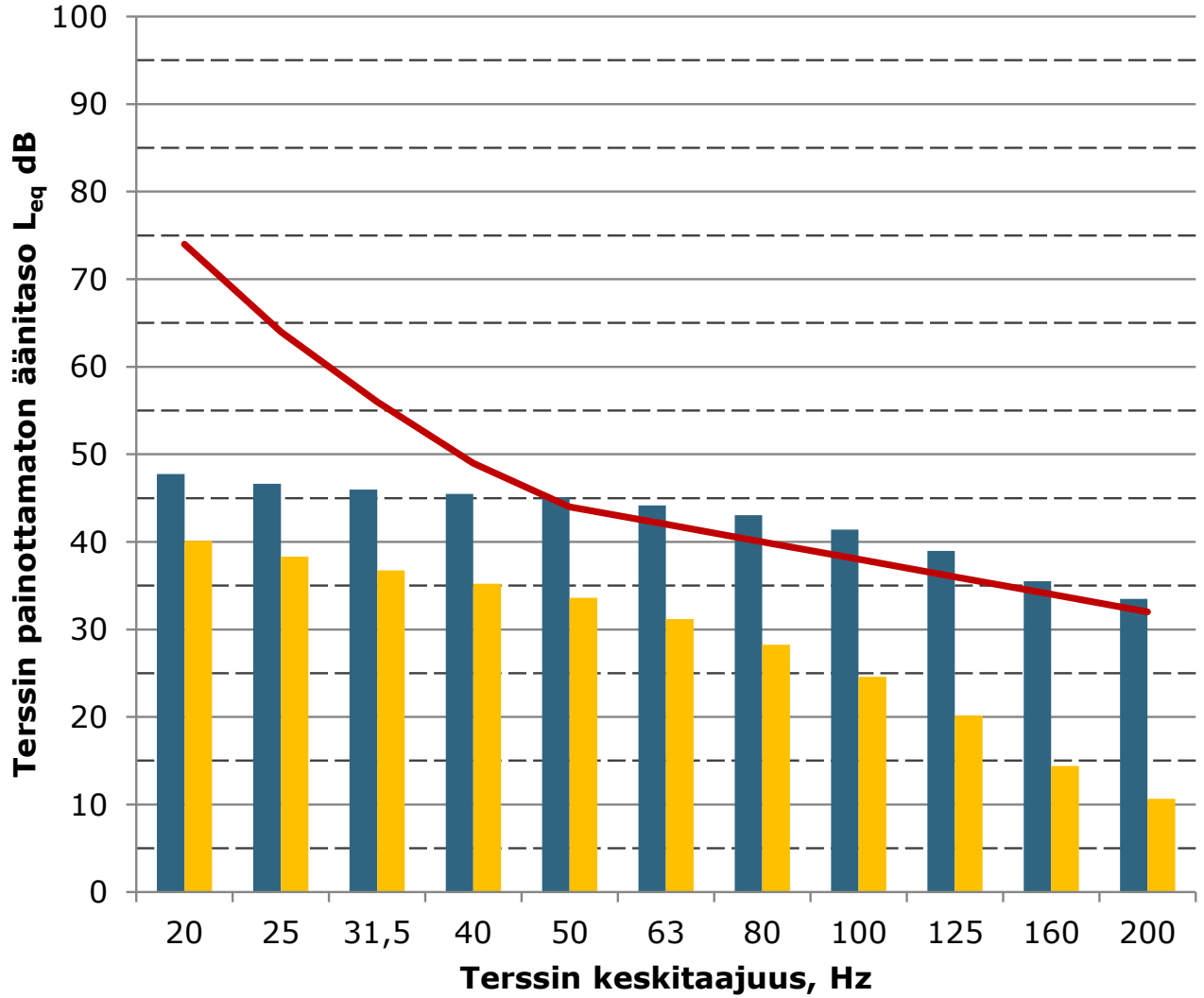
Äänitaso sisällä dB

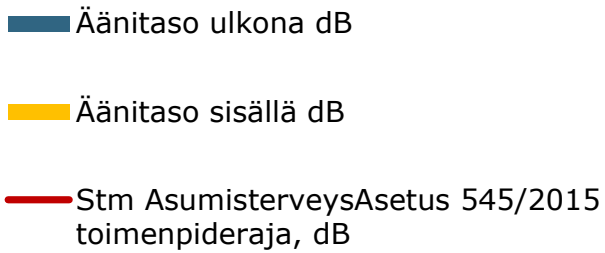
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB

Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 7,2 MW, 194 m, 19
Vestas V150-4.2 4,2 MW, 140 m, 4
Prokon P3000-116 3030 116.7 3,03 MW, 122 m, 3
Nordex N163 5600 5,6 MW, 210 m, 8
Vestas V150-4.2 4,2 MW, 145 m, 7
Nordex N163-5,7MW 5,7 MW, 158 m, 4
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284

Liite 12. Matalataajuisen melun yhteisvaikutuksen rakennuskohtaiset arvot - VE2

Matalien taajuuksien äänitasot ulkona ja sisällä, A Lomarakennus (Söderändan 49), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



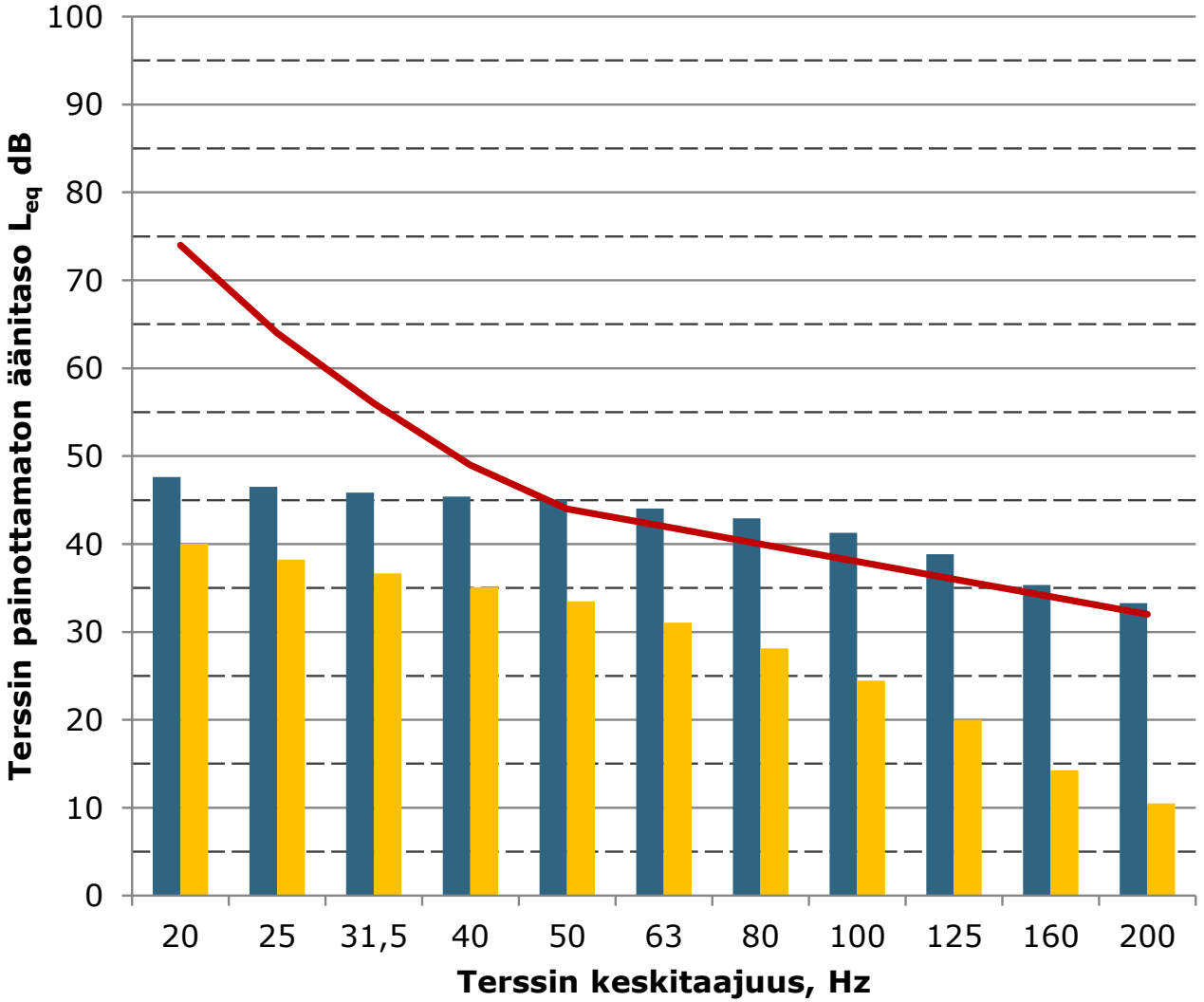


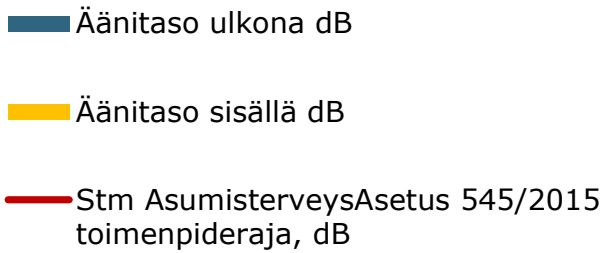
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2	7,2 MW, 194 m,	9
Vestas V150-4.2	4,2 MW, 140 m,	4
Prokon P3000-116 3030 116.7	3,03 MW, 122 m,	3
Nordex N163 5600	5,6 MW, 210 m,	8
Vestas V150-4.2	4,2 MW, 145 m,	7
Nordex N163-5,7MW	5,7 MW, 158 m,	4

Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284

Matalien taajuuksien äänitasot ulkona ja sisällä, B Asuinrakennus (Söderändan 81), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



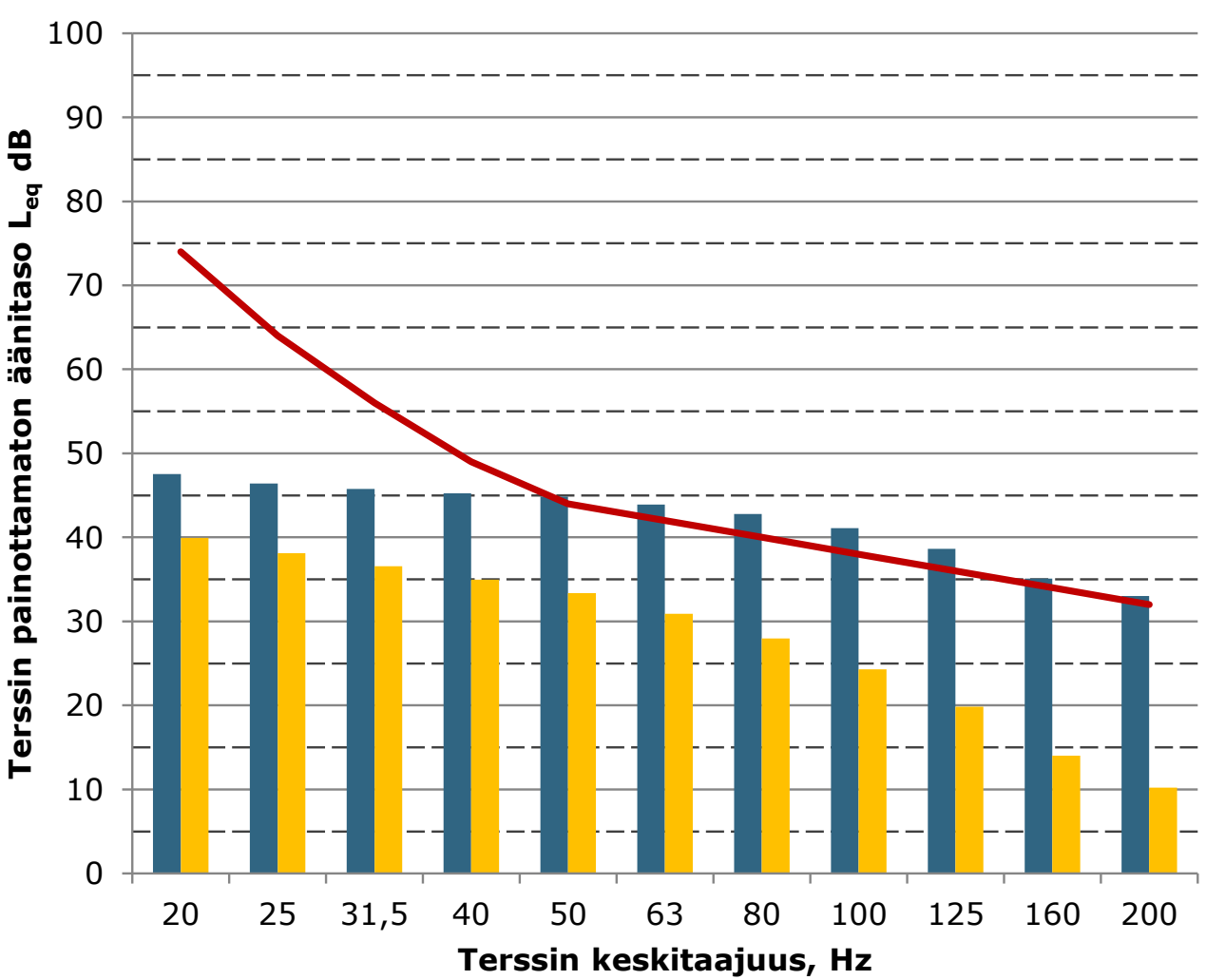


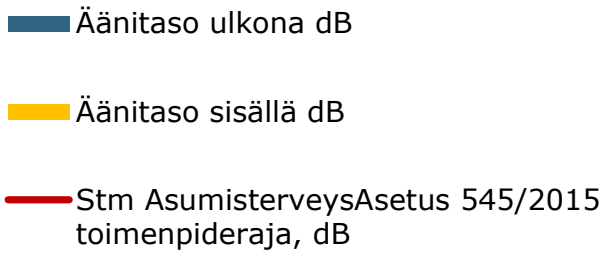
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2	7,2 MW, 194 m,	9
Vestas V150-4.2	4,2 MW, 140 m,	4
Prokon P3000-116 3030 116.7	3,03 MW, 122 m,	3
Nordex N163 5600	5,6 MW, 210 m,	8
Vestas V150-4.2	4,2 MW, 145 m,	7
Nordex N163-5,7MW	5,7 MW, 158 m,	4

Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284

Matalien taajuuksien äänitasot ulkona ja sisällä, C Lomarakennus (Säderändan 166), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



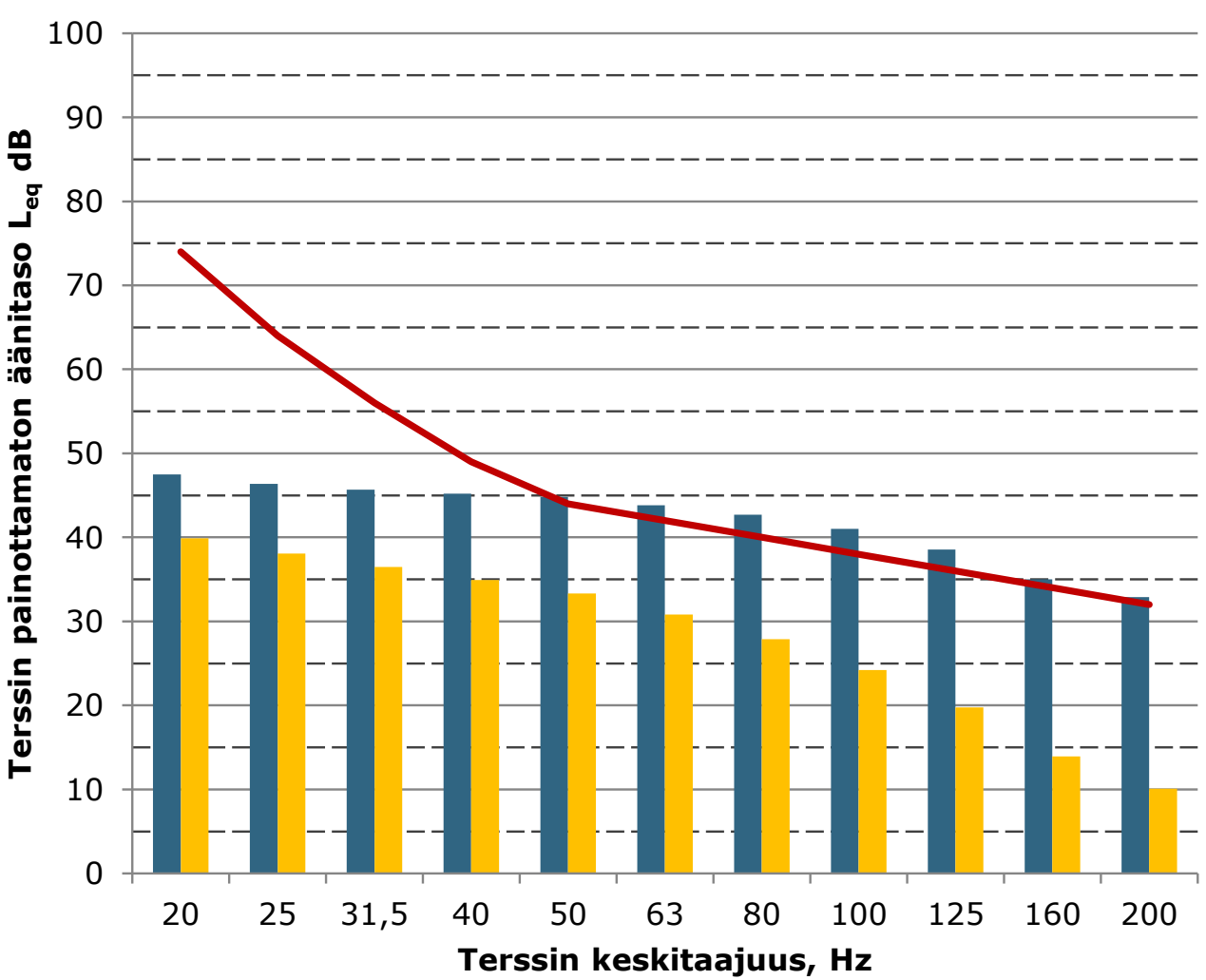


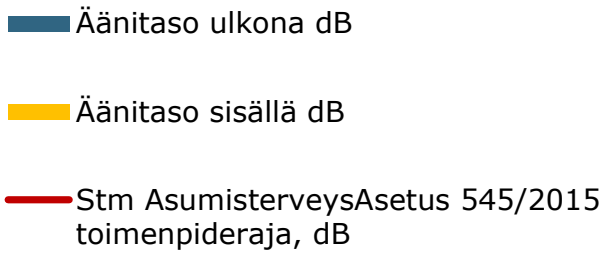
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2	7,2 MW, 194 m,	9
Vestas V150-4.2	4,2 MW, 140 m,	4
Prokon P3000-116 3030 116.7	3,03 MW, 122 m,	3
Nordex N163 5600	5,6 MW, 210 m,	8
Vestas V150-4.2	4,2 MW, 145 m,	7
Nordex N163-5,7MW	5,7 MW, 158 m,	4

Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284

Matalien taajuuksien äänitasot ulkona ja sisällä, D Lomarakennus (Söderändan 188), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



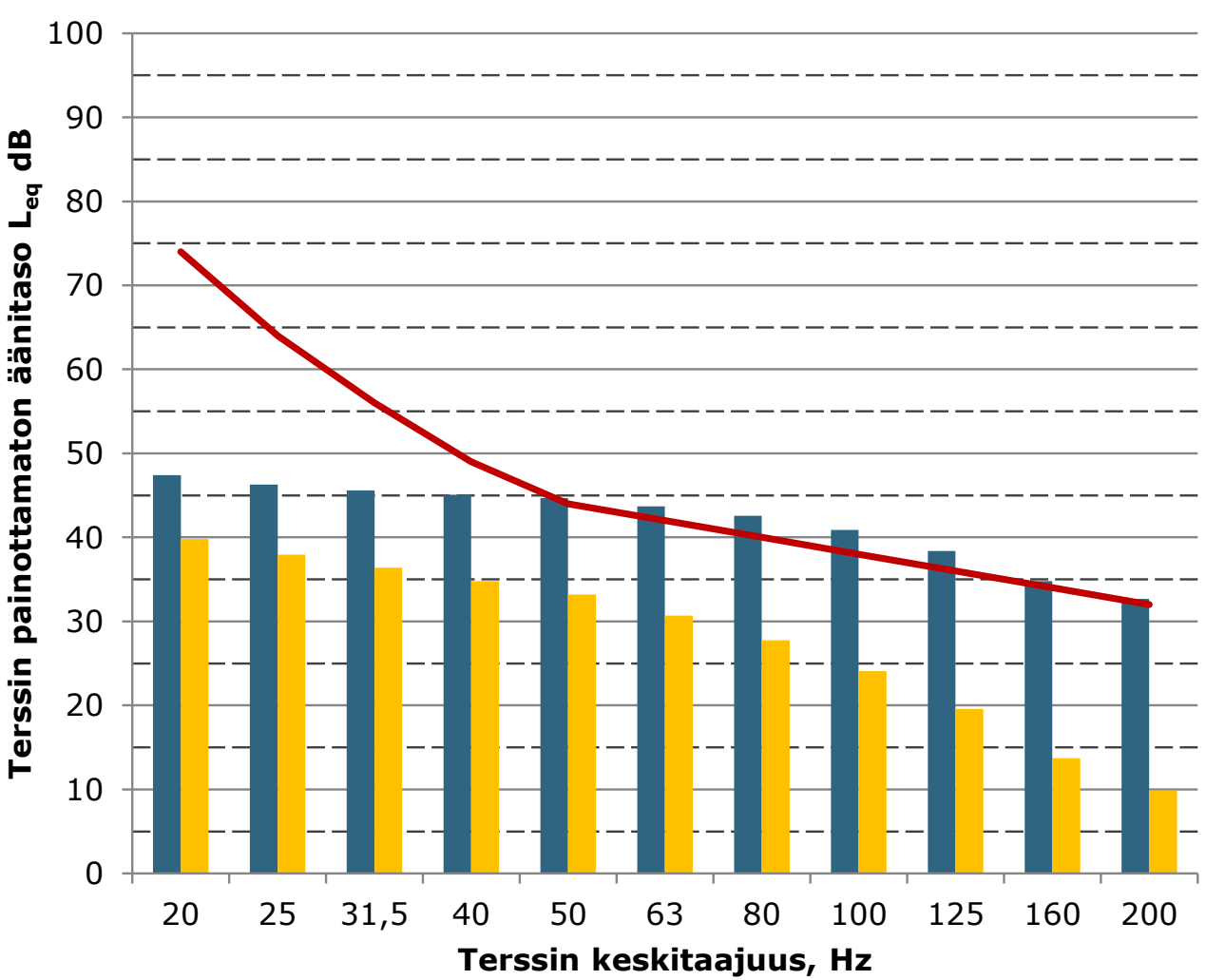


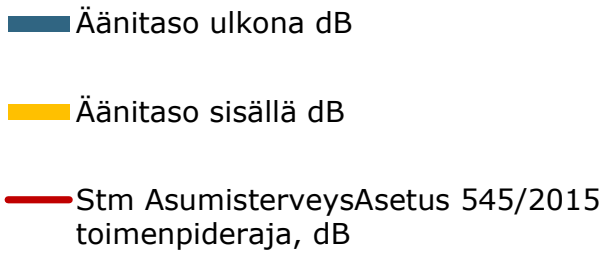
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2	7,2 MW, 194 m,	9
Vestas V150-4.2	4,2 MW, 140 m,	4
Prokon P3000-116 3030 116.7	3,03 MW, 122 m,	3
Nordex N163 5600	5,6 MW, 210 m,	8
Vestas V150-4.2	4,2 MW, 145 m,	7
Nordex N163-5,7MW	5,7 MW, 158 m,	4

Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284

Matalien taajuuksien äänitasot ulkona ja sisällä, E Asuinrakennus (Rökiöntie 930), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



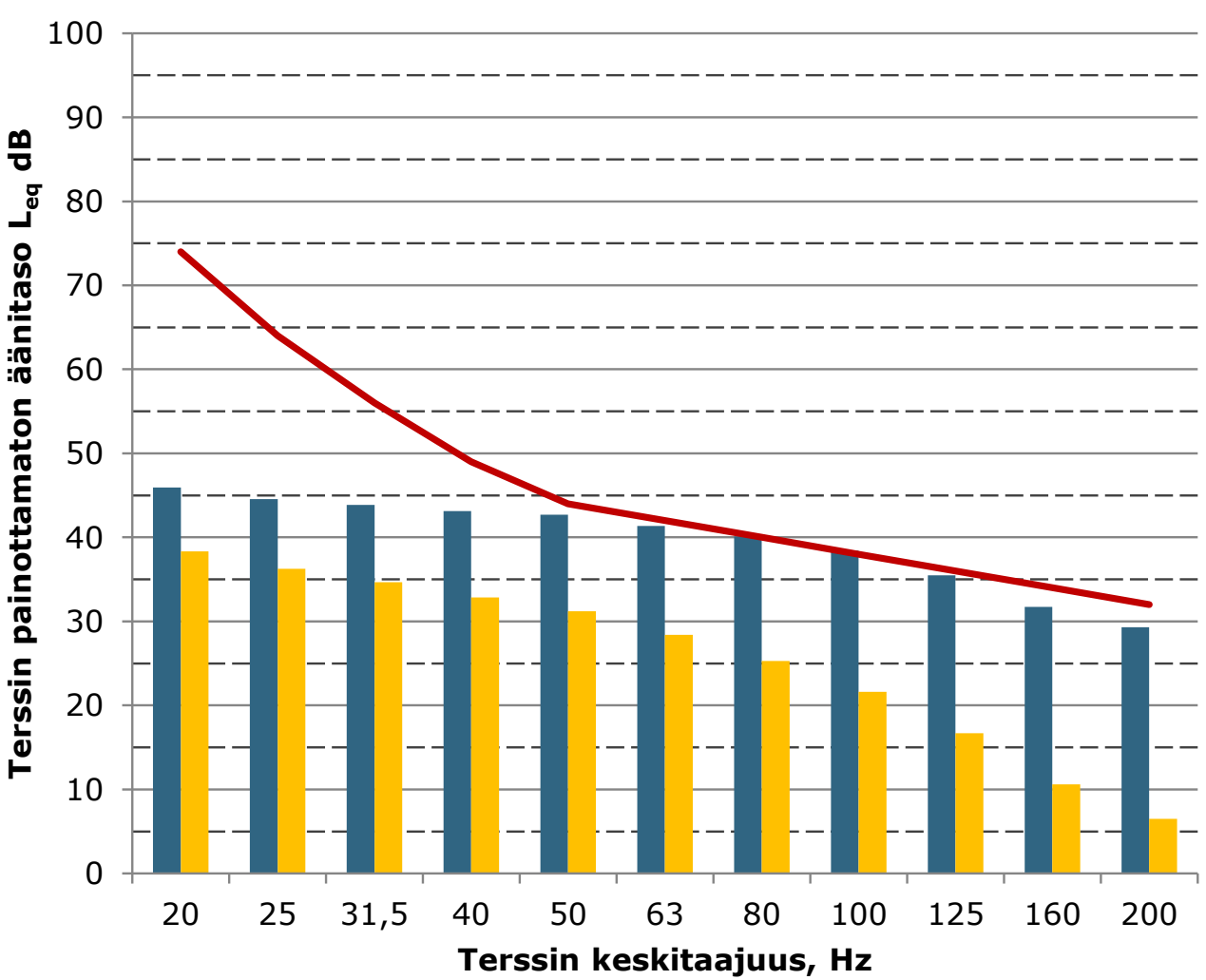


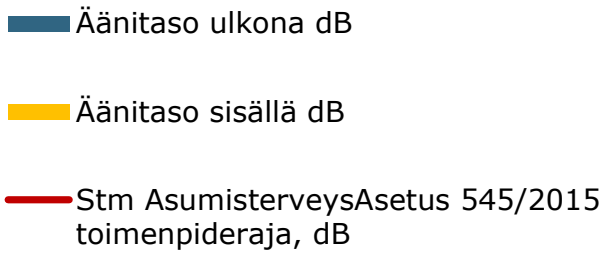
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2	7,2 MW, 194 m,	9
Vestas V150-4.2	4,2 MW, 140 m,	4
Prokon P3000-116 3030 116.7	3,03 MW, 122 m,	3
Nordex N163 5600	5,6 MW, 210 m,	8
Vestas V150-4.2	4,2 MW, 145 m,	7
Nordex N163-5,7MW	5,7 MW, 158 m,	4

Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284

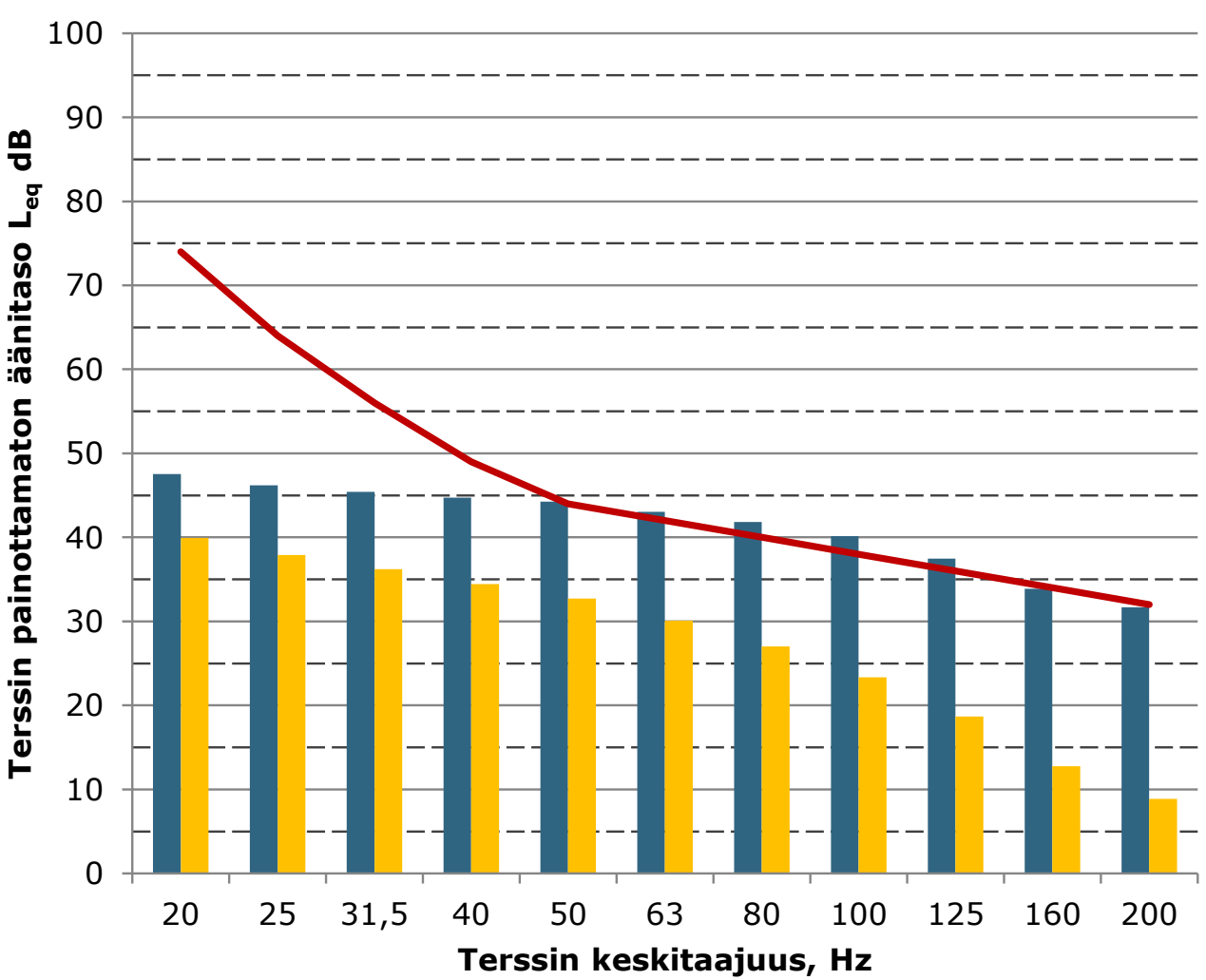
Matalien taajuuksien äänitasot ulkona ja sisällä, F Asuinrakennus (Kukkusintie 474), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

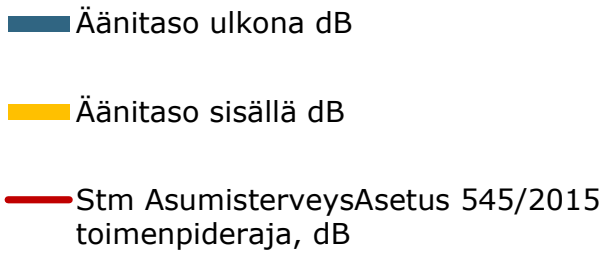




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 7,2 MW, 194 m, 9
Vestas V150-4.2 4,2 MW, 140 m, 4
Prokon P3000-116 3030 116.7 3,03 MW, 122 m, 3
Nordex N163 5600 5,6 MW, 210 m, 8
Vestas V150-4.2 4,2 MW, 145 m, 7
Nordex N163-5,7MW 5,7 MW, 158 m, 4
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284

Matalien taajuuksien äänitasot ulkona ja sisällä, G Asuinrakennus (Kovik byväg 53), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



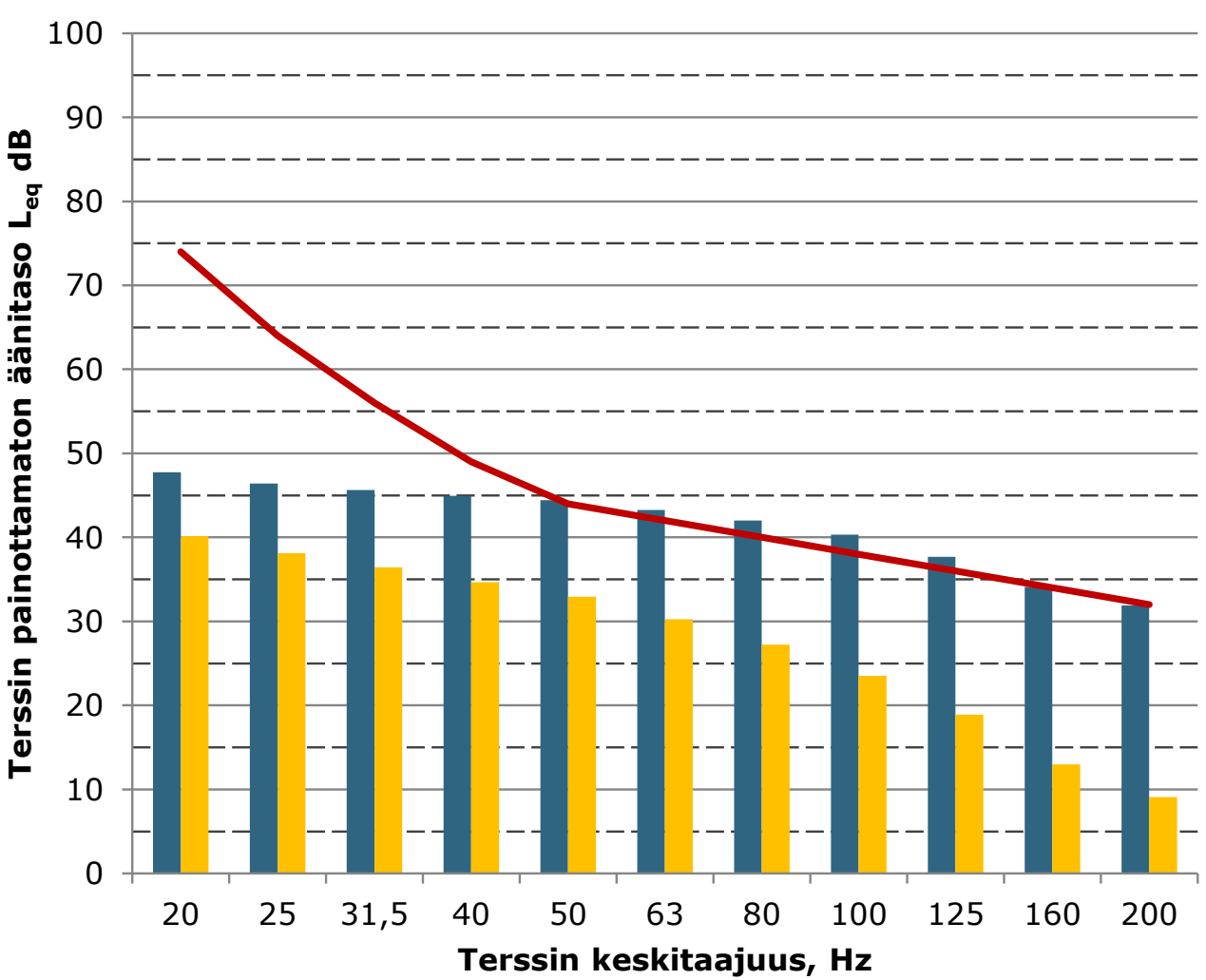


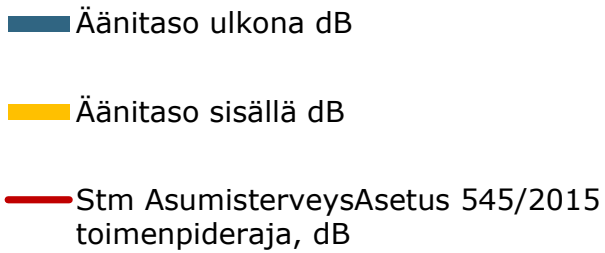
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2	7,2 MW, 194 m,	9
Vestas V150-4.2	4,2 MW, 140 m,	4
Prokon P3000-116 3030 116.7	3,03 MW, 122 m,	3
Nordex N163 5600	5,6 MW, 210 m,	8
Vestas V150-4.2	4,2 MW, 145 m,	7
Nordex N163-5,7MW	5,7 MW, 158 m,	4

Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284

Matalien taajuuksien äänitasot ulkona ja sisällä, H Asuinrakennus (Vöyrintie 1021), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



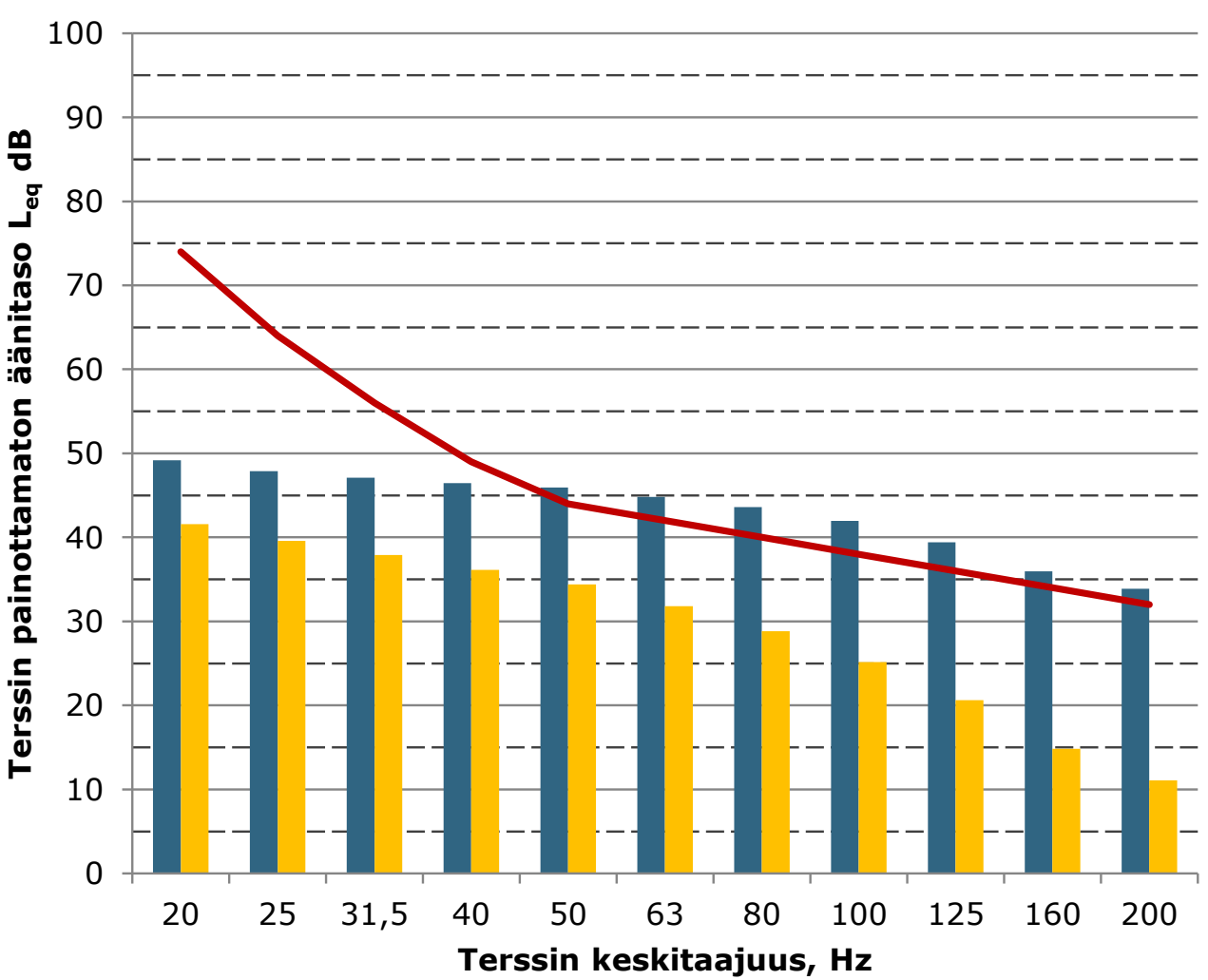


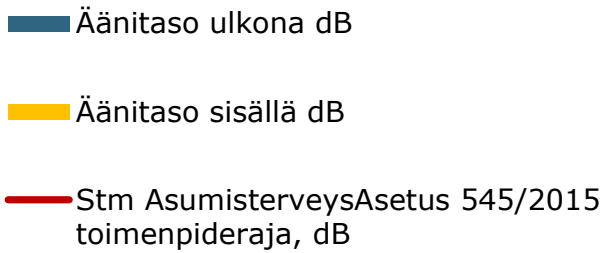
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2	7,2 MW, 194 m,	9
Vestas V150-4.2	4,2 MW, 140 m,	4
Prokon P3000-116 3030 116.7	3,03 MW, 122 m,	3
Nordex N163 5600	5,6 MW, 210 m,	8
Vestas V150-4.2	4,2 MW, 145 m,	7
Nordex N163-5,7MW	5,7 MW, 158 m,	4

Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284

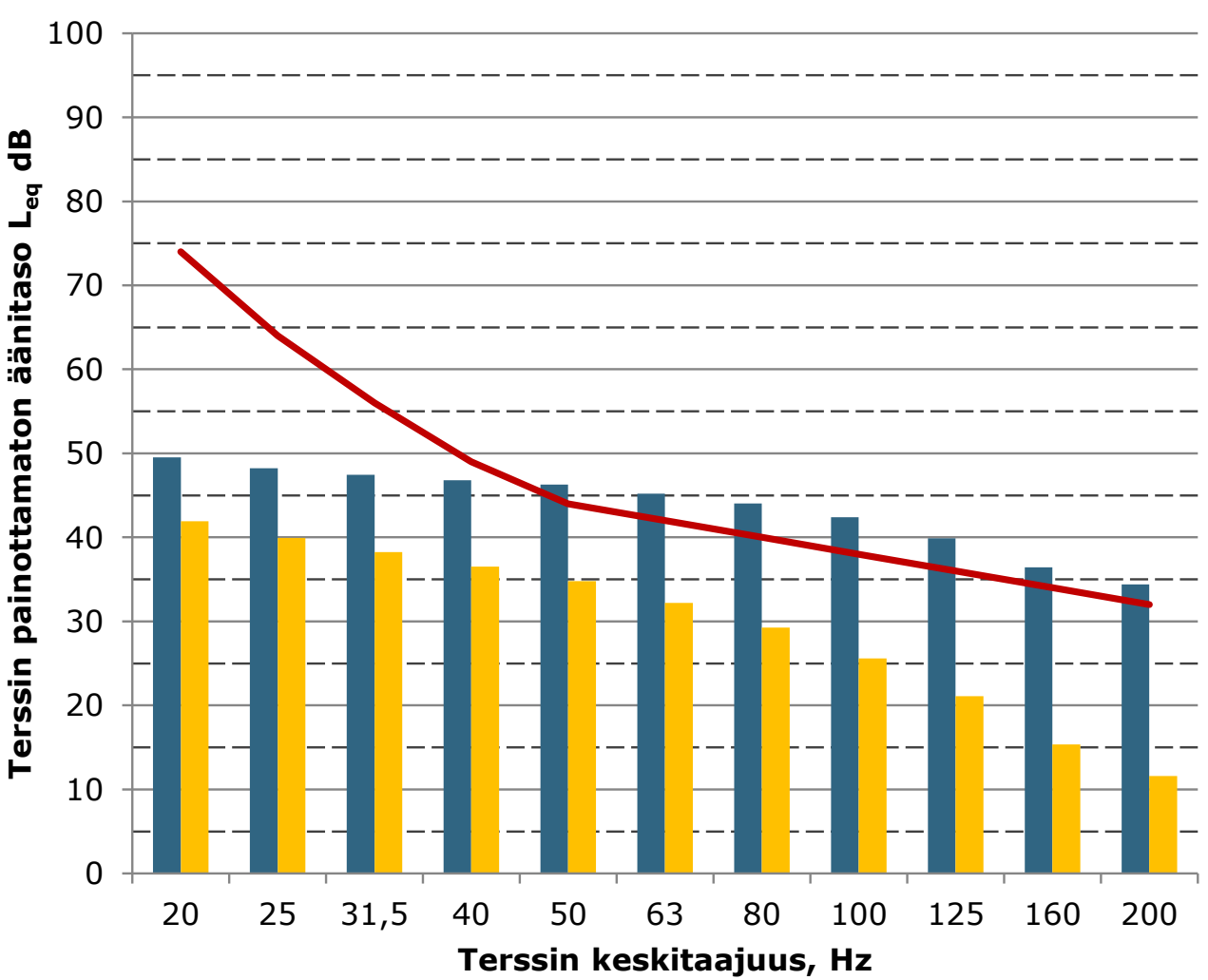
Matalien taajuuksien äänitasot ulkona ja sisällä, I Lomarakennus (Ehrsbackavägen 29), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan





Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 7,2 MW, 194 m, 9
Vestas V150-4.2 4,2 MW, 140 m, 4
Prokon P3000-116 3030 116.7 3,03 MW, 122 m, 3
Nordex N163 5600 5,6 MW, 210 m, 8
Vestas V150-4.2 4,2 MW, 145 m, 7
Nordex N163-5,7MW 5,7 MW, 158 m, 4
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284

Matalien taajuuksien äänitasot ulkona ja sisällä, J Asuinrakennus (Kleidersvägen 118), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



Äänitaso ulkona dB

Äänitaso sisällä dB

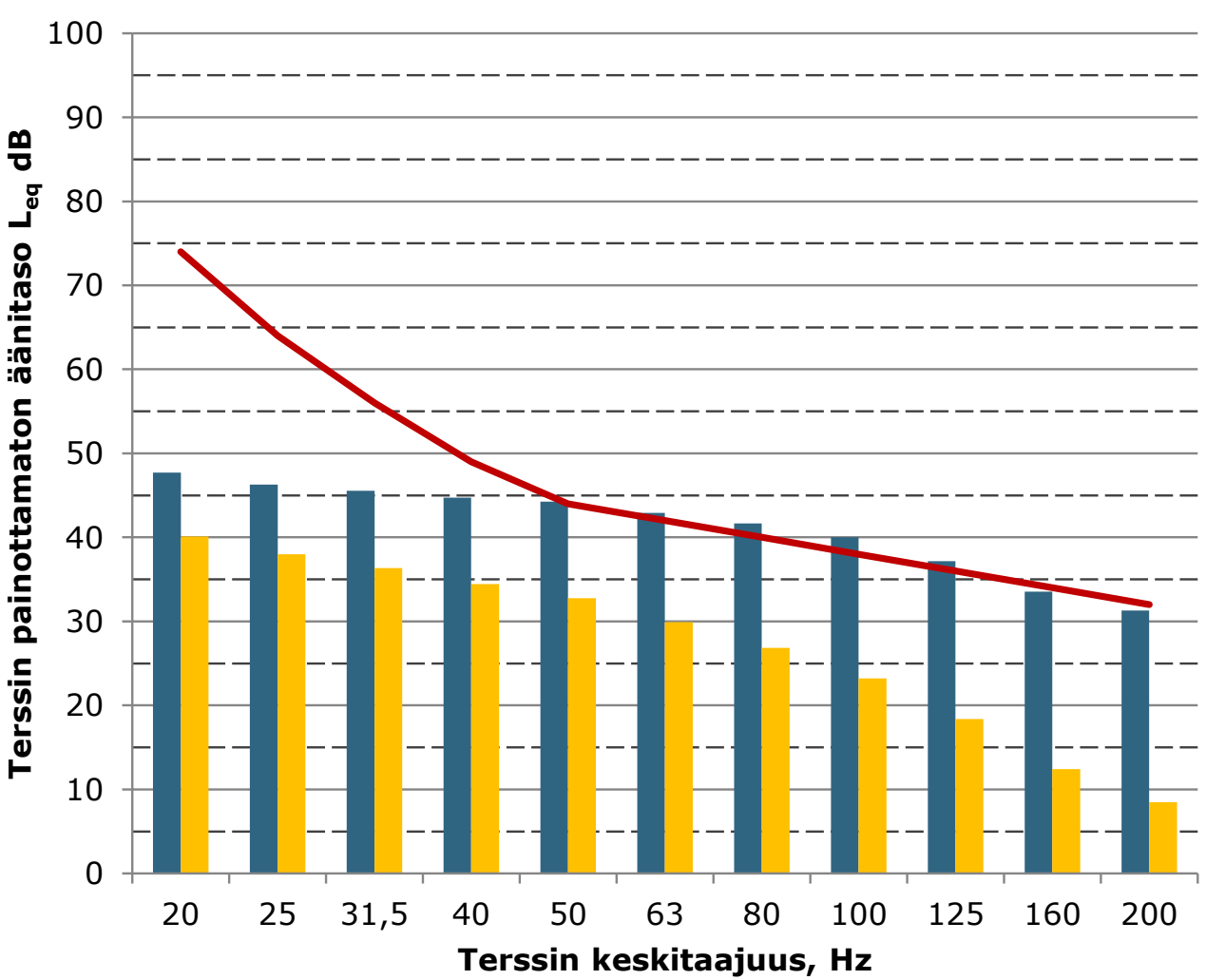
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB

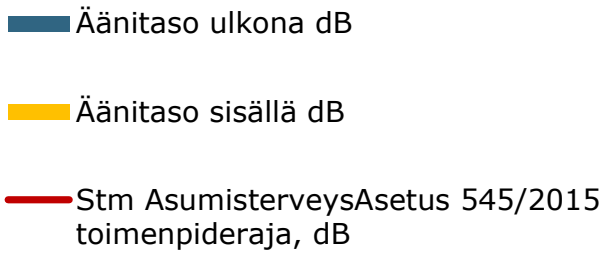
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2	7,2 MW, 194 m,	9
Vestas V150-4.2	4,2 MW, 140 m,	4
Prokon P3000-116 3030 116.7	3,03 MW, 122 m,	3
Nordex N163 5600	5,6 MW, 210 m,	8
Vestas V150-4.2	4,2 MW, 145 m,	7
Nordex N163-5,7MW	5,7 MW, 158 m,	4

Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284

Matalien taajuuksien äänitasot ulkona ja sisällä, K Asuinrakennus (Rökiöntie 154), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



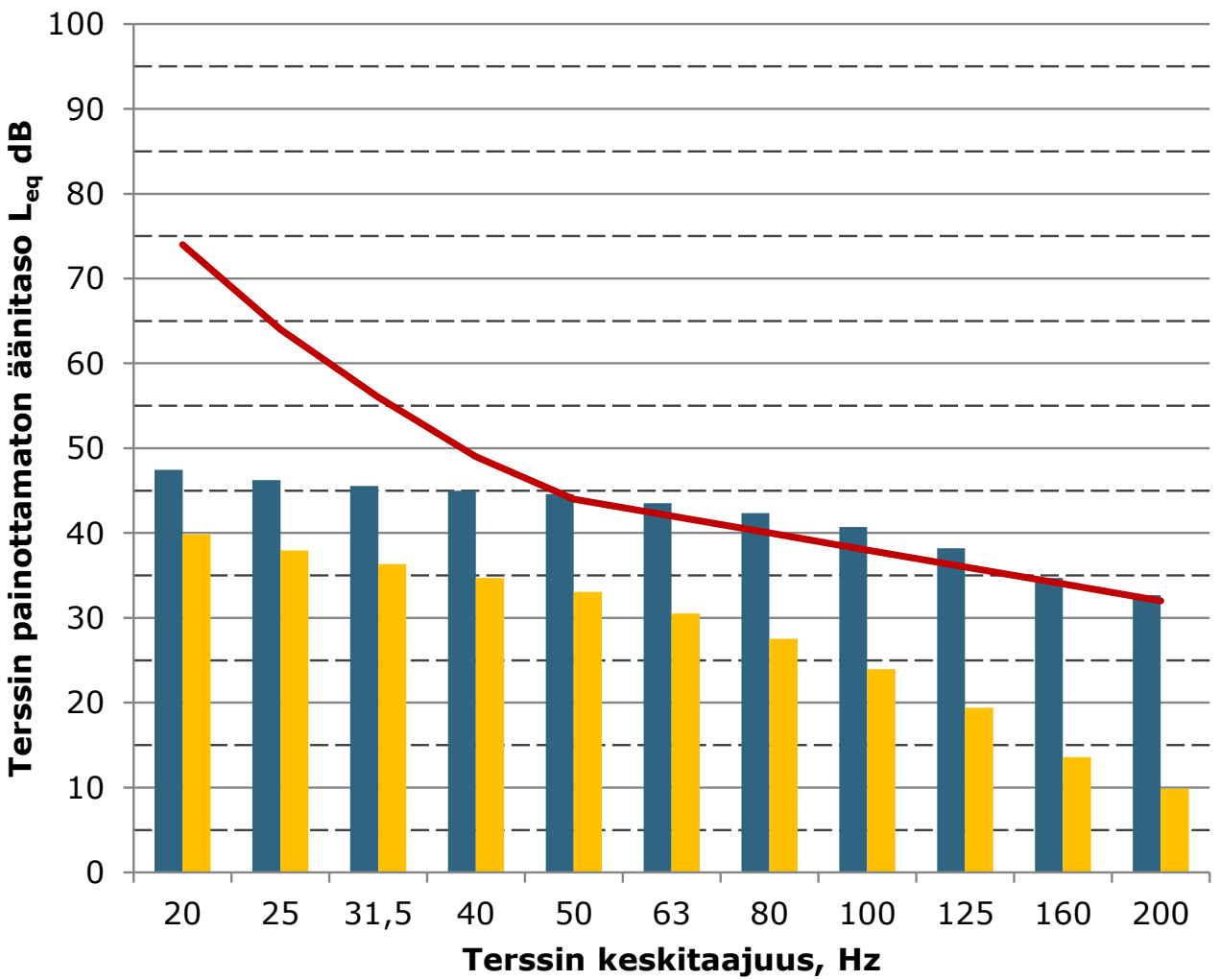


Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2	7,2 MW, 194 m,	9
Vestas V150-4.2	4,2 MW, 140 m,	4
Prokon P3000-116 3030 116.7	3,03 MW, 122 m,	3
Nordex N163 5600	5,6 MW, 210 m,	8
Vestas V150-4.2	4,2 MW, 145 m,	7
Nordex N163-5,7MW	5,7 MW, 158 m,	4

Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284

Matalien taajuuksien äänitasot ulkona ja sisällä, L Asuinrakennus (Bjurbäcksvägen 231), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



Äänitaso ulkona dB

Äänitaso sisällä dB

Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB

Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2	7,2 MW, 194 m,	9
Vestas V150-4.2	4,2 MW, 140 m,	4
Prokon P3000-116 3030 116.7	3,03 MW, 122 m,	3
Nordex N163 5600	5,6 MW, 210 m,	8
Vestas V150-4.2	4,2 MW, 145 m,	7
Nordex N163-5,7MW	5,7 MW, 158 m,	4

Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284

Liite 13. Yhteisvaikutus varjostusmallinnuksen tulokset ”Real Case, No forest” - VE1

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Calculated:
14.7.2023 9.20/3.5.584

SHADOW - Main Result

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No Forest

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) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational hours are calculated from WTGs in calculation and wind distribution:
MERRA-2_N63,00_E022,50 (41)

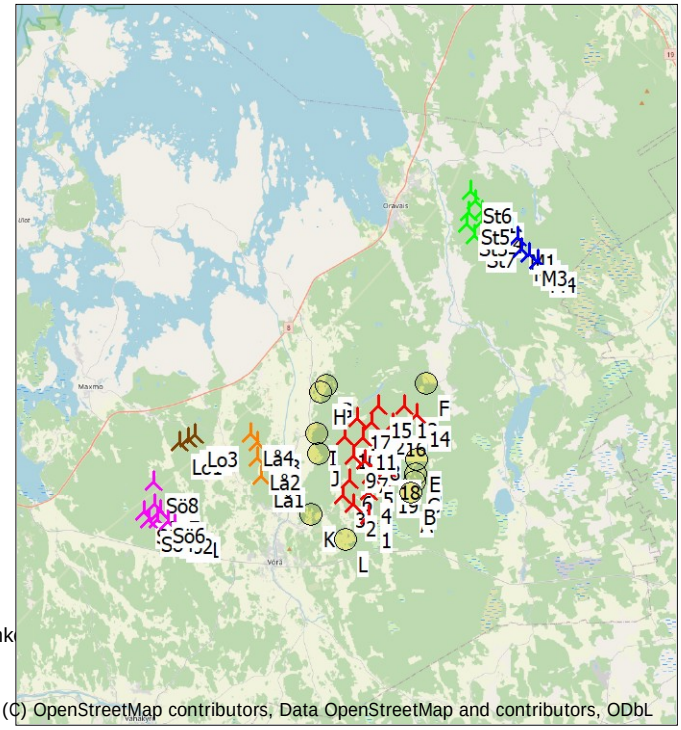
Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	547	428	409	541	812	1 087	1 287	891	718	583	592	8 612

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: Height Contours: CONTOURLINE_Lasor tuulivoimahank
Obstacles used in calculation
Receptor grid resolution: 1,0 m

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89



Scale 1:400 000

New WTG Shadow receptor

WTGs

	East	North	Z [m]	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Shadow data Calculation distance [m]	RPM [RPM]
1	265 860	7 011 060	40,0	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
10	264 871	7 015 451	34,5	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
11	265 796	7 015 259	39,8	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
12	266 380	7 016 090	44,5	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
13	268 137	7 016 809	31,7	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
14	268 822	7 016 315	40,0	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
15	266 770	7 016 850	43,5	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
16	267 439	7 015 897	37,5	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
17	265 604	7 016 343	20,0	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
18	267 010	7 013 530	40,8	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
19	266 794	7 012 894	40,4	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
2	265 074	7 011 774	34,4	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
3	264 546	7 012 237	34,4	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
4	265 960	7 012 340	40,0	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
5	266 070	7 013 270	35,0	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
6	264 950	7 013 100	40,0	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
7	265 850	7 014 020	40,0	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
8	266 560	7 014 700	40,0	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
9	265 278	7 014 371	40,2	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
Lo1	256 101	7 015 724	26,7	PROKON P3000-116 3030 ...	Yes	PROKON	P3000-116-3 030	3 030	116,7	122,0	1 819	11,7
Lo2	256 554	7 015 922	32,5	PROKON P3000-116 3030 ...	Yes	PROKON	P3000-116-3 030	3 030	116,7	122,0	1 819	11,7
Lo3	256 967	7 016 054	29,3	PROKON P3000-116 3030 ...	Yes	PROKON	P3000-116-3 030	3 030	116,7	122,0	1 819	11,7
Lå1	260 282	7 013 598	20,0	VESTAS V150-4.2 4200 15...	Yes	VESTAS	V150-4.2-4 200	4 200	150,0	140,0	1 903	10,4
Lå2	260 183	7 014 579	27,2	VESTAS V150-4.2 4200 15...	Yes	VESTAS	V150-4.2-4 200	4 200	150,0	140,0	1 903	10,4
Lå3	260 216	7 015 423	20,0	VESTAS V150-4.2 4200 15...	Yes	VESTAS	V150-4.2-4 200	4 200	150,0	140,0	1 903	10,4
Lå4	259 928	7 015 932	27,5	VESTAS V150-4.2 4200 15...	Yes	VESTAS	V150-4.2-4 200	4 200	150,0	140,0	1 903	10,4
M1	274 763	7 025 285	32,5	NORDEX N163/5,7MW 570...	Yes	NORDEX	N163/5,7MW-5 700	5 700	163,0	158,0	1 806	10,7
M2	274 926	7 024 666	32,8	NORDEX N163/5,7MW 570...	Yes	NORDEX	N163/5,7MW-5 700	5 700	163,0	158,0	1 806	10,7
M3	275 298	7 024 342	35,0	NORDEX N163/5,7MW 570...	Yes	NORDEX	N163/5,7MW-5 700	5 700	163,0	158,0	1 806	10,7
M4	275 772	7 024 008	40,0	NORDEX N163/5,7MW 570...	Yes	NORDEX	N163/5,7MW-5 700	5 700	163,0	158,0	1 806	10,7
St1	272 700	7 027 390	30,0	VESTAS V150-4.2 HH145 4...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	1 902	10,4

To be continued on next page...

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Calculated:
14.7.2023 9.20/3.5.584

SHADOW - Main Result

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No Forest

...continued from previous page

	East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
			[m]					[kW]	[m]	[m]	[m]	[RPM]
St2	273 002	7 026 818	30,0	VESTAS V150-4.2 HH145 4...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	1 902	10,4
St3	272 153	7 026 165	30,0	VESTAS V150-4.2 HH145 4...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	1 902	10,4
St4	272 991	7 026 229	30,0	VESTAS V150-4.2 HH145 4...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	1 902	10,4
St5	272 290	7 026 760	26,1	VESTAS V150-4.2 HH145 4...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	1 902	10,4
St6	272 494	7 027 846	25,1	VESTAS V150-4.2 HH145 4...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	1 902	10,4
St7	272 483	7 025 533	30,2	VESTAS V150-4.2 HH145 4...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	1 902	10,4
Sö1	255 445	7 011 327	45,9	Generic RD180 7700 180.0...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	2 461	10,4
Sö2	255 137	7 011 612	50,0	Generic RD180 7700 180.0...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	2 461	10,4
Sö3	254 614	7 011 705	37,5	Generic RD180 7700 180.0...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	2 461	10,4
Sö4	254 111	7 011 739	25,0	Generic RD180 7700 180.0...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	2 461	10,4
Sö5	253 945	7 012 144	32,5	Generic RD180 7700 180.0...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	2 461	10,4
Sö6	254 771	7 012 174	40,0	Generic RD180 7700 180.0...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	2 461	10,4
Sö7	254 521	7 012 552	32,9	Generic RD180 7700 180.0...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	2 461	10,4
Sö8	254 528	7 013 790	20,0	Generic RD180 7700 180.0...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	2 461	10,4

Shadow receptor-Input

No.	Name	East	North	Z	Width	Height	Elevation a.g.l.	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
				[m]	[m]	[m]	[m]	[°]		[m]
A	A Lomarakennus (Söderändan 49)	267 990	7 011 759	42,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
B	B Asuinrakennus (Söderändan 81)	268 161	7 012 123	37,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
C	C Lomarakennus (Säderändan 166)	268 388	7 012 783	39,1	5,0	5,0	1,0	90,0	"Green house mode"	6,0
D	D Lomarakennus (Söderändan 188)	268 493	7 013 188	37,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0
E	E Asuinrakennus (Rökiöntie 930)	268 646	7 013 924	38,1	5,0	5,0	1,0	90,0	"Green house mode"	6,0
F	F Asuinrakennus (Kukkusintie 474)	269 409	7 017 903	25,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
G	G Asuinrakennus (Kovik byväg 53)	264 096	7 018 174	10,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
H	H Asuinrakennus (Vöyrintie 1021)	263 817	7 017 837	8,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
I	I Lomarakennus (Ehrsbackavägen 29)	263 418	7 015 700	21,7	5,0	5,0	1,0	90,0	"Green house mode"	6,0
J	J Asuinrakennus (Kleidersvägen 118)	263 380	7 014 576	13,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0
K	K Asuinrakennus (Rökiöntie 154)	262 790	7 011 335	27,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
L	L Asuinrakennus (Bjurbäcksvägen 231)	264 546	7 009 923	27,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0

Calculation Results

Shadow receptor

No.	Name	Shadow, expected values Shadow hours per year [h/year]
A	A Lomarakennus (Söderändan 49)	8:09
B	B Asuinrakennus (Söderändan 81)	8:35
C	C Lomarakennus (Säderändan 166)	6:58
D	D Lomarakennus (Söderändan 188)	4:52
E	E Asuinrakennus (Rökiöntie 930)	1:58
F	F Asuinrakennus (Kukkusintie 474)	5:10
G	G Asuinrakennus (Kovik byväg 53)	0:00
H	H Asuinrakennus (Vöyrintie 1021)	0:00
I	I Lomarakennus (Ehrsbackavägen 29)	2:48
J	J Asuinrakennus (Kleidersvägen 118)	7:54
K	K Asuinrakennus (Rökiöntie 154)	0:00
L	L Asuinrakennus (Bjurbäcksvägen 231)	4:15

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

No.	Name	Expected [h/year]
1	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8836)	4:15
10	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8824)	10:42
11	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8825)	0:00
12	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8823)	0:00
13	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8822)	2:31
14	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8818)	2:36

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14.7.2023 9.20/3.5.584

SHADOW - Main Result

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No Forest

...continued from previous page

No.	Name	Expected [h/year]
15	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8821)	0:00
16	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8819)	0:00
17	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8820)	0:00
18	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8827)	13:21
19	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8830)	17:14
2	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8835)	0:00
3	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8834)	0:00
4	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8833)	0:00
5	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8831)	0:00
6	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8832)	0:00
7	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8828)	0:00
8	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8826)	0:00
9	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8829)	0:00
Lo1	PROKON P3000-116 3030 116.7 !O! hub: 122,0 m (TOT: 180,4 m) (8676)	0:00
Lo2	PROKON P3000-116 3030 116.7 !O! hub: 122,0 m (TOT: 180,4 m) (8677)	0:00
Lo3	PROKON P3000-116 3030 116.7 !O! hub: 122,0 m (TOT: 180,4 m) (8678)	0:00
Lå1	VESTAS V150-4.2 4200 150.0 !O! hub: 140,0 m (TOT: 215,0 m) (8679)	0:00
Lå2	VESTAS V150-4.2 4200 150.0 !O! hub: 140,0 m (TOT: 215,0 m) (8680)	0:00
Lå3	VESTAS V150-4.2 4200 150.0 !O! hub: 140,0 m (TOT: 215,0 m) (8681)	0:00
Lå4	VESTAS V150-4.2 4200 150.0 !O! hub: 140,0 m (TOT: 215,0 m) (8682)	0:00
M1	NORDEX N163/5,7MW 5700 163.0 !O! hub: 158,0 m (TOT: 239,5 m) (8772)	0:00
M2	NORDEX N163/5,7MW 5700 163.0 !O! hub: 158,0 m (TOT: 239,5 m) (8773)	0:00
M3	NORDEX N163/5,7MW 5700 163.0 !O! hub: 158,0 m (TOT: 239,5 m) (8774)	0:00
M4	NORDEX N163/5,7MW 5700 163.0 !O! hub: 158,0 m (TOT: 239,5 m) (8775)	0:00
St1	VESTAS V150-4.2 HH145 4200 150.0 !O! hub: 145,0 m (TOT: 220,0 m) (8669)	0:00
St2	VESTAS V150-4.2 HH145 4200 150.0 !O! hub: 145,0 m (TOT: 220,0 m) (8670)	0:00
St3	VESTAS V150-4.2 HH145 4200 150.0 !O! hub: 145,0 m (TOT: 220,0 m) (8671)	0:00
St4	VESTAS V150-4.2 HH145 4200 150.0 !O! hub: 145,0 m (TOT: 220,0 m) (8672)	0:00
St5	VESTAS V150-4.2 HH145 4200 150.0 !O! hub: 145,0 m (TOT: 220,0 m) (8673)	0:00
St6	VESTAS V150-4.2 HH145 4200 150.0 !O! hub: 145,0 m (TOT: 220,0 m) (8674)	0:00
St7	VESTAS V150-4.2 HH145 4200 150.0 !O! hub: 145,0 m (TOT: 220,0 m) (8675)	0:00
Sö1	Generic RD180 7700 180.0 !O! hub: 210,0 m (TOT: 300,0 m) (8713)	0:00
Sö2	Generic RD180 7700 180.0 !O! hub: 210,0 m (TOT: 300,0 m) (8714)	0:00
Sö3	Generic RD180 7700 180.0 !O! hub: 210,0 m (TOT: 300,0 m) (8715)	0:00
Sö4	Generic RD180 7700 180.0 !O! hub: 210,0 m (TOT: 300,0 m) (8716)	0:00
Sö5	Generic RD180 7700 180.0 !O! hub: 210,0 m (TOT: 300,0 m) (8717)	0:00
Sö6	Generic RD180 7700 180.0 !O! hub: 210,0 m (TOT: 300,0 m) (8718)	0:00
Sö7	Generic RD180 7700 180.0 !O! hub: 210,0 m (TOT: 300,0 m) (8719)	0:00
Sö8	Generic RD180 7700 180.0 !O! hub: 210,0 m (TOT: 300,0 m) (8720)	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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14.7.2023 9.20/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No Forest Shadow receptor: A - A Lomarakennus (Söderändan 49)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	547	428	409	541	812	1 087	1 287	891	718	583	592	8 612

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May		June		July		August	September	October	November	December
1	10.09	09.07	07.39	06.54	05.13		03.44	21.28 (19)	03.27	21.34 (19)	04.44	06.14	07.36	08.06	09.34
	15.00	16.23	17.49	20.18	21.45		23.15	28 21.56 (19)	23.41	28 22.02 (19)	22.28	20.47	19.04	16.22	15.04
2	10.08	09.04	07.36	06.51	05.10		03.42	21.29 (19)	03.29	21.34 (19)	04.47	06.17	07.39	08.09	09.37
	15.01	16.26	17.52	20.21	21.48		23.17	27 21.56 (19)	23.40	28 22.02 (19)	22.25	20.43	19.01	16.19	15.03
3	10.07	09.01	07.33	06.47	05.07		03.40	21.29 (19)	03.30	21.34 (19)	04.50	06.19	07.42	08.12	09.40
	15.03	16.29	17.55	20.23	21.51		23.20	28 21.57 (19)	23.38	28 22.02 (19)	22.22	20.40	18.57	16.16	15.01
4	10.06	08.58	07.29	06.44	05.04		03.38	21.29 (19)	03.32	21.35 (19)	04.53	06.22	07.45	08.15	09.42
	15.05	16.32	17.58	20.26	21.54		23.22	27 21.56 (19)	23.37	28 22.03 (19)	22.19	20.37	18.54	16.13	14.59
5	10.05	08.55	07.26	06.41	05.00		03.36	21.29 (19)	03.34	21.35 (19)	04.56	06.25	07.47	08.18	09.44
	15.07	16.36	18.01	20.29	21.57		23.24	28 21.57 (19)	23.35	28 22.03 (19)	22.16	20.33	18.51	16.10	14.58
6	10.04	08.52	07.23	06.37	04.57		03.34	21.29 (19)	03.36	21.35 (19)	04.59	06.28	07.50	08.21	09.47
	15.09	16.39	18.04	20.32	22.00		23.26	28 21.57 (19)	23.34	28 22.03 (19)	22.13	20.30	18.47	16.07	14.56
7	10.03	08.49	07.19	06.34	04.54		03.32	21.30 (19)	03.38	21.36 (19)	05.02	06.30	07.53	08.24	09.49
	15.12	16.42	18.07	20.35	22.03		23.28	27 21.57 (19)	23.32	27 22.03 (19)	22.10	20.26	18.44	16.04	14.55
8	10.01	08.46	07.16	06.30	04.51		03.31	21.30 (19)	03.40	21.35 (19)	05.05	06.33	07.56	08.27	09.51
	15.14	16.45	18.09	20.38	22.06		23.30	28 21.58 (19)	23.30	28 22.03 (19)	22.06	20.23	18.40	16.01	14.54
9	10.00	08.43	07.13	06.27	04.48		03.29	21.30 (19)	03.42	21.36 (19)	05.08	06.36	07.58	08.30	09.53
	15.16	16.48	18.12	20.41	22.09		23.32	28 21.58 (19)	23.28	28 22.04 (19)	22.03	20.19	18.37	15.58	14.53
10	09.58	08.40	07.09	06.24	04.45		03.28	21.30 (19)	03.44	21.36 (19)	05.11	06.39	08.01	08.33	09.55
	15.19	16.51	18.15	20.43	22.12		23.34	28 21.58 (19)	23.26	28 22.04 (19)	22.00	20.16	18.34	15.56	14.52
11	09.57	08.37	07.06	06.20	04.42		03.26	21.30 (19)	03.47	21.36 (19)	05.14	06.41	08.04	08.36	09.57
	15.21	16.54	18.18	20.46	22.15		23.36	28 21.58 (19)	23.24	27 22.03 (19)	21.57	20.13	18.30	15.53	14.51
12	09.55	08.34	07.03	06.17	04.39		03.25	21.30 (19)	03.49	21.36 (19)	05.17	06.44	08.07	08.39	09.59
	15.24	16.57	18.21	20.49	22.18		23.37	27 21.57 (19)	23.22	28 22.04 (19)	21.54	20.09	18.27	15.50	14.50
13	09.53	08.31	06.59	06.13	04.35		03.24	21.31 (19)	03.51	21.37 (19)	05.19	06.47	08.10	08.42	10.00
	15.27	17.01	18.24	20.52	22.21		23.39	27 21.58 (19)	23.20	27 22.04 (19)	21.50	20.06	18.24	15.47	14.49
14	09.51	08.28	06.56	06.10	04.32		03.23	21.31 (19)	03.54	21.37 (19)	05.22	06.50	08.13	08.45	10.02
	15.29	17.04	18.27	20.55	22.24		23.40	27 21.58 (19)	23.18	27 22.04 (19)	21.47	20.02	18.20	15.44	14.48
15	09.49	08.25	06.52	06.07	04.29		03.22	21.31 (19)	03.56	21.38 (19)	05.25	06.52	08.16	08.48	10.03
	15.32	17.07	18.30	20.58	22.27		23.41	27 21.58 (19)	23.15	26 22.04 (19)	21.44	19.59	18.17	15.42	14.48
16	09.47	08.22	06.49	06.03	04.26		03.22	21.32 (19)	03.59	21.38 (19)	05.28	06.55	08.18	08.51	10.05
	15.35	17.10	18.32	21.01	22.30		23.42	27 21.59 (19)	23.13	26 22.04 (19)	21.40	19.55	18.14	15.39	14.48
17	09.45	08.18	06.46	06.00	04.24		03.21	21.31 (19)	04.01	21.38 (19)	05.31	06.58	08.21	08.55	10.06
	15.38	17.13	18.35	21.04	22.33		23.43	27 21.58 (19)	23.10	25 22.03 (19)	21.37	19.52	18.10	15.36	14.47
18	09.43	08.15	06.42	05.56	04.21	21.37 (19)	03.21	21.32 (19)	04.04	21.39 (19)	05.34	07.01	08.24	08.58	10.07
	15.40	17.16	18.38	21.07	22.36	9 21.46 (19)	23.44	27 21.59 (19)	23.08	24 22.03 (19)	21.34	19.49	18.07	15.34	14.47
19	09.40	08.12	06.39	05.53	04.18	21.34 (19)	03.20	21.32 (19)	04.07	21.39 (19)	05.37	07.03	08.27	09.01	10.08
	15.43	17.19	18.41	21.10	22.39	13 21.47 (19)	23.44	27 21.59 (19)	23.05	23 22.02 (19)	21.31	19.45	18.04	15.31	14.47
20	09.38	08.09	06.35	05.50	04.15	21.33 (19)	03.20	21.32 (19)	04.10	21.39 (19)	05.40	07.06	08.30	09.04	10.09
	15.46	17.22	18.44	21.12	22.42	16 21.49 (19)	23.45	27 21.59 (19)	23.03	23 22.02 (19)	21.27	19.42	18.01	15.29	14.47
21	09.36	08.06	06.32	05.46	04.12	21.32 (19)	03.20	21.33 (19)	04.12	21.41 (19)	05.43	07.09	08.33	09.06	10.10
	15.49	17.25	18.47	21.15	22.45	18 21.50 (19)	23.45	27 22.00 (19)	23.00	21 22.02 (19)	21.24	19.38	17.57	15.26	14.48
22	09.33	08.02	06.28	05.43	04.09	21.31 (19)	03.20	21.33 (19)	04.15	21.42 (19)	05.46	07.11	08.36	09.09	10.10
	15.52	17.28	18.49	21.18	22.48	20 21.51 (19)	23.45	27 22.00 (19)	22.57	19 22.01 (19)	21.21	19.35	17.54	15.24	14.48
23	09.31	07.59	06.25	05.40	04.07	21.31 (19)	03.20	21.33 (19)	04.18	21.42 (19)	05.48	07.14	08.39	09.12	10.11
	15.55	17.31	18.52	21.21	22.51	21 21.52 (19)	23.45	27 22.00 (19)	22.55	18 22.00 (19)	21.17	19.31	17.51	15.21	14.49
24	09.28	07.56	06.22	05.36	04.04	21.30 (19)	03.21	21.34 (19)	04.21	21.43 (19)	05.51	07.17	08.42	09.15	10.11
	15.58	17.34	18.55	21.24	22.54	23 21.53 (19)	23.45	27 22.01 (19)	22.52	15 21.58 (19)	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.18	05.33	04.01	21.30 (19)	03.21	21.33 (19)	04.24	21.46 (19)	05.54	07.20	07.45	09.18	10.11
	16.01	17.37	18.58	21.27	22.56	24 21.54 (19)	23.45	27 22.00 (19)	22.49	11 21.57 (19)	21.10	19.25	16.44	15.17	14.50
26	09.23	07.49	06.15	05.30	03.59	21.29 (19)	03.22	21.34 (19)	04.27	21.48 (19)	05.57	07.22	07.48	09.21	10.11
	16.04	17.40	19.01	21.30	22.59	25 21.54 (19)	23.45	27 22.01 (19)	22.46	6 21.54 (19)	21.07	19.21	16.41	15.14	14.51
27	09.21	07.46	06.11	05.26	03.56	21.29 (19)	03.23	21.33 (19)	04.29		06.00	07.25	07.51	09.24	10.11
	16.07	17.43	19.04	21.33	23.02	26 21.55 (19)	23.44	28 22.01 (19)	22.43		21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.54	21.29 (19)	03.24	21.34 (19)	04.32		06.03	07.28	07.54	09.26	10.11
	16.11	17.46	19.06	21.36	23.05	26 21.55 (19)	23.43	27 22.01 (19)	22.40		21.00	19.14	16.35	15.10	14.53
29	09.15		07.05	05.20	03.51	21.28 (19)	03.25	21.34 (19)	04.35		06.05	07.31	07.57	09.29	10.11
	16.14		20.09	21.39	23.07	27 21.55 (19)	23.43	27 22.01 (19)	22.37		20.57	19.11	16.32	15.08	14.55
30	09.12		07.01	05.17	03.49	21.29 (19)	03.26	21.34 (19)	04.38		06.08	07.33	08.00	09.32	10.10
	16.17		20.12	21.42	23.10	27 21.56 (19)	23.42	28 22.02 (19)	22.34		20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.47	21.29 (19)			04.41		06.11		08.03		10.10
	16.20		20.15		23.12	27 21.56 (19)			22.31		20.50		16.26		14.58
Potential sun hours	182	242	363	447	559		605		594		502	392	308	206	151
Total, worst case						302		820		625					
Sun reduction						0,48		0,49		0,39					
Oper. time red.						0,98		0,98		0,98					
Wind dir. red.						0,63		0,63		0,63					
Total reduction						0,30		0,31		0,24					
Total, real						89		250		150					

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)		First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker	(WTG causing flicker last time)

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Calculated:
14.7.2023 9.20/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No Forest Shadow receptor: B - B Asuinrakennus (Söderändan 81)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	547	428	409	541	812	1 087	1 287	891	718	583	592	8 612

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April			May			June		
1	10.09	09.07	07.39	06.54			05.13		20.37 (19)	03.44		22.07 (18)
	15.00	16.23	17.49	20.18			21.45	20	20.57 (19)	23.15	9	22.16 (18)
2	10.08	09.04	07.36	06.51			05.10		20.35 (19)	03.42		22.06 (18)
	15.01	16.26	17.52	20.21			21.48	23	20.58 (19)	23.17	12	22.18 (18)
3	10.07	09.01	07.33	06.47			05.07		20.34 (19)	03.40		22.05 (18)
	15.03	16.29	17.55	20.23			21.51	25	20.59 (19)	23.20	14	22.19 (18)
4	10.06	08.58	07.29	06.44			05.04		20.33 (19)	03.38		22.05 (18)
	15.05	16.32	17.58	20.26			21.54	26	20.59 (19)	23.22	15	22.20 (18)
5	10.05	08.55	07.26	06.41			05.00		20.33 (19)	03.36		22.04 (18)
	15.07	16.36	18.01	20.29			21.57	26	20.59 (19)	23.24	17	22.21 (18)
6	10.04	08.52	07.23	06.37			04.57		20.32 (19)	03.34		22.04 (18)
	15.09	16.39	18.04	20.32			22.00	27	20.59 (19)	23.26	18	22.22 (18)
7	10.03	08.49	07.19	06.34			04.54		20.32 (19)	03.32		22.04 (18)
	15.12	16.42	18.07	20.35			22.03	28	21.00 (19)	23.28	19	22.23 (18)
8	10.01	08.46	07.16	06.30			04.51		20.32 (19)	03.31		22.04 (18)
	15.14	16.45	18.09	20.38			22.06	28	21.00 (19)	23.30	19	22.23 (18)
9	10.00	08.43	07.13	06.27			04.48		20.31 (19)	03.29		22.04 (18)
	15.16	16.48	18.12	20.41			22.09	29	21.00 (19)	23.32	20	22.24 (18)
10	09.58	08.40	07.09	06.24			04.45		20.32 (19)	03.28		22.04 (18)
	15.19	16.51	18.15	20.43			22.12	28	21.00 (19)	23.34	20	22.24 (18)
11	09.57	08.37	07.06	06.20			04.42		20.32 (19)	03.26		22.03 (18)
	15.21	16.54	18.18	20.46			22.15	28	21.00 (19)	23.36	21	22.24 (18)
12	09.55	08.34	07.03	06.17			04.38		20.31 (19)	03.25		22.03 (18)
	15.24	16.57	18.21	20.49			22.18	28	20.59 (19)	23.37	21	22.24 (18)
13	09.53	08.31	06.59	06.13			04.35		20.32 (19)	03.24		22.04 (18)
	15.26	17.01	18.24	20.52			22.21	27	20.59 (19)	23.39	21	22.25 (18)
14	09.51	08.28	06.56	06.10			04.32		20.32 (19)	03.23		22.03 (18)
	15.29	17.04	18.27	20.55			22.24	26	20.58 (19)	23.40	22	22.25 (18)
15	09.49	08.25	06.52	06.07			04.29		20.33 (19)	03.22		22.04 (18)
	15.32	17.07	18.30	20.58			22.27	25	20.58 (19)	23.41	22	22.26 (18)
16	09.47	08.22	06.49	06.03			04.26		20.33 (19)	03.21		22.04 (18)
	15.35	17.10	18.32	21.01			22.30	24	20.57 (19)	23.42	22	22.26 (18)
17	09.45	08.18	06.46	06.00			04.23		20.34 (19)	03.21		22.03 (18)
	15.37	17.13	18.35	21.04			22.33	23	20.57 (19)	23.43	23	22.26 (18)
18	09.43	08.15	06.42	05.56			04.21		20.35 (19)	03.20		22.04 (18)
	15.40	17.16	18.38	21.07			22.36	22	20.57 (19)	23.44	22	22.26 (18)
19	09.40	08.12	06.39	05.53			04.18		20.35 (19)	03.20		22.04 (18)
	15.43	17.19	18.41	21.10			22.39	20	20.55 (19)	23.44	23	22.27 (18)
20	09.38	08.09	06.35	05.50			04.15		20.37 (19)	03.20		22.04 (18)
	15.46	17.22	18.44	21.12			22.42	18	20.55 (19)	23.45	23	22.27 (18)
21	09.36	08.06	06.32	05.46			04.12		20.38 (19)	03.20		22.04 (18)
	15.49	17.25	18.47	21.15			22.45	16	20.54 (19)	23.45	23	22.27 (18)
22	09.33	08.02	06.28	05.43			04.09		20.40 (19)	03.20		22.05 (18)
	15.52	17.28	18.49	21.18			22.48	13	20.53 (19)	23.45	23	22.28 (18)
23	09.31	07.59	06.25	05.40			04.07		20.42 (19)	03.20		22.05 (18)
	15.55	17.31	18.52	21.21			22.51	9	20.51 (19)	23.45	23	22.28 (18)
24	09.28	07.56	06.22	05.36			04.04			03.21		22.05 (18)
	15.58	17.34	18.55	21.24			22.54			23.45	23	22.28 (18)
25	09.26	07.53	06.18	05.33			04.01			03.21		22.06 (18)
	16.01	17.37	18.58	21.27			22.56			23.45	22	22.28 (18)
26	09.23	07.49	06.15	05.30			03.59			03.22		22.06 (18)
	16.04	17.40	19.01	21.30			22.59			23.45	23	22.29 (18)
27	09.21	07.46	06.11	05.26			03.56			03.23		22.06 (18)
	16.07	17.43	19.04	21.33			23.02			23.44	22	22.28 (18)
28	09.18	07.43	06.08	05.23		20.42 (19)	03.54			03.24		22.06 (18)
	16.11	17.46	19.06	21.36	8	20.50 (19)	23.05			23.44	22	22.28 (18)
29	09.15		07.05	05.20		20.39 (19)	03.51			03.25		22.07 (18)
	16.14		20.09	21.39	14	20.53 (19)	23.07			23.43	22	22.29 (18)
30	09.12		07.01	05.17		20.38 (19)	03.49			03.26		22.07 (18)
	16.17		20.12	21.42	18	20.56 (19)	23.10			23.42	22	22.29 (18)
31	09.10		06.58				03.46		22.09 (18)			
	16.20		20.15				23.12	5	22.14 (18)			
Potential sun hours	182	242	363	447			559			605		
Total, worst case					40			544			608	
Sun reduction					0,41			0,48			0,49	
Oper. time red.					0,98			0,98			0,98	
Wind dir. red.					0,60			0,60			0,63	
Total reduction					0,24			0,28			0,31	
Total, real					10			154			186	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.20/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No Forest Shadow receptor: B - B Asuinrakennus (Söderändan 81)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	547	428	409	541	812	1 087	1 287	891	718	583	592	8 612

Idle start wind speed: Cut in wind speed from power curve

	July			August			September	October	November	December
1	03.27		22.08 (18)	04.44		20.42 (19)	06.14	07.36	08.06	09.35
	23.41	21	22.29 (18)	22.28	28	21.10 (19)	20.47	19.04	16.22	15.04
2	03.29		22.08 (18)	04.47		20.42 (19)	06.17	07.39	08.09	09.37
	23.40	21	22.29 (18)	22.25	28	21.10 (19)	20.43	19.01	16.19	15.03
3	03.30		22.08 (18)	04.50		20.42 (19)	06.19	07.42	08.12	09.40
	23.38	20	22.28 (18)	22.22	28	21.10 (19)	20.40	18.57	16.16	15.01
4	03.32		22.09 (18)	04.53		20.41 (19)	06.22	07.44	08.15	09.42
	23.37	20	22.29 (18)	22.19	29	21.10 (19)	20.37	18.54	16.13	14.59
5	03.34		22.10 (18)	04.56		20.42 (19)	06.25	07.47	08.18	09.44
	23.35	18	22.28 (18)	22.16	28	21.10 (19)	20.33	18.51	16.10	14.58
6	03.36		22.10 (18)	04.59		20.41 (19)	06.28	07.50	08.21	09.47
	23.34	18	22.28 (18)	22.13	28	21.09 (19)	20.30	18.47	16.07	14.56
7	03.38		22.11 (18)	05.02		20.42 (19)	06.30	07.53	08.24	09.49
	23.32	17	22.28 (18)	22.10	27	21.09 (19)	20.26	18.44	16.04	14.55
8	03.40		22.11 (18)	05.05		20.42 (19)	06.33	07.56	08.27	09.51
	23.30	16	22.27 (18)	22.06	26	21.08 (19)	20.23	18.40	16.01	14.54
9	03.42		22.12 (18)	05.08		20.43 (19)	06.36	07.58	08.30	09.53
	23.28	15	22.27 (18)	22.03	25	21.08 (19)	20.19	18.37	15.58	14.52
10	03.44		22.14 (18)	05.11		20.44 (19)	06.39	08.01	08.33	09.55
	23.26	12	22.26 (18)	22.00	24	21.08 (19)	20.16	18.34	15.56	14.51
11	03.46		22.14 (18)	05.14		20.44 (19)	06.41	08.04	08.36	09.57
	23.24	11	22.25 (18)	21.57	22	21.06 (19)	20.13	18.30	15.53	14.51
12	03.49		22.16 (18)	05.16		20.45 (19)	06.44	08.07	08.39	09.59
	23.22	7	22.23 (18)	21.54	20	21.05 (19)	20.09	18.27	15.50	14.50
13	03.51			05.19		20.46 (19)	06.47	08.10	08.42	10.00
	23.20			21.50	17	21.03 (19)	20.06	18.24	15.47	14.49
14	03.54			05.22		20.48 (19)	06.50	08.13	08.45	10.02
	23.18			21.47	13	21.01 (19)	20.02	18.20	15.44	14.48
15	03.56			05.25		20.52 (19)	06.52	08.16	08.48	10.03
	23.15			21.44	6	20.58 (19)	19.59	18.17	15.42	14.48
16	03.59			05.28			06.55	08.18	08.52	10.05
	23.13			21.40			19.55	18.14	15.39	14.48
17	04.01			05.31			06.58	08.21	08.55	10.06
	23.11			21.37			19.52	18.10	15.36	14.47
18	04.04			05.34			07.01	08.24	08.58	10.07
	23.08			21.34			19.49	18.07	15.34	14.47
19	04.07			05.37			07.03	08.27	09.01	10.08
	23.05			21.31			19.45	18.04	15.31	14.47
20	04.10		20.53 (19)	05.40			07.06	08.30	09.04	10.09
	23.03	5	20.58 (19)	21.27			19.42	18.01	15.29	14.47
21	04.12		20.51 (19)	05.43			07.09	08.33	09.07	10.10
	23.00	11	21.02 (19)	21.24			19.38	17.57	15.26	14.48
22	04.15		20.49 (19)	05.45			07.11	08.36	09.09	10.10
	22.57	14	21.03 (19)	21.21			19.35	17.54	15.24	14.48
23	04.18		20.48 (19)	05.48			07.14	08.39	09.12	10.11
	22.55	16	21.04 (19)	21.17			19.31	17.51	15.21	14.49
24	04.21		20.46 (19)	05.51			07.17	08.42	09.15	10.11
	22.52	19	21.05 (19)	21.14			19.28	17.48	15.19	14.49
25	04.24		20.46 (19)	05.54			07.20	07.45	09.18	10.11
	22.49	21	21.07 (19)	21.10			19.25	16.44	15.17	14.50
26	04.26		20.45 (19)	05.57			07.22	07.48	09.21	10.11
	22.46	22	21.07 (19)	21.07			19.21	16.41	15.14	14.51
27	04.29		20.45 (19)	06.00			07.25	07.51	09.24	10.11
	22.43	23	21.08 (19)	21.04			19.18	16.38	15.12	14.52
28	04.32		20.44 (19)	06.03			07.28	07.54	09.27	10.11
	22.40	25	21.09 (19)	21.00			19.14	16.35	15.10	14.53
29	04.35		20.43 (19)	06.05			07.31	07.57	09.29	10.11
	22.37	26	21.09 (19)	20.57			19.11	16.32	15.08	14.55
30	04.38		20.43 (19)	06.08			07.33	08.00	09.32	10.10
	22.34	27	21.10 (19)	20.54			19.08	16.29	15.06	14.56
31	04.41		20.42 (19)	06.11				08.03		10.10
	22.31	27	21.09 (19)	20.50				16.26		14.57
Potential sun hours	594			502			392	308	206	151
Total, worst case		432			349					
Sun reduction		0,39			0,32					
Oper. time red.		0,98			0,98					
Wind dir. red.		0,62			0,60					
Total reduction		0,23			0,19					
Total, real		101			65					

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.20/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No Forest Shadow receptor: C - C Lomarakennus (Säderändan 166)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	547	428	409	541	812	1 087	1 287	891	718	583	592	8 612

Idle start wind speed: Cut in wind speed from power curve

	January	February	March		April		May		June
1	10.09	09.07	07.39		06.54		19.10 (19)	05.13	20.32 (18)	03.44
	14.59	16.23	17.49		20.18	24	19.34 (19)	21.45	23	20.55 (18)	23.15
2	10.08	09.04	07.36		06.51		19.09 (19)	05.10		20.31 (18)	03.42
	15.01	16.26	17.52		20.21	25	19.34 (19)	21.48	25	20.56 (18)	23.17
3	10.08	09.01	07.33		06.47		19.08 (19)	05.07		20.30 (18)	03.40
	15.03	16.29	17.55		20.23	26	19.34 (19)	21.51	26	20.56 (18)	23.20
4	10.06	08.58	07.29		06.44		19.07 (19)	05.04		20.29 (18)	03.38
	15.05	16.32	17.58		20.26	27	19.34 (19)	21.54	27	20.56 (18)	23.22
5	10.05	08.55	07.26		06.41		19.07 (19)	05.00		20.29 (18)	03.36
	15.07	16.36	18.01		20.29	27	19.34 (19)	21.57	27	20.56 (18)	23.24
6	10.04	08.52	07.23		06.37		19.07 (19)	04.57		20.28 (18)	03.34
	15.09	16.39	18.04		20.32	26	19.33 (19)	22.00	28	20.56 (18)	23.26
7	10.03	08.49	07.19		06.34		19.07 (19)	04.54		20.29 (18)	03.32
	15.11	16.42	18.06		20.35	26	19.33 (19)	22.03	28	20.57 (18)	23.28
8	10.01	08.46	07.16		06.30		19.08 (19)	04.51		20.28 (18)	03.31
	15.14	16.45	18.09		20.38	24	19.32 (19)	22.06	29	20.57 (18)	23.30
9	10.00	08.43	07.13		06.27		19.07 (19)	04.48		20.28 (18)	03.29
	15.16	16.48	18.12		20.41	23	19.30 (19)	22.09	28	20.56 (18)	23.32
10	09.58	08.40	07.09		06.24		19.08 (19)	04.45		20.28 (18)	03.28
	15.19	16.51	18.15		20.43	22	19.30 (19)	22.12	28	20.56 (18)	23.34
11	09.57	08.37	07.06		06.20		19.10 (19)	04.41		20.29 (18)	03.26
	15.21	16.54	18.18		20.46	18	19.28 (19)	22.15	27	20.56 (18)	23.36
12	09.55	08.34	07.03		06.17		19.12 (19)	04.38		20.29 (18)	03.25
	15.24	16.57	18.21		20.49	14	19.26 (19)	22.18	26	20.55 (18)	23.37
13	09.53	08.31	06.59		06.13		19.14 (19)	04.35		20.30 (18)	03.24
	15.26	17.01	18.24		20.52	9	19.23 (19)	22.21	25	20.55 (18)	23.39
14	09.51	08.28	06.56		06.10			04.32		20.30 (18)	03.23
	15.29	17.04	18.27		20.55			22.24	24	20.54 (18)	23.40
15	09.49	08.25	06.52		06.07			04.29		20.31 (18)	03.22
	15.32	17.07	18.30		20.58			22.27	23	20.54 (18)	23.41
16	09.47	08.22	06.49		06.03			04.26		20.31 (18)	03.21
	15.35	17.10	18.32		21.01			22.30	22	20.53 (18)	23.42
17	09.45	08.18	06.46		06.00			04.23		20.32 (18)	03.21
	15.37	17.13	18.35		21.04			22.33	20	20.52 (18)	23.43
18	09.43	08.15	06.42		05.56			04.20		20.34 (18)	03.20
	15.40	17.16	18.38		21.07			22.36	18	20.52 (18)	23.44
19	09.40	08.12	06.39		05.53			04.18		20.35 (18)	03.20
	15.43	17.19	18.41		21.10			22.39	15	20.50 (18)	23.44
20	09.38	08.09	06.35		05.50			04.15		20.37 (18)	03.20
	15.46	17.22	18.44		21.12			22.42	11	20.48 (18)	23.45
21	09.36	08.06	06.32		05.46			04.12		20.39 (18)	03.20
	15.49	17.25	18.47		21.15			22.45	7	20.46 (18)	23.45
22	09.33	08.02	06.28		05.43			04.09			03.20
	15.52	17.28	18.49		21.18			22.48			23.45
23	09.31	07.59	06.25		05.40			04.06			03.20
	15.55	17.31	18.52		21.21			22.51			23.46
24	09.28	07.56	06.22		05.36			04.04			03.21
	15.58	17.34	18.55		21.24			22.54			23.45
25	09.26	07.53	06.18		05.33			04.01			03.21
	16.01	17.37	18.58		21.27			22.57			23.45
26	09.23	07.49	06.15		05.30			03.59			03.22
	16.04	17.40	19.01		21.30			22.59			23.45
27	09.21	07.46	06.11		05.26		20.38 (18)	03.56			03.23
	16.07	17.43	19.04		21.33	10	20.48 (18)	23.02			23.44
28	09.18	07.43	06.08	18.17 (19)	05.23		20.35 (18)	03.53			03.24
	16.10	17.46	19.06	12	18.29 (19)	21.36	16	20.51 (18)	23.05		23.44
29	09.15		07.05		19.14 (19)	05.20		20.33 (18)	03.51		03.25
	16.14		20.09	17	19.31 (19)	21.39	19	20.52 (18)	23.07		23.43
30	09.13		07.01		19.12 (19)	05.17		20.32 (18)	03.49		03.26
	16.17		20.12	21	19.33 (19)	21.42	21	20.53 (18)	23.10		23.42
31	09.10		06.58		19.10 (19)				03.46		
	16.20		20.15	23	19.33 (19)				23.13		
Potential sun hours	182	242	363		447			559			605
Total, worst case				73		357			487		
Sun reduction				0,32		0,41			0,48		
Oper. time red.				0,98		0,98			0,98		
Wind dir. red.				0,59		0,59			0,60		
Total reduction				0,19		0,24			0,28		
Total, real				14		85			137		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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SHADOW - Calendar

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No Forest Shadow receptor: C - C Lomarakennus (Säderändan 166)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	547	428	409	541	812	1 087	1 287	891	718	583	592	8 612

Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October	November	December
1	03.27		04.44		20.39 (18)	06.14	19.09 (19)	07.36	08.06	09.35
	23.41		22.28	27	21.06 (18)	20.47	18 19.27 (19)	19.04	16.22	15.04
2	03.29		04.47		20.39 (18)	06.17	19.07 (19)	07.39	08.09	09.37
	23.40		22.25	27	21.06 (18)	20.43	22 19.29 (19)	19.01	16.19	15.02
3	03.30		04.50		20.39 (18)	06.19	19.05 (19)	07.42	08.12	09.40
	23.38		22.22	28	21.07 (18)	20.40	23 19.28 (19)	18.57	16.16	15.01
4	03.32		04.53		20.38 (18)	06.22	19.05 (19)	07.44	08.15	09.42
	23.37		22.19	28	21.06 (18)	20.37	24 19.29 (19)	18.54	16.13	14.59
5	03.34		04.56		20.38 (18)	06.25	19.03 (19)	07.47	08.18	09.44
	23.36		22.16	29	21.07 (18)	20.33	26 19.29 (19)	18.51	16.10	14.58
6	03.36		04.59		20.38 (18)	06.28	19.03 (19)	07.50	08.21	09.47
	23.34		22.13	28	21.06 (18)	20.30	26 19.29 (19)	18.47	16.07	14.56
7	03.38		05.02		20.38 (18)	06.30	19.03 (19)	07.53	08.24	09.49
	23.32		22.10	28	21.06 (18)	20.26	26 19.29 (19)	18.44	16.04	14.55
8	03.40		05.05		20.38 (18)	06.33	19.02 (19)	07.56	08.27	09.51
	23.30		22.06	27	21.05 (18)	20.23	26 19.28 (19)	18.40	16.01	14.54
9	03.42		05.08		20.39 (18)	06.36	19.02 (19)	07.58	08.30	09.53
	23.28		22.03	26	21.05 (18)	20.19	26 19.28 (19)	18.37	15.58	14.52
10	03.44		05.11		20.39 (18)	06.39	19.02 (19)	08.01	08.33	09.55
	23.27		22.00	26	21.05 (18)	20.16	26 19.28 (19)	18.34	15.55	14.51
11	03.46		05.13		20.39 (18)	06.41	19.02 (19)	08.04	08.36	09.57
	23.24		21.57	25	21.04 (18)	20.13	24 19.26 (19)	18.30	15.53	14.50
12	03.49		05.16		20.40 (18)	06.44	19.03 (19)	08.07	08.39	09.59
	23.22		21.54	23	21.03 (18)	20.09	22 19.25 (19)	18.27	15.50	14.50
13	03.51		05.19		20.40 (18)	06.47	19.04 (19)	08.10	08.42	10.00
	23.20		21.50	21	21.01 (18)	20.06	20 19.24 (19)	18.24	15.47	14.49
14	03.54		05.22		20.42 (18)	06.50	19.04 (19)	08.13	08.45	10.02
	23.18		21.47	18	21.00 (18)	20.02	18 19.22 (19)	18.20	15.44	14.48
15	03.56		05.25		20.44 (18)	06.52	19.06 (19)	08.16	08.49	10.03
	23.15		21.44	15	20.59 (18)	19.59	13 19.19 (19)	18.17	15.41	14.48
16	03.59		05.28		20.46 (18)	06.55	19.10 (19)	08.18	08.52	10.05
	23.13		21.41	9	20.55 (18)	19.55	5 19.15 (19)	18.14	15.39	14.47
17	04.01		05.31			06.58		08.21	08.55	10.06
	23.11		21.37			19.52		18.10	15.36	14.47
18	04.04		05.34			07.01		08.24	08.58	10.07
	23.08		21.34			19.49		18.07	15.34	14.47
19	04.07		05.37			07.03		08.27	09.01	10.08
	23.05		21.31			19.45		18.04	15.31	14.47
20	04.09		05.40			07.06		08.30	09.04	10.09
	23.03		21.27			19.42		18.01	15.28	14.47
21	04.12		05.43			07.09		08.33	09.07	10.10
	23.00		21.24			19.38		17.57	15.26	14.48
22	04.15	20.52 (18)	05.45			07.11		08.36	09.09	10.10
	22.57	2 20.54 (18)	21.21			19.35		17.54	15.24	14.48
23	04.18	20.48 (18)	05.48			07.14		08.39	09.12	10.11
	22.55	10 20.58 (18)	21.17			19.31		17.51	15.21	14.49
24	04.21	20.46 (18)	05.51			07.17		08.42	09.15	10.11
	22.52	13 20.59 (18)	21.14			19.28		17.48	15.19	14.49
25	04.24	20.45 (18)	05.54			07.20		07.45	09.18	10.11
	22.49	16 21.01 (18)	21.10			19.25		16.44	15.17	14.50
26	04.26	20.43 (18)	05.57			07.22		07.48	09.21	10.11
	22.46	19 21.02 (18)	21.07			19.21		16.41	15.14	14.51
27	04.29	20.42 (18)	06.00			07.25		07.51	09.24	10.11
	22.43	21 21.03 (18)	21.04			19.18		16.38	15.12	14.52
28	04.32	20.42 (18)	06.03			07.28		07.54	09.27	10.11
	22.40	22 21.04 (18)	21.00			19.14		16.35	15.10	14.53
29	04.35	20.40 (18)	06.05			07.31		07.57	09.29	10.11
	22.37	24 21.04 (18)	20.57			19.11		16.32	15.08	14.54
30	04.38	20.40 (18)	06.08		19.14 (19)	07.33		08.00	09.32	10.11
	22.34	25 21.05 (18)	20.54	10	19.24 (19)	19.08		16.29	15.06	14.56
31	04.41	20.39 (18)	06.11		19.11 (19)			08.03		10.10
	22.31	26 21.05 (18)	20.50	14	19.25 (19)			16.25		14.57
Potential sun hours	594		502			392		308	206	151
Total, worst case		178		409			345			
Sun reduction		0,39		0,32			0,33			
Oper. time red.		0,98		0,98			0,98			
Wind dir. red.		0,60		0,60			0,59			
Total reduction		0,23		0,19			0,19			
Total, real		41		76			66			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.20/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No ForestShadow receptor: D - D Lomarakennus (Söderändan 188)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	547	428	409	541	812	1 087	1 287	891	718	583	592	8 612

Idle start wind speed: Cut in wind speed from power curve

	January	February	March		April		May	June
1	10.09	09.07	07.39		06.54		05.13	03.44
	14.59	16.23	17.49		20.18		21.45	23.15
2	10.08	09.04	07.36		06.51		05.10	03.42
	15.01	16.26	17.52		20.21		21.48	23.17
3	10.08	09.01	07.33		06.47		05.07	03.40
	15.03	16.29	17.55		20.23		21.51	23.20
4	10.07	08.58	07.29		06.44		05.04	03.38
	15.05	16.32	17.58		20.26		21.54	23.22
5	10.05	08.55	07.26		06.41		05.00	03.36
	15.07	16.36	18.01		20.29		21.57	23.24
6	10.04	08.52	07.23		06.37		04.57	03.34
	15.09	16.39	18.04		20.32		22.00	23.27
7	10.03	08.49	07.19		06.34		04.54	03.32
	15.11	16.42	18.06		20.35		22.03	23.29
8	10.01	08.46	07.16		06.30	19.45 (18)	04.51	03.31
	15.14	16.45	18.09		20.38	12 19.57 (18)	22.06	23.31
9	10.00	08.43	07.13		06.27	19.42 (18)	04.48	03.29
	15.16	16.48	18.12		20.41	17 19.59 (18)	22.09	23.32
10	09.58	08.40	07.09		06.23	19.40 (18)	04.45	03.28
	15.19	16.51	18.15		20.43	21 20.01 (18)	22.12	23.34
11	09.57	08.37	07.06		06.20	19.39 (18)	04.41	03.26
	15.21	16.54	18.18		20.46	23 20.02 (18)	22.15	23.36
12	09.55	08.34	07.03	17.34 (19)	06.17	19.38 (18)	04.38	03.25
	15.24	16.57	18.21	11 17.45 (19)	20.49	25 20.03 (18)	22.18	23.37
13	09.53	08.31	06.59	17.31 (19)	06.13	19.36 (18)	04.35	03.24
	15.26	17.00	18.24	16 17.47 (19)	20.52	26 20.02 (18)	22.21	23.39
14	09.51	08.28	06.56	17.29 (19)	06.10	19.36 (18)	04.32	03.23
	15.29	17.04	18.27	20 17.49 (19)	20.55	27 20.03 (18)	22.24	23.40
15	09.49	08.25	06.52	17.28 (19)	06.06	19.35 (18)	04.29	03.22
	15.32	17.07	18.29	21 17.49 (19)	20.58	28 20.03 (18)	22.27	23.41
16	09.47	08.22	06.49	17.27 (19)	06.03	19.35 (18)	04.26	03.21
	15.35	17.10	18.32	23 17.50 (19)	21.01	28 20.03 (18)	22.30	23.42
17	09.45	08.18	06.46	17.26 (19)	06.00	19.34 (18)	04.23	03.21
	15.37	17.13	18.35	24 17.50 (19)	21.04	28 20.02 (18)	22.33	23.43
18	09.43	08.15	06.42	17.25 (19)	05.56	19.34 (18)	04.20	03.20
	15.40	17.16	18.38	25 17.50 (19)	21.07	28 20.02 (18)	22.36	23.44
19	09.41	08.12	06.39	17.26 (19)	05.53	19.34 (18)	04.18	03.20
	15.43	17.19	18.41	24 17.50 (19)	21.10	28 20.02 (18)	22.39	23.45
20	09.38	08.09	06.35	17.25 (19)	05.50	19.35 (18)	04.15	03.20
	15.46	17.22	18.44	24 17.49 (19)	21.12	26 20.01 (18)	22.42	23.45
21	09.36	08.06	06.32	17.25 (19)	05.46	19.35 (18)	04.12	03.20
	15.49	17.25	18.47	24 17.49 (19)	21.15	25 20.00 (18)	22.45	23.45
22	09.33	08.02	06.28	17.25 (19)	05.43	19.36 (18)	04.09	03.20
	15.52	17.28	18.49	23 17.48 (19)	21.18	24 20.00 (18)	22.48	23.46
23	09.31	07.59	06.25	17.26 (19)	05.40	19.37 (18)	04.06	03.20
	15.55	17.31	18.52	21 17.47 (19)	21.21	22 19.59 (18)	22.51	23.46
24	09.28	07.56	06.22	17.26 (19)	05.36	19.37 (18)	04.04	03.21
	15.58	17.34	18.55	19 17.45 (19)	21.24	19 19.56 (18)	22.54	23.45
25	09.26	07.53	06.18	17.28 (19)	05.33	19.39 (18)	04.01	03.21
	16.01	17.37	18.58	15 17.43 (19)	21.27	16 19.55 (18)	22.57	23.45
26	09.23	07.49	06.15	17.30 (19)	05.30	19.41 (18)	03.58	03.22
	16.04	17.40	19.01	10 17.40 (19)	21.30	11 19.52 (18)	22.59	23.45
27	09.21	07.46	06.11		05.26		03.56	03.23
	16.07	17.43	19.04		21.33		23.02	23.44
28	09.18	07.43	06.08		05.23		03.53	03.24
	16.10	17.46	19.06		21.36		23.05	23.44
29	09.15		07.05		05.20		03.51	03.25
	16.14		20.09		21.39		23.07	23.43
30	09.13		07.01		05.16		03.49	03.26
	16.17		20.12		21.42		23.10	23.42
31	09.10		06.58				03.46	
	16.20		20.15				23.13	
Potential sun hours	182	242	363		447		559	605
Total, worst case				300		434		
Sun reduction				0,32		0,41		
Oper. time red.				0,98		0,98		
Wind dir. red.				0,57		0,58		
Total reduction				0,18		0,23		
Total, real				54		102		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.20/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No ForestShadow receptor: D - D Lomarakennus (Söderändan 188)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	547	428	409	541	812	1 087	1 287	891	718	583	592	8 612

Idle start wind speed: Cut in wind speed from power curve

	July	August		September		October		November	December
1	03.27	04.44		06.14		19.38 (18)	07.36	18.12 (19)	08.06	09.35
	23.41	22.28		20.47	23	20.01 (18)	19.04	14 18.26 (19)	16.22	15.04
2	03.29	04.47		06.17		19.39 (18)	07.39	18.15 (19)	08.09	09.37
	23.40	22.25		20.43	21	20.00 (18)	19.01	7 18.22 (19)	16.19	15.02
3	03.30	04.50		06.19		19.40 (18)	07.42		08.12	09.40
	23.38	22.22		20.40	17	19.57 (18)	18.57		16.16	15.01
4	03.32	04.53		06.22		19.42 (18)	07.44		08.15	09.42
	23.37	22.19		20.37	12	19.54 (18)	18.54		16.13	14.59
5	03.34	04.56		06.25			07.47		08.18	09.44
	23.36	22.16		20.33			18.51		16.10	14.58
6	03.36	04.59		06.28			07.50		08.21	09.47
	23.34	22.13		20.30			18.47		16.07	14.56
7	03.38	05.02		06.30			07.53		08.24	09.49
	23.32	22.10		20.26			18.44		16.04	14.55
8	03.40	05.05		06.33			07.56		08.27	09.51
	23.30	22.07		20.23			18.40		16.01	14.54
9	03.42	05.08		06.36			07.58		08.30	09.53
	23.29	22.03		20.19			18.37		15.58	14.52
10	03.44	05.11		06.39			08.01		08.33	09.55
	23.27	22.00		20.16			18.34		15.55	14.51
11	03.46	05.13		06.41			08.04		08.36	09.57
	23.24	21.57		20.13			18.30		15.53	14.50
12	03.49	05.16		06.44			08.07		08.39	09.59
	23.22	21.54		20.09			18.27		15.50	14.50
13	03.51	05.19		06.47			08.10		08.42	10.00
	23.20	21.50		20.06			18.24		15.47	14.49
14	03.54	05.22		06.50			08.13		08.45	10.02
	23.18	21.47		20.02			18.20		15.44	14.48
15	03.56	05.25		06.52			08.16		08.49	10.03
	23.16	21.44		19.59			18.17		15.41	14.48
16	03.59	05.28	19.52 (18)	06.55			08.18		08.52	10.05
	23.13	21.41	4 19.56 (18)	19.55			18.14		15.39	14.47
17	04.01	05.31	19.48 (18)	06.58		18.20 (19)	08.21		08.55	10.06
	23.11	21.37	12 20.00 (18)	19.52	8	18.28 (19)	18.10		15.36	14.47
18	04.04	05.34	19.45 (18)	07.01		18.17 (19)	08.24		08.58	10.07
	23.08	21.34	16 20.01 (18)	19.49	14	18.31 (19)	18.07		15.33	14.47
19	04.07	05.37	19.43 (18)	07.03		18.15 (19)	08.27		09.01	10.08
	23.06	21.31	20 20.03 (18)	19.45	17	18.32 (19)	18.04		15.31	14.47
20	04.09	05.40	19.42 (18)	07.06		18.12 (19)	08.30		09.04	10.09
	23.03	21.27	22 20.04 (18)	19.42	20	18.32 (19)	18.01		15.28	14.47
21	04.12	05.43	19.40 (18)	07.09		18.11 (19)	08.33		09.07	10.10
	23.00	21.24	24 20.04 (18)	19.38	22	18.33 (19)	17.57		15.26	14.48
22	04.15	05.45	19.40 (18)	07.11		18.10 (19)	08.36		09.10	10.10
	22.58	21.21	25 20.05 (18)	19.35	24	18.34 (19)	17.54		15.23	14.48
23	04.18	05.48	19.38 (18)	07.14		18.09 (19)	08.39		09.12	10.11
	22.55	21.17	27 20.05 (18)	19.31	24	18.33 (19)	17.51		15.21	14.48
24	04.21	05.51	19.38 (18)	07.17		18.09 (19)	08.42		09.15	10.11
	22.52	21.14	27 20.05 (18)	19.28	24	18.33 (19)	17.48		15.19	14.49
25	04.23	05.54	19.38 (18)	07.20		18.08 (19)	07.45		09.18	10.11
	22.49	21.10	28 20.06 (18)	19.25	25	18.33 (19)	16.44		15.17	14.50
26	04.26	05.57	19.37 (18)	07.22		18.09 (19)	07.48		09.21	10.11
	22.46	21.07	28 20.05 (18)	19.21	24	18.33 (19)	16.41		15.14	14.51
27	04.29	06.00	19.37 (18)	07.25		18.08 (19)	07.51		09.24	10.11
	22.43	21.04	28 20.05 (18)	19.18	23	18.31 (19)	16.38		15.12	14.52
28	04.32	06.02	19.36 (18)	07.28		18.08 (19)	07.54		09.27	10.11
	22.40	21.00	28 20.04 (18)	19.14	22	18.30 (19)	16.35		15.10	14.53
29	04.35	06.05	19.37 (18)	07.31		18.09 (19)	07.57		09.29	10.11
	22.37	20.57	27 20.04 (18)	19.11	20	18.29 (19)	16.32		15.08	14.54
30	04.38	06.08	19.37 (18)	07.33		18.10 (19)	08.00		09.32	10.11
	22.34	20.54	26 20.03 (18)	19.07	18	18.28 (19)	16.29		15.06	14.56
31	04.41	06.11	19.37 (18)				08.03			10.10
	22.31	20.50	25 20.02 (18)				16.25			14.57
Potential sun hours	594	502		392			308		206	151
Total, worst case			367		358			21		
Sun reduction			0,32		0,33			0,35		
Oper. time red.			0,98		0,98			0,98		
Wind dir. red.			0,58		0,57			0,57		
Total reduction			0,18		0,18			0,19		
Total, real			66		66			4		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

Project:
Lasor tuulivoimahanke 2023

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Calculated:
14.7.2023 9.20/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No Forest Shadow receptor: E - E Asuinrakennus (Rökiöntie 930)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	547	428	409	541	812	1 087	1 287	891	718	583	592	8 612

Idle start wind speed: Cut in wind speed from power curve

	January	February	March		April	May	June	July	August	September		October		November	December
1	10.09	09.07	07.39		06.54	05.13	03.44	03.27	04.44	06.14		07.36	17.54 (18)	08.06	09.35
	14.59	16.23	17.49		20.18	21.45	23.15	23.41	22.28	20.47		19.04	23 18.17 (18)	16.22	15.04
2	10.09	09.04	07.36		06.51	05.10	03.42	03.29	04.47	06.16		07.39	17.54 (18)	08.09	09.37
	15.01	16.26	17.52		20.21	21.48	23.18	23.40	22.25	20.43		19.01	22 18.16 (18)	16.19	15.02
3	10.08	09.01	07.33		06.47	05.07	03.40	03.30	04.50	06.19		07.42	17.54 (18)	08.12	09.40
	15.03	16.29	17.55		20.23	21.51	23.20	23.39	22.22	20.40		18.57	20 18.14 (18)	16.16	15.01
4	10.07	08.58	07.29		06.44	05.03	03.38	03.32	04.53	06.22		07.44	17.55 (18)	08.15	09.42
	15.05	16.32	17.58		20.26	21.54	23.22	23.37	22.19	20.37		18.54	18 18.13 (18)	16.13	14.59
5	10.06	08.55	07.26		06.41	05.00	03.36	03.34	04.56	06.25		07.47	17.57 (18)	08.18	09.45
	15.07	16.35	18.01		20.29	21.57	23.24	23.36	22.16	20.33		18.51	13 18.10 (18)	16.10	14.57
6	10.04	08.52	07.23		06.37	04.57	03.34	03.35	04.59	06.28		07.50	18.00 (18)	08.21	09.47
	15.09	16.39	18.04		20.32	22.00	23.27	23.34	22.13	20.30		18.47	7 18.07 (18)	16.07	14.56
7	10.03	08.49	07.19		06.34	04.54	03.32	03.37	05.02	06.30		07.53		08.24	09.49
	15.11	16.42	18.06		20.35	22.03	23.29	23.32	22.10	20.26		18.44		16.04	14.55
8	10.02	08.46	07.16	17.21 (18)	06.30	04.51	03.30	03.40	05.05	06.33		07.56		08.27	09.51
	15.14	16.45	18.09	11 17.32 (18)	20.38	22.06	23.31	23.31	22.07	20.23		18.40		16.01	14.53
9	10.00	08.43	07.13	17.18 (18)	06.27	04.48	03.29	03.42	05.08	06.36		07.58		08.30	09.53
	15.16	16.48	18.12	16 17.34 (18)	20.41	22.09	23.32	23.29	22.03	20.19		18.37		15.58	14.52
10	09.58	08.40	07.09	17.17 (18)	06.23	04.44	03.27	03.44	05.10	06.39		08.01		08.33	09.55
	15.18	16.51	18.15	19 17.36 (18)	20.43	22.12	23.34	23.27	22.00	20.16		18.34		15.55	14.51
11	09.57	08.37	07.06	17.15 (18)	06.20	04.41	03.26	03.46	05.13	06.41		08.04		08.36	09.57
	15.21	16.54	18.18	22 17.37 (18)	20.46	22.15	23.36	23.25	21.57	20.13		18.30		15.53	14.50
12	09.55	08.34	07.02	17.14 (18)	06.17	04.38	03.25	03.49	05.16	06.44		08.07		08.39	09.59
	15.24	16.57	18.21	24 17.38 (18)	20.49	22.19	23.37	23.22	21.54	20.09		18.27		15.50	14.49
13	09.53	08.31	06.59	17.13 (18)	06.13	04.35	03.24	03.51	05.19	06.47		08.10		08.42	10.01
	15.26	17.00	18.24	24 17.37 (18)	20.52	22.22	23.39	23.20	21.50	20.06		18.24		15.47	14.49
14	09.51	08.28	06.56	17.13 (18)	06.10	04.32	03.23	03.53	05.22	06.50		08.13		08.46	10.02
	15.29	17.04	18.27	25 17.38 (18)	20.55	22.25	23.40	23.18	21.47	20.02		18.20		15.44	14.48
15	09.49	08.25	06.52	17.12 (18)	06.06	04.29	03.22	03.56	05.25	06.52		08.16		08.49	10.04
	15.32	17.07	18.29	25 17.37 (18)	20.58	22.28	23.41	23.16	21.44	19.59		18.17		15.41	14.48
16	09.47	08.22	06.49	17.12 (18)	06.03	04.26	03.21	03.59	05.28	06.55		08.18		08.52	10.05
	15.34	17.10	18.32	25 17.37 (18)	21.01	22.31	23.42	23.13	21.41	19.55		18.14		15.39	14.47
17	09.45	08.18	06.46	17.12 (18)	06.00	04.23	03.21	04.01	05.31	06.58		08.21		08.55	10.06
	15.37	17.13	18.35	24 17.36 (18)	21.04	22.34	23.43	23.11	21.37	19.52		18.10		15.36	14.47
18	09.43	08.15	06.42	17.12 (18)	05.56	04.20	03.20	04.04	05.34	07.01		08.24		08.58	10.07
	15.40	17.16	18.38	24 17.36 (18)	21.07	22.36	23.44	23.08	21.34	19.49		18.07		15.33	14.47
19	09.41	08.12	06.39	17.13 (18)	05.53	04.17	03.20	04.07	05.37	07.03		08.27		09.01	10.08
	15.43	17.19	18.41	22 17.35 (18)	21.10	22.39	23.45	23.06	21.31	19.45		18.04		15.31	14.47
20	09.38	08.09	06.35	17.13 (18)	05.50	04.15	03.20	04.09	05.40	07.06		08.30		09.04	10.09
	15.46	17.22	18.44	20 17.33 (18)	21.12	22.42	23.45	23.03	21.27	19.42		18.01		15.28	14.47
21	09.36	08.06	06.32	17.15 (18)	05.46	04.12	03.20	04.12	05.42	07.09	18.03 (18)	08.33		09.07	10.10
	15.49	17.25	18.47	17 17.32 (18)	21.15	22.45	23.45	23.00	21.24	19.38	11 18.14 (18)	17.57		15.26	14.47
22	09.33	08.02	06.28	17.17 (18)	05.43	04.09	03.20	04.15	05.45	07.11	18.01 (18)	08.36		09.10	10.10
	15.52	17.28	18.49	12 17.29 (18)	21.18	22.48	23.46	22.58	21.21	19.35	16 18.17 (18)	17.54		15.23	14.48
23	09.31	07.59	06.25	17.21 (18)	05.40	04.06	03.20	04.18	05.48	07.14	17.58 (18)	08.39		09.13	10.11
	15.55	17.31	18.52	4 17.25 (18)	21.21	22.51	23.46	22.55	21.17	19.31	19 18.17 (18)	17.51		15.21	14.48
24	09.29	07.56	06.22		05.36	04.04	03.20	04.21	05.51	07.17	17.57 (18)	08.42		09.15	10.11
	15.58	17.34	18.55		21.24	22.54	23.46	22.52	21.14	19.28	21 18.18 (18)	17.48		15.19	14.49
25	09.26	07.53	06.18		05.33	04.01	03.21	04.23	05.54	07.20	17.56 (18)	07.45		09.18	10.11
	16.01	17.37	18.58		21.27	22.57	23.45	22.49	21.11	19.25	23 18.19 (18)	16.44		15.16	14.50
26	09.23	07.49	06.15		05.30	03.58	03.22	04.26	05.57	07.22	17.55 (18)	07.48		09.21	10.12
	16.04	17.40	19.01		21.30	22.59	23.45	22.46	21.07	19.21	24 18.19 (18)	16.41		15.14	14.51
27	09.21	07.46	06.11		05.26	03.56	03.22	04.29	06.00	07.25	17.53 (18)	07.51		09.24	10.12
	16.07	17.43	19.04		21.33	23.02	23.44	22.43	21.04	19.18	25 18.18 (18)	16.38		15.12	14.52
28	09.18	07.43	06.08		05.23	03.53	03.23	04.32	06.02	07.28	17.53 (18)	07.54		09.27	10.11
	16.10	17.46	19.06		21.36	23.05	23.44	22.40	21.00	19.14	25 18.18 (18)	16.35		15.10	14.53
29	09.15		07.04		05.20	03.51	03.24	04.35	06.05	07.31	17.53 (18)	07.57		09.29	10.11
	16.13		20.09		21.39	23.08	23.43	22.38	20.57	19.11	25 18.18 (18)	16.32		15.08	14.54
30	09.13		07.01		05.16	03.49	03.26	04.38	06.08	07.33	17.53 (18)	08.00		09.32	10.11
	16.17		20.12		21.42	23.10	23.42	22.35	20.54	19.07	25 18.18 (18)	16.29		15.06	14.56
31	09.10		06.58			03.46		04.41	06.11			08.03			10.10
	16.20		20.15			23.13		22.32	20.50			16.25			14.57
Potential sun hours	182	242	363		447	559	605	594	502	392		308		206	151
Total, worst case				314							214		103		
Sun reduction				0,32							0,33		0,35		
Oper. time red.				0,98							0,98		0,98		
Wind dir. red.				0,58							0,58		0,58		
Total reduction				0,18							0,19		0,20		
Total, real				58							40		20		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.20/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No Forest Shadow receptor: F - F Asuinrakennus (Kukkusintie 474)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	547	428	409	541	812	1 087	1 287	891	718	583	592	8 612

Idle start wind speed: Cut in wind speed from power curve

	January		February		March	April	May	June
1	10.10		09.07		13.40 (14)	07.39	06.54	05.13	03.43
	14.59		16.23	22	14.02 (14)	17.49	20.18	21.45	23.16
2	10.09		09.04		13.41 (14)	07.36	06.51	05.10	03.41
	15.01		16.26	20	14.01 (14)	17.52	20.21	21.48	23.18
3	10.08		09.01		13.43 (14)	07.33	06.47	05.06	03.39
	15.02		16.29	17	14.00 (14)	17.55	20.23	21.51	23.20
4	10.07		08.59		13.45 (14)	07.29	06.44	05.03	03.37
	15.04		16.32	13	13.58 (14)	17.58	20.26	21.55	23.23
5	10.06		08.56		13.49 (14)	07.26	06.40	05.00	03.35
	15.06		16.35	6	13.55 (14)	18.01	20.29	21.58	23.25
6	10.05		08.53			07.23	06.37	04.57	03.33
	15.09		16.38			18.03	20.32	22.01	23.27
7	10.03		08.50		15.44 (13)	07.19	06.34	04.54	03.31
	15.11		16.41	8	15.52 (13)	18.06	20.35	22.04	23.29
8	10.02		08.47		15.41 (13)	07.16	06.30	04.50	03.30
	15.13		16.45	14	15.55 (13)	18.09	20.38	22.07	23.31
9	10.00		08.44		15.40 (13)	07.13	06.27	04.47	03.28
	15.16		16.48	17	15.57 (13)	18.12	20.41	22.10	23.33
10	09.59		08.41		15.38 (13)	07.09	06.23	04.44	03.27
	15.18	6	13.48 (14)	16.51	20	15.58 (13)	18.15	20.43	22.13	23.35
11	09.57		13.39 (14)	08.37		15.38 (13)	07.06	06.20	04.41	03.25
	15.21	11	13.50 (14)	16.54	22	16.00 (13)	18.18	20.46	22.16	23.37
12	09.55		13.39 (14)	08.34		15.37 (13)	07.02	06.16	04.38	03.24
	15.23	13	13.52 (14)	16.57	23	16.00 (13)	18.21	20.49	22.19	23.38
13	09.53		13.38 (14)	08.31		15.37 (13)	06.59	06.13	04.35	03.23
	15.26	16	13.54 (14)	17.00	24	16.01 (13)	18.24	20.52	22.22	23.39
14	09.52		13.37 (14)	08.28		15.36 (13)	06.56	06.10	04.32	03.22
	15.28	17	13.54 (14)	17.03	25	16.01 (13)	18.27	20.55	22.25	23.41
15	09.50		13.37 (14)	08.25		15.36 (13)	06.52	06.06	04.29	03.21
	15.31	19	13.56 (14)	17.06	26	16.02 (13)	18.29	20.58	22.28	23.42
16	09.47		13.37 (14)	08.22		15.36 (13)	06.49	06.03	04.26	03.20
	15.34	21	13.58 (14)	17.10	26	16.02 (13)	18.32	21.01	22.31	23.43
17	09.45		13.36 (14)	08.19		15.36 (13)	06.45	06.00	04.23	03.20
	15.37	22	13.58 (14)	17.13	26	16.02 (13)	18.35	21.04	22.34	23.44
18	09.43		13.36 (14)	08.15		15.36 (13)	06.42	05.56	04.20	03.19
	15.40	23	13.59 (14)	17.16	25	16.01 (13)	18.38	21.07	22.37	23.45
19	09.41		13.36 (14)	08.12		15.37 (13)	06.39	05.53	04.17	03.19
	15.43	23	13.59 (14)	17.19	24	16.01 (13)	18.41	21.10	22.40	23.45
20	09.39		13.36 (14)	08.09		15.37 (13)	06.35	05.49	04.14	03.19
	15.46	25	14.01 (14)	17.22	23	16.00 (13)	18.44	21.13	22.43	23.46
21	09.36		13.36 (14)	08.06		15.38 (13)	06.32	05.46	04.11	03.19
	15.49	25	14.01 (14)	17.25	22	16.00 (13)	18.47	21.16	22.46	23.46
22	09.34		13.36 (14)	08.02		15.39 (13)	06.28	05.43	04.09	03.19
	15.52	26	14.02 (14)	17.28	19	15.58 (13)	18.49	21.19	22.49	23.46
23	09.31		13.36 (14)	07.59		15.41 (13)	06.25	05.39	04.06	03.19
	15.55	26	14.02 (14)	17.31	16	15.57 (13)	18.52	21.21	22.51	23.46
24	09.29		13.36 (14)	07.56		15.43 (13)	06.22	05.36	04.03	03.20
	15.58	27	14.03 (14)	17.34	11	15.54 (13)	18.55	21.24	22.54	23.46
25	09.26		13.37 (14)	07.53			06.18	05.33	04.00	03.20
	16.01	26	14.03 (14)	17.37			18.58	21.27	22.57	23.46
26	09.24		13.37 (14)	07.49			06.15	05.29	03.58	03.21
	16.04	26	14.03 (14)	17.40			19.01	21.30	23.00	23.46
27	09.21		13.38 (14)	07.46			06.11	05.26	03.55	03.22
	16.07	26	14.04 (14)	17.43			19.04	21.33	23.03	23.45
28	09.18		13.37 (14)	07.43			06.08	05.23	03.53	03.23
	16.10	26	14.03 (14)	17.46			19.06	21.36	23.05	23.44
29	09.16		13.38 (14)				07.04	05.19	03.50	03.24
	16.13	26	14.04 (14)				20.09	21.39	23.08	23.44
30	09.13		13.39 (14)				07.01	05.16	03.48	03.25
	16.16	24	14.03 (14)				20.12	21.42	23.11	23.43
31	09.10		13.40 (14)				06.58		03.46	
	16.19	23	14.03 (14)				20.15		23.13	
Potential sun hours	181			242			363	447	560	606
Total, worst case		477			449					
Sun reduction		0,17			0,33					
Oper. time red.		0,98			0,98					
Wind dir. red.		0,67			0,63					
Total reduction		0,12			0,21					
Total, real		56			93					

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.20/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No Forest Shadow receptor: F - F Asuinrakennus (Kukkusintie 474)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	547	428	409	541	812	1 087	1 287	891	718	583	592	8 612

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October		November		December		
1	03.26	04.43	06.14	07.36		08.06	15.08 (13)	09.35		13.22 (14)
	23.42	22.29	20.47	19.04		16.22	19 15.27 (13)	15.04	10	13.32 (14)
2	03.28	04.46	06.16	07.39		08.09	15.10 (13)	09.38		13.24 (14)
	23.40	22.26	20.43	19.01		16.19	17 15.27 (13)	15.02	6	13.30 (14)
3	03.29	04.49	06.19	07.42		08.12	15.12 (13)	09.40		
	23.39	22.23	20.40	18.57		16.16	13 15.25 (13)	15.00		
4	03.31	04.52	06.22	07.44		08.15	15.14 (13)	09.43		
	23.38	22.19	20.37	18.54		16.13	7 15.21 (13)	14.59		
5	03.33	04.55	06.25	07.47		08.18		09.45		
	23.36	22.16	20.33	18.50		16.10		14.57		
6	03.35	04.58	06.27	07.50		08.21	13.18 (14)	09.47		
	23.35	22.13	20.30	18.47		16.07	7 13.25 (14)	14.56		
7	03.37	05.01	06.30	07.53		08.24	13.15 (14)	09.49		
	23.33	22.10	20.26	18.44		16.04	14 13.29 (14)	14.54		
8	03.39	05.04	06.33	07.56		08.27	13.14 (14)	09.52		
	23.31	22.07	20.23	18.40		16.01	17 13.31 (14)	14.53		
9	03.41	05.07	06.36	07.59		08.30	13.12 (14)	09.54		
	23.29	22.04	20.19	18.37		15.58	19 13.31 (14)	14.52		
10	03.43	05.10	06.39	08.01		08.33	13.11 (14)	09.56		
	23.27	22.00	20.16	18.34		15.55	22 13.33 (14)	14.51		
11	03.46	05.13	06.41	08.04		08.37	13.11 (14)	09.58		
	23.25	21.57	20.13	18.30		15.52	23 13.34 (14)	14.50		
12	03.48	05.16	06.44	08.07		08.40	13.10 (14)	09.59		
	23.23	21.54	20.09	18.27		15.49	25 13.35 (14)	14.49		
13	03.50	05.19	06.47	08.10		08.43	13.10 (14)	10.01		
	23.21	21.51	20.06	18.24		15.47	25 13.35 (14)	14.48		
14	03.53	05.22	06.49	08.13		08.46	13.09 (14)	10.03		
	23.18	21.47	20.02	18.20		15.44	26 13.35 (14)	14.48		
15	03.55	05.25	06.52	08.16		08.49	13.09 (14)	10.04		
	23.16	21.44	19.59	18.17		15.41	26 13.35 (14)	14.47		
16	03.58	05.28	06.55	08.18		08.52	13.10 (14)	10.05		
	23.14	21.41	19.55	18.14		15.38	26 13.36 (14)	14.47		
17	04.01	05.31	06.58	08.21	16.17 (13)	08.55	13.10 (14)	10.07		
	23.11	21.37	19.52	18.10	5 16.22 (13)	15.36	26 13.36 (14)	14.46		
18	04.03	05.34	07.00	08.24	16.14 (13)	08.58	13.10 (14)	10.08		
	23.09	21.34	19.49	18.07	13 16.27 (13)	15.33	27 13.37 (14)	14.46		
19	04.06	05.36	07.03	08.27	16.11 (13)	09.01	13.11 (14)	10.09		
	23.06	21.31	19.45	18.04	17 16.28 (13)	15.31	26 13.37 (14)	14.46		
20	04.09	05.39	07.06	08.30	16.09 (13)	09.04	13.11 (14)	10.10		
	23.03	21.27	19.42	18.00	20 16.29 (13)	15.28	26 13.37 (14)	14.47		
21	04.12	05.42	07.09	08.33	16.08 (13)	09.07	13.12 (14)	10.10		
	23.01	21.24	19.38	17.57	22 16.30 (13)	15.25	25 13.37 (14)	14.47		
22	04.14	05.45	07.11	08.36	16.07 (13)	09.10	13.12 (14)	10.11		
	22.58	21.21	19.35	17.54	23 16.30 (13)	15.23	25 13.37 (14)	14.47		
23	04.17	05.48	07.14	08.39	16.07 (13)	09.13	13.13 (14)	10.11		
	22.55	21.17	19.31	17.51	24 16.31 (13)	15.21	24 13.37 (14)	14.48		
24	04.20	05.51	07.17	08.42	16.06 (13)	09.16	13.14 (14)	10.12		
	22.52	21.14	19.28	17.47	25 16.31 (13)	15.18	22 13.36 (14)	14.48		
25	04.23	05.54	07.20	07.45	15.05 (13)	09.19	13.14 (14)	10.12		
	22.50	21.11	19.25	16.44	26 15.31 (13)	15.16	22 13.36 (14)	14.49		
26	04.26	05.57	07.22	07.48	15.06 (13)	09.21	13.15 (14)	10.12		
	22.47	21.07	19.21	16.41	26 15.32 (13)	15.14	21 13.36 (14)	14.50		
27	04.29	05.59	07.25	07.51	15.05 (13)	09.24	13.16 (14)	10.12		
	22.44	21.04	19.18	16.38	26 15.31 (13)	15.12	19 13.35 (14)	14.51		
28	04.32	06.02	07.28	07.54	15.06 (13)	09.27	13.17 (14)	10.12		
	22.41	21.00	19.14	16.35	25 15.31 (13)	15.10	18 13.35 (14)	14.52		
29	04.35	06.05	07.31	07.57	15.06 (13)	09.30	13.19 (14)	10.12		
	22.38	20.57	19.11	16.31	24 15.30 (13)	15.08	15 13.34 (14)	14.54		
30	04.38	06.08	07.33	08.00	15.06 (13)	09.32	13.20 (14)	10.11		
	22.35	20.54	19.07	16.28	23 15.29 (13)	15.06	13 13.33 (14)	14.55		
31	04.41	06.11		08.03	15.08 (13)			10.11		
	22.32	20.50		16.25	21 15.29 (13)			14.57		
Potential sun hours	595	503	392	307		206		150		
Total, worst case					320		595		16	
Sun reduction					0,35		0,23		0,20	
Oper. time red.					0,98		0,98		0,98	
Wind dir. red.					0,63		0,67		0,67	
Total reduction					0,21		0,15		0,13	
Total, real					69		91		2	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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14.7.2023 9.20/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No Forest Shadow receptor: G - G Asuinrakennus (Kovik byväg 53)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	547	428	409	541	812	1 087	1 287	891	718	583	592	8 612

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.08	07.40	06.55	05.13	03.44	03.27	04.44	06.14	07.37	08.06	09.35
	14.59	16.23	17.49	20.18	21.46	23.16	23.42	22.29	20.47	19.04	16.22	15.04
2	10.09	09.05	07.37	06.51	05.10	03.42	03.28	04.47	06.17	07.39	08.09	09.38
	15.01	16.26	17.52	20.21	21.49	23.19	23.41	22.26	20.44	19.01	16.19	15.02
3	10.08	09.02	07.33	06.48	05.07	03.40	03.30	04.50	06.20	07.42	08.12	09.41
	15.03	16.29	17.55	20.24	21.52	23.21	23.40	22.23	20.40	18.58	16.16	15.01
4	10.07	08.59	07.30	06.44	05.04	03.37	03.32	04.53	06.22	07.45	08.15	09.43
	15.05	16.32	17.58	20.27	21.55	23.23	23.38	22.20	20.37	18.54	16.13	14.59
5	10.06	08.56	07.27	06.41	05.00	03.36	03.33	04.56	06.25	07.48	08.19	09.45
	15.07	16.36	18.01	20.30	21.58	23.25	23.37	22.17	20.34	18.51	16.10	14.57
6	10.05	08.53	07.23	06.37	04.57	03.34	03.35	04.59	06.28	07.51	08.22	09.48
	15.09	16.39	18.04	20.32	22.01	23.28	23.35	22.14	20.30	18.47	16.07	14.56
7	10.04	08.50	07.20	06.34	04.54	03.32	03.37	05.02	06.31	07.53	08.25	09.50
	15.11	16.42	18.07	20.35	22.04	23.30	23.33	22.10	20.27	18.44	16.04	14.55
8	10.02	08.47	07.16	06.31	04.51	03.30	03.39	05.05	06.33	07.56	08.28	09.52
	15.14	16.45	18.10	20.38	22.07	23.32	23.31	22.07	20.23	18.41	16.01	14.53
9	10.01	08.44	07.13	06.27	04.48	03.29	03.41	05.08	06.36	07.59	08.31	09.54
	15.16	16.48	18.13	20.41	22.10	23.33	23.30	22.04	20.20	18.37	15.58	14.52
10	09.59	08.41	07.10	06.24	04.45	03.27	03.44	05.11	06.39	08.02	08.34	09.56
	15.18	16.51	18.15	20.44	22.13	23.35	23.28	22.01	20.16	18.34	15.56	14.51
11	09.58	08.38	07.06	06.20	04.41	03.26	03.46	05.14	06.42	08.05	08.37	09.58
	15.21	16.54	18.18	20.47	22.16	23.37	23.26	21.58	20.13	18.31	15.53	14.50
12	09.56	08.35	07.03	06.17	04.38	03.25	03.48	05.16	06.44	08.07	08.40	10.00
	15.24	16.58	18.21	20.50	22.19	23.38	23.23	21.54	20.10	18.27	15.50	14.49
13	09.54	08.32	07.00	06.14	04.35	03.23	03.51	05.19	06.47	08.10	08.43	10.01
	15.26	17.01	18.24	20.53	22.22	23.40	23.21	21.51	20.06	18.24	15.47	14.49
14	09.52	08.29	06.56	06.10	04.32	03.22	03.53	05.22	06.50	08.13	08.46	10.03
	15.29	17.04	18.27	20.55	22.25	23.41	23.19	21.48	20.03	18.21	15.44	14.48
15	09.50	08.25	06.53	06.07	04.29	03.22	03.56	05.25	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	23.42	23.16	21.44	19.59	18.17	15.41	14.48
16	09.48	08.22	06.49	06.03	04.26	03.21	03.58	05.28	06.55	08.19	08.52	10.06
	15.34	17.10	18.33	21.01	22.31	23.43	23.14	21.41	19.56	18.14	15.39	14.47
17	09.46	08.19	06.46	06.00	04.23	03.20	04.01	05.31	06.58	08.22	08.55	10.07
	15.37	17.13	18.36	21.04	22.34	23.44	23.12	21.38	19.52	18.11	15.36	14.47
18	09.44	08.16	06.42	05.57	04.20	03.20	04.04	05.34	07.01	08.25	08.58	10.08
	15.40	17.16	18.38	21.07	22.37	23.45	23.09	21.35	19.49	18.07	15.34	14.47
19	09.41	08.13	06.39	05.53	04.17	03.19	04.06	05.37	07.04	08.28	09.01	10.09
	15.43	17.19	18.41	21.10	22.40	23.46	23.06	21.31	19.46	18.04	15.31	14.47
20	09.39	08.09	06.36	05.50	04.15	03.19	04.09	05.40	07.06	08.30	09.04	10.10
	15.46	17.22	18.44	21.13	22.43	23.46	23.04	21.28	19.42	18.01	15.28	14.47
21	09.37	08.06	06.32	05.46	04.12	03.19	04.12	05.43	07.09	08.33	09.07	10.11
	15.49	17.25	18.47	21.16	22.46	23.47	23.01	21.25	19.39	17.58	15.26	14.47
22	09.34	08.03	06.29	05.43	04.09	03.19	04.15	05.46	07.12	08.36	09.10	10.11
	15.52	17.28	18.50	21.19	22.49	23.47	22.58	21.21	19.35	17.54	15.23	14.48
23	09.32	08.00	06.25	05.40	04.06	03.20	04.18	05.48	07.15	08.39	09.13	10.12
	15.55	17.31	18.53	21.22	22.52	23.47	22.56	21.18	19.32	17.51	15.21	14.48
24	09.29	07.56	06.22	05.36	04.04	03.20	04.21	05.51	07.17	08.42	09.16	10.12
	15.58	17.34	18.55	21.25	22.55	23.47	22.53	21.14	19.28	17.48	15.19	14.49
25	09.27	07.53	06.19	05.33	04.01	03.21	04.23	05.54	07.20	07.45	09.19	10.12
	16.01	17.37	18.58	21.28	22.57	23.46	22.50	21.11	19.25	16.45	15.16	14.50
26	09.24	07.50	06.15	05.30	03.58	03.21	04.26	05.57	07.23	07.48	09.22	10.12
	16.04	17.40	19.01	21.31	23.00	23.46	22.47	21.08	19.22	16.41	15.14	14.51
27	09.21	07.47	06.12	05.26	03.56	03.22	04.29	06.00	07.26	07.51	09.25	10.12
	16.07	17.43	19.04	21.34	23.03	23.46	22.44	21.04	19.18	16.38	15.12	14.52
28	09.19	07.43	06.08	05.23	03.53	03.23	04.32	06.03	07.28	07.54	09.27	10.12
	16.10	17.46	19.07	21.37	23.06	23.45	22.41	21.01	19.15	16.35	15.10	14.53
29	09.16		07.05	05.20	03.51	03.24	04.35	06.06	07.31	07.57	09.30	10.12
	16.14		20.10	21.40	23.08	23.44	22.38	20.57	19.11	16.32	15.08	14.54
30	09.13		07.01	05.17	03.48	03.25	04.38	06.08	07.34	08.00	09.33	10.12
	16.17		20.12	21.43	23.11	23.43	22.35	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.11
	16.20		20.15		23.14		22.32	20.51		16.26		14.57
Potential sun hours	181	242	363	447	560	606	595	503	392	307	206	150
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.20/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No Forest Shadow receptor: H - H Asuinrakennus (Vöyrintie 1021)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	547	428	409	541	812	1 087	1 287	891	718	583	592	8 612

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.08	07.40	06.55	05.13	03.44	03.27	04.44	06.14	07.37	08.06	09.35
	14.59	16.23	17.49	20.18	21.46	23.16	23.42	22.29	20.47	19.04	16.23	15.04
2	10.09	09.05	07.37	06.51	05.10	03.42	03.28	04.47	06.17	07.39	08.09	09.38
	15.01	16.26	17.52	20.21	21.49	23.18	23.41	22.26	20.44	19.01	16.19	15.02
3	10.08	09.02	07.33	06.48	05.07	03.40	03.30	04.50	06.20	07.42	08.12	09.41
	15.03	16.29	17.55	20.24	21.52	23.21	23.40	22.23	20.40	18.58	16.16	15.01
4	10.07	08.59	07.30	06.44	05.04	03.38	03.32	04.53	06.22	07.45	08.15	09.43
	15.05	16.33	17.58	20.27	21.55	23.23	23.38	22.20	20.37	18.54	16.13	14.59
5	10.06	08.56	07.27	06.41	05.00	03.36	03.33	04.56	06.25	07.48	08.19	09.45
	15.07	16.36	18.01	20.30	21.58	23.25	23.37	22.17	20.34	18.51	16.10	14.57
6	10.05	08.53	07.23	06.37	04.57	03.34	03.35	04.59	06.28	07.51	08.22	09.48
	15.09	16.39	18.04	20.32	22.01	23.28	23.35	22.14	20.30	18.47	16.07	14.56
7	10.04	08.50	07.20	06.34	04.54	03.32	03.37	05.02	06.31	07.53	08.25	09.50
	15.11	16.42	18.07	20.35	22.04	23.30	23.33	22.10	20.27	18.44	16.04	14.55
8	10.02	08.47	07.16	06.31	04.51	03.30	03.39	05.05	06.33	07.56	08.28	09.52
	15.14	16.45	18.10	20.38	22.07	23.32	23.31	22.07	20.23	18.41	16.01	14.53
9	10.01	08.44	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.59	08.31	09.54
	15.16	16.48	18.13	20.41	22.10	23.33	23.30	22.04	20.20	18.37	15.58	14.52
10	09.59	08.41	07.10	06.24	04.45	03.27	03.44	05.11	06.39	08.02	08.34	09.56
	15.19	16.51	18.16	20.44	22.13	23.35	23.28	22.01	20.16	18.34	15.56	14.51
11	09.58	08.38	07.06	06.20	04.42	03.26	03.46	05.14	06.42	08.05	08.37	09.58
	15.21	16.54	18.18	20.47	22.16	23.37	23.25	21.58	20.13	18.31	15.53	14.50
12	09.56	08.35	07.03	06.17	04.38	03.25	03.48	05.17	06.44	08.07	08.40	10.00
	15.24	16.58	18.21	20.50	22.19	23.38	23.23	21.54	20.10	18.27	15.50	14.49
13	09.54	08.32	07.00	06.14	04.35	03.24	03.51	05.19	06.47	08.10	08.43	10.01
	15.26	17.01	18.24	20.53	22.22	23.40	23.21	21.51	20.06	18.24	15.47	14.49
14	09.52	08.29	06.56	06.10	04.32	03.23	03.53	05.22	06.50	08.13	08.46	10.03
	15.29	17.04	18.27	20.56	22.25	23.41	23.19	21.48	20.03	18.21	15.44	14.48
15	09.50	08.25	06.53	06.07	04.29	03.22	03.56	05.25	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	23.42	23.16	21.44	19.59	18.17	15.42	14.48
16	09.48	08.22	06.49	06.03	04.26	03.21	03.59	05.28	06.55	08.19	08.52	10.06
	15.35	17.10	18.33	21.01	22.31	23.43	23.14	21.41	19.56	18.14	15.39	14.47
17	09.46	08.19	06.46	06.00	04.23	03.20	04.01	05.31	06.58	08.22	08.55	10.07
	15.37	17.13	18.36	21.04	22.34	23.44	23.12	21.38	19.52	18.11	15.36	14.47
18	09.44	08.16	06.43	05.57	04.20	03.20	04.04	05.34	07.01	08.25	08.58	10.08
	15.40	17.16	18.38	21.07	22.37	23.45	23.09	21.35	19.49	18.07	15.34	14.47
19	09.41	08.13	06.39	05.53	04.18	03.20	04.07	05.37	07.04	08.28	09.01	10.09
	15.43	17.19	18.41	21.10	22.40	23.46	23.06	21.31	19.46	18.04	15.31	14.47
20	09.39	08.09	06.36	05.50	04.15	03.19	04.09	05.40	07.06	08.31	09.04	10.10
	15.46	17.22	18.44	21.13	22.43	23.46	23.04	21.28	19.42	18.01	15.28	14.47
21	09.37	08.06	06.32	05.46	04.12	03.19	04.12	05.43	07.09	08.33	09.07	10.11
	15.49	17.25	18.47	21.16	22.46	23.46	23.01	21.25	19.39	17.58	15.26	14.47
22	09.34	08.03	06.29	05.43	04.09	03.19	04.15	05.46	07.12	08.36	09.10	10.11
	15.52	17.28	18.50	21.19	22.49	23.47	22.58	21.21	19.35	17.54	15.24	14.48
23	09.32	08.00	06.25	05.40	04.06	03.20	04.18	05.48	07.15	08.39	09.13	10.12
	15.55	17.31	18.53	21.22	22.52	23.47	22.56	21.18	19.32	17.51	15.21	14.48
24	09.29	07.56	06.22	05.36	04.04	03.20	04.21	05.51	07.17	08.42	09.16	10.12
	15.58	17.34	18.55	21.25	22.55	23.47	22.53	21.14	19.28	17.48	15.19	14.49
25	09.27	07.53	06.19	05.33	04.01	03.21	04.23	05.54	07.20	07.45	09.19	10.12
	16.01	17.37	18.58	21.28	22.57	23.46	22.50	21.11	19.25	16.45	15.17	14.50
26	09.24	07.50	06.15	05.30	03.58	03.21	04.26	05.57	07.23	07.48	09.22	10.12
	16.04	17.40	19.01	21.31	23.00	23.46	22.47	21.08	19.22	16.41	15.14	14.51
27	09.21	07.47	06.12	05.26	03.56	03.22	04.29	06.00	07.26	07.51	09.25	10.12
	16.07	17.43	19.04	21.34	23.03	23.45	22.44	21.04	19.18	16.38	15.12	14.52
28	09.19	07.43	06.08	05.23	03.53	03.23	04.32	06.03	07.28	07.54	09.27	10.12
	16.11	17.46	19.07	21.37	23.06	23.45	22.41	21.01	19.15	16.35	15.10	14.53
29	09.16		07.05	05.20	03.51	03.24	04.35	06.06	07.31	07.57	09.30	10.12
	16.14		20.10	21.40	23.08	23.44	22.38	20.57	19.11	16.32	15.08	14.54
30	09.13		07.01	05.17	03.48	03.26	04.38	06.08	07.34	08.00	09.33	10.12
	16.17		20.12	21.43	23.11	23.43	22.35	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.11
	16.20		20.15		23.14		22.32	20.51		16.26		14.57
Potential sun hours	181	242	363	447	560	606	595	503	392	307	206	150
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Miikka Saranpää / miikka.saranpaa@fcg.fi
Calculated:
14.7.2023 9.20/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No ForestShadow receptor: I - I Lomarakennus (Ehrsbackavägen 29)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	547	428	409	541	812	1 087	1 287	891	718	583	592	8 612

Idle start wind speed: Cut in wind speed from power curve

	January	February	March		April		May	June	July	August	September		October	November	December
1	10.10	09.07	07.40		06.55		07.53 (10)	05.14	03.44	03.27	04.44	06.14		07.37	08.06	09.35
	15.00	16.23	17.49		20.18	29	08.22 (10)	21.46	23.16	23.42	22.29	20.47		19.04	16.23	15.04
2	10.09	09.05	07.37		06.51		07.54 (10)	05.10	03.42	03.29	04.47	06.17	08.03 (10)	07.39	08.09	09.38
	15.01	16.26	17.52		20.21	28	08.22 (10)	21.49	23.18	23.41	22.26	20.44	2 08.05 (10)	19.01	16.20	15.03
3	10.08	09.02	07.33		06.48		07.54 (10)	05.07	03.40	03.30	04.50	06.20	07.57 (10)	07.42	08.12	09.40
	15.03	16.30	17.55		20.24	28	08.22 (10)	21.52	23.21	23.39	22.23	20.40	13 08.10 (10)	18.58	16.17	15.01
4	10.07	08.59	07.30		06.44		07.54 (10)	05.04	03.38	03.32	04.53	06.22	07.54 (10)	07.45	08.15	09.43
	15.05	16.33	17.58		20.27	26	08.20 (10)	21.55	23.23	23.38	22.20	20.37	18 08.12 (10)	18.54	16.13	14.59
5	10.06	08.56	07.27		06.41		07.54 (10)	05.01	03.36	03.34	04.56	06.25	07.53 (10)	07.48	08.18	09.45
	15.07	16.36	18.01		20.30	26	08.20 (10)	21.58	23.25	23.36	22.17	20.34	20 08.13 (10)	18.51	16.10	14.58
6	10.05	08.53	07.23		06.37		07.55 (10)	04.57	03.34	03.36	04.59	06.28	07.51 (10)	07.51	08.22	09.47
	15.09	16.39	18.04		20.32	24	08.19 (10)	22.01	23.27	23.35	22.13	20.30	23 08.14 (10)	18.48	16.07	14.56
7	10.04	08.50	07.20		06.34		07.56 (10)	04.54	03.32	03.38	05.02	06.31	07.50 (10)	07.53	08.25	09.50
	15.12	16.42	18.07		20.35	20	08.16 (10)	22.04	23.29	23.33	22.10	20.27	25 08.15 (10)	18.44	16.04	14.55
8	10.02	08.47	07.16		06.31		07.57 (10)	04.51	03.31	03.40	05.05	06.34	07.49 (10)	07.56	08.28	09.52
	15.14	16.45	18.10		20.38	18	08.15 (10)	22.07	23.31	23.31	22.07	20.23	27 08.16 (10)	18.41	16.02	14.54
9	10.01	08.44	07.13		06.27		07.59 (10)	04.48	03.29	03.42	05.08	06.36	07.47 (10)	07.59	08.31	09.54
	15.16	16.48	18.13		20.41	13	08.12 (10)	22.10	23.33	23.29	22.04	20.20	28 08.15 (10)	18.37	15.59	14.53
10	09.59	08.41	07.10		06.24		08.04 (10)	04.45	03.28	03.44	05.11	06.39	07.47 (10)	08.02	08.34	09.56
	15.19	16.51	18.16		20.44	1	08.05 (10)	22.13	23.35	23.27	22.01	20.16	28 08.15 (10)	18.34	15.56	14.51
11	09.57	08.38	07.06		06.20			04.42	03.26	03.46	05.14	06.42	07.47 (10)	08.05	08.37	09.58
	15.21	16.55	18.18		20.47			22.16	23.37	23.25	21.57	20.13	29 08.16 (10)	18.31	15.53	14.51
12	09.56	08.35	07.03		06.17			04.39	03.25	03.49	05.17	06.45	07.46 (10)	08.07	08.40	09.59
	15.24	16.58	18.21		20.50			22.19	23.38	23.23	21.54	20.10	29 08.15 (10)	18.27	15.50	14.50
13	09.54	08.32	07.00		06.14			04.36	03.24	03.51	05.20	06.47	07.46 (10)	08.10	08.43	10.01
	15.27	17.01	18.24		20.53			22.22	23.40	23.21	21.51	20.06	28 08.14 (10)	18.24	15.47	14.49
14	09.52	08.28	06.56		06.10			04.33	03.23	03.54	05.23	06.50	07.46 (10)	08.13	08.46	10.03
	15.29	17.04	18.27		20.55			22.25	23.41	23.19	21.48	20.03	28 08.14 (10)	18.21	15.44	14.48
15	09.50	08.25	06.53		06.07			04.30	03.22	03.56	05.25	06.53	07.46 (10)	08.16	08.49	10.04
	15.32	17.07	18.30		20.58			22.28	23.42	23.16	21.44	19.59	26 08.12 (10)	18.17	15.42	14.48
16	09.48	08.22	06.49		06.03			04.27	03.21	03.59	05.28	06.55	07.46 (10)	08.19	08.52	10.05
	15.35	17.10	18.33		21.01			22.31	23.43	23.14	21.41	19.56	26 08.12 (10)	18.14	15.39	14.48
17	09.46	08.19	06.46		06.00			04.24	03.21	04.01	05.31	06.58	07.47 (10)	08.22	08.55	10.07
	15.38	17.13	18.36		21.04			22.34	23.44	23.11	21.38	19.52	24 08.11 (10)	18.11	15.36	14.47
18	09.43	08.16	06.43		05.57			04.21	03.20	04.04	05.34	07.01	07.48 (10)	08.25	08.58	10.08
	15.40	17.16	18.38		21.07			22.37	23.45	23.09	21.34	19.49	20 08.08 (10)	18.07	15.34	14.47
19	09.41	08.13	06.39		05.53			04.18	03.20	04.07	05.37	07.04	07.49 (10)	08.28	09.01	10.09
	15.43	17.19	18.41		21.10			22.40	23.45	23.06	21.31	19.46	17 08.06 (10)	18.04	15.31	14.47
20	09.39	08.09	06.36		05.50			04.15	03.20	04.10	05.40	07.06	07.52 (10)	08.30	09.04	10.10
	15.46	17.22	18.44		21.13			22.43	23.46	23.04	21.28	19.42	12 08.04 (10)	18.01	15.29	14.47
21	09.36	08.06	06.32		05.47			04.12	03.20	04.12	05.43	07.09		08.33	09.07	10.10
	15.49	17.25	18.47		21.16			22.46	23.46	23.01	21.24	19.39		17.58	15.26	14.48
22	09.34	08.03	06.29		05.43			04.09	03.20	04.15	05.46	07.12		08.36	09.10	10.11
	15.52	17.28	18.50		21.19			22.49	23.46	22.58	21.21	19.35		17.54	15.24	14.48
23	09.32	08.00	06.25	07.06 (10)	05.40			04.07	03.20	04.18	05.49	07.15		08.39	09.13	10.11
	15.55	17.31	18.53	10 07.16 (10)	21.22			22.52	23.46	22.55	21.18	19.32		17.51	15.21	14.49
24	09.29	07.56	06.22	07.03 (10)	05.37			04.04	03.21	04.21	05.51	07.17		08.42	09.16	10.12
	15.58	17.34	18.55	16 07.19 (10)	21.25			22.54	23.46	22.53	21.14	19.28		17.48	15.19	14.49
25	09.26	07.53	06.19	07.00 (10)	05.33			04.01	03.21	04.24	05.54	07.20		07.45	09.19	10.12
	16.01	17.37	18.58	20 07.20 (10)	21.28			22.57	23.46	22.50	21.11	19.25		16.45	15.17	14.50
26	09.24	07.50	06.15	06.59 (10)	05.30			03.59	03.22	04.27	05.57	07.23		07.48	09.22	10.12
	16.05	17.40	19.01	23 07.22 (10)	21.31			23.00	23.46	22.47	21.08	19.22		16.42	15.15	14.51
27	09.21	07.46	06.12	06.57 (10)	05.27			03.56	03.23	04.29	06.00	07.26		07.51	09.24	10.12
	16.08	17.43	19.04	25 07.22 (10)	21.34			23.03	23.45	22.44	21.04	19.18		16.38	15.12	14.52
28	09.19	07.43	06.08	06.56 (10)	05.23			03.54	03.24	04.32	06.03	07.28		07.54	09.27	10.12
	16.11	17.46	19.07	27 07.23 (10)	21.37			23.05	23.44	22.41	21.01	19.15		16.35	15.10	14.53
29	09.16		07.05	07.56 (10)	05.20			03.51	03.25	04.35	06.06	07.31		07.57	09.30	10.12
	16.14		20.10	27 08.23 (10)	21.40			23.08	23.44	22.38	20.57	19.11		16.32	15.08	14.55
30	09.13		07.01	07.55 (10)	05.17			03.49	03.26	04.38	06.08	07.34		08.00	09.33	10.11
	16.17		20.12	28 08.23 (10)	21.43			23.11	23.43	22.35	20.54	19.08		16.29	15.06	14.56
31	09.10		06.58	07.54 (10)				03.46		04.41	06.11			08.03		10.11
	16.20		20.15	29 08.23 (10)				23.13		22.32	20.51			16.26		14.57
Potential sun hours	182	242	363		447		559	606	595	502	392		308	206	151	
Total, worst case				205		213						423				
Sun reduction				0,32		0,41						0,33				
Oper. time red.				0,98		0,98						0,98				
Wind dir. red.				0,58		0,58						0,58				
Total reduction				0,19		0,24						0,19				
Total, real				38		50						80				

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)		First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Licensed user:
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Miikka Saranpää / miikka.saranpaa@fcg.fi
Calculated:
14.7.2023 9.20/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No ForestShadow receptor: J - J Asuinrakennus (Kleidersvägen 118)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	547	428	409	541	812	1 087	1 287	891	718	583	592	8 612

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.07	07.40	06.55	05.14	03.44	05.20 (10)	03.27	05.28 (10)	04.44	06.14	07.37	08.06	09.35
	15.00	16.23	17.49	20.18	21.46	23.16	26 05.46 (10)	23.42	20 05.48 (10)	22.29	20.47	19.04	16.23	15.05
2	10.09	09.05	07.37	06.51	05.10	03.42	05.20 (10)	03.29	05.28 (10)	04.47	06.17	07.39	08.09	09.38
	15.01	16.26	17.52	20.21	21.49	23.18	25 05.45 (10)	23.40	21 05.49 (10)	22.26	20.44	19.01	16.20	15.03
3	10.08	09.02	07.33	06.48	05.07	03.40	05.21 (10)	03.30	05.28 (10)	04.50	06.20	07.42	08.12	09.40
	15.03	16.30	17.55	20.24	21.52	23.20	24 05.45 (10)	23.39	21 05.49 (10)	22.23	20.40	18.58	16.17	15.01
4	10.07	08.59	07.30	06.44	05.04	03.38	05.21 (10)	03.32	05.29 (10)	04.53	06.22	07.45	08.15	09.43
	15.05	16.33	17.58	20.27	21.55	23.23	24 05.45 (10)	23.38	21 05.50 (10)	22.20	20.37	18.54	16.14	14.59
5	10.06	08.56	07.27	06.41	05.01	03.36	05.21 (10)	03.34	05.28 (10)	04.56	06.25	07.48	08.18	09.45
	15.07	16.36	18.01	20.30	21.58	23.25	24 05.45 (10)	23.36	22 05.50 (10)	22.17	20.34	18.51	16.11	14.58
6	10.05	08.53	07.23	06.38	04.57	03.34	05.22 (10)	03.36	05.29 (10)	04.59	06.28	07.50	08.21	09.47
	15.10	16.39	18.04	20.32	22.01	23.27	23 05.45 (10)	23.35	22 05.51 (10)	22.13	20.30	18.48	16.08	14.56
7	10.03	08.50	07.20	06.34	04.54	03.32	05.22 (10)	03.38	05.28 (10)	05.02	06.31	07.53	08.25	09.50
	15.12	16.42	18.07	20.35	22.04	23.29	23 05.45 (10)	23.33	23 05.51 (10)	22.10	20.27	18.44	16.05	14.55
8	10.02	08.47	07.16	06.31	04.51	03.31	05.23 (10)	03.40	05.28 (10)	05.05	06.34	07.56	08.28	09.52
	15.14	16.45	18.10	20.38	22.07	23.31	22 05.45 (10)	23.31	24 05.52 (10)	22.07	20.23	18.41	16.02	14.54
9	10.00	08.44	07.13	06.27	04.48	03.29	05.23 (10)	03.42	05.28 (10)	05.08	06.36	07.59	08.31	09.54
	15.16	16.48	18.13	20.41	22.10	23.33	22 05.45 (10)	23.29	24 05.52 (10)	22.04	20.20	18.37	15.59	14.53
10	09.59	08.41	07.10	06.24	04.45	03.28	05.24 (10)	03.44	05.28 (10)	05.11	06.39	08.02	08.34	09.56
	15.19	16.52	18.16	20.44	22.13	23.35	20 05.44 (10)	23.27	25 05.53 (10)	22.01	20.16	18.34	15.56	14.52
11	09.57	08.38	07.06	06.20	04.42	03.26	05.24 (10)	03.47	05.28 (10)	05.14	06.42	08.05	08.37	09.58
	15.21	16.55	18.18	20.47	22.16	23.36	20 05.44 (10)	23.25	25 05.53 (10)	21.57	20.13	18.31	15.53	14.51
12	09.55	08.35	07.03	06.17	04.39	05.29 (10)	03.25	05.25 (10)	03.49	05.27 (10)	05.17	06.45	08.07	08.40	09.59
	15.24	16.58	18.21	20.50	22.19	5 05.34 (10)	23.38	20 05.45 (10)	23.23	26 05.53 (10)	21.54	20.10	18.27	15.50	14.50
13	09.54	08.32	07.00	06.14	04.36	05.26 (10)	03.24	05.25 (10)	03.51	05.28 (10)	05.20	06.47	08.10	08.43	10.01
	15.27	17.01	18.24	20.53	22.22	11 05.37 (10)	23.39	19 05.44 (10)	23.21	25 05.53 (10)	21.51	20.06	18.24	15.47	14.49
14	09.52	08.28	06.56	06.10	04.33	05.24 (10)	03.23	05.26 (10)	03.54	05.28 (10)	05.23	06.50	08.13	08.46	10.03
	15.29	17.04	18.27	20.55	22.25	15 05.39 (10)	23.41	19 05.45 (10)	23.18	26 05.54 (10)	21.48	20.03	18.21	15.45	14.48
15	09.50	08.25	06.53	06.07	04.30	05.22 (10)	03.22	05.26 (10)	03.56	05.28 (10)	05.26	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	18 05.40 (10)	23.42	18 05.44 (10)	23.16	26 05.54 (10)	21.44	19.59	18.17	15.42	14.48
16	09.48	08.22	06.49	06.03	04.27	05.22 (10)	03.22	05.26 (10)	03.59	05.28 (10)	05.28	06.55	08.19	08.52	10.05
	15.35	17.10	18.33	21.01	22.31	19 05.41 (10)	23.43	18 05.44 (10)	23.14	26 05.54 (10)	21.41	19.56	18.14	15.39	14.48
17	09.45	08.19	06.46	06.00	04.24	05.20 (10)	03.21	05.27 (10)	04.02	05.28 (10)	05.31	06.58	08.22	08.55	10.07
	15.38	17.13	18.36	21.04	22.34	21 05.41 (10)	23.44	18 05.45 (10)	23.11	26 05.54 (10)	21.38	19.52	18.11	15.36	14.47
18	09.43	08.16	06.43	05.57	04.21	05.20 (10)	03.20	05.26 (10)	04.04	05.28 (10)	05.34	07.01	08.25	08.58	10.08
	15.41	17.16	18.38	21.07	22.37	22 05.42 (10)	23.44	18 05.44 (10)	23.09	26 05.54 (10)	21.34	19.49	18.07	15.34	14.47
19	09.41	08.13	06.39	05.53	04.18	05.20 (10)	03.20	05.27 (10)	04.07	05.28 (10)	05.37	07.04	08.28	09.01	10.09
	15.43	17.19	18.41	21.10	22.40	23 05.43 (10)	23.45	17 05.44 (10)	23.06	26 05.54 (10)	21.31	19.46	18.04	15.31	14.47
20	09.39	08.09	06.36	05.50	04.15	05.19 (10)	03.20	05.27 (10)	04.10	05.29 (10)	05.40	07.06	08.30	09.04	10.10
	15.46	17.22	18.44	21.13	22.43	24 05.43 (10)	23.46	17 05.44 (10)	23.03	26 05.55 (10)	21.28	19.42	18.01	15.29	14.48
21	09.36	08.06	06.32	05.47	04.12	05.19 (10)	03.20	05.28 (10)	04.12	05.29 (10)	05.43	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.16	22.46	25 05.44 (10)	23.46	17 05.45 (10)	23.01	25 05.54 (10)	21.24	19.39	17.58	15.26	14.48
22	09.34	08.03	06.29	05.43	04.09	05.19 (10)	03.20	05.28 (10)	04.15	05.29 (10)	05.46	07.12	08.36	09.10	10.11
	15.52	17.28	18.50	21.19	22.49	25 05.44 (10)	23.46	17 05.45 (10)	22.58	25 05.54 (10)	21.21	19.35	17.54	15.24	14.48
23	09.31	08.00	06.25	05.40	04.07	05.19 (10)	03.20	05.28 (10)	04.18	05.29 (10)	05.49	07.15	08.39	09.13	10.11
	15.55	17.31	18.53	21.22	22.51	26 05.45 (10)	23.46	17 05.45 (10)	22.55	24 05.53 (10)	21.18	19.32	17.51	15.21	14.49
24	09.29	07.56	06.22	05.37	04.04	05.19 (10)	03.21	05.28 (10)	04.21	05.30 (10)	05.52	07.17	08.42	09.16	10.12
	15.58	17.34	18.55	21.25	22.54	26 05.45 (10)	23.46	18 05.46 (10)	22.52	24 05.54 (10)	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.19	05.33	04.01	05.19 (10)	03.21	05.28 (10)	04.24	05.30 (10)	05.54	07.20	07.45	09.19	10.12
	16.02	17.37	18.58	21.28	22.57	26 05.45 (10)	23.46	18 05.46 (10)	22.50	23 05.53 (10)	21.11	19.25	16.45	15.17	14.50
26	09.24	07.50	06.15	05.30	03.59	05.19 (10)	03.22	05.29 (10)	04.27	05.30 (10)	05.57	07.23	07.48	09.22	10.12
	16.05	17.40	19.01	21.31	23.00	26 05.45 (10)	23.45	18 05.47 (10)	22.47	22 05.52 (10)	21.08	19.22	16.42	15.15	14.51
27	09.21	07.46	06.12	05.27	03.56	05.19 (10)	03.23	05.28 (10)	04.30	05.32 (10)	06.00	07.26	07.51	09.24	10.12
	16.08	17.43	19.04	21.34	23.03	26 05.45 (10)	23.45	18 05.46 (10)	22.44	20 05.52 (10)	21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.54	05.19 (10)	03.24	05.28 (10)	04.33	05.32 (10)	06.03	07.28	07.54	09.27	10.12
	16.11	17.46	19.07	21.37	23.05	26 05.45 (10)	23.44	19 05.47 (10)	22.41	19 05.51 (10)	21.01	19.15	16.35	15.10	14.53
29	09.16		07.05	05.20	03.51	05.19 (10)	03.25	05.28 (10)	04.35	05.34 (10)	06.06	07.31	07.57	09.30	10.12
	16.14		20.10	21.40	23.08	26 05.45 (10)	23.43	19 05.47 (10)	22.38	16 05.50 (10)	20.57	19.11	16.32	15.08	14.55
30	09.13		07.01	05.17	03.49	05.20 (10)	03.26	05.28 (10)	04.38	05.35 (10)	06.08	07.34	08.00	09.33	10.11
	16.17		20.12	21.43	23.11	25 05.45 (10)	23.43	20 05.48 (10)	22.35	13 05.48 (10)	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.47	05.20 (10)			04.41	05.38 (10)	06.11		08.03		10.11
	16.20		20.15		23.13	25 05.45 (10)			22.32	9 05.47 (10)	20.51		16.26		14.58
Potential sun hours	182	242	363	447	559	605		594		502	392	308	206	151	
Total, worst case					440	598		701							
Sun reduction					0,48	0,49		0,39							
Oper. time red.					0,98	0,98		0,98							
Wind dir. red.					0,62	0,62		0,62							
Total reduction					0,29	0,30		0,24							
Total, real					128	180		166							

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)		First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker	(WTG causing flicker last time)

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Calculated:
14.7.2023 9.20/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No Forest Shadow receptor: K - K Asuinrakennus (Rökiöntie 154)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	547	428	409	541	812	1 087	1 287	891	718	583	592	8 612

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.40	06.55	05.14	03.45	03.28	04.45	06.14	07.37	08.06	09.35
	15.00	16.24	17.49	20.18	21.46	23.15	23.41	22.29	20.47	19.05	16.23	15.05
2	10.09	09.04	07.36	06.51	05.11	03.43	03.29	04.48	06.17	07.39	08.09	09.37
	15.02	16.27	17.52	20.21	21.49	23.18	23.40	22.26	20.44	19.01	16.20	15.03
3	10.08	09.02	07.33	06.48	05.07	03.41	03.31	04.50	06.20	07.42	08.12	09.40
	15.04	16.30	17.55	20.24	21.52	23.20	23.39	22.23	20.40	18.58	16.17	15.01
4	10.07	08.59	07.30	06.44	05.04	03.39	03.33	04.53	06.23	07.45	08.15	09.42
	15.06	16.33	17.58	20.27	21.55	23.22	23.37	22.19	20.37	18.54	16.14	15.00
5	10.06	08.56	07.26	06.41	05.01	03.37	03.34	04.56	06.25	07.48	08.18	09.45
	15.08	16.36	18.01	20.29	21.58	23.24	23.36	22.16	20.33	18.51	16.11	14.58
6	10.04	08.53	07.23	06.38	04.58	03.35	03.36	04.59	06.28	07.50	08.21	09.47
	15.10	16.39	18.04	20.32	22.01	23.27	23.34	22.13	20.30	18.48	16.08	14.57
7	10.03	08.50	07.20	06.34	04.55	03.33	03.38	05.02	06.31	07.53	08.24	09.49
	15.12	16.42	18.07	20.35	22.04	23.29	23.32	22.10	20.27	18.44	16.05	14.55
8	10.02	08.47	07.16	06.31	04.51	03.31	03.40	05.05	06.34	07.56	08.27	09.51
	15.14	16.45	18.10	20.38	22.07	23.31	23.31	22.07	20.23	18.41	16.02	14.54
9	10.00	08.44	07.13	06.27	04.48	03.30	03.43	05.08	06.36	07.59	08.30	09.53
	15.17	16.49	18.13	20.41	22.10	23.32	23.29	22.04	20.20	18.38	15.59	14.53
10	09.59	08.41	07.10	06.24	04.45	03.28	03.45	05.11	06.39	08.02	08.34	09.55
	15.19	16.52	18.16	20.44	22.13	23.34	23.27	22.00	20.16	18.34	15.56	14.52
11	09.57	08.38	07.06	06.21	04.42	03.27	03.47	05.14	06.42	08.05	08.37	09.57
	15.22	16.55	18.18	20.47	22.16	23.36	23.25	21.57	20.13	18.31	15.53	14.51
12	09.55	08.35	07.03	06.17	04.39	03.26	03.49	05.17	06.45	08.07	08.40	09.59
	15.24	16.58	18.21	20.50	22.19	23.37	23.22	21.54	20.10	18.27	15.50	14.50
13	09.53	08.31	07.00	06.14	04.36	03.25	03.52	05.20	06.47	08.10	08.43	10.01
	15.27	17.01	18.24	20.52	22.22	23.39	23.20	21.51	20.06	18.24	15.48	14.50
14	09.51	08.28	06.56	06.10	04.33	03.24	03.54	05.23	06.50	08.13	08.46	10.02
	15.30	17.04	18.27	20.55	22.25	23.40	23.18	21.47	20.03	18.21	15.45	14.49
15	09.49	08.25	06.53	06.07	04.30	03.23	03.57	05.26	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	23.41	23.16	21.44	19.59	18.18	15.42	14.48
16	09.47	08.22	06.49	06.04	04.27	03.22	03.59	05.29	06.56	08.19	08.52	10.05
	15.35	17.10	18.33	21.01	22.31	23.42	23.13	21.41	19.56	18.14	15.39	14.48
17	09.45	08.19	06.46	06.00	04.24	03.22	04.02	05.32	06.58	08.22	08.55	10.06
	15.38	17.13	18.36	21.04	22.34	23.43	23.11	21.38	19.52	18.11	15.37	14.48
18	09.43	08.16	06.43	05.57	04.21	03.21	04.05	05.34	07.01	08.25	08.58	10.07
	15.41	17.16	18.38	21.07	22.37	23.44	23.08	21.34	19.49	18.08	15.34	14.48
19	09.41	08.12	06.39	05.54	04.18	03.21	04.07	05.37	07.04	08.27	09.01	10.08
	15.44	17.19	18.41	21.10	22.40	23.45	23.06	21.31	19.46	18.04	15.32	14.48
20	09.38	08.09	06.36	05.50	04.15	03.21	04.10	05.40	07.06	08.30	09.04	10.09
	15.47	17.22	18.44	21.13	22.42	23.45	23.03	21.28	19.42	18.01	15.29	14.48
21	09.36	08.06	06.32	05.47	04.13	03.21	04.13	05.43	07.09	08.33	09.07	10.10
	15.50	17.26	18.47	21.16	22.45	23.45	23.00	21.24	19.39	17.58	15.27	14.48
22	09.34	08.03	06.29	05.43	04.10	03.21	04.16	05.46	07.12	08.36	09.10	10.10
	15.53	17.29	18.50	21.19	22.48	23.46	22.58	21.21	19.35	17.55	15.24	14.49
23	09.31	08.00	06.25	05.40	04.07	03.21	04.18	05.49	07.15	08.39	09.13	10.11
	15.56	17.32	18.53	21.22	22.51	23.46	22.55	21.18	19.32	17.51	15.22	14.49
24	09.29	07.56	06.22	05.37	04.04	03.21	04.21	05.52	07.17	08.42	09.16	10.11
	15.59	17.35	18.55	21.25	22.54	23.46	22.52	21.14	19.28	17.48	15.19	14.50
25	09.26	07.53	06.19	05.33	04.02	03.22	04.24	05.55	07.20	07.45	09.18	10.12
	16.02	17.38	18.58	21.28	22.57	23.45	22.49	21.11	19.25	16.45	15.17	14.51
26	09.24	07.50	06.15	05.30	03.59	03.23	04.27	05.57	07.23	07.48	09.21	10.12
	16.05	17.41	19.01	21.31	23.00	23.45	22.46	21.07	19.22	16.42	15.15	14.52
27	09.21	07.46	06.12	05.27	03.57	03.23	04.30	06.00	07.26	07.51	09.24	10.12
	16.08	17.43	19.04	21.34	23.02	23.44	22.44	21.04	19.18	16.39	15.13	14.53
28	09.18	07.43	06.08	05.24	03.54	03.24	04.33	06.03	07.28	07.54	09.27	10.11
	16.11	17.46	19.07	21.37	23.05	23.44	22.41	21.01	19.15	16.35	15.11	14.54
29	09.16		07.05	05.20	03.52	03.25	04.36	06.06	07.31	07.57	09.30	10.11
	16.14		20.10	21.40	23.08	23.43	22.38	20.57	19.11	16.32	15.09	14.55
30	09.13		07.02	05.17	03.49	03.27	04.39	06.09	07.34	08.00	09.32	10.11
	16.17		20.12	21.43	23.10	23.42	22.35	20.54	19.08	16.29	15.07	14.57
31	09.10		06.58		03.47		04.42	06.11		08.03		10.10
	16.20		20.15		23.13		22.32	20.51		16.26		14.58
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.20/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No Fores Shadow receptor: L - L Asuinrakennus (Bjurbäcksvägen 231)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	547	428	409	541	812	1 087	1 287	891	718	583	592	8 612

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.40	06.55	05.14	03.45	04.44 (1)	03.28	04.44 (1)	04.45	06.14	07.36	08.06	09.35
	15.00	16.23	17.49	20.18	21.45	23.15 12	04.56 (1)	23.41 23	05.07 (1)	22.28	20.47	19.04	16.23	15.05
2	10.08	09.04	07.36	06.51	05.10	03.43	04.43 (1)	03.30	04.46 (1)	04.47	06.17	07.39	08.09	09.37
	15.02	16.27	17.52	20.21	21.48	23.17 14	04.57 (1)	23.39 22	05.08 (1)	22.25	20.44	19.01	16.20	15.03
3	10.07	09.01	07.33	06.48	05.07	03.41	04.43 (1)	03.31	04.46 (1)	04.50	06.20	07.42	08.12	09.40
	15.04	16.30	17.55	20.24	21.51	23.20 15	04.58 (1)	23.38 22	05.08 (1)	22.22	20.40	18.58	16.17	15.01
4	10.06	08.58	07.30	06.44	05.04	03.39	04.42 (1)	03.33	04.46 (1)	04.53	06.22	07.45	08.15	09.42
	15.06	16.33	17.58	20.26	21.54	23.22 18	05.00 (1)	23.37 21	05.07 (1)	22.19	20.37	18.54	16.14	15.00
5	10.05	08.55	07.26	06.41	05.01	03.37	04.41 (1)	03.35	04.46 (1)	04.56	06.25	07.48	08.18	09.44
	15.08	16.36	18.01	20.29	21.57	23.24 19	05.00 (1)	23.35 21	05.07 (1)	22.16	20.33	18.51	16.11	14.58
6	10.04	08.52	07.23	06.38	04.58	03.35	04.41 (1)	03.36	04.48 (1)	04.59	06.28	07.50	08.21	09.47
	15.10	16.39	18.04	20.32	22.00	23.26 19	05.00 (1)	23.34 19	05.07 (1)	22.13	20.30	18.47	16.08	14.57
7	10.03	08.50	07.20	06.34	04.54	03.33	04.41 (1)	03.38	04.48 (1)	05.02	06.31	07.53	08.24	09.49
	15.12	16.42	18.07	20.35	22.03	23.28 20	05.01 (1)	23.32 18	05.06 (1)	22.10	20.26	18.44	16.05	14.55
8	10.01	08.47	07.16	06.31	04.51	03.31	04.41 (1)	03.40	04.49 (1)	05.05	06.34	07.56	08.27	09.51
	15.14	16.45	18.10	20.38	22.06	23.30 21	05.02 (1)	23.30 17	05.06 (1)	22.07	20.23	18.41	16.02	14.54
9	10.00	08.44	07.13	06.27	04.48	03.30	04.41 (1)	03.43	04.49 (1)	05.08	06.36	07.59	08.30	09.53
	15.17	16.49	18.13	20.41	22.09	23.32 21	05.02 (1)	23.28 16	05.05 (1)	22.03	20.20	18.37	15.59	14.53
10	09.58	08.40	07.10	06.24	04.45	03.28	04.40 (1)	03.45	04.50 (1)	05.11	06.39	08.02	08.33	09.55
	15.19	16.52	18.15	20.44	22.12	23.34 22	05.02 (1)	23.26 15	05.05 (1)	22.00	20.16	18.34	15.56	14.52
11	09.57	08.37	07.06	06.20	04.42	03.27	04.41 (1)	03.47	04.52 (1)	05.14	06.42	08.04	08.36	09.57
	15.22	16.55	18.18	20.46	22.15	23.35 22	05.03 (1)	23.24 13	05.05 (1)	21.57	20.13	18.31	15.53	14.51
12	09.55	08.34	07.03	06.17	04.39	03.26	04.41 (1)	03.49	04.53 (1)	05.17	06.44	08.07	08.39	09.59
	15.24	16.58	18.21	20.49	22.18	23.37 23	05.04 (1)	23.22 11	05.04 (1)	21.54	20.09	18.27	15.50	14.50
13	09.53	08.31	06.59	06.14	04.36	03.25	04.40 (1)	03.52	04.55 (1)	05.20	06.47	08.10	08.42	10.00
	15.27	17.01	18.24	20.52	22.21	23.38 23	05.03 (1)	23.20 7	05.02 (1)	21.50	20.06	18.24	15.47	14.50
14	09.51	08.28	06.56	06.10	04.33	03.24	04.41 (1)	03.54		05.23	06.50	08.13	08.46	10.02
	15.30	17.04	18.27	20.55	22.24	23.40 23	05.04 (1)	23.18		21.47	20.03	18.21	15.45	14.49
15	09.49	08.25	06.53	06.07	04.30	03.23	04.41 (1)	03.57		05.26	06.53	08.16	08.49	10.03
	15.32	17.07	18.30	20.58	22.27	23.41 23	05.04 (1)	23.15		21.44	19.59	18.17	15.42	14.48
16	09.47	08.22	06.49	06.04	04.27	03.22	04.41 (1)	03.59		05.29	06.55	08.19	08.52	10.05
	15.35	17.10	18.33	21.01	22.30	23.42 24	05.05 (1)	23.13		21.41	19.56	18.14	15.39	14.48
17	09.45	08.19	06.46	06.00	04.24	03.22	04.41 (1)	04.02		05.31	06.58	08.21	08.55	10.06
	15.38	17.13	18.35	21.04	22.33	23.43 24	05.05 (1)	23.11		21.37	19.52	18.11	15.37	14.48
18	09.43	08.15	06.42	05.57	04.21	03.21	04.42 (1)	04.05		05.34	07.01	08.24	08.58	10.07
	15.41	17.16	18.38	21.07	22.36	23.44 24	05.06 (1)	23.08		21.34	19.49	18.07	15.34	14.48
19	09.40	08.12	06.39	05.53	04.18	03.21	04.42 (1)	04.07		05.37	07.04	08.27	09.01	10.08
	15.44	17.19	18.41	21.10	22.39	23.44 24	05.06 (1)	23.05		21.31	19.45	18.04	15.31	14.48
20	09.38	08.09	06.36	05.50	04.15	03.21	04.42 (1)	04.10		05.40	07.06	08.30	09.04	10.09
	15.47	17.22	18.44	21.13	22.42	23.45 24	05.06 (1)	23.03		21.27	19.42	18.01	15.29	14.48
21	09.36	08.06	06.32	05.47	04.13	03.21	04.42 (1)	04.13		05.43	07.09	08.33	09.07	10.10
	15.50	17.25	18.47	21.16	22.45	23.45 24	05.06 (1)	23.00		21.24	19.39	17.58	15.27	14.48
22	09.33	08.03	06.29	05.43	04.10	03.21	04.42 (1)	04.16		05.46	07.12	08.36	09.10	10.10
	15.53	17.28	18.50	21.18	22.48	23.45 24	05.06 (1)	22.57		21.21	19.35	17.54	15.24	14.49
23	09.31	07.59	06.25	05.40	04.07	03.21	04.43 (1)	04.18		05.49	07.14	08.39	09.12	10.11
	15.56	17.31	18.52	21.21	22.51	23.45 24	05.07 (1)	22.55		21.17	19.32	17.51	15.22	14.49
24	09.28	07.56	06.22	05.37	04.04	03.21	04.43 (1)	04.21		05.52	07.17	08.42	09.15	10.11
	15.59	17.34	18.55	21.24	22.54	23.45 24	05.07 (1)	22.52		21.14	19.28	17.48	15.19	14.50
25	09.26	07.53	06.19	05.33	04.02	03.22	04.43 (1)	04.24		05.54	07.20	07.45	09.18	10.11
	16.02	17.37	18.58	21.27	22.56	23.45 24	05.07 (1)	22.49		21.11	19.25	16.45	15.17	14.51
26	09.23	07.50	06.15	05.30	03.59	03.23	04.43 (1)	04.27		05.57	07.23	07.48	09.21	10.11
	16.05	17.40	19.01	21.30	22.59	23.45 24	05.07 (1)	22.46		21.07	19.21	16.42	15.15	14.52
27	09.21	07.46	06.12	05.27	03.57	03.23	04.44 (1)	04.30		06.00	07.25	07.51	09.24	10.11
	16.08	17.43	19.04	21.33	23.02	23.44 23	05.07 (1)	22.43		21.04	19.18	16.38	15.13	14.53
28	09.18	07.43	06.08	05.24	03.54	03.24	04.44 (1)	04.33		06.03	07.28	07.54	09.27	10.11
	16.11	17.46	19.07	21.36	23.05	23.43 24	05.08 (1)	22.40		21.01	19.15	16.35	15.11	14.54
29	09.15		07.05	05.20	03.52	03.26	04.44 (1)	04.36		06.06	07.31	07.57	09.29	10.11
	16.14		20.09	21.39	23.07	23.43 23	05.07 (1)	22.37		20.57	19.11	16.32	15.09	14.55
30	09.13		07.01	05.17	03.49 04.48 (1)	03.27	04.44 (1)	04.39		06.09	07.34	08.00	09.32	10.10
	16.17		20.12	21.42	23.10 4 04.52 (1)	23.42 23	05.07 (1)	22.34		20.54	19.08	16.29	15.07	14.57
31	09.10		06.58		03.47 04.45 (1)			04.42		06.11		08.03		10.10
	16.20		20.15		23.12 9 04.54 (1)			22.31		20.50		16.26		14.58
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case					13	652	225					
Sun reduction					0,48	0,49	0,39					
Oper. time red.					0,98	0,98	0,98					
Wind dir. red.					0,63	0,63	0,63					
Total reduction					0,29	0,30	0,24					
Total, real					4	198	54					

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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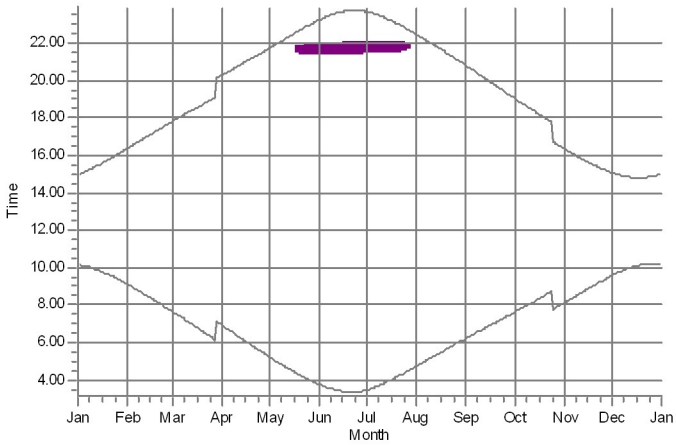
14.7.2023 9.20/3.5.584

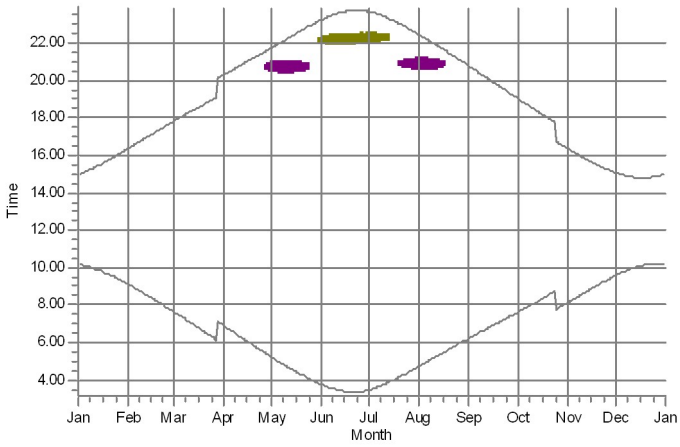
SHADOW - Calendar, graphical

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No Forest

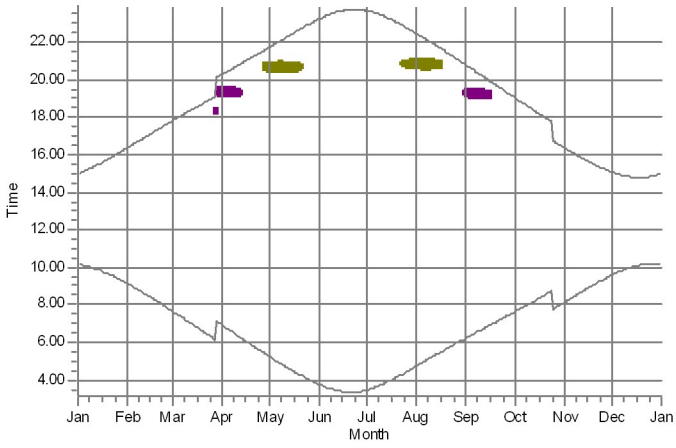
A: A Lomarakennus (Söderändan 49)



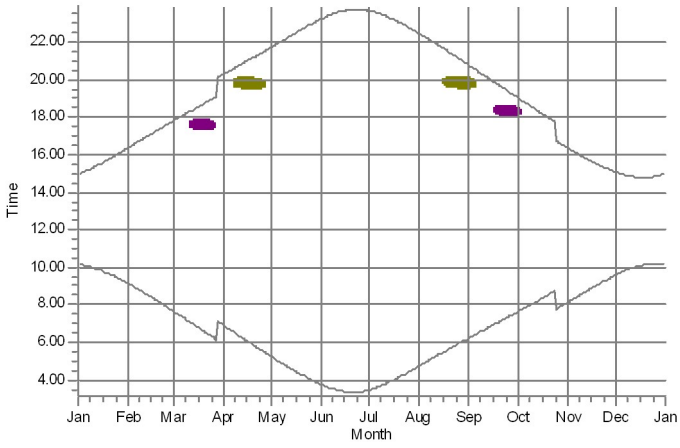
B: B Asuinrakennus (Söderändan 81)



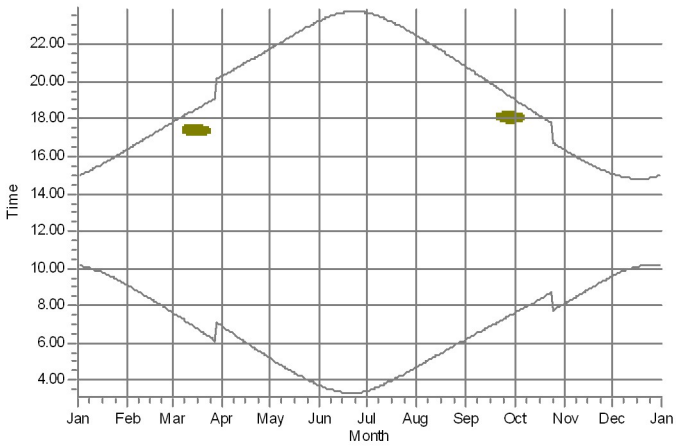
C: C Lomarakennus (Säderändan 166)



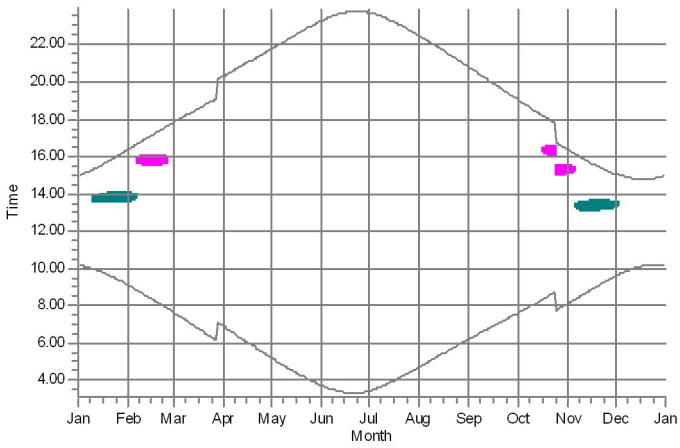
D: D Lomarakennus (Söderändan 188)



E: E Asuinrakennus (Rökiöntie 930)



F: F Asuinrakennus (Kukkusintie 474)



WTGs

13: Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8822)
14: Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8818)
18: Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8827)
19: Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8830)

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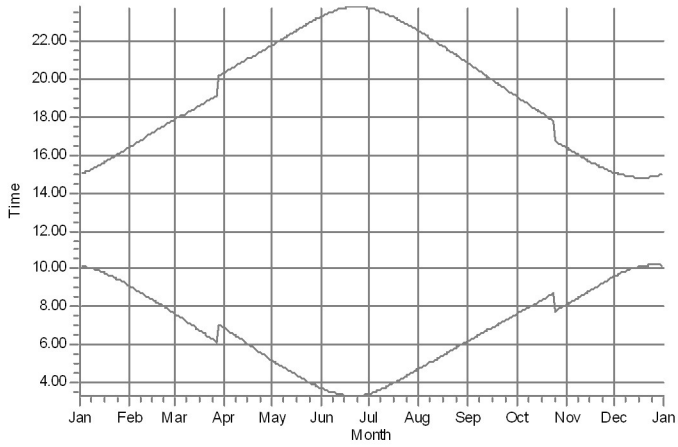
14.7.2023 9.20/3.5.584

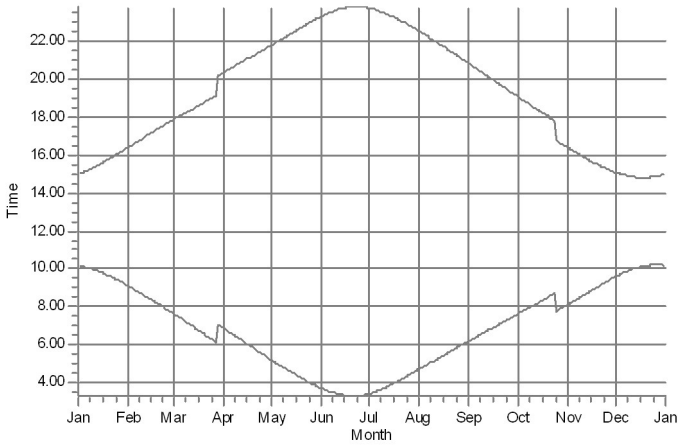
SHADOW - Calendar, graphical

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No Forest

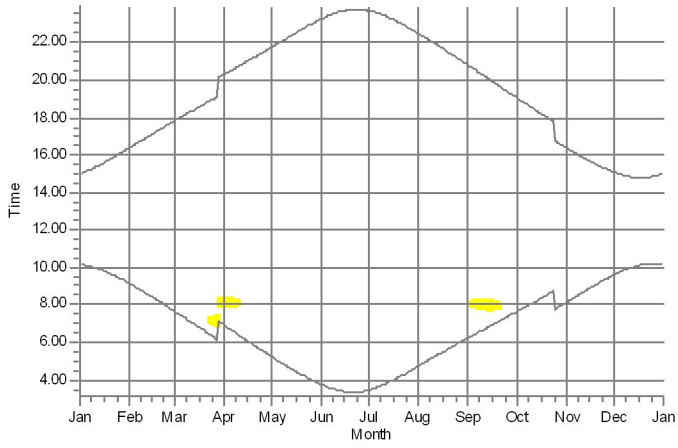
G: G Asuinrakennus (Kovik byväg 53)



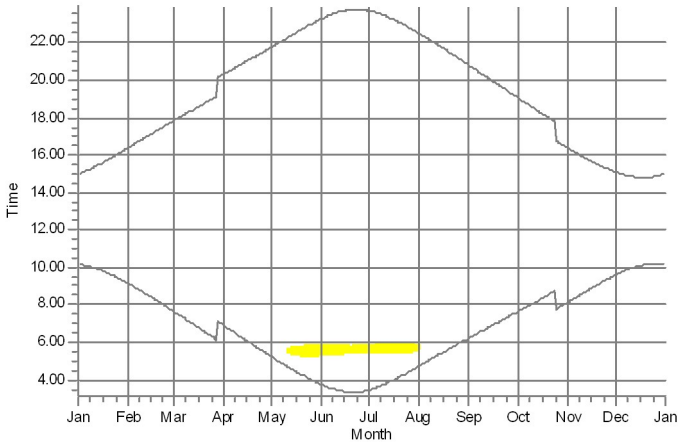
H: H Asuinrakennus (Vöyrintie 1021)



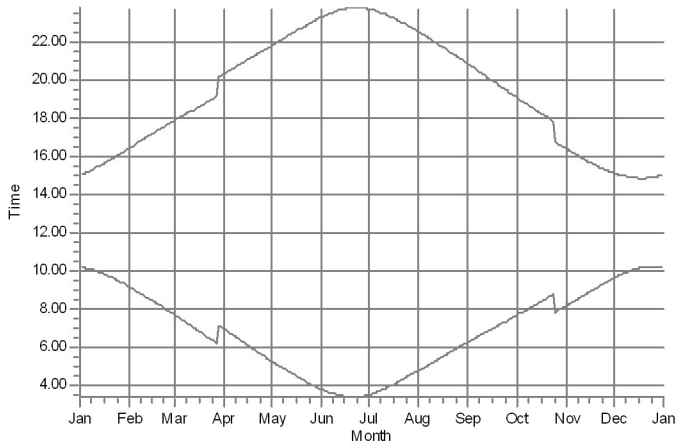
I: I Lomarakennus (Ehrsbackavägen 29)



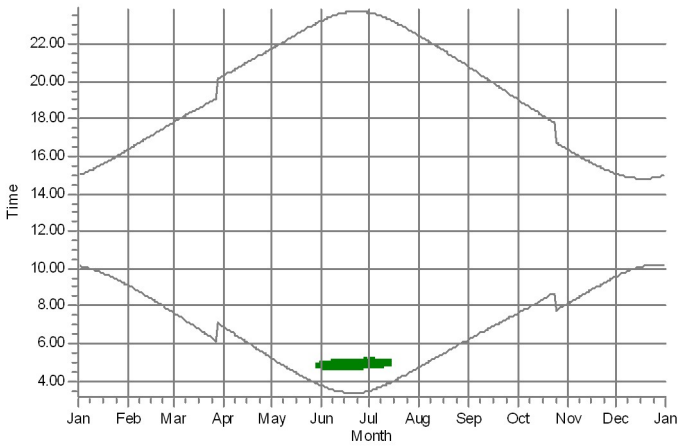
J: J Asuinrakennus (Kleidersvägen 118)



K: K Asuinrakennus (Rökiöntie 154)



L: L Asuinrakennus (Bjurbäcksvägen 231)



WTGs

1: Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8836)

10: Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8824)

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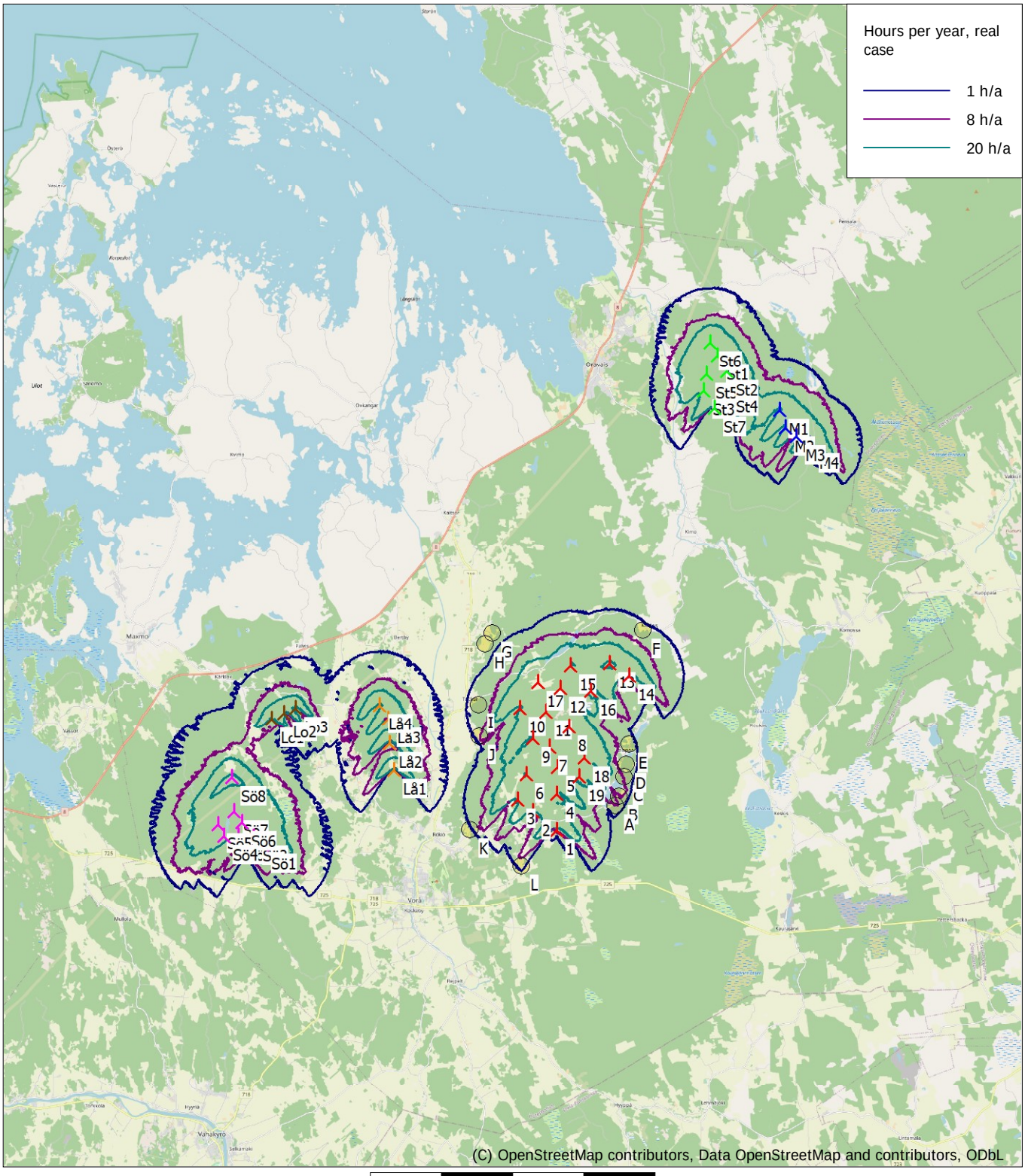
SHADOW - Map

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No Forest



0 2,5 5 7,5 10km

Map: EMD OpenStreetMap , Print scale 1:200 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 264 510 North: 7 019 520

New WTG Shadow receptor

Flicker map level: Height Contours: CONTOURLINE_Lasor tuulivoimahanke 2022_0.wpo (3)

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

Liite 14. Yhteisvaikutus varjostusmallinnuksen tulokset ”Real Case, Luke forest” - VE1

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SHADOW - Main Result

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke Forest

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) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational hours are calculated from WTGs in calculation and wind distribution:
MERRA-2_N63,00_E022,50 (41)

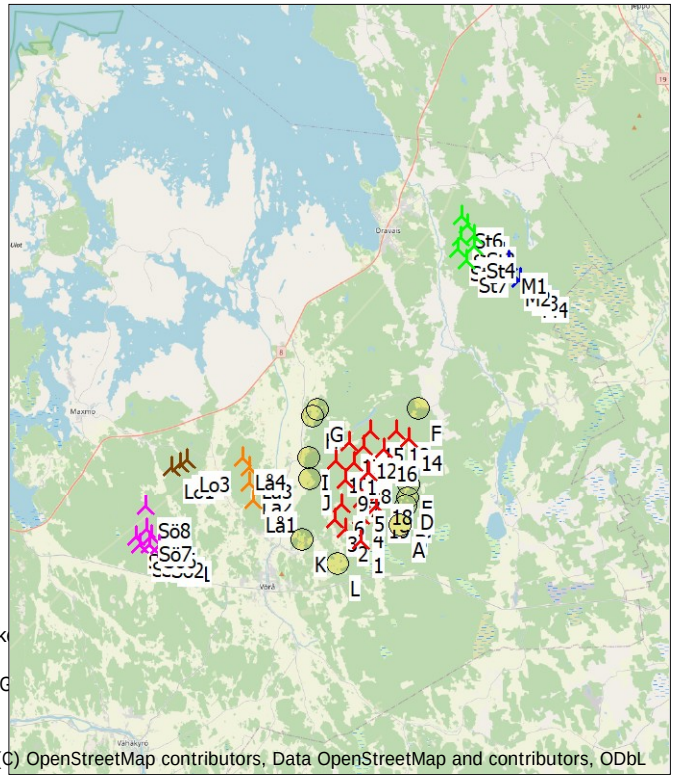
Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	547	428	409	541	812	1 087	1 287	891	718	583	592	8 612

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: Height Contours: CONTOURLINE_Lasor tuulivoimahank
Area object(s) used in calculation:
Area object (Heights a.g.l. for e.g. Forest (ORA tool) or ZVI obstructions): REC
Obstacles used in calculation
Receptor grid resolution: 1,0 m

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89



Scale 1:400 000
New WTG
Shadow receptor

WTGs

	East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
			[m]					[kW]	[m]	[m]	[m]	[RPM]
1	265 860	7 011 060	40,0	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
10	264 871	7 015 451	34,5	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
11	265 796	7 015 259	39,8	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
12	266 380	7 016 090	44,5	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
13	268 137	7 016 809	31,7	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
14	268 822	7 016 315	40,0	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
15	266 770	7 016 850	43,5	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
16	267 439	7 015 897	37,5	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
17	265 604	7 016 343	20,0	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
18	267 010	7 013 530	40,8	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
19	266 794	7 012 894	40,4	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
2	265 074	7 011 774	34,4	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
3	264 546	7 012 237	34,4	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
4	265 960	7 012 340	40,0	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
5	266 070	7 013 270	35,0	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
6	264 950	7 013 100	40,0	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
7	265 850	7 014 020	40,0	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
8	266 560	7 014 700	40,0	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
9	265 278	7 014 371	40,2	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
Lo1	256 101	7 015 724	26,7	PROKON P3000-116 3030 ...	Yes	PROKON	P3000-116-3 030	3 030	116,7	122,0	1 819	11,7
Lo2	256 554	7 015 922	32,5	PROKON P3000-116 3030 ...	Yes	PROKON	P3000-116-3 030	3 030	116,7	122,0	1 819	11,7
Lo3	256 967	7 016 054	29,3	PROKON P3000-116 3030 ...	Yes	PROKON	P3000-116-3 030	3 030	116,7	122,0	1 819	11,7
Lå1	260 282	7 013 598	20,0	VESTAS V150-4.2 4200 15...	Yes	VESTAS	V150-4.2-4 200	4 200	150,0	140,0	1 903	10,4
Lå2	260 183	7 014 579	27,2	VESTAS V150-4.2 4200 15...	Yes	VESTAS	V150-4.2-4 200	4 200	150,0	140,0	1 903	10,4
Lå3	260 216	7 015 423	20,0	VESTAS V150-4.2 4200 15...	Yes	VESTAS	V150-4.2-4 200	4 200	150,0	140,0	1 903	10,4
Lå4	259 928	7 015 932	27,5	VESTAS V150-4.2 4200 15...	Yes	VESTAS	V150-4.2-4 200	4 200	150,0	140,0	1 903	10,4
M1	274 763	7 025 285	32,5	NORDEX N163/5,7MW 570...	Yes	NORDEX	N163/5,7MW-5 700	5 700	163,0	158,0	1 806	10,7
M2	274 926	7 024 666	32,8	NORDEX N163/5,7MW 570...	Yes	NORDEX	N163/5,7MW-5 700	5 700	163,0	158,0	1 806	10,7
M3	275 298	7 024 342	35,0	NORDEX N163/5,7MW 570...	Yes	NORDEX	N163/5,7MW-5 700	5 700	163,0	158,0	1 806	10,7

To be continued on next page...

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Calculated:
14.7.2023 9.25/3.5.584

SHADOW - Main Result

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke Forest

...continued from previous page

	East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
			[m]					[kW]	[m]	[m]	[m]	[RPM]
M4	275 772	7 024 008	40,0	NORDEX N163/5,7MW 570...	Yes	NORDEX	N163/5,7MW-5 700	5 700	163,0	158,0	1 806	10,7
St1	272 700	7 027 390	30,0	VESTAS V150-4.2 HH145 4...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	1 902	10,4
St2	273 002	7 026 818	30,0	VESTAS V150-4.2 HH145 4...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	1 902	10,4
St3	272 153	7 026 165	30,0	VESTAS V150-4.2 HH145 4...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	1 902	10,4
St4	272 991	7 026 229	30,0	VESTAS V150-4.2 HH145 4...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	1 902	10,4
St5	272 290	7 026 760	26,1	VESTAS V150-4.2 HH145 4...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	1 902	10,4
St6	272 494	7 027 846	25,1	VESTAS V150-4.2 HH145 4...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	1 902	10,4
St7	272 483	7 025 533	30,2	VESTAS V150-4.2 HH145 4...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	1 902	10,4
Sö1	255 445	7 011 327	45,9	Generic RD180 7700 180.0...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	2 461	10,4
Sö2	255 137	7 011 612	50,0	Generic RD180 7700 180.0...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	2 461	10,4
Sö3	254 614	7 011 705	37,5	Generic RD180 7700 180.0...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	2 461	10,4
Sö4	254 111	7 011 739	25,0	Generic RD180 7700 180.0...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	2 461	10,4
Sö5	253 945	7 012 144	32,5	Generic RD180 7700 180.0...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	2 461	10,4
Sö6	254 771	7 012 174	40,0	Generic RD180 7700 180.0...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	2 461	10,4
Sö7	254 521	7 012 552	32,9	Generic RD180 7700 180.0...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	2 461	10,4
Sö8	254 528	7 013 790	20,0	Generic RD180 7700 180.0...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	2 461	10,4

Shadow receptor-Input

No.	Name	East	North	Z	Width	Height	Elevation a.g.l.	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
				[m]	[m]	[m]	[m]	[°]		[m]
A	A Lomarakennus (Söderändan 49)	267 990	7 011 759	42,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
B	B Asuinrakennus (Söderändan 81)	268 161	7 012 123	37,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
C	C Lomarakennus (Säderändan 166)	268 388	7 012 783	39,1	5,0	5,0	1,0	90,0	"Green house mode"	6,0
D	D Lomarakennus (Söderändan 188)	268 493	7 013 188	37,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0
E	E Asuinrakennus (Rökiöntie 930)	268 646	7 013 924	38,1	5,0	5,0	1,0	90,0	"Green house mode"	6,0
F	F Asuinrakennus (Kukkusintie 474)	269 409	7 017 903	25,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
G	G Asuinrakennus (Kovik byväg 53)	264 096	7 018 174	10,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
H	H Asuinrakennus (Vöyrintie 1021)	263 817	7 017 837	8,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
I	I Lomarakennus (Ehrsbackavägen 29)	263 418	7 015 700	21,7	5,0	5,0	1,0	90,0	"Green house mode"	6,0
J	J Asuinrakennus (Kleidersvägen 118)	263 380	7 014 576	13,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0
K	K Asuinrakennus (Rökiöntie 154)	262 790	7 011 335	27,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
L	L Asuinrakennus (Bjurbäcksvägen 231)	264 546	7 009 923	27,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0

Calculation Results

Shadow receptor

No.	Name	Shadow, expected values Shadow hours per year [h/year]
A	A Lomarakennus (Söderändan 49)	8:09
B	B Asuinrakennus (Söderändan 81)	0:00
C	C Lomarakennus (Säderändan 166)	0:00
D	D Lomarakennus (Söderändan 188)	4:52
E	E Asuinrakennus (Rökiöntie 930)	1:58
F	F Asuinrakennus (Kukkusintie 474)	0:00
G	G Asuinrakennus (Kovik byväg 53)	0:00
H	H Asuinrakennus (Vöyrintie 1021)	0:00
I	I Lomarakennus (Ehrsbackavägen 29)	2:48
J	J Asuinrakennus (Kleidersvägen 118)	7:54
K	K Asuinrakennus (Rökiöntie 154)	0:00
L	L Asuinrakennus (Bjurbäcksvägen 231)	0:00

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

No.	Name	Expected [h/year]
1	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8836)	0:00
10	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8824)	10:42
11	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8825)	0:00
12	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8823)	0:00

To be continued on next page...

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Calculated:
14.7.2023 9.25/3.5.584

SHADOW - Main Result

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke Forest

...continued from previous page

No.	Name	Expected [h/year]
13	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8822)	0:00
14	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8818)	0:00
15	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8821)	0:00
16	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8819)	0:00
17	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8820)	0:00
18	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8827)	5:00
19	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8830)	9:59
2	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8835)	0:00
3	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8834)	0:00
4	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8833)	0:00
5	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8831)	0:00
6	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8832)	0:00
7	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8828)	0:00
8	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8826)	0:00
9	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8829)	0:00
Lo1	PROKON P3000-116 3030 116.7 !O! hub: 122,0 m (TOT: 180,4 m) (8676)	0:00
Lo2	PROKON P3000-116 3030 116.7 !O! hub: 122,0 m (TOT: 180,4 m) (8677)	0:00
Lo3	PROKON P3000-116 3030 116.7 !O! hub: 122,0 m (TOT: 180,4 m) (8678)	0:00
Lå1	VESTAS V150-4.2 4200 150.0 !O! hub: 140,0 m (TOT: 215,0 m) (8679)	0:00
Lå2	VESTAS V150-4.2 4200 150.0 !O! hub: 140,0 m (TOT: 215,0 m) (8680)	0:00
Lå3	VESTAS V150-4.2 4200 150.0 !O! hub: 140,0 m (TOT: 215,0 m) (8681)	0:00
Lå4	VESTAS V150-4.2 4200 150.0 !O! hub: 140,0 m (TOT: 215,0 m) (8682)	0:00
M1	NORDEX N163/5,7MW 5700 163.0 !O! hub: 158,0 m (TOT: 239,5 m) (8772)	0:00
M2	NORDEX N163/5,7MW 5700 163.0 !O! hub: 158,0 m (TOT: 239,5 m) (8773)	0:00
M3	NORDEX N163/5,7MW 5700 163.0 !O! hub: 158,0 m (TOT: 239,5 m) (8774)	0:00
M4	NORDEX N163/5,7MW 5700 163.0 !O! hub: 158,0 m (TOT: 239,5 m) (8775)	0:00
St1	VESTAS V150-4.2 HH145 4200 150.0 !O! hub: 145,0 m (TOT: 220,0 m) (8669)	0:00
St2	VESTAS V150-4.2 HH145 4200 150.0 !O! hub: 145,0 m (TOT: 220,0 m) (8670)	0:00
St3	VESTAS V150-4.2 HH145 4200 150.0 !O! hub: 145,0 m (TOT: 220,0 m) (8671)	0:00
St4	VESTAS V150-4.2 HH145 4200 150.0 !O! hub: 145,0 m (TOT: 220,0 m) (8672)	0:00
St5	VESTAS V150-4.2 HH145 4200 150.0 !O! hub: 145,0 m (TOT: 220,0 m) (8673)	0:00
St6	VESTAS V150-4.2 HH145 4200 150.0 !O! hub: 145,0 m (TOT: 220,0 m) (8674)	0:00
St7	VESTAS V150-4.2 HH145 4200 150.0 !O! hub: 145,0 m (TOT: 220,0 m) (8675)	0:00
Sö1	Generic RD180 7700 180.0 !O! hub: 210,0 m (TOT: 300,0 m) (8713)	0:00
Sö2	Generic RD180 7700 180.0 !O! hub: 210,0 m (TOT: 300,0 m) (8714)	0:00
Sö3	Generic RD180 7700 180.0 !O! hub: 210,0 m (TOT: 300,0 m) (8715)	0:00
Sö4	Generic RD180 7700 180.0 !O! hub: 210,0 m (TOT: 300,0 m) (8716)	0:00
Sö5	Generic RD180 7700 180.0 !O! hub: 210,0 m (TOT: 300,0 m) (8717)	0:00
Sö6	Generic RD180 7700 180.0 !O! hub: 210,0 m (TOT: 300,0 m) (8718)	0:00
Sö7	Generic RD180 7700 180.0 !O! hub: 210,0 m (TOT: 300,0 m) (8719)	0:00
Sö8	Generic RD180 7700 180.0 !O! hub: 210,0 m (TOT: 300,0 m) (8720)	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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Calculated:
14.7.2023 9.25/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke ForestShadow receptor: A - A Lomarakennus (Söderändan 49)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	547	428	409	541	812	1 087	1 287	891	718	583	592	8 612

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May		June		July		August	September	October	November	December
1	10.09	09.07	07.39	06.54	05.13		03.44	21.28 (19)	03.27	21.34 (19)	04.44	06.14	07.36	08.06	09.34
	15.00	16.23	17.49	20.18	21.45		23.15	28 21.56 (19)	23.41	28 22.02 (19)	22.28	20.47	19.04	16.22	15.04
2	10.08	09.04	07.36	06.51	05.10		03.42	21.29 (19)	03.29	21.34 (19)	04.47	06.17	07.39	08.09	09.37
	15.01	16.26	17.52	20.21	21.48		23.17	27 21.56 (19)	23.40	28 22.02 (19)	22.25	20.43	19.01	16.19	15.03
3	10.07	09.01	07.33	06.47	05.07		03.40	21.29 (19)	03.30	21.34 (19)	04.50	06.19	07.42	08.12	09.40
	15.03	16.29	17.55	20.23	21.51		23.20	28 21.57 (19)	23.38	28 22.02 (19)	22.22	20.40	18.57	16.16	15.01
4	10.06	08.58	07.29	06.44	05.04		03.38	21.29 (19)	03.32	21.35 (19)	04.53	06.22	07.45	08.15	09.42
	15.05	16.32	17.58	20.26	21.54		23.22	27 21.56 (19)	23.37	28 22.03 (19)	22.19	20.37	18.54	16.13	14.59
5	10.05	08.55	07.26	06.41	05.00		03.36	21.29 (19)	03.34	21.35 (19)	04.56	06.25	07.47	08.18	09.44
	15.07	16.36	18.01	20.29	21.57		23.24	28 21.57 (19)	23.35	28 22.03 (19)	22.16	20.33	18.51	16.10	14.58
6	10.04	08.52	07.23	06.37	04.57		03.34	21.29 (19)	03.36	21.35 (19)	04.59	06.28	07.50	08.21	09.47
	15.09	16.39	18.04	20.32	22.00		23.26	28 21.57 (19)	23.34	28 22.03 (19)	22.13	20.30	18.47	16.07	14.56
7	10.03	08.49	07.19	06.34	04.54		03.32	21.30 (19)	03.38	21.36 (19)	05.02	06.30	07.53	08.24	09.49
	15.12	16.42	18.07	20.35	22.03		23.28	27 21.57 (19)	23.32	27 22.03 (19)	22.10	20.26	18.44	16.04	14.55
8	10.01	08.46	07.16	06.30	04.51		03.31	21.30 (19)	03.40	21.35 (19)	05.05	06.33	07.56	08.27	09.51
	15.14	16.45	18.09	20.38	22.06		23.30	28 21.58 (19)	23.30	28 22.03 (19)	22.06	20.23	18.40	16.01	14.54
9	10.00	08.43	07.13	06.27	04.48		03.29	21.30 (19)	03.42	21.36 (19)	05.08	06.36	07.58	08.30	09.53
	15.16	16.48	18.12	20.41	22.09		23.32	28 21.58 (19)	23.28	28 22.04 (19)	22.03	20.19	18.37	15.58	14.53
10	09.58	08.40	07.09	06.24	04.45		03.28	21.30 (19)	03.44	21.36 (19)	05.11	06.39	08.01	08.33	09.55
	15.19	16.51	18.15	20.43	22.12		23.34	28 21.58 (19)	23.26	28 22.04 (19)	22.00	20.16	18.34	15.56	14.52
11	09.57	08.37	07.06	06.20	04.42		03.26	21.30 (19)	03.47	21.36 (19)	05.14	06.41	08.04	08.36	09.57
	15.21	16.54	18.18	20.46	22.15		23.36	28 21.58 (19)	23.24	27 22.03 (19)	21.57	20.13	18.30	15.53	14.51
12	09.55	08.34	07.03	06.17	04.39		03.25	21.30 (19)	03.49	21.36 (19)	05.17	06.44	08.07	08.39	09.59
	15.24	16.57	18.21	20.49	22.18		23.37	27 21.57 (19)	23.22	28 22.04 (19)	21.54	20.09	18.27	15.50	14.50
13	09.53	08.31	06.59	06.13	04.35		03.24	21.31 (19)	03.51	21.37 (19)	05.19	06.47	08.10	08.42	10.00
	15.27	17.01	18.24	20.52	22.21		23.39	27 21.58 (19)	23.20	27 22.04 (19)	21.50	20.06	18.24	15.47	14.49
14	09.51	08.28	06.56	06.10	04.32		03.23	21.31 (19)	03.54	21.37 (19)	05.22	06.50	08.13	08.45	10.02
	15.29	17.04	18.27	20.55	22.24		23.40	27 21.58 (19)	23.18	27 22.04 (19)	21.47	20.02	18.20	15.44	14.48
15	09.49	08.25	06.52	06.07	04.29		03.22	21.31 (19)	03.56	21.38 (19)	05.25	06.52	08.16	08.48	10.03
	15.32	17.07	18.30	20.58	22.27		23.41	27 21.58 (19)	23.15	26 22.04 (19)	21.44	19.59	18.17	15.42	14.48
16	09.47	08.22	06.49	06.03	04.26		03.22	21.32 (19)	03.59	21.38 (19)	05.28	06.55	08.18	08.51	10.05
	15.35	17.10	18.32	21.01	22.30		23.42	27 21.59 (19)	23.13	26 22.04 (19)	21.40	19.55	18.14	15.39	14.48
17	09.45	08.18	06.46	06.00	04.24		03.21	21.31 (19)	04.01	21.38 (19)	05.31	06.58	08.21	08.55	10.06
	15.38	17.13	18.35	21.04	22.33		23.43	27 21.58 (19)	23.10	25 22.03 (19)	21.37	19.52	18.10	15.36	14.47
18	09.43	08.15	06.42	05.56	04.21	21.37 (19)	03.21	21.32 (19)	04.04	21.39 (19)	05.34	07.01	08.24	08.58	10.07
	15.40	17.16	18.38	21.07	22.36	9 21.46 (19)	23.44	27 21.59 (19)	23.08	24 22.03 (19)	21.34	19.49	18.07	15.34	14.47
19	09.40	08.12	06.39	05.53	04.18	21.34 (19)	03.20	21.32 (19)	04.07	21.39 (19)	05.37	07.03	08.27	09.01	10.08
	15.43	17.19	18.41	21.10	22.39	13 21.47 (19)	23.44	27 21.59 (19)	23.05	23 22.02 (19)	21.31	19.45	18.04	15.31	14.47
20	09.38	08.09	06.35	05.50	04.15	21.33 (19)	03.20	21.32 (19)	04.10	21.39 (19)	05.40	07.06	08.30	09.04	10.09
	15.46	17.22	18.44	21.12	22.42	16 21.49 (19)	23.45	27 21.59 (19)	23.03	23 22.02 (19)	21.27	19.42	18.01	15.29	14.47
21	09.36	08.06	06.32	05.46	04.12	21.32 (19)	03.20	21.33 (19)	04.12	21.41 (19)	05.43	07.09	08.33	09.06	10.10
	15.49	17.25	18.47	21.15	22.45	18 21.50 (19)	23.45	27 22.00 (19)	23.00	21 22.02 (19)	21.24	19.38	17.57	15.26	14.48
22	09.33	08.02	06.28	05.43	04.09	21.31 (19)	03.20	21.33 (19)	04.15	21.42 (19)	05.46	07.11	08.36	09.09	10.10
	15.52	17.28	18.49	21.18	22.48	20 21.51 (19)	23.45	27 22.00 (19)	22.57	19 22.01 (19)	21.21	19.35	17.54	15.24	14.48
23	09.31	07.59	06.25	05.40	04.07	21.31 (19)	03.20	21.33 (19)	04.18	21.42 (19)	05.48	07.14	08.39	09.12	10.11
	15.55	17.31	18.52	21.21	22.51	21 21.52 (19)	23.45	27 22.00 (19)	22.55	18 22.00 (19)	21.17	19.31	17.51	15.21	14.49
24	09.28	07.56	06.22	05.36	04.04	21.30 (19)	03.21	21.34 (19)	04.21	21.43 (19)	05.51	07.17	08.42	09.15	10.11
	15.58	17.34	18.55	21.24	22.54	23 21.53 (19)	23.45	27 22.01 (19)	22.52	15 21.58 (19)	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.18	05.33	04.01	21.30 (19)	03.21	21.33 (19)	04.24	21.46 (19)	05.54	07.20	07.45	09.18	10.11
	16.01	17.37	18.58	21.27	22.56	24 21.54 (19)	23.45	27 22.00 (19)	22.49	11 21.57 (19)	21.10	19.25	16.44	15.17	14.50
26	09.23	07.49	06.15	05.30	03.59	21.29 (19)	03.22	21.34 (19)	04.27	21.48 (19)	05.57	07.22	07.48	09.21	10.11
	16.04	17.40	19.01	21.30	22.59	25 21.54 (19)	23.45	27 22.01 (19)	22.46	6 21.54 (19)	21.07	19.21	16.41	15.14	14.51
27	09.21	07.46	06.11	05.26	03.56	21.29 (19)	03.23	21.33 (19)	04.29		06.00	07.25	07.51	09.24	10.11
	16.07	17.43	19.04	21.33	23.02	26 21.55 (19)	23.44	28 22.01 (19)	22.43		21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.54	21.29 (19)	03.24	21.34 (19)	04.32		06.03	07.28	07.54	09.26	10.11
	16.11	17.46	19.06	21.36	23.05	26 21.55 (19)	23.43	27 22.01 (19)	22.40		21.00	19.14	16.35	15.10	14.53
29	09.15		07.05	05.20	03.51	21.28 (19)	03.25	21.34 (19)	04.35		06.05	07.31	07.57	09.29	10.11
	16.14		20.09	21.39	23.07	27 21.55 (19)	23.43	27 22.01 (19)	22.37		20.57	19.11	16.32	15.08	14.55
30	09.12		07.01	05.17	03.49	21.29 (19)	03.26	21.34 (19)	04.38		06.08	07.33	08.00	09.32	10.10
	16.17		20.12	21.42	23.10	27 21.56 (19)	23.42	28 22.02 (19)	22.34		20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.47	21.29 (19)			04.41		06.11		08.03		10.10
	16.20		20.15		23.12	27 21.56 (19)			22.31		20.50		16.26		14.58
Potential sun hours	182	242	363	447	559		605		594		502	392	308	206	151
Total, worst case						302		820		625					
Sun reduction						0,48		0,49		0,39					
Oper. time red.						0,98		0,98		0,98					
Wind dir. red.						0,63		0,63		0,63					
Total reduction						0,30		0,31		0,24					
Total, real						89		250		150					

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)		First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker	(WTG causing flicker last time)

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Calculated:
14.7.2023 9.25/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke ForestShadow receptor: B - B Asuinrakennus (Söderändan 81)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	547	428	409	541	812	1 087	1 287	891	718	583	592	8 612

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.39	06.54	05.13	03.44	03.27	04.44	06.14	07.36	08.06	09.35
	15.00	16.23	17.49	20.18	21.45	23.15	23.41	22.28	20.47	19.04	16.22	15.04
2	10.08	09.04	07.36	06.51	05.10	03.42	03.29	04.47	06.17	07.39	08.09	09.37
	15.01	16.26	17.52	20.21	21.48	23.17	23.40	22.25	20.43	19.01	16.19	15.03
3	10.07	09.01	07.33	06.47	05.07	03.40	03.30	04.50	06.19	07.42	08.12	09.40
	15.03	16.29	17.55	20.23	21.51	23.20	23.38	22.22	20.40	18.57	16.16	15.01
4	10.06	08.58	07.29	06.44	05.04	03.38	03.32	04.53	06.22	07.44	08.15	09.42
	15.05	16.32	17.58	20.26	21.54	23.22	23.37	22.19	20.37	18.54	16.13	14.59
5	10.05	08.55	07.26	06.41	05.00	03.36	03.34	04.56	06.25	07.47	08.18	09.44
	15.07	16.36	18.01	20.29	21.57	23.24	23.35	22.16	20.33	18.51	16.10	14.58
6	10.04	08.52	07.23	06.37	04.57	03.34	03.36	04.59	06.28	07.50	08.21	09.47
	15.09	16.39	18.04	20.32	22.00	23.26	23.34	22.13	20.30	18.47	16.07	14.56
7	10.03	08.49	07.19	06.34	04.54	03.32	03.38	05.02	06.30	07.53	08.24	09.49
	15.12	16.42	18.07	20.35	22.03	23.28	23.32	22.10	20.26	18.44	16.04	14.55
8	10.01	08.46	07.16	06.30	04.51	03.31	03.40	05.05	06.33	07.56	08.27	09.51
	15.14	16.45	18.09	20.38	22.06	23.30	23.30	22.06	20.23	18.40	16.01	14.54
9	10.00	08.43	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.58	08.30	09.53
	15.16	16.48	18.12	20.41	22.09	23.32	23.28	22.03	20.19	18.37	15.58	14.52
10	09.58	08.40	07.09	06.24	04.45	03.28	03.44	05.11	06.39	08.01	08.33	09.55
	15.19	16.51	18.15	20.43	22.12	23.34	23.26	22.00	20.16	18.34	15.56	14.51
11	09.57	08.37	07.06	06.20	04.42	03.26	03.46	05.14	06.41	08.04	08.36	09.57
	15.21	16.54	18.18	20.46	22.15	23.36	23.24	21.57	20.13	18.30	15.53	14.51
12	09.55	08.34	07.03	06.17	04.38	03.25	03.49	05.16	06.44	08.07	08.39	09.59
	15.24	16.57	18.21	20.49	22.18	23.37	23.22	21.54	20.09	18.27	15.50	14.50
13	09.53	08.31	06.59	06.13	04.35	03.24	03.51	05.19	06.47	08.10	08.42	10.00
	15.26	17.01	18.24	20.52	22.21	23.39	23.20	21.50	20.06	18.24	15.47	14.49
14	09.51	08.28	06.56	06.10	04.32	03.23	03.54	05.22	06.50	08.13	08.45	10.02
	15.29	17.04	18.27	20.55	22.24	23.40	23.18	21.47	20.02	18.20	15.44	14.48
15	09.49	08.25	06.52	06.07	04.29	03.22	03.56	05.25	06.52	08.16	08.48	10.03
	15.32	17.07	18.30	20.58	22.27	23.41	23.15	21.44	19.59	18.17	15.42	14.48
16	09.47	08.22	06.49	06.03	04.26	03.21	03.59	05.28	06.55	08.18	08.52	10.05
	15.35	17.10	18.32	21.01	22.30	23.42	23.13	21.40	19.55	18.14	15.39	14.48
17	09.45	08.18	06.46	06.00	04.23	03.21	04.01	05.31	06.58	08.21	08.55	10.06
	15.37	17.13	18.35	21.04	22.33	23.43	23.11	21.37	19.52	18.10	15.36	14.47
18	09.43	08.15	06.42	05.56	04.21	03.20	04.04	05.34	07.01	08.24	08.58	10.07
	15.40	17.16	18.38	21.07	22.36	23.44	23.08	21.34	19.49	18.07	15.34	14.47
19	09.40	08.12	06.39	05.53	04.18	03.20	04.07	05.37	07.03	08.27	09.01	10.08
	15.43	17.19	18.41	21.10	22.39	23.44	23.05	21.31	19.45	18.04	15.31	14.47
20	09.38	08.09	06.35	05.50	04.15	03.20	04.10	05.40	07.06	08.30	09.04	10.09
	15.46	17.22	18.44	21.12	22.42	23.45	23.03	21.27	19.42	18.01	15.29	14.47
21	09.36	08.06	06.32	05.46	04.12	03.20	04.12	05.43	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.15	22.45	23.45	23.00	21.24	19.38	17.57	15.26	14.48
22	09.33	08.02	06.28	05.43	04.09	03.20	04.15	05.45	07.11	08.36	09.09	10.10
	15.52	17.28	18.49	21.18	22.48	23.45	22.57	21.21	19.35	17.54	15.24	14.48
23	09.31	07.59	06.25	05.40	04.07	03.20	04.18	05.48	07.14	08.39	09.12	10.11
	15.55	17.31	18.52	21.21	22.51	23.45	22.55	21.17	19.31	17.51	15.21	14.49
24	09.28	07.56	06.22	05.36	04.04	03.21	04.21	05.51	07.17	08.42	09.15	10.11
	15.58	17.34	18.55	21.24	22.54	23.45	22.52	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.18	05.33	04.01	03.21	04.24	05.54	07.20	07.45	09.18	10.11
	16.01	17.37	18.58	21.27	22.56	23.45	22.49	21.10	19.25	16.44	15.17	14.50
26	09.23	07.49	06.15	05.30	03.59	03.22	04.26	05.57	07.22	07.48	09.21	10.11
	16.04	17.40	19.01	21.30	22.59	23.45	22.46	21.07	19.21	16.41	15.14	14.51
27	09.21	07.46	06.11	05.26	03.56	03.23	04.29	06.00	07.25	07.51	09.24	10.11
	16.07	17.43	19.04	21.33	23.02	23.44	22.43	21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.54	03.24	04.32	06.03	07.28	07.54	09.27	10.11
	16.11	17.46	19.06	21.36	23.05	23.44	22.40	21.00	19.14	16.35	15.10	14.53
29	09.15		07.05	05.20	03.51	03.25	04.35	06.05	07.31	07.57	09.29	10.11
	16.14		20.09	21.39	23.07	23.43	22.37	20.57	19.11	16.32	15.08	14.55
30	09.12		07.01	05.17	03.49	03.26	04.38	06.08	07.33	08.00	09.32	10.10
	16.17		20.12	21.42	23.10	23.42	22.34	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.10
	16.20		20.15		23.12		22.31	20.50		16.26		14.57
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.25/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke ForestShadow receptor: C - C Lomarakennus (Säderändan 166)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	547	428	409	541	812	1 087	1 287	891	718	583	592	8 612

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.39	06.54	05.13	03.44	03.27	04.44	06.14	07.36	08.06	09.35
	14.59	16.23	17.49	20.18	21.45	23.15	23.41	22.28	20.47	19.04	16.22	15.04
2	10.08	09.04	07.36	06.51	05.10	03.42	03.29	04.47	06.17	07.39	08.09	09.37
	15.01	16.26	17.52	20.21	21.48	23.17	23.40	22.25	20.43	19.01	16.19	15.02
3	10.08	09.01	07.33	06.47	05.07	03.40	03.30	04.50	06.19	07.42	08.12	09.40
	15.03	16.29	17.55	20.23	21.51	23.20	23.38	22.22	20.40	18.57	16.16	15.01
4	10.06	08.58	07.29	06.44	05.04	03.38	03.32	04.53	06.22	07.44	08.15	09.42
	15.05	16.32	17.58	20.26	21.54	23.22	23.37	22.19	20.37	18.54	16.13	14.59
5	10.05	08.55	07.26	06.41	05.00	03.36	03.34	04.56	06.25	07.47	08.18	09.44
	15.07	16.36	18.01	20.29	21.57	23.24	23.36	22.16	20.33	18.51	16.10	14.58
6	10.04	08.52	07.23	06.37	04.57	03.34	03.36	04.59	06.28	07.50	08.21	09.47
	15.09	16.39	18.04	20.32	22.00	23.26	23.34	22.13	20.30	18.47	16.07	14.56
7	10.03	08.49	07.19	06.34	04.54	03.32	03.38	05.02	06.30	07.53	08.24	09.49
	15.11	16.42	18.06	20.35	22.03	23.28	23.32	22.10	20.26	18.44	16.04	14.55
8	10.01	08.46	07.16	06.30	04.51	03.31	03.40	05.05	06.33	07.56	08.27	09.51
	15.14	16.45	18.09	20.38	22.06	23.30	23.30	22.06	20.23	18.40	16.01	14.54
9	10.00	08.43	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.58	08.30	09.53
	15.16	16.48	18.12	20.41	22.09	23.32	23.28	22.03	20.19	18.37	15.58	14.52
10	09.58	08.40	07.09	06.24	04.45	03.28	03.44	05.11	06.39	08.01	08.33	09.55
	15.19	16.51	18.15	20.43	22.12	23.34	23.27	22.00	20.16	18.34	15.55	14.51
11	09.57	08.37	07.06	06.20	04.41	03.26	03.46	05.13	06.41	08.04	08.36	09.57
	15.21	16.54	18.18	20.46	22.15	23.36	23.24	21.57	20.13	18.30	15.53	14.50
12	09.55	08.34	07.03	06.17	04.38	03.25	03.49	05.16	06.44	08.07	08.39	09.59
	15.24	16.57	18.21	20.49	22.18	23.37	23.22	21.54	20.09	18.27	15.50	14.50
13	09.53	08.31	06.59	06.13	04.35	03.24	03.51	05.19	06.47	08.10	08.42	10.00
	15.26	17.01	18.24	20.52	22.21	23.39	23.20	21.50	20.06	18.24	15.47	14.49
14	09.51	08.28	06.56	06.10	04.32	03.23	03.54	05.22	06.50	08.13	08.45	10.02
	15.29	17.04	18.27	20.55	22.24	23.40	23.18	21.47	20.02	18.20	15.44	14.48
15	09.49	08.25	06.52	06.07	04.29	03.22	03.56	05.25	06.52	08.16	08.49	10.03
	15.32	17.07	18.30	20.58	22.27	23.41	23.15	21.44	19.59	18.17	15.41	14.48
16	09.47	08.22	06.49	06.03	04.26	03.21	03.59	05.28	06.55	08.18	08.52	10.05
	15.35	17.10	18.32	21.01	22.30	23.42	23.13	21.41	19.55	18.14	15.39	14.47
17	09.45	08.18	06.46	06.00	04.23	03.21	04.01	05.31	06.58	08.21	08.55	10.06
	15.37	17.13	18.35	21.04	22.33	23.43	23.11	21.37	19.52	18.10	15.36	14.47
18	09.43	08.15	06.42	05.56	04.20	03.20	04.04	05.34	07.01	08.24	08.58	10.07
	15.40	17.16	18.38	21.07	22.36	23.44	23.08	21.34	19.49	18.07	15.34	14.47
19	09.40	08.12	06.39	05.53	04.18	03.20	04.07	05.37	07.03	08.27	09.01	10.08
	15.43	17.19	18.41	21.10	22.39	23.44	23.05	21.31	19.45	18.04	15.31	14.47
20	09.38	08.09	06.35	05.50	04.15	03.20	04.09	05.40	07.06	08.30	09.04	10.09
	15.46	17.22	18.44	21.12	22.42	23.45	23.03	21.27	19.42	18.01	15.28	14.47
21	09.36	08.06	06.32	05.46	04.12	03.20	04.12	05.43	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.15	22.45	23.45	23.00	21.24	19.38	17.57	15.26	14.48
22	09.33	08.02	06.28	05.43	04.09	03.20	04.15	05.45	07.11	08.36	09.09	10.10
	15.52	17.28	18.49	21.18	22.48	23.45	22.57	21.21	19.35	17.54	15.24	14.48
23	09.31	07.59	06.25	05.40	04.06	03.20	04.18	05.48	07.14	08.39	09.12	10.11
	15.55	17.31	18.52	21.21	22.51	23.46	22.55	21.17	19.31	17.51	15.21	14.49
24	09.28	07.56	06.22	05.36	04.04	03.21	04.21	05.51	07.17	08.42	09.15	10.11
	15.58	17.34	18.55	21.24	22.54	23.45	22.52	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.18	05.33	04.01	03.21	04.24	05.54	07.20	07.45	09.18	10.11
	16.01	17.37	18.58	21.27	22.57	23.45	22.49	21.10	19.25	16.44	15.17	14.50
26	09.23	07.49	06.15	05.30	03.59	03.22	04.26	05.57	07.22	07.48	09.21	10.11
	16.04	17.40	19.01	21.30	22.59	23.45	22.46	21.07	19.21	16.41	15.14	14.51
27	09.21	07.46	06.11	05.26	03.56	03.23	04.29	06.00	07.25	07.51	09.24	10.11
	16.07	17.43	19.04	21.33	23.02	23.44	22.43	21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.53	03.24	04.32	06.03	07.28	07.54	09.27	10.11
	16.10	17.46	19.06	21.36	23.05	23.44	22.40	21.00	19.14	16.35	15.10	14.53
29	09.15		07.05	05.20	03.51	03.25	04.35	06.05	07.31	07.57	09.29	10.11
	16.14		20.09	21.39	23.07	23.43	22.37	20.57	19.11	16.32	15.08	14.54
30	09.13		07.01	05.17	03.49	03.26	04.38	06.08	07.33	08.00	09.32	10.11
	16.17		20.12	21.42	23.10	23.42	22.34	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.10
	16.20		20.15		23.13		22.31	20.50		16.25		14.57
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.25/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke ForestShadow receptor: D - D Lomarakennus (Söderändan 188)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	547	428	409	541	812	1 087	1 287	891	718	583	592	8 612

Idle start wind speed: Cut in wind speed from power curve

	January	February	March		April		May	June
1	10.09	09.07	07.39		06.54		05.13	03.44
	14.59	16.23	17.49		20.18		21.45	23.15
2	10.08	09.04	07.36		06.51		05.10	03.42
	15.01	16.26	17.52		20.21		21.48	23.17
3	10.08	09.01	07.33		06.47		05.07	03.40
	15.03	16.29	17.55		20.23		21.51	23.20
4	10.07	08.58	07.29		06.44		05.04	03.38
	15.05	16.32	17.58		20.26		21.54	23.22
5	10.05	08.55	07.26		06.41		05.00	03.36
	15.07	16.36	18.01		20.29		21.57	23.24
6	10.04	08.52	07.23		06.37		04.57	03.34
	15.09	16.39	18.04		20.32		22.00	23.27
7	10.03	08.49	07.19		06.34		04.54	03.32
	15.11	16.42	18.06		20.35		22.03	23.29
8	10.01	08.46	07.16		06.30	19.45 (18)	04.51	03.31
	15.14	16.45	18.09		20.38	12 19.57 (18)	22.06	23.31
9	10.00	08.43	07.13		06.27	19.42 (18)	04.48	03.29
	15.16	16.48	18.12		20.41	17 19.59 (18)	22.09	23.32
10	09.58	08.40	07.09		06.23	19.40 (18)	04.45	03.28
	15.19	16.51	18.15		20.43	21 20.01 (18)	22.12	23.34
11	09.57	08.37	07.06		06.20	19.39 (18)	04.41	03.26
	15.21	16.54	18.18		20.46	23 20.02 (18)	22.15	23.36
12	09.55	08.34	07.03	17.34 (19)	06.17	19.38 (18)	04.38	03.25
	15.24	16.57	18.21	11 17.45 (19)	20.49	25 20.03 (18)	22.18	23.37
13	09.53	08.31	06.59	17.31 (19)	06.13	19.36 (18)	04.35	03.24
	15.26	17.00	18.24	16 17.47 (19)	20.52	26 20.02 (18)	22.21	23.39
14	09.51	08.28	06.56	17.29 (19)	06.10	19.36 (18)	04.32	03.23
	15.29	17.04	18.27	20 17.49 (19)	20.55	27 20.03 (18)	22.24	23.40
15	09.49	08.25	06.52	17.28 (19)	06.06	19.35 (18)	04.29	03.22
	15.32	17.07	18.29	21 17.49 (19)	20.58	28 20.03 (18)	22.27	23.41
16	09.47	08.22	06.49	17.27 (19)	06.03	19.35 (18)	04.26	03.21
	15.35	17.10	18.32	23 17.50 (19)	21.01	28 20.03 (18)	22.30	23.42
17	09.45	08.18	06.46	17.26 (19)	06.00	19.34 (18)	04.23	03.21
	15.37	17.13	18.35	24 17.50 (19)	21.04	28 20.02 (18)	22.33	23.43
18	09.43	08.15	06.42	17.25 (19)	05.56	19.34 (18)	04.20	03.20
	15.40	17.16	18.38	25 17.50 (19)	21.07	28 20.02 (18)	22.36	23.44
19	09.41	08.12	06.39	17.26 (19)	05.53	19.34 (18)	04.18	03.20
	15.43	17.19	18.41	24 17.50 (19)	21.10	28 20.02 (18)	22.39	23.45
20	09.38	08.09	06.35	17.25 (19)	05.50	19.35 (18)	04.15	03.20
	15.46	17.22	18.44	24 17.49 (19)	21.12	26 20.01 (18)	22.42	23.45
21	09.36	08.06	06.32	17.25 (19)	05.46	19.35 (18)	04.12	03.20
	15.49	17.25	18.47	24 17.49 (19)	21.15	25 20.00 (18)	22.45	23.45
22	09.33	08.02	06.28	17.25 (19)	05.43	19.36 (18)	04.09	03.20
	15.52	17.28	18.49	23 17.48 (19)	21.18	24 20.00 (18)	22.48	23.46
23	09.31	07.59	06.25	17.26 (19)	05.40	19.37 (18)	04.06	03.20
	15.55	17.31	18.52	21 17.47 (19)	21.21	22 19.59 (18)	22.51	23.46
24	09.28	07.56	06.22	17.26 (19)	05.36	19.37 (18)	04.04	03.21
	15.58	17.34	18.55	19 17.45 (19)	21.24	19 19.56 (18)	22.54	23.45
25	09.26	07.53	06.18	17.28 (19)	05.33	19.39 (18)	04.01	03.21
	16.01	17.37	18.58	15 17.43 (19)	21.27	16 19.55 (18)	22.57	23.45
26	09.23	07.49	06.15	17.30 (19)	05.30	19.41 (18)	03.58	03.22
	16.04	17.40	19.01	10 17.40 (19)	21.30	11 19.52 (18)	22.59	23.45
27	09.21	07.46	06.11		05.26		03.56	03.23
	16.07	17.43	19.04		21.33		23.02	23.44
28	09.18	07.43	06.08		05.23		03.53	03.24
	16.10	17.46	19.06		21.36		23.05	23.44
29	09.15		07.05		05.20		03.51	03.25
	16.14		20.09		21.39		23.07	23.43
30	09.13		07.01		05.16		03.49	03.26
	16.17		20.12		21.42		23.10	23.42
31	09.10		06.58				03.46	
	16.20		20.15				23.13	
Potential sun hours	182	242	363		447		559	605
Total, worst case				300		434		
Sun reduction				0,32		0,41		
Oper. time red.				0,98		0,98		
Wind dir. red.				0,57		0,58		
Total reduction				0,18		0,23		
Total, real				54		102		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.25/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke ForestShadow receptor: D - D Lomarakennus (Söderändan 188)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	547	428	409	541	812	1 087	1 287	891	718	583	592	8 612

Idle start wind speed: Cut in wind speed from power curve

	July		August			September			October			November	December
1	03.27		04.44			06.14		19.38 (18)	07.36		18.12 (19)	08.06	09.35
	23.41		22.28			20.47	23	20.01 (18)	19.04	14	18.26 (19)	16.22	15.04
2	03.29		04.47			06.17		19.39 (18)	07.39		18.15 (19)	08.09	09.37
	23.40		22.25			20.43	21	20.00 (18)	19.01	7	18.22 (19)	16.19	15.02
3	03.30		04.50			06.19		19.40 (18)	07.42			08.12	09.40
	23.38		22.22			20.40	17	19.57 (18)	18.57			16.16	15.01
4	03.32		04.53			06.22		19.42 (18)	07.44			08.15	09.42
	23.37		22.19			20.37	12	19.54 (18)	18.54			16.13	14.59
5	03.34		04.56			06.25			07.47			08.18	09.44
	23.36		22.16			20.33			18.51			16.10	14.58
6	03.36		04.59			06.28			07.50			08.21	09.47
	23.34		22.13			20.30			18.47			16.07	14.56
7	03.38		05.02			06.30			07.53			08.24	09.49
	23.32		22.10			20.26			18.44			16.04	14.55
8	03.40		05.05			06.33			07.56			08.27	09.51
	23.30		22.07			20.23			18.40			16.01	14.54
9	03.42		05.08			06.36			07.58			08.30	09.53
	23.29		22.03			20.19			18.37			15.58	14.52
10	03.44		05.11			06.39			08.01			08.33	09.55
	23.27		22.00			20.16			18.34			15.55	14.51
11	03.46		05.13			06.41			08.04			08.36	09.57
	23.24		21.57			20.13			18.30			15.53	14.50
12	03.49		05.16			06.44			08.07			08.39	09.59
	23.22		21.54			20.09			18.27			15.50	14.50
13	03.51		05.19			06.47			08.10			08.42	10.00
	23.20		21.50			20.06			18.24			15.47	14.49
14	03.54		05.22			06.50			08.13			08.45	10.02
	23.18		21.47			20.02			18.20			15.44	14.48
15	03.56		05.25			06.52			08.16			08.49	10.03
	23.16		21.44			19.59			18.17			15.41	14.48
16	03.59		05.28		19.52 (18)	06.55			08.18			08.52	10.05
	23.13		21.41	4	19.56 (18)	19.55			18.14			15.39	14.47
17	04.01		05.31		19.48 (18)	06.58		18.20 (19)	08.21			08.55	10.06
	23.11		21.37	12	20.00 (18)	19.52	8	18.28 (19)	18.10			15.36	14.47
18	04.04		05.34		19.45 (18)	07.01		18.17 (19)	08.24			08.58	10.07
	23.08		21.34	16	20.01 (18)	19.49	14	18.31 (19)	18.07			15.33	14.47
19	04.07		05.37		19.43 (18)	07.03		18.15 (19)	08.27			09.01	10.08
	23.06		21.31	20	20.03 (18)	19.45	17	18.32 (19)	18.04			15.31	14.47
20	04.09		05.40		19.42 (18)	07.06		18.12 (19)	08.30			09.04	10.09
	23.03		21.27	22	20.04 (18)	19.42	20	18.32 (19)	18.01			15.28	14.47
21	04.12		05.43		19.40 (18)	07.09		18.11 (19)	08.33			09.07	10.10
	23.00		21.24	24	20.04 (18)	19.38	22	18.33 (19)	17.57			15.26	14.48
22	04.15		05.45		19.40 (18)	07.11		18.10 (19)	08.36			09.10	10.10
	22.58		21.21	25	20.05 (18)	19.35	24	18.34 (19)	17.54			15.23	14.48
23	04.18		05.48		19.38 (18)	07.14		18.09 (19)	08.39			09.12	10.11
	22.55		21.17	27	20.05 (18)	19.31	24	18.33 (19)	17.51			15.21	14.48
24	04.21		05.51		19.38 (18)	07.17		18.09 (19)	08.42			09.15	10.11
	22.52		21.14	27	20.05 (18)	19.28	24	18.33 (19)	17.48			15.19	14.49
25	04.23		05.54		19.38 (18)	07.20		18.08 (19)	07.45			09.18	10.11
	22.49		21.10	28	20.06 (18)	19.25	25	18.33 (19)	16.44			15.17	14.50
26	04.26		05.57		19.37 (18)	07.22		18.09 (19)	07.48			09.21	10.11
	22.46		21.07	28	20.05 (18)	19.21	24	18.33 (19)	16.41			15.14	14.51
27	04.29		06.00		19.37 (18)	07.25		18.08 (19)	07.51			09.24	10.11
	22.43		21.04	28	20.05 (18)	19.18	23	18.31 (19)	16.38			15.12	14.52
28	04.32		06.02		19.36 (18)	07.28		18.08 (19)	07.54			09.27	10.11
	22.40		21.00	28	20.04 (18)	19.14	22	18.30 (19)	16.35			15.10	14.53
29	04.35		06.05		19.37 (18)	07.31		18.09 (19)	07.57			09.29	10.11
	22.37		20.57	27	20.04 (18)	19.11	20	18.29 (19)	16.32			15.08	14.54
30	04.38		06.08		19.37 (18)	07.33		18.10 (19)	08.00			09.32	10.11
	22.34		20.54	26	20.03 (18)	19.07	18	18.28 (19)	16.29			15.06	14.56
31	04.41		06.11		19.37 (18)				08.03				10.10
	22.31		20.50	25	20.02 (18)				16.25				14.57
Potential sun hours	594		502			392			308			206	151
Total, worst case				367			358			21			
Sun reduction				0,32			0,33			0,35			
Oper. time red.				0,98			0,98			0,98			
Wind dir. red.				0,58			0,57			0,57			
Total reduction				0,18			0,18			0,19			
Total, real				66			66			4			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.25/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke Forest Shadow receptor: E - E Asuinrakennus (Rökiöntie 930)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	547	428	409	541	812	1 087	1 287	891	718	583	592	8 612

Idle start wind speed: Cut in wind speed from power curve

	January	February	March		April	May	June	July	August	September		October		November	December
1	10.09	09.07	07.39		06.54	05.13	03.44	03.27	04.44	06.14		07.36	17.54 (18)	08.06	09.35
	14.59	16.23	17.49		20.18	21.45	23.15	23.41	22.28	20.47		19.04	23 18.17 (18)	16.22	15.04
2	10.09	09.04	07.36		06.51	05.10	03.42	03.29	04.47	06.16		07.39	17.54 (18)	08.09	09.37
	15.01	16.26	17.52		20.21	21.48	23.18	23.40	22.25	20.43		19.01	22 18.16 (18)	16.19	15.02
3	10.08	09.01	07.33		06.47	05.07	03.40	03.30	04.50	06.19		07.42	17.54 (18)	08.12	09.40
	15.03	16.29	17.55		20.23	21.51	23.20	23.39	22.22	20.40		18.57	20 18.14 (18)	16.16	15.01
4	10.07	08.58	07.29		06.44	05.03	03.38	03.32	04.53	06.22		07.44	17.55 (18)	08.15	09.42
	15.05	16.32	17.58		20.26	21.54	23.22	23.37	22.19	20.37		18.54	18 18.13 (18)	16.13	14.59
5	10.06	08.55	07.26		06.41	05.00	03.36	03.34	04.56	06.25		07.47	17.57 (18)	08.18	09.45
	15.07	16.35	18.01		20.29	21.57	23.24	23.36	22.16	20.33		18.51	13 18.10 (18)	16.10	14.57
6	10.04	08.52	07.23		06.37	04.57	03.34	03.35	04.59	06.28		07.50	18.00 (18)	08.21	09.47
	15.09	16.39	18.04		20.32	22.00	23.27	23.34	22.13	20.30		18.47	7 18.07 (18)	16.07	14.56
7	10.03	08.49	07.19		06.34	04.54	03.32	03.37	05.02	06.30		07.53		08.24	09.49
	15.11	16.42	18.06		20.35	22.03	23.29	23.32	22.10	20.26		18.44		16.04	14.55
8	10.02	08.46	07.16	17.21 (18)	06.30	04.51	03.30	03.40	05.05	06.33		07.56		08.27	09.51
	15.14	16.45	18.09	11 17.32 (18)	20.38	22.06	23.31	23.31	22.07	20.23		18.40		16.01	14.53
9	10.00	08.43	07.13	17.18 (18)	06.27	04.48	03.29	03.42	05.08	06.36		07.58		08.30	09.53
	15.16	16.48	18.12	16 17.34 (18)	20.41	22.09	23.32	23.29	22.03	20.19		18.37		15.58	14.52
10	09.58	08.40	07.09	17.17 (18)	06.23	04.44	03.27	03.44	05.10	06.39		08.01		08.33	09.55
	15.18	16.51	18.15	19 17.36 (18)	20.43	22.12	23.34	23.27	22.00	20.16		18.34		15.55	14.51
11	09.57	08.37	07.06	17.15 (18)	06.20	04.41	03.26	03.46	05.13	06.41		08.04		08.36	09.57
	15.21	16.54	18.18	22 17.37 (18)	20.46	22.15	23.36	23.25	21.57	20.13		18.30		15.53	14.50
12	09.55	08.34	07.02	17.14 (18)	06.17	04.38	03.25	03.49	05.16	06.44		08.07		08.39	09.59
	15.24	16.57	18.21	24 17.38 (18)	20.49	22.19	23.37	23.22	21.54	20.09		18.27		15.50	14.49
13	09.53	08.31	06.59	17.13 (18)	06.13	04.35	03.24	03.51	05.19	06.47		08.10		08.42	10.01
	15.26	17.00	18.24	24 17.37 (18)	20.52	22.22	23.39	23.20	21.50	20.06		18.24		15.47	14.49
14	09.51	08.28	06.56	17.13 (18)	06.10	04.32	03.23	03.53	05.22	06.50		08.13		08.46	10.02
	15.29	17.04	18.27	25 17.38 (18)	20.55	22.25	23.40	23.18	21.47	20.02		18.20		15.44	14.48
15	09.49	08.25	06.52	17.12 (18)	06.06	04.29	03.22	03.56	05.25	06.52		08.16		08.49	10.04
	15.32	17.07	18.29	25 17.37 (18)	20.58	22.28	23.41	23.16	21.44	19.59		18.17		15.41	14.48
16	09.47	08.22	06.49	17.12 (18)	06.03	04.26	03.21	03.59	05.28	06.55		08.18		08.52	10.05
	15.34	17.10	18.32	25 17.37 (18)	21.01	22.31	23.42	23.13	21.41	19.55		18.14		15.39	14.47
17	09.45	08.18	06.46	17.12 (18)	06.00	04.23	03.21	04.01	05.31	06.58		08.21		08.55	10.06
	15.37	17.13	18.35	24 17.36 (18)	21.04	22.34	23.43	23.11	21.37	19.52		18.10		15.36	14.47
18	09.43	08.15	06.42	17.12 (18)	05.56	04.20	03.20	04.04	05.34	07.01		08.24		08.58	10.07
	15.40	17.16	18.38	24 17.36 (18)	21.07	22.36	23.44	23.08	21.34	19.49		18.07		15.33	14.47
19	09.41	08.12	06.39	17.13 (18)	05.53	04.17	03.20	04.07	05.37	07.03		08.27		09.01	10.08
	15.43	17.19	18.41	22 17.35 (18)	21.10	22.39	23.45	23.06	21.31	19.45		18.04		15.31	14.47
20	09.38	08.09	06.35	17.13 (18)	05.50	04.15	03.20	04.09	05.40	07.06		08.30		09.04	10.09
	15.46	17.22	18.44	20 17.33 (18)	21.12	22.42	23.45	23.03	21.27	19.42		18.01		15.28	14.47
21	09.36	08.06	06.32	17.15 (18)	05.46	04.12	03.20	04.12	05.42	07.09	18.03 (18)	08.33		09.07	10.10
	15.49	17.25	18.47	17 17.32 (18)	21.15	22.45	23.45	23.00	21.24	19.38	11 18.14 (18)	17.57		15.26	14.47
22	09.33	08.02	06.28	17.17 (18)	05.43	04.09	03.20	04.15	05.45	07.11	18.01 (18)	08.36		09.10	10.10
	15.52	17.28	18.49	12 17.29 (18)	21.18	22.48	23.46	22.58	21.21	19.35	16 18.17 (18)	17.54		15.23	14.48
23	09.31	07.59	06.25	17.21 (18)	05.40	04.06	03.20	04.18	05.48	07.14	17.58 (18)	08.39		09.13	10.11
	15.55	17.31	18.52	4 17.25 (18)	21.21	22.51	23.46	22.55	21.17	19.31	19 18.17 (18)	17.51		15.21	14.48
24	09.29	07.56	06.22		05.36	04.04	03.20	04.21	05.51	07.17	17.57 (18)	08.42		09.15	10.11
	15.58	17.34	18.55		21.24	22.54	23.46	22.52	21.14	19.28	21 18.18 (18)	17.48		15.19	14.49
25	09.26	07.53	06.18		05.33	04.01	03.21	04.23	05.54	07.20	17.56 (18)	07.45		09.18	10.11
	16.01	17.37	18.58		21.27	22.57	23.45	22.49	21.11	19.25	23 18.19 (18)	16.44		15.16	14.50
26	09.23	07.49	06.15		05.30	03.58	03.22	04.26	05.57	07.22	17.55 (18)	07.48		09.21	10.12
	16.04	17.40	19.01		21.30	22.59	23.45	22.46	21.07	19.21	24 18.19 (18)	16.41		15.14	14.51
27	09.21	07.46	06.11		05.26	03.56	03.22	04.29	06.00	07.25	17.53 (18)	07.51		09.24	10.12
	16.07	17.43	19.04		21.33	23.02	23.44	22.43	21.04	19.18	25 18.18 (18)	16.38		15.12	14.52
28	09.18	07.43	06.08		05.23	03.53	03.23	04.32	06.02	07.28	17.53 (18)	07.54		09.27	10.11
	16.10	17.46	19.06		21.36	23.05	23.44	22.40	21.00	19.14	25 18.18 (18)	16.35		15.10	14.53
29	09.15		07.04		05.20	03.51	03.24	04.35	06.05	07.31	17.53 (18)	07.57		09.29	10.11
	16.13		20.09		21.39	23.08	23.43	22.38	20.57	19.11	25 18.18 (18)	16.32		15.08	14.54
30	09.13		07.01		05.16	03.49	03.26	04.38	06.08	07.33	17.53 (18)	08.00		09.32	10.11
	16.17		20.12		21.42	23.10	23.42	22.35	20.54	19.07	25 18.18 (18)	16.29		15.06	14.56
31	09.10		06.58			03.46		04.41	06.11			08.03			10.10
	16.20		20.15			23.13		22.32	20.50			16.25			14.57
Potential sun hours	182	242	363		447	559	605	594	502	392		308		206	151
Total, worst case				314							214		103		
Sun reduction				0,32							0,33		0,35		
Oper. time red.				0,98							0,98		0,98		
Wind dir. red.				0,58							0,58		0,58		
Total reduction				0,18							0,19		0,20		
Total, real				58							40		20		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)		First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker	(WTG causing flicker last time)

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Miikka Saranpää / miikka.saranpaa@fcg.fi
Calculated:
14.7.2023 9.25/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke ForestShadow receptor: F - F Asuinrakennus (Kukkusintie 474)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	547	428	409	541	812	1 087	1 287	891	718	583	592	8 612

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.07	07.39	06.54	05.13	03.43	03.26	04.43	06.14	07.36	08.06	09.35
	14.59	16.23	17.49	20.18	21.45	23.16	23.42	22.29	20.47	19.04	16.22	15.04
2	10.09	09.04	07.36	06.51	05.10	03.41	03.28	04.46	06.16	07.39	08.09	09.38
	15.01	16.26	17.52	20.21	21.48	23.18	23.40	22.26	20.43	19.01	16.19	15.02
3	10.08	09.01	07.33	06.47	05.06	03.39	03.29	04.49	06.19	07.42	08.12	09.40
	15.02	16.29	17.55	20.23	21.51	23.20	23.39	22.23	20.40	18.57	16.16	15.00
4	10.07	08.59	07.29	06.44	05.03	03.37	03.31	04.52	06.22	07.44	08.15	09.43
	15.04	16.32	17.58	20.26	21.55	23.23	23.38	22.19	20.37	18.54	16.13	14.59
5	10.06	08.56	07.26	06.40	05.00	03.35	03.33	04.55	06.25	07.47	08.18	09.45
	15.06	16.35	18.01	20.29	21.58	23.25	23.36	22.16	20.33	18.50	16.10	14.57
6	10.05	08.53	07.23	06.37	04.57	03.33	03.35	04.58	06.27	07.50	08.21	09.47
	15.09	16.38	18.03	20.32	22.01	23.27	23.35	22.13	20.30	18.47	16.07	14.56
7	10.03	08.50	07.19	06.34	04.54	03.31	03.37	05.01	06.30	07.53	08.24	09.49
	15.11	16.41	18.06	20.35	22.04	23.29	23.33	22.10	20.26	18.44	16.04	14.54
8	10.02	08.47	07.16	06.30	04.50	03.30	03.39	05.04	06.33	07.56	08.27	09.52
	15.13	16.45	18.09	20.38	22.07	23.31	23.31	22.07	20.23	18.40	16.01	14.53
9	10.00	08.44	07.13	06.27	04.47	03.28	03.41	05.07	06.36	07.59	08.30	09.54
	15.16	16.48	18.12	20.41	22.10	23.33	23.29	22.04	20.19	18.37	15.58	14.52
10	09.59	08.41	07.09	06.23	04.44	03.27	03.43	05.10	06.39	08.01	08.33	09.56
	15.18	16.51	18.15	20.43	22.13	23.35	23.27	22.00	20.16	18.34	15.55	14.51
11	09.57	08.37	07.06	06.20	04.41	03.25	03.46	05.13	06.41	08.04	08.37	09.58
	15.21	16.54	18.18	20.46	22.16	23.37	23.25	21.57	20.13	18.30	15.52	14.50
12	09.55	08.34	07.02	06.16	04.38	03.24	03.48	05.16	06.44	08.07	08.40	09.59
	15.23	16.57	18.21	20.49	22.19	23.38	23.23	21.54	20.09	18.27	15.49	14.49
13	09.53	08.31	06.59	06.13	04.35	03.23	03.50	05.19	06.47	08.10	08.43	10.01
	15.26	17.00	18.24	20.52	22.22	23.39	23.21	21.51	20.06	18.24	15.47	14.48
14	09.52	08.28	06.56	06.10	04.32	03.22	03.53	05.22	06.49	08.13	08.46	10.03
	15.28	17.03	18.27	20.55	22.25	23.41	23.18	21.47	20.02	18.20	15.44	14.48
15	09.50	08.25	06.52	06.06	04.29	03.21	03.55	05.25	06.52	08.16	08.49	10.04
	15.31	17.06	18.29	20.58	22.28	23.42	23.16	21.44	19.59	18.17	15.41	14.47
16	09.47	08.22	06.49	06.03	04.26	03.20	03.58	05.28	06.55	08.18	08.52	10.05
	15.34	17.10	18.32	21.01	22.31	23.43	23.14	21.41	19.55	18.14	15.38	14.47
17	09.45	08.19	06.45	06.00	04.23	03.20	04.01	05.31	06.58	08.21	08.55	10.07
	15.37	17.13	18.35	21.04	22.34	23.44	23.11	21.37	19.52	18.10	15.36	14.46
18	09.43	08.15	06.42	05.56	04.20	03.19	04.03	05.34	07.00	08.24	08.58	10.08
	15.40	17.16	18.38	21.07	22.37	23.45	23.09	21.34	19.49	18.07	15.33	14.46
19	09.41	08.12	06.39	05.53	04.17	03.19	04.06	05.36	07.03	08.27	09.01	10.09
	15.43	17.19	18.41	21.10	22.40	23.45	23.06	21.31	19.45	18.04	15.31	14.46
20	09.39	08.09	06.35	05.49	04.14	03.19	04.09	05.39	07.06	08.30	09.04	10.10
	15.46	17.22	18.44	21.13	22.43	23.46	23.03	21.27	19.42	18.00	15.28	14.47
21	09.36	08.06	06.32	05.46	04.11	03.19	04.12	05.42	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.16	22.46	23.46	23.01	21.24	19.38	17.57	15.25	14.47
22	09.34	08.02	06.28	05.43	04.09	03.19	04.14	05.45	07.11	08.36	09.10	10.11
	15.52	17.28	18.49	21.19	22.49	23.46	22.58	21.21	19.35	17.54	15.23	14.47
23	09.31	07.59	06.25	05.39	04.06	03.19	04.17	05.48	07.14	08.39	09.13	10.11
	15.55	17.31	18.52	21.21	22.51	23.46	22.55	21.17	19.31	17.51	15.21	14.48
24	09.29	07.56	06.22	05.36	04.03	03.20	04.20	05.51	07.17	08.42	09.16	10.12
	15.58	17.34	18.55	21.24	22.54	23.46	22.52	21.14	19.28	17.47	15.18	14.48
25	09.26	07.53	06.18	05.33	04.00	03.20	04.23	05.54	07.20	07.45	09.19	10.12
	16.01	17.37	18.58	21.27	22.57	23.46	22.50	21.11	19.25	16.44	15.16	14.49
26	09.24	07.49	06.15	05.29	03.58	03.21	04.26	05.57	07.22	07.48	09.21	10.12
	16.04	17.40	19.01	21.30	23.00	23.46	22.47	21.07	19.21	16.41	15.14	14.50
27	09.21	07.46	06.11	05.26	03.55	03.22	04.29	05.59	07.25	07.51	09.24	10.12
	16.07	17.43	19.04	21.33	23.03	23.45	22.44	21.04	19.18	16.38	15.12	14.51
28	09.18	07.43	06.08	05.23	03.53	03.23	04.32	06.02	07.28	07.54	09.27	10.12
	16.10	17.46	19.06	21.36	23.05	23.44	22.41	21.00	19.14	16.35	15.10	14.52
29	09.16		07.04	05.19	03.50	03.24	04.35	06.05	07.31	07.57	09.30	10.12
	16.13		20.09	21.39	23.08	23.44	22.38	20.57	19.11	16.31	15.08	14.54
30	09.13		07.01	05.16	03.48	03.25	04.38	06.08	07.33	08.00	09.32	10.11
	16.16		20.12	21.42	23.11	23.43	22.35	20.54	19.07	16.28	15.06	14.55
31	09.10		06.58		03.46		04.41	06.11		08.03		10.11
	16.19		20.15		23.13		22.32	20.50		16.25		14.57
Potential sun hours	181	242	363	447	560	606	595	503	392	307	206	150
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.25/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke ForestShadow receptor: G - G Asuinrakennus (Kovik byväg 53)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	547	428	409	541	812	1 087	1 287	891	718	583	592	8 612

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.08	07.40	06.55	05.13	03.44	03.27	04.44	06.14	07.37	08.06	09.35
	14.59	16.23	17.49	20.18	21.46	23.16	23.42	22.29	20.47	19.04	16.22	15.04
2	10.09	09.05	07.37	06.51	05.10	03.42	03.28	04.47	06.17	07.39	08.09	09.38
	15.01	16.26	17.52	20.21	21.49	23.19	23.41	22.26	20.44	19.01	16.19	15.02
3	10.08	09.02	07.33	06.48	05.07	03.40	03.30	04.50	06.20	07.42	08.12	09.41
	15.03	16.29	17.55	20.24	21.52	23.21	23.40	22.23	20.40	18.58	16.16	15.01
4	10.07	08.59	07.30	06.44	05.04	03.37	03.32	04.53	06.22	07.45	08.15	09.43
	15.05	16.32	17.58	20.27	21.55	23.23	23.38	22.20	20.37	18.54	16.13	14.59
5	10.06	08.56	07.27	06.41	05.00	03.36	03.33	04.56	06.25	07.48	08.19	09.45
	15.07	16.36	18.01	20.30	21.58	23.25	23.37	22.17	20.34	18.51	16.10	14.57
6	10.05	08.53	07.23	06.37	04.57	03.34	03.35	04.59	06.28	07.51	08.22	09.48
	15.09	16.39	18.04	20.32	22.01	23.28	23.35	22.14	20.30	18.47	16.07	14.56
7	10.04	08.50	07.20	06.34	04.54	03.32	03.37	05.02	06.31	07.53	08.25	09.50
	15.11	16.42	18.07	20.35	22.04	23.30	23.33	22.10	20.27	18.44	16.04	14.55
8	10.02	08.47	07.16	06.31	04.51	03.30	03.39	05.05	06.33	07.56	08.28	09.52
	15.14	16.45	18.10	20.38	22.07	23.32	23.31	22.07	20.23	18.41	16.01	14.53
9	10.01	08.44	07.13	06.27	04.48	03.29	03.41	05.08	06.36	07.59	08.31	09.54
	15.16	16.48	18.13	20.41	22.10	23.33	23.30	22.04	20.20	18.37	15.58	14.52
10	09.59	08.41	07.10	06.24	04.45	03.27	03.44	05.11	06.39	08.02	08.34	09.56
	15.18	16.51	18.15	20.44	22.13	23.35	23.28	22.01	20.16	18.34	15.56	14.51
11	09.58	08.38	07.06	06.20	04.41	03.26	03.46	05.14	06.42	08.05	08.37	09.58
	15.21	16.54	18.18	20.47	22.16	23.37	23.26	21.58	20.13	18.31	15.53	14.50
12	09.56	08.35	07.03	06.17	04.38	03.25	03.48	05.16	06.44	08.07	08.40	10.00
	15.24	16.58	18.21	20.50	22.19	23.38	23.23	21.54	20.10	18.27	15.50	14.49
13	09.54	08.32	07.00	06.14	04.35	03.23	03.51	05.19	06.47	08.10	08.43	10.01
	15.26	17.01	18.24	20.53	22.22	23.40	23.21	21.51	20.06	18.24	15.47	14.49
14	09.52	08.29	06.56	06.10	04.32	03.22	03.53	05.22	06.50	08.13	08.46	10.03
	15.29	17.04	18.27	20.55	22.25	23.41	23.19	21.48	20.03	18.21	15.44	14.48
15	09.50	08.25	06.53	06.07	04.29	03.22	03.56	05.25	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	23.42	23.16	21.44	19.59	18.17	15.41	14.48
16	09.48	08.22	06.49	06.03	04.26	03.21	03.58	05.28	06.55	08.19	08.52	10.06
	15.34	17.10	18.33	21.01	22.31	23.43	23.14	21.41	19.56	18.14	15.39	14.47
17	09.46	08.19	06.46	06.00	04.23	03.20	04.01	05.31	06.58	08.22	08.55	10.07
	15.37	17.13	18.36	21.04	22.34	23.44	23.12	21.38	19.52	18.11	15.36	14.47
18	09.44	08.16	06.42	05.57	04.20	03.20	04.04	05.34	07.01	08.25	08.58	10.08
	15.40	17.16	18.38	21.07	22.37	23.45	23.09	21.35	19.49	18.07	15.34	14.47
19	09.41	08.13	06.39	05.53	04.17	03.19	04.06	05.37	07.04	08.28	09.01	10.09
	15.43	17.19	18.41	21.10	22.40	23.46	23.06	21.31	19.46	18.04	15.31	14.47
20	09.39	08.09	06.36	05.50	04.15	03.19	04.09	05.40	07.06	08.30	09.04	10.10
	15.46	17.22	18.44	21.13	22.43	23.46	23.04	21.28	19.42	18.01	15.28	14.47
21	09.37	08.06	06.32	05.46	04.12	03.19	04.12	05.43	07.09	08.33	09.07	10.11
	15.49	17.25	18.47	21.16	22.46	23.47	23.01	21.25	19.39	17.58	15.26	14.47
22	09.34	08.03	06.29	05.43	04.09	03.19	04.15	05.46	07.12	08.36	09.10	10.11
	15.52	17.28	18.50	21.19	22.49	23.47	22.58	21.21	19.35	17.54	15.23	14.48
23	09.32	08.00	06.25	05.40	04.06	03.20	04.18	05.48	07.15	08.39	09.13	10.12
	15.55	17.31	18.53	21.22	22.52	23.47	22.56	21.18	19.32	17.51	15.21	14.48
24	09.29	07.56	06.22	05.36	04.04	03.20	04.21	05.51	07.17	08.42	09.16	10.12
	15.58	17.34	18.55	21.25	22.55	23.47	22.53	21.14	19.28	17.48	15.19	14.49
25	09.27	07.53	06.19	05.33	04.01	03.21	04.23	05.54	07.20	07.45	09.19	10.12
	16.01	17.37	18.58	21.28	22.57	23.46	22.50	21.11	19.25	16.45	15.16	14.50
26	09.24	07.50	06.15	05.30	03.58	03.21	04.26	05.57	07.23	07.48	09.22	10.12
	16.04	17.40	19.01	21.31	23.00	23.46	22.47	21.08	19.22	16.41	15.14	14.51
27	09.21	07.47	06.12	05.26	03.56	03.22	04.29	06.00	07.26	07.51	09.25	10.12
	16.07	17.43	19.04	21.34	23.03	23.46	22.44	21.04	19.18	16.38	15.12	14.52
28	09.19	07.43	06.08	05.23	03.53	03.23	04.32	06.03	07.28	07.54	09.27	10.12
	16.10	17.46	19.07	21.37	23.06	23.45	22.41	21.01	19.15	16.35	15.10	14.53
29	09.16		07.05	05.20	03.51	03.24	04.35	06.06	07.31	07.57	09.30	10.12
	16.14		20.10	21.40	23.08	23.44	22.38	20.57	19.11	16.32	15.08	14.54
30	09.13		07.01	05.17	03.48	03.25	04.38	06.08	07.34	08.00	09.33	10.12
	16.17		20.12	21.43	23.11	23.43	22.35	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.11
	16.20		20.15		23.14		22.32	20.51		16.26		14.57
Potential sun hours	181	242	363	447	560	606	595	503	392	307	206	150
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.25/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke ForestShadow receptor: H - H Asuinrakennus (Vöyrintie 1021)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	547	428	409	541	812	1 087	1 287	891	718	583	592	8 612

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.08	07.40	06.55	05.13	03.44	03.27	04.44	06.14	07.37	08.06	09.35
	14.59	16.23	17.49	20.18	21.46	23.16	23.42	22.29	20.47	19.04	16.23	15.04
2	10.09	09.05	07.37	06.51	05.10	03.42	03.28	04.47	06.17	07.39	08.09	09.38
	15.01	16.26	17.52	20.21	21.49	23.18	23.41	22.26	20.44	19.01	16.19	15.02
3	10.08	09.02	07.33	06.48	05.07	03.40	03.30	04.50	06.20	07.42	08.12	09.41
	15.03	16.29	17.55	20.24	21.52	23.21	23.40	22.23	20.40	18.58	16.16	15.01
4	10.07	08.59	07.30	06.44	05.04	03.38	03.32	04.53	06.22	07.45	08.15	09.43
	15.05	16.33	17.58	20.27	21.55	23.23	23.38	22.20	20.37	18.54	16.13	14.59
5	10.06	08.56	07.27	06.41	05.00	03.36	03.33	04.56	06.25	07.48	08.19	09.45
	15.07	16.36	18.01	20.30	21.58	23.25	23.37	22.17	20.34	18.51	16.10	14.57
6	10.05	08.53	07.23	06.37	04.57	03.34	03.35	04.59	06.28	07.51	08.22	09.48
	15.09	16.39	18.04	20.32	22.01	23.28	23.35	22.14	20.30	18.47	16.07	14.56
7	10.04	08.50	07.20	06.34	04.54	03.32	03.37	05.02	06.31	07.53	08.25	09.50
	15.11	16.42	18.07	20.35	22.04	23.30	23.33	22.10	20.27	18.44	16.04	14.55
8	10.02	08.47	07.16	06.31	04.51	03.30	03.39	05.05	06.33	07.56	08.28	09.52
	15.14	16.45	18.10	20.38	22.07	23.32	23.31	22.07	20.23	18.41	16.01	14.53
9	10.01	08.44	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.59	08.31	09.54
	15.16	16.48	18.13	20.41	22.10	23.33	23.30	22.04	20.20	18.37	15.58	14.52
10	09.59	08.41	07.10	06.24	04.45	03.27	03.44	05.11	06.39	08.02	08.34	09.56
	15.19	16.51	18.16	20.44	22.13	23.35	23.28	22.01	20.16	18.34	15.56	14.51
11	09.58	08.38	07.06	06.20	04.42	03.26	03.46	05.14	06.42	08.05	08.37	09.58
	15.21	16.54	18.18	20.47	22.16	23.37	23.25	21.58	20.13	18.31	15.53	14.50
12	09.56	08.35	07.03	06.17	04.38	03.25	03.48	05.17	06.44	08.07	08.40	10.00
	15.24	16.58	18.21	20.50	22.19	23.38	23.23	21.54	20.10	18.27	15.50	14.49
13	09.54	08.32	07.00	06.14	04.35	03.24	03.51	05.19	06.47	08.10	08.43	10.01
	15.26	17.01	18.24	20.53	22.22	23.40	23.21	21.51	20.06	18.24	15.47	14.49
14	09.52	08.29	06.56	06.10	04.32	03.23	03.53	05.22	06.50	08.13	08.46	10.03
	15.29	17.04	18.27	20.56	22.25	23.41	23.19	21.48	20.03	18.21	15.44	14.48
15	09.50	08.25	06.53	06.07	04.29	03.22	03.56	05.25	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	23.42	23.16	21.44	19.59	18.17	15.42	14.48
16	09.48	08.22	06.49	06.03	04.26	03.21	03.59	05.28	06.55	08.19	08.52	10.06
	15.35	17.10	18.33	21.01	22.31	23.43	23.14	21.41	19.56	18.14	15.39	14.47
17	09.46	08.19	06.46	06.00	04.23	03.20	04.01	05.31	06.58	08.22	08.55	10.07
	15.37	17.13	18.36	21.04	22.34	23.44	23.12	21.38	19.52	18.11	15.36	14.47
18	09.44	08.16	06.43	05.57	04.20	03.20	04.04	05.34	07.01	08.25	08.58	10.08
	15.40	17.16	18.38	21.07	22.37	23.45	23.09	21.35	19.49	18.07	15.34	14.47
19	09.41	08.13	06.39	05.53	04.18	03.20	04.07	05.37	07.04	08.28	09.01	10.09
	15.43	17.19	18.41	21.10	22.40	23.46	23.06	21.31	19.46	18.04	15.31	14.47
20	09.39	08.09	06.36	05.50	04.15	03.19	04.09	05.40	07.06	08.31	09.04	10.10
	15.46	17.22	18.44	21.13	22.43	23.46	23.04	21.28	19.42	18.01	15.28	14.47
21	09.37	08.06	06.32	05.46	04.12	03.19	04.12	05.43	07.09	08.33	09.07	10.11
	15.49	17.25	18.47	21.16	22.46	23.46	23.01	21.25	19.39	17.58	15.26	14.47
22	09.34	08.03	06.29	05.43	04.09	03.19	04.15	05.46	07.12	08.36	09.10	10.11
	15.52	17.28	18.50	21.19	22.49	23.47	22.58	21.21	19.35	17.54	15.24	14.48
23	09.32	08.00	06.25	05.40	04.06	03.20	04.18	05.48	07.15	08.39	09.13	10.12
	15.55	17.31	18.53	21.22	22.52	23.47	22.56	21.18	19.32	17.51	15.21	14.48
24	09.29	07.56	06.22	05.36	04.04	03.20	04.21	05.51	07.17	08.42	09.16	10.12
	15.58	17.34	18.55	21.25	22.55	23.47	22.53	21.14	19.28	17.48	15.19	14.49
25	09.27	07.53	06.19	05.33	04.01	03.21	04.23	05.54	07.20	07.45	09.19	10.12
	16.01	17.37	18.58	21.28	22.57	23.46	22.50	21.11	19.25	16.45	15.17	14.50
26	09.24	07.50	06.15	05.30	03.58	03.21	04.26	05.57	07.23	07.48	09.22	10.12
	16.04	17.40	19.01	21.31	23.00	23.46	22.47	21.08	19.22	16.41	15.14	14.51
27	09.21	07.47	06.12	05.26	03.56	03.22	04.29	06.00	07.26	07.51	09.25	10.12
	16.07	17.43	19.04	21.34	23.03	23.45	22.44	21.04	19.18	16.38	15.12	14.52
28	09.19	07.43	06.08	05.23	03.53	03.23	04.32	06.03	07.28	07.54	09.27	10.12
	16.11	17.46	19.07	21.37	23.06	23.45	22.41	21.01	19.15	16.35	15.10	14.53
29	09.16		07.05	05.20	03.51	03.24	04.35	06.06	07.31	07.57	09.30	10.12
	16.14		20.10	21.40	23.08	23.44	22.38	20.57	19.11	16.32	15.08	14.54
30	09.13		07.01	05.17	03.48	03.26	04.38	06.08	07.34	08.00	09.33	10.12
	16.17		20.12	21.43	23.11	23.43	22.35	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.11
	16.20		20.15		23.14		22.32	20.51		16.26		14.57
Potential sun hours	181	242	363	447	560	606	595	503	392	307	206	150
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.25/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke Fores Shadow receptor: I - I Lomarakennus (Ehrsbackavägen 29)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	547	428	409	541	812	1 087	1 287	891	718	583	592	8 612

Idle start wind speed: Cut in wind speed from power curve

	January	February	March		April		May	June	July	August	September		October	November	December
1	10.10	09.07	07.40		06.55	07.53 (10)	05.14	03.44	03.27	04.44	06.14		07.37	08.06	09.35
	15.00	16.23	17.49		20.18	29 08.22 (10)	21.46	23.16	23.42	22.29	20.47		19.04	16.23	15.04
2	10.09	09.05	07.37		06.51	07.54 (10)	05.10	03.42	03.29	04.47	06.17	08.03 (10)	07.39	08.09	09.38
	15.01	16.26	17.52		20.21	28 08.22 (10)	21.49	23.18	23.41	22.26	20.44	2 08.05 (10)	19.01	16.20	15.03
3	10.08	09.02	07.33		06.48	07.54 (10)	05.07	03.40	03.30	04.50	06.20	07.57 (10)	07.42	08.12	09.40
	15.03	16.30	17.55		20.24	28 08.22 (10)	21.52	23.21	23.39	22.23	20.40	13 08.10 (10)	18.58	16.17	15.01
4	10.07	08.59	07.30		06.44	07.54 (10)	05.04	03.38	03.32	04.53	06.22	07.54 (10)	07.45	08.15	09.43
	15.05	16.33	17.58		20.27	26 08.20 (10)	21.55	23.23	23.38	22.20	20.37	18 08.12 (10)	18.54	16.13	14.59
5	10.06	08.56	07.27		06.41	07.54 (10)	05.01	03.36	03.34	04.56	06.25	07.53 (10)	07.48	08.18	09.45
	15.07	16.36	18.01		20.30	26 08.20 (10)	21.58	23.25	23.36	22.17	20.34	20 08.13 (10)	18.51	16.10	14.58
6	10.05	08.53	07.23		06.37	07.55 (10)	04.57	03.34	03.36	04.59	06.28	07.51 (10)	07.51	08.22	09.47
	15.09	16.39	18.04		20.32	24 08.19 (10)	22.01	23.27	23.35	22.13	20.30	23 08.14 (10)	18.48	16.07	14.56
7	10.04	08.50	07.20		06.34	07.56 (10)	04.54	03.32	03.38	05.02	06.31	07.50 (10)	07.53	08.25	09.50
	15.12	16.42	18.07		20.35	20 08.16 (10)	22.04	23.29	23.33	22.10	20.27	25 08.15 (10)	18.44	16.04	14.55
8	10.02	08.47	07.16		06.31	07.57 (10)	04.51	03.31	03.40	05.05	06.34	07.49 (10)	07.56	08.28	09.52
	15.14	16.45	18.10		20.38	18 08.15 (10)	22.07	23.31	23.31	22.07	20.23	27 08.16 (10)	18.41	16.02	14.54
9	10.01	08.44	07.13		06.27	07.59 (10)	04.48	03.29	03.42	05.08	06.36	07.47 (10)	07.59	08.31	09.54
	15.16	16.48	18.13		20.41	13 08.12 (10)	22.10	23.33	23.29	22.04	20.20	28 08.15 (10)	18.37	15.59	14.53
10	09.59	08.41	07.10		06.24	08.04 (10)	04.45	03.28	03.44	05.11	06.39	07.47 (10)	08.02	08.34	09.56
	15.19	16.51	18.16		20.44	1 08.05 (10)	22.13	23.35	23.27	22.01	20.16	28 08.15 (10)	18.34	15.56	14.51
11	09.57	08.38	07.06		06.20		04.42	03.26	03.46	05.14	06.42	07.47 (10)	08.05	08.37	09.58
	15.21	16.55	18.18		20.47		22.16	23.37	23.25	21.57	20.13	29 08.16 (10)	18.31	15.53	14.51
12	09.56	08.35	07.03		06.17		04.39	03.25	03.49	05.17	06.45	07.46 (10)	08.07	08.40	09.59
	15.24	16.58	18.21		20.50		22.19	23.38	23.23	21.54	20.10	29 08.15 (10)	18.27	15.50	14.50
13	09.54	08.32	07.00		06.14		04.36	03.24	03.51	05.20	06.47	07.46 (10)	08.10	08.43	10.01
	15.27	17.01	18.24		20.53		22.22	23.40	23.21	21.51	20.06	28 08.14 (10)	18.24	15.47	14.49
14	09.52	08.28	06.56		06.10		04.33	03.23	03.54	05.23	06.50	07.46 (10)	08.13	08.46	10.03
	15.29	17.04	18.27		20.55		22.25	23.41	23.19	21.48	20.03	28 08.14 (10)	18.21	15.44	14.48
15	09.50	08.25	06.53		06.07		04.30	03.22	03.56	05.25	06.53	07.46 (10)	08.16	08.49	10.04
	15.32	17.07	18.30		20.58		22.28	23.42	23.16	21.44	19.59	26 08.12 (10)	18.17	15.42	14.48
16	09.48	08.22	06.49		06.03		04.27	03.21	03.59	05.28	06.55	07.46 (10)	08.19	08.52	10.05
	15.35	17.10	18.33		21.01		22.31	23.43	23.14	21.41	19.56	26 08.12 (10)	18.14	15.39	14.48
17	09.46	08.19	06.46		06.00		04.24	03.21	04.01	05.31	06.58	07.47 (10)	08.22	08.55	10.07
	15.38	17.13	18.36		21.04		22.34	23.44	23.11	21.38	19.52	24 08.11 (10)	18.11	15.36	14.47
18	09.43	08.16	06.43		05.57		04.21	03.20	04.04	05.34	07.01	07.48 (10)	08.25	08.58	10.08
	15.40	17.16	18.38		21.07		22.37	23.45	23.09	21.34	19.49	20 08.08 (10)	18.07	15.34	14.47
19	09.41	08.13	06.39		05.53		04.18	03.20	04.07	05.37	07.04	07.49 (10)	08.28	09.01	10.09
	15.43	17.19	18.41		21.10		22.40	23.45	23.06	21.31	19.46	17 08.06 (10)	18.04	15.31	14.47
20	09.39	08.09	06.36		05.50		04.15	03.20	04.10	05.40	07.06	07.52 (10)	08.30	09.04	10.10
	15.46	17.22	18.44		21.13		22.43	23.46	23.04	21.28	19.42	12 08.04 (10)	18.01	15.29	14.47
21	09.36	08.06	06.32		05.47		04.12	03.20	04.12	05.43	07.09		08.33	09.07	10.10
	15.49	17.25	18.47		21.16		22.46	23.46	23.01	21.24	19.39		17.58	15.26	14.48
22	09.34	08.03	06.29		05.43		04.09	03.20	04.15	05.46	07.12		08.36	09.10	10.11
	15.52	17.28	18.50		21.19		22.49	23.46	22.58	21.21	19.35		17.54	15.24	14.48
23	09.32	08.00	06.25	07.06 (10)	05.40		04.07	03.20	04.18	05.49	07.15		08.39	09.13	10.11
	15.55	17.31	18.53	10 07.16 (10)	21.22		22.52	23.46	22.55	21.18	19.32		17.51	15.21	14.49
24	09.29	07.56	06.22	07.03 (10)	05.37		04.04	03.21	04.21	05.51	07.17		08.42	09.16	10.12
	15.58	17.34	18.55	16 07.19 (10)	21.25		22.54	23.46	22.53	21.14	19.28		17.48	15.19	14.49
25	09.26	07.53	06.19	07.00 (10)	05.33		04.01	03.21	04.24	05.54	07.20		07.45	09.19	10.12
	16.01	17.37	18.58	20 07.20 (10)	21.28		22.57	23.46	22.50	21.11	19.25		16.45	15.17	14.50
26	09.24	07.50	06.15	06.59 (10)	05.30		03.59	03.22	04.27	05.57	07.23		07.48	09.22	10.12
	16.05	17.40	19.01	23 07.22 (10)	21.31		23.00	23.46	22.47	21.08	19.22		16.42	15.15	14.51
27	09.21	07.46	06.12	06.57 (10)	05.27		03.56	03.23	04.29	06.00	07.26		07.51	09.24	10.12
	16.08	17.43	19.04	25 07.22 (10)	21.34		23.03	23.45	22.44	21.04	19.18		16.38	15.12	14.52
28	09.19	07.43	06.08	06.56 (10)	05.23		03.54	03.24	04.32	06.03	07.28		07.54	09.27	10.12
	16.11	17.46	19.07	27 07.23 (10)	21.37		23.05	23.44	22.41	21.01	19.15		16.35	15.10	14.53
29	09.16		07.05	07.56 (10)	05.20		03.51	03.25	04.35	06.06	07.31		07.57	09.30	10.12
	16.14		20.10	27 08.23 (10)	21.40		23.08	23.44	22.38	20.57	19.11		16.32	15.08	14.55
30	09.13		07.01	07.55 (10)	05.17		03.49	03.26	04.38	06.08	07.34		08.00	09.33	10.11
	16.17		20.12	28 08.23 (10)	21.43		23.11	23.43	22.35	20.54	19.08		16.29	15.06	14.56
31	09.10		06.58	07.54 (10)			03.46		04.41	06.11			08.03		10.11
	16.20		20.15	29 08.23 (10)			23.13		22.32	20.51			16.26		14.57
Potential sun hours	182	242	363		447		559	606	595	502	392		308	206	151
Total, worst case				205		213						423			
Sun reduction				0,32		0,41						0,33			
Oper. time red.				0,98		0,98						0,98			
Wind dir. red.				0,58		0,58						0,58			
Total reduction				0,19		0,24						0,19			
Total, real				38		50						80			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)		First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker	(WTG causing flicker last time)

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Calculated:
14.7.2023 9.25/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke ForestShadow receptor: J - J Asuinrakennus (Kleidersvägen 118)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	547	428	409	541	812	1 087	1 287	891	718	583	592	8 612

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May		June		July		August	September	October	November	December
1	10.10	09.07	07.40	06.55	05.14		03.44	05.20 (10)	03.27	05.28 (10)	04.44	06.14	07.37	08.06	09.35
	15.00	16.23	17.49	20.18	21.46		23.16	26 05.46 (10)	23.42	20 05.48 (10)	22.29	20.47	19.04	16.23	15.05
2	10.09	09.05	07.37	06.51	05.10		03.42	05.20 (10)	03.29	05.28 (10)	04.47	06.17	07.39	08.09	09.38
	15.01	16.26	17.52	20.21	21.49		23.18	25 05.45 (10)	23.40	21 05.49 (10)	22.26	20.44	19.01	16.20	15.03
3	10.08	09.02	07.33	06.48	05.07		03.40	05.21 (10)	03.30	05.28 (10)	04.50	06.20	07.42	08.12	09.40
	15.03	16.30	17.55	20.24	21.52		23.20	24 05.45 (10)	23.39	21 05.49 (10)	22.23	20.40	18.58	16.17	15.01
4	10.07	08.59	07.30	06.44	05.04		03.38	05.21 (10)	03.32	05.29 (10)	04.53	06.22	07.45	08.15	09.43
	15.05	16.33	17.58	20.27	21.55		23.23	24 05.45 (10)	23.38	21 05.50 (10)	22.20	20.37	18.54	16.14	14.59
5	10.06	08.56	07.27	06.41	05.01		03.36	05.21 (10)	03.34	05.28 (10)	04.56	06.25	07.48	08.18	09.45
	15.07	16.36	18.01	20.30	21.58		23.25	24 05.45 (10)	23.36	22 05.50 (10)	22.17	20.34	18.51	16.11	14.58
6	10.05	08.53	07.23	06.38	04.57		03.34	05.22 (10)	03.36	05.29 (10)	04.59	06.28	07.50	08.21	09.47
	15.10	16.39	18.04	20.32	22.01		23.27	23 05.45 (10)	23.35	22 05.51 (10)	22.13	20.30	18.48	16.08	14.56
7	10.03	08.50	07.20	06.34	04.54		03.32	05.22 (10)	03.38	05.28 (10)	05.02	06.31	07.53	08.25	09.50
	15.12	16.42	18.07	20.35	22.04		23.29	23 05.45 (10)	23.33	23 05.51 (10)	22.10	20.27	18.44	16.05	14.55
8	10.02	08.47	07.16	06.31	04.51		03.31	05.23 (10)	03.40	05.28 (10)	05.05	06.34	07.56	08.28	09.52
	15.14	16.45	18.10	20.38	22.07		23.31	22 05.45 (10)	23.31	24 05.52 (10)	22.07	20.23	18.41	16.02	14.54
9	10.00	08.44	07.13	06.27	04.48		03.29	05.23 (10)	03.42	05.28 (10)	05.08	06.36	07.59	08.31	09.54
	15.16	16.48	18.13	20.41	22.10		23.33	22 05.45 (10)	23.29	24 05.52 (10)	22.04	20.20	18.37	15.59	14.53
10	09.59	08.41	07.10	06.24	04.45		03.28	05.24 (10)	03.44	05.28 (10)	05.11	06.39	08.02	08.34	09.56
	15.19	16.52	18.16	20.44	22.13		23.35	20 05.44 (10)	23.27	25 05.53 (10)	22.01	20.16	18.34	15.56	14.52
11	09.57	08.38	07.06	06.20	04.42		03.26	05.24 (10)	03.47	05.28 (10)	05.14	06.42	08.05	08.37	09.58
	15.21	16.55	18.18	20.47	22.16		23.36	20 05.44 (10)	23.25	25 05.53 (10)	21.57	20.13	18.31	15.53	14.51
12	09.55	08.35	07.03	06.17	04.39		05.29 (10)	03.25	05.25 (10)	03.49	05.27 (10)	05.17	06.45	08.07	08.40	09.59
	15.24	16.58	18.21	20.50	22.19	5	05.34 (10)	23.38	20 05.45 (10)	23.23	26 05.53 (10)	21.54	20.10	18.27	15.50	14.50
13	09.54	08.32	07.00	06.14	04.36		05.26 (10)	03.24	05.25 (10)	03.51	05.28 (10)	05.20	06.47	08.10	08.43	10.01
	15.27	17.01	18.24	20.53	22.22	11	05.37 (10)	23.39	19 05.44 (10)	23.21	25 05.53 (10)	21.51	20.06	18.24	15.47	14.49
14	09.52	08.28	06.56	06.10	04.33		05.24 (10)	03.23	05.26 (10)	03.54	05.28 (10)	05.23	06.50	08.13	08.46	10.03
	15.29	17.04	18.27	20.55	22.25	15	05.39 (10)	23.41	19 05.45 (10)	23.18	26 05.54 (10)	21.48	20.03	18.21	15.45	14.48
15	09.50	08.25	06.53	06.07	04.30		05.22 (10)	03.22	05.26 (10)	03.56	05.28 (10)	05.26	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	18	05.40 (10)	23.42	18 05.44 (10)	23.16	26 05.54 (10)	21.44	19.59	18.17	15.42	14.48
16	09.48	08.22	06.49	06.03	04.27		05.22 (10)	03.22	05.26 (10)	03.59	05.28 (10)	05.28	06.55	08.19	08.52	10.05
	15.35	17.10	18.33	21.01	22.31	19	05.41 (10)	23.43	18 05.44 (10)	23.14	26 05.54 (10)	21.41	19.56	18.14	15.39	14.48
17	09.45	08.19	06.46	06.00	04.24		05.20 (10)	03.21	05.27 (10)	04.02	05.28 (10)	05.31	06.58	08.22	08.55	10.07
	15.38	17.13	18.36	21.04	22.34	21	05.41 (10)	23.44	18 05.45 (10)	23.11	26 05.54 (10)	21.38	19.52	18.11	15.36	14.47
18	09.43	08.16	06.43	05.57	04.21		05.20 (10)	03.20	05.26 (10)	04.04	05.28 (10)	05.34	07.01	08.25	08.58	10.08
	15.41	17.16	18.38	21.07	22.37	22	05.42 (10)	23.44	18 05.44 (10)	23.09	26 05.54 (10)	21.34	19.49	18.07	15.34	14.47
19	09.41	08.13	06.39	05.53	04.18		05.20 (10)	03.20	05.27 (10)	04.07	05.28 (10)	05.37	07.04	08.28	09.01	10.09
	15.43	17.19	18.41	21.10	22.40	23	05.43 (10)	23.45	17 05.44 (10)	23.06	26 05.54 (10)	21.31	19.46	18.04	15.31	14.47
20	09.39	08.09	06.36	05.50	04.15		05.19 (10)	03.20	05.27 (10)	04.10	05.29 (10)	05.40	07.06	08.30	09.04	10.10
	15.46	17.22	18.44	21.13	22.43	24	05.43 (10)	23.46	17 05.44 (10)	23.03	26 05.55 (10)	21.28	19.42	18.01	15.29	14.48
21	09.36	08.06	06.32	05.47	04.12		05.19 (10)	03.20	05.28 (10)	04.12	05.29 (10)	05.43	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.16	22.46	25	05.44 (10)	23.46	17 05.45 (10)	23.01	25 05.54 (10)	21.24	19.39	17.58	15.26	14.48
22	09.34	08.03	06.29	05.43	04.09		05.19 (10)	03.20	05.28 (10)	04.15	05.29 (10)	05.46	07.12	08.36	09.10	10.11
	15.52	17.28	18.50	21.19	22.49	25	05.44 (10)	23.46	17 05.45 (10)	22.58	25 05.54 (10)	21.21	19.35	17.54	15.24	14.48
23	09.31	08.00	06.25	05.40	04.07		05.19 (10)	03.20	05.28 (10)	04.18	05.29 (10)	05.49	07.15	08.39	09.13	10.11
	15.55	17.31	18.53	21.22	22.51	26	05.45 (10)	23.46	17 05.45 (10)	22.55	24 05.53 (10)	21.18	19.32	17.51	15.21	14.49
24	09.29	07.56	06.22	05.37	04.04		05.19 (10)	03.21	05.28 (10)	04.21	05.30 (10)	05.52	07.17	08.42	09.16	10.12
	15.58	17.34	18.55	21.25	22.54	26	05.45 (10)	23.46	18 05.46 (10)	22.52	24 05.54 (10)	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.19	05.33	04.01		05.19 (10)	03.21	05.28 (10)	04.24	05.30 (10)	05.54	07.20	07.45	09.19	10.12
	16.02	17.37	18.58	21.28	22.57	26	05.45 (10)	23.46	18 05.46 (10)	22.50	23 05.53 (10)	21.11	19.25	16.45	15.17	14.50
26	09.24	07.50	06.15	05.30	03.59		05.19 (10)	03.22	05.29 (10)	04.27	05.30 (10)	05.57	07.23	07.48	09.22	10.12
	16.05	17.40	19.01	21.31	23.00	26	05.45 (10)	23.45	18 05.47 (10)	22.47	22 05.52 (10)	21.08	19.22	16.42	15.15	14.51
27	09.21	07.46	06.12	05.27	03.56		05.19 (10)	03.23	05.28 (10)	04.30	05.32 (10)	06.00	07.26	07.51	09.24	10.12
	16.08	17.43	19.04	21.34	23.03	26	05.45 (10)	23.45	18 05.46 (10)	22.44	20 05.52 (10)	21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.54		05.19 (10)	03.24	05.28 (10)	04.33	05.32 (10)	06.03	07.28	07.54	09.27	10.12
	16.11	17.46	19.07	21.37	23.05	26	05.45 (10)	23.44	19 05.47 (10)	22.41	19 05.51 (10)	21.01	19.15	16.35	15.10	14.53
29	09.16		07.05	05.20	03.51		05.19 (10)	03.25	05.28 (10)	04.35	05.34 (10)	06.06	07.31	07.57	09.30	10.12
	16.14		20.10	21.40	23.08	26	05.45 (10)	23.43	19 05.47 (10)	22.38	16 05.50 (10)	20.57	19.11	16.32	15.08	14.55
30	09.13		07.01	05.17	03.49		05.20 (10)	03.26	05.28 (10)	04.38	05.35 (10)	06.08	07.34	08.00	09.33	10.11
	16.17		20.12	21.43	23.11	25	05.45 (10)	23.43	20 05.48 (10)	22.35	13 05.48 (10)	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.47		05.20 (10)			04.41	05.38 (10)	06.11		08.03		10.11
	16.20		20.15		23.13	25	05.45 (10)			22.32	9 05.47 (10)	20.51		16.26		14.58
Potential sun hours	182	242	363	447	559		605		594		502	392	308	206	151	
Total, worst case						440		598		701						
Sun reduction						0,48		0,49		0,39						
Oper. time red.						0,98		0,98		0,98						
Wind dir. red.						0,62		0,62		0,62						
Total reduction						0,29		0,30		0,24						
Total, real						128		180		166						

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)		First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker	(WTG causing flicker last time)

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Calculated:
14.7.2023 9.25/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke Forest Shadow receptor: K - K Asuinrakennus (Rökiöntie 154)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	547	428	409	541	812	1 087	1 287	891	718	583	592	8 612

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.40	06.55	05.14	03.45	03.28	04.45	06.14	07.37	08.06	09.35
	15.00	16.24	17.49	20.18	21.46	23.15	23.41	22.29	20.47	19.05	16.23	15.05
2	10.09	09.04	07.36	06.51	05.11	03.43	03.29	04.48	06.17	07.39	08.09	09.37
	15.02	16.27	17.52	20.21	21.49	23.18	23.40	22.26	20.44	19.01	16.20	15.03
3	10.08	09.02	07.33	06.48	05.07	03.41	03.31	04.50	06.20	07.42	08.12	09.40
	15.04	16.30	17.55	20.24	21.52	23.20	23.39	22.23	20.40	18.58	16.17	15.01
4	10.07	08.59	07.30	06.44	05.04	03.39	03.33	04.53	06.23	07.45	08.15	09.42
	15.06	16.33	17.58	20.27	21.55	23.22	23.37	22.19	20.37	18.54	16.14	15.00
5	10.06	08.56	07.26	06.41	05.01	03.37	03.34	04.56	06.25	07.48	08.18	09.45
	15.08	16.36	18.01	20.29	21.58	23.24	23.36	22.16	20.33	18.51	16.11	14.58
6	10.04	08.53	07.23	06.38	04.58	03.35	03.36	04.59	06.28	07.50	08.21	09.47
	15.10	16.39	18.04	20.32	22.01	23.27	23.34	22.13	20.30	18.48	16.08	14.57
7	10.03	08.50	07.20	06.34	04.55	03.33	03.38	05.02	06.31	07.53	08.24	09.49
	15.12	16.42	18.07	20.35	22.04	23.29	23.32	22.10	20.27	18.44	16.05	14.55
8	10.02	08.47	07.16	06.31	04.51	03.31	03.40	05.05	06.34	07.56	08.27	09.51
	15.14	16.45	18.10	20.38	22.07	23.31	23.31	22.07	20.23	18.41	16.02	14.54
9	10.00	08.44	07.13	06.27	04.48	03.30	03.43	05.08	06.36	07.59	08.30	09.53
	15.17	16.49	18.13	20.41	22.10	23.32	23.29	22.04	20.20	18.38	15.59	14.53
10	09.59	08.41	07.10	06.24	04.45	03.28	03.45	05.11	06.39	08.02	08.34	09.55
	15.19	16.52	18.16	20.44	22.13	23.34	23.27	22.00	20.16	18.34	15.56	14.52
11	09.57	08.38	07.06	06.21	04.42	03.27	03.47	05.14	06.42	08.05	08.37	09.57
	15.22	16.55	18.18	20.47	22.16	23.36	23.25	21.57	20.13	18.31	15.53	14.51
12	09.55	08.35	07.03	06.17	04.39	03.26	03.49	05.17	06.45	08.07	08.40	09.59
	15.24	16.58	18.21	20.50	22.19	23.37	23.22	21.54	20.10	18.27	15.50	14.50
13	09.53	08.31	07.00	06.14	04.36	03.25	03.52	05.20	06.47	08.10	08.43	10.01
	15.27	17.01	18.24	20.52	22.22	23.39	23.20	21.51	20.06	18.24	15.48	14.50
14	09.51	08.28	06.56	06.10	04.33	03.24	03.54	05.23	06.50	08.13	08.46	10.02
	15.30	17.04	18.27	20.55	22.25	23.40	23.18	21.47	20.03	18.21	15.45	14.49
15	09.49	08.25	06.53	06.07	04.30	03.23	03.57	05.26	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	23.41	23.16	21.44	19.59	18.18	15.42	14.48
16	09.47	08.22	06.49	06.04	04.27	03.22	03.59	05.29	06.56	08.19	08.52	10.05
	15.35	17.10	18.33	21.01	22.31	23.42	23.13	21.41	19.56	18.14	15.39	14.48
17	09.45	08.19	06.46	06.00	04.24	03.22	04.02	05.32	06.58	08.22	08.55	10.06
	15.38	17.13	18.36	21.04	22.34	23.43	23.11	21.38	19.52	18.11	15.37	14.48
18	09.43	08.16	06.43	05.57	04.21	03.21	04.05	05.34	07.01	08.25	08.58	10.07
	15.41	17.16	18.38	21.07	22.37	23.44	23.08	21.34	19.49	18.08	15.34	14.48
19	09.41	08.12	06.39	05.54	04.18	03.21	04.07	05.37	07.04	08.27	09.01	10.08
	15.44	17.19	18.41	21.10	22.40	23.45	23.06	21.31	19.46	18.04	15.32	14.48
20	09.38	08.09	06.36	05.50	04.15	03.21	04.10	05.40	07.06	08.30	09.04	10.09
	15.47	17.22	18.44	21.13	22.42	23.45	23.03	21.28	19.42	18.01	15.29	14.48
21	09.36	08.06	06.32	05.47	04.13	03.21	04.13	05.43	07.09	08.33	09.07	10.10
	15.50	17.26	18.47	21.16	22.45	23.45	23.00	21.24	19.39	17.58	15.27	14.48
22	09.34	08.03	06.29	05.43	04.10	03.21	04.16	05.46	07.12	08.36	09.10	10.10
	15.53	17.29	18.50	21.19	22.48	23.46	22.58	21.21	19.35	17.55	15.24	14.49
23	09.31	08.00	06.25	05.40	04.07	03.21	04.18	05.49	07.15	08.39	09.13	10.11
	15.56	17.32	18.53	21.22	22.51	23.46	22.55	21.18	19.32	17.51	15.22	14.49
24	09.29	07.56	06.22	05.37	04.04	03.21	04.21	05.52	07.17	08.42	09.16	10.11
	15.59	17.35	18.55	21.25	22.54	23.46	22.52	21.14	19.28	17.48	15.19	14.50
25	09.26	07.53	06.19	05.33	04.02	03.22	04.24	05.55	07.20	07.45	09.18	10.12
	16.02	17.38	18.58	21.28	22.57	23.45	22.49	21.11	19.25	16.45	15.17	14.51
26	09.24	07.50	06.15	05.30	03.59	03.23	04.27	05.57	07.23	07.48	09.21	10.12
	16.05	17.41	19.01	21.31	23.00	23.45	22.46	21.07	19.22	16.42	15.15	14.52
27	09.21	07.46	06.12	05.27	03.57	03.23	04.30	06.00	07.26	07.51	09.24	10.12
	16.08	17.43	19.04	21.34	23.02	23.44	22.44	21.04	19.18	16.39	15.13	14.53
28	09.18	07.43	06.08	05.24	03.54	03.24	04.33	06.03	07.28	07.54	09.27	10.11
	16.11	17.46	19.07	21.37	23.05	23.44	22.41	21.01	19.15	16.35	15.11	14.54
29	09.16		07.05	05.20	03.52	03.25	04.36	06.06	07.31	07.57	09.30	10.11
	16.14		20.10	21.40	23.08	23.43	22.38	20.57	19.11	16.32	15.09	14.55
30	09.13		07.02	05.17	03.49	03.27	04.39	06.09	07.34	08.00	09.32	10.11
	16.17		20.12	21.43	23.10	23.42	22.35	20.54	19.08	16.29	15.07	14.57
31	09.10		06.58		03.47		04.42	06.11		08.03		10.10
	16.20		20.15		23.13		22.32	20.51		16.26		14.58
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.25/3.5.584

SHADOW - Calendar

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke Fores Shadow receptor: L - L Asuinrakennus (Bjurbäcksvägen 231)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	547	428	409	541	812	1 087	1 287	891	718	583	592	8 612

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.40	06.55	05.14	03.45	03.28	04.45	06.14	07.36	08.06	09.35
	15.00	16.23	17.49	20.18	21.45	23.15	23.41	22.28	20.47	19.04	16.23	15.05
2	10.08	09.04	07.36	06.51	05.10	03.43	03.30	04.47	06.17	07.39	08.09	09.37
	15.02	16.27	17.52	20.21	21.48	23.17	23.39	22.25	20.44	19.01	16.20	15.03
3	10.07	09.01	07.33	06.48	05.07	03.41	03.31	04.50	06.20	07.42	08.12	09.40
	15.04	16.30	17.55	20.24	21.51	23.20	23.38	22.22	20.40	18.58	16.17	15.01
4	10.06	08.58	07.30	06.44	05.04	03.39	03.33	04.53	06.22	07.45	08.15	09.42
	15.06	16.33	17.58	20.26	21.54	23.22	23.37	22.19	20.37	18.54	16.14	15.00
5	10.05	08.55	07.26	06.41	05.01	03.37	03.35	04.56	06.25	07.48	08.18	09.44
	15.08	16.36	18.01	20.29	21.57	23.24	23.35	22.16	20.33	18.51	16.11	14.58
6	10.04	08.52	07.23	06.38	04.58	03.35	03.36	04.59	06.28	07.50	08.21	09.47
	15.10	16.39	18.04	20.32	22.00	23.26	23.34	22.13	20.30	18.47	16.08	14.57
7	10.03	08.50	07.20	06.34	04.54	03.33	03.38	05.02	06.31	07.53	08.24	09.49
	15.12	16.42	18.07	20.35	22.03	23.28	23.32	22.10	20.26	18.44	16.05	14.55
8	10.01	08.47	07.16	06.31	04.51	03.31	03.40	05.05	06.34	07.56	08.27	09.51
	15.14	16.45	18.10	20.38	22.06	23.30	23.30	22.07	20.23	18.41	16.02	14.54
9	10.00	08.44	07.13	06.27	04.48	03.30	03.43	05.08	06.36	07.59	08.30	09.53
	15.17	16.49	18.13	20.41	22.09	23.32	23.28	22.03	20.20	18.37	15.59	14.53
10	09.58	08.40	07.10	06.24	04.45	03.28	03.45	05.11	06.39	08.02	08.33	09.55
	15.19	16.52	18.15	20.44	22.12	23.34	23.26	22.00	20.16	18.34	15.56	14.52
11	09.57	08.37	07.06	06.20	04.42	03.27	03.47	05.14	06.42	08.04	08.36	09.57
	15.22	16.55	18.18	20.46	22.15	23.35	23.24	21.57	20.13	18.31	15.53	14.51
12	09.55	08.34	07.03	06.17	04.39	03.26	03.49	05.17	06.44	08.07	08.39	09.59
	15.24	16.58	18.21	20.49	22.18	23.37	23.22	21.54	20.09	18.27	15.50	14.50
13	09.53	08.31	06.59	06.14	04.36	03.25	03.52	05.20	06.47	08.10	08.42	10.00
	15.27	17.01	18.24	20.52	22.21	23.38	23.20	21.50	20.06	18.24	15.47	14.50
14	09.51	08.28	06.56	06.10	04.33	03.24	03.54	05.23	06.50	08.13	08.46	10.02
	15.30	17.04	18.27	20.55	22.24	23.40	23.18	21.47	20.03	18.21	15.45	14.49
15	09.49	08.25	06.53	06.07	04.30	03.23	03.57	05.26	06.53	08.16	08.49	10.03
	15.32	17.07	18.30	20.58	22.27	23.41	23.15	21.44	19.59	18.17	15.42	14.48
16	09.47	08.22	06.49	06.04	04.27	03.22	03.59	05.29	06.55	08.19	08.52	10.05
	15.35	17.10	18.33	21.01	22.30	23.42	23.13	21.41	19.56	18.14	15.39	14.48
17	09.45	08.19	06.46	06.00	04.24	03.22	04.02	05.31	06.58	08.21	08.55	10.06
	15.38	17.13	18.35	21.04	22.33	23.43	23.11	21.37	19.52	18.11	15.37	14.48
18	09.43	08.15	06.42	05.57	04.21	03.21	04.05	05.34	07.01	08.24	08.58	10.07
	15.41	17.16	18.38	21.07	22.36	23.44	23.08	21.34	19.49	18.07	15.34	14.48
19	09.40	08.12	06.39	05.53	04.18	03.21	04.07	05.37	07.04	08.27	09.01	10.08
	15.44	17.19	18.41	21.10	22.39	23.44	23.05	21.31	19.45	18.04	15.31	14.48
20	09.38	08.09	06.36	05.50	04.15	03.21	04.10	05.40	07.06	08.30	09.04	10.09
	15.47	17.22	18.44	21.13	22.42	23.45	23.03	21.27	19.42	18.01	15.29	14.48
21	09.36	08.06	06.32	05.47	04.13	03.21	04.13	05.43	07.09	08.33	09.07	10.10
	15.50	17.25	18.47	21.16	22.45	23.45	23.00	21.24	19.39	17.58	15.27	14.48
22	09.33	08.03	06.29	05.43	04.10	03.21	04.16	05.46	07.12	08.36	09.10	10.10
	15.53	17.28	18.50	21.18	22.48	23.45	22.57	21.21	19.35	17.54	15.24	14.49
23	09.31	07.59	06.25	05.40	04.07	03.21	04.18	05.49	07.14	08.39	09.12	10.11
	15.56	17.31	18.52	21.21	22.51	23.45	22.55	21.17	19.32	17.51	15.22	14.49
24	09.28	07.56	06.22	05.37	04.04	03.21	04.21	05.52	07.17	08.42	09.15	10.11
	15.59	17.34	18.55	21.24	22.54	23.45	22.52	21.14	19.28	17.48	15.19	14.50
25	09.26	07.53	06.19	05.33	04.02	03.22	04.24	05.54	07.20	07.45	09.18	10.11
	16.02	17.37	18.58	21.27	22.56	23.45	22.49	21.11	19.25	16.45	15.17	14.51
26	09.23	07.50	06.15	05.30	03.59	03.23	04.27	05.57	07.23	07.48	09.21	10.11
	16.05	17.40	19.01	21.30	22.59	23.45	22.46	21.07	19.21	16.42	15.15	14.52
27	09.21	07.46	06.12	05.27	03.57	03.23	04.30	06.00	07.25	07.51	09.24	10.11
	16.08	17.43	19.04	21.33	23.02	23.44	22.43	21.04	19.18	16.38	15.13	14.53
28	09.18	07.43	06.08	05.24	03.54	03.24	04.33	06.03	07.28	07.54	09.27	10.11
	16.11	17.46	19.07	21.36	23.05	23.43	22.40	21.01	19.15	16.35	15.11	14.54
29	09.15		07.05	05.20	03.52	03.26	04.36	06.06	07.31	07.57	09.29	10.11
	16.14		20.09	21.39	23.07	23.43	22.37	20.57	19.11	16.32	15.09	14.55
30	09.13		07.01	05.17	03.49	03.27	04.39	06.09	07.34	08.00	09.32	10.10
	16.17		20.12	21.42	23.10	23.42	22.34	20.54	19.08	16.29	15.07	14.57
31	09.10		06.58		03.47		04.42	06.11		08.03		10.10
	16.20		20.15		23.12		22.31	20.50		16.26		14.58
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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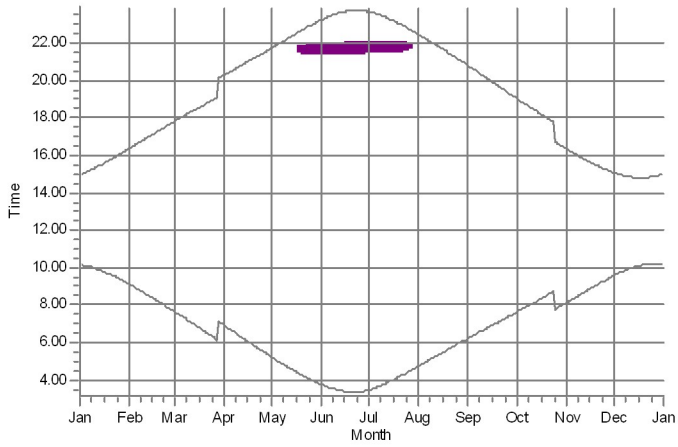
Calculated:
14.7.2023 9.25/3.5.584

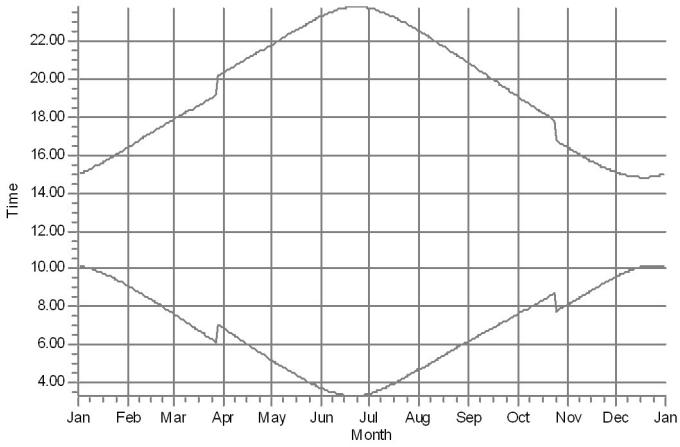
SHADOW - Calendar, graphical

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke Forest

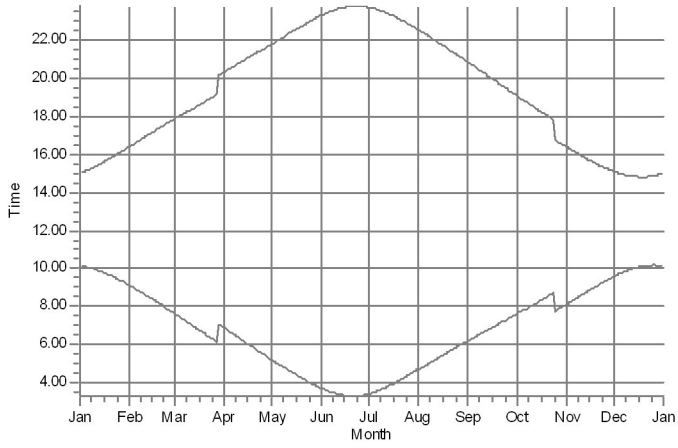
A: A Lomarakennus (Söderändan 49)



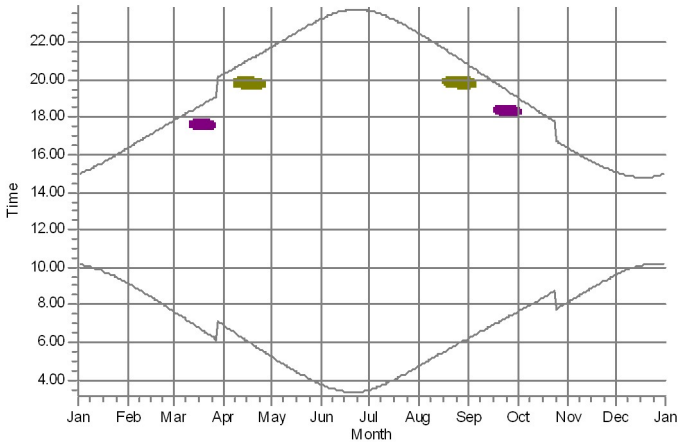
B: B Asuinrakennus (Söderändan 81)



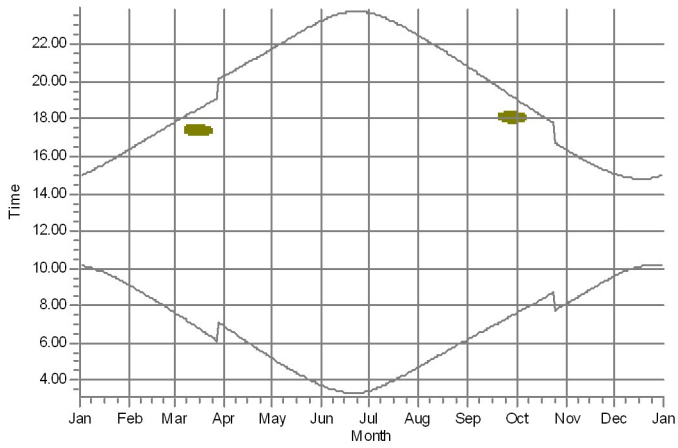
C: C Lomarakennus (Säderändan 166)



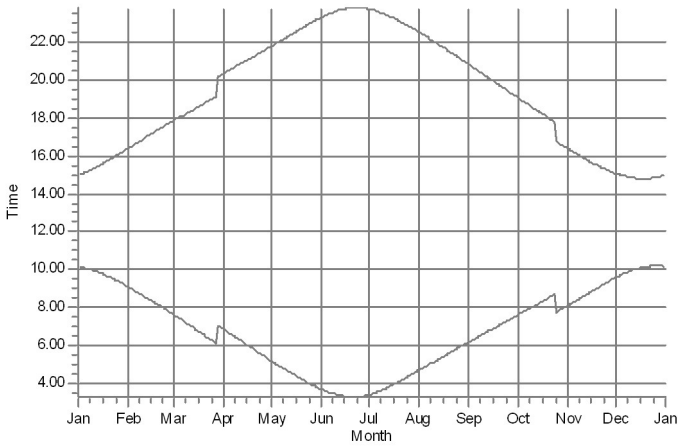
D: D Lomarakennus (Söderändan 188)



E: E Asuinrakennus (Rökiöntie 930)



F: F Asuinrakennus (Kukkusintie 474)



WTGs

18: Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8827)

19: Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8830)

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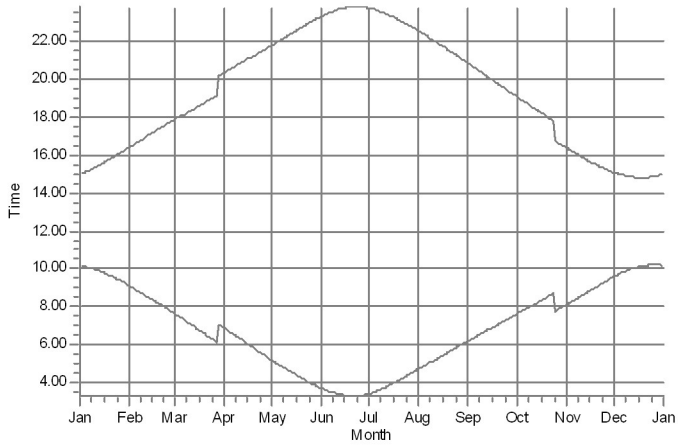
14.7.2023 9.25/3.5.584

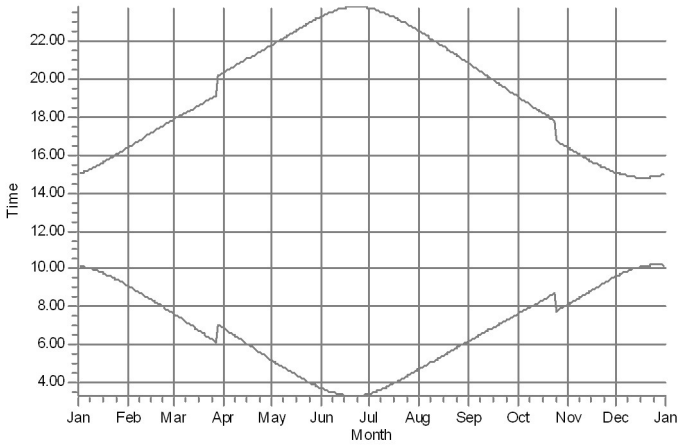
SHADOW - Calendar, graphical

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke Forest

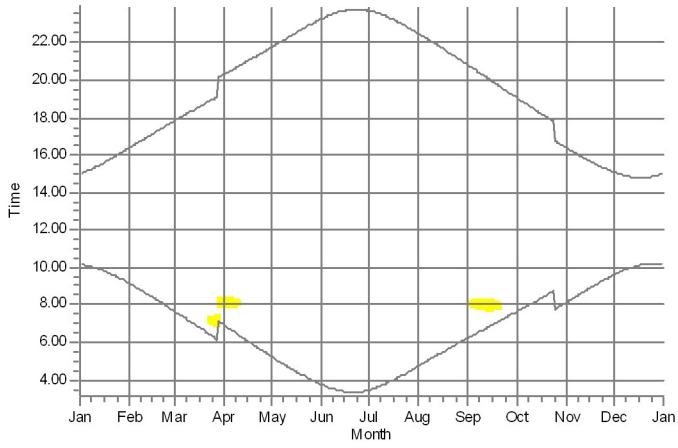
G: G Asuinrakennus (Kovik byväg 53)



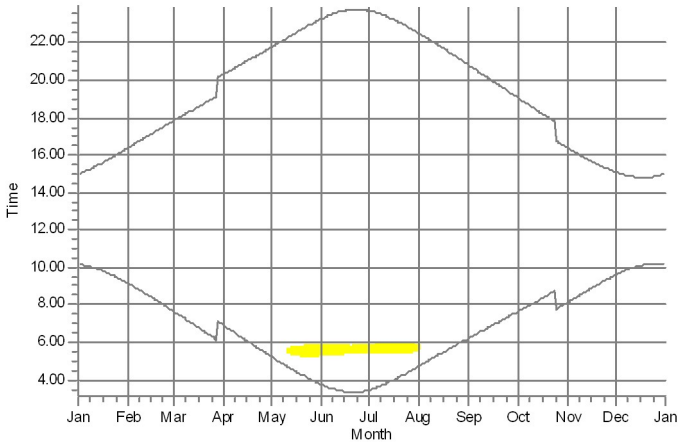
H: H Asuinrakennus (Vöyrintie 1021)



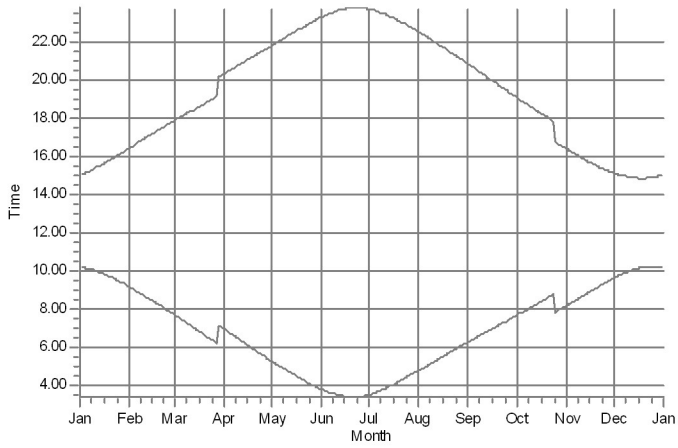
I: I Lomarakennus (Ehrsbackavägen 29)



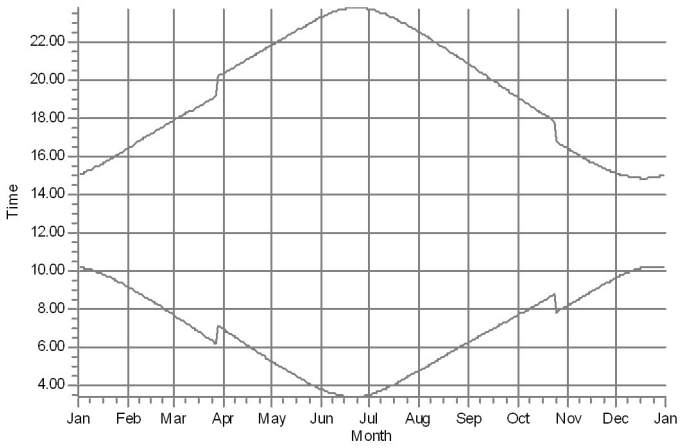
J: J Asuinrakennus (Kleidersvägen 118)



K: K Asuinrakennus (Rökiöntie 154)



L: L Asuinrakennus (Bjurbäcksvägen 231)



WTGs

10: Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8824)

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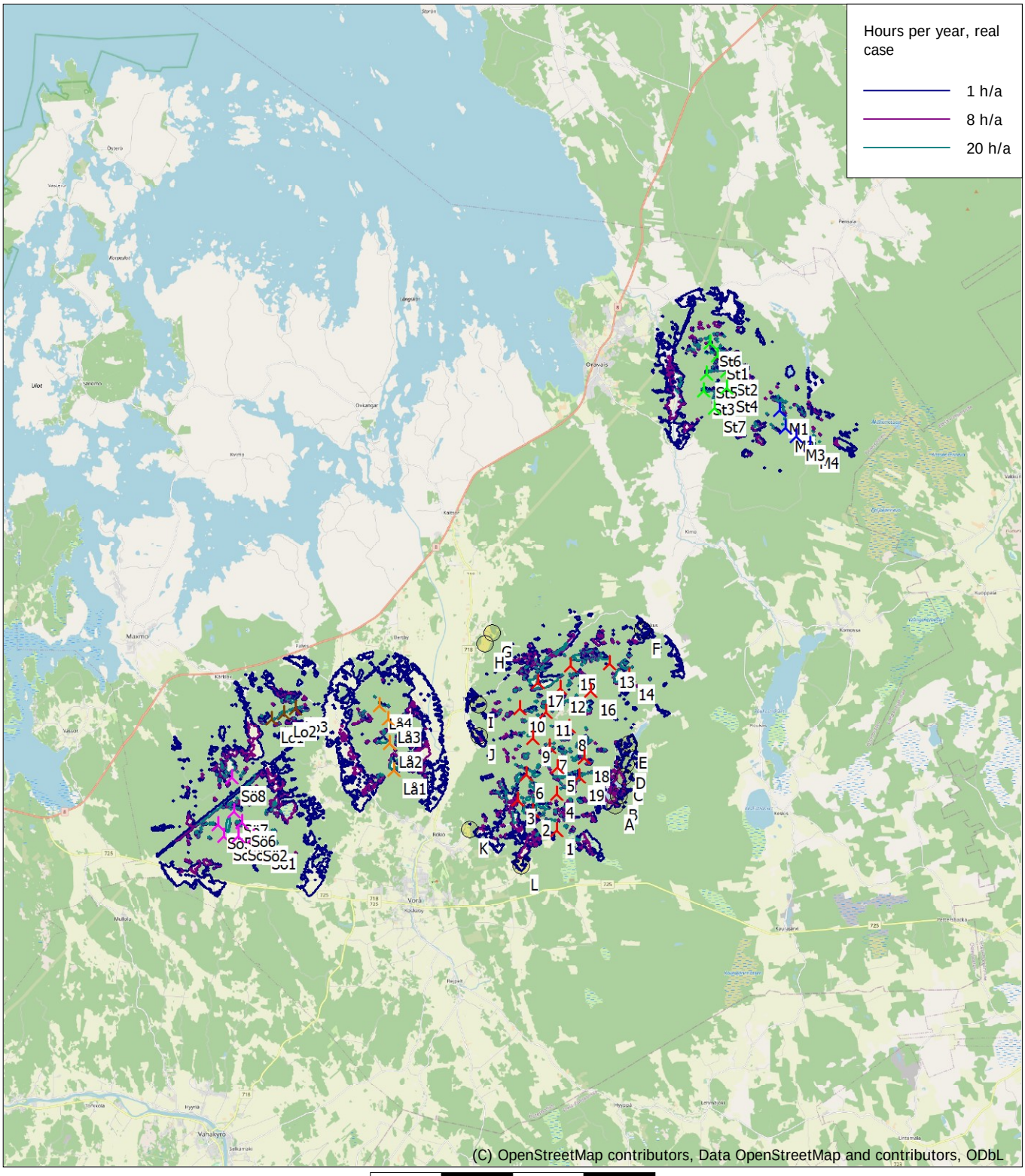
Calculated:
14.7.2023 9.25/3.5.584

SHADOW - Map

Calculation: VE1_19xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke Forest



0 2,5 5 7,5 10km

Map: EMD OpenStreetMap , Print scale 1:200 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 264 510 North: 7 019 520

New WTG Shadow receptor

Flicker map level: Height Contours: CONTOURLINE_Lasor tuulivoimahanke 2022_0.wpo (3)

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

Liite 15. Yhteisvaikutus varjostusmallinnuksen tulokset ”Real Case, No forest” - VE2

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SHADOW - Main Result

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No Forest

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) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational hours are calculated from WTGs in calculation and wind distribution:
MERRA-2_N63,00_E022,50 (41)

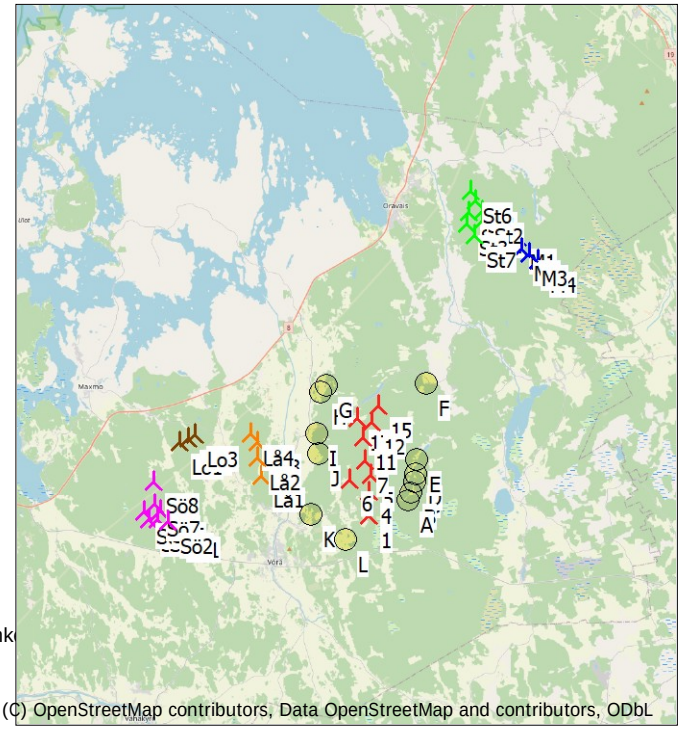
Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
716	546	427	409	540	810	1 084	1 285	889	717	582	591	8 594

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: Height Contours: CONTOURLINE_Lasor tuulivoimahank
Obstacles used in calculation
Receptor grid resolution: 1,0 m

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89



Scale 1:400 000

New WTG Shadow receptor

WTGs

	East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
			[m]					[kW]	[m]	[m]	[m]	[RPM]
1	265 860	7 011 060	40,0	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
11	265 796	7 015 259	39,8	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
12	266 380	7 016 090	44,5	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
15	266 770	7 016 850	43,5	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
17	265 604	7 016 343	20,0	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
4	265 960	7 012 340	40,0	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
5	266 070	7 013 270	35,0	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
6	264 950	7 013 100	40,0	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
7	265 850	7 014 020	40,0	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
Lo1	256 101	7 015 724	26,7	PROKON P3000-116 3030 ...	Yes	PROKON	P3000-116-3 030	3 030	116,7	122,0	1 819	11,7
Lo2	256 554	7 015 922	32,5	PROKON P3000-116 3030 ...	Yes	PROKON	P3000-116-3 030	3 030	116,7	122,0	1 819	11,7
Lo3	256 967	7 016 054	29,3	PROKON P3000-116 3030 ...	Yes	PROKON	P3000-116-3 030	3 030	116,7	122,0	1 819	11,7
Lå1	260 282	7 013 598	20,0	VESTAS V150-4.2 4200 15...	Yes	VESTAS	V150-4.2-4 200	4 200	150,0	140,0	1 903	10,4
Lå2	260 183	7 014 579	27,2	VESTAS V150-4.2 4200 15...	Yes	VESTAS	V150-4.2-4 200	4 200	150,0	140,0	1 903	10,4
Lå3	260 216	7 015 423	20,0	VESTAS V150-4.2 4200 15...	Yes	VESTAS	V150-4.2-4 200	4 200	150,0	140,0	1 903	10,4
Lå4	259 928	7 015 932	27,5	VESTAS V150-4.2 4200 15...	Yes	VESTAS	V150-4.2-4 200	4 200	150,0	140,0	1 903	10,4
M1	274 763	7 025 285	32,5	NORDEX N163/5,7MW 570...	Yes	NORDEX	N163/5,7MW-5 700	5 700	163,0	158,0	1 806	10,7
M2	274 926	7 024 666	32,8	NORDEX N163/5,7MW 570...	Yes	NORDEX	N163/5,7MW-5 700	5 700	163,0	158,0	1 806	10,7
M3	275 298	7 024 342	35,0	NORDEX N163/5,7MW 570...	Yes	NORDEX	N163/5,7MW-5 700	5 700	163,0	158,0	1 806	10,7
M4	275 772	7 024 008	40,0	NORDEX N163/5,7MW 570...	Yes	NORDEX	N163/5,7MW-5 700	5 700	163,0	158,0	1 806	10,7
St1	272 700	7 027 390	30,0	VESTAS V150-4.2 HH145 4...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	1 902	10,4
St2	273 002	7 026 818	30,0	VESTAS V150-4.2 HH145 4...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	1 902	10,4
St3	272 153	7 026 165	30,0	VESTAS V150-4.2 HH145 4...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	1 902	10,4
St4	272 991	7 026 229	30,0	VESTAS V150-4.2 HH145 4...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	1 902	10,4
St5	272 290	7 026 760	26,1	VESTAS V150-4.2 HH145 4...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	1 902	10,4
St6	272 494	7 027 846	25,1	VESTAS V150-4.2 HH145 4...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	1 902	10,4
St7	272 483	7 025 533	30,2	VESTAS V150-4.2 HH145 4...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	1 902	10,4
Sö1	255 445	7 011 327	45,9	Generic RD180 7700 180.0...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	2 461	10,4
Sö2	255 137	7 011 612	50,0	Generic RD180 7700 180.0...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	2 461	10,4
Sö3	254 614	7 011 705	37,5	Generic RD180 7700 180.0...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	2 461	10,4
Sö4	254 111	7 011 739	25,0	Generic RD180 7700 180.0...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	2 461	10,4

To be continued on next page...

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Calculated:
14.7.2023 9.46/3.5.584

SHADOW - Main Result

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No Forest

...continued from previous page

	East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
			[m]					[kW]	[m]	[m]	[m]	[RPM]
Sö5	253 945	7 012 144	32,5	Generic RD180 7700 180.0…	Yes	Generic	RD180-7 700	7 700	180,0	210,0	2 461	10,4
Sö6	254 771	7 012 174	40,0	Generic RD180 7700 180.0…	Yes	Generic	RD180-7 700	7 700	180,0	210,0	2 461	10,4
Sö7	254 521	7 012 552	32,9	Generic RD180 7700 180.0…	Yes	Generic	RD180-7 700	7 700	180,0	210,0	2 461	10,4
Sö8	254 528	7 013 790	20,0	Generic RD180 7700 180.0…	Yes	Generic	RD180-7 700	7 700	180,0	210,0	2 461	10,4

Shadow receptor-Input

No.	Name	East	North	Z	Width	Height	Elevation a.g.l.	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
				[m]	[m]	[m]	[m]	[°]		[m]
A	A Lomarakennus (Söderändan 49)	267 990	7 011 759	42,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
B	B Asuinrakennus (Söderändan 81)	268 161	7 012 123	37,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
C	C Lomarakennus (Säderändan 166)	268 388	7 012 783	39,1	5,0	5,0	1,0	90,0	"Green house mode"	6,0
D	D Lomarakennus (Söderändan 188)	268 493	7 013 188	37,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0
E	E Asuinrakennus (Rökiöntie 930)	268 646	7 013 924	38,1	5,0	5,0	1,0	90,0	"Green house mode"	6,0
F	F Asuinrakennus (Kukkusintie 474)	269 409	7 017 903	25,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
G	G Asuinrakennus (Kovik byväg 53)	264 096	7 018 174	10,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
H	H Asuinrakennus (Vöyrintie 1021)	263 817	7 017 837	8,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
I	I Lomarakennus (Ehrsbackavägen 29)	263 418	7 015 700	21,7	5,0	5,0	1,0	90,0	"Green house mode"	6,0
J	J Asuinrakennus (Kleidersvägen 118)	263 380	7 014 576	13,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0
K	K Asuinrakennus (Rökiöntie 154)	262 790	7 011 335	27,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
L	L Asuinrakennus (Bjurbäcksvägen 231)	264 546	7 009 923	27,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0

Calculation Results

Shadow receptor

No.	Name	Shadow, expected values Shadow hours per year [h/year]
A	A Lomarakennus (Söderändan 49)	0:00
B	B Asuinrakennus (Söderändan 81)	0:00
C	C Lomarakennus (Säderändan 166)	0:00
D	D Lomarakennus (Söderändan 188)	0:00
E	E Asuinrakennus (Rökiöntie 930)	0:00
F	F Asuinrakennus (Kukkusintie 474)	0:00
G	G Asuinrakennus (Kovik byväg 53)	0:00
H	H Asuinrakennus (Vöyrintie 1021)	0:00
I	I Lomarakennus (Ehrsbackavägen 29)	0:00
J	J Asuinrakennus (Kleidersvägen 118)	0:00
K	K Asuinrakennus (Rökiöntie 154)	0:00
L	L Asuinrakennus (Bjurbäcksvägen 231)	4:15

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

No.	Name	Expected [h/year]
1	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8816)	4:15
11	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8811)	0:00
12	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8810)	0:00
15	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8809)	0:00
17	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8817)	0:00
4	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8815)	0:00
5	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8813)	0:00
6	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8814)	0:00
7	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8812)	0:00
Lo1	PROKON P3000-116 3030 116.7 !O! hub: 122,0 m (TOT: 180,4 m) (8676)	0:00
Lo2	PROKON P3000-116 3030 116.7 !O! hub: 122,0 m (TOT: 180,4 m) (8677)	0:00
Lo3	PROKON P3000-116 3030 116.7 !O! hub: 122,0 m (TOT: 180,4 m) (8678)	0:00
Lå1	VESTAS V150-4.2 4200 150.0 !O! hub: 140,0 m (TOT: 215,0 m) (8679)	0:00
Lå2	VESTAS V150-4.2 4200 150.0 !O! hub: 140,0 m (TOT: 215,0 m) (8680)	0:00
Lå3	VESTAS V150-4.2 4200 150.0 !O! hub: 140,0 m (TOT: 215,0 m) (8681)	0:00
Lå4	VESTAS V150-4.2 4200 150.0 !O! hub: 140,0 m (TOT: 215,0 m) (8682)	0:00

To be continued on next page...

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14.7.2023 9.46/3.5.584

SHADOW - Main Result

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No Forest

...continued from previous page

No.	Name	Expected [h/year]
M1	NORDEX N163/5,7MW 5700 163.0 !O! hub: 158,0 m (TOT: 239,5 m) (8772)	0:00
M2	NORDEX N163/5,7MW 5700 163.0 !O! hub: 158,0 m (TOT: 239,5 m) (8773)	0:00
M3	NORDEX N163/5,7MW 5700 163.0 !O! hub: 158,0 m (TOT: 239,5 m) (8774)	0:00
M4	NORDEX N163/5,7MW 5700 163.0 !O! hub: 158,0 m (TOT: 239,5 m) (8775)	0:00
St1	VESTAS V150-4.2 HH145 4200 150.0 !O! hub: 145,0 m (TOT: 220,0 m) (8669)	0:00
St2	VESTAS V150-4.2 HH145 4200 150.0 !O! hub: 145,0 m (TOT: 220,0 m) (8670)	0:00
St3	VESTAS V150-4.2 HH145 4200 150.0 !O! hub: 145,0 m (TOT: 220,0 m) (8671)	0:00
St4	VESTAS V150-4.2 HH145 4200 150.0 !O! hub: 145,0 m (TOT: 220,0 m) (8672)	0:00
St5	VESTAS V150-4.2 HH145 4200 150.0 !O! hub: 145,0 m (TOT: 220,0 m) (8673)	0:00
St6	VESTAS V150-4.2 HH145 4200 150.0 !O! hub: 145,0 m (TOT: 220,0 m) (8674)	0:00
St7	VESTAS V150-4.2 HH145 4200 150.0 !O! hub: 145,0 m (TOT: 220,0 m) (8675)	0:00
Sö1	Generic RD180 7700 180.0 !O! hub: 210,0 m (TOT: 300,0 m) (8713)	0:00
Sö2	Generic RD180 7700 180.0 !O! hub: 210,0 m (TOT: 300,0 m) (8714)	0:00
Sö3	Generic RD180 7700 180.0 !O! hub: 210,0 m (TOT: 300,0 m) (8715)	0:00
Sö4	Generic RD180 7700 180.0 !O! hub: 210,0 m (TOT: 300,0 m) (8716)	0:00
Sö5	Generic RD180 7700 180.0 !O! hub: 210,0 m (TOT: 300,0 m) (8717)	0:00
Sö6	Generic RD180 7700 180.0 !O! hub: 210,0 m (TOT: 300,0 m) (8718)	0:00
Sö7	Generic RD180 7700 180.0 !O! hub: 210,0 m (TOT: 300,0 m) (8719)	0:00
Sö8	Generic RD180 7700 180.0 !O! hub: 210,0 m (TOT: 300,0 m) (8720)	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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14.7.2023 9.46/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No Forest Shadow receptor: A - A Lomarakennus (Söderändan 49)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
716	546	427	409	540	810	1 084	1 285	889	717	582	591	8 594

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.39	06.54	05.13	03.44	03.27	04.44	06.14	07.36	08.06	09.34
	15.00	16.23	17.49	20.18	21.45	23.15	23.41	22.28	20.47	19.04	16.22	15.04
2	10.08	09.04	07.36	06.51	05.10	03.42	03.29	04.47	06.17	07.39	08.09	09.37
	15.01	16.26	17.52	20.21	21.48	23.17	23.40	22.25	20.43	19.01	16.19	15.03
3	10.07	09.01	07.33	06.47	05.07	03.40	03.30	04.50	06.19	07.42	08.12	09.40
	15.03	16.29	17.55	20.23	21.51	23.20	23.38	22.22	20.40	18.57	16.16	15.01
4	10.06	08.58	07.29	06.44	05.04	03.38	03.32	04.53	06.22	07.45	08.15	09.42
	15.05	16.32	17.58	20.26	21.54	23.22	23.37	22.19	20.37	18.54	16.13	14.59
5	10.05	08.55	07.26	06.41	05.00	03.36	03.34	04.56	06.25	07.47	08.18	09.44
	15.07	16.36	18.01	20.29	21.57	23.24	23.35	22.16	20.33	18.51	16.10	14.58
6	10.04	08.52	07.23	06.37	04.57	03.34	03.36	04.59	06.28	07.50	08.21	09.47
	15.09	16.39	18.04	20.32	22.00	23.26	23.34	22.13	20.30	18.47	16.07	14.56
7	10.03	08.49	07.19	06.34	04.54	03.32	03.38	05.02	06.30	07.53	08.24	09.49
	15.12	16.42	18.07	20.35	22.03	23.28	23.32	22.10	20.26	18.44	16.04	14.55
8	10.01	08.46	07.16	06.30	04.51	03.31	03.40	05.05	06.33	07.56	08.27	09.51
	15.14	16.45	18.09	20.38	22.06	23.30	23.30	22.06	20.23	18.40	16.01	14.54
9	10.00	08.43	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.58	08.30	09.53
	15.16	16.48	18.12	20.41	22.09	23.32	23.28	22.03	20.19	18.37	15.58	14.53
10	09.58	08.40	07.09	06.24	04.45	03.28	03.44	05.11	06.39	08.01	08.33	09.55
	15.19	16.51	18.15	20.43	22.12	23.34	23.26	22.00	20.16	18.34	15.56	14.52
11	09.57	08.37	07.06	06.20	04.42	03.26	03.47	05.14	06.41	08.04	08.36	09.57
	15.21	16.54	18.18	20.46	22.15	23.36	23.24	21.57	20.13	18.30	15.53	14.51
12	09.55	08.34	07.03	06.17	04.39	03.25	03.49	05.17	06.44	08.07	08.39	09.59
	15.24	16.57	18.21	20.49	22.18	23.37	23.22	21.54	20.09	18.27	15.50	14.50
13	09.53	08.31	06.59	06.13	04.35	03.24	03.51	05.19	06.47	08.10	08.42	10.00
	15.27	17.01	18.24	20.52	22.21	23.39	23.20	21.50	20.06	18.24	15.47	14.49
14	09.51	08.28	06.56	06.10	04.32	03.23	03.54	05.22	06.50	08.13	08.45	10.02
	15.29	17.04	18.27	20.55	22.24	23.40	23.18	21.47	20.02	18.20	15.44	14.48
15	09.49	08.25	06.52	06.07	04.29	03.22	03.56	05.25	06.52	08.16	08.48	10.03
	15.32	17.07	18.30	20.58	22.27	23.41	23.15	21.44	19.59	18.17	15.42	14.48
16	09.47	08.22	06.49	06.03	04.26	03.22	03.59	05.28	06.55	08.18	08.51	10.05
	15.35	17.10	18.32	21.01	22.30	23.42	23.13	21.40	19.55	18.14	15.39	14.48
17	09.45	08.18	06.46	06.00	04.24	03.21	04.01	05.31	06.58	08.21	08.55	10.06
	15.38	17.13	18.35	21.04	22.33	23.43	23.10	21.37	19.52	18.10	15.36	14.47
18	09.43	08.15	06.42	05.56	04.21	03.21	04.04	05.34	07.01	08.24	08.58	10.07
	15.40	17.16	18.38	21.07	22.36	23.44	23.08	21.34	19.49	18.07	15.34	14.47
19	09.40	08.12	06.39	05.53	04.18	03.20	04.07	05.37	07.03	08.27	09.01	10.08
	15.43	17.19	18.41	21.10	22.39	23.44	23.05	21.31	19.45	18.04	15.31	14.47
20	09.38	08.09	06.35	05.50	04.15	03.20	04.10	05.40	07.06	08.30	09.04	10.09
	15.46	17.22	18.44	21.12	22.42	23.45	23.03	21.27	19.42	18.01	15.29	14.47
21	09.36	08.06	06.32	05.46	04.12	03.20	04.12	05.43	07.09	08.33	09.06	10.10
	15.49	17.25	18.47	21.15	22.45	23.45	23.00	21.24	19.38	17.57	15.26	14.48
22	09.33	08.02	06.28	05.43	04.09	03.20	04.15	05.46	07.11	08.36	09.09	10.10
	15.52	17.28	18.49	21.18	22.48	23.45	22.57	21.21	19.35	17.54	15.24	14.48
23	09.31	07.59	06.25	05.40	04.07	03.20	04.18	05.48	07.14	08.39	09.12	10.11
	15.55	17.31	18.52	21.21	22.51	23.45	22.55	21.17	19.31	17.51	15.21	14.49
24	09.28	07.56	06.22	05.36	04.04	03.21	04.21	05.51	07.17	08.42	09.15	10.11
	15.58	17.34	18.55	21.24	22.54	23.45	22.52	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.18	05.33	04.01	03.21	04.24	05.54	07.20	07.45	09.18	10.11
	16.01	17.37	18.58	21.27	22.56	23.45	22.49	21.10	19.25	16.44	15.17	14.50
26	09.23	07.49	06.15	05.30	03.59	03.22	04.27	05.57	07.22	07.48	09.21	10.11
	16.04	17.40	19.01	21.30	22.59	23.45	22.46	21.07	19.21	16.41	15.14	14.51
27	09.21	07.46	06.11	05.26	03.56	03.23	04.29	06.00	07.25	07.51	09.24	10.11
	16.07	17.43	19.04	21.33	23.02	23.44	22.43	21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.54	03.24	04.32	06.03	07.28	07.54	09.26	10.11
	16.11	17.46	19.06	21.36	23.05	23.43	22.40	21.00	19.14	16.35	15.10	14.53
29	09.15		07.05	05.20	03.51	03.25	04.35	06.05	07.31	07.57	09.29	10.11
	16.14		20.09	21.39	23.07	23.43	22.37	20.57	19.11	16.32	15.08	14.55
30	09.12		07.01	05.17	03.49	03.26	04.38	06.08	07.33	08.00	09.32	10.10
	16.17		20.12	21.42	23.10	23.42	22.34	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.47		04.41	06.11		08.03		10.10
	16.20		20.15		23.12		22.31	20.50		16.26		14.58
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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14.7.2023 9.46/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No Forest Shadow receptor: B - B Asuinrakennus (Söderändan 81)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
716	546	427	409	540	810	1 084	1 285	889	717	582	591	8 594

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.39	06.54	05.13	03.44	03.27	04.44	06.14	07.36	08.06	09.35
	15.00	16.23	17.49	20.18	21.45	23.15	23.41	22.28	20.47	19.04	16.22	15.04
2	10.08	09.04	07.36	06.51	05.10	03.42	03.29	04.47	06.17	07.39	08.09	09.37
	15.01	16.26	17.52	20.21	21.48	23.17	23.40	22.25	20.43	19.01	16.19	15.03
3	10.07	09.01	07.33	06.47	05.07	03.40	03.30	04.50	06.19	07.42	08.12	09.40
	15.03	16.29	17.55	20.23	21.51	23.20	23.38	22.22	20.40	18.57	16.16	15.01
4	10.06	08.58	07.29	06.44	05.04	03.38	03.32	04.53	06.22	07.44	08.15	09.42
	15.05	16.32	17.58	20.26	21.54	23.22	23.37	22.19	20.37	18.54	16.13	14.59
5	10.05	08.55	07.26	06.41	05.00	03.36	03.34	04.56	06.25	07.47	08.18	09.44
	15.07	16.36	18.01	20.29	21.57	23.24	23.35	22.16	20.33	18.51	16.10	14.58
6	10.04	08.52	07.23	06.37	04.57	03.34	03.36	04.59	06.28	07.50	08.21	09.47
	15.09	16.39	18.04	20.32	22.00	23.26	23.34	22.13	20.30	18.47	16.07	14.56
7	10.03	08.49	07.19	06.34	04.54	03.32	03.38	05.02	06.30	07.53	08.24	09.49
	15.12	16.42	18.07	20.35	22.03	23.28	23.32	22.10	20.26	18.44	16.04	14.55
8	10.01	08.46	07.16	06.30	04.51	03.31	03.40	05.05	06.33	07.56	08.27	09.51
	15.14	16.45	18.09	20.38	22.06	23.30	23.30	22.06	20.23	18.40	16.01	14.54
9	10.00	08.43	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.58	08.30	09.53
	15.16	16.48	18.12	20.41	22.09	23.32	23.28	22.03	20.19	18.37	15.58	14.52
10	09.58	08.40	07.09	06.24	04.45	03.28	03.44	05.11	06.39	08.01	08.33	09.55
	15.19	16.51	18.15	20.43	22.12	23.34	23.26	22.00	20.16	18.34	15.56	14.51
11	09.57	08.37	07.06	06.20	04.42	03.26	03.46	05.14	06.41	08.04	08.36	09.57
	15.21	16.54	18.18	20.46	22.15	23.36	23.24	21.57	20.13	18.30	15.53	14.51
12	09.55	08.34	07.03	06.17	04.38	03.25	03.49	05.16	06.44	08.07	08.39	09.59
	15.24	16.57	18.21	20.49	22.18	23.37	23.22	21.54	20.09	18.27	15.50	14.50
13	09.53	08.31	06.59	06.13	04.35	03.24	03.51	05.19	06.47	08.10	08.42	10.00
	15.26	17.01	18.24	20.52	22.21	23.39	23.20	21.50	20.06	18.24	15.47	14.49
14	09.51	08.28	06.56	06.10	04.32	03.23	03.54	05.22	06.50	08.13	08.45	10.02
	15.29	17.04	18.27	20.55	22.24	23.40	23.18	21.47	20.02	18.20	15.44	14.48
15	09.49	08.25	06.52	06.07	04.29	03.22	03.56	05.25	06.52	08.16	08.48	10.03
	15.32	17.07	18.30	20.58	22.27	23.41	23.15	21.44	19.59	18.17	15.42	14.48
16	09.47	08.22	06.49	06.03	04.26	03.21	03.59	05.28	06.55	08.18	08.52	10.05
	15.35	17.10	18.32	21.01	22.30	23.42	23.13	21.40	19.55	18.14	15.39	14.48
17	09.45	08.18	06.46	06.00	04.23	03.21	04.01	05.31	06.58	08.21	08.55	10.06
	15.37	17.13	18.35	21.04	22.33	23.43	23.11	21.37	19.52	18.10	15.36	14.47
18	09.43	08.15	06.42	05.56	04.21	03.20	04.04	05.34	07.01	08.24	08.58	10.07
	15.40	17.16	18.38	21.07	22.36	23.44	23.08	21.34	19.49	18.07	15.34	14.47
19	09.40	08.12	06.39	05.53	04.18	03.20	04.07	05.37	07.03	08.27	09.01	10.08
	15.43	17.19	18.41	21.10	22.39	23.44	23.05	21.31	19.45	18.04	15.31	14.47
20	09.38	08.09	06.35	05.50	04.15	03.20	04.10	05.40	07.06	08.30	09.04	10.09
	15.46	17.22	18.44	21.12	22.42	23.45	23.03	21.27	19.42	18.01	15.29	14.47
21	09.36	08.06	06.32	05.46	04.12	03.20	04.12	05.43	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.15	22.45	23.45	23.00	21.24	19.38	17.57	15.26	14.48
22	09.33	08.02	06.28	05.43	04.09	03.20	04.15	05.45	07.11	08.36	09.09	10.10
	15.52	17.28	18.49	21.18	22.48	23.45	22.57	21.21	19.35	17.54	15.24	14.48
23	09.31	07.59	06.25	05.40	04.07	03.20	04.18	05.48	07.14	08.39	09.12	10.11
	15.55	17.31	18.52	21.21	22.51	23.45	22.55	21.17	19.31	17.51	15.21	14.49
24	09.28	07.56	06.22	05.36	04.04	03.21	04.21	05.51	07.17	08.42	09.15	10.11
	15.58	17.34	18.55	21.24	22.54	23.45	22.52	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.18	05.33	04.01	03.21	04.24	05.54	07.20	07.45	09.18	10.11
	16.01	17.37	18.58	21.27	22.56	23.45	22.49	21.10	19.25	16.44	15.17	14.50
26	09.23	07.49	06.15	05.30	03.59	03.22	04.26	05.57	07.22	07.48	09.21	10.11
	16.04	17.40	19.01	21.30	22.59	23.45	22.46	21.07	19.21	16.41	15.14	14.51
27	09.21	07.46	06.11	05.26	03.56	03.23	04.29	06.00	07.25	07.51	09.24	10.11
	16.07	17.43	19.04	21.33	23.02	23.44	22.43	21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.54	03.24	04.32	06.03	07.28	07.54	09.27	10.11
	16.11	17.46	19.06	21.36	23.05	23.44	22.40	21.00	19.14	16.35	15.10	14.53
29	09.15		07.05	05.20	03.51	03.25	04.35	06.05	07.31	07.57	09.29	10.11
	16.14		20.09	21.39	23.07	23.43	22.37	20.57	19.11	16.32	15.08	14.55
30	09.12		07.01	05.17	03.49	03.26	04.38	06.08	07.33	08.00	09.32	10.10
	16.17		20.12	21.42	23.10	23.42	22.34	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.10
	16.20		20.15		23.12		22.31	20.50		16.26		14.57
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.46/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No Forest Shadow receptor: C - C Lomarakennus (Säderändan 166)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
716	546	427	409	540	810	1 084	1 285	889	717	582	591	8 594

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.39	06.54	05.13	03.44	03.27	04.44	06.14	07.36	08.06	09.35
	14.59	16.23	17.49	20.18	21.45	23.15	23.41	22.28	20.47	19.04	16.22	15.04
2	10.08	09.04	07.36	06.51	05.10	03.42	03.29	04.47	06.17	07.39	08.09	09.37
	15.01	16.26	17.52	20.21	21.48	23.17	23.40	22.25	20.43	19.01	16.19	15.02
3	10.08	09.01	07.33	06.47	05.07	03.40	03.30	04.50	06.19	07.42	08.12	09.40
	15.03	16.29	17.55	20.23	21.51	23.20	23.38	22.22	20.40	18.57	16.16	15.01
4	10.06	08.58	07.29	06.44	05.04	03.38	03.32	04.53	06.22	07.44	08.15	09.42
	15.05	16.32	17.58	20.26	21.54	23.22	23.37	22.19	20.37	18.54	16.13	14.59
5	10.05	08.55	07.26	06.41	05.00	03.36	03.34	04.56	06.25	07.47	08.18	09.44
	15.07	16.36	18.01	20.29	21.57	23.24	23.36	22.16	20.33	18.51	16.10	14.58
6	10.04	08.52	07.23	06.37	04.57	03.34	03.36	04.59	06.28	07.50	08.21	09.47
	15.09	16.39	18.04	20.32	22.00	23.26	23.34	22.13	20.30	18.47	16.07	14.56
7	10.03	08.49	07.19	06.34	04.54	03.32	03.38	05.02	06.30	07.53	08.24	09.49
	15.11	16.42	18.06	20.35	22.03	23.28	23.32	22.10	20.26	18.44	16.04	14.55
8	10.01	08.46	07.16	06.30	04.51	03.31	03.40	05.05	06.33	07.56	08.27	09.51
	15.14	16.45	18.09	20.38	22.06	23.30	23.30	22.06	20.23	18.40	16.01	14.54
9	10.00	08.43	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.58	08.30	09.53
	15.16	16.48	18.12	20.41	22.09	23.32	23.28	22.03	20.19	18.37	15.58	14.52
10	09.58	08.40	07.09	06.24	04.45	03.28	03.44	05.11	06.39	08.01	08.33	09.55
	15.19	16.51	18.15	20.43	22.12	23.34	23.27	22.00	20.16	18.34	15.55	14.51
11	09.57	08.37	07.06	06.20	04.41	03.26	03.46	05.13	06.41	08.04	08.36	09.57
	15.21	16.54	18.18	20.46	22.15	23.36	23.24	21.57	20.13	18.30	15.53	14.50
12	09.55	08.34	07.03	06.17	04.38	03.25	03.49	05.16	06.44	08.07	08.39	09.59
	15.24	16.57	18.21	20.49	22.18	23.37	23.22	21.54	20.09	18.27	15.50	14.50
13	09.53	08.31	06.59	06.13	04.35	03.24	03.51	05.19	06.47	08.10	08.42	10.00
	15.26	17.01	18.24	20.52	22.21	23.39	23.20	21.50	20.06	18.24	15.47	14.49
14	09.51	08.28	06.56	06.10	04.32	03.23	03.54	05.22	06.50	08.13	08.45	10.02
	15.29	17.04	18.27	20.55	22.24	23.40	23.18	21.47	20.02	18.20	15.44	14.48
15	09.49	08.25	06.52	06.07	04.29	03.22	03.56	05.25	06.52	08.16	08.49	10.03
	15.32	17.07	18.30	20.58	22.27	23.41	23.15	21.44	19.59	18.17	15.41	14.48
16	09.47	08.22	06.49	06.03	04.26	03.21	03.59	05.28	06.55	08.18	08.52	10.05
	15.35	17.10	18.32	21.01	22.30	23.42	23.13	21.41	19.55	18.14	15.39	14.47
17	09.45	08.18	06.46	06.00	04.23	03.21	04.01	05.31	06.58	08.21	08.55	10.06
	15.37	17.13	18.35	21.04	22.33	23.43	23.11	21.37	19.52	18.10	15.36	14.47
18	09.43	08.15	06.42	05.56	04.20	03.20	04.04	05.34	07.01	08.24	08.58	10.07
	15.40	17.16	18.38	21.07	22.36	23.44	23.08	21.34	19.49	18.07	15.34	14.47
19	09.40	08.12	06.39	05.53	04.18	03.20	04.07	05.37	07.03	08.27	09.01	10.08
	15.43	17.19	18.41	21.10	22.39	23.44	23.05	21.31	19.45	18.04	15.31	14.47
20	09.38	08.09	06.35	05.50	04.15	03.20	04.09	05.40	07.06	08.30	09.04	10.09
	15.46	17.22	18.44	21.12	22.42	23.45	23.03	21.27	19.42	18.01	15.28	14.47
21	09.36	08.06	06.32	05.46	04.12	03.20	04.12	05.43	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.15	22.45	23.45	23.00	21.24	19.38	17.57	15.26	14.48
22	09.33	08.02	06.28	05.43	04.09	03.20	04.15	05.45	07.11	08.36	09.09	10.10
	15.52	17.28	18.49	21.18	22.48	23.45	22.57	21.21	19.35	17.54	15.24	14.48
23	09.31	07.59	06.25	05.40	04.06	03.20	04.18	05.48	07.14	08.39	09.12	10.11
	15.55	17.31	18.52	21.21	22.51	23.46	22.55	21.17	19.31	17.51	15.21	14.49
24	09.28	07.56	06.22	05.36	04.04	03.21	04.21	05.51	07.17	08.42	09.15	10.11
	15.58	17.34	18.55	21.24	22.54	23.45	22.52	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.18	05.33	04.01	03.21	04.24	05.54	07.20	07.45	09.18	10.11
	16.01	17.37	18.58	21.27	22.57	23.45	22.49	21.10	19.25	16.44	15.17	14.50
26	09.23	07.49	06.15	05.30	03.59	03.22	04.26	05.57	07.22	07.48	09.21	10.11
	16.04	17.40	19.01	21.30	22.59	23.45	22.46	21.07	19.21	16.41	15.14	14.51
27	09.21	07.46	06.11	05.26	03.56	03.23	04.29	06.00	07.25	07.51	09.24	10.11
	16.07	17.43	19.04	21.33	23.02	23.44	22.43	21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.53	03.24	04.32	06.03	07.28	07.54	09.27	10.11
	16.10	17.46	19.06	21.36	23.05	23.44	22.40	21.00	19.14	16.35	15.10	14.53
29	09.15		07.05	05.20	03.51	03.25	04.35	06.05	07.31	07.57	09.29	10.11
	16.14		20.09	21.39	23.07	23.43	22.37	20.57	19.11	16.32	15.08	14.54
30	09.13		07.01	05.17	03.49	03.26	04.38	06.08	07.33	08.00	09.32	10.11
	16.17		20.12	21.42	23.10	23.42	22.34	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.10
	16.20		20.15		23.13		22.31	20.50		16.25		14.57
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.46/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No Forest Shadow receptor: D - D Lomarakennus (Söderändan 188)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
716	546	427	409	540	810	1 084	1 285	889	717	582	591	8 594

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.39	06.54	05.13	03.44	03.27	04.44	06.14	07.36	08.06	09.35
	14.59	16.23	17.49	20.18	21.45	23.15	23.41	22.28	20.47	19.04	16.22	15.04
2	10.08	09.04	07.36	06.51	05.10	03.42	03.29	04.47	06.17	07.39	08.09	09.37
	15.01	16.26	17.52	20.21	21.48	23.17	23.40	22.25	20.43	19.01	16.19	15.02
3	10.08	09.01	07.33	06.47	05.07	03.40	03.30	04.50	06.19	07.42	08.12	09.40
	15.03	16.29	17.55	20.23	21.51	23.20	23.38	22.22	20.40	18.57	16.16	15.01
4	10.07	08.58	07.29	06.44	05.04	03.38	03.32	04.53	06.22	07.44	08.15	09.42
	15.05	16.32	17.58	20.26	21.54	23.22	23.37	22.19	20.37	18.54	16.13	14.59
5	10.05	08.55	07.26	06.41	05.00	03.36	03.34	04.56	06.25	07.47	08.18	09.44
	15.07	16.36	18.01	20.29	21.57	23.24	23.36	22.16	20.33	18.51	16.10	14.58
6	10.04	08.52	07.23	06.37	04.57	03.34	03.36	04.59	06.28	07.50	08.21	09.47
	15.09	16.39	18.04	20.32	22.00	23.27	23.34	22.13	20.30	18.47	16.07	14.56
7	10.03	08.49	07.19	06.34	04.54	03.32	03.38	05.02	06.30	07.53	08.24	09.49
	15.11	16.42	18.06	20.35	22.03	23.29	23.32	22.10	20.26	18.44	16.04	14.55
8	10.01	08.46	07.16	06.30	04.51	03.31	03.40	05.05	06.33	07.56	08.27	09.51
	15.14	16.45	18.09	20.38	22.06	23.31	23.30	22.07	20.23	18.40	16.01	14.54
9	10.00	08.43	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.58	08.30	09.53
	15.16	16.48	18.12	20.41	22.09	23.32	23.29	22.03	20.19	18.37	15.58	14.52
10	09.58	08.40	07.09	06.23	04.45	03.28	03.44	05.11	06.39	08.01	08.33	09.55
	15.19	16.51	18.15	20.43	22.12	23.34	23.27	22.00	20.16	18.34	15.55	14.51
11	09.57	08.37	07.06	06.20	04.41	03.26	03.46	05.13	06.41	08.04	08.36	09.57
	15.21	16.54	18.18	20.46	22.15	23.36	23.24	21.57	20.13	18.30	15.53	14.50
12	09.55	08.34	07.03	06.17	04.38	03.25	03.49	05.16	06.44	08.07	08.39	09.59
	15.24	16.57	18.21	20.49	22.18	23.37	23.22	21.54	20.09	18.27	15.50	14.50
13	09.53	08.31	06.59	06.13	04.35	03.24	03.51	05.19	06.47	08.10	08.42	10.00
	15.26	17.00	18.24	20.52	22.21	23.39	23.20	21.50	20.06	18.24	15.47	14.49
14	09.51	08.28	06.56	06.10	04.32	03.23	03.54	05.22	06.50	08.13	08.45	10.02
	15.29	17.04	18.27	20.55	22.24	23.40	23.18	21.47	20.02	18.20	15.44	14.48
15	09.49	08.25	06.52	06.06	04.29	03.22	03.56	05.25	06.52	08.16	08.49	10.03
	15.32	17.07	18.29	20.58	22.27	23.41	23.16	21.44	19.59	18.17	15.41	14.48
16	09.47	08.22	06.49	06.03	04.26	03.21	03.59	05.28	06.55	08.18	08.52	10.05
	15.35	17.10	18.32	21.01	22.30	23.42	23.13	21.41	19.55	18.14	15.39	14.47
17	09.45	08.18	06.46	06.00	04.23	03.21	04.01	05.31	06.58	08.21	08.55	10.06
	15.37	17.13	18.35	21.04	22.33	23.43	23.11	21.37	19.52	18.10	15.36	14.47
18	09.43	08.15	06.42	05.56	04.20	03.20	04.04	05.34	07.01	08.24	08.58	10.07
	15.40	17.16	18.38	21.07	22.36	23.44	23.08	21.34	19.49	18.07	15.33	14.47
19	09.41	08.12	06.39	05.53	04.18	03.20	04.07	05.37	07.03	08.27	09.01	10.08
	15.43	17.19	18.41	21.10	22.39	23.45	23.06	21.31	19.45	18.04	15.31	14.47
20	09.38	08.09	06.35	05.50	04.15	03.20	04.09	05.40	07.06	08.30	09.04	10.09
	15.46	17.22	18.44	21.12	22.42	23.45	23.03	21.27	19.42	18.01	15.28	14.47
21	09.36	08.06	06.32	05.46	04.12	03.20	04.12	05.43	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.15	22.45	23.45	23.00	21.24	19.38	17.57	15.26	14.48
22	09.33	08.02	06.28	05.43	04.09	03.20	04.15	05.45	07.11	08.36	09.10	10.10
	15.52	17.28	18.49	21.18	22.48	23.46	22.58	21.21	19.35	17.54	15.23	14.48
23	09.31	07.59	06.25	05.40	04.06	03.20	04.18	05.48	07.14	08.39	09.12	10.11
	15.55	17.31	18.52	21.21	22.51	23.46	22.55	21.17	19.31	17.51	15.21	14.48
24	09.28	07.56	06.22	05.36	04.04	03.21	04.21	05.51	07.17	08.42	09.15	10.11
	15.58	17.34	18.55	21.24	22.54	23.45	22.52	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.18	05.33	04.01	03.21	04.23	05.54	07.20	07.45	09.18	10.11
	16.01	17.37	18.58	21.27	22.57	23.45	22.49	21.10	19.25	16.44	15.17	14.50
26	09.23	07.49	06.15	05.30	03.58	03.22	04.26	05.57	07.22	07.48	09.21	10.11
	16.04	17.40	19.01	21.30	22.59	23.45	22.46	21.07	19.21	16.41	15.14	14.51
27	09.21	07.46	06.11	05.26	03.56	03.23	04.29	06.00	07.25	07.51	09.24	10.11
	16.07	17.43	19.04	21.33	23.02	23.44	22.43	21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.53	03.24	04.32	06.02	07.28	07.54	09.27	10.11
	16.10	17.46	19.06	21.36	23.05	23.44	22.40	21.00	19.14	16.35	15.10	14.53
29	09.15		07.05	05.20	03.51	03.25	04.35	06.05	07.31	07.57	09.29	10.11
	16.14		20.09	21.39	23.07	23.43	22.37	20.57	19.11	16.32	15.08	14.54
30	09.13		07.01	05.16	03.49	03.26	04.38	06.08	07.33	08.00	09.32	10.11
	16.17		20.12	21.42	23.10	23.42	22.34	20.54	19.07	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.10
	16.20		20.15		23.13		22.31	20.50		16.25		14.57
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.46/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No ForestShadow receptor: E - E Asuinrakennus (Rökiöntie 930)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
716	546	427	409	540	810	1 084	1 285	889	717	582	591	8 594

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.39	06.54	05.13	03.44	03.27	04.44	06.14	07.36	08.06	09.35
	14.59	16.23	17.49	20.18	21.45	23.15	23.41	22.28	20.47	19.04	16.22	15.04
2	10.09	09.04	07.36	06.51	05.10	03.42	03.29	04.47	06.16	07.39	08.09	09.37
	15.01	16.26	17.52	20.21	21.48	23.18	23.40	22.25	20.43	19.01	16.19	15.02
3	10.08	09.01	07.33	06.47	05.07	03.40	03.30	04.50	06.19	07.42	08.12	09.40
	15.03	16.29	17.55	20.23	21.51	23.20	23.39	22.22	20.40	18.57	16.16	15.01
4	10.07	08.58	07.29	06.44	05.03	03.38	03.32	04.53	06.22	07.44	08.15	09.42
	15.05	16.32	17.58	20.26	21.54	23.22	23.37	22.19	20.37	18.54	16.13	14.59
5	10.06	08.55	07.26	06.41	05.00	03.36	03.34	04.56	06.25	07.47	08.18	09.45
	15.07	16.35	18.01	20.29	21.57	23.24	23.36	22.16	20.33	18.51	16.10	14.57
6	10.04	08.52	07.23	06.37	04.57	03.34	03.35	04.59	06.28	07.50	08.21	09.47
	15.09	16.39	18.04	20.32	22.00	23.27	23.34	22.13	20.30	18.47	16.07	14.56
7	10.03	08.49	07.19	06.34	04.54	03.32	03.37	05.02	06.30	07.53	08.24	09.49
	15.11	16.42	18.06	20.35	22.03	23.29	23.32	22.10	20.26	18.44	16.04	14.55
8	10.02	08.46	07.16	06.30	04.51	03.30	03.40	05.05	06.33	07.56	08.27	09.51
	15.14	16.45	18.09	20.38	22.06	23.31	23.31	22.07	20.23	18.40	16.01	14.53
9	10.00	08.43	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.58	08.30	09.53
	15.16	16.48	18.12	20.41	22.09	23.32	23.29	22.03	20.19	18.37	15.58	14.52
10	09.58	08.40	07.09	06.23	04.44	03.27	03.44	05.10	06.39	08.01	08.33	09.55
	15.18	16.51	18.15	20.43	22.12	23.34	23.27	22.00	20.16	18.34	15.55	14.51
11	09.57	08.37	07.06	06.20	04.41	03.26	03.46	05.13	06.41	08.04	08.36	09.57
	15.21	16.54	18.18	20.46	22.15	23.36	23.25	21.57	20.13	18.30	15.53	14.50
12	09.55	08.34	07.02	06.17	04.38	03.25	03.49	05.16	06.44	08.07	08.39	09.59
	15.24	16.57	18.21	20.49	22.19	23.37	23.22	21.54	20.09	18.27	15.50	14.49
13	09.53	08.31	06.59	06.13	04.35	03.24	03.51	05.19	06.47	08.10	08.42	10.01
	15.26	17.00	18.24	20.52	22.22	23.39	23.20	21.50	20.06	18.24	15.47	14.49
14	09.51	08.28	06.56	06.10	04.32	03.23	03.53	05.22	06.50	08.13	08.46	10.02
	15.29	17.04	18.27	20.55	22.25	23.40	23.18	21.47	20.02	18.20	15.44	14.48
15	09.49	08.25	06.52	06.06	04.29	03.22	03.56	05.25	06.52	08.16	08.49	10.04
	15.32	17.07	18.29	20.58	22.28	23.41	23.16	21.44	19.59	18.17	15.41	14.48
16	09.47	08.22	06.49	06.03	04.26	03.21	03.59	05.28	06.55	08.18	08.52	10.05
	15.34	17.10	18.32	21.01	22.31	23.42	23.13	21.41	19.55	18.14	15.39	14.47
17	09.45	08.18	06.46	06.00	04.23	03.21	04.01	05.31	06.58	08.21	08.55	10.06
	15.37	17.13	18.35	21.04	22.34	23.43	23.11	21.37	19.52	18.10	15.36	14.47
18	09.43	08.15	06.42	05.56	04.20	03.20	04.04	05.34	07.01	08.24	08.58	10.07
	15.40	17.16	18.38	21.07	22.36	23.44	23.08	21.34	19.49	18.07	15.33	14.47
19	09.41	08.12	06.39	05.53	04.17	03.20	04.07	05.37	07.03	08.27	09.01	10.08
	15.43	17.19	18.41	21.10	22.39	23.45	23.06	21.31	19.45	18.04	15.31	14.47
20	09.38	08.09	06.35	05.50	04.15	03.20	04.09	05.40	07.06	08.30	09.04	10.09
	15.46	17.22	18.44	21.12	22.42	23.45	23.03	21.27	19.42	18.01	15.28	14.47
21	09.36	08.06	06.32	05.46	04.12	03.20	04.12	05.42	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.15	22.45	23.45	23.00	21.24	19.38	17.57	15.26	14.47
22	09.33	08.02	06.28	05.43	04.09	03.20	04.15	05.45	07.11	08.36	09.10	10.10
	15.52	17.28	18.49	21.18	22.48	23.46	22.58	21.21	19.35	17.54	15.23	14.48
23	09.31	07.59	06.25	05.40	04.06	03.20	04.18	05.48	07.14	08.39	09.13	10.11
	15.55	17.31	18.52	21.21	22.51	23.46	22.55	21.17	19.31	17.51	15.21	14.48
24	09.29	07.56	06.22	05.36	04.04	03.20	04.21	05.51	07.17	08.42	09.15	10.11
	15.58	17.34	18.55	21.24	22.54	23.46	22.52	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.18	05.33	04.01	03.21	04.23	05.54	07.20	07.45	09.18	10.11
	16.01	17.37	18.58	21.27	22.57	23.45	22.49	21.11	19.25	16.44	15.16	14.50
26	09.23	07.49	06.15	05.30	03.58	03.22	04.26	05.57	07.22	07.48	09.21	10.12
	16.04	17.40	19.01	21.30	22.59	23.45	22.46	21.07	19.21	16.41	15.14	14.51
27	09.21	07.46	06.11	05.26	03.56	03.22	04.29	06.00	07.25	07.51	09.24	10.12
	16.07	17.43	19.04	21.33	23.02	23.44	22.43	21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.53	03.23	04.32	06.02	07.28	07.54	09.27	10.11
	16.10	17.46	19.06	21.36	23.05	23.44	22.40	21.00	19.14	16.35	15.10	14.53
29	09.15		07.04	05.20	03.51	03.24	04.35	06.05	07.31	07.57	09.29	10.11
	16.13		20.09	21.39	23.08	23.43	22.38	20.57	19.11	16.32	15.08	14.54
30	09.13		07.01	05.16	03.49	03.26	04.38	06.08	07.33	08.00	09.32	10.11
	16.17		20.12	21.42	23.10	23.42	22.35	20.54	19.07	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.10
	16.20		20.15		23.13		22.32	20.50		16.25		14.57
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.46/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No Forest Shadow receptor: F - F Asuinrakennus (Kukkusintie 474)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
716	546	427	409	540	810	1 084	1 285	889	717	582	591	8 594

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.07	07.39	06.54	05.13	03.43	03.26	04.43	06.14	07.36	08.06	09.35
	14.59	16.23	17.49	20.18	21.45	23.16	23.42	22.29	20.47	19.04	16.22	15.04
2	10.09	09.04	07.36	06.51	05.10	03.41	03.28	04.46	06.16	07.39	08.09	09.38
	15.01	16.26	17.52	20.21	21.48	23.18	23.40	22.26	20.43	19.01	16.19	15.02
3	10.08	09.01	07.33	06.47	05.06	03.39	03.29	04.49	06.19	07.42	08.12	09.40
	15.02	16.29	17.55	20.23	21.51	23.20	23.39	22.23	20.40	18.57	16.16	15.00
4	10.07	08.59	07.29	06.44	05.03	03.37	03.31	04.52	06.22	07.44	08.15	09.43
	15.04	16.32	17.58	20.26	21.55	23.23	23.38	22.19	20.37	18.54	16.13	14.59
5	10.06	08.56	07.26	06.40	05.00	03.35	03.33	04.55	06.25	07.47	08.18	09.45
	15.06	16.35	18.01	20.29	21.58	23.25	23.36	22.16	20.33	18.50	16.10	14.57
6	10.05	08.53	07.23	06.37	04.57	03.33	03.35	04.58	06.27	07.50	08.21	09.47
	15.09	16.38	18.03	20.32	22.01	23.27	23.35	22.13	20.30	18.47	16.07	14.56
7	10.03	08.50	07.19	06.34	04.54	03.31	03.37	05.01	06.30	07.53	08.24	09.49
	15.11	16.41	18.06	20.35	22.04	23.29	23.33	22.10	20.26	18.44	16.04	14.54
8	10.02	08.47	07.16	06.30	04.50	03.30	03.39	05.04	06.33	07.56	08.27	09.52
	15.13	16.45	18.09	20.38	22.07	23.31	23.31	22.07	20.23	18.40	16.01	14.53
9	10.00	08.44	07.13	06.27	04.47	03.28	03.41	05.07	06.36	07.59	08.30	09.54
	15.16	16.48	18.12	20.41	22.10	23.33	23.29	22.04	20.19	18.37	15.58	14.52
10	09.59	08.41	07.09	06.23	04.44	03.27	03.43	05.10	06.39	08.01	08.33	09.56
	15.18	16.51	18.15	20.43	22.13	23.35	23.27	22.00	20.16	18.34	15.55	14.51
11	09.57	08.37	07.06	06.20	04.41	03.25	03.46	05.13	06.41	08.04	08.37	09.58
	15.21	16.54	18.18	20.46	22.16	23.37	23.25	21.57	20.13	18.30	15.52	14.50
12	09.55	08.34	07.02	06.16	04.38	03.24	03.48	05.16	06.44	08.07	08.40	09.59
	15.23	16.57	18.21	20.49	22.19	23.38	23.23	21.54	20.09	18.27	15.49	14.49
13	09.53	08.31	06.59	06.13	04.35	03.23	03.50	05.19	06.47	08.10	08.43	10.01
	15.26	17.00	18.24	20.52	22.22	23.39	23.21	21.51	20.06	18.24	15.47	14.48
14	09.52	08.28	06.56	06.10	04.32	03.22	03.53	05.22	06.49	08.13	08.46	10.03
	15.28	17.03	18.27	20.55	22.25	23.41	23.18	21.47	20.02	18.20	15.44	14.48
15	09.50	08.25	06.52	06.06	04.29	03.21	03.55	05.25	06.52	08.16	08.49	10.04
	15.31	17.06	18.29	20.58	22.28	23.42	23.16	21.44	19.59	18.17	15.41	14.47
16	09.47	08.22	06.49	06.03	04.26	03.20	03.58	05.28	06.55	08.18	08.52	10.05
	15.34	17.10	18.32	21.01	22.31	23.43	23.14	21.41	19.55	18.14	15.38	14.47
17	09.45	08.19	06.45	06.00	04.23	03.20	04.01	05.31	06.58	08.21	08.55	10.07
	15.37	17.13	18.35	21.04	22.34	23.44	23.11	21.37	19.52	18.10	15.36	14.46
18	09.43	08.15	06.42	05.56	04.20	03.19	04.03	05.34	07.00	08.24	08.58	10.08
	15.40	17.16	18.38	21.07	22.37	23.45	23.09	21.34	19.49	18.07	15.33	14.46
19	09.41	08.12	06.39	05.53	04.17	03.19	04.06	05.36	07.03	08.27	09.01	10.09
	15.43	17.19	18.41	21.10	22.40	23.45	23.06	21.31	19.45	18.04	15.31	14.46
20	09.39	08.09	06.35	05.49	04.14	03.19	04.09	05.39	07.06	08.30	09.04	10.10
	15.46	17.22	18.44	21.13	22.43	23.46	23.03	21.27	19.42	18.00	15.28	14.47
21	09.36	08.06	06.32	05.46	04.11	03.19	04.12	05.42	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.16	22.46	23.46	23.01	21.24	19.38	17.57	15.25	14.47
22	09.34	08.02	06.28	05.43	04.09	03.19	04.14	05.45	07.11	08.36	09.10	10.11
	15.52	17.28	18.49	21.19	22.49	23.46	22.58	21.21	19.35	17.54	15.23	14.47
23	09.31	07.59	06.25	05.39	04.06	03.19	04.17	05.48	07.14	08.39	09.13	10.11
	15.55	17.31	18.52	21.21	22.51	23.46	22.55	21.17	19.31	17.51	15.21	14.48
24	09.29	07.56	06.22	05.36	04.03	03.20	04.20	05.51	07.17	08.42	09.16	10.12
	15.58	17.34	18.55	21.24	22.54	23.46	22.52	21.14	19.28	17.47	15.18	14.48
25	09.26	07.53	06.18	05.33	04.00	03.20	04.23	05.54	07.20	07.45	09.19	10.12
	16.01	17.37	18.58	21.27	22.57	23.46	22.50	21.11	19.25	16.44	15.16	14.49
26	09.24	07.49	06.15	05.29	03.58	03.21	04.26	05.57	07.22	07.48	09.21	10.12
	16.04	17.40	19.01	21.30	23.00	23.46	22.47	21.07	19.21	16.41	15.14	14.50
27	09.21	07.46	06.11	05.26	03.55	03.22	04.29	05.59	07.25	07.51	09.24	10.12
	16.07	17.43	19.04	21.33	23.03	23.45	22.44	21.04	19.18	16.38	15.12	14.51
28	09.18	07.43	06.08	05.23	03.53	03.23	04.32	06.02	07.28	07.54	09.27	10.12
	16.10	17.46	19.06	21.36	23.05	23.44	22.41	21.00	19.14	16.35	15.10	14.52
29	09.16		07.04	05.19	03.50	03.24	04.35	06.05	07.31	07.57	09.30	10.12
	16.13		20.09	21.39	23.08	23.44	22.38	20.57	19.11	16.31	15.08	14.54
30	09.13		07.01	05.16	03.48	03.25	04.38	06.08	07.33	08.00	09.32	10.11
	16.16		20.12	21.42	23.11	23.43	22.35	20.54	19.07	16.28	15.06	14.55
31	09.10		06.58		03.46		04.41	06.11		08.03		10.11
	16.19		20.15		23.13		22.32	20.50		16.25		14.57
Potential sun hours	181	242	363	447	560	606	595	503	392	307	206	150
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.46/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No Forest Shadow receptor: G - G Asuinrakennus (Kovik byväg 53)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
716	546	427	409	540	810	1 084	1 285	889	717	582	591	8 594

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.08	07.40	06.55	05.13	03.44	03.27	04.44	06.14	07.37	08.06	09.35
	14.59	16.23	17.49	20.18	21.46	23.16	23.42	22.29	20.47	19.04	16.22	15.04
2	10.09	09.05	07.37	06.51	05.10	03.42	03.28	04.47	06.17	07.39	08.09	09.38
	15.01	16.26	17.52	20.21	21.49	23.19	23.41	22.26	20.44	19.01	16.19	15.02
3	10.08	09.02	07.33	06.48	05.07	03.40	03.30	04.50	06.20	07.42	08.12	09.41
	15.03	16.29	17.55	20.24	21.52	23.21	23.40	22.23	20.40	18.58	16.16	15.01
4	10.07	08.59	07.30	06.44	05.04	03.37	03.32	04.53	06.22	07.45	08.15	09.43
	15.05	16.32	17.58	20.27	21.55	23.23	23.38	22.20	20.37	18.54	16.13	14.59
5	10.06	08.56	07.27	06.41	05.00	03.36	03.33	04.56	06.25	07.48	08.19	09.45
	15.07	16.36	18.01	20.30	21.58	23.25	23.37	22.17	20.34	18.51	16.10	14.57
6	10.05	08.53	07.23	06.37	04.57	03.34	03.35	04.59	06.28	07.51	08.22	09.48
	15.09	16.39	18.04	20.32	22.01	23.28	23.35	22.14	20.30	18.47	16.07	14.56
7	10.04	08.50	07.20	06.34	04.54	03.32	03.37	05.02	06.31	07.53	08.25	09.50
	15.11	16.42	18.07	20.35	22.04	23.30	23.33	22.10	20.27	18.44	16.04	14.55
8	10.02	08.47	07.16	06.31	04.51	03.30	03.39	05.05	06.33	07.56	08.28	09.52
	15.14	16.45	18.10	20.38	22.07	23.32	23.31	22.07	20.23	18.41	16.01	14.53
9	10.01	08.44	07.13	06.27	04.48	03.29	03.41	05.08	06.36	07.59	08.31	09.54
	15.16	16.48	18.13	20.41	22.10	23.33	23.30	22.04	20.20	18.37	15.58	14.52
10	09.59	08.41	07.10	06.24	04.45	03.27	03.44	05.11	06.39	08.02	08.34	09.56
	15.18	16.51	18.15	20.44	22.13	23.35	23.28	22.01	20.16	18.34	15.56	14.51
11	09.58	08.38	07.06	06.20	04.41	03.26	03.46	05.14	06.42	08.05	08.37	09.58
	15.21	16.54	18.18	20.47	22.16	23.37	23.26	21.58	20.13	18.31	15.53	14.50
12	09.56	08.35	07.03	06.17	04.38	03.25	03.48	05.16	06.44	08.07	08.40	10.00
	15.24	16.58	18.21	20.50	22.19	23.38	23.23	21.54	20.10	18.27	15.50	14.49
13	09.54	08.32	07.00	06.14	04.35	03.23	03.51	05.19	06.47	08.10	08.43	10.01
	15.26	17.01	18.24	20.53	22.22	23.40	23.21	21.51	20.06	18.24	15.47	14.49
14	09.52	08.29	06.56	06.10	04.32	03.22	03.53	05.22	06.50	08.13	08.46	10.03
	15.29	17.04	18.27	20.55	22.25	23.41	23.19	21.48	20.03	18.21	15.44	14.48
15	09.50	08.25	06.53	06.07	04.29	03.22	03.56	05.25	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	23.42	23.16	21.44	19.59	18.17	15.41	14.48
16	09.48	08.22	06.49	06.03	04.26	03.21	03.58	05.28	06.55	08.19	08.52	10.06
	15.34	17.10	18.33	21.01	22.31	23.43	23.14	21.41	19.56	18.14	15.39	14.47
17	09.46	08.19	06.46	06.00	04.23	03.20	04.01	05.31	06.58	08.22	08.55	10.07
	15.37	17.13	18.36	21.04	22.34	23.44	23.12	21.38	19.52	18.11	15.36	14.47
18	09.44	08.16	06.42	05.57	04.20	03.20	04.04	05.34	07.01	08.25	08.58	10.08
	15.40	17.16	18.38	21.07	22.37	23.45	23.09	21.35	19.49	18.07	15.34	14.47
19	09.41	08.13	06.39	05.53	04.17	03.19	04.06	05.37	07.04	08.28	09.01	10.09
	15.43	17.19	18.41	21.10	22.40	23.46	23.06	21.31	19.46	18.04	15.31	14.47
20	09.39	08.09	06.36	05.50	04.15	03.19	04.09	05.40	07.06	08.30	09.04	10.10
	15.46	17.22	18.44	21.13	22.43	23.46	23.04	21.28	19.42	18.01	15.28	14.47
21	09.37	08.06	06.32	05.46	04.12	03.19	04.12	05.43	07.09	08.33	09.07	10.11
	15.49	17.25	18.47	21.16	22.46	23.47	23.01	21.25	19.39	17.58	15.26	14.47
22	09.34	08.03	06.29	05.43	04.09	03.19	04.15	05.46	07.12	08.36	09.10	10.11
	15.52	17.28	18.50	21.19	22.49	23.47	22.58	21.21	19.35	17.54	15.23	14.48
23	09.32	08.00	06.25	05.40	04.06	03.20	04.18	05.48	07.15	08.39	09.13	10.12
	15.55	17.31	18.53	21.22	22.52	23.47	22.56	21.18	19.32	17.51	15.21	14.48
24	09.29	07.56	06.22	05.36	04.04	03.20	04.21	05.51	07.17	08.42	09.16	10.12
	15.58	17.34	18.55	21.25	22.55	23.47	22.53	21.14	19.28	17.48	15.19	14.49
25	09.27	07.53	06.19	05.33	04.01	03.21	04.23	05.54	07.20	07.45	09.19	10.12
	16.01	17.37	18.58	21.28	22.57	23.46	22.50	21.11	19.25	16.45	15.16	14.50
26	09.24	07.50	06.15	05.30	03.58	03.21	04.26	05.57	07.23	07.48	09.22	10.12
	16.04	17.40	19.01	21.31	23.00	23.46	22.47	21.08	19.22	16.41	15.14	14.51
27	09.21	07.47	06.12	05.26	03.56	03.22	04.29	06.00	07.26	07.51	09.25	10.12
	16.07	17.43	19.04	21.34	23.03	23.46	22.44	21.04	19.18	16.38	15.12	14.52
28	09.19	07.43	06.08	05.23	03.53	03.23	04.32	06.03	07.28	07.54	09.27	10.12
	16.10	17.46	19.07	21.37	23.06	23.45	22.41	21.01	19.15	16.35	15.10	14.53
29	09.16		07.05	05.20	03.51	03.24	04.35	06.06	07.31	07.57	09.30	10.12
	16.14		20.10	21.40	23.08	23.44	22.38	20.57	19.11	16.32	15.08	14.54
30	09.13		07.01	05.17	03.48	03.25	04.38	06.08	07.34	08.00	09.33	10.12
	16.17		20.12	21.43	23.11	23.43	22.35	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.11
	16.20		20.15		23.14		22.32	20.51		16.26		14.57
Potential sun hours	181	242	363	447	560	606	595	503	392	307	206	150
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.46/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No Forest Shadow receptor: H - H Asuinrakennus (Vöyrintie 1021)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
716	546	427	409	540	810	1 084	1 285	889	717	582	591	8 594

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.08	07.40	06.55	05.13	03.44	03.27	04.44	06.14	07.37	08.06	09.35
	14.59	16.23	17.49	20.18	21.46	23.16	23.42	22.29	20.47	19.04	16.23	15.04
2	10.09	09.05	07.37	06.51	05.10	03.42	03.28	04.47	06.17	07.39	08.09	09.38
	15.01	16.26	17.52	20.21	21.49	23.18	23.41	22.26	20.44	19.01	16.19	15.02
3	10.08	09.02	07.33	06.48	05.07	03.40	03.30	04.50	06.20	07.42	08.12	09.41
	15.03	16.29	17.55	20.24	21.52	23.21	23.40	22.23	20.40	18.58	16.16	15.01
4	10.07	08.59	07.30	06.44	05.04	03.38	03.32	04.53	06.22	07.45	08.15	09.43
	15.05	16.33	17.58	20.27	21.55	23.23	23.38	22.20	20.37	18.54	16.13	14.59
5	10.06	08.56	07.27	06.41	05.00	03.36	03.33	04.56	06.25	07.48	08.19	09.45
	15.07	16.36	18.01	20.30	21.58	23.25	23.37	22.17	20.34	18.51	16.10	14.57
6	10.05	08.53	07.23	06.37	04.57	03.34	03.35	04.59	06.28	07.51	08.22	09.48
	15.09	16.39	18.04	20.32	22.01	23.28	23.35	22.14	20.30	18.47	16.07	14.56
7	10.04	08.50	07.20	06.34	04.54	03.32	03.37	05.02	06.31	07.53	08.25	09.50
	15.11	16.42	18.07	20.35	22.04	23.30	23.33	22.10	20.27	18.44	16.04	14.55
8	10.02	08.47	07.16	06.31	04.51	03.30	03.39	05.05	06.33	07.56	08.28	09.52
	15.14	16.45	18.10	20.38	22.07	23.32	23.31	22.07	20.23	18.41	16.01	14.53
9	10.01	08.44	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.59	08.31	09.54
	15.16	16.48	18.13	20.41	22.10	23.33	23.30	22.04	20.20	18.37	15.58	14.52
10	09.59	08.41	07.10	06.24	04.45	03.27	03.44	05.11	06.39	08.02	08.34	09.56
	15.19	16.51	18.16	20.44	22.13	23.35	23.28	22.01	20.16	18.34	15.56	14.51
11	09.58	08.38	07.06	06.20	04.42	03.26	03.46	05.14	06.42	08.05	08.37	09.58
	15.21	16.54	18.18	20.47	22.16	23.37	23.25	21.58	20.13	18.31	15.53	14.50
12	09.56	08.35	07.03	06.17	04.38	03.25	03.48	05.17	06.44	08.07	08.40	10.00
	15.24	16.58	18.21	20.50	22.19	23.38	23.23	21.54	20.10	18.27	15.50	14.49
13	09.54	08.32	07.00	06.14	04.35	03.24	03.51	05.19	06.47	08.10	08.43	10.01
	15.26	17.01	18.24	20.53	22.22	23.40	23.21	21.51	20.06	18.24	15.47	14.49
14	09.52	08.29	06.56	06.10	04.32	03.23	03.53	05.22	06.50	08.13	08.46	10.03
	15.29	17.04	18.27	20.56	22.25	23.41	23.19	21.48	20.03	18.21	15.44	14.48
15	09.50	08.25	06.53	06.07	04.29	03.22	03.56	05.25	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	23.42	23.16	21.44	19.59	18.17	15.42	14.48
16	09.48	08.22	06.49	06.03	04.26	03.21	03.59	05.28	06.55	08.19	08.52	10.06
	15.35	17.10	18.33	21.01	22.31	23.43	23.14	21.41	19.56	18.14	15.39	14.47
17	09.46	08.19	06.46	06.00	04.23	03.20	04.01	05.31	06.58	08.22	08.55	10.07
	15.37	17.13	18.36	21.04	22.34	23.44	23.12	21.38	19.52	18.11	15.36	14.47
18	09.44	08.16	06.43	05.57	04.20	03.20	04.04	05.34	07.01	08.25	08.58	10.08
	15.40	17.16	18.38	21.07	22.37	23.45	23.09	21.35	19.49	18.07	15.34	14.47
19	09.41	08.13	06.39	05.53	04.18	03.20	04.07	05.37	07.04	08.28	09.01	10.09
	15.43	17.19	18.41	21.10	22.40	23.46	23.06	21.31	19.46	18.04	15.31	14.47
20	09.39	08.09	06.36	05.50	04.15	03.19	04.09	05.40	07.06	08.31	09.04	10.10
	15.46	17.22	18.44	21.13	22.43	23.46	23.04	21.28	19.42	18.01	15.28	14.47
21	09.37	08.06	06.32	05.46	04.12	03.19	04.12	05.43	07.09	08.33	09.07	10.11
	15.49	17.25	18.47	21.16	22.46	23.46	23.01	21.25	19.39	17.58	15.26	14.47
22	09.34	08.03	06.29	05.43	04.09	03.19	04.15	05.46	07.12	08.36	09.10	10.11
	15.52	17.28	18.50	21.19	22.49	23.47	22.58	21.21	19.35	17.54	15.24	14.48
23	09.32	08.00	06.25	05.40	04.06	03.20	04.18	05.48	07.15	08.39	09.13	10.12
	15.55	17.31	18.53	21.22	22.52	23.47	22.56	21.18	19.32	17.51	15.21	14.48
24	09.29	07.56	06.22	05.36	04.04	03.20	04.21	05.51	07.17	08.42	09.16	10.12
	15.58	17.34	18.55	21.25	22.55	23.47	22.53	21.14	19.28	17.48	15.19	14.49
25	09.27	07.53	06.19	05.33	04.01	03.21	04.23	05.54	07.20	07.45	09.19	10.12
	16.01	17.37	18.58	21.28	22.57	23.46	22.50	21.11	19.25	16.45	15.17	14.50
26	09.24	07.50	06.15	05.30	03.58	03.21	04.26	05.57	07.23	07.48	09.22	10.12
	16.04	17.40	19.01	21.31	23.00	23.46	22.47	21.08	19.22	16.41	15.14	14.51
27	09.21	07.47	06.12	05.26	03.56	03.22	04.29	06.00	07.26	07.51	09.25	10.12
	16.07	17.43	19.04	21.34	23.03	23.45	22.44	21.04	19.18	16.38	15.12	14.52
28	09.19	07.43	06.08	05.23	03.53	03.23	04.32	06.03	07.28	07.54	09.27	10.12
	16.11	17.46	19.07	21.37	23.06	23.45	22.41	21.01	19.15	16.35	15.10	14.53
29	09.16		07.05	05.20	03.51	03.24	04.35	06.06	07.31	07.57	09.30	10.12
	16.14		20.10	21.40	23.08	23.44	22.38	20.57	19.11	16.32	15.08	14.54
30	09.13		07.01	05.17	03.48	03.26	04.38	06.08	07.34	08.00	09.33	10.12
	16.17		20.12	21.43	23.11	23.43	22.35	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.11
	16.20		20.15		23.14		22.32	20.51		16.26		14.57
Potential sun hours	181	242	363	447	560	606	595	503	392	307	206	150
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Miikka Saranpää / miikka.saranpaa@fcg.fi
Calculated:
14.7.2023 9.46/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No ForestShadow receptor: I - I Lomarakennus (Ehrsbackavägen 29)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
716	546	427	409	540	810	1 084	1 285	889	717	582	591	8 594

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.07	07.40	06.55	05.14	03.44	03.27	04.44	06.14	07.37	08.06	09.35
	15.00	16.23	17.49	20.18	21.46	23.16	23.42	22.29	20.47	19.04	16.23	15.04
2	10.09	09.05	07.37	06.51	05.10	03.42	03.29	04.47	06.17	07.39	08.09	09.38
	15.01	16.26	17.52	20.21	21.49	23.18	23.41	22.26	20.44	19.01	16.20	15.03
3	10.08	09.02	07.33	06.48	05.07	03.40	03.30	04.50	06.20	07.42	08.12	09.40
	15.03	16.30	17.55	20.24	21.52	23.21	23.39	22.23	20.40	18.58	16.17	15.01
4	10.07	08.59	07.30	06.44	05.04	03.38	03.32	04.53	06.22	07.45	08.15	09.43
	15.05	16.33	17.58	20.27	21.55	23.23	23.38	22.20	20.37	18.54	16.13	14.59
5	10.06	08.56	07.27	06.41	05.01	03.36	03.34	04.56	06.25	07.48	08.18	09.45
	15.07	16.36	18.01	20.30	21.58	23.25	23.36	22.17	20.34	18.51	16.10	14.58
6	10.05	08.53	07.23	06.37	04.57	03.34	03.36	04.59	06.28	07.51	08.22	09.47
	15.09	16.39	18.04	20.32	22.01	23.27	23.35	22.13	20.30	18.48	16.07	14.56
7	10.04	08.50	07.20	06.34	04.54	03.32	03.38	05.02	06.31	07.53	08.25	09.50
	15.12	16.42	18.07	20.35	22.04	23.29	23.33	22.10	20.27	18.44	16.04	14.55
8	10.02	08.47	07.16	06.31	04.51	03.31	03.40	05.05	06.34	07.56	08.28	09.52
	15.14	16.45	18.10	20.38	22.07	23.31	23.31	22.07	20.23	18.41	16.02	14.54
9	10.01	08.44	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.59	08.31	09.54
	15.16	16.48	18.13	20.41	22.10	23.33	23.29	22.04	20.20	18.37	15.59	14.53
10	09.59	08.41	07.10	06.24	04.45	03.28	03.44	05.11	06.39	08.02	08.34	09.56
	15.19	16.51	18.16	20.44	22.13	23.35	23.27	22.01	20.16	18.34	15.56	14.51
11	09.57	08.38	07.06	06.20	04.42	03.26	03.46	05.14	06.42	08.05	08.37	09.58
	15.21	16.55	18.18	20.47	22.16	23.37	23.25	21.57	20.13	18.31	15.53	14.51
12	09.56	08.35	07.03	06.17	04.39	03.25	03.49	05.17	06.45	08.07	08.40	09.59
	15.24	16.58	18.21	20.50	22.19	23.38	23.23	21.54	20.10	18.27	15.50	14.50
13	09.54	08.32	07.00	06.14	04.36	03.24	03.51	05.20	06.47	08.10	08.43	10.01
	15.27	17.01	18.24	20.53	22.22	23.40	23.21	21.51	20.06	18.24	15.47	14.49
14	09.52	08.28	06.56	06.10	04.33	03.23	03.54	05.23	06.50	08.13	08.46	10.03
	15.29	17.04	18.27	20.55	22.25	23.41	23.19	21.48	20.03	18.21	15.44	14.48
15	09.50	08.25	06.53	06.07	04.30	03.22	03.56	05.25	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	23.42	23.16	21.44	19.59	18.17	15.42	14.48
16	09.48	08.22	06.49	06.03	04.27	03.21	03.59	05.28	06.55	08.19	08.52	10.05
	15.35	17.10	18.33	21.01	22.31	23.43	23.14	21.41	19.56	18.14	15.39	14.48
17	09.46	08.19	06.46	06.00	04.24	03.21	04.01	05.31	06.58	08.22	08.55	10.07
	15.38	17.13	18.36	21.04	22.34	23.44	23.11	21.38	19.52	18.11	15.36	14.47
18	09.43	08.16	06.43	05.57	04.21	03.20	04.04	05.34	07.01	08.25	08.58	10.08
	15.40	17.16	18.38	21.07	22.37	23.45	23.09	21.34	19.49	18.07	15.34	14.47
19	09.41	08.13	06.39	05.53	04.18	03.20	04.07	05.37	07.04	08.28	09.01	10.09
	15.43	17.19	18.41	21.10	22.40	23.45	23.06	21.31	19.46	18.04	15.31	14.47
20	09.39	08.09	06.36	05.50	04.15	03.20	04.10	05.40	07.06	08.30	09.04	10.10
	15.46	17.22	18.44	21.13	22.43	23.46	23.04	21.28	19.42	18.01	15.29	14.47
21	09.36	08.06	06.32	05.47	04.12	03.20	04.12	05.43	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.16	22.46	23.46	23.01	21.24	19.39	17.58	15.26	14.48
22	09.34	08.03	06.29	05.43	04.09	03.20	04.15	05.46	07.12	08.36	09.10	10.11
	15.52	17.28	18.50	21.19	22.49	23.46	22.58	21.21	19.35	17.54	15.24	14.48
23	09.32	08.00	06.25	05.40	04.07	03.20	04.18	05.49	07.15	08.39	09.13	10.11
	15.55	17.31	18.53	21.22	22.52	23.46	22.55	21.18	19.32	17.51	15.21	14.49
24	09.29	07.56	06.22	05.37	04.04	03.21	04.21	05.51	07.17	08.42	09.16	10.12
	15.58	17.34	18.55	21.25	22.54	23.46	22.53	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.19	05.33	04.01	03.21	04.24	05.54	07.20	07.45	09.19	10.12
	16.01	17.37	18.58	21.28	22.57	23.46	22.50	21.11	19.25	16.45	15.17	14.50
26	09.24	07.50	06.15	05.30	03.59	03.22	04.27	05.57	07.23	07.48	09.22	10.12
	16.05	17.40	19.01	21.31	23.00	23.46	22.47	21.08	19.22	16.42	15.15	14.51
27	09.21	07.46	06.12	05.27	03.56	03.23	04.29	06.00	07.26	07.51	09.24	10.12
	16.08	17.43	19.04	21.34	23.03	23.45	22.44	21.04	19.18	16.38	15.12	14.52
28	09.19	07.43	06.08	05.23	03.54	03.24	04.32	06.03	07.28	07.54	09.27	10.12
	16.11	17.46	19.07	21.37	23.05	23.44	22.41	21.01	19.15	16.35	15.10	14.53
29	09.16		07.05	05.20	03.51	03.25	04.35	06.06	07.31	07.57	09.30	10.12
	16.14		20.10	21.40	23.08	23.44	22.38	20.57	19.11	16.32	15.08	14.55
30	09.13		07.01	05.17	03.49	03.26	04.38	06.08	07.34	08.00	09.33	10.11
	16.17		20.12	21.43	23.11	23.43	22.35	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.11
	16.20		20.15		23.13		22.32	20.51		16.26		14.57
Potential sun hours	182	242	363	447	559	606	595	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

Project:
Lasor tuulivoimahanke 2023

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+358104095666
Miikka Saranpää / miikka.saranpaa@fcg.fi
Calculated:
14.7.2023 9.46/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No Forest Shadow receptor: J - J Asuinrakennus (Kleidersvägen 118)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
716	546	427	409	540	810	1 084	1 285	889	717	582	591	8 594

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.07	07.40	06.55	05.14	03.44	03.27	04.44	06.14	07.37	08.06	09.35
	15.00	16.23	17.49	20.18	21.46	23.16	23.42	22.29	20.47	19.04	16.23	15.05
2	10.09	09.05	07.37	06.51	05.10	03.42	03.29	04.47	06.17	07.39	08.09	09.38
	15.01	16.26	17.52	20.21	21.49	23.18	23.40	22.26	20.44	19.01	16.20	15.03
3	10.08	09.02	07.33	06.48	05.07	03.40	03.30	04.50	06.20	07.42	08.12	09.40
	15.03	16.30	17.55	20.24	21.52	23.20	23.39	22.23	20.40	18.58	16.17	15.01
4	10.07	08.59	07.30	06.44	05.04	03.38	03.32	04.53	06.22	07.45	08.15	09.43
	15.05	16.33	17.58	20.27	21.55	23.23	23.38	22.20	20.37	18.54	16.14	14.59
5	10.06	08.56	07.27	06.41	05.01	03.36	03.34	04.56	06.25	07.48	08.18	09.45
	15.07	16.36	18.01	20.30	21.58	23.25	23.36	22.17	20.34	18.51	16.11	14.58
6	10.05	08.53	07.23	06.38	04.57	03.34	03.36	04.59	06.28	07.50	08.21	09.47
	15.10	16.39	18.04	20.32	22.01	23.27	23.35	22.13	20.30	18.48	16.08	14.56
7	10.03	08.50	07.20	06.34	04.54	03.32	03.38	05.02	06.31	07.53	08.25	09.50
	15.12	16.42	18.07	20.35	22.04	23.29	23.33	22.10	20.27	18.44	16.05	14.55
8	10.02	08.47	07.16	06.31	04.51	03.31	03.40	05.05	06.34	07.56	08.28	09.52
	15.14	16.45	18.10	20.38	22.07	23.31	23.31	22.07	20.23	18.41	16.02	14.54
9	10.00	08.44	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.59	08.31	09.54
	15.16	16.48	18.13	20.41	22.10	23.33	23.29	22.04	20.20	18.37	15.59	14.53
10	09.59	08.41	07.10	06.24	04.45	03.28	03.44	05.11	06.39	08.02	08.34	09.56
	15.19	16.52	18.16	20.44	22.13	23.35	23.27	22.01	20.16	18.34	15.56	14.52
11	09.57	08.38	07.06	06.20	04.42	03.26	03.47	05.14	06.42	08.05	08.37	09.58
	15.21	16.55	18.18	20.47	22.16	23.36	23.25	21.57	20.13	18.31	15.53	14.51
12	09.55	08.35	07.03	06.17	04.39	03.25	03.49	05.17	06.45	08.07	08.40	09.59
	15.24	16.58	18.21	20.50	22.19	23.38	23.23	21.54	20.10	18.27	15.50	14.50
13	09.54	08.32	07.00	06.14	04.36	03.24	03.51	05.20	06.47	08.10	08.43	10.01
	15.27	17.01	18.24	20.53	22.22	23.39	23.21	21.51	20.06	18.24	15.47	14.49
14	09.52	08.28	06.56	06.10	04.33	03.23	03.54	05.23	06.50	08.13	08.46	10.03
	15.29	17.04	18.27	20.55	22.25	23.41	23.18	21.48	20.03	18.21	15.45	14.48
15	09.50	08.25	06.53	06.07	04.30	03.22	03.56	05.26	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	23.42	23.16	21.44	19.59	18.17	15.42	14.48
16	09.48	08.22	06.49	06.03	04.27	03.22	03.59	05.28	06.55	08.19	08.52	10.05
	15.35	17.10	18.33	21.01	22.31	23.43	23.14	21.41	19.56	18.14	15.39	14.48
17	09.45	08.19	06.46	06.00	04.24	03.21	04.02	05.31	06.58	08.22	08.55	10.07
	15.38	17.13	18.36	21.04	22.34	23.44	23.11	21.38	19.52	18.11	15.36	14.47
18	09.43	08.16	06.43	05.57	04.21	03.20	04.04	05.34	07.01	08.25	08.58	10.08
	15.41	17.16	18.38	21.07	22.37	23.44	23.09	21.34	19.49	18.07	15.34	14.47
19	09.41	08.13	06.39	05.53	04.18	03.20	04.07	05.37	07.04	08.28	09.01	10.09
	15.43	17.19	18.41	21.10	22.40	23.45	23.06	21.31	19.46	18.04	15.31	14.47
20	09.39	08.09	06.36	05.50	04.15	03.20	04.10	05.40	07.06	08.30	09.04	10.10
	15.46	17.22	18.44	21.13	22.43	23.46	23.03	21.28	19.42	18.01	15.29	14.48
21	09.36	08.06	06.32	05.47	04.12	03.20	04.12	05.43	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.16	22.46	23.46	23.01	21.24	19.39	17.58	15.26	14.48
22	09.34	08.03	06.29	05.43	04.09	03.20	04.15	05.46	07.12	08.36	09.10	10.11
	15.52	17.28	18.50	21.19	22.49	23.46	22.58	21.21	19.35	17.54	15.24	14.48
23	09.31	08.00	06.25	05.40	04.07	03.20	04.18	05.49	07.15	08.39	09.13	10.11
	15.55	17.31	18.53	21.22	22.51	23.46	22.55	21.18	19.32	17.51	15.21	14.49
24	09.29	07.56	06.22	05.37	04.04	03.21	04.21	05.52	07.17	08.42	09.16	10.12
	15.58	17.34	18.55	21.25	22.54	23.46	22.52	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.19	05.33	04.01	03.21	04.24	05.54	07.20	07.45	09.19	10.12
	16.02	17.37	18.58	21.28	22.57	23.46	22.50	21.11	19.25	16.45	15.17	14.50
26	09.24	07.50	06.15	05.30	03.59	03.22	04.27	05.57	07.23	07.48	09.22	10.12
	16.05	17.40	19.01	21.31	23.00	23.45	22.47	21.08	19.22	16.42	15.15	14.51
27	09.21	07.46	06.12	05.27	03.56	03.23	04.30	06.00	07.26	07.51	09.24	10.12
	16.08	17.43	19.04	21.34	23.03	23.45	22.44	21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.54	03.24	04.33	06.03	07.28	07.54	09.27	10.12
	16.11	17.46	19.07	21.37	23.05	23.44	22.41	21.01	19.15	16.35	15.10	14.53
29	09.16		07.05	05.20	03.51	03.25	04.35	06.06	07.31	07.57	09.30	10.12
	16.14		20.10	21.40	23.08	23.43	22.38	20.57	19.11	16.32	15.08	14.55
30	09.13		07.01	05.17	03.49	03.26	04.38	06.08	07.34	08.00	09.33	10.11
	16.17		20.12	21.43	23.11	23.43	22.35	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.47		04.41	06.11		08.03		10.11
	16.20		20.15		23.13		22.32	20.51		16.26		14.58
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Miikka Saranpää / miikka.saranpaa@fcg.fi
Calculated:
14.7.2023 9.46/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No ForestShadow receptor: K - K Asuinrakennus (Rökiöntie 154)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
716	546	427	409	540	810	1 084	1 285	889	717	582	591	8 594

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.40	06.55	05.14	03.45	03.28	04.45	06.14	07.37	08.06	09.35
	15.00	16.24	17.49	20.18	21.46	23.15	23.41	22.29	20.47	19.05	16.23	15.05
2	10.09	09.04	07.36	06.51	05.11	03.43	03.29	04.48	06.17	07.39	08.09	09.37
	15.02	16.27	17.52	20.21	21.49	23.18	23.40	22.26	20.44	19.01	16.20	15.03
3	10.08	09.02	07.33	06.48	05.07	03.41	03.31	04.50	06.20	07.42	08.12	09.40
	15.04	16.30	17.55	20.24	21.52	23.20	23.39	22.23	20.40	18.58	16.17	15.01
4	10.07	08.59	07.30	06.44	05.04	03.39	03.33	04.53	06.23	07.45	08.15	09.42
	15.06	16.33	17.58	20.27	21.55	23.22	23.37	22.19	20.37	18.54	16.14	15.00
5	10.06	08.56	07.26	06.41	05.01	03.37	03.34	04.56	06.25	07.48	08.18	09.45
	15.08	16.36	18.01	20.29	21.58	23.24	23.36	22.16	20.33	18.51	16.11	14.58
6	10.04	08.53	07.23	06.38	04.58	03.35	03.36	04.59	06.28	07.50	08.21	09.47
	15.10	16.39	18.04	20.32	22.01	23.27	23.34	22.13	20.30	18.48	16.08	14.57
7	10.03	08.50	07.20	06.34	04.55	03.33	03.38	05.02	06.31	07.53	08.24	09.49
	15.12	16.42	18.07	20.35	22.04	23.29	23.32	22.10	20.27	18.44	16.05	14.55
8	10.02	08.47	07.16	06.31	04.51	03.31	03.40	05.05	06.34	07.56	08.27	09.51
	15.14	16.45	18.10	20.38	22.07	23.31	23.31	22.07	20.23	18.41	16.02	14.54
9	10.00	08.44	07.13	06.27	04.48	03.30	03.43	05.08	06.36	07.59	08.30	09.53
	15.17	16.49	18.13	20.41	22.10	23.32	23.29	22.04	20.20	18.38	15.59	14.53
10	09.59	08.41	07.10	06.24	04.45	03.28	03.45	05.11	06.39	08.02	08.34	09.55
	15.19	16.52	18.16	20.44	22.13	23.34	23.27	22.00	20.16	18.34	15.56	14.52
11	09.57	08.38	07.06	06.21	04.42	03.27	03.47	05.14	06.42	08.05	08.37	09.57
	15.22	16.55	18.18	20.47	22.16	23.36	23.25	21.57	20.13	18.31	15.53	14.51
12	09.55	08.35	07.03	06.17	04.39	03.26	03.49	05.17	06.45	08.07	08.40	09.59
	15.24	16.58	18.21	20.50	22.19	23.37	23.22	21.54	20.10	18.27	15.50	14.50
13	09.53	08.31	07.00	06.14	04.36	03.25	03.52	05.20	06.47	08.10	08.43	10.01
	15.27	17.01	18.24	20.52	22.22	23.39	23.20	21.51	20.06	18.24	15.48	14.50
14	09.51	08.28	06.56	06.10	04.33	03.24	03.54	05.23	06.50	08.13	08.46	10.02
	15.30	17.04	18.27	20.55	22.25	23.40	23.18	21.47	20.03	18.21	15.45	14.49
15	09.49	08.25	06.53	06.07	04.30	03.23	03.57	05.26	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	23.41	23.16	21.44	19.59	18.18	15.42	14.48
16	09.47	08.22	06.49	06.04	04.27	03.22	03.59	05.29	06.56	08.19	08.52	10.05
	15.35	17.10	18.33	21.01	22.31	23.42	23.13	21.41	19.56	18.14	15.39	14.48
17	09.45	08.19	06.46	06.00	04.24	03.22	04.02	05.32	06.58	08.22	08.55	10.06
	15.38	17.13	18.36	21.04	22.34	23.43	23.11	21.38	19.52	18.11	15.37	14.48
18	09.43	08.16	06.43	05.57	04.21	03.21	04.05	05.34	07.01	08.25	08.58	10.07
	15.41	17.16	18.38	21.07	22.37	23.44	23.08	21.34	19.49	18.08	15.34	14.48
19	09.41	08.12	06.39	05.54	04.18	03.21	04.07	05.37	07.04	08.27	09.01	10.08
	15.44	17.19	18.41	21.10	22.40	23.45	23.06	21.31	19.46	18.04	15.32	14.48
20	09.38	08.09	06.36	05.50	04.15	03.21	04.10	05.40	07.06	08.30	09.04	10.09
	15.47	17.22	18.44	21.13	22.42	23.45	23.03	21.28	19.42	18.01	15.29	14.48
21	09.36	08.06	06.32	05.47	04.13	03.21	04.13	05.43	07.09	08.33	09.07	10.10
	15.50	17.26	18.47	21.16	22.45	23.45	23.00	21.24	19.39	17.58	15.27	14.48
22	09.34	08.03	06.29	05.43	04.10	03.21	04.16	05.46	07.12	08.36	09.10	10.10
	15.53	17.29	18.50	21.19	22.48	23.46	22.58	21.21	19.35	17.55	15.24	14.49
23	09.31	08.00	06.25	05.40	04.07	03.21	04.18	05.49	07.15	08.39	09.13	10.11
	15.56	17.32	18.53	21.22	22.51	23.46	22.55	21.18	19.32	17.51	15.22	14.49
24	09.29	07.56	06.22	05.37	04.04	03.21	04.21	05.52	07.17	08.42	09.16	10.11
	15.59	17.35	18.55	21.25	22.54	23.46	22.52	21.14	19.28	17.48	15.19	14.50
25	09.26	07.53	06.19	05.33	04.02	03.22	04.24	05.55	07.20	07.45	09.18	10.12
	16.02	17.38	18.58	21.28	22.57	23.45	22.49	21.11	19.25	16.45	15.17	14.51
26	09.24	07.50	06.15	05.30	03.59	03.23	04.27	05.57	07.23	07.48	09.21	10.12
	16.05	17.41	19.01	21.31	23.00	23.45	22.46	21.07	19.22	16.42	15.15	14.52
27	09.21	07.46	06.12	05.27	03.57	03.23	04.30	06.00	07.26	07.51	09.24	10.12
	16.08	17.43	19.04	21.34	23.02	23.44	22.44	21.04	19.18	16.39	15.13	14.53
28	09.18	07.43	06.08	05.24	03.54	03.24	04.33	06.03	07.28	07.54	09.27	10.11
	16.11	17.46	19.07	21.37	23.05	23.44	22.41	21.01	19.15	16.35	15.11	14.54
29	09.16		07.05	05.20	03.52	03.25	04.36	06.06	07.31	07.57	09.30	10.11
	16.14		20.10	21.40	23.08	23.43	22.38	20.57	19.11	16.32	15.09	14.55
30	09.13		07.02	05.17	03.49	03.27	04.39	06.09	07.34	08.00	09.32	10.11
	16.17		20.12	21.43	23.10	23.42	22.35	20.54	19.08	16.29	15.07	14.57
31	09.10		06.58		03.47		04.42	06.11		08.03		10.10
	16.20		20.15		23.13		22.32	20.51		16.26		14.58
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.46/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No ForestShadow receptor: L - L Asuinrakennus (Bjurbäcksvägen 231)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
716	546	427	409	540	810	1 084	1 285	889	717	582	591	8 594

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.40	06.55	05.14	03.45	04.44 (1)	03.28	04.44 (1)	04.45	06.14	07.36	08.06	09.35
	15.00	16.23	17.49	20.18	21.45	23.15 12	04.56 (1)	23.41 23	05.07 (1)	22.28	20.47	19.04	16.23	15.05
2	10.08	09.04	07.36	06.51	05.10	03.43	04.43 (1)	03.30	04.46 (1)	04.47	06.17	07.39	08.09	09.37
	15.02	16.27	17.52	20.21	21.48	23.17 14	04.57 (1)	23.39 22	05.08 (1)	22.25	20.44	19.01	16.20	15.03
3	10.07	09.01	07.33	06.48	05.07	03.41	04.43 (1)	03.31	04.46 (1)	04.50	06.20	07.42	08.12	09.40
	15.04	16.30	17.55	20.24	21.51	23.20 15	04.58 (1)	23.38 22	05.08 (1)	22.22	20.40	18.58	16.17	15.01
4	10.06	08.58	07.30	06.44	05.04	03.39	04.42 (1)	03.33	04.46 (1)	04.53	06.22	07.45	08.15	09.42
	15.06	16.33	17.58	20.26	21.54	23.22 18	05.00 (1)	23.37 21	05.07 (1)	22.19	20.37	18.54	16.14	15.00
5	10.05	08.55	07.26	06.41	05.01	03.37	04.41 (1)	03.35	04.46 (1)	04.56	06.25	07.48	08.18	09.44
	15.08	16.36	18.01	20.29	21.57	23.24 19	05.00 (1)	23.35 21	05.07 (1)	22.16	20.33	18.51	16.11	14.58
6	10.04	08.52	07.23	06.38	04.58	03.35	04.41 (1)	03.36	04.48 (1)	04.59	06.28	07.50	08.21	09.47
	15.10	16.39	18.04	20.32	22.00	23.26 19	05.00 (1)	23.34 19	05.07 (1)	22.13	20.30	18.47	16.08	14.57
7	10.03	08.50	07.20	06.34	04.54	03.33	04.41 (1)	03.38	04.48 (1)	05.02	06.31	07.53	08.24	09.49
	15.12	16.42	18.07	20.35	22.03	23.28 20	05.01 (1)	23.32 18	05.06 (1)	22.10	20.26	18.44	16.05	14.55
8	10.01	08.47	07.16	06.31	04.51	03.31	04.41 (1)	03.40	04.49 (1)	05.05	06.34	07.56	08.27	09.51
	15.14	16.45	18.10	20.38	22.06	23.30 21	05.02 (1)	23.30 17	05.06 (1)	22.07	20.23	18.41	16.02	14.54
9	10.00	08.44	07.13	06.27	04.48	03.30	04.41 (1)	03.43	04.49 (1)	05.08	06.36	07.59	08.30	09.53
	15.17	16.49	18.13	20.41	22.09	23.32 21	05.02 (1)	23.28 16	05.05 (1)	22.03	20.20	18.37	15.59	14.53
10	09.58	08.40	07.10	06.24	04.45	03.28	04.40 (1)	03.45	04.50 (1)	05.11	06.39	08.02	08.33	09.55
	15.19	16.52	18.15	20.44	22.12	23.34 22	05.02 (1)	23.26 15	05.05 (1)	22.00	20.16	18.34	15.56	14.52
11	09.57	08.37	07.06	06.20	04.42	03.27	04.41 (1)	03.47	04.52 (1)	05.14	06.42	08.04	08.36	09.57
	15.22	16.55	18.18	20.46	22.15	23.35 22	05.03 (1)	23.24 13	05.05 (1)	21.57	20.13	18.31	15.53	14.51
12	09.55	08.34	07.03	06.17	04.39	03.26	04.41 (1)	03.49	04.53 (1)	05.17	06.44	08.07	08.39	09.59
	15.24	16.58	18.21	20.49	22.18	23.37 23	05.04 (1)	23.22 11	05.04 (1)	21.54	20.09	18.27	15.50	14.50
13	09.53	08.31	06.59	06.14	04.36	03.25	04.40 (1)	03.52	04.55 (1)	05.20	06.47	08.10	08.42	10.00
	15.27	17.01	18.24	20.52	22.21	23.38 23	05.03 (1)	23.20 7	05.02 (1)	21.50	20.06	18.24	15.47	14.50
14	09.51	08.28	06.56	06.10	04.33	03.24	04.41 (1)	03.54		05.23	06.50	08.13	08.46	10.02
	15.30	17.04	18.27	20.55	22.24	23.40 23	05.04 (1)	23.18		21.47	20.03	18.21	15.45	14.49
15	09.49	08.25	06.53	06.07	04.30	03.23	04.41 (1)	03.57		05.26	06.53	08.16	08.49	10.03
	15.32	17.07	18.30	20.58	22.27	23.41 23	05.04 (1)	23.15		21.44	19.59	18.17	15.42	14.48
16	09.47	08.22	06.49	06.04	04.27	03.22	04.41 (1)	03.59		05.29	06.55	08.19	08.52	10.05
	15.35	17.10	18.33	21.01	22.30	23.42 24	05.05 (1)	23.13		21.41	19.56	18.14	15.39	14.48
17	09.45	08.19	06.46	06.00	04.24	03.22	04.41 (1)	04.02		05.31	06.58	08.21	08.55	10.06
	15.38	17.13	18.35	21.04	22.33	23.43 24	05.05 (1)	23.11		21.37	19.52	18.11	15.37	14.48
18	09.43	08.15	06.42	05.57	04.21	03.21	04.42 (1)	04.05		05.34	07.01	08.24	08.58	10.07
	15.41	17.16	18.38	21.07	22.36	23.44 24	05.06 (1)	23.08		21.34	19.49	18.07	15.34	14.48
19	09.40	08.12	06.39	05.53	04.18	03.21	04.42 (1)	04.07		05.37	07.04	08.27	09.01	10.08
	15.44	17.19	18.41	21.10	22.39	23.44 24	05.06 (1)	23.05		21.31	19.45	18.04	15.31	14.48
20	09.38	08.09	06.36	05.50	04.15	03.21	04.42 (1)	04.10		05.40	07.06	08.30	09.04	10.09
	15.47	17.22	18.44	21.13	22.42	23.45 24	05.06 (1)	23.03		21.27	19.42	18.01	15.29	14.48
21	09.36	08.06	06.32	05.47	04.13	03.21	04.42 (1)	04.13		05.43	07.09	08.33	09.07	10.10
	15.50	17.25	18.47	21.16	22.45	23.45 24	05.06 (1)	23.00		21.24	19.39	17.58	15.27	14.48
22	09.33	08.03	06.29	05.43	04.10	03.21	04.42 (1)	04.16		05.46	07.12	08.36	09.10	10.10
	15.53	17.28	18.50	21.18	22.48	23.45 24	05.06 (1)	22.57		21.21	19.35	17.54	15.24	14.49
23	09.31	07.59	06.25	05.40	04.07	03.21	04.43 (1)	04.18		05.49	07.14	08.39	09.12	10.11
	15.56	17.31	18.52	21.21	22.51	23.45 24	05.07 (1)	22.55		21.17	19.32	17.51	15.22	14.49
24	09.28	07.56	06.22	05.37	04.04	03.21	04.43 (1)	04.21		05.52	07.17	08.42	09.15	10.11
	15.59	17.34	18.55	21.24	22.54	23.45 24	05.07 (1)	22.52		21.14	19.28	17.48	15.19	14.50
25	09.26	07.53	06.19	05.33	04.02	03.22	04.43 (1)	04.24		05.54	07.20	07.45	09.18	10.11
	16.02	17.37	18.58	21.27	22.56	23.45 24	05.07 (1)	22.49		21.11	19.25	16.45	15.17	14.51
26	09.23	07.50	06.15	05.30	03.59	03.23	04.43 (1)	04.27		05.57	07.23	07.48	09.21	10.11
	16.05	17.40	19.01	21.30	22.59	23.45 24	05.07 (1)	22.46		21.07	19.21	16.42	15.15	14.52
27	09.21	07.46	06.12	05.27	03.57	03.23	04.44 (1)	04.30		06.00	07.25	07.51	09.24	10.11
	16.08	17.43	19.04	21.33	23.02	23.44 23	05.07 (1)	22.43		21.04	19.18	16.38	15.13	14.53
28	09.18	07.43	06.08	05.24	03.54	03.24	04.44 (1)	04.33		06.03	07.28	07.54	09.27	10.11
	16.11	17.46	19.07	21.36	23.05	23.43 24	05.08 (1)	22.40		21.01	19.15	16.35	15.11	14.54
29	09.15		07.05	05.20	03.52	03.26	04.44 (1)	04.36		06.06	07.31	07.57	09.29	10.11
	16.14		20.09	21.39	23.07	23.43 23	05.07 (1)	22.37		20.57	19.11	16.32	15.09	14.55
30	09.13		07.01	05.17	03.49 04.48 (1)	03.27	04.44 (1)	04.39		06.09	07.34	08.00	09.32	10.10
	16.17		20.12	21.42	23.10 4 04.52 (1)	23.42 23	05.07 (1)	22.34		20.54	19.08	16.29	15.07	14.57
31	09.10		06.58		03.47 04.45 (1)			04.42		06.11		08.03		10.10
	16.20		20.15		23.12 9 04.54 (1)			22.31		20.50		16.26		14.58
Potential sun hours	182	242	363	447	559	605		594		502	392	308	206	151
Total, worst case					13	652		225						
Sun reduction					0,48	0,49		0,39						
Oper. time red.					0,98	0,98		0,98						
Wind dir. red.					0,63	0,63		0,63						
Total reduction					0,29	0,30		0,24						
Total, real					4	198		54						

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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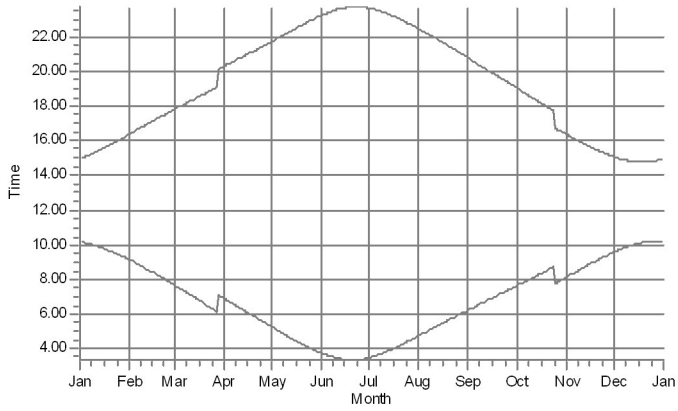
Calculated:
14.7.2023 9.46/3.5.584

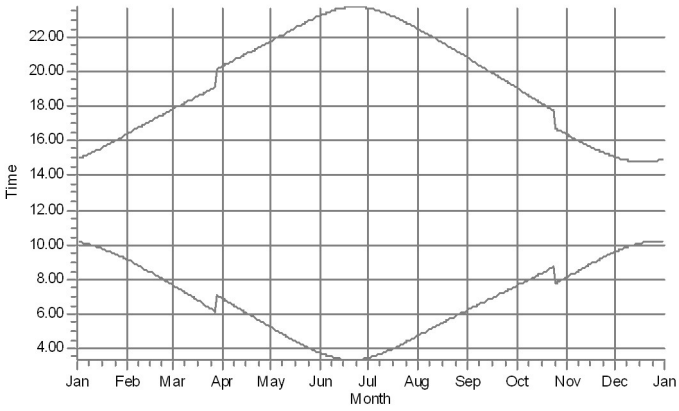
SHADOW - Calendar, graphical

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No Forest

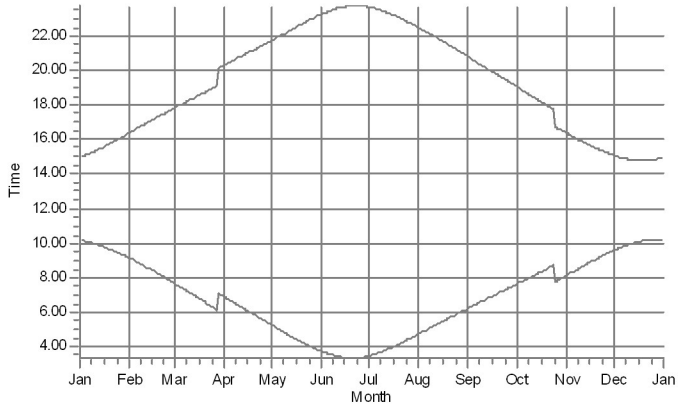
A: A Lomarakennus (Söderändan 49)



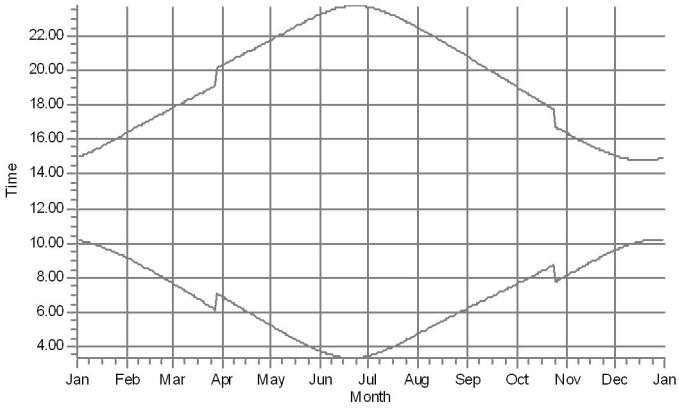
B: B Asuinrakennus (Söderändan 81)



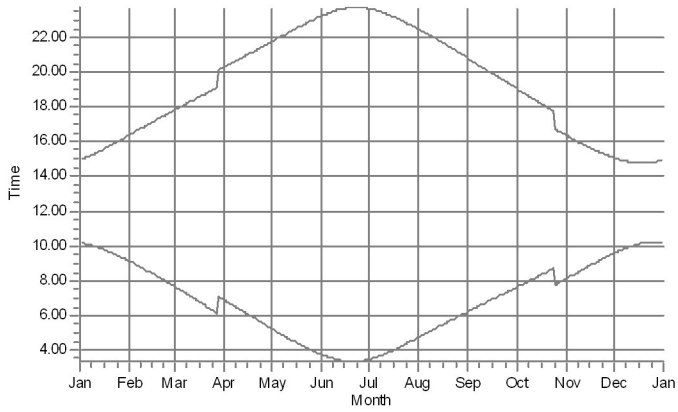
C: C Lomarakennus (Säderändan 166)



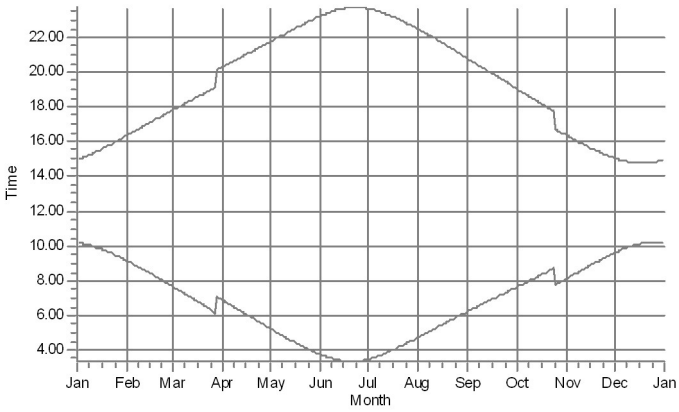
D: D Lomarakennus (Söderändan 188)



E: E Asuinrakennus (Rökiöntie 930)



F: F Asuinrakennus (Kukkusintie 474)



WTGs

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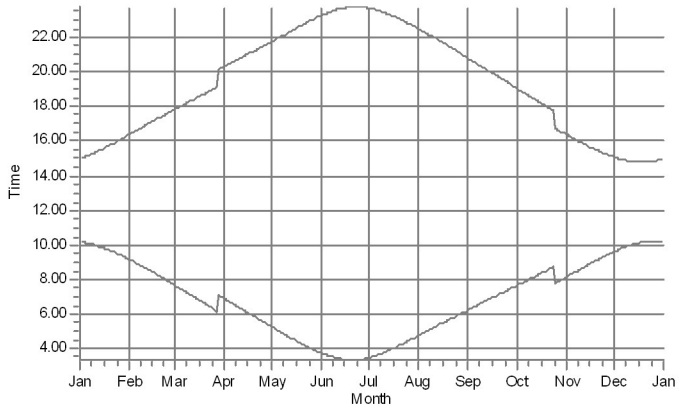
Calculated:
14.7.2023 9.46/3.5.584

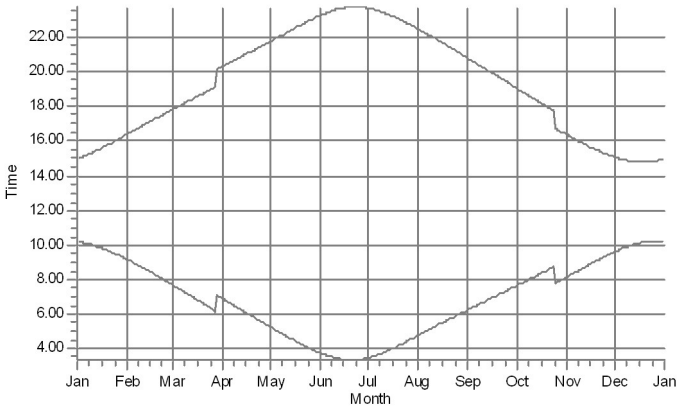
SHADOW - Calendar, graphical

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No Forest

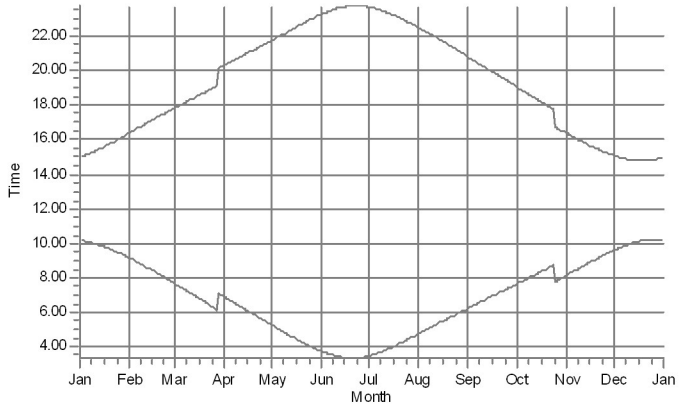
G: G Asuinrakennus (Kovik byväg 53)



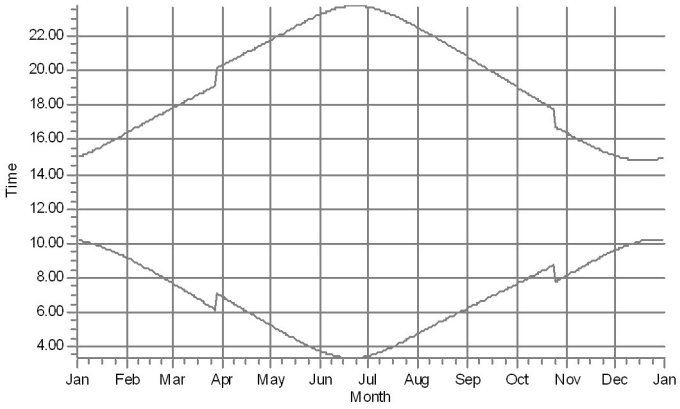
H: H Asuinrakennus (Vöyrintie 1021)



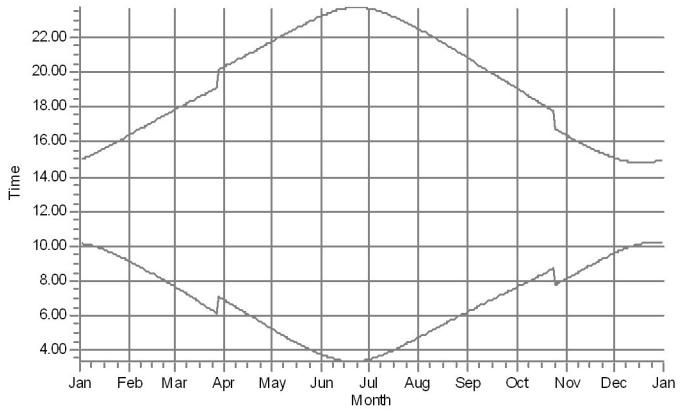
I: I Lomarakennus (Ehrsbackavägen 29)



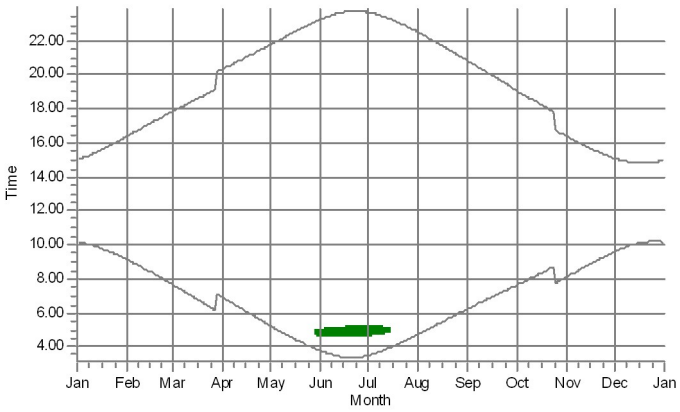
J: J Asuinrakennus (Kleidersvägen 118)



K: K Asuinrakennus (Rökiöntie 154)



L: L Asuinrakennus (Bjurbäcksvägen 231)



WTGs

1: Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8816)

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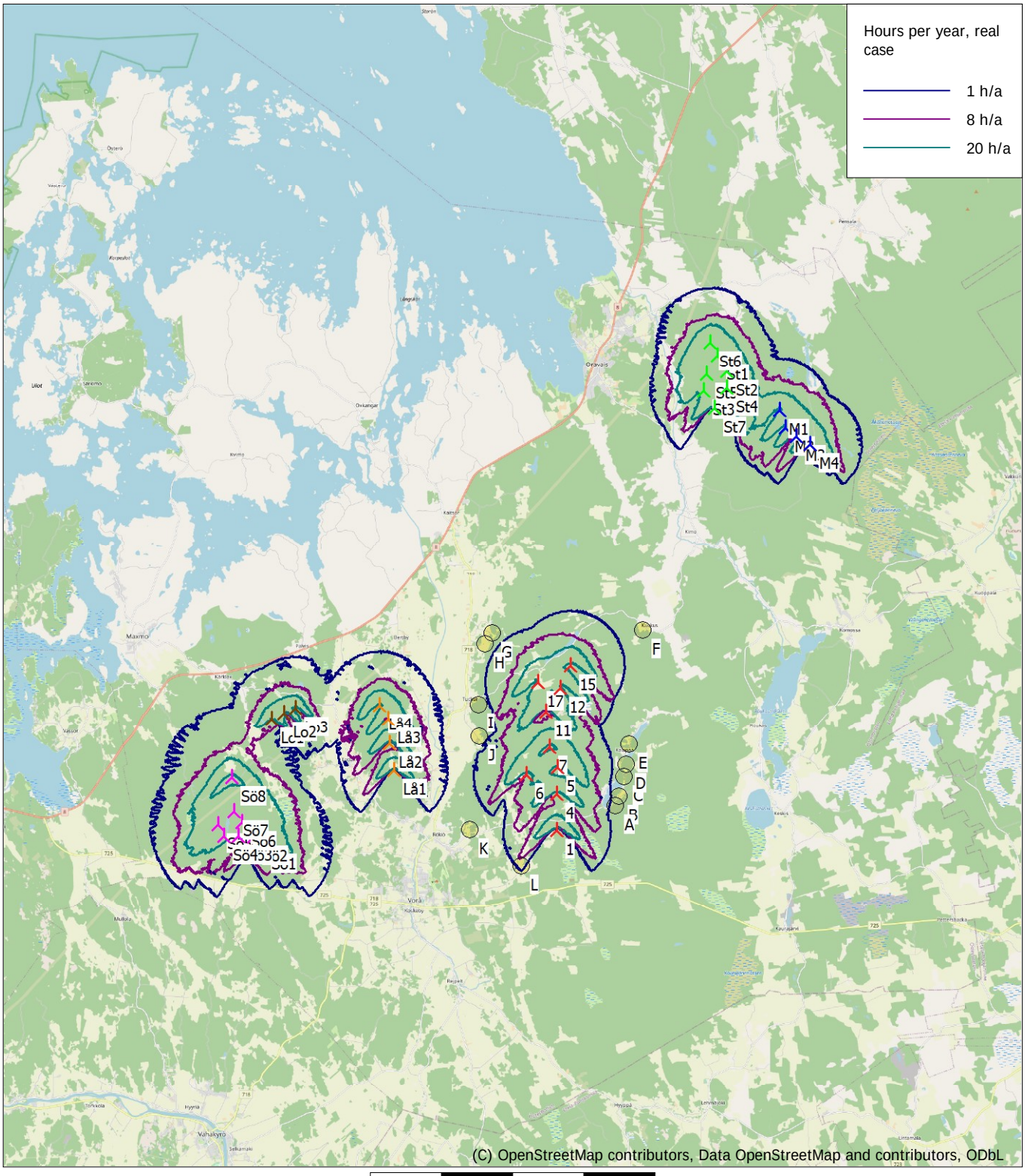
Calculated:
14.7.2023 9.46/3.5.584

SHADOW - Map

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _No Forest



Map: EMD OpenStreetMap , Print scale 1:200 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 264 510 North: 7 019 520

New WTG Shadow receptor

Flicker map level: Height Contours: CONTOURLINE_Lasor tuulivoimahanke 2022_0.wpo (3)

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

Liite 16. Yhteisvaikutus varjostusmallinnuksen tulokset ”Real Case, Luke forest” - VE2

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SHADOW - Main Result

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke Forest

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) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational hours are calculated from WTGs in calculation and wind distribution:
MERRA-2_N63,00_E022,50 (41)

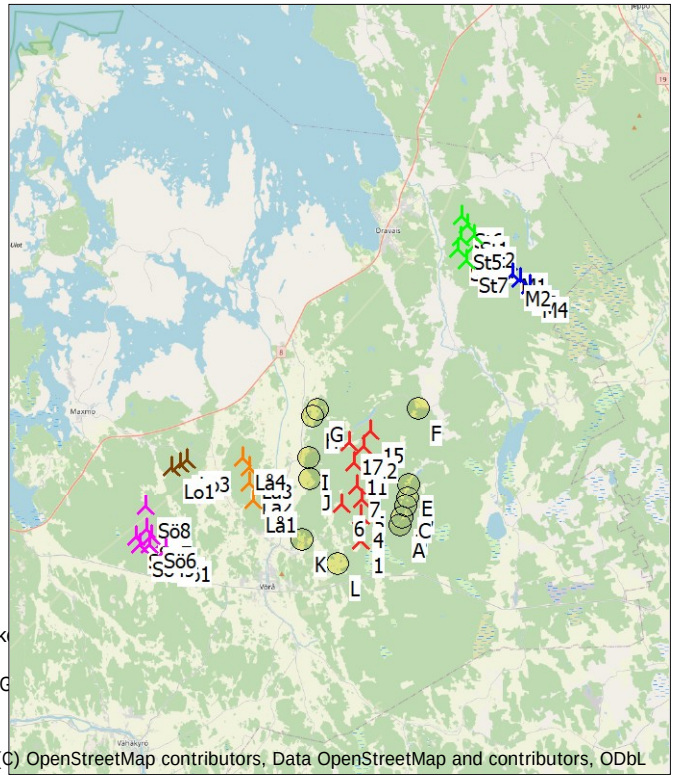
Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
716	546	427	409	540	810	1 084	1 285	889	717	582	591	8 594

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: Height Contours: CONTOURLINE_Lasor tuulivoimahank
Area object(s) used in calculation:
Area object (Heights a.g.l. for e.g. Forest (ORA tool) or ZVI obstructions): REC
Obstacles used in calculation
Receptor grid resolution: 1,0 m

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89



(C) OpenStreetMap contributors, Data OpenStreetMap and contributors, ODbL

Scale 1:400 000

New WTG Shadow receptor

WTGs

	East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
			[m]					[kW]	[m]	[m]	[m]	[RPM]
1	265 860	7 011 060	40,0	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
11	265 796	7 015 259	39,8	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
12	266 380	7 016 090	44,5	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
15	266 770	7 016 850	43,5	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
17	265 604	7 016 343	20,0	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
4	265 960	7 012 340	40,0	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
5	266 070	7 013 270	35,0	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
6	264 950	7 013 100	40,0	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
7	265 850	7 014 020	40,0	Generic RD180 7000 180.0...	Yes	Generic	RD180-7 000	7 000	180,0	190,0	1 902	10,4
Lo1	256 101	7 015 724	26,7	PROKON P3000-116 3030 ...	Yes	PROKON	P3000-116-3 030	3 030	116,7	122,0	1 819	11,7
Lo2	256 554	7 015 922	32,5	PROKON P3000-116 3030 ...	Yes	PROKON	P3000-116-3 030	3 030	116,7	122,0	1 819	11,7
Lo3	256 967	7 016 054	29,3	PROKON P3000-116 3030 ...	Yes	PROKON	P3000-116-3 030	3 030	116,7	122,0	1 819	11,7
Lå1	260 282	7 013 598	20,0	VESTAS V150-4.2 4200 15...	Yes	VESTAS	V150-4.2-4 200	4 200	150,0	140,0	1 903	10,4
Lå2	260 183	7 014 579	27,2	VESTAS V150-4.2 4200 15...	Yes	VESTAS	V150-4.2-4 200	4 200	150,0	140,0	1 903	10,4
Lå3	260 216	7 015 423	20,0	VESTAS V150-4.2 4200 15...	Yes	VESTAS	V150-4.2-4 200	4 200	150,0	140,0	1 903	10,4
Lå4	259 928	7 015 932	27,5	VESTAS V150-4.2 4200 15...	Yes	VESTAS	V150-4.2-4 200	4 200	150,0	140,0	1 903	10,4
M1	274 763	7 025 285	32,5	NORDEX N163/5,7MW 570...	Yes	NORDEX	N163/5,7MW-5 700	5 700	163,0	158,0	1 806	10,7
M2	274 926	7 024 666	32,8	NORDEX N163/5,7MW 570...	Yes	NORDEX	N163/5,7MW-5 700	5 700	163,0	158,0	1 806	10,7
M3	275 298	7 024 342	35,0	NORDEX N163/5,7MW 570...	Yes	NORDEX	N163/5,7MW-5 700	5 700	163,0	158,0	1 806	10,7
M4	275 772	7 024 008	40,0	NORDEX N163/5,7MW 570...	Yes	NORDEX	N163/5,7MW-5 700	5 700	163,0	158,0	1 806	10,7
St1	272 700	7 027 390	30,0	VESTAS V150-4.2 HH145 4...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	1 902	10,4
St2	273 002	7 026 818	30,0	VESTAS V150-4.2 HH145 4...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	1 902	10,4
St3	272 153	7 026 165	30,0	VESTAS V150-4.2 HH145 4...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	1 902	10,4
St4	272 991	7 026 229	30,0	VESTAS V150-4.2 HH145 4...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	1 902	10,4
St5	272 290	7 026 760	26,1	VESTAS V150-4.2 HH145 4...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	1 902	10,4
St6	272 494	7 027 846	25,1	VESTAS V150-4.2 HH145 4...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	1 902	10,4
St7	272 483	7 025 533	30,2	VESTAS V150-4.2 HH145 4...	Yes	VESTAS	V150-4.2 HH145-4 200	4 200	150,0	145,0	1 902	10,4
Sö1	255 445	7 011 327	45,9	Generic RD180 7700 180.0...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	2 461	10,4
Sö2	255 137	7 011 612	50,0	Generic RD180 7700 180.0...	Yes	Generic	RD180-7 700	7 700	180,0	210,0	2 461	10,4

To be continued on next page...

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Calculated:
14.7.2023 9.51/3.5.584

SHADOW - Main Result

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke Forest

...continued from previous page

	East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
			[m]					[kW]	[m]	[m]	[m]	[RPM]
Sö3	254 614	7 011 705	37,5	Generic RD180 7700 180.0…	Yes	Generic	RD180-7 700	7 700	180,0	210,0	2 461	10,4
Sö4	254 111	7 011 739	25,0	Generic RD180 7700 180.0…	Yes	Generic	RD180-7 700	7 700	180,0	210,0	2 461	10,4
Sö5	253 945	7 012 144	32,5	Generic RD180 7700 180.0…	Yes	Generic	RD180-7 700	7 700	180,0	210,0	2 461	10,4
Sö6	254 771	7 012 174	40,0	Generic RD180 7700 180.0…	Yes	Generic	RD180-7 700	7 700	180,0	210,0	2 461	10,4
Sö7	254 521	7 012 552	32,9	Generic RD180 7700 180.0…	Yes	Generic	RD180-7 700	7 700	180,0	210,0	2 461	10,4
Sö8	254 528	7 013 790	20,0	Generic RD180 7700 180.0…	Yes	Generic	RD180-7 700	7 700	180,0	210,0	2 461	10,4

Shadow receptor-Input

No.	Name	East	North	Z	Width	Height	Elevation a.g.l.	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
				[m]	[m]	[m]	[m]	[°]		[m]
A	A Lomarakennus (Söderändan 49)	267 990	7 011 759	42,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
B	B Asuinrakennus (Söderändan 81)	268 161	7 012 123	37,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
C	C Lomarakennus (Säderändan 166)	268 388	7 012 783	39,1	5,0	5,0	1,0	90,0	"Green house mode"	6,0
D	D Lomarakennus (Söderändan 188)	268 493	7 013 188	37,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0
E	E Asuinrakennus (Rökiöntie 930)	268 646	7 013 924	38,1	5,0	5,0	1,0	90,0	"Green house mode"	6,0
F	F Asuinrakennus (Kukkusintie 474)	269 409	7 017 903	25,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
G	G Asuinrakennus (Kovik byväg 53)	264 096	7 018 174	10,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
H	H Asuinrakennus (Vöyrintie 1021)	263 817	7 017 837	8,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
I	I Lomarakennus (Ehrsbackavägen 29)	263 418	7 015 700	21,7	5,0	5,0	1,0	90,0	"Green house mode"	6,0
J	J Asuinrakennus (Kleidersvägen 118)	263 380	7 014 576	13,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0
K	K Asuinrakennus (Rökiöntie 154)	262 790	7 011 335	27,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
L	L Asuinrakennus (Bjurbäcksvägen 231)	264 546	7 009 923	27,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0

Calculation Results

Shadow receptor

No.	Name	Shadow, expected values Shadow hours per year [h/year]
A	A Lomarakennus (Söderändan 49)	0:00
B	B Asuinrakennus (Söderändan 81)	0:00
C	C Lomarakennus (Säderändan 166)	0:00
D	D Lomarakennus (Söderändan 188)	0:00
E	E Asuinrakennus (Rökiöntie 930)	0:00
F	F Asuinrakennus (Kukkusintie 474)	0:00
G	G Asuinrakennus (Kovik byväg 53)	0:00
H	H Asuinrakennus (Vöyrintie 1021)	0:00
I	I Lomarakennus (Ehrsbackavägen 29)	0:00
J	J Asuinrakennus (Kleidersvägen 118)	0:00
K	K Asuinrakennus (Rökiöntie 154)	0:00
L	L Asuinrakennus (Bjurbäcksvägen 231)	0:00

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

No.	Name	Expected [h/year]
1	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8816)	0:00
11	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8811)	0:00
12	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8810)	0:00
15	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8809)	0:00
17	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8817)	0:00
4	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8815)	0:00
5	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8813)	0:00
6	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8814)	0:00
7	Generic RD180 7000 180.0 !O! hub: 190,0 m (TOT: 280,0 m) (8812)	0:00
Lo1	PROKON P3000-116 3030 116.7 !O! hub: 122,0 m (TOT: 180,4 m) (8676)	0:00
Lo2	PROKON P3000-116 3030 116.7 !O! hub: 122,0 m (TOT: 180,4 m) (8677)	0:00
Lo3	PROKON P3000-116 3030 116.7 !O! hub: 122,0 m (TOT: 180,4 m) (8678)	0:00
Lå1	VESTAS V150-4.2 4200 150.0 !O! hub: 140,0 m (TOT: 215,0 m) (8679)	0:00
Lå2	VESTAS V150-4.2 4200 150.0 !O! hub: 140,0 m (TOT: 215,0 m) (8680)	0:00

To be continued on next page...

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SHADOW - Main Result

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke Forest

...continued from previous page

No.	Name	Expected [h/year]
Lå3	VESTAS V150-4.2 4200 150.0 !O! hub: 140,0 m (TOT: 215,0 m) (8681)	0:00
Lå4	VESTAS V150-4.2 4200 150.0 !O! hub: 140,0 m (TOT: 215,0 m) (8682)	0:00
M1	NORDEX N163/5,7MW 5700 163.0 !O! hub: 158,0 m (TOT: 239,5 m) (8772)	0:00
M2	NORDEX N163/5,7MW 5700 163.0 !O! hub: 158,0 m (TOT: 239,5 m) (8773)	0:00
M3	NORDEX N163/5,7MW 5700 163.0 !O! hub: 158,0 m (TOT: 239,5 m) (8774)	0:00
M4	NORDEX N163/5,7MW 5700 163.0 !O! hub: 158,0 m (TOT: 239,5 m) (8775)	0:00
St1	VESTAS V150-4.2 HH145 4200 150.0 !O! hub: 145,0 m (TOT: 220,0 m) (8669)	0:00
St2	VESTAS V150-4.2 HH145 4200 150.0 !O! hub: 145,0 m (TOT: 220,0 m) (8670)	0:00
St3	VESTAS V150-4.2 HH145 4200 150.0 !O! hub: 145,0 m (TOT: 220,0 m) (8671)	0:00
St4	VESTAS V150-4.2 HH145 4200 150.0 !O! hub: 145,0 m (TOT: 220,0 m) (8672)	0:00
St5	VESTAS V150-4.2 HH145 4200 150.0 !O! hub: 145,0 m (TOT: 220,0 m) (8673)	0:00
St6	VESTAS V150-4.2 HH145 4200 150.0 !O! hub: 145,0 m (TOT: 220,0 m) (8674)	0:00
St7	VESTAS V150-4.2 HH145 4200 150.0 !O! hub: 145,0 m (TOT: 220,0 m) (8675)	0:00
Sö1	Generic RD180 7700 180.0 !O! hub: 210,0 m (TOT: 300,0 m) (8713)	0:00
Sö2	Generic RD180 7700 180.0 !O! hub: 210,0 m (TOT: 300,0 m) (8714)	0:00
Sö3	Generic RD180 7700 180.0 !O! hub: 210,0 m (TOT: 300,0 m) (8715)	0:00
Sö4	Generic RD180 7700 180.0 !O! hub: 210,0 m (TOT: 300,0 m) (8716)	0:00
Sö5	Generic RD180 7700 180.0 !O! hub: 210,0 m (TOT: 300,0 m) (8717)	0:00
Sö6	Generic RD180 7700 180.0 !O! hub: 210,0 m (TOT: 300,0 m) (8718)	0:00
Sö7	Generic RD180 7700 180.0 !O! hub: 210,0 m (TOT: 300,0 m) (8719)	0:00
Sö8	Generic RD180 7700 180.0 !O! hub: 210,0 m (TOT: 300,0 m) (8720)	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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Calculated:
14.7.2023 9.51/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke Forest Shadow receptor: A - A Lomarakennus (Söderändan 49)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
716	546	427	409	540	810	1 084	1 285	889	717	582	591	8 594

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.39	06.54	05.13	03.44	03.27	04.44	06.14	07.36	08.06	09.34
	15.00	16.23	17.49	20.18	21.45	23.15	23.41	22.28	20.47	19.04	16.22	15.04
2	10.08	09.04	07.36	06.51	05.10	03.42	03.29	04.47	06.17	07.39	08.09	09.37
	15.01	16.26	17.52	20.21	21.48	23.17	23.40	22.25	20.43	19.01	16.19	15.03
3	10.07	09.01	07.33	06.47	05.07	03.40	03.30	04.50	06.19	07.42	08.12	09.40
	15.03	16.29	17.55	20.23	21.51	23.20	23.38	22.22	20.40	18.57	16.16	15.01
4	10.06	08.58	07.29	06.44	05.04	03.38	03.32	04.53	06.22	07.45	08.15	09.42
	15.05	16.32	17.58	20.26	21.54	23.22	23.37	22.19	20.37	18.54	16.13	14.59
5	10.05	08.55	07.26	06.41	05.00	03.36	03.34	04.56	06.25	07.47	08.18	09.44
	15.07	16.36	18.01	20.29	21.57	23.24	23.35	22.16	20.33	18.51	16.10	14.58
6	10.04	08.52	07.23	06.37	04.57	03.34	03.36	04.59	06.28	07.50	08.21	09.47
	15.09	16.39	18.04	20.32	22.00	23.26	23.34	22.13	20.30	18.47	16.07	14.56
7	10.03	08.49	07.19	06.34	04.54	03.32	03.38	05.02	06.30	07.53	08.24	09.49
	15.12	16.42	18.07	20.35	22.03	23.28	23.32	22.10	20.26	18.44	16.04	14.55
8	10.01	08.46	07.16	06.30	04.51	03.31	03.40	05.05	06.33	07.56	08.27	09.51
	15.14	16.45	18.09	20.38	22.06	23.30	23.30	22.06	20.23	18.40	16.01	14.54
9	10.00	08.43	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.58	08.30	09.53
	15.16	16.48	18.12	20.41	22.09	23.32	23.28	22.03	20.19	18.37	15.58	14.53
10	09.58	08.40	07.09	06.24	04.45	03.28	03.44	05.11	06.39	08.01	08.33	09.55
	15.19	16.51	18.15	20.43	22.12	23.34	23.26	22.00	20.16	18.34	15.56	14.52
11	09.57	08.37	07.06	06.20	04.42	03.26	03.47	05.14	06.41	08.04	08.36	09.57
	15.21	16.54	18.18	20.46	22.15	23.36	23.24	21.57	20.13	18.30	15.53	14.51
12	09.55	08.34	07.03	06.17	04.39	03.25	03.49	05.17	06.44	08.07	08.39	09.59
	15.24	16.57	18.21	20.49	22.18	23.37	23.22	21.54	20.09	18.27	15.50	14.50
13	09.53	08.31	06.59	06.13	04.35	03.24	03.51	05.19	06.47	08.10	08.42	10.00
	15.27	17.01	18.24	20.52	22.21	23.39	23.20	21.50	20.06	18.24	15.47	14.49
14	09.51	08.28	06.56	06.10	04.32	03.23	03.54	05.22	06.50	08.13	08.45	10.02
	15.29	17.04	18.27	20.55	22.24	23.40	23.18	21.47	20.02	18.20	15.44	14.48
15	09.49	08.25	06.52	06.07	04.29	03.22	03.56	05.25	06.52	08.16	08.48	10.03
	15.32	17.07	18.30	20.58	22.27	23.41	23.15	21.44	19.59	18.17	15.42	14.48
16	09.47	08.22	06.49	06.03	04.26	03.22	03.59	05.28	06.55	08.18	08.51	10.05
	15.35	17.10	18.32	21.01	22.30	23.42	23.13	21.40	19.55	18.14	15.39	14.48
17	09.45	08.18	06.46	06.00	04.24	03.21	04.01	05.31	06.58	08.21	08.55	10.06
	15.38	17.13	18.35	21.04	22.33	23.43	23.10	21.37	19.52	18.10	15.36	14.47
18	09.43	08.15	06.42	05.56	04.21	03.21	04.04	05.34	07.01	08.24	08.58	10.07
	15.40	17.16	18.38	21.07	22.36	23.44	23.08	21.34	19.49	18.07	15.34	14.47
19	09.40	08.12	06.39	05.53	04.18	03.20	04.07	05.37	07.03	08.27	09.01	10.08
	15.43	17.19	18.41	21.10	22.39	23.44	23.05	21.31	19.45	18.04	15.31	14.47
20	09.38	08.09	06.35	05.50	04.15	03.20	04.10	05.40	07.06	08.30	09.04	10.09
	15.46	17.22	18.44	21.12	22.42	23.45	23.03	21.27	19.42	18.01	15.29	14.47
21	09.36	08.06	06.32	05.46	04.12	03.20	04.12	05.43	07.09	08.33	09.06	10.10
	15.49	17.25	18.47	21.15	22.45	23.45	23.00	21.24	19.38	17.57	15.26	14.48
22	09.33	08.02	06.28	05.43	04.09	03.20	04.15	05.46	07.11	08.36	09.09	10.10
	15.52	17.28	18.49	21.18	22.48	23.45	22.57	21.21	19.35	17.54	15.24	14.48
23	09.31	07.59	06.25	05.40	04.07	03.20	04.18	05.48	07.14	08.39	09.12	10.11
	15.55	17.31	18.52	21.21	22.51	23.45	22.55	21.17	19.31	17.51	15.21	14.49
24	09.28	07.56	06.22	05.36	04.04	03.21	04.21	05.51	07.17	08.42	09.15	10.11
	15.58	17.34	18.55	21.24	22.54	23.45	22.52	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.18	05.33	04.01	03.21	04.24	05.54	07.20	07.45	09.18	10.11
	16.01	17.37	18.58	21.27	22.56	23.45	22.49	21.10	19.25	16.44	15.17	14.50
26	09.23	07.49	06.15	05.30	03.59	03.22	04.27	05.57	07.22	07.48	09.21	10.11
	16.04	17.40	19.01	21.30	22.59	23.45	22.46	21.07	19.21	16.41	15.14	14.51
27	09.21	07.46	06.11	05.26	03.56	03.23	04.29	06.00	07.25	07.51	09.24	10.11
	16.07	17.43	19.04	21.33	23.02	23.44	22.43	21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.54	03.24	04.32	06.03	07.28	07.54	09.26	10.11
	16.11	17.46	19.06	21.36	23.05	23.43	22.40	21.00	19.14	16.35	15.10	14.53
29	09.15		07.05	05.20	03.51	03.25	04.35	06.05	07.31	07.57	09.29	10.11
	16.14		20.09	21.39	23.07	23.43	22.37	20.57	19.11	16.32	15.08	14.55
30	09.12		07.01	05.17	03.49	03.26	04.38	06.08	07.33	08.00	09.32	10.10
	16.17		20.12	21.42	23.10	23.42	22.34	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.47		04.41	06.11		08.03		10.10
	16.20		20.15		23.12		22.31	20.50		16.26		14.58
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.51/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke Forest Shadow receptor: B - B Asuinrakennus (Söderändan 81)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
716	546	427	409	540	810	1 084	1 285	889	717	582	591	8 594

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.39	06.54	05.13	03.44	03.27	04.44	06.14	07.36	08.06	09.35
	15.00	16.23	17.49	20.18	21.45	23.15	23.41	22.28	20.47	19.04	16.22	15.04
2	10.08	09.04	07.36	06.51	05.10	03.42	03.29	04.47	06.17	07.39	08.09	09.37
	15.01	16.26	17.52	20.21	21.48	23.17	23.40	22.25	20.43	19.01	16.19	15.03
3	10.07	09.01	07.33	06.47	05.07	03.40	03.30	04.50	06.19	07.42	08.12	09.40
	15.03	16.29	17.55	20.23	21.51	23.20	23.38	22.22	20.40	18.57	16.16	15.01
4	10.06	08.58	07.29	06.44	05.04	03.38	03.32	04.53	06.22	07.44	08.15	09.42
	15.05	16.32	17.58	20.26	21.54	23.22	23.37	22.19	20.37	18.54	16.13	14.59
5	10.05	08.55	07.26	06.41	05.00	03.36	03.34	04.56	06.25	07.47	08.18	09.44
	15.07	16.36	18.01	20.29	21.57	23.24	23.35	22.16	20.33	18.51	16.10	14.58
6	10.04	08.52	07.23	06.37	04.57	03.34	03.36	04.59	06.28	07.50	08.21	09.47
	15.09	16.39	18.04	20.32	22.00	23.26	23.34	22.13	20.30	18.47	16.07	14.56
7	10.03	08.49	07.19	06.34	04.54	03.32	03.38	05.02	06.30	07.53	08.24	09.49
	15.12	16.42	18.07	20.35	22.03	23.28	23.32	22.10	20.26	18.44	16.04	14.55
8	10.01	08.46	07.16	06.30	04.51	03.31	03.40	05.05	06.33	07.56	08.27	09.51
	15.14	16.45	18.09	20.38	22.06	23.30	23.30	22.06	20.23	18.40	16.01	14.54
9	10.00	08.43	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.58	08.30	09.53
	15.16	16.48	18.12	20.41	22.09	23.32	23.28	22.03	20.19	18.37	15.58	14.52
10	09.58	08.40	07.09	06.24	04.45	03.28	03.44	05.11	06.39	08.01	08.33	09.55
	15.19	16.51	18.15	20.43	22.12	23.34	23.26	22.00	20.16	18.34	15.56	14.51
11	09.57	08.37	07.06	06.20	04.42	03.26	03.46	05.14	06.41	08.04	08.36	09.57
	15.21	16.54	18.18	20.46	22.15	23.36	23.24	21.57	20.13	18.30	15.53	14.51
12	09.55	08.34	07.03	06.17	04.38	03.25	03.49	05.16	06.44	08.07	08.39	09.59
	15.24	16.57	18.21	20.49	22.18	23.37	23.22	21.54	20.09	18.27	15.50	14.50
13	09.53	08.31	06.59	06.13	04.35	03.24	03.51	05.19	06.47	08.10	08.42	10.00
	15.26	17.01	18.24	20.52	22.21	23.39	23.20	21.50	20.06	18.24	15.47	14.49
14	09.51	08.28	06.56	06.10	04.32	03.23	03.54	05.22	06.50	08.13	08.45	10.02
	15.29	17.04	18.27	20.55	22.24	23.40	23.18	21.47	20.02	18.20	15.44	14.48
15	09.49	08.25	06.52	06.07	04.29	03.22	03.56	05.25	06.52	08.16	08.48	10.03
	15.32	17.07	18.30	20.58	22.27	23.41	23.15	21.44	19.59	18.17	15.42	14.48
16	09.47	08.22	06.49	06.03	04.26	03.21	03.59	05.28	06.55	08.18	08.52	10.05
	15.35	17.10	18.32	21.01	22.30	23.42	23.13	21.40	19.55	18.14	15.39	14.48
17	09.45	08.18	06.46	06.00	04.23	03.21	04.01	05.31	06.58	08.21	08.55	10.06
	15.37	17.13	18.35	21.04	22.33	23.43	23.11	21.37	19.52	18.10	15.36	14.47
18	09.43	08.15	06.42	05.56	04.21	03.20	04.04	05.34	07.01	08.24	08.58	10.07
	15.40	17.16	18.38	21.07	22.36	23.44	23.08	21.34	19.49	18.07	15.34	14.47
19	09.40	08.12	06.39	05.53	04.18	03.20	04.07	05.37	07.03	08.27	09.01	10.08
	15.43	17.19	18.41	21.10	22.39	23.44	23.05	21.31	19.45	18.04	15.31	14.47
20	09.38	08.09	06.35	05.50	04.15	03.20	04.10	05.40	07.06	08.30	09.04	10.09
	15.46	17.22	18.44	21.12	22.42	23.45	23.03	21.27	19.42	18.01	15.29	14.47
21	09.36	08.06	06.32	05.46	04.12	03.20	04.12	05.43	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.15	22.45	23.45	23.00	21.24	19.38	17.57	15.26	14.48
22	09.33	08.02	06.28	05.43	04.09	03.20	04.15	05.45	07.11	08.36	09.09	10.10
	15.52	17.28	18.49	21.18	22.48	23.45	22.57	21.21	19.35	17.54	15.24	14.48
23	09.31	07.59	06.25	05.40	04.07	03.20	04.18	05.48	07.14	08.39	09.12	10.11
	15.55	17.31	18.52	21.21	22.51	23.45	22.55	21.17	19.31	17.51	15.21	14.49
24	09.28	07.56	06.22	05.36	04.04	03.21	04.21	05.51	07.17	08.42	09.15	10.11
	15.58	17.34	18.55	21.24	22.54	23.45	22.52	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.18	05.33	04.01	03.21	04.24	05.54	07.20	07.45	09.18	10.11
	16.01	17.37	18.58	21.27	22.56	23.45	22.49	21.10	19.25	16.44	15.17	14.50
26	09.23	07.49	06.15	05.30	03.59	03.22	04.26	05.57	07.22	07.48	09.21	10.11
	16.04	17.40	19.01	21.30	22.59	23.45	22.46	21.07	19.21	16.41	15.14	14.51
27	09.21	07.46	06.11	05.26	03.56	03.23	04.29	06.00	07.25	07.51	09.24	10.11
	16.07	17.43	19.04	21.33	23.02	23.44	22.43	21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.54	03.24	04.32	06.03	07.28	07.54	09.27	10.11
	16.11	17.46	19.06	21.36	23.05	23.44	22.40	21.00	19.14	16.35	15.10	14.53
29	09.15		07.05	05.20	03.51	03.25	04.35	06.05	07.31	07.57	09.29	10.11
	16.14		20.09	21.39	23.07	23.43	22.37	20.57	19.11	16.32	15.08	14.55
30	09.12		07.01	05.17	03.49	03.26	04.38	06.08	07.33	08.00	09.32	10.10
	16.17		20.12	21.42	23.10	23.42	22.34	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.10
	16.20		20.15		23.12		22.31	20.50		16.26		14.57
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.51/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke ForestShadow receptor: C - C Lomarakennus (Säderändan 166)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
716	546	427	409	540	810	1 084	1 285	889	717	582	591	8 594

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.39	06.54	05.13	03.44	03.27	04.44	06.14	07.36	08.06	09.35
	14.59	16.23	17.49	20.18	21.45	23.15	23.41	22.28	20.47	19.04	16.22	15.04
2	10.08	09.04	07.36	06.51	05.10	03.42	03.29	04.47	06.17	07.39	08.09	09.37
	15.01	16.26	17.52	20.21	21.48	23.17	23.40	22.25	20.43	19.01	16.19	15.02
3	10.08	09.01	07.33	06.47	05.07	03.40	03.30	04.50	06.19	07.42	08.12	09.40
	15.03	16.29	17.55	20.23	21.51	23.20	23.38	22.22	20.40	18.57	16.16	15.01
4	10.06	08.58	07.29	06.44	05.04	03.38	03.32	04.53	06.22	07.44	08.15	09.42
	15.05	16.32	17.58	20.26	21.54	23.22	23.37	22.19	20.37	18.54	16.13	14.59
5	10.05	08.55	07.26	06.41	05.00	03.36	03.34	04.56	06.25	07.47	08.18	09.44
	15.07	16.36	18.01	20.29	21.57	23.24	23.36	22.16	20.33	18.51	16.10	14.58
6	10.04	08.52	07.23	06.37	04.57	03.34	03.36	04.59	06.28	07.50	08.21	09.47
	15.09	16.39	18.04	20.32	22.00	23.26	23.34	22.13	20.30	18.47	16.07	14.56
7	10.03	08.49	07.19	06.34	04.54	03.32	03.38	05.02	06.30	07.53	08.24	09.49
	15.11	16.42	18.06	20.35	22.03	23.28	23.32	22.10	20.26	18.44	16.04	14.55
8	10.01	08.46	07.16	06.30	04.51	03.31	03.40	05.05	06.33	07.56	08.27	09.51
	15.14	16.45	18.09	20.38	22.06	23.30	23.30	22.06	20.23	18.40	16.01	14.54
9	10.00	08.43	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.58	08.30	09.53
	15.16	16.48	18.12	20.41	22.09	23.32	23.28	22.03	20.19	18.37	15.58	14.52
10	09.58	08.40	07.09	06.24	04.45	03.28	03.44	05.11	06.39	08.01	08.33	09.55
	15.19	16.51	18.15	20.43	22.12	23.34	23.27	22.00	20.16	18.34	15.55	14.51
11	09.57	08.37	07.06	06.20	04.41	03.26	03.46	05.13	06.41	08.04	08.36	09.57
	15.21	16.54	18.18	20.46	22.15	23.36	23.24	21.57	20.13	18.30	15.53	14.50
12	09.55	08.34	07.03	06.17	04.38	03.25	03.49	05.16	06.44	08.07	08.39	09.59
	15.24	16.57	18.21	20.49	22.18	23.37	23.22	21.54	20.09	18.27	15.50	14.50
13	09.53	08.31	06.59	06.13	04.35	03.24	03.51	05.19	06.47	08.10	08.42	10.00
	15.26	17.01	18.24	20.52	22.21	23.39	23.20	21.50	20.06	18.24	15.47	14.49
14	09.51	08.28	06.56	06.10	04.32	03.23	03.54	05.22	06.50	08.13	08.45	10.02
	15.29	17.04	18.27	20.55	22.24	23.40	23.18	21.47	20.02	18.20	15.44	14.48
15	09.49	08.25	06.52	06.07	04.29	03.22	03.56	05.25	06.52	08.16	08.49	10.03
	15.32	17.07	18.30	20.58	22.27	23.41	23.15	21.44	19.59	18.17	15.41	14.48
16	09.47	08.22	06.49	06.03	04.26	03.21	03.59	05.28	06.55	08.18	08.52	10.05
	15.35	17.10	18.32	21.01	22.30	23.42	23.13	21.41	19.55	18.14	15.39	14.47
17	09.45	08.18	06.46	06.00	04.23	03.21	04.01	05.31	06.58	08.21	08.55	10.06
	15.37	17.13	18.35	21.04	22.33	23.43	23.11	21.37	19.52	18.10	15.36	14.47
18	09.43	08.15	06.42	05.56	04.20	03.20	04.04	05.34	07.01	08.24	08.58	10.07
	15.40	17.16	18.38	21.07	22.36	23.44	23.08	21.34	19.49	18.07	15.34	14.47
19	09.40	08.12	06.39	05.53	04.18	03.20	04.07	05.37	07.03	08.27	09.01	10.08
	15.43	17.19	18.41	21.10	22.39	23.44	23.05	21.31	19.45	18.04	15.31	14.47
20	09.38	08.09	06.35	05.50	04.15	03.20	04.09	05.40	07.06	08.30	09.04	10.09
	15.46	17.22	18.44	21.12	22.42	23.45	23.03	21.27	19.42	18.01	15.28	14.47
21	09.36	08.06	06.32	05.46	04.12	03.20	04.12	05.43	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.15	22.45	23.45	23.00	21.24	19.38	17.57	15.26	14.48
22	09.33	08.02	06.28	05.43	04.09	03.20	04.15	05.45	07.11	08.36	09.09	10.10
	15.52	17.28	18.49	21.18	22.48	23.45	22.57	21.21	19.35	17.54	15.24	14.48
23	09.31	07.59	06.25	05.40	04.06	03.20	04.18	05.48	07.14	08.39	09.12	10.11
	15.55	17.31	18.52	21.21	22.51	23.46	22.55	21.17	19.31	17.51	15.21	14.49
24	09.28	07.56	06.22	05.36	04.04	03.21	04.21	05.51	07.17	08.42	09.15	10.11
	15.58	17.34	18.55	21.24	22.54	23.45	22.52	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.18	05.33	04.01	03.21	04.24	05.54	07.20	07.45	09.18	10.11
	16.01	17.37	18.58	21.27	22.57	23.45	22.49	21.10	19.25	16.44	15.17	14.50
26	09.23	07.49	06.15	05.30	03.59	03.22	04.26	05.57	07.22	07.48	09.21	10.11
	16.04	17.40	19.01	21.30	22.59	23.45	22.46	21.07	19.21	16.41	15.14	14.51
27	09.21	07.46	06.11	05.26	03.56	03.23	04.29	06.00	07.25	07.51	09.24	10.11
	16.07	17.43	19.04	21.33	23.02	23.44	22.43	21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.53	03.24	04.32	06.03	07.28	07.54	09.27	10.11
	16.10	17.46	19.06	21.36	23.05	23.44	22.40	21.00	19.14	16.35	15.10	14.53
29	09.15		07.05	05.20	03.51	03.25	04.35	06.05	07.31	07.57	09.29	10.11
	16.14		20.09	21.39	23.07	23.43	22.37	20.57	19.11	16.32	15.08	14.54
30	09.13		07.01	05.17	03.49	03.26	04.38	06.08	07.33	08.00	09.32	10.11
	16.17		20.12	21.42	23.10	23.42	22.34	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.10
	16.20		20.15		23.13		22.31	20.50		16.25		14.57
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.51/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke ForestShadow receptor: D - D Lomarakennus (Söderändan 188)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
716	546	427	409	540	810	1 084	1 285	889	717	582	591	8 594

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.39	06.54	05.13	03.44	03.27	04.44	06.14	07.36	08.06	09.35
	14.59	16.23	17.49	20.18	21.45	23.15	23.41	22.28	20.47	19.04	16.22	15.04
2	10.08	09.04	07.36	06.51	05.10	03.42	03.29	04.47	06.17	07.39	08.09	09.37
	15.01	16.26	17.52	20.21	21.48	23.17	23.40	22.25	20.43	19.01	16.19	15.02
3	10.08	09.01	07.33	06.47	05.07	03.40	03.30	04.50	06.19	07.42	08.12	09.40
	15.03	16.29	17.55	20.23	21.51	23.20	23.38	22.22	20.40	18.57	16.16	15.01
4	10.07	08.58	07.29	06.44	05.04	03.38	03.32	04.53	06.22	07.44	08.15	09.42
	15.05	16.32	17.58	20.26	21.54	23.22	23.37	22.19	20.37	18.54	16.13	14.59
5	10.05	08.55	07.26	06.41	05.00	03.36	03.34	04.56	06.25	07.47	08.18	09.44
	15.07	16.36	18.01	20.29	21.57	23.24	23.36	22.16	20.33	18.51	16.10	14.58
6	10.04	08.52	07.23	06.37	04.57	03.34	03.36	04.59	06.28	07.50	08.21	09.47
	15.09	16.39	18.04	20.32	22.00	23.27	23.34	22.13	20.30	18.47	16.07	14.56
7	10.03	08.49	07.19	06.34	04.54	03.32	03.38	05.02	06.30	07.53	08.24	09.49
	15.11	16.42	18.06	20.35	22.03	23.29	23.32	22.10	20.26	18.44	16.04	14.55
8	10.01	08.46	07.16	06.30	04.51	03.31	03.40	05.05	06.33	07.56	08.27	09.51
	15.14	16.45	18.09	20.38	22.06	23.31	23.30	22.07	20.23	18.40	16.01	14.54
9	10.00	08.43	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.58	08.30	09.53
	15.16	16.48	18.12	20.41	22.09	23.32	23.29	22.03	20.19	18.37	15.58	14.52
10	09.58	08.40	07.09	06.23	04.45	03.28	03.44	05.11	06.39	08.01	08.33	09.55
	15.19	16.51	18.15	20.43	22.12	23.34	23.27	22.00	20.16	18.34	15.55	14.51
11	09.57	08.37	07.06	06.20	04.41	03.26	03.46	05.13	06.41	08.04	08.36	09.57
	15.21	16.54	18.18	20.46	22.15	23.36	23.24	21.57	20.13	18.30	15.53	14.50
12	09.55	08.34	07.03	06.17	04.38	03.25	03.49	05.16	06.44	08.07	08.39	09.59
	15.24	16.57	18.21	20.49	22.18	23.37	23.22	21.54	20.09	18.27	15.50	14.50
13	09.53	08.31	06.59	06.13	04.35	03.24	03.51	05.19	06.47	08.10	08.42	10.00
	15.26	17.00	18.24	20.52	22.21	23.39	23.20	21.50	20.06	18.24	15.47	14.49
14	09.51	08.28	06.56	06.10	04.32	03.23	03.54	05.22	06.50	08.13	08.45	10.02
	15.29	17.04	18.27	20.55	22.24	23.40	23.18	21.47	20.02	18.20	15.44	14.48
15	09.49	08.25	06.52	06.06	04.29	03.22	03.56	05.25	06.52	08.16	08.49	10.03
	15.32	17.07	18.29	20.58	22.27	23.41	23.16	21.44	19.59	18.17	15.41	14.48
16	09.47	08.22	06.49	06.03	04.26	03.21	03.59	05.28	06.55	08.18	08.52	10.05
	15.35	17.10	18.32	21.01	22.30	23.42	23.13	21.41	19.55	18.14	15.39	14.47
17	09.45	08.18	06.46	06.00	04.23	03.21	04.01	05.31	06.58	08.21	08.55	10.06
	15.37	17.13	18.35	21.04	22.33	23.43	23.11	21.37	19.52	18.10	15.36	14.47
18	09.43	08.15	06.42	05.56	04.20	03.20	04.04	05.34	07.01	08.24	08.58	10.07
	15.40	17.16	18.38	21.07	22.36	23.44	23.08	21.34	19.49	18.07	15.33	14.47
19	09.41	08.12	06.39	05.53	04.18	03.20	04.07	05.37	07.03	08.27	09.01	10.08
	15.43	17.19	18.41	21.10	22.39	23.45	23.06	21.31	19.45	18.04	15.31	14.47
20	09.38	08.09	06.35	05.50	04.15	03.20	04.09	05.40	07.06	08.30	09.04	10.09
	15.46	17.22	18.44	21.12	22.42	23.45	23.03	21.27	19.42	18.01	15.28	14.47
21	09.36	08.06	06.32	05.46	04.12	03.20	04.12	05.43	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.15	22.45	23.45	23.00	21.24	19.38	17.57	15.26	14.48
22	09.33	08.02	06.28	05.43	04.09	03.20	04.15	05.45	07.11	08.36	09.10	10.10
	15.52	17.28	18.49	21.18	22.48	23.46	22.58	21.21	19.35	17.54	15.23	14.48
23	09.31	07.59	06.25	05.40	04.06	03.20	04.18	05.48	07.14	08.39	09.12	10.11
	15.55	17.31	18.52	21.21	22.51	23.46	22.55	21.17	19.31	17.51	15.21	14.48
24	09.28	07.56	06.22	05.36	04.04	03.21	04.21	05.51	07.17	08.42	09.15	10.11
	15.58	17.34	18.55	21.24	22.54	23.45	22.52	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.18	05.33	04.01	03.21	04.23	05.54	07.20	07.45	09.18	10.11
	16.01	17.37	18.58	21.27	22.57	23.45	22.49	21.10	19.25	16.44	15.17	14.50
26	09.23	07.49	06.15	05.30	03.58	03.22	04.26	05.57	07.22	07.48	09.21	10.11
	16.04	17.40	19.01	21.30	22.59	23.45	22.46	21.07	19.21	16.41	15.14	14.51
27	09.21	07.46	06.11	05.26	03.56	03.23	04.29	06.00	07.25	07.51	09.24	10.11
	16.07	17.43	19.04	21.33	23.02	23.44	22.43	21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.53	03.24	04.32	06.02	07.28	07.54	09.27	10.11
	16.10	17.46	19.06	21.36	23.05	23.44	22.40	21.00	19.14	16.35	15.10	14.53
29	09.15		07.05	05.20	03.51	03.25	04.35	06.05	07.31	07.57	09.29	10.11
	16.14		20.09	21.39	23.07	23.43	22.37	20.57	19.11	16.32	15.08	14.54
30	09.13		07.01	05.16	03.49	03.26	04.38	06.08	07.33	08.00	09.32	10.11
	16.17		20.12	21.42	23.10	23.42	22.34	20.54	19.07	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.10
	16.20		20.15		23.13		22.31	20.50		16.25		14.57
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.51/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke Forest Shadow receptor: E - E Asuinrakennus (Rökiöntie 930)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
716	546	427	409	540	810	1 084	1 285	889	717	582	591	8 594

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.39	06.54	05.13	03.44	03.27	04.44	06.14	07.36	08.06	09.35
	14.59	16.23	17.49	20.18	21.45	23.15	23.41	22.28	20.47	19.04	16.22	15.04
2	10.09	09.04	07.36	06.51	05.10	03.42	03.29	04.47	06.16	07.39	08.09	09.37
	15.01	16.26	17.52	20.21	21.48	23.18	23.40	22.25	20.43	19.01	16.19	15.02
3	10.08	09.01	07.33	06.47	05.07	03.40	03.30	04.50	06.19	07.42	08.12	09.40
	15.03	16.29	17.55	20.23	21.51	23.20	23.39	22.22	20.40	18.57	16.16	15.01
4	10.07	08.58	07.29	06.44	05.03	03.38	03.32	04.53	06.22	07.44	08.15	09.42
	15.05	16.32	17.58	20.26	21.54	23.22	23.37	22.19	20.37	18.54	16.13	14.59
5	10.06	08.55	07.26	06.41	05.00	03.36	03.34	04.56	06.25	07.47	08.18	09.45
	15.07	16.35	18.01	20.29	21.57	23.24	23.36	22.16	20.33	18.51	16.10	14.57
6	10.04	08.52	07.23	06.37	04.57	03.34	03.35	04.59	06.28	07.50	08.21	09.47
	15.09	16.39	18.04	20.32	22.00	23.27	23.34	22.13	20.30	18.47	16.07	14.56
7	10.03	08.49	07.19	06.34	04.54	03.32	03.37	05.02	06.30	07.53	08.24	09.49
	15.11	16.42	18.06	20.35	22.03	23.29	23.32	22.10	20.26	18.44	16.04	14.55
8	10.02	08.46	07.16	06.30	04.51	03.30	03.40	05.05	06.33	07.56	08.27	09.51
	15.14	16.45	18.09	20.38	22.06	23.31	23.31	22.07	20.23	18.40	16.01	14.53
9	10.00	08.43	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.58	08.30	09.53
	15.16	16.48	18.12	20.41	22.09	23.32	23.29	22.03	20.19	18.37	15.58	14.52
10	09.58	08.40	07.09	06.23	04.44	03.27	03.44	05.10	06.39	08.01	08.33	09.55
	15.18	16.51	18.15	20.43	22.12	23.34	23.27	22.00	20.16	18.34	15.55	14.51
11	09.57	08.37	07.06	06.20	04.41	03.26	03.46	05.13	06.41	08.04	08.36	09.57
	15.21	16.54	18.18	20.46	22.15	23.36	23.25	21.57	20.13	18.30	15.53	14.50
12	09.55	08.34	07.02	06.17	04.38	03.25	03.49	05.16	06.44	08.07	08.39	09.59
	15.24	16.57	18.21	20.49	22.19	23.37	23.22	21.54	20.09	18.27	15.50	14.49
13	09.53	08.31	06.59	06.13	04.35	03.24	03.51	05.19	06.47	08.10	08.42	10.01
	15.26	17.00	18.24	20.52	22.22	23.39	23.20	21.50	20.06	18.24	15.47	14.49
14	09.51	08.28	06.56	06.10	04.32	03.23	03.53	05.22	06.50	08.13	08.46	10.02
	15.29	17.04	18.27	20.55	22.25	23.40	23.18	21.47	20.02	18.20	15.44	14.48
15	09.49	08.25	06.52	06.06	04.29	03.22	03.56	05.25	06.52	08.16	08.49	10.04
	15.32	17.07	18.29	20.58	22.28	23.41	23.16	21.44	19.59	18.17	15.41	14.48
16	09.47	08.22	06.49	06.03	04.26	03.21	03.59	05.28	06.55	08.18	08.52	10.05
	15.34	17.10	18.32	21.01	22.31	23.42	23.13	21.41	19.55	18.14	15.39	14.47
17	09.45	08.18	06.46	06.00	04.23	03.21	04.01	05.31	06.58	08.21	08.55	10.06
	15.37	17.13	18.35	21.04	22.34	23.43	23.11	21.37	19.52	18.10	15.36	14.47
18	09.43	08.15	06.42	05.56	04.20	03.20	04.04	05.34	07.01	08.24	08.58	10.07
	15.40	17.16	18.38	21.07	22.36	23.44	23.08	21.34	19.49	18.07	15.33	14.47
19	09.41	08.12	06.39	05.53	04.17	03.20	04.07	05.37	07.03	08.27	09.01	10.08
	15.43	17.19	18.41	21.10	22.39	23.45	23.06	21.31	19.45	18.04	15.31	14.47
20	09.38	08.09	06.35	05.50	04.15	03.20	04.09	05.40	07.06	08.30	09.04	10.09
	15.46	17.22	18.44	21.12	22.42	23.45	23.03	21.27	19.42	18.01	15.28	14.47
21	09.36	08.06	06.32	05.46	04.12	03.20	04.12	05.42	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.15	22.45	23.45	23.00	21.24	19.38	17.57	15.26	14.47
22	09.33	08.02	06.28	05.43	04.09	03.20	04.15	05.45	07.11	08.36	09.10	10.10
	15.52	17.28	18.49	21.18	22.48	23.46	22.58	21.21	19.35	17.54	15.23	14.48
23	09.31	07.59	06.25	05.40	04.06	03.20	04.18	05.48	07.14	08.39	09.13	10.11
	15.55	17.31	18.52	21.21	22.51	23.46	22.55	21.17	19.31	17.51	15.21	14.48
24	09.29	07.56	06.22	05.36	04.04	03.20	04.21	05.51	07.17	08.42	09.15	10.11
	15.58	17.34	18.55	21.24	22.54	23.46	22.52	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.18	05.33	04.01	03.21	04.23	05.54	07.20	07.45	09.18	10.11
	16.01	17.37	18.58	21.27	22.57	23.45	22.49	21.11	19.25	16.44	15.16	14.50
26	09.23	07.49	06.15	05.30	03.58	03.22	04.26	05.57	07.22	07.48	09.21	10.12
	16.04	17.40	19.01	21.30	22.59	23.45	22.46	21.07	19.21	16.41	15.14	14.51
27	09.21	07.46	06.11	05.26	03.56	03.22	04.29	06.00	07.25	07.51	09.24	10.12
	16.07	17.43	19.04	21.33	23.02	23.44	22.43	21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.53	03.23	04.32	06.02	07.28	07.54	09.27	10.11
	16.10	17.46	19.06	21.36	23.05	23.44	22.40	21.00	19.14	16.35	15.10	14.53
29	09.15		07.04	05.20	03.51	03.24	04.35	06.05	07.31	07.57	09.29	10.11
	16.13		20.09	21.39	23.08	23.43	22.38	20.57	19.11	16.32	15.08	14.54
30	09.13		07.01	05.16	03.49	03.26	04.38	06.08	07.33	08.00	09.32	10.11
	16.17		20.12	21.42	23.10	23.42	22.35	20.54	19.07	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.10
	16.20		20.15		23.13		22.32	20.50		16.25		14.57
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.51/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke Forest Shadow receptor: F - F Asuinrakennus (Kukkusintie 474)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
716	546	427	409	540	810	1 084	1 285	889	717	582	591	8 594

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.07	07.39	06.54	05.13	03.43	03.26	04.43	06.14	07.36	08.06	09.35
	14.59	16.23	17.49	20.18	21.45	23.16	23.42	22.29	20.47	19.04	16.22	15.04
2	10.09	09.04	07.36	06.51	05.10	03.41	03.28	04.46	06.16	07.39	08.09	09.38
	15.01	16.26	17.52	20.21	21.48	23.18	23.40	22.26	20.43	19.01	16.19	15.02
3	10.08	09.01	07.33	06.47	05.06	03.39	03.29	04.49	06.19	07.42	08.12	09.40
	15.02	16.29	17.55	20.23	21.51	23.20	23.39	22.23	20.40	18.57	16.16	15.00
4	10.07	08.59	07.29	06.44	05.03	03.37	03.31	04.52	06.22	07.44	08.15	09.43
	15.04	16.32	17.58	20.26	21.55	23.23	23.38	22.19	20.37	18.54	16.13	14.59
5	10.06	08.56	07.26	06.40	05.00	03.35	03.33	04.55	06.25	07.47	08.18	09.45
	15.06	16.35	18.01	20.29	21.58	23.25	23.36	22.16	20.33	18.50	16.10	14.57
6	10.05	08.53	07.23	06.37	04.57	03.33	03.35	04.58	06.27	07.50	08.21	09.47
	15.09	16.38	18.03	20.32	22.01	23.27	23.35	22.13	20.30	18.47	16.07	14.56
7	10.03	08.50	07.19	06.34	04.54	03.31	03.37	05.01	06.30	07.53	08.24	09.49
	15.11	16.41	18.06	20.35	22.04	23.29	23.33	22.10	20.26	18.44	16.04	14.54
8	10.02	08.47	07.16	06.30	04.50	03.30	03.39	05.04	06.33	07.56	08.27	09.52
	15.13	16.45	18.09	20.38	22.07	23.31	23.31	22.07	20.23	18.40	16.01	14.53
9	10.00	08.44	07.13	06.27	04.47	03.28	03.41	05.07	06.36	07.59	08.30	09.54
	15.16	16.48	18.12	20.41	22.10	23.33	23.29	22.04	20.19	18.37	15.58	14.52
10	09.59	08.41	07.09	06.23	04.44	03.27	03.43	05.10	06.39	08.01	08.33	09.56
	15.18	16.51	18.15	20.43	22.13	23.35	23.27	22.00	20.16	18.34	15.55	14.51
11	09.57	08.37	07.06	06.20	04.41	03.25	03.46	05.13	06.41	08.04	08.37	09.58
	15.21	16.54	18.18	20.46	22.16	23.37	23.25	21.57	20.13	18.30	15.52	14.50
12	09.55	08.34	07.02	06.16	04.38	03.24	03.48	05.16	06.44	08.07	08.40	09.59
	15.23	16.57	18.21	20.49	22.19	23.38	23.23	21.54	20.09	18.27	15.49	14.49
13	09.53	08.31	06.59	06.13	04.35	03.23	03.50	05.19	06.47	08.10	08.43	10.01
	15.26	17.00	18.24	20.52	22.22	23.39	23.21	21.51	20.06	18.24	15.47	14.48
14	09.52	08.28	06.56	06.10	04.32	03.22	03.53	05.22	06.49	08.13	08.46	10.03
	15.28	17.03	18.27	20.55	22.25	23.41	23.18	21.47	20.02	18.20	15.44	14.48
15	09.50	08.25	06.52	06.06	04.29	03.21	03.55	05.25	06.52	08.16	08.49	10.04
	15.31	17.06	18.29	20.58	22.28	23.42	23.16	21.44	19.59	18.17	15.41	14.47
16	09.47	08.22	06.49	06.03	04.26	03.20	03.58	05.28	06.55	08.18	08.52	10.05
	15.34	17.10	18.32	21.01	22.31	23.43	23.14	21.41	19.55	18.14	15.38	14.47
17	09.45	08.19	06.45	06.00	04.23	03.20	04.01	05.31	06.58	08.21	08.55	10.07
	15.37	17.13	18.35	21.04	22.34	23.44	23.11	21.37	19.52	18.10	15.36	14.46
18	09.43	08.15	06.42	05.56	04.20	03.19	04.03	05.34	07.00	08.24	08.58	10.08
	15.40	17.16	18.38	21.07	22.37	23.45	23.09	21.34	19.49	18.07	15.33	14.46
19	09.41	08.12	06.39	05.53	04.17	03.19	04.06	05.36	07.03	08.27	09.01	10.09
	15.43	17.19	18.41	21.10	22.40	23.45	23.06	21.31	19.45	18.04	15.31	14.46
20	09.39	08.09	06.35	05.49	04.14	03.19	04.09	05.39	07.06	08.30	09.04	10.10
	15.46	17.22	18.44	21.13	22.43	23.46	23.03	21.27	19.42	18.00	15.28	14.47
21	09.36	08.06	06.32	05.46	04.11	03.19	04.12	05.42	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.16	22.46	23.46	23.01	21.24	19.38	17.57	15.25	14.47
22	09.34	08.02	06.28	05.43	04.09	03.19	04.14	05.45	07.11	08.36	09.10	10.11
	15.52	17.28	18.49	21.19	22.49	23.46	22.58	21.21	19.35	17.54	15.23	14.47
23	09.31	07.59	06.25	05.39	04.06	03.19	04.17	05.48	07.14	08.39	09.13	10.11
	15.55	17.31	18.52	21.21	22.51	23.46	22.55	21.17	19.31	17.51	15.21	14.48
24	09.29	07.56	06.22	05.36	04.03	03.20	04.20	05.51	07.17	08.42	09.16	10.12
	15.58	17.34	18.55	21.24	22.54	23.46	22.52	21.14	19.28	17.47	15.18	14.48
25	09.26	07.53	06.18	05.33	04.00	03.20	04.23	05.54	07.20	07.45	09.19	10.12
	16.01	17.37	18.58	21.27	22.57	23.46	22.50	21.11	19.25	16.44	15.16	14.49
26	09.24	07.49	06.15	05.29	03.58	03.21	04.26	05.57	07.22	07.48	09.21	10.12
	16.04	17.40	19.01	21.30	23.00	23.46	22.47	21.07	19.21	16.41	15.14	14.50
27	09.21	07.46	06.11	05.26	03.55	03.22	04.29	05.59	07.25	07.51	09.24	10.12
	16.07	17.43	19.04	21.33	23.03	23.45	22.44	21.04	19.18	16.38	15.12	14.51
28	09.18	07.43	06.08	05.23	03.53	03.23	04.32	06.02	07.28	07.54	09.27	10.12
	16.10	17.46	19.06	21.36	23.05	23.44	22.41	21.00	19.14	16.35	15.10	14.52
29	09.16		07.04	05.19	03.50	03.24	04.35	06.05	07.31	07.57	09.30	10.12
	16.13		20.09	21.39	23.08	23.44	22.38	20.57	19.11	16.31	15.08	14.54
30	09.13		07.01	05.16	03.48	03.25	04.38	06.08	07.33	08.00	09.32	10.11
	16.16		20.12	21.42	23.11	23.43	22.35	20.54	19.07	16.28	15.06	14.55
31	09.10		06.58		03.46		04.41	06.11		08.03		10.11
	16.19		20.15		23.13		22.32	20.50		16.25		14.57
Potential sun hours	181	242	363	447	560	606	595	503	392	307	206	150
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.51/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke Forest Shadow receptor: G - G Asuinrakennus (Kovik byväg 53)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
716	546	427	409	540	810	1 084	1 285	889	717	582	591	8 594

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.08	07.40	06.55	05.13	03.44	03.27	04.44	06.14	07.37	08.06	09.35
	14.59	16.23	17.49	20.18	21.46	23.16	23.42	22.29	20.47	19.04	16.22	15.04
2	10.09	09.05	07.37	06.51	05.10	03.42	03.28	04.47	06.17	07.39	08.09	09.38
	15.01	16.26	17.52	20.21	21.49	23.19	23.41	22.26	20.44	19.01	16.19	15.02
3	10.08	09.02	07.33	06.48	05.07	03.40	03.30	04.50	06.20	07.42	08.12	09.41
	15.03	16.29	17.55	20.24	21.52	23.21	23.40	22.23	20.40	18.58	16.16	15.01
4	10.07	08.59	07.30	06.44	05.04	03.37	03.32	04.53	06.22	07.45	08.15	09.43
	15.05	16.32	17.58	20.27	21.55	23.23	23.38	22.20	20.37	18.54	16.13	14.59
5	10.06	08.56	07.27	06.41	05.00	03.36	03.33	04.56	06.25	07.48	08.19	09.45
	15.07	16.36	18.01	20.30	21.58	23.25	23.37	22.17	20.34	18.51	16.10	14.57
6	10.05	08.53	07.23	06.37	04.57	03.34	03.35	04.59	06.28	07.51	08.22	09.48
	15.09	16.39	18.04	20.32	22.01	23.28	23.35	22.14	20.30	18.47	16.07	14.56
7	10.04	08.50	07.20	06.34	04.54	03.32	03.37	05.02	06.31	07.53	08.25	09.50
	15.11	16.42	18.07	20.35	22.04	23.30	23.33	22.10	20.27	18.44	16.04	14.55
8	10.02	08.47	07.16	06.31	04.51	03.30	03.39	05.05	06.33	07.56	08.28	09.52
	15.14	16.45	18.10	20.38	22.07	23.32	23.31	22.07	20.23	18.41	16.01	14.53
9	10.01	08.44	07.13	06.27	04.48	03.29	03.41	05.08	06.36	07.59	08.31	09.54
	15.16	16.48	18.13	20.41	22.10	23.33	23.30	22.04	20.20	18.37	15.58	14.52
10	09.59	08.41	07.10	06.24	04.45	03.27	03.44	05.11	06.39	08.02	08.34	09.56
	15.18	16.51	18.15	20.44	22.13	23.35	23.28	22.01	20.16	18.34	15.56	14.51
11	09.58	08.38	07.06	06.20	04.41	03.26	03.46	05.14	06.42	08.05	08.37	09.58
	15.21	16.54	18.18	20.47	22.16	23.37	23.26	21.58	20.13	18.31	15.53	14.50
12	09.56	08.35	07.03	06.17	04.38	03.25	03.48	05.16	06.44	08.07	08.40	10.00
	15.24	16.58	18.21	20.50	22.19	23.38	23.23	21.54	20.10	18.27	15.50	14.49
13	09.54	08.32	07.00	06.14	04.35	03.23	03.51	05.19	06.47	08.10	08.43	10.01
	15.26	17.01	18.24	20.53	22.22	23.40	23.21	21.51	20.06	18.24	15.47	14.49
14	09.52	08.29	06.56	06.10	04.32	03.22	03.53	05.22	06.50	08.13	08.46	10.03
	15.29	17.04	18.27	20.55	22.25	23.41	23.19	21.48	20.03	18.21	15.44	14.48
15	09.50	08.25	06.53	06.07	04.29	03.22	03.56	05.25	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	23.42	23.16	21.44	19.59	18.17	15.41	14.48
16	09.48	08.22	06.49	06.03	04.26	03.21	03.58	05.28	06.55	08.19	08.52	10.06
	15.34	17.10	18.33	21.01	22.31	23.43	23.14	21.41	19.56	18.14	15.39	14.47
17	09.46	08.19	06.46	06.00	04.23	03.20	04.01	05.31	06.58	08.22	08.55	10.07
	15.37	17.13	18.36	21.04	22.34	23.44	23.12	21.38	19.52	18.11	15.36	14.47
18	09.44	08.16	06.42	05.57	04.20	03.20	04.04	05.34	07.01	08.25	08.58	10.08
	15.40	17.16	18.38	21.07	22.37	23.45	23.09	21.35	19.49	18.07	15.34	14.47
19	09.41	08.13	06.39	05.53	04.17	03.19	04.06	05.37	07.04	08.28	09.01	10.09
	15.43	17.19	18.41	21.10	22.40	23.46	23.06	21.31	19.46	18.04	15.31	14.47
20	09.39	08.09	06.36	05.50	04.15	03.19	04.09	05.40	07.06	08.30	09.04	10.10
	15.46	17.22	18.44	21.13	22.43	23.46	23.04	21.28	19.42	18.01	15.28	14.47
21	09.37	08.06	06.32	05.46	04.12	03.19	04.12	05.43	07.09	08.33	09.07	10.11
	15.49	17.25	18.47	21.16	22.46	23.47	23.01	21.25	19.39	17.58	15.26	14.47
22	09.34	08.03	06.29	05.43	04.09	03.19	04.15	05.46	07.12	08.36	09.10	10.11
	15.52	17.28	18.50	21.19	22.49	23.47	22.58	21.21	19.35	17.54	15.23	14.48
23	09.32	08.00	06.25	05.40	04.06	03.20	04.18	05.48	07.15	08.39	09.13	10.12
	15.55	17.31	18.53	21.22	22.52	23.47	22.56	21.18	19.32	17.51	15.21	14.48
24	09.29	07.56	06.22	05.36	04.04	03.20	04.21	05.51	07.17	08.42	09.16	10.12
	15.58	17.34	18.55	21.25	22.55	23.47	22.53	21.14	19.28	17.48	15.19	14.49
25	09.27	07.53	06.19	05.33	04.01	03.21	04.23	05.54	07.20	07.45	09.19	10.12
	16.01	17.37	18.58	21.28	22.57	23.46	22.50	21.11	19.25	16.45	15.16	14.50
26	09.24	07.50	06.15	05.30	03.58	03.21	04.26	05.57	07.23	07.48	09.22	10.12
	16.04	17.40	19.01	21.31	23.00	23.46	22.47	21.08	19.22	16.41	15.14	14.51
27	09.21	07.47	06.12	05.26	03.56	03.22	04.29	06.00	07.26	07.51	09.25	10.12
	16.07	17.43	19.04	21.34	23.03	23.46	22.44	21.04	19.18	16.38	15.12	14.52
28	09.19	07.43	06.08	05.23	03.53	03.23	04.32	06.03	07.28	07.54	09.27	10.12
	16.10	17.46	19.07	21.37	23.06	23.45	22.41	21.01	19.15	16.35	15.10	14.53
29	09.16		07.05	05.20	03.51	03.24	04.35	06.06	07.31	07.57	09.30	10.12
	16.14		20.10	21.40	23.08	23.44	22.38	20.57	19.11	16.32	15.08	14.54
30	09.13		07.01	05.17	03.48	03.25	04.38	06.08	07.34	08.00	09.33	10.12
	16.17		20.12	21.43	23.11	23.43	22.35	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.11
	16.20		20.15		23.14		22.32	20.51		16.26		14.57
Potential sun hours	181	242	363	447	560	606	595	503	392	307	206	150
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.51/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke Forest Shadow receptor: H - H Asuinrakennus (Vöyrintie 1021)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
716	546	427	409	540	810	1 084	1 285	889	717	582	591	8 594

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.08	07.40	06.55	05.13	03.44	03.27	04.44	06.14	07.37	08.06	09.35
	14.59	16.23	17.49	20.18	21.46	23.16	23.42	22.29	20.47	19.04	16.23	15.04
2	10.09	09.05	07.37	06.51	05.10	03.42	03.28	04.47	06.17	07.39	08.09	09.38
	15.01	16.26	17.52	20.21	21.49	23.18	23.41	22.26	20.44	19.01	16.19	15.02
3	10.08	09.02	07.33	06.48	05.07	03.40	03.30	04.50	06.20	07.42	08.12	09.41
	15.03	16.29	17.55	20.24	21.52	23.21	23.40	22.23	20.40	18.58	16.16	15.01
4	10.07	08.59	07.30	06.44	05.04	03.38	03.32	04.53	06.22	07.45	08.15	09.43
	15.05	16.33	17.58	20.27	21.55	23.23	23.38	22.20	20.37	18.54	16.13	14.59
5	10.06	08.56	07.27	06.41	05.00	03.36	03.33	04.56	06.25	07.48	08.19	09.45
	15.07	16.36	18.01	20.30	21.58	23.25	23.37	22.17	20.34	18.51	16.10	14.57
6	10.05	08.53	07.23	06.37	04.57	03.34	03.35	04.59	06.28	07.51	08.22	09.48
	15.09	16.39	18.04	20.32	22.01	23.28	23.35	22.14	20.30	18.47	16.07	14.56
7	10.04	08.50	07.20	06.34	04.54	03.32	03.37	05.02	06.31	07.53	08.25	09.50
	15.11	16.42	18.07	20.35	22.04	23.30	23.33	22.10	20.27	18.44	16.04	14.55
8	10.02	08.47	07.16	06.31	04.51	03.30	03.39	05.05	06.33	07.56	08.28	09.52
	15.14	16.45	18.10	20.38	22.07	23.32	23.31	22.07	20.23	18.41	16.01	14.53
9	10.01	08.44	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.59	08.31	09.54
	15.16	16.48	18.13	20.41	22.10	23.33	23.30	22.04	20.20	18.37	15.58	14.52
10	09.59	08.41	07.10	06.24	04.45	03.27	03.44	05.11	06.39	08.02	08.34	09.56
	15.19	16.51	18.16	20.44	22.13	23.35	23.28	22.01	20.16	18.34	15.56	14.51
11	09.58	08.38	07.06	06.20	04.42	03.26	03.46	05.14	06.42	08.05	08.37	09.58
	15.21	16.54	18.18	20.47	22.16	23.37	23.25	21.58	20.13	18.31	15.53	14.50
12	09.56	08.35	07.03	06.17	04.38	03.25	03.48	05.17	06.44	08.07	08.40	10.00
	15.24	16.58	18.21	20.50	22.19	23.38	23.23	21.54	20.10	18.27	15.50	14.49
13	09.54	08.32	07.00	06.14	04.35	03.24	03.51	05.19	06.47	08.10	08.43	10.01
	15.26	17.01	18.24	20.53	22.22	23.40	23.21	21.51	20.06	18.24	15.47	14.49
14	09.52	08.29	06.56	06.10	04.32	03.23	03.53	05.22	06.50	08.13	08.46	10.03
	15.29	17.04	18.27	20.56	22.25	23.41	23.19	21.48	20.03	18.21	15.44	14.48
15	09.50	08.25	06.53	06.07	04.29	03.22	03.56	05.25	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	23.42	23.16	21.44	19.59	18.17	15.42	14.48
16	09.48	08.22	06.49	06.03	04.26	03.21	03.59	05.28	06.55	08.19	08.52	10.06
	15.35	17.10	18.33	21.01	22.31	23.43	23.14	21.41	19.56	18.14	15.39	14.47
17	09.46	08.19	06.46	06.00	04.23	03.20	04.01	05.31	06.58	08.22	08.55	10.07
	15.37	17.13	18.36	21.04	22.34	23.44	23.12	21.38	19.52	18.11	15.36	14.47
18	09.44	08.16	06.43	05.57	04.20	03.20	04.04	05.34	07.01	08.25	08.58	10.08
	15.40	17.16	18.38	21.07	22.37	23.45	23.09	21.35	19.49	18.07	15.34	14.47
19	09.41	08.13	06.39	05.53	04.18	03.20	04.07	05.37	07.04	08.28	09.01	10.09
	15.43	17.19	18.41	21.10	22.40	23.46	23.06	21.31	19.46	18.04	15.31	14.47
20	09.39	08.09	06.36	05.50	04.15	03.19	04.09	05.40	07.06	08.31	09.04	10.10
	15.46	17.22	18.44	21.13	22.43	23.46	23.04	21.28	19.42	18.01	15.28	14.47
21	09.37	08.06	06.32	05.46	04.12	03.19	04.12	05.43	07.09	08.33	09.07	10.11
	15.49	17.25	18.47	21.16	22.46	23.46	23.01	21.25	19.39	17.58	15.26	14.47
22	09.34	08.03	06.29	05.43	04.09	03.19	04.15	05.46	07.12	08.36	09.10	10.11
	15.52	17.28	18.50	21.19	22.49	23.47	22.58	21.21	19.35	17.54	15.24	14.48
23	09.32	08.00	06.25	05.40	04.06	03.20	04.18	05.48	07.15	08.39	09.13	10.12
	15.55	17.31	18.53	21.22	22.52	23.47	22.56	21.18	19.32	17.51	15.21	14.48
24	09.29	07.56	06.22	05.36	04.04	03.20	04.21	05.51	07.17	08.42	09.16	10.12
	15.58	17.34	18.55	21.25	22.55	23.47	22.53	21.14	19.28	17.48	15.19	14.49
25	09.27	07.53	06.19	05.33	04.01	03.21	04.23	05.54	07.20	07.45	09.19	10.12
	16.01	17.37	18.58	21.28	22.57	23.46	22.50	21.11	19.25	16.45	15.17	14.50
26	09.24	07.50	06.15	05.30	03.58	03.21	04.26	05.57	07.23	07.48	09.22	10.12
	16.04	17.40	19.01	21.31	23.00	23.46	22.47	21.08	19.22	16.41	15.14	14.51
27	09.21	07.47	06.12	05.26	03.56	03.22	04.29	06.00	07.26	07.51	09.25	10.12
	16.07	17.43	19.04	21.34	23.03	23.45	22.44	21.04	19.18	16.38	15.12	14.52
28	09.19	07.43	06.08	05.23	03.53	03.23	04.32	06.03	07.28	07.54	09.27	10.12
	16.11	17.46	19.07	21.37	23.06	23.45	22.41	21.01	19.15	16.35	15.10	14.53
29	09.16		07.05	05.20	03.51	03.24	04.35	06.06	07.31	07.57	09.30	10.12
	16.14		20.10	21.40	23.08	23.44	22.38	20.57	19.11	16.32	15.08	14.54
30	09.13		07.01	05.17	03.48	03.26	04.38	06.08	07.34	08.00	09.33	10.12
	16.17		20.12	21.43	23.11	23.43	22.35	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.11
	16.20		20.15		23.14		22.32	20.51		16.26		14.57
Potential sun hours	181	242	363	447	560	606	595	503	392	307	206	150
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.51/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke ForestShadow receptor: I - I Lomarakennus (Ehrsbackavägen 29)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
716	546	427	409	540	810	1 084	1 285	889	717	582	591	8 594

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.07	07.40	06.55	05.14	03.44	03.27	04.44	06.14	07.37	08.06	09.35
	15.00	16.23	17.49	20.18	21.46	23.16	23.42	22.29	20.47	19.04	16.23	15.04
2	10.09	09.05	07.37	06.51	05.10	03.42	03.29	04.47	06.17	07.39	08.09	09.38
	15.01	16.26	17.52	20.21	21.49	23.18	23.41	22.26	20.44	19.01	16.20	15.03
3	10.08	09.02	07.33	06.48	05.07	03.40	03.30	04.50	06.20	07.42	08.12	09.40
	15.03	16.30	17.55	20.24	21.52	23.21	23.39	22.23	20.40	18.58	16.17	15.01
4	10.07	08.59	07.30	06.44	05.04	03.38	03.32	04.53	06.22	07.45	08.15	09.43
	15.05	16.33	17.58	20.27	21.55	23.23	23.38	22.20	20.37	18.54	16.13	14.59
5	10.06	08.56	07.27	06.41	05.01	03.36	03.34	04.56	06.25	07.48	08.18	09.45
	15.07	16.36	18.01	20.30	21.58	23.25	23.36	22.17	20.34	18.51	16.10	14.58
6	10.05	08.53	07.23	06.37	04.57	03.34	03.36	04.59	06.28	07.51	08.22	09.47
	15.09	16.39	18.04	20.32	22.01	23.27	23.35	22.13	20.30	18.48	16.07	14.56
7	10.04	08.50	07.20	06.34	04.54	03.32	03.38	05.02	06.31	07.53	08.25	09.50
	15.12	16.42	18.07	20.35	22.04	23.29	23.33	22.10	20.27	18.44	16.04	14.55
8	10.02	08.47	07.16	06.31	04.51	03.31	03.40	05.05	06.34	07.56	08.28	09.52
	15.14	16.45	18.10	20.38	22.07	23.31	23.31	22.07	20.23	18.41	16.02	14.54
9	10.01	08.44	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.59	08.31	09.54
	15.16	16.48	18.13	20.41	22.10	23.33	23.29	22.04	20.20	18.37	15.59	14.53
10	09.59	08.41	07.10	06.24	04.45	03.28	03.44	05.11	06.39	08.02	08.34	09.56
	15.19	16.51	18.16	20.44	22.13	23.35	23.27	22.01	20.16	18.34	15.56	14.51
11	09.57	08.38	07.06	06.20	04.42	03.26	03.46	05.14	06.42	08.05	08.37	09.58
	15.21	16.55	18.18	20.47	22.16	23.37	23.25	21.57	20.13	18.31	15.53	14.51
12	09.56	08.35	07.03	06.17	04.39	03.25	03.49	05.17	06.45	08.07	08.40	09.59
	15.24	16.58	18.21	20.50	22.19	23.38	23.23	21.54	20.10	18.27	15.50	14.50
13	09.54	08.32	07.00	06.14	04.36	03.24	03.51	05.20	06.47	08.10	08.43	10.01
	15.27	17.01	18.24	20.53	22.22	23.40	23.21	21.51	20.06	18.24	15.47	14.49
14	09.52	08.28	06.56	06.10	04.33	03.23	03.54	05.23	06.50	08.13	08.46	10.03
	15.29	17.04	18.27	20.55	22.25	23.41	23.19	21.48	20.03	18.21	15.44	14.48
15	09.50	08.25	06.53	06.07	04.30	03.22	03.56	05.25	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	23.42	23.16	21.44	19.59	18.17	15.42	14.48
16	09.48	08.22	06.49	06.03	04.27	03.21	03.59	05.28	06.55	08.19	08.52	10.05
	15.35	17.10	18.33	21.01	22.31	23.43	23.14	21.41	19.56	18.14	15.39	14.48
17	09.46	08.19	06.46	06.00	04.24	03.21	04.01	05.31	06.58	08.22	08.55	10.07
	15.38	17.13	18.36	21.04	22.34	23.44	23.11	21.38	19.52	18.11	15.36	14.47
18	09.43	08.16	06.43	05.57	04.21	03.20	04.04	05.34	07.01	08.25	08.58	10.08
	15.40	17.16	18.38	21.07	22.37	23.45	23.09	21.34	19.49	18.07	15.34	14.47
19	09.41	08.13	06.39	05.53	04.18	03.20	04.07	05.37	07.04	08.28	09.01	10.09
	15.43	17.19	18.41	21.10	22.40	23.45	23.06	21.31	19.46	18.04	15.31	14.47
20	09.39	08.09	06.36	05.50	04.15	03.20	04.10	05.40	07.06	08.30	09.04	10.10
	15.46	17.22	18.44	21.13	22.43	23.46	23.04	21.28	19.42	18.01	15.29	14.47
21	09.36	08.06	06.32	05.47	04.12	03.20	04.12	05.43	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.16	22.46	23.46	23.01	21.24	19.39	17.58	15.26	14.48
22	09.34	08.03	06.29	05.43	04.09	03.20	04.15	05.46	07.12	08.36	09.10	10.11
	15.52	17.28	18.50	21.19	22.49	23.46	22.58	21.21	19.35	17.54	15.24	14.48
23	09.32	08.00	06.25	05.40	04.07	03.20	04.18	05.49	07.15	08.39	09.13	10.11
	15.55	17.31	18.53	21.22	22.52	23.46	22.55	21.18	19.32	17.51	15.21	14.49
24	09.29	07.56	06.22	05.37	04.04	03.21	04.21	05.51	07.17	08.42	09.16	10.12
	15.58	17.34	18.55	21.25	22.54	23.46	22.53	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.19	05.33	04.01	03.21	04.24	05.54	07.20	07.45	09.19	10.12
	16.01	17.37	18.58	21.28	22.57	23.46	22.50	21.11	19.25	16.45	15.17	14.50
26	09.24	07.50	06.15	05.30	03.59	03.22	04.27	05.57	07.23	07.48	09.22	10.12
	16.05	17.40	19.01	21.31	23.00	23.46	22.47	21.08	19.22	16.42	15.15	14.51
27	09.21	07.46	06.12	05.27	03.56	03.23	04.29	06.00	07.26	07.51	09.24	10.12
	16.08	17.43	19.04	21.34	23.03	23.45	22.44	21.04	19.18	16.38	15.12	14.52
28	09.19	07.43	06.08	05.23	03.54	03.24	04.32	06.03	07.28	07.54	09.27	10.12
	16.11	17.46	19.07	21.37	23.05	23.44	22.41	21.01	19.15	16.35	15.10	14.53
29	09.16		07.05	05.20	03.51	03.25	04.35	06.06	07.31	07.57	09.30	10.12
	16.14		20.10	21.40	23.08	23.44	22.38	20.57	19.11	16.32	15.08	14.55
30	09.13		07.01	05.17	03.49	03.26	04.38	06.08	07.34	08.00	09.33	10.11
	16.17		20.12	21.43	23.11	23.43	22.35	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.46		04.41	06.11		08.03		10.11
	16.20		20.15		23.13		22.32	20.51		16.26		14.57
Potential sun hours	182	242	363	447	559	606	595	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Miikka Saranpää / miikka.saranpaa@fcg.fi
Calculated:
14.7.2023 9.51/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke ForestShadow receptor: J - J Asuinrakennus (Kleidersvägen 118)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
716	546	427	409	540	810	1 084	1 285	889	717	582	591	8 594

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.07	07.40	06.55	05.14	03.44	03.27	04.44	06.14	07.37	08.06	09.35
	15.00	16.23	17.49	20.18	21.46	23.16	23.42	22.29	20.47	19.04	16.23	15.05
2	10.09	09.05	07.37	06.51	05.10	03.42	03.29	04.47	06.17	07.39	08.09	09.38
	15.01	16.26	17.52	20.21	21.49	23.18	23.40	22.26	20.44	19.01	16.20	15.03
3	10.08	09.02	07.33	06.48	05.07	03.40	03.30	04.50	06.20	07.42	08.12	09.40
	15.03	16.30	17.55	20.24	21.52	23.20	23.39	22.23	20.40	18.58	16.17	15.01
4	10.07	08.59	07.30	06.44	05.04	03.38	03.32	04.53	06.22	07.45	08.15	09.43
	15.05	16.33	17.58	20.27	21.55	23.23	23.38	22.20	20.37	18.54	16.14	14.59
5	10.06	08.56	07.27	06.41	05.01	03.36	03.34	04.56	06.25	07.48	08.18	09.45
	15.07	16.36	18.01	20.30	21.58	23.25	23.36	22.17	20.34	18.51	16.11	14.58
6	10.05	08.53	07.23	06.38	04.57	03.34	03.36	04.59	06.28	07.50	08.21	09.47
	15.10	16.39	18.04	20.32	22.01	23.27	23.35	22.13	20.30	18.48	16.08	14.56
7	10.03	08.50	07.20	06.34	04.54	03.32	03.38	05.02	06.31	07.53	08.25	09.50
	15.12	16.42	18.07	20.35	22.04	23.29	23.33	22.10	20.27	18.44	16.05	14.55
8	10.02	08.47	07.16	06.31	04.51	03.31	03.40	05.05	06.34	07.56	08.28	09.52
	15.14	16.45	18.10	20.38	22.07	23.31	23.31	22.07	20.23	18.41	16.02	14.54
9	10.00	08.44	07.13	06.27	04.48	03.29	03.42	05.08	06.36	07.59	08.31	09.54
	15.16	16.48	18.13	20.41	22.10	23.33	23.29	22.04	20.20	18.37	15.59	14.53
10	09.59	08.41	07.10	06.24	04.45	03.28	03.44	05.11	06.39	08.02	08.34	09.56
	15.19	16.52	18.16	20.44	22.13	23.35	23.27	22.01	20.16	18.34	15.56	14.52
11	09.57	08.38	07.06	06.20	04.42	03.26	03.47	05.14	06.42	08.05	08.37	09.58
	15.21	16.55	18.18	20.47	22.16	23.36	23.25	21.57	20.13	18.31	15.53	14.51
12	09.55	08.35	07.03	06.17	04.39	03.25	03.49	05.17	06.45	08.07	08.40	09.59
	15.24	16.58	18.21	20.50	22.19	23.38	23.23	21.54	20.10	18.27	15.50	14.50
13	09.54	08.32	07.00	06.14	04.36	03.24	03.51	05.20	06.47	08.10	08.43	10.01
	15.27	17.01	18.24	20.53	22.22	23.39	23.21	21.51	20.06	18.24	15.47	14.49
14	09.52	08.28	06.56	06.10	04.33	03.23	03.54	05.23	06.50	08.13	08.46	10.03
	15.29	17.04	18.27	20.55	22.25	23.41	23.18	21.48	20.03	18.21	15.45	14.48
15	09.50	08.25	06.53	06.07	04.30	03.22	03.56	05.26	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	23.42	23.16	21.44	19.59	18.17	15.42	14.48
16	09.48	08.22	06.49	06.03	04.27	03.22	03.59	05.28	06.55	08.19	08.52	10.05
	15.35	17.10	18.33	21.01	22.31	23.43	23.14	21.41	19.56	18.14	15.39	14.48
17	09.45	08.19	06.46	06.00	04.24	03.21	04.02	05.31	06.58	08.22	08.55	10.07
	15.38	17.13	18.36	21.04	22.34	23.44	23.11	21.38	19.52	18.11	15.36	14.47
18	09.43	08.16	06.43	05.57	04.21	03.20	04.04	05.34	07.01	08.25	08.58	10.08
	15.41	17.16	18.38	21.07	22.37	23.44	23.09	21.34	19.49	18.07	15.34	14.47
19	09.41	08.13	06.39	05.53	04.18	03.20	04.07	05.37	07.04	08.28	09.01	10.09
	15.43	17.19	18.41	21.10	22.40	23.45	23.06	21.31	19.46	18.04	15.31	14.47
20	09.39	08.09	06.36	05.50	04.15	03.20	04.10	05.40	07.06	08.30	09.04	10.10
	15.46	17.22	18.44	21.13	22.43	23.46	23.03	21.28	19.42	18.01	15.29	14.48
21	09.36	08.06	06.32	05.47	04.12	03.20	04.12	05.43	07.09	08.33	09.07	10.10
	15.49	17.25	18.47	21.16	22.46	23.46	23.01	21.24	19.39	17.58	15.26	14.48
22	09.34	08.03	06.29	05.43	04.09	03.20	04.15	05.46	07.12	08.36	09.10	10.11
	15.52	17.28	18.50	21.19	22.49	23.46	22.58	21.21	19.35	17.54	15.24	14.48
23	09.31	08.00	06.25	05.40	04.07	03.20	04.18	05.49	07.15	08.39	09.13	10.11
	15.55	17.31	18.53	21.22	22.51	23.46	22.55	21.18	19.32	17.51	15.21	14.49
24	09.29	07.56	06.22	05.37	04.04	03.21	04.21	05.52	07.17	08.42	09.16	10.12
	15.58	17.34	18.55	21.25	22.54	23.46	22.52	21.14	19.28	17.48	15.19	14.49
25	09.26	07.53	06.19	05.33	04.01	03.21	04.24	05.54	07.20	07.45	09.19	10.12
	16.02	17.37	18.58	21.28	22.57	23.46	22.50	21.11	19.25	16.45	15.17	14.50
26	09.24	07.50	06.15	05.30	03.59	03.22	04.27	05.57	07.23	07.48	09.22	10.12
	16.05	17.40	19.01	21.31	23.00	23.45	22.47	21.08	19.22	16.42	15.15	14.51
27	09.21	07.46	06.12	05.27	03.56	03.23	04.30	06.00	07.26	07.51	09.24	10.12
	16.08	17.43	19.04	21.34	23.03	23.45	22.44	21.04	19.18	16.38	15.12	14.52
28	09.18	07.43	06.08	05.23	03.54	03.24	04.33	06.03	07.28	07.54	09.27	10.12
	16.11	17.46	19.07	21.37	23.05	23.44	22.41	21.01	19.15	16.35	15.10	14.53
29	09.16		07.05	05.20	03.51	03.25	04.35	06.06	07.31	07.57	09.30	10.12
	16.14		20.10	21.40	23.08	23.43	22.38	20.57	19.11	16.32	15.08	14.55
30	09.13		07.01	05.17	03.49	03.26	04.38	06.08	07.34	08.00	09.33	10.11
	16.17		20.12	21.43	23.11	23.43	22.35	20.54	19.08	16.29	15.06	14.56
31	09.10		06.58		03.47		04.41	06.11		08.03		10.11
	16.20		20.15		23.13		22.32	20.51		16.26		14.58
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.51/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke Forest Shadow receptor: K - K Asuinrakennus (Rökiöntie 154)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
716	546	427	409	540	810	1 084	1 285	889	717	582	591	8 594

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.40	06.55	05.14	03.45	03.28	04.45	06.14	07.37	08.06	09.35
	15.00	16.24	17.49	20.18	21.46	23.15	23.41	22.29	20.47	19.05	16.23	15.05
2	10.09	09.04	07.36	06.51	05.11	03.43	03.29	04.48	06.17	07.39	08.09	09.37
	15.02	16.27	17.52	20.21	21.49	23.18	23.40	22.26	20.44	19.01	16.20	15.03
3	10.08	09.02	07.33	06.48	05.07	03.41	03.31	04.50	06.20	07.42	08.12	09.40
	15.04	16.30	17.55	20.24	21.52	23.20	23.39	22.23	20.40	18.58	16.17	15.01
4	10.07	08.59	07.30	06.44	05.04	03.39	03.33	04.53	06.23	07.45	08.15	09.42
	15.06	16.33	17.58	20.27	21.55	23.22	23.37	22.19	20.37	18.54	16.14	15.00
5	10.06	08.56	07.26	06.41	05.01	03.37	03.34	04.56	06.25	07.48	08.18	09.45
	15.08	16.36	18.01	20.29	21.58	23.24	23.36	22.16	20.33	18.51	16.11	14.58
6	10.04	08.53	07.23	06.38	04.58	03.35	03.36	04.59	06.28	07.50	08.21	09.47
	15.10	16.39	18.04	20.32	22.01	23.27	23.34	22.13	20.30	18.48	16.08	14.57
7	10.03	08.50	07.20	06.34	04.55	03.33	03.38	05.02	06.31	07.53	08.24	09.49
	15.12	16.42	18.07	20.35	22.04	23.29	23.32	22.10	20.27	18.44	16.05	14.55
8	10.02	08.47	07.16	06.31	04.51	03.31	03.40	05.05	06.34	07.56	08.27	09.51
	15.14	16.45	18.10	20.38	22.07	23.31	23.31	22.07	20.23	18.41	16.02	14.54
9	10.00	08.44	07.13	06.27	04.48	03.30	03.43	05.08	06.36	07.59	08.30	09.53
	15.17	16.49	18.13	20.41	22.10	23.32	23.29	22.04	20.20	18.38	15.59	14.53
10	09.59	08.41	07.10	06.24	04.45	03.28	03.45	05.11	06.39	08.02	08.34	09.55
	15.19	16.52	18.16	20.44	22.13	23.34	23.27	22.00	20.16	18.34	15.56	14.52
11	09.57	08.38	07.06	06.21	04.42	03.27	03.47	05.14	06.42	08.05	08.37	09.57
	15.22	16.55	18.18	20.47	22.16	23.36	23.25	21.57	20.13	18.31	15.53	14.51
12	09.55	08.35	07.03	06.17	04.39	03.26	03.49	05.17	06.45	08.07	08.40	09.59
	15.24	16.58	18.21	20.50	22.19	23.37	23.22	21.54	20.10	18.27	15.50	14.50
13	09.53	08.31	07.00	06.14	04.36	03.25	03.52	05.20	06.47	08.10	08.43	10.01
	15.27	17.01	18.24	20.52	22.22	23.39	23.20	21.51	20.06	18.24	15.48	14.50
14	09.51	08.28	06.56	06.10	04.33	03.24	03.54	05.23	06.50	08.13	08.46	10.02
	15.30	17.04	18.27	20.55	22.25	23.40	23.18	21.47	20.03	18.21	15.45	14.49
15	09.49	08.25	06.53	06.07	04.30	03.23	03.57	05.26	06.53	08.16	08.49	10.04
	15.32	17.07	18.30	20.58	22.28	23.41	23.16	21.44	19.59	18.18	15.42	14.48
16	09.47	08.22	06.49	06.04	04.27	03.22	03.59	05.29	06.56	08.19	08.52	10.05
	15.35	17.10	18.33	21.01	22.31	23.42	23.13	21.41	19.56	18.14	15.39	14.48
17	09.45	08.19	06.46	06.00	04.24	03.22	04.02	05.32	06.58	08.22	08.55	10.06
	15.38	17.13	18.36	21.04	22.34	23.43	23.11	21.38	19.52	18.11	15.37	14.48
18	09.43	08.16	06.43	05.57	04.21	03.21	04.05	05.34	07.01	08.25	08.58	10.07
	15.41	17.16	18.38	21.07	22.37	23.44	23.08	21.34	19.49	18.08	15.34	14.48
19	09.41	08.12	06.39	05.54	04.18	03.21	04.07	05.37	07.04	08.27	09.01	10.08
	15.44	17.19	18.41	21.10	22.40	23.45	23.06	21.31	19.46	18.04	15.32	14.48
20	09.38	08.09	06.36	05.50	04.15	03.21	04.10	05.40	07.06	08.30	09.04	10.09
	15.47	17.22	18.44	21.13	22.42	23.45	23.03	21.28	19.42	18.01	15.29	14.48
21	09.36	08.06	06.32	05.47	04.13	03.21	04.13	05.43	07.09	08.33	09.07	10.10
	15.50	17.26	18.47	21.16	22.45	23.45	23.00	21.24	19.39	17.58	15.27	14.48
22	09.34	08.03	06.29	05.43	04.10	03.21	04.16	05.46	07.12	08.36	09.10	10.10
	15.53	17.29	18.50	21.19	22.48	23.46	22.58	21.21	19.35	17.55	15.24	14.49
23	09.31	08.00	06.25	05.40	04.07	03.21	04.18	05.49	07.15	08.39	09.13	10.11
	15.56	17.32	18.53	21.22	22.51	23.46	22.55	21.18	19.32	17.51	15.22	14.49
24	09.29	07.56	06.22	05.37	04.04	03.21	04.21	05.52	07.17	08.42	09.16	10.11
	15.59	17.35	18.55	21.25	22.54	23.46	22.52	21.14	19.28	17.48	15.19	14.50
25	09.26	07.53	06.19	05.33	04.02	03.22	04.24	05.55	07.20	07.45	09.18	10.12
	16.02	17.38	18.58	21.28	22.57	23.45	22.49	21.11	19.25	16.45	15.17	14.51
26	09.24	07.50	06.15	05.30	03.59	03.23	04.27	05.57	07.23	07.48	09.21	10.12
	16.05	17.41	19.01	21.31	23.00	23.45	22.46	21.07	19.22	16.42	15.15	14.52
27	09.21	07.46	06.12	05.27	03.57	03.23	04.30	06.00	07.26	07.51	09.24	10.12
	16.08	17.43	19.04	21.34	23.02	23.44	22.44	21.04	19.18	16.39	15.13	14.53
28	09.18	07.43	06.08	05.24	03.54	03.24	04.33	06.03	07.28	07.54	09.27	10.11
	16.11	17.46	19.07	21.37	23.05	23.44	22.41	21.01	19.15	16.35	15.11	14.54
29	09.16		07.05	05.20	03.52	03.25	04.36	06.06	07.31	07.57	09.30	10.11
	16.14		20.10	21.40	23.08	23.43	22.38	20.57	19.11	16.32	15.09	14.55
30	09.13		07.02	05.17	03.49	03.27	04.39	06.09	07.34	08.00	09.32	10.11
	16.17		20.12	21.43	23.10	23.42	22.35	20.54	19.08	16.29	15.07	14.57
31	09.10		06.58		03.47		04.42	06.11		08.03		10.10
	16.20		20.15		23.13		22.32	20.51		16.26		14.58
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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Calculated:
14.7.2023 9.51/3.5.584

SHADOW - Calendar

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke Forest Shadow receptor: L - L Asuinrakennus (Bjurbäcksvägen 231)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
716	546	427	409	540	810	1 084	1 285	889	717	582	591	8 594

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.07	07.40	06.55	05.14	03.45	03.28	04.45	06.14	07.36	08.06	09.35
	15.00	16.23	17.49	20.18	21.45	23.15	23.41	22.28	20.47	19.04	16.23	15.05
2	10.08	09.04	07.36	06.51	05.10	03.43	03.30	04.47	06.17	07.39	08.09	09.37
	15.02	16.27	17.52	20.21	21.48	23.17	23.39	22.25	20.44	19.01	16.20	15.03
3	10.07	09.01	07.33	06.48	05.07	03.41	03.31	04.50	06.20	07.42	08.12	09.40
	15.04	16.30	17.55	20.24	21.51	23.20	23.38	22.22	20.40	18.58	16.17	15.01
4	10.06	08.58	07.30	06.44	05.04	03.39	03.33	04.53	06.22	07.45	08.15	09.42
	15.06	16.33	17.58	20.26	21.54	23.22	23.37	22.19	20.37	18.54	16.14	15.00
5	10.05	08.55	07.26	06.41	05.01	03.37	03.35	04.56	06.25	07.48	08.18	09.44
	15.08	16.36	18.01	20.29	21.57	23.24	23.35	22.16	20.33	18.51	16.11	14.58
6	10.04	08.52	07.23	06.38	04.58	03.35	03.36	04.59	06.28	07.50	08.21	09.47
	15.10	16.39	18.04	20.32	22.00	23.26	23.34	22.13	20.30	18.47	16.08	14.57
7	10.03	08.50	07.20	06.34	04.54	03.33	03.38	05.02	06.31	07.53	08.24	09.49
	15.12	16.42	18.07	20.35	22.03	23.28	23.32	22.10	20.26	18.44	16.05	14.55
8	10.01	08.47	07.16	06.31	04.51	03.31	03.40	05.05	06.34	07.56	08.27	09.51
	15.14	16.45	18.10	20.38	22.06	23.30	23.30	22.07	20.23	18.41	16.02	14.54
9	10.00	08.44	07.13	06.27	04.48	03.30	03.43	05.08	06.36	07.59	08.30	09.53
	15.17	16.49	18.13	20.41	22.09	23.32	23.28	22.03	20.20	18.37	15.59	14.53
10	09.58	08.40	07.10	06.24	04.45	03.28	03.45	05.11	06.39	08.02	08.33	09.55
	15.19	16.52	18.15	20.44	22.12	23.34	23.26	22.00	20.16	18.34	15.56	14.52
11	09.57	08.37	07.06	06.20	04.42	03.27	03.47	05.14	06.42	08.04	08.36	09.57
	15.22	16.55	18.18	20.46	22.15	23.35	23.24	21.57	20.13	18.31	15.53	14.51
12	09.55	08.34	07.03	06.17	04.39	03.26	03.49	05.17	06.44	08.07	08.39	09.59
	15.24	16.58	18.21	20.49	22.18	23.37	23.22	21.54	20.09	18.27	15.50	14.50
13	09.53	08.31	06.59	06.14	04.36	03.25	03.52	05.20	06.47	08.10	08.42	10.00
	15.27	17.01	18.24	20.52	22.21	23.38	23.20	21.50	20.06	18.24	15.47	14.50
14	09.51	08.28	06.56	06.10	04.33	03.24	03.54	05.23	06.50	08.13	08.46	10.02
	15.30	17.04	18.27	20.55	22.24	23.40	23.18	21.47	20.03	18.21	15.45	14.49
15	09.49	08.25	06.53	06.07	04.30	03.23	03.57	05.26	06.53	08.16	08.49	10.03
	15.32	17.07	18.30	20.58	22.27	23.41	23.15	21.44	19.59	18.17	15.42	14.48
16	09.47	08.22	06.49	06.04	04.27	03.22	03.59	05.29	06.55	08.19	08.52	10.05
	15.35	17.10	18.33	21.01	22.30	23.42	23.13	21.41	19.56	18.14	15.39	14.48
17	09.45	08.19	06.46	06.00	04.24	03.22	04.02	05.31	06.58	08.21	08.55	10.06
	15.38	17.13	18.35	21.04	22.33	23.43	23.11	21.37	19.52	18.11	15.37	14.48
18	09.43	08.15	06.42	05.57	04.21	03.21	04.05	05.34	07.01	08.24	08.58	10.07
	15.41	17.16	18.38	21.07	22.36	23.44	23.08	21.34	19.49	18.07	15.34	14.48
19	09.40	08.12	06.39	05.53	04.18	03.21	04.07	05.37	07.04	08.27	09.01	10.08
	15.44	17.19	18.41	21.10	22.39	23.44	23.05	21.31	19.45	18.04	15.31	14.48
20	09.38	08.09	06.36	05.50	04.15	03.21	04.10	05.40	07.06	08.30	09.04	10.09
	15.47	17.22	18.44	21.13	22.42	23.45	23.03	21.27	19.42	18.01	15.29	14.48
21	09.36	08.06	06.32	05.47	04.13	03.21	04.13	05.43	07.09	08.33	09.07	10.10
	15.50	17.25	18.47	21.16	22.45	23.45	23.00	21.24	19.39	17.58	15.27	14.48
22	09.33	08.03	06.29	05.43	04.10	03.21	04.16	05.46	07.12	08.36	09.10	10.10
	15.53	17.28	18.50	21.18	22.48	23.45	22.57	21.21	19.35	17.54	15.24	14.49
23	09.31	07.59	06.25	05.40	04.07	03.21	04.18	05.49	07.14	08.39	09.12	10.11
	15.56	17.31	18.52	21.21	22.51	23.45	22.55	21.17	19.32	17.51	15.22	14.49
24	09.28	07.56	06.22	05.37	04.04	03.21	04.21	05.52	07.17	08.42	09.15	10.11
	15.59	17.34	18.55	21.24	22.54	23.45	22.52	21.14	19.28	17.48	15.19	14.50
25	09.26	07.53	06.19	05.33	04.02	03.22	04.24	05.54	07.20	07.45	09.18	10.11
	16.02	17.37	18.58	21.27	22.56	23.45	22.49	21.11	19.25	16.45	15.17	14.51
26	09.23	07.50	06.15	05.30	03.59	03.23	04.27	05.57	07.23	07.48	09.21	10.11
	16.05	17.40	19.01	21.30	22.59	23.45	22.46	21.07	19.21	16.42	15.15	14.52
27	09.21	07.46	06.12	05.27	03.57	03.23	04.30	06.00	07.25	07.51	09.24	10.11
	16.08	17.43	19.04	21.33	23.02	23.44	22.43	21.04	19.18	16.38	15.13	14.53
28	09.18	07.43	06.08	05.24	03.54	03.24	04.33	06.03	07.28	07.54	09.27	10.11
	16.11	17.46	19.07	21.36	23.05	23.43	22.40	21.01	19.15	16.35	15.11	14.54
29	09.15		07.05	05.20	03.52	03.26	04.36	06.06	07.31	07.57	09.29	10.11
	16.14		20.09	21.39	23.07	23.43	22.37	20.57	19.11	16.32	15.09	14.55
30	09.13		07.01	05.17	03.49	03.27	04.39	06.09	07.34	08.00	09.32	10.10
	16.17		20.12	21.42	23.10	23.42	22.34	20.54	19.08	16.29	15.07	14.57
31	09.10		06.58		03.47		04.42	06.11		08.03		10.10
	16.20		20.15		23.12		22.31	20.50		16.26		14.58
Potential sun hours	182	242	363	447	559	605	594	502	392	308	206	151
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker Last time (hh:mm) with flicker	(WTG causing flicker first time) (WTG causing flicker last time)

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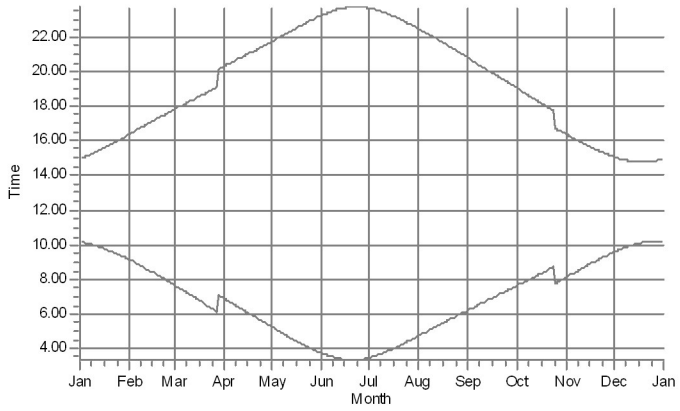
Calculated:
14.7.2023 9.51/3.5.584

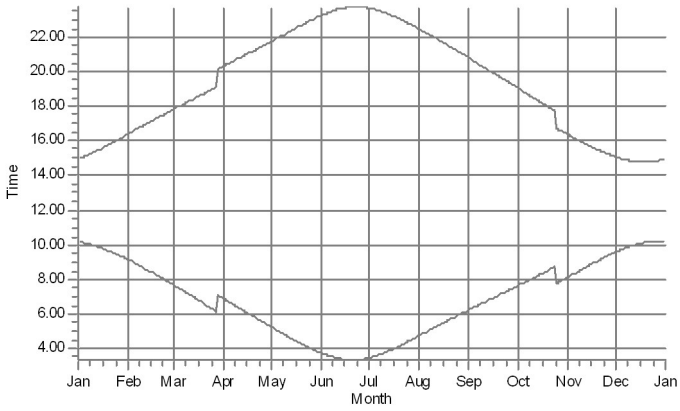
SHADOW - Calendar, graphical

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke Forest

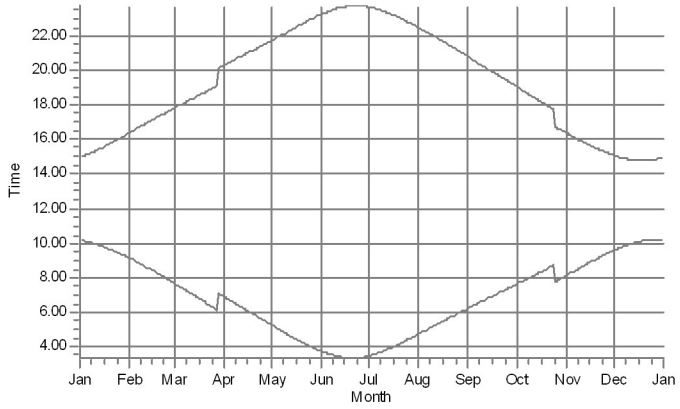
A: A Lomarakennus (Söderändan 49)



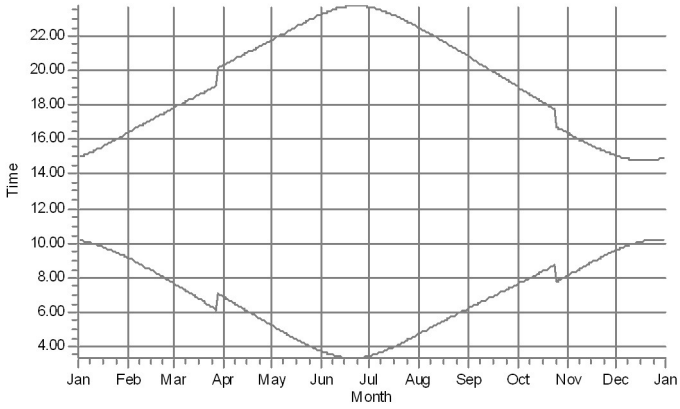
B: B Asuinrakennus (Söderändan 81)



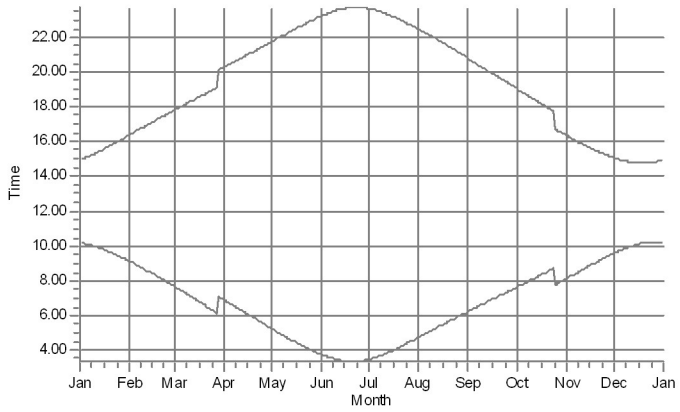
C: C Lomarakennus (Säderändan 166)



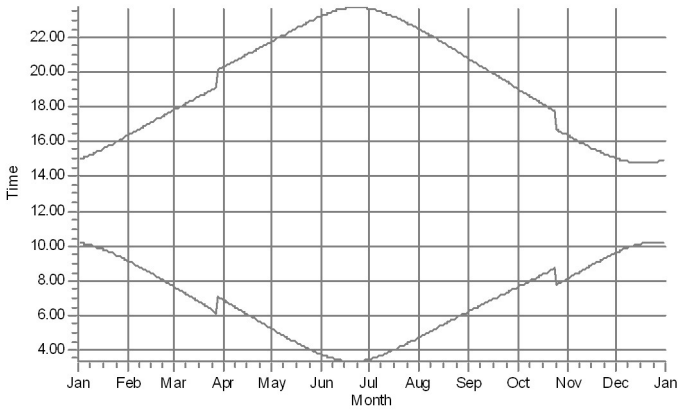
D: D Lomarakennus (Söderändan 188)



E: E Asuinrakennus (Rökiöntie 930)



F: F Asuinrakennus (Kukkusintie 474)



WTGs

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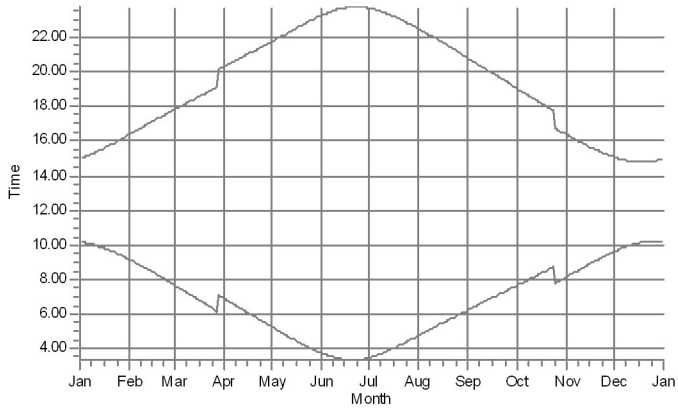
Calculated:
14.7.2023 9.51/3.5.584

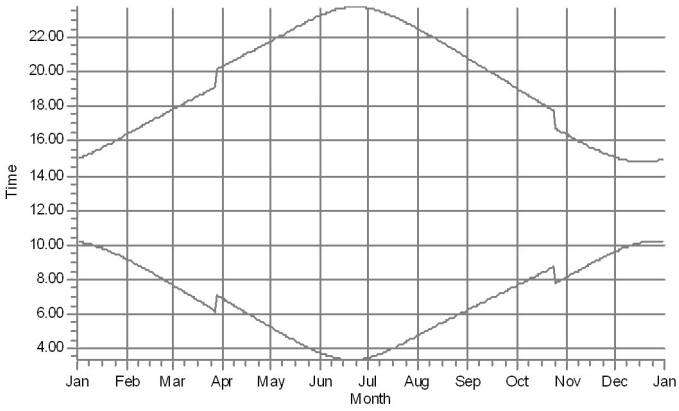
SHADOW - Calendar, graphical

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke Forest

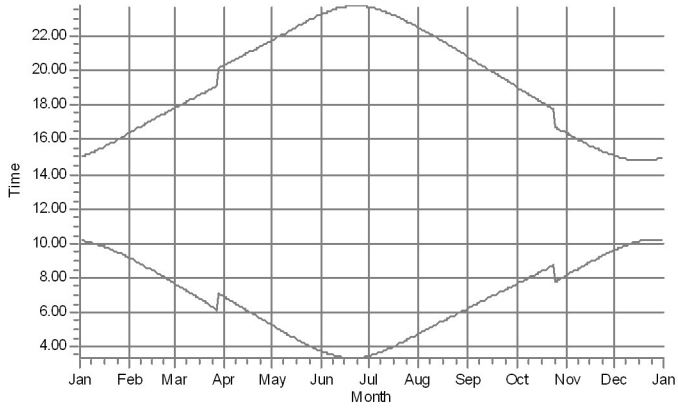
G: G Asuinrakennus (Kovik byväg 53)



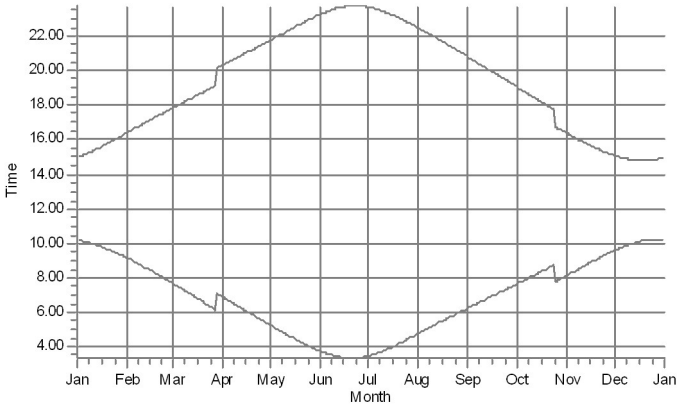
H: H Asuinrakennus (Vöyrintie 1021)



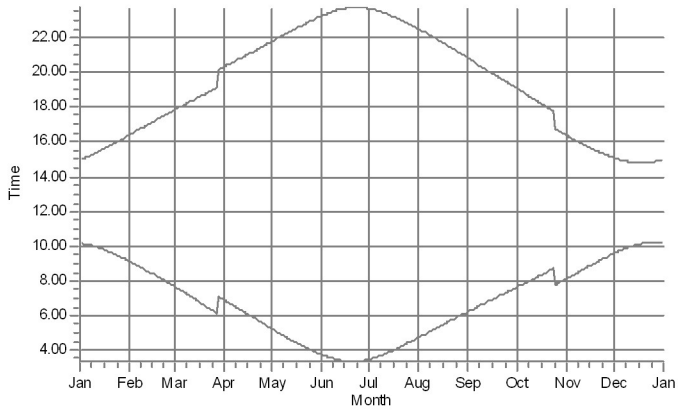
I: I Lomarakennus (Ehrsbackavägen 29)



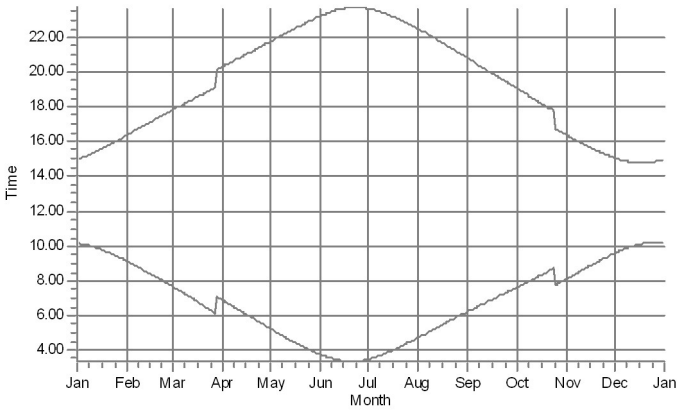
J: J Asuinrakennus (Kleidersvägen 118)



K: K Asuinrakennus (Rökiöntie 154)



L: L Asuinrakennus (Bjurbäcksvägen 231)



WTGs

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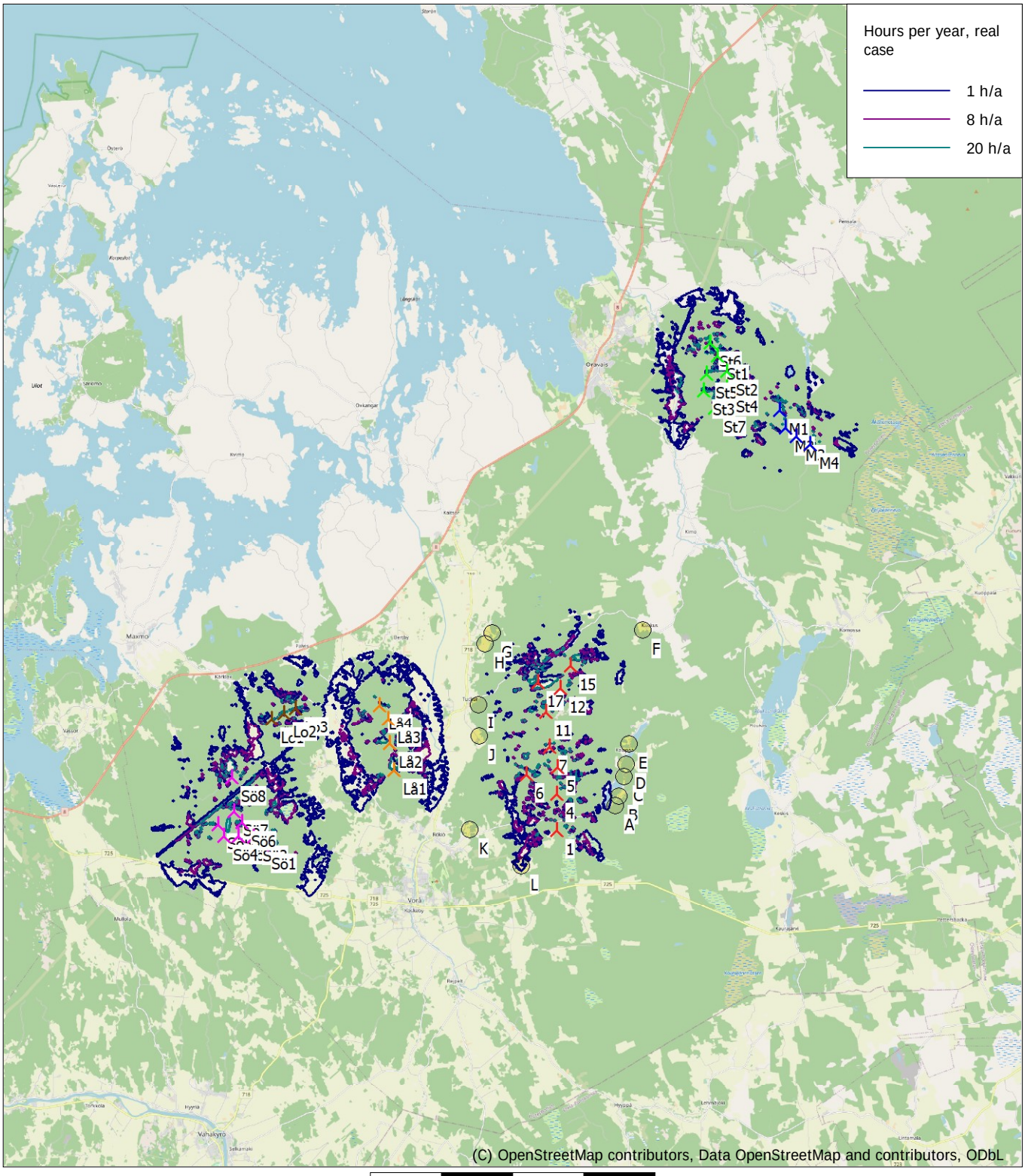
Calculated:
14.7.2023 9.51/3.5.584

SHADOW - Map

Calculation: VE2_9xRD180xHH190 + Lålax + Lotlax + Söderskogen + Storbacken + Mörknässkogen _Luke Forest



0 2,5 5 7,5 10km

Map: EMD OpenStreetMap , Print scale 1:200 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 264 510 North: 7 019 520

New WTG Shadow receptor

Flicker map level: Height Contours: CONTOURLINE_Lasor tuulivoimahanke 2022_0.wpo (3)

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