Uusimon tuulivoimapuisto, Pihtipudas

Melu- ja varjostusmallinnusraportti

MYRSKY

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Sisällysluettelo

Liitteet

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1 MELU- JA VARJOSTUSMALLINNUKSEN TAVOITTEET

Myrsky Energia Oy suunnittelee tuulivoimapuistoa Pihtiputaan kunnan pohjoisosaan. 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 kolmen hankevaihtoehdon voimaloiden sijoitussuunnitelmien mukaisesti. Melu- ja varjostusmallinnukset on laatinut Henri Korhonen 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 (Taulukko 3).

Hankevaihtoehdossa 1 (VE 1) voimalamäärä on 21 kpl, hankevaihtoehdossa 2 (VE 2) 18 kpl ja hankevaihtoehdossa 3 (VE 3) 10 kpl. Tuulivoimaloiden äänenpainetasot on mallinnettu käyttäen V172-7,2 MW voimalaitosta, jossa on ääntä vaimentavat sahalaitasiivet (STE). Voimalaitosten napakorkeutena on käytetty 214 metriä, jolloin voimalaitosten kokonaiskorkeudeksi muodostuu 300 metriä. V172-7,2 MW (STE) voimalaitoksen valmistajan ilmoittama tuulivoimalan tuottama äänitehotaso on 106,9 dB(A) ja siihen on lisätty 2 dB(A) varmuusarvo (Taulukko 1).

Yhteismelun mallinnuksissa on huomioitu Uusimon suunniteltujen tuulivoimaloiden lisäksi Hallakallion tuulivoimahankkeen suunnitellut voimalat (28 kpl). Hallakallion tuulivoimalat on mallinnettu V172-7,2MW voimaloilla, joiden kokonaiskorkeus on 320 metriä. V172-7,2 MW (NO STE) voimalaitoksen valmistajan ilmoittama tuulivoimalan tuottama äänitehotaso on 110,1 dB(A) ja siihen on lisätty 2 dB(A) varmuusarvo (Taulukko 2).

Melumallinnusten laskentatuloksia on havainnollistettu ns. keskiäänitasokarttojen avulla. Keskiäänitasokartoissa on melun keskiäänitaso- eli ekvivalenttiäänitasokäyrät (LAeq) 5 dB välein.

Taulukko 1. Uusimon tuulivoimahankkeen mallinnusohjelma ja tuulivoimaloiden äänitehotasot voimalaitoksella V172-7,2 MW sekä melun erityispiirteet.

MALLINNUSOHJELMANTIEDOT							
Mallinnusohjelma ja versio: WindPRO version 3.6				Mallinnusmenetelmä: ISO 9613-2			
TUULIVOIMALOIDEN TIEDOT							
Tuulivoimalan valmistaja: Vestas				Tyyppi: V172 – 7,2 MW		Sarjanumero/t:-	
Nimellisteho: 7,2 MW		Napakorkeus: 214 m		Roottorinhalkaisija: 172 m		Tornin tyyppi: teräs/hybridi	
Mahdollisuudet vaikuttaa tuulivoimalan melupäästöön käytön aikana ja sen vaikutus meluun							
Lapakulman säätö		Pyörimisnopeus		Muu, mikä: PO7200 (STE)			
Kyllä	dB	Kyllä	dB	Noise mode säätö:		Kyllä	
~~Ei~~		~~Ei~~		Noise mode, lähtömelutaso		106,9 dB(A) + 2 dB (A)	
AKUSTISET TIEDOT/LASKENNA LÄHTÖTIEDOT							
Third octave noise emission V172-7.2MW 50/60 Hz Document no 0128-4336_00 *Lähtömelutasoon on lisätty varmuusarvoksi 2 dB(A)*							

Oktaaveittain [Hz], dB(A)		1/3-oktaaveittain [Hz], dB(A)					
		12,5	*53*	*125,0*	*95,2*	*1250,0*	*95,9*
62,5	*92,4*	*16,0*	*58,6*	*160,0*	*96,8*	*1600,0*	*94,4*
125	*100*	*20*	*63,7*	*200,0*	*98*	*2000,0*	*92,4*
250	*103,3*	*25*	*68,9*	*250,0*	*98,6*	*2500,0*	*90,1*
500	*103,5*	*31,5*	*73,8*	*315,0*	*98,8*	*3150,0*	*87,5*
1000	*101,9*	*40*	*78,6*	*400,0*	*98,9*	*4000,0*	*84,5*
2000	*97,4*	*50,0*	*83*	*500,0*	*98,7*	*5000,0*	*81,1*
4000	*89,9*	*63,0*	*86,8*	*630,0*	*98,6*	*6300,0*	*77,4*
8000	*79,2*	*80,0*	*90,2*	*800,0*	*98,1*	*8000,0*	*73,3*
108,9 dB(A)		*100,0*	*92,9*	*1000,0*	*97,2*	*10000*	*68,9*

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

Taulukko 2. Hallakallion tuulivoimahankkeen mallinnusohjelma ja tuulivoimaloiden äänitehotasot voimalaitoksella V172-7,2 MW sekä melun erityispiirteet.

MALLINNUSOHJELMANTIEDOT							
Mallinnusohjelma ja versio: WindPRO version 3.6				Mallinnusmenetelmä: ISO 9613-2			
TUULIVOIMALOIDEN TIEDOT							
Tuulivoimalan valmistaja: Vestas				Tyyppi: V172 – 7,2 MW		Sarjanumero/t:-	
Nimellisteho: 7,2 MW		Napakorkeus: 234 m		Roottorinhalkaisija: 172 m		Tornin tyyppi: teräs/hybridi	
Mahdollisuudet vaikuttaa tuulivoimalan melupäästöön käytön aikana ja sen vaikutus meluun							
Lapakulman säätö		Pyörimisnopeus		Muu, mikä: PO7200-0S			
Kyllä	dB	Kyllä	dB	Noise mode säätö: Mode 0, no STE		Kyllä	
~~Ei~~		~~Ei~~		Noise mode, lähtömelutaso		110,1 dB(A) + 2 dB (A)	
AKUSTISET TIEDOT/LASKENNA LÄHTÖTIEDOT							
Third octave noise emission V172-7.2MW 50/60 Hz Document no 0128-4336_00 *Lähtömelutasoon on lisätty epävarmuusarvoksi 2 dB(A)*							

Oktaaveittain [Hz], dB(A)		1/3-oktaaveittain [Hz], dB(A)					
		12,5	*50,6*	*125,0*	*97,2*	*1250,0*	*99,8*
62,5	*93,5*	*16,0*	*56,7*	*160,0*	*99,2*	*1600,0*	*98,3*
125	*102,3*	*20*	*62,4*	*200,0*	*100,6*	*2000,0*	*96,3*
250	*106,1*	*25*	*68,1*	*250,0*	*101,5*	*2500,0*	*94*
500	*107*	*31,5*	*73,5*	*315,0*	*101,9*	*3150,0*	*91,3*
1000	*105,7*	*40*	*78,7*	*400,0*	*102,2*	*4000,0*	*88,2*
2000	*101,3*	*50,0*	*83,5*	*500,0*	*102,2*	*5000,0*	*84,8*
4000	*93,6*	*63,0*	*87,8*	*630,0*	*102,2*	*6300,0*	*81,0*
8000	*82,8*	*80,0*	*91,5*	*800,0*	*101,8*	*8000,0*	*76,7*
112,1 dB(A)		*100,0*	*94,6*	*1000,0*	*101*	*10000*	*72,1*

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

Taulukko 3. Käytetyt mallinnusparametrit ISO 9613-2 laskelmissa.

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	0,4 / vesialueilla 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 voimalavalmistajalta 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, 2019) julkistamien Anojanssi projektin tulosten mukaisten ääneneristävyysarvoin ja tuloksia verrattiin toimenpiderajoihin.

Anojanssi projektissa mitattiin ilmaääneneristävyys standardin ISO 16283-3:2016 mukaan. Projektissa valittiin 13 pientaloa ja 26 julkisivurakennetta niin, että edustettuina oli kevyitä, raskaita, uusia ja vanhoja julkisivurakenteita. Tuloksista johdettiin 84 % persentiili, joka kertoo arvon, joka ylittyi 84 % mitatuista suomalaisista pientaloista.

Taulukko 4. 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

Matalataajuisen melun laskelmassa huomioitiin maanpinnan muodon vaikutus ohjeen 4/2014 mukaisesti. Tulokset on esitetty taajuuskohtaisena taulukkona hankealuetta ympäröiville asuin- ja lomarakennuksille.

2.2 Varjostusmallinnus

Tuulivoimaloiden varjostusvaikutukset on mallinnettu hankevaihtoehdoissa käyttäen roottorinhalkaisijaltaan 200 metristä voimalaitosta, jonka napakorkeus on 200 metriä. Kokonaiskorkeudeltaan voimalat ovat tällöin 300 metriä korkeita.

Taulukko 5. Uusimon tuulivoimahankkeen mallinnusohjelma ja tuulivoimaloiden koko varjostusmallinnuksissa.

MALLINNUSOHJELMAN TIEDOT			
Mallinnusohjelma ja versio: WindPRO versiot 3.6		Mallinnusmenetelmä: ISO 9613-2	
TUULIVOIMALAN (TUULIVOIMALOIDEN TIEDOT)			
Tuulivoimalan valmistaja: Generic		Tyyppi: Generic RD200xHH200	Sarjanumero/t:-
Nimellisteho: -	Napakorkeus: 200 m	Roottorin halkaisija: 200 m	Tornin tyyppi: teräs/hybridi
Lavan maksimi leveys: 4,72 m	90 % säteelle laskettu lapaleveys: 1,44 m	Maksimivälke-etäisyys 2089 m	

Varjostuksen yhteismallinnuksissa on huomioitu Uusimon suunniteltujen tuulivoimaloiden lisäksi suunnitellut Hallakallion tuulivoimalat. Hallakallion tuulivoimalat on mallinnettu napakorkeudella 215 metriä, ja roottorin halkaisijalla 210 metriä, jolloin kokonaiskorkeudeksi muodostuu 320 metriä.

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 Seinäjoen sääaseman mitattuihin säätietoihin 1991–2020. Laskentojen tuulen suunta ja nopeusjakaumana käytettiin NASA:n MERRA-dataa (Modern Era Retrospective-analysis for Research and Applications) (1993-2023) hankealueen läheisyydestä (Lon: 26,88, Lat: 63,50).

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 laitosmallille noin 2089 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).

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 Paikkatietoaineistot

Korkeustiedot perustuvat Maanmittauslaitoksen (MML) maastotietokannan korkeuskäyrät-aineistoon. Korkeusaseman intrapoloitimenetelmänä kohteille on käytetty WindPron TIN menetelmää.

Melumallinnuksen ja matalataajuisen melun mallinnuksen laskentapisteet perustuvat Maanmittauslaitoksen Maastotietokannan (MTK) rakennuskantaa koskeviin tietoihin. Maastotietokannan mukaan Uusimon hankealueella sijaitsee kaksi loma-ajan rakennusta. Molempien rakennusten käyttötarkoitus ollaan muuttamassa ”muuksi” käyttötarkoitukseksi. Kyseisiä rakennuksia ei näin ollen ole huomioitu laskentapisteinä tässä selvityksessä.

2.4 Raja- ja ohjearvot

2.4.1 Melu

Valtioneuvoston asetuksessa (1107/2015) tuulivoimaloille on määritelty ohjearvot päivä- ja yöajan keskiäänitasojen maksimiarvolle. Jos tuulivoimalan melu sisältää tonaalisia, kapeakaistaisia tai impulssimaisia komponentteja, mallinnustuloksiin tulee asetuksen 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 äänenvoimakkuuteen.

Taulukko 6. Valtioneuvoston asetuksen mukaiset tuulivoimaloiden melutason ohjearvot (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 7. 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 keski-äänitaso 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 LAeq, 1h mitattuna niissä tiloissa, jotka on tarkoitettu nukkumiseen.

2.4.2 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.

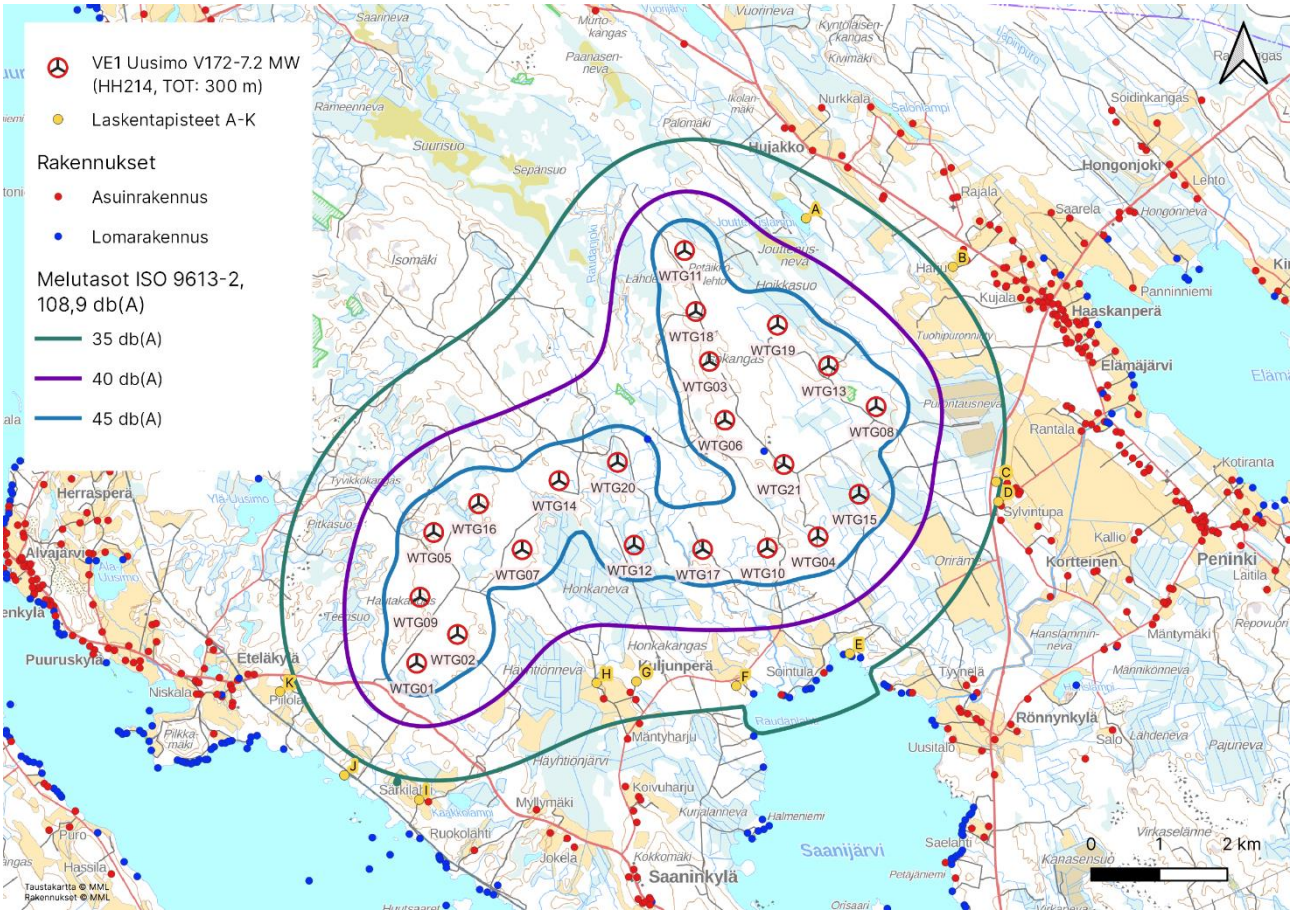
Arvioinnissa on tarkasteltu vaikutuksia alueella, jossa varjoja tai välkettä mallinnuksen mukaisessa todellisessa tilanteessa (”Real Case”) esiintyy vähintään kahdeksan tuntia vuodessa.

3 MELU- JA VARJOSTUSMALLINNUSTEN TULOKSET

3.1 Melu

3.1.1 VE1: Melun laskentatulokset (ISO 9613-2)

Hankevaihtoehdon 1 (VE1) melumallinnuksen tulosten mukaan melutaso 40 dB(A) ei ylity lähimmillä asuin- ja lomarakennuksilla (Kuva 1, Taulukko 8). Katso tarkemmat laskentatulokset liitteestä 1.



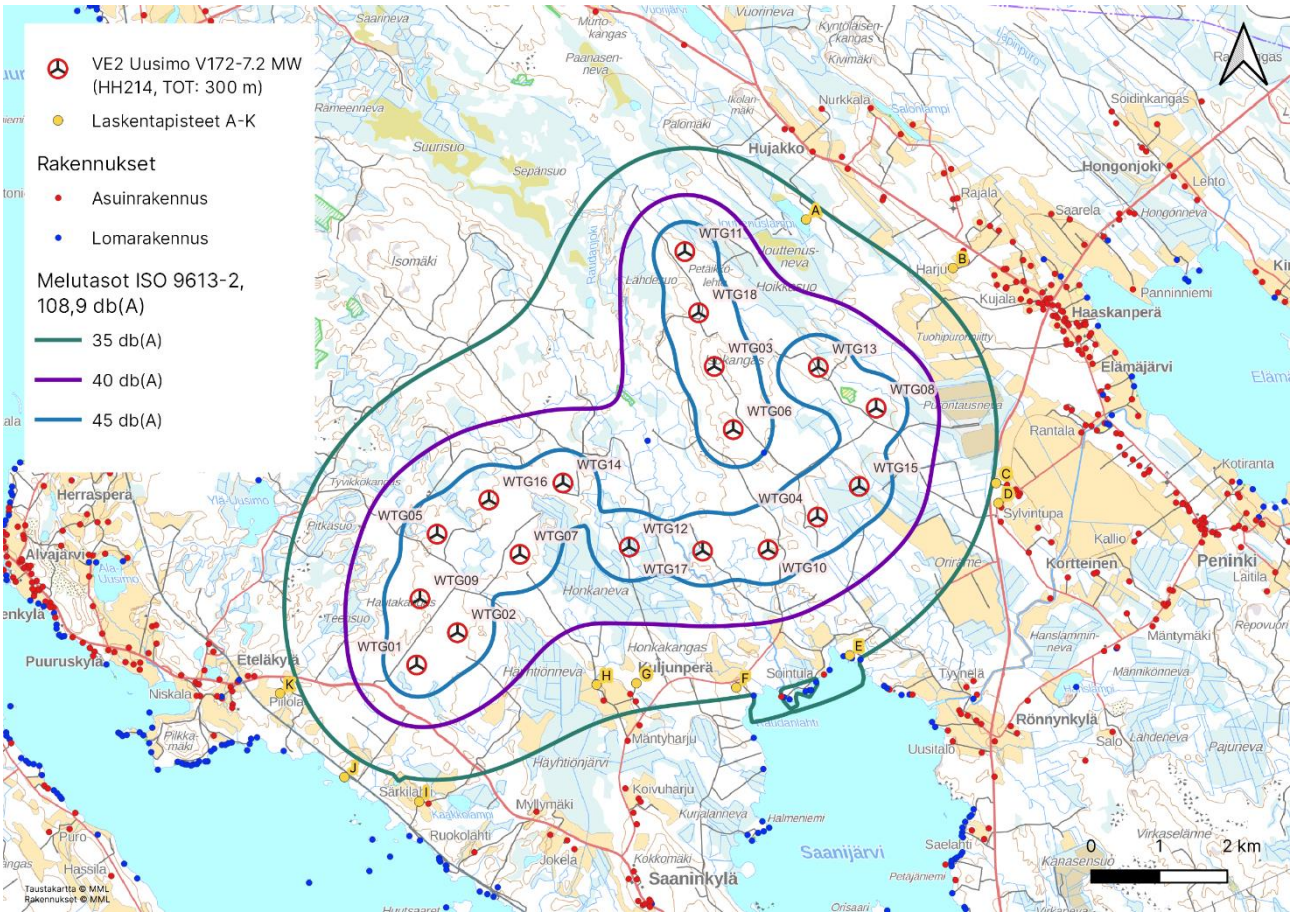
Kuva 1. Melumallinnuksen tulos hankevaihtoehdossa 1.

Taulukko 8. Laskennalliset melutasot Uusimon tuulivoimahankkeen ympäristössä hankevaihtoehdossa 1.

Laskentapiste	ETRS89-TM35 Itä	ETRS89-TM35 Pohjoinen	Z (m)	Laskenta-korkeus (m)	Melutaso dB(A)
A - Lomarakennus	429 470	7 041 260	146	4	38,4
B - Asuinrakennus	431 627	7 040 548	145	4	34,3
C - Asuinrakennus	432 261	7 037 387	123	4	35,3
D - Asuinrakennus	432 294	7 037 094	122	4	34,9
E - Lomarakennus	430 111	7 034 859	117	4	36,5
F - Asuinrakennus	428 445	7 034 384	123	4	36,2
G - Asuinrakennus	426 978	7 034 448	123	4	36,7
H - Asuinrakennus	426 394	7 034 428	123	4	37,0
I - Asuinrakennus	423 788	7 032 711	125	4	33,7
J - Lomarakennus	422 689	7 033 070	114	4	33,5
K - Asuinrakennus	421 745	7 034 298	125	4	33,8

3.1.2 VE2: Melun laskentatulokset (ISO 9613-2)

Hankevaihtoehdon 2 (VE2) melumallinnuksen tulosten mukaan melutaso 40 dB(A) ei ylity lähimmillä asuin- ja lomarakennuksilla (Kuva 2, Taulukko 9). Katso tarkemmat laskentatulokset liitteestä 2.



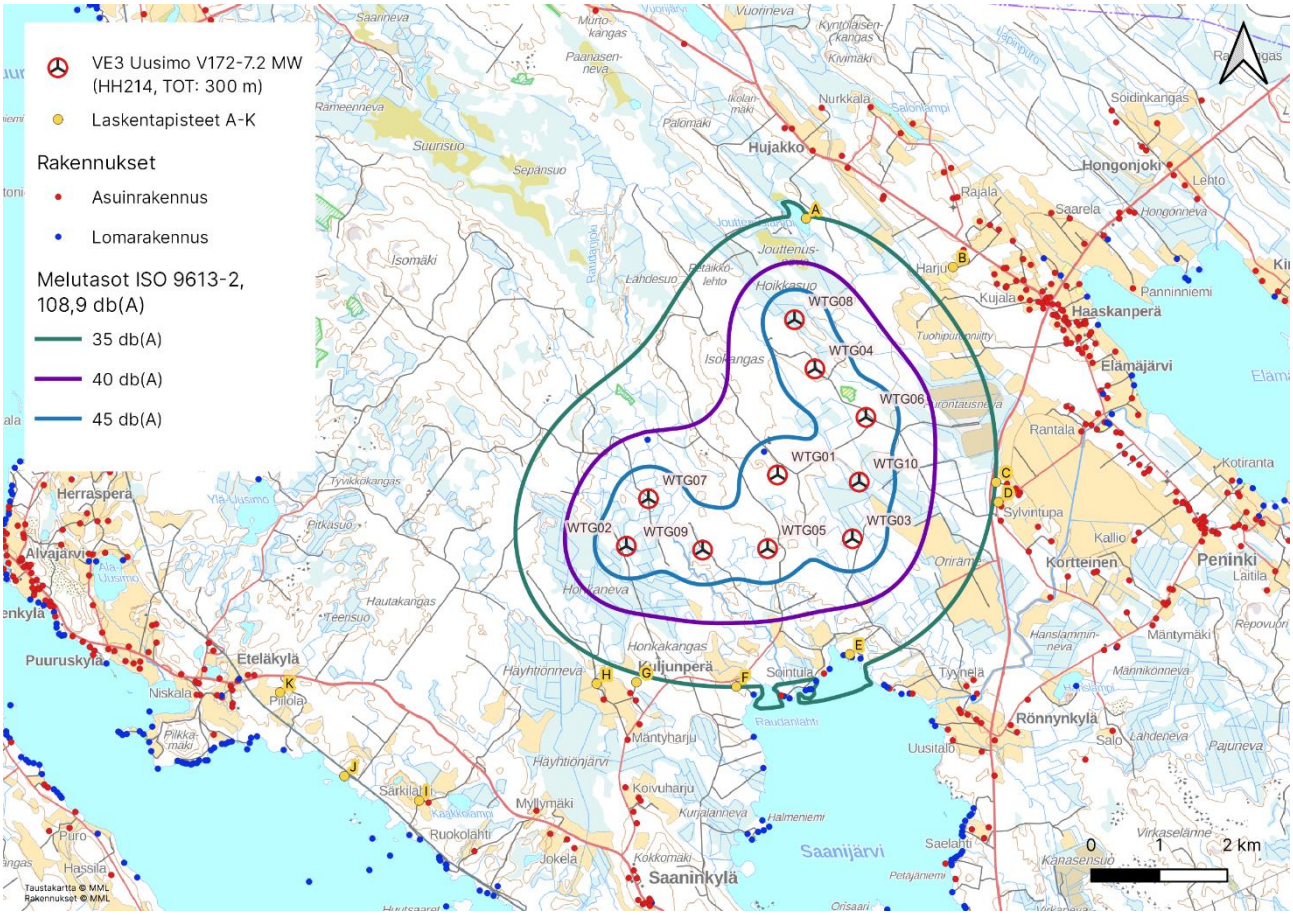
Kuva 2. Melumallinnuksen tulos hankevaihtoehdossa 2.

Taulukko 9. Laskennalliset melutasot Uusimon tuulivoimahankkeen ympäristössä hankevaihtoehdossa 2.

Laskentapiste	ETRS89-TM35 Itä	ETRS89-TM35 Pohjoinen	Z (m)	Laskenta-korkeus (m)	Melutaso dB(A)
A - Lomarakennus	429 470	7 041 260	146	4	36,9
B - Asuinrakennus	431 627	7 040 548	145	4	33,2
C - Asuinrakennus	432 261	7 037 387	123	4	34,7
D - Asuinrakennus	432 294	7 037 094	122	4	34,3
E - Lomarakennus	430 111	7 034 859	117	4	35,5
F - Asuinrakennus	428 445	7 034 384	123	4	35,5
G - Asuinrakennus	426 978	7 034 448	123	4	36,3
H - Asuinrakennus	426 394	7 034 428	123	4	36,7
I - Asuinrakennus	423 788	7 032 711	125	4	33,5
J - Lomarakennus	422 689	7 033 070	114	4	33,4
K - Asuinrakennus	421 745	7 034 298	125	4	33,6

3.1.3 VE3: Melun laskentatulokset (ISO 9613-2)

Hankevaihtoehdon 3 (VE3) melumallinnuksen tulosten mukaan melutaso 40 dB(A) ei ylity lähimmillä asuin- ja lomarakennuksilla (Kuva 3, Taulukko 10). Katso tarkemmat laskentatulokset liitteestä 3.



Kuva 3. Melumallinnuksen tulos hankevaihtoehdossa 3.

Taulukko 10. Laskennalliset melutasot Uusimon tuulivoimahankkeen ympäristössä hankevaihtoehdossa 3.

Laskentapiste	ETRS89-TM35 Itä	ETRS89-TM35 Pohjoinen	Z (m)	Laskenta-korkeus (m)	Melutaso dB(A)
A - Lomarakennus	429 470	7 041 260	146	4	36,1
B - Asuinrakennus	431 627	7 040 548	145	4	32,9
C - Asuinrakennus	432 261	7 037 387	123	4	34,9
D - Asuinrakennus	432 294	7 037 094	122	4	34,6
E - Lomarakennus	430 111	7 034 859	117	4	36,0
F - Asuinrakennus	428 445	7 034 384	123	4	35,0
G - Asuinrakennus	426 978	7 034 448	123	4	34,4
H - Asuinrakennus	426 394	7 034 428	123	4	33,4
I - Asuinrakennus	423 788	7 032 711	125	4	24,6
J - Lomarakennus	422 689	7 033 070	114	4	23,4
K - Asuinrakennus	421 745	7 034 298	125	4	23,0

3.1.4 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.

Uusimon tuulivoimahankkeen aiheuttama matalataajuinen melu ei hankevaihtoehdoissa ylitä Sosiaali- ja terveysministeriön asumisterveysohjearvoa laskentapisteiden sisätiloissa.

Hankevaihtoehdon 1 tulokset laskentapisteittäin on esitetty taulukossa 11, hankevaihtoehdon 2 taulukossa 12 ja hankevaihtoehdon 3 taulukossa 13. Taulukoissa näkyy toimenpiderajan alitus (negatiivinen arvo) tai ylitys (positiivinen arvo).

Tarkemmat matalataajuisen melun rakennuskohtaiset laskentatulokset on esitetty kuvaajilla liitteissä 4, 5 ja 6.

Taulukko 11. Matalataajuisen melun laskentatulokset VE1.

Laskentapiste	**Äänitaso ulkona**		**Äänitaso sisällä**	
	L eq,1h – Asumis-terveys ohje sisällä	**Hz**	**L eq,1h – Asumis-terveys ohje sisällä**	**Hz**
A - Lomarakennus	10,2	100	-3,9	50
B - Asuinrakennus	7,8	100	-6,1	50
C - Asuinrakennus	8,5	100	-5,5	50
D - Asuinrakennus	8,3	100	-5,7	50
E - Lomarakennus	9,5	100	-4,6	50

F - Asuinrakennus	9,4	100	-4,6	50
G - Asuinrakennus	9,9	100	-4,1	50
H - Asuinrakennus	10,1	100	-3,9	50
I - Asuinrakennus	7,1	100	-6,8	50
J - Lomarakennus	6,9	100	-7,0	50
K - Lomarakennus	7,1	100	-6,8	50

Taulukko 12. Matalataajuisen melun laskentatulokset VE2.

Laskentapiste	Äänitaso ulkona		Äänitaso sisällä	
	L eq,1h – Asumisterveys ohje sisällä	Hz	L eq,1h – Asumis-terveys ohje sisällä	Hz
A - Lomarakennus	8,9	100	-5,2	50
B - Asuinrakennus	6,8	100	-7,1	50
C - Asuinrakennus	7,9	100	-6,1	50
D - Asuinrakennus	7,6	100	-6,4	50
E - Lomarakennus	8,6	100	-5,4	50
F - Asuinrakennus	8,8	100	-5,2	50
G - Asuinrakennus	9,5	100	-4,6	50
H - Asuinrakennus	9,7	100	-4,3	50
I - Asuinrakennus	6,8	100	-7,1	50
J - Lomarakennus	6,7	100	-7,3	50
K - Lomarakennus	6,9	100	-7,1	50

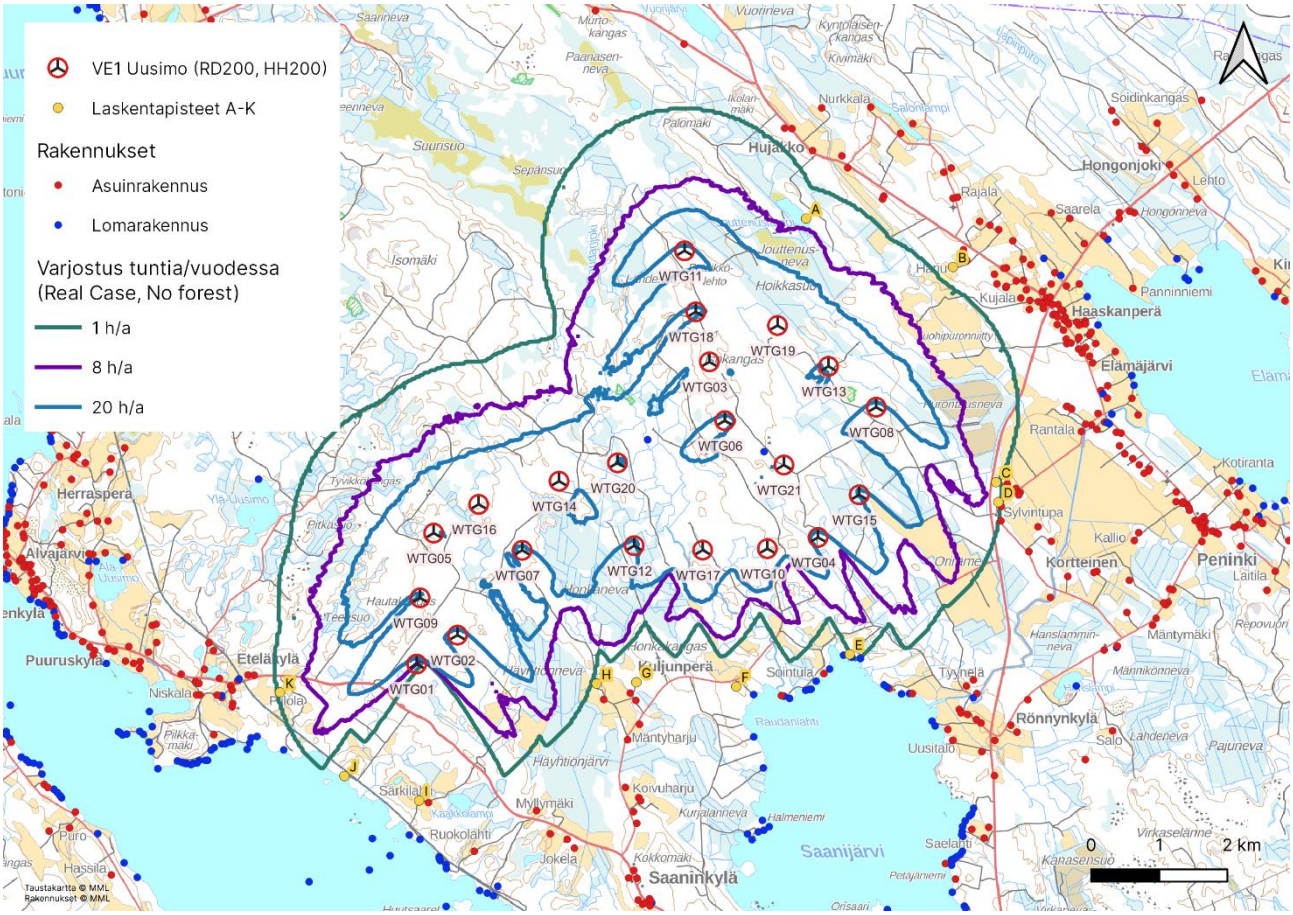
Taulukko 13. Matalataajuisen melun laskentatulokset VE3.

Laskentapiste	Äänitaso ulkona		Äänitaso sisällä	
	L eq,1h – Asumisterveys ohje sisällä	Hz	L eq,1h – Asumis-terveys ohje sisällä	Hz
A - Lomarakennus	7,7	100	-6,4	50
B - Asuinrakennus	6,2	100	-7,8	50
C - Asuinrakennus	7,8	100	-6,3	50
D - Asuinrakennus	7,6	100	-6,5	50
E - Lomarakennus	8,6	100	-5,5	50
F - Asuinrakennus	7,9	100	-6,2	50
G - Asuinrakennus	7,4	100	-6,7	50
H - Asuinrakennus	6,6	100	-7,5	50
I - Asuinrakennus	-0,1	100	-13,5	50
J - Lomarakennus	-1,0	80	-14,4	50
K - Lomarakennus	-1,3	80	-14,7	50

3.2 Varjostus

3.2.1 Hankevaihtoehto VE1, “Real Case, No forest”

Hankevaihtoehdossa 1 varjostusvaikutusalueelle 8 h/a ei sijoitu asuin- tai lomarakennuksia. Mallinnustulosten mukaan varjostusta ilmenee enimmillään 5 h 14 min vuodessa hankealueen itäpuolella sijaitsevan asuinrakennuksen (laskentapiste C) alueella (Kuva 4, Taulukko 14). Tarkemmat laskentatulokset on esitetty liitteessä 7.



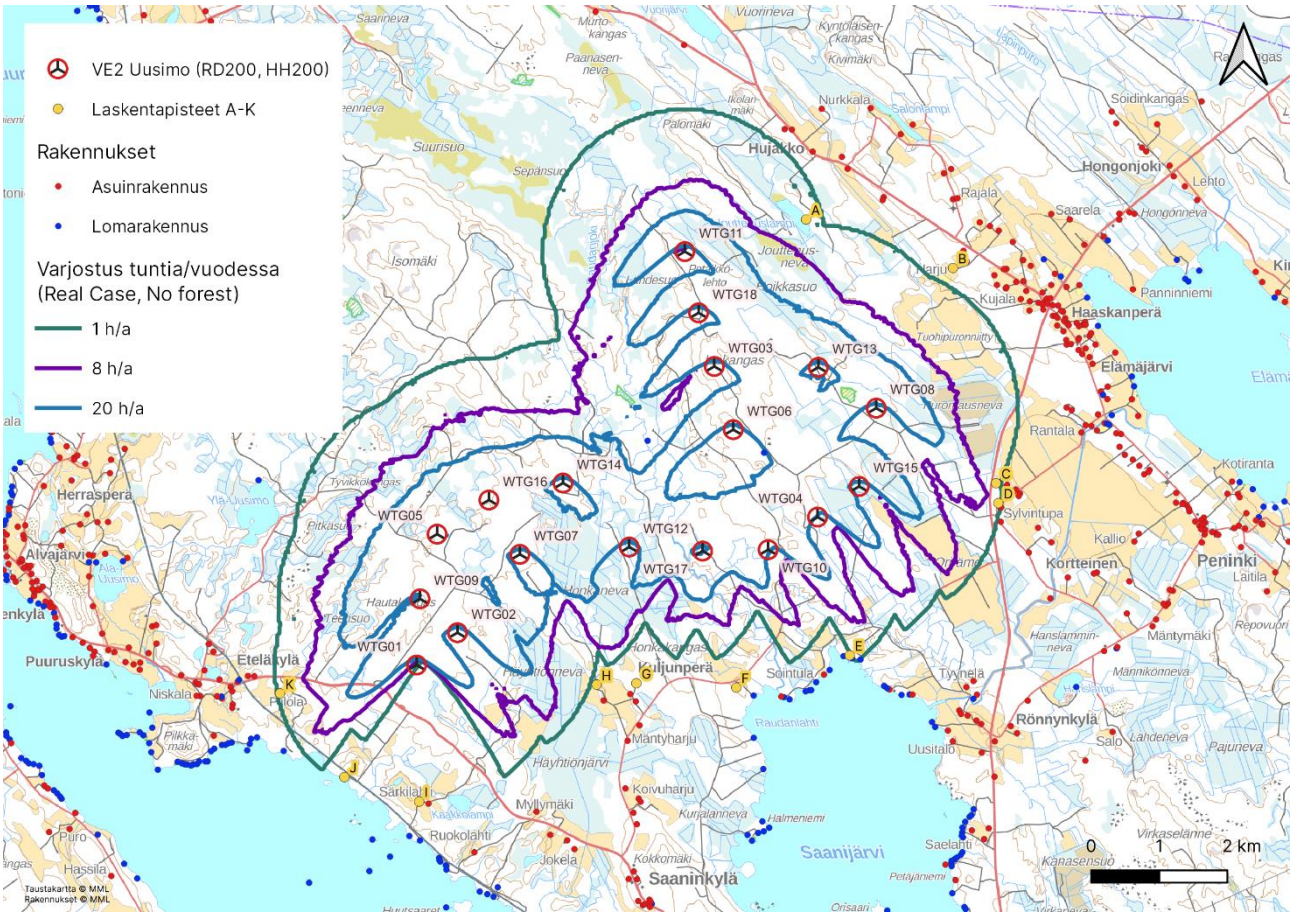
Kuva 4. Varjostusmallinnuksen tulos hankevaihtoehdossa 1 (puuston suojaavaa vaikutusta ei ole huomioitu).

Taulukko 14. Varjostusmallinnuksen tulos VE1, kun puuston suojaavaa vaikutusta ei ole huomioitu "Real Case, No forest".

Laskentapiste	ETRS89-TM35 Itä	ETRS89-TM35 Pohjoinen	Z (m)	Laskentaikkuna (m)	Varjostus (h/a)
A - Lomarakennus	429 470	7 041 260	146	5,0 x 5,0	4:43
B - Asuinrakennus	431 627	7 040 548	145	5,0 x 5,0	0:00
C - Asuinrakennus	432 261	7 037 387	123	5,0 x 5,0	5:14
D - Asuinrakennus	432 294	7 037 094	122	5,0 x 5,0	1:45
E - Lomarakennus	430 111	7 034 859	117	5,0 x 5,0	1:02
F - Asuinrakennus	428 445	7 034 384	123	5,0 x 5,0	0:00
G - Asuinrakennus	426 978	7 034 448	123	5,0 x 5,0	0:00
H - Asuinrakennus	426 394	7 034 428	123	5,0 x 5,0	0:00
I - Asuinrakennus	423 788	7 032 711	125	5,0 x 5,0	0:00
J - Lomarakennus	422 689	7 033 070	114	5,0 x 5,0	0:00
K - Asuinrakennus	421 745	7 034 298	125	5,0 x 5,0	2:11

3.2.2 Hankevaihtoehto VE2, "Real Case, No forest"

Hankevaihtoehdossa 2 varjostusvaikutusalueelle 8 h/a ei sijoitu asuin- tai lomarakennuksia. Mallinnustulosten mukaan varjostusta ilmenee enimmillään 5 h 23 min vuodessa hankealueen itäpuolella sijaitsevan asuinrakennuksen (laskentapiste C) alueella (Kuva 5, Taulukko 15). Tarkemmat laskentatulokset on esitetty liitteessä 8.



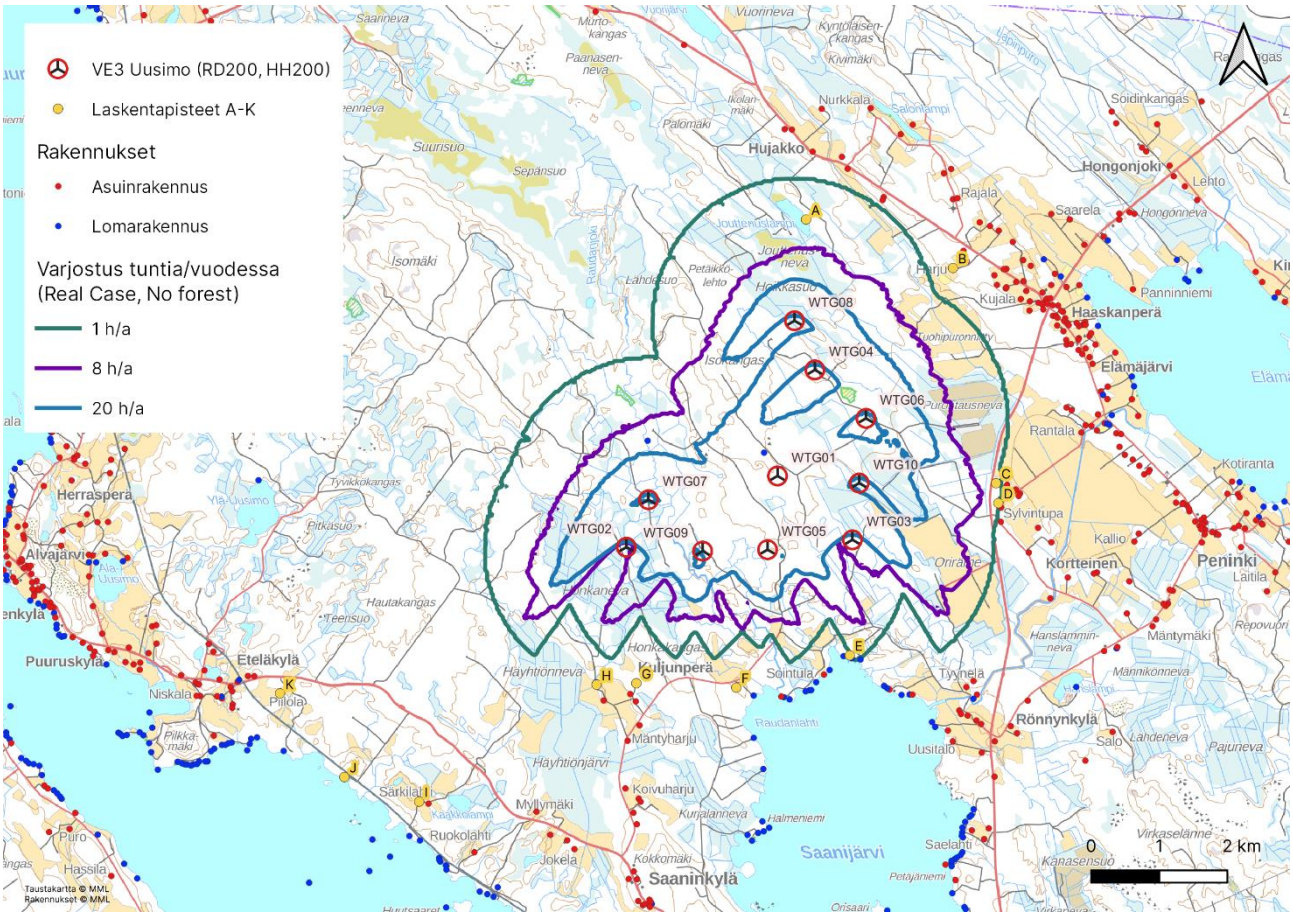
Kuva 5. Varjostusmallinnuksen tulos hankevaihtoehdossa 2 (puuston suojaavaa vaikutusta ei ole huomioitu).

Taulukko 15. Varjostusmallinnuksen tulos VE2, kun puuston suojaavaa vaikutusta ei ole huomioitu "Real Case, No forest".

Laskentapiste	ETRS89-TM35 Itä	ETRS89-TM35 Pohjoinen	Z (m)	Laskentaikkuna (m)	Varjostus (h/a)
A - Lomarakennus	429 470	7 041 260	146	5,0 x 5,0	1:43
B - Asuinrakennus	431 627	7 040 548	145	5,0 x 5,0	0:00
C - Asuinrakennus	432 261	7 037 387	123	5,0 x 5,0	5:23
D - Asuinrakennus	432 294	7 037 094	122	5,0 x 5,0	1:51
E - Lomarakennus	430 111	7 034 859	117	5,0 x 5,0	0:47
F - Asuinrakennus	428 445	7 034 384	123	5,0 x 5,0	0:00
G - Asuinrakennus	426 978	7 034 448	123	5,0 x 5,0	0:00
H - Asuinrakennus	426 394	7 034 428	123	5,0 x 5,0	0:00
I - Asuinrakennus	423 788	7 032 711	125	5,0 x 5,0	0:00
J - Lomarakennus	422 689	7 033 070	114	5,0 x 5,0	0:00
K - Asuinrakennus	421 745	7 034 298	125	5,0 x 5,0	2:11

3.2.3 Hankevaihtoehto VE3, "Real Case, No forest"

Hankevaihtoehdossa 3 varjostusvaikutusalueelle 8 h/a ei sijoitu asuin- tai lomarakennuksia. Mallinnustulosten mukaan varjostusta ilmenee enimmillään 3 h 43 min vuodessa hankealueen pohjoispuolella sijaitsevan asuinrakennuksen (laskentapiste A) alueella (Kuva 6, Taulukko 16). Tarkemmat laskentatulokset on esitetty liitteessä 9.



Kuva 6. Varjostusmallinnuksen tulos hankevaihtoehdossa 3 (puuston suojaavaa vaikutusta ei ole huomioitu).

Taulukko 16. Varjostusmallinnuksen tulos VE3, kun puuston suojaavaa vaikutusta ei ole huomioitu "Real Case, No forest".

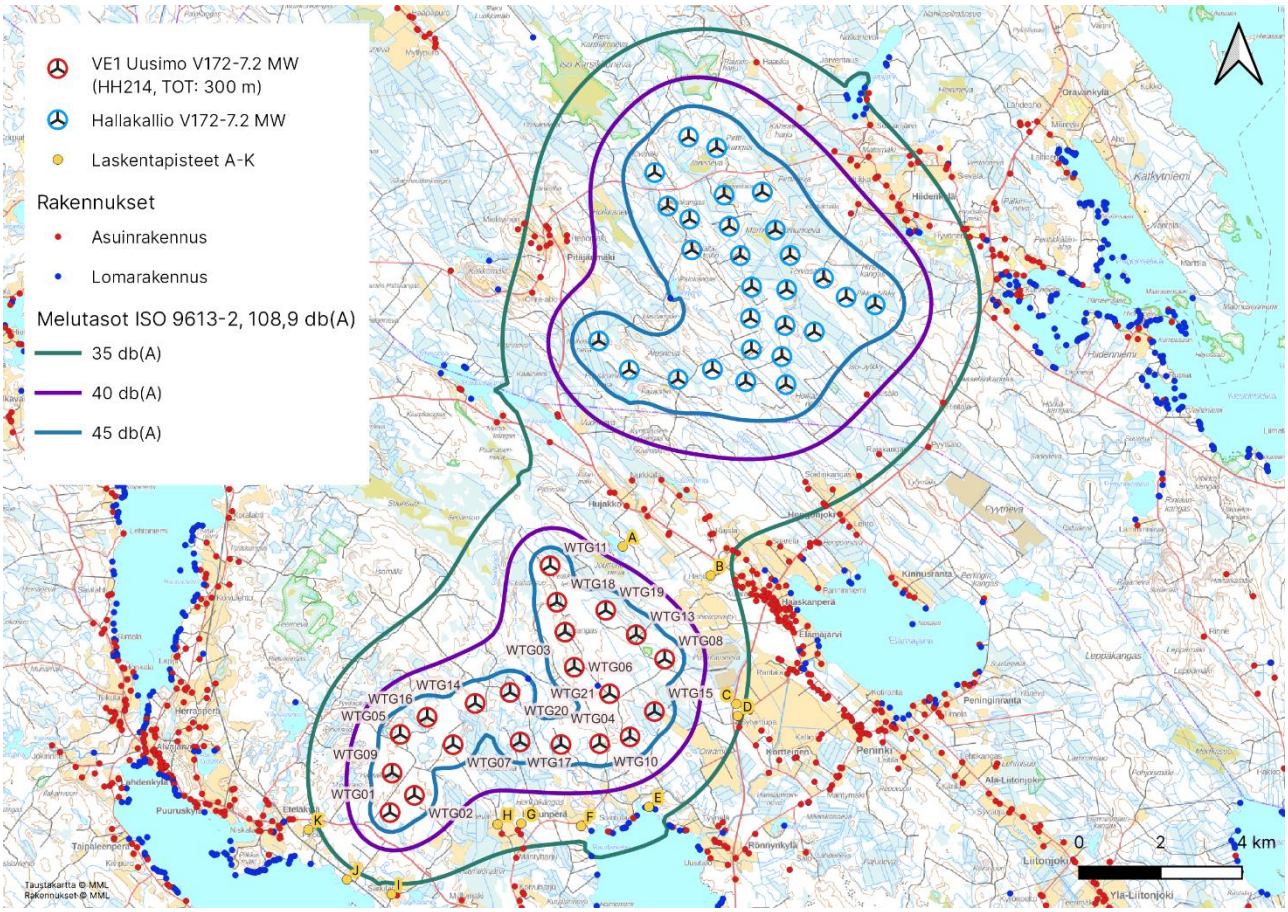
Laskentapiste	ETRS89-TM35 Itä	ETRS89-TM35 Pohjoinen	Z (m)	Laskentaikkuna (m)	Varjostus (h/a)
A - Lomarakennus	429 470	7 041 260	146	5,0 x 5,0	3:43
B - Asuinrakennus	431 627	7 040 548	145	5,0 x 5,0	0:00
C - Asuinrakennus	432 261	7 037 387	123	5,0 x 5,0	1:44
D - Asuinrakennus	432 294	7 037 094	122	5,0 x 5,0	1:52
E - Lomarakennus	430 111	7 034 859	117	5,0 x 5,0	0:58
F - Asuinrakennus	428 445	7 034 384	123	5,0 x 5,0	0:00
G - Asuinrakennus	426 978	7 034 448	123	5,0 x 5,0	0:00
H - Asuinrakennus	426 394	7 034 428	123	5,0 x 5,0	0:00
I - Asuinrakennus	423 788	7 032 711	125	5,0 x 5,0	0:00
J - Lomarakennus	422 689	7 033 070	114	5,0 x 5,0	0:00
K - Asuinrakennus	421 745	7 034 298	125	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 Uusimon tuulivoimapuiston lähimmillä asuin- ja lomarakennuksilla (Kuva 7, Taulukko 17). Katso tarkemmat laskentatulokset liitteestä 10.



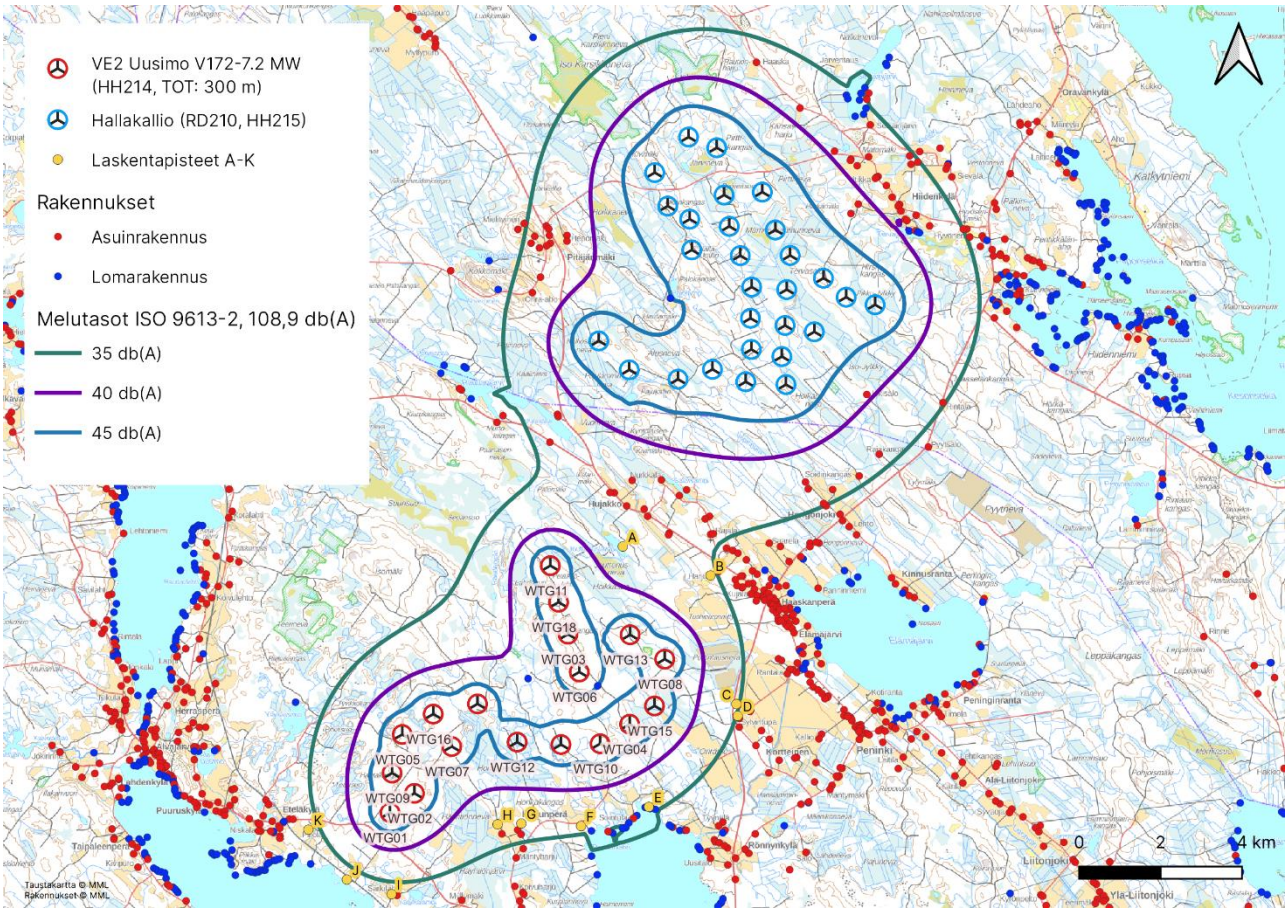
Kuva 7. Melun yhteisvaikutuksen mallinnuksen tulos hankevaihtoehdossa VE1.

Taulukko 17. Laskennalliset yhteismelun tasot Uusimon tuulivoimahankkeen ympäristössä hankevaihtoehdossa 1

Laskentapiste	ETRS89-TM35 Itä	ETRS89-TM35 Pohjoinen	Z (m)	Laskenta-korkeus (m)	Melutaso dB(A)
A - Lomarakennus	429 470	7 041 260	146	4	39,2
B - Asuinrakennus	431 627	7 040 548	145	4	35,9
C - Asuinrakennus	432 261	7 037 387	123	4	35,7
D - Asuinrakennus	432 294	7 037 094	122	4	35,4
E - Lomarakennus	430 111	7 034 859	117	4	36,6
F - Asuinrakennus	428 445	7 034 384	123	4	36,3
G - Asuinrakennus	426 978	7 034 448	123	4	36,8
H - Asuinrakennus	426 394	7 034 428	123	4	37,1
I - Asuinrakennus	423 788	7 032 711	125	4	33,8
J - Lomarakennus	422 689	7 033 070	114	4	33,7
K - Asuinrakennus	421 745	7 034 298	125	4	33,9

4.1.2 VE2: Yhteismelun laskentatulokset (ISO 9613-2)

Hankevaihtoehdon 2 (VE2) yhteismelun mallinnuksen mukaan melutaso 40 dB(A) ei ylity Uusimon tuulivoimapuiston lähimmillä asuin- ja lomarakennuksilla (Kuva 8, Taulukko 18). Katso tarkemmat laskentatulokset liitteestä 11.



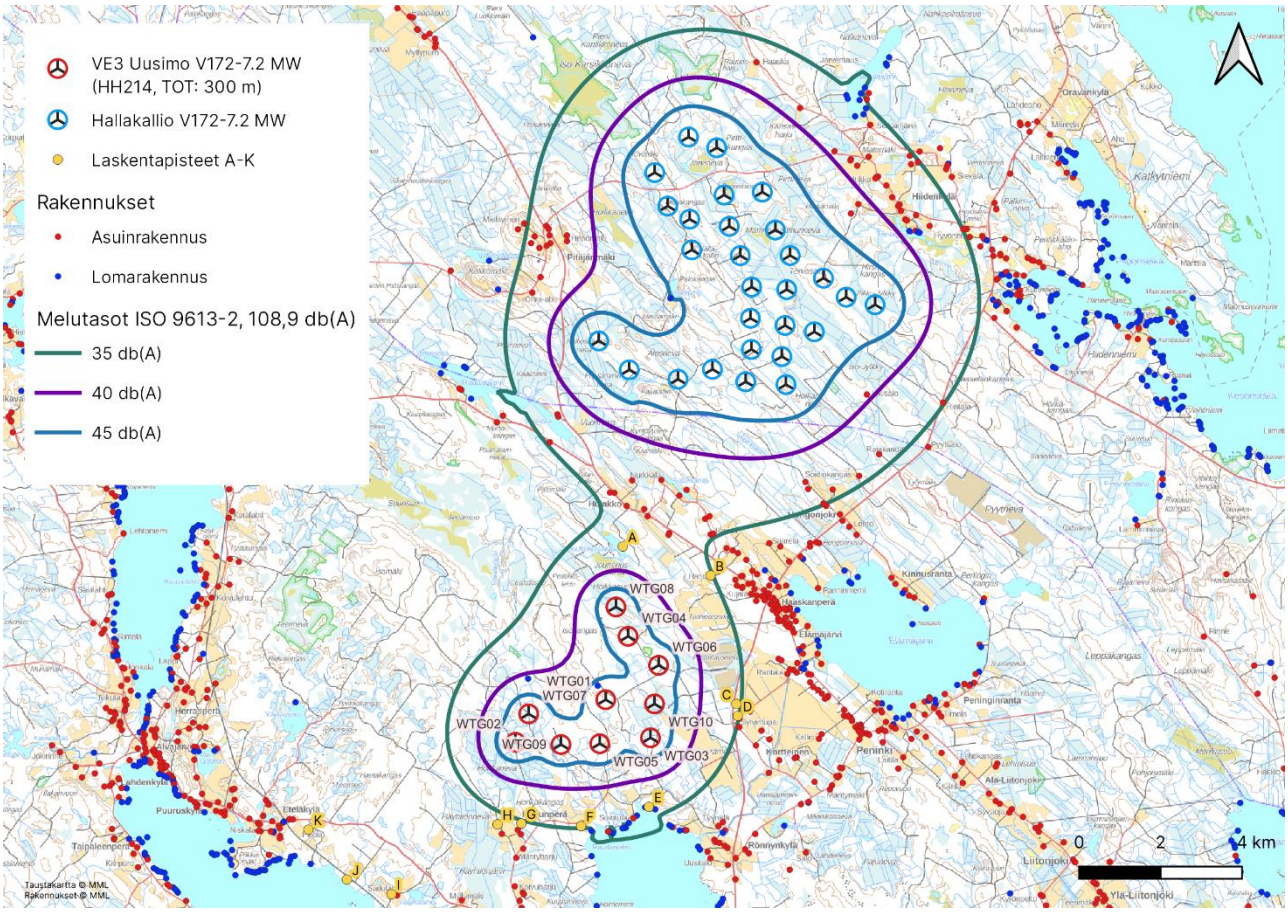
Kuva 8. Melun yhteisvaikutuksen mallinnuksen tulos hankevaihtoehdossa VE2.

Taulukko 18. Laskennalliset yhteismelun tasot Uusimon tuulivoimahankkeen ympäristössä hankevaihtoehdossa 2

Laskentapiste	ETRS89-TM35 Itä	ETRS89-TM35 Pohjoinen	Z (m)	Laskenta-korkeus (m)	Melutaso dB(A)
A - Lomarakennus	429 470	7 041 260	146	4	38,0
B - Asuinrakennus	431 627	7 040 548	145	4	35,3
C - Asuinrakennus	432 261	7 037 387	123	4	35,3
D - Asuinrakennus	432 294	7 037 094	122	4	34,9
E - Lomarakennus	430 111	7 034 859	117	4	35,7
F - Asuinrakennus	428 445	7 034 384	123	4	35,7
G - Asuinrakennus	426 978	7 034 448	123	4	36,5
H - Asuinrakennus	426 394	7 034 428	123	4	36,8
I - Asuinrakennus	423 788	7 032 711	125	4	33,6
J - Lomarakennus	422 689	7 033 070	114	4	33,5
K - Asuinrakennus	421 745	7 034 298	125	4	33,8

4.1.3 VE3: Yhteismelun laskentatulokset (ISO 9613-2)

Hankevaihtoehdon 3 (VE3) yhteismelun mallinnuksen mukaan melutaso 40 dB(A) ei ylity Uusimon tuulivoimapuiston lähimmillä asuin- ja lomarakennuksilla (Kuva 9, Taulukko 19). Katso tarkemmat laskentatulokset liitteestä 12.



Kuva 9. Melun yhteisvaikutuksen mallinnuksen tulos hankevaihtoehdossa VE3.

Taulukko 19. Laskennalliset yhteismelun tasot Uusimon tuulivoimahankkeen ympäristössä hankevaihtoehdossa 3

Laskentapiste	ETRS89-TM35 Itä	ETRS89-TM35 Pohjoinen	Z (m)	Laskenta-korkeus (m)	Melutaso dB(A)
A - Lomarakennus	429 470	7 041 260	146	4	37,4
B - Asuinrakennus	431 627	7 040 548	145	4	35,1
C - Asuinrakennus	432 261	7 037 387	123	4	35,5
D - Asuinrakennus	432 294	7 037 094	122	4	35,1
E - Lomarakennus	430 111	7 034 859	117	4	36,2
F - Asuinrakennus	428 445	7 034 384	123	4	35,2
G - Asuinrakennus	426 978	7 034 448	123	4	34,6
H - Asuinrakennus	426 394	7 034 428	123	4	33,7
I - Asuinrakennus	423 788	7 032 711	125	4	25,6
J - Lomarakennus	422 689	7 033 070	114	4	24,7
K - Asuinrakennus	421 745	7 034 298	125	4	24,5

4.1.4 Matalataajuiset melutasot

Uusimon ja Hallakallion tuulivoimahankkeiden aiheuttama matalataajuinen yhteismelu ei Uusimon hankevaihtoehdoissa ylitä Sosiaali- ja terveysministeriön asumisterveysohjearvoa laskentapisteiden sisätiloissa.

Uusimon hankevaihtoehtojen tulokset laskentapisteittäin on esitetty taulukoissa 20, 21 ja 22. Taulukoissa esitetään toimenpiderajan alitus (negatiivinen arvo) tai ylitys (positiivinen arvo).

Tarkemmat matalataajuisen yhteismelun laskentatulokset ja kuvaajat on esitetty liitteissä 13, 14 ja 15.

Taulukko 20. 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	10,8	100	-3,2	50
B - Asuinrakennus	8,8	100	-5,0	50
C - Asuinrakennus	8,9	100	-5,0	50
D - Asuinrakennus	8,6	100	-5,2	50
E - Lomarakennus	9,6	100	-4,3	50
F - Asuinrakennus	9,6	100	-4,4	50
G - Asuinrakennus	10,0	100	-3,9	50
H - Asuinrakennus	10,2	100	-3,8	50
I - Asuinrakennus	7,2	100	-6,6	50
J - Lomarakennus	7,0	100	-6,8	50
K - Lomarakennus	7,2	100	-6,6	50

Taulukko 21. 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	9,8	100	-4,2	50
B - Asuinrakennus	8,1	100	-5,7	50
C - Asuinrakennus	8,3	100	-5,6	50
D - Asuinrakennus	8,0	100	-5,8	50
E - Lomarakennus	8,8	100	-5,1	50
F - Asuinrakennus	8,9	100	-5,0	50
G - Asuinrakennus	9,6	100	-4,4	50
H - Asuinrakennus	9,9	100	-4,1	50
I - Asuinrakennus	7,0	100	-6,9	50
J - Lomarakennus	6,8	100	-7,0	50
K - Lomarakennus	7,0	100	-6,8	50

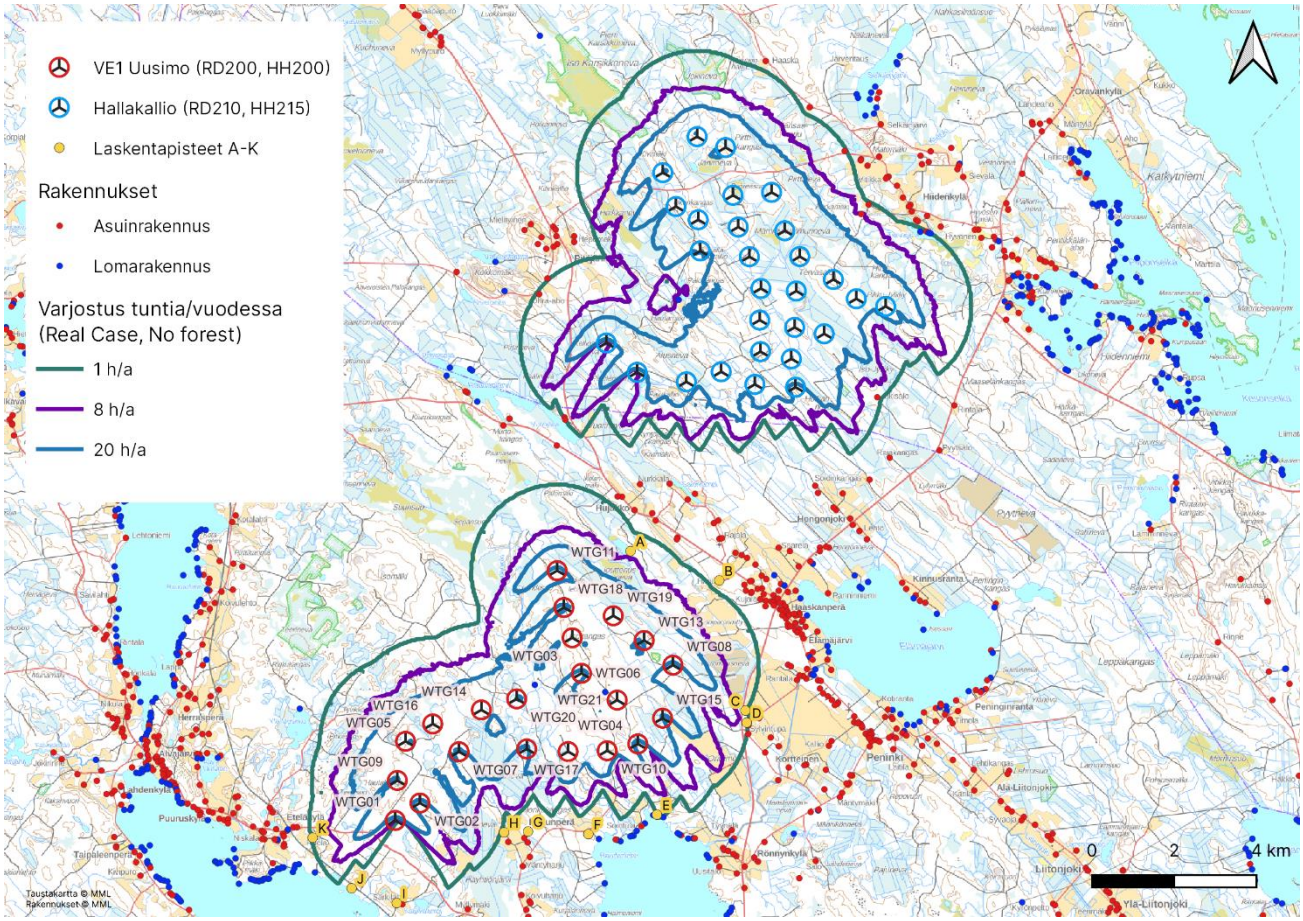
Taulukko 22. Matalataajuisen yhteismelun laskentatulokset VE3

Laskentapiste	Äänitaso ulkona		Äänitaso sisällä	
	L eq,1h – Asumisterveys ohje sisällä	Hz	L eq,1h – Asumis-terveys ohje sisällä	Hz
A - Lomarakennus	8,8	100	-5,2	50
B - Asuinrakennus	7,6	100	-6,2	50
C - Asuinrakennus	8,2	100	-5,7	50
D - Asuinrakennus	8,0	100	-6,0	50
E - Lomarakennus	8,8	100	-5,2	50
F - Asuinrakennus	8,1	100	-5,9	50
G - Asuinrakennus	7,6	100	-6,4	50
H - Asuinrakennus	6,8	100	-7,1	50
I - Asuinrakennus	0,6	80	-12,6	50
J - Lomarakennus	-0,2	80	-13,4	50
K - Lomarakennus	-0,4	80	-13,5	50

4.2 Varjostus

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

Hankevaihtoehdon 1 yhteisvaikutusmallinnuksessa varjostusvaikutus 8 h/a ei ylity Uusimon tuulivoimapuiston lähimmillä asuin- ja lomarakennuksilla (Kuva 10, Taulukko 23). Tarkemmat laskentatulokset on esitetty liitteessä 16.



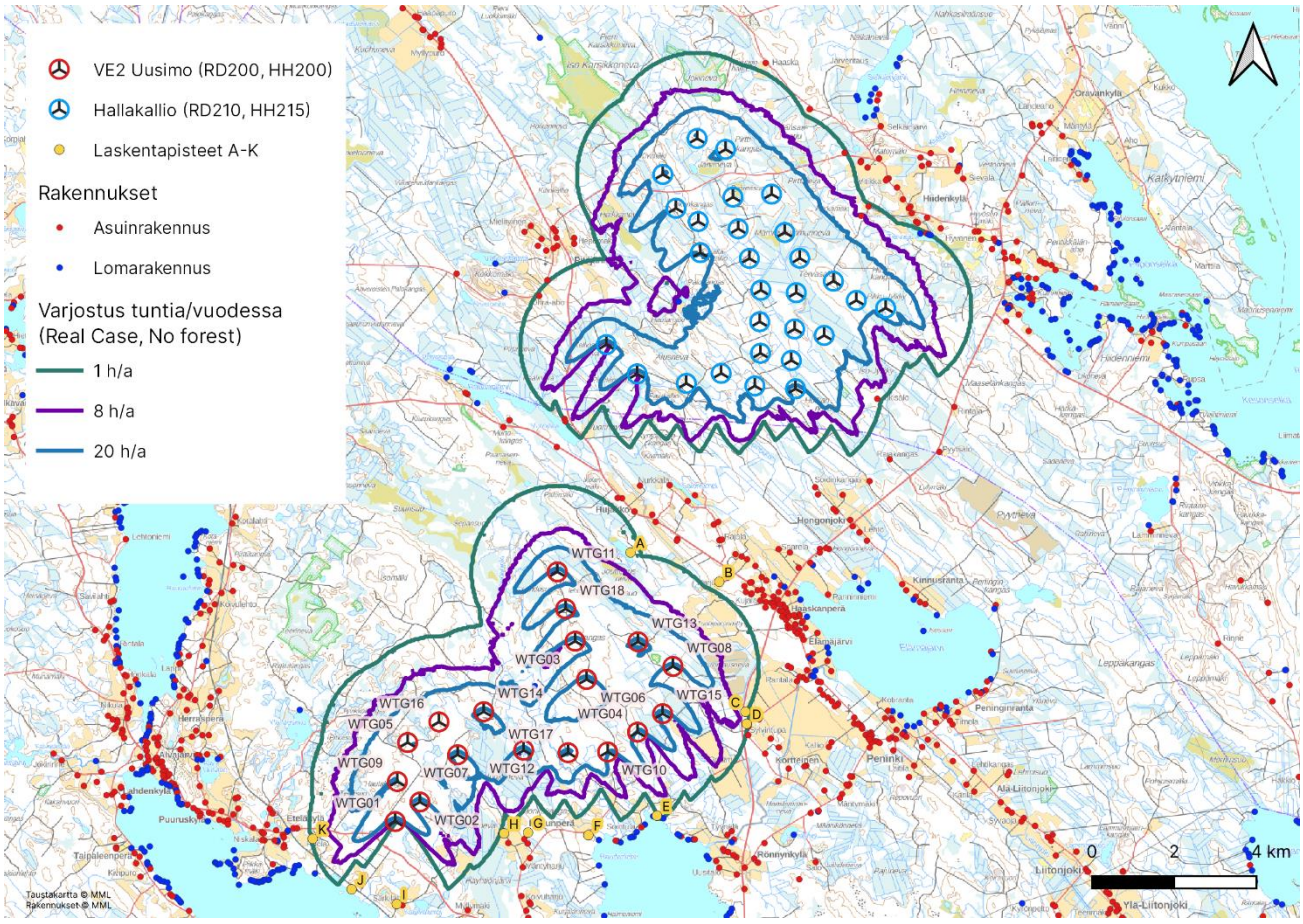
Kuva 10. Varjostuksen yhteismallinnuksen tulos hankevaihtoehdossa 1 (puuston suojaavaa vaikutusta ei ole huomioitu)

Taulukko 23. Varjostuksen yhteismallinnuksen tulos VE1, kun puuston suojaavaa vaikutusta ei ole huomioitu "Real Case, No Forest".

Laskentapiste	ETRS89-TM35 Itä	ETRS89-TM35 Pohjoinen	Z (m)	Laskentaikkuna (m)	Varjostus (h/a)
A - Lomarakennus	429 470	7 041 260	146	5,0 x 5,0	4:43
B - Asuinrakennus	431 627	7 040 548	145	5,0 x 5,0	0:00
C - Asuinrakennus	432 261	7 037 387	123	5,0 x 5,0	5:14
D - Asuinrakennus	432 294	7 037 094	122	5,0 x 5,0	1:45
E - Lomarakennus	430 111	7 034 859	117	5,0 x 5,0	1:02
F - Asuinrakennus	428 445	7 034 384	123	5,0 x 5,0	0:00
G - Asuinrakennus	426 978	7 034 448	123	5,0 x 5,0	0:00
H - Asuinrakennus	426 394	7 034 428	123	5,0 x 5,0	0:00
I - Asuinrakennus	423 788	7 032 711	125	5,0 x 5,0	0:00
J - Lomarakennus	422 689	7 033 070	114	5,0 x 5,0	0:00
K - Asuinrakennus	421 745	7 034 298	125	5,0 x 5,0	2:11

4.2.2 VE 2: Varjostuksen yhteisvaikutus, "Real Case, No forest"

Hankevaihtoehdon 2 yhteisvaikutusmallinnuksessa varjostusvaikutus 8 h/a ei ylity Uusimon tuulivoimapuiston lähimmillä asuin- ja lomarakennuksilla (Kuva 11, Taulukko 24). Tarkemmat laskentatulokset on esitetty liitteessä 17.



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

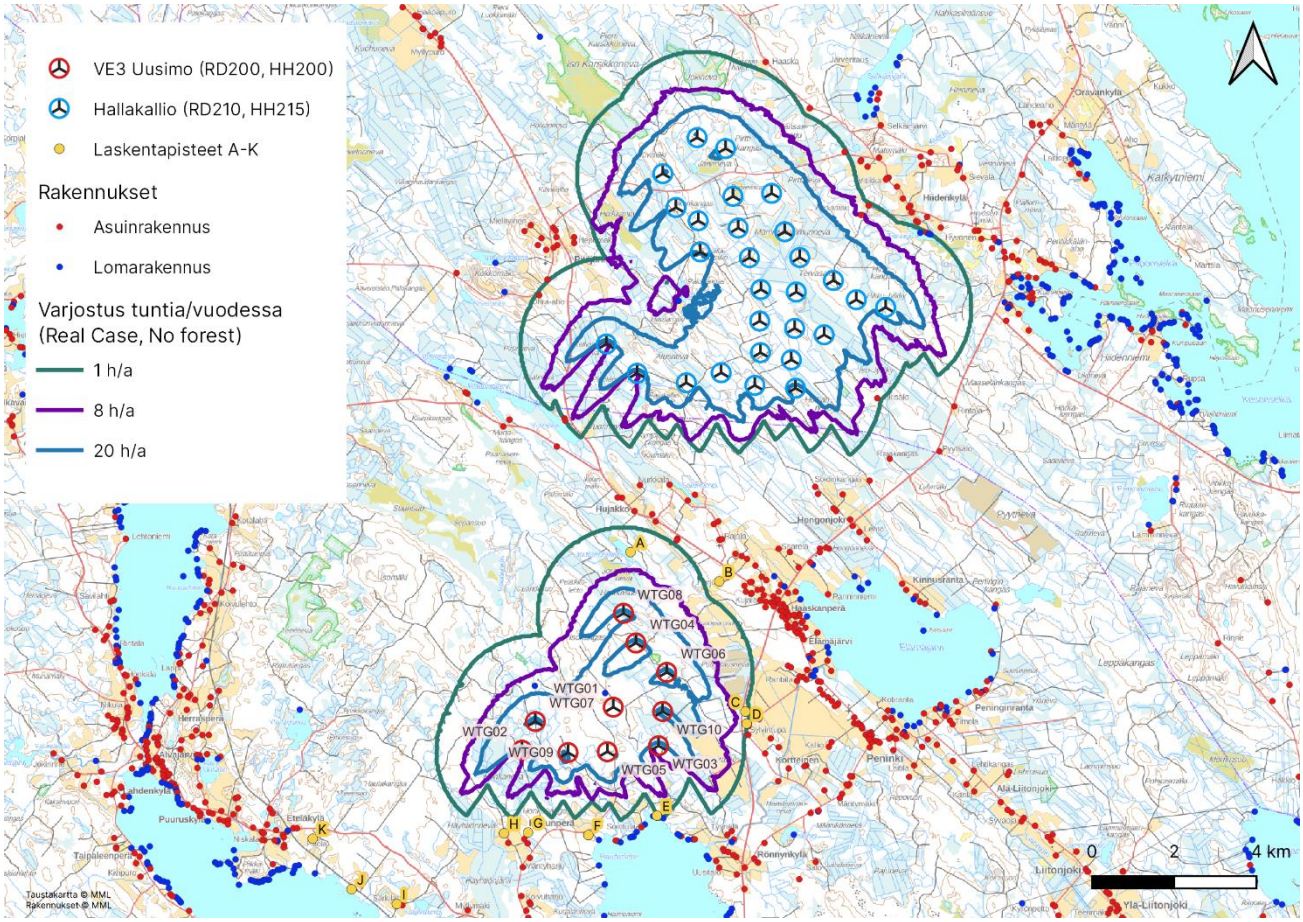
Taulukko 24. Varjostuksen yhteismallinnuksen tulos VE2, kun puuston suojaavaa vaikutusta ei ole huomioitu "Real Case, No Forest".

Laskentapiste	ETRS89-TM35 Itä	ETRS89-TM35 Pohjoinen	Z (m)	Laskentaikkuna (m)	Varjostus (h/a)
A - Lomarakennus	429 470	7 041 260	146	5,0 x 5,0	1:43
B - Asuinrakennus	431 627	7 040 548	145	5,0 x 5,0	0:00
C - Asuinrakennus	432 261	7 037 387	123	5,0 x 5,0	5:23
D - Asuinrakennus	432 294	7 037 094	122	5,0 x 5,0	1:51
E - Lomarakennus	430 111	7 034 859	117	5,0 x 5,0	0:47
F - Asuinrakennus	428 445	7 034 384	123	5,0 x 5,0	0:00
G - Asuinrakennus	426 978	7 034 448	123	5,0 x 5,0	0:00
H - Asuinrakennus	426 394	7 034 428	123	5,0 x 5,0	0:00
I - Asuinrakennus	423 788	7 032 711	125	5,0 x 5,0	0:00

J - Lomarakennus	422 689	7 033 070	114	5,0 x 5,0	0:00
K - Asuinrakennus	421 745	7 034 298	125	5,0 x 5,0	2:11

4.2.3 VE 3: Varjostuksen yhteisvaikutus, ”Real Case, No forest”

Hankevaihtoehdon 3 yhteisvaikutusmallinnuksessa varjostusvaikutus 8 h/a ei ylity Uusimon tuulivoimapuiston lähimmillä asuin- ja lomarakennuksilla (Kuva 12, Taulukko 25). Tarkemmat laskentatulokset on esitetty liitteessä 18.



Kuva 12. Varjostuksen yhteismallinnuksen tulos hankevaihtoehdossa 3 (puuston suojaavaa vaikutusta ei ole huomioitu)

Taulukko 25. Varjostuksen yhteismallinnuksen tulos VE3, kun puuston suojaavaa vaikutusta ei ole huomioitu "Real Case, No Forest".

Laskentapiste	ETRS89-TM35 Itä	ETRS89-TM35 Pohjoinen	Z (m)	Laskentaikkuna (m)	Varjostus (h/a)
A - Lomarakennus	429 470	7 041 260	146	5,0 x 5,0	3:43
B - Asuinrakennus	431 627	7 040 548	145	5,0 x 5,0	0:00
C - Asuinrakennus	432 261	7 037 387	123	5,0 x 5,0	1:44
D - Asuinrakennus	432 294	7 037 094	122	5,0 x 5,0	1:52
E - Lomarakennus	430 111	7 034 859	117	5,0 x 5,0	0:58
F - Asuinrakennus	428 445	7 034 384	123	5,0 x 5,0	0:00
G - Asuinrakennus	426 978	7 034 448	123	5,0 x 5,0	0:00
H - Asuinrakennus	426 394	7 034 428	123	5,0 x 5,0	0:00
I - Asuinrakennus	423 788	7 032 711	125	5,0 x 5,0	0:00
J - Lomarakennus	422 689	7 033 070	114	5,0 x 5,0	0:00
K - Asuinrakennus	421 745	7 034 298	125	5,0 x 5,0	0:00

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

Project:

Pihtipudas_Uusimo_melu_ja_varjostus

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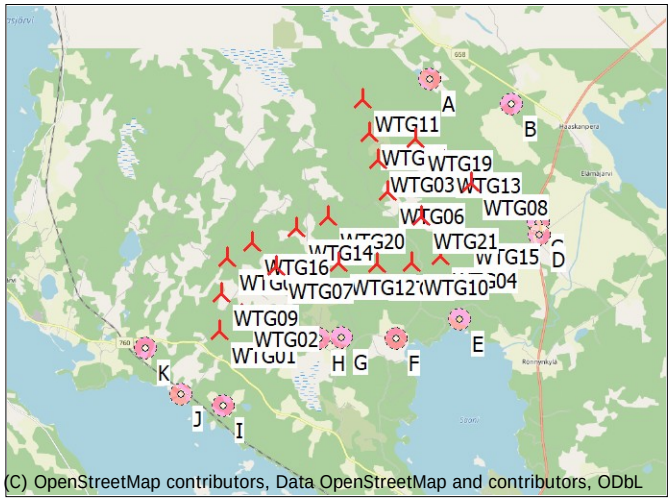
Calculated:
30.1.2024 10.50/3.6.355

DECIBEL - Main Result

Calculation: Uusimo_VE1_V172-7.2MWx21xHH214

Calculation is done according to Finnish guideline " Ympäristöhallinnon ohjeita 2 | 2014 " from the Ministry of the Environment of Finland

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89



Scale 1:200 000

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)]
WTG01	423 751	7 034 716	140,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG02	424 350	7 035 140	132,8	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG03	428 051	7 039 154	159,5	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG04	429 647	7 036 576	126,3	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG05	424 001	7 036 639	140,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG06	428 278	7 038 291	151,2	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG07	425 301	7 036 387	132,5	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG08	430 500	7 038 489	132,7	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG09	423 801	7 035 688	141,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG10	428 901	7 036 410	128,2	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG11	427 685	7 040 785	140,7	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG12	426 946	7 036 454	125,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG13	429 799	7 039 089	140,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG14	425 843	7 037 401	134,9	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG15	430 250	7 037 201	128,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG16	424 662	7 037 061	143,3	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG17	427 952	7 036 390	122,3	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG18	427 851	7 039 889	147,4	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG19	429 050	7 039 688	142,5	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG20	426 702	7 037 670	127,5	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG21	429 145	7 037 639	135,6	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9

Calculation Results

Sound level

Noise sensitive area					Demands	Sound level			
No.	Name	East	North	Z	Immission height	Noise	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	429 470	7 041 260	145,5	4,0	40,0	38,4	487	No
B	B - Asuinrakennus	431 627	7 040 548	144,9	4,0	40,0	34,3	1 184	No
C	C - Asuinrakennus	432 261	7 037 387	122,5	4,0	40,0	35,3	924	No
D	D - Asuinrakennus	432 294	7 037 094	122,1	4,0	40,0	34,9	996	No
E	E - Lomarakennus	430 111	7 034 859	117,3	4,0	40,0	36,5	652	No
F	F - Asuinrakennus	428 445	7 034 384	122,5	4,0	40,0	36,2	824	No
G	G - Asuinrakennus	426 978	7 034 448	122,8	4,0	40,0	36,7	804	No
H	H - Asuinrakennus	426 394	7 034 428	122,5	4,0	40,0	37,0	842	No
I	I - Asuinrakennus	423 788	7 032 711	125,0	4,0	40,0	33,7	1 080	No
J	J - Lomarakennus	422 689	7 033 070	114,2	4,0	40,0	33,5	1 059	No
K	K - Asuinrakennus	421 745	7 034 298	125,0	4,0	40,0	33,8	1 092	No

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Calculated:
30.1.2024 10.50/3.6.355

DECIBEL - Main Result

Calculation: Uusimo_VE1_V172-7.2MWx21xHH214

Distances (m)

WTG	A	B	C	D	E	F	G	H	I	J	K
WTG01	8691	9800	8919	8868	6362	4705	3238	2659	2006	1959	2050
WTG02	7979	9067	8224	8181	5768	4164	2717	2164	2493	2654	2738
WTG03	2540	3838	4566	4717	4764	4786	4827	5008	7726	8109	7959
WTG04	4688	4439	2737	2698	1779	2500	3413	3898	7019	7791	8224
WTG05	7160	8570	8294	8306	6364	4983	3696	3258	3934	3802	3251
WTG06	3200	4039	4084	4191	3891	3910	4056	4297	7162	7648	7656
WTG07	6414	7573	7032	7029	5048	3728	2564	2243	3975	4221	4124
WTG08	2956	2348	2078	2273	3651	4590	5360	5775	8856	9506	9706
WTG09	7949	9213	8629	8609	6365	4824	3411	2883	2977	2844	2482
WTG10	4883	4955	3499	3461	1968	2077	2748	3196	6311	7053	7462
WTG11	1847	3949	5700	5905	6404	6446	6377	6487	8966	9191	8796
WTG12	5429	6219	5396	5387	3545	2555	2006	2099	4897	5438	5630
WTG13	2196	2339	2993	3194	4242	4896	5431	5772	8764	9315	9372
WTG14	5296	6585	6418	6459	4969	3984	3164	3024	5121	5358	5140
WTG15	4133	3619	2020	2047	2347	3345	4276	4749	7868	8615	8987
WTG16	6383	7789	7606	7632	5878	4634	3492	3152	4437	4452	4018
WTG17	5102	5550	4423	4399	2647	2065	2172	2505	5556	6222	6550
WTG18	2122	3833	5071	5249	5515	5537	5511	5652	8248	8552	8279
WTG19	1627	2716	3950	4154	4945	5338	5635	5893	8739	9180	9079
WTG20	4534	5705	5567	5622	4419	3719	3234	3256	5751	6104	5995
WTG21	3635	3824	3126	3196	2944	3329	3857	4228	7279	7909	8119

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Calculated:
30.1.2024 10.50/3.6.355

DECIBEL - Assumptions for noise calculation

Calculation: Uusimo_VE1_V172-7.2MWx21xHH214

Noise calculation model:
ISO 9613-2 Finland
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_Pihtipudas_Uusimo_melu_ja_varjostus_0.w2r (13)
Area type with hard ground: vesistot
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:
Pure tones penalty is added to total noise impact at receptors
Noise sensitive area
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 NSA 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 + 2dB

Source	Source/Date	Creator	Edited
Manufacturer	11.9.2023	USER	30.1.2024 10.36

					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	214,0	8,0	108,9	No	92,4	100,0	103,3	103,5	101,9	97,4	89,9	79,2

Noise sensitive area: A A - Lomarakennus

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
Pure tone penalty: 0 dB

Noise sensitive area: B B - Asuinrakennus

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
Pure tone penalty: 0 dB

Noise sensitive area: C C - Asuinrakennus

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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Calculated:
30.1.2024 10.50/3.6.355

DECIBEL - Assumptions for noise calculation

Calculation: Uusimo_VE1_V172-7.2MWx21xHH214

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

Noise sensitive area: D D - Asuinrakennus

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
Pure tone penalty: 0 dB

Noise sensitive area: E E - Lomarakennus

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
Pure tone penalty: 0 dB

Noise sensitive area: F F - Asuinrakennus

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
Pure tone penalty: 0 dB

Noise sensitive area: G G - Asuinrakennus

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
Pure tone penalty: 0 dB

Noise sensitive area: H H - Asuinrakennus

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
Pure tone penalty: 0 dB

Noise sensitive area: I I - Asuinrakennus

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
Pure tone penalty: 0 dB

Noise sensitive area: J J - Lomarakennus

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
Pure tone penalty: 0 dB

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DECIBEL - Assumptions for noise calculation

Calculation: Uusimo_VE1_V172-7.2MWx21xHH214

Noise sensitive area: K K - Asuinrakennus

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
Pure tone penalty: 0 dB

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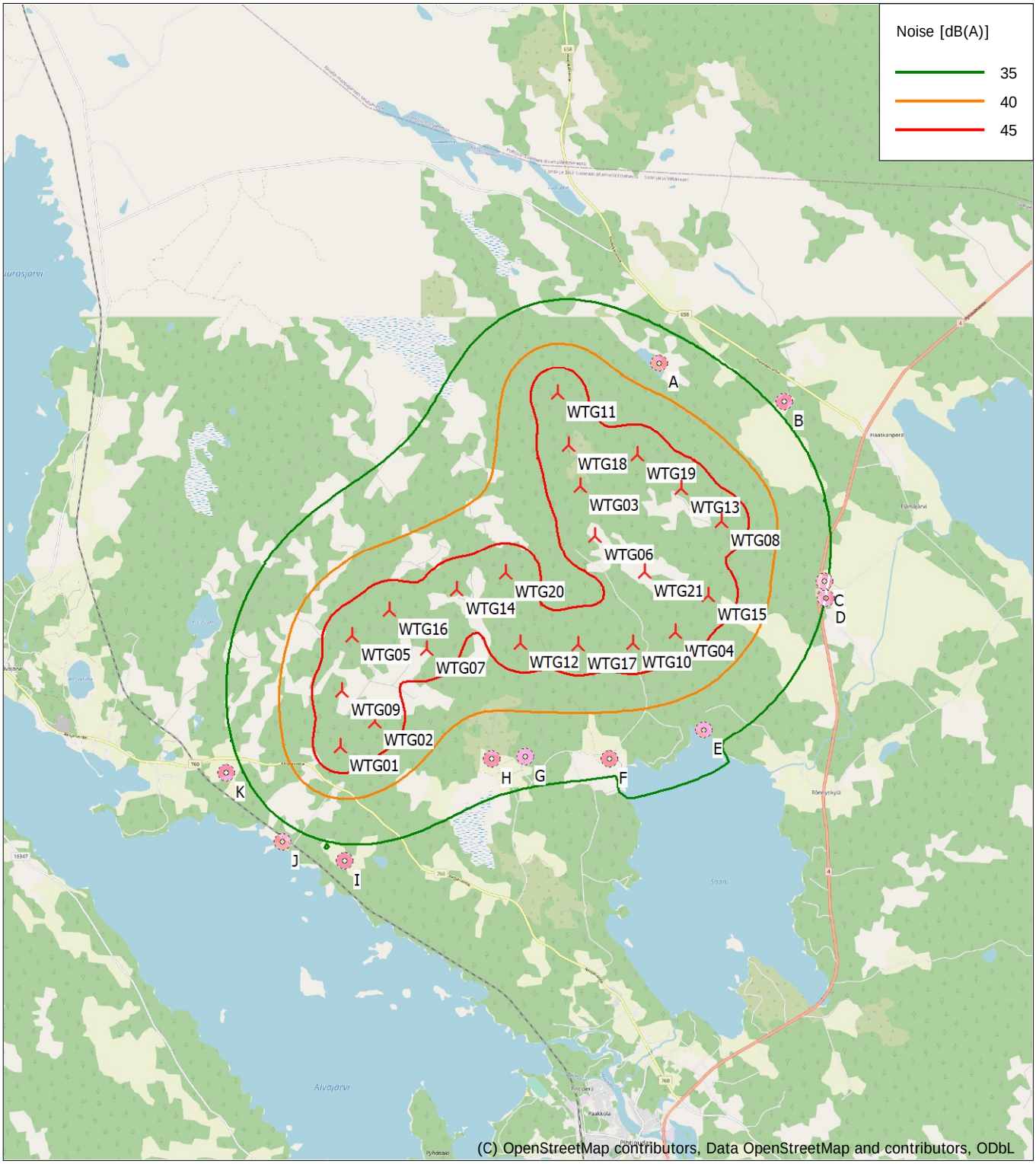
Calculated:
30.1.2024 10.50/3.6.355

DECIBEL - Map 8,0 m/s

Calculation: Uusimo_VE1_V172-7.2MWx21xHH214



0 1 2 3 4 km

Map: EMD OpenStreetMap , Print scale 1:100 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 427 126 North: 7 037 751

New WTG Noise sensitive area

Noise calculation model: ISO 9613-2 Finland. 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:

Pihtipudas_Uusimo_melu_ja_varjostus

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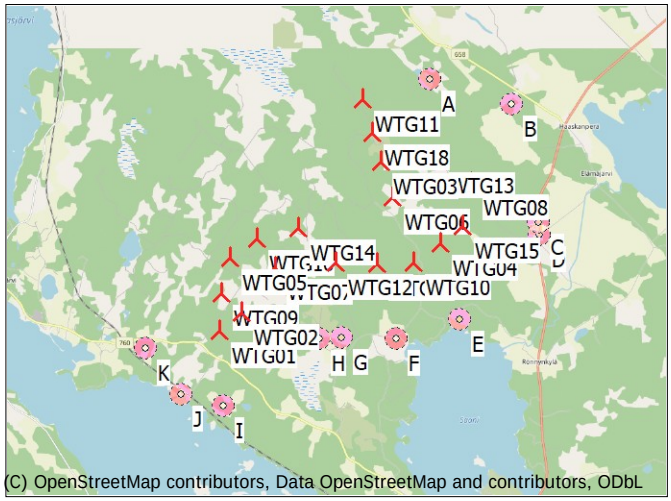
Calculated:
30.1.2024 11.01/3.6.355

DECIBEL - Main Result

Calculation: Uusimo_VE2_V172-7.2MWx18xHH214

Calculation is done according to Finnish guideline " Ympäristöhallinnon ohjeita 2 | 2014 " from the Ministry of the Environment of Finland

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89



Scale 1:200 000

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)]
WTG01	423 751	7 034 716	140,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG02	424 350	7 035 191	132,5	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG03	428 122	7 039 102	160,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG04	429 639	7 036 890	128,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG05	424 051	7 036 638	139,7	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG06	428 401	7 038 173	148,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG07	425 267	7 036 341	132,5	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG08	430 501	7 038 489	132,6	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG09	423 801	7 035 688	141,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG10	428 913	7 036 410	128,2	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG11	427 690	7 040 789	140,8	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG12	426 874	7 036 449	125,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG13	429 650	7 039 089	140,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG14	425 900	7 037 389	133,7	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG15	430 250	7 037 340	128,9	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG16	424 812	7 037 139	142,1	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG17	427 951	7 036 390	122,3	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG18	427 892	7 039 889	150,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9

Calculation Results

Sound level

Noise sensitive area No.	Name	East	North	Z	Immission height	Demands Sound level Noise	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	429 470	7 041 260	145,5	4,0	40,0	36,9	822	No
B	B - Asuinrakennus	431 627	7 040 548	144,9	4,0	40,0	33,2	1 344	No
C	C - Asuinrakennus	432 261	7 037 387	122,5	4,0	40,0	34,7	963	No
D	D - Asuinrakennus	432 294	7 037 094	122,1	4,0	40,0	34,3	1 046	No
E	E - Lomarakennus	430 111	7 034 859	117,3	4,0	40,0	35,5	854	No
F	F - Asuinrakennus	428 445	7 034 384	122,5	4,0	40,0	35,5	913	No
G	G - Asuinrakennus	426 978	7 034 448	122,8	4,0	40,0	36,3	872	No
H	H - Asuinrakennus	426 394	7 034 428	122,5	4,0	40,0	36,7	887	No
I	I - Asuinrakennus	423 788	7 032 711	125,0	4,0	40,0	33,5	1 094	No
J	J - Lomarakennus	422 689	7 033 070	114,2	4,0	40,0	33,4	1 070	No
K	K - Asuinrakennus	421 745	7 034 298	125,0	4,0	40,0	33,6	1 100	No

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Calculated:
30.1.2024 11.01/3.6.355

DECIBEL - Main Result

Calculation: Uusimo_VE2_V172-7.2MWx18xHH214

Distances (m)

WTG	A	B	C	D	E	F	G	H	I	J	K
WTG01	8691	9800	8919	8868	6362	4706	3238	2659	2006	1959	2049
WTG02	7940	9037	8210	8169	5771	4174	2731	2182	2543	2694	2754
WTG03	2544	3791	4480	4630	4686	4729	4793	4983	7722	8118	7984
WTG04	4374	4164	2669	2663	2085	2775	3611	4072	7189	7930	8308
WTG05	7123	8526	8244	8256	6316	4938	3656	3221	3936	3819	3285
WTG06	3267	4006	3940	4040	3730	3789	3988	4249	7149	7659	7702
WTG07	6470	7626	7072	7068	5066	3732	2552	2221	3920	4165	4072
WTG08	2956	2347	2077	2273	3652	4591	5361	5775	8857	9507	9707
WTG09	7949	9213	8629	8609	6365	4824	3411	2883	2977	2844	2482
WTG10	4882	4949	3487	3450	1960	2079	2756	3205	6320	7063	7473
WTG11	1841	3945	5698	5904	6406	6449	6381	6491	8971	9197	8802
WTG12	5467	6277	5468	5459	3607	2595	2004	2077	4847	5378	5562
WTG13	2179	2457	3116	3312	4255	4856	5355	5685	8663	9202	9244
WTG14	5266	6541	6361	6401	4913	3937	3132	3002	5133	5382	5179
WTG15	3997	3492	2011	2059	2485	3463	4367	4832	7949	8683	9033
WTG16	6219	7620	7453	7482	5769	4559	3455	3139	4545	4590	4181
WTG17	5102	5550	4424	4400	2648	2065	2172	2504	5555	6221	6549
WTG18	2090	3793	5035	5215	5499	5533	5517	5663	8268	8577	8309

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DECIBEL - Assumptions for noise calculation

Calculation: Uusimo_VE2_V172-7.2MWx18xHH214

Noise calculation model:
ISO 9613-2 Finland
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_Pihtipudas_Uusimo_melu_ja_varjostus_0.w2r (13)
Area type with hard ground: vesistot
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:
Pure tones penalty is added to total noise impact at receptors
Noise sensitive area
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 NSA 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 + 2dB

Source	Source/Date	Creator	Edited
Manufacturer	11.9.2023	USER	30.1.2024 10.36

					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	214,0	8,0	108,9	No	92,4	100,0	103,3	103,5	101,9	97,4	89,9	79,2

Noise sensitive area: A A - Lomarakennus

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
Pure tone penalty: 0 dB

Noise sensitive area: B B - Asuinrakennus

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
Pure tone penalty: 0 dB

Noise sensitive area: C C - Asuinrakennus

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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30.1.2024 11.01/3.6.355

DECIBEL - Assumptions for noise calculation

Calculation: Uusimo_VE2_V172-7.2MWx18xHH214

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

Noise sensitive area: D D - Asuinrakennus

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
Pure tone penalty: 0 dB

Noise sensitive area: E E - Lomarakennus

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
Pure tone penalty: 0 dB

Noise sensitive area: F F - Asuinrakennus

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
Pure tone penalty: 0 dB

Noise sensitive area: G G - Asuinrakennus

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
Pure tone penalty: 0 dB

Noise sensitive area: H H - Asuinrakennus

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
Pure tone penalty: 0 dB

Noise sensitive area: I I - Asuinrakennus

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
Pure tone penalty: 0 dB

Noise sensitive area: J J - Lomarakennus

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
Pure tone penalty: 0 dB

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DECIBEL - Assumptions for noise calculation

Calculation: Uusimo_VE2_V172-7.2MWx18xHH214

Noise sensitive area: K K - Asuinrakennus

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
Pure tone penalty: 0 dB

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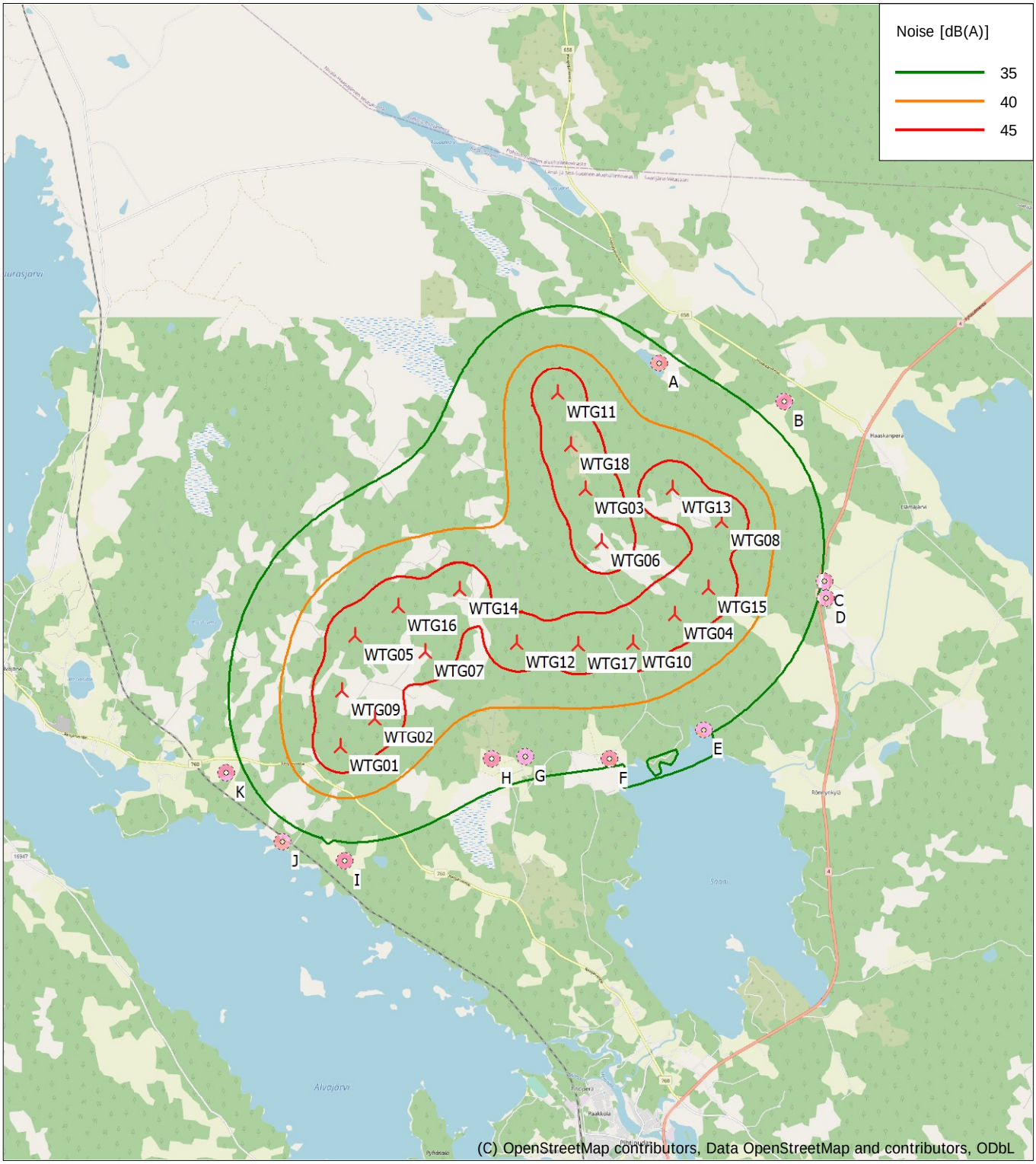
DECIBEL - Map 8,0 m/s

Calculation: Uusimo_VE2_V172-7.2MWx18xHH214



Map: EMD OpenStreetMap , Print scale 1:100 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 427 126 North: 7 037 753

New WTG Noise sensitive area

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

Liite 3. Melun leviämismallinnuksen tulokset ISO 9613-2, YM 2 /2014 - Hankevaihtoehto 3

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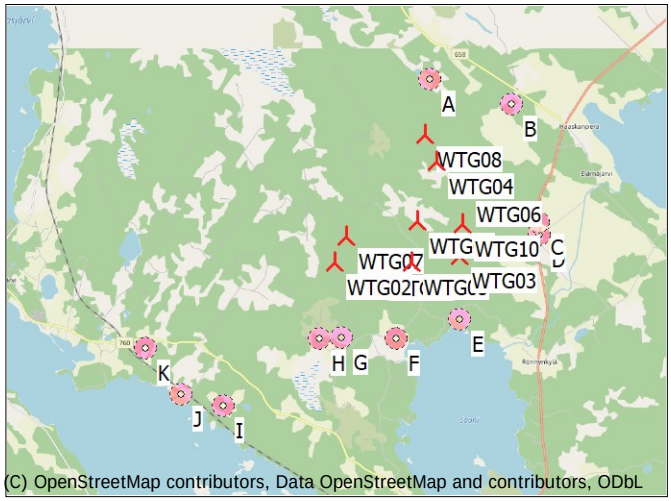
DECIBEL - Main Result

Calculation: Uusimo_VE3_V172-7.2MWx10xHH214

Calculation is done according to Finnish guideline " Ympäristöhallinnon ohjeita 2 | 2014 " from the Ministry of the Environment of Finland

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89



Scale 1:200 000

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)]
WTG01	429 051	7 037 493	138,6	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG02	426 831	7 036 447	125,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG03	430 151	7 036 555	125,8	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG04	429 601	7 039 051	140,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG05	428 904	7 036 410	128,2	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG06	430 350	7 038 339	134,3	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG07	427 156	7 037 144	126,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG08	429 300	7 039 773	141,1	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG09	427 951	7 036 390	122,3	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG10	430 251	7 037 388	129,2	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9

Calculation Results

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	429 470	7 041 260	145,5	4,0	40,0	36,1	649	No
B	B - Asuinrakennus	431 627	7 040 548	144,9	4,0	40,0	32,9	1 368	No
C	C - Asuinrakennus	432 261	7 037 387	122,5	4,0	40,0	34,9	908	No
D	D - Asuinrakennus	432 294	7 037 094	122,1	4,0	40,0	34,6	968	No
E	E - Lomarakennus	430 111	7 034 859	117,3	4,0	40,0	36,0	692	No
F	F - Asuinrakennus	428 445	7 034 384	122,5	4,0	40,0	35,0	934	No
G	G - Asuinrakennus	426 978	7 034 448	122,8	4,0	40,0	34,4	996	No
H	H - Asuinrakennus	426 394	7 034 428	122,5	4,0	40,0	33,4	1 138	No
I	I - Asuinrakennus	423 788	7 032 711	125,0	4,0	40,0	24,6	3 937	No
J	J - Lomarakennus	422 689	7 033 070	114,2	4,0	40,0	23,4	4 468	No
K	K - Asuinrakennus	421 745	7 034 298	125,0	4,0	40,0	23,0	4 644	No

Distances (m)

	WTG									
NSA	WTG01	WTG02	WTG03	WTG04	WTG05	WTG06	WTG07	WTG08	WTG09	WTG10
A	3790	5489	4754	2213	4883	3051	4722	1497	5102	3950
B	3997	6310	4257	2520	4953	2552	5620	2453	5550	3447
C	3212	5510	2268	3138	3496	2135	5111	3803	4424	2010
D	3268	5501	2210	3329	3458	2309	5139	4018	4400	2065
E	2840	3644	1697	4223	1966	3489	3736	4981	2648	2534
F	3167	2619	2761	4808	2077	4390	3045	5456	2065	3505
G	3683	2004	3809	5298	2750	5149	2701	5809	2172	4399

To be continued on next page...

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DECIBEL - Main Result

Calculation: Uusimo_VE3_V172-7.2MWx10xHH214

...continued from previous page

	WTG									
NSA	WTG01	WTG02	WTG03	WTG04	WTG05	WTG06	WTG07	WTG08	WTG09	WTG10
H	4056	2065	4317	5626	3198	5563	2820	6084	2504	4861
I	7111	4819	7434	8601	6313	8645	5567	8958	5555	7977
J	7748	5344	8236	9140	7056	9298	6045	9414	6221	8707
K	7974	5522	8704	9182	7465	9507	6114	9330	6549	9050

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Calculated:
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DECIBEL - Assumptions for noise calculation

Calculation: Uusimo_VE3_V172-7.2MWx10xHH214

Noise calculation model:
ISO 9613-2 Finland
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_Pihtipudas_Uusimo_melu_ja_varjostus_0.w2r (13)
Area type with hard ground: vesistot
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:
Pure tones penalty is added to total noise impact at receptors
Noise sensitive area
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 NSA 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 + 2dB

Source	Source/Date	Creator	Edited
Manufacturer	11.9.2023	USER	30.1.2024 10.36

					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	214,0	8,0	108,9	No	92,4	100,0	103,3	103,5	101,9	97,4	89,9	79,2

Noise sensitive area: A A - Lomarakennus
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
Pure tone penalty: 0 dB

Noise sensitive area: B B - Asuinrakennus
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
Pure tone penalty: 0 dB

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

Licensed user:
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Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henri Korhonen / henri.korhonen@fcg.fi

DECIBEL - Assumptions for noise calculation

Calculation: Uusimo_VE3_V172-7.2MWx10xHH214

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

Noise sensitive area: D D - Asuinrakennus

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
Pure tone penalty: 0 dB

Noise sensitive area: E E - Lomarakennus

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
Pure tone penalty: 0 dB

Noise sensitive area: F F - Asuinrakennus

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
Pure tone penalty: 0 dB

Noise sensitive area: G G - Asuinrakennus

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
Pure tone penalty: 0 dB

Noise sensitive area: H H - Asuinrakennus

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
Pure tone penalty: 0 dB

Noise sensitive area: I I - Asuinrakennus

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
Pure tone penalty: 0 dB

Noise sensitive area: J J - Lomarakennus

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
Pure tone penalty: 0 dB

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+358104095666
Henri Korhonen / henri.korhonen@fcg.fi

DECIBEL - Assumptions for noise calculation

Calculation: Uusimo_VE3_V172-7.2MWx10xHH214

Noise sensitive area: K K - Asuinrakennus

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
Pure tone penalty: 0 dB

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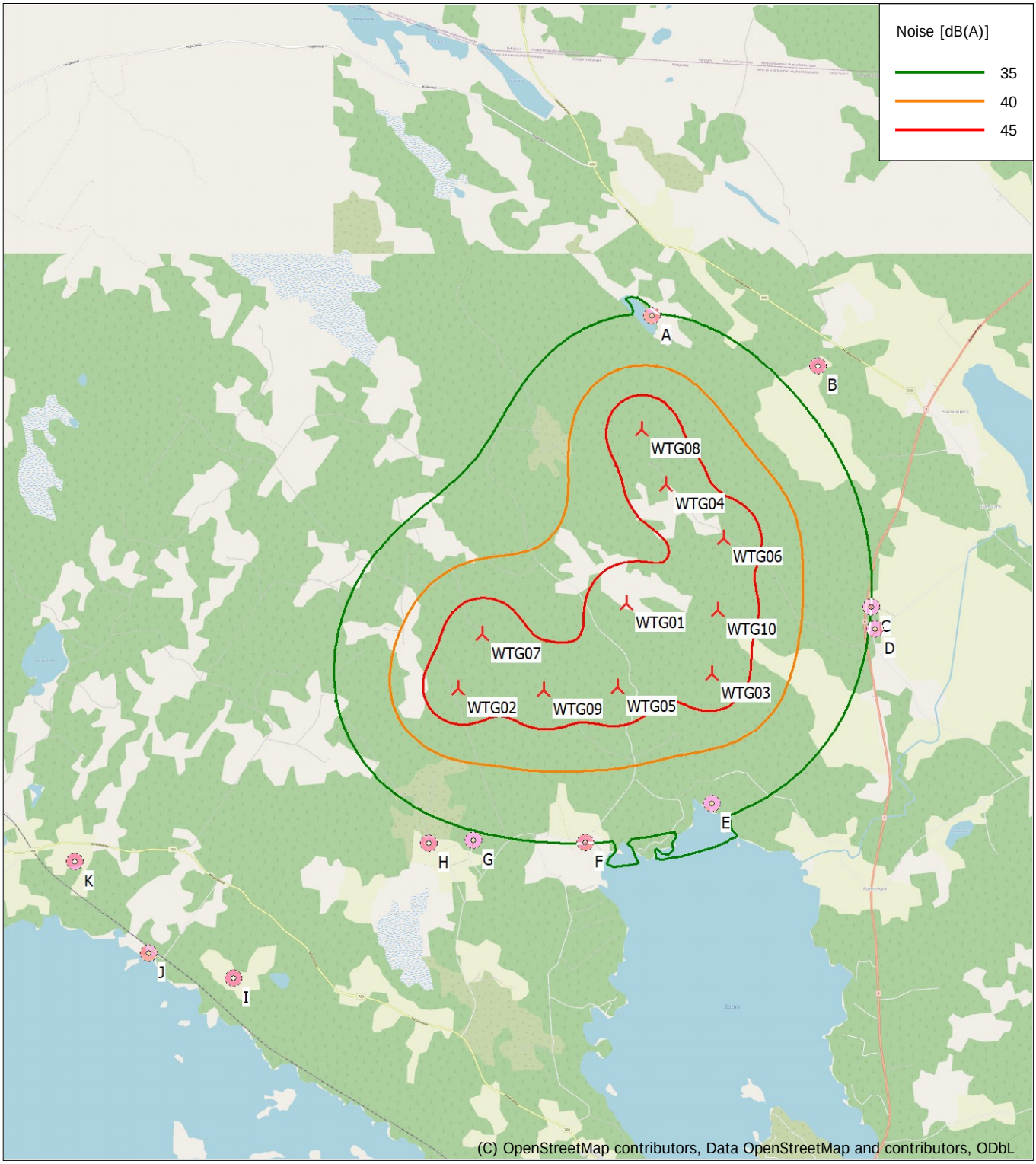
+358104095666
Henri Korhonen / henri.korhonen@fcg.fi
Calculated:
30.1.2024 11.05/3.6.355

DECIBEL - Map 8,0 m/s

Calculation: Uusimo_VE3_V172-7.2MWx10xHH214



0 1 2 3 4 km

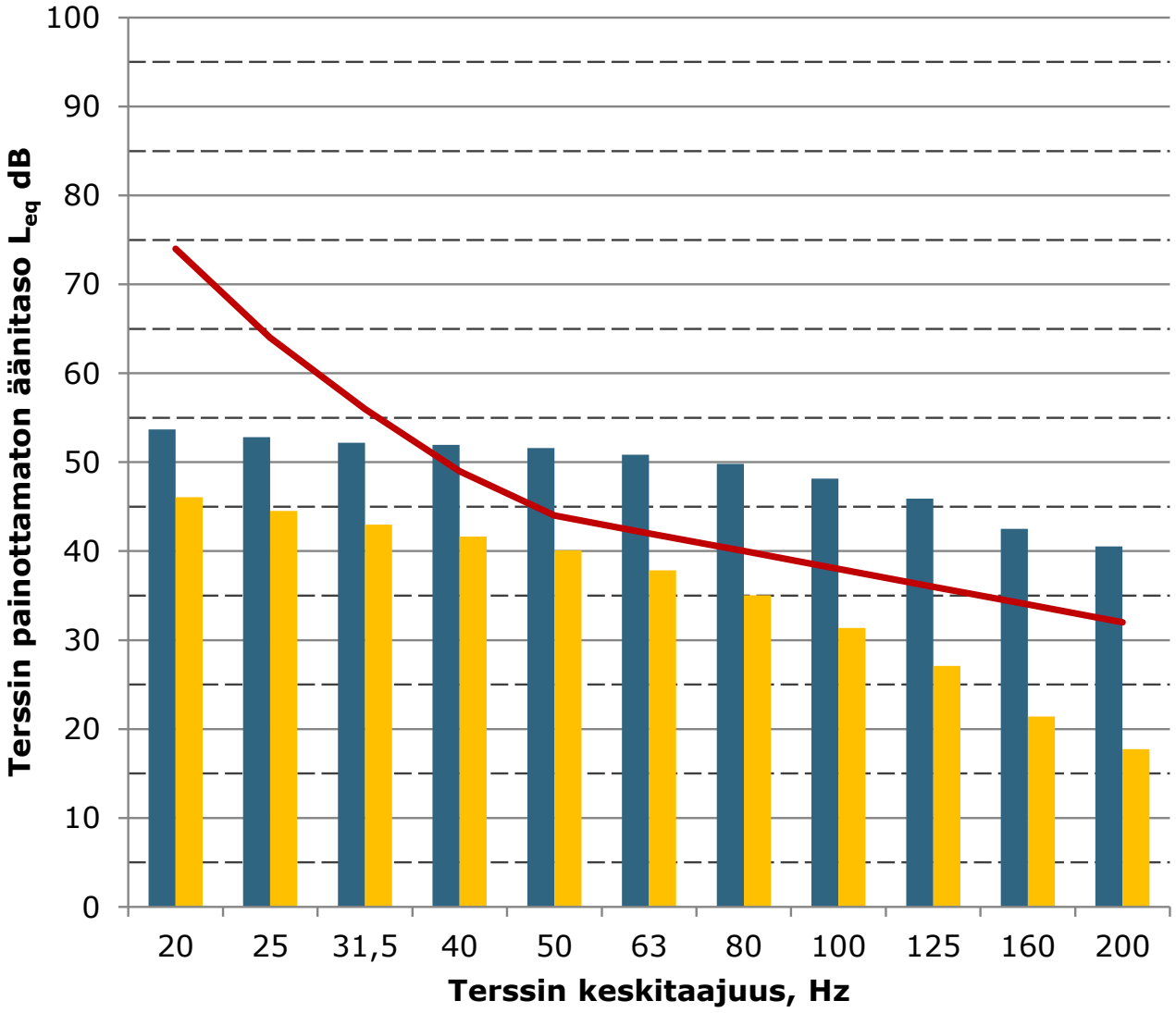
Map: EMD OpenStreetMap , Print scale 1:75 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 427 797 North: 7 037 992

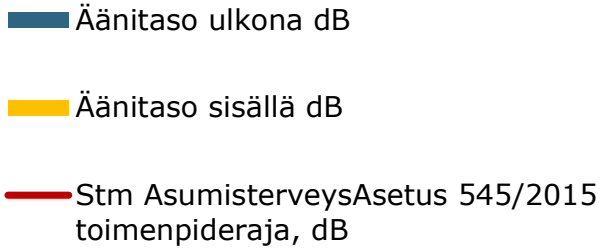
New WTG Noise sensitive area

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

Liite 4. Matalataajuisen melun rakennuskohtaiset arvot - Hankevaihtoehto 1

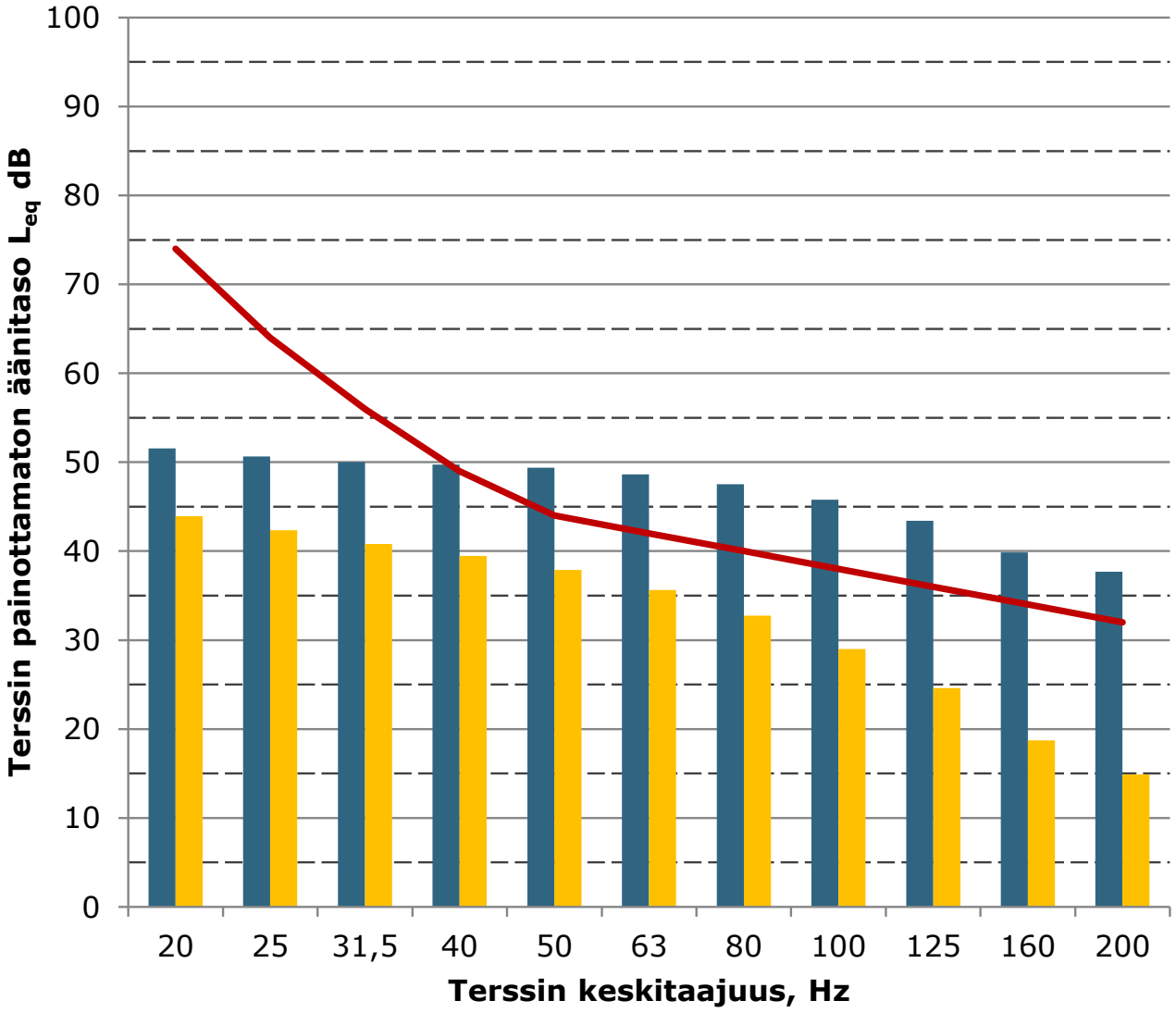
Matalien taajuuksien äänitasot ulkona ja sisällä, Lomarakennus A, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

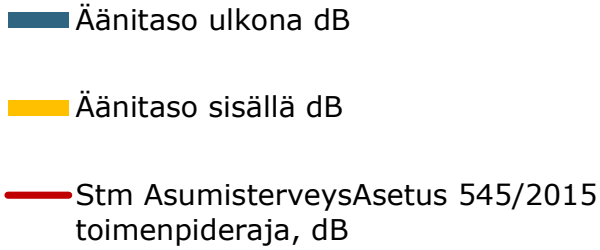




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 21
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

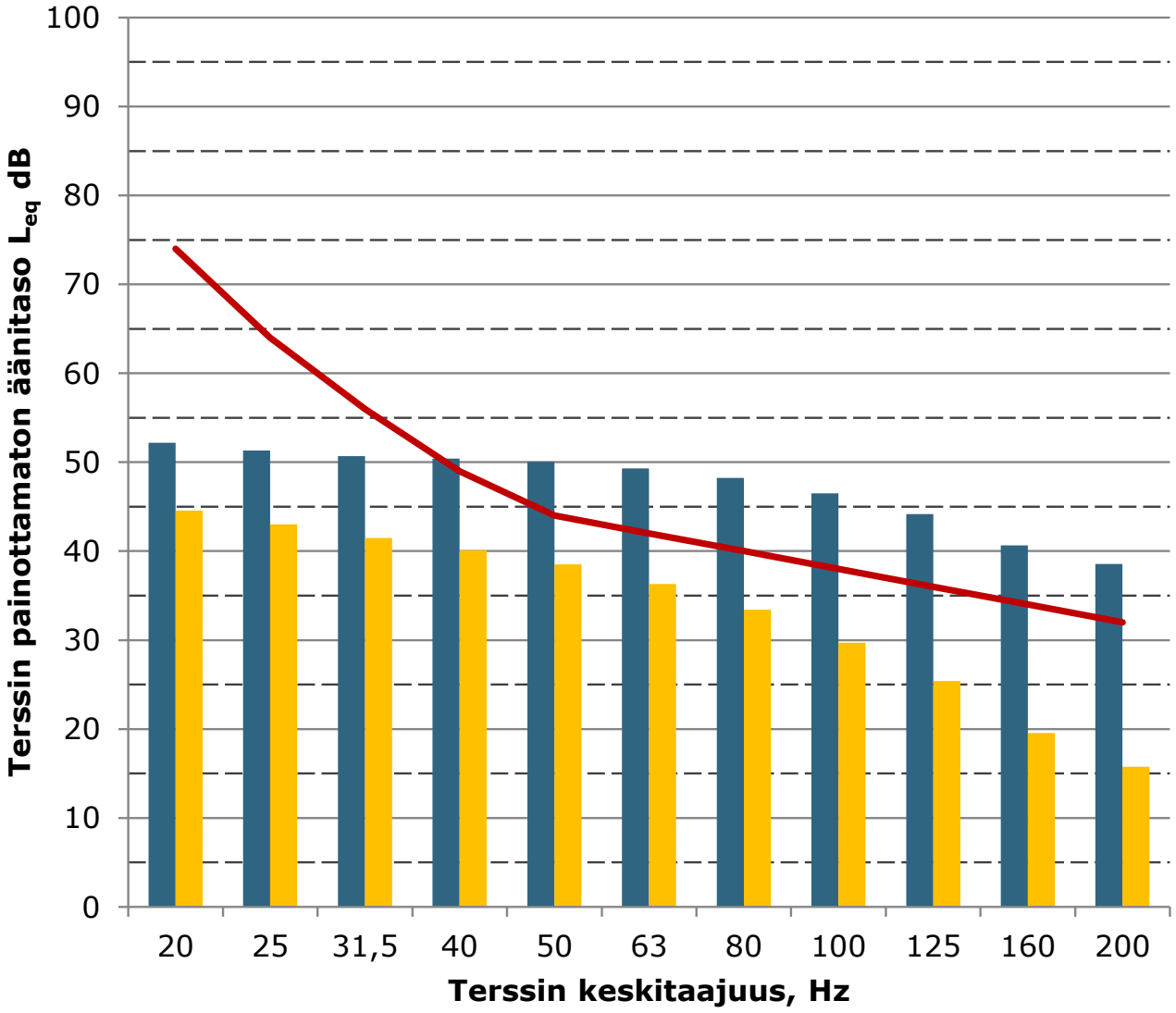
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus B, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

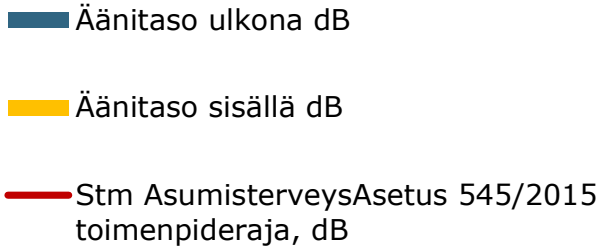




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 21
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

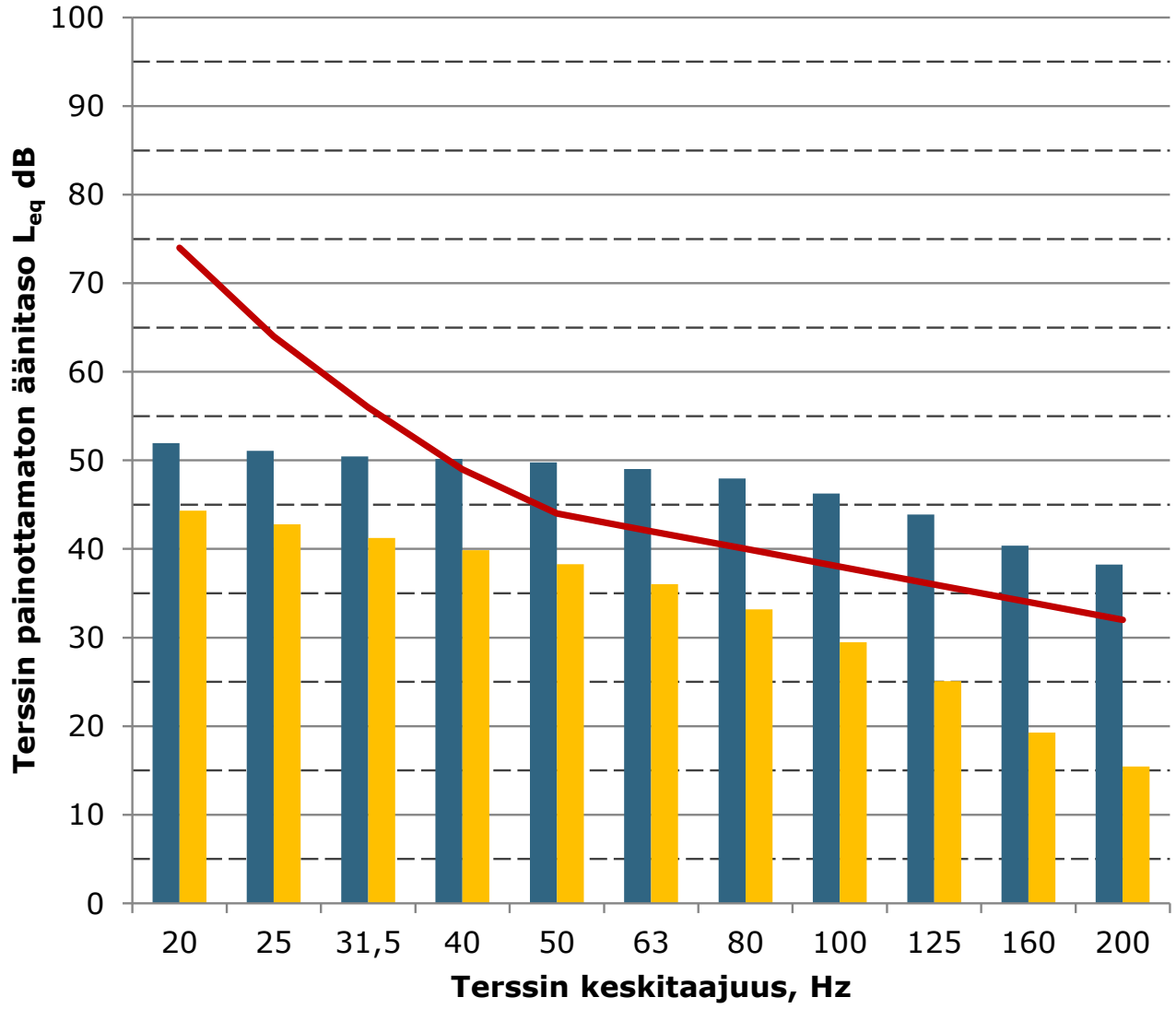
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus C, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

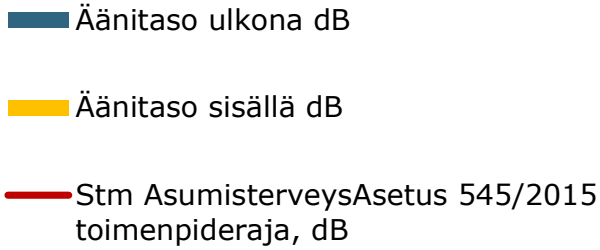




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 21
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

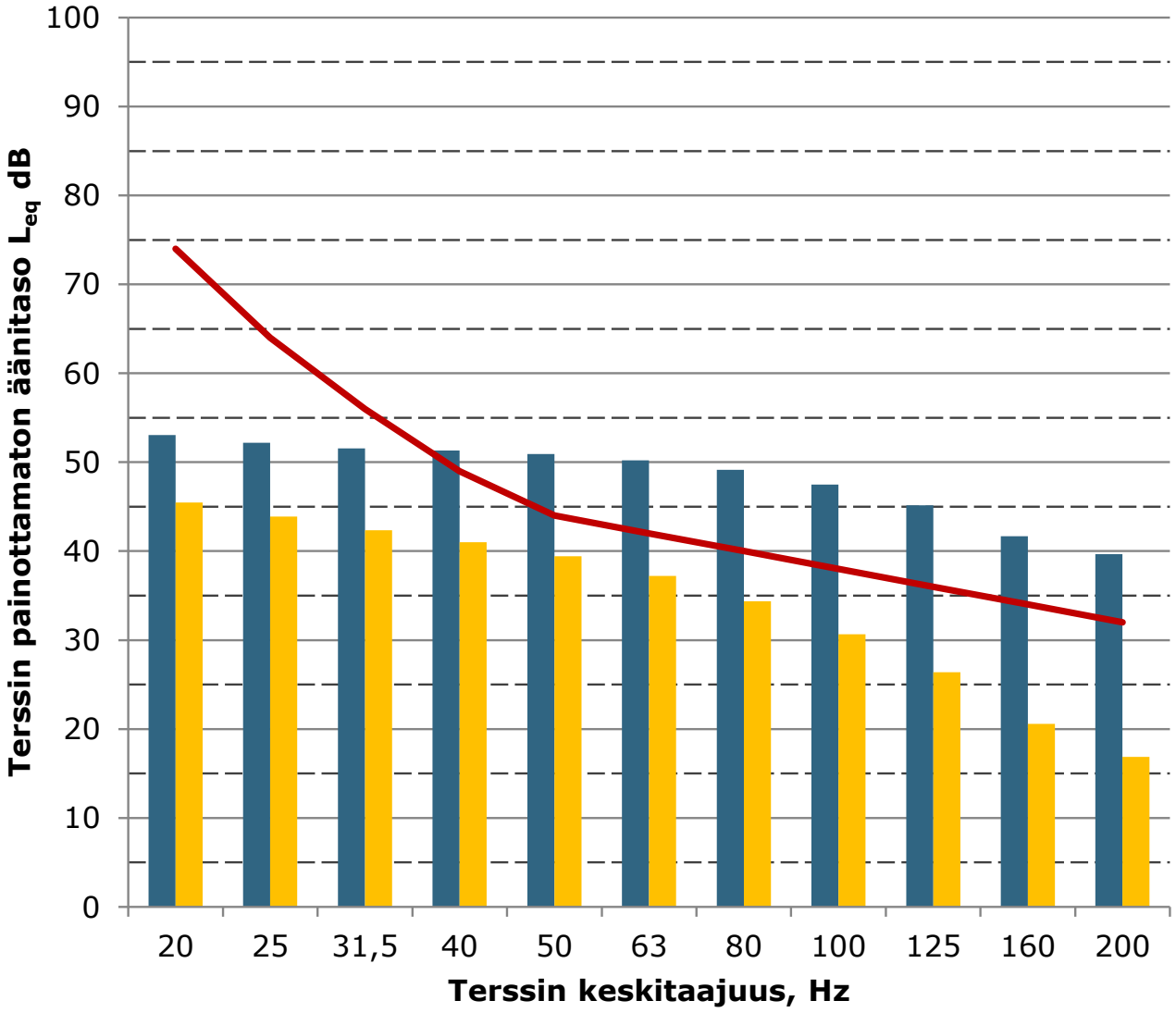
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus D, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

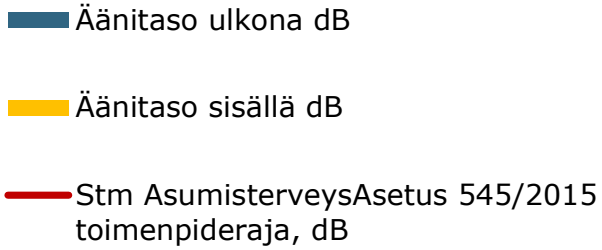




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 21
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

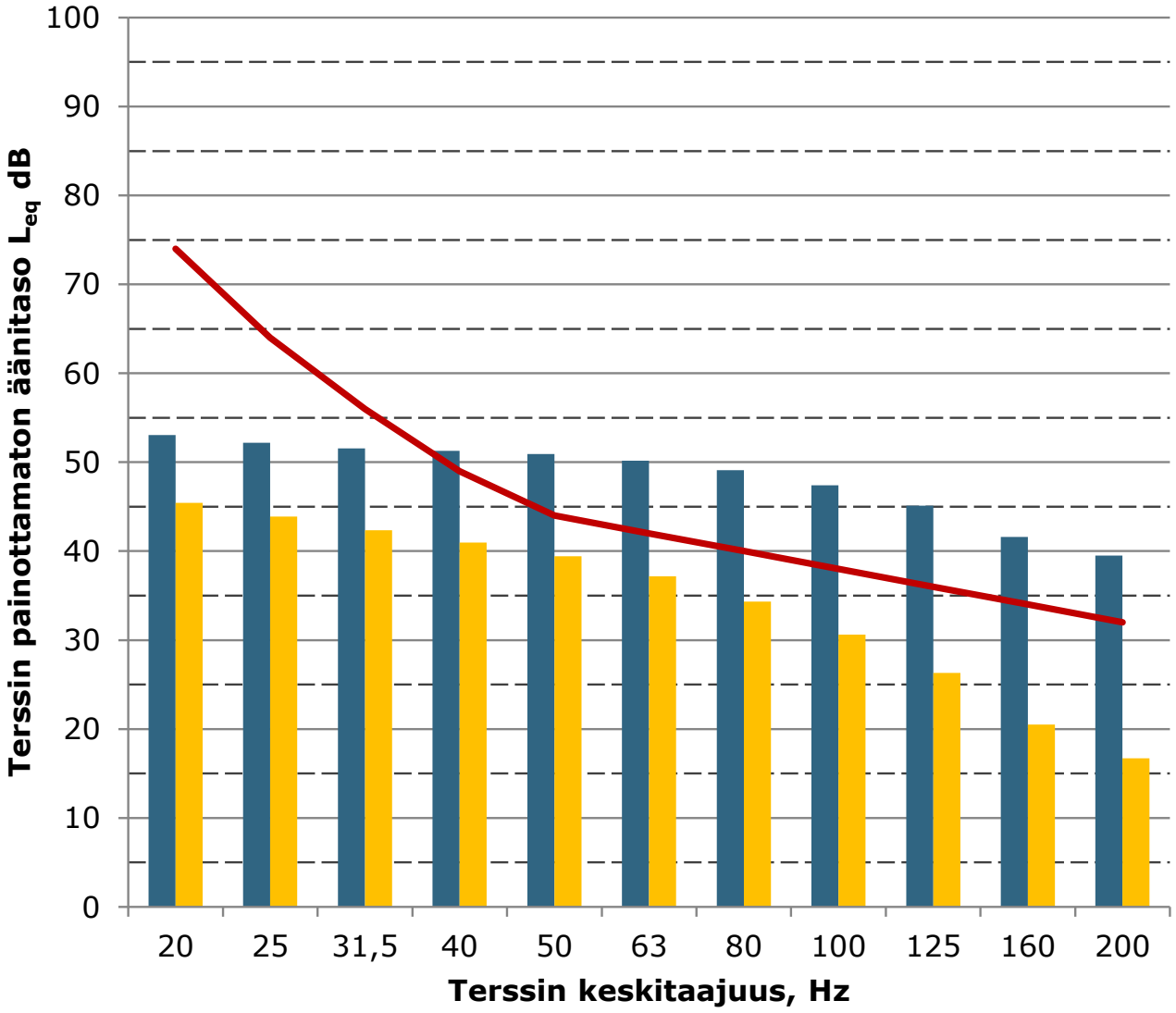
Matalien taajuuksien äänitasot ulkona ja sisällä, Lomarakennus E, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

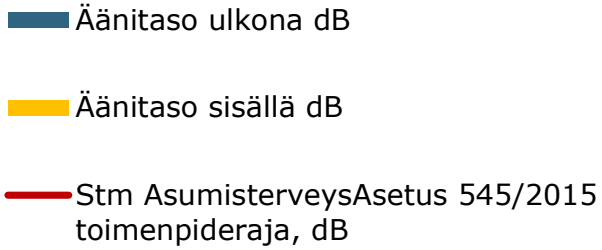




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 21
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

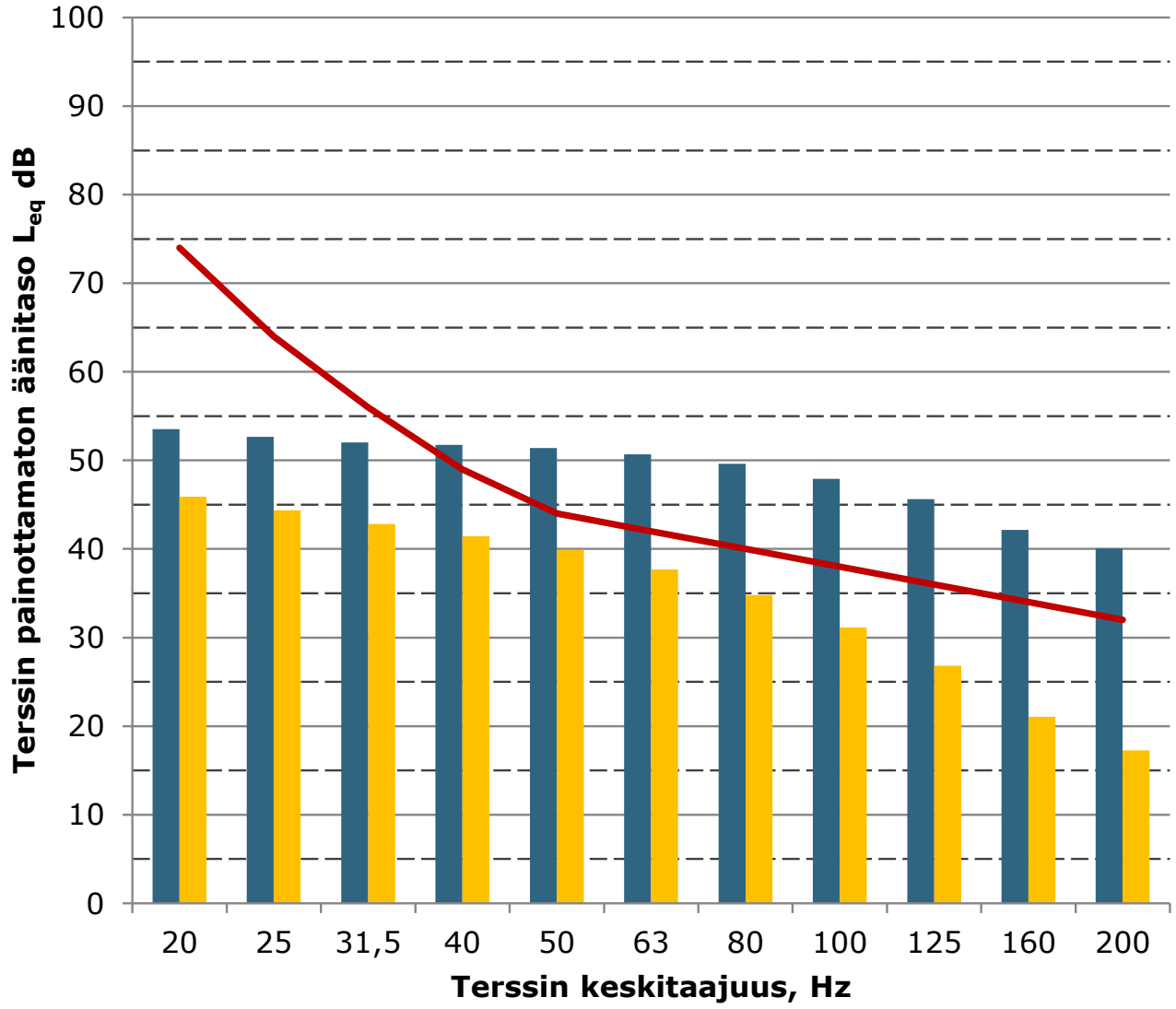
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus F, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

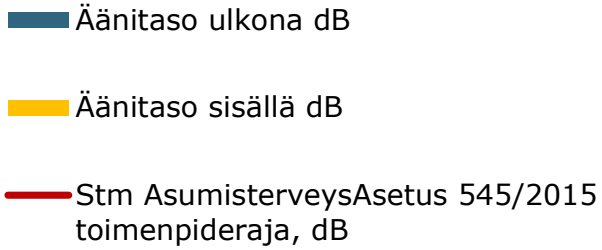




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 21
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

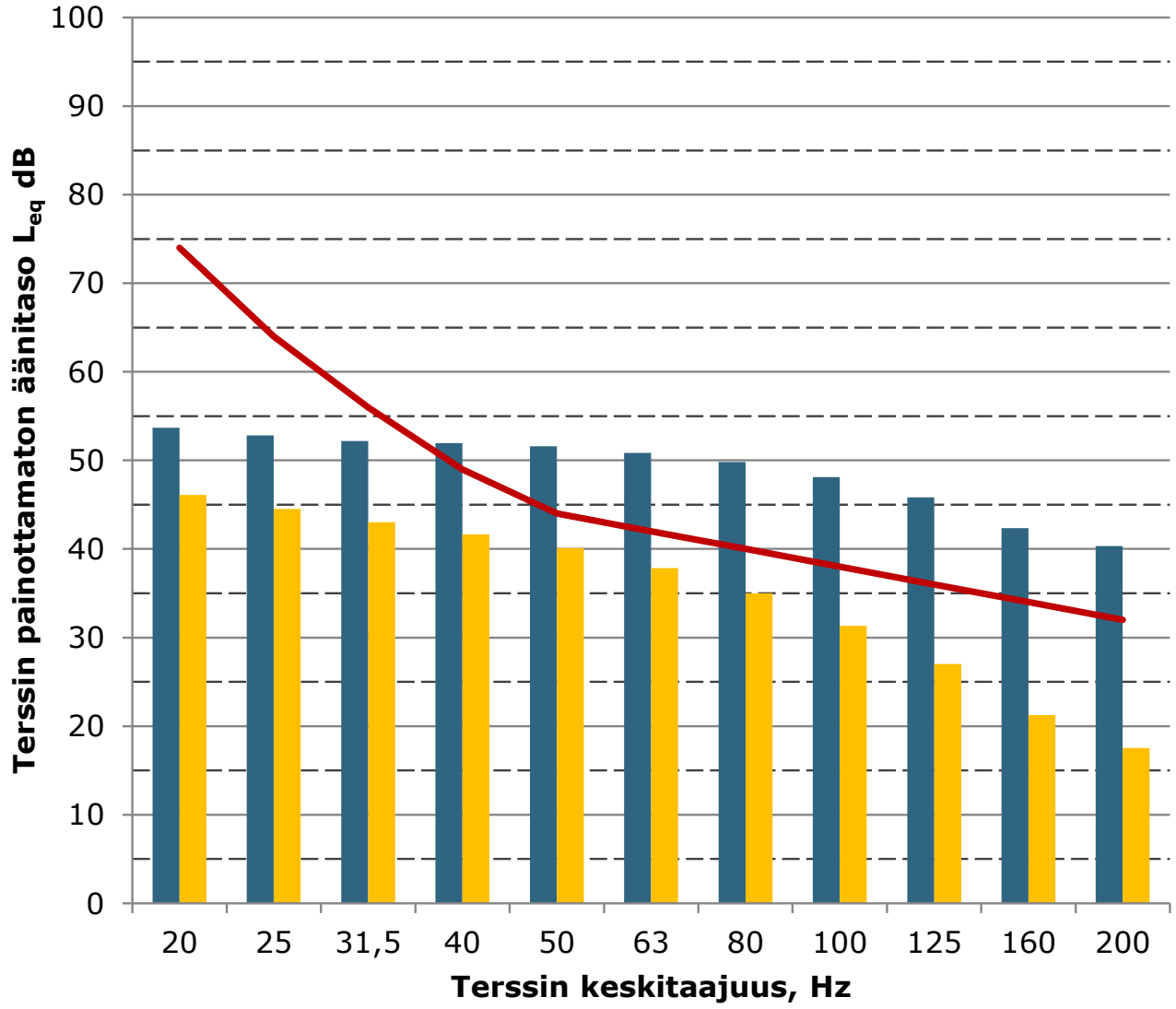
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus G, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

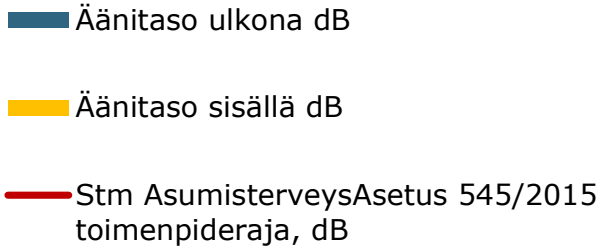




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 21
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

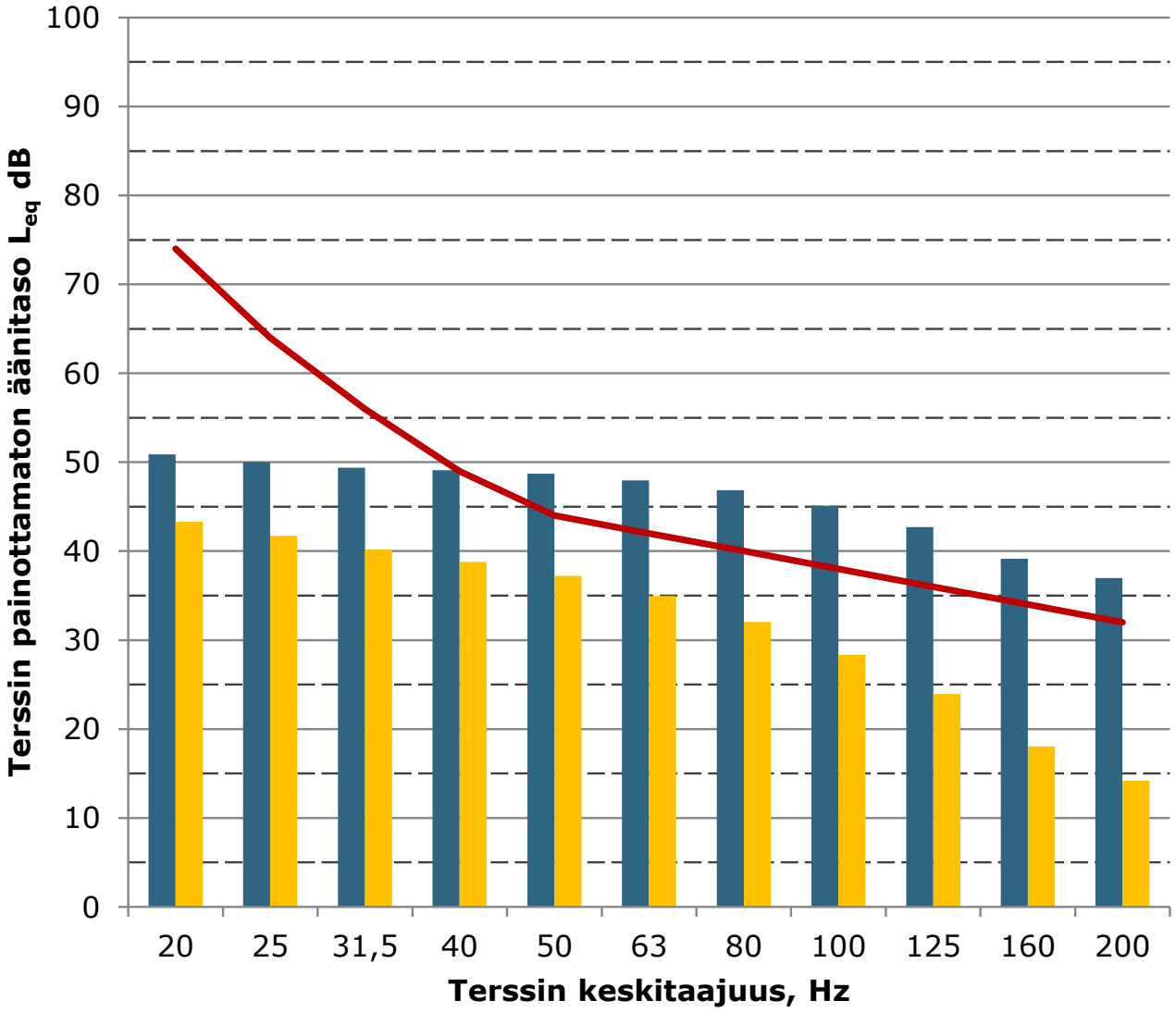
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus H, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

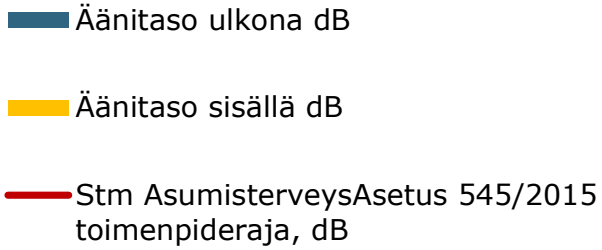




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 21
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

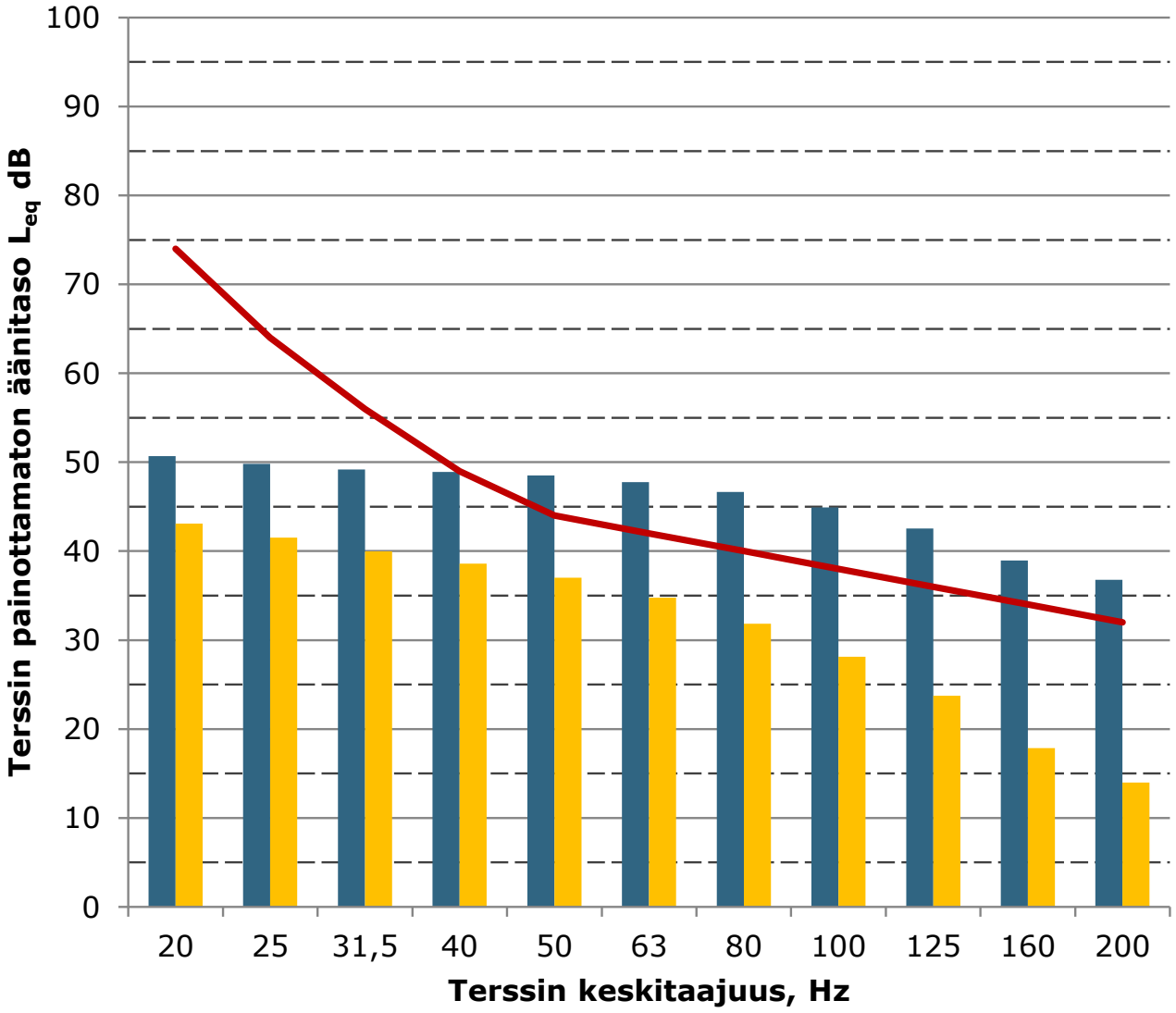
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus I, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

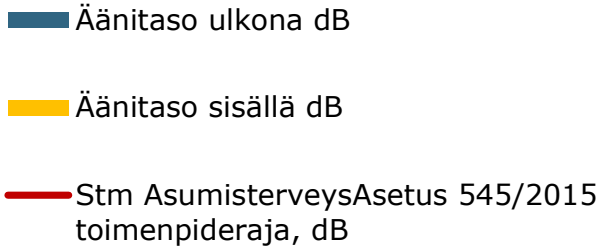




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 21
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

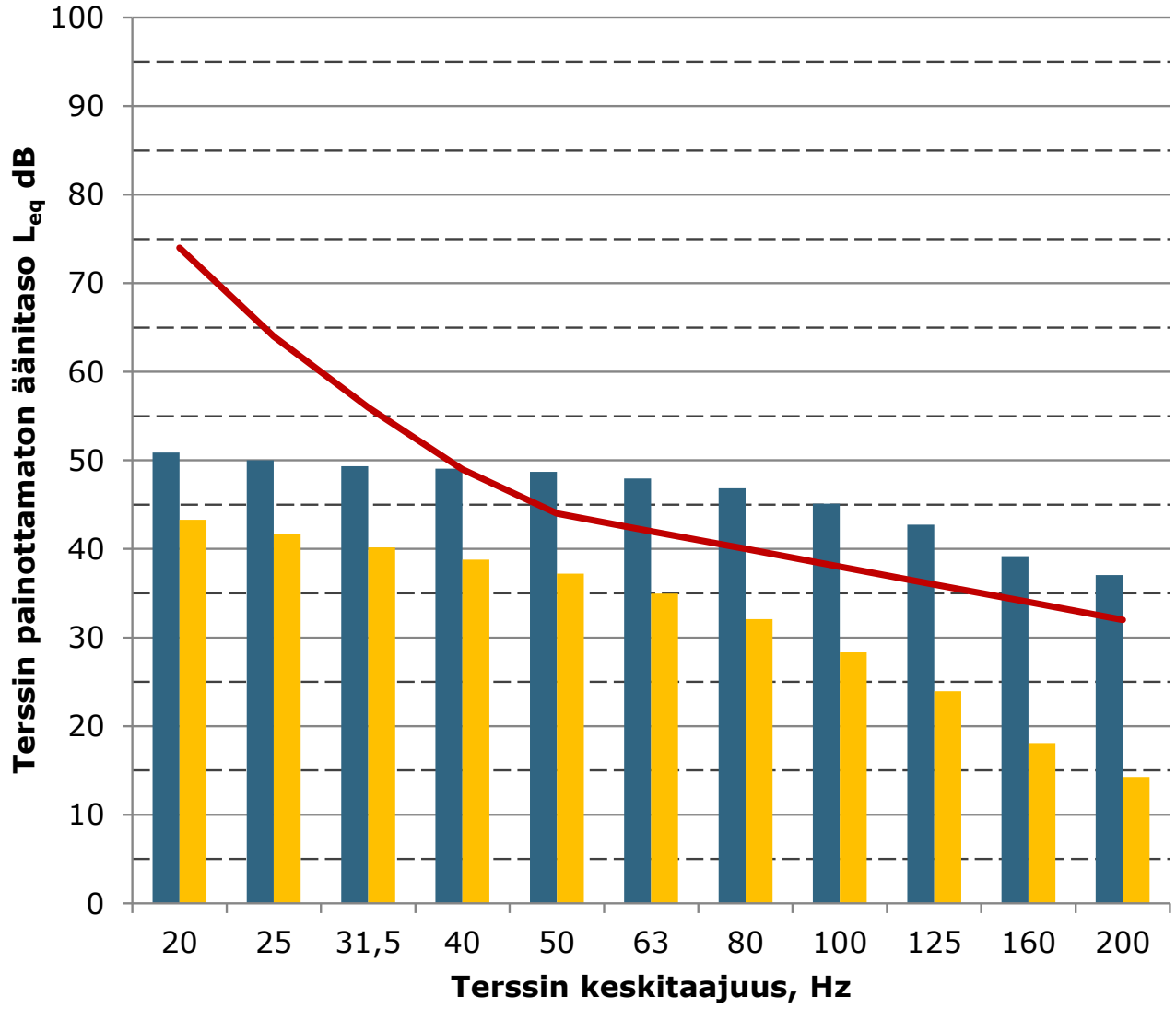
Matalien taajuuksien äänitasot ulkona ja sisällä, Lomarakennus J, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

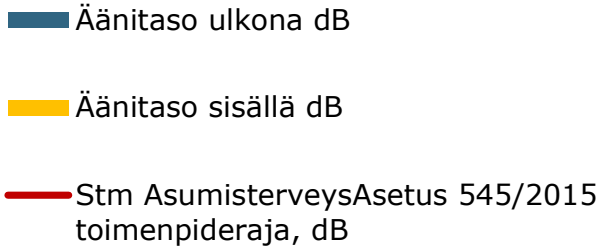




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 21
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

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

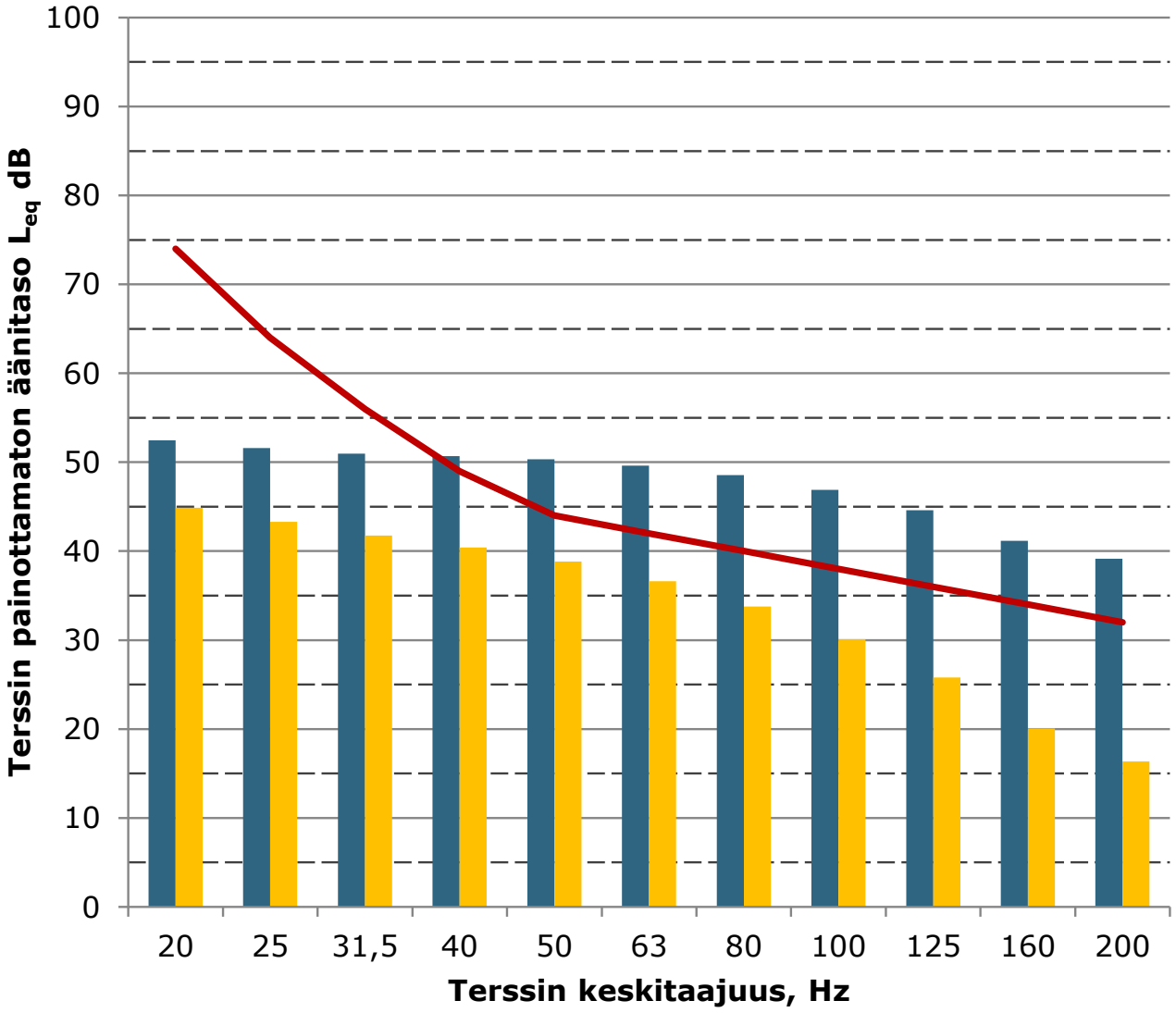


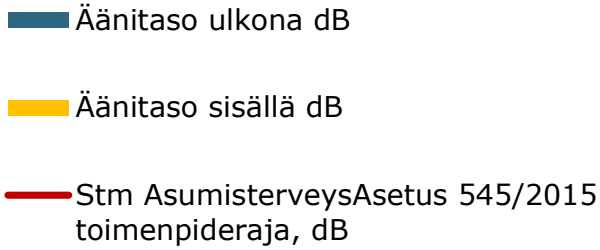


Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 21
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Liite 5. Matalataajuisen melun rakennuskohtaiset arvot - Hankevaihtoehto 2

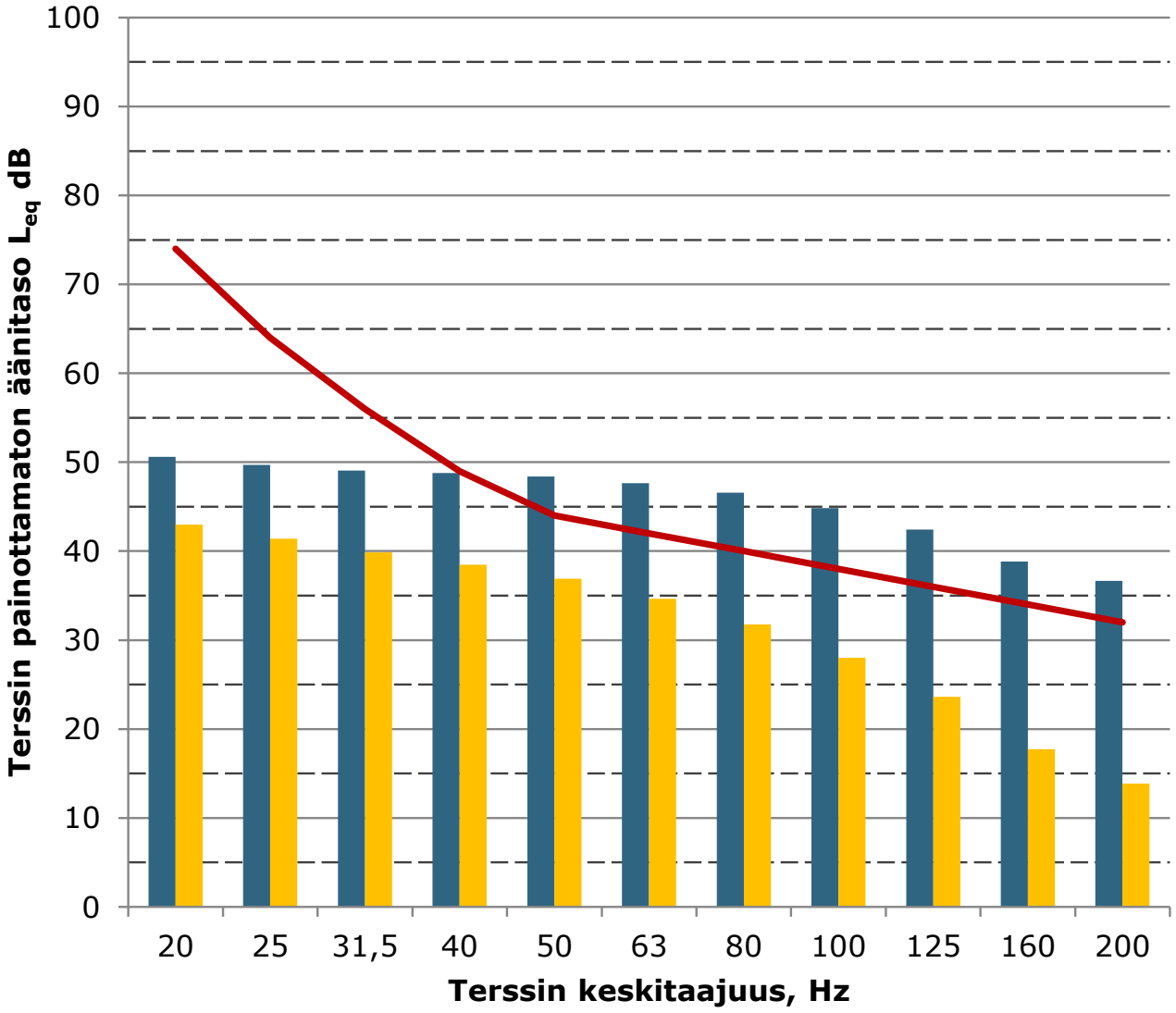
Matalien taajuuksien äänitasot ulkona ja sisällä, Lomarakennus A, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

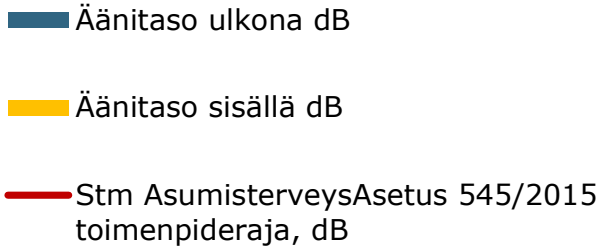




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 18
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

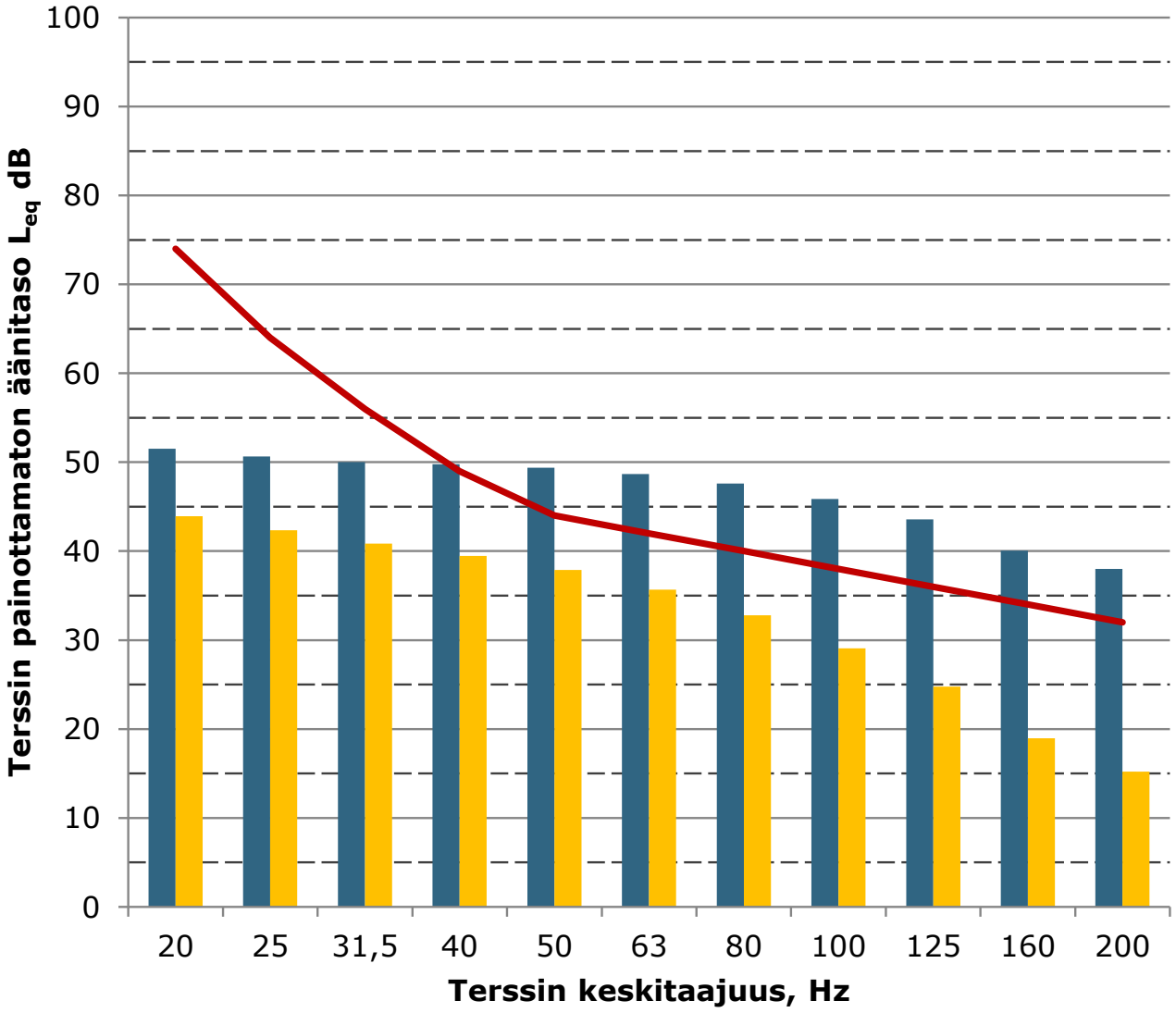
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus B, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

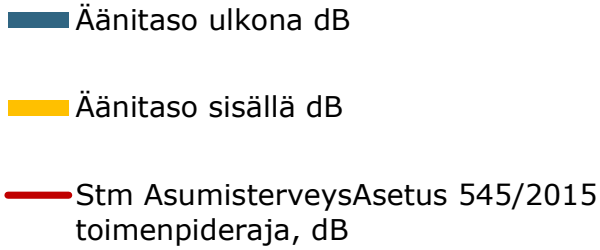




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 18
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

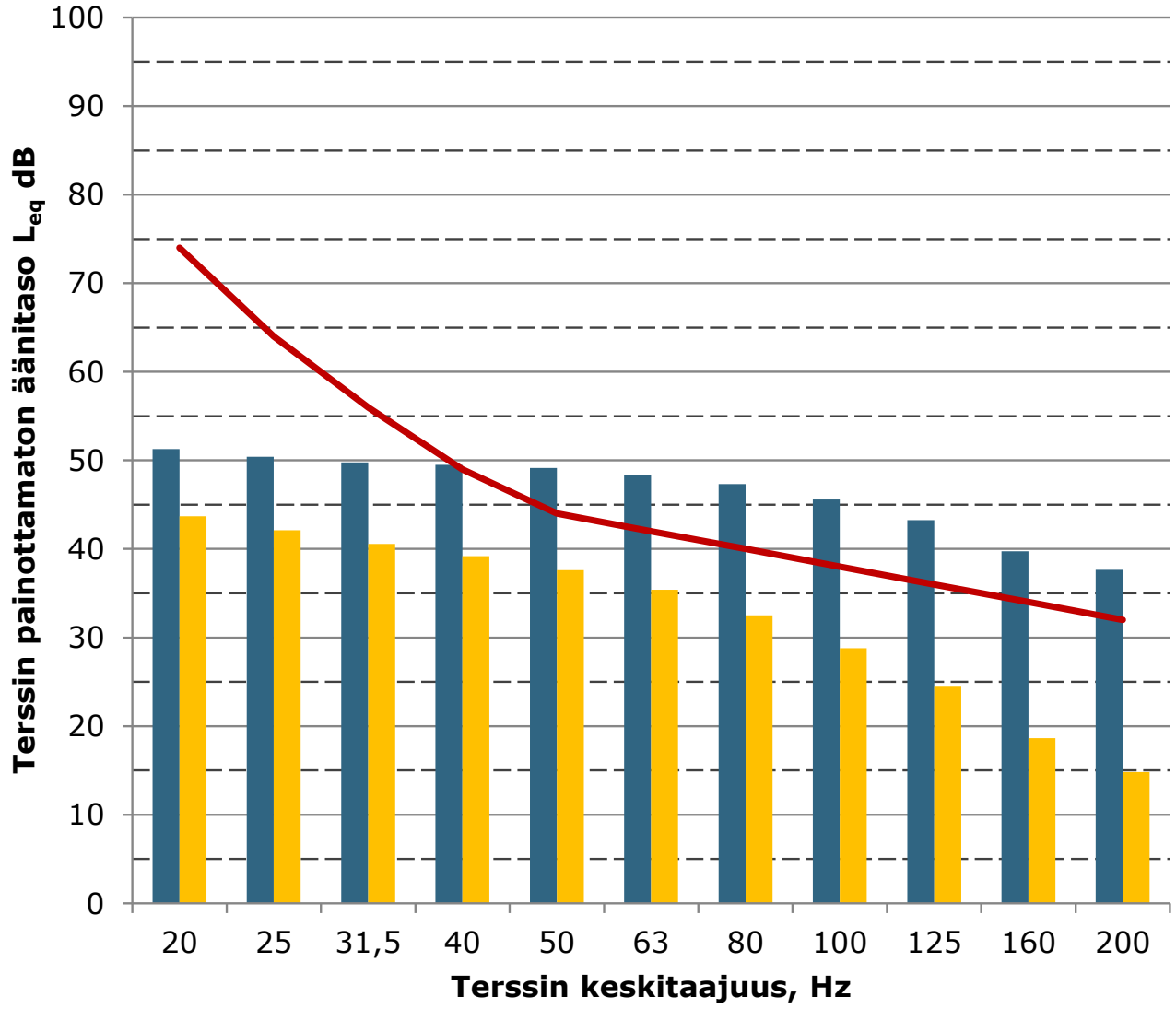
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus C, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

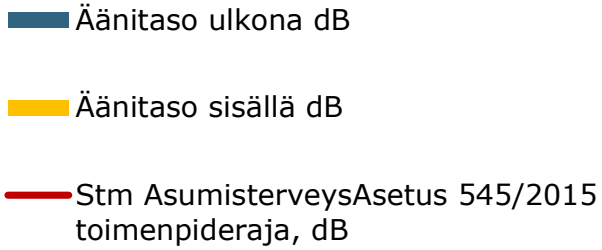




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 18
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

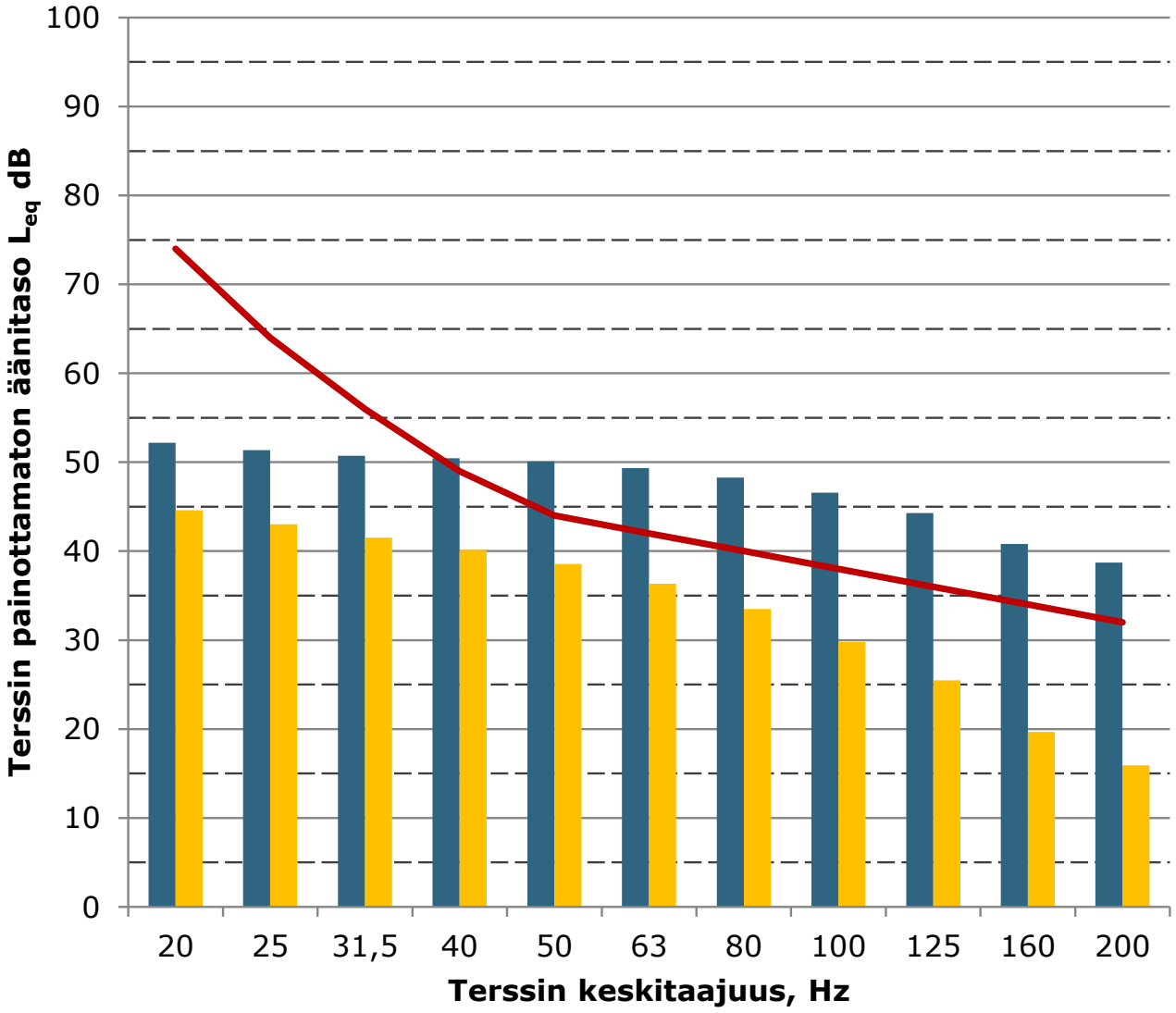
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus D, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

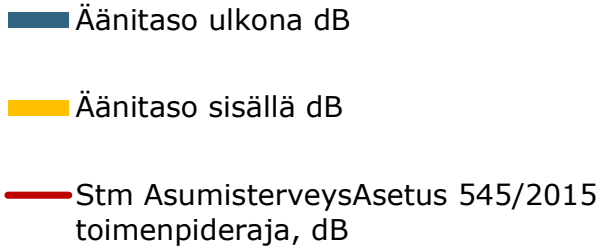




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 18
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

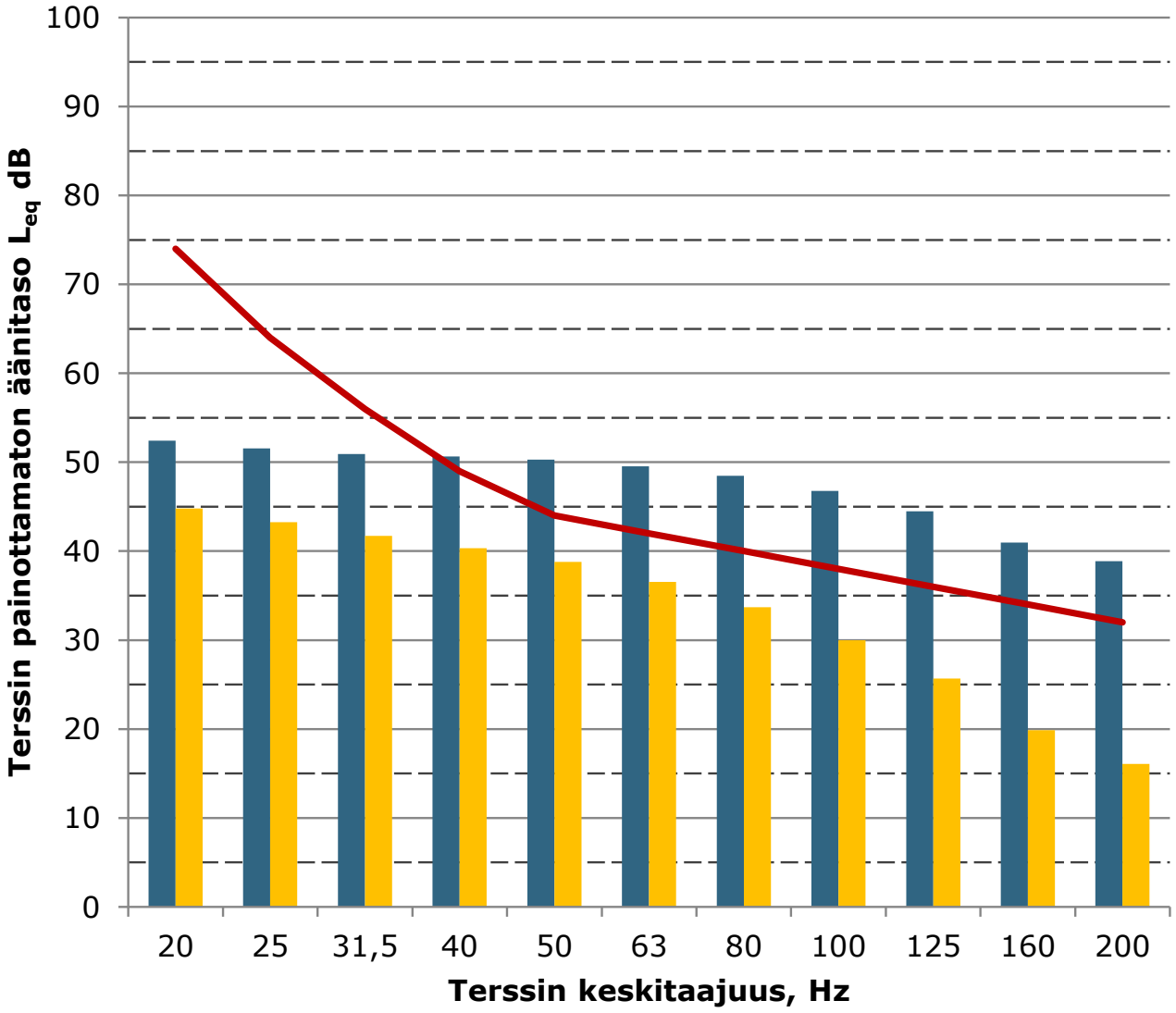
Matalien taajuuksien äänitasot ulkona ja sisällä, Lomarakennus E, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

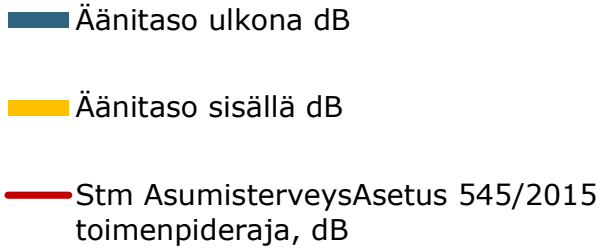




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 18
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

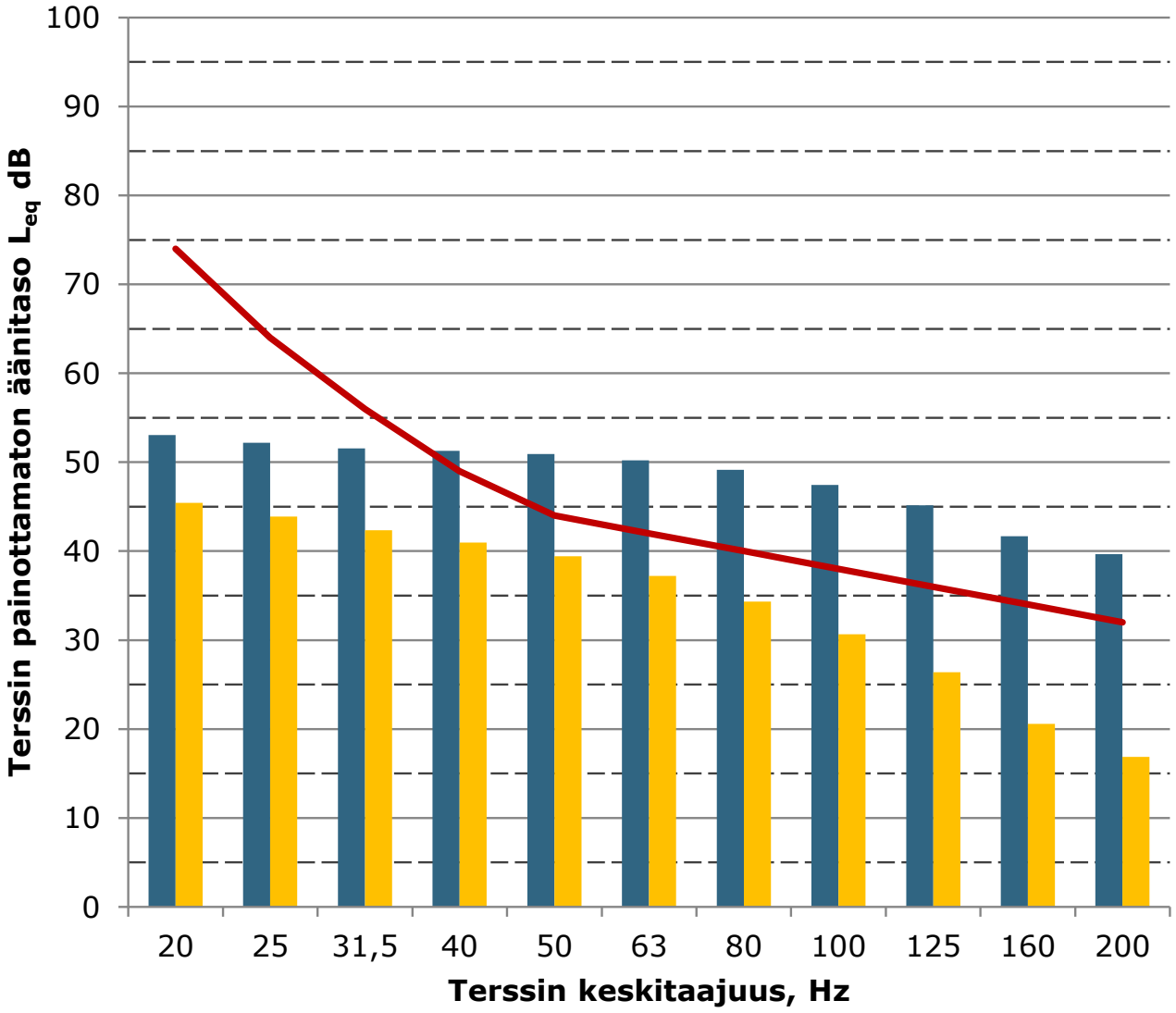
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus F, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

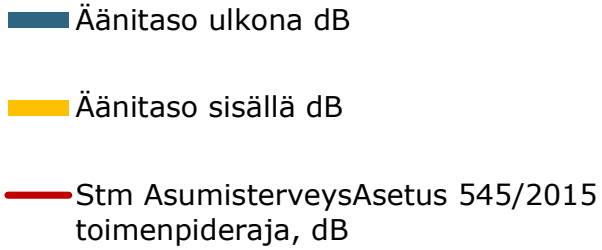




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 18
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

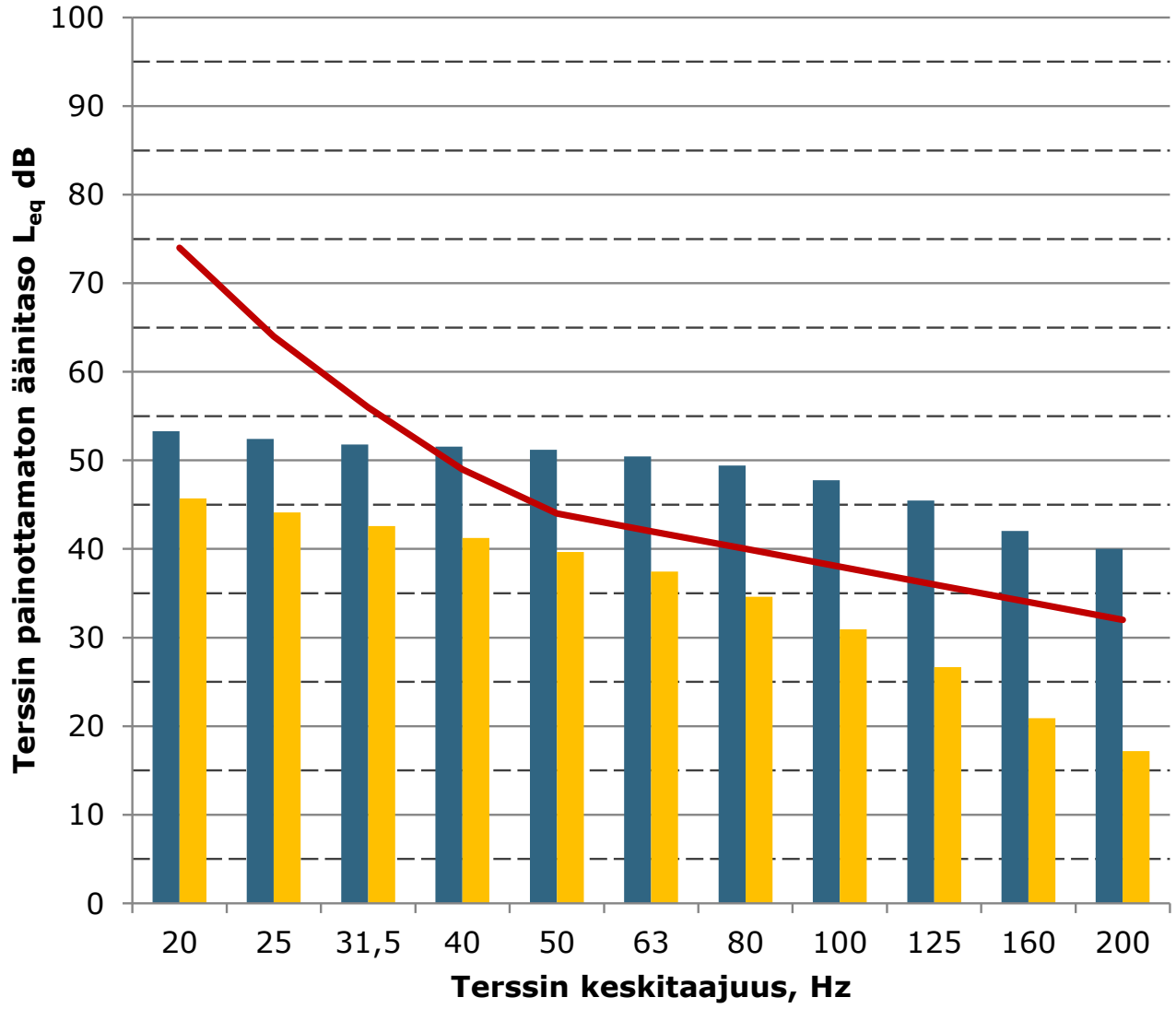
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus G, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

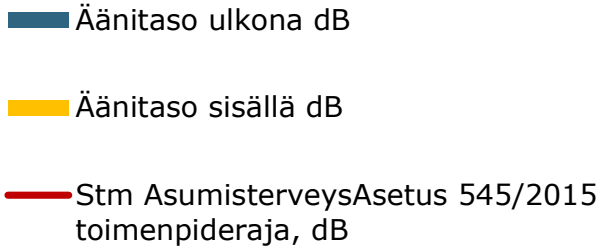




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 18
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

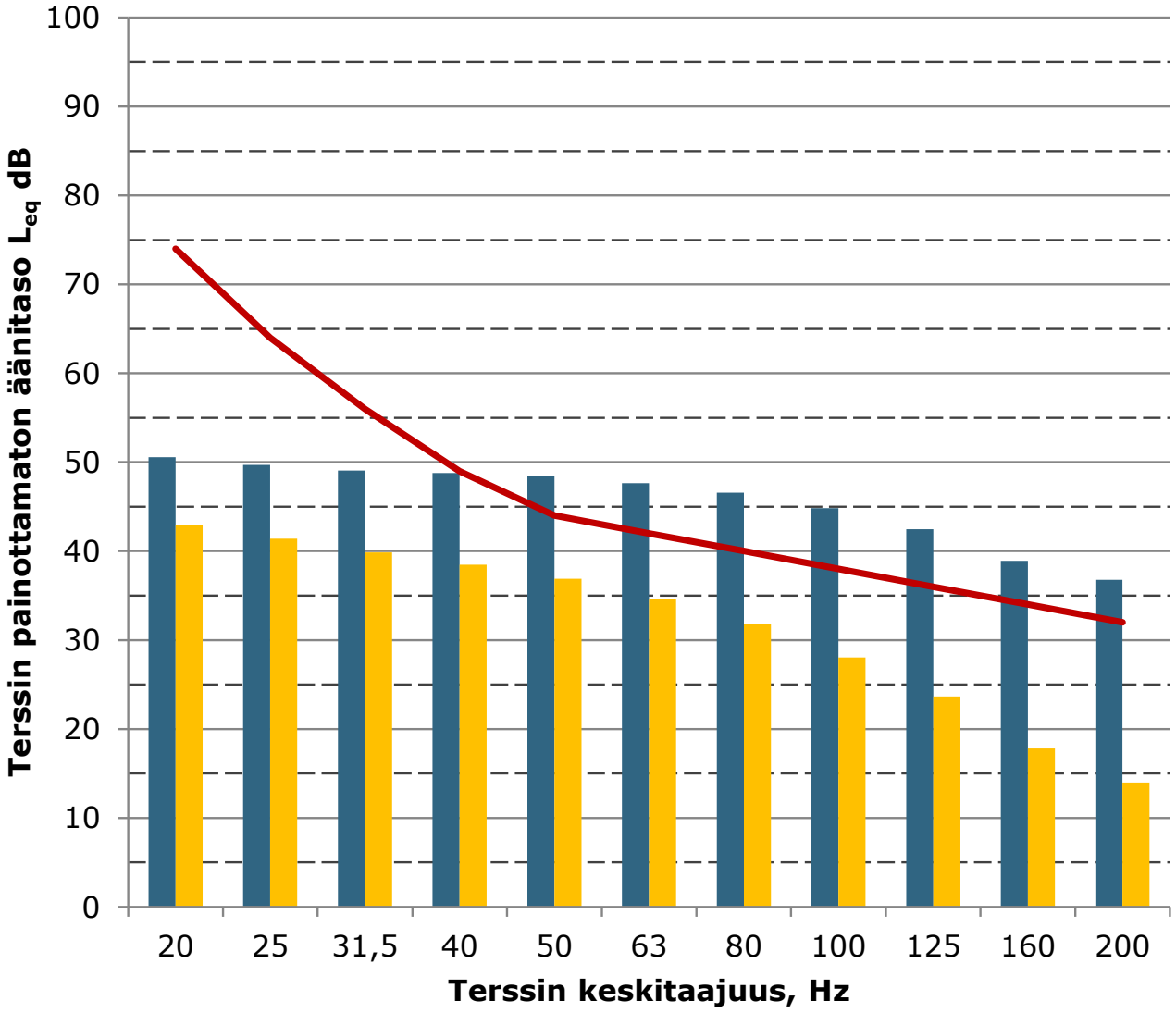
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus H, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

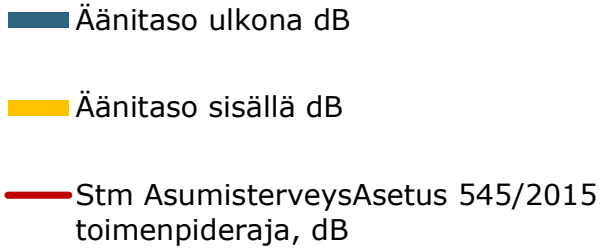




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 18
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

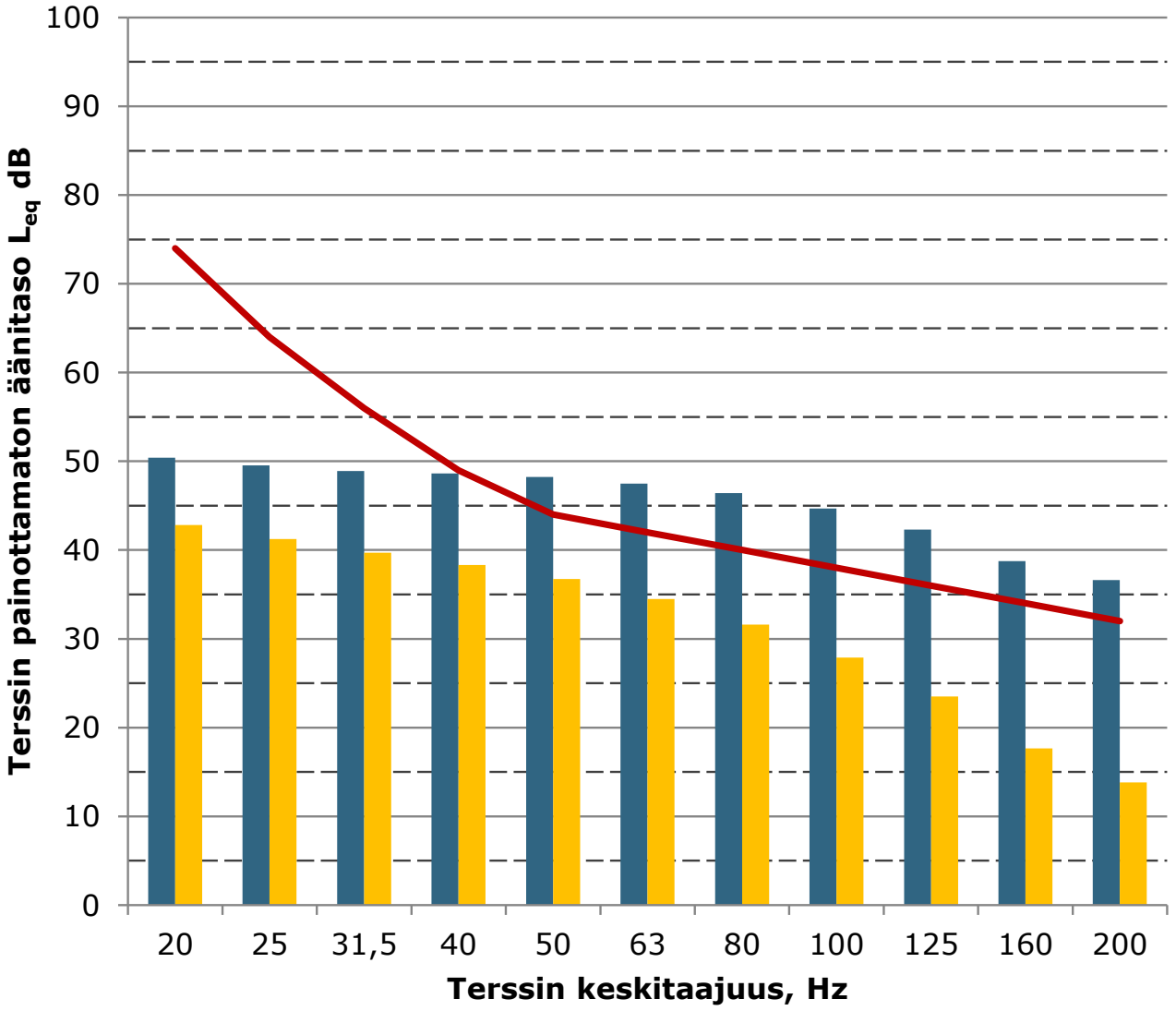
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus I, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

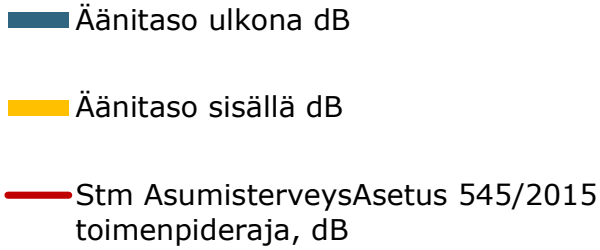




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 18
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

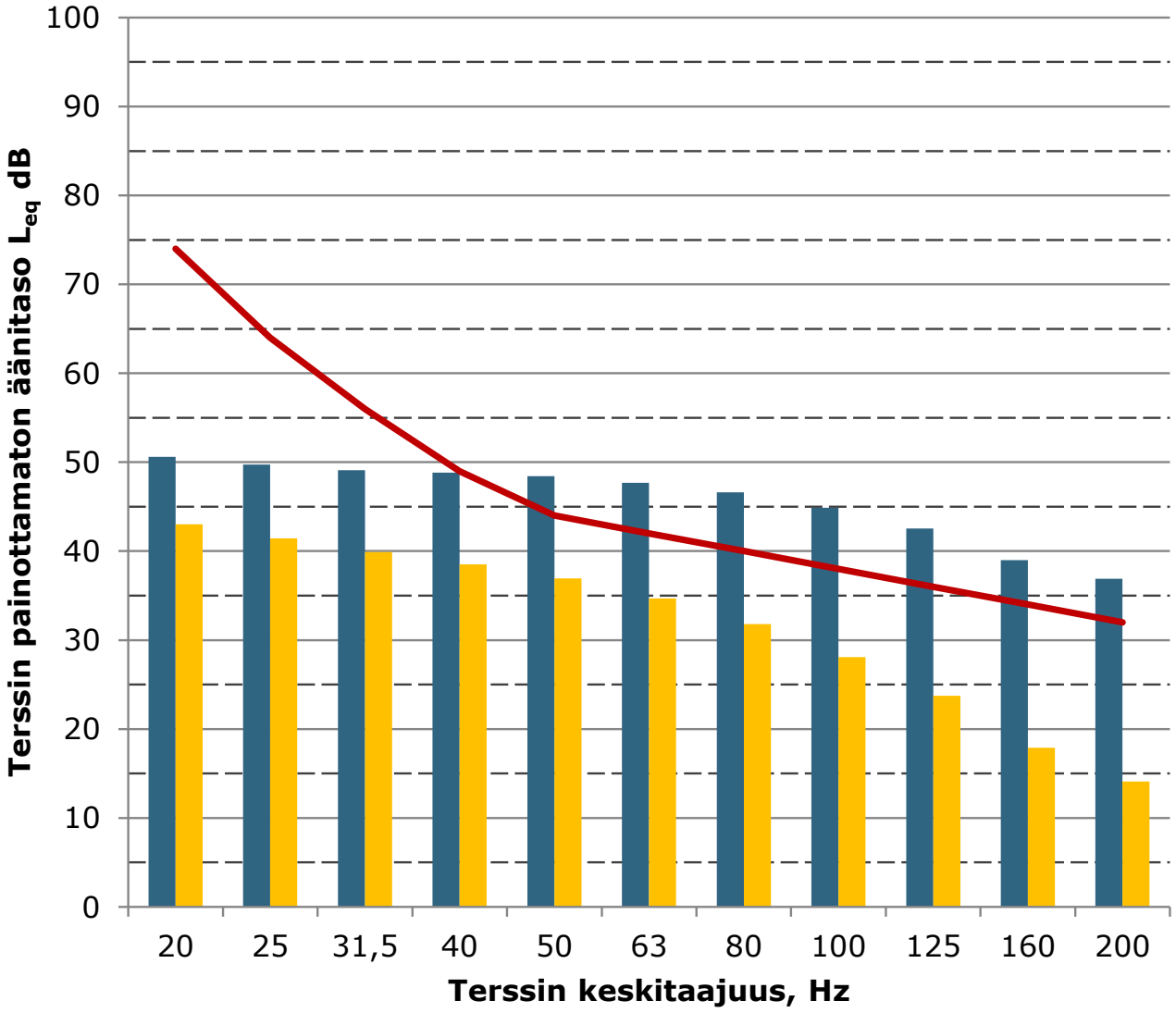
Matalien taajuuksien äänitasot ulkona ja sisällä, Lomarakennus J, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

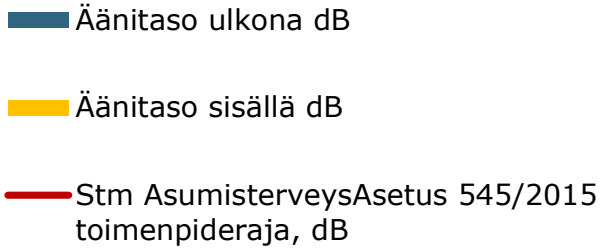




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 18
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

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

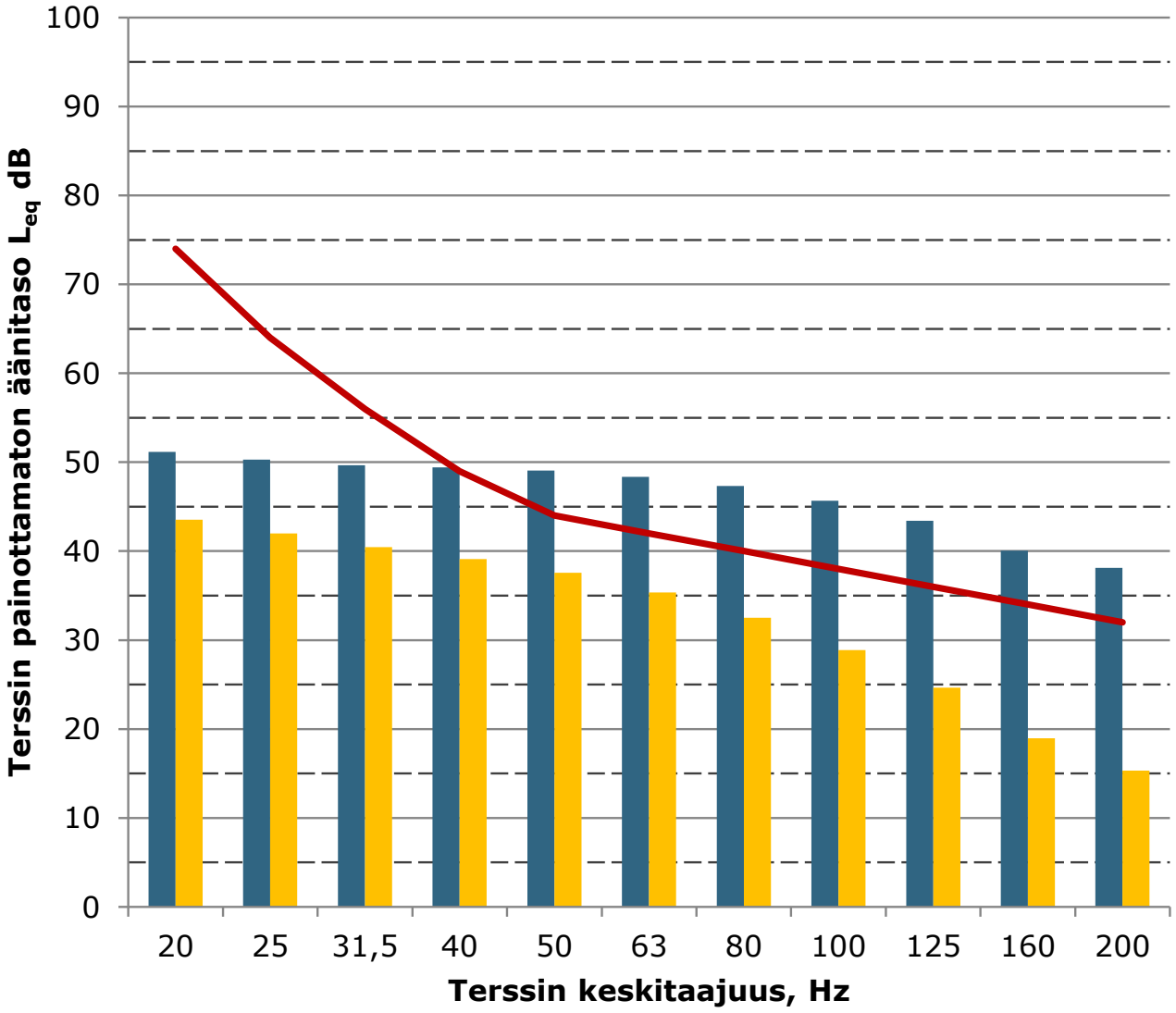


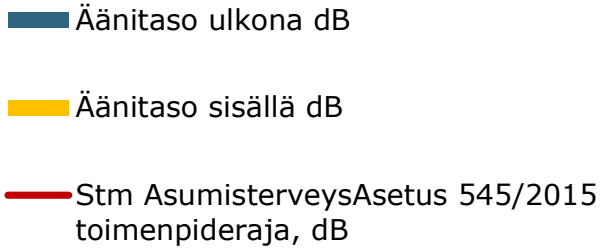


Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 18
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Liite 6. Matalataajuisen melun rakennuskohtaiset arvot - Hankevaihtoehto 3

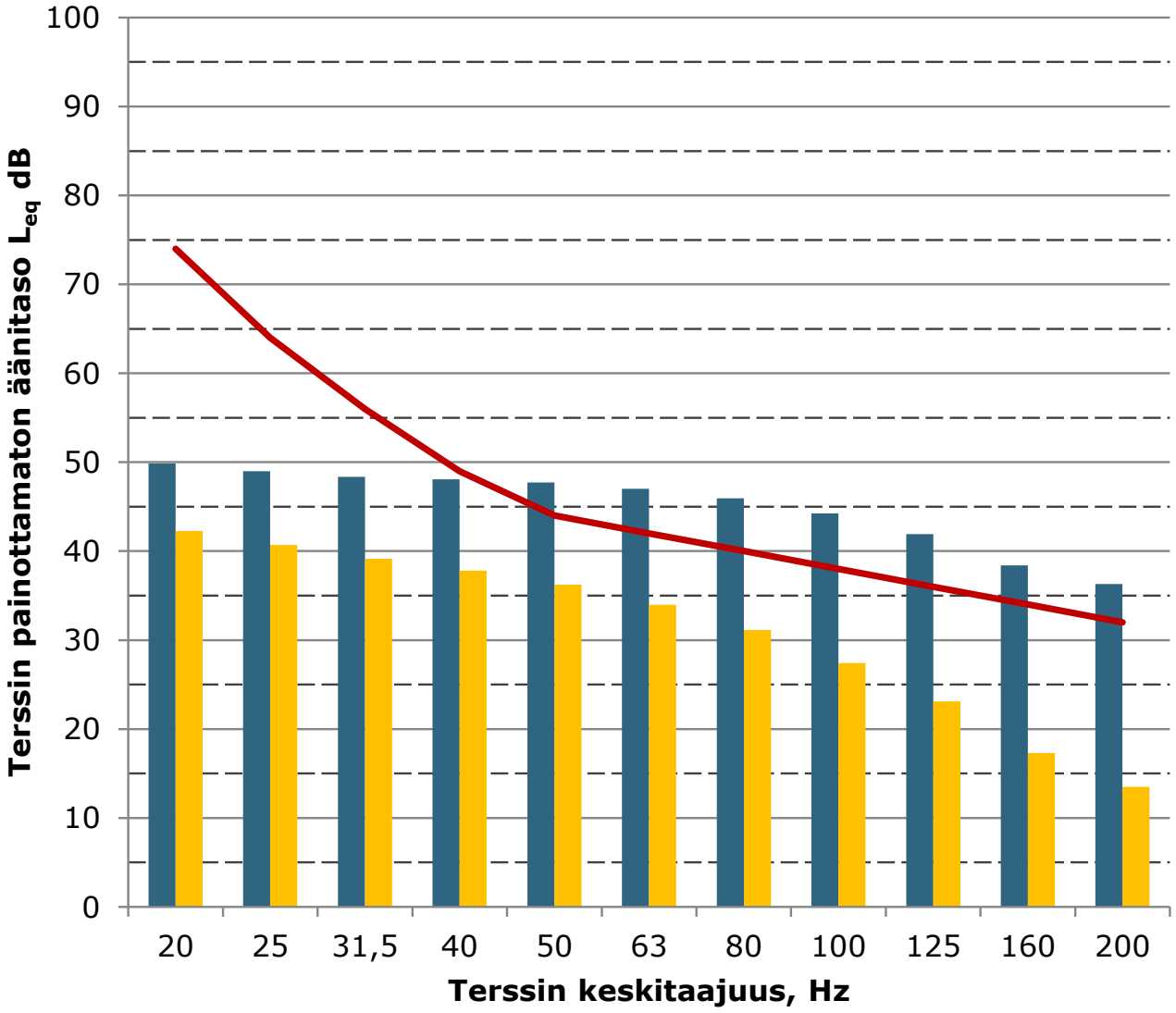
Matalien taajuuksien äänitasot ulkona ja sisällä, Lomarakennus A, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

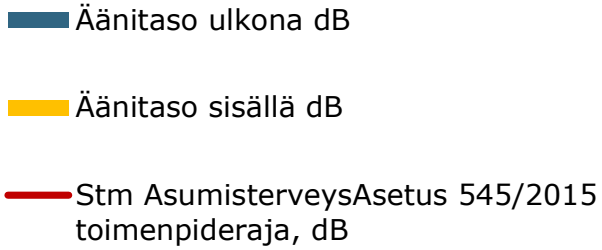




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 10
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

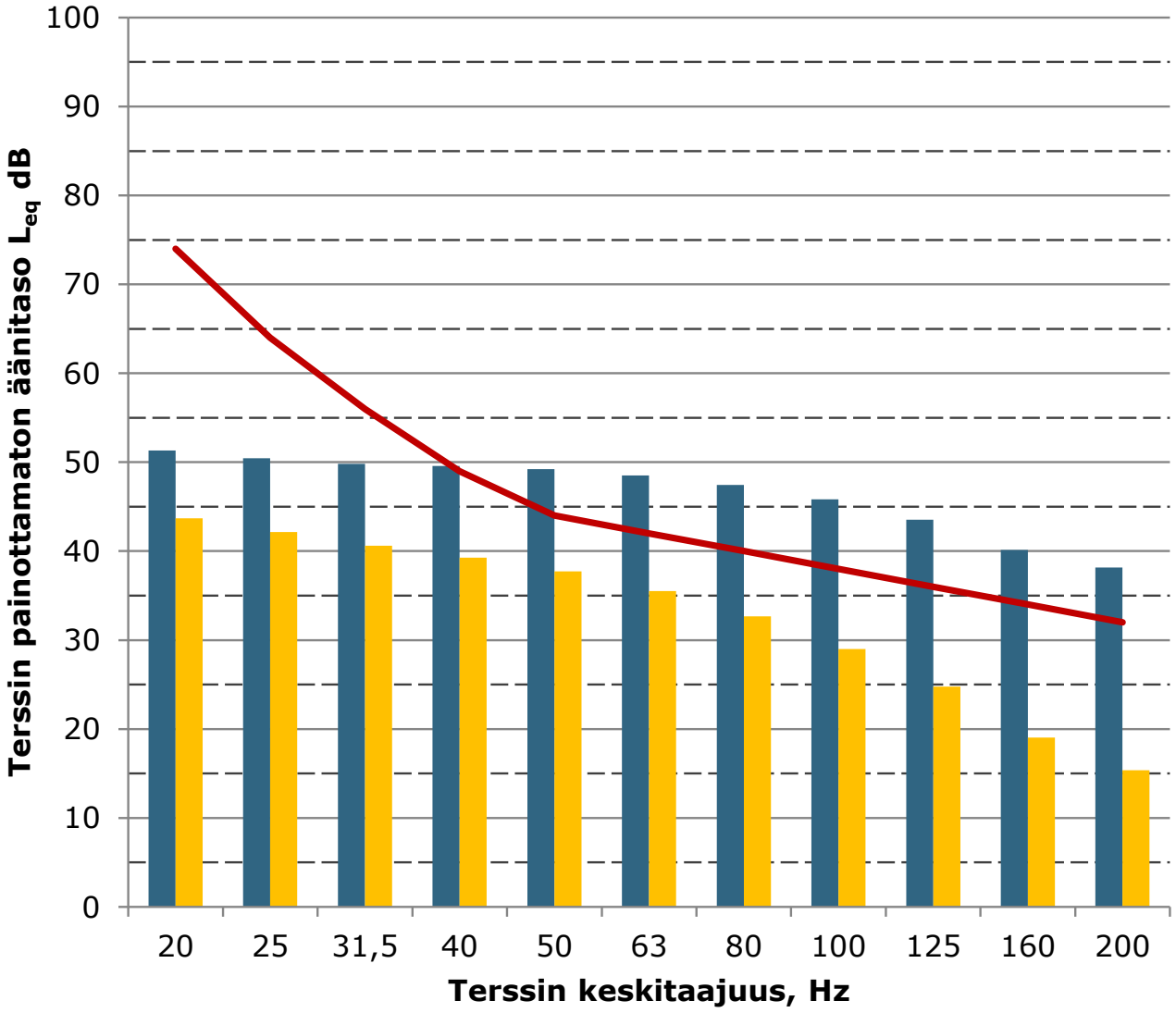
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus B, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

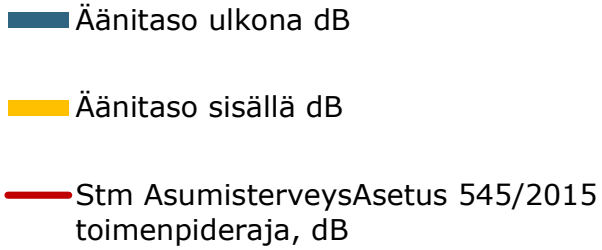




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 10
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

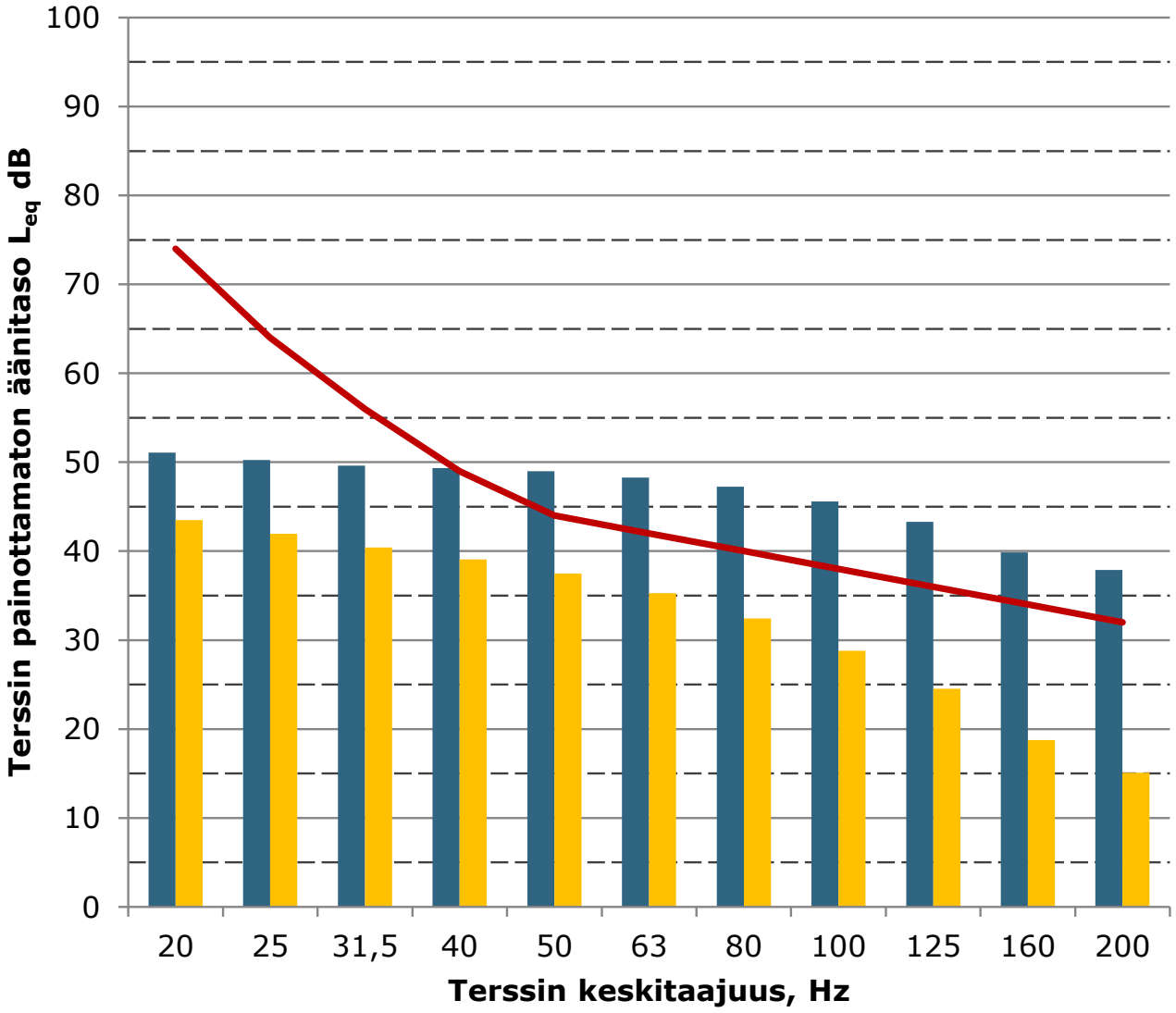
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus C, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

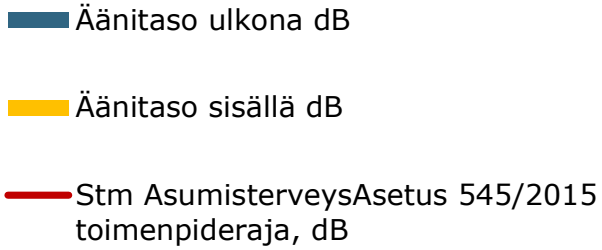




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 10
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

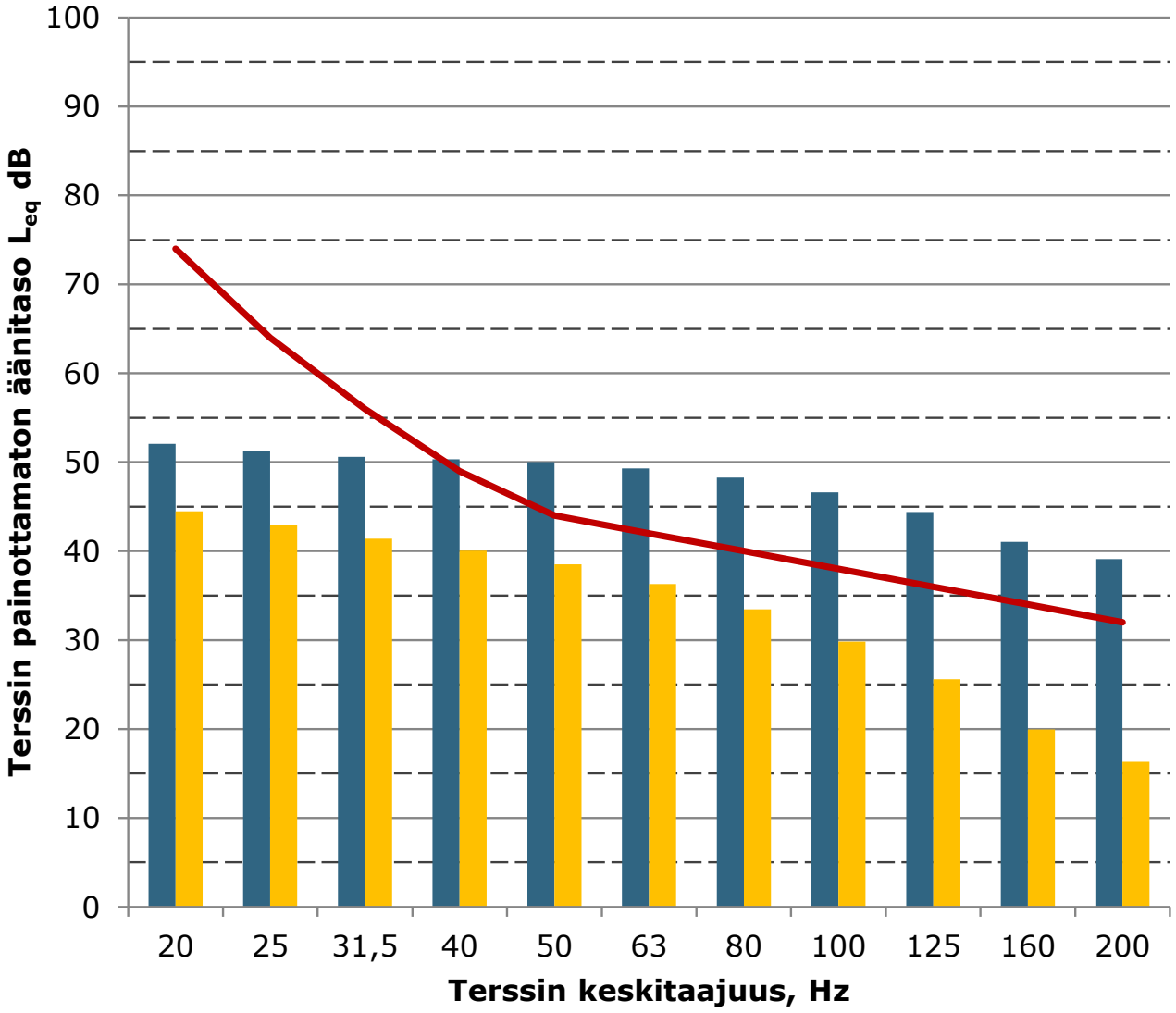
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus D, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

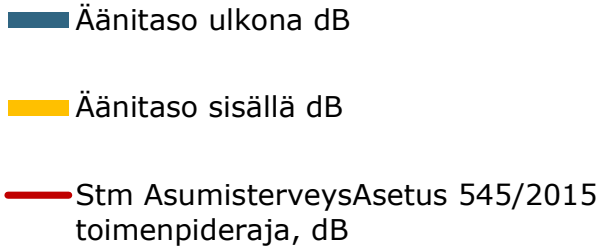




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 10
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

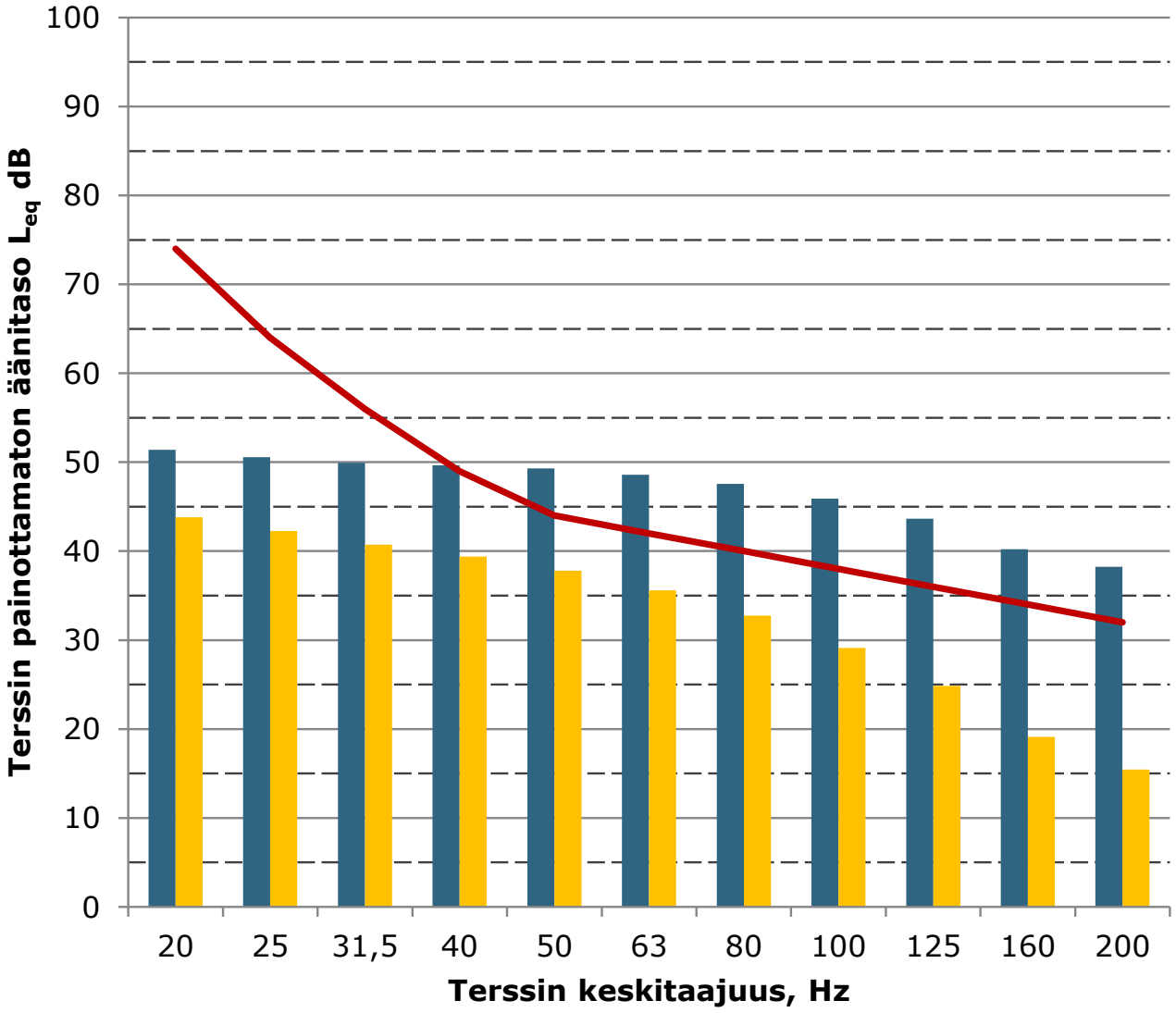
Matalien taajuuksien äänitasot ulkona ja sisällä, Lomarakennus E, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

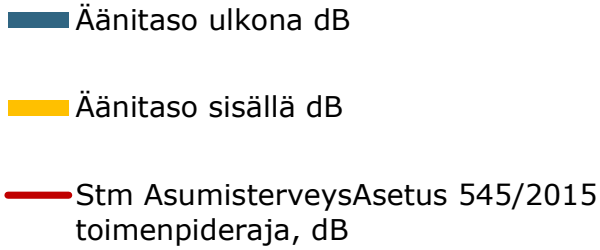




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 10
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

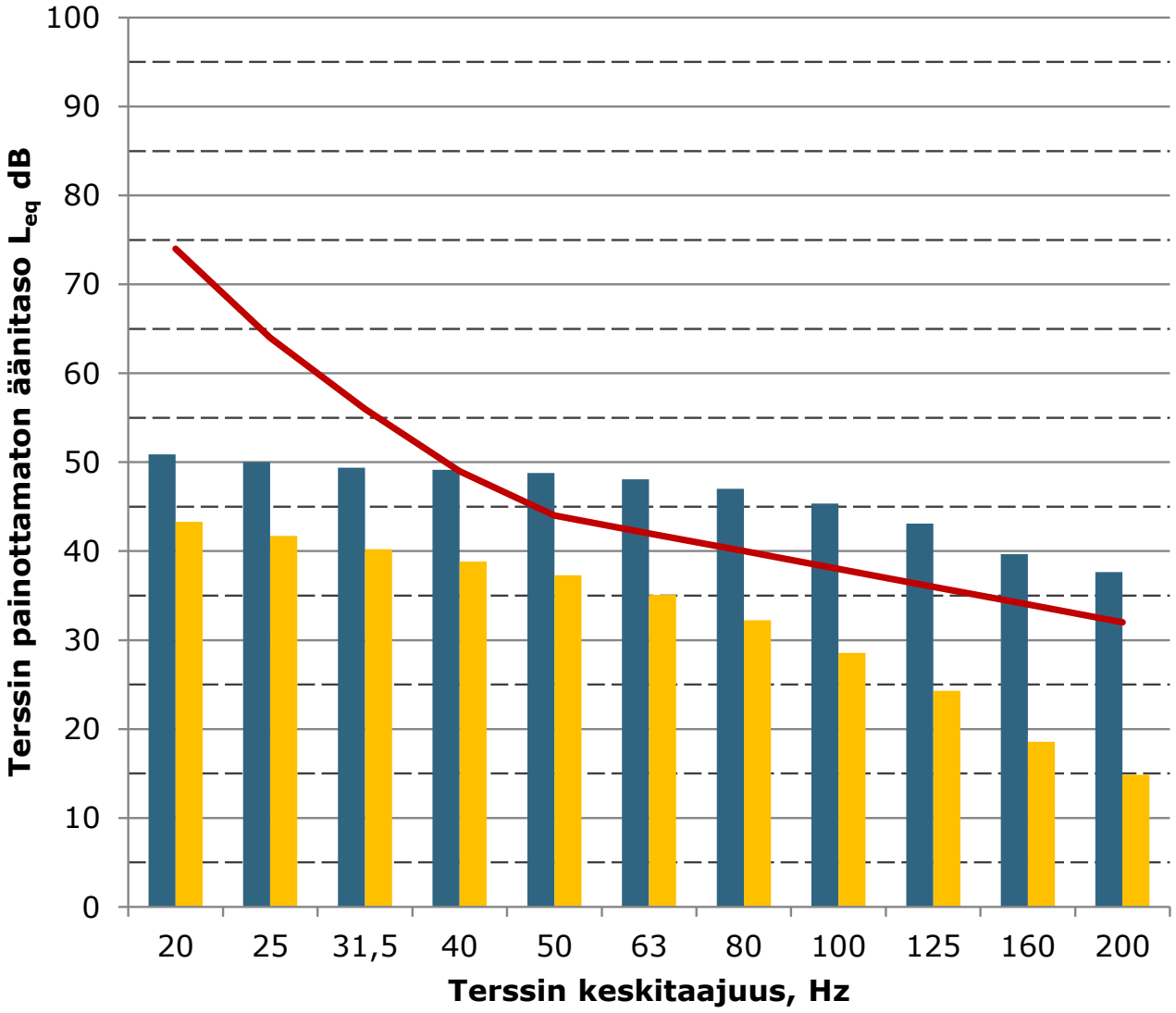
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus F, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

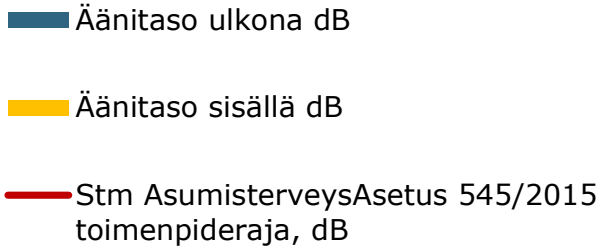




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 10
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

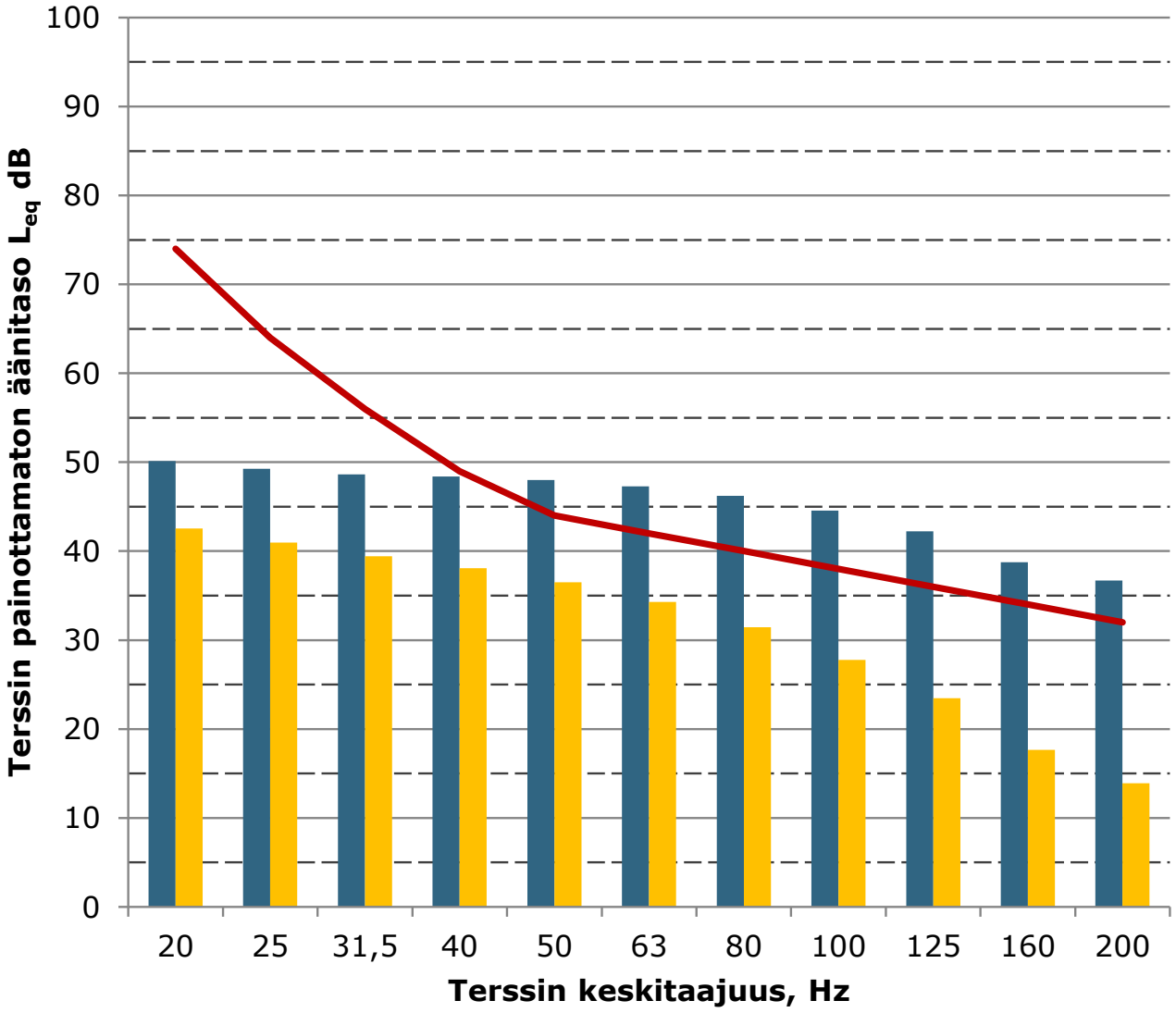
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus G, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

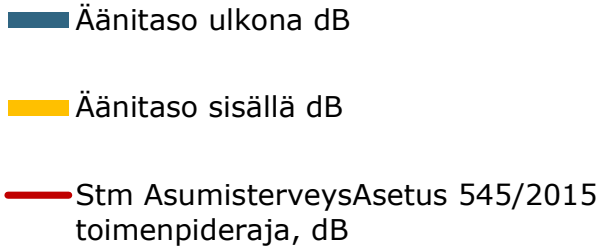




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 10
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

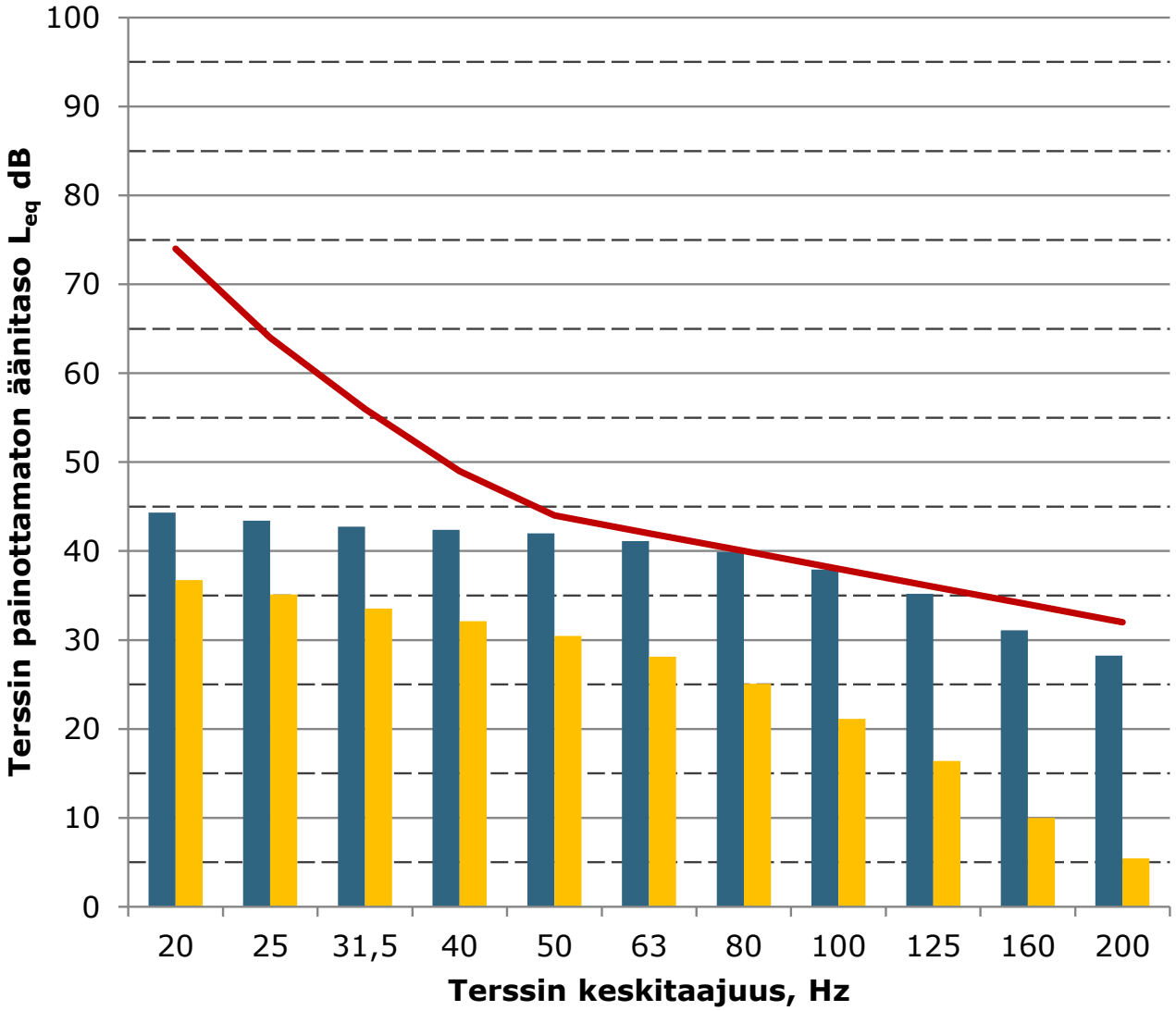
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus H, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

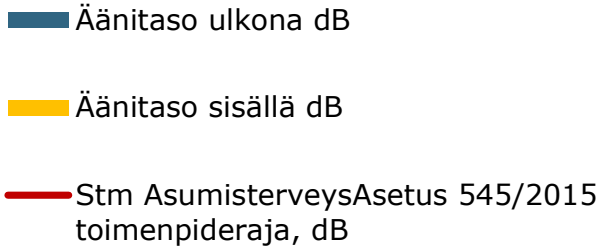




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 10
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

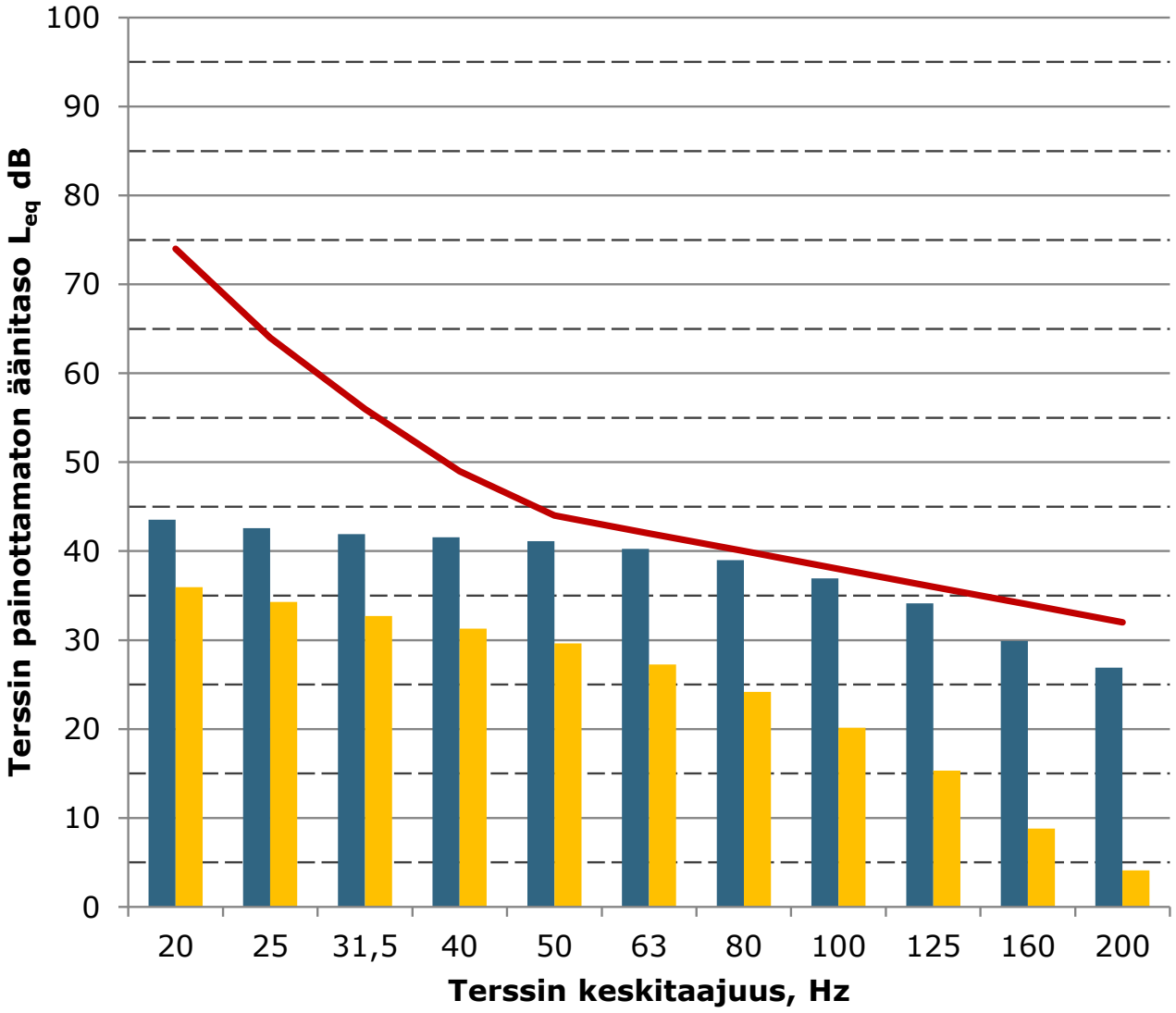
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus I, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

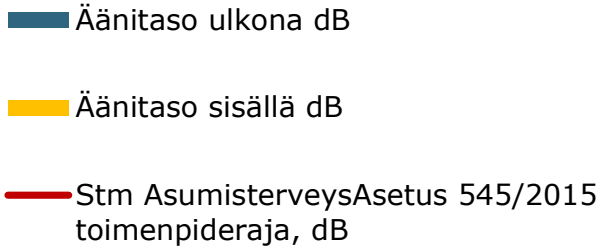




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 10
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

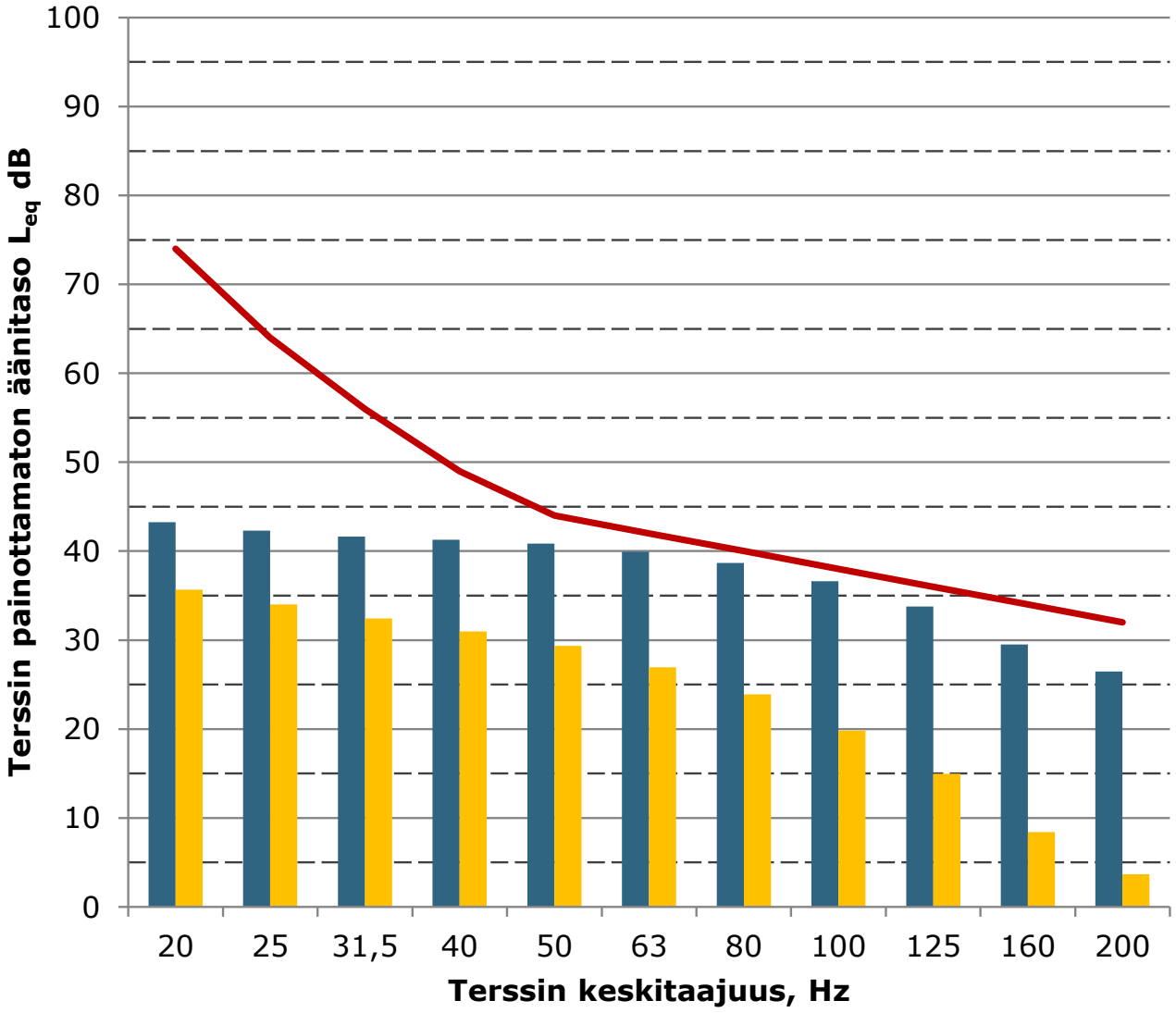
Matalien taajuuksien äänitasot ulkona ja sisällä, Lomarakennus J, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

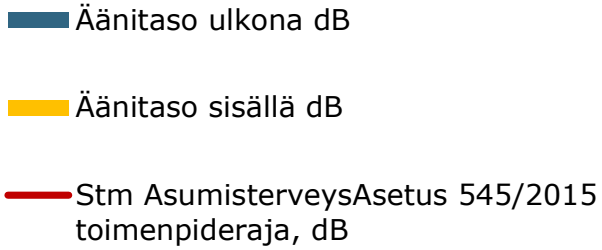




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 10
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

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





Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 10
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 7. Varjostusmallinnuksen tulokset ”Real Case, No forest” - Hankevaihtoehto 1

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Henri Korhonen / henri.korhonen@fcg.fi
Calculated:
31.1.2024 8.55/3.6.355

SHADOW - Main Result

Calculation: Uusimo_VE1_RD200x21xHH200_No_Forest

Assumptions for shadow calculations

Maximum distance for influence	2 089	m
Minimum sun height over horizon for influence	3	°
Day step for calculation	1	days
Time step for calculation	1	minutes

Sunshine probability S (Average daily sunshine hours) []

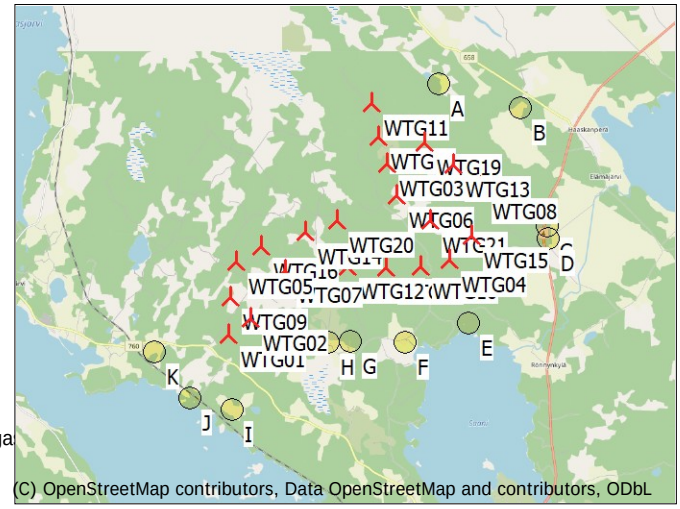
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

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_Pyhäntä_Pilpankanga
Receptor grid resolution: 1,0 m

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89



Scale 1:200 000

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]
WTG01	423 751	7 034 716	140,0	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG02	424 350	7 035 140	132,8	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG03	428 051	7 039 154	159,5	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG04	429 647	7 036 576	126,3	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG05	424 001	7 036 639	140,0	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG06	428 278	7 038 291	151,2	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG07	425 301	7 036 387	132,5	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG08	430 500	7 038 489	132,7	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG09	423 801	7 035 688	141,0	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG10	428 901	7 036 410	128,2	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG11	427 685	7 040 785	140,7	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG12	426 946	7 036 454	125,0	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG13	429 799	7 039 089	140,0	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG14	425 843	7 037 401	134,9	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG15	430 250	7 037 201	128,0	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG16	424 662	7 037 061	143,3	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG17	427 952	7 036 390	122,3	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG18	427 851	7 039 889	147,4	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG19	429 050	7 039 688	142,5	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG20	426 702	7 037 670	127,5	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG21	429 145	7 037 639	135,6	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5

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	429 470	7 041 260	145,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
B	B - Asuinrakennus	431 627	7 040 548	144,9	5,0	5,0	1,0	90,0	"Green house mode"	6,0
C	C - Asuinrakennus	432 261	7 037 387	122,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
D	D - Asuinrakennus	432 294	7 037 094	122,1	5,0	5,0	1,0	90,0	"Green house mode"	6,0
E	E - Lomarakennus	430 111	7 034 859	117,3	5,0	5,0	1,0	90,0	"Green house mode"	6,0
F	F - Asuinrakennus	428 445	7 034 384	122,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
G	G - Asuinrakennus	426 978	7 034 448	122,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0
H	H - Asuinrakennus	426 394	7 034 428	122,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
I	I - Asuinrakennus	423 788	7 032 711	125,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
J	J - Lomarakennus	422 689	7 033 070	114,2	5,0	5,0	1,0	90,0	"Green house mode"	6,0
K	K - Asuinrakennus	421 745	7 034 298	125,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0

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Calculated:
31.1.2024 8.55/3.6.355

SHADOW - Main Result

Calculation: Uusimo_VE1_RD200x21xHH200_No_Forest

Calculation Results

Shadow receptor

No.	Name	Shadow, expected values Shadow hours per year [h/year]
A	A - Lomarakennus	4:43
B	B - Asuinrakennus	0:00
C	C - Asuinrakennus	5:14
D	D - Asuinrakennus	1:45
E	E - Lomarakennus	1:02
F	F - Asuinrakennus	0:00
G	G - Asuinrakennus	0:00
H	H - Asuinrakennus	0:00
I	I - Asuinrakennus	0:00
J	J - Lomarakennus	0:00
K	K - Asuinrakennus	2:11

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

No.	Name	Expected [h/year]
WTG01	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (436)	2:11
WTG02	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (434)	0:00
WTG03	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (416)	0:00
WTG04	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (417)	0:00
WTG05	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (418)	0:00
WTG06	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (419)	0:00
WTG07	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (420)	0:00
WTG08	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (421)	3:41
WTG09	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (435)	0:00
WTG10	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (422)	1:02
WTG11	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (423)	1:42
WTG12	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (424)	0:00
WTG13	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (425)	0:00
WTG14	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (426)	0:00
WTG15	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (427)	3:19
WTG16	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (428)	0:00
WTG17	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (429)	0:00
WTG18	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (430)	0:00
WTG19	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (431)	2:52
WTG20	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (432)	0:00
WTG21	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (433)	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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SHADOW - Calendar

Calculation: Uusimo_VE1_RD200x21xHH200_No_Forest

Shadow receptor: A - A - Lomarakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January			February			March			April	May	June
1	10.01			08.57		13.15 (WTG19)	07.28			06.41	04.58	03.27
	14.42			16.08	26	13.41 (WTG19)	17.35			20.06	21.35	23.07
2	10.00			08.54		13.16 (WTG19)	07.24			06.37	04.55	03.24
	14.44			16.11	25	13.41 (WTG19)	17.38			20.08	21.38	23.10
3	09.59			08.51		13.17 (WTG19)	07.21			06.34	04.52	03.22
	14.46			16.14	22	13.39 (WTG19)	17.41			20.11	21.41	23.12
4	09.58			08.48		13.18 (WTG19)	07.17			06.31	04.48	03.20
	14.48			16.17	20	13.38 (WTG19)	17.44			20.14	21.44	23.15
5	09.57			08.45		13.21 (WTG19)	07.14			06.27	04.45	03.18
	14.50			16.21	16	13.37 (WTG19)	17.47			20.17	21.47	23.17
6	09.56		13.17 (WTG19)	08.42		13.23 (WTG19)	07.11			06.24	04.42	03.16
	14.52	5	13.22 (WTG19)	16.24	11	13.34 (WTG19)	17.50			20.20	21.50	23.19
7	09.54		13.16 (WTG19)	08.39			07.07			06.20	04.39	03.14
	14.55	9	13.25 (WTG19)	16.27			17.53			20.23	21.53	23.21
8	09.53		13.14 (WTG19)	08.36			07.04		17.17 (WTG11)	06.17	04.35	03.12
	14.57	13	13.27 (WTG19)	16.30			17.56	4	17.21 (WTG11)	20.26	21.56	23.23
9	09.51		13.13 (WTG19)	08.33			07.00		17.13 (WTG11)	06.13	04.32	03.11
	14.59	15	13.28 (WTG19)	16.33			17.59	10	17.23 (WTG11)	20.29	21.59	23.25
10	09.50		13.13 (WTG19)	08.29			06.57		17.11 (WTG11)	06.10	04.29	03.09
	15.02	17	13.30 (WTG19)	16.37			18.02	16	17.27 (WTG11)	20.32	22.02	23.27
11	09.48		13.12 (WTG19)	08.26			06.54		17.09 (WTG11)	06.06	04.26	03.08
	15.05	19	13.31 (WTG19)	16.40			18.05	20	17.29 (WTG11)	20.35	22.06	23.29
12	09.46		13.12 (WTG19)	08.23			06.50		17.08 (WTG11)	06.03	04.23	03.06
	15.07	21	13.33 (WTG19)	16.43			18.08	23	17.31 (WTG11)	20.38	22.09	23.31
13	09.44		13.12 (WTG19)	08.20			06.47		17.07 (WTG11)	05.59	04.20	03.05
	15.10	22	13.34 (WTG19)	16.46			18.11	24	17.31 (WTG11)	20.40	22.12	23.32
14	09.42		13.11 (WTG19)	08.17			06.43		17.07 (WTG11)	05.56	04.17	03.04
	15.13	23	13.34 (WTG19)	16.49			18.14	24	17.31 (WTG11)	20.43	22.15	23.33
15	09.40		13.11 (WTG19)	08.14			06.40		17.06 (WTG11)	05.53	04.13	03.03
	15.15	25	13.36 (WTG19)	16.52			18.17	25	17.31 (WTG11)	20.46	22.18	23.35
16	09.38		13.11 (WTG19)	08.10			06.36		17.06 (WTG11)	05.49	04.10	03.02
	15.18	25	13.36 (WTG19)	16.56			18.19	25	17.31 (WTG11)	20.49	22.21	23.36
17	09.36		13.10 (WTG19)	08.07			06.33		17.05 (WTG11)	05.46	04.07	03.02
	15.21	27	13.37 (WTG19)	16.59			18.22	25	17.30 (WTG11)	20.52	22.24	23.37
18	09.33		13.11 (WTG19)	08.04			06.29		17.06 (WTG11)	05.42	04.04	03.01
	15.24	27	13.38 (WTG19)	17.02			18.25	24	17.30 (WTG11)	20.55	22.27	23.38
19	09.31		13.10 (WTG19)	08.01			06.26		17.05 (WTG11)	05.39	04.01	03.01
	15.27	29	13.39 (WTG19)	17.05			18.28	24	17.29 (WTG11)	20.58	22.30	23.38
20	09.29		13.11 (WTG19)	07.57			06.23		17.06 (WTG11)	05.35	03.58	03.01
	15.30	29	13.40 (WTG19)	17.08			18.31	22	17.28 (WTG11)	21.01	22.33	23.39
21	09.26		13.11 (WTG19)	07.54			06.19		17.07 (WTG11)	05.32	03.56	03.01
	15.33	29	13.40 (WTG19)	17.11			18.34	19	17.26 (WTG11)	21.04	22.36	23.39
22	09.24		13.10 (WTG19)	07.51			06.16		17.09 (WTG11)	05.29	03.53	03.01
	15.36	30	13.40 (WTG19)	17.14			18.37	16	17.25 (WTG11)	21.07	22.39	23.39
23	09.21		13.11 (WTG19)	07.48			06.12		17.10 (WTG11)	05.25	03.50	03.01
	15.39	30	13.41 (WTG19)	17.17			18.40	12	17.22 (WTG11)	21.10	22.42	23.39
24	09.19		13.11 (WTG19)	07.44			06.09			05.22	03.47	03.01
	15.42	30	13.41 (WTG19)	17.20			18.42			21.13	22.45	23.39
25	09.16		13.11 (WTG19)	07.41			06.05			05.18	03.44	03.02
	15.46	30	13.41 (WTG19)	17.23			18.45			21.16	22.48	23.39
26	09.13		13.12 (WTG19)	07.38			06.02			05.15	03.42	03.03
	15.49	30	13.42 (WTG19)	17.26			18.48			21.19	22.51	23.38
27	09.11		13.12 (WTG19)	07.34			05.58			05.12	03.39	03.03
	15.52	30	13.42 (WTG19)	17.29			18.51			21.22	22.54	23.38
28	09.08		13.13 (WTG19)	07.31			05.55			05.08	03.36	03.04
	15.55	29	13.42 (WTG19)	17.32			18.54			21.25	22.56	23.37
29	09.05		13.13 (WTG19)				06.51			05.05	03.34	03.06
	15.58	29	13.42 (WTG19)				19.57			21.28	22.59	23.36
30	09.02		13.13 (WTG19)				06.48			05.02	03.31	03.07
	16.01	28	13.41 (WTG19)				20.00			21.32	23.02	23.35
31	08.59		13.14 (WTG19)				06.44				03.29	
	16.05	28	13.42 (WTG19)				20.03				23.05	
Potential sun hours	178			241			363			449	563	611
Total, worst case		629			120			313				
Sun reduction		0,17			0,33			0,32				
Oper. time red.		0,90			0,90			0,90				
Wind dir. red.		0,70			0,70			0,55				
Total reduction		0,11			0,21			0,16				
Total, real		71			26			52				

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:
31.1.2024 8.55/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE1_RD200x21xHH200_No_Forest

Shadow receptor: A - A - Lomarakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	July	August	September			October			November			December		
1	03.08	04.28	06.00			07.24		17.47 (WTG11)	07.55			09.26		12.54 (WTG19)
	23.34	22.19	20.35			18.51	23	18.10 (WTG11)	16.08			14.48	19	13.13 (WTG19)
2	03.10	04.31	06.03			07.26		17.47 (WTG11)	07.58			09.28		12.55 (WTG19)
	23.33	22.16	20.32			18.48	21	18.08 (WTG11)	16.05			14.46	18	13.13 (WTG19)
3	03.12	04.34	06.06			07.29		17.48 (WTG11)	08.01			09.31		12.57 (WTG19)
	23.32	22.12	20.28			18.44	18	18.06 (WTG11)	16.02			14.44	16	13.13 (WTG19)
4	03.13	04.37	06.08			07.32		17.49 (WTG11)	08.04			09.33		12.58 (WTG19)
	23.30	22.09	20.25			18.41	13	18.02 (WTG11)	15.59			14.42	13	13.11 (WTG19)
5	03.15	04.40	06.11			07.35		17.52 (WTG11)	08.07		12.53 (WTG19)	09.36		13.00 (WTG19)
	23.28	22.06	20.21			18.37	7	17.59 (WTG11)	15.55	12	13.05 (WTG19)	14.41	10	13.10 (WTG19)
6	03.17	04.43	06.14			07.38			08.10		12.50 (WTG19)	09.38		13.03 (WTG19)
	23.27	22.03	20.18			18.34			15.52	17	13.07 (WTG19)	14.39	6	13.09 (WTG19)
7	03.19	04.46	06.17			07.41			08.13		12.49 (WTG19)	09.40		
	23.25	22.00	20.14			18.31			15.49	20	13.09 (WTG19)	14.38		
8	03.21	04.49	06.20			07.43			08.16		12.48 (WTG19)	09.43		
	23.23	21.56	20.11			18.27			15.46	22	13.10 (WTG19)	14.37		
9	03.24	04.52	06.22			07.46			08.20		12.47 (WTG19)	09.45		
	23.21	21.53	20.07			18.24			15.43	24	13.11 (WTG19)	14.35		
10	03.26	04.55	06.25			07.49			08.23		12.45 (WTG19)	09.47		
	23.19	21.50	20.04			18.20			15.40	26	13.11 (WTG19)	14.34		
11	03.28	04.58	06.28			07.52			08.26		12.45 (WTG19)	09.49		
	23.17	21.46	20.00			18.17			15.38	27	13.12 (WTG19)	14.33		
12	03.31	05.01	06.31			07.55			08.29		12.45 (WTG19)	09.50		
	23.15	21.43	19.57			18.14			15.35	28	13.13 (WTG19)	14.32		
13	03.33	05.04	06.34			07.58			08.32		12.44 (WTG19)	09.52		
	23.12	21.40	19.54			18.10			15.32	30	13.14 (WTG19)	14.32		
14	03.36	05.07	06.36			08.01			08.35		12.44 (WTG19)	09.54		
	23.10	21.36	19.50			18.07			15.29	30	13.14 (WTG19)	14.31		
15	03.39	05.10	06.39			08.04			08.38		12.44 (WTG19)	09.55		
	23.07	21.33	19.47			18.03			15.26	30	13.14 (WTG19)	14.30		
16	03.41	05.13	06.42			08.07			08.41		12.44 (WTG19)	09.57		
	23.05	21.30	19.43			18.00			15.23	31	13.15 (WTG19)	14.30		
17	03.44	05.16	06.45			08.09			08.45		12.45 (WTG19)	09.58		
	23.02	21.26	19.40			17.57			15.21	30	13.15 (WTG19)	14.30		
18	03.47	05.19	06.47			08.12			08.48		12.45 (WTG19)	09.59		
	23.00	21.23	19.36			17.53			15.18	30	13.15 (WTG19)	14.30		
19	03.50	05.22	06.50			08.15			08.51		12.45 (WTG19)	10.00		
	22.57	21.20	19.33			17.50			15.15	30	13.15 (WTG19)	14.30		
20	03.53	05.25	06.53		17.58 (WTG11)	08.18			08.54		12.45 (WTG19)	10.01		
	22.54	21.16	19.29	10	18.08 (WTG11)	17.47			15.13	30	13.15 (WTG19)	14.30		
21	03.55	05.28	06.56		17.54 (WTG11)	08.21			08.57		12.46 (WTG19)	10.02		
	22.51	21.13	19.26	15	18.09 (WTG11)	17.43			15.10	29	13.15 (WTG19)	14.30		
22	03.58	05.31	06.59		17.52 (WTG11)	08.24			09.00		12.47 (WTG19)	10.02		
	22.49	21.09	19.22	19	18.11 (WTG11)	17.40			15.08	29	13.16 (WTG19)	14.30		
23	04.01	05.34	07.01		17.51 (WTG11)	08.27			09.03		12.47 (WTG19)	10.03		
	22.46	21.06	19.19	21	18.12 (WTG11)	17.37			15.05	29	13.16 (WTG19)	14.31		
24	04.04	05.37	07.04		17.50 (WTG11)	08.30			09.06		12.48 (WTG19)	10.03		
	22.43	21.03	19.15	23	18.13 (WTG11)	17.34			15.03	27	13.15 (WTG19)	14.32		
25	04.07	05.40	07.07		17.49 (WTG11)	07.33			09.09		12.48 (WTG19)	10.03		
	22.40	20.59	19.12	24	18.13 (WTG11)	16.30			15.01	27	13.15 (WTG19)	14.32		
26	04.10	05.43	07.10		17.47 (WTG11)	07.36			09.12		12.49 (WTG19)	10.03		
	22.37	20.56	19.08	25	18.12 (WTG11)	16.27			14.58	26	13.15 (WTG19)	14.33		
27	04.13	05.46	07.12		17.47 (WTG11)	07.39			09.15		12.50 (WTG19)	10.03		
	22.34	20.52	19.05	25	18.12 (WTG11)	16.24			14.56	25	13.15 (WTG19)	14.34		
28	04.16	05.48	07.15		17.47 (WTG11)	07.42			09.17		12.51 (WTG19)	10.03		
	22.31	20.49	19.01	25	18.12 (WTG11)	16.21			14.54	24	13.15 (WTG19)	14.36		
29	04.19	05.51	07.18		17.47 (WTG11)	07.45			09.20		12.52 (WTG19)	10.03		
	22.28	20.45	18.58	25	18.12 (WTG11)	16.17			14.52	22	13.14 (WTG19)	14.37		
30	04.22	05.54	07.21		17.47 (WTG11)	07.49			09.23		12.54 (WTG19)	10.02		
	22.25	20.42	18.55	24	18.11 (WTG11)	16.14			14.50	20	13.14 (WTG19)	14.38		
31	04.25	05.57				07.52						10.02		
	22.22	20.39				16.11						14.40		
Potential sun hours	599	504	392			307			203			146		
Total, worst case				236			82			675			82	
Sun reduction				0,36			0,25			0,17			0,12	
Oper. time red.				0,90			0,90			0,90			0,90	
Wind dir. red.				0,55			0,55			0,70			0,70	
Total reduction				0,18			0,13			0,11			0,08	
Total, real				43			11			75			7	

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:
31.1.2024 8.55/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE1_RD200x21xHH200_No_Forest

Shadow receptor: B - B - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.01	08.56	07.27	06.41	04.58	03.26	03.08	04.28	06.00	07.23	07.54	09.25
	14.42	16.08	17.35	20.05	21.34	23.07	23.34	22.18	20.35	18.51	16.08	14.48
2	10.00	08.53	07.24	06.37	04.55	03.24	03.10	04.31	06.03	07.26	07.58	09.28
	14.44	16.11	17.38	20.08	21.37	23.09	23.33	22.15	20.31	18.48	16.05	14.46
3	09.59	08.50	07.21	06.34	04.52	03.22	03.11	04.34	06.05	07.29	08.01	09.31
	14.46	16.14	17.41	20.11	21.41	23.12	23.31	22.12	20.28	18.44	16.02	14.44
4	09.58	08.48	07.17	06.30	04.48	03.20	03.13	04.37	06.08	07.32	08.04	09.33
	14.48	16.17	17.44	20.14	21.44	23.14	23.30	22.09	20.25	18.41	15.58	14.42
5	09.57	08.45	07.14	06.27	04.45	03.18	03.15	04.40	06.11	07.35	08.07	09.35
	14.50	16.21	17.47	20.17	21.47	23.17	23.28	22.06	20.21	18.37	15.55	14.41
6	09.55	08.42	07.10	06.23	04.42	03.16	03.17	04.43	06.14	07.38	08.10	09.38
	14.52	16.24	17.50	20.20	21.50	23.19	23.26	22.03	20.18	18.34	15.52	14.39
7	09.54	08.38	07.07	06.20	04.39	03.14	03.19	04.46	06.17	07.40	08.13	09.40
	14.54	16.27	17.53	20.23	21.53	23.21	23.25	21.59	20.14	18.30	15.49	14.38
8	09.53	08.35	07.04	06.17	04.35	03.12	03.21	04.49	06.19	07.43	08.16	09.42
	14.57	16.30	17.56	20.26	21.56	23.23	23.23	21.56	20.11	18.27	15.46	14.36
9	09.51	08.32	07.00	06.13	04.32	03.11	03.24	04.52	06.22	07.46	08.19	09.44
	14.59	16.33	17.59	20.29	21.59	23.25	23.21	21.53	20.07	18.24	15.43	14.35
10	09.49	08.29	06.57	06.10	04.29	03.09	03.26	04.55	06.25	07.49	08.23	09.46
	15.02	16.36	18.02	20.31	22.02	23.27	23.19	21.49	20.04	18.20	15.40	14.34
11	09.48	08.26	06.53	06.06	04.26	03.08	03.28	04.58	06.28	07.52	08.26	09.48
	15.04	16.40	18.05	20.34	22.05	23.29	23.16	21.46	20.00	18.17	15.37	14.33
12	09.46	08.23	06.50	06.03	04.23	03.06	03.31	05.01	06.31	07.55	08.29	09.50
	15.07	16.43	18.08	20.37	22.08	23.30	23.14	21.43	19.57	18.13	15.35	14.32
13	09.44	08.20	06.47	05.59	04.20	03.05	03.33	05.04	06.33	07.58	08.32	09.52
	15.10	16.46	18.11	20.40	22.12	23.32	23.12	21.40	19.53	18.10	15.32	14.31
14	09.42	08.17	06.43	05.56	04.16	03.04	03.36	05.07	06.36	08.01	08.35	09.54
	15.13	16.49	18.13	20.43	22.15	23.33	23.10	21.36	19.50	18.07	15.29	14.31
15	09.40	08.13	06.40	05.52	04.13	03.03	03.39	05.10	06.39	08.03	08.38	09.55
	15.15	16.52	18.16	20.46	22.18	23.34	23.07	21.33	19.46	18.03	15.26	14.30
16	09.38	08.10	06.36	05.49	04.10	03.02	03.41	05.13	06.42	08.06	08.41	09.56
	15.18	16.55	18.19	20.49	22.21	23.36	23.05	21.30	19.43	18.00	15.23	14.30
17	09.35	08.07	06.33	05.46	04.07	03.02	03.44	05.16	06.44	08.09	08.44	09.58
	15.21	16.59	18.22	20.52	22.24	23.36	23.02	21.26	19.39	17.57	15.21	14.30
18	09.33	08.04	06.29	05.42	04.04	03.01	03.47	05.19	06.47	08.12	08.47	09.59
	15.24	17.02	18.25	20.55	22.27	23.37	22.59	21.23	19.36	17.53	15.18	14.30
19	09.31	08.00	06.26	05.39	04.01	03.01	03.50	05.22	06.50	08.15	08.50	10.00
	15.27	17.05	18.28	20.58	22.30	23.38	22.57	21.19	19.32	17.50	15.15	14.30
20	09.28	07.57	06.22	05.35	03.58	03.01	03.52	05.25	06.53	08.18	08.54	10.01
	15.30	17.08	18.31	21.01	22.33	23.38	22.54	21.16	19.29	17.47	15.13	14.30
21	09.26	07.54	06.19	05.32	03.55	03.00	03.55	05.28	06.56	08.21	08.57	10.01
	15.33	17.11	18.34	21.04	22.36	23.39	22.51	21.13	19.26	17.43	15.10	14.30
22	09.24	07.51	06.15	05.28	03.53	03.01	03.58	05.31	06.58	08.24	09.00	10.02
	15.36	17.14	18.37	21.07	22.39	23.39	22.48	21.09	19.22	17.40	15.08	14.30
23	09.21	07.47	06.12	05.25	03.50	03.01	04.01	05.34	07.01	08.27	09.03	10.03
	15.39	17.17	18.39	21.10	22.42	23.39	22.46	21.06	19.19	17.37	15.05	14.31
24	09.18	07.44	06.09	05.22	03.47	03.01	04.04	05.37	07.04	08.30	09.06	10.03
	15.42	17.20	18.42	21.13	22.45	23.39	22.43	21.02	19.15	17.33	15.03	14.32
25	09.16	07.41	06.05	05.18	03.44	03.02	04.07	05.40	07.07	07.33	09.09	10.03
	15.45	17.23	18.45	21.16	22.48	23.39	22.40	20.59	19.12	16.30	15.00	14.32
26	09.13	07.37	06.02	05.15	03.41	03.03	04.10	05.42	07.09	07.36	09.11	10.03
	15.49	17.26	18.48	21.19	22.51	23.38	22.37	20.56	19.08	16.27	14.58	14.33
27	09.10	07.34	05.58	05.12	03.39	03.03	04.13	05.45	07.12	07.39	09.14	10.03
	15.52	17.29	18.51	21.22	22.53	23.38	22.34	20.52	19.05	16.24	14.56	14.34
28	09.08	07.31	05.55	05.08	03.36	03.04	04.16	05.48	07.15	07.42	09.17	10.03
	15.55	17.32	18.54	21.25	22.56	23.37	22.31	20.49	19.01	16.20	14.54	14.36
29	09.05		06.51	05.05	03.34	03.06	04.19	05.51	07.18	07.45	09.20	10.03
	15.58		19.57	21.28	22.59	23.36	22.28	20.45	18.58	16.17	14.52	14.37
30	09.02		06.48	05.02	03.31	03.07	04.22	05.54	07.21	07.48	09.23	10.02
	16.01		20.00	21.31	23.02	23.35	22.25	20.42	18.54	16.14	14.50	14.38
31	08.59		06.44		03.29		04.25	05.57		07.51		10.02
	16.05		20.02		23.04		22.22	20.38		16.11		14.40
Potential sun hours	178	241	363	449	563	611	599	504	392	307	203	146
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:
31.1.2024 8.55/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE1_RD200x21xHH200_No_Forest

Shadow receptor: C - C - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March		April		May		June
1	10.00	08.56	07.27		06.41		04.58		03.27
	14.42	16.08	17.35		20.05	14	18.55 (WTG15)		23.06
2	09.59	08.53	07.24		06.37		04.55		03.25
	14.44	16.11	17.38		20.08	9	18.53 (WTG15)		23.09
3	09.58	08.50	07.20		06.34		04.52	20.54 (WTG08)	03.22
	14.46	16.14	17.41		20.11		21.40	3	20.57 (WTG08)	23.11
4	09.57	08.47	07.17		06.30		04.49	20.50 (WTG08)	03.20
	14.48	16.17	17.44		20.14		21.43	10	21.00 (WTG08)	23.14
5	09.56	08.44	07.14		06.27		04.45	20.49 (WTG08)	03.18
	14.50	16.21	17.47		20.17		21.46	14	21.03 (WTG08)	23.16
6	09.55	08.41	07.10		06.23		04.42	20.48 (WTG08)	03.16
	14.53	16.24	17.50		20.20		21.50	17	21.05 (WTG08)	23.18
7	09.54	08.38	07.07		06.20		04.39	20.47 (WTG08)	03.14
	14.55	16.27	17.53		20.23		21.53	19	21.06 (WTG08)	23.21
8	09.52	08.35	07.04		06.17		04.36	20.46 (WTG08)	03.13
	14.57	16.30	17.56		20.25		21.56	20	21.06 (WTG08)	23.23
9	09.51	08.32	07.00		06.13		04.32	20.45 (WTG08)	03.11
	15.00	16.33	17.59		20.28		21.59	22	21.07 (WTG08)	23.25
10	09.49	08.29	06.57		06.10		04.29	20.45 (WTG08)	03.09
	15.02	16.37	18.02		20.31		22.02	23	21.08 (WTG08)	23.26
11	09.47	08.26	06.53		06.06		04.26	20.44 (WTG08)	03.08
	15.05	16.40	18.05		20.34		22.05	24	21.08 (WTG08)	23.28
12	09.45	08.23	06.50		06.03		04.23	20.44 (WTG08)	03.07
	15.07	16.43	18.08		20.37		22.08	23	21.07 (WTG08)	23.30
13	09.43	08.20	06.46		05.59		04.20	20.44 (WTG08)	03.06
	15.10	16.46	18.11		20.40		22.11	24	21.08 (WTG08)	23.31
14	09.41	08.16	06.43		05.56		04.17	20.44 (WTG08)	03.04
	15.13	16.49	18.13		20.43		22.14	24	21.08 (WTG08)	23.33
15	09.39	08.13	06.40		05.52		04.14	20.44 (WTG08)	03.04
	15.16	16.52	18.16		20.46		22.17	24	21.08 (WTG08)	23.34
16	09.37	08.10	06.36		05.49		04.11	20.44 (WTG08)	03.03
	15.18	16.55	18.19		20.49		22.20	23	21.07 (WTG08)	23.35
17	09.35	08.07	06.33		05.46		04.07	20.45 (WTG08)	03.02
	15.21	16.59	18.22		20.52		22.23	22	21.07 (WTG08)	23.36
18	09.33	08.04	06.29		05.42		04.04	20.45 (WTG08)	03.02
	15.24	17.02	18.25		20.55		22.27	22	21.07 (WTG08)	23.37
19	09.30	08.00	06.26	17.49 (WTG15)	05.39		04.02		20.45 (WTG08)	03.01
	15.27	17.05	18.28	5 17.54 (WTG15)	20.58		22.30	22	21.07 (WTG08)	23.37
20	09.28	07.57	06.22	17.45 (WTG15)	05.35		03.59		20.46 (WTG08)	03.01
	15.30	17.08	18.31	11 17.56 (WTG15)	21.01		22.33	20	21.06 (WTG08)	23.38
21	09.26	07.54	06.19	17.43 (WTG15)	05.32		03.56		20.47 (WTG08)	03.01
	15.33	17.11	18.34	16 17.59 (WTG15)	21.04		22.36	19	21.06 (WTG08)	23.38
22	09.23	07.50	06.15	17.41 (WTG15)	05.29		03.53		20.47 (WTG08)	03.01
	15.36	17.14	18.37	19 18.00 (WTG15)	21.07		22.39	18	21.05 (WTG08)	23.38
23	09.21	07.47	06.12	17.40 (WTG15)	05.25		03.50		20.48 (WTG08)	03.01
	15.39	17.17	18.39	22 18.02 (WTG15)	21.10		22.41	16	21.04 (WTG08)	23.38
24	09.18	07.44	06.08	17.39 (WTG15)	05.22		03.47		20.50 (WTG08)	03.02
	15.43	17.20	18.42	22 18.01 (WTG15)	21.13		22.44	13	21.03 (WTG08)	23.38
25	09.15	07.41	06.05	17.39 (WTG15)	05.18		03.44		20.51 (WTG08)	03.02
	15.46	17.23	18.45	23 18.02 (WTG15)	21.16		22.47	11	21.02 (WTG08)	23.38
26	09.13	07.37	06.02	17.39 (WTG15)	05.15		03.42		20.53 (WTG08)	03.03
	15.49	17.26	18.48	23 18.02 (WTG15)	21.19		22.50	7	21.00 (WTG08)	23.38
27	09.10	07.34	05.58	17.38 (WTG15)	05.12		03.39			03.04
	15.52	17.29	18.51	23 18.01 (WTG15)	21.22		22.53			23.37
28	09.07	07.31	05.55	17.38 (WTG15)	05.08		03.37			03.05
	15.55	17.32	18.54	23 18.01 (WTG15)	21.25		22.56			23.36
29	09.05		06.51	18.38 (WTG15)	05.05		03.34			03.06
	15.58		19.57	21 18.59 (WTG15)	21.28		22.59			23.35
30	09.02		06.48	18.39 (WTG15)	05.02		03.32			03.07
	16.01		19.59	20 18.59 (WTG15)	21.31		23.01			23.34
31	08.59		06.44	18.39 (WTG15)			03.29			
	16.05		20.02	18 18.57 (WTG15)			23.04			
Potential sun hours	179	241	363		448		562		611
Total, worst case				246		23		440	
Sun reduction				0,32		0,44		0,48	
Oper. time red.				0,90		0,90		0,90	
Wind dir. red.				0,56		0,56		0,60	
Total reduction				0,16		0,22		0,26	
Total, real				40		5		114	

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:
31.1.2024 8.55/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE1_RD200x21xHH200_No_Forest

Shadow receptor: C - C - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	July			August			September			October	November	December
1	03.09			04.28		20.55 (WTG08)	06.00			07.23	07.54	09.25
	23.33			22.18	23	21.18 (WTG08)	20.35			18.51	16.08	14.48
2	03.10			04.31		20.54 (WTG08)	06.03			07.26	07.57	09.28
	23.32			22.15	24	21.18 (WTG08)	20.31			18.47	16.05	14.46
3	03.12			04.34		20.55 (WTG08)	06.05			07.29	08.00	09.30
	23.31			22.12	23	21.18 (WTG08)	20.28			18.44	16.02	14.44
4	03.14			04.37		20.56 (WTG08)	06.08			07.32	08.04	09.33
	23.29			22.09	22	21.18 (WTG08)	20.24			18.41	15.59	14.43
5	03.16			04.40		20.56 (WTG08)	06.11			07.35	08.07	09.35
	23.28			22.05	20	21.16 (WTG08)	20.21			18.37	15.55	14.41
6	03.18			04.43		20.57 (WTG08)	06.14			07.37	08.10	09.37
	23.26			22.02	19	21.16 (WTG08)	20.18			18.34	15.52	14.40
7	03.20			04.46		20.57 (WTG08)	06.17			07.40	08.13	09.40
	23.24			21.59	17	21.14 (WTG08)	20.14			18.30	15.49	14.38
8	03.22			04.49		20.59 (WTG08)	06.19			07.43	08.16	09.42
	23.22			21.56	13	21.12 (WTG08)	20.11			18.27	15.46	14.37
9	03.24			04.52		21.01 (WTG08)	06.22			07.46	08.19	09.44
	23.20			21.52	8	21.09 (WTG08)	20.07			18.24	15.43	14.36
10	03.26			04.55			06.25		18.37 (WTG15)	07.49	08.22	09.46
	23.18			21.49			20.04	8	18.45 (WTG15)	18.20	15.40	14.34
11	03.29			04.58			06.28		18.34 (WTG15)	07.52	08.25	09.48
	23.16			21.46			20.00	13	18.47 (WTG15)	18.17	15.38	14.33
12	03.31			05.01			06.31		18.32 (WTG15)	07.55	08.28	09.50
	23.14			21.43			19.57	17	18.49 (WTG15)	18.13	15.35	14.33
13	03.34			05.04			06.33		18.30 (WTG15)	07.57	08.32	09.51
	23.11			21.39			19.53	19	18.49 (WTG15)	18.10	15.32	14.32
14	03.36			05.07			06.36		18.29 (WTG15)	08.00	08.35	09.53
	23.09			21.36			19.50	21	18.50 (WTG15)	18.07	15.29	14.31
15	03.39			05.10			06.39		18.28 (WTG15)	08.03	08.38	09.55
	23.07			21.33			19.46	22	18.50 (WTG15)	18.03	15.26	14.31
16	03.42			05.13			06.42		18.28 (WTG15)	08.06	08.41	09.56
	23.04			21.29			19.43	23	18.51 (WTG15)	18.00	15.23	14.30
17	03.44		21.03 (WTG08)	05.16			06.44		18.26 (WTG15)	08.09	08.44	09.57
	23.02	5	21.08 (WTG08)	21.26			19.39	24	18.50 (WTG15)	17.57	15.21	14.30
18	03.47		21.02 (WTG08)	05.19			06.47		18.26 (WTG15)	08.12	08.47	09.58
	22.59	9	21.11 (WTG08)	21.23			19.36	23	18.49 (WTG15)	17.53	15.18	14.30
19	03.50		21.00 (WTG08)	05.22			06.50		18.27 (WTG15)	08.15	08.50	09.59
	22.56	13	21.13 (WTG08)	21.19			19.32	22	18.49 (WTG15)	17.50	15.15	14.30
20	03.53		20.59 (WTG08)	05.25			06.53		18.26 (WTG15)	08.18	08.53	10.00
	22.54	15	21.14 (WTG08)	21.16			19.29	21	18.47 (WTG15)	17.47	15.13	14.30
21	03.56		20.58 (WTG08)	05.28			06.56		18.27 (WTG15)	08.21	08.56	10.01
	22.51	16	21.14 (WTG08)	21.12			19.25	20	18.47 (WTG15)	17.43	15.10	14.30
22	03.58		20.57 (WTG08)	05.31			06.58		18.28 (WTG15)	08.24	08.59	10.02
	22.48	18	21.15 (WTG08)	21.09			19.22	17	18.45 (WTG15)	17.40	15.08	14.31
23	04.01		20.57 (WTG08)	05.34			07.01		18.29 (WTG15)	08.27	09.02	10.02
	22.45	19	21.16 (WTG08)	21.06			19.19	13	18.42 (WTG15)	17.37	15.05	14.31
24	04.04		20.56 (WTG08)	05.37			07.04		18.30 (WTG15)	08.30	09.05	10.02
	22.42	21	21.17 (WTG08)	21.02			19.15	8	18.38 (WTG15)	17.33	15.03	14.32
25	04.07		20.56 (WTG08)	05.40			07.07			07.33	09.08	10.03
	22.39	22	21.18 (WTG08)	20.59			19.12			16.30	15.01	14.33
26	04.10		20.55 (WTG08)	05.43			07.09			07.36	09.11	10.03
	22.36	23	21.18 (WTG08)	20.55			19.08			16.27	14.58	14.34
27	04.13		20.55 (WTG08)	05.45			07.12			07.39	09.14	10.03
	22.33	23	21.18 (WTG08)	20.52			19.05			16.24	14.56	14.35
28	04.16		20.55 (WTG08)	05.48			07.15			07.42	09.17	10.02
	22.30	23	21.18 (WTG08)	20.49			19.01			16.21	14.54	14.36
29	04.19		20.54 (WTG08)	05.51			07.18			07.45	09.20	10.02
	22.27	24	21.18 (WTG08)	20.45			18.58			16.17	14.52	14.37
30	04.22		20.55 (WTG08)	05.54			07.21			07.48	09.22	10.02
	22.24	24	21.19 (WTG08)	20.42			18.54			16.14	14.50	14.39
31	04.25		20.54 (WTG08)	05.57						07.51		10.01
	22.21	24	21.18 (WTG08)	20.38						16.11		14.40
Potential sun hours	598			504			392			307	204	147
Total, worst case		279			169			271				
Sun reduction		0,46			0,42			0,36				
Oper. time red.		0,90			0,90			0,90				
Wind dir. red.		0,60			0,60			0,56				
Total reduction		0,25			0,22			0,18				
Total, real		69			38			49				

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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Henri Korhonen / henri.korhonen@fcg.fi
Calculated:
31.1.2024 8.55/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE1_RD200x21xHH200_No_Forest

Shadow receptor: D - D - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March			April			May	June
1	10.00	08.56	07.27			06.41		19.07 (WTG15)	04.58	03.27
	14.42	16.08	17.35			20.05	21	19.28 (WTG15)	21.34	23.06
2	09.59	08.53	07.24			06.37		19.07 (WTG15)	04.55	03.25
	14.44	16.11	17.38			20.08	22	19.29 (WTG15)	21.37	23.09
3	09.58	08.50	07.20			06.34		19.06 (WTG15)	04.52	03.22
	14.46	16.14	17.41			20.11	22	19.28 (WTG15)	21.40	23.11
4	09.57	08.47	07.17			06.30		19.05 (WTG15)	04.49	03.20
	14.48	16.17	17.44			20.14	23	19.28 (WTG15)	21.43	23.14
5	09.56	08.44	07.14			06.27		19.04 (WTG15)	04.45	03.18
	14.50	16.21	17.47			20.17	24	19.28 (WTG15)	21.46	23.16
6	09.55	08.41	07.10			06.23		19.05 (WTG15)	04.42	03.16
	14.53	16.24	17.50			20.20	22	19.27 (WTG15)	21.50	23.18
7	09.54	08.38	07.07			06.20		19.05 (WTG15)	04.39	03.14
	14.55	16.27	17.53			20.23	22	19.27 (WTG15)	21.53	23.20
8	09.52	08.35	07.04			06.17		19.05 (WTG15)	04.36	03.13
	14.57	16.30	17.56			20.25	20	19.25 (WTG15)	21.56	23.23
9	09.50	08.32	07.00			06.13		19.06 (WTG15)	04.32	03.11
	15.00	16.33	17.59			20.28	18	19.24 (WTG15)	21.59	23.24
10	09.49	08.29	06.57			06.10		19.08 (WTG15)	04.29	03.09
	15.02	16.37	18.02			20.31	15	19.23 (WTG15)	22.02	23.26
11	09.47	08.26	06.53			06.06		19.09 (WTG15)	04.26	03.08
	15.05	16.40	18.05			20.34	11	19.20 (WTG15)	22.05	23.28
12	09.45	08.23	06.50			06.03		19.13 (WTG15)	04.23	03.07
	15.07	16.43	18.08			20.37	3	19.16 (WTG15)	22.08	23.30
13	09.43	08.20	06.46			05.59			04.20	03.06
	15.10	16.46	18.11			20.40			22.11	23.31
14	09.41	08.16	06.43			05.56			04.17	03.05
	15.13	16.49	18.13			20.43			22.14	23.33
15	09.39	08.13	06.40			05.52			04.14	03.04
	15.16	16.52	18.16			20.46			22.17	23.34
16	09.37	08.10	06.36			05.49			04.11	03.03
	15.19	16.55	18.19			20.49			22.20	23.35
17	09.35	08.07	06.33			05.46			04.08	03.02
	15.21	16.59	18.22			20.52			22.23	23.36
18	09.33	08.04	06.29			05.42			04.05	03.02
	15.24	17.02	18.25			20.55			22.26	23.37
19	09.30	08.00	06.26			05.39			04.02	03.01
	15.27	17.05	18.28			20.58			22.30	23.37
20	09.28	07.57	06.22			05.35			03.59	03.01
	15.30	17.08	18.31			21.01			22.33	23.38
21	09.26	07.54	06.19			05.32			03.56	03.01
	15.33	17.11	18.34			21.04			22.36	23.38
22	09.23	07.50	06.15			05.29			03.53	03.01
	15.36	17.14	18.37			21.07			22.38	23.38
23	09.21	07.47	06.12			05.25			03.50	03.01
	15.39	17.17	18.39			21.10			22.41	23.38
24	09.18	07.44	06.08			05.22			03.47	03.02
	15.43	17.20	18.42			21.13			22.44	23.38
25	09.15	07.41	06.05			05.18			03.45	03.02
	15.46	17.23	18.45			21.16			22.47	23.38
26	09.13	07.37	06.02			05.15			03.42	03.03
	15.49	17.26	18.48			21.19			22.50	23.37
27	09.10	07.34	05.58			05.12			03.39	03.04
	15.52	17.29	18.51			21.22			22.53	23.37
28	09.07	07.31	05.55		18.18 (WTG15)	05.08			03.37	03.05
	15.55	17.32	18.54	1	18.19 (WTG15)	21.25			22.56	23.36
29	09.05		06.51		19.12 (WTG15)	05.05			03.34	03.06
	15.58		19.57	10	19.22 (WTG15)	21.28			22.58	23.35
30	09.02		06.48		19.11 (WTG15)	05.02			03.32	03.07
	16.02		19.59	14	19.25 (WTG15)	21.31			23.01	23.34
31	08.59		06.44		19.08 (WTG15)				03.29	
	16.05		20.02	19	19.27 (WTG15)				23.04	
Potential sun hours	179	241	363			448			562	610
Total, worst case				44			223			
Sun reduction				0,32			0,44			
Oper. time red.				0,90			0,90			
Wind dir. red.				0,56			0,56			
Total reduction				0,16			0,22			
Total, real				7			50			

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:
31.1.2024 8.55/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE1_RD200x21xHH200_No_Forest

Shadow receptor: D - D - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	July	August			September			October	November	December
1	03.09	04.28			06.00		19.08 (WTG15)	07.23	07.54	09.25
	23.33	22.18			20.35	11	19.19 (WTG15)	18.51	16.08	14.48
2	03.10	04.31			06.03		19.05 (WTG15)	07.26	07.57	09.28
	23.32	22.15			20.31	16	19.21 (WTG15)	18.47	16.05	14.46
3	03.12	04.34			06.05		19.04 (WTG15)	07.29	08.00	09.30
	23.31	22.12			20.28	18	19.22 (WTG15)	18.44	16.02	14.44
4	03.14	04.37			06.08		19.02 (WTG15)	07.32	08.04	09.33
	23.29	22.09			20.24	20	19.22 (WTG15)	18.41	15.59	14.43
5	03.16	04.40			06.11		19.01 (WTG15)	07.35	08.07	09.35
	23.28	22.05			20.21	22	19.23 (WTG15)	18.37	15.55	14.41
6	03.18	04.43			06.14		19.01 (WTG15)	07.37	08.10	09.37
	23.26	22.02			20.17	23	19.24 (WTG15)	18.34	15.52	14.40
7	03.20	04.46			06.17		19.00 (WTG15)	07.40	08.13	09.40
	23.24	21.59			20.14	23	19.23 (WTG15)	18.30	15.49	14.38
8	03.22	04.49			06.19		19.00 (WTG15)	07.43	08.16	09.42
	23.22	21.56			20.11	23	19.23 (WTG15)	18.27	15.46	14.37
9	03.24	04.52			06.22		19.00 (WTG15)	07.46	08.19	09.44
	23.20	21.52			20.07	23	19.23 (WTG15)	18.24	15.43	14.36
10	03.26	04.55			06.25		18.59 (WTG15)	07.49	08.22	09.46
	23.18	21.49			20.04	22	19.21 (WTG15)	18.20	15.40	14.34
11	03.29	04.58			06.28		19.00 (WTG15)	07.52	08.25	09.48
	23.16	21.46			20.00	20	19.20 (WTG15)	18.17	15.38	14.34
12	03.31	05.01			06.31		19.01 (WTG15)	07.55	08.28	09.50
	23.14	21.43			19.57	18	19.19 (WTG15)	18.13	15.35	14.33
13	03.34	05.04			06.33		19.01 (WTG15)	07.57	08.32	09.51
	23.11	21.39			19.53	15	19.16 (WTG15)	18.10	15.32	14.32
14	03.36	05.07			06.36		19.03 (WTG15)	08.00	08.35	09.53
	23.09	21.36			19.50	10	19.13 (WTG15)	18.07	15.29	14.31
15	03.39	05.10			06.39		19.06 (WTG15)	08.03	08.38	09.55
	23.07	21.33			19.46	4	19.10 (WTG15)	18.03	15.26	14.31
16	03.42	05.13			06.42			08.06	08.41	09.56
	23.04	21.29			19.43			18.00	15.23	14.30
17	03.44	05.16			06.44			08.09	08.44	09.57
	23.01	21.26			19.39			17.57	15.21	14.30
18	03.47	05.19			06.47			08.12	08.47	09.58
	22.59	21.23			19.36			17.53	15.18	14.30
19	03.50	05.22			06.50			08.15	08.50	09.59
	22.56	21.19			19.32			17.50	15.15	14.30
20	03.53	05.25			06.53			08.18	08.53	10.00
	22.54	21.16			19.29			17.47	15.13	14.30
21	03.56	05.28			06.56			08.21	08.56	10.01
	22.51	21.12			19.25			17.43	15.10	14.30
22	03.59	05.31			06.58			08.24	08.59	10.02
	22.48	21.09			19.22			17.40	15.08	14.31
23	04.01	05.34			07.01			08.27	09.02	10.02
	22.45	21.06			19.19			17.37	15.05	14.31
24	04.04	05.37			07.04			08.30	09.05	10.02
	22.42	21.02			19.15			17.33	15.03	14.32
25	04.07	05.40			07.07			07.33	09.08	10.03
	22.39	20.59			19.12			16.30	15.01	14.33
26	04.10	05.43			07.09			07.36	09.11	10.03
	22.36	20.55			19.08			16.27	14.58	14.34
27	04.13	05.45			07.12			07.39	09.14	10.03
	22.33	20.52			19.05			16.24	14.56	14.35
28	04.16	05.48			07.15			07.42	09.17	10.02
	22.30	20.49			19.01			16.21	14.54	14.36
29	04.19	05.51			07.18			07.45	09.19	10.02
	22.27	20.45			18.58			16.17	14.52	14.37
30	04.22	05.54			07.21			07.48	09.22	10.02
	22.24	20.42			18.54			16.14	14.50	14.39
31	04.25	05.57		19.12 (WTG15)				07.51		10.01
	22.21	20.38	4	19.16 (WTG15)				16.11		14.40
Potential sun hours	598	504			392			307	204	147
Total, worst case			4			268				
Sun reduction			0,42			0,36				
Oper. time red.			0,90			0,90				
Wind dir. red.			0,56			0,56				
Total reduction			0,21			0,18				
Total, real			1			48				

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:
31.1.2024 8.55/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE1_RD200x21xHH200_No_Forest

Shadow receptor: E - E - Lomarakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June			July			August	September	October	November	December
1	10.00	08.56	07.27	06.41	04.59	03.27			03.09		22.19 (WTG10)	04.29	06.00	07.24	07.54	09.25
	14.43	16.08	17.35	20.05	21.34	23.06			23.33	7	22.26 (WTG10)	22.18	20.35	18.51	16.08	14.48
2	09.59	08.53	07.24	06.38	04.55	03.25			03.11		22.21 (WTG10)	04.32	06.03	07.26	07.57	09.27
	14.45	16.11	17.38	20.08	21.37	23.09			23.32	3	22.24 (WTG10)	22.15	20.31	18.48	16.05	14.47
3	09.58	08.50	07.21	06.34	04.52	03.23			03.13			04.35	06.06	07.29	08.00	09.30
	14.47	16.15	17.41	20.11	21.40	23.11			23.30			22.12	20.28	18.44	16.02	14.45
4	09.57	08.47	07.17	06.31	04.49	03.21			03.14			04.38	06.08	07.32	08.04	09.33
	14.49	16.18	17.44	20.14	21.43	23.14			23.29			22.09	20.25	18.41	15.59	14.43
5	09.56	08.44	07.14	06.27	04.46	03.19			03.16			04.41	06.11	07.35	08.07	09.35
	14.51	16.21	17.47	20.17	21.46	23.16			23.27			22.05	20.21	18.37	15.56	14.41
6	09.55	08.41	07.10	06.24	04.42	03.17			03.18			04.44	06.14	07.38	08.10	09.37
	14.53	16.24	17.50	20.20	21.50	23.18			23.26			22.02	20.18	18.34	15.53	14.40
7	09.53	08.38	07.07	06.20	04.39	03.15			03.20			04.47	06.17	07.40	08.13	09.40
	14.55	16.27	17.53	20.23	21.53	23.20			23.24			21.59	20.14	18.31	15.50	14.39
8	09.52	08.35	07.04	06.17	04.36	03.13			03.22			04.50	06.20	07.43	08.16	09.42
	14.58	16.31	17.56	20.26	21.56	23.22			23.22			21.56	20.11	18.27	15.47	14.37
9	09.50	08.32	07.00	06.13	04.33	03.12			03.25			04.53	06.22	07.46	08.19	09.44
	15.00	16.34	17.59	20.28	21.59	23.24			23.20			21.52	20.07	18.24	15.44	14.36
10	09.49	08.29	06.57	06.10	04.30	03.10			03.27			04.56	06.25	07.49	08.22	09.46
	15.03	16.37	18.02	20.31	22.02	23.26			23.18			21.49	20.04	18.20	15.41	14.35
11	09.47	08.26	06.53	06.06	04.26	03.09		22.16 (WTG10)	03.29			04.59	06.28	07.52	08.25	09.48
	15.05	16.40	18.05	20.34	22.05	23.28	5	22.21 (WTG10)	23.16			21.46	20.00	18.17	15.38	14.34
12	09.45	08.23	06.50	06.03	04.23	03.07		22.15 (WTG10)	03.32			05.02	06.31	07.55	08.28	09.50
	15.08	16.43	18.08	20.37	22.08	23.29	8	22.23 (WTG10)	23.14			21.43	19.57	18.14	15.35	14.33
13	09.43	08.20	06.47	06.00	04.20	03.06		22.14 (WTG10)	03.34			05.05	06.34	07.58	08.32	09.51
	15.10	16.46	18.11	20.40	22.11	23.31	10	22.24 (WTG10)	23.11			21.39	19.53	18.10	15.32	14.32
14	09.41	08.16	06.43	05.56	04.17	03.05		22.15 (WTG10)	03.37			05.08	06.36	08.00	08.35	09.53
	15.13	16.49	18.14	20.43	22.14	23.32	10	22.25 (WTG10)	23.09			21.36	19.50	18.07	15.29	14.32
15	09.39	08.13	06.40	05.53	04.14	03.04		22.14 (WTG10)	03.39			05.11	06.39	08.03	08.38	09.54
	15.16	16.53	18.17	20.46	22.17	23.33	11	22.25 (WTG10)	23.06			21.33	19.46	18.04	15.27	14.31
16	09.37	08.10	06.36	05.49	04.11	03.03		22.14 (WTG10)	03.42			05.14	06.42	08.06	08.41	09.56
	15.19	16.56	18.19	20.49	22.20	23.35	12	22.26 (WTG10)	23.04			21.29	19.43	18.00	15.24	14.31
17	09.35	08.07	06.33	05.46	04.08	03.03		22.14 (WTG10)	03.45			05.17	06.45	08.09	08.44	09.57
	15.22	16.59	18.22	20.52	22.23	23.36	13	22.27 (WTG10)	23.01			21.26	19.39	17.57	15.21	14.31
18	09.33	08.04	06.29	05.42	04.05	03.02		22.13 (WTG10)	03.48			05.20	06.47	08.12	08.47	09.58
	15.25	17.02	18.25	20.55	22.26	23.36	13	22.26 (WTG10)	22.59			21.23	19.36	17.54	15.18	14.30
19	09.30	08.00	06.26	05.39	04.02	03.02		22.13 (WTG10)	03.50			05.22	06.50	08.15	08.50	09.59
	15.28	17.05	18.28	20.58	22.29	23.37	14	22.27 (WTG10)	22.56			21.19	19.33	17.50	15.16	14.30
20	09.28	07.57	06.22	05.36	03.59	03.02		22.13 (WTG10)	03.53			05.25	06.53	08.18	08.53	10.00
	15.31	17.08	18.31	21.01	22.32	23.37	14	22.27 (WTG10)	22.53			21.16	19.29	17.47	15.13	14.31
21	09.26	07.54	06.19	05.32	03.56	03.02		22.14 (WTG10)	03.56			05.28	06.56	08.21	08.56	10.01
	15.34	17.11	18.34	21.04	22.35	23.38	14	22.28 (WTG10)	22.51			21.12	19.26	17.44	15.11	14.31
22	09.23	07.51	06.16	05.29	03.53	03.02		22.14 (WTG10)	03.59			05.31	06.59	08.24	08.59	10.01
	15.37	17.14	18.37	21.07	22.38	23.38	14	22.28 (WTG10)	22.48			21.09	19.22	17.40	15.08	14.31
23	09.21	07.47	06.12	05.25	03.50	03.02		22.14 (WTG10)	04.02			05.34	07.01	08.27	09.02	10.02
	15.40	17.17	18.40	21.10	22.41	23.38	14	22.28 (WTG10)	22.45			21.06	19.19	17.37	15.06	14.32
24	09.18	07.44	06.09	05.22	03.48	03.02		22.15 (WTG10)	04.05			05.37	07.04	08.30	09.05	10.02
	15.43	17.20	18.42	21.13	22.44	23.38	13	22.28 (WTG10)	22.42			21.02	19.15	17.34	15.03	14.32
25	09.15	07.41	06.05	05.19	03.45	03.03		22.15 (WTG10)	04.08			05.40	07.07	07.33	09.08	10.02
	15.46	17.23	18.45	21.16	22.47	23.38	13	22.28 (WTG10)	22.39			20.59	19.12	16.30	15.01	14.33
26	09.13	07.37	06.02	05.15	03.42	03.04		22.16 (WTG10)	04.11			05.43	07.10	07.36	09.11	10.02
	15.49	17.26	18.48	21.19	22.50	23.37	12	22.28 (WTG10)	22.36			20.55	19.08	16.27	14.59	14.34
27	09.10	07.34	05.58	05.12	03.40	03.05		22.16 (WTG10)	04.14			05.46	07.12	07.39	09.14	10.02
	15.52	17.29	18.51	21.22	22.53	23.37	11	22.27 (WTG10)	22.33			20.52	19.05	16.24	14.57	14.35
28	09.07	07.31	05.55	05.09	03.37	03.06		22.17 (WTG10)	04.17			05.49	07.15	07.42	09.17	10.02
	15.56	17.32	18.54	21.25	22.56	23.36	10	22.27 (WTG10)	22.30			20.49	19.01	16.21	14.54	14.36
29	09.05		06.51	05.05	03.35	03.07		22.17 (WTG10)	04.20			05.51	07.18	07.45	09.19	10.02
	15.59		19.57	21.28	22.58	23.35	10	22.27 (WTG10)	22.27			20.45	18.58	16.18	14.52	14.38
30	09.02		06.48	05.02	03.32	03.08		22.18 (WTG10)	04.23			05.54	07.21	07.48	09.22	10.02
	16.02		20.00	21.31	23.01	23.34	9	22.27 (WTG10)	22.24			20.42	18.55	16.14	14.50	14.39
31	08.59		06.44		03.30				04.26			05.57		07.51		10.01
	16.05		20.02		23.04				22.21			20.38		16.11		14.41
Potential sun hours	179	241	363	448	562	610			598			504	392	307	204	147
Total, worst case						230			10							
Sun reduction						0,45			0,46							
Oper. time red.						0,90			0,90							
Wind dir. red.						0,65			0,65							
Total reduction						0,26			0,27							
Total, real						60			3							

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:
31.1.2024 8.55/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE1_RD200x21xHH200_No_Forest

Shadow receptor: F - F - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.00	08.56	07.27	06.41	04.59	03.28	03.10	04.29	06.00	07.24	07.54	09.25
	14.43	16.08	17.36	20.05	21.34	23.06	23.33	22.18	20.35	18.51	16.08	14.49
2	09.59	08.53	07.24	06.38	04.56	03.25	03.11	04.32	06.03	07.26	07.58	09.28
	14.45	16.12	17.39	20.08	21.37	23.09	23.32	22.15	20.32	18.48	16.05	14.47
3	09.58	08.50	07.21	06.34	04.52	03.23	03.13	04.35	06.06	07.29	08.01	09.30
	14.47	16.15	17.42	20.11	21.40	23.11	23.30	22.12	20.28	18.44	16.02	14.45
4	09.57	08.47	07.17	06.31	04.49	03.21	03.15	04.38	06.09	07.32	08.04	09.33
	14.49	16.18	17.44	20.14	21.43	23.14	23.29	22.09	20.25	18.41	15.59	14.43
5	09.56	08.44	07.14	06.27	04.46	03.19	03.16	04.41	06.11	07.35	08.07	09.35
	14.51	16.21	17.47	20.17	21.47	23.16	23.27	22.06	20.21	18.38	15.56	14.42
6	09.55	08.41	07.11	06.24	04.43	03.17	03.18	04.44	06.14	07.38	08.10	09.37
	14.53	16.24	17.50	20.20	21.50	23.18	23.26	22.02	20.18	18.34	15.53	14.40
7	09.54	08.38	07.07	06.20	04.39	03.15	03.20	04.47	06.17	07.41	08.13	09.40
	14.55	16.28	17.53	20.23	21.53	23.20	23.24	21.59	20.14	18.31	15.50	14.39
8	09.52	08.35	07.04	06.17	04.36	03.13	03.23	04.50	06.20	07.43	08.16	09.42
	14.58	16.31	17.56	20.26	21.56	23.22	23.22	21.56	20.11	18.27	15.47	14.37
9	09.50	08.32	07.00	06.14	04.33	03.12	03.25	04.53	06.23	07.46	08.19	09.44
	15.00	16.34	17.59	20.29	21.59	23.24	23.20	21.53	20.07	18.24	15.44	14.36
10	09.49	08.29	06.57	06.10	04.30	03.10	03.27	04.56	06.25	07.49	08.22	09.46
	15.03	16.37	18.02	20.32	22.02	23.26	23.18	21.49	20.04	18.21	15.41	14.35
11	09.47	08.26	06.54	06.07	04.27	03.09	03.30	04.59	06.28	07.52	08.25	09.48
	15.05	16.40	18.05	20.34	22.05	23.28	23.16	21.46	20.00	18.17	15.38	14.34
12	09.45	08.23	06.50	06.03	04.23	03.08	03.32	05.02	06.31	07.55	08.29	09.50
	15.08	16.43	18.08	20.37	22.08	23.29	23.14	21.43	19.57	18.14	15.35	14.33
13	09.43	08.20	06.47	06.00	04.20	03.06	03.34	05.05	06.34	07.58	08.32	09.51
	15.11	16.47	18.11	20.40	22.11	23.31	23.11	21.39	19.53	18.10	15.32	14.33
14	09.41	08.17	06.43	05.56	04.17	03.05	03.37	05.08	06.37	08.01	08.35	09.53
	15.13	16.50	18.14	20.43	22.14	23.32	23.09	21.36	19.50	18.07	15.30	14.32
15	09.39	08.13	06.40	05.53	04.14	03.04	03.40	05.11	06.39	08.04	08.38	09.54
	15.16	16.53	18.17	20.46	22.17	23.34	23.07	21.33	19.47	18.04	15.27	14.31
16	09.37	08.10	06.36	05.49	04.11	03.04	03.42	05.14	06.42	08.06	08.41	09.56
	15.19	16.56	18.20	20.49	22.20	23.35	23.04	21.29	19.43	18.00	15.24	14.31
17	09.35	08.07	06.33	05.46	04.08	03.03	03.45	05.17	06.45	08.09	08.44	09.57
	15.22	16.59	18.22	20.52	22.23	23.36	23.01	21.26	19.40	17.57	15.21	14.31
18	09.33	08.04	06.30	05.43	04.05	03.02	03.48	05.20	06.48	08.12	08.47	09.58
	15.25	17.02	18.25	20.55	22.27	23.36	22.59	21.23	19.36	17.54	15.19	14.31
19	09.30	08.00	06.26	05.39	04.02	03.02	03.51	05.23	06.50	08.15	08.50	09.59
	15.28	17.05	18.28	20.58	22.30	23.37	22.56	21.19	19.33	17.50	15.16	14.31
20	09.28	07.57	06.23	05.36	03.59	03.02	03.53	05.26	06.53	08.18	08.53	10.00
	15.31	17.08	18.31	21.01	22.33	23.38	22.53	21.16	19.29	17.47	15.13	14.31
21	09.26	07.54	06.19	05.32	03.56	03.02	03.56	05.28	06.56	08.21	08.56	10.01
	15.34	17.11	18.34	21.04	22.36	23.38	22.51	21.13	19.26	17.44	15.11	14.31
22	09.23	07.51	06.16	05.29	03.53	03.02	03.59	05.31	06.59	08.24	08.59	10.01
	15.37	17.14	18.37	21.07	22.38	23.38	22.48	21.09	19.22	17.40	15.08	14.31
23	09.21	07.47	06.12	05.26	03.51	03.02	04.02	05.34	07.01	08.27	09.02	10.02
	15.40	17.17	18.40	21.10	22.41	23.38	22.45	21.06	19.19	17.37	15.06	14.32
24	09.18	07.44	06.09	05.22	03.48	03.03	04.05	05.37	07.04	08.30	09.05	10.02
	15.43	17.20	18.43	21.13	22.44	23.38	22.42	21.02	19.15	17.34	15.04	14.33
25	09.16	07.41	06.05	05.19	03.45	03.03	04.08	05.40	07.07	07.33	09.08	10.02
	15.46	17.24	18.45	21.16	22.47	23.38	22.39	20.59	19.12	16.31	15.01	14.33
26	09.13	07.37	06.02	05.16	03.42	03.04	04.11	05.43	07.10	07.36	09.11	10.03
	15.49	17.27	18.48	21.19	22.50	23.37	22.36	20.56	19.08	16.27	14.59	14.34
27	09.10	07.34	05.58	05.12	03.40	03.05	04.14	05.46	07.13	07.39	09.14	10.03
	15.53	17.30	18.51	21.22	22.53	23.37	22.33	20.52	19.05	16.24	14.57	14.35
28	09.07	07.31	05.55	05.09	03.37	03.06	04.17	05.49	07.15	07.42	09.17	10.02
	15.56	17.33	18.54	21.25	22.56	23.36	22.30	20.49	19.02	16.21	14.55	14.37
29	09.05		06.52	05.06	03.35	03.07	04.20	05.52	07.18	07.45	09.20	10.02
	15.59		19.57	21.28	22.58	23.35	22.27	20.45	18.58	16.18	14.53	14.38
30	09.02		06.48	05.02	03.32	03.08	04.23	05.54	07.21	07.48	09.22	10.02
	16.02		20.00	21.31	23.01	23.34	22.24	20.42	18.55	16.15	14.51	14.39
31	08.59		06.45		03.30		04.26	05.57		07.51		10.01
	16.05		20.03		23.04		22.21	20.38		16.11		14.41
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
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:
31.1.2024 8.55/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE1_RD200x21xHH200_No_Forest

Shadow receptor: G - G - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.00	08.56	07.28	06.41	04.59	03.28	03.10	04.29	06.00	07.24	07.55	09.25
	14.43	16.08	17.36	20.06	21.34	23.06	23.33	22.18	20.35	18.51	16.08	14.49
2	09.59	08.53	07.24	06.38	04.56	03.25	03.11	04.32	06.03	07.27	07.58	09.28
	14.45	16.12	17.39	20.08	21.37	23.09	23.32	22.15	20.32	18.48	16.05	14.47
3	09.59	08.50	07.21	06.34	04.52	03.23	03.13	04.35	06.06	07.29	08.01	09.30
	14.47	16.15	17.42	20.11	21.41	23.11	23.31	22.12	20.28	18.45	16.02	14.45
4	09.57	08.47	07.17	06.31	04.49	03.21	03.15	04.38	06.09	07.32	08.04	09.33
	14.49	16.18	17.45	20.14	21.44	23.14	23.29	22.09	20.25	18.41	15.59	14.43
5	09.56	08.45	07.14	06.27	04.46	03.19	03.17	04.41	06.12	07.35	08.07	09.35
	14.51	16.21	17.48	20.17	21.47	23.16	23.28	22.06	20.21	18.38	15.56	14.42
6	09.55	08.42	07.11	06.24	04.43	03.17	03.19	04.44	06.14	07.38	08.10	09.37
	14.53	16.24	17.51	20.20	21.50	23.18	23.26	22.02	20.18	18.34	15.53	14.40
7	09.54	08.38	07.07	06.21	04.39	03.15	03.21	04.47	06.17	07.41	08.13	09.40
	14.56	16.28	17.53	20.23	21.53	23.20	23.24	21.59	20.14	18.31	15.50	14.39
8	09.52	08.35	07.04	06.17	04.36	03.14	03.23	04.50	06.20	07.44	08.16	09.42
	14.58	16.31	17.56	20.26	21.56	23.22	23.22	21.56	20.11	18.27	15.47	14.38
9	09.51	08.32	07.00	06.14	04.33	03.12	03.25	04.53	06.23	07.46	08.19	09.44
	15.00	16.34	17.59	20.29	21.59	23.24	23.20	21.53	20.07	18.24	15.44	14.36
10	09.49	08.29	06.57	06.10	04.30	03.10	03.27	04.56	06.26	07.49	08.22	09.46
	15.03	16.37	18.02	20.32	22.02	23.26	23.18	21.49	20.04	18.21	15.41	14.35
11	09.47	08.26	06.54	06.07	04.27	03.09	03.30	04.59	06.28	07.52	08.26	09.48
	15.05	16.40	18.05	20.35	22.05	23.28	23.16	21.46	20.01	18.17	15.38	14.34
12	09.45	08.23	06.50	06.03	04.24	03.08	03.32	05.02	06.31	07.55	08.29	09.50
	15.08	16.43	18.08	20.37	22.08	23.30	23.14	21.43	19.57	18.14	15.35	14.33
13	09.43	08.20	06.47	06.00	04.20	03.06	03.35	05.05	06.34	07.58	08.32	09.51
	15.11	16.47	18.11	20.40	22.11	23.31	23.11	21.40	19.54	18.11	15.32	14.33
14	09.42	08.17	06.43	05.56	04.17	03.05	03.37	05.08	06.37	08.01	08.35	09.53
	15.14	16.50	18.14	20.43	22.14	23.32	23.09	21.36	19.50	18.07	15.30	14.32
15	09.39	08.13	06.40	05.53	04.14	03.04	03.40	05.11	06.39	08.04	08.38	09.55
	15.16	16.53	18.17	20.46	22.17	23.34	23.07	21.33	19.47	18.04	15.27	14.31
16	09.37	08.10	06.37	05.50	04.11	03.04	03.42	05.14	06.42	08.07	08.41	09.56
	15.19	16.56	18.20	20.49	22.21	23.35	23.04	21.30	19.43	18.00	15.24	14.31
17	09.35	08.07	06.33	05.46	04.08	03.03	03.45	05.17	06.45	08.09	08.44	09.57
	15.22	16.59	18.23	20.52	22.24	23.36	23.02	21.26	19.40	17.57	15.21	14.31
18	09.33	08.04	06.30	05.43	04.05	03.03	03.48	05.20	06.48	08.12	08.47	09.58
	15.25	17.02	18.25	20.55	22.27	23.36	22.59	21.23	19.36	17.54	15.19	14.31
19	09.31	08.01	06.26	05.39	04.02	03.02	03.51	05.23	06.50	08.15	08.50	09.59
	15.28	17.05	18.28	20.58	22.30	23.37	22.56	21.19	19.33	17.50	15.16	14.31
20	09.28	07.57	06.23	05.36	03.59	03.02	03.54	05.26	06.53	08.18	08.53	10.00
	15.31	17.08	18.31	21.01	22.33	23.38	22.54	21.16	19.29	17.47	15.14	14.31
21	09.26	07.54	06.19	05.33	03.56	03.02	03.56	05.29	06.56	08.21	08.56	10.01
	15.34	17.11	18.34	21.04	22.36	23.38	22.51	21.13	19.26	17.44	15.11	14.31
22	09.23	07.51	06.16	05.29	03.54	03.02	03.59	05.32	06.59	08.24	08.59	10.02
	15.37	17.15	18.37	21.07	22.39	23.38	22.48	21.09	19.22	17.41	15.08	14.32
23	09.21	07.48	06.12	05.26	03.51	03.02	04.02	05.34	07.02	08.27	09.02	10.02
	15.40	17.18	18.40	21.10	22.42	23.38	22.45	21.06	19.19	17.37	15.06	14.32
24	09.18	07.44	06.09	05.22	03.48	03.03	04.05	05.37	07.04	08.30	09.05	10.02
	15.43	17.21	18.43	21.13	22.44	23.38	22.42	21.03	19.15	17.34	15.04	14.33
25	09.16	07.41	06.05	05.19	03.45	03.03	04.08	05.40	07.07	07.33	09.08	10.03
	15.46	17.24	18.46	21.16	22.47	23.38	22.39	20.59	19.12	16.31	15.01	14.34
26	09.13	07.38	06.02	05.16	03.43	03.04	04.11	05.43	07.10	07.36	09.11	10.03
	15.49	17.27	18.48	21.19	22.50	23.37	22.37	20.56	19.09	16.28	14.59	14.35
27	09.10	07.34	05.59	05.12	03.40	03.05	04.14	05.46	07.13	07.39	09.14	10.03
	15.53	17.30	18.51	21.22	22.53	23.37	22.34	20.52	19.05	16.24	14.57	14.36
28	09.08	07.31	05.55	05.09	03.37	03.06	04.17	05.49	07.15	07.42	09.17	10.02
	15.56	17.33	18.54	21.25	22.56	23.36	22.31	20.49	19.02	16.21	14.55	14.37
29	09.05		06.52	05.06	03.35	03.07	04.20	05.52	07.18	07.45	09.20	10.02
	15.59		19.57	21.28	22.59	23.35	22.28	20.45	18.58	16.18	14.53	14.38
30	09.02		06.48	05.02	03.32	03.08	04.23	05.55	07.21	07.48	09.22	10.02
	16.02		20.00	21.31	23.01	23.34	22.24	20.42	18.55	16.15	14.51	14.40
31	08.59		06.45		03.30		04.26	05.57		07.51		10.01
	16.05		20.03		23.04		22.21	20.39		16.12		14.41
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
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:
31.1.2024 8.55/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE1_RD200x21xHH200_No_Forest

Shadow receptor: H - H - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.00	08.56	07.28	06.41	04.59	03.28	03.10	04.29	06.00	07.24	07.55	09.25
	14.43	16.09	17.36	20.06	21.34	23.06	23.33	22.18	20.35	18.51	16.08	14.49
2	10.00	08.53	07.24	06.38	04.56	03.25	03.11	04.32	06.03	07.27	07.58	09.28
	14.45	16.12	17.39	20.09	21.37	23.09	23.32	22.15	20.32	18.48	16.05	14.47
3	09.59	08.50	07.21	06.34	04.52	03.23	03.13	04.35	06.06	07.29	08.01	09.30
	14.47	16.15	17.42	20.11	21.41	23.11	23.31	22.12	20.28	18.45	16.02	14.45
4	09.58	08.48	07.17	06.31	04.49	03.21	03.15	04.38	06.09	07.32	08.04	09.33
	14.49	16.18	17.45	20.14	21.44	23.14	23.29	22.09	20.25	18.41	15.59	14.43
5	09.56	08.45	07.14	06.27	04.46	03.19	03.17	04.41	06.12	07.35	08.07	09.35
	14.51	16.21	17.48	20.17	21.47	23.16	23.28	22.06	20.21	18.38	15.56	14.42
6	09.55	08.42	07.11	06.24	04.43	03.17	03.19	04.44	06.14	07.38	08.10	09.38
	14.53	16.24	17.51	20.20	21.50	23.18	23.26	22.02	20.18	18.34	15.53	14.40
7	09.54	08.39	07.07	06.21	04.39	03.15	03.21	04.47	06.17	07.41	08.13	09.40
	14.56	16.28	17.54	20.23	21.53	23.20	23.24	21.59	20.14	18.31	15.50	14.39
8	09.52	08.35	07.04	06.17	04.36	03.14	03.23	04.50	06.20	07.44	08.16	09.42
	14.58	16.31	17.56	20.26	21.56	23.23	23.22	21.56	20.11	18.27	15.47	14.38
9	09.51	08.32	07.01	06.14	04.33	03.12	03.25	04.53	06.23	07.46	08.19	09.44
	15.00	16.34	17.59	20.29	21.59	23.24	23.20	21.53	20.08	18.24	15.44	14.36
10	09.49	08.29	06.57	06.10	04.30	03.10	03.27	04.56	06.26	07.49	08.23	09.46
	15.03	16.37	18.02	20.32	22.02	23.26	23.18	21.49	20.04	18.21	15.41	14.35
11	09.47	08.26	06.54	06.07	04.27	03.09	03.30	04.59	06.28	07.52	08.26	09.48
	15.06	16.40	18.05	20.35	22.05	23.28	23.16	21.46	20.01	18.17	15.38	14.34
12	09.45	08.23	06.50	06.03	04.24	03.08	03.32	05.02	06.31	07.55	08.29	09.50
	15.08	16.44	18.08	20.38	22.08	23.30	23.14	21.43	19.57	18.14	15.35	14.33
13	09.44	08.20	06.47	06.00	04.20	03.07	03.35	05.05	06.34	07.58	08.32	09.52
	15.11	16.47	18.11	20.40	22.11	23.31	23.11	21.40	19.54	18.11	15.32	14.33
14	09.42	08.17	06.43	05.56	04.17	03.05	03.37	05.08	06.37	08.01	08.35	09.53
	15.14	16.50	18.14	20.43	22.14	23.32	23.09	21.36	19.50	18.07	15.30	14.32
15	09.39	08.14	06.40	05.53	04.14	03.05	03.40	05.11	06.39	08.04	08.38	09.55
	15.16	16.53	18.17	20.46	22.18	23.34	23.07	21.33	19.47	18.04	15.27	14.32
16	09.37	08.10	06.37	05.50	04.11	03.04	03.42	05.14	06.42	08.07	08.41	09.56
	15.19	16.56	18.20	20.49	22.21	23.35	23.04	21.30	19.43	18.00	15.24	14.31
17	09.35	08.07	06.33	05.46	04.08	03.03	03.45	05.17	06.45	08.10	08.44	09.57
	15.22	16.59	18.23	20.52	22.24	23.36	23.02	21.26	19.40	17.57	15.21	14.31
18	09.33	08.04	06.30	05.43	04.05	03.03	03.48	05.20	06.48	08.12	08.47	09.58
	15.25	17.02	18.25	20.55	22.27	23.37	22.59	21.23	19.36	17.54	15.19	14.31
19	09.31	08.01	06.26	05.39	04.02	03.02	03.51	05.23	06.51	08.15	08.50	09.59
	15.28	17.05	18.28	20.58	22.30	23.37	22.56	21.20	19.33	17.50	15.16	14.31
20	09.28	07.57	06.23	05.36	03.59	03.02	03.54	05.26	06.53	08.18	08.53	10.00
	15.31	17.08	18.31	21.01	22.33	23.38	22.54	21.16	19.29	17.47	15.14	14.31
21	09.26	07.54	06.19	05.33	03.56	03.02	03.56	05.29	06.56	08.21	08.56	10.01
	15.34	17.12	18.34	21.04	22.36	23.38	22.51	21.13	19.26	17.44	15.11	14.31
22	09.23	07.51	06.16	05.29	03.54	03.02	03.59	05.32	06.59	08.24	08.59	10.02
	15.37	17.15	18.37	21.07	22.39	23.38	22.48	21.09	19.22	17.41	15.09	14.32
23	09.21	07.48	06.12	05.26	03.51	03.02	04.02	05.34	07.02	08.27	09.02	10.02
	15.40	17.18	18.40	21.10	22.42	23.38	22.45	21.06	19.19	17.37	15.06	14.32
24	09.18	07.44	06.09	05.22	03.48	03.03	04.05	05.37	07.04	08.30	09.05	10.02
	15.43	17.21	18.43	21.13	22.44	23.38	22.42	21.03	19.16	17.34	15.04	14.33
25	09.16	07.41	06.06	05.19	03.45	03.03	04.08	05.40	07.07	07.33	09.08	10.03
	15.46	17.24	18.46	21.16	22.47	23.38	22.39	20.59	19.12	16.31	15.01	14.34
26	09.13	07.38	06.02	05.16	03.43	03.04	04.11	05.43	07.10	07.36	09.11	10.03
	15.50	17.27	18.48	21.19	22.50	23.37	22.37	20.56	19.09	16.28	14.59	14.35
27	09.10	07.34	05.59	05.12	03.40	03.05	04.14	05.46	07.13	07.39	09.14	10.03
	15.53	17.30	18.51	21.22	22.53	23.37	22.34	20.52	19.05	16.24	14.57	14.36
28	09.08	07.31	05.55	05.09	03.37	03.06	04.17	05.49	07.15	07.42	09.17	10.02
	15.56	17.33	18.54	21.25	22.56	23.36	22.31	20.49	19.02	16.21	14.55	14.37
29	09.05		06.52	05.06	03.35	03.07	04.20	05.52	07.18	07.45	09.20	10.02
	15.59		19.57	21.28	22.59	23.35	22.28	20.45	18.58	16.18	14.53	14.38
30	09.02		06.48	05.02	03.32	03.08	04.23	05.55	07.21	07.48	09.22	10.02
	16.02		20.00	21.31	23.01	23.34	22.24	20.42	18.55	16.15	14.51	14.40
31	08.59		06.45		03.30		04.26	05.57		07.52		10.01
	16.05		20.03		23.04		22.21	20.39		16.12		14.41
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
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:
31.1.2024 8.55/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE1_RD200x21xHH200_No_Forest

Shadow receptor: I - I - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.00	08.56	07.28	06.42	04.59	03.28	03.10	04.29	06.01	07.24	07.55	09.25
	14.44	16.09	17.36	20.06	21.35	23.06	23.33	22.18	20.35	18.52	16.09	14.49
2	09.59	08.54	07.24	06.38	04.56	03.26	03.12	04.32	06.03	07.27	07.58	09.28
	14.46	16.12	17.39	20.09	21.38	23.09	23.32	22.15	20.32	18.48	16.06	14.47
3	09.59	08.51	07.21	06.35	04.53	03.24	03.13	04.35	06.06	07.30	08.01	09.30
	14.47	16.15	17.42	20.12	21.41	23.11	23.31	22.12	20.28	18.45	16.03	14.46
4	09.57	08.48	07.18	06.31	04.50	03.22	03.15	04.38	06.09	07.32	08.04	09.33
	14.49	16.18	17.45	20.14	21.44	23.14	23.29	22.09	20.25	18.41	15.59	14.44
5	09.56	08.45	07.14	06.28	04.46	03.20	03.17	04.41	06.12	07.35	08.07	09.35
	14.52	16.22	17.48	20.17	21.47	23.16	23.28	22.06	20.22	18.38	15.56	14.42
6	09.55	08.42	07.11	06.24	04.43	03.18	03.19	04.44	06.15	07.38	08.10	09.38
	14.54	16.25	17.51	20.20	21.50	23.18	23.26	22.03	20.18	18.35	15.53	14.41
7	09.54	08.39	07.08	06.21	04.40	03.16	03.21	04.47	06.17	07.41	08.13	09.40
	14.56	16.28	17.54	20.23	21.53	23.20	23.24	21.59	20.15	18.31	15.50	14.39
8	09.52	08.36	07.04	06.17	04.37	03.14	03.23	04.50	06.20	07.44	08.16	09.42
	14.58	16.31	17.57	20.26	21.56	23.22	23.22	21.56	20.11	18.28	15.47	14.38
9	09.51	08.33	07.01	06.14	04.33	03.12	03.25	04.53	06.23	07.47	08.20	09.44
	15.01	16.34	18.00	20.29	21.59	23.24	23.20	21.53	20.08	18.24	15.44	14.37
10	09.49	08.29	06.57	06.10	04.30	03.11	03.28	04.56	06.26	07.49	08.23	09.46
	15.03	16.38	18.03	20.32	22.02	23.26	23.18	21.50	20.04	18.21	15.41	14.36
11	09.47	08.26	06.54	06.07	04.27	03.09	03.30	04.59	06.29	07.52	08.26	09.48
	15.06	16.41	18.05	20.35	22.05	23.28	23.16	21.46	20.01	18.18	15.39	14.35
12	09.45	08.23	06.50	06.04	04.24	03.08	03.33	05.02	06.31	07.55	08.29	09.50
	15.09	16.44	18.08	20.38	22.08	23.30	23.14	21.43	19.57	18.14	15.36	14.34
13	09.44	08.20	06.47	06.00	04.21	03.07	03.35	05.05	06.34	07.58	08.32	09.52
	15.11	16.47	18.11	20.41	22.11	23.31	23.11	21.40	19.54	18.11	15.33	14.33
14	09.42	08.17	06.44	05.57	04.18	03.06	03.38	05.08	06.37	08.01	08.35	09.53
	15.14	16.50	18.14	20.44	22.15	23.32	23.09	21.36	19.50	18.07	15.30	14.32
15	09.40	08.14	06.40	05.53	04.15	03.05	03.40	05.11	06.40	08.04	08.38	09.55
	15.17	16.53	18.17	20.46	22.18	23.34	23.07	21.33	19.47	18.04	15.27	14.32
16	09.37	08.10	06.37	05.50	04.12	03.04	03.43	05.14	06.42	08.07	08.41	09.56
	15.20	16.56	18.20	20.49	22.21	23.35	23.04	21.30	19.43	18.01	15.24	14.32
17	09.35	08.07	06.33	05.46	04.09	03.04	03.46	05.17	06.45	08.10	08.44	09.57
	15.23	16.59	18.23	20.52	22.24	23.36	23.02	21.26	19.40	17.57	15.22	14.31
18	09.33	08.04	06.30	05.43	04.06	03.03	03.48	05.20	06.48	08.13	08.47	09.58
	15.25	17.03	18.26	20.55	22.27	23.36	22.59	21.23	19.36	17.54	15.19	14.31
19	09.31	08.01	06.26	05.40	04.03	03.03	03.51	05.23	06.51	08.16	08.50	09.59
	15.28	17.06	18.29	20.58	22.30	23.37	22.56	21.20	19.33	17.51	15.16	14.31
20	09.28	07.58	06.23	05.36	04.00	03.03	03.54	05.26	06.53	08.18	08.53	10.00
	15.31	17.09	18.31	21.01	22.33	23.38	22.54	21.16	19.30	17.47	15.14	14.31
21	09.26	07.54	06.20	05.33	03.57	03.03	03.57	05.29	06.56	08.21	08.57	10.01
	15.34	17.12	18.34	21.04	22.36	23.38	22.51	21.13	19.26	17.44	15.11	14.32
22	09.23	07.51	06.16	05.29	03.54	03.03	04.00	05.32	06.59	08.24	09.00	10.02
	15.37	17.15	18.37	21.07	22.39	23.38	22.48	21.09	19.23	17.41	15.09	14.32
23	09.21	07.48	06.13	05.26	03.51	03.03	04.03	05.35	07.02	08.27	09.02	10.02
	15.41	17.18	18.40	21.10	22.42	23.38	22.45	21.06	19.19	17.38	15.06	14.33
24	09.18	07.44	06.09	05.23	03.48	03.03	04.06	05.38	07.05	08.30	09.05	10.02
	15.44	17.21	18.43	21.13	22.44	23.38	22.42	21.03	19.16	17.34	15.04	14.33
25	09.16	07.41	06.06	05.19	03.46	03.04	04.08	05.41	07.07	07.33	09.08	10.03
	15.47	17.24	18.46	21.16	22.47	23.38	22.40	20.59	19.12	16.31	15.02	14.34
26	09.13	07.38	06.02	05.16	03.43	03.05	04.11	05.43	07.10	07.36	09.11	10.03
	15.50	17.27	18.49	21.19	22.50	23.37	22.37	20.56	19.09	16.28	14.59	14.35
27	09.10	07.34	05.59	05.13	03.40	03.06	04.14	05.46	07.13	07.39	09.14	10.03
	15.53	17.30	18.51	21.22	22.53	23.37	22.34	20.52	19.05	16.25	14.57	14.36
28	09.08	07.31	05.55	05.09	03.38	03.07	04.17	05.49	07.16	07.42	09.17	10.02
	15.56	17.33	18.54	21.25	22.56	23.36	22.31	20.49	19.02	16.21	14.55	14.37
29	09.05		06.52	05.06	03.35	03.08	04.20	05.52	07.18	07.46	09.20	10.02
	15.59		19.57	21.28	22.59	23.35	22.28	20.46	18.59	16.18	14.53	14.39
30	09.02		06.48	05.03	03.33	03.09	04.23	05.55	07.21	07.49	09.22	10.02
	16.03		20.00	21.31	23.01	23.34	22.25	20.42	18.55	16.15	14.51	14.40
31	08.59		06.45		03.30		04.26	05.58		07.52		10.01
	16.06		20.03		23.04		22.21	20.39		16.12		14.42
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
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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Henri Korhonen / henri.korhonen@fcg.fi
Calculated:
31.1.2024 8.55/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE1_RD200x21xHH200_No_Forest

Shadow receptor: J - J - Lomarakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.00	08.57	07.28	06.42	04.59	03.28	03.10	04.29	06.01	07.24	07.55	09.25
	14.44	16.09	17.36	20.06	21.35	23.07	23.33	22.18	20.35	18.52	16.09	14.49
2	10.00	08.54	07.24	06.38	04.56	03.26	03.12	04.32	06.03	07.27	07.58	09.28
	14.46	16.12	17.39	20.09	21.38	23.09	23.32	22.15	20.32	18.48	16.06	14.47
3	09.59	08.51	07.21	06.35	04.53	03.24	03.14	04.35	06.06	07.30	08.01	09.30
	14.47	16.15	17.42	20.12	21.41	23.12	23.31	22.12	20.29	18.45	16.03	14.46
4	09.58	08.48	07.18	06.31	04.50	03.22	03.15	04.38	06.09	07.33	08.04	09.33
	14.50	16.19	17.45	20.15	21.44	23.14	23.29	22.09	20.25	18.41	16.00	14.44
5	09.56	08.45	07.14	06.28	04.46	03.20	03.17	04.41	06.12	07.35	08.07	09.35
	14.52	16.22	17.48	20.17	21.47	23.16	23.28	22.06	20.22	18.38	15.56	14.42
6	09.55	08.42	07.11	06.24	04.43	03.18	03.19	04.44	06.15	07.38	08.10	09.38
	14.54	16.25	17.51	20.20	21.50	23.18	23.26	22.03	20.18	18.35	15.53	14.41
7	09.54	08.39	07.08	06.21	04.40	03.16	03.21	04.47	06.18	07.41	08.13	09.40
	14.56	16.28	17.54	20.23	21.53	23.21	23.24	21.59	20.15	18.31	15.50	14.39
8	09.52	08.36	07.04	06.17	04.37	03.14	03.23	04.50	06.20	07.44	08.16	09.42
	14.58	16.31	17.57	20.26	21.56	23.23	23.22	21.56	20.11	18.28	15.47	14.38
9	09.51	08.33	07.01	06.14	04.33	03.12	03.26	04.53	06.23	07.47	08.20	09.44
	15.01	16.34	18.00	20.29	21.59	23.25	23.20	21.53	20.08	18.24	15.44	14.37
10	09.49	08.30	06.57	06.11	04.30	03.11	03.28	04.56	06.26	07.50	08.23	09.46
	15.03	16.38	18.03	20.32	22.02	23.26	23.18	21.50	20.04	18.21	15.42	14.36
11	09.47	08.26	06.54	06.07	04.27	03.10	03.30	04.59	06.29	07.52	08.26	09.48
	15.06	16.41	18.06	20.35	22.05	23.28	23.16	21.46	20.01	18.18	15.39	14.35
12	09.46	08.23	06.51	06.04	04.24	03.08	03.33	05.02	06.31	07.55	08.29	09.50
	15.09	16.44	18.08	20.38	22.08	23.30	23.14	21.43	19.57	18.14	15.36	14.34
13	09.44	08.20	06.47	06.00	04.21	03.07	03.35	05.05	06.34	07.58	08.32	09.52
	15.11	16.47	18.11	20.41	22.12	23.31	23.12	21.40	19.54	18.11	15.33	14.33
14	09.42	08.17	06.44	05.57	04.18	03.06	03.38	05.08	06.37	08.01	08.35	09.53
	15.14	16.50	18.14	20.44	22.15	23.33	23.09	21.36	19.50	18.08	15.30	14.33
15	09.40	08.14	06.40	05.53	04.15	03.05	03.40	05.11	06.40	08.04	08.38	09.55
	15.17	16.53	18.17	20.47	22.18	23.34	23.07	21.33	19.47	18.04	15.27	14.32
16	09.38	08.11	06.37	05.50	04.12	03.04	03.43	05.14	06.43	08.07	08.41	09.56
	15.20	16.56	18.20	20.50	22.21	23.35	23.04	21.30	19.44	18.01	15.25	14.32
17	09.35	08.07	06.33	05.47	04.09	03.04	03.46	05.17	06.45	08.10	08.44	09.57
	15.23	17.00	18.23	20.52	22.24	23.36	23.02	21.26	19.40	17.57	15.22	14.31
18	09.33	08.04	06.30	05.43	04.06	03.03	03.48	05.20	06.48	08.13	08.48	09.58
	15.26	17.03	18.26	20.55	22.27	23.37	22.59	21.23	19.37	17.54	15.19	14.31
19	09.31	08.01	06.27	05.40	04.03	03.03	03.51	05.23	06.51	08.16	08.51	09.59
	15.28	17.06	18.29	20.58	22.30	23.37	22.56	21.20	19.33	17.51	15.17	14.31
20	09.28	07.58	06.23	05.36	04.00	03.03	03.54	05.26	06.54	08.19	08.54	10.00
	15.31	17.09	18.32	21.01	22.33	23.38	22.54	21.16	19.30	17.48	15.14	14.31
21	09.26	07.54	06.20	05.33	03.57	03.03	03.57	05.29	06.56	08.22	08.57	10.01
	15.34	17.12	18.34	21.04	22.36	23.38	22.51	21.13	19.26	17.44	15.11	14.32
22	09.24	07.51	06.16	05.30	03.54	03.03	04.00	05.32	06.59	08.25	09.00	10.02
	15.38	17.15	18.37	21.07	22.39	23.38	22.48	21.10	19.23	17.41	15.09	14.32
23	09.21	07.48	06.13	05.26	03.51	03.03	04.03	05.35	07.02	08.27	09.03	10.02
	15.41	17.18	18.40	21.10	22.42	23.38	22.45	21.06	19.19	17.38	15.07	14.33
24	09.18	07.44	06.09	05.23	03.49	03.03	04.06	05.38	07.05	08.30	09.06	10.03
	15.44	17.21	18.43	21.13	22.45	23.38	22.43	21.03	19.16	17.34	15.04	14.33
25	09.16	07.41	06.06	05.19	03.46	03.04	04.08	05.41	07.07	07.33	09.08	10.03
	15.47	17.24	18.46	21.16	22.48	23.38	22.40	20.59	19.12	16.31	15.02	14.34
26	09.13	07.38	06.02	05.16	03.43	03.05	04.11	05.44	07.10	07.37	09.11	10.03
	15.50	17.27	18.49	21.19	22.50	23.37	22.37	20.56	19.09	16.28	15.00	14.35
27	09.11	07.35	05.59	05.13	03.40	03.06	04.14	05.46	07.13	07.40	09.14	10.03
	15.53	17.30	18.52	21.22	22.53	23.37	22.34	20.53	19.05	16.25	14.57	14.36
28	09.08	07.31	05.55	05.09	03.38	03.07	04.17	05.49	07.16	07.43	09.17	10.03
	15.56	17.33	18.54	21.25	22.56	23.36	22.31	20.49	19.02	16.21	14.55	14.37
29	09.05		06.52	05.06	03.35	03.08	04.20	05.52	07.19	07.46	09.20	10.02
	15.59		19.57	21.29	22.59	23.35	22.28	20.46	18.59	16.18	14.53	14.39
30	09.02		06.49	05.03	03.33	03.09	04.23	05.55	07.21	07.49	09.23	10.02
	16.03		20.00	21.32	23.01	23.34	22.25	20.42	18.55	16.15	14.51	14.40
31	08.59		06.45		03.31		04.26	05.58		07.52		10.01
	16.06		20.03		23.04		22.22	20.39		16.12		14.42
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
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:
31.1.2024 8.55/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE1_RD200x21xHH200_No_Forest

Shadow receptor: K - K - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April		May	June	July	August		September		October	November	December
1	10.01	08.57	07.28	06.42		04.59	03.28	03.10	04.29		06.01	06.40 (WTG01)	07.24	07.55	09.25
	14.44	16.09	17.36	20.06		21.35	23.07	23.34	22.19		20.36	3 06.43 (WTG01)	18.52	16.09	14.49
2	10.00	08.54	07.25	06.38		04.56	03.26	03.12	04.32		06.04		07.27	07.58	09.28
	14.46	16.12	17.39	20.09		21.38	23.09	23.32	22.16		20.32		18.48	16.06	14.47
3	09.59	08.51	07.21	06.35		04.53	03.24	03.13	04.35		06.06		07.30	08.01	09.31
	14.47	16.15	17.42	20.12		21.41	23.12	23.31	22.12		20.29		18.45	16.03	14.46
4	09.58	08.48	07.18	06.31		04.50	03.22	03.15	04.38		06.09		07.33	08.04	09.33
	14.49	16.19	17.45	20.15		21.44	23.14	23.30	22.09		20.25		18.41	16.00	14.44
5	09.57	08.45	07.14	06.28		04.46	03.20	03.17	04.41		06.12		07.35	08.07	09.36
	14.52	16.22	17.48	20.18		21.47	23.16	23.28	22.06		20.22		18.38	15.56	14.42
6	09.55	08.42	07.11	06.24		04.43	03.18	03.19	04.44		06.15		07.38	08.10	09.38
	14.54	16.25	17.51	20.20		21.50	23.19	23.26	22.03		20.18		18.35	15.53	14.41
7	09.54	08.39	07.08	06.21		04.40	03.16	03.21	04.47		06.18		07.41	08.14	09.40
	14.56	16.28	17.54	20.23		21.53	23.21	23.24	22.00		20.15		18.31	15.50	14.39
8	09.53	08.36	07.04	06.18		04.37	03.14	03.23	04.50		06.20		07.44	08.17	09.42
	14.58	16.31	17.57	20.26		21.56	23.23	23.23	21.56		20.11		18.28	15.47	14.38
9	09.51	08.33	07.01	06.14		04.33	03.12	03.25	04.53		06.23		07.47	08.20	09.44
	15.01	16.34	18.00	20.29		21.59	23.25	23.21	21.53		20.08		18.24	15.44	14.37
10	09.49	08.30	06.57	06.11		04.30	03.11	03.28	04.56		06.26		07.50	08.23	09.46
	15.03	16.38	18.03	20.32		22.03	23.27	23.18	21.50		20.04		18.21	15.42	14.36
11	09.48	08.27	06.54	06.07		06.40 (WTG01)	04.27	03.09	03.30	04.59		06.29	07.53	08.26	09.48
	15.06	16.41	18.06	20.35	4	06.44 (WTG01)	22.06	23.28	23.16	21.47		20.01	18.18	15.39	14.35
12	09.46	08.23	06.51	06.04		06.36 (WTG01)	04.24	03.08	03.33	05.02		06.32	07.55	08.29	09.50
	15.09	16.44	18.09	20.38	12	06.48 (WTG01)	22.09	23.30	23.14	21.43		19.57	18.14	15.36	14.34
13	09.44	08.20	06.47	06.00		06.34 (WTG01)	04.21	03.07	03.35	05.05		06.34	07.58	08.32	09.52
	15.11	16.47	18.11	20.41	16	06.50 (WTG01)	22.12	23.31	23.12	21.40		19.54	18.11	15.33	14.33
14	09.42	08.17	06.44	05.57		06.32 (WTG01)	04.18	03.06	03.38	05.08		06.37	08.01	08.35	09.53
	15.14	16.50	18.14	20.44	19	06.51 (WTG01)	22.15	23.33	23.09	21.37		19.51	18.08	15.30	14.32
15	09.40	08.14	06.40	05.53		06.31 (WTG01)	04.15	03.05	03.40	05.11		06.40	08.04	08.38	09.55
	15.17	16.53	18.17	20.47	20	06.51 (WTG01)	22.18	23.34	23.07	21.33		19.47	18.04	15.27	14.32
16	09.38	08.11	06.37	05.50		06.30 (WTG01)	04.12	03.04	03.43	05.14	06.41 (WTG01)	06.43	08.07	08.42	09.56
	15.20	16.56	18.20	20.50	22	06.52 (WTG01)	22.21	23.35	23.05	21.30	9 06.50 (WTG01)	19.44	18.01	15.25	14.32
17	09.36	08.07	06.33	05.47		06.30 (WTG01)	04.09	03.04	03.46	05.17	06.39 (WTG01)	06.45	08.10	08.45	09.58
	15.23	17.00	18.23	20.53	23	06.53 (WTG01)	22.24	23.36	23.02	21.27	14 06.53 (WTG01)	19.40	17.58	15.22	14.31
18	09.33	08.04	06.30	05.43		06.29 (WTG01)	04.06	03.03	03.48	05.20	06.37 (WTG01)	06.48	08.13	08.48	09.59
	15.25	17.03	18.26	20.56	23	06.52 (WTG01)	22.27	23.37	22.59	21.23	16 06.53 (WTG01)	19.37	17.54	15.19	14.31
19	09.31	08.01	06.27	05.40		06.28 (WTG01)	04.03	03.03	03.51	05.23	06.36 (WTG01)	06.51	08.16	08.51	10.00
	15.28	17.06	18.29	20.59	24	06.52 (WTG01)	22.30	23.37	22.57	21.20	19 06.55 (WTG01)	19.33	17.51	15.17	14.31
20	09.29	07.58	06.23	05.36		06.29 (WTG01)	04.00	03.03	03.54	05.26	06.34 (WTG01)	06.54	08.19	08.54	10.01
	15.31	17.09	18.32	21.02	23	06.52 (WTG01)	22.33	23.38	22.54	21.17	21 06.55 (WTG01)	19.30	17.48	15.14	14.31
21	09.26	07.54	06.20	05.33		06.29 (WTG01)	03.57	03.02	03.57	05.29	06.34 (WTG01)	06.56	08.22	08.57	10.01
	15.34	17.12	18.34	21.05	22	06.51 (WTG01)	22.36	23.38	22.51	21.13	21 06.55 (WTG01)	19.26	17.44	15.11	14.32
22	09.24	07.51	06.16	05.30		06.29 (WTG01)	03.54	03.03	04.00	05.32	06.33 (WTG01)	06.59	08.25	09.00	10.02
	15.38	17.15	18.37	21.08	22	06.51 (WTG01)	22.39	23.39	22.48	21.10	23 06.56 (WTG01)	19.23	17.41	15.09	14.32
23	09.21	07.48	06.13	05.26		06.29 (WTG01)	03.51	03.03	04.03	05.35	06.32 (WTG01)	07.02	08.28	09.03	10.02
	15.41	17.18	18.40	21.11	20	06.49 (WTG01)	22.42	23.39	22.46	21.06	23 06.55 (WTG01)	19.19	17.38	15.06	14.33
24	09.19	07.45	06.09	05.23		06.29 (WTG01)	03.48	03.03	04.06	05.38	06.32 (WTG01)	07.05	08.31	09.06	10.03
	15.44	17.21	18.43	21.14	19	06.48 (WTG01)	22.45	23.38	22.43	21.03	23 06.55 (WTG01)	19.16	17.34	15.04	14.33
25	09.16	07.41	06.06	05.19		06.30 (WTG01)	03.46	03.04	04.08	05.41	06.32 (WTG01)	07.07	07.34	09.09	10.03
	15.47	17.24	18.46	21.17	17	06.47 (WTG01)	22.48	23.38	22.40	21.00	23 06.55 (WTG01)	19.12	16.31	15.02	14.34
26	09.13	07.38	06.02	05.16		06.32 (WTG01)	03.43	03.05	04.11	05.44	06.32 (WTG01)	07.10	07.37	09.12	10.03
	15.50	17.27	18.49	21.20	13	06.45 (WTG01)	22.51	23.38	22.37	20.56	22 06.54 (WTG01)	19.09	16.28	15.00	14.35
27	09.11	07.35	05.59	05.13		06.34 (WTG01)	03.40	03.05	04.14	05.46	06.32 (WTG01)	07.13	07.40	09.14	10.03
	15.53	17.30	18.52	21.23	8	06.42 (WTG01)	22.53	23.37	22.34	20.53	22 06.54 (WTG01)	19.06	16.25	14.57	14.36
28	09.08	07.31	05.56	05.09			03.38	03.06	04.17	05.49	06.33 (WTG01)	07.16	07.43	09.17	10.03
	15.56	17.33	18.55	21.26			22.56	23.37	22.31	20.49	20 06.53 (WTG01)	19.02	16.22	14.55	14.37
29	09.05		06.52	05.06			03.35	03.08	04.20	05.52	06.33 (WTG01)	07.19	07.46	09.20	10.03
	15.59		19.57	21.29			22.59	23.36	22.28	20.46	18 06.51 (WTG01)	18.59	16.18	14.53	14.39
30	09.02		06.49	05.03			03.33	03.09	04.23	05.55	06.34 (WTG01)	07.21	07.49	09.23	10.02
	16.03		20.00	21.32			23.02	23.35	22.25	20.42	16 06.50 (WTG01)	18.55	16.15	14.51	14.40
31	09.00		06.45				03.30		04.26	05.58	06.36 (WTG01)		07.52		10.02
	16.06		20.03				23.04		22.22	20.39	12 06.48 (WTG01)		16.12		14.42
Potential sun hours	179	241	363	448			562	610	598	504		392		307	204	147
Total, worst case					307						302		3			
Sun reduction					0,44						0,42		0,36			
Oper. time red.					0,90						0,90		0,90			
Wind dir. red.					0,56						0,56		0,56			
Total reduction					0,22						0,21		0,18			
Total, real					68						63		1			

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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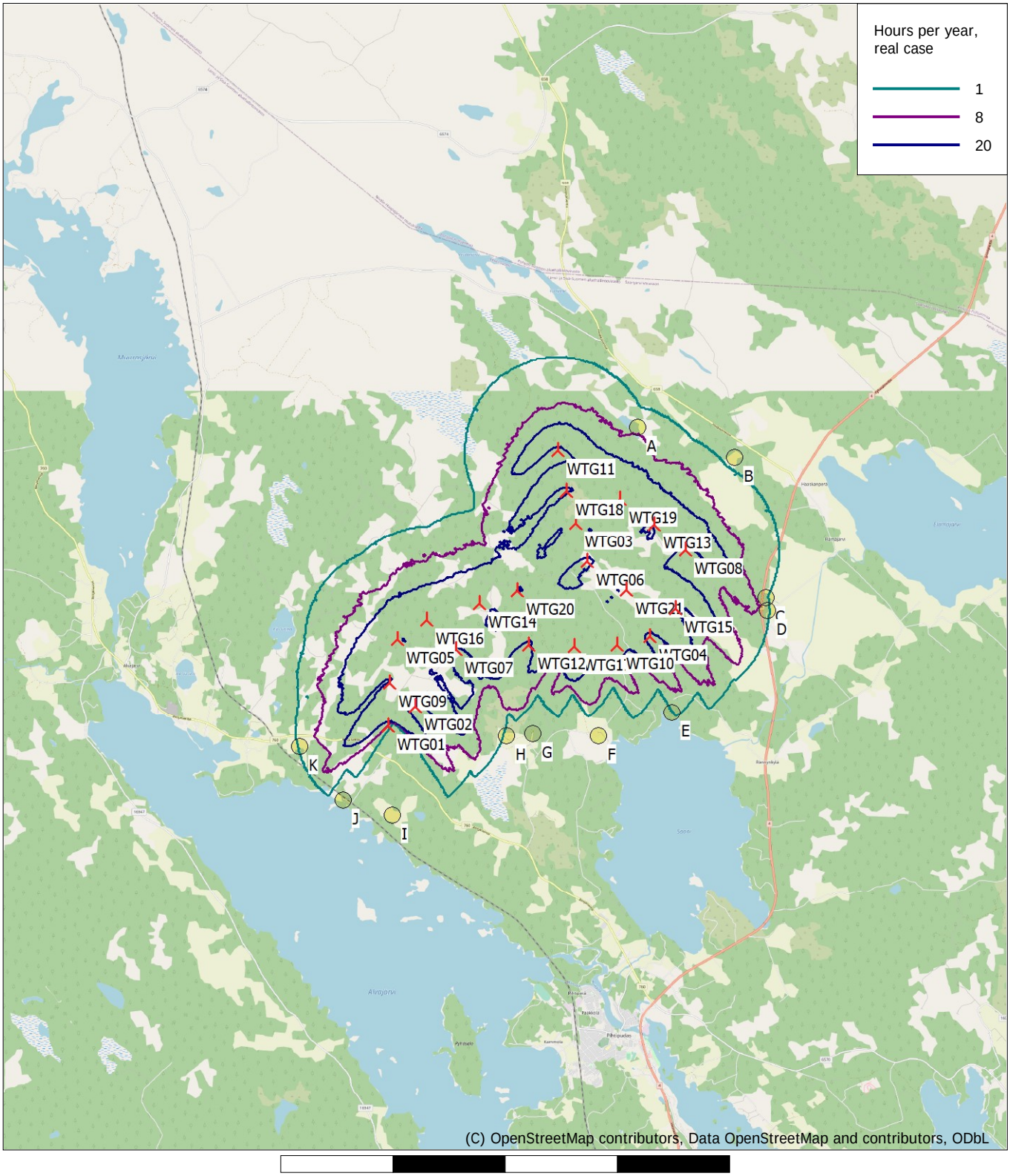
Calculated:
31.1.2024 8.55/3.6.355

SHADOW - Map

Calculation: Uusimo_VE1_RD200x21xHH200_No_Forest



0 2,5 5 7,5 10km

Map: EMD OpenStreetMap , Print scale 1:125 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 426 720 North: 7 038 300

New WTG Shadow receptor

Flicker map level: Height Contours: CONTOURLINE_Pyhäntä_Pilpankangas_0.wpo (2)

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, No forest” - Hankevaihtoehto 2

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31.1.2024 10.54/3.6.355

SHADOW - Main Result

Calculation: Uusimo_VE2_RD200x18xHH200_No_Forest

Assumptions for shadow calculations

Maximum distance for influence	2 089	m
Minimum sun height over horizon for influence	3	°
Day step for calculation	1	days
Time step for calculation	1	minutes

Sunshine probability S (Average daily sunshine hours) []

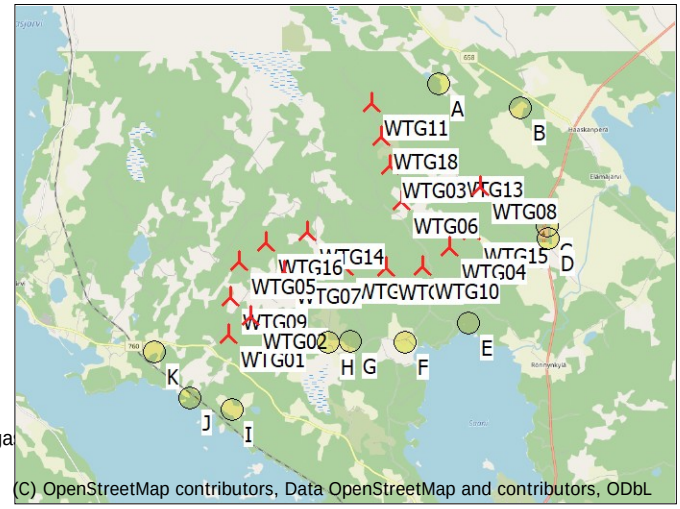
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

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_Pyhäntä_Pilpankanga
Receptor grid resolution: 1,0 m

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89



Scale 1:200 000

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]
WTG01	423 751	7 034 716	140,0	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG02	424 350	7 035 191	132,5	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG03	428 122	7 039 102	160,0	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG04	429 639	7 036 890	128,0	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG05	424 051	7 036 638	139,7	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG06	428 401	7 038 173	148,0	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG07	425 267	7 036 341	132,5	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG08	430 501	7 038 489	132,6	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG09	423 801	7 035 688	141,0	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG10	428 913	7 036 410	128,2	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG11	427 690	7 040 789	140,8	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG12	426 874	7 036 449	125,0	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG13	429 650	7 039 089	140,0	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG14	425 900	7 037 389	133,7	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG15	430 250	7 037 340	128,9	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG16	424 812	7 037 139	142,1	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG17	427 951	7 036 390	122,3	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG18	427 892	7 039 889	150,0	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5

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	429 470	7 041 260	145,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
B	B - Asuinrakennus	431 627	7 040 548	144,9	5,0	5,0	1,0	90,0	"Green house mode"	6,0
C	C - Asuinrakennus	432 261	7 037 387	122,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
D	D - Asuinrakennus	432 294	7 037 094	122,1	5,0	5,0	1,0	90,0	"Green house mode"	6,0
E	E - Lomarakennus	430 111	7 034 859	117,3	5,0	5,0	1,0	90,0	"Green house mode"	6,0
F	F - Asuinrakennus	428 445	7 034 384	122,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
G	G - Asuinrakennus	426 978	7 034 448	122,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0
H	H - Asuinrakennus	426 394	7 034 428	122,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
I	I - Asuinrakennus	423 788	7 032 711	125,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
J	J - Lomarakennus	422 689	7 033 070	114,2	5,0	5,0	1,0	90,0	"Green house mode"	6,0
K	K - Asuinrakennus	421 745	7 034 298	125,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0

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Calculated:
31.1.2024 10.54/3.6.355

SHADOW - Main Result

Calculation: Uusimo_VE2_RD200x18xHH200_No_Forest

Calculation Results

Shadow receptor

No.	Name	Shadow, expected values Shadow hours per year [h/year]
A	A - Lomarakennus	1:43
B	B - Asuinrakennus	0:00
C	C - Asuinrakennus	5:23
D	D - Asuinrakennus	1:51
E	E - Lomarakennus	0:47
F	F - Asuinrakennus	0:00
G	G - Asuinrakennus	0:00
H	H - Asuinrakennus	0:00
I	I - Asuinrakennus	0:00
J	J - Lomarakennus	0:00
K	K - Asuinrakennus	2:11

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

No.	Name	Expected [h/year]
WTG01	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (437)	2:11
WTG02	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (438)	0:00
WTG03	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (439)	0:00
WTG04	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (440)	0:00
WTG05	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (441)	0:00
WTG06	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (442)	0:00
WTG07	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (443)	0:00
WTG08	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (444)	3:42
WTG09	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (445)	0:00
WTG10	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (446)	0:47
WTG11	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (447)	1:43
WTG12	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (448)	0:00
WTG13	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (449)	0:00
WTG14	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (450)	0:00
WTG15	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (454)	3:34
WTG16	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (451)	0:00
WTG17	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (452)	0:00
WTG18	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (453)	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:
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SHADOW - Calendar

Calculation: Uusimo_VE2_RD200x18xHH200_No_Forest

Shadow receptor: A - A - Lomarakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March		April	May	June	July	August	September		October		November	December
1	10.01	08.57	07.28		06.41	04.58	03.27	03.08	04.28	06.00		07.24		07.55	09.26
	14.42	16.08	17.35		20.06	21.35	23.07	23.34	22.19	20.35		18.51	22	18.10 (WTG11)	16.08	14.48
2	10.00	08.54	07.24		06.37	04.55	03.24	03.10	04.31	06.03		07.26		17.47 (WTG11)	07.58	09.28
	14.44	16.11	17.38		20.08	21.38	23.10	23.33	22.16	20.32		18.48	21	18.08 (WTG11)	16.05	14.46
3	09.59	08.51	07.21		06.34	04.52	03.22	03.12	04.34	06.06		07.29		17.48 (WTG11)	08.01	09.31
	14.46	16.14	17.41		20.11	21.41	23.12	23.32	22.12	20.28		18.44	18	18.06 (WTG11)	16.02	14.44
4	09.58	08.48	07.17		06.31	04.48	03.20	03.13	04.37	06.08		07.32		17.50 (WTG11)	08.04	09.33
	14.48	16.17	17.44		20.14	21.44	23.15	23.30	22.09	20.25		18.41	12	18.02 (WTG11)	15.59	14.42
5	09.57	08.45	07.14		06.27	04.45	03.18	03.15	04.40	06.11		07.35		17.52 (WTG11)	08.07	09.36
	14.50	16.21	17.47		20.17	21.47	23.17	23.28	22.06	20.21		18.37	7	17.59 (WTG11)	15.55	14.41
6	09.56	08.42	07.11		06.24	04.42	03.16	03.17	04.43	06.14		07.38			08.10	09.38
	14.52	16.24	17.50		20.20	21.50	23.19	23.27	22.03	20.18		18.34			15.52	14.39
7	09.54	08.39	07.07		06.20	04.39	03.14	03.19	04.46	06.17		07.41			08.13	09.40
	14.55	16.27	17.53		20.23	21.53	23.21	23.25	22.00	20.14		18.31			15.49	14.38
8	09.53	08.36	07.04		17.19 (WTG11)	06.17	04.35	03.12	03.21	04.49	06.20	07.43			08.16	09.43
	14.57	16.30	17.56	2	17.21 (WTG11)	20.26	21.56	23.23	23.23	21.56	20.11	18.27			15.46	14.37
9	09.51	08.33	07.00		17.13 (WTG11)	06.13	04.32	03.11	03.24	04.52	06.22	07.46			08.20	09.45
	14.59	16.33	17.59	10	17.23 (WTG11)	20.29	21.59	23.25	23.21	21.53	20.07	18.24			15.43	14.35
10	09.50	08.29	06.57		17.12 (WTG11)	06.10	04.29	03.09	03.26	04.55	06.25	07.49			08.23	09.47
	15.02	16.37	18.02	15	17.27 (WTG11)	20.32	22.02	23.27	23.19	21.50	20.04	18.20			15.40	14.34
11	09.48	08.26	06.54		17.09 (WTG11)	06.06	04.26	03.08	03.28	04.58	06.28	07.52			08.26	09.49
	15.05	16.40	18.05	20	17.29 (WTG11)	20.35	22.06	23.29	23.17	21.46	20.00	18.17			15.38	14.33
12	09.46	08.23	06.50		17.09 (WTG11)	06.03	04.23	03.06	03.31	05.01	06.31	07.55			08.29	09.50
	15.07	16.43	18.08	22	17.31 (WTG11)	20.38	22.09	23.31	23.15	21.43	19.57	18.14			15.35	14.32
13	09.44	08.20	06.47		17.07 (WTG11)	05.59	04.20	03.05	03.33	05.04	06.34	07.58			08.32	09.52
	15.10	16.46	18.11	24	17.31 (WTG11)	20.40	22.12	23.32	23.12	21.40	19.54	18.10			15.32	14.32
14	09.42	08.17	06.43		17.07 (WTG11)	05.56	04.17	03.04	03.36	05.07	06.36	08.01			08.35	09.54
	15.13	16.49	18.14	25	17.32 (WTG11)	20.43	22.15	23.33	23.10	21.36	19.50	18.07			15.29	14.31
15	09.40	08.14	06.40		17.06 (WTG11)	05.53	04.13	03.03	03.39	05.10	06.39	08.04			08.38	09.55
	15.15	16.52	18.17	25	17.31 (WTG11)	20.46	22.18	23.35	23.07	21.33	19.47	18.03			15.26	14.30
16	09.38	08.10	06.36		17.06 (WTG11)	05.49	04.10	03.02	03.41	05.13	06.42	08.07			08.41	09.57
	15.18	16.56	18.19	25	17.31 (WTG11)	20.49	22.21	23.36	23.05	21.30	19.43	18.00			15.23	14.30
17	09.36	08.07	06.33		17.05 (WTG11)	05.46	04.07	03.02	03.44	05.16	06.45	08.09			08.45	09.58
	15.21	16.59	18.22	26	17.31 (WTG11)	20.52	22.24	23.37	23.02	21.26	19.40	17.57			15.21	14.30
18	09.33	08.04	06.29		17.06 (WTG11)	05.42	04.04	03.01	03.47	05.19	06.47	08.12			08.48	09.59
	15.24	17.02	18.25	24	17.30 (WTG11)	20.55	22.27	23.38	23.00	21.23	19.36	17.53			15.18	14.30
19	09.31	08.01	06.26		17.05 (WTG11)	05.39	04.01	03.01	03.50	05.22	06.50	08.15			08.51	10.00
	15.27	17.05	18.28	24	17.29 (WTG11)	20.58	22.30	23.38	22.57	21.20	19.33	17.50			15.15	14.30
20	09.29	07.57	06.23		17.06 (WTG11)	05.35	03.58	03.01	03.53	05.25	06.53	17.58 (WTG11)		08.18	08.54	10.01
	15.30	17.08	18.31	23	17.29 (WTG11)	21.01	22.33	23.39	22.54	21.16	19.29	11	18.09 (WTG11)	17.47	15.13	14.30
21	09.26	07.54	06.19		17.07 (WTG11)	05.32	03.56	03.01	03.55	05.28	06.56		17.54 (WTG11)	08.21	08.57	10.02
	15.33	17.11	18.34	20	17.27 (WTG11)	21.04	22.36	23.39	22.51	21.13	19.26	16	18.10 (WTG11)	17.43	15.10	14.30
22	09.24	07.51	06.16		17.08 (WTG11)	05.29	03.53	03.01	03.58	05.31	06.59		17.52 (WTG11)	08.24	09.00	10.02
	15.36	17.14	18.37	18	17.26 (WTG11)	21.07	22.39	23.39	22.49	21.09	19.22	19	18.11 (WTG11)	17.40	15.08	14.30
23	09.21	07.48	06.12		17.10 (WTG11)	05.25	03.50	03.01	04.01	05.34	07.01		17.51 (WTG11)	08.27	09.03	10.03
	15.39	17.17	18.40	13	17.23 (WTG11)	21.10	22.42	23.39	22.46	21.06	19.19	21	18.12 (WTG11)	17.37	15.05	14.31
24	09.19	07.44	06.09		17.15 (WTG11)	05.22	03.47	03.01	04.04	05.37	07.04		17.50 (WTG11)	08.30	09.06	10.03
	15.42	17.20	18.42	3	17.18 (WTG11)	21.13	22.45	23.39	22.43	21.03	19.15	23	18.13 (WTG11)	17.34	15.03	14.32
25	09.16	07.41	06.05			05.18	03.44	03.02	04.07	05.40	07.07		17.49 (WTG11)	07.33	09.09	10.03
	15.46	17.23	18.45			21.16	22.48	23.39	22.40	20.59	19.12	24	18.13 (WTG11)	16.30	15.01	14.32
26	09.13	07.38	06.02			05.15	03.42	03.03	04.10	05.43	07.10		17.47 (WTG11)	07.36	09.12	10.03
	15.49	17.26	18.48			21.19	22.51	23.38	22.37	20.56	19.08	26	18.13 (WTG11)	16.27	14.58	14.33
27	09.11	07.34	05.58			05.12	03.39	03.03	04.13	05.46	07.12		17.47 (WTG11)	07.39	09.15	10.03
	15.52	17.29	18.51			21.22	22.54	23.38	22.34	20.52	19.05	26	18.13 (WTG11)	16.24	14.56	14.34
28	09.08	07.31	05.55			05.08	03.36	03.04	04.16	05.48	07.15		17.47 (WTG11)	07.42	09.17	10.03
	15.55	17.32	18.54			21.25	22.56	23.37	22.31	20.49	19.01	25	18.12 (WTG11)	16.21	14.54	14.36
29	09.05		06.51			05.05	03.34	03.06	04.19	05.51	07.18		17.47 (WTG11)	07.45	09.20	10.03
	15.58		19.57			21.28	22.59	23.36	22.28	20.45	18.58	25	18.12 (WTG11)	16.17	14.52	14.37
30	09.02		06.48			05.02	03.31	03.07	04.22	05.54	07.21		17.47 (WTG11)	07.49	09.23	10.02
	16.01		20.00			21.32	23.02	23.35	22.25	20.42	18.55	24	18.11 (WTG11)	16.14	14.50	14.38
31	08.59		06.44				03.29		04.25	05.57				07.52		10.02
	16.05		20.03				23.05		22.22	20.39				16.11		14.40
Potential sun hours	178	241	363		449	563	611	599	504	392		307		203	146	
Total, worst case				319							240		80			
Sun reduction				0,32							0,36		0,25			
Oper. time red.				0,90							0,90		0,90			
Wind dir. red.				0,55							0,55		0,55			
Total reduction				0,16							0,18		0,13			
Total, real				51							43		10			

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:
31.1.2024 10.54/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE2_RD200x18xHH200_No_Forest

Shadow receptor: B - B - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.01	08.56	07.27	06.41	04.58	03.26	03.08	04.28	06.00	07.23	07.54	09.25
	14.42	16.08	17.35	20.05	21.34	23.07	23.34	22.18	20.35	18.51	16.08	14.48
2	10.00	08.53	07.24	06.37	04.55	03.24	03.10	04.31	06.03	07.26	07.58	09.28
	14.44	16.11	17.38	20.08	21.37	23.09	23.33	22.15	20.31	18.48	16.05	14.46
3	09.59	08.50	07.21	06.34	04.52	03.22	03.11	04.34	06.05	07.29	08.01	09.31
	14.46	16.14	17.41	20.11	21.41	23.12	23.31	22.12	20.28	18.44	16.02	14.44
4	09.58	08.48	07.17	06.30	04.48	03.20	03.13	04.37	06.08	07.32	08.04	09.33
	14.48	16.17	17.44	20.14	21.44	23.14	23.30	22.09	20.25	18.41	15.58	14.42
5	09.57	08.45	07.14	06.27	04.45	03.18	03.15	04.40	06.11	07.35	08.07	09.35
	14.50	16.21	17.47	20.17	21.47	23.17	23.28	22.06	20.21	18.37	15.55	14.41
6	09.55	08.42	07.10	06.23	04.42	03.16	03.17	04.43	06.14	07.38	08.10	09.38
	14.52	16.24	17.50	20.20	21.50	23.19	23.26	22.03	20.18	18.34	15.52	14.39
7	09.54	08.38	07.07	06.20	04.39	03.14	03.19	04.46	06.17	07.40	08.13	09.40
	14.54	16.27	17.53	20.23	21.53	23.21	23.25	21.59	20.14	18.30	15.49	14.38
8	09.53	08.35	07.04	06.17	04.35	03.12	03.21	04.49	06.19	07.43	08.16	09.42
	14.57	16.30	17.56	20.26	21.56	23.23	23.23	21.56	20.11	18.27	15.46	14.36
9	09.51	08.32	07.00	06.13	04.32	03.11	03.24	04.52	06.22	07.46	08.19	09.44
	14.59	16.33	17.59	20.29	21.59	23.25	23.21	21.53	20.07	18.24	15.43	14.35
10	09.49	08.29	06.57	06.10	04.29	03.09	03.26	04.55	06.25	07.49	08.23	09.46
	15.02	16.36	18.02	20.31	22.02	23.27	23.19	21.49	20.04	18.20	15.40	14.34
11	09.48	08.26	06.53	06.06	04.26	03.08	03.28	04.58	06.28	07.52	08.26	09.48
	15.04	16.40	18.05	20.34	22.05	23.29	23.16	21.46	20.00	18.17	15.37	14.33
12	09.46	08.23	06.50	06.03	04.23	03.06	03.31	05.01	06.31	07.55	08.29	09.50
	15.07	16.43	18.08	20.37	22.08	23.30	23.14	21.43	19.57	18.13	15.35	14.32
13	09.44	08.20	06.47	05.59	04.20	03.05	03.33	05.04	06.33	07.58	08.32	09.52
	15.10	16.46	18.11	20.40	22.12	23.32	23.12	21.40	19.53	18.10	15.32	14.31
14	09.42	08.17	06.43	05.56	04.16	03.04	03.36	05.07	06.36	08.01	08.35	09.54
	15.13	16.49	18.13	20.43	22.15	23.33	23.10	21.36	19.50	18.07	15.29	14.31
15	09.40	08.13	06.40	05.52	04.13	03.03	03.39	05.10	06.39	08.03	08.38	09.55
	15.15	16.52	18.16	20.46	22.18	23.34	23.07	21.33	19.46	18.03	15.26	14.30
16	09.38	08.10	06.36	05.49	04.10	03.02	03.41	05.13	06.42	08.06	08.41	09.56
	15.18	16.55	18.19	20.49	22.21	23.36	23.05	21.30	19.43	18.00	15.23	14.30
17	09.35	08.07	06.33	05.46	04.07	03.02	03.44	05.16	06.44	08.09	08.44	09.58
	15.21	16.59	18.22	20.52	22.24	23.36	23.02	21.26	19.39	17.57	15.21	14.30
18	09.33	08.04	06.29	05.42	04.04	03.01	03.47	05.19	06.47	08.12	08.47	09.59
	15.24	17.02	18.25	20.55	22.27	23.37	22.59	21.23	19.36	17.53	15.18	14.30
19	09.31	08.00	06.26	05.39	04.01	03.01	03.50	05.22	06.50	08.15	08.50	10.00
	15.27	17.05	18.28	20.58	22.30	23.38	22.57	21.19	19.32	17.50	15.15	14.30
20	09.28	07.57	06.22	05.35	03.58	03.01	03.52	05.25	06.53	08.18	08.54	10.01
	15.30	17.08	18.31	21.01	22.33	23.38	22.54	21.16	19.29	17.47	15.13	14.30
21	09.26	07.54	06.19	05.32	03.55	03.00	03.55	05.28	06.56	08.21	08.57	10.01
	15.33	17.11	18.34	21.04	22.36	23.39	22.51	21.13	19.26	17.43	15.10	14.30
22	09.24	07.51	06.15	05.28	03.53	03.01	03.58	05.31	06.58	08.24	09.00	10.02
	15.36	17.14	18.37	21.07	22.39	23.39	22.48	21.09	19.22	17.40	15.08	14.30
23	09.21	07.47	06.12	05.25	03.50	03.01	04.01	05.34	07.01	08.27	09.03	10.03
	15.39	17.17	18.39	21.10	22.42	23.39	22.46	21.06	19.19	17.37	15.05	14.31
24	09.18	07.44	06.09	05.22	03.47	03.01	04.04	05.37	07.04	08.30	09.06	10.03
	15.42	17.20	18.42	21.13	22.45	23.39	22.43	21.02	19.15	17.33	15.03	14.32
25	09.16	07.41	06.05	05.18	03.44	03.02	04.07	05.40	07.07	07.33	09.09	10.03
	15.45	17.23	18.45	21.16	22.48	23.39	22.40	20.59	19.12	16.30	15.00	14.32
26	09.13	07.37	06.02	05.15	03.41	03.03	04.10	05.42	07.09	07.36	09.11	10.03
	15.49	17.26	18.48	21.19	22.51	23.38	22.37	20.56	19.08	16.27	14.58	14.33
27	09.10	07.34	05.58	05.12	03.39	03.03	04.13	05.45	07.12	07.39	09.14	10.03
	15.52	17.29	18.51	21.22	22.53	23.38	22.34	20.52	19.05	16.24	14.56	14.34
28	09.08	07.31	05.55	05.08	03.36	03.04	04.16	05.48	07.15	07.42	09.17	10.03
	15.55	17.32	18.54	21.25	22.56	23.37	22.31	20.49	19.01	16.20	14.54	14.36
29	09.05		06.51	05.05	03.34	03.06	04.19	05.51	07.18	07.45	09.20	10.03
	15.58		19.57	21.28	22.59	23.36	22.28	20.45	18.58	16.17	14.52	14.37
30	09.02		06.48	05.02	03.31	03.07	04.22	05.54	07.21	07.48	09.23	10.02
	16.01		20.00	21.31	23.02	23.35	22.25	20.42	18.54	16.14	14.50	14.38
31	08.59		06.44		03.29		04.25	05.57		07.51		10.02
	16.05		20.02		23.04		22.22	20.38		16.11		14.40
Potential sun hours	178	241	363	449	563	611	599	504	392	307	203	146
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:
31.1.2024 10.54/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE2_RD200x18xHH200_No_Forest

Shadow receptor: C - C - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March		April		May		June
1	10.00	08.56	07.27		06.41		04.58		03.27
	14.42	16.08	17.35		20.05	24	19.14 (WTG15)		23.06
2	09.59	08.53	07.24		06.37		18.51 (WTG15)	04.55	03.25
	14.44	16.11	17.38		20.08	22	19.13 (WTG15)	21.37	23.09
3	09.58	08.50	07.20		06.34		18.51 (WTG15)	04.52	20.54 (WTG08) 03.22
	14.46	16.14	17.41		20.11	21	19.12 (WTG15)	21.40	3 20.57 (WTG08) 23.11
4	09.57	08.47	07.17		06.30		18.52 (WTG15)	04.49	20.51 (WTG08) 03.20
	14.48	16.17	17.44		20.14	19	19.11 (WTG15)	21.43	9 21.00 (WTG08) 23.14
5	09.56	08.44	07.14		06.27		18.52 (WTG15)	04.45	20.50 (WTG08) 03.18
	14.50	16.21	17.47		20.17	17	19.09 (WTG15)	21.46	13 21.03 (WTG08) 23.16
6	09.55	08.41	07.10		06.23		18.54 (WTG15)	04.42	20.48 (WTG08) 03.16
	14.53	16.24	17.50		20.20	13	19.07 (WTG15)	21.50	17 21.05 (WTG08) 23.18
7	09.54	08.38	07.07		06.20		18.58 (WTG15)	04.39	20.47 (WTG08) 03.14
	14.55	16.27	17.53		20.23	6	19.04 (WTG15)	21.53	19 21.06 (WTG08) 23.21
8	09.52	08.35	07.04		06.17			04.36	20.46 (WTG08) 03.13
	14.57	16.30	17.56		20.25			21.56	21 21.07 (WTG08) 23.23
9	09.51	08.32	07.00		06.13			04.32	20.45 (WTG08) 03.11
	15.00	16.33	17.59		20.28			21.59	22 21.07 (WTG08) 23.25
10	09.49	08.29	06.57		06.10			04.29	20.45 (WTG08) 03.09
	15.02	16.37	18.02		20.31			22.02	23 21.08 (WTG08) 23.26
11	09.47	08.26	06.53		06.06			04.26	20.44 (WTG08) 03.08
	15.05	16.40	18.05		20.34			22.05	24 21.08 (WTG08) 23.28
12	09.45	08.23	06.50		06.03			04.23	20.44 (WTG08) 03.07
	15.07	16.43	18.08		20.37			22.08	24 21.08 (WTG08) 23.30
13	09.43	08.20	06.46		05.59			04.20	20.44 (WTG08) 03.06
	15.10	16.46	18.11		20.40			22.11	24 21.08 (WTG08) 23.31
14	09.41	08.16	06.43		05.56			04.17	20.44 (WTG08) 03.04
	15.13	16.49	18.13		20.43			22.14	24 21.08 (WTG08) 23.33
15	09.39	08.13	06.40		05.52			04.14	20.44 (WTG08) 03.04
	15.16	16.52	18.16		20.46			22.17	24 21.08 (WTG08) 23.34
16	09.37	08.10	06.36		05.49			04.11	20.44 (WTG08) 03.03
	15.18	16.55	18.19		20.49			22.20	23 21.07 (WTG08) 23.35
17	09.35	08.07	06.33		05.46			04.07	20.45 (WTG08) 03.02
	15.21	16.59	18.22		20.52			22.23	23 21.08 (WTG08) 23.36
18	09.33	08.04	06.29		05.42			04.04	20.45 (WTG08) 03.02
	15.24	17.02	18.25		20.55			22.27	22 21.07 (WTG08) 23.37
19	09.30	08.00	06.26		05.39			04.02	20.45 (WTG08) 03.01
	15.27	17.05	18.28		20.58			22.30	22 21.07 (WTG08) 23.37
20	09.28	07.57	06.22		05.35			03.59	20.46 (WTG08) 03.01
	15.30	17.08	18.31		21.01			22.33	20 21.06 (WTG08) 23.38
21	09.26	07.54	06.19		05.32			03.56	20.47 (WTG08) 03.01
	15.33	17.11	18.34		21.04			22.36	19 21.06 (WTG08) 23.38
22	09.23	07.50	06.15		05.29			03.53	20.47 (WTG08) 03.01
	15.36	17.14	18.37		21.07			22.39	18 21.05 (WTG08) 23.38
23	09.21	07.47	06.12		05.25			03.50	20.48 (WTG08) 03.01
	15.39	17.17	18.39		21.10			22.41	16 21.04 (WTG08) 23.38
24	09.18	07.44	06.08	17.59 (WTG15)	05.22			03.47	20.50 (WTG08) 03.02
	15.43	17.20	18.42	8 18.07 (WTG15)	21.13			22.44	13 21.03 (WTG08) 23.38
25	09.15	07.41	06.05	17.56 (WTG15)	05.18			03.44	20.51 (WTG08) 03.02
	15.46	17.23	18.45	15 18.11 (WTG15)	21.16			22.47	11 21.02 (WTG08) 23.38
26	09.13	07.37	06.02	17.55 (WTG15)	05.15			03.42	20.53 (WTG08) 03.03
	15.49	17.26	18.48	18 18.13 (WTG15)	21.19			22.50	8 21.01 (WTG08) 23.38
27	09.10	07.34	05.58	17.53 (WTG15)	05.12			03.39	03.04
	15.52	17.29	18.51	21 18.14 (WTG15)	21.22			22.53	23.37
28	09.07	07.31	05.55	17.53 (WTG15)	05.08			03.37	03.05
	15.55	17.32	18.54	22 18.15 (WTG15)	21.25			22.56	23.36
29	09.05		06.51	18.51 (WTG15)	05.05			03.34	03.06
	15.58		19.57	23 19.14 (WTG15)	21.28			22.59	23.35
30	09.02		06.48	18.51 (WTG15)	05.02			03.32	03.07
	16.01		19.59	23 19.14 (WTG15)	21.31			23.01	23.34
31	08.59		06.44	18.50 (WTG15)				03.29	
	16.05		20.02	24 19.14 (WTG15)				23.04	
Potential sun hours	179	241	363		448		562		611
Total, worst case				154		122		442	
Sun reduction				0,32		0,44		0,48	
Oper. time red.				0,90		0,90		0,90	
Wind dir. red.				0,56		0,56		0,60	
Total reduction				0,16		0,22		0,26	
Total, real				25		27		115	

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:
31.1.2024 10.54/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE2_RD200x18xHH200_No_Forest

Shadow receptor: C - C - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	July			August			September			October	November	December
1	03.09			04.28		20.55 (WTG08)	06.00			07.23	07.54	09.25
	23.33			22.18	23	21.18 (WTG08)	20.35			18.51	16.08	14.48
2	03.10			04.31		20.55 (WTG08)	06.03			07.26	07.57	09.28
	23.32			22.15	23	21.18 (WTG08)	20.31			18.47	16.05	14.46
3	03.12			04.34		20.55 (WTG08)	06.05			07.29	08.00	09.30
	23.31			22.12	23	21.18 (WTG08)	20.28			18.44	16.02	14.44
4	03.14			04.37		20.56 (WTG08)	06.08			07.32	08.04	09.33
	23.29			22.09	22	21.18 (WTG08)	20.24			18.41	15.59	14.43
5	03.16			04.40		20.56 (WTG08)	06.11		18.54 (WTG15)	07.35	08.07	09.35
	23.28			22.05	20	21.16 (WTG08)	20.21	6	19.00 (WTG15)	18.37	15.55	14.41
6	03.18			04.43		20.57 (WTG08)	06.14		18.50 (WTG15)	07.37	08.10	09.37
	23.26			22.02	19	21.16 (WTG08)	20.18	13	19.03 (WTG15)	18.34	15.52	14.40
7	03.20			04.46		20.57 (WTG08)	06.17		18.47 (WTG15)	07.40	08.13	09.40
	23.24			21.59	17	21.14 (WTG08)	20.14	17	19.04 (WTG15)	18.30	15.49	14.38
8	03.22			04.49		20.59 (WTG08)	06.19		18.46 (WTG15)	07.43	08.16	09.42
	23.22			21.56	13	21.12 (WTG08)	20.11	19	19.05 (WTG15)	18.27	15.46	14.37
9	03.24			04.52		21.01 (WTG08)	06.22		18.45 (WTG15)	07.46	08.19	09.44
	23.20			21.52	8	21.09 (WTG08)	20.07	21	19.06 (WTG15)	18.24	15.43	14.36
10	03.26			04.55			06.25		18.43 (WTG15)	07.49	08.22	09.46
	23.18			21.49			20.04	22	19.05 (WTG15)	18.20	15.40	14.34
11	03.29			04.58			06.28		18.43 (WTG15)	07.52	08.25	09.48
	23.16			21.46			20.00	23	19.06 (WTG15)	18.17	15.38	14.33
12	03.31			05.01			06.31		18.43 (WTG15)	07.55	08.28	09.50
	23.14			21.43			19.57	23	19.06 (WTG15)	18.13	15.35	14.33
13	03.34			05.04			06.33		18.42 (WTG15)	07.57	08.32	09.51
	23.11			21.39			19.53	23	19.05 (WTG15)	18.10	15.32	14.32
14	03.36			05.07			06.36		18.42 (WTG15)	08.00	08.35	09.53
	23.09			21.36			19.50	23	19.05 (WTG15)	18.07	15.29	14.31
15	03.39			05.10			06.39		18.42 (WTG15)	08.03	08.38	09.55
	23.07			21.33			19.46	22	19.04 (WTG15)	18.03	15.26	14.31
16	03.42			05.13			06.42		18.43 (WTG15)	08.06	08.41	09.56
	23.04			21.29			19.43	20	19.03 (WTG15)	18.00	15.23	14.30
17	03.44		21.03 (WTG08)	05.16			06.44		18.43 (WTG15)	08.09	08.44	09.57
	23.02	5	21.08 (WTG08)	21.26			19.39	18	19.01 (WTG15)	17.57	15.21	14.30
18	03.47		21.02 (WTG08)	05.19			06.47		18.44 (WTG15)	08.12	08.47	09.58
	22.59	10	21.12 (WTG08)	21.23			19.36	15	18.59 (WTG15)	17.53	15.18	14.30
19	03.50		21.00 (WTG08)	05.22			06.50		18.46 (WTG15)	08.15	08.50	09.59
	22.56	13	21.13 (WTG08)	21.19			19.32	10	18.56 (WTG15)	17.50	15.15	14.30
20	03.53		20.59 (WTG08)	05.25			06.53		18.49 (WTG15)	08.18	08.53	10.00
	22.54	15	21.14 (WTG08)	21.16			19.29	3	18.52 (WTG15)	17.47	15.13	14.30
21	03.56		20.58 (WTG08)	05.28			06.56			08.21	08.56	10.01
	22.51	17	21.15 (WTG08)	21.12			19.25			17.43	15.10	14.30
22	03.58		20.57 (WTG08)	05.31			06.58			08.24	08.59	10.02
	22.48	18	21.15 (WTG08)	21.09			19.22			17.40	15.08	14.31
23	04.01		20.57 (WTG08)	05.34			07.01			08.27	09.02	10.02
	22.45	19	21.16 (WTG08)	21.06			19.19			17.37	15.05	14.31
24	04.04		20.56 (WTG08)	05.37			07.04			08.30	09.05	10.02
	22.42	21	21.17 (WTG08)	21.02			19.15			17.33	15.03	14.32
25	04.07		20.56 (WTG08)	05.40			07.07			07.33	09.08	10.03
	22.39	22	21.18 (WTG08)	20.59			19.12			16.30	15.01	14.33
26	04.10		20.55 (WTG08)	05.43			07.09			07.36	09.11	10.03
	22.36	23	21.18 (WTG08)	20.55			19.08			16.27	14.58	14.34
27	04.13		20.55 (WTG08)	05.45			07.12			07.39	09.14	10.03
	22.33	23	21.18 (WTG08)	20.52			19.05			16.24	14.56	14.35
28	04.16		20.55 (WTG08)	05.48			07.15			07.42	09.17	10.02
	22.30	23	21.18 (WTG08)	20.49			19.01			16.21	14.54	14.36
29	04.19		20.54 (WTG08)	05.51			07.18			07.45	09.20	10.02
	22.27	24	21.18 (WTG08)	20.45			18.58			16.17	14.52	14.37
30	04.22		20.55 (WTG08)	05.54			07.21			07.48	09.22	10.02
	22.24	24	21.19 (WTG08)	20.42			18.54			16.14	14.50	14.39
31	04.25		20.54 (WTG08)	05.57						07.51		10.01
	22.21	24	21.18 (WTG08)	20.38						16.11		14.40
Potential sun hours	598			504			392			307	204	147
Total, worst case		281			168			278				
Sun reduction		0,46			0,42			0,36				
Oper. time red.		0,90			0,90			0,90				
Wind dir. red.		0,60			0,60			0,56				
Total reduction		0,25			0,22			0,18				
Total, real		69			38			50				

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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Henri Korhonen / henri.korhonen@fcg.fi
Calculated:
31.1.2024 10.54/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE2_RD200x18xHH200_No_Forest

Shadow receptor: D - D - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.00	08.56	07.27	06.41	04.58	03.27	03.09	04.28	06.00 19.16 (WTG15)	07.23	07.54	09.25
	14.42	16.08	17.35	20.05	21.34	23.06	23.33	22.18	20.35 22 19.38 (WTG15)	18.51	16.08	14.48
2	09.59	08.53	07.24	06.37 19.27 (WTG15)	04.55	03.25	03.10	04.31	06.03 19.16 (WTG15)	07.26	07.57	09.28
	14.44	16.11	17.38	20.08 7 19.34 (WTG15)	21.37	23.09	23.32	22.15	20.31 22 19.38 (WTG15)	18.47	16.05	14.46
3	09.58	08.50	07.20	06.34 19.24 (WTG15)	04.52	03.22	03.12	04.34	06.05 19.16 (WTG15)	07.29	08.00	09.30
	14.46	16.14	17.41	20.11 12 19.36 (WTG15)	21.40	23.11	23.31	22.12	20.28 23 19.39 (WTG15)	18.44	16.02	14.44
4	09.57	08.47	07.17	06.30 19.22 (WTG15)	04.49	03.20	03.14	04.37	06.08 19.15 (WTG15)	07.32	08.04	09.33
	14.48	16.17	17.44	20.14 17 19.39 (WTG15)	21.43	23.14	23.29	22.09	20.24 23 19.38 (WTG15)	18.41	15.59	14.43
5	09.56	08.44	07.14	06.27 19.20 (WTG15)	04.45	03.18	03.16	04.40	06.11 19.15 (WTG15)	07.35	08.07	09.35
	14.50	16.21	17.47	20.17 20 19.40 (WTG15)	21.46	23.16	23.28	22.05	20.21 22 19.37 (WTG15)	18.37	15.55	14.41
6	09.55	08.41	07.10	06.23 19.19 (WTG15)	04.42	03.16	03.18	04.43	06.14 19.15 (WTG15)	07.37	08.10	09.37
	14.53	16.24	17.50	20.20 22 19.41 (WTG15)	21.50	23.18	23.26	22.02	20.17 22 19.37 (WTG15)	18.34	15.52	14.40
7	09.54	08.38	07.07	06.20 19.19 (WTG15)	04.39	03.14	03.20	04.46	06.17 19.15 (WTG15)	07.40	08.13	09.40
	14.55	16.27	17.53	20.23 22 19.41 (WTG15)	21.53	23.20	23.24	21.59	20.14 20 19.35 (WTG15)	18.30	15.49	14.38
8	09.52	08.35	07.04	06.17 19.18 (WTG15)	04.36	03.13	03.22	04.49	06.19 19.16 (WTG15)	07.43	08.16	09.42
	14.57	16.30	17.56	20.25 22 19.40 (WTG15)	21.56	23.23	23.22	21.56	20.11 17 19.33 (WTG15)	18.27	15.46	14.37
9	09.50	08.32	07.00	06.13 19.18 (WTG15)	04.32	03.11	03.24	04.52	06.22 19.18 (WTG15)	07.46	08.19	09.44
	15.00	16.33	17.59	20.28 23 19.41 (WTG15)	21.59	23.24	23.20	21.52	20.07 12 19.30 (WTG15)	18.24	15.43	14.36
10	09.49	08.29	06.57	06.10 19.18 (WTG15)	04.29	03.09	03.26	04.55	06.25 19.19 (WTG15)	07.49	08.22	09.46
	15.02	16.37	18.02	20.31 23 19.41 (WTG15)	22.02	23.26	23.18	21.49	20.04 7 19.26 (WTG15)	18.20	15.40	14.34
11	09.47	08.26	06.53	06.06 19.17 (WTG15)	04.26	03.08	03.29	04.58	06.28	07.52	08.25	09.48
	15.05	16.40	18.05	20.34 22 19.39 (WTG15)	22.05	23.28	23.16	21.46	20.00	18.17	15.38	14.34
12	09.45	08.23	06.50	06.03 19.18 (WTG15)	04.23	03.07	03.31	05.01	06.31	07.55	08.28	09.50
	15.07	16.43	18.08	20.37 21 19.39 (WTG15)	22.08	23.30	23.14	21.43	19.57	18.13	15.35	14.33
13	09.43	08.20	06.46	05.59 19.18 (WTG15)	04.20	03.06	03.34	05.04	06.33	07.57	08.32	09.51
	15.10	16.46	18.11	20.40 20 19.38 (WTG15)	22.11	23.31	23.11	21.39	19.53	18.10	15.32	14.32
14	09.41	08.16	06.43	05.56 19.18 (WTG15)	04.17	03.05	03.36	05.07	06.36	08.00	08.35	09.53
	15.13	16.49	18.13	20.43 18 19.36 (WTG15)	22.14	23.33	23.09	21.36	19.50	18.07	15.29	14.31
15	09.39	08.13	06.40	05.52 19.20 (WTG15)	04.14	03.04	03.39	05.10	06.39	08.03	08.38	09.55
	15.16	16.52	18.16	20.46 15 19.35 (WTG15)	22.17	23.34	23.07	21.33	19.46	18.03	15.26	14.31
16	09.37	08.10	06.36	05.49 19.22 (WTG15)	04.11	03.03	03.42	05.13	06.42	08.06	08.41	09.56
	15.19	16.55	18.19	20.49 10 19.32 (WTG15)	22.20	23.35	23.04	21.29	19.43	18.00	15.23	14.30
17	09.35	08.07	06.33	05.46	04.08	03.02	03.44	05.16	06.44	08.09	08.44	09.57
	15.21	16.59	18.22	20.52	22.23	23.36	23.01	21.26	19.39	17.57	15.21	14.30
18	09.33	08.04	06.29	05.42	04.05	03.02	03.47	05.19	06.47	08.12	08.47	09.58
	15.24	17.02	18.25	20.55	22.26	23.37	22.59	21.23	19.36	17.53	15.18	14.30
19	09.30	08.00	06.26	05.39	04.02	03.01	03.50	05.22	06.50	08.15	08.50	09.59
	15.27	17.05	18.28	20.58	22.30	23.37	22.56	21.19	19.32	17.50	15.15	14.30
20	09.28	07.57	06.22	05.35	03.59	03.01	03.53	05.25	06.53	08.18	08.53	10.00
	15.30	17.08	18.31	21.01	22.33	23.38	22.54	21.16	19.29	17.47	15.13	14.30
21	09.26	07.54	06.19	05.32	03.56	03.01	03.56	05.28	06.56	08.21	08.56	10.01
	15.33	17.11	18.34	21.04	22.36	23.38	22.51	21.12	19.25	17.43	15.10	14.30
22	09.23	07.50	06.15	05.29	03.53	03.01	03.59	05.31	06.58	08.24	08.59	10.02
	15.36	17.14	18.37	21.07	22.38	23.38	22.48	21.09	19.22	17.40	15.08	14.31
23	09.21	07.47	06.12	05.25	03.50	03.01	04.01	05.34	07.01	08.27	09.02	10.02
	15.39	17.17	18.39	21.10	22.41	23.38	22.45	21.06	19.19	17.37	15.05	14.31
24	09.18	07.44	06.08	05.22	03.47	03.02	04.04	05.37	07.04	08.30	09.05	10.02
	15.43	17.20	18.42	21.13	22.44	23.38	22.42	21.02	19.15	17.33	15.03	14.32
25	09.15	07.41	06.05	05.18	03.45	03.02	04.07	05.40	07.07	07.33	09.08	10.03
	15.46	17.23	18.45	21.16	22.47	23.38	22.39	20.59	19.12	16.30	15.01	14.33
26	09.13	07.37	06.02	05.15	03.42	03.03	04.10	05.43	07.09	07.36	09.11	10.03
	15.49	17.26	18.48	21.19	22.50	23.37	22.36	20.55	19.08	16.27	14.58	14.34
27	09.10	07.34	05.58	05.12	03.39	03.04	04.13	05.45 19.24 (WTG15)	07.12	07.39	09.14	10.03
	15.52	17.29	18.51	21.22	22.53	23.37	22.33	20.52 10 19.34 (WTG15)	19.05	16.24	14.56	14.35
28	09.07	07.31	05.55	05.08	03.37	03.05	04.16	05.48 19.22 (WTG15)	07.15	07.42	09.17	10.02
	15.55	17.32	18.54	21.25	22.56	23.36	22.30	20.49 14 19.36 (WTG15)	19.01	16.21	14.54	14.36
29	09.05		06.51	05.05	03.34	03.06	04.19	05.51 19.19 (WTG15)	07.18	07.45	09.19	10.02
	15.58		19.57	21.28	22.58	23.35	22.27	20.45 18 19.37 (WTG15)	18.58	16.17	14.52	14.37
30	09.02		06.48	05.02	03.32	03.07	04.22	05.54 19.18 (WTG15)	07.21	07.48	09.22	10.02
	16.02		19.59	21.31	23.01	23.34	22.24	20.42 20 19.38 (WTG15)	18.54	16.14	14.50	14.39
31	08.59		06.44		03.29		04.25	05.57 19.17 (WTG15)		07.51		10.01
	16.05		20.02		23.04		22.21	20.38 22 19.39 (WTG15)		16.11		14.40
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
Total, worst case				274				84	190			
Sun reduction				0,44				0,42	0,36			
Oper. time red.				0,90				0,90	0,90			
Wind dir. red.				0,56				0,56	0,56			
Total reduction				0,22				0,21	0,18			
Total, real				60				17	34			

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:
31.1.2024 10.54/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE2_RD200x18xHH200_No_Forest

Shadow receptor: E - E - Lomarakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June			July	August	September	October	November	December
1	10.00	08.56	07.27	06.41	04.59	03.27			03.09	04.29	06.00	07.24	07.54	09.25
	14.43	16.08	17.35	20.05	21.34	23.06			23.33	22.18	20.35	18.51	16.08	14.48
2	09.59	08.53	07.24	06.38	04.55	03.25			03.11	04.32	06.03	07.26	07.57	09.27
	14.45	16.11	17.38	20.08	21.37	23.09			23.32	22.15	20.31	18.48	16.05	14.47
3	09.58	08.50	07.21	06.34	04.52	03.23			03.13	04.35	06.06	07.29	08.00	09.30
	14.47	16.15	17.41	20.11	21.40	23.11			23.30	22.12	20.28	18.44	16.02	14.45
4	09.57	08.47	07.17	06.31	04.49	03.21			03.14	04.38	06.08	07.32	08.04	09.33
	14.49	16.18	17.44	20.14	21.43	23.14			23.29	22.09	20.25	18.41	15.59	14.43
5	09.56	08.44	07.14	06.27	04.46	03.19			03.16	04.41	06.11	07.35	08.07	09.35
	14.51	16.21	17.47	20.17	21.46	23.16			23.27	22.05	20.21	18.37	15.56	14.41
6	09.55	08.41	07.10	06.24	04.42	03.17			03.18	04.44	06.14	07.38	08.10	09.37
	14.53	16.24	17.50	20.20	21.50	23.18			23.26	22.02	20.18	18.34	15.53	14.40
7	09.53	08.38	07.07	06.20	04.39	03.15			03.20	04.47	06.17	07.40	08.13	09.40
	14.55	16.27	17.53	20.23	21.53	23.20			23.24	21.59	20.14	18.31	15.50	14.39
8	09.52	08.35	07.04	06.17	04.36	03.13			03.22	04.50	06.20	07.43	08.16	09.42
	14.58	16.31	17.56	20.26	21.56	23.22			23.22	21.56	20.11	18.27	15.47	14.37
9	09.50	08.32	07.00	06.13	04.33	03.12			03.25	04.53	06.22	07.46	08.19	09.44
	15.00	16.34	17.59	20.28	21.59	23.24			23.20	21.52	20.07	18.24	15.44	14.36
10	09.49	08.29	06.57	06.10	04.30	03.10			03.27	04.56	06.25	07.49	08.22	09.46
	15.03	16.37	18.02	20.31	22.02	23.26			23.18	21.49	20.04	18.20	15.41	14.35
11	09.47	08.26	06.53	06.06	04.26	03.09			03.29	04.59	06.28	07.52	08.25	09.48
	15.05	16.40	18.05	20.34	22.05	23.28			23.16	21.46	20.00	18.17	15.38	14.34
12	09.45	08.23	06.50	06.03	04.23	03.07		22.18 (WTG10)	03.32	05.02	06.31	07.55	08.28	09.50
	15.08	16.43	18.08	20.37	22.08	23.29	4	22.22 (WTG10)	23.14	21.43	19.57	18.14	15.35	14.33
13	09.43	08.20	06.47	06.00	04.20	03.06		22.17 (WTG10)	03.34	05.05	06.34	07.58	08.32	09.51
	15.10	16.46	18.11	20.40	22.11	23.31	6	22.23 (WTG10)	23.11	21.39	19.53	18.10	15.32	14.32
14	09.41	08.16	06.43	05.56	04.17	03.05		22.17 (WTG10)	03.37	05.08	06.36	08.00	08.35	09.53
	15.13	16.49	18.14	20.43	22.14	23.32	8	22.25 (WTG10)	23.09	21.36	19.50	18.07	15.29	14.32
15	09.39	08.13	06.40	05.53	04.14	03.04		22.16 (WTG10)	03.39	05.11	06.39	08.03	08.38	09.54
	15.16	16.53	18.17	20.46	22.17	23.33	9	22.25 (WTG10)	23.06	21.33	19.46	18.04	15.27	14.31
16	09.37	08.10	06.36	05.49	04.11	03.03		22.16 (WTG10)	03.42	05.14	06.42	08.06	08.41	09.56
	15.19	16.56	18.19	20.49	22.20	23.35	10	22.26 (WTG10)	23.04	21.29	19.43	18.00	15.24	14.31
17	09.35	08.07	06.33	05.46	04.08	03.03		22.16 (WTG10)	03.45	05.17	06.45	08.09	08.44	09.57
	15.22	16.59	18.22	20.52	22.23	23.36	11	22.27 (WTG10)	23.01	21.26	19.39	17.57	15.21	14.31
18	09.33	08.04	06.29	05.42	04.05	03.02		22.15 (WTG10)	03.48	05.20	06.47	08.12	08.47	09.58
	15.25	17.02	18.25	20.55	22.26	23.36	12	22.27 (WTG10)	22.59	21.23	19.36	17.54	15.18	14.30
19	09.30	08.00	06.26	05.39	04.02	03.02		22.15 (WTG10)	03.50	05.22	06.50	08.15	08.50	09.59
	15.28	17.05	18.28	20.58	22.29	23.37	12	22.27 (WTG10)	22.56	21.19	19.33	17.50	15.16	14.30
20	09.28	07.57	06.22	05.36	03.59	03.02		22.15 (WTG10)	03.53	05.25	06.53	08.18	08.53	10.00
	15.31	17.08	18.31	21.01	22.32	23.37	12	22.27 (WTG10)	22.53	21.16	19.29	17.47	15.13	14.31
21	09.26	07.54	06.19	05.32	03.56	03.02		22.16 (WTG10)	03.56	05.28	06.56	08.21	08.56	10.01
	15.34	17.11	18.34	21.04	22.35	23.38	12	22.28 (WTG10)	22.51	21.12	19.26	17.44	15.11	14.31
22	09.23	07.51	06.16	05.29	03.53	03.02		22.16 (WTG10)	03.59	05.31	06.59	08.24	08.59	10.01
	15.37	17.14	18.37	21.07	22.38	23.38	12	22.28 (WTG10)	22.48	21.09	19.22	17.40	15.08	14.31
23	09.21	07.47	06.12	05.25	03.50	03.02		22.16 (WTG10)	04.02	05.34	07.01	08.27	09.02	10.02
	15.40	17.17	18.40	21.10	22.41	23.38	12	22.28 (WTG10)	22.45	21.06	19.19	17.37	15.06	14.32
24	09.18	07.44	06.09	05.22	03.48	03.02		22.17 (WTG10)	04.05	05.37	07.04	08.30	09.05	10.02
	15.43	17.20	18.42	21.13	22.44	23.38	12	22.29 (WTG10)	22.42	21.02	19.15	17.34	15.03	14.32
25	09.15	07.41	06.05	05.19	03.45	03.03		22.17 (WTG10)	04.08	05.40	07.07	07.33	09.08	10.02
	15.46	17.23	18.45	21.16	22.47	23.38	11	22.28 (WTG10)	22.39	20.59	19.12	16.30	15.01	14.33
26	09.13	07.37	06.02	05.15	03.42	03.04		22.18 (WTG10)	04.11	05.43	07.10	07.36	09.11	10.02
	15.49	17.26	18.48	21.19	22.50	23.37	10	22.28 (WTG10)	22.36	20.55	19.08	16.27	14.59	14.34
27	09.10	07.34	05.58	05.12	03.40	03.05		22.18 (WTG10)	04.14	05.46	07.12	07.39	09.14	10.02
	15.52	17.29	18.51	21.22	22.53	23.37	10	22.28 (WTG10)	22.33	20.52	19.05	16.24	14.57	14.35
28	09.07	07.31	05.55	05.09	03.37	03.06		22.19 (WTG10)	04.17	05.49	07.15	07.42	09.17	10.02
	15.56	17.32	18.54	21.25	22.56	23.36	8	22.27 (WTG10)	22.30	20.49	19.01	16.21	14.54	14.36
29	09.05		06.51	05.05	03.35	03.07		22.20 (WTG10)	04.20	05.51	07.18	07.45	09.19	10.02
	15.59		19.57	21.28	22.58	23.35	7	22.27 (WTG10)	22.27	20.45	18.58	16.18	14.52	14.38
30	09.02		06.48	05.02	03.32	03.08		22.21 (WTG10)	04.23	05.54	07.21	07.48	09.22	10.02
	16.02		20.00	21.31	23.01	23.34	5	22.26 (WTG10)	22.24	20.42	18.55	16.14	14.50	14.39
31	08.59		06.44		03.30				04.26	05.57		07.51		10.01
	16.05		20.02		23.04				22.21	20.38		16.11		14.41
Potential sun hours	179	241	363	448	562	610			598	504	392	307	204	147
Total, worst case							183							
Sun reduction							0,45							
Oper. time red.							0,90							
Wind dir. red.							0,65							
Total reduction							0,26							
Total, real							48							

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:
31.1.2024 10.54/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE2_RD200x18xHH200_No_Forest

Shadow receptor: F - F - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.00	08.56	07.27	06.41	04.59	03.28	03.10	04.29	06.00	07.24	07.54	09.25
	14.43	16.08	17.36	20.05	21.34	23.06	23.33	22.18	20.35	18.51	16.08	14.49
2	09.59	08.53	07.24	06.38	04.56	03.25	03.11	04.32	06.03	07.26	07.58	09.28
	14.45	16.12	17.39	20.08	21.37	23.09	23.32	22.15	20.32	18.48	16.05	14.47
3	09.58	08.50	07.21	06.34	04.52	03.23	03.13	04.35	06.06	07.29	08.01	09.30
	14.47	16.15	17.42	20.11	21.40	23.11	23.30	22.12	20.28	18.44	16.02	14.45
4	09.57	08.47	07.17	06.31	04.49	03.21	03.15	04.38	06.09	07.32	08.04	09.33
	14.49	16.18	17.44	20.14	21.43	23.14	23.29	22.09	20.25	18.41	15.59	14.43
5	09.56	08.44	07.14	06.27	04.46	03.19	03.16	04.41	06.11	07.35	08.07	09.35
	14.51	16.21	17.47	20.17	21.47	23.16	23.27	22.06	20.21	18.38	15.56	14.42
6	09.55	08.41	07.11	06.24	04.43	03.17	03.18	04.44	06.14	07.38	08.10	09.37
	14.53	16.24	17.50	20.20	21.50	23.18	23.26	22.02	20.18	18.34	15.53	14.40
7	09.54	08.38	07.07	06.20	04.39	03.15	03.20	04.47	06.17	07.41	08.13	09.40
	14.55	16.28	17.53	20.23	21.53	23.20	23.24	21.59	20.14	18.31	15.50	14.39
8	09.52	08.35	07.04	06.17	04.36	03.13	03.23	04.50	06.20	07.43	08.16	09.42
	14.58	16.31	17.56	20.26	21.56	23.22	23.22	21.56	20.11	18.27	15.47	14.37
9	09.50	08.32	07.00	06.14	04.33	03.12	03.25	04.53	06.23	07.46	08.19	09.44
	15.00	16.34	17.59	20.29	21.59	23.24	23.20	21.53	20.07	18.24	15.44	14.36
10	09.49	08.29	06.57	06.10	04.30	03.10	03.27	04.56	06.25	07.49	08.22	09.46
	15.03	16.37	18.02	20.32	22.02	23.26	23.18	21.49	20.04	18.21	15.41	14.35
11	09.47	08.26	06.54	06.07	04.27	03.09	03.30	04.59	06.28	07.52	08.25	09.48
	15.05	16.40	18.05	20.34	22.05	23.28	23.16	21.46	20.00	18.17	15.38	14.34
12	09.45	08.23	06.50	06.03	04.23	03.08	03.32	05.02	06.31	07.55	08.29	09.50
	15.08	16.43	18.08	20.37	22.08	23.29	23.14	21.43	19.57	18.14	15.35	14.33
13	09.43	08.20	06.47	06.00	04.20	03.06	03.34	05.05	06.34	07.58	08.32	09.51
	15.11	16.47	18.11	20.40	22.11	23.31	23.11	21.39	19.53	18.10	15.32	14.33
14	09.41	08.17	06.43	05.56	04.17	03.05	03.37	05.08	06.37	08.01	08.35	09.53
	15.13	16.50	18.14	20.43	22.14	23.32	23.09	21.36	19.50	18.07	15.30	14.32
15	09.39	08.13	06.40	05.53	04.14	03.04	03.40	05.11	06.39	08.04	08.38	09.54
	15.16	16.53	18.17	20.46	22.17	23.34	23.07	21.33	19.47	18.04	15.27	14.31
16	09.37	08.10	06.36	05.49	04.11	03.04	03.42	05.14	06.42	08.06	08.41	09.56
	15.19	16.56	18.20	20.49	22.20	23.35	23.04	21.29	19.43	18.00	15.24	14.31
17	09.35	08.07	06.33	05.46	04.08	03.03	03.45	05.17	06.45	08.09	08.44	09.57
	15.22	16.59	18.22	20.52	22.23	23.36	23.01	21.26	19.40	17.57	15.21	14.31
18	09.33	08.04	06.30	05.43	04.05	03.02	03.48	05.20	06.48	08.12	08.47	09.58
	15.25	17.02	18.25	20.55	22.27	23.36	22.59	21.23	19.36	17.54	15.19	14.31
19	09.30	08.00	06.26	05.39	04.02	03.02	03.51	05.23	06.50	08.15	08.50	09.59
	15.28	17.05	18.28	20.58	22.30	23.37	22.56	21.19	19.33	17.50	15.16	14.31
20	09.28	07.57	06.23	05.36	03.59	03.02	03.53	05.26	06.53	08.18	08.53	10.00
	15.31	17.08	18.31	21.01	22.33	23.38	22.53	21.16	19.29	17.47	15.13	14.31
21	09.26	07.54	06.19	05.32	03.56	03.02	03.56	05.28	06.56	08.21	08.56	10.01
	15.34	17.11	18.34	21.04	22.36	23.38	22.51	21.13	19.26	17.44	15.11	14.31
22	09.23	07.51	06.16	05.29	03.53	03.02	03.59	05.31	06.59	08.24	08.59	10.01
	15.37	17.14	18.37	21.07	22.38	23.38	22.48	21.09	19.22	17.40	15.08	14.31
23	09.21	07.47	06.12	05.26	03.51	03.02	04.02	05.34	07.01	08.27	09.02	10.02
	15.40	17.17	18.40	21.10	22.41	23.38	22.45	21.06	19.19	17.37	15.06	14.32
24	09.18	07.44	06.09	05.22	03.48	03.03	04.05	05.37	07.04	08.30	09.05	10.02
	15.43	17.20	18.43	21.13	22.44	23.38	22.42	21.02	19.15	17.34	15.04	14.33
25	09.16	07.41	06.05	05.19	03.45	03.03	04.08	05.40	07.07	07.33	09.08	10.02
	15.46	17.24	18.45	21.16	22.47	23.38	22.39	20.59	19.12	16.31	15.01	14.33
26	09.13	07.37	06.02	05.16	03.42	03.04	04.11	05.43	07.10	07.36	09.11	10.03
	15.49	17.27	18.48	21.19	22.50	23.37	22.36	20.56	19.08	16.27	14.59	14.34
27	09.10	07.34	05.58	05.12	03.40	03.05	04.14	05.46	07.13	07.39	09.14	10.03
	15.53	17.30	18.51	21.22	22.53	23.37	22.33	20.52	19.05	16.24	14.57	14.35
28	09.07	07.31	05.55	05.09	03.37	03.06	04.17	05.49	07.15	07.42	09.17	10.02
	15.56	17.33	18.54	21.25	22.56	23.36	22.30	20.49	19.02	16.21	14.55	14.37
29	09.05		06.52	05.06	03.35	03.07	04.20	05.52	07.18	07.45	09.20	10.02
	15.59		19.57	21.28	22.58	23.35	22.27	20.45	18.58	16.18	14.53	14.38
30	09.02		06.48	05.02	03.32	03.08	04.23	05.54	07.21	07.48	09.22	10.02
	16.02		20.00	21.31	23.01	23.34	22.24	20.42	18.55	16.15	14.51	14.39
31	08.59		06.45		03.30		04.26	05.57		07.51		10.01
	16.05		20.03		23.04		22.21	20.38		16.11		14.41
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
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:
31.1.2024 10.54/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE2_RD200x18xHH200_No_Forest

Shadow receptor: G - G - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.00	08.56	07.28	06.41	04.59	03.28	03.10	04.29	06.00	07.24	07.55	09.25
	14.43	16.08	17.36	20.06	21.34	23.06	23.33	22.18	20.35	18.51	16.08	14.49
2	09.59	08.53	07.24	06.38	04.56	03.25	03.11	04.32	06.03	07.27	07.58	09.28
	14.45	16.12	17.39	20.08	21.37	23.09	23.32	22.15	20.32	18.48	16.05	14.47
3	09.59	08.50	07.21	06.34	04.52	03.23	03.13	04.35	06.06	07.29	08.01	09.30
	14.47	16.15	17.42	20.11	21.41	23.11	23.31	22.12	20.28	18.45	16.02	14.45
4	09.57	08.47	07.17	06.31	04.49	03.21	03.15	04.38	06.09	07.32	08.04	09.33
	14.49	16.18	17.45	20.14	21.44	23.14	23.29	22.09	20.25	18.41	15.59	14.43
5	09.56	08.45	07.14	06.27	04.46	03.19	03.17	04.41	06.12	07.35	08.07	09.35
	14.51	16.21	17.48	20.17	21.47	23.16	23.28	22.06	20.21	18.38	15.56	14.42
6	09.55	08.42	07.11	06.24	04.43	03.17	03.19	04.44	06.14	07.38	08.10	09.37
	14.53	16.24	17.51	20.20	21.50	23.18	23.26	22.02	20.18	18.34	15.53	14.40
7	09.54	08.38	07.07	06.21	04.39	03.15	03.21	04.47	06.17	07.41	08.13	09.40
	14.56	16.28	17.53	20.23	21.53	23.20	23.24	21.59	20.14	18.31	15.50	14.39
8	09.52	08.35	07.04	06.17	04.36	03.14	03.23	04.50	06.20	07.44	08.16	09.42
	14.58	16.31	17.56	20.26	21.56	23.22	23.22	21.56	20.11	18.27	15.47	14.38
9	09.51	08.32	07.00	06.14	04.33	03.12	03.25	04.53	06.23	07.46	08.19	09.44
	15.00	16.34	17.59	20.29	21.59	23.24	23.20	21.53	20.07	18.24	15.44	14.36
10	09.49	08.29	06.57	06.10	04.30	03.10	03.27	04.56	06.26	07.49	08.22	09.46
	15.03	16.37	18.02	20.32	22.02	23.26	23.18	21.49	20.04	18.21	15.41	14.35
11	09.47	08.26	06.54	06.07	04.27	03.09	03.30	04.59	06.28	07.52	08.26	09.48
	15.05	16.40	18.05	20.35	22.05	23.28	23.16	21.46	20.01	18.17	15.38	14.34
12	09.45	08.23	06.50	06.03	04.24	03.08	03.32	05.02	06.31	07.55	08.29	09.50
	15.08	16.43	18.08	20.37	22.08	23.30	23.14	21.43	19.57	18.14	15.35	14.33
13	09.43	08.20	06.47	06.00	04.20	03.06	03.35	05.05	06.34	07.58	08.32	09.51
	15.11	16.47	18.11	20.40	22.11	23.31	23.11	21.40	19.54	18.11	15.32	14.33
14	09.42	08.17	06.43	05.56	04.17	03.05	03.37	05.08	06.37	08.01	08.35	09.53
	15.14	16.50	18.14	20.43	22.14	23.32	23.09	21.36	19.50	18.07	15.30	14.32
15	09.39	08.13	06.40	05.53	04.14	03.04	03.40	05.11	06.39	08.04	08.38	09.55
	15.16	16.53	18.17	20.46	22.17	23.34	23.07	21.33	19.47	18.04	15.27	14.31
16	09.37	08.10	06.37	05.50	04.11	03.04	03.42	05.14	06.42	08.07	08.41	09.56
	15.19	16.56	18.20	20.49	22.21	23.35	23.04	21.30	19.43	18.00	15.24	14.31
17	09.35	08.07	06.33	05.46	04.08	03.03	03.45	05.17	06.45	08.09	08.44	09.57
	15.22	16.59	18.23	20.52	22.24	23.36	23.02	21.26	19.40	17.57	15.21	14.31
18	09.33	08.04	06.30	05.43	04.05	03.03	03.48	05.20	06.48	08.12	08.47	09.58
	15.25	17.02	18.25	20.55	22.27	23.36	22.59	21.23	19.36	17.54	15.19	14.31
19	09.31	08.01	06.26	05.39	04.02	03.02	03.51	05.23	06.50	08.15	08.50	09.59
	15.28	17.05	18.28	20.58	22.30	23.37	22.56	21.19	19.33	17.50	15.16	14.31
20	09.28	07.57	06.23	05.36	03.59	03.02	03.54	05.26	06.53	08.18	08.53	10.00
	15.31	17.08	18.31	21.01	22.33	23.38	22.54	21.16	19.29	17.47	15.14	14.31
21	09.26	07.54	06.19	05.33	03.56	03.02	03.56	05.29	06.56	08.21	08.56	10.01
	15.34	17.11	18.34	21.04	22.36	23.38	22.51	21.13	19.26	17.44	15.11	14.31
22	09.23	07.51	06.16	05.29	03.54	03.02	03.59	05.32	06.59	08.24	08.59	10.02
	15.37	17.15	18.37	21.07	22.39	23.38	22.48	21.09	19.22	17.41	15.08	14.32
23	09.21	07.48	06.12	05.26	03.51	03.02	04.02	05.34	07.02	08.27	09.02	10.02
	15.40	17.18	18.40	21.10	22.42	23.38	22.45	21.06	19.19	17.37	15.06	14.32
24	09.18	07.44	06.09	05.22	03.48	03.03	04.05	05.37	07.04	08.30	09.05	10.02
	15.43	17.21	18.43	21.13	22.44	23.38	22.42	21.03	19.15	17.34	15.04	14.33
25	09.16	07.41	06.05	05.19	03.45	03.03	04.08	05.40	07.07	07.33	09.08	10.03
	15.46	17.24	18.46	21.16	22.47	23.38	22.39	20.59	19.12	16.31	15.01	14.34
26	09.13	07.38	06.02	05.16	03.43	03.04	04.11	05.43	07.10	07.36	09.11	10.03
	15.49	17.27	18.48	21.19	22.50	23.37	22.37	20.56	19.09	16.28	14.59	14.35
27	09.10	07.34	05.59	05.12	03.40	03.05	04.14	05.46	07.13	07.39	09.14	10.03
	15.53	17.30	18.51	21.22	22.53	23.37	22.34	20.52	19.05	16.24	14.57	14.36
28	09.08	07.31	05.55	05.09	03.37	03.06	04.17	05.49	07.15	07.42	09.17	10.02
	15.56	17.33	18.54	21.25	22.56	23.36	22.31	20.49	19.02	16.21	14.55	14.37
29	09.05		06.52	05.06	03.35	03.07	04.20	05.52	07.18	07.45	09.20	10.02
	15.59		19.57	21.28	22.59	23.35	22.28	20.45	18.58	16.18	14.53	14.38
30	09.02		06.48	05.02	03.32	03.08	04.23	05.55	07.21	07.48	09.22	10.02
	16.02		20.00	21.31	23.01	23.34	22.24	20.42	18.55	16.15	14.51	14.40
31	08.59		06.45		03.30		04.26	05.57		07.51		10.01
	16.05		20.03		23.04		22.21	20.39		16.12		14.41
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
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:
31.1.2024 10.54/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE2_RD200x18xHH200_No_Forest

Shadow receptor: H - H - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.00	08.56	07.28	06.41	04.59	03.28	03.10	04.29	06.00	07.24	07.55	09.25
	14.43	16.09	17.36	20.06	21.34	23.06	23.33	22.18	20.35	18.51	16.08	14.49
2	10.00	08.53	07.24	06.38	04.56	03.25	03.11	04.32	06.03	07.27	07.58	09.28
	14.45	16.12	17.39	20.09	21.37	23.09	23.32	22.15	20.32	18.48	16.05	14.47
3	09.59	08.50	07.21	06.34	04.52	03.23	03.13	04.35	06.06	07.29	08.01	09.30
	14.47	16.15	17.42	20.11	21.41	23.11	23.31	22.12	20.28	18.45	16.02	14.45
4	09.58	08.48	07.17	06.31	04.49	03.21	03.15	04.38	06.09	07.32	08.04	09.33
	14.49	16.18	17.45	20.14	21.44	23.14	23.29	22.09	20.25	18.41	15.59	14.43
5	09.56	08.45	07.14	06.27	04.46	03.19	03.17	04.41	06.12	07.35	08.07	09.35
	14.51	16.21	17.48	20.17	21.47	23.16	23.28	22.06	20.21	18.38	15.56	14.42
6	09.55	08.42	07.11	06.24	04.43	03.17	03.19	04.44	06.14	07.38	08.10	09.38
	14.53	16.24	17.51	20.20	21.50	23.18	23.26	22.02	20.18	18.34	15.53	14.40
7	09.54	08.39	07.07	06.21	04.39	03.15	03.21	04.47	06.17	07.41	08.13	09.40
	14.56	16.28	17.54	20.23	21.53	23.20	23.24	21.59	20.14	18.31	15.50	14.39
8	09.52	08.35	07.04	06.17	04.36	03.14	03.23	04.50	06.20	07.44	08.16	09.42
	14.58	16.31	17.56	20.26	21.56	23.23	23.22	21.56	20.11	18.27	15.47	14.38
9	09.51	08.32	07.01	06.14	04.33	03.12	03.25	04.53	06.23	07.46	08.19	09.44
	15.00	16.34	17.59	20.29	21.59	23.24	23.20	21.53	20.08	18.24	15.44	14.36
10	09.49	08.29	06.57	06.10	04.30	03.10	03.27	04.56	06.26	07.49	08.23	09.46
	15.03	16.37	18.02	20.32	22.02	23.26	23.18	21.49	20.04	18.21	15.41	14.35
11	09.47	08.26	06.54	06.07	04.27	03.09	03.30	04.59	06.28	07.52	08.26	09.48
	15.06	16.40	18.05	20.35	22.05	23.28	23.16	21.46	20.01	18.17	15.38	14.34
12	09.45	08.23	06.50	06.03	04.24	03.08	03.32	05.02	06.31	07.55	08.29	09.50
	15.08	16.44	18.08	20.38	22.08	23.30	23.14	21.43	19.57	18.14	15.35	14.33
13	09.44	08.20	06.47	06.00	04.20	03.07	03.35	05.05	06.34	07.58	08.32	09.52
	15.11	16.47	18.11	20.40	22.11	23.31	23.11	21.40	19.54	18.11	15.32	14.33
14	09.42	08.17	06.43	05.56	04.17	03.05	03.37	05.08	06.37	08.01	08.35	09.53
	15.14	16.50	18.14	20.43	22.14	23.32	23.09	21.36	19.50	18.07	15.30	14.32
15	09.39	08.14	06.40	05.53	04.14	03.05	03.40	05.11	06.39	08.04	08.38	09.55
	15.16	16.53	18.17	20.46	22.18	23.34	23.07	21.33	19.47	18.04	15.27	14.32
16	09.37	08.10	06.37	05.50	04.11	03.04	03.42	05.14	06.42	08.07	08.41	09.56
	15.19	16.56	18.20	20.49	22.21	23.35	23.04	21.30	19.43	18.00	15.24	14.31
17	09.35	08.07	06.33	05.46	04.08	03.03	03.45	05.17	06.45	08.10	08.44	09.57
	15.22	16.59	18.23	20.52	22.24	23.36	23.02	21.26	19.40	17.57	15.21	14.31
18	09.33	08.04	06.30	05.43	04.05	03.03	03.48	05.20	06.48	08.12	08.47	09.58
	15.25	17.02	18.25	20.55	22.27	23.37	22.59	21.23	19.36	17.54	15.19	14.31
19	09.31	08.01	06.26	05.39	04.02	03.02	03.51	05.23	06.51	08.15	08.50	09.59
	15.28	17.05	18.28	20.58	22.30	23.37	22.56	21.20	19.33	17.50	15.16	14.31
20	09.28	07.57	06.23	05.36	03.59	03.02	03.54	05.26	06.53	08.18	08.53	10.00
	15.31	17.08	18.31	21.01	22.33	23.38	22.54	21.16	19.29	17.47	15.14	14.31
21	09.26	07.54	06.19	05.33	03.56	03.02	03.56	05.29	06.56	08.21	08.56	10.01
	15.34	17.12	18.34	21.04	22.36	23.38	22.51	21.13	19.26	17.44	15.11	14.31
22	09.23	07.51	06.16	05.29	03.54	03.02	03.59	05.32	06.59	08.24	08.59	10.02
	15.37	17.15	18.37	21.07	22.39	23.38	22.48	21.09	19.22	17.41	15.09	14.32
23	09.21	07.48	06.12	05.26	03.51	03.02	04.02	05.34	07.02	08.27	09.02	10.02
	15.40	17.18	18.40	21.10	22.42	23.38	22.45	21.06	19.19	17.37	15.06	14.32
24	09.18	07.44	06.09	05.22	03.48	03.03	04.05	05.37	07.04	08.30	09.05	10.02
	15.43	17.21	18.43	21.13	22.44	23.38	22.42	21.03	19.16	17.34	15.04	14.33
25	09.16	07.41	06.06	05.19	03.45	03.03	04.08	05.40	07.07	07.33	09.08	10.03
	15.46	17.24	18.46	21.16	22.47	23.38	22.39	20.59	19.12	16.31	15.01	14.34
26	09.13	07.38	06.02	05.16	03.43	03.04	04.11	05.43	07.10	07.36	09.11	10.03
	15.50	17.27	18.48	21.19	22.50	23.37	22.37	20.56	19.09	16.28	14.59	14.35
27	09.10	07.34	05.59	05.12	03.40	03.05	04.14	05.46	07.13	07.39	09.14	10.03
	15.53	17.30	18.51	21.22	22.53	23.37	22.34	20.52	19.05	16.24	14.57	14.36
28	09.08	07.31	05.55	05.09	03.37	03.06	04.17	05.49	07.15	07.42	09.17	10.02
	15.56	17.33	18.54	21.25	22.56	23.36	22.31	20.49	19.02	16.21	14.55	14.37
29	09.05		06.52	05.06	03.35	03.07	04.20	05.52	07.18	07.45	09.20	10.02
	15.59		19.57	21.28	22.59	23.35	22.28	20.45	18.58	16.18	14.53	14.38
30	09.02		06.48	05.02	03.32	03.08	04.23	05.55	07.21	07.48	09.22	10.02
	16.02		20.00	21.31	23.01	23.34	22.24	20.42	18.55	16.15	14.51	14.40
31	08.59		06.45		03.30		04.26	05.57		07.52		10.01
	16.05		20.03		23.04		22.21	20.39		16.12		14.41
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
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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Henri Korhonen / henri.korhonen@fcg.fi
Calculated:
31.1.2024 10.54/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE2_RD200x18xHH200_No_Forest

Shadow receptor: I - I - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.00	08.56	07.28	06.42	04.59	03.28	03.10	04.29	06.01	07.24	07.55	09.25
	14.44	16.09	17.36	20.06	21.35	23.06	23.33	22.18	20.35	18.52	16.09	14.49
2	09.59	08.54	07.24	06.38	04.56	03.26	03.12	04.32	06.03	07.27	07.58	09.28
	14.46	16.12	17.39	20.09	21.38	23.09	23.32	22.15	20.32	18.48	16.06	14.47
3	09.59	08.51	07.21	06.35	04.53	03.24	03.13	04.35	06.06	07.30	08.01	09.30
	14.47	16.15	17.42	20.12	21.41	23.11	23.31	22.12	20.28	18.45	16.03	14.46
4	09.57	08.48	07.18	06.31	04.50	03.22	03.15	04.38	06.09	07.32	08.04	09.33
	14.49	16.18	17.45	20.14	21.44	23.14	23.29	22.09	20.25	18.41	15.59	14.44
5	09.56	08.45	07.14	06.28	04.46	03.20	03.17	04.41	06.12	07.35	08.07	09.35
	14.52	16.22	17.48	20.17	21.47	23.16	23.28	22.06	20.22	18.38	15.56	14.42
6	09.55	08.42	07.11	06.24	04.43	03.18	03.19	04.44	06.15	07.38	08.10	09.38
	14.54	16.25	17.51	20.20	21.50	23.18	23.26	22.03	20.18	18.35	15.53	14.41
7	09.54	08.39	07.08	06.21	04.40	03.16	03.21	04.47	06.17	07.41	08.13	09.40
	14.56	16.28	17.54	20.23	21.53	23.20	23.24	21.59	20.15	18.31	15.50	14.39
8	09.52	08.36	07.04	06.17	04.37	03.14	03.23	04.50	06.20	07.44	08.16	09.42
	14.58	16.31	17.57	20.26	21.56	23.22	23.22	21.56	20.11	18.28	15.47	14.38
9	09.51	08.33	07.01	06.14	04.33	03.12	03.25	04.53	06.23	07.47	08.20	09.44
	15.01	16.34	18.00	20.29	21.59	23.24	23.20	21.53	20.08	18.24	15.44	14.37
10	09.49	08.29	06.57	06.10	04.30	03.11	03.28	04.56	06.26	07.49	08.23	09.46
	15.03	16.38	18.03	20.32	22.02	23.26	23.18	21.50	20.04	18.21	15.41	14.36
11	09.47	08.26	06.54	06.07	04.27	03.09	03.30	04.59	06.29	07.52	08.26	09.48
	15.06	16.41	18.05	20.35	22.05	23.28	23.16	21.46	20.01	18.18	15.39	14.35
12	09.45	08.23	06.50	06.04	04.24	03.08	03.33	05.02	06.31	07.55	08.29	09.50
	15.09	16.44	18.08	20.38	22.08	23.30	23.14	21.43	19.57	18.14	15.36	14.34
13	09.44	08.20	06.47	06.00	04.21	03.07	03.35	05.05	06.34	07.58	08.32	09.52
	15.11	16.47	18.11	20.41	22.11	23.31	23.11	21.40	19.54	18.11	15.33	14.33
14	09.42	08.17	06.44	05.57	04.18	03.06	03.38	05.08	06.37	08.01	08.35	09.53
	15.14	16.50	18.14	20.44	22.15	23.32	23.09	21.36	19.50	18.07	15.30	14.32
15	09.40	08.14	06.40	05.53	04.15	03.05	03.40	05.11	06.40	08.04	08.38	09.55
	15.17	16.53	18.17	20.46	22.18	23.34	23.07	21.33	19.47	18.04	15.27	14.32
16	09.37	08.10	06.37	05.50	04.12	03.04	03.43	05.14	06.42	08.07	08.41	09.56
	15.20	16.56	18.20	20.49	22.21	23.35	23.04	21.30	19.43	18.01	15.24	14.32
17	09.35	08.07	06.33	05.46	04.09	03.04	03.46	05.17	06.45	08.10	08.44	09.57
	15.23	16.59	18.23	20.52	22.24	23.36	23.02	21.26	19.40	17.57	15.22	14.31
18	09.33	08.04	06.30	05.43	04.06	03.03	03.48	05.20	06.48	08.13	08.47	09.58
	15.25	17.03	18.26	20.55	22.27	23.36	22.59	21.23	19.36	17.54	15.19	14.31
19	09.31	08.01	06.26	05.40	04.03	03.03	03.51	05.23	06.51	08.16	08.50	09.59
	15.28	17.06	18.29	20.58	22.30	23.37	22.56	21.20	19.33	17.51	15.16	14.31
20	09.28	07.58	06.23	05.36	04.00	03.03	03.54	05.26	06.53	08.18	08.53	10.00
	15.31	17.09	18.31	21.01	22.33	23.38	22.54	21.16	19.30	17.47	15.14	14.31
21	09.26	07.54	06.20	05.33	03.57	03.03	03.57	05.29	06.56	08.21	08.57	10.01
	15.34	17.12	18.34	21.04	22.36	23.38	22.51	21.13	19.26	17.44	15.11	14.32
22	09.23	07.51	06.16	05.29	03.54	03.03	04.00	05.32	06.59	08.24	09.00	10.02
	15.37	17.15	18.37	21.07	22.39	23.38	22.48	21.09	19.23	17.41	15.09	14.32
23	09.21	07.48	06.13	05.26	03.51	03.03	04.03	05.35	07.02	08.27	09.02	10.02
	15.41	17.18	18.40	21.10	22.42	23.38	22.45	21.06	19.19	17.38	15.06	14.33
24	09.18	07.44	06.09	05.23	03.48	03.03	04.06	05.38	07.05	08.30	09.05	10.02
	15.44	17.21	18.43	21.13	22.44	23.38	22.42	21.03	19.16	17.34	15.04	14.33
25	09.16	07.41	06.06	05.19	03.46	03.04	04.08	05.41	07.07	07.33	09.08	10.03
	15.47	17.24	18.46	21.16	22.47	23.38	22.40	20.59	19.12	16.31	15.02	14.34
26	09.13	07.38	06.02	05.16	03.43	03.05	04.11	05.43	07.10	07.36	09.11	10.03
	15.50	17.27	18.49	21.19	22.50	23.37	22.37	20.56	19.09	16.28	14.59	14.35
27	09.10	07.34	05.59	05.13	03.40	03.06	04.14	05.46	07.13	07.39	09.14	10.03
	15.53	17.30	18.51	21.22	22.53	23.37	22.34	20.52	19.05	16.25	14.57	14.36
28	09.08	07.31	05.55	05.09	03.38	03.07	04.17	05.49	07.16	07.42	09.17	10.02
	15.56	17.33	18.54	21.25	22.56	23.36	22.31	20.49	19.02	16.21	14.55	14.37
29	09.05		06.52	05.06	03.35	03.08	04.20	05.52	07.18	07.46	09.20	10.02
	15.59		19.57	21.28	22.59	23.35	22.28	20.46	18.59	16.18	14.53	14.39
30	09.02		06.48	05.03	03.33	03.09	04.23	05.55	07.21	07.49	09.22	10.02
	16.03		20.00	21.31	23.01	23.34	22.25	20.42	18.55	16.15	14.51	14.40
31	08.59		06.45		03.30		04.26	05.58		07.52		10.01
	16.06		20.03		23.04		22.21	20.39		16.12		14.42
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
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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Henri Korhonen / henri.korhonen@fcg.fi
Calculated:
31.1.2024 10.54/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE2_RD200x18xHH200_No_Forest

Shadow receptor: J - J - Lomarakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.00	08.57	07.28	06.42	04.59	03.28	03.10	04.29	06.01	07.24	07.55	09.25
	14.44	16.09	17.36	20.06	21.35	23.07	23.33	22.18	20.35	18.52	16.09	14.49
2	10.00	08.54	07.24	06.38	04.56	03.26	03.12	04.32	06.03	07.27	07.58	09.28
	14.46	16.12	17.39	20.09	21.38	23.09	23.32	22.15	20.32	18.48	16.06	14.47
3	09.59	08.51	07.21	06.35	04.53	03.24	03.14	04.35	06.06	07.30	08.01	09.30
	14.47	16.15	17.42	20.12	21.41	23.12	23.31	22.12	20.29	18.45	16.03	14.46
4	09.58	08.48	07.18	06.31	04.50	03.22	03.15	04.38	06.09	07.33	08.04	09.33
	14.50	16.19	17.45	20.15	21.44	23.14	23.29	22.09	20.25	18.41	16.00	14.44
5	09.56	08.45	07.14	06.28	04.46	03.20	03.17	04.41	06.12	07.35	08.07	09.35
	14.52	16.22	17.48	20.17	21.47	23.16	23.28	22.06	20.22	18.38	15.56	14.42
6	09.55	08.42	07.11	06.24	04.43	03.18	03.19	04.44	06.15	07.38	08.10	09.38
	14.54	16.25	17.51	20.20	21.50	23.18	23.26	22.03	20.18	18.35	15.53	14.41
7	09.54	08.39	07.08	06.21	04.40	03.16	03.21	04.47	06.18	07.41	08.13	09.40
	14.56	16.28	17.54	20.23	21.53	23.21	23.24	21.59	20.15	18.31	15.50	14.39
8	09.52	08.36	07.04	06.17	04.37	03.14	03.23	04.50	06.20	07.44	08.16	09.42
	14.58	16.31	17.57	20.26	21.56	23.23	23.22	21.56	20.11	18.28	15.47	14.38
9	09.51	08.33	07.01	06.14	04.33	03.12	03.26	04.53	06.23	07.47	08.20	09.44
	15.01	16.34	18.00	20.29	21.59	23.25	23.20	21.53	20.08	18.24	15.44	14.37
10	09.49	08.30	06.57	06.11	04.30	03.11	03.28	04.56	06.26	07.50	08.23	09.46
	15.03	16.38	18.03	20.32	22.02	23.26	23.18	21.50	20.04	18.21	15.42	14.36
11	09.47	08.26	06.54	06.07	04.27	03.10	03.30	04.59	06.29	07.52	08.26	09.48
	15.06	16.41	18.06	20.35	22.05	23.28	23.16	21.46	20.01	18.18	15.39	14.35
12	09.46	08.23	06.51	06.04	04.24	03.08	03.33	05.02	06.31	07.55	08.29	09.50
	15.09	16.44	18.08	20.38	22.08	23.30	23.14	21.43	19.57	18.14	15.36	14.34
13	09.44	08.20	06.47	06.00	04.21	03.07	03.35	05.05	06.34	07.58	08.32	09.52
	15.11	16.47	18.11	20.41	22.12	23.31	23.12	21.40	19.54	18.11	15.33	14.33
14	09.42	08.17	06.44	05.57	04.18	03.06	03.38	05.08	06.37	08.01	08.35	09.53
	15.14	16.50	18.14	20.44	22.15	23.33	23.09	21.36	19.50	18.08	15.30	14.33
15	09.40	08.14	06.40	05.53	04.15	03.05	03.40	05.11	06.40	08.04	08.38	09.55
	15.17	16.53	18.17	20.47	22.18	23.34	23.07	21.33	19.47	18.04	15.27	14.32
16	09.38	08.11	06.37	05.50	04.12	03.04	03.43	05.14	06.43	08.07	08.41	09.56
	15.20	16.56	18.20	20.50	22.21	23.35	23.04	21.30	19.44	18.01	15.25	14.32
17	09.35	08.07	06.33	05.47	04.09	03.04	03.46	05.17	06.45	08.10	08.44	09.57
	15.23	17.00	18.23	20.52	22.24	23.36	23.02	21.26	19.40	17.57	15.22	14.31
18	09.33	08.04	06.30	05.43	04.06	03.03	03.48	05.20	06.48	08.13	08.48	09.58
	15.26	17.03	18.26	20.55	22.27	23.37	22.59	21.23	19.37	17.54	15.19	14.31
19	09.31	08.01	06.27	05.40	04.03	03.03	03.51	05.23	06.51	08.16	08.51	09.59
	15.28	17.06	18.29	20.58	22.30	23.37	22.56	21.20	19.33	17.51	15.17	14.31
20	09.28	07.58	06.23	05.36	04.00	03.03	03.54	05.26	06.54	08.19	08.54	10.00
	15.31	17.09	18.32	21.01	22.33	23.38	22.54	21.16	19.30	17.48	15.14	14.31
21	09.26	07.54	06.20	05.33	03.57	03.03	03.57	05.29	06.56	08.22	08.57	10.01
	15.34	17.12	18.34	21.04	22.36	23.38	22.51	21.13	19.26	17.44	15.11	14.32
22	09.24	07.51	06.16	05.30	03.54	03.03	04.00	05.32	06.59	08.25	09.00	10.02
	15.38	17.15	18.37	21.07	22.39	23.38	22.48	21.10	19.23	17.41	15.09	14.32
23	09.21	07.48	06.13	05.26	03.51	03.03	04.03	05.35	07.02	08.27	09.03	10.02
	15.41	17.18	18.40	21.10	22.42	23.38	22.45	21.06	19.19	17.38	15.07	14.33
24	09.18	07.44	06.09	05.23	03.49	03.03	04.06	05.38	07.05	08.30	09.06	10.03
	15.44	17.21	18.43	21.13	22.45	23.38	22.43	21.03	19.16	17.34	15.04	14.33
25	09.16	07.41	06.06	05.19	03.46	03.04	04.08	05.41	07.07	07.33	09.08	10.03
	15.47	17.24	18.46	21.16	22.48	23.38	22.40	20.59	19.12	16.31	15.02	14.34
26	09.13	07.38	06.02	05.16	03.43	03.05	04.11	05.44	07.10	07.37	09.11	10.03
	15.50	17.27	18.49	21.19	22.50	23.37	22.37	20.56	19.09	16.28	15.00	14.35
27	09.11	07.35	05.59	05.13	03.40	03.06	04.14	05.46	07.13	07.40	09.14	10.03
	15.53	17.30	18.52	21.22	22.53	23.37	22.34	20.53	19.05	16.25	14.57	14.36
28	09.08	07.31	05.55	05.09	03.38	03.07	04.17	05.49	07.16	07.43	09.17	10.03
	15.56	17.33	18.54	21.25	22.56	23.36	22.31	20.49	19.02	16.21	14.55	14.37
29	09.05		06.52	05.06	03.35	03.08	04.20	05.52	07.19	07.46	09.20	10.02
	15.59		19.57	21.29	22.59	23.35	22.28	20.46	18.59	16.18	14.53	14.39
30	09.02		06.49	05.03	03.33	03.09	04.23	05.55	07.21	07.49	09.23	10.02
	16.03		20.00	21.32	23.01	23.34	22.25	20.42	18.55	16.15	14.51	14.40
31	08.59		06.45		03.31		04.26	05.58		07.52		10.01
	16.06		20.03		23.04		22.22	20.39		16.12		14.42
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
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:
31.1.2024 10.54/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE2_RD200x18xHH200_No_Forest

Shadow receptor: K - K - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April		May	June	July	August		September		October	November	December
1	10.01	08.57	07.28	06.42		04.59	03.28	03.10	04.29		06.01	06.40 (WTG01)	07.24	07.55	09.25
	14.44	16.09	17.36	20.06		21.35	23.07	23.34	22.19		20.36	3 06.43 (WTG01)	18.52	16.09	14.49
2	10.00	08.54	07.25	06.38		04.56	03.26	03.12	04.32		06.04		07.27	07.58	09.28
	14.46	16.12	17.39	20.09		21.38	23.09	23.32	22.16		20.32		18.48	16.06	14.47
3	09.59	08.51	07.21	06.35		04.53	03.24	03.13	04.35		06.06		07.30	08.01	09.31
	14.47	16.15	17.42	20.12		21.41	23.12	23.31	22.12		20.29		18.45	16.03	14.46
4	09.58	08.48	07.18	06.31		04.50	03.22	03.15	04.38		06.09		07.33	08.04	09.33
	14.49	16.19	17.45	20.15		21.44	23.14	23.30	22.09		20.25		18.41	16.00	14.44
5	09.57	08.45	07.14	06.28		04.46	03.20	03.17	04.41		06.12		07.35	08.07	09.36
	14.52	16.22	17.48	20.18		21.47	23.16	23.28	22.06		20.22		18.38	15.56	14.42
6	09.55	08.42	07.11	06.24		04.43	03.18	03.19	04.44		06.15		07.38	08.10	09.38
	14.54	16.25	17.51	20.20		21.50	23.19	23.26	22.03		20.18		18.35	15.53	14.41
7	09.54	08.39	07.08	06.21		04.40	03.16	03.21	04.47		06.18		07.41	08.14	09.40
	14.56	16.28	17.54	20.23		21.53	23.21	23.24	22.00		20.15		18.31	15.50	14.39
8	09.53	08.36	07.04	06.18		04.37	03.14	03.23	04.50		06.20		07.44	08.17	09.42
	14.58	16.31	17.57	20.26		21.56	23.23	23.23	21.56		20.11		18.28	15.47	14.38
9	09.51	08.33	07.01	06.14		04.33	03.12	03.25	04.53		06.23		07.47	08.20	09.44
	15.01	16.34	18.00	20.29		21.59	23.25	23.21	21.53		20.08		18.24	15.44	14.37
10	09.49	08.30	06.57	06.11		04.30	03.11	03.28	04.56		06.26		07.50	08.23	09.46
	15.03	16.38	18.03	20.32		22.03	23.27	23.18	21.50		20.04		18.21	15.42	14.36
11	09.48	08.27	06.54	06.07		06.41 (WTG01)	04.27	03.09	03.30	04.59		06.29		07.53	08.26	09.48
	15.06	16.41	18.06	20.35	3	06.44 (WTG01)	22.06	23.28	23.16	21.47		20.01		18.18	15.39	14.35
12	09.46	08.23	06.51	06.04		06.36 (WTG01)	04.24	03.08	03.33	05.02		06.32		07.55	08.29	09.50
	15.09	16.44	18.09	20.38	12	06.48 (WTG01)	22.09	23.30	23.14	21.43		19.57		18.14	15.36	14.34
13	09.44	08.20	06.47	06.00		06.34 (WTG01)	04.21	03.07	03.35	05.05		06.34		07.58	08.32	09.52
	15.11	16.47	18.11	20.41	16	06.50 (WTG01)	22.12	23.31	23.12	21.40		19.54		18.11	15.33	14.33
14	09.42	08.17	06.44	05.57		06.32 (WTG01)	04.18	03.06	03.38	05.08		06.37		08.01	08.35	09.53
	15.14	16.50	18.14	20.44	18	06.50 (WTG01)	22.15	23.33	23.09	21.37		19.51		18.08	15.30	14.32
15	09.40	08.14	06.40	05.53		06.31 (WTG01)	04.15	03.05	03.40	05.11		06.40		08.04	08.38	09.55
	15.17	16.53	18.17	20.47	20	06.51 (WTG01)	22.18	23.34	23.07	21.33		19.47		18.04	15.27	14.32
16	09.38	08.11	06.37	05.50		06.30 (WTG01)	04.12	03.04	03.43	05.14	06.41 (WTG01)	06.43		08.07	08.42	09.56
	15.20	16.56	18.20	20.50	22	06.52 (WTG01)	22.21	23.35	23.05	21.30	9 06.50 (WTG01)	19.44		18.01	15.25	14.32
17	09.36	08.07	06.33	05.47		06.30 (WTG01)	04.09	03.04	03.46	05.17	06.39 (WTG01)	06.45		08.10	08.45	09.58
	15.23	17.00	18.23	20.53	23	06.53 (WTG01)	22.24	23.36	23.02	21.27	14 06.53 (WTG01)	19.40		17.58	15.22	14.31
18	09.33	08.04	06.30	05.43		06.29 (WTG01)	04.06	03.03	03.48	05.20	06.37 (WTG01)	06.48		08.13	08.48	09.59
	15.25	17.03	18.26	20.56	23	06.52 (WTG01)	22.27	23.37	22.59	21.23	16 06.53 (WTG01)	19.37		17.54	15.19	14.31
19	09.31	08.01	06.27	05.40		06.28 (WTG01)	04.03	03.03	03.51	05.23	06.36 (WTG01)	06.51		08.16	08.51	10.00
	15.28	17.06	18.29	20.59	24	06.52 (WTG01)	22.30	23.37	22.57	21.20	19 06.55 (WTG01)	19.33		17.51	15.17	14.31
20	09.29	07.58	06.23	05.36		06.28 (WTG01)	04.00	03.03	03.54	05.26	06.34 (WTG01)	06.54		08.19	08.54	10.01
	15.31	17.09	18.32	21.02	24	06.52 (WTG01)	22.33	23.38	22.54	21.17	21 06.55 (WTG01)	19.30		17.48	15.14	14.31
21	09.26	07.54	06.20	05.33		06.29 (WTG01)	03.57	03.02	03.57	05.29	06.34 (WTG01)	06.56		08.22	08.57	10.01
	15.34	17.12	18.34	21.05	22	06.51 (WTG01)	22.36	23.38	22.51	21.13	21 06.55 (WTG01)	19.26		17.44	15.11	14.32
22	09.24	07.51	06.16	05.30		06.29 (WTG01)	03.54	03.03	04.00	05.32	06.33 (WTG01)	06.59		08.25	09.00	10.02
	15.38	17.15	18.37	21.08	22	06.51 (WTG01)	22.39	23.39	22.48	21.10	23 06.56 (WTG01)	19.23		17.41	15.09	14.32
23	09.21	07.48	06.13	05.26		06.29 (WTG01)	03.51	03.03	04.03	05.35	06.32 (WTG01)	07.02		08.28	09.03	10.02
	15.41	17.18	18.40	21.11	20	06.49 (WTG01)	22.42	23.39	22.46	21.06	23 06.55 (WTG01)	19.19		17.38	15.06	14.33
24	09.19	07.45	06.09	05.23		06.29 (WTG01)	03.48	03.03	04.06	05.38	06.32 (WTG01)	07.05		08.31	09.06	10.03
	15.44	17.21	18.43	21.14	19	06.48 (WTG01)	22.45	23.38	22.43	21.03	23 06.55 (WTG01)	19.16		17.34	15.04	14.33
25	09.16	07.41	06.06	05.19		06.30 (WTG01)	03.46	03.04	04.08	05.41	06.32 (WTG01)	07.07		07.34	09.09	10.03
	15.47	17.24	18.46	21.17	17	06.47 (WTG01)	22.48	23.38	22.40	21.00	23 06.55 (WTG01)	19.12		16.31	15.02	14.34
26	09.13	07.38	06.02	05.16		06.32 (WTG01)	03.43	03.05	04.11	05.44	06.32 (WTG01)	07.10		07.37	09.12	10.03
	15.50	17.27	18.49	21.20	13	06.45 (WTG01)	22.51	23.38	22.37	20.56	22 06.54 (WTG01)	19.09		16.28	15.00	14.35
27	09.11	07.35	05.59	05.13		06.34 (WTG01)	03.40	03.05	04.14	05.46	06.32 (WTG01)	07.13		07.40	09.14	10.03
	15.53	17.30	18.52	21.23	8	06.42 (WTG01)	22.53	23.37	22.34	20.53	22 06.54 (WTG01)	19.06		16.25	14.57	14.36
28	09.08	07.31	05.56	05.09			03.38	03.06	04.17	05.49	06.33 (WTG01)	07.16		07.43	09.17	10.03
	15.56	17.33	18.55	21.26			22.56	23.37	22.31	20.49	20 06.53 (WTG01)	19.02		16.22	14.55	14.37
29	09.05		06.52	05.06			03.35	03.08	04.20	05.52	06.33 (WTG01)	07.19		07.46	09.20	10.03
	15.59		19.57	21.29			22.59	23.36	22.28	20.46	18 06.51 (WTG01)	18.59		16.18	14.53	14.39
30	09.02		06.49	05.03			03.33	03.09	04.23	05.55	06.34 (WTG01)	07.21		07.49	09.23	10.02
	16.03		20.00	21.32			23.02	23.35	22.25	20.42	16 06.50 (WTG01)	18.55		16.15	14.51	14.40
31	09.00		06.45				03.30		04.26	05.58	06.36 (WTG01)			07.52		10.02
	16.06		20.03				23.04		22.22	20.39	12 06.48 (WTG01)			16.12		14.42
Potential sun hours	179	241	363	448			562	610	598	504		392		307	204	147
Total, worst case					306						302		3			
Sun reduction					0,44						0,42		0,36			
Oper. time red.					0,90						0,90		0,90			
Wind dir. red.					0,56						0,56		0,56			
Total reduction					0,22						0,21		0,18			
Total, real					68						63		1			

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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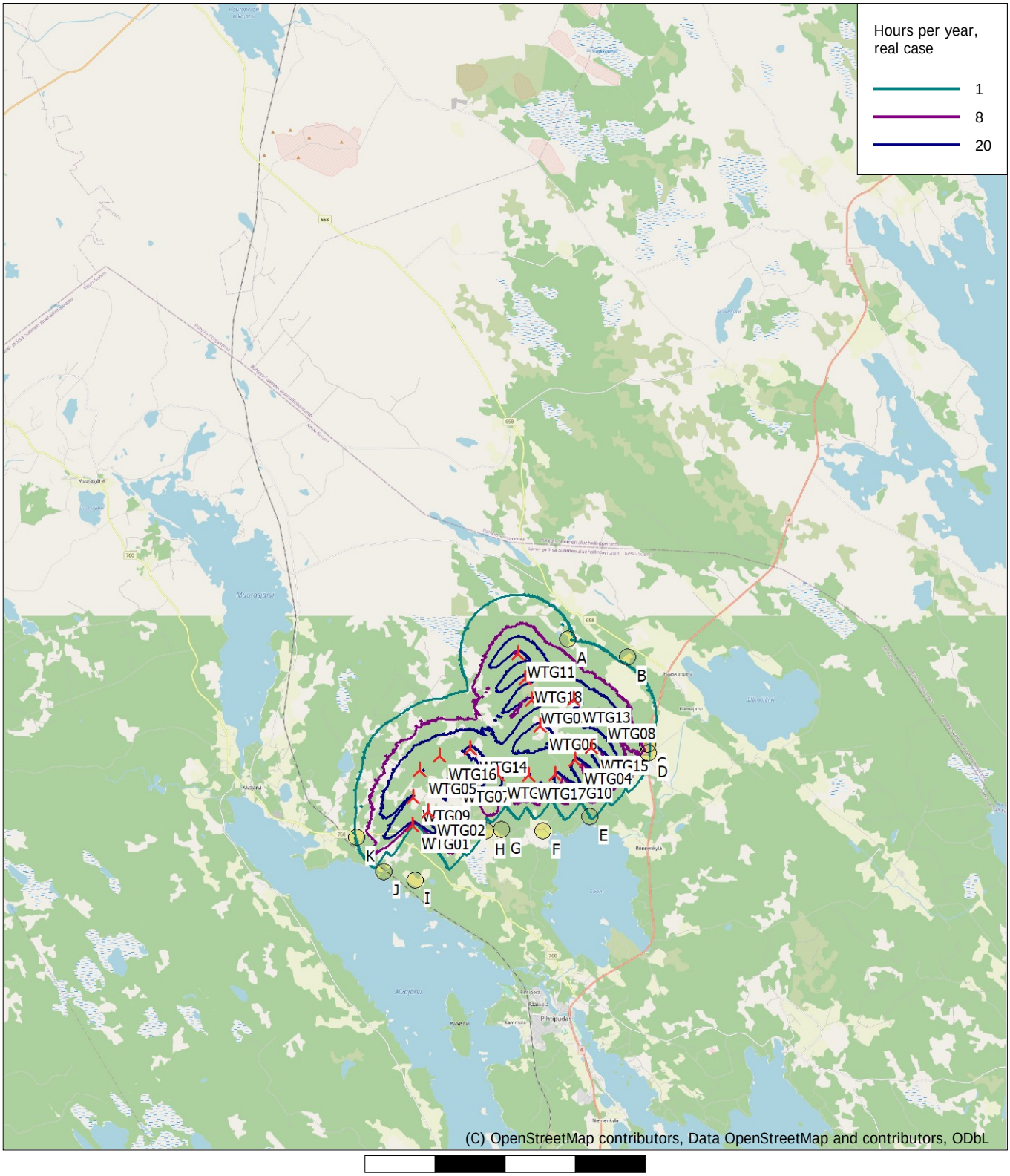
Calculated:
31.1.2024 10.54/3.6.355

SHADOW - Map

Calculation: Uusimo_VE2_RD200x18xHH200_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: 427 770 North: 7 044 000

New WTG Shadow receptor

Flicker map level: Height Contours: CONTOURLINE_Pyhäntä_Pilpankangas_0.wpo (2)

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

Liite 9. Varjostusmallinnuksen tulokset ”Real Case, No forest” - Hankevaihtoehto 3

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SHADOW - Main Result

Calculation: Uusimo_VE3_RD200x10xHH200_No_Forest

Assumptions for shadow calculations

Maximum distance for influence	2 089	m
Minimum sun height over horizon for influence	3	°
Day step for calculation	1	days
Time step for calculation	1	minutes

Sunshine probability S (Average daily sunshine hours) []

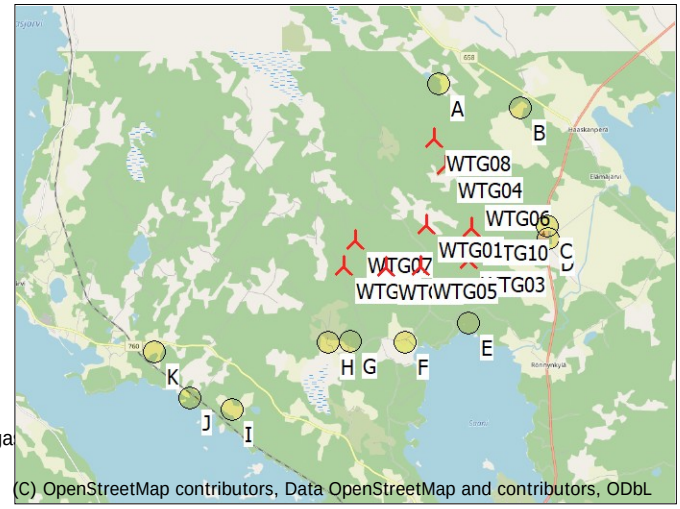
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

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_Pyhäntä_Pilpankanga
Receptor grid resolution: 1,0 m

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89



Scale 1:200 000

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]
WTG01	429 051	7 037 493	138,6	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG02	426 831	7 036 447	125,0	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG03	430 151	7 036 555	125,8	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG04	429 601	7 039 051	140,0	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG05	428 904	7 036 410	128,2	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG06	430 350	7 038 339	134,3	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG07	427 156	7 037 144	126,0	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG08	429 300	7 039 773	141,1	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG09	427 951	7 036 390	122,3	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG10	430 251	7 037 388	129,2	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5

Shadow receptor-Input

No.	Name	East	North	Z [m]	Width [m]	Height [m]	Elevation a.g.l. [m]	Slope of window [°]	Direction mode	Eye height (ZVI) a.g.l. [m]
A	A - Lomarakennus	429 470	7 041 260	145,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
B	B - Asuinrakennus	431 627	7 040 548	144,9	5,0	5,0	1,0	90,0	"Green house mode"	6,0
C	C - Asuinrakennus	432 261	7 037 387	122,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
D	D - Asuinrakennus	432 294	7 037 094	122,1	5,0	5,0	1,0	90,0	"Green house mode"	6,0
E	E - Lomarakennus	430 111	7 034 859	117,3	5,0	5,0	1,0	90,0	"Green house mode"	6,0
F	F - Asuinrakennus	428 445	7 034 384	122,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
G	G - Asuinrakennus	426 978	7 034 448	122,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0
H	H - Asuinrakennus	426 394	7 034 428	122,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
I	I - Asuinrakennus	423 788	7 032 711	125,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
J	J - Lomarakennus	422 689	7 033 070	114,2	5,0	5,0	1,0	90,0	"Green house mode"	6,0
K	K - Asuinrakennus	421 745	7 034 298	125,0	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	3:34
B	B - Asuinrakennus	0:00
C	C - Asuinrakennus	1:44
D	D - Asuinrakennus	1:52

To be continued on next page...

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31.1.2024 11.06/3.6.355

SHADOW - Main Result

Calculation: Uusimo_VE3_RD200x10xHH200_No_Forest

...continued from previous page

No.	Name	Shadow, expected values Shadow hours per year [h/year]
E	E - Lomarakennus	0:58
F	F - Asuinrakennus	0:00
G	G - Asuinrakennus	0:00
H	H - Asuinrakennus	0:00
I	I - Asuinrakennus	0:00
J	J - Lomarakennus	0:00
K	K - Asuinrakennus	0:00

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

No.	Name	Expected [h/year]
WTG01	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (455)	0:00
WTG02	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (456)	0:00
WTG03	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (457)	0:00
WTG04	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (458)	0:00
WTG05	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (459)	0:58
WTG06	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (460)	0:00
WTG07	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (461)	0:00
WTG08	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (462)	3:34
WTG09	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (463)	0:00
WTG10	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (464)	3:36

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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SHADOW - Calendar

Calculation: Uusimo_VE3_RD200x10xHH200_No_Forest

Shadow receptor: A - A - Lomarakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January			February			March	April	May	June
1	10.01			08.57		12.38 (WTG08)	07.28	06.41	04.58	03.27
	14.42			16.08	28	13.06 (WTG08)	17.35	20.06	21.35	23.07
2	10.00		12.39 (WTG08)	08.54		12.40 (WTG08)	07.24	06.37	04.55	03.24
	14.44	6	12.45 (WTG08)	16.11	26	13.06 (WTG08)	17.38	20.08	21.38	23.10
3	09.59		12.38 (WTG08)	08.51		12.40 (WTG08)	07.21	06.34	04.52	03.22
	14.46	10	12.48 (WTG08)	16.14	25	13.05 (WTG08)	17.41	20.11	21.41	23.12
4	09.58		12.37 (WTG08)	08.48		12.41 (WTG08)	07.17	06.31	04.48	03.20
	14.48	12	12.49 (WTG08)	16.17	23	13.04 (WTG08)	17.44	20.14	21.44	23.15
5	09.57		12.37 (WTG08)	08.45		12.44 (WTG08)	07.14	06.27	04.45	03.18
	14.50	14	12.51 (WTG08)	16.21	19	13.03 (WTG08)	17.47	20.17	21.47	23.17
6	09.56		12.36 (WTG08)	08.42		12.46 (WTG08)	07.11	06.24	04.42	03.16
	14.52	16	12.52 (WTG08)	16.24	14	13.00 (WTG08)	17.50	20.20	21.50	23.19
7	09.54		12.36 (WTG08)	08.39		12.51 (WTG08)	07.07	06.20	04.39	03.14
	14.55	18	12.54 (WTG08)	16.27	6	12.57 (WTG08)	17.53	20.23	21.53	23.21
8	09.53		12.35 (WTG08)	08.36			07.04	06.17	04.35	03.12
	14.57	20	12.55 (WTG08)	16.30			17.56	20.26	21.56	23.23
9	09.51		12.34 (WTG08)	08.33			07.00	06.13	04.32	03.11
	14.59	22	12.56 (WTG08)	16.33			17.59	20.29	21.59	23.25
10	09.50		12.35 (WTG08)	08.29			06.57	06.10	04.29	03.09
	15.02	23	12.58 (WTG08)	16.37			18.02	20.32	22.02	23.27
11	09.48		12.34 (WTG08)	08.26			06.54	06.06	04.26	03.08
	15.05	24	12.58 (WTG08)	16.40			18.05	20.35	22.06	23.29
12	09.46		12.34 (WTG08)	08.23			06.50	06.03	04.23	03.06
	15.07	26	13.00 (WTG08)	16.43			18.08	20.38	22.09	23.31
13	09.44		12.34 (WTG08)	08.20			06.47	05.59	04.20	03.05
	15.10	26	13.00 (WTG08)	16.46			18.11	20.40	22.12	23.32
14	09.42		12.33 (WTG08)	08.17			06.43	05.56	04.17	03.04
	15.13	28	13.01 (WTG08)	16.49			18.14	20.43	22.15	23.33
15	09.40		12.34 (WTG08)	08.14			06.40	05.53	04.13	03.03
	15.15	28	13.02 (WTG08)	16.52			18.17	20.46	22.18	23.35
16	09.38		12.33 (WTG08)	08.10			06.36	05.49	04.10	03.02
	15.18	30	13.03 (WTG08)	16.56			18.19	20.49	22.21	23.36
17	09.36		12.33 (WTG08)	08.07			06.33	05.46	04.07	03.02
	15.21	30	13.03 (WTG08)	16.59			18.22	20.52	22.24	23.37
18	09.33		12.34 (WTG08)	08.04			06.29	05.42	04.04	03.01
	15.24	30	13.04 (WTG08)	17.02			18.25	20.55	22.27	23.38
19	09.31		12.33 (WTG08)	08.01			06.26	05.39	04.01	03.01
	15.27	32	13.05 (WTG08)	17.05			18.28	20.58	22.30	23.38
20	09.29		12.34 (WTG08)	07.57			06.23	05.35	03.58	03.01
	15.30	32	13.06 (WTG08)	17.08			18.31	21.01	22.33	23.39
21	09.26		12.34 (WTG08)	07.54			06.19	05.32	03.56	03.01
	15.33	32	13.06 (WTG08)	17.11			18.34	21.04	22.36	23.39
22	09.24		12.33 (WTG08)	07.51			06.16	05.29	03.53	03.01
	15.36	33	13.06 (WTG08)	17.14			18.37	21.07	22.39	23.39
23	09.21		12.34 (WTG08)	07.48			06.12	05.25	03.50	03.01
	15.39	33	13.07 (WTG08)	17.17			18.40	21.10	22.42	23.39
24	09.19		12.34 (WTG08)	07.44			06.09	05.22	03.47	03.01
	15.42	33	13.07 (WTG08)	17.20			18.42	21.13	22.45	23.39
25	09.16		12.34 (WTG08)	07.41			06.05	05.18	03.44	03.02
	15.46	33	13.07 (WTG08)	17.23			18.45	21.16	22.48	23.39
26	09.13		12.35 (WTG08)	07.38			06.02	05.15	03.42	03.03
	15.49	33	13.08 (WTG08)	17.26			18.48	21.19	22.51	23.38
27	09.11		12.35 (WTG08)	07.34			05.58	05.12	03.39	03.03
	15.52	32	13.07 (WTG08)	17.29			18.51	21.22	22.54	23.38
28	09.08		12.36 (WTG08)	07.31			05.55	05.08	03.36	03.04
	15.55	32	13.08 (WTG08)	17.32			18.54	21.25	22.56	23.37
29	09.05		12.36 (WTG08)				06.51	05.05	03.34	03.06
	15.58	32	13.08 (WTG08)				19.57	21.28	22.59	23.36
30	09.02		12.36 (WTG08)				06.48	05.02	03.31	03.07
	16.01	31	13.07 (WTG08)				20.00	21.32	23.02	23.35
31	08.59		12.38 (WTG08)				06.44		03.29	
	16.05	29	13.07 (WTG08)				20.03		23.05	
Potential sun hours	178			241			363	449	563	611
Total, worst case		780			141					
Sun reduction		0,17			0,33					
Oper. time red.		0,90			0,90					
Wind dir. red.		0,72			0,72					
Total reduction		0,11			0,21					
Total, real		87			30					

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:
31.1.2024 11.06/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE3_RD200x10xHH200_No_Forest

Shadow receptor: A - A - Lomarakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	July		August		September		October		November				December			
1	03.08		04.28		06.00		07.24		07.55				09.26		12.16	(WTG08)
	23.34		22.19		20.35		18.51		16.08				14.48	25	12.41	(WTG08)
2	03.10		04.31		06.03		07.26		07.58				09.28		12.17	(WTG08)
	23.33		22.16		20.32		18.48		16.05				14.46	23	12.40	(WTG08)
3	03.12		04.34		06.06		07.29		08.01				09.31		12.19	(WTG08)
	23.32		22.12		20.28		18.44		16.02				14.44	21	12.40	(WTG08)
4	03.13		04.37		06.08		07.32		08.04		12.19	(WTG08)	09.33		12.19	(WTG08)
	23.30		22.09		20.25		18.41		15.59	8	12.27	(WTG08)	14.42	20	12.39	(WTG08)
5	03.15		04.40		06.11		07.35		08.07		12.16	(WTG08)	09.36		12.20	(WTG08)
	23.28		22.06		20.21		18.37		15.55	15	12.31	(WTG08)	14.41	19	12.39	(WTG08)
6	03.17		04.43		06.14		07.38		08.10		12.13	(WTG08)	09.38		12.22	(WTG08)
	23.27		22.03		20.18		18.34		15.52	20	12.33	(WTG08)	14.39	17	12.39	(WTG08)
7	03.19		04.46		06.17		07.41		08.13		12.12	(WTG08)	09.40		12.23	(WTG08)
	23.25		22.00		20.14		18.31		15.49	22	12.34	(WTG08)	14.38	15	12.38	(WTG08)
8	03.21		04.49		06.20		07.43		08.16		12.11	(WTG08)	09.43		12.25	(WTG08)
	23.23		21.56		20.11		18.27		15.46	25	12.36	(WTG08)	14.37	13	12.38	(WTG08)
9	03.24		04.52		06.22		07.46		08.20		12.10	(WTG08)	09.45		12.27	(WTG08)
	23.21		21.53		20.07		18.24		15.43	27	12.37	(WTG08)	14.35	10	12.37	(WTG08)
10	03.26		04.55		06.25		07.49		08.23		12.09	(WTG08)	09.47		12.28	(WTG08)
	23.19		21.50		20.04		18.20		15.40	28	12.37	(WTG08)	14.34	7	12.35	(WTG08)
11	03.28		04.58		06.28		07.52		08.26		12.08	(WTG08)	09.49			
	23.17		21.46		20.00		18.17		15.38	30	12.38	(WTG08)	14.33			
12	03.31		05.01		06.31		07.55		08.29		12.08	(WTG08)	09.50			
	23.15		21.43		19.57		18.14		15.35	31	12.39	(WTG08)	14.32			
13	03.33		05.04		06.34		07.58		08.32		12.08	(WTG08)	09.52			
	23.12		21.40		19.54		18.10		15.32	31	12.39	(WTG08)	14.32			
14	03.36		05.07		06.36		08.01		08.35		12.08	(WTG08)	09.54			
	23.10		21.36		19.50		18.07		15.29	32	12.40	(WTG08)	14.31			
15	03.39		05.10		06.39		08.04		08.38		12.08	(WTG08)	09.55			
	23.07		21.33		19.47		18.03		15.26	32	12.40	(WTG08)	14.30			
16	03.41		05.13		06.42		08.07		08.41		12.08	(WTG08)	09.57			
	23.05		21.30		19.43		18.00		15.23	33	12.41	(WTG08)	14.30			
17	03.44		05.16		06.45		08.09		08.45		12.08	(WTG08)	09.58			
	23.02		21.26		19.40		17.57		15.21	33	12.41	(WTG08)	14.30			
18	03.47		05.19		06.47		08.12		08.48		12.08	(WTG08)	09.59			
	23.00		21.23		19.36		17.53		15.18	33	12.41	(WTG08)	14.30			
19	03.50		05.22		06.50		08.15		08.51		12.08	(WTG08)	10.00			
	22.57		21.20		19.33		17.50		15.15	33	12.41	(WTG08)	14.30			
20	03.53		05.25		06.53		08.18		08.54		12.08	(WTG08)	10.01			
	22.54		21.16		19.29		17.47		15.13	33	12.41	(WTG08)	14.30			
21	03.55		05.28		06.56		08.21		08.57		12.09	(WTG08)	10.02			
	22.51		21.13		19.26		17.43		15.10	32	12.41	(WTG08)	14.30			
22	03.58		05.31		06.59		08.24		09.00		12.10	(WTG08)	10.02			
	22.49		21.09		19.22		17.40		15.08	32	12.42	(WTG08)	14.30			
23	04.01		05.34		07.01		08.27		09.03		12.10	(WTG08)	10.03			
	22.46		21.06		19.19		17.37		15.05	32	12.42	(WTG08)	14.31			
24	04.04		05.37		07.04		08.30		09.06		12.11	(WTG08)	10.03			
	22.43		21.03		19.15		17.34		15.03	31	12.42	(WTG08)	14.32			
25	04.07		05.40		07.07		07.33		09.09		12.11	(WTG08)	10.03			
	22.40		20.59		19.12		16.30		15.01	30	12.41	(WTG08)	14.32			
26	04.10		05.43		07.10		07.36		09.12		12.12	(WTG08)	10.03			
	22.37		20.56		19.08		16.27		14.58	29	12.41	(WTG08)	14.33			
27	04.13		05.46		07.12		07.39		09.15		12.13	(WTG08)	10.03			
	22.34		20.52		19.05		16.24		14.56	29	12.42	(WTG08)	14.34			
28	04.16		05.48		07.15		07.42		09.17		12.14	(WTG08)	10.03			
	22.31		20.49		19.01		16.21		14.54	27	12.41	(WTG08)	14.36			
29	04.19		05.51		07.18		07.45		09.20		12.14	(WTG08)	10.03			
	22.28		20.45		18.58		16.17		14.52	27	12.41	(WTG08)	14.37			
30	04.22		05.54		07.21		07.49		09.23		12.16	(WTG08)	10.02			
	22.25		20.42		18.55		16.14		14.50	25	12.41	(WTG08)	14.38			
31	04.25		05.57				07.52						10.02			
	22.22		20.39				16.11						14.40			
Potential sun hours	599		504		392		307		203				146			
Total, worst case									760					170		
Sun reduction									0,17					0,12		
Oper. time red.									0,90					0,90		
Wind dir. red.									0,72					0,72		
Total reduction									0,11					0,08		
Total, real									84					13		

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:
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SHADOW - Calendar

Calculation: Uusimo_VE3_RD200x10xHH200_No_Forest

Shadow receptor: B - B - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.01	08.56	07.27	06.41	04.58	03.26	03.08	04.28	06.00	07.23	07.54	09.25
	14.42	16.08	17.35	20.05	21.34	23.07	23.34	22.18	20.35	18.51	16.08	14.48
2	10.00	08.53	07.24	06.37	04.55	03.24	03.10	04.31	06.03	07.26	07.58	09.28
	14.44	16.11	17.38	20.08	21.37	23.09	23.33	22.15	20.31	18.48	16.05	14.46
3	09.59	08.50	07.21	06.34	04.52	03.22	03.11	04.34	06.05	07.29	08.01	09.31
	14.46	16.14	17.41	20.11	21.41	23.12	23.31	22.12	20.28	18.44	16.02	14.44
4	09.58	08.48	07.17	06.30	04.48	03.20	03.13	04.37	06.08	07.32	08.04	09.33
	14.48	16.17	17.44	20.14	21.44	23.14	23.30	22.09	20.25	18.41	15.58	14.42
5	09.57	08.45	07.14	06.27	04.45	03.18	03.15	04.40	06.11	07.35	08.07	09.35
	14.50	16.21	17.47	20.17	21.47	23.17	23.28	22.06	20.21	18.37	15.55	14.41
6	09.55	08.42	07.10	06.23	04.42	03.16	03.17	04.43	06.14	07.38	08.10	09.38
	14.52	16.24	17.50	20.20	21.50	23.19	23.26	22.03	20.18	18.34	15.52	14.39
7	09.54	08.38	07.07	06.20	04.39	03.14	03.19	04.46	06.17	07.40	08.13	09.40
	14.54	16.27	17.53	20.23	21.53	23.21	23.25	21.59	20.14	18.30	15.49	14.38
8	09.53	08.35	07.04	06.17	04.35	03.12	03.21	04.49	06.19	07.43	08.16	09.42
	14.57	16.30	17.56	20.26	21.56	23.23	23.23	21.56	20.11	18.27	15.46	14.36
9	09.51	08.32	07.00	06.13	04.32	03.11	03.24	04.52	06.22	07.46	08.19	09.44
	14.59	16.33	17.59	20.29	21.59	23.25	23.21	21.53	20.07	18.24	15.43	14.35
10	09.49	08.29	06.57	06.10	04.29	03.09	03.26	04.55	06.25	07.49	08.23	09.46
	15.02	16.36	18.02	20.31	22.02	23.27	23.19	21.49	20.04	18.20	15.40	14.34
11	09.48	08.26	06.53	06.06	04.26	03.08	03.28	04.58	06.28	07.52	08.26	09.48
	15.04	16.40	18.05	20.34	22.05	23.29	23.16	21.46	20.00	18.17	15.37	14.33
12	09.46	08.23	06.50	06.03	04.23	03.06	03.31	05.01	06.31	07.55	08.29	09.50
	15.07	16.43	18.08	20.37	22.08	23.30	23.14	21.43	19.57	18.13	15.35	14.32
13	09.44	08.20	06.47	05.59	04.20	03.05	03.33	05.04	06.33	07.58	08.32	09.52
	15.10	16.46	18.11	20.40	22.12	23.32	23.12	21.40	19.53	18.10	15.32	14.31
14	09.42	08.17	06.43	05.56	04.16	03.04	03.36	05.07	06.36	08.01	08.35	09.54
	15.13	16.49	18.13	20.43	22.15	23.33	23.10	21.36	19.50	18.07	15.29	14.31
15	09.40	08.13	06.40	05.52	04.13	03.03	03.39	05.10	06.39	08.03	08.38	09.55
	15.15	16.52	18.16	20.46	22.18	23.34	23.07	21.33	19.46	18.03	15.26	14.30
16	09.38	08.10	06.36	05.49	04.10	03.02	03.41	05.13	06.42	08.06	08.41	09.56
	15.18	16.55	18.19	20.49	22.21	23.36	23.05	21.30	19.43	18.00	15.23	14.30
17	09.35	08.07	06.33	05.46	04.07	03.02	03.44	05.16	06.44	08.09	08.44	09.58
	15.21	16.59	18.22	20.52	22.24	23.36	23.02	21.26	19.39	17.57	15.21	14.30
18	09.33	08.04	06.29	05.42	04.04	03.01	03.47	05.19	06.47	08.12	08.47	09.59
	15.24	17.02	18.25	20.55	22.27	23.37	22.59	21.23	19.36	17.53	15.18	14.30
19	09.31	08.00	06.26	05.39	04.01	03.01	03.50	05.22	06.50	08.15	08.50	10.00
	15.27	17.05	18.28	20.58	22.30	23.38	22.57	21.19	19.32	17.50	15.15	14.30
20	09.28	07.57	06.22	05.35	03.58	03.01	03.52	05.25	06.53	08.18	08.54	10.01
	15.30	17.08	18.31	21.01	22.33	23.38	22.54	21.16	19.29	17.47	15.13	14.30
21	09.26	07.54	06.19	05.32	03.55	03.00	03.55	05.28	06.56	08.21	08.57	10.01
	15.33	17.11	18.34	21.04	22.36	23.39	22.51	21.13	19.26	17.43	15.10	14.30
22	09.24	07.51	06.15	05.28	03.53	03.01	03.58	05.31	06.58	08.24	09.00	10.02
	15.36	17.14	18.37	21.07	22.39	23.39	22.48	21.09	19.22	17.40	15.08	14.30
23	09.21	07.47	06.12	05.25	03.50	03.01	04.01	05.34	07.01	08.27	09.03	10.03
	15.39	17.17	18.39	21.10	22.42	23.39	22.46	21.06	19.19	17.37	15.05	14.31
24	09.18	07.44	06.09	05.22	03.47	03.01	04.04	05.37	07.04	08.30	09.06	10.03
	15.42	17.20	18.42	21.13	22.45	23.39	22.43	21.02	19.15	17.33	15.03	14.32
25	09.16	07.41	06.05	05.18	03.44	03.02	04.07	05.40	07.07	07.33	09.09	10.03
	15.45	17.23	18.45	21.16	22.48	23.39	22.40	20.59	19.12	16.30	15.00	14.32
26	09.13	07.37	06.02	05.15	03.41	03.03	04.10	05.42	07.09	07.36	09.11	10.03
	15.49	17.26	18.48	21.19	22.51	23.38	22.37	20.56	19.08	16.27	14.58	14.33
27	09.10	07.34	05.58	05.12	03.39	03.03	04.13	05.45	07.12	07.39	09.14	10.03
	15.52	17.29	18.51	21.22	22.53	23.38	22.34	20.52	19.05	16.24	14.56	14.34
28	09.08	07.31	05.55	05.08	03.36	03.04	04.16	05.48	07.15	07.42	09.17	10.03
	15.55	17.32	18.54	21.25	22.56	23.37	22.31	20.49	19.01	16.20	14.54	14.36
29	09.05		06.51	05.05	03.34	03.06	04.19	05.51	07.18	07.45	09.20	10.03
	15.58		19.57	21.28	22.59	23.36	22.28	20.45	18.58	16.17	14.52	14.37
30	09.02		06.48	05.02	03.31	03.07	04.22	05.54	07.21	07.48	09.23	10.02
	16.01		20.00	21.31	23.02	23.35	22.25	20.42	18.54	16.14	14.50	14.38
31	08.59		06.44		03.29		04.25	05.57		07.51		10.02
	16.05		20.02		23.04		22.22	20.38		16.11		14.40
Potential sun hours	178	241	363	449	563	611	599	504	392	307	203	146
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:
31.1.2024 11.06/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE3_RD200x10xHH200_No_Forest

Shadow receptor: C - C - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.00	08.56	07.27	06.41	18.55 (WTG10)	04.58	03.27	03.09	04.28	06.00	07.23	07.54	09.25
	14.42	16.08	17.35	20.05	19.19 (WTG10)	21.34	23.06	23.33	22.18	20.35	18.51	16.08	14.48
2	09.59	08.53	07.24	06.37	18.55 (WTG10)	04.55	03.25	03.10	04.31	06.03	07.26	07.57	09.28
	14.44	16.11	17.38	20.08	19.19 (WTG10)	21.37	23.09	23.32	22.15	20.31	18.47	16.05	14.46
3	09.58	08.50	07.20	06.34	18.55 (WTG10)	04.52	03.22	03.12	04.34	06.05	07.29	08.00	09.30
	14.46	16.14	17.41	20.11	19.18 (WTG10)	21.40	23.11	23.31	22.12	20.28	18.44	16.02	14.44
4	09.57	08.47	07.17	06.30	18.55 (WTG10)	04.49	03.20	03.14	04.37	06.08	07.32	08.04	09.33
	14.48	16.17	17.44	20.14	19.17 (WTG10)	21.43	23.14	23.29	22.09	20.24	18.41	15.59	14.43
5	09.56	08.44	07.14	06.27	18.55 (WTG10)	04.45	03.18	03.16	04.40	06.11	07.35	08.07	09.35
	14.50	16.21	17.47	20.17	19.15 (WTG10)	21.46	23.16	23.28	22.05	20.21	18.37	15.55	14.41
6	09.55	08.41	07.10	06.23	18.56 (WTG10)	04.42	03.16	03.18	04.43	06.14	07.37	08.10	09.37
	14.53	16.24	17.50	20.20	19.15 (WTG10)	21.50	23.18	23.26	22.02	20.18	18.34	15.52	14.40
7	09.54	08.38	07.07	06.20	18.58 (WTG10)	04.39	03.14	03.20	04.46	06.17	07.40	08.13	09.40
	14.55	16.27	17.53	20.23	19.13 (WTG10)	21.53	23.21	23.24	21.59	20.14	18.30	15.49	14.38
8	09.52	08.35	07.04	06.17	18.59 (WTG10)	04.36	03.13	03.22	04.49	06.19	07.43	08.16	09.42
	14.57	16.30	17.56	20.25	19.10 (WTG10)	21.56	23.23	23.22	21.56	20.11	18.27	15.46	14.37
9	09.51	08.32	07.00	06.13		04.32	03.11	03.24	04.52	06.22	07.46	08.19	09.44
	15.00	16.33	17.59	20.28		21.59	23.25	23.20	21.52	20.07	18.24	15.43	14.36
10	09.49	08.29	06.57	06.10		04.29	03.09	03.26	04.55	06.25	07.49	08.22	09.46
	15.02	16.37	18.02	20.31		22.02	23.26	23.18	21.49	20.04	18.20	15.40	14.34
11	09.47	08.26	06.53	06.06		04.26	03.08	03.29	04.58	06.28	07.52	08.25	09.48
	15.05	16.40	18.05	20.34		22.05	23.28	23.16	21.46	20.00	18.17	15.38	14.33
12	09.45	08.23	06.50	06.03		04.23	03.07	03.31	05.01	06.31	07.55	08.28	09.50
	15.07	16.43	18.08	20.37		22.08	23.30	23.14	21.43	19.57	18.13	15.35	14.33
13	09.43	08.20	06.46	05.59		04.20	03.06	03.34	05.04	06.33	07.57	08.32	09.51
	15.10	16.46	18.11	20.40		22.11	23.31	23.11	21.39	19.53	18.10	15.32	14.32
14	09.41	08.16	06.43	05.56		04.17	03.04	03.36	05.07	06.36	08.00	08.35	09.53
	15.13	16.49	18.13	20.43		22.14	23.33	23.09	21.36	19.50	18.07	15.29	14.31
15	09.39	08.13	06.40	05.52		04.14	03.04	03.39	05.10	06.39	08.03	08.38	09.55
	15.16	16.52	18.16	20.46		22.17	23.34	23.07	21.33	19.46	18.03	15.26	14.31
16	09.37	08.10	06.36	05.49		04.11	03.03	03.42	05.13	06.42	08.06	08.41	09.56
	15.18	16.55	18.19	20.49		22.20	23.35	23.04	21.29	19.43	18.00	15.23	14.30
17	09.35	08.07	06.33	05.46		04.07	03.02	03.44	05.16	06.44	08.09	08.44	09.57
	15.21	16.59	18.22	20.52		22.23	23.36	23.02	21.26	19.39	17.57	15.21	14.30
18	09.33	08.04	06.29	05.42		04.04	03.02	03.47	05.19	06.47	08.12	08.47	09.58
	15.24	17.02	18.25	20.55		22.27	23.37	22.59	21.23	19.36	17.53	15.18	14.30
19	09.30	08.00	06.26	05.39		04.02	03.01	03.50	05.22	06.50	08.15	08.50	09.59
	15.27	17.05	18.28	20.58		22.30	23.37	22.56	21.19	19.32	17.50	15.15	14.30
20	09.28	07.57	06.22	05.35		03.59	03.01	03.53	05.25	06.53	08.18	08.53	10.00
	15.30	17.08	18.31	21.01		22.33	23.38	22.54	21.16	19.29	17.47	15.13	14.30
21	09.26	07.54	06.19	05.32		03.56	03.01	03.56	05.28	06.56	08.21	08.56	10.01
	15.33	17.11	18.34	21.04		22.36	23.38	22.51	21.12	19.25	17.43	15.10	14.30
22	09.23	07.50	06.15	05.29		03.53	03.01	03.58	05.31	06.58	08.24	08.59	10.02
	15.36	17.14	18.37	21.07		22.39	23.38	22.48	21.09	19.22	17.40	15.08	14.31
23	09.21	07.47	06.12	05.25		03.50	03.01	04.01	05.34	07.01	08.27	09.02	10.02
	15.39	17.17	18.39	21.10		22.41	23.38	22.45	21.06	19.19	17.37	15.05	14.31
24	09.18	07.44	06.08	05.22		03.47	03.02	04.04	05.37	07.04	08.30	09.05	10.02
	15.43	17.20	18.42	21.13		22.44	23.38	22.42	21.02	19.15	17.33	15.03	14.32
25	09.15	07.41	06.05 18.06 (WTG10)	05.18		03.44	03.02	04.07	05.40	07.07	07.33	09.08	10.03
	15.46	17.23	18.45 5 18.11 (WTG10)	21.16		22.47	23.38	22.39	20.59	19.12	16.30	15.01	14.33
26	09.13	07.37	06.02 18.03 (WTG10)	05.15		03.42	03.03	04.10	05.43	07.09	07.36	09.11	10.03
	15.49	17.26	18.48 11 18.14 (WTG10)	21.19		22.50	23.38	22.36	20.55	19.08	16.27	14.58	14.34
27	09.10	07.34	05.58 18.00 (WTG10)	05.12		03.39	03.04	04.13	05.45	07.12	07.39	09.14	10.03
	15.52	17.29	18.51 16 18.16 (WTG10)	21.22		22.53	23.37	22.33	20.52	19.05	16.24	14.56	14.35
28	09.07	07.31	05.55 17.59 (WTG10)	05.08		03.37	03.05	04.16	05.48	07.15	07.42	09.17	10.02
	15.55	17.32	18.54 19 18.18 (WTG10)	21.25		22.56	23.36	22.30	20.49	19.01	16.21	14.54	14.36
29	09.05		06.51 18.57 (WTG10)	05.05		03.34	03.06	04.19	05.51	07.18	07.45	09.20	10.02
	15.58		19.57 21 19.18 (WTG10)	21.28		22.59	23.35	22.27	20.45	18.58	16.17	14.52	14.37
30	09.02		06.48 18.57 (WTG10)	05.02		03.32	03.07	04.22	05.54	07.21	07.48	09.22	10.02
	16.01		19.59 22 19.19 (WTG10)	21.31		23.01	23.34	22.24	20.42	18.54	16.14	14.50	14.39
31	08.59		06.44 18.55 (WTG10)			03.29		04.25	05.57		07.51		10.01
	16.05		20.02 23 19.18 (WTG10)			23.04		22.21	20.38		16.11		14.40
Potential sun hours	179	241	363	448		562	611	598	504	392	307	204	147
Total, worst case			117	158						278			
Sun reduction			0,32	0,44						0,36			
Oper. time red.			0,90	0,90						0,90			
Wind dir. red.			0,56	0,56						0,56			
Total reduction			0,16	0,22						0,18			
Total, real			19	35						50			

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)

Licensed user:
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Calculated:
31.1.2024 11.06/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE3_RD200x10xHH200_No_Forest

Shadow receptor: D - D - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April		May	June	July	August		September		October	November	December
1	10.00	08.56	07.27	06.41		04.58	03.27	03.09	04.28		06.00	19.20 (WTG10)	07.23	07.54	09.25
	14.42	16.08	17.35	20.05		21.34	23.06	23.33	22.18		20.35 23	19.43 (WTG10)	18.51	16.08	14.48
2	09.59	08.53	07.24	06.37		04.55	03.25	03.10	04.31		06.03	19.20 (WTG10)	07.26	07.57	09.28
	14.44	16.11	17.38	20.08		21.37	23.09	23.32	22.15		20.31 23	19.43 (WTG10)	18.47	16.05	14.46
3	09.58	08.50	07.20	06.34		04.52	03.22	03.12	04.34		06.05	19.21 (WTG10)	07.29	08.00	09.30
	14.46	16.14	17.41	20.11		21.40	23.11	23.31	22.12		20.28 22	19.43 (WTG10)	18.44	16.02	14.44
4	09.57	08.47	07.17	06.30	19.30 (WTG10)	04.49	03.20	03.14	04.37		06.08	19.20 (WTG10)	07.32	08.04	09.33
	14.48	16.17	17.44	20.14 9	19.39 (WTG10)	21.43	23.14	23.29	22.09		20.24 22	19.42 (WTG10)	18.41	15.59	14.43
5	09.56	08.44	07.14	06.27	19.27 (WTG10)	04.45	03.18	03.16	04.40		06.11	19.21 (WTG10)	07.35	08.07	09.35
	14.50	16.21	17.47	20.17 14	19.41 (WTG10)	21.46	23.16	23.28	22.05		20.21 20	19.41 (WTG10)	18.37	15.55	14.41
6	09.55	08.41	07.10	06.23	19.26 (WTG10)	04.42	03.16	03.18	04.43		06.14	19.22 (WTG10)	07.37	08.10	09.37
	14.53	16.24	17.50	20.20 18	19.44 (WTG10)	21.50	23.18	23.26	22.02		20.17 18	19.40 (WTG10)	18.34	15.52	14.40
7	09.54	08.38	07.07	06.20	19.25 (WTG10)	04.39	03.14	03.20	04.46		06.17	19.22 (WTG10)	07.40	08.13	09.40
	14.55	16.27	17.53	20.23 20	19.45 (WTG10)	21.53	23.20	23.24	21.59		20.14 14	19.36 (WTG10)	18.30	15.49	14.38
8	09.52	08.35	07.04	06.17	19.23 (WTG10)	04.36	03.13	03.22	04.49		06.19	19.24 (WTG10)	07.43	08.16	09.42
	14.57	16.30	17.56	20.25 22	19.45 (WTG10)	21.56	23.23	23.22	21.56		20.11 9	19.33 (WTG10)	18.27	15.46	14.37
9	09.50	08.32	07.00	06.13	19.23 (WTG10)	04.32	03.11	03.24	04.52		06.22	19.28 (WTG10)	07.46	08.19	09.44
	15.00	16.33	17.59	20.28 22	19.45 (WTG10)	21.59	23.24	23.20	21.52		20.07 2	19.30 (WTG10)	18.24	15.43	14.36
10	09.49	08.29	06.57	06.10	19.22 (WTG10)	04.29	03.09	03.26	04.55		06.25		07.49	08.22	09.46
	15.02	16.37	18.02	20.31 23	19.45 (WTG10)	22.02	23.26	23.18	21.49		20.04		18.20	15.40	14.34
11	09.47	08.26	06.53	06.06	19.21 (WTG10)	04.26	03.08	03.29	04.58		06.28		07.52	08.25	09.48
	15.05	16.40	18.05	20.34 23	19.44 (WTG10)	22.05	23.28	23.16	21.46		20.00		18.17	15.38	14.34
12	09.45	08.23	06.50	06.03	19.22 (WTG10)	04.23	03.07	03.31	05.01		06.31		07.55	08.28	09.50
	15.07	16.43	18.08	20.37 22	19.44 (WTG10)	22.08	23.30	23.14	21.43		19.57		18.13	15.35	14.33
13	09.43	08.20	06.46	05.59	19.22 (WTG10)	04.20	03.06	03.34	05.04		06.33		07.57	08.32	09.51
	15.10	16.46	18.11	20.40 22	19.44 (WTG10)	22.11	23.31	23.11	21.39		19.53		18.10	15.32	14.32
14	09.41	08.16	06.43	05.56	19.22 (WTG10)	04.17	03.05	03.36	05.07		06.36		08.00	08.35	09.53
	15.13	16.49	18.13	20.43 20	19.42 (WTG10)	22.14	23.33	23.09	21.36		19.50		18.07	15.29	14.31
15	09.39	08.13	06.40	05.52	19.23 (WTG10)	04.14	03.04	03.39	05.10		06.39		08.03	08.38	09.55
	15.16	16.52	18.16	20.46 19	19.42 (WTG10)	22.17	23.34	23.07	21.33		19.46		18.03	15.26	14.31
16	09.37	08.10	06.36	05.49	19.24 (WTG10)	04.11	03.03	03.42	05.13		06.42		08.06	08.41	09.56
	15.19	16.55	18.19	20.49 16	19.40 (WTG10)	22.20	23.35	23.04	21.29		19.43		18.00	15.23	14.30
17	09.35	08.07	06.33	05.46	19.25 (WTG10)	04.08	03.02	03.44	05.16		06.44		08.09	08.44	09.57
	15.21	16.59	18.22	20.52 14	19.39 (WTG10)	22.23	23.36	23.01	21.26		19.39		17.57	15.21	14.30
18	09.33	08.04	06.29	05.42	19.27 (WTG10)	04.05	03.02	03.47	05.19		06.47		08.12	08.47	09.58
	15.24	17.02	18.25	20.55 8	19.35 (WTG10)	22.26	23.37	22.59	21.23		19.36		17.53	15.18	14.30
19	09.30	08.00	06.26	05.39		04.02	03.01	03.50	05.22		06.50		08.15	08.50	09.59
	15.27	17.05	18.28	20.58		22.30	23.37	22.56	21.19		19.32		17.50	15.15	14.30
20	09.28	07.57	06.22	05.35		03.59	03.01	03.53	05.25		06.53		08.18	08.53	10.00
	15.30	17.08	18.31	21.01		22.33	23.38	22.54	21.16		19.29		17.47	15.13	14.30
21	09.26	07.54	06.19	05.32		03.56	03.01	03.56	05.28		06.56		08.21	08.56	10.01
	15.33	17.11	18.34	21.04		22.36	23.38	22.51	21.12		19.25		17.43	15.10	14.30
22	09.23	07.50	06.15	05.29		03.53	03.01	03.59	05.31		06.58		08.24	08.59	10.02
	15.36	17.14	18.37	21.07		22.38	23.38	22.48	21.09		19.22		17.40	15.08	14.31
23	09.21	07.47	06.12	05.25		03.50	03.01	04.01	05.34		07.01		08.27	09.02	10.02
	15.39	17.17	18.39	21.10		22.41	23.38	22.45	21.06		19.19		17.37	15.05	14.31
24	09.18	07.44	06.08	05.22		03.47	03.02	04.04	05.37		07.04		08.30	09.05	10.02
	15.43	17.20	18.42	21.13		22.44	23.38	22.42	21.02		19.15		17.33	15.03	14.32
25	09.15	07.41	06.05	05.18		03.45	03.02	04.07	05.40	19.31 (WTG10)	07.07		07.33	09.08	10.03
	15.46	17.23	18.45	21.16		22.47	23.38	22.39	20.59 8	19.39 (WTG10)	19.12		16.30	15.01	14.33
26	09.13	07.37	06.02	05.15		03.42	03.03	04.10	05.43	19.27 (WTG10)	07.09		07.36	09.11	10.03
	15.49	17.26	18.48	21.19		22.50	23.37	22.36	20.55 14	19.41 (WTG10)	19.08		16.27	14.58	14.34
27	09.10	07.34	05.58	05.12		03.39	03.04	04.13	05.45	19.25 (WTG10)	07.12		07.39	09.14	10.03
	15.52	17.29	18.51	21.22		22.53	23.37	22.33	20.52 17	19.42 (WTG10)	19.05		16.24	14.56	14.35
28	09.07	07.31	05.55	05.08		03.37	03.05	04.16	05.48	19.24 (WTG10)	07.15		07.42	09.17	10.02
	15.55	17.32	18.54	21.25		22.56	23.36	22.30	20.49 19	19.43 (WTG10)	19.01		16.21	14.54	14.36
29	09.05		06.51	05.05		03.34	03.06	04.19	05.51	19.22 (WTG10)	07.18		07.45	09.19	10.02
	15.58		19.57	21.28		22.58	23.35	22.27	20.45 21	19.43 (WTG10)	18.58		16.17	14.52	14.37
30	09.02		06.48	05.02		03.32	03.07	04.22	05.54	19.22 (WTG10)	07.21		07.48	09.22	10.02
	16.02		19.59	21.31		23.01	23.34	22.24	20.42 22	19.44 (WTG10)	18.54		16.14	14.50	14.39
31	08.59		06.44			03.29		04.25	05.57	19.22 (WTG10)			07.51		10.01
	16.05		20.02			23.04		22.21	20.38 22	19.44 (WTG10)			16.11		14.40
Potential sun hours	179	241	363	448		562	610	598	504		392		307	204	147
Total, worst case					272					123		153			
Sun reduction					0,44					0,42		0,36			
Oper. time red.					0,90					0,90		0,90			
Wind dir. red.					0,55					0,55		0,55			
Total reduction					0,22					0,21		0,18			
Total, real					60					26		27			

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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Henri Korhonen / henri.korhonen@fcg.fi
Calculated:
31.1.2024 11.06/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE3_RD200x10xHH200_No_Forest

Shadow receptor: E - E - Lomarakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June		July		August	September	October	November	December
1	10.00	08.56	07.27	06.41	04.59	03.27		03.09		22.20 (WTG05)	04.29	06.00	07.24	07.54	09.25
	14.43	16.08	17.35	20.05	21.34	23.06		23.33	6	22.26 (WTG05)	22.18	20.35	18.51	16.08	14.48
2	09.59	08.53	07.24	06.38	04.55	03.25		03.11			04.32	06.03	07.26	07.57	09.27
	14.45	16.11	17.38	20.08	21.37	23.09		23.32			22.15	20.31	18.48	16.05	14.47
3	09.58	08.50	07.21	06.34	04.52	03.23		03.13			04.35	06.06	07.29	08.00	09.30
	14.47	16.15	17.41	20.11	21.40	23.11		23.30			22.12	20.28	18.44	16.02	14.45
4	09.57	08.47	07.17	06.31	04.49	03.21		03.14			04.38	06.08	07.32	08.04	09.33
	14.49	16.18	17.44	20.14	21.43	23.14		23.29			22.09	20.25	18.41	15.59	14.43
5	09.56	08.44	07.14	06.27	04.46	03.19		03.16			04.41	06.11	07.35	08.07	09.35
	14.51	16.21	17.47	20.17	21.46	23.16		23.27			22.05	20.21	18.37	15.56	14.41
6	09.55	08.41	07.10	06.24	04.42	03.17		03.18			04.44	06.14	07.38	08.10	09.37
	14.53	16.24	17.50	20.20	21.50	23.18		23.26			22.02	20.18	18.34	15.53	14.40
7	09.53	08.38	07.07	06.20	04.39	03.15		03.20			04.47	06.17	07.40	08.13	09.40
	14.55	16.27	17.53	20.23	21.53	23.20		23.24			21.59	20.14	18.31	15.50	14.39
8	09.52	08.35	07.04	06.17	04.36	03.13		03.22			04.50	06.20	07.43	08.16	09.42
	14.58	16.31	17.56	20.26	21.56	23.22		23.22			21.56	20.11	18.27	15.47	14.37
9	09.50	08.32	07.00	06.13	04.33	03.12		03.25			04.53	06.22	07.46	08.19	09.44
	15.00	16.34	17.59	20.28	21.59	23.24		23.20			21.52	20.07	18.24	15.44	14.36
10	09.49	08.29	06.57	06.10	04.30	03.10		03.27			04.56	06.25	07.49	08.22	09.46
	15.03	16.37	18.02	20.31	22.02	23.26		23.18			21.49	20.04	18.20	15.41	14.35
11	09.47	08.26	06.53	06.06	04.26	03.09	22.16 (WTG05)	03.29			04.59	06.28	07.52	08.25	09.48
	15.05	16.40	18.05	20.34	22.05	23.28	5 22.21 (WTG05)	23.16			21.46	20.00	18.17	15.38	14.34
12	09.45	08.23	06.50	06.03	04.23	03.07	22.16 (WTG05)	03.32			05.02	06.31	07.55	08.28	09.50
	15.08	16.43	18.08	20.37	22.08	23.29	7 22.23 (WTG05)	23.14			21.43	19.57	18.14	15.35	14.33
13	09.43	08.20	06.47	06.00	04.20	03.06	22.15 (WTG05)	03.34			05.05	06.34	07.58	08.32	09.51
	15.10	16.46	18.11	20.40	22.11	23.31	9 22.24 (WTG05)	23.11			21.39	19.53	18.10	15.32	14.32
14	09.41	08.16	06.43	05.56	04.17	03.05	22.15 (WTG05)	03.37			05.08	06.36	08.00	08.35	09.53
	15.13	16.49	18.14	20.43	22.14	23.32	10 22.25 (WTG05)	23.09			21.36	19.50	18.07	15.29	14.32
15	09.39	08.13	06.40	05.53	04.14	03.04	22.14 (WTG05)	03.39			05.11	06.39	08.03	08.38	09.54
	15.16	16.53	18.17	20.46	22.17	23.33	11 22.25 (WTG05)	23.06			21.33	19.46	18.04	15.27	14.31
16	09.37	08.10	06.36	05.49	04.11	03.03	22.14 (WTG05)	03.42			05.14	06.42	08.06	08.41	09.56
	15.19	16.56	18.19	20.49	22.20	23.35	12 22.26 (WTG05)	23.04			21.29	19.43	18.00	15.24	14.31
17	09.35	08.07	06.33	05.46	04.08	03.03	22.15 (WTG05)	03.45			05.17	06.45	08.09	08.44	09.57
	15.22	16.59	18.22	20.52	22.23	23.36	12 22.27 (WTG05)	23.01			21.26	19.39	17.57	15.21	14.31
18	09.33	08.04	06.29	05.42	04.05	03.02	22.14 (WTG05)	03.48			05.20	06.47	08.12	08.47	09.58
	15.25	17.02	18.25	20.55	22.26	23.36	12 22.26 (WTG05)	22.59			21.23	19.36	17.54	15.18	14.30
19	09.30	08.00	06.26	05.39	04.02	03.02	22.14 (WTG05)	03.50			05.22	06.50	08.15	08.50	09.59
	15.28	17.05	18.28	20.58	22.29	23.37	13 22.27 (WTG05)	22.56			21.19	19.33	17.50	15.16	14.30
20	09.28	07.57	06.22	05.36	03.59	03.02	22.14 (WTG05)	03.53			05.25	06.53	08.18	08.53	10.00
	15.31	17.08	18.31	21.01	22.32	23.37	13 22.27 (WTG05)	22.53			21.16	19.29	17.47	15.13	14.31
21	09.26	07.54	06.19	05.32	03.56	03.02	22.15 (WTG05)	03.56			05.28	06.56	08.21	08.56	10.01
	15.34	17.11	18.34	21.04	22.35	23.38	13 22.28 (WTG05)	22.51			21.12	19.26	17.44	15.11	14.31
22	09.23	07.51	06.16	05.29	03.53	03.02	22.15 (WTG05)	03.59			05.31	06.59	08.24	08.59	10.01
	15.37	17.14	18.37	21.07	22.38	23.38	13 22.28 (WTG05)	22.48			21.09	19.22	17.40	15.08	14.31
23	09.21	07.47	06.12	05.25	03.50	03.02	22.15 (WTG05)	04.02			05.34	07.01	08.27	09.02	10.02
	15.40	17.17	18.40	21.10	22.41	23.38	13 22.28 (WTG05)	22.45			21.06	19.19	17.37	15.06	14.32
24	09.18	07.44	06.09	05.22	03.48	03.02	22.16 (WTG05)	04.05			05.37	07.04	08.30	09.05	10.02
	15.43	17.20	18.42	21.13	22.44	23.38	13 22.29 (WTG05)	22.42			21.02	19.15	17.34	15.03	14.32
25	09.15	07.41	06.05	05.19	03.45	03.03	22.16 (WTG05)	04.08			05.40	07.07	07.33	09.08	10.02
	15.46	17.23	18.45	21.16	22.47	23.38	12 22.28 (WTG05)	22.39			20.59	19.12	16.30	15.01	14.33
26	09.13	07.37	06.02	05.15	03.42	03.04	22.17 (WTG05)	04.11			05.43	07.10	07.36	09.11	10.02
	15.49	17.26	18.48	21.19	22.50	23.37	11 22.28 (WTG05)	22.36			20.55	19.08	16.27	14.59	14.34
27	09.10	07.34	05.58	05.12	03.40	03.05	22.16 (WTG05)	04.14			05.46	07.12	07.39	09.14	10.02
	15.52	17.29	18.51	21.22	22.53	23.37	11 22.27 (WTG05)	22.33			20.52	19.05	16.24	14.57	14.35
28	09.07	07.31	05.55	05.09	03.37	03.06	22.17 (WTG05)	04.17			05.49	07.15	07.42	09.17	10.02
	15.56	17.32	18.54	21.25	22.56	23.36	10 22.27 (WTG05)	22.30			20.49	19.01	16.21	14.54	14.36
29	09.05		06.51	05.05	03.35	03.07	22.18 (WTG05)	04.20			05.51	07.18	07.45	09.19	10.02
	15.59		19.57	21.28	22.58	23.35	9 22.27 (WTG05)	22.27			20.45	18.58	16.18	14.52	14.38
30	09.02		06.48	05.02	03.32	03.08	22.19 (WTG05)	04.23			05.54	07.21	07.48	09.22	10.02
	16.02		20.00	21.31	23.01	23.34	8 22.27 (WTG05)	22.24			20.42	18.55	16.14	14.50	14.39
31	08.59		06.44		03.30			04.26			05.57		07.51		10.01
	16.05		20.02		23.04			22.21			20.38		16.11		14.41
Potential sun hours	179	241	363	448	562	610		598		504	392	307	204	147
Total, worst case						217		6						
Sun reduction						0,45		0,46						
Oper. time red.						0,90		0,90						
Wind dir. red.						0,65		0,65						
Total reduction						0,26		0,27						
Total, real						56		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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Henri Korhonen / henri.korhonen@fcg.fi
Calculated:
31.1.2024 11.06/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE3_RD200x10xHH200_No_Forest

Shadow receptor: F - F - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.00	08.56	07.27	06.41	04.59	03.28	03.10	04.29	06.00	07.24	07.54	09.25
	14.43	16.08	17.36	20.05	21.34	23.06	23.33	22.18	20.35	18.51	16.08	14.49
2	09.59	08.53	07.24	06.38	04.56	03.25	03.11	04.32	06.03	07.26	07.58	09.28
	14.45	16.12	17.39	20.08	21.37	23.09	23.32	22.15	20.32	18.48	16.05	14.47
3	09.58	08.50	07.21	06.34	04.52	03.23	03.13	04.35	06.06	07.29	08.01	09.30
	14.47	16.15	17.42	20.11	21.40	23.11	23.30	22.12	20.28	18.44	16.02	14.45
4	09.57	08.47	07.17	06.31	04.49	03.21	03.15	04.38	06.09	07.32	08.04	09.33
	14.49	16.18	17.44	20.14	21.43	23.14	23.29	22.09	20.25	18.41	15.59	14.43
5	09.56	08.44	07.14	06.27	04.46	03.19	03.16	04.41	06.11	07.35	08.07	09.35
	14.51	16.21	17.47	20.17	21.47	23.16	23.27	22.06	20.21	18.38	15.56	14.42
6	09.55	08.41	07.11	06.24	04.43	03.17	03.18	04.44	06.14	07.38	08.10	09.37
	14.53	16.24	17.50	20.20	21.50	23.18	23.26	22.02	20.18	18.34	15.53	14.40
7	09.54	08.38	07.07	06.20	04.39	03.15	03.20	04.47	06.17	07.41	08.13	09.40
	14.55	16.28	17.53	20.23	21.53	23.20	23.24	21.59	20.14	18.31	15.50	14.39
8	09.52	08.35	07.04	06.17	04.36	03.13	03.23	04.50	06.20	07.43	08.16	09.42
	14.58	16.31	17.56	20.26	21.56	23.22	23.22	21.56	20.11	18.27	15.47	14.37
9	09.50	08.32	07.00	06.14	04.33	03.12	03.25	04.53	06.23	07.46	08.19	09.44
	15.00	16.34	17.59	20.29	21.59	23.24	23.20	21.53	20.07	18.24	15.44	14.36
10	09.49	08.29	06.57	06.10	04.30	03.10	03.27	04.56	06.25	07.49	08.22	09.46
	15.03	16.37	18.02	20.32	22.02	23.26	23.18	21.49	20.04	18.21	15.41	14.35
11	09.47	08.26	06.54	06.07	04.27	03.09	03.30	04.59	06.28	07.52	08.25	09.48
	15.05	16.40	18.05	20.34	22.05	23.28	23.16	21.46	20.00	18.17	15.38	14.34
12	09.45	08.23	06.50	06.03	04.23	03.08	03.32	05.02	06.31	07.55	08.29	09.50
	15.08	16.43	18.08	20.37	22.08	23.29	23.14	21.43	19.57	18.14	15.35	14.33
13	09.43	08.20	06.47	06.00	04.20	03.06	03.34	05.05	06.34	07.58	08.32	09.51
	15.11	16.47	18.11	20.40	22.11	23.31	23.11	21.39	19.53	18.10	15.32	14.33
14	09.41	08.17	06.43	05.56	04.17	03.05	03.37	05.08	06.37	08.01	08.35	09.53
	15.13	16.50	18.14	20.43	22.14	23.32	23.09	21.36	19.50	18.07	15.30	14.32
15	09.39	08.13	06.40	05.53	04.14	03.04	03.40	05.11	06.39	08.04	08.38	09.54
	15.16	16.53	18.17	20.46	22.17	23.34	23.07	21.33	19.47	18.04	15.27	14.31
16	09.37	08.10	06.36	05.49	04.11	03.04	03.42	05.14	06.42	08.06	08.41	09.56
	15.19	16.56	18.20	20.49	22.20	23.35	23.04	21.29	19.43	18.00	15.24	14.31
17	09.35	08.07	06.33	05.46	04.08	03.03	03.45	05.17	06.45	08.09	08.44	09.57
	15.22	16.59	18.22	20.52	22.23	23.36	23.01	21.26	19.40	17.57	15.21	14.31
18	09.33	08.04	06.30	05.43	04.05	03.02	03.48	05.20	06.48	08.12	08.47	09.58
	15.25	17.02	18.25	20.55	22.27	23.36	22.59	21.23	19.36	17.54	15.19	14.31
19	09.30	08.00	06.26	05.39	04.02	03.02	03.51	05.23	06.50	08.15	08.50	09.59
	15.28	17.05	18.28	20.58	22.30	23.37	22.56	21.19	19.33	17.50	15.16	14.31
20	09.28	07.57	06.23	05.36	03.59	03.02	03.53	05.26	06.53	08.18	08.53	10.00
	15.31	17.08	18.31	21.01	22.33	23.38	22.53	21.16	19.29	17.47	15.13	14.31
21	09.26	07.54	06.19	05.32	03.56	03.02	03.56	05.28	06.56	08.21	08.56	10.01
	15.34	17.11	18.34	21.04	22.36	23.38	22.51	21.13	19.26	17.44	15.11	14.31
22	09.23	07.51	06.16	05.29	03.53	03.02	03.59	05.31	06.59	08.24	08.59	10.01
	15.37	17.14	18.37	21.07	22.38	23.38	22.48	21.09	19.22	17.40	15.08	14.31
23	09.21	07.47	06.12	05.26	03.51	03.02	04.02	05.34	07.01	08.27	09.02	10.02
	15.40	17.17	18.40	21.10	22.41	23.38	22.45	21.06	19.19	17.37	15.06	14.32
24	09.18	07.44	06.09	05.22	03.48	03.03	04.05	05.37	07.04	08.30	09.05	10.02
	15.43	17.20	18.43	21.13	22.44	23.38	22.42	21.02	19.15	17.34	15.04	14.33
25	09.16	07.41	06.05	05.19	03.45	03.03	04.08	05.40	07.07	07.33	09.08	10.02
	15.46	17.24	18.45	21.16	22.47	23.38	22.39	20.59	19.12	16.31	15.01	14.33
26	09.13	07.37	06.02	05.16	03.42	03.04	04.11	05.43	07.10	07.36	09.11	10.03
	15.49	17.27	18.48	21.19	22.50	23.37	22.36	20.56	19.08	16.27	14.59	14.34
27	09.10	07.34	05.58	05.12	03.40	03.05	04.14	05.46	07.13	07.39	09.14	10.03
	15.53	17.30	18.51	21.22	22.53	23.37	22.33	20.52	19.05	16.24	14.57	14.35
28	09.07	07.31	05.55	05.09	03.37	03.06	04.17	05.49	07.15	07.42	09.17	10.02
	15.56	17.33	18.54	21.25	22.56	23.36	22.30	20.49	19.02	16.21	14.55	14.37
29	09.05		06.52	05.06	03.35	03.07	04.20	05.52	07.18	07.45	09.20	10.02
	15.59		19.57	21.28	22.58	23.35	22.27	20.45	18.58	16.18	14.53	14.38
30	09.02		06.48	05.02	03.32	03.08	04.23	05.54	07.21	07.48	09.22	10.02
	16.02		20.00	21.31	23.01	23.34	22.24	20.42	18.55	16.15	14.51	14.39
31	08.59		06.45		03.30		04.26	05.57		07.51		10.01
	16.05		20.03		23.04		22.21	20.38		16.11		14.41
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
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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Henri Korhonen / henri.korhonen@fcg.fi
Calculated:
31.1.2024 11.06/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE3_RD200x10xHH200_No_Forest

Shadow receptor: G - G - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.00	08.56	07.28	06.41	04.59	03.28	03.10	04.29	06.00	07.24	07.55	09.25
	14.43	16.08	17.36	20.06	21.34	23.06	23.33	22.18	20.35	18.51	16.08	14.49
2	09.59	08.53	07.24	06.38	04.56	03.25	03.11	04.32	06.03	07.27	07.58	09.28
	14.45	16.12	17.39	20.08	21.37	23.09	23.32	22.15	20.32	18.48	16.05	14.47
3	09.59	08.50	07.21	06.34	04.52	03.23	03.13	04.35	06.06	07.29	08.01	09.30
	14.47	16.15	17.42	20.11	21.41	23.11	23.31	22.12	20.28	18.45	16.02	14.45
4	09.57	08.47	07.17	06.31	04.49	03.21	03.15	04.38	06.09	07.32	08.04	09.33
	14.49	16.18	17.45	20.14	21.44	23.14	23.29	22.09	20.25	18.41	15.59	14.43
5	09.56	08.45	07.14	06.27	04.46	03.19	03.17	04.41	06.12	07.35	08.07	09.35
	14.51	16.21	17.48	20.17	21.47	23.16	23.28	22.06	20.21	18.38	15.56	14.42
6	09.55	08.42	07.11	06.24	04.43	03.17	03.19	04.44	06.14	07.38	08.10	09.37
	14.53	16.24	17.51	20.20	21.50	23.18	23.26	22.02	20.18	18.34	15.53	14.40
7	09.54	08.38	07.07	06.21	04.39	03.15	03.21	04.47	06.17	07.41	08.13	09.40
	14.56	16.28	17.53	20.23	21.53	23.20	23.24	21.59	20.14	18.31	15.50	14.39
8	09.52	08.35	07.04	06.17	04.36	03.14	03.23	04.50	06.20	07.44	08.16	09.42
	14.58	16.31	17.56	20.26	21.56	23.22	23.22	21.56	20.11	18.27	15.47	14.38
9	09.51	08.32	07.00	06.14	04.33	03.12	03.25	04.53	06.23	07.46	08.19	09.44
	15.00	16.34	17.59	20.29	21.59	23.24	23.20	21.53	20.07	18.24	15.44	14.36
10	09.49	08.29	06.57	06.10	04.30	03.10	03.27	04.56	06.26	07.49	08.22	09.46
	15.03	16.37	18.02	20.32	22.02	23.26	23.18	21.49	20.04	18.21	15.41	14.35
11	09.47	08.26	06.54	06.07	04.27	03.09	03.30	04.59	06.28	07.52	08.26	09.48
	15.05	16.40	18.05	20.35	22.05	23.28	23.16	21.46	20.01	18.17	15.38	14.34
12	09.45	08.23	06.50	06.03	04.24	03.08	03.32	05.02	06.31	07.55	08.29	09.50
	15.08	16.43	18.08	20.37	22.08	23.30	23.14	21.43	19.57	18.14	15.35	14.33
13	09.43	08.20	06.47	06.00	04.20	03.06	03.35	05.05	06.34	07.58	08.32	09.51
	15.11	16.47	18.11	20.40	22.11	23.31	23.11	21.40	19.54	18.11	15.32	14.33
14	09.42	08.17	06.43	05.56	04.17	03.05	03.37	05.08	06.37	08.01	08.35	09.53
	15.14	16.50	18.14	20.43	22.14	23.32	23.09	21.36	19.50	18.07	15.30	14.32
15	09.39	08.13	06.40	05.53	04.14	03.04	03.40	05.11	06.39	08.04	08.38	09.55
	15.16	16.53	18.17	20.46	22.17	23.34	23.07	21.33	19.47	18.04	15.27	14.31
16	09.37	08.10	06.37	05.50	04.11	03.04	03.42	05.14	06.42	08.07	08.41	09.56
	15.19	16.56	18.20	20.49	22.21	23.35	23.04	21.30	19.43	18.00	15.24	14.31
17	09.35	08.07	06.33	05.46	04.08	03.03	03.45	05.17	06.45	08.09	08.44	09.57
	15.22	16.59	18.23	20.52	22.24	23.36	23.02	21.26	19.40	17.57	15.21	14.31
18	09.33	08.04	06.30	05.43	04.05	03.03	03.48	05.20	06.48	08.12	08.47	09.58
	15.25	17.02	18.25	20.55	22.27	23.36	22.59	21.23	19.36	17.54	15.19	14.31
19	09.31	08.01	06.26	05.39	04.02	03.02	03.51	05.23	06.50	08.15	08.50	09.59
	15.28	17.05	18.28	20.58	22.30	23.37	22.56	21.19	19.33	17.50	15.16	14.31
20	09.28	07.57	06.23	05.36	03.59	03.02	03.54	05.26	06.53	08.18	08.53	10.00
	15.31	17.08	18.31	21.01	22.33	23.38	22.54	21.16	19.29	17.47	15.14	14.31
21	09.26	07.54	06.19	05.33	03.56	03.02	03.56	05.29	06.56	08.21	08.56	10.01
	15.34	17.11	18.34	21.04	22.36	23.38	22.51	21.13	19.26	17.44	15.11	14.31
22	09.23	07.51	06.16	05.29	03.54	03.02	03.59	05.32	06.59	08.24	08.59	10.02
	15.37	17.15	18.37	21.07	22.39	23.38	22.48	21.09	19.22	17.41	15.08	14.32
23	09.21	07.48	06.12	05.26	03.51	03.02	04.02	05.34	07.02	08.27	09.02	10.02
	15.40	17.18	18.40	21.10	22.42	23.38	22.45	21.06	19.19	17.37	15.06	14.32
24	09.18	07.44	06.09	05.22	03.48	03.03	04.05	05.37	07.04	08.30	09.05	10.02
	15.43	17.21	18.43	21.13	22.44	23.38	22.42	21.03	19.15	17.34	15.04	14.33
25	09.16	07.41	06.05	05.19	03.45	03.03	04.08	05.40	07.07	07.33	09.08	10.03
	15.46	17.24	18.46	21.16	22.47	23.38	22.39	20.59	19.12	16.31	15.01	14.34
26	09.13	07.38	06.02	05.16	03.43	03.04	04.11	05.43	07.10	07.36	09.11	10.03
	15.49	17.27	18.48	21.19	22.50	23.37	22.37	20.56	19.09	16.28	14.59	14.35
27	09.10	07.34	05.59	05.12	03.40	03.05	04.14	05.46	07.13	07.39	09.14	10.03
	15.53	17.30	18.51	21.22	22.53	23.37	22.34	20.52	19.05	16.24	14.57	14.36
28	09.08	07.31	05.55	05.09	03.37	03.06	04.17	05.49	07.15	07.42	09.17	10.02
	15.56	17.33	18.54	21.25	22.56	23.36	22.31	20.49	19.02	16.21	14.55	14.37
29	09.05		06.52	05.06	03.35	03.07	04.20	05.52	07.18	07.45	09.20	10.02
	15.59		19.57	21.28	22.59	23.35	22.28	20.45	18.58	16.18	14.53	14.38
30	09.02		06.48	05.02	03.32	03.08	04.23	05.55	07.21	07.48	09.22	10.02
	16.02		20.00	21.31	23.01	23.34	22.24	20.42	18.55	16.15	14.51	14.40
31	08.59		06.45		03.30		04.26	05.57		07.51		10.01
	16.05		20.03		23.04		22.21	20.39		16.12		14.41
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
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:
31.1.2024 11.06/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE3_RD200x10xHH200_No_Forest

Shadow receptor: H - H - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.00	08.56	07.28	06.41	04.59	03.28	03.10	04.29	06.00	07.24	07.55	09.25
	14.43	16.09	17.36	20.06	21.34	23.06	23.33	22.18	20.35	18.51	16.08	14.49
2	10.00	08.53	07.24	06.38	04.56	03.25	03.11	04.32	06.03	07.27	07.58	09.28
	14.45	16.12	17.39	20.09	21.37	23.09	23.32	22.15	20.32	18.48	16.05	14.47
3	09.59	08.50	07.21	06.34	04.52	03.23	03.13	04.35	06.06	07.29	08.01	09.30
	14.47	16.15	17.42	20.11	21.41	23.11	23.31	22.12	20.28	18.45	16.02	14.45
4	09.58	08.48	07.17	06.31	04.49	03.21	03.15	04.38	06.09	07.32	08.04	09.33
	14.49	16.18	17.45	20.14	21.44	23.14	23.29	22.09	20.25	18.41	15.59	14.43
5	09.56	08.45	07.14	06.27	04.46	03.19	03.17	04.41	06.12	07.35	08.07	09.35
	14.51	16.21	17.48	20.17	21.47	23.16	23.28	22.06	20.21	18.38	15.56	14.42
6	09.55	08.42	07.11	06.24	04.43	03.17	03.19	04.44	06.14	07.38	08.10	09.38
	14.53	16.24	17.51	20.20	21.50	23.18	23.26	22.02	20.18	18.34	15.53	14.40
7	09.54	08.39	07.07	06.21	04.39	03.15	03.21	04.47	06.17	07.41	08.13	09.40
	14.56	16.28	17.54	20.23	21.53	23.20	23.24	21.59	20.14	18.31	15.50	14.39
8	09.52	08.35	07.04	06.17	04.36	03.14	03.23	04.50	06.20	07.44	08.16	09.42
	14.58	16.31	17.56	20.26	21.56	23.23	23.22	21.56	20.11	18.27	15.47	14.38
9	09.51	08.32	07.01	06.14	04.33	03.12	03.25	04.53	06.23	07.46	08.19	09.44
	15.00	16.34	17.59	20.29	21.59	23.24	23.20	21.53	20.08	18.24	15.44	14.36
10	09.49	08.29	06.57	06.10	04.30	03.10	03.27	04.56	06.26	07.49	08.23	09.46
	15.03	16.37	18.02	20.32	22.02	23.26	23.18	21.49	20.04	18.21	15.41	14.35
11	09.47	08.26	06.54	06.07	04.27	03.09	03.30	04.59	06.28	07.52	08.26	09.48
	15.06	16.40	18.05	20.35	22.05	23.28	23.16	21.46	20.01	18.17	15.38	14.34
12	09.45	08.23	06.50	06.03	04.24	03.08	03.32	05.02	06.31	07.55	08.29	09.50
	15.08	16.44	18.08	20.38	22.08	23.30	23.14	21.43	19.57	18.14	15.35	14.33
13	09.44	08.20	06.47	06.00	04.20	03.07	03.35	05.05	06.34	07.58	08.32	09.52
	15.11	16.47	18.11	20.40	22.11	23.31	23.11	21.40	19.54	18.11	15.32	14.33
14	09.42	08.17	06.43	05.56	04.17	03.05	03.37	05.08	06.37	08.01	08.35	09.53
	15.14	16.50	18.14	20.43	22.14	23.32	23.09	21.36	19.50	18.07	15.30	14.32
15	09.39	08.14	06.40	05.53	04.14	03.05	03.40	05.11	06.39	08.04	08.38	09.55
	15.16	16.53	18.17	20.46	22.18	23.34	23.07	21.33	19.47	18.04	15.27	14.32
16	09.37	08.10	06.37	05.50	04.11	03.04	03.42	05.14	06.42	08.07	08.41	09.56
	15.19	16.56	18.20	20.49	22.21	23.35	23.04	21.30	19.43	18.00	15.24	14.31
17	09.35	08.07	06.33	05.46	04.08	03.03	03.45	05.17	06.45	08.10	08.44	09.57
	15.22	16.59	18.23	20.52	22.24	23.36	23.02	21.26	19.40	17.57	15.21	14.31
18	09.33	08.04	06.30	05.43	04.05	03.03	03.48	05.20	06.48	08.12	08.47	09.58
	15.25	17.02	18.25	20.55	22.27	23.37	22.59	21.23	19.36	17.54	15.19	14.31
19	09.31	08.01	06.26	05.39	04.02	03.02	03.51	05.23	06.51	08.15	08.50	09.59
	15.28	17.05	18.28	20.58	22.30	23.37	22.56	21.20	19.33	17.50	15.16	14.31
20	09.28	07.57	06.23	05.36	03.59	03.02	03.54	05.26	06.53	08.18	08.53	10.00
	15.31	17.08	18.31	21.01	22.33	23.38	22.54	21.16	19.29	17.47	15.14	14.31
21	09.26	07.54	06.19	05.33	03.56	03.02	03.56	05.29	06.56	08.21	08.56	10.01
	15.34	17.12	18.34	21.04	22.36	23.38	22.51	21.13	19.26	17.44	15.11	14.31
22	09.23	07.51	06.16	05.29	03.54	03.02	03.59	05.32	06.59	08.24	08.59	10.02
	15.37	17.15	18.37	21.07	22.39	23.38	22.48	21.09	19.22	17.41	15.09	14.32
23	09.21	07.48	06.12	05.26	03.51	03.02	04.02	05.34	07.02	08.27	09.02	10.02
	15.40	17.18	18.40	21.10	22.42	23.38	22.45	21.06	19.19	17.37	15.06	14.32
24	09.18	07.44	06.09	05.22	03.48	03.03	04.05	05.37	07.04	08.30	09.05	10.02
	15.43	17.21	18.43	21.13	22.44	23.38	22.42	21.03	19.16	17.34	15.04	14.33
25	09.16	07.41	06.06	05.19	03.45	03.03	04.08	05.40	07.07	07.33	09.08	10.03
	15.46	17.24	18.46	21.16	22.47	23.38	22.39	20.59	19.12	16.31	15.01	14.34
26	09.13	07.38	06.02	05.16	03.43	03.04	04.11	05.43	07.10	07.36	09.11	10.03
	15.50	17.27	18.48	21.19	22.50	23.37	22.37	20.56	19.09	16.28	14.59	14.35
27	09.10	07.34	05.59	05.12	03.40	03.05	04.14	05.46	07.13	07.39	09.14	10.03
	15.53	17.30	18.51	21.22	22.53	23.37	22.34	20.52	19.05	16.24	14.57	14.36
28	09.08	07.31	05.55	05.09	03.37	03.06	04.17	05.49	07.15	07.42	09.17	10.02
	15.56	17.33	18.54	21.25	22.56	23.36	22.31	20.49	19.02	16.21	14.55	14.37
29	09.05		06.52	05.06	03.35	03.07	04.20	05.52	07.18	07.45	09.20	10.02
	15.59		19.57	21.28	22.59	23.35	22.28	20.45	18.58	16.18	14.53	14.38
30	09.02		06.48	05.02	03.32	03.08	04.23	05.55	07.21	07.48	09.22	10.02
	16.02		20.00	21.31	23.01	23.34	22.24	20.42	18.55	16.15	14.51	14.40
31	08.59		06.45		03.30		04.26	05.57		07.52		10.01
	16.05		20.03		23.04		22.21	20.39		16.12		14.41
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
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:
31.1.2024 11.06/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE3_RD200x10xHH200_No_Forest

Shadow receptor: I - I - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.00	08.56	07.28	06.42	04.59	03.28	03.10	04.29	06.01	07.24	07.55	09.25
	14.44	16.09	17.36	20.06	21.35	23.06	23.33	22.18	20.35	18.52	16.09	14.49
2	09.59	08.54	07.24	06.38	04.56	03.26	03.12	04.32	06.03	07.27	07.58	09.28
	14.46	16.12	17.39	20.09	21.38	23.09	23.32	22.15	20.32	18.48	16.06	14.47
3	09.59	08.51	07.21	06.35	04.53	03.24	03.13	04.35	06.06	07.30	08.01	09.30
	14.47	16.15	17.42	20.12	21.41	23.11	23.31	22.12	20.28	18.45	16.03	14.46
4	09.57	08.48	07.18	06.31	04.50	03.22	03.15	04.38	06.09	07.32	08.04	09.33
	14.49	16.18	17.45	20.14	21.44	23.14	23.29	22.09	20.25	18.41	15.59	14.44
5	09.56	08.45	07.14	06.28	04.46	03.20	03.17	04.41	06.12	07.35	08.07	09.35
	14.52	16.22	17.48	20.17	21.47	23.16	23.28	22.06	20.22	18.38	15.56	14.42
6	09.55	08.42	07.11	06.24	04.43	03.18	03.19	04.44	06.15	07.38	08.10	09.38
	14.54	16.25	17.51	20.20	21.50	23.18	23.26	22.03	20.18	18.35	15.53	14.41
7	09.54	08.39	07.08	06.21	04.40	03.16	03.21	04.47	06.17	07.41	08.13	09.40
	14.56	16.28	17.54	20.23	21.53	23.20	23.24	21.59	20.15	18.31	15.50	14.39
8	09.52	08.36	07.04	06.17	04.37	03.14	03.23	04.50	06.20	07.44	08.16	09.42
	14.58	16.31	17.57	20.26	21.56	23.22	23.22	21.56	20.11	18.28	15.47	14.38
9	09.51	08.33	07.01	06.14	04.33	03.12	03.25	04.53	06.23	07.47	08.20	09.44
	15.01	16.34	18.00	20.29	21.59	23.24	23.20	21.53	20.08	18.24	15.44	14.37
10	09.49	08.29	06.57	06.10	04.30	03.11	03.28	04.56	06.26	07.49	08.23	09.46
	15.03	16.38	18.03	20.32	22.02	23.26	23.18	21.50	20.04	18.21	15.41	14.36
11	09.47	08.26	06.54	06.07	04.27	03.09	03.30	04.59	06.29	07.52	08.26	09.48
	15.06	16.41	18.05	20.35	22.05	23.28	23.16	21.46	20.01	18.18	15.39	14.35
12	09.45	08.23	06.50	06.04	04.24	03.08	03.33	05.02	06.31	07.55	08.29	09.50
	15.09	16.44	18.08	20.38	22.08	23.30	23.14	21.43	19.57	18.14	15.36	14.34
13	09.44	08.20	06.47	06.00	04.21	03.07	03.35	05.05	06.34	07.58	08.32	09.52
	15.11	16.47	18.11	20.41	22.11	23.31	23.11	21.40	19.54	18.11	15.33	14.33
14	09.42	08.17	06.44	05.57	04.18	03.06	03.38	05.08	06.37	08.01	08.35	09.53
	15.14	16.50	18.14	20.44	22.15	23.32	23.09	21.36	19.50	18.07	15.30	14.32
15	09.40	08.14	06.40	05.53	04.15	03.05	03.40	05.11	06.40	08.04	08.38	09.55
	15.17	16.53	18.17	20.46	22.18	23.34	23.07	21.33	19.47	18.04	15.27	14.32
16	09.37	08.10	06.37	05.50	04.12	03.04	03.43	05.14	06.42	08.07	08.41	09.56
	15.20	16.56	18.20	20.49	22.21	23.35	23.04	21.30	19.43	18.01	15.24	14.32
17	09.35	08.07	06.33	05.46	04.09	03.04	03.46	05.17	06.45	08.10	08.44	09.57
	15.23	16.59	18.23	20.52	22.24	23.36	23.02	21.26	19.40	17.57	15.22	14.31
18	09.33	08.04	06.30	05.43	04.06	03.03	03.48	05.20	06.48	08.13	08.47	09.58
	15.25	17.03	18.26	20.55	22.27	23.36	22.59	21.23	19.36	17.54	15.19	14.31
19	09.31	08.01	06.26	05.40	04.03	03.03	03.51	05.23	06.51	08.16	08.50	09.59
	15.28	17.06	18.29	20.58	22.30	23.37	22.56	21.20	19.33	17.51	15.16	14.31
20	09.28	07.58	06.23	05.36	04.00	03.03	03.54	05.26	06.53	08.18	08.53	10.00
	15.31	17.09	18.31	21.01	22.33	23.38	22.54	21.16	19.30	17.47	15.14	14.31
21	09.26	07.54	06.20	05.33	03.57	03.03	03.57	05.29	06.56	08.21	08.57	10.01
	15.34	17.12	18.34	21.04	22.36	23.38	22.51	21.13	19.26	17.44	15.11	14.32
22	09.23	07.51	06.16	05.29	03.54	03.03	04.00	05.32	06.59	08.24	09.00	10.02
	15.37	17.15	18.37	21.07	22.39	23.38	22.48	21.09	19.23	17.41	15.09	14.32
23	09.21	07.48	06.13	05.26	03.51	03.03	04.03	05.35	07.02	08.27	09.02	10.02
	15.41	17.18	18.40	21.10	22.42	23.38	22.45	21.06	19.19	17.38	15.06	14.33
24	09.18	07.44	06.09	05.23	03.48	03.03	04.06	05.38	07.05	08.30	09.05	10.02
	15.44	17.21	18.43	21.13	22.44	23.38	22.42	21.03	19.16	17.34	15.04	14.33
25	09.16	07.41	06.06	05.19	03.46	03.04	04.08	05.41	07.07	07.33	09.08	10.03
	15.47	17.24	18.46	21.16	22.47	23.38	22.40	20.59	19.12	16.31	15.02	14.34
26	09.13	07.38	06.02	05.16	03.43	03.05	04.11	05.43	07.10	07.36	09.11	10.03
	15.50	17.27	18.49	21.19	22.50	23.37	22.37	20.56	19.09	16.28	14.59	14.35
27	09.10	07.34	05.59	05.13	03.40	03.06	04.14	05.46	07.13	07.39	09.14	10.03
	15.53	17.30	18.51	21.22	22.53	23.37	22.34	20.52	19.05	16.25	14.57	14.36
28	09.08	07.31	05.55	05.09	03.38	03.07	04.17	05.49	07.16	07.42	09.17	10.02
	15.56	17.33	18.54	21.25	22.56	23.36	22.31	20.49	19.02	16.21	14.55	14.37
29	09.05		06.52	05.06	03.35	03.08	04.20	05.52	07.18	07.46	09.20	10.02
	15.59		19.57	21.28	22.59	23.35	22.28	20.46	18.59	16.18	14.53	14.39
30	09.02		06.48	05.03	03.33	03.09	04.23	05.55	07.21	07.49	09.22	10.02
	16.03		20.00	21.31	23.01	23.34	22.25	20.42	18.55	16.15	14.51	14.40
31	08.59		06.45		03.30		04.26	05.58		07.52		10.01
	16.06		20.03		23.04		22.21	20.39		16.12		14.42
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
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:
31.1.2024 11.06/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE3_RD200x10xHH200_No_Forest

Shadow receptor: J - J - Lomarakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.00	08.57	07.28	06.42	04.59	03.28	03.10	04.29	06.01	07.24	07.55	09.25
	14.44	16.09	17.36	20.06	21.35	23.07	23.33	22.18	20.35	18.52	16.09	14.49
2	10.00	08.54	07.24	06.38	04.56	03.26	03.12	04.32	06.03	07.27	07.58	09.28
	14.46	16.12	17.39	20.09	21.38	23.09	23.32	22.15	20.32	18.48	16.06	14.47
3	09.59	08.51	07.21	06.35	04.53	03.24	03.14	04.35	06.06	07.30	08.01	09.30
	14.47	16.15	17.42	20.12	21.41	23.12	23.31	22.12	20.29	18.45	16.03	14.46
4	09.58	08.48	07.18	06.31	04.50	03.22	03.15	04.38	06.09	07.33	08.04	09.33
	14.50	16.19	17.45	20.15	21.44	23.14	23.29	22.09	20.25	18.41	16.00	14.44
5	09.56	08.45	07.14	06.28	04.46	03.20	03.17	04.41	06.12	07.35	08.07	09.35
	14.52	16.22	17.48	20.17	21.47	23.16	23.28	22.06	20.22	18.38	15.56	14.42
6	09.55	08.42	07.11	06.24	04.43	03.18	03.19	04.44	06.15	07.38	08.10	09.38
	14.54	16.25	17.51	20.20	21.50	23.18	23.26	22.03	20.18	18.35	15.53	14.41
7	09.54	08.39	07.08	06.21	04.40	03.16	03.21	04.47	06.18	07.41	08.13	09.40
	14.56	16.28	17.54	20.23	21.53	23.21	23.24	21.59	20.15	18.31	15.50	14.39
8	09.52	08.36	07.04	06.17	04.37	03.14	03.23	04.50	06.20	07.44	08.16	09.42
	14.58	16.31	17.57	20.26	21.56	23.23	23.22	21.56	20.11	18.28	15.47	14.38
9	09.51	08.33	07.01	06.14	04.33	03.12	03.26	04.53	06.23	07.47	08.20	09.44
	15.01	16.34	18.00	20.29	21.59	23.25	23.20	21.53	20.08	18.24	15.44	14.37
10	09.49	08.30	06.57	06.11	04.30	03.11	03.28	04.56	06.26	07.50	08.23	09.46
	15.03	16.38	18.03	20.32	22.02	23.26	23.18	21.50	20.04	18.21	15.42	14.36
11	09.47	08.26	06.54	06.07	04.27	03.10	03.30	04.59	06.29	07.52	08.26	09.48
	15.06	16.41	18.06	20.35	22.05	23.28	23.16	21.46	20.01	18.18	15.39	14.35
12	09.46	08.23	06.51	06.04	04.24	03.08	03.33	05.02	06.31	07.55	08.29	09.50
	15.09	16.44	18.08	20.38	22.08	23.30	23.14	21.43	19.57	18.14	15.36	14.34
13	09.44	08.20	06.47	06.00	04.21	03.07	03.35	05.05	06.34	07.58	08.32	09.52
	15.11	16.47	18.11	20.41	22.12	23.31	23.12	21.40	19.54	18.11	15.33	14.33
14	09.42	08.17	06.44	05.57	04.18	03.06	03.38	05.08	06.37	08.01	08.35	09.53
	15.14	16.50	18.14	20.44	22.15	23.33	23.09	21.36	19.50	18.08	15.30	14.33
15	09.40	08.14	06.40	05.53	04.15	03.05	03.40	05.11	06.40	08.04	08.38	09.55
	15.17	16.53	18.17	20.47	22.18	23.34	23.07	21.33	19.47	18.04	15.27	14.32
16	09.38	08.11	06.37	05.50	04.12	03.04	03.43	05.14	06.43	08.07	08.41	09.56
	15.20	16.56	18.20	20.50	22.21	23.35	23.04	21.30	19.44	18.01	15.25	14.32
17	09.35	08.07	06.33	05.47	04.09	03.04	03.46	05.17	06.45	08.10	08.44	09.57
	15.23	17.00	18.23	20.52	22.24	23.36	23.02	21.26	19.40	17.57	15.22	14.31
18	09.33	08.04	06.30	05.43	04.06	03.03	03.48	05.20	06.48	08.13	08.48	09.58
	15.26	17.03	18.26	20.55	22.27	23.37	22.59	21.23	19.37	17.54	15.19	14.31
19	09.31	08.01	06.27	05.40	04.03	03.03	03.51	05.23	06.51	08.16	08.51	09.59
	15.28	17.06	18.29	20.58	22.30	23.37	22.56	21.20	19.33	17.51	15.17	14.31
20	09.28	07.58	06.23	05.36	04.00	03.03	03.54	05.26	06.54	08.19	08.54	10.00
	15.31	17.09	18.32	21.01	22.33	23.38	22.54	21.16	19.30	17.48	15.14	14.31
21	09.26	07.54	06.20	05.33	03.57	03.03	03.57	05.29	06.56	08.22	08.57	10.01
	15.34	17.12	18.34	21.04	22.36	23.38	22.51	21.13	19.26	17.44	15.11	14.32
22	09.24	07.51	06.16	05.30	03.54	03.03	04.00	05.32	06.59	08.25	09.00	10.02
	15.38	17.15	18.37	21.07	22.39	23.38	22.48	21.10	19.23	17.41	15.09	14.32
23	09.21	07.48	06.13	05.26	03.51	03.03	04.03	05.35	07.02	08.27	09.03	10.02
	15.41	17.18	18.40	21.10	22.42	23.38	22.45	21.06	19.19	17.38	15.07	14.33
24	09.18	07.44	06.09	05.23	03.49	03.03	04.06	05.38	07.05	08.30	09.06	10.03
	15.44	17.21	18.43	21.13	22.45	23.38	22.43	21.03	19.16	17.34	15.04	14.33
25	09.16	07.41	06.06	05.19	03.46	03.04	04.08	05.41	07.07	07.33	09.08	10.03
	15.47	17.24	18.46	21.16	22.48	23.38	22.40	20.59	19.12	16.31	15.02	14.34
26	09.13	07.38	06.02	05.16	03.43	03.05	04.11	05.44	07.10	07.37	09.11	10.03
	15.50	17.27	18.49	21.19	22.50	23.37	22.37	20.56	19.09	16.28	15.00	14.35
27	09.11	07.35	05.59	05.13	03.40	03.06	04.14	05.46	07.13	07.40	09.14	10.03
	15.53	17.30	18.52	21.22	22.53	23.37	22.34	20.53	19.05	16.25	14.57	14.36
28	09.08	07.31	05.55	05.09	03.38	03.07	04.17	05.49	07.16	07.43	09.17	10.03
	15.56	17.33	18.54	21.25	22.56	23.36	22.31	20.49	19.02	16.21	14.55	14.37
29	09.05		06.52	05.06	03.35	03.08	04.20	05.52	07.19	07.46	09.20	10.02
	15.59		19.57	21.29	22.59	23.35	22.28	20.46	18.59	16.18	14.53	14.39
30	09.02		06.49	05.03	03.33	03.09	04.23	05.55	07.21	07.49	09.23	10.02
	16.03		20.00	21.32	23.01	23.34	22.25	20.42	18.55	16.15	14.51	14.40
31	08.59		06.45		03.31		04.26	05.58		07.52		10.01
	16.06		20.03		23.04		22.22	20.39		16.12		14.42
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
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:
31.1.2024 11.06/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE3_RD200x10xHH200_No_Forest

Shadow receptor: K - K - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.01	08.57	07.28	06.42	04.59	03.28	03.10	04.29	06.01	07.24	07.55	09.25
	14.44	16.09	17.36	20.06	21.35	23.07	23.34	22.19	20.36	18.52	16.09	14.49
2	10.00	08.54	07.25	06.38	04.56	03.26	03.12	04.32	06.04	07.27	07.58	09.28
	14.46	16.12	17.39	20.09	21.38	23.09	23.32	22.16	20.32	18.48	16.06	14.47
3	09.59	08.51	07.21	06.35	04.53	03.24	03.13	04.35	06.06	07.30	08.01	09.31
	14.47	16.15	17.42	20.12	21.41	23.12	23.31	22.12	20.29	18.45	16.03	14.46
4	09.58	08.48	07.18	06.31	04.50	03.22	03.15	04.38	06.09	07.33	08.04	09.33
	14.49	16.19	17.45	20.15	21.44	23.14	23.30	22.09	20.25	18.41	16.00	14.44
5	09.57	08.45	07.14	06.28	04.46	03.20	03.17	04.41	06.12	07.35	08.07	09.36
	14.52	16.22	17.48	20.18	21.47	23.16	23.28	22.06	20.22	18.38	15.56	14.42
6	09.55	08.42	07.11	06.24	04.43	03.18	03.19	04.44	06.15	07.38	08.10	09.38
	14.54	16.25	17.51	20.20	21.50	23.19	23.26	22.03	20.18	18.35	15.53	14.41
7	09.54	08.39	07.08	06.21	04.40	03.16	03.21	04.47	06.18	07.41	08.14	09.40
	14.56	16.28	17.54	20.23	21.53	23.21	23.24	22.00	20.15	18.31	15.50	14.39
8	09.53	08.36	07.04	06.18	04.37	03.14	03.23	04.50	06.20	07.44	08.17	09.42
	14.58	16.31	17.57	20.26	21.56	23.23	23.23	21.56	20.11	18.28	15.47	14.38
9	09.51	08.33	07.01	06.14	04.33	03.12	03.25	04.53	06.23	07.47	08.20	09.44
	15.01	16.34	18.00	20.29	21.59	23.25	23.21	21.53	20.08	18.24	15.44	14.37
10	09.49	08.30	06.57	06.11	04.30	03.11	03.28	04.56	06.26	07.50	08.23	09.46
	15.03	16.38	18.03	20.32	22.03	23.27	23.18	21.50	20.04	18.21	15.42	14.36
11	09.48	08.27	06.54	06.07	04.27	03.09	03.30	04.59	06.29	07.53	08.26	09.48
	15.06	16.41	18.06	20.35	22.06	23.28	23.16	21.47	20.01	18.18	15.39	14.35
12	09.46	08.23	06.51	06.04	04.24	03.08	03.33	05.02	06.32	07.55	08.29	09.50
	15.09	16.44	18.09	20.38	22.09	23.30	23.14	21.43	19.57	18.14	15.36	14.34
13	09.44	08.20	06.47	06.00	04.21	03.07	03.35	05.05	06.34	07.58	08.32	09.52
	15.11	16.47	18.11	20.41	22.12	23.31	23.12	21.40	19.54	18.11	15.33	14.33
14	09.42	08.17	06.44	05.57	04.18	03.06	03.38	05.08	06.37	08.01	08.35	09.53
	15.14	16.50	18.14	20.44	22.15	23.33	23.09	21.37	19.51	18.08	15.30	14.32
15	09.40	08.14	06.40	05.53	04.15	03.05	03.40	05.11	06.40	08.04	08.38	09.55
	15.17	16.53	18.17	20.47	22.18	23.34	23.07	21.33	19.47	18.04	15.27	14.32
16	09.38	08.11	06.37	05.50	04.12	03.04	03.43	05.14	06.43	08.07	08.42	09.56
	15.20	16.56	18.20	20.50	22.21	23.35	23.05	21.30	19.44	18.01	15.25	14.32
17	09.36	08.07	06.33	05.47	04.09	03.04	03.46	05.17	06.45	08.10	08.45	09.58
	15.23	17.00	18.23	20.53	22.24	23.36	23.02	21.27	19.40	17.58	15.22	14.31
18	09.33	08.04	06.30	05.43	04.06	03.03	03.48	05.20	06.48	08.13	08.48	09.59
	15.25	17.03	18.26	20.56	22.27	23.37	22.59	21.23	19.37	17.54	15.19	14.31
19	09.31	08.01	06.27	05.40	04.03	03.03	03.51	05.23	06.51	08.16	08.51	10.00
	15.28	17.06	18.29	20.59	22.30	23.37	22.57	21.20	19.33	17.51	15.17	14.31
20	09.29	07.58	06.23	05.36	04.00	03.03	03.54	05.26	06.54	08.19	08.54	10.01
	15.31	17.09	18.32	21.02	22.33	23.38	22.54	21.17	19.30	17.48	15.14	14.31
21	09.26	07.54	06.20	05.33	03.57	03.02	03.57	05.29	06.56	08.22	08.57	10.01
	15.34	17.12	18.34	21.05	22.36	23.38	22.51	21.13	19.26	17.44	15.11	14.32
22	09.24	07.51	06.16	05.30	03.54	03.03	04.00	05.32	06.59	08.25	09.00	10.02
	15.38	17.15	18.37	21.08	22.39	23.39	22.48	21.10	19.23	17.41	15.09	14.32
23	09.21	07.48	06.13	05.26	03.51	03.03	04.03	05.35	07.02	08.28	09.03	10.02
	15.41	17.18	18.40	21.11	22.42	23.39	22.46	21.06	19.19	17.38	15.06	14.33
24	09.19	07.45	06.09	05.23	03.48	03.03	04.06	05.38	07.05	08.31	09.06	10.03
	15.44	17.21	18.43	21.14	22.45	23.38	22.43	21.03	19.16	17.34	15.04	14.33
25	09.16	07.41	06.06	05.19	03.46	03.04	04.08	05.41	07.07	07.34	09.09	10.03
	15.47	17.24	18.46	21.17	22.48	23.38	22.40	21.00	19.12	16.31	15.02	14.34
26	09.13	07.38	06.02	05.16	03.43	03.05	04.11	05.44	07.10	07.37	09.12	10.03
	15.50	17.27	18.49	21.20	22.51	23.38	22.37	20.56	19.09	16.28	15.00	14.35
27	09.11	07.35	05.59	05.13	03.40	03.05	04.14	05.46	07.13	07.40	09.14	10.03
	15.53	17.30	18.52	21.23	22.53	23.37	22.34	20.53	19.06	16.25	14.57	14.36
28	09.08	07.31	05.56	05.09	03.38	03.06	04.17	05.49	07.16	07.43	09.17	10.03
	15.56	17.33	18.55	21.26	22.56	23.37	22.31	20.49	19.02	16.22	14.55	14.37
29	09.05		06.52	05.06	03.35	03.08	04.20	05.52	07.19	07.46	09.20	10.03
	15.59		19.57	21.29	22.59	23.36	22.28	20.46	18.59	16.18	14.53	14.39
30	09.02		06.49	05.03	03.33	03.09	04.23	05.55	07.21	07.49	09.23	10.02
	16.03		20.00	21.32	23.02	23.35	22.25	20.42	18.55	16.15	14.51	14.40
31	09.00		06.45		03.30		04.26	05.58		07.52		10.02
	16.06		20.03		23.04		22.22	20.39		16.12		14.42
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
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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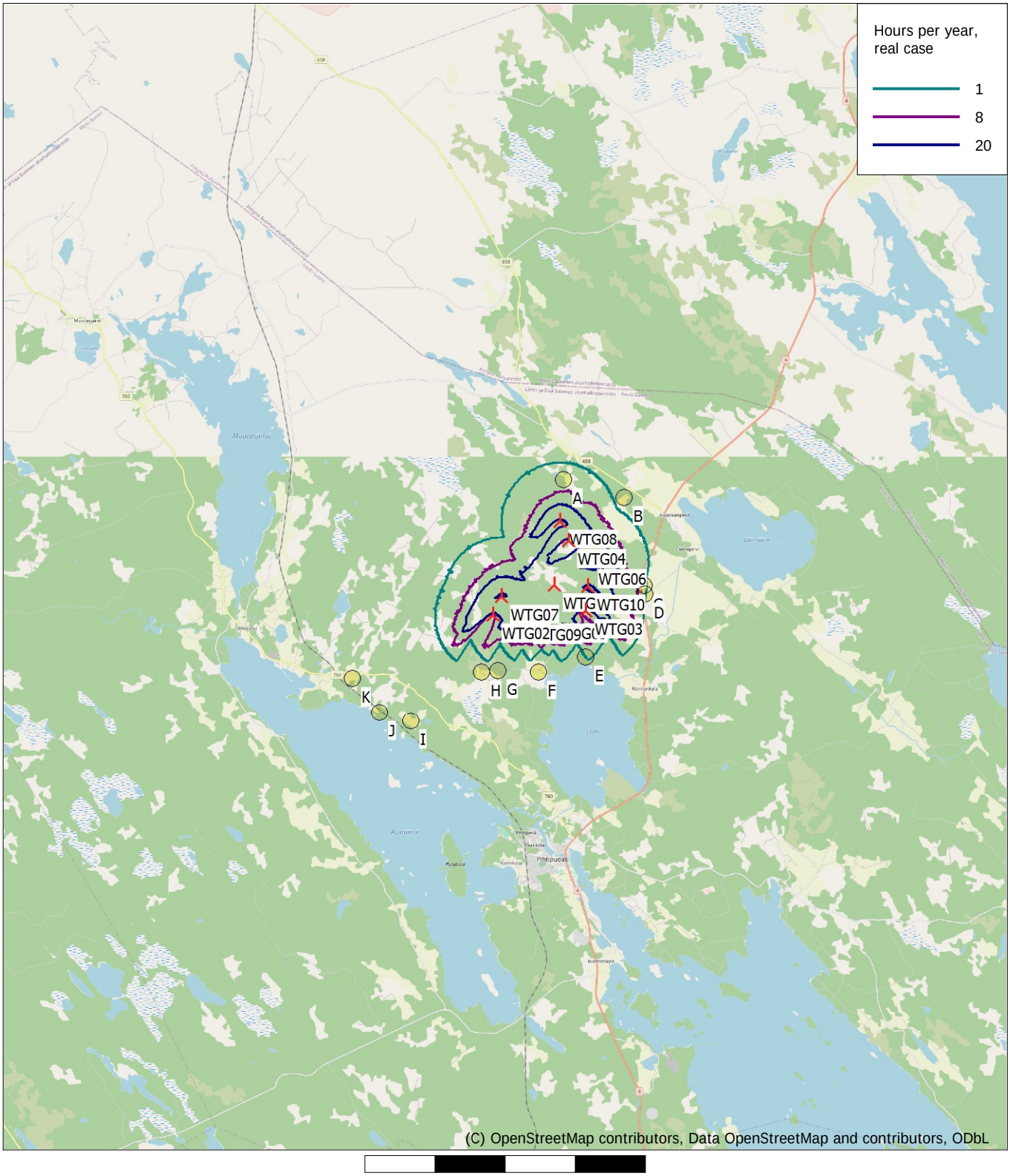
Calculated:
31.1.2024 11.06/3.6.355

SHADOW - Map

Calculation: Uusimo_VE3_RD200x10xHH200_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: 427 770 North: 7 038 300

New WTG Shadow receptor

Flicker map level: Height Contours: CONTOURLINE_Pyhäntä_Pilpankangas_0.wpo (2)

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

Liite 10. Melun yhteismallinnuksen tulokset VE1

Project:

Pihtipudas_Uusimo_melu_ja_varjostus

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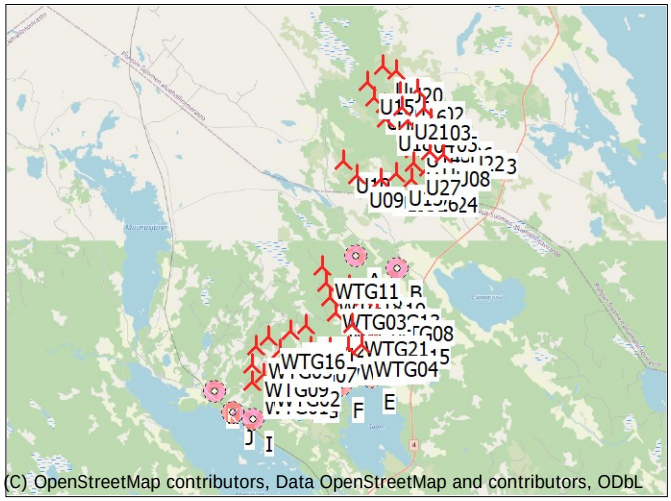
Calculated:
31.1.2024 10.01/3.6.355

DECIBEL - Main Result

Calculation: Uusimo_VE1_V172-7.2MWx21xHH214 + Hallakallio_VE1_V172-7.2MWx28xHH234

Calculation is done according to Finnish guideline " Ympäristöhallinnon ohjeita 2 | 2014 " from the Ministry of the Environment of Finland

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)]
U01	431 115	7 049 309	180,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U02	432 899	7 049 975	165,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U03	433 219	7 049 043	157,9	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U04	432 357	7 048 412	161,1	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U05	433 583	7 048 416	162,1	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U06	434 401	7 047 858	177,5	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U07	433 498	7 047 578	151,3	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U08	434 177	7 046 539	155,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U09	429 630	7 045 604	152,5	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U10	428 881	7 046 314	155,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U11	433 458	7 046 695	150,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U12	430 826	7 045 372	159,7	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U13	431 674	7 045 617	154,9	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U14	432 637	7 047 640	156,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U15	430 255	7 050 454	184,4	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U16	431 960	7 049 903	171,3	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U17	430 574	7 049 631	185,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U18	431 166	7 048 552	187,4	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U19	431 088	7 051 329	168,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U20	431 779	7 051 064	168,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U21	432 087	7 049 133	170,8	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U22	434 959	7 047 391	165,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U23	435 671	7 047 205	164,4	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U24	433 480	7 045 242	149,2	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U25	433 379	7 045 931	149,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U26	432 492	7 045 311	146,4	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U27	432 629	7 046 106	161,5	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U28	432 609	7 046 872	165,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
WTG01	423 751	7 034 716	140,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG02	424 350	7 035 140	132,8	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG03	428 051	7 039 154	159,5	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG04	429 647	7 036 576	126,3	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG05	424 001	7 036 639	140,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG06	428 278	7 038 291	151,2	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG07	425 301	7 036 387	132,5	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG08	430 500	7 038 489	132,7	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG09	423 801	7 035 688	141,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG10	428 901	7 036 410	128,2	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG11	427 685	7 040 785	140,7	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG12	426 946	7 036 454	125,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG13	429 799	7 039 089	140,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG14	425 843	7 037 401	134,9	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG15	430 250	7 037 201	128,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG16	424 662	7 037 061	143,3	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG17	427 952	7 036 390	122,3	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG18	427 851	7 039 889	147,4	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG19	429 050	7 039 688	142,5	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG20	426 702	7 037 670	127,5	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG21	429 145	7 037 639	135,6	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9

Calculation Results

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Calculated:
31.1.2024 10.01/3.6.355

DECIBEL - Main Result

Calculation: Uusimo_VE1_V172-7.2MWx21xHH214 + Hallakallio_VE1_V172-7.2MWx28xHH234

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	429 470	7 041 260	145,5	4,0	40,0	39,2	390	No
B	B - Asuinrakennus	431 627	7 040 548	144,9	4,0	40,0	35,9	1 122	No
C	C - Asuinrakennus	432 261	7 037 387	122,5	4,0	40,0	35,7	895	No
D	D - Asuinrakennus	432 294	7 037 094	122,1	4,0	40,0	35,4	970	No
E	E - Lomarakennus	430 111	7 034 859	117,3	4,0	40,0	36,6	638	No
F	F - Asuinrakennus	428 445	7 034 384	122,5	4,0	40,0	36,3	809	No
G	G - Asuinrakennus	426 978	7 034 448	122,8	4,0	40,0	36,8	789	No
H	H - Asuinrakennus	426 394	7 034 428	122,5	4,0	40,0	37,1	823	No
I	I - Asuinrakennus	423 788	7 032 711	125,0	4,0	40,0	33,8	1 075	No
J	J - Lomarakennus	422 689	7 033 070	114,2	4,0	40,0	33,7	1 055	No
K	K - Asuinrakennus	421 745	7 034 298	125,0	4,0	40,0	33,9	1 087	No

Distances (m)

WTG	A	B	C	D	E	F	G	H	I	J	K
U01	8216	8776	11978	12272	14485	15162	15426	15612	18144	18295	17696
U02	9365	9512	12604	12895	15371	16214	16617	16852	19520	19748	19240
U03	8639	8643	11696	11985	14521	15417	15873	16130	18860	19132	18684
U04	7713	7898	11026	11319	13739	14563	14965	15202	17888	18134	17659
U05	8254	8107	11108	11395	13995	14943	15451	15727	18509	18819	18424
U06	8237	7818	10688	10968	13689	14731	15327	15635	18495	18864	18548
U07	7493	7275	10267	10553	13163	14129	14660	14946	17757	18092	17734
U08	7073	6511	9351	9631	12368	13439	14072	14396	17296	17703	17447
U09	4347	5436	8628	8917	10756	11282	11467	11635	14155	14328	13784
U10	5088	6387	9546	9832	11522	11938	12018	12144	14526	14620	13976
U11	6741	6414	9385	9671	12301	13292	13856	14155	17002	17367	17055
U12	4330	4890	8114	8407	10538	11243	11582	11807	14486	14750	14322
U13	4882	5069	8251	8545	10871	11687	12116	12372	15124	15432	15056
U14	7123	7163	10260	10551	13029	13903	14355	14612	17355	17642	17224
U15	9228	10001	13221	13515	15596	16171	16338	16484	18885	18959	18260
U16	8995	9361	12520	12814	15158	15912	16238	16445	19036	19217	18651
U17	8444	9144	12360	12655	14780	15395	15603	15767	18230	18342	17693
U18	7487	8018	11219	11514	13734	14427	14713	14908	17475	17651	17086
U19	10198	10794	13991	14286	16499	17149	17374	17540	19998	20098	19425
U20	10073	10517	13686	13980	16292	17010	17296	17486	20018	20160	19540
U21	8296	8597	11748	12041	14410	15192	15548	15768	18400	18610	18084
U22	8229	7611	10362	10636	13437	14546	15205	15536	18447	18858	18602
U23	8590	7788	10393	10659	13540	14716	15437	15789	18742	19191	18987
U24	5651	5046	7949	8234	10916	11968	12601	12929	15842	16266	16046
U25	6091	5661	8618	8904	11545	12557	13147	13458	16333	16724	16452
U26	5054	4841	7928	8220	10721	11652	12183	12475	15314	15682	15388
U27	5785	5648	8727	9018	11526	12446	12956	13238	16050	16393	16059
U28	6430	6400	9492	9783	12271	13164	13641	13910	16684	16997	16618
WTG01	8691	9800	8919	8868	6362	4705	3238	2659	2006	1959	2050
WTG02	7979	9067	8224	8181	5768	4164	2717	2164	2493	2654	2738
WTG03	2540	3838	4566	4717	4764	4786	4827	5008	7726	8109	7959
WTG04	4688	4439	2737	2698	1779	2500	3413	3898	7019	7791	8224
WTG05	7160	8570	8294	8306	6364	4983	3696	3258	3934	3802	3251
WTG06	3200	4039	4084	4191	3891	3910	4056	4297	7162	7648	7656
WTG07	6414	7573	7032	7029	5048	3728	2564	2243	3975	4221	4124
WTG08	2956	2348	2078	2273	3651	4590	5360	5775	8856	9506	9706
WTG09	7949	9213	8629	8609	6365	4824	3411	2883	2977	2844	2482
WTG10	4883	4955	3499	3461	1968	2077	2748	3196	6311	7053	7462
WTG11	1847	3949	5700	5905	6404	6446	6377	6487	8966	9191	8796
WTG12	5429	6219	5396	5387	3545	2555	2006	2099	4897	5438	5630
WTG13	2196	2339	2993	3194	4242	4896	5431	5772	8764	9315	9372
WTG14	5296	6585	6418	6459	4969	3984	3164	3024	5121	5358	5140
WTG15	4133	3619	2020	2047	2347	3345	4276	4749	7868	8615	8987
WTG16	6383	7789	7606	7632	5878	4634	3492	3152	4437	4452	4018
WTG17	5102	5550	4423	4399	2647	2065	2172	2505	5556	6222	6550
WTG18	2122	3833	5071	5249	5515	5537	5511	5652	8248	8552	8279

To be continued on next page...

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DECIBEL - Main Result

Calculation: Uusimo_VE1_V172-7.2MWx21xHH214 + Hallakallio_VE1_V172-7.2MWx28xHH234

...continued from previous page

WTG	A	B	C	D	E	F	G	H	I	J	K
WTG19	1627	2716	3950	4154	4945	5338	5635	5893	8739	9180	9079
WTG20	4534	5705	5567	5622	4419	3719	3234	3256	5751	6104	5995
WTG21	3635	3824	3126	3196	2944	3329	3857	4228	7279	7909	8119

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Calculated:
31.1.2024 10.01/3.6.355

DECIBEL - Assumptions for noise calculation

Calculation: Uusimo_VE1_V172-7.2MWx21xHH214 + Hallakallio_VE1_V172-7.2MWx28xHH234

Noise calculation model:
ISO 9613-2 Finland
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_Pihtipudas_Uusimo_melu_ja_varjostus_0.w2r (13)
Area type with hard ground: vesistot
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:
Pure tones penalty is added to total noise impact at receptors
Noise sensitive area
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 NSA 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 + 2dB

Source	Source/Date	Creator	Edited
Manufacturer	11.9.2023	USER	30.1.2024 10.36

					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	214,0	8,0	108,9	No	92,4	100,0	103,3	103,5	101,9	97,4	89,9	79,2

WTG: VESTAS V172-7.2 7200 172.0 !O!
Noise: V172 - 7,2 MW PO7200-0S + 2dB

Source	Source/Date	Creator	Edited
Manufacturer	11.9.2023	USER	25.1.2024 9.56

					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	234,0	8,0	112,1	No	93,5	102,2	106,1	107,0	105,7	101,3	93,6	82,8

Noise sensitive area: A A - Lomarakennus

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
Pure tone penalty: 0 dB

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DECIBEL - Assumptions for noise calculation

Calculation: Uusimo_VE1_V172-7.2MWx21xHH214 + Hallakallio_VE1_V172-7.2MWx28xHH234

Noise sensitive area: B B - Asuinrakennus
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
Pure tone penalty: 0 dB

Noise sensitive area: C C - Asuinrakennus
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
Pure tone penalty: 0 dB

Noise sensitive area: D D - Asuinrakennus
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
Pure tone penalty: 0 dB

Noise sensitive area: E E - Lomarakennus
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
Pure tone penalty: 0 dB

Noise sensitive area: F F - Asuinrakennus
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
Pure tone penalty: 0 dB

Noise sensitive area: G G - Asuinrakennus
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
Pure tone penalty: 0 dB

Noise sensitive area: H H - Asuinrakennus
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
Pure tone penalty: 0 dB

Noise sensitive area: I I - Asuinrakennus
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: Uusimo_VE1_V172-7.2MWx21xHH214 + Hallakallio_VE1_V172-7.2MWx28xHH234

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

Noise sensitive area: J J - Lomarakennus

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
Pure tone penalty: 0 dB

Noise sensitive area: K K - Asuinrakennus

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
Pure tone penalty: 0 dB

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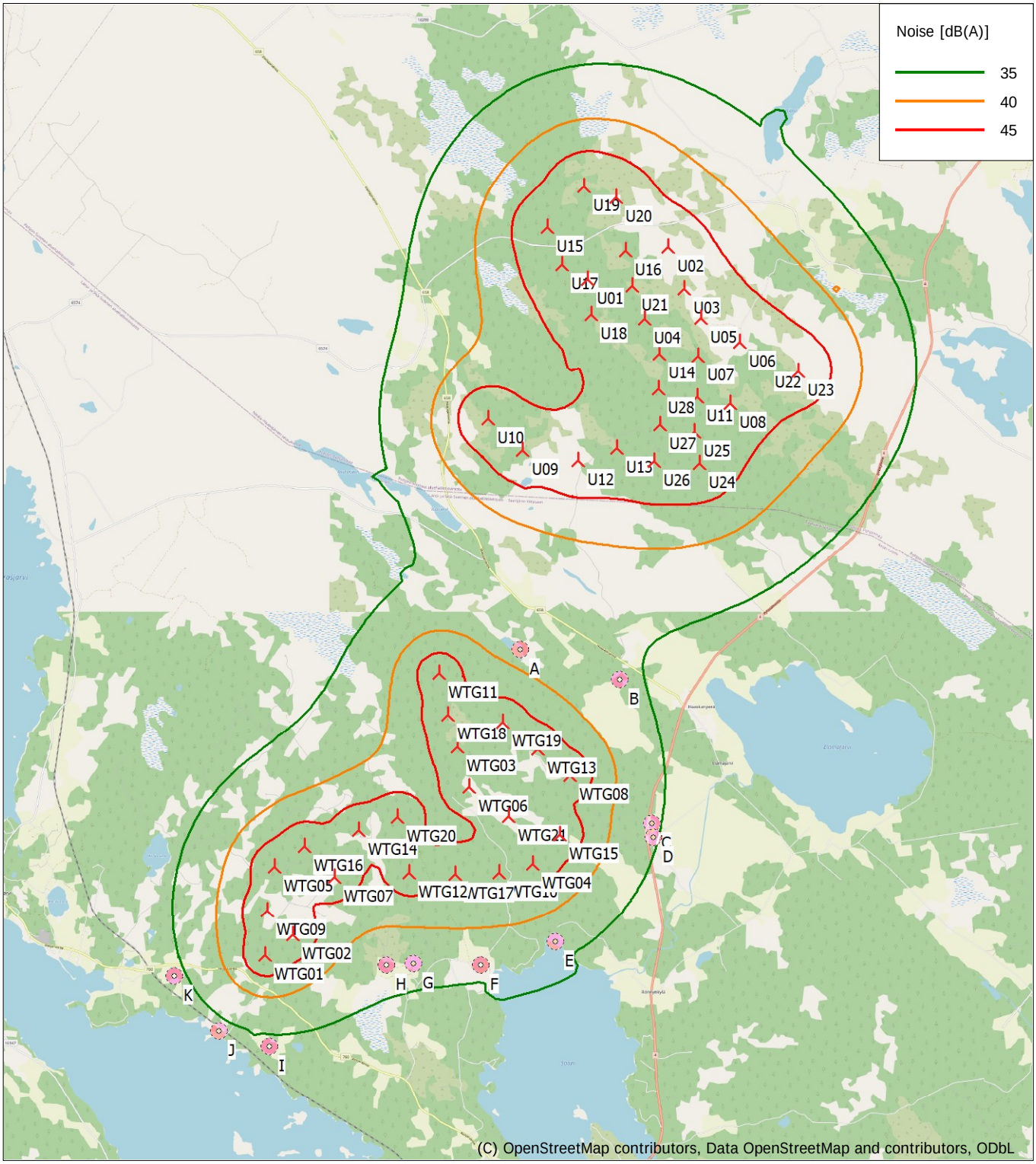
31.1.2024 10.01/3.6.355

DECIBEL - Map 8,0 m/s

Calculation: Uusimo_VE1_V172-7.2MWx21xHH214 + Hallakallio_VE1_V172-7.2MWx28xHH234



0 2,5 5 7,5 10km

Map: EMD OpenStreetMap , Print scale 1:125 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 429 711 North: 7 043 022

New WTG Noise sensitive area

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

Liite 11. Melun yhteismallinnuksen tulokset VE2

Project:

Pihtipudas_Uusimo_melu_ja_varjostus

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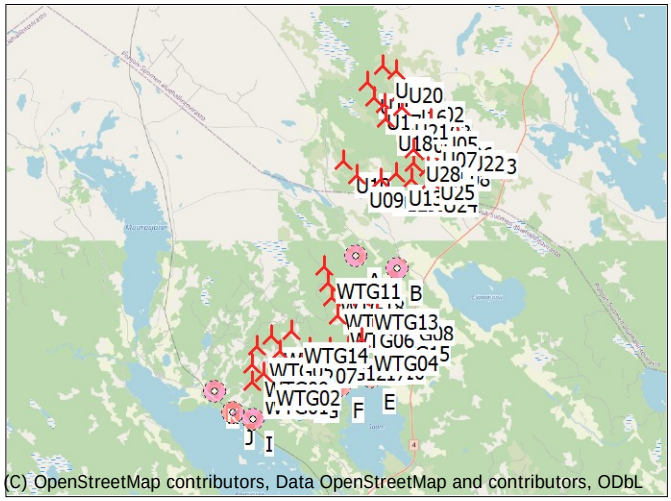
Calculated:
31.1.2024 10.24/3.6.355

DECIBEL - Main Result

Calculation: Uusimo_VE2_V172-7.2MWx18xHH214+ Hallakallio_VE1_V172-7.2MWx28xHH234

Calculation is done according to Finnish guideline " Ympäristöhallinnon ohjeita 2 | 2014 " from the Ministry of the Environment of Finland

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)]
U01	431 115	7 049 309	180,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U02	432 899	7 049 975	165,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U03	433 219	7 049 043	157,9	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U04	432 357	7 048 412	161,1	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U05	433 583	7 048 416	162,1	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U06	434 401	7 047 858	177,5	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U07	433 498	7 047 578	151,3	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U08	434 177	7 046 539	155,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U09	429 630	7 045 604	152,5	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U10	428 881	7 046 314	155,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U11	433 458	7 046 695	150,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U12	430 826	7 045 372	159,7	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U13	431 674	7 045 617	154,9	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U14	432 637	7 047 640	156,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U15	430 255	7 050 454	184,4	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U16	431 960	7 049 903	171,3	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U17	430 574	7 049 631	185,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U18	431 166	7 048 552	187,4	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U19	431 088	7 051 329	168,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U20	431 779	7 051 064	168,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U21	432 087	7 049 133	170,8	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U22	434 959	7 047 391	165,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U23	435 671	7 047 205	164,4	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U24	433 480	7 045 242	149,2	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U25	433 379	7 045 931	149,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U26	432 492	7 045 311	146,4	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U27	432 629	7 046 106	161,5	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U28	432 609	7 046 872	165,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
WTG01	423 751	7 034 716	140,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG02	424 350	7 035 191	132,5	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG03	428 122	7 039 102	160,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG04	429 639	7 036 890	128,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG05	424 051	7 036 638	139,7	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG06	428 401	7 038 173	148,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG07	425 267	7 036 341	132,5	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG08	430 501	7 038 489	132,6	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG09	423 801	7 035 688	141,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG10	428 913	7 036 410	128,2	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG11	427 690	7 040 789	140,8	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG12	426 874	7 036 449	125,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG13	429 650	7 039 089	140,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG14	425 900	7 037 389	133,7	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG15	430 250	7 037 340	128,9	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG16	424 812	7 037 139	142,1	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG17	427 951	7 036 390	122,3	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG18	427 892	7 039 889	150,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9

Calculation Results

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Calculated:
31.1.2024 10.24/3.6.355

DECIBEL - Main Result

Calculation: Uusimo_VE2_V172-7.2MWx18xHH214+ Hallakallio_VE1_V172-7.2MWx28xHH234

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	429 470	7 041 260	145,5	4,0	40,0	38,0	741	No
B	B - Asuinrakennus	431 627	7 040 548	144,9	4,0	40,0	35,3	1 293	No
C	C - Asuinrakennus	432 261	7 037 387	122,5	4,0	40,0	35,3	936	No
D	D - Asuinrakennus	432 294	7 037 094	122,1	4,0	40,0	34,9	1 024	No
E	E - Lomarakennus	430 111	7 034 859	117,3	4,0	40,0	35,7	839	No
F	F - Asuinrakennus	428 445	7 034 384	122,5	4,0	40,0	35,7	898	No
G	G - Asuinrakennus	426 978	7 034 448	122,8	4,0	40,0	36,5	857	No
H	H - Asuinrakennus	426 394	7 034 428	122,5	4,0	40,0	36,8	869	No
I	I - Asuinrakennus	423 788	7 032 711	125,0	4,0	40,0	33,6	1 090	No
J	J - Lomarakennus	422 689	7 033 070	114,2	4,0	40,0	33,5	1 068	No
K	K - Asuinrakennus	421 745	7 034 298	125,0	4,0	40,0	33,8	1 097	No

Distances (m)

WTG	A	B	C	D	E	F	G	H	I	J	K
U01	8216	8776	11978	12272	14485	15162	15426	15612	18144	18295	17696
U02	9365	9512	12604	12895	15371	16214	16617	16852	19520	19748	19240
U03	8639	8643	11696	11985	14521	15417	15873	16130	18860	19132	18684
U04	7713	7898	11026	11319	13739	14563	14965	15202	17888	18134	17659
U05	8254	8107	11108	11395	13995	14943	15451	15727	18509	18819	18424
U06	8237	7818	10688	10968	13689	14731	15327	15635	18495	18864	18548
U07	7493	7275	10267	10553	13163	14129	14660	14946	17757	18092	17734
U08	7073	6511	9351	9631	12368	13439	14072	14396	17296	17703	17447
U09	4347	5436	8628	8917	10756	11282	11467	11635	14155	14328	13784
U10	5088	6387	9546	9832	11522	11938	12018	12144	14526	14620	13976
U11	6741	6414	9385	9671	12301	13292	13856	14155	17002	17367	17055
U12	4330	4890	8114	8407	10538	11243	11582	11807	14486	14750	14322
U13	4882	5069	8251	8545	10871	11687	12116	12372	15124	15432	15056
U14	7123	7163	10260	10551	13029	13903	14355	14612	17355	17642	17224
U15	9228	10001	13221	13515	15596	16171	16338	16484	18885	18959	18260
U16	8995	9361	12520	12814	15158	15912	16238	16445	19036	19217	18651
U17	8444	9144	12360	12655	14780	15395	15603	15767	18230	18342	17693
U18	7487	8018	11219	11514	13734	14427	14713	14908	17475	17651	17086
U19	10198	10794	13991	14286	16499	17149	17374	17540	19998	20098	19425
U20	10073	10517	13686	13980	16292	17010	17296	17486	20018	20160	19540
U21	8296	8597	11748	12041	14410	15192	15548	15768	18400	18610	18084
U22	8229	7611	10362	10636	13437	14546	15205	15536	18447	18858	18602
U23	8590	7788	10393	10659	13540	14716	15437	15789	18742	19191	18987
U24	5651	5046	7949	8234	10916	11968	12601	12929	15842	16266	16046
U25	6091	5661	8618	8904	11545	12557	13147	13458	16333	16724	16452
U26	5054	4841	7928	8220	10721	11652	12183	12475	15314	15682	15388
U27	5785	5648	8727	9018	11526	12446	12956	13238	16050	16393	16059
U28	6430	6400	9492	9783	12271	13164	13641	13910	16684	16997	16618
WTG01	8691	9800	8919	8868	6362	4706	3238	2659	2006	1959	2049
WTG02	7940	9037	8210	8169	5771	4174	2731	2182	2543	2694	2754
WTG03	2544	3791	4480	4630	4686	4729	4793	4983	7722	8118	7984
WTG04	4374	4164	2669	2663	2085	2775	3611	4072	7189	7930	8308
WTG05	7123	8526	8244	8256	6316	4938	3656	3221	3936	3819	3285
WTG06	3267	4006	3940	4040	3730	3789	3988	4249	7149	7659	7702
WTG07	6470	7626	7072	7068	5066	3732	2552	2221	3920	4165	4072
WTG08	2956	2347	2077	2273	3652	4591	5361	5775	8857	9507	9707
WTG09	7949	9213	8629	8609	6365	4824	3411	2883	2977	2844	2482
WTG10	4882	4949	3487	3450	1960	2079	2756	3205	6320	7063	7473
WTG11	1841	3945	5698	5904	6406	6449	6381	6491	8971	9197	8802
WTG12	5467	6277	5468	5459	3607	2595	2004	2077	4847	5378	5562
WTG13	2179	2457	3116	3312	4255	4856	5355	5685	8663	9202	9244
WTG14	5266	6541	6361	6401	4913	3937	3132	3002	5133	5382	5179
WTG15	3997	3492	2011	2059	2485	3463	4367	4832	7949	8683	9033
WTG16	6219	7620	7453	7482	5769	4559	3455	3139	4545	4590	4181
WTG17	5102	5550	4424	4400	2648	2065	2172	2504	5555	6221	6549
WTG18	2090	3793	5035	5215	5499	5533	5517	5663	8268	8577	8309

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Calculated:
31.1.2024 10.24/3.6.355

DECIBEL - Assumptions for noise calculation

Calculation: Uusimo_VE2_V172-7.2MWx18xHH214+ Hallakallio_VE1_V172-7.2MWx28xHH234

Noise calculation model:
ISO 9613-2 Finland
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_Pihtipudas_Uusimo_melu_ja_varjostus_0.w2r (13)
Area type with hard ground: vesistot
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:
Pure tones penalty is added to total noise impact at receptors
Noise sensitive area
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 NSA 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 + 2dB

Source	Source/Date	Creator	Edited
Manufacturer	11.9.2023	USER	30.1.2024 10.36

					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	214,0	8,0	108,9	No	92,4	100,0	103,3	103,5	101,9	97,4	89,9	79,2

WTG: VESTAS V172-7.2 7200 172.0 !O!
Noise: V172 - 7,2 MW PO7200-0S + 2dB

Source	Source/Date	Creator	Edited
Manufacturer	11.9.2023	USER	25.1.2024 9.56

					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	234,0	8,0	112,1	No	93,5	102,2	106,1	107,0	105,7	101,3	93,6	82,8

Noise sensitive area: A A - Lomarakennus

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
Pure tone penalty: 0 dB

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DECIBEL - Assumptions for noise calculation

Calculation: Uusimo_VE2_V172-7.2MWx18xHH214+ Hallakallio_VE1_V172-7.2MWx28xHH234

Noise sensitive area: B B - Asuinrakennus
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
Pure tone penalty: 0 dB

Noise sensitive area: C C - Asuinrakennus
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
Pure tone penalty: 0 dB

Noise sensitive area: D D - Asuinrakennus
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
Pure tone penalty: 0 dB

Noise sensitive area: E E - Lomarakennus
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
Pure tone penalty: 0 dB

Noise sensitive area: F F - Asuinrakennus
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
Pure tone penalty: 0 dB

Noise sensitive area: G G - Asuinrakennus
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
Pure tone penalty: 0 dB

Noise sensitive area: H H - Asuinrakennus
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
Pure tone penalty: 0 dB

Noise sensitive area: I I - Asuinrakennus
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: Uusimo_VE2_V172-7.2MWx18xHH214+ Hallakallio_VE1_V172-7.2MWx28xHH234

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

Noise sensitive area: J J - Lomarakennus

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
Pure tone penalty: 0 dB

Noise sensitive area: K K - Asuinrakennus

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
Pure tone penalty: 0 dB

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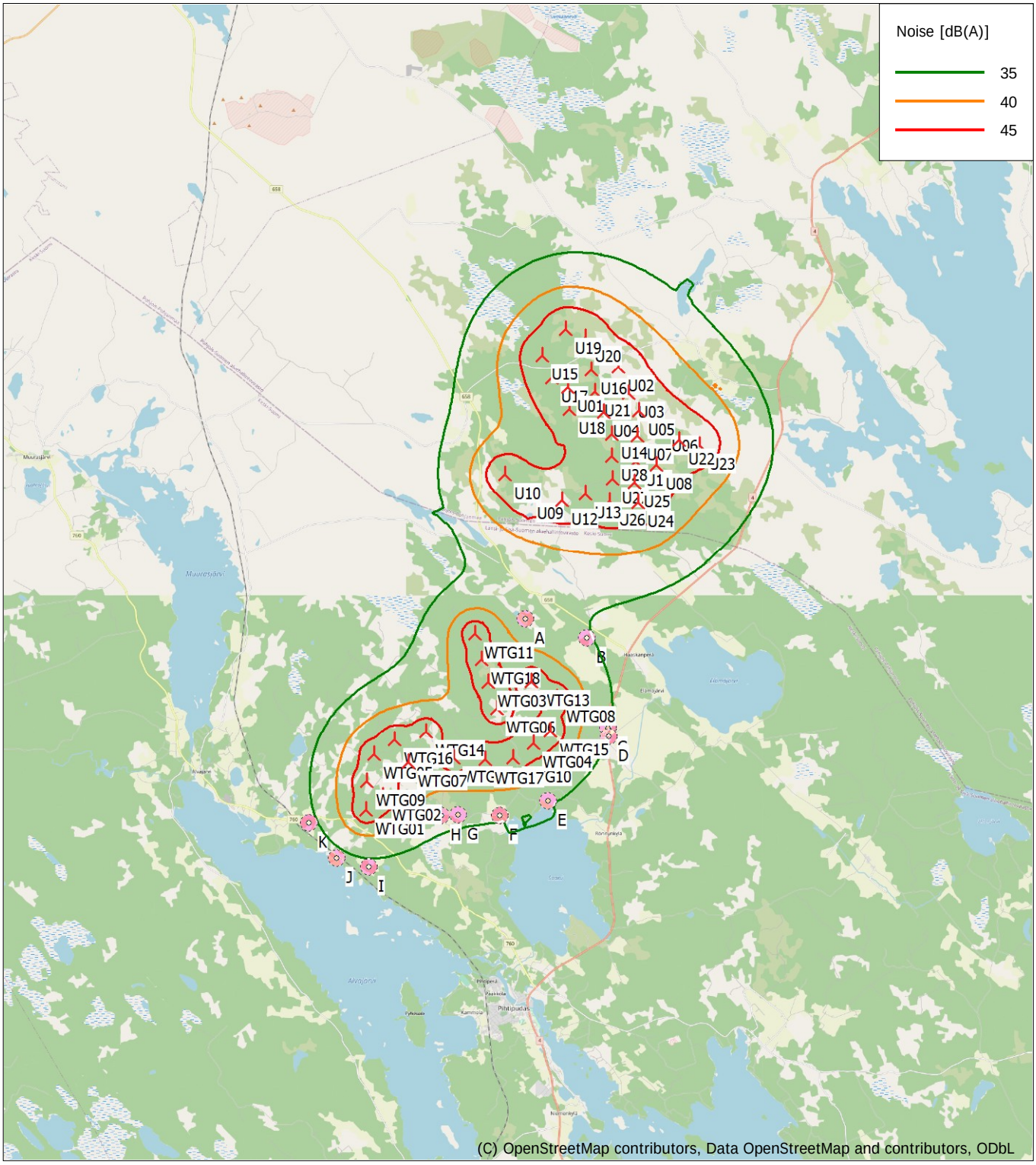
31.1.2024 10.24/3.6.355

DECIBEL - Map 8,0 m/s

Calculation: Uusimo_VE2_V172-7.2MWx18xHH214+ Hallakallio_VE1_V172-7.2MWx28xHH234



0 2,5 5 7,5 10km

Map: EMD OpenStreetMap , Print scale 1:200 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 429 711 North: 7 043 022

New WTG Noise sensitive area

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

Liite 12. Melun yhteismallinnuksen tulokset VE3

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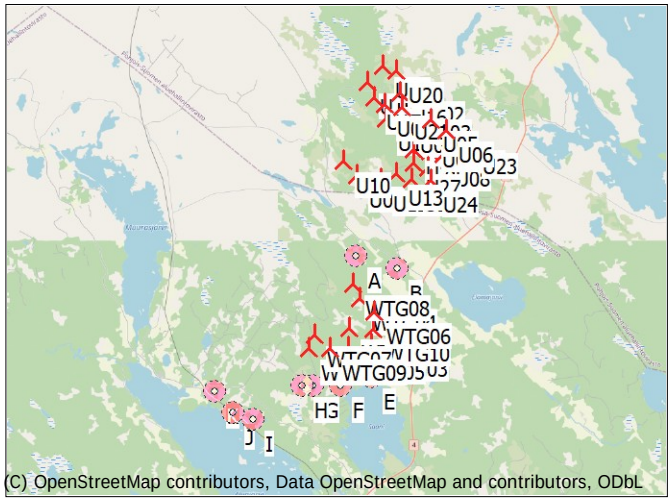
DECIBEL - Main Result

Calculation: Uusimo_VE3_V172-7.2MWx10xHH214 + Hallakallio_VE1_V172-7.2MWx28xHH234

Calculation is done according to Finnish guideline " Ympäristöhallinnon ohjeita 2 | 2014 " from the Ministry of the Environment of Finland

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)]
U01	431 115	7 049 309	180,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U02	432 899	7 049 975	165,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U03	433 219	7 049 043	157,9	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U04	432 357	7 048 412	161,1	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U05	433 583	7 048 416	162,1	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U06	434 401	7 047 858	177,5	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U07	433 498	7 047 578	151,3	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U08	434 177	7 046 539	155,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U09	429 630	7 045 604	152,5	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U10	428 881	7 046 314	155,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U11	433 458	7 046 695	150,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U12	430 826	7 045 372	159,7	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U13	431 674	7 045 617	154,9	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U14	432 637	7 047 640	156,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U15	430 255	7 050 454	184,4	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U16	431 960	7 049 903	171,3	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U17	430 574	7 049 631	185,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U18	431 166	7 048 552	187,4	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U19	431 088	7 051 329	168,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U20	431 779	7 051 064	168,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U21	432 087	7 049 133	170,8	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U22	434 959	7 047 391	165,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U23	435 671	7 047 205	164,4	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U24	433 480	7 045 242	149,2	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U25	433 379	7 045 931	149,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U26	432 492	7 045 311	146,4	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U27	432 629	7 046 106	161,5	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
U28	432 609	7 046 872	165,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	234,0	USER	V172 - 7,2 MW PO7200-0S + 2dB	8,0	112,1
WTG01	429 051	7 037 493	138,6	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG02	426 831	7 036 447	125,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG03	430 151	7 036 555	125,8	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG04	429 601	7 039 051	140,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG05	428 904	7 036 410	128,2	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG06	430 350	7 038 339	134,3	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG07	427 156	7 037 144	126,0	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG08	429 300	7 039 773	141,1	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG09	427 951	7 036 390	122,3	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9
WTG10	430 251	7 037 388	129,2	VESTAS V172-7.2 7200 17...	Yes	VESTAS	V172-7.2-7 200	7 200	172,0	214,0	USER	V172 - 7,2 MW PO7200 STE + 2dB	8,0	108,9

Calculation Results

Sound level

Noise sensitive area No.	Name	East	North	Z	Demands Immission height	Sound level Noise	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	429 470	7 041 260	145,5	4,0	40,0	37,4	597	No
B	B - Asuinrakennus	431 627	7 040 548	144,9	4,0	40,0	35,1	1 311	No

To be continued on next page...

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Calculated:
31.1.2024 10.38/3.6.355

DECIBEL - Main Result

Calculation: Uusimo_VE3_V172-7.2MWx10xHH214 + Hallakallio_VE1_V172-7.2MWx28xHH234

...continued from previous page

Noise sensitive area						Demands	Sound level		
No.	Name	East	North	Z	Immission height	Noise	From WTGs	Distance to noise demand	2 dB penalty applied for one or more WTGs
				[m]	[m]	[dB(A)]	[dB(A)]	[m]	
C	C - Asuinrakennus	432 261	7 037 387	122,5	4,0	40,0	35,5	882	No
D	D - Asuinrakennus	432 294	7 037 094	122,1	4,0	40,0	35,1	944	No
E	E - Lomarakennus	430 111	7 034 859	117,3	4,0	40,0	36,2	676	No
F	F - Asuinrakennus	428 445	7 034 384	122,5	4,0	40,0	35,2	920	No
G	G - Asuinrakennus	426 978	7 034 448	122,8	4,0	40,0	34,6	984	No
H	H - Asuinrakennus	426 394	7 034 428	122,5	4,0	40,0	33,7	1 128	No
I	I - Asuinrakennus	423 788	7 032 711	125,0	4,0	40,0	25,6	3 929	No
J	J - Lomarakennus	422 689	7 033 070	114,2	4,0	40,0	24,7	4 465	No
K	K - Asuinrakennus	421 745	7 034 298	125,0	4,0	40,0	24,5	4 633	No

Distances (m)

WTG	A	B	C	D	E	F	G	H	I	J	K
U01	8216	8776	11978	12272	14485	15162	15426	15612	18144	18295	17696
U02	9365	9512	12604	12895	15371	16214	16617	16852	19520	19748	19240
U03	8639	8643	11696	11985	14521	15417	15873	16130	18860	19132	18684
U04	7713	7898	11026	11319	13739	14563	14965	15202	17888	18134	17659
U05	8254	8107	11108	11395	13995	14943	15451	15727	18509	18819	18424
U06	8237	7818	10688	10968	13689	14731	15327	15635	18495	18864	18548
U07	7493	7275	10267	10553	13163	14129	14660	14946	17757	18092	17734
U08	7073	6511	9351	9631	12368	13439	14072	14396	17296	17703	17447
U09	4347	5436	8628	8917	10756	11282	11467	11635	14155	14328	13784
U10	5088	6387	9546	9832	11522	11938	12018	12144	14526	14620	13976
U11	6741	6414	9385	9671	12301	13292	13856	14155	17002	17367	17055
U12	4330	4890	8114	8407	10538	11243	11582	11807	14486	14750	14322
U13	4882	5069	8251	8545	10871	11687	12116	12372	15124	15432	15056
U14	7123	7163	10260	10551	13029	13903	14355	14612	17355	17642	17224
U15	9228	10001	13221	13515	15596	16171	16338	16484	18885	18959	18260
U16	8995	9361	12520	12814	15158	15912	16238	16445	19036	19217	18651
U17	8444	9144	12360	12655	14780	15395	15603	15767	18230	18342	17693
U18	7487	8018	11219	11514	13734	14427	14713	14908	17475	17651	17086
U19	10198	10794	13991	14286	16499	17149	17374	17540	19998	20098	19425
U20	10073	10517	13686	13980	16292	17010	17296	17486	20018	20160	19540
U21	8296	8597	11748	12041	14410	15192	15548	15768	18400	18610	18084
U22	8229	7611	10362	10636	13437	14546	15205	15536	18447	18858	18602
U23	8590	7788	10393	10659	13540	14716	15437	15789	18742	19191	18987
U24	5651	5046	7949	8234	10916	11968	12601	12929	15842	16266	16046
U25	6091	5661	8618	8904	11545	12557	13147	13458	16333	16724	16452
U26	5054	4841	7928	8220	10721	11652	12183	12475	15314	15682	15388
U27	5785	5648	8727	9018	11526	12446	12956	13238	16050	16393	16059
U28	6430	6400	9492	9783	12271	13164	13641	13910	16684	16997	16618
WTG01	3790	3997	3212	3268	2840	3167	3683	4056	7111	7748	7974
WTG02	5489	6310	5510	5501	3644	2619	2004	2065	4819	5344	5522
WTG03	4754	4257	2268	2210	1697	2761	3809	4317	7434	8236	8704
WTG04	2213	2520	3138	3329	4223	4808	5298	5626	8601	9140	9182
WTG05	4883	4953	3496	3458	1966	2077	2750	3198	6313	7056	7465
WTG06	3051	2552	2135	2309	3489	4390	5149	5563	8645	9298	9507
WTG07	4722	5620	5111	5139	3736	3045	2701	2820	5567	6045	6114
WTG08	1497	2453	3803	4018	4981	5456	5809	6084	8958	9414	9330
WTG09	5102	5550	4424	4400	2648	2065	2172	2504	5555	6221	6549
WTG10	3950	3447	2010	2065	2534	3505	4399	4861	7977	8707	9050

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Calculated:
31.1.2024 10.38/3.6.355

DECIBEL - Assumptions for noise calculation

Calculation: Uusimo_VE3_V172-7.2MWx10xHH214 + Hallakallio_VE1_V172-7.2MWx28xHH234

Noise calculation model:
ISO 9613-2 Finland
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_Pihtipudas_Uusimo_melu_ja_varjostus_0.w2r (13)
Area type with hard ground: vesistot
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:
Pure tones penalty is added to total noise impact at receptors
Noise sensitive area
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 NSA 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 PO7200-0S + 2dB

Source	Source/Date	Creator	Edited
Manufacturer	11.9.2023	USER	25.1.2024 9.56

					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	234,0	8,0	112,1	No	93,5	102,2	106,1	107,0	105,7	101,3	93,6	82,8

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

Source	Source/Date	Creator	Edited
Manufacturer	11.9.2023	USER	30.1.2024 10.36

					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	214,0	8,0	108,9	No	92,4	100,0	103,3	103,5	101,9	97,4	89,9	79,2

Noise sensitive area: A A - Lomarakennus

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
Pure tone penalty: 0 dB

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DECIBEL - Assumptions for noise calculation

Calculation: Uusimo_VE3_V172-7.2MWx10xHH214 + Hallakallio_VE1_V172-7.2MWx28xHH234

Noise sensitive area: B B - Asuinrakennus
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
Pure tone penalty: 0 dB

Noise sensitive area: C C - Asuinrakennus
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
Pure tone penalty: 0 dB

Noise sensitive area: D D - Asuinrakennus
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
Pure tone penalty: 0 dB

Noise sensitive area: E E - Lomarakennus
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
Pure tone penalty: 0 dB

Noise sensitive area: F F - Asuinrakennus
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
Pure tone penalty: 0 dB

Noise sensitive area: G G - Asuinrakennus
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
Pure tone penalty: 0 dB

Noise sensitive area: H H - Asuinrakennus
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
Pure tone penalty: 0 dB

Noise sensitive area: I I - Asuinrakennus
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: Uusimo_VE3_V172-7.2MWx10xHH214 + Hallakallio_VE1_V172-7.2MWx28xHH234

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

Noise sensitive area: J J - Lomarakennus

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
Pure tone penalty: 0 dB

Noise sensitive area: K K - Asuinrakennus

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
Pure tone penalty: 0 dB

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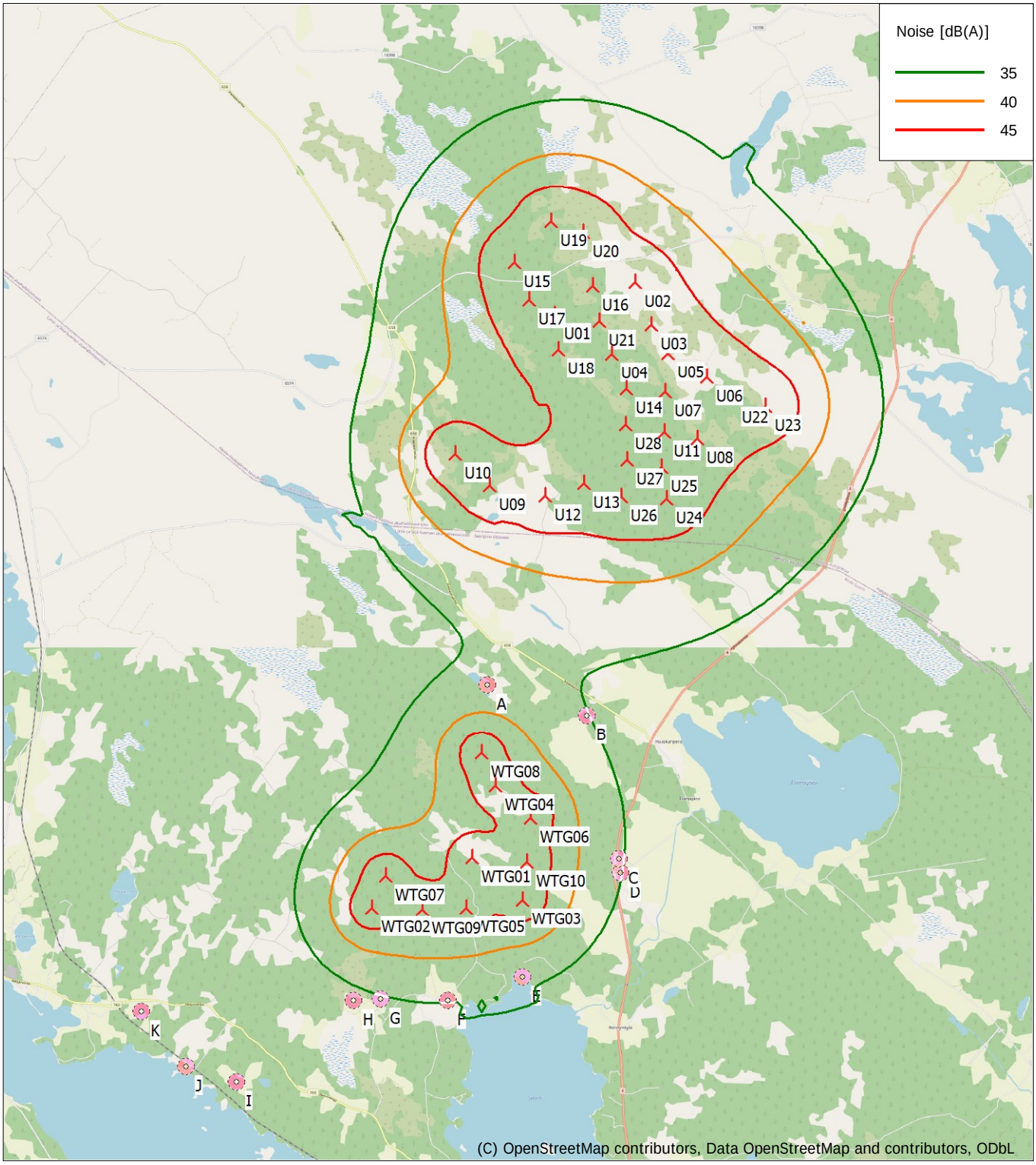
Calculated:
31.1.2024 10.38/3.6.355

DECIBEL - Map 8,0 m/s

Calculation: Uusimo_VE3_V172-7.2MWx10xHH214 + Hallakallio_VE1_V172-7.2MWx28xHH234



0 2,5 5 7,5 10km

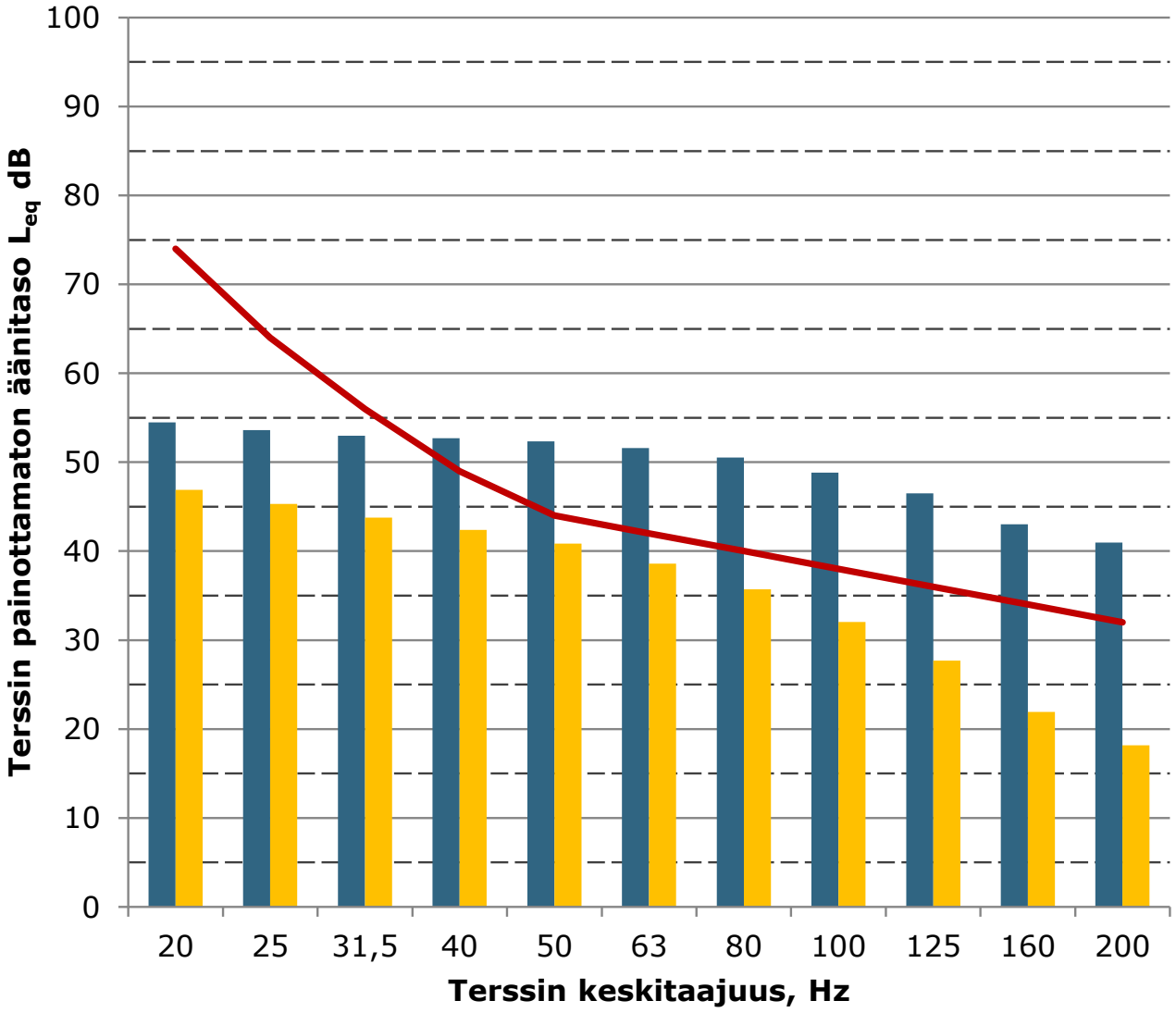
Map: EMD OpenStreetMap , Print scale 1:125 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 430 458 North: 7 043 770

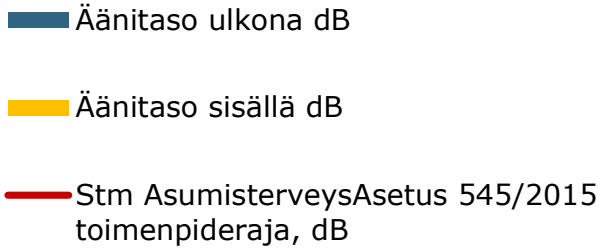
New WTG Noise sensitive area

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

Liite 13. Matalataajuisen melun yhteisvaikutuksen rakennuskohtaiset arvot – VE1

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



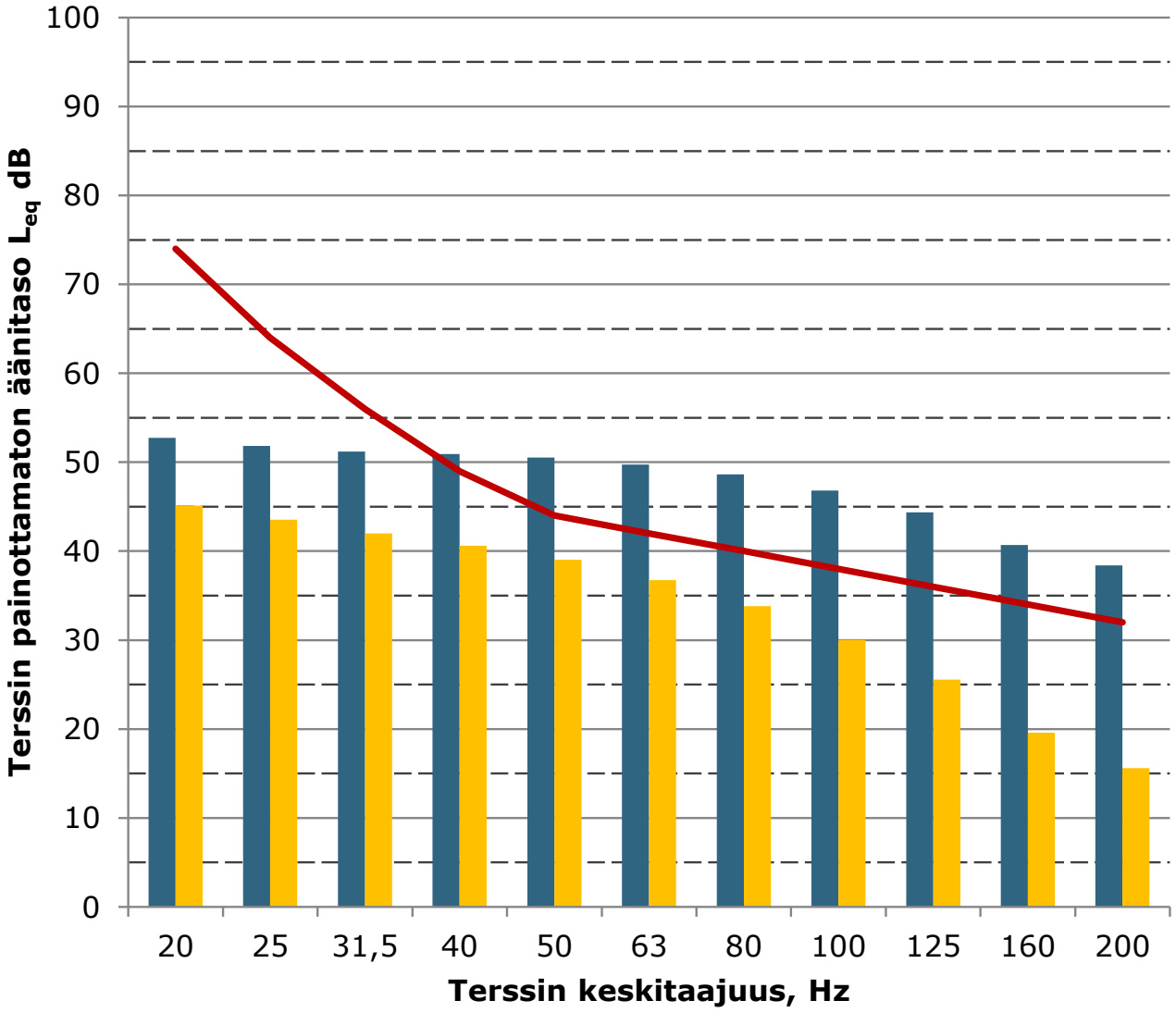


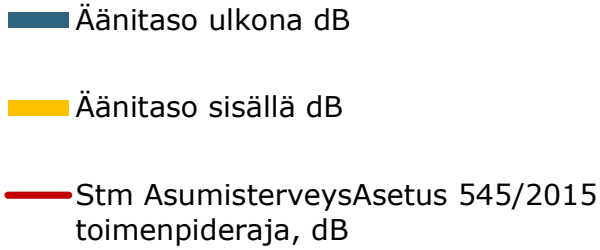
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2 + 2 dB	7,2 MW, 214 m,	21
Vestas V172-7.2 + 2 dB	7,2 MW, 234 m,	28

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.

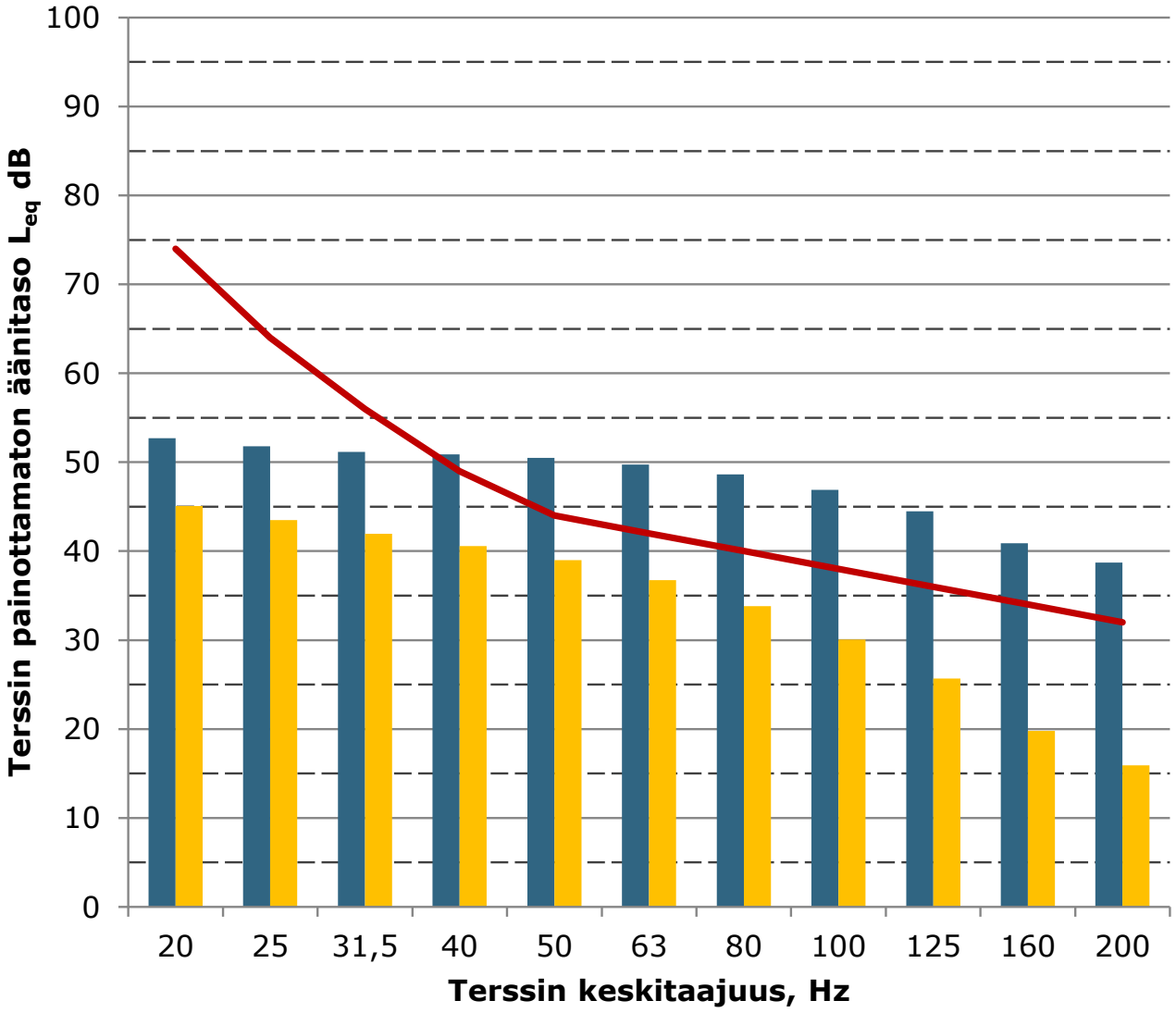
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus B, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

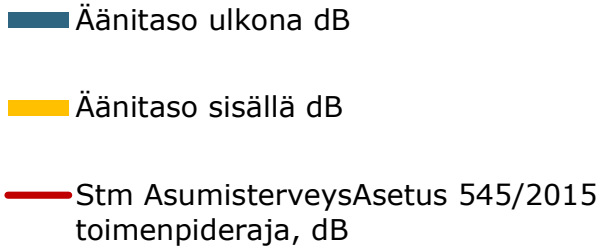




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 21
Vestas V172-7.2 + 2 dB 7,2 MW, 234 m, 28
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus C, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



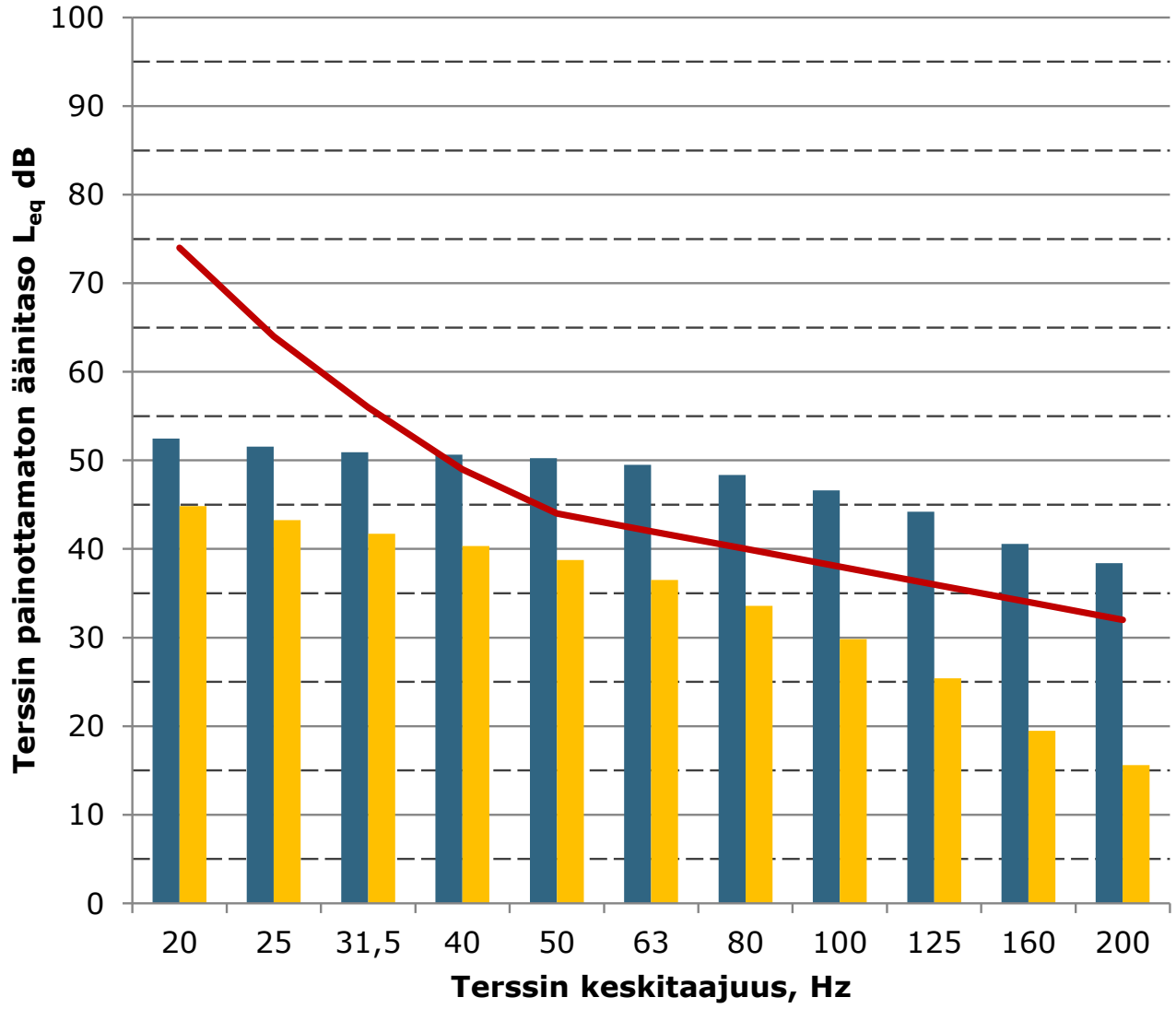


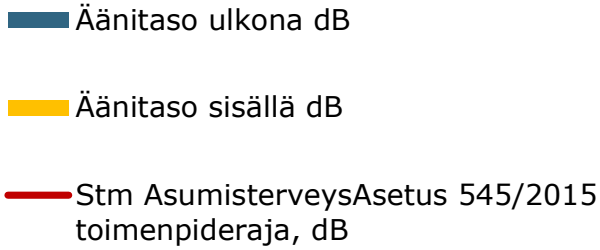
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2 + 2 dB	7,2 MW, 214 m,	21
Vestas V172-7.2 + 2 dB	7,2 MW, 234 m,	28

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.

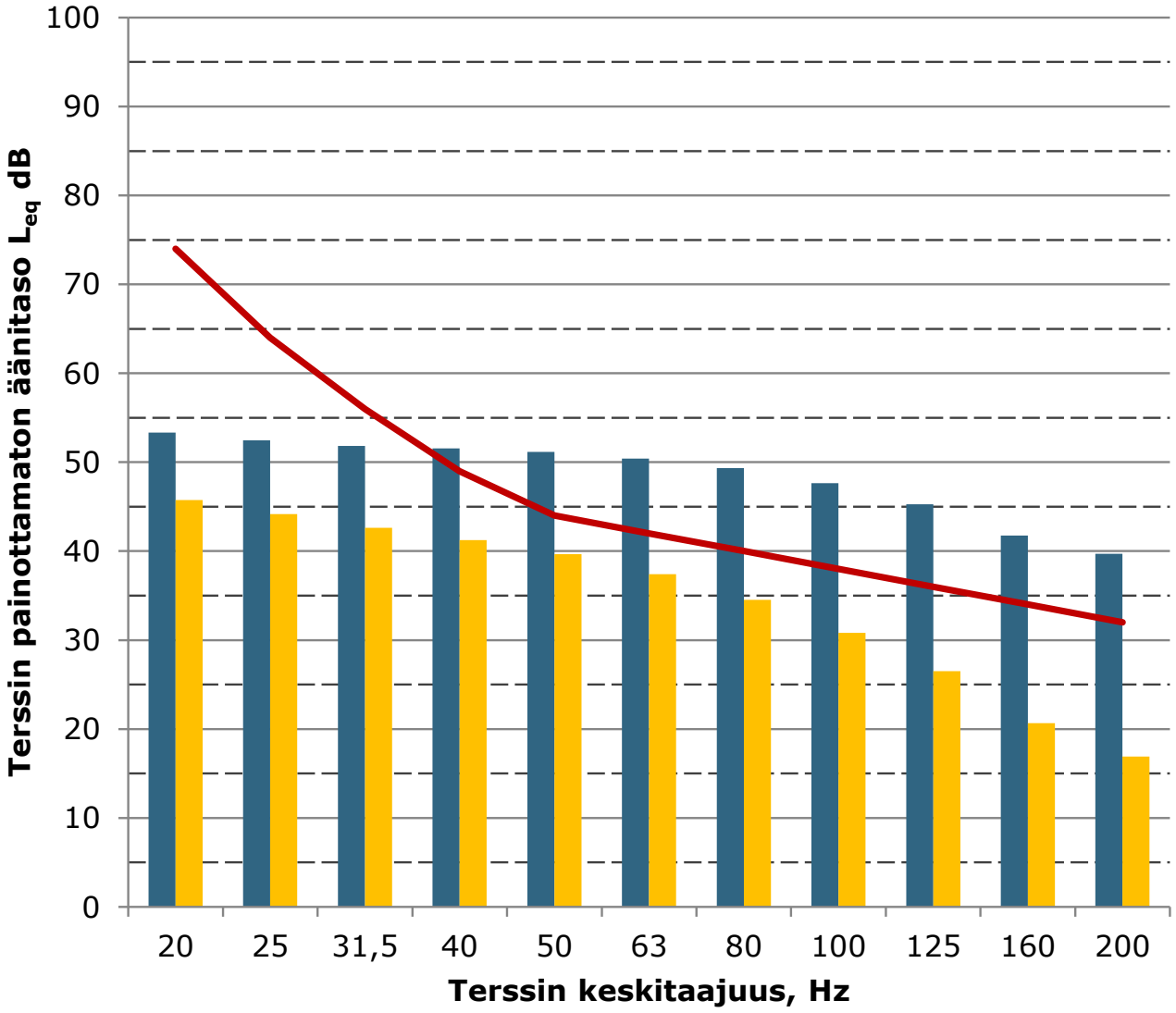
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus D, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

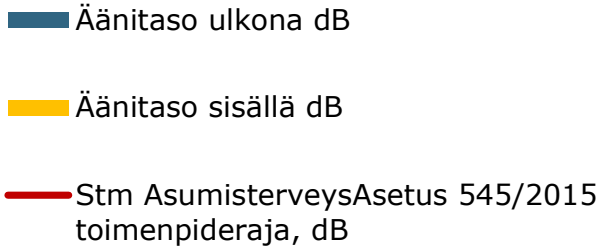




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 21
Vestas V172-7.2 + 2 dB 7,2 MW, 234 m, 28
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Matalien taajuuksien äänitasot ulkona ja sisällä, Lomarakennus E, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



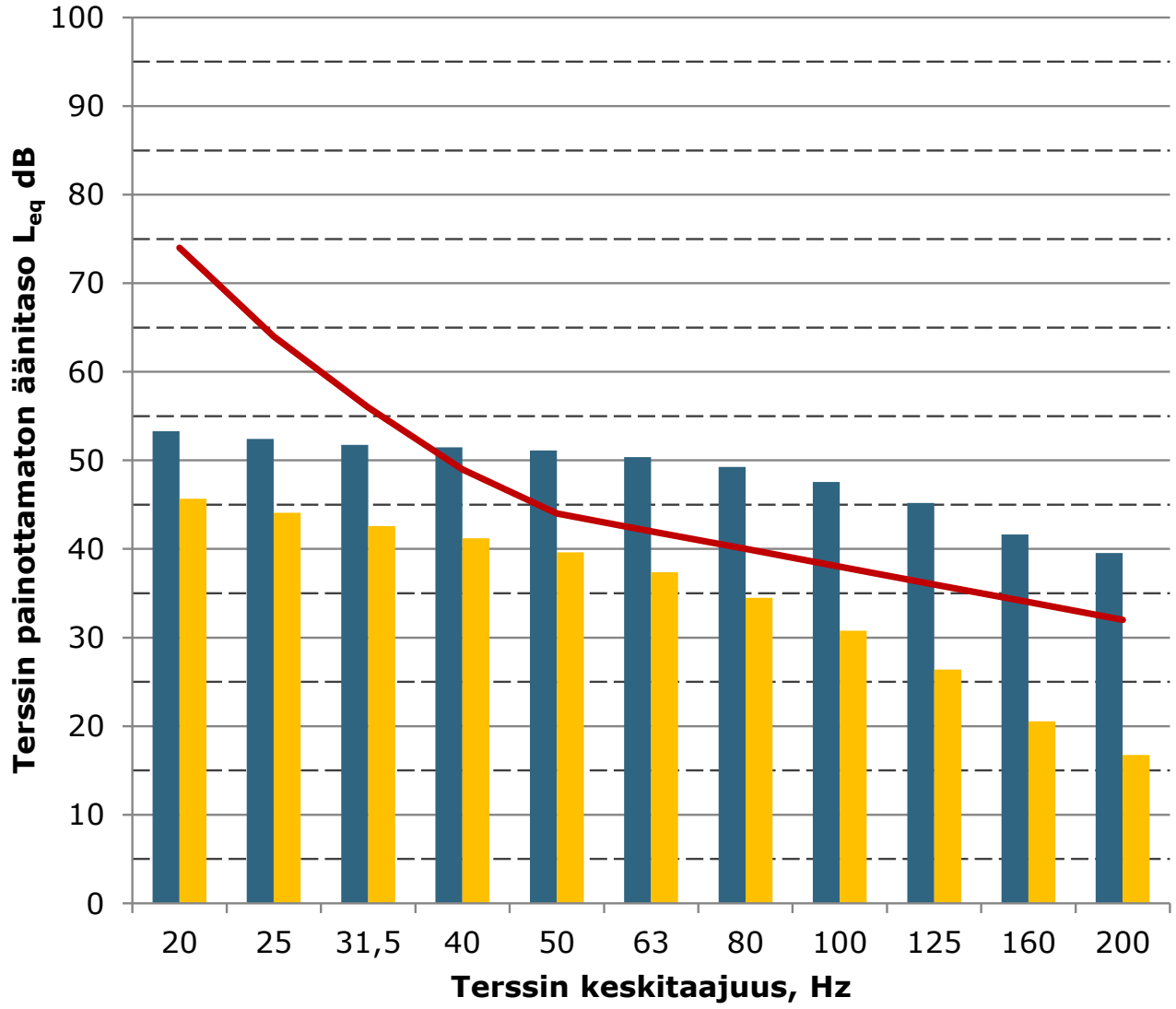


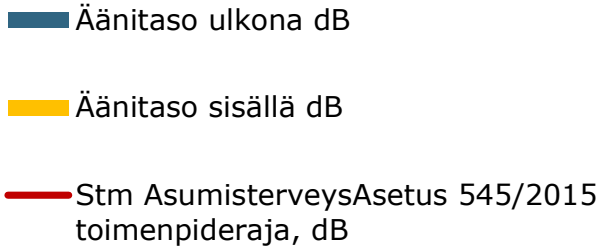
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2 + 2 dB	7,2 MW, 214 m,	21
Vestas V172-7.2 + 2 dB	7,2 MW, 234 m,	28

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.

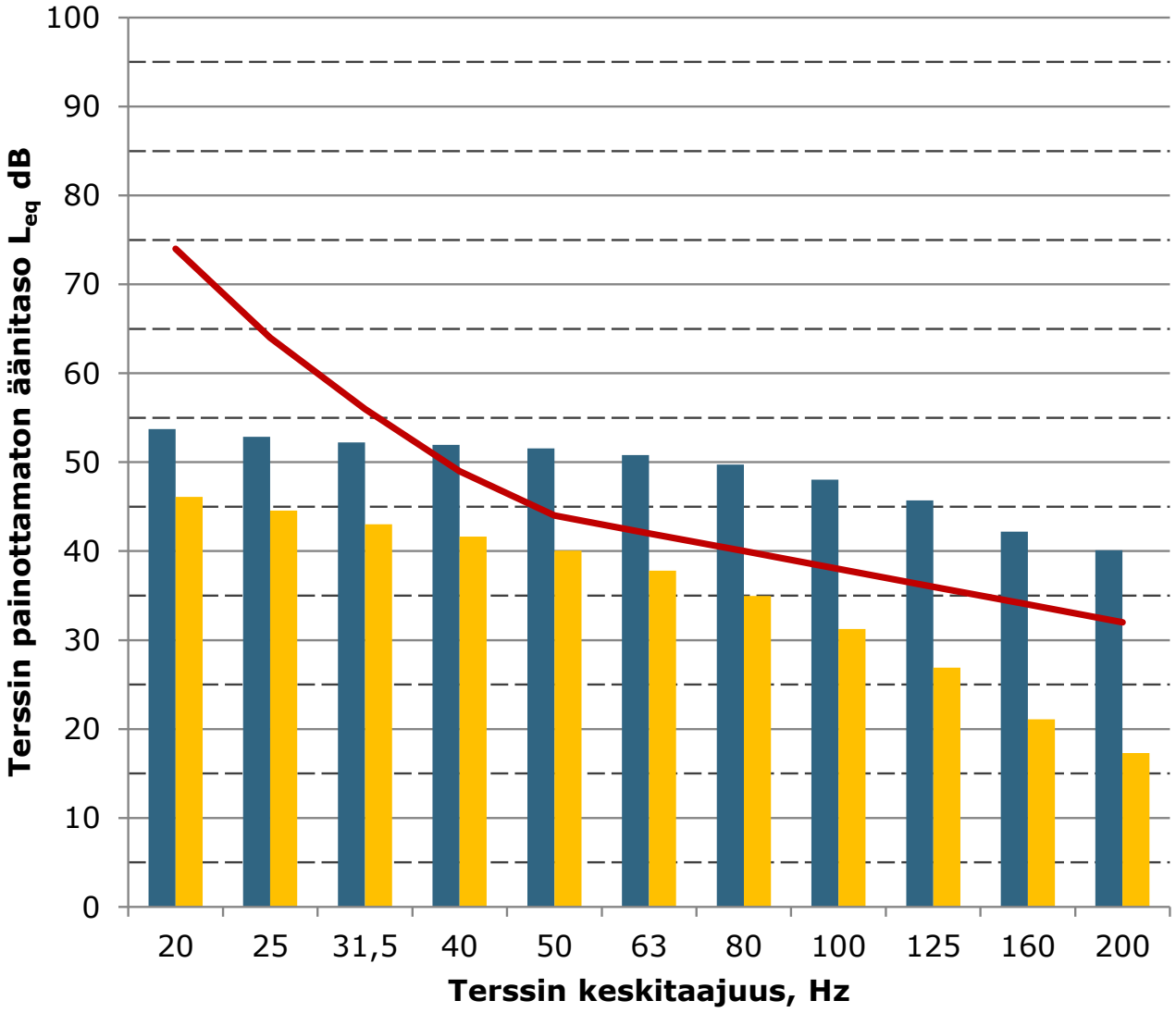
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus F, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

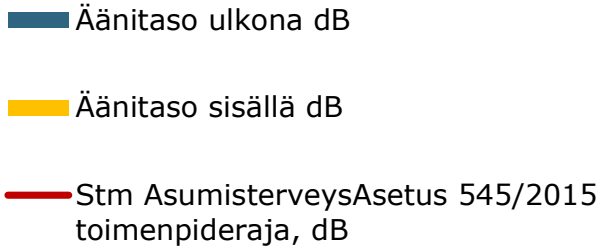




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 21
Vestas V172-7.2 + 2 dB 7,2 MW, 234 m, 28
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus G, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



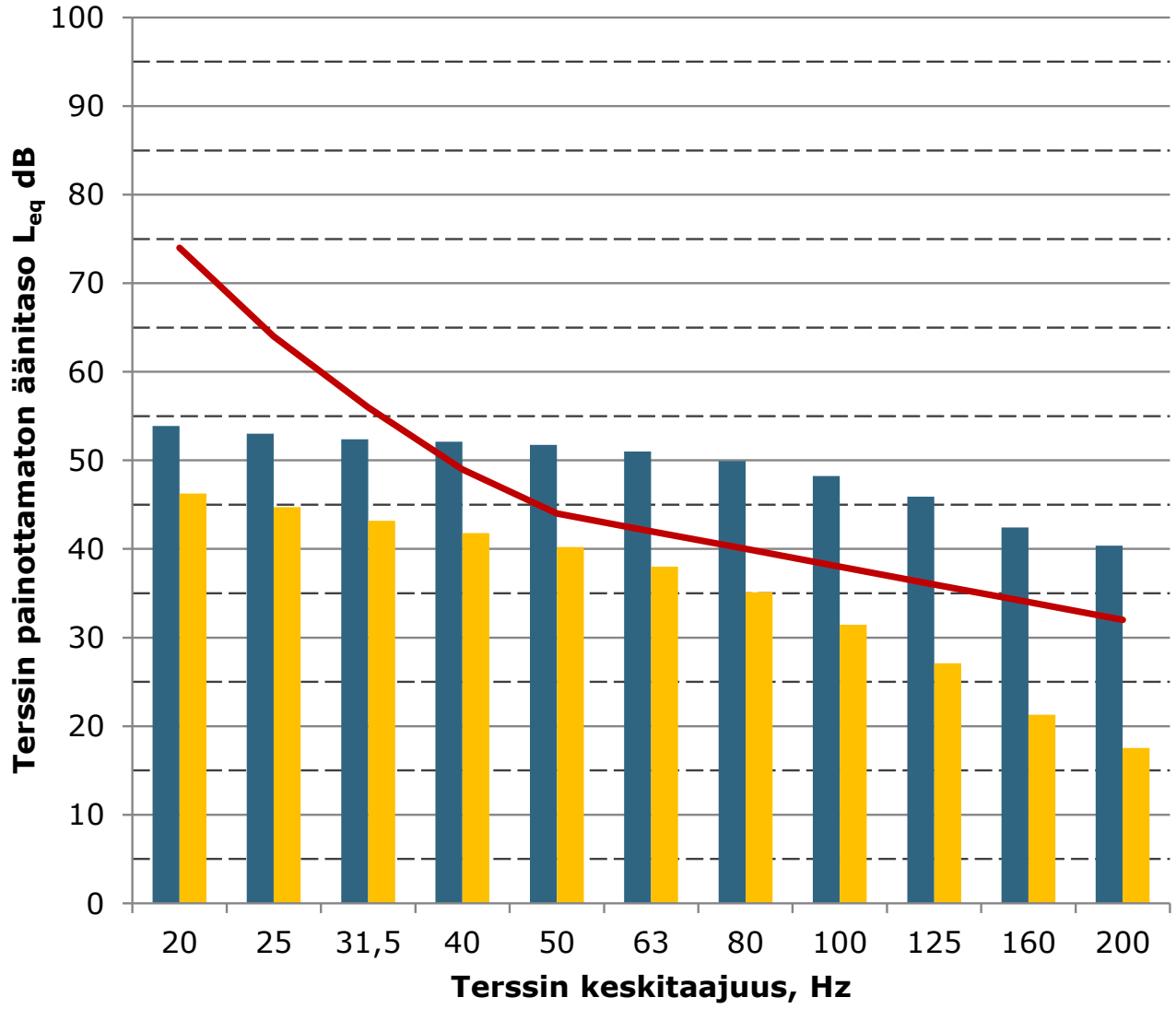


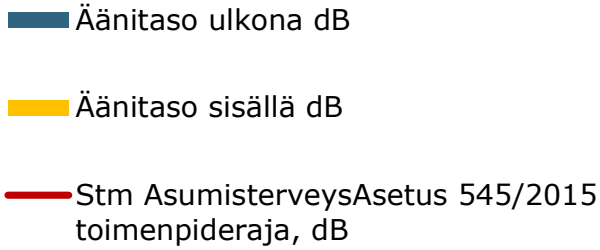
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2 + 2 dB	7,2 MW, 214 m,	21
Vestas V172-7.2 + 2 dB	7,2 MW, 234 m,	28

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.

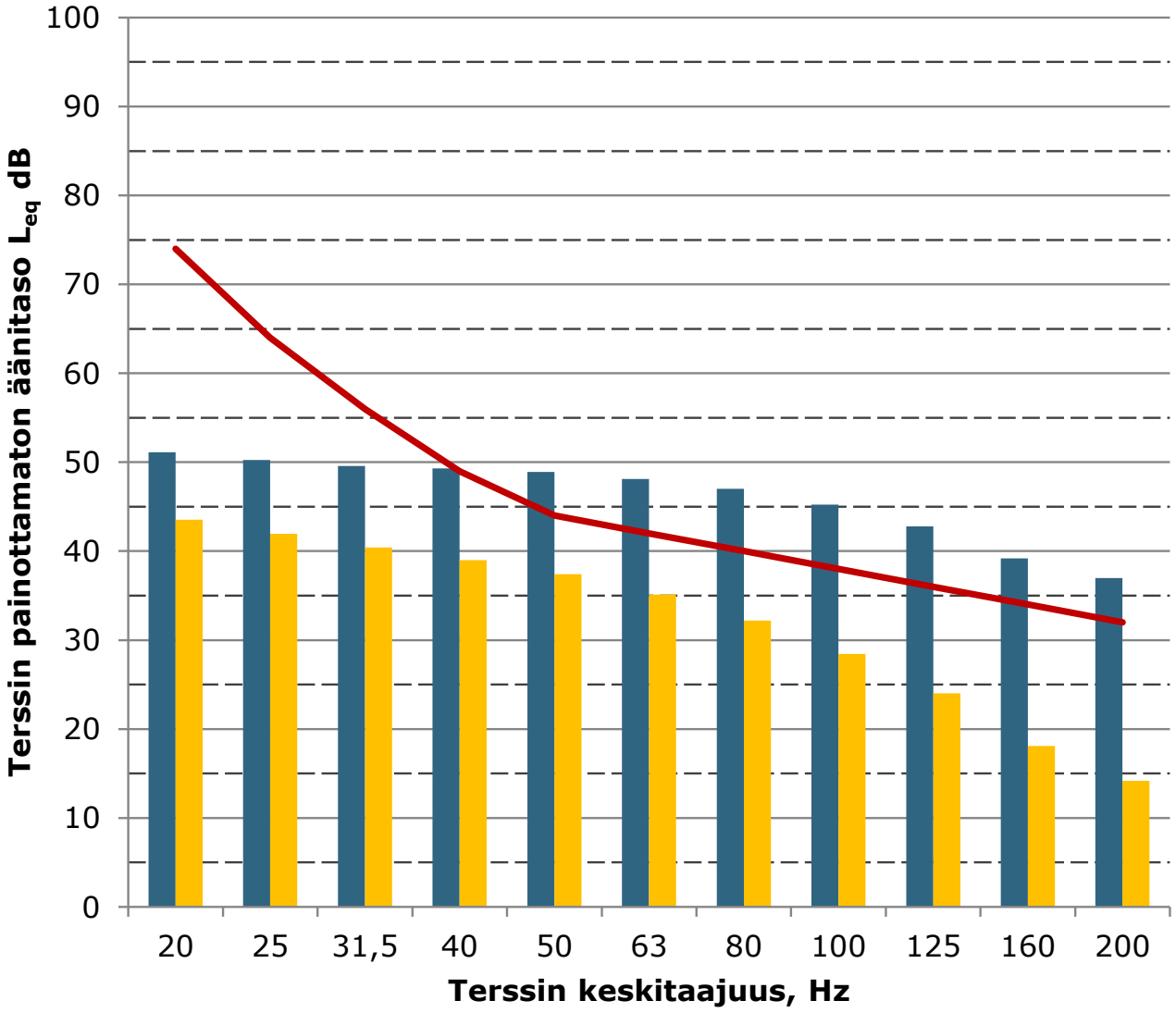
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus H, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

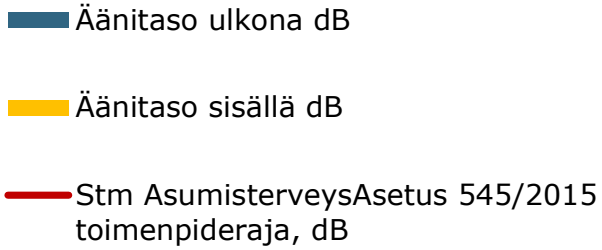




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V172-7.2 + 2 dB 7,2 MW, 214 m, 21
Vestas V172-7.2 + 2 dB 7,2 MW, 234 m, 28
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus I, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



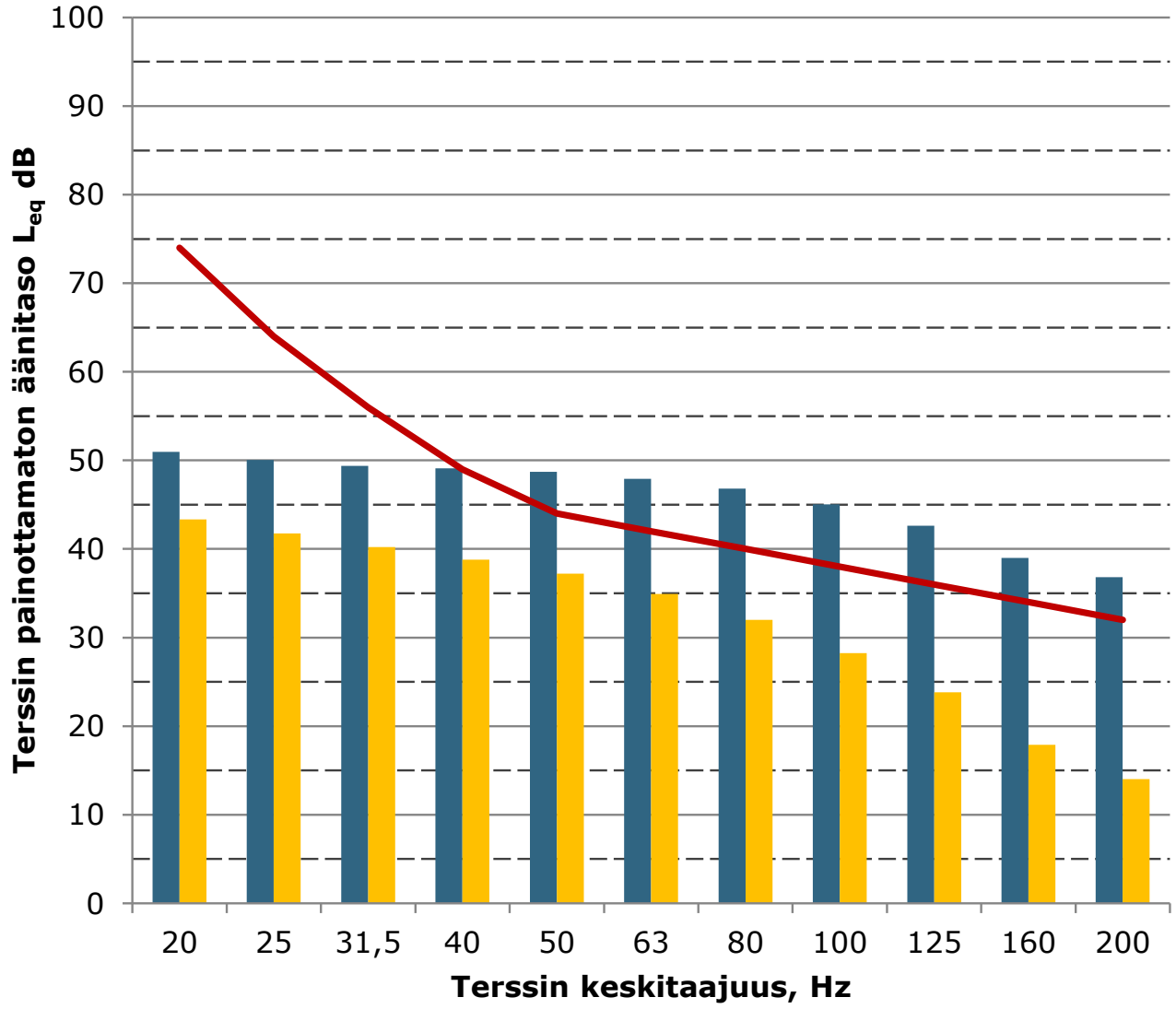


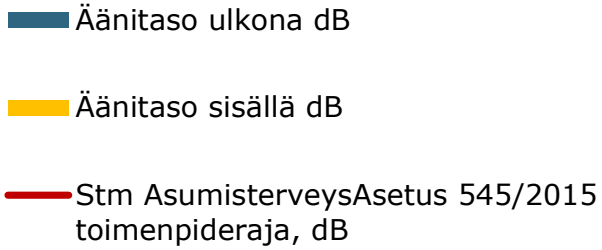
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2 + 2 dB	7,2 MW, 214 m,	21
Vestas V172-7.2 + 2 dB	7,2 MW, 234 m,	28

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, Lomarakennus J, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



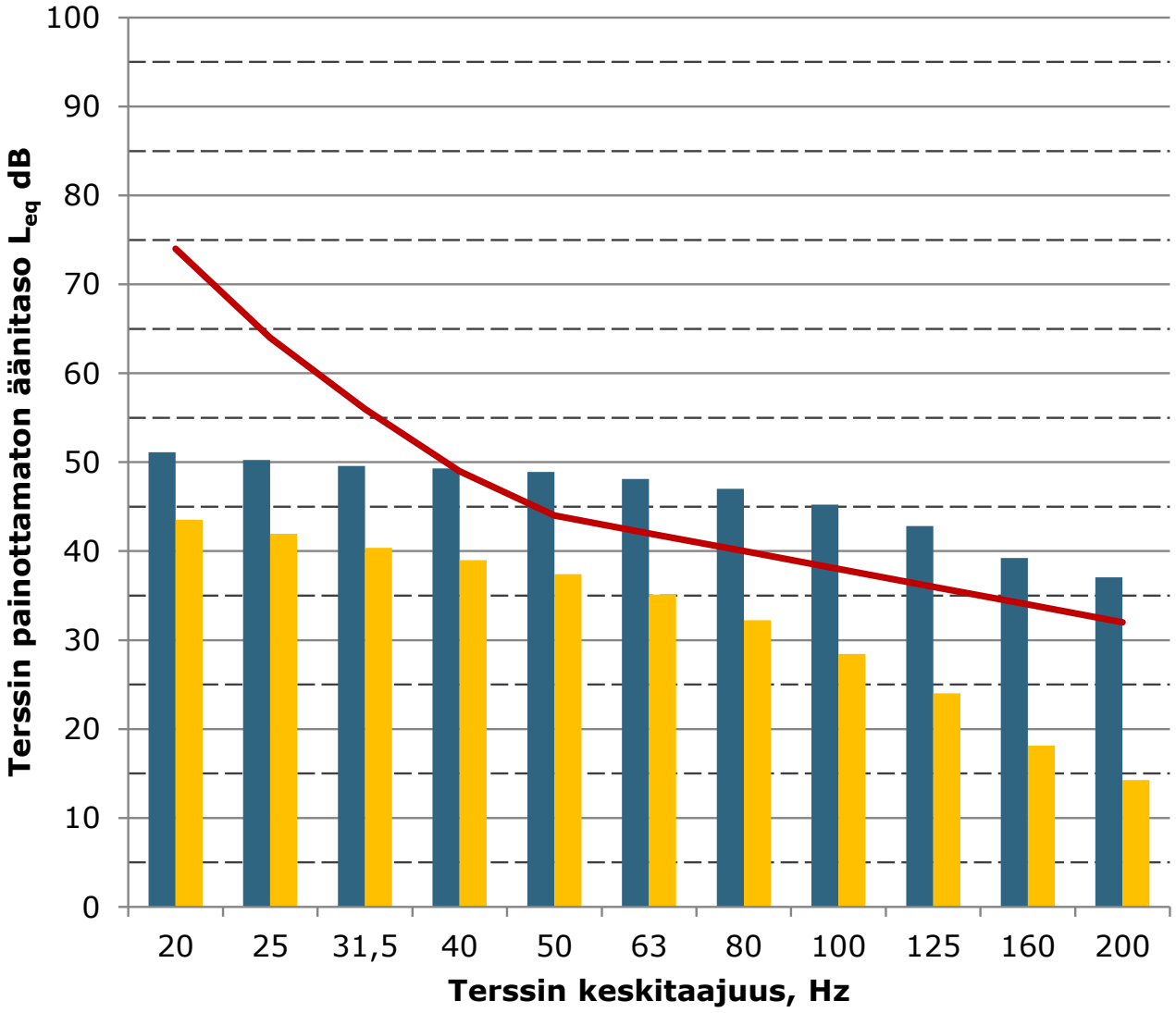


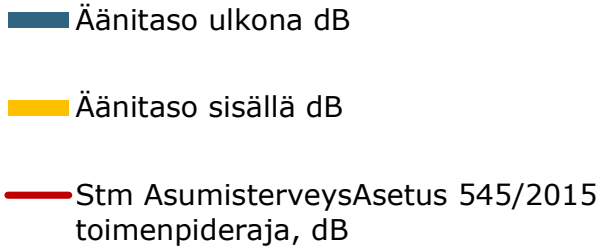
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2 + 2 dB 7,2 MW	214 m,	21
Vestas V172-7.2 + 2 dB 7,2 MW	234 m,	28

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, Asuinrakennus K, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan





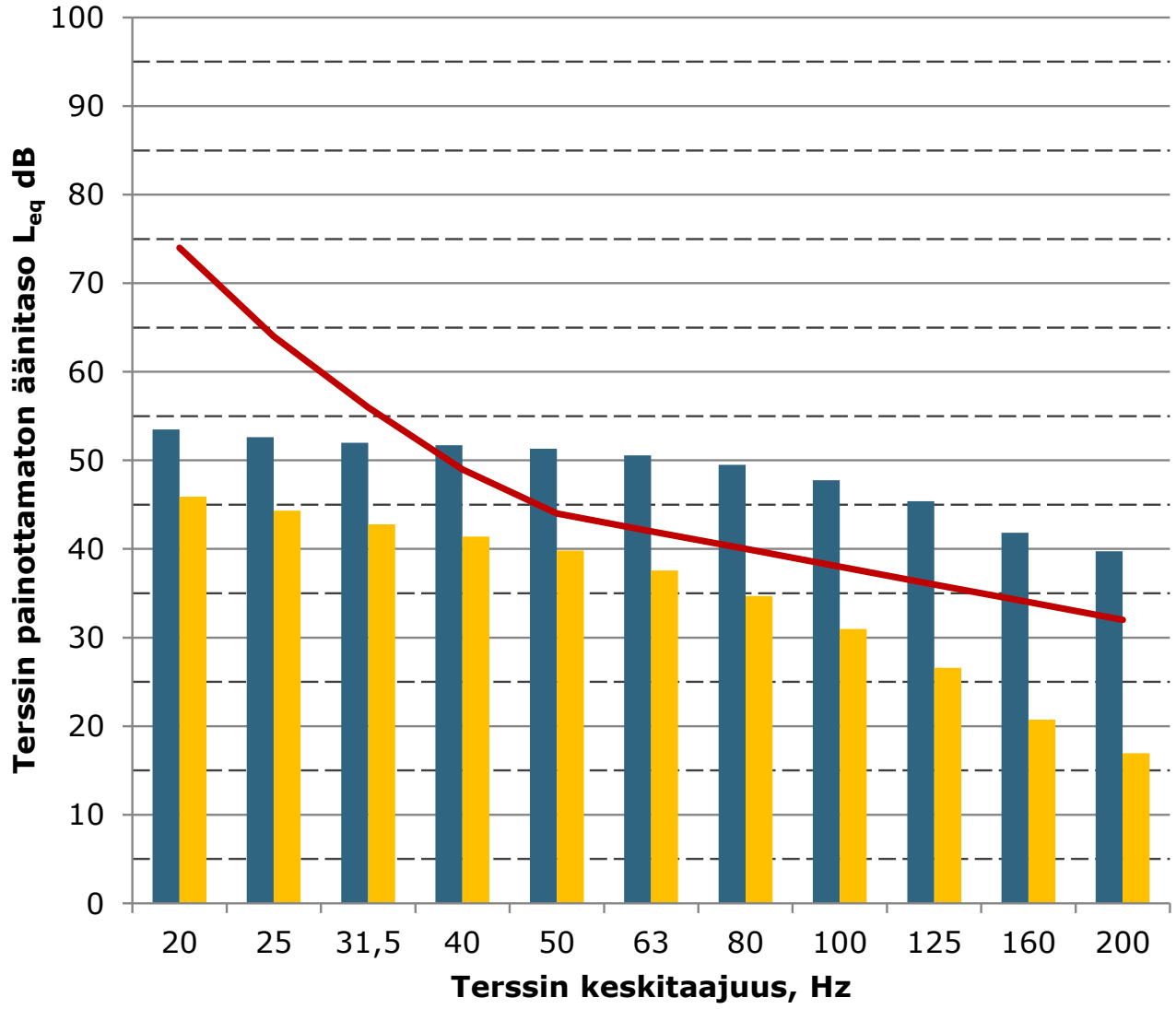
Tiedot rakennuksista ja voimaloista WindPro-raportista:

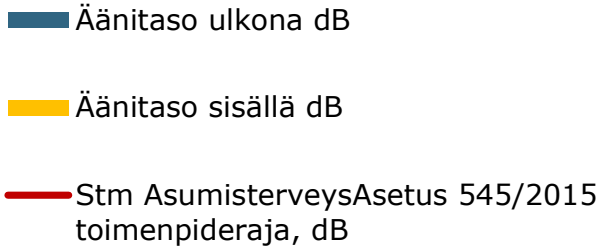
Voimalat	napakorkeus	kpl
Vestas V172-7.2 + 2 dB	7,2 MW, 214 m,	21
Vestas V172-7.2 + 2 dB	7,2 MW, 234 m,	28

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 14. Matalataajuisen melun yhteisvaikutuksen rakennuskohtaiset arvot – VE2

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



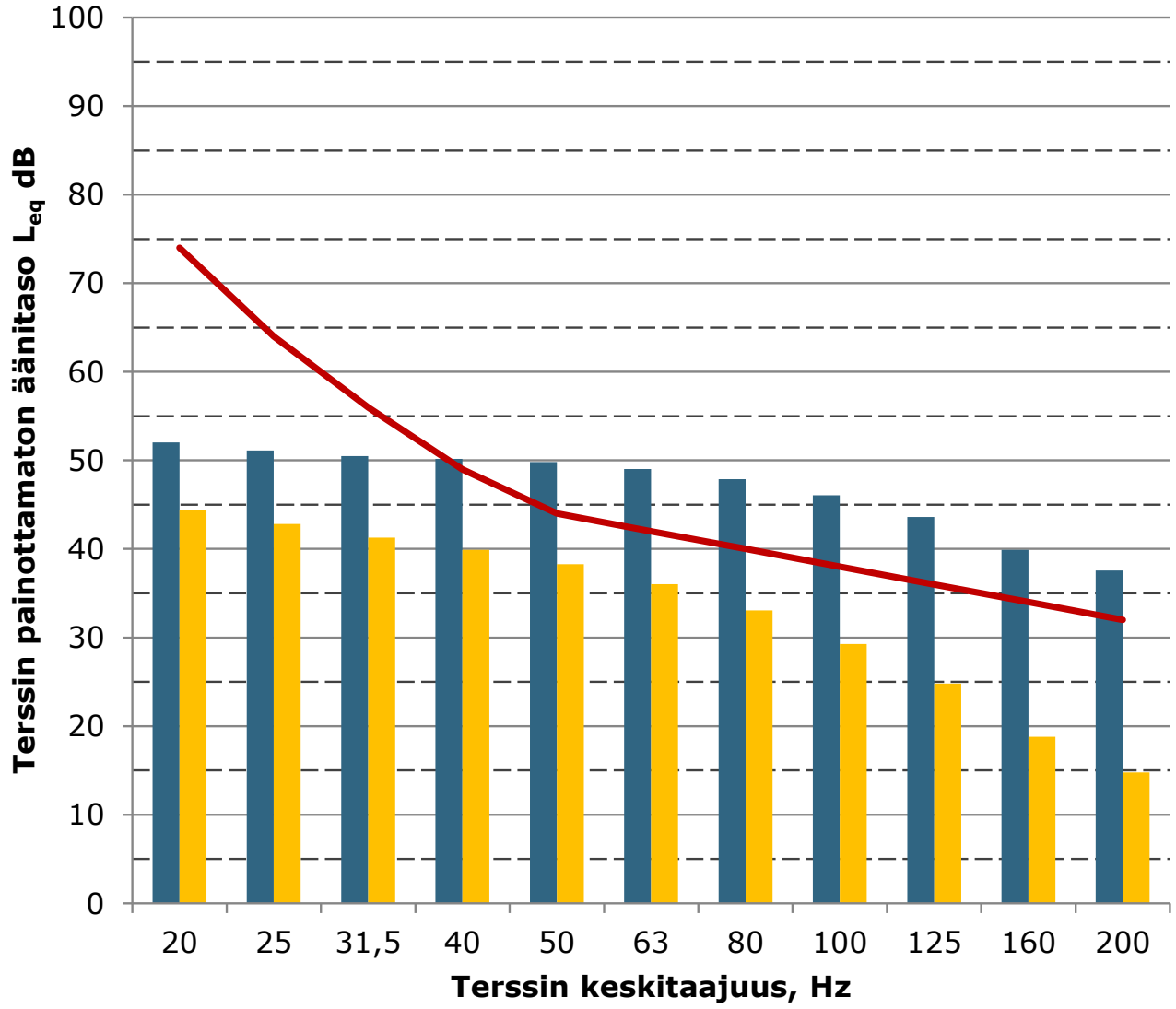


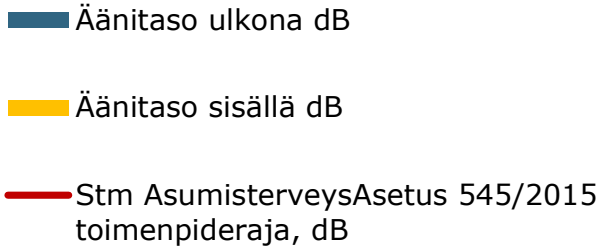
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2 + 2 dB	7,2 MW, 214 m,	18
Vestas V172-7.2 + 2 dB	7,2 MW, 234 m,	28

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, Asuinrakennus B, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



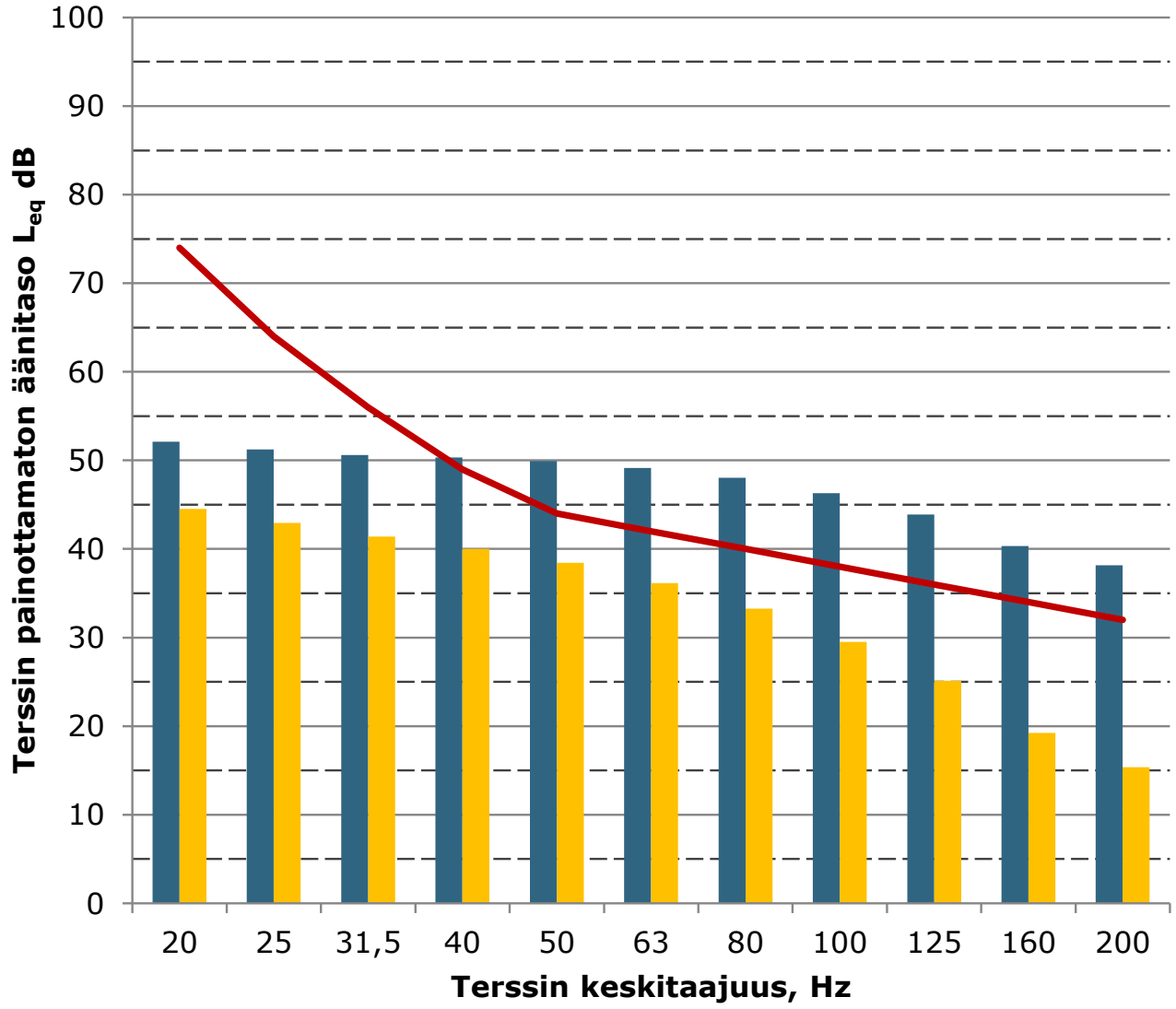


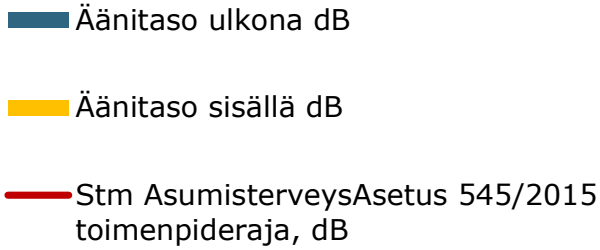
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2 + 2 dB	7,2 MW, 214 m,	18
Vestas V172-7.2 + 2 dB	7,2 MW, 234 m,	28

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, Asuinrakennus C, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



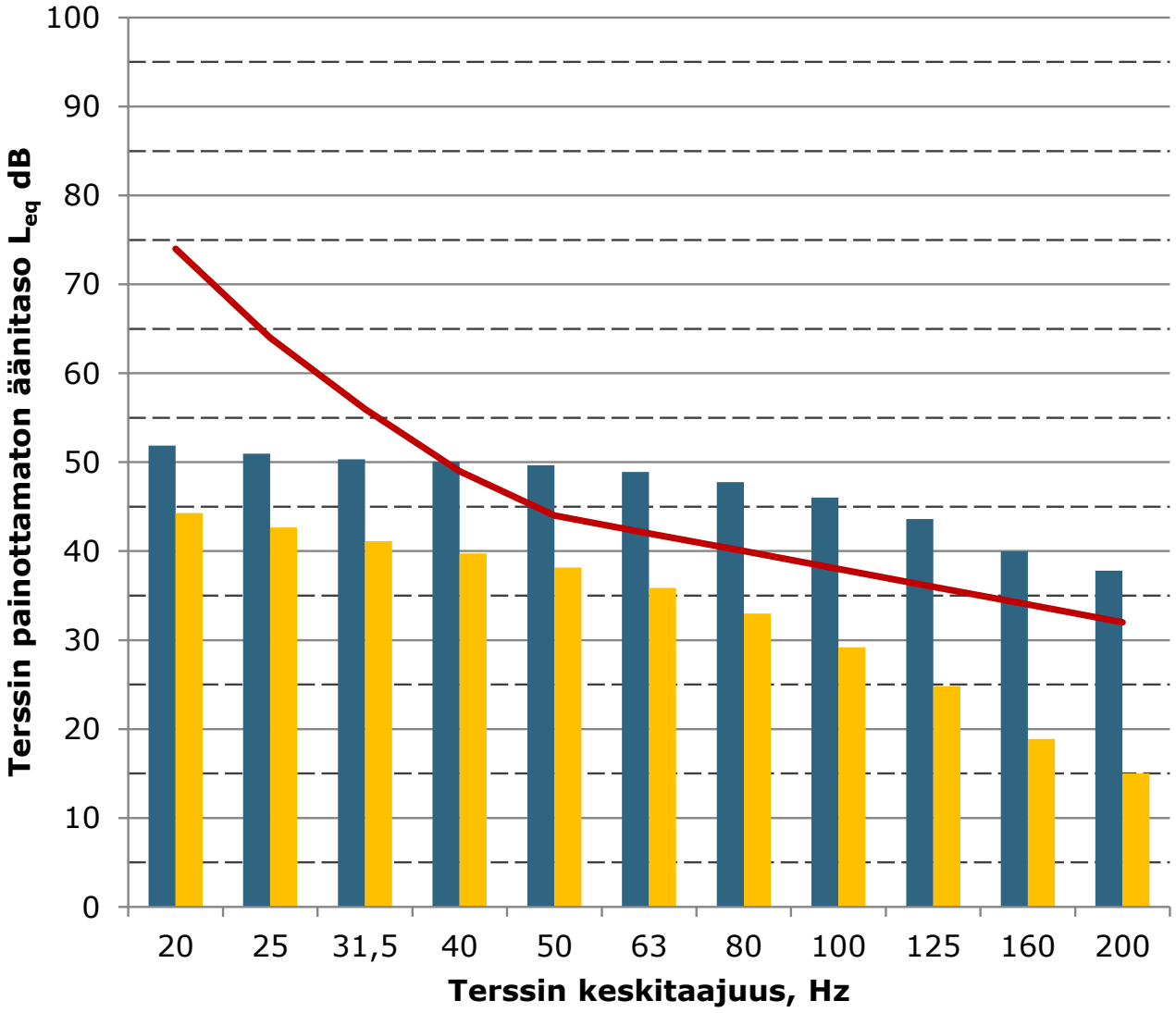


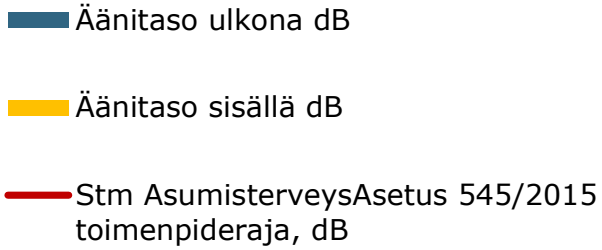
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2 + 2 dB	7,2 MW, 214 m,	18
Vestas V172-7.2 + 2 dB	7,2 MW, 234 m,	28

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, Asuinrakennus D, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



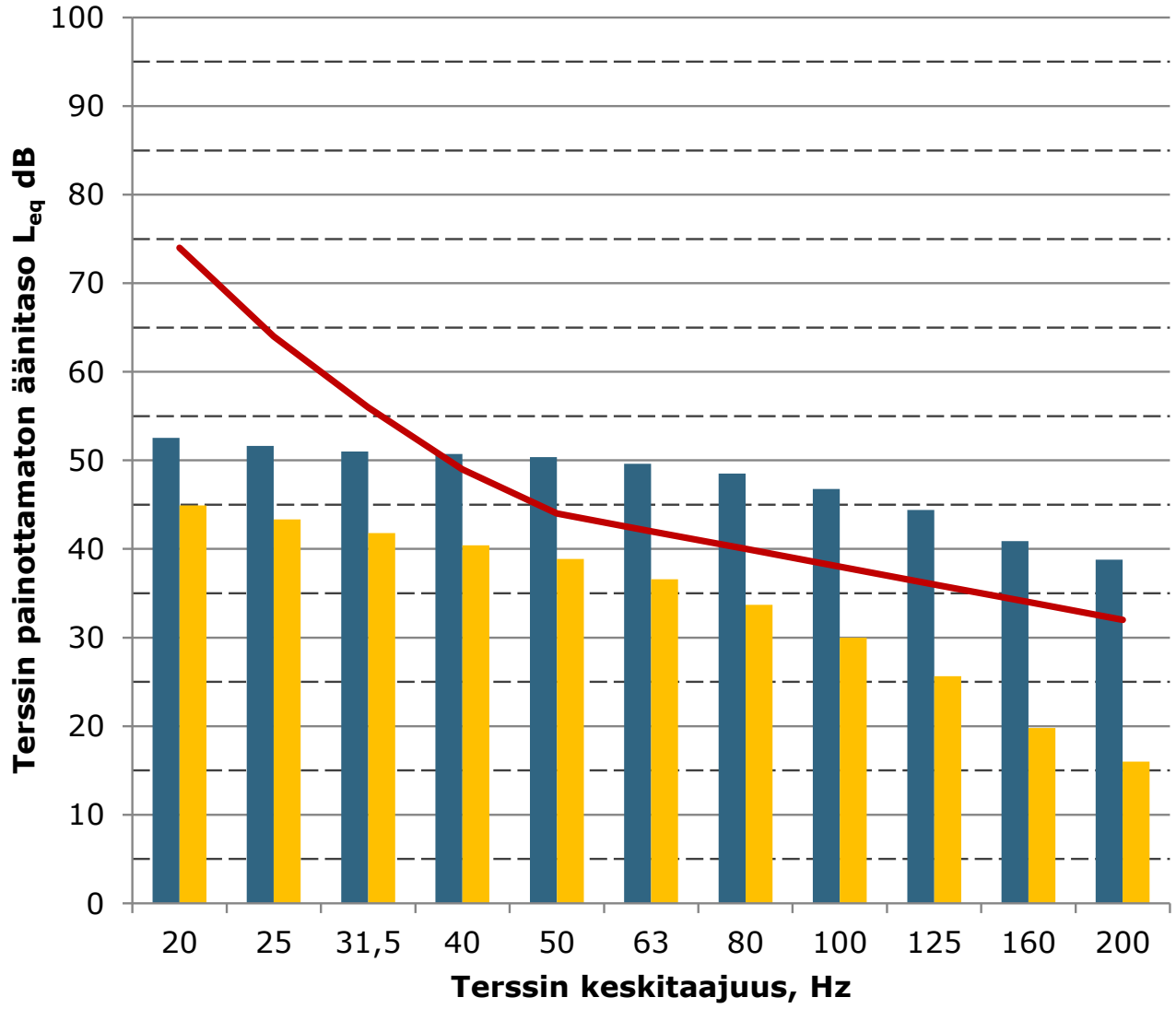


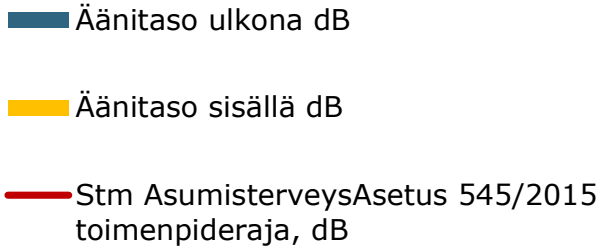
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2 + 2 dB	7,2 MW, 214 m,	18
Vestas V172-7.2 + 2 dB	7,2 MW, 234 m,	28

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, Lomarakennus E, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



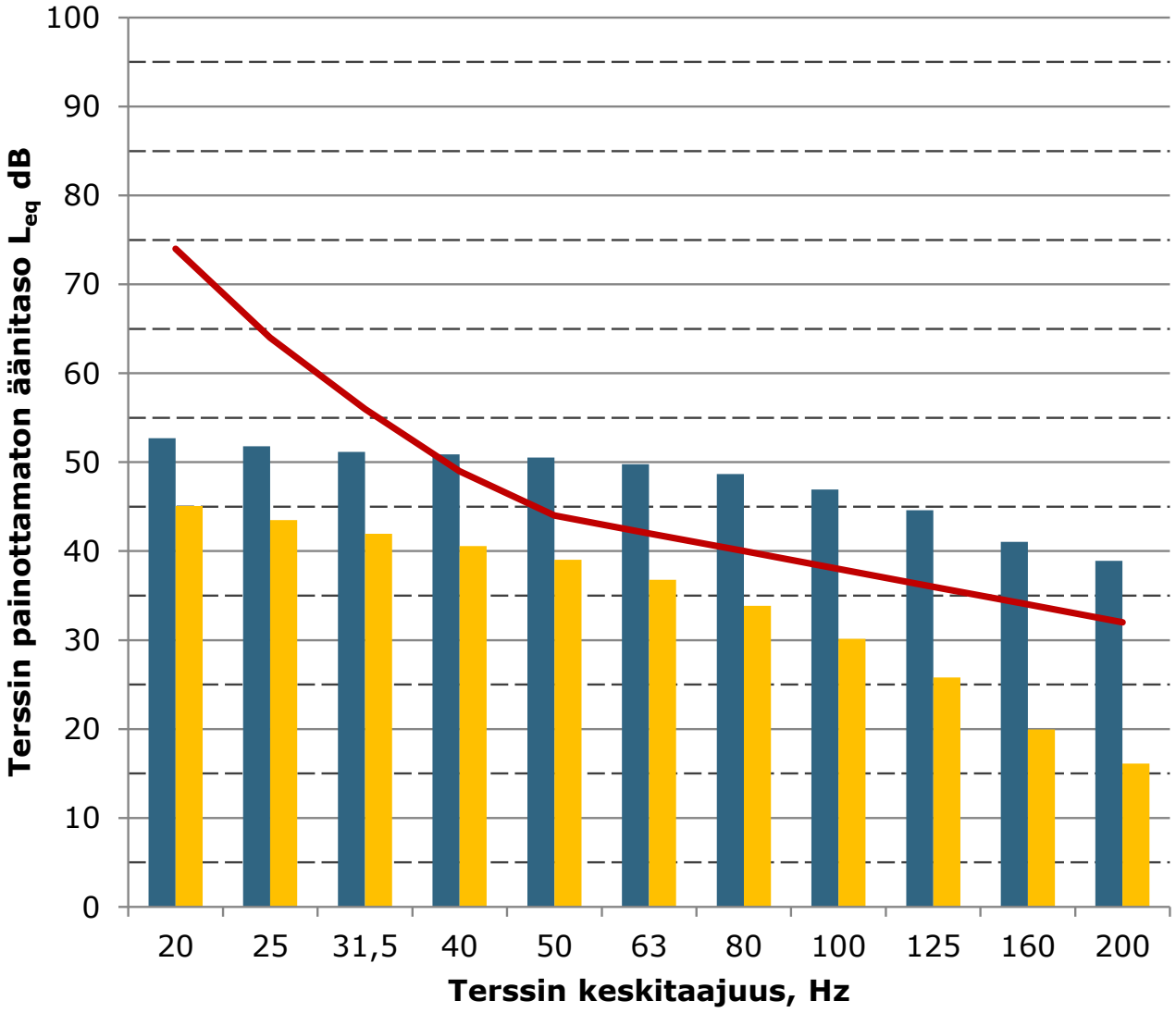


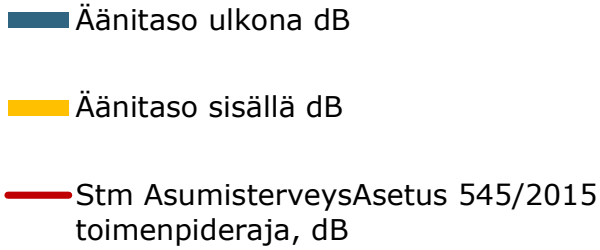
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2 + 2 dB	7,2 MW, 214 m,	18
Vestas V172-7.2 + 2 dB	7,2 MW, 234 m,	28

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, Asuinrakennus F, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



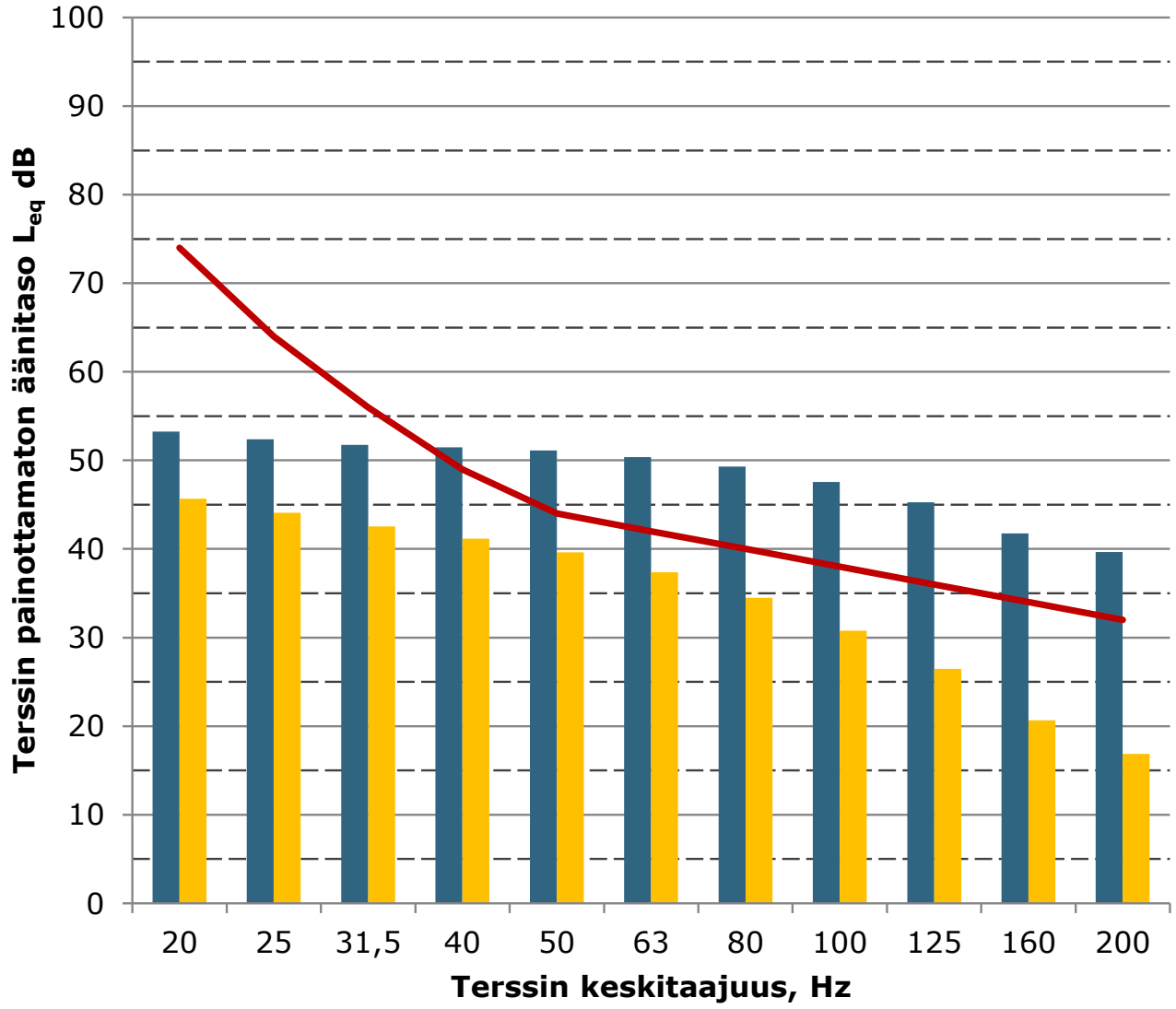


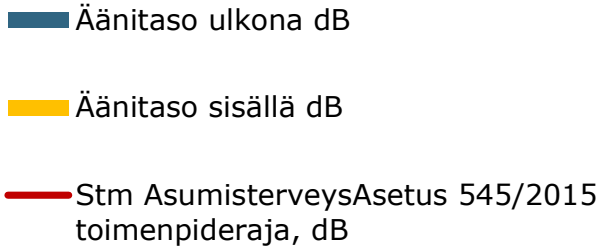
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2 + 2 dB	7,2 MW, 214 m,	18
Vestas V172-7.2 + 2 dB	7,2 MW, 234 m,	28

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, Asuinrakennus G, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



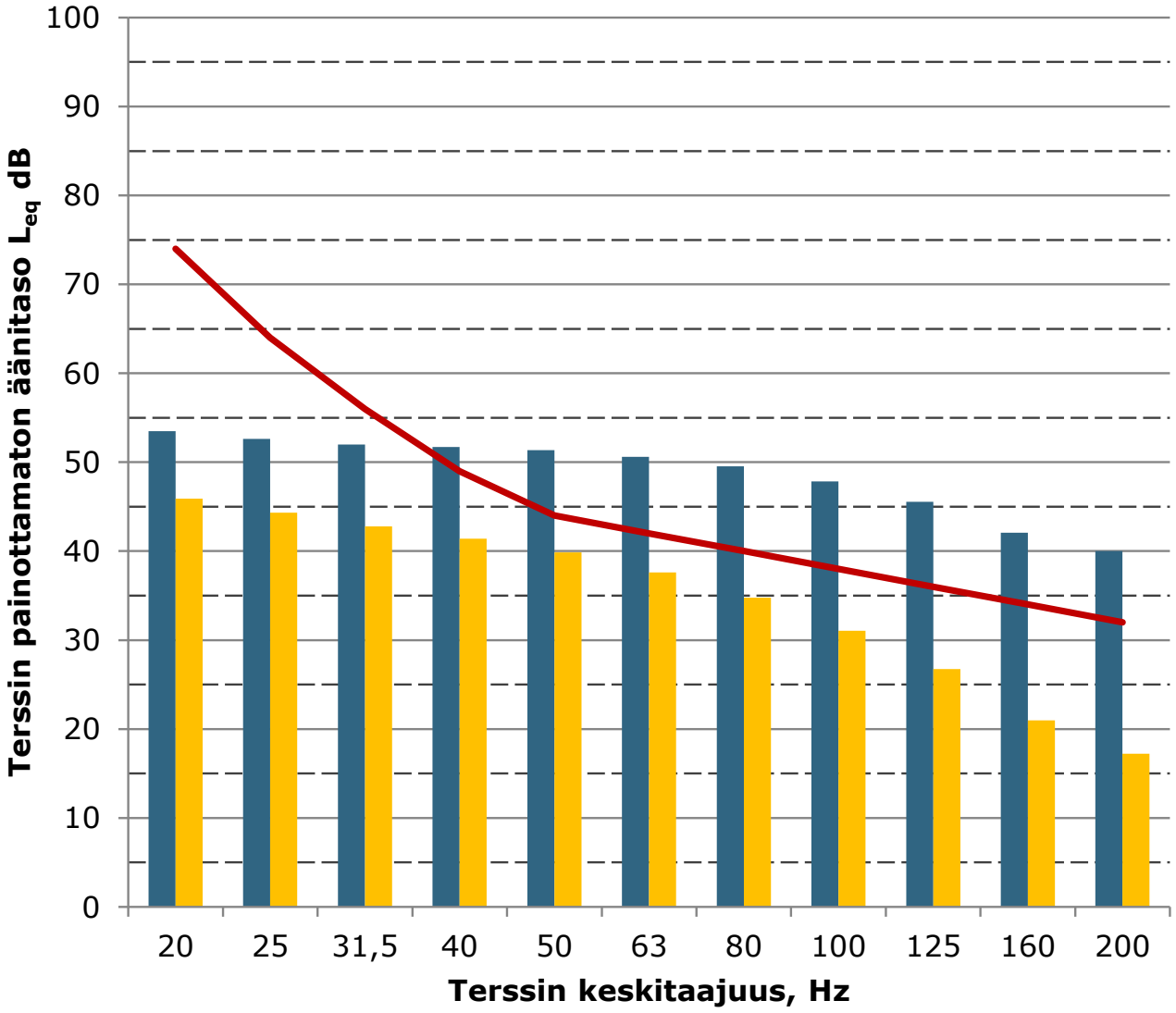


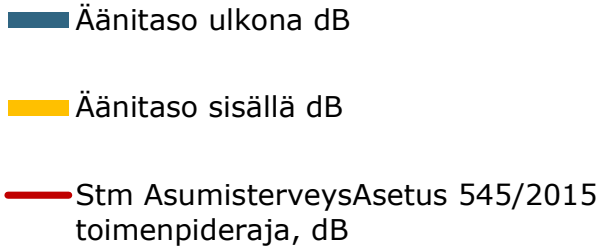
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2 + 2 dB	7,2 MW, 214 m,	18
Vestas V172-7.2 + 2 dB	7,2 MW, 234 m,	28

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, Asuinrakennus H, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



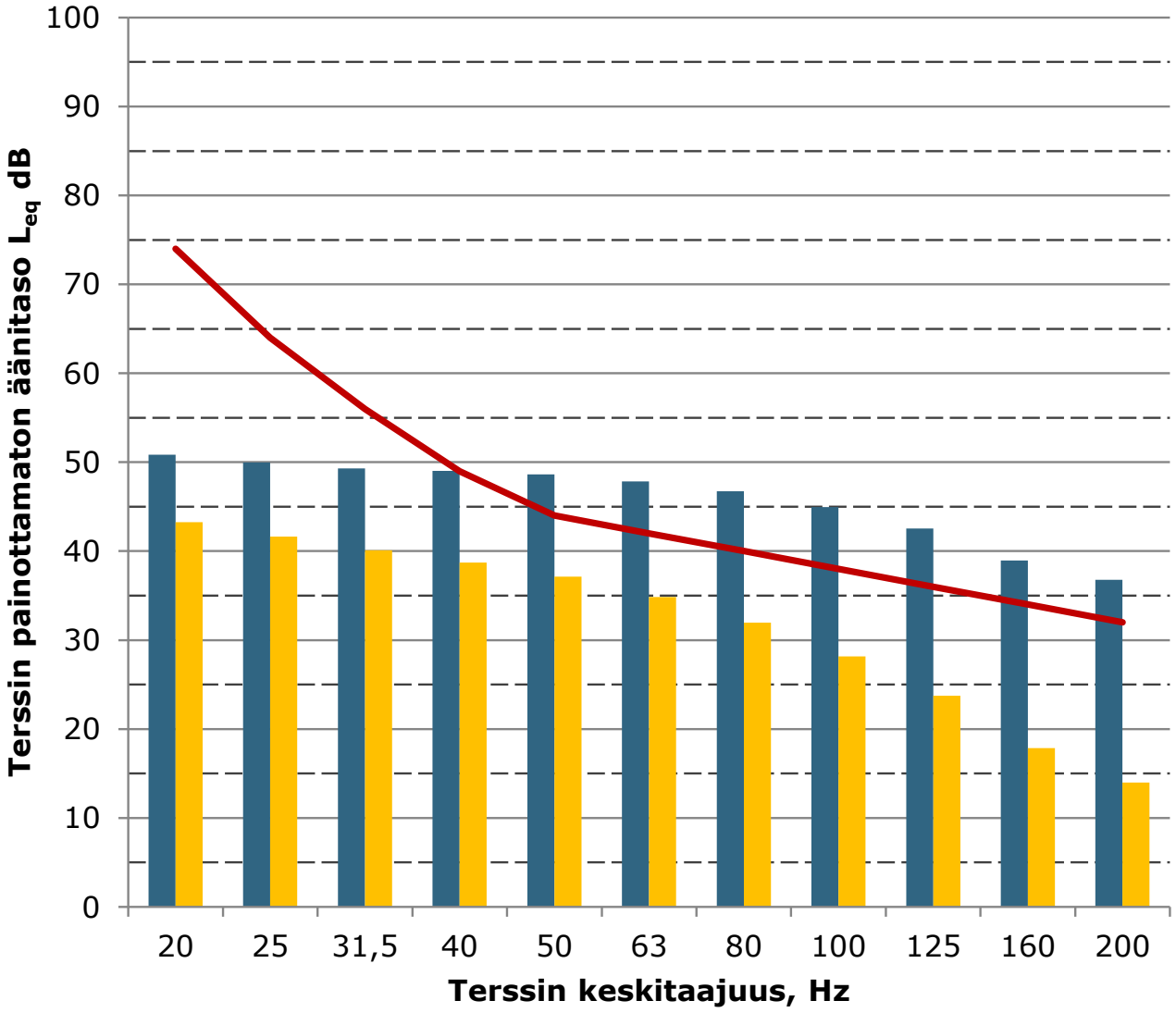


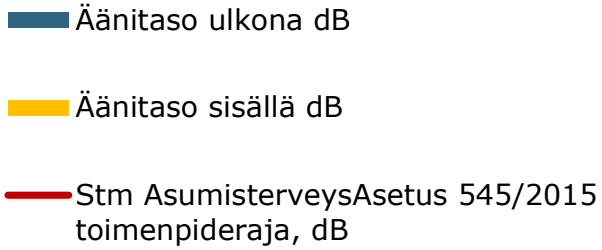
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2 + 2 dB 7,2 MW	214 m,	18
Vestas V172-7.2 + 2 dB 7,2 MW	234 m,	28

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, Asuinrakennus I, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



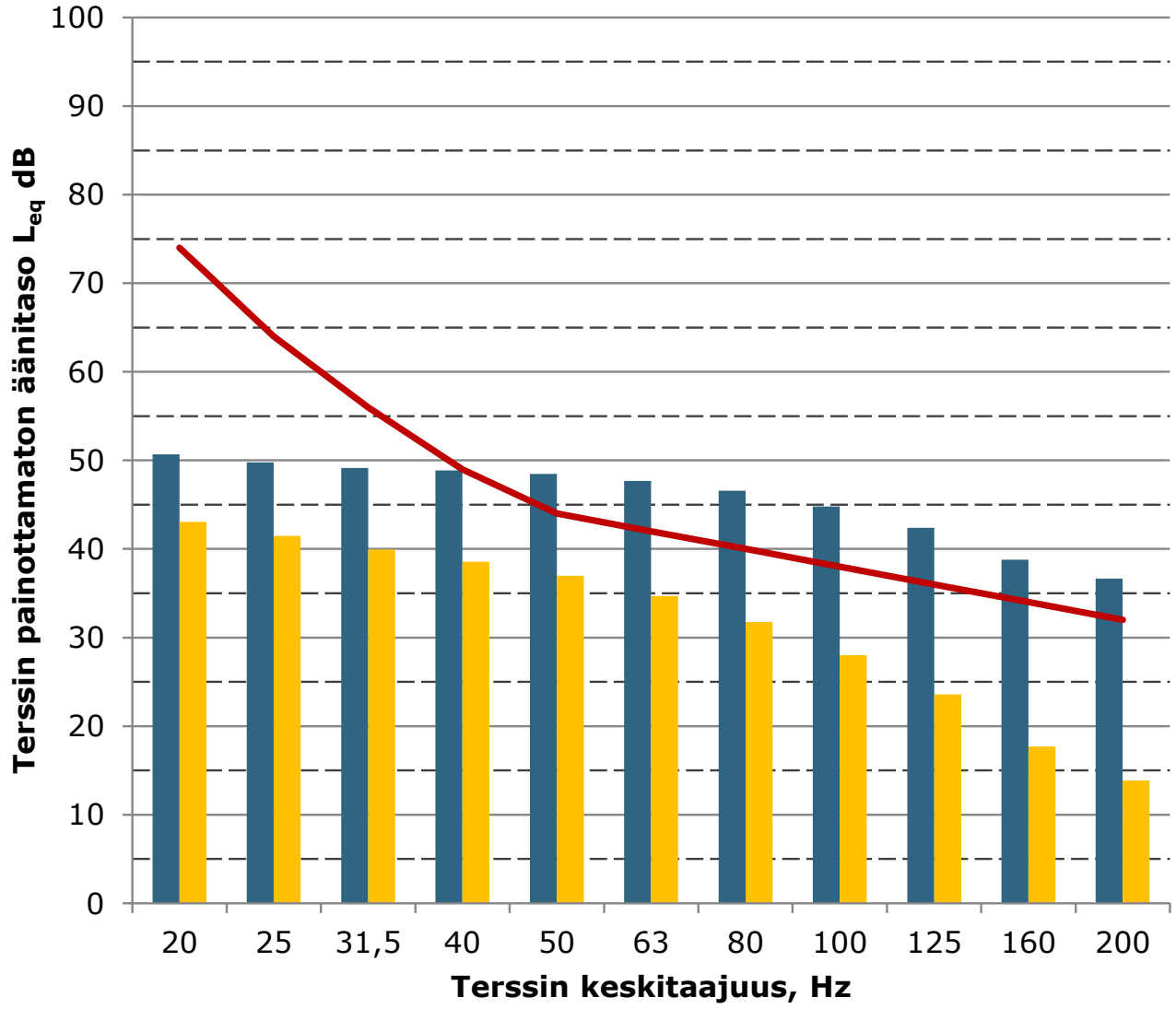


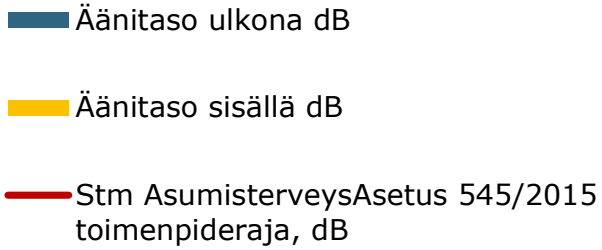
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2 + 2 dB	7,2 MW, 214 m,	18
Vestas V172-7.2 + 2 dB	7,2 MW, 234 m,	28

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, Lomarakennus J, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



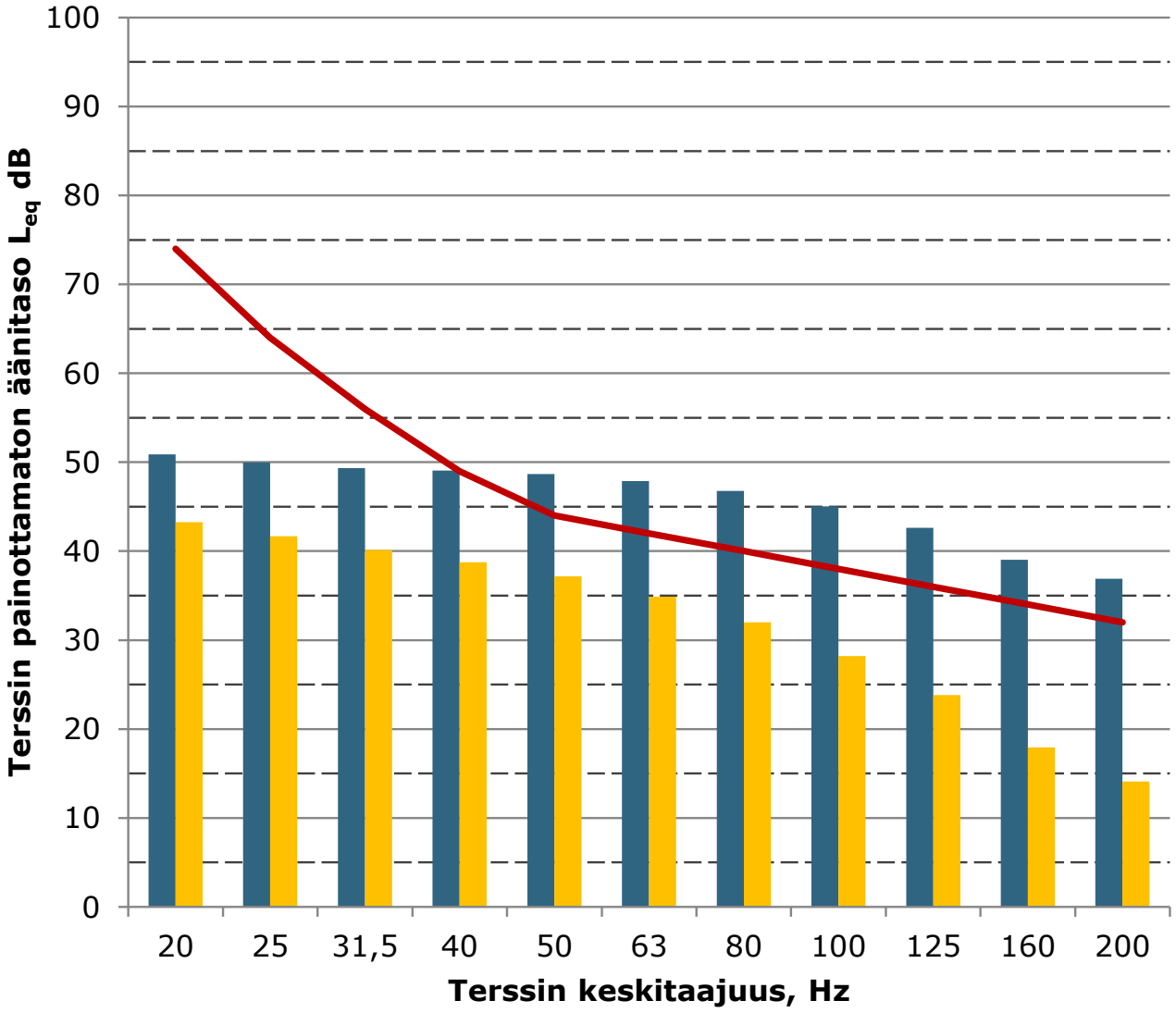


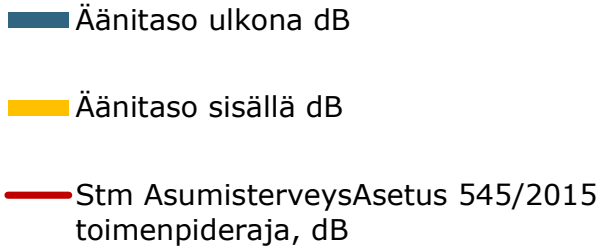
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2 + 2 dB	7,2 MW, 214 m,	18
Vestas V172-7.2 + 2 dB	7,2 MW, 234 m,	28

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, Asuinrakennus K, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan





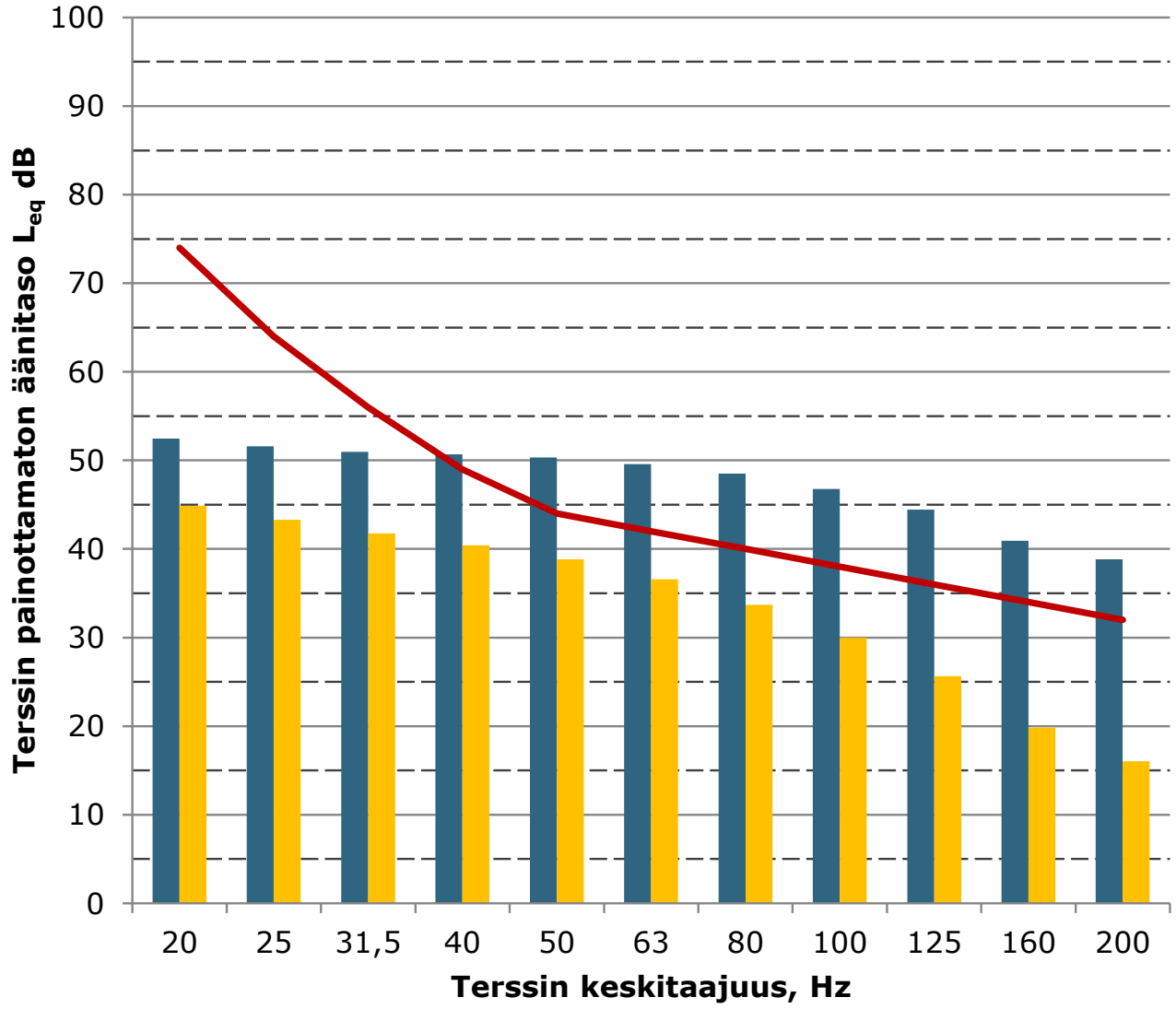
Tiedot rakennuksista ja voimaloista WindPro-raportista:

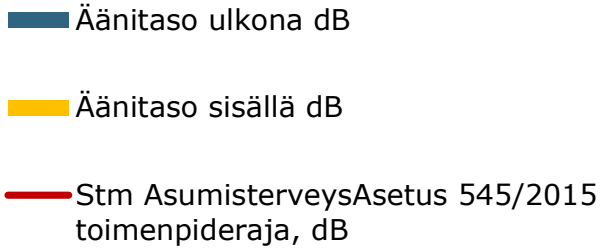
Voimalat	napakorkeus	kpl
Vestas V172-7.2 + 2 dB	7,2 MW, 214 m,	18
Vestas V172-7.2 + 2 dB	7,2 MW, 234 m,	28

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 15. Matalataajuisen melun yhteisvaikutuksen rakennuskohtaiset arvot – VE3

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



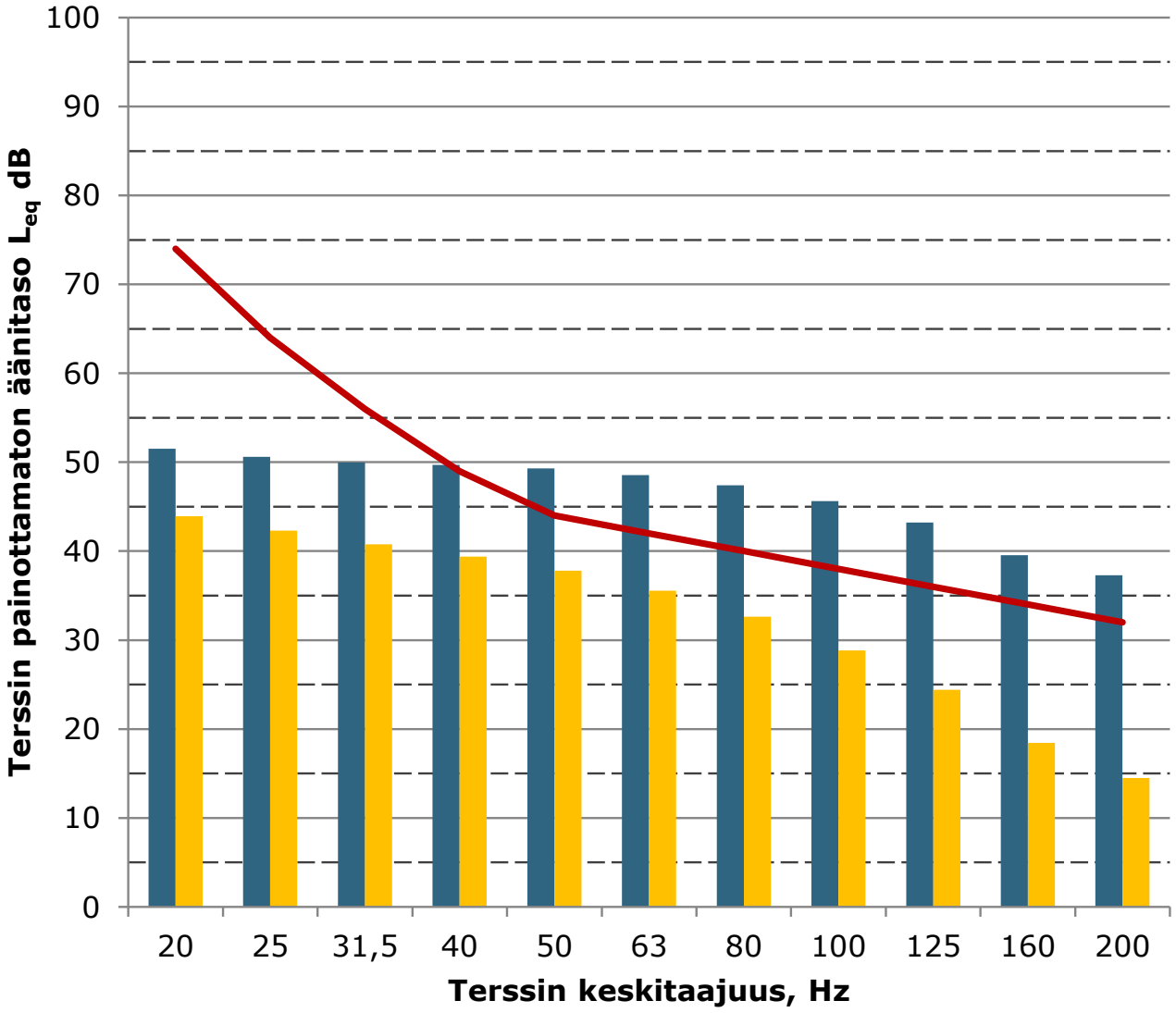


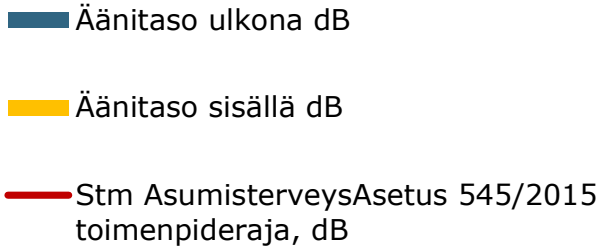
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2 + 2 dB	7,2 MW, 214 m,	10
Vestas V172-7.2 + 2 dB	7,2 MW, 234 m,	28

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, Asuinrakennus B, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



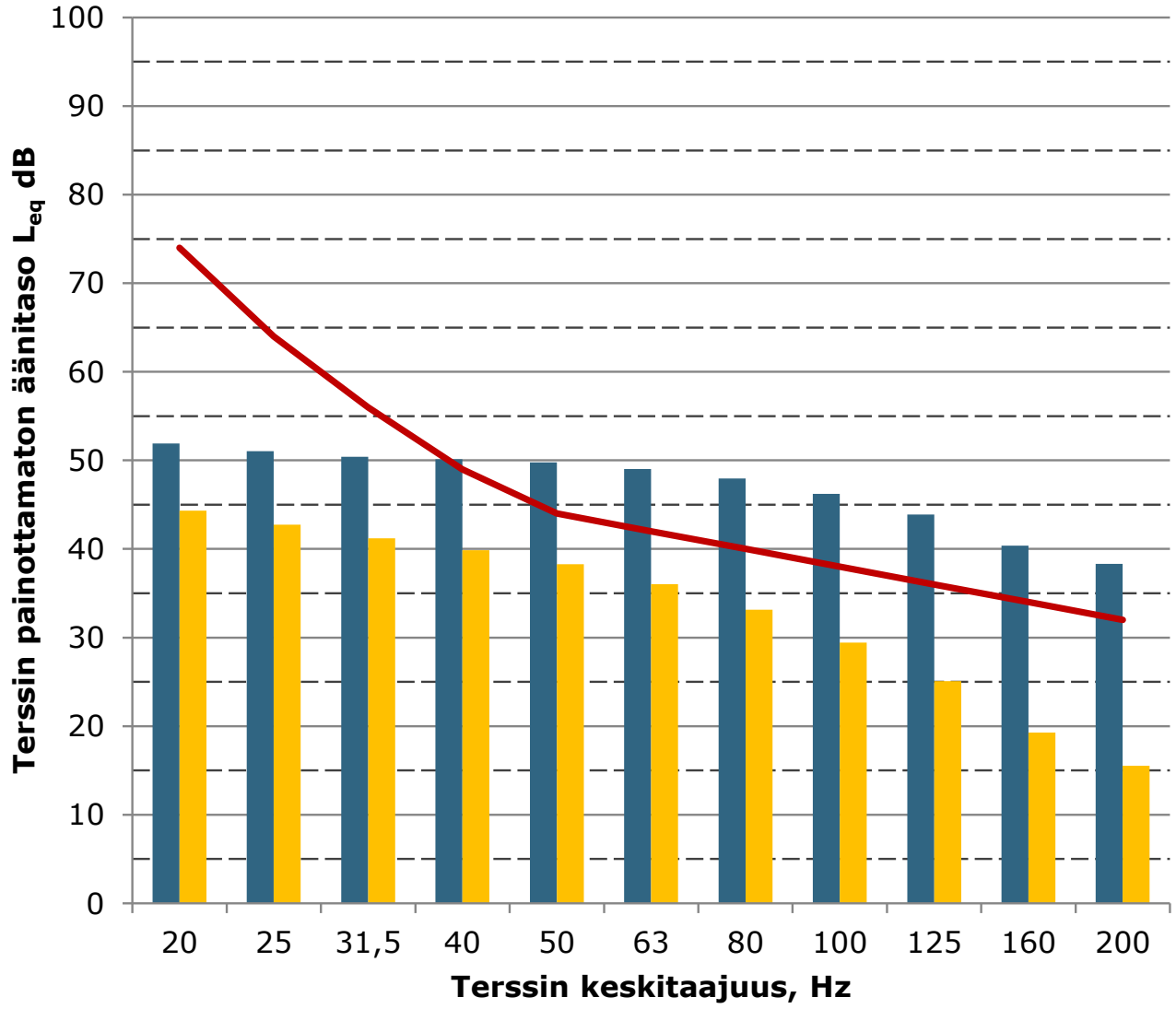


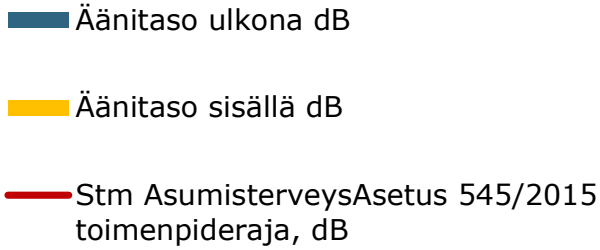
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2 + 2 dB	7,2 MW, 214 m,	10
Vestas V172-7.2 + 2 dB	7,2 MW, 234 m,	28

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, Asuinrakennus C, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



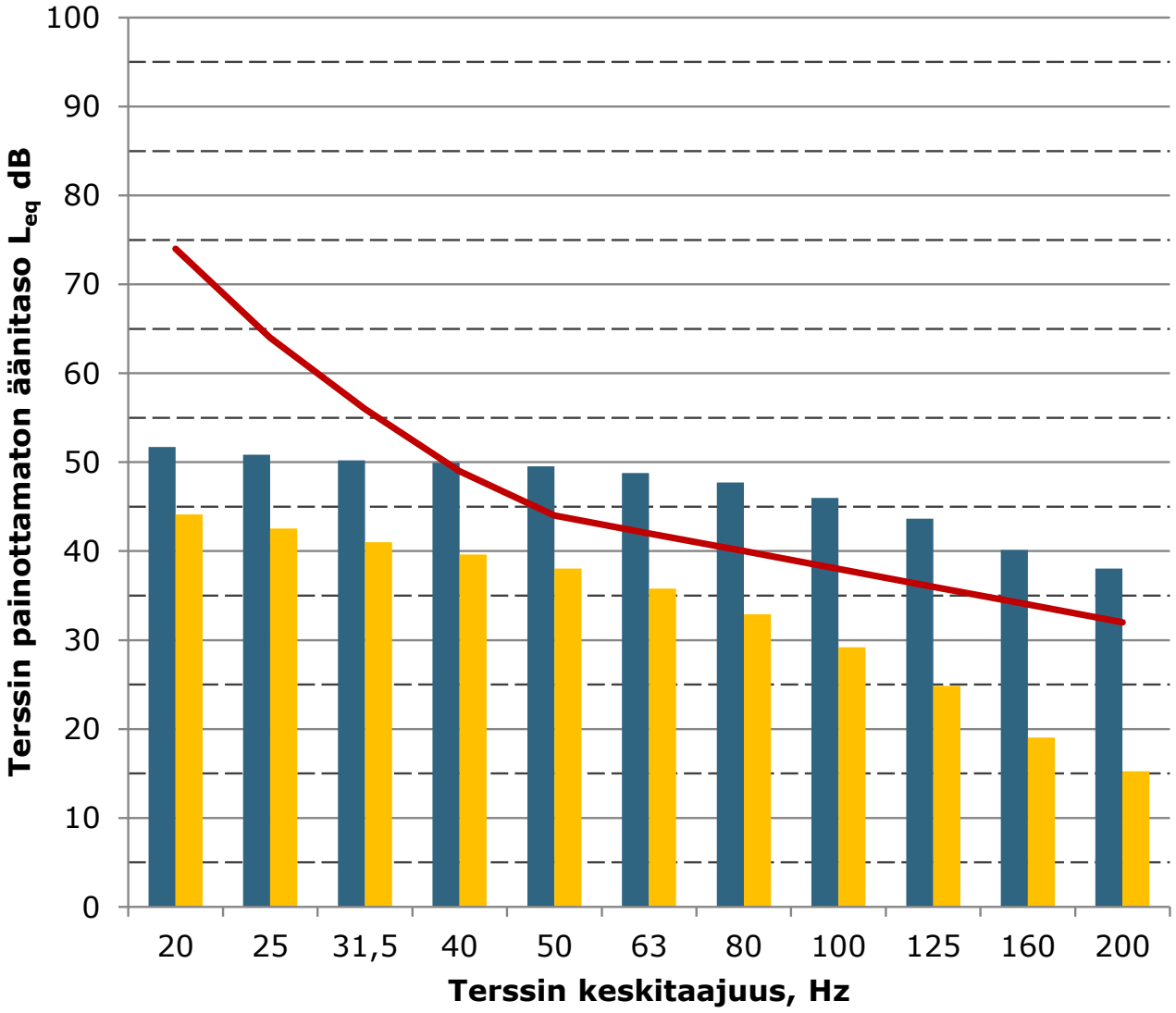


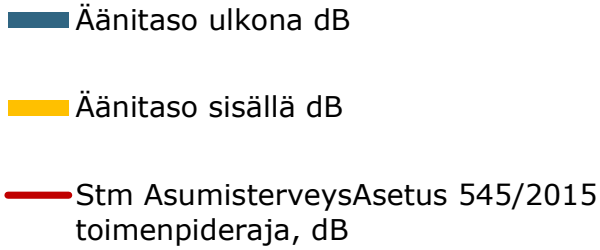
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2 + 2 dB	7,2 MW, 214 m,	10
Vestas V172-7.2 + 2 dB	7,2 MW, 234 m,	28

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, Asuinrakennus D, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



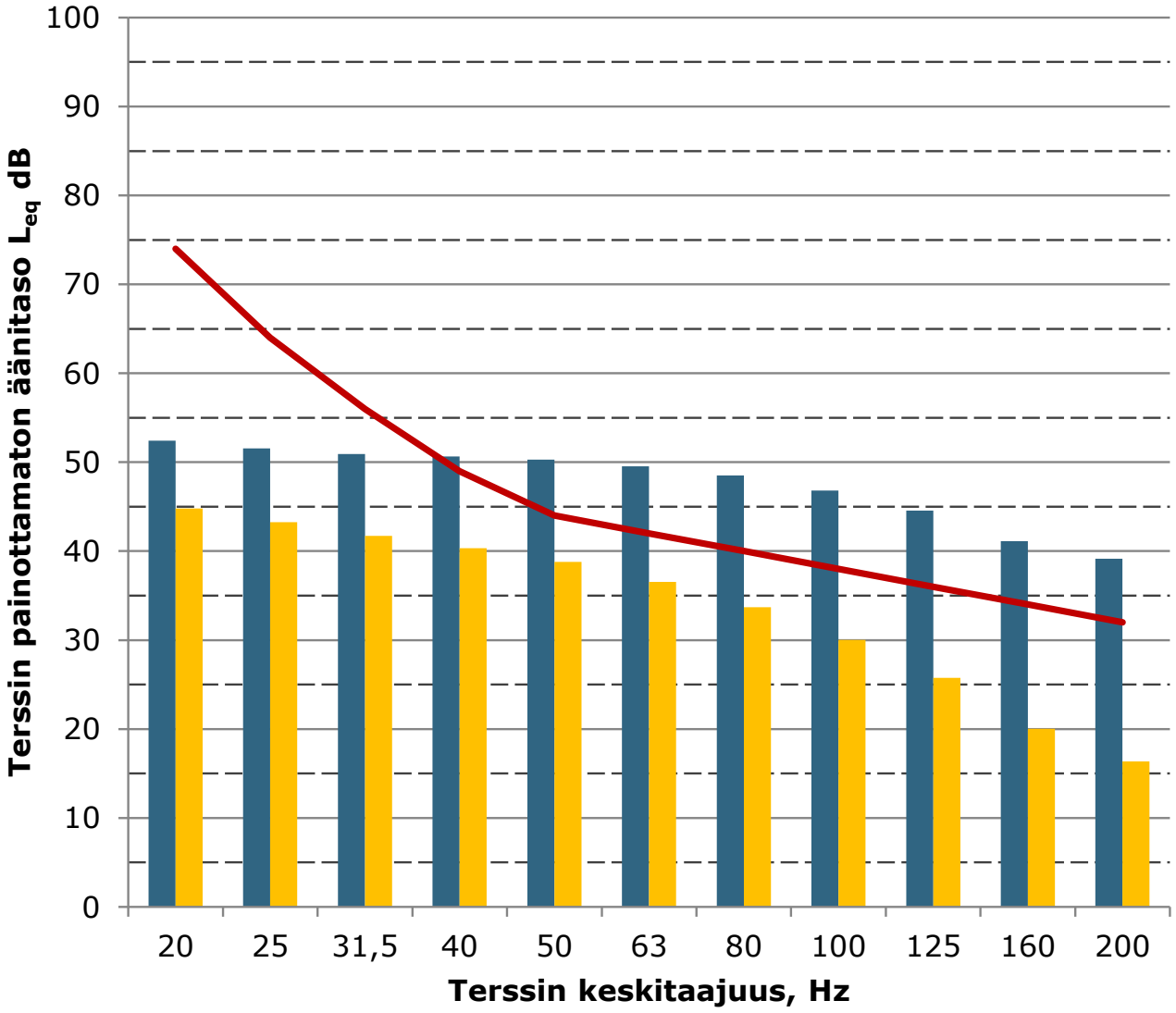


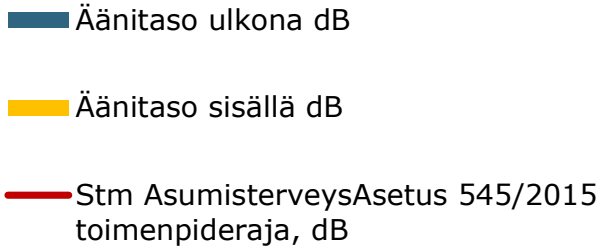
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2 + 2 dB	7,2 MW, 214 m,	10
Vestas V172-7.2 + 2 dB	7,2 MW, 234 m,	28

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, Lomarakennus E, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



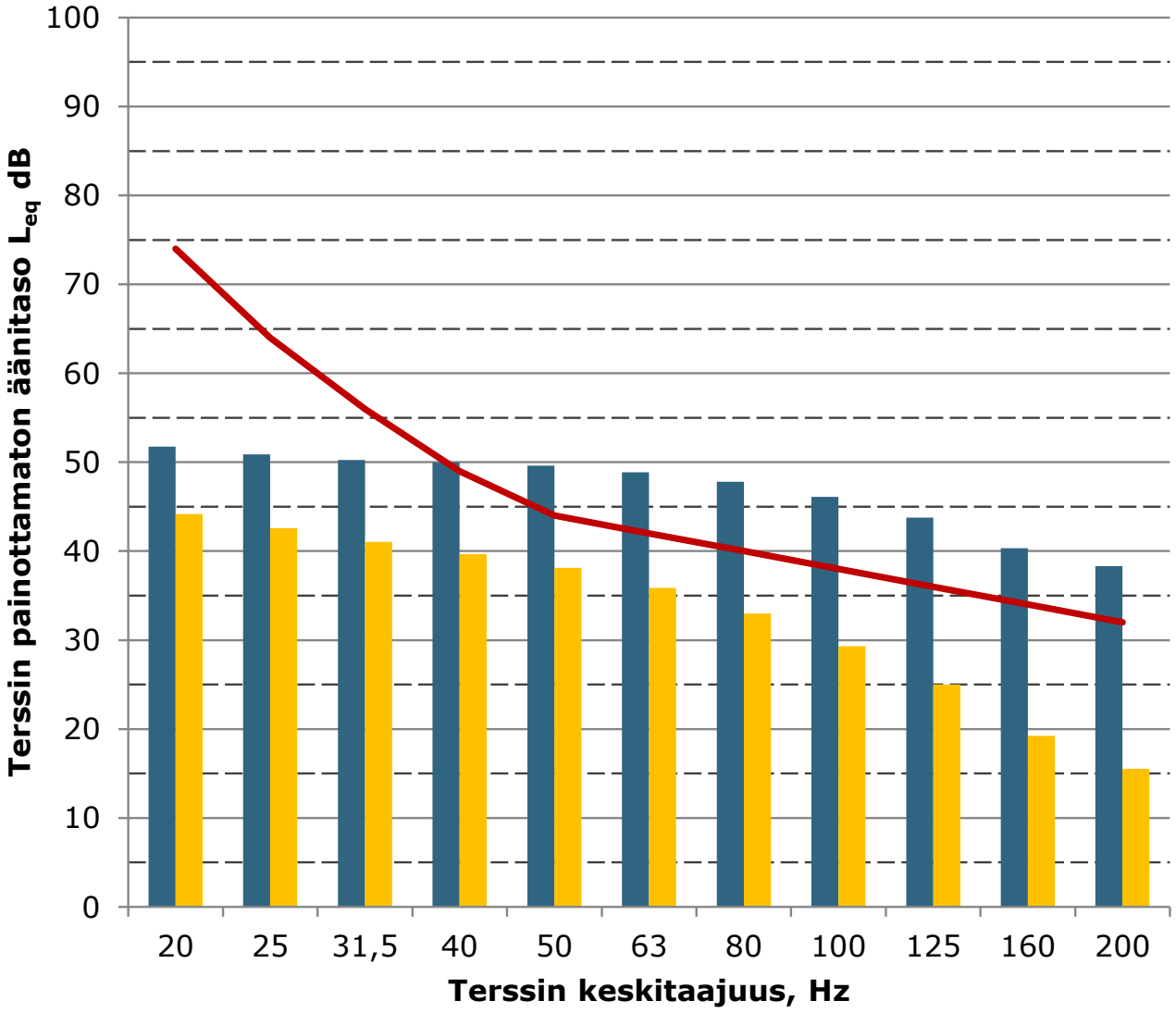


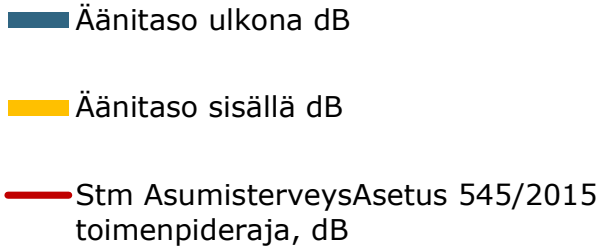
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2 + 2 dB	7,2 MW, 214 m,	10
Vestas V172-7.2 + 2 dB	7,2 MW, 234 m,	28

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, Asuinrakennus F, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



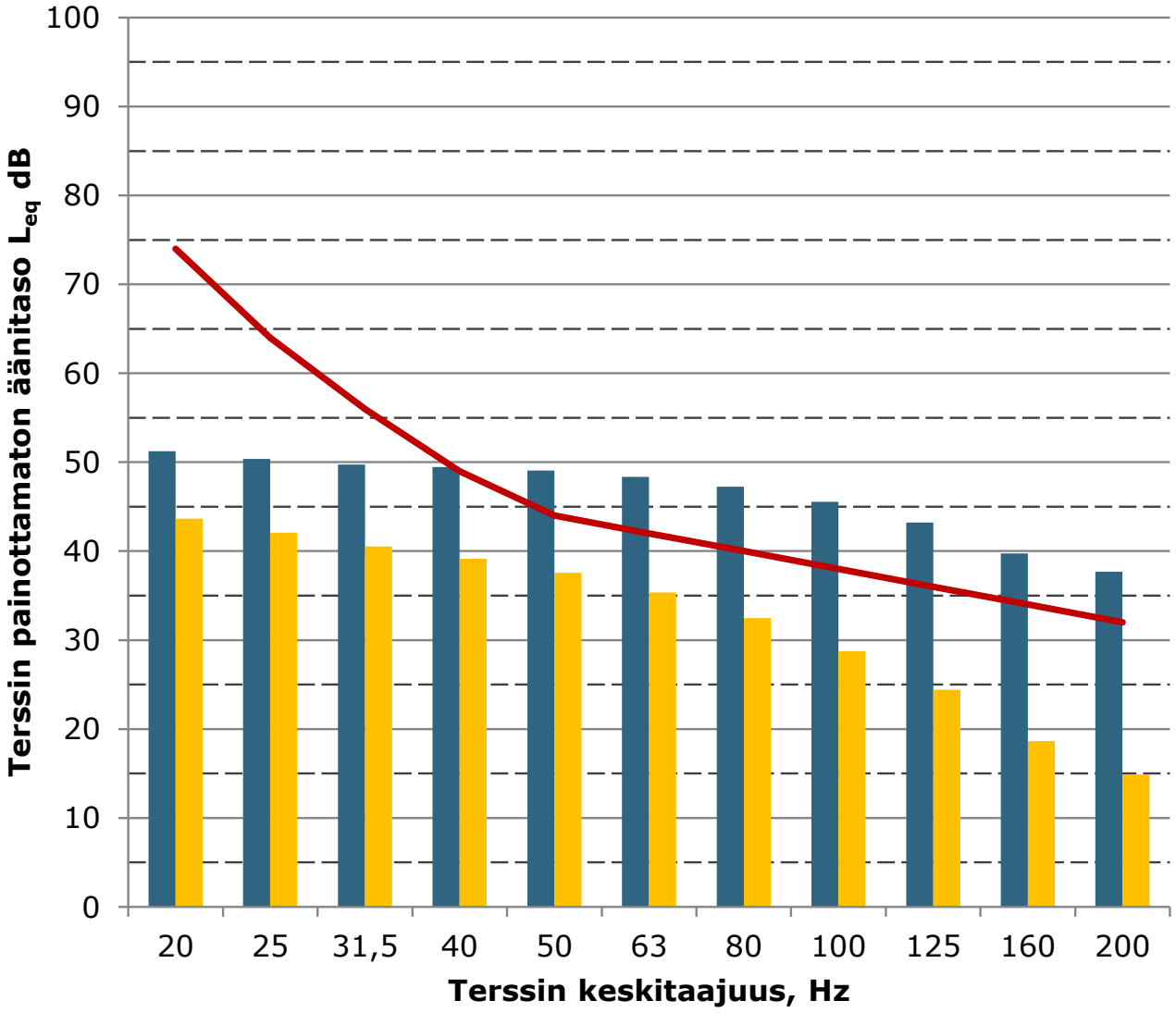


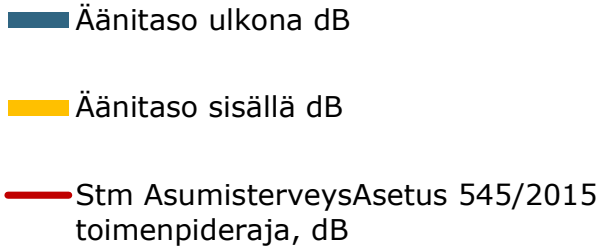
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2 + 2 dB	7,2 MW, 214 m,	10
Vestas V172-7.2 + 2 dB	7,2 MW, 234 m,	28

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, Asuinrakennus G, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



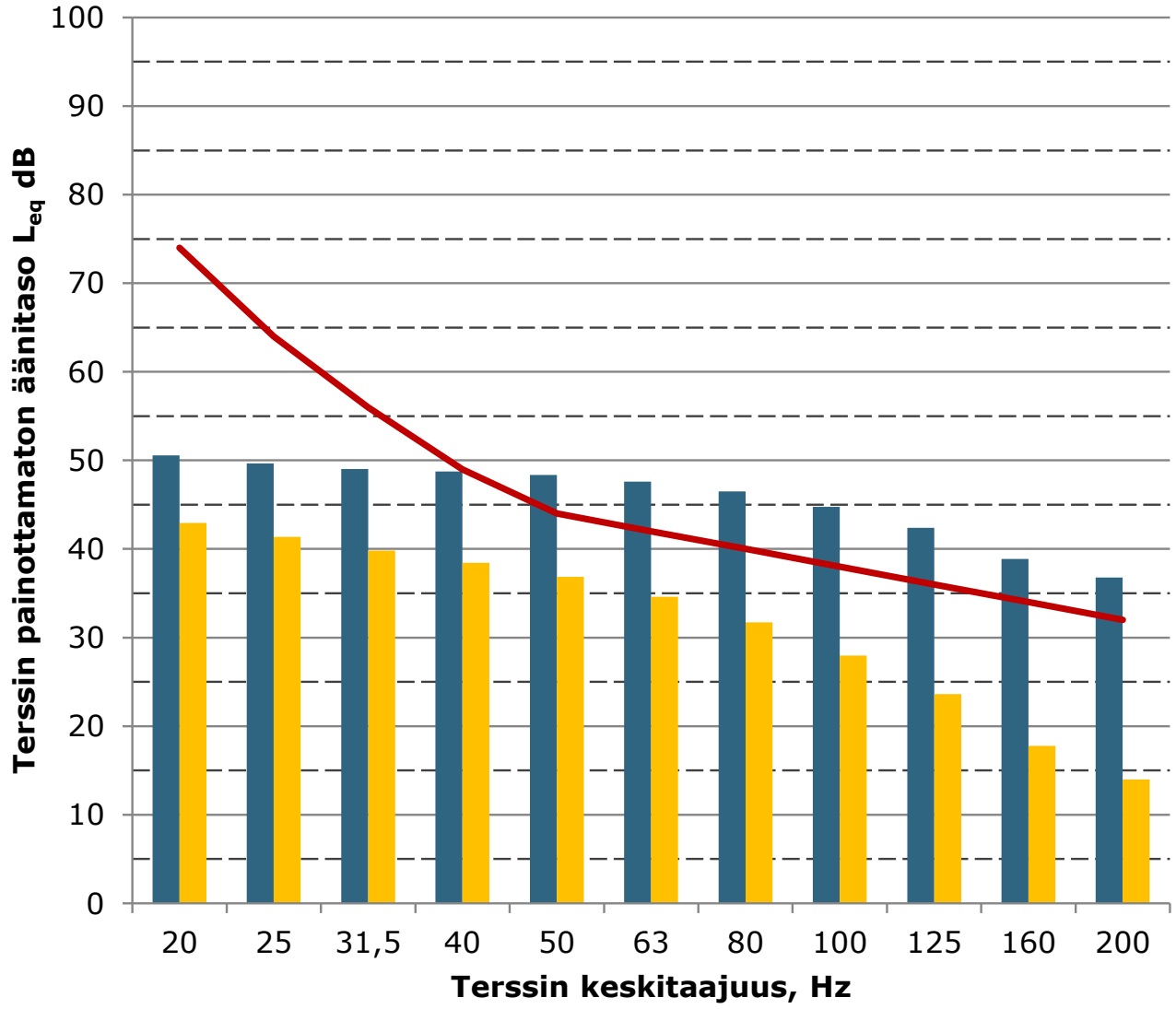


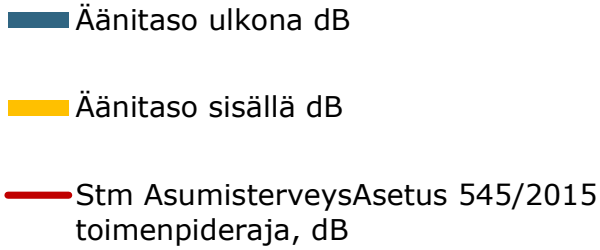
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2 + 2 dB	7,2 MW, 214 m,	10
Vestas V172-7.2 + 2 dB	7,2 MW, 234 m,	28

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, Asuinrakennus H, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



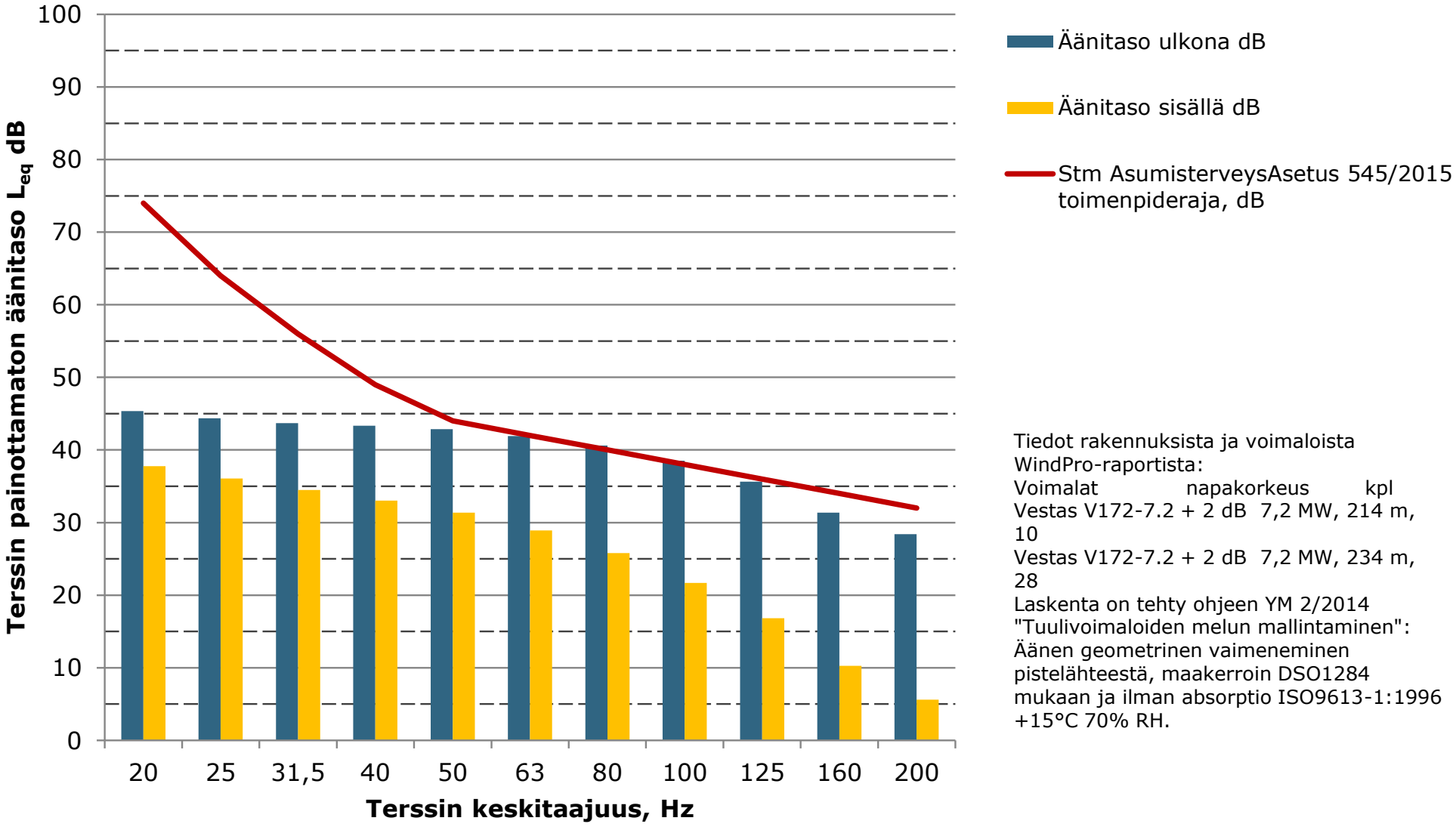


Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2 + 2 dB	7,2 MW, 214 m,	10
Vestas V172-7.2 + 2 dB	7,2 MW, 234 m,	28

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, Asuinrakennus I, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

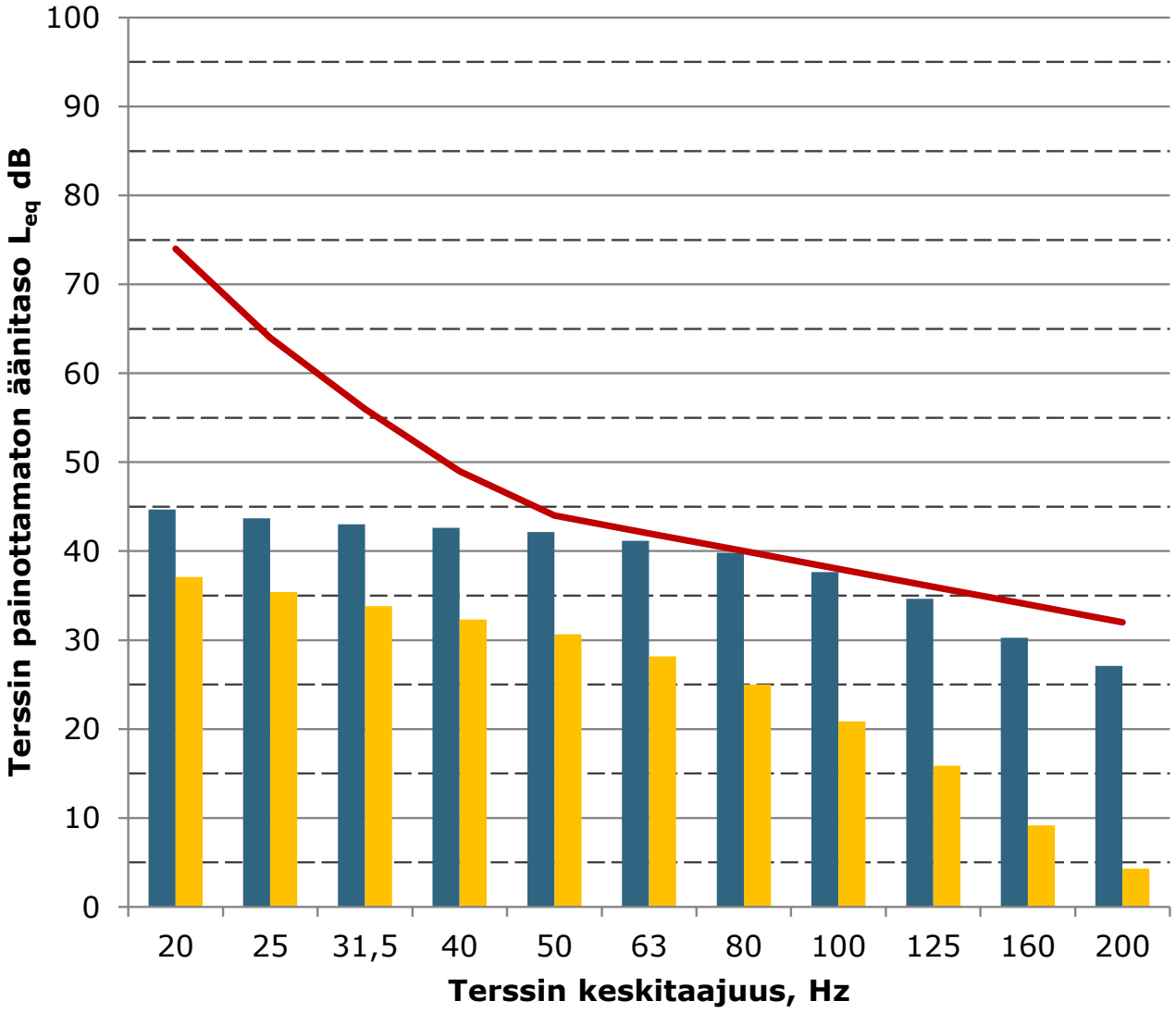


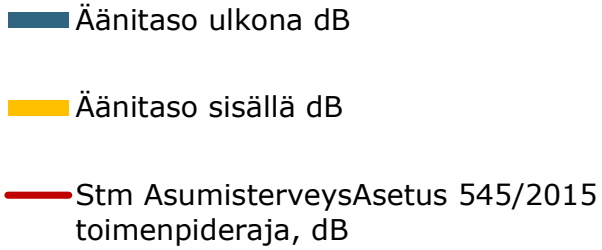
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2 + 2 dB	7,2 MW, 214 m,	10
Vestas V172-7.2 + 2 dB	7,2 MW, 234 m,	28

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, Lomarakennus J, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



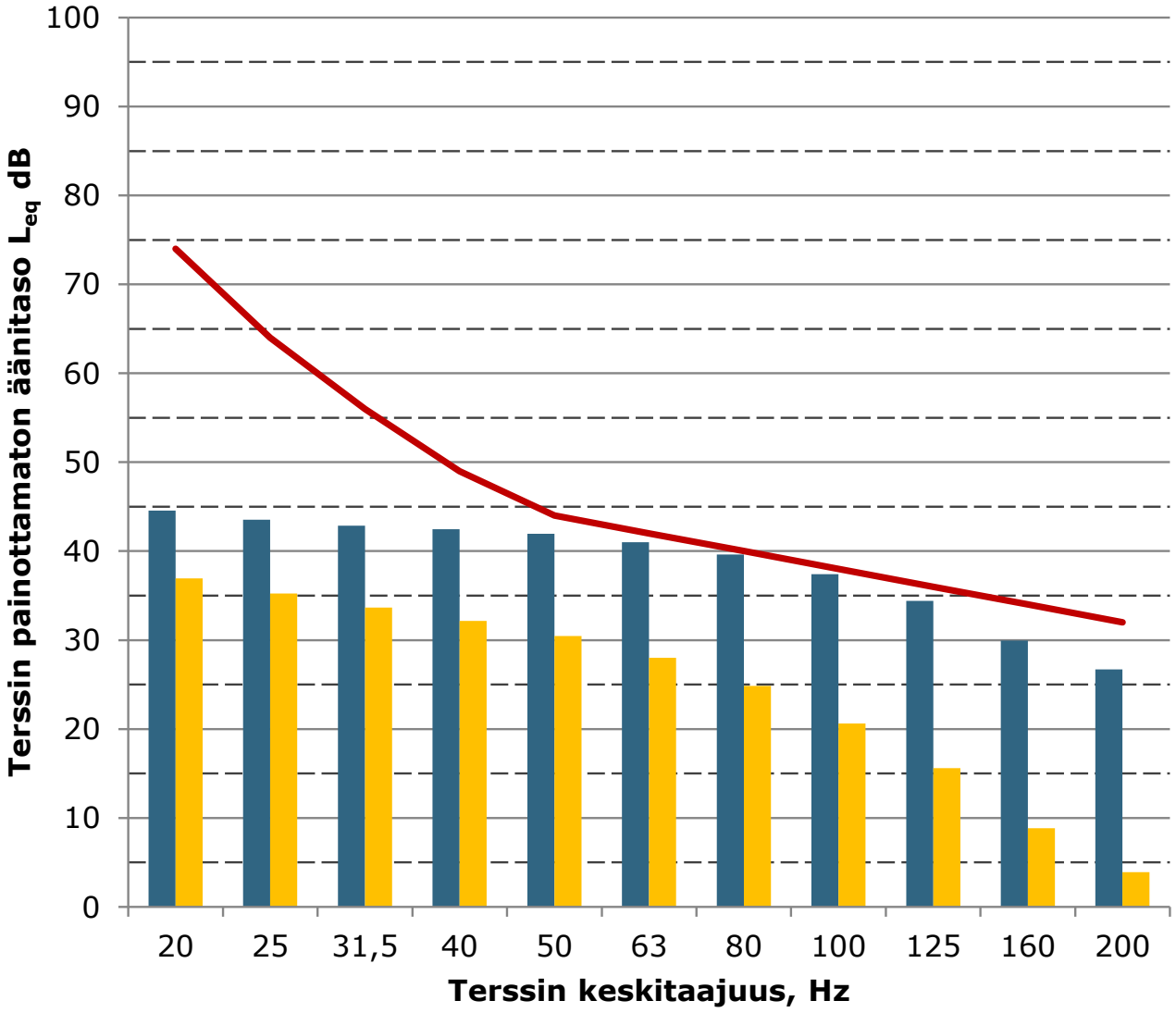


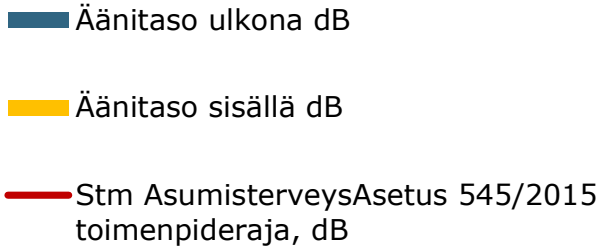
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2 + 2 dB	7,2 MW, 214 m,	10
Vestas V172-7.2 + 2 dB	7,2 MW, 234 m,	28

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, Asuinrakennus K, ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan





Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V172-7.2 + 2 dB	7,2 MW, 214 m,	10
Vestas V172-7.2 + 2 dB	7,2 MW, 234 m,	28

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 16. Yhteisvaikutus varjostusmallinnuksen tulokset ”Real Case, No forest” - VE1

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+358104095666
Henri Korhonen / henri.korhonen@fcg.fi
Calculated:
31.1.2024 9.03/3.6.355

SHADOW - Main Result

Calculation: Uusimo_VE1_RD200x21xHH200_+_Hallakallio_No_Forest

Assumptions for shadow calculations

Maximum distance for influence	2 089	m
Minimum sun height over horizon for influence	3	°
Day step for calculation	1	days
Time step for calculation	1	minutes

Sunshine probability S (Average daily sunshine hours) []

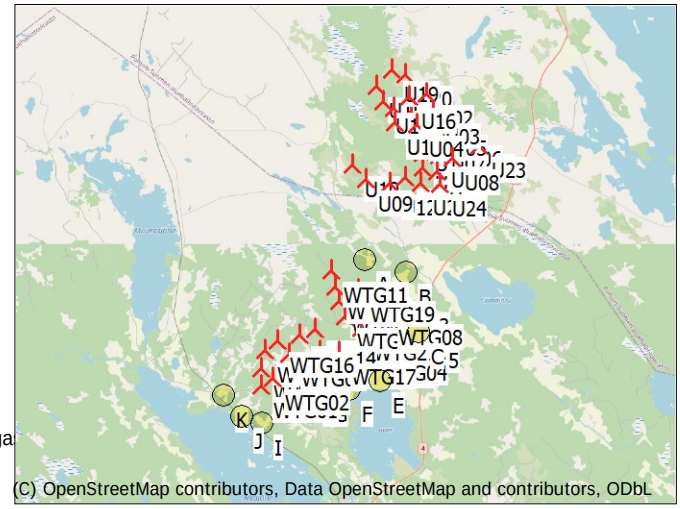
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

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_Pyhäntä_Pilpankanga
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]
U01	431 115	7 049 309	180,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U02	432 899	7 049 975	165,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U03	433 219	7 049 043	157,9	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U04	432 357	7 048 412	161,1	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U05	433 583	7 048 416	162,1	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U06	434 401	7 047 858	177,5	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U07	433 498	7 047 578	151,3	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U08	434 177	7 046 539	155,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U09	429 630	7 045 604	152,5	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U10	428 881	7 046 314	155,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U11	433 458	7 046 695	150,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U12	430 826	7 045 372	159,7	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U13	431 674	7 045 617	154,9	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U14	432 637	7 047 640	156,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U15	430 255	7 050 454	184,4	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U16	431 960	7 049 903	171,3	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U17	430 574	7 049 631	185,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U18	431 166	7 048 552	187,4	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U19	431 088	7 051 329	168,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U20	431 779	7 051 064	168,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U21	432 087	7 049 133	170,8	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U22	434 959	7 047 391	165,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U23	435 671	7 047 205	164,4	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U24	433 480	7 045 242	149,2	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U25	433 379	7 045 931	149,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U26	432 492	7 045 311	146,4	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U27	432 629	7 046 106	161,5	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U28	432 609	7 046 872	165,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
WTG01	423 751	7 034 716	140,0	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG02	424 350	7 035 140	132,8	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG03	428 051	7 039 154	159,5	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG04	429 647	7 036 576	126,3	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG05	424 001	7 036 639	140,0	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG06	428 278	7 038 291	151,2	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG07	425 301	7 036 387	132,5	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG08	430 500	7 038 489	132,7	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG09	423 801	7 035 688	141,0	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG10	428 901	7 036 410	128,2	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG11	427 685	7 040 785	140,7	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG12	426 946	7 036 454	125,0	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5

To be continued on next page...

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Henri Korhonen / henri.korhonen@fcg.fi
Calculated:
31.1.2024 9.03/3.6.355

SHADOW - Main Result

Calculation: Uusimo_VE1_RD200x21xHH200_+_Hallakallio_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]
WTG13	429 799	7 039 089	140,0	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG14	425 843	7 037 401	134,9	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG15	430 250	7 037 201	128,0	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG16	424 662	7 037 061	143,3	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG17	427 952	7 036 390	122,3	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG18	427 851	7 039 889	147,4	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG19	429 050	7 039 688	142,5	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG20	426 702	7 037 670	127,5	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG21	429 145	7 037 639	135,6	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5

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	429 470	7 041 260	145,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
B	B - Asuinrakennus	431 627	7 040 548	144,9	5,0	5,0	1,0	90,0	"Green house mode"	6,0
C	C - Asuinrakennus	432 261	7 037 387	122,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
D	D - Asuinrakennus	432 294	7 037 094	122,1	5,0	5,0	1,0	90,0	"Green house mode"	6,0
E	E - Lomarakennus	430 111	7 034 859	117,3	5,0	5,0	1,0	90,0	"Green house mode"	6,0
F	F - Asuinrakennus	428 445	7 034 384	122,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
G	G - Asuinrakennus	426 978	7 034 448	122,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0
H	H - Asuinrakennus	426 394	7 034 428	122,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
I	I - Asuinrakennus	423 788	7 032 711	125,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
J	J - Lomarakennus	422 689	7 033 070	114,2	5,0	5,0	1,0	90,0	"Green house mode"	6,0
K	K - Asuinrakennus	421 745	7 034 298	125,0	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	4:43
B	B - Asuinrakennus	0:00
C	C - Asuinrakennus	5:14
D	D - Asuinrakennus	1:45
E	E - Lomarakennus	1:02
F	F - Asuinrakennus	0:00
G	G - Asuinrakennus	0:00
H	H - Asuinrakennus	0:00
I	I - Asuinrakennus	0:00
J	J - Lomarakennus	0:00
K	K - Asuinrakennus	2:11

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

No.	Name	Expected [h/year]
U01	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (388)	0:00
U02	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (389)	0:00
U03	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (390)	0:00
U04	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (391)	0:00
U05	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (392)	0:00
U06	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (393)	0:00
U07	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (394)	0:00
U08	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (395)	0:00
U09	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (396)	0:00
U10	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (397)	0:00
U11	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (398)	0:00
U12	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (399)	0:00
U13	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (400)	0:00

To be continued on next page...

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SHADOW - Main Result

Calculation: Uusimo_VE1_RD200x21xHH200_+_Hallakallio_No_Forest

...continued from previous page

No.	Name	Expected [h/year]
U14	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (401)	0:00
U15	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (402)	0:00
U16	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (403)	0:00
U17	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (404)	0:00
U18	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (405)	0:00
U19	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (406)	0:00
U20	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (407)	0:00
U21	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (408)	0:00
U22	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (409)	0:00
U23	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (410)	0:00
U24	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (411)	0:00
U25	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (412)	0:00
U26	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (413)	0:00
U27	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (414)	0:00
U28	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (415)	0:00
WTG01	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (436)	2:11
WTG02	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (434)	0:00
WTG03	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (416)	0:00
WTG04	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (417)	0:00
WTG05	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (418)	0:00
WTG06	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (419)	0:00
WTG07	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (420)	0:00
WTG08	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (421)	3:41
WTG09	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (435)	0:00
WTG10	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (422)	1:02
WTG11	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (423)	1:42
WTG12	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (424)	0:00
WTG13	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (425)	0:00
WTG14	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (426)	0:00
WTG15	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (427)	3:19
WTG16	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (428)	0:00
WTG17	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (429)	0:00
WTG18	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (430)	0:00
WTG19	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (431)	2:52
WTG20	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (432)	0:00
WTG21	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (433)	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:
31.1.2024 9.03/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE1_RD200x21xHH200_+_Hallakallio_No_Forest Shadow receptor: A - A - Lomarakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January			February			March			April	May	June
1	10.01			08.57		13.15 (WTG19)	07.28			06.41	04.58	03.27
	14.42			16.08	26	13.41 (WTG19)	17.35			20.06	21.35	23.07
2	10.00			08.54		13.16 (WTG19)	07.24			06.37	04.55	03.24
	14.44			16.11	25	13.41 (WTG19)	17.38			20.08	21.38	23.10
3	09.59			08.51		13.17 (WTG19)	07.21			06.34	04.52	03.22
	14.46			16.14	22	13.39 (WTG19)	17.41			20.11	21.41	23.12
4	09.58			08.48		13.18 (WTG19)	07.17			06.31	04.48	03.20
	14.48			16.17	20	13.38 (WTG19)	17.44			20.14	21.44	23.15
5	09.57			08.45		13.21 (WTG19)	07.14			06.27	04.45	03.18
	14.50			16.21	16	13.37 (WTG19)	17.47			20.17	21.47	23.17
6	09.56		13.17 (WTG19)	08.42		13.23 (WTG19)	07.11			06.24	04.42	03.16
	14.52	5	13.22 (WTG19)	16.24	11	13.34 (WTG19)	17.50			20.20	21.50	23.19
7	09.54		13.16 (WTG19)	08.39			07.07			06.20	04.39	03.14
	14.55	9	13.25 (WTG19)	16.27			17.53			20.23	21.53	23.21
8	09.53		13.14 (WTG19)	08.36			07.04		17.17 (WTG11)	06.17	04.35	03.12
	14.57	13	13.27 (WTG19)	16.30			17.56	4	17.21 (WTG11)	20.26	21.56	23.23
9	09.51		13.13 (WTG19)	08.33			07.00		17.13 (WTG11)	06.13	04.32	03.11
	14.59	15	13.28 (WTG19)	16.33			17.59	10	17.23 (WTG11)	20.29	21.59	23.25
10	09.50		13.13 (WTG19)	08.29			06.57		17.11 (WTG11)	06.10	04.29	03.09
	15.02	17	13.30 (WTG19)	16.37			18.02	16	17.27 (WTG11)	20.32	22.02	23.27
11	09.48		13.12 (WTG19)	08.26			06.54		17.09 (WTG11)	06.06	04.26	03.08
	15.05	19	13.31 (WTG19)	16.40			18.05	20	17.29 (WTG11)	20.35	22.06	23.29
12	09.46		13.12 (WTG19)	08.23			06.50		17.08 (WTG11)	06.03	04.23	03.06
	15.07	21	13.33 (WTG19)	16.43			18.08	23	17.31 (WTG11)	20.38	22.09	23.31
13	09.44		13.12 (WTG19)	08.20			06.47		17.07 (WTG11)	05.59	04.20	03.05
	15.10	22	13.34 (WTG19)	16.46			18.11	24	17.31 (WTG11)	20.40	22.12	23.32
14	09.42		13.11 (WTG19)	08.17			06.43		17.07 (WTG11)	05.56	04.17	03.04
	15.13	23	13.34 (WTG19)	16.49			18.14	24	17.31 (WTG11)	20.43	22.15	23.33
15	09.40		13.11 (WTG19)	08.14			06.40		17.06 (WTG11)	05.53	04.13	03.03
	15.15	25	13.36 (WTG19)	16.52			18.17	25	17.31 (WTG11)	20.46	22.18	23.35
16	09.38		13.11 (WTG19)	08.10			06.36		17.06 (WTG11)	05.49	04.10	03.02
	15.18	25	13.36 (WTG19)	16.56			18.19	25	17.31 (WTG11)	20.49	22.21	23.36
17	09.36		13.10 (WTG19)	08.07			06.33		17.05 (WTG11)	05.46	04.07	03.02
	15.21	27	13.37 (WTG19)	16.59			18.22	25	17.30 (WTG11)	20.52	22.24	23.37
18	09.33		13.11 (WTG19)	08.04			06.29		17.06 (WTG11)	05.42	04.04	03.01
	15.24	27	13.38 (WTG19)	17.02			18.25	24	17.30 (WTG11)	20.55	22.27	23.38
19	09.31		13.10 (WTG19)	08.01			06.26		17.05 (WTG11)	05.39	04.01	03.01
	15.27	29	13.39 (WTG19)	17.05			18.28	24	17.29 (WTG11)	20.58	22.30	23.38
20	09.29		13.11 (WTG19)	07.57			06.23		17.06 (WTG11)	05.35	03.58	03.01
	15.30	29	13.40 (WTG19)	17.08			18.31	22	17.28 (WTG11)	21.01	22.33	23.39
21	09.26		13.11 (WTG19)	07.54			06.19		17.07 (WTG11)	05.32	03.56	03.01
	15.33	29	13.40 (WTG19)	17.11			18.34	19	17.26 (WTG11)	21.04	22.36	23.39
22	09.24		13.10 (WTG19)	07.51			06.16		17.09 (WTG11)	05.29	03.53	03.01
	15.36	30	13.40 (WTG19)	17.14			18.37	16	17.25 (WTG11)	21.07	22.39	23.39
23	09.21		13.11 (WTG19)	07.48			06.12		17.10 (WTG11)	05.25	03.50	03.01
	15.39	30	13.41 (WTG19)	17.17			18.40	12	17.22 (WTG11)	21.10	22.42	23.39
24	09.19		13.11 (WTG19)	07.44			06.09			05.22	03.47	03.01
	15.42	30	13.41 (WTG19)	17.20			18.42			21.13	22.45	23.39
25	09.16		13.11 (WTG19)	07.41			06.05			05.18	03.44	03.02
	15.46	30	13.41 (WTG19)	17.23			18.45			21.16	22.48	23.39
26	09.13		13.12 (WTG19)	07.38			06.02			05.15	03.42	03.03
	15.49	30	13.42 (WTG19)	17.26			18.48			21.19	22.51	23.38
27	09.11		13.12 (WTG19)	07.34			05.58			05.12	03.39	03.03
	15.52	30	13.42 (WTG19)	17.29			18.51			21.22	22.54	23.38
28	09.08		13.13 (WTG19)	07.31			05.55			05.08	03.36	03.04
	15.55	29	13.42 (WTG19)	17.32			18.54			21.25	22.56	23.37
29	09.05		13.13 (WTG19)				06.51			05.05	03.34	03.06
	15.58	29	13.42 (WTG19)				19.57			21.28	22.59	23.36
30	09.02		13.13 (WTG19)				06.48			05.02	03.31	03.07
	16.01	28	13.41 (WTG19)				20.00			21.32	23.02	23.35
31	08.59		13.14 (WTG19)				06.44				03.29	
	16.05	28	13.42 (WTG19)				20.03				23.05	
Potential sun hours	178			241			363			449	563	611
Total, worst case		629			120			313				
Sun reduction		0,17			0,33			0,32				
Oper. time red.		0,90			0,90			0,90				
Wind dir. red.		0,70			0,70			0,55				
Total reduction		0,11			0,21			0,16				
Total, real		71			26			52				

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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31.1.2024 9.03/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE1_RD200x21xHH200_+_Hallakallio_No_Forest Shadow receptor: A - A - Lomarakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	July	August	September			October			November			December		
1	03.08	04.28	06.00			07.24		17.47 (WTG11)	07.55			09.26		12.54 (WTG19)
	23.34	22.19	20.35			18.51	23	18.10 (WTG11)	16.08			14.48	19	13.13 (WTG19)
2	03.10	04.31	06.03			07.26		17.47 (WTG11)	07.58			09.28		12.55 (WTG19)
	23.33	22.16	20.32			18.48	21	18.08 (WTG11)	16.05			14.46	18	13.13 (WTG19)
3	03.12	04.34	06.06			07.29		17.48 (WTG11)	08.01			09.31		12.57 (WTG19)
	23.32	22.12	20.28			18.44	18	18.06 (WTG11)	16.02			14.44	16	13.13 (WTG19)
4	03.13	04.37	06.08			07.32		17.49 (WTG11)	08.04			09.33		12.58 (WTG19)
	23.30	22.09	20.25			18.41	13	18.02 (WTG11)	15.59			14.42	13	13.11 (WTG19)
5	03.15	04.40	06.11			07.35		17.52 (WTG11)	08.07		12.53 (WTG19)	09.36		13.00 (WTG19)
	23.28	22.06	20.21			18.37	7	17.59 (WTG11)	15.55	12	13.05 (WTG19)	14.41	10	13.10 (WTG19)
6	03.17	04.43	06.14			07.38			08.10		12.50 (WTG19)	09.38		13.03 (WTG19)
	23.27	22.03	20.18			18.34			15.52	17	13.07 (WTG19)	14.39	6	13.09 (WTG19)
7	03.19	04.46	06.17			07.41			08.13		12.49 (WTG19)	09.40		
	23.25	22.00	20.14			18.31			15.49	20	13.09 (WTG19)	14.38		
8	03.21	04.49	06.20			07.43			08.16		12.48 (WTG19)	09.43		
	23.23	21.56	20.11			18.27			15.46	22	13.10 (WTG19)	14.37		
9	03.24	04.52	06.22			07.46			08.20		12.47 (WTG19)	09.45		
	23.21	21.53	20.07			18.24			15.43	24	13.11 (WTG19)	14.35		
10	03.26	04.55	06.25			07.49			08.23		12.45 (WTG19)	09.47		
	23.19	21.50	20.04			18.20			15.40	26	13.11 (WTG19)	14.34		
11	03.28	04.58	06.28			07.52			08.26		12.45 (WTG19)	09.49		
	23.17	21.46	20.00			18.17			15.38	27	13.12 (WTG19)	14.33		
12	03.31	05.01	06.31			07.55			08.29		12.45 (WTG19)	09.50		
	23.15	21.43	19.57			18.14			15.35	28	13.13 (WTG19)	14.32		
13	03.33	05.04	06.34			07.58			08.32		12.44 (WTG19)	09.52		
	23.12	21.40	19.54			18.10			15.32	30	13.14 (WTG19)	14.32		
14	03.36	05.07	06.36			08.01			08.35		12.44 (WTG19)	09.54		
	23.10	21.36	19.50			18.07			15.29	30	13.14 (WTG19)	14.31		
15	03.39	05.10	06.39			08.04			08.38		12.44 (WTG19)	09.55		
	23.07	21.33	19.47			18.03			15.26	30	13.14 (WTG19)	14.30		
16	03.41	05.13	06.42			08.07			08.41		12.44 (WTG19)	09.57		
	23.05	21.30	19.43			18.00			15.23	31	13.15 (WTG19)	14.30		
17	03.44	05.16	06.45			08.09			08.45		12.45 (WTG19)	09.58		
	23.02	21.26	19.40			17.57			15.21	30	13.15 (WTG19)	14.30		
18	03.47	05.19	06.47			08.12			08.48		12.45 (WTG19)	09.59		
	23.00	21.23	19.36			17.53			15.18	30	13.15 (WTG19)	14.30		
19	03.50	05.22	06.50			08.15			08.51		12.45 (WTG19)	10.00		
	22.57	21.20	19.33			17.50			15.15	30	13.15 (WTG19)	14.30		
20	03.53	05.25	06.53		17.58 (WTG11)	08.18			08.54		12.45 (WTG19)	10.01		
	22.54	21.16	19.29	10	18.08 (WTG11)	17.47			15.13	30	13.15 (WTG19)	14.30		
21	03.55	05.28	06.56		17.54 (WTG11)	08.21			08.57		12.46 (WTG19)	10.02		
	22.51	21.13	19.26	15	18.09 (WTG11)	17.43			15.10	29	13.15 (WTG19)	14.30		
22	03.58	05.31	06.59		17.52 (WTG11)	08.24			09.00		12.47 (WTG19)	10.02		
	22.49	21.09	19.22	19	18.11 (WTG11)	17.40			15.08	29	13.16 (WTG19)	14.30		
23	04.01	05.34	07.01		17.51 (WTG11)	08.27			09.03		12.47 (WTG19)	10.03		
	22.46	21.06	19.19	21	18.12 (WTG11)	17.37			15.05	29	13.16 (WTG19)	14.31		
24	04.04	05.37	07.04		17.50 (WTG11)	08.30			09.06		12.48 (WTG19)	10.03		
	22.43	21.03	19.15	23	18.13 (WTG11)	17.34			15.03	27	13.15 (WTG19)	14.32		
25	04.07	05.40	07.07		17.49 (WTG11)	07.33			09.09		12.48 (WTG19)	10.03		
	22.40	20.59	19.12	24	18.13 (WTG11)	16.30			15.01	27	13.15 (WTG19)	14.32		
26	04.10	05.43	07.10		17.47 (WTG11)	07.36			09.12		12.49 (WTG19)	10.03		
	22.37	20.56	19.08	25	18.12 (WTG11)	16.27			14.58	26	13.15 (WTG19)	14.33		
27	04.13	05.46	07.12		17.47 (WTG11)	07.39			09.15		12.50 (WTG19)	10.03		
	22.34	20.52	19.05	25	18.12 (WTG11)	16.24			14.56	25	13.15 (WTG19)	14.34		
28	04.16	05.48	07.15		17.47 (WTG11)	07.42			09.17		12.51 (WTG19)	10.03		
	22.31	20.49	19.01	25	18.12 (WTG11)	16.21			14.54	24	13.15 (WTG19)	14.36		
29	04.19	05.51	07.18		17.47 (WTG11)	07.45			09.20		12.52 (WTG19)	10.03		
	22.28	20.45	18.58	25	18.12 (WTG11)	16.17			14.52	22	13.14 (WTG19)	14.37		
30	04.22	05.54	07.21		17.47 (WTG11)	07.49			09.23		12.54 (WTG19)	10.02		
	22.25	20.42	18.55	24	18.11 (WTG11)	16.14			14.50	20	13.14 (WTG19)	14.38		
31	04.25	05.57				07.52						10.02		
	22.22	20.39				16.11						14.40		
Potential sun hours	599	504	392			307			203			146		
Total, worst case				236			82			675			82	
Sun reduction				0,36			0,25			0,17			0,12	
Oper. time red.				0,90			0,90			0,90			0,90	
Wind dir. red.				0,55			0,55			0,70			0,70	
Total reduction				0,18			0,13			0,11			0,08	
Total, real				43			11			75			7	

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:
31.1.2024 9.03/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE1_RD200x21xHH200_+_Hallakallio_No_Forest Shadow receptor: B - B - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.01	08.56	07.27	06.41	04.58	03.26	03.08	04.28	06.00	07.23	07.54	09.25
	14.42	16.08	17.35	20.05	21.34	23.07	23.34	22.18	20.35	18.51	16.08	14.48
2	10.00	08.53	07.24	06.37	04.55	03.24	03.10	04.31	06.03	07.26	07.58	09.28
	14.44	16.11	17.38	20.08	21.37	23.09	23.33	22.15	20.31	18.48	16.05	14.46
3	09.59	08.50	07.21	06.34	04.52	03.22	03.11	04.34	06.05	07.29	08.01	09.31
	14.46	16.14	17.41	20.11	21.41	23.12	23.31	22.12	20.28	18.44	16.02	14.44
4	09.58	08.48	07.17	06.30	04.48	03.20	03.13	04.37	06.08	07.32	08.04	09.33
	14.48	16.17	17.44	20.14	21.44	23.14	23.30	22.09	20.25	18.41	15.58	14.42
5	09.57	08.45	07.14	06.27	04.45	03.18	03.15	04.40	06.11	07.35	08.07	09.35
	14.50	16.21	17.47	20.17	21.47	23.17	23.28	22.06	20.21	18.37	15.55	14.41
6	09.55	08.42	07.10	06.23	04.42	03.16	03.17	04.43	06.14	07.38	08.10	09.38
	14.52	16.24	17.50	20.20	21.50	23.19	23.26	22.03	20.18	18.34	15.52	14.39
7	09.54	08.38	07.07	06.20	04.39	03.14	03.19	04.46	06.17	07.40	08.13	09.40
	14.54	16.27	17.53	20.23	21.53	23.21	23.25	21.59	20.14	18.30	15.49	14.38
8	09.53	08.35	07.04	06.17	04.35	03.12	03.21	04.49	06.19	07.43	08.16	09.42
	14.57	16.30	17.56	20.26	21.56	23.23	23.23	21.56	20.11	18.27	15.46	14.36
9	09.51	08.32	07.00	06.13	04.32	03.11	03.24	04.52	06.22	07.46	08.19	09.44
	14.59	16.33	17.59	20.29	21.59	23.25	23.21	21.53	20.07	18.24	15.43	14.35
10	09.49	08.29	06.57	06.10	04.29	03.09	03.26	04.55	06.25	07.49	08.23	09.46
	15.02	16.36	18.02	20.31	22.02	23.27	23.19	21.49	20.04	18.20	15.40	14.34
11	09.48	08.26	06.53	06.06	04.26	03.08	03.28	04.58	06.28	07.52	08.26	09.48
	15.04	16.40	18.05	20.34	22.05	23.29	23.16	21.46	20.00	18.17	15.37	14.33
12	09.46	08.23	06.50	06.03	04.23	03.06	03.31	05.01	06.31	07.55	08.29	09.50
	15.07	16.43	18.08	20.37	22.08	23.30	23.14	21.43	19.57	18.13	15.35	14.32
13	09.44	08.20	06.47	05.59	04.20	03.05	03.33	05.04	06.33	07.58	08.32	09.52
	15.10	16.46	18.11	20.40	22.12	23.32	23.12	21.40	19.53	18.10	15.32	14.31
14	09.42	08.17	06.43	05.56	04.16	03.04	03.36	05.07	06.36	08.01	08.35	09.54
	15.13	16.49	18.13	20.43	22.15	23.33	23.10	21.36	19.50	18.07	15.29	14.31
15	09.40	08.13	06.40	05.52	04.13	03.03	03.39	05.10	06.39	08.03	08.38	09.55
	15.15	16.52	18.16	20.46	22.18	23.34	23.07	21.33	19.46	18.03	15.26	14.30
16	09.38	08.10	06.36	05.49	04.10	03.02	03.41	05.13	06.42	08.06	08.41	09.56
	15.18	16.55	18.19	20.49	22.21	23.36	23.05	21.30	19.43	18.00	15.23	14.30
17	09.35	08.07	06.33	05.46	04.07	03.02	03.44	05.16	06.44	08.09	08.44	09.58
	15.21	16.59	18.22	20.52	22.24	23.36	23.02	21.26	19.39	17.57	15.21	14.30
18	09.33	08.04	06.29	05.42	04.04	03.01	03.47	05.19	06.47	08.12	08.47	09.59
	15.24	17.02	18.25	20.55	22.27	23.37	22.59	21.23	19.36	17.53	15.18	14.30
19	09.31	08.00	06.26	05.39	04.01	03.01	03.50	05.22	06.50	08.15	08.50	10.00
	15.27	17.05	18.28	20.58	22.30	23.38	22.57	21.19	19.32	17.50	15.15	14.30
20	09.28	07.57	06.22	05.35	03.58	03.01	03.52	05.25	06.53	08.18	08.54	10.01
	15.30	17.08	18.31	21.01	22.33	23.38	22.54	21.16	19.29	17.47	15.13	14.30
21	09.26	07.54	06.19	05.32	03.55	03.00	03.55	05.28	06.56	08.21	08.57	10.01
	15.33	17.11	18.34	21.04	22.36	23.39	22.51	21.13	19.26	17.43	15.10	14.30
22	09.24	07.51	06.15	05.28	03.53	03.01	03.58	05.31	06.58	08.24	09.00	10.02
	15.36	17.14	18.37	21.07	22.39	23.39	22.48	21.09	19.22	17.40	15.08	14.30
23	09.21	07.47	06.12	05.25	03.50	03.01	04.01	05.34	07.01	08.27	09.03	10.03
	15.39	17.17	18.39	21.10	22.42	23.39	22.46	21.06	19.19	17.37	15.05	14.31
24	09.18	07.44	06.09	05.22	03.47	03.01	04.04	05.37	07.04	08.30	09.06	10.03
	15.42	17.20	18.42	21.13	22.45	23.39	22.43	21.02	19.15	17.33	15.03	14.32
25	09.16	07.41	06.05	05.18	03.44	03.02	04.07	05.40	07.07	07.33	09.09	10.03
	15.45	17.23	18.45	21.16	22.48	23.39	22.40	20.59	19.12	16.30	15.00	14.32
26	09.13	07.37	06.02	05.15	03.41	03.03	04.10	05.42	07.09	07.36	09.11	10.03
	15.49	17.26	18.48	21.19	22.51	23.38	22.37	20.56	19.08	16.27	14.58	14.33
27	09.10	07.34	05.58	05.12	03.39	03.03	04.13	05.45	07.12	07.39	09.14	10.03
	15.52	17.29	18.51	21.22	22.53	23.38	22.34	20.52	19.05	16.24	14.56	14.34
28	09.08	07.31	05.55	05.08	03.36	03.04	04.16	05.48	07.15	07.42	09.17	10.03
	15.55	17.32	18.54	21.25	22.56	23.37	22.31	20.49	19.01	16.20	14.54	14.36
29	09.05		06.51	05.05	03.34	03.06	04.19	05.51	07.18	07.45	09.20	10.03
	15.58		19.57	21.28	22.59	23.36	22.28	20.45	18.58	16.17	14.52	14.37
30	09.02		06.48	05.02	03.31	03.07	04.22	05.54	07.21	07.48	09.23	10.02
	16.01		20.00	21.31	23.02	23.35	22.25	20.42	18.54	16.14	14.50	14.38
31	08.59		06.44		03.29		04.25	05.57		07.51		10.02
	16.05		20.02		23.04		22.22	20.38		16.11		14.40
Potential sun hours	178	241	363	449	563	611	599	504	392	307	203	146
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:
31.1.2024 9.03/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE1_RD200x21xHH200_+_Hallakallio_No_Forest Shadow receptor: C - C - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March		April		May		June
1	10.00	08.56	07.27		06.41	18.41 (WTG15)	04.58		03.27
	14.42	16.08	17.35		20.05	14 18.55 (WTG15)	21.34		23.06
2	09.59	08.53	07.24		06.37	18.44 (WTG15)	04.55		03.25
	14.44	16.11	17.38		20.08	9 18.53 (WTG15)	21.37		23.09
3	09.58	08.50	07.20		06.34		04.52	20.54 (WTG08)	03.22
	14.46	16.14	17.41		20.11		21.40	3 20.57 (WTG08)	23.11
4	09.57	08.47	07.17		06.30		04.49	20.50 (WTG08)	03.20
	14.48	16.17	17.44		20.14		21.43	10 21.00 (WTG08)	23.14
5	09.56	08.44	07.14		06.27		04.45	20.49 (WTG08)	03.18
	14.50	16.21	17.47		20.17		21.46	14 21.03 (WTG08)	23.16
6	09.55	08.41	07.10		06.23		04.42	20.48 (WTG08)	03.16
	14.53	16.24	17.50		20.20		21.50	17 21.05 (WTG08)	23.18
7	09.54	08.38	07.07		06.20		04.39	20.47 (WTG08)	03.14
	14.55	16.27	17.53		20.23		21.53	19 21.06 (WTG08)	23.21
8	09.52	08.35	07.04		06.17		04.36	20.46 (WTG08)	03.13
	14.57	16.30	17.56		20.25		21.56	20 21.06 (WTG08)	23.23
9	09.51	08.32	07.00		06.13		04.32	20.45 (WTG08)	03.11
	15.00	16.33	17.59		20.28		21.59	22 21.07 (WTG08)	23.25
10	09.49	08.29	06.57		06.10		04.29	20.45 (WTG08)	03.09
	15.02	16.37	18.02		20.31		22.02	23 21.08 (WTG08)	23.26
11	09.47	08.26	06.53		06.06		04.26	20.44 (WTG08)	03.08
	15.05	16.40	18.05		20.34		22.05	24 21.08 (WTG08)	23.28
12	09.45	08.23	06.50		06.03		04.23	20.44 (WTG08)	03.07
	15.07	16.43	18.08		20.37		22.08	23 21.07 (WTG08)	23.30
13	09.43	08.20	06.46		05.59		04.20	20.44 (WTG08)	03.06
	15.10	16.46	18.11		20.40		22.11	24 21.08 (WTG08)	23.31
14	09.41	08.16	06.43		05.56		04.17	20.44 (WTG08)	03.04
	15.13	16.49	18.13		20.43		22.14	24 21.08 (WTG08)	23.33
15	09.39	08.13	06.40		05.52		04.14	20.44 (WTG08)	03.04
	15.16	16.52	18.16		20.46		22.17	24 21.08 (WTG08)	23.34
16	09.37	08.10	06.36		05.49		04.11	20.44 (WTG08)	03.03
	15.18	16.55	18.19		20.49		22.20	23 21.07 (WTG08)	23.35
17	09.35	08.07	06.33		05.46		04.07	20.45 (WTG08)	03.02
	15.21	16.59	18.22		20.52		22.23	22 21.07 (WTG08)	23.36
18	09.33	08.04	06.29		05.42		04.04	20.45 (WTG08)	03.02
	15.24	17.02	18.25		20.55		22.27	22 21.07 (WTG08)	23.37
19	09.30	08.00	06.26	17.49 (WTG15)	05.39		04.02	20.45 (WTG08)	03.01
	15.27	17.05	18.28	5 17.54 (WTG15)	20.58		22.30	22 21.07 (WTG08)	23.37
20	09.28	07.57	06.22	17.45 (WTG15)	05.35		03.59	20.46 (WTG08)	03.01
	15.30	17.08	18.31	11 17.56 (WTG15)	21.01		22.33	20 21.06 (WTG08)	23.38
21	09.26	07.54	06.19	17.43 (WTG15)	05.32		03.56	20.47 (WTG08)	03.01
	15.33	17.11	18.34	16 17.59 (WTG15)	21.04		22.36	19 21.06 (WTG08)	23.38
22	09.23	07.50	06.15	17.41 (WTG15)	05.29		03.53	20.47 (WTG08)	03.01
	15.36	17.14	18.37	19 18.00 (WTG15)	21.07		22.39	18 21.05 (WTG08)	23.38
23	09.21	07.47	06.12	17.40 (WTG15)	05.25		03.50	20.48 (WTG08)	03.01
	15.39	17.17	18.39	22 18.02 (WTG15)	21.10		22.41	16 21.04 (WTG08)	23.38
24	09.18	07.44	06.08	17.39 (WTG15)	05.22		03.47	20.50 (WTG08)	03.02
	15.43	17.20	18.42	22 18.01 (WTG15)	21.13		22.44	13 21.03 (WTG08)	23.38
25	09.15	07.41	06.05	17.39 (WTG15)	05.18		03.44	20.51 (WTG08)	03.02
	15.46	17.23	18.45	23 18.02 (WTG15)	21.16		22.47	11 21.02 (WTG08)	23.38
26	09.13	07.37	06.02	17.39 (WTG15)	05.15		03.42	20.53 (WTG08)	03.03
	15.49	17.26	18.48	23 18.02 (WTG15)	21.19		22.50	7 21.00 (WTG08)	23.38
27	09.10	07.34	05.58	17.38 (WTG15)	05.12		03.39		03.04
	15.52	17.29	18.51	23 18.01 (WTG15)	21.22		22.53		23.37
28	09.07	07.31	05.55	17.38 (WTG15)	05.08		03.37		03.05
	15.55	17.32	18.54	23 18.01 (WTG15)	21.25		22.56		23.36
29	09.05		06.51	18.38 (WTG15)	05.05		03.34		03.06
	15.58		19.57	21 18.59 (WTG15)	21.28		22.59		23.35
30	09.02		06.48	18.39 (WTG15)	05.02		03.32		03.07
	16.01		19.59	20 18.59 (WTG15)	21.31		23.01		23.34
31	08.59		06.44	18.39 (WTG15)			03.29		
	16.05		20.02	18 18.57 (WTG15)			23.04		
Potential sun hours	179	241	363		448		562		611
Total, worst case			246		23		440		
Sun reduction			0,32		0,44		0,48		
Oper. time red.			0,90		0,90		0,90		
Wind dir. red.			0,56		0,56		0,60		
Total reduction			0,16		0,22		0,26		
Total, real			40		5		114		

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:
31.1.2024 9.03/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE1_RD200x21xHH200_+_Hallakallio_No_Forest Shadow receptor: C - C - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	July			August			September			October	November	December
1	03.09			04.28		20.55 (WTG08)	06.00			07.23	07.54	09.25
	23.33			22.18	23	21.18 (WTG08)	20.35			18.51	16.08	14.48
2	03.10			04.31		20.54 (WTG08)	06.03			07.26	07.57	09.28
	23.32			22.15	24	21.18 (WTG08)	20.31			18.47	16.05	14.46
3	03.12			04.34		20.55 (WTG08)	06.05			07.29	08.00	09.30
	23.31			22.12	23	21.18 (WTG08)	20.28			18.44	16.02	14.44
4	03.14			04.37		20.56 (WTG08)	06.08			07.32	08.04	09.33
	23.29			22.09	22	21.18 (WTG08)	20.24			18.41	15.59	14.43
5	03.16			04.40		20.56 (WTG08)	06.11			07.35	08.07	09.35
	23.28			22.05	20	21.16 (WTG08)	20.21			18.37	15.55	14.41
6	03.18			04.43		20.57 (WTG08)	06.14			07.37	08.10	09.37
	23.26			22.02	19	21.16 (WTG08)	20.18			18.34	15.52	14.40
7	03.20			04.46		20.57 (WTG08)	06.17			07.40	08.13	09.40
	23.24			21.59	17	21.14 (WTG08)	20.14			18.30	15.49	14.38
8	03.22			04.49		20.59 (WTG08)	06.19			07.43	08.16	09.42
	23.22			21.56	13	21.12 (WTG08)	20.11			18.27	15.46	14.37
9	03.24			04.52		21.01 (WTG08)	06.22			07.46	08.19	09.44
	23.20			21.52	8	21.09 (WTG08)	20.07			18.24	15.43	14.36
10	03.26			04.55			06.25		18.37 (WTG15)	07.49	08.22	09.46
	23.18			21.49			20.04	8	18.45 (WTG15)	18.20	15.40	14.34
11	03.29			04.58			06.28		18.34 (WTG15)	07.52	08.25	09.48
	23.16			21.46			20.00	13	18.47 (WTG15)	18.17	15.38	14.33
12	03.31			05.01			06.31		18.32 (WTG15)	07.55	08.28	09.50
	23.14			21.43			19.57	17	18.49 (WTG15)	18.13	15.35	14.33
13	03.34			05.04			06.33		18.30 (WTG15)	07.57	08.32	09.51
	23.11			21.39			19.53	19	18.49 (WTG15)	18.10	15.32	14.32
14	03.36			05.07			06.36		18.29 (WTG15)	08.00	08.35	09.53
	23.09			21.36			19.50	21	18.50 (WTG15)	18.07	15.29	14.31
15	03.39			05.10			06.39		18.28 (WTG15)	08.03	08.38	09.55
	23.07			21.33			19.46	22	18.50 (WTG15)	18.03	15.26	14.31
16	03.42			05.13			06.42		18.28 (WTG15)	08.06	08.41	09.56
	23.04			21.29			19.43	23	18.51 (WTG15)	18.00	15.23	14.30
17	03.44		21.03 (WTG08)	05.16			06.44		18.26 (WTG15)	08.09	08.44	09.57
	23.02	5	21.08 (WTG08)	21.26			19.39	24	18.50 (WTG15)	17.57	15.21	14.30
18	03.47		21.02 (WTG08)	05.19			06.47		18.26 (WTG15)	08.12	08.47	09.58
	22.59	9	21.11 (WTG08)	21.23			19.36	23	18.49 (WTG15)	17.53	15.18	14.30
19	03.50		21.00 (WTG08)	05.22			06.50		18.27 (WTG15)	08.15	08.50	09.59
	22.56	13	21.13 (WTG08)	21.19			19.32	22	18.49 (WTG15)	17.50	15.15	14.30
20	03.53		20.59 (WTG08)	05.25			06.53		18.26 (WTG15)	08.18	08.53	10.00
	22.54	15	21.14 (WTG08)	21.16			19.29	21	18.47 (WTG15)	17.47	15.13	14.30
21	03.56		20.58 (WTG08)	05.28			06.56		18.27 (WTG15)	08.21	08.56	10.01
	22.51	16	21.14 (WTG08)	21.12			19.25	20	18.47 (WTG15)	17.43	15.10	14.30
22	03.58		20.57 (WTG08)	05.31			06.58		18.28 (WTG15)	08.24	08.59	10.02
	22.48	18	21.15 (WTG08)	21.09			19.22	17	18.45 (WTG15)	17.40	15.08	14.31
23	04.01		20.57 (WTG08)	05.34			07.01		18.29 (WTG15)	08.27	09.02	10.02
	22.45	19	21.16 (WTG08)	21.06			19.19	13	18.42 (WTG15)	17.37	15.05	14.31
24	04.04		20.56 (WTG08)	05.37			07.04		18.30 (WTG15)	08.30	09.05	10.02
	22.42	21	21.17 (WTG08)	21.02			19.15	8	18.38 (WTG15)	17.33	15.03	14.32
25	04.07		20.56 (WTG08)	05.40			07.07			07.33	09.08	10.03
	22.39	22	21.18 (WTG08)	20.59			19.12			16.30	15.01	14.33
26	04.10		20.55 (WTG08)	05.43			07.09			07.36	09.11	10.03
	22.36	23	21.18 (WTG08)	20.55			19.08			16.27	14.58	14.34
27	04.13		20.55 (WTG08)	05.45			07.12			07.39	09.14	10.03
	22.33	23	21.18 (WTG08)	20.52			19.05			16.24	14.56	14.35
28	04.16		20.55 (WTG08)	05.48			07.15			07.42	09.17	10.02
	22.30	23	21.18 (WTG08)	20.49			19.01			16.21	14.54	14.36
29	04.19		20.54 (WTG08)	05.51			07.18			07.45	09.20	10.02
	22.27	24	21.18 (WTG08)	20.45			18.58			16.17	14.52	14.37
30	04.22		20.55 (WTG08)	05.54			07.21			07.48	09.22	10.02
	22.24	24	21.19 (WTG08)	20.42			18.54			16.14	14.50	14.39
31	04.25		20.54 (WTG08)	05.57						07.51		10.01
	22.21	24	21.18 (WTG08)	20.38						16.11		14.40
Potential sun hours	598			504			392			307	204	147
Total, worst case		279			169			271				
Sun reduction		0,46			0,42			0,36				
Oper. time red.		0,90			0,90			0,90				
Wind dir. red.		0,60			0,60			0,56				
Total reduction		0,25			0,22			0,18				
Total, real		69			38			49				

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:
31.1.2024 9.03/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE1_RD200x21xHH200_+_Hallakallio_No_Forest Shadow receptor: D - D - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March			April			May	June
1	10.00	08.56	07.27			06.41		19.07 (WTG15)	04.58	03.27
	14.42	16.08	17.35			20.05	21	19.28 (WTG15)	21.34	23.06
2	09.59	08.53	07.24			06.37		19.07 (WTG15)	04.55	03.25
	14.44	16.11	17.38			20.08	22	19.29 (WTG15)	21.37	23.09
3	09.58	08.50	07.20			06.34		19.06 (WTG15)	04.52	03.22
	14.46	16.14	17.41			20.11	22	19.28 (WTG15)	21.40	23.11
4	09.57	08.47	07.17			06.30		19.05 (WTG15)	04.49	03.20
	14.48	16.17	17.44			20.14	23	19.28 (WTG15)	21.43	23.14
5	09.56	08.44	07.14			06.27		19.04 (WTG15)	04.45	03.18
	14.50	16.21	17.47			20.17	24	19.28 (WTG15)	21.46	23.16
6	09.55	08.41	07.10			06.23		19.05 (WTG15)	04.42	03.16
	14.53	16.24	17.50			20.20	22	19.27 (WTG15)	21.50	23.18
7	09.54	08.38	07.07			06.20		19.05 (WTG15)	04.39	03.14
	14.55	16.27	17.53			20.23	22	19.27 (WTG15)	21.53	23.20
8	09.52	08.35	07.04			06.17		19.05 (WTG15)	04.36	03.13
	14.57	16.30	17.56			20.25	20	19.25 (WTG15)	21.56	23.23
9	09.50	08.32	07.00			06.13		19.06 (WTG15)	04.32	03.11
	15.00	16.33	17.59			20.28	18	19.24 (WTG15)	21.59	23.24
10	09.49	08.29	06.57			06.10		19.08 (WTG15)	04.29	03.09
	15.02	16.37	18.02			20.31	15	19.23 (WTG15)	22.02	23.26
11	09.47	08.26	06.53			06.06		19.09 (WTG15)	04.26	03.08
	15.05	16.40	18.05			20.34	11	19.20 (WTG15)	22.05	23.28
12	09.45	08.23	06.50			06.03		19.13 (WTG15)	04.23	03.07
	15.07	16.43	18.08			20.37	3	19.16 (WTG15)	22.08	23.30
13	09.43	08.20	06.46			05.59			04.20	03.06
	15.10	16.46	18.11			20.40			22.11	23.31
14	09.41	08.16	06.43			05.56			04.17	03.05
	15.13	16.49	18.13			20.43			22.14	23.33
15	09.39	08.13	06.40			05.52			04.14	03.04
	15.16	16.52	18.16			20.46			22.17	23.34
16	09.37	08.10	06.36			05.49			04.11	03.03
	15.19	16.55	18.19			20.49			22.20	23.35
17	09.35	08.07	06.33			05.46			04.08	03.02
	15.21	16.59	18.22			20.52			22.23	23.36
18	09.33	08.04	06.29			05.42			04.05	03.02
	15.24	17.02	18.25			20.55			22.26	23.37
19	09.30	08.00	06.26			05.39			04.02	03.01
	15.27	17.05	18.28			20.58			22.30	23.37
20	09.28	07.57	06.22			05.35			03.59	03.01
	15.30	17.08	18.31			21.01			22.33	23.38
21	09.26	07.54	06.19			05.32			03.56	03.01
	15.33	17.11	18.34			21.04			22.36	23.38
22	09.23	07.50	06.15			05.29			03.53	03.01
	15.36	17.14	18.37			21.07			22.38	23.38
23	09.21	07.47	06.12			05.25			03.50	03.01
	15.39	17.17	18.39			21.10			22.41	23.38
24	09.18	07.44	06.08			05.22			03.47	03.02
	15.43	17.20	18.42			21.13			22.44	23.38
25	09.15	07.41	06.05			05.18			03.45	03.02
	15.46	17.23	18.45			21.16			22.47	23.38
26	09.13	07.37	06.02			05.15			03.42	03.03
	15.49	17.26	18.48			21.19			22.50	23.37
27	09.10	07.34	05.58			05.12			03.39	03.04
	15.52	17.29	18.51			21.22			22.53	23.37
28	09.07	07.31	05.55		18.18 (WTG15)	05.08			03.37	03.05
	15.55	17.32	18.54	1	18.19 (WTG15)	21.25			22.56	23.36
29	09.05		06.51		19.12 (WTG15)	05.05			03.34	03.06
	15.58		19.57	10	19.22 (WTG15)	21.28			22.58	23.35
30	09.02		06.48		19.11 (WTG15)	05.02			03.32	03.07
	16.02		19.59	14	19.25 (WTG15)	21.31			23.01	23.34
31	08.59		06.44		19.08 (WTG15)				03.29	
	16.05		20.02	19	19.27 (WTG15)				23.04	
Potential sun hours	179	241	363			448			562	610
Total, worst case				44			223			
Sun reduction				0,32			0,44			
Oper. time red.				0,90			0,90			
Wind dir. red.				0,56			0,56			
Total reduction				0,16			0,22			
Total, real				7			50			

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:
31.1.2024 9.03/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE1_RD200x21xHH200_+_Hallakallio_No_Forest Shadow receptor: D - D - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	July	August			September			October	November	December
1	03.09	04.28			06.00		19.08 (WTG15)	07.23	07.54	09.25
	23.33	22.18			20.35	11	19.19 (WTG15)	18.51	16.08	14.48
2	03.10	04.31			06.03		19.05 (WTG15)	07.26	07.57	09.28
	23.32	22.15			20.31	16	19.21 (WTG15)	18.47	16.05	14.46
3	03.12	04.34			06.05		19.04 (WTG15)	07.29	08.00	09.30
	23.31	22.12			20.28	18	19.22 (WTG15)	18.44	16.02	14.44
4	03.14	04.37			06.08		19.02 (WTG15)	07.32	08.04	09.33
	23.29	22.09			20.24	20	19.22 (WTG15)	18.41	15.59	14.43
5	03.16	04.40			06.11		19.01 (WTG15)	07.35	08.07	09.35
	23.28	22.05			20.21	22	19.23 (WTG15)	18.37	15.55	14.41
6	03.18	04.43			06.14		19.01 (WTG15)	07.37	08.10	09.37
	23.26	22.02			20.17	23	19.24 (WTG15)	18.34	15.52	14.40
7	03.20	04.46			06.17		19.00 (WTG15)	07.40	08.13	09.40
	23.24	21.59			20.14	23	19.23 (WTG15)	18.30	15.49	14.38
8	03.22	04.49			06.19		19.00 (WTG15)	07.43	08.16	09.42
	23.22	21.56			20.11	23	19.23 (WTG15)	18.27	15.46	14.37
9	03.24	04.52			06.22		19.00 (WTG15)	07.46	08.19	09.44
	23.20	21.52			20.07	23	19.23 (WTG15)	18.24	15.43	14.36
10	03.26	04.55			06.25		18.59 (WTG15)	07.49	08.22	09.46
	23.18	21.49			20.04	22	19.21 (WTG15)	18.20	15.40	14.34
11	03.29	04.58			06.28		19.00 (WTG15)	07.52	08.25	09.48
	23.16	21.46			20.00	20	19.20 (WTG15)	18.17	15.38	14.34
12	03.31	05.01			06.31		19.01 (WTG15)	07.55	08.28	09.50
	23.14	21.43			19.57	18	19.19 (WTG15)	18.13	15.35	14.33
13	03.34	05.04			06.33		19.01 (WTG15)	07.57	08.32	09.51
	23.11	21.39			19.53	15	19.16 (WTG15)	18.10	15.32	14.32
14	03.36	05.07			06.36		19.03 (WTG15)	08.00	08.35	09.53
	23.09	21.36			19.50	10	19.13 (WTG15)	18.07	15.29	14.31
15	03.39	05.10			06.39		19.06 (WTG15)	08.03	08.38	09.55
	23.07	21.33			19.46	4	19.10 (WTG15)	18.03	15.26	14.31
16	03.42	05.13			06.42			08.06	08.41	09.56
	23.04	21.29			19.43			18.00	15.23	14.30
17	03.44	05.16			06.44			08.09	08.44	09.57
	23.01	21.26			19.39			17.57	15.21	14.30
18	03.47	05.19			06.47			08.12	08.47	09.58
	22.59	21.23			19.36			17.53	15.18	14.30
19	03.50	05.22			06.50			08.15	08.50	09.59
	22.56	21.19			19.32			17.50	15.15	14.30
20	03.53	05.25			06.53			08.18	08.53	10.00
	22.54	21.16			19.29			17.47	15.13	14.30
21	03.56	05.28			06.56			08.21	08.56	10.01
	22.51	21.12			19.25			17.43	15.10	14.30
22	03.59	05.31			06.58			08.24	08.59	10.02
	22.48	21.09			19.22			17.40	15.08	14.31
23	04.01	05.34			07.01			08.27	09.02	10.02
	22.45	21.06			19.19			17.37	15.05	14.31
24	04.04	05.37			07.04			08.30	09.05	10.02
	22.42	21.02			19.15			17.33	15.03	14.32
25	04.07	05.40			07.07			07.33	09.08	10.03
	22.39	20.59			19.12			16.30	15.01	14.33
26	04.10	05.43			07.09			07.36	09.11	10.03
	22.36	20.55			19.08			16.27	14.58	14.34
27	04.13	05.45			07.12			07.39	09.14	10.03
	22.33	20.52			19.05			16.24	14.56	14.35
28	04.16	05.48			07.15			07.42	09.17	10.02
	22.30	20.49			19.01			16.21	14.54	14.36
29	04.19	05.51			07.18			07.45	09.19	10.02
	22.27	20.45			18.58			16.17	14.52	14.37
30	04.22	05.54			07.21			07.48	09.22	10.02
	22.24	20.42			18.54			16.14	14.50	14.39
31	04.25	05.57		19.12 (WTG15)				07.51		10.01
	22.21	20.38	4	19.16 (WTG15)				16.11		14.40
Potential sun hours	598	504			392			307	204	147
Total, worst case			4			268				
Sun reduction			0,42			0,36				
Oper. time red.			0,90			0,90				
Wind dir. red.			0,56			0,56				
Total reduction			0,21			0,18				
Total, real			1			48				

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:
31.1.2024 9.03/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE1_RD200x21xHH200_+_Hallakallio_No_Forest Shadow receptor: E - E - Lomarakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June			July			August	September	October	November	December
1	10.00	08.56	07.27	06.41	04.59	03.27			03.09		22.19 (WTG10)	04.29	06.00	07.24	07.54	09.25
	14.43	16.08	17.35	20.05	21.34	23.06			23.33	7	22.26 (WTG10)	22.18	20.35	18.51	16.08	14.48
2	09.59	08.53	07.24	06.38	04.55	03.25			03.11		22.21 (WTG10)	04.32	06.03	07.26	07.57	09.27
	14.45	16.11	17.38	20.08	21.37	23.09			23.32	3	22.24 (WTG10)	22.15	20.31	18.48	16.05	14.47
3	09.58	08.50	07.21	06.34	04.52	03.23			03.13			04.35	06.06	07.29	08.00	09.30
	14.47	16.15	17.41	20.11	21.40	23.11			23.30			22.12	20.28	18.44	16.02	14.45
4	09.57	08.47	07.17	06.31	04.49	03.21			03.14			04.38	06.08	07.32	08.04	09.33
	14.49	16.18	17.44	20.14	21.43	23.14			23.29			22.09	20.25	18.41	15.59	14.43
5	09.56	08.44	07.14	06.27	04.46	03.19			03.16			04.41	06.11	07.35	08.07	09.35
	14.51	16.21	17.47	20.17	21.46	23.16			23.27			22.05	20.21	18.37	15.56	14.41
6	09.55	08.41	07.10	06.24	04.42	03.17			03.18			04.44	06.14	07.38	08.10	09.37
	14.53	16.24	17.50	20.20	21.50	23.18			23.26			22.02	20.18	18.34	15.53	14.40
7	09.53	08.38	07.07	06.20	04.39	03.15			03.20			04.47	06.17	07.40	08.13	09.40
	14.55	16.27	17.53	20.23	21.53	23.20			23.24			21.59	20.14	18.31	15.50	14.39
8	09.52	08.35	07.04	06.17	04.36	03.13			03.22			04.50	06.20	07.43	08.16	09.42
	14.58	16.31	17.56	20.26	21.56	23.22			23.22			21.56	20.11	18.27	15.47	14.37
9	09.50	08.32	07.00	06.13	04.33	03.12			03.25			04.53	06.22	07.46	08.19	09.44
	15.00	16.34	17.59	20.28	21.59	23.24			23.20			21.52	20.07	18.24	15.44	14.36
10	09.49	08.29	06.57	06.10	04.30	03.10			03.27			04.56	06.25	07.49	08.22	09.46
	15.03	16.37	18.02	20.31	22.02	23.26			23.18			21.49	20.04	18.20	15.41	14.35
11	09.47	08.26	06.53	06.06	04.26	03.09		22.16 (WTG10)	03.29			04.59	06.28	07.52	08.25	09.48
	15.05	16.40	18.05	20.34	22.05	23.28	5	22.21 (WTG10)	23.16			21.46	20.00	18.17	15.38	14.34
12	09.45	08.23	06.50	06.03	04.23	03.07		22.15 (WTG10)	03.32			05.02	06.31	07.55	08.28	09.50
	15.08	16.43	18.08	20.37	22.08	23.29	8	22.23 (WTG10)	23.14			21.43	19.57	18.14	15.35	14.33
13	09.43	08.20	06.47	06.00	04.20	03.06		22.14 (WTG10)	03.34			05.05	06.34	07.58	08.32	09.51
	15.10	16.46	18.11	20.40	22.11	23.31	10	22.24 (WTG10)	23.11			21.39	19.53	18.10	15.32	14.32
14	09.41	08.16	06.43	05.56	04.17	03.05		22.15 (WTG10)	03.37			05.08	06.36	08.00	08.35	09.53
	15.13	16.49	18.14	20.43	22.14	23.32	10	22.25 (WTG10)	23.09			21.36	19.50	18.07	15.29	14.32
15	09.39	08.13	06.40	05.53	04.14	03.04		22.14 (WTG10)	03.39			05.11	06.39	08.03	08.38	09.54
	15.16	16.53	18.17	20.46	22.17	23.33	11	22.25 (WTG10)	23.06			21.33	19.46	18.04	15.27	14.31
16	09.37	08.10	06.36	05.49	04.11	03.03		22.14 (WTG10)	03.42			05.14	06.42	08.06	08.41	09.56
	15.19	16.56	18.19	20.49	22.20	23.35	12	22.26 (WTG10)	23.04			21.29	19.43	18.00	15.24	14.31
17	09.35	08.07	06.33	05.46	04.08	03.03		22.14 (WTG10)	03.45			05.17	06.45	08.09	08.44	09.57
	15.22	16.59	18.22	20.52	22.23	23.36	13	22.27 (WTG10)	23.01			21.26	19.39	17.57	15.21	14.31
18	09.33	08.04	06.29	05.42	04.05	03.02		22.13 (WTG10)	03.48			05.20	06.47	08.12	08.47	09.58
	15.25	17.02	18.25	20.55	22.26	23.36	13	22.26 (WTG10)	22.59			21.23	19.36	17.54	15.18	14.30
19	09.30	08.00	06.26	05.39	04.02	03.02		22.13 (WTG10)	03.50			05.22	06.50	08.15	08.50	09.59
	15.28	17.05	18.28	20.58	22.29	23.37	14	22.27 (WTG10)	22.56			21.19	19.33	17.50	15.16	14.30
20	09.28	07.57	06.22	05.36	03.59	03.02		22.13 (WTG10)	03.53			05.25	06.53	08.18	08.53	10.00
	15.31	17.08	18.31	21.01	22.32	23.37	14	22.27 (WTG10)	22.53			21.16	19.29	17.47	15.13	14.31
21	09.26	07.54	06.19	05.32	03.56	03.02		22.14 (WTG10)	03.56			05.28	06.56	08.21	08.56	10.01
	15.34	17.11	18.34	21.04	22.35	23.38	14	22.28 (WTG10)	22.51			21.12	19.26	17.44	15.11	14.31
22	09.23	07.51	06.16	05.29	03.53	03.02		22.14 (WTG10)	03.59			05.31	06.59	08.24	08.59	10.01
	15.37	17.14	18.37	21.07	22.38	23.38	14	22.28 (WTG10)	22.48			21.09	19.22	17.40	15.08	14.31
23	09.21	07.47	06.12	05.25	03.50	03.02		22.14 (WTG10)	04.02			05.34	07.01	08.27	09.02	10.02
	15.40	17.17	18.40	21.10	22.41	23.38	14	22.28 (WTG10)	22.45			21.06	19.19	17.37	15.06	14.32
24	09.18	07.44	06.09	05.22	03.48	03.02		22.15 (WTG10)	04.05			05.37	07.04	08.30	09.05	10.02
	15.43	17.20	18.42	21.13	22.44	23.38	13	22.28 (WTG10)	22.42			21.02	19.15	17.34	15.03	14.32
25	09.15	07.41	06.05	05.19	03.45	03.03		22.15 (WTG10)	04.08			05.40	07.07	07.33	09.08	10.02
	15.46	17.23	18.45	21.16	22.47	23.38	13	22.28 (WTG10)	22.39			20.59	19.12	16.30	15.01	14.33
26	09.13	07.37	06.02	05.15	03.42	03.04		22.16 (WTG10)	04.11			05.43	07.10	07.36	09.11	10.02
	15.49	17.26	18.48	21.19	22.50	23.37	12	22.28 (WTG10)	22.36			20.55	19.08	16.27	14.59	14.34
27	09.10	07.34	05.58	05.12	03.40	03.05		22.16 (WTG10)	04.14			05.46	07.12	07.39	09.14	10.02
	15.52	17.29	18.51	21.22	22.53	23.37	11	22.27 (WTG10)	22.33			20.52	19.05	16.24	14.57	14.35
28	09.07	07.31	05.55	05.09	03.37	03.06		22.17 (WTG10)	04.17			05.49	07.15	07.42	09.17	10.02
	15.56	17.32	18.54	21.25	22.56	23.36	10	22.27 (WTG10)	22.30			20.49	19.01	16.21	14.54	14.36
29	09.05		06.51	05.05	03.35	03.07		22.17 (WTG10)	04.20			05.51	07.18	07.45	09.19	10.02
	15.59		19.57	21.28	22.58	23.35	10	22.27 (WTG10)	22.27			20.45	18.58	16.18	14.52	14.38
30	09.02		06.48	05.02	03.32	03.08		22.18 (WTG10)	04.23			05.54	07.21	07.48	09.22	10.02
	16.02		20.00	21.31	23.01	23.34	9	22.27 (WTG10)	22.24			20.42	18.55	16.14	14.50	14.39
31	08.59		06.44		03.30				04.26			05.57		07.51		10.01
	16.05		20.02		23.04				22.21			20.38		16.11		14.41
Potential sun hours	179	241	363	448	562	610			598			504	392	307	204	147
Total, worst case						230			10							
Sun reduction						0,45			0,46							
Oper. time red.						0,90			0,90							
Wind dir. red.						0,65			0,65							
Total reduction						0,26			0,27							
Total, real						60			3							

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:
31.1.2024 9.03/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE1_RD200x21xHH200_+_Hallakallio_No_Forest Shadow receptor: F - F - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.00	08.56	07.27	06.41	04.59	03.28	03.10	04.29	06.00	07.24	07.54	09.25
	14.43	16.08	17.36	20.05	21.34	23.06	23.33	22.18	20.35	18.51	16.08	14.49
2	09.59	08.53	07.24	06.38	04.56	03.25	03.11	04.32	06.03	07.26	07.58	09.28
	14.45	16.12	17.39	20.08	21.37	23.09	23.32	22.15	20.32	18.48	16.05	14.47
3	09.58	08.50	07.21	06.34	04.52	03.23	03.13	04.35	06.06	07.29	08.01	09.30
	14.47	16.15	17.42	20.11	21.40	23.11	23.30	22.12	20.28	18.44	16.02	14.45
4	09.57	08.47	07.17	06.31	04.49	03.21	03.15	04.38	06.09	07.32	08.04	09.33
	14.49	16.18	17.44	20.14	21.43	23.14	23.29	22.09	20.25	18.41	15.59	14.43
5	09.56	08.44	07.14	06.27	04.46	03.19	03.16	04.41	06.11	07.35	08.07	09.35
	14.51	16.21	17.47	20.17	21.47	23.16	23.27	22.06	20.21	18.38	15.56	14.42
6	09.55	08.41	07.11	06.24	04.43	03.17	03.18	04.44	06.14	07.38	08.10	09.37
	14.53	16.24	17.50	20.20	21.50	23.18	23.26	22.02	20.18	18.34	15.53	14.40
7	09.54	08.38	07.07	06.20	04.39	03.15	03.20	04.47	06.17	07.41	08.13	09.40
	14.55	16.28	17.53	20.23	21.53	23.20	23.24	21.59	20.14	18.31	15.50	14.39
8	09.52	08.35	07.04	06.17	04.36	03.13	03.23	04.50	06.20	07.43	08.16	09.42
	14.58	16.31	17.56	20.26	21.56	23.22	23.22	21.56	20.11	18.27	15.47	14.37
9	09.50	08.32	07.00	06.14	04.33	03.12	03.25	04.53	06.23	07.46	08.19	09.44
	15.00	16.34	17.59	20.29	21.59	23.24	23.20	21.53	20.07	18.24	15.44	14.36
10	09.49	08.29	06.57	06.10	04.30	03.10	03.27	04.56	06.25	07.49	08.22	09.46
	15.03	16.37	18.02	20.32	22.02	23.26	23.18	21.49	20.04	18.21	15.41	14.35
11	09.47	08.26	06.54	06.07	04.27	03.09	03.30	04.59	06.28	07.52	08.25	09.48
	15.05	16.40	18.05	20.34	22.05	23.28	23.16	21.46	20.00	18.17	15.38	14.34
12	09.45	08.23	06.50	06.03	04.23	03.08	03.32	05.02	06.31	07.55	08.29	09.50
	15.08	16.43	18.08	20.37	22.08	23.29	23.14	21.43	19.57	18.14	15.35	14.33
13	09.43	08.20	06.47	06.00	04.20	03.06	03.34	05.05	06.34	07.58	08.32	09.51
	15.11	16.47	18.11	20.40	22.11	23.31	23.11	21.39	19.53	18.10	15.32	14.33
14	09.41	08.17	06.43	05.56	04.17	03.05	03.37	05.08	06.37	08.01	08.35	09.53
	15.13	16.50	18.14	20.43	22.14	23.32	23.09	21.36	19.50	18.07	15.30	14.32
15	09.39	08.13	06.40	05.53	04.14	03.04	03.40	05.11	06.39	08.04	08.38	09.54
	15.16	16.53	18.17	20.46	22.17	23.34	23.07	21.33	19.47	18.04	15.27	14.31
16	09.37	08.10	06.36	05.49	04.11	03.04	03.42	05.14	06.42	08.06	08.41	09.56
	15.19	16.56	18.20	20.49	22.20	23.35	23.04	21.29	19.43	18.00	15.24	14.31
17	09.35	08.07	06.33	05.46	04.08	03.03	03.45	05.17	06.45	08.09	08.44	09.57
	15.22	16.59	18.22	20.52	22.23	23.36	23.01	21.26	19.40	17.57	15.21	14.31
18	09.33	08.04	06.30	05.43	04.05	03.02	03.48	05.20	06.48	08.12	08.47	09.58
	15.25	17.02	18.25	20.55	22.27	23.36	22.59	21.23	19.36	17.54	15.19	14.31
19	09.30	08.00	06.26	05.39	04.02	03.02	03.51	05.23	06.50	08.15	08.50	09.59
	15.28	17.05	18.28	20.58	22.30	23.37	22.56	21.19	19.33	17.50	15.16	14.31
20	09.28	07.57	06.23	05.36	03.59	03.02	03.53	05.26	06.53	08.18	08.53	10.00
	15.31	17.08	18.31	21.01	22.33	23.38	22.53	21.16	19.29	17.47	15.13	14.31
21	09.26	07.54	06.19	05.32	03.56	03.02	03.56	05.28	06.56	08.21	08.56	10.01
	15.34	17.11	18.34	21.04	22.36	23.38	22.51	21.13	19.26	17.44	15.11	14.31
22	09.23	07.51	06.16	05.29	03.53	03.02	03.59	05.31	06.59	08.24	08.59	10.01
	15.37	17.14	18.37	21.07	22.38	23.38	22.48	21.09	19.22	17.40	15.08	14.31
23	09.21	07.47	06.12	05.26	03.51	03.02	04.02	05.34	07.01	08.27	09.02	10.02
	15.40	17.17	18.40	21.10	22.41	23.38	22.45	21.06	19.19	17.37	15.06	14.32
24	09.18	07.44	06.09	05.22	03.48	03.03	04.05	05.37	07.04	08.30	09.05	10.02
	15.43	17.20	18.43	21.13	22.44	23.38	22.42	21.02	19.15	17.34	15.04	14.33
25	09.16	07.41	06.05	05.19	03.45	03.03	04.08	05.40	07.07	07.33	09.08	10.02
	15.46	17.24	18.45	21.16	22.47	23.38	22.39	20.59	19.12	16.31	15.01	14.33
26	09.13	07.37	06.02	05.16	03.42	03.04	04.11	05.43	07.10	07.36	09.11	10.03
	15.49	17.27	18.48	21.19	22.50	23.37	22.36	20.56	19.08	16.27	14.59	14.34
27	09.10	07.34	05.58	05.12	03.40	03.05	04.14	05.46	07.13	07.39	09.14	10.03
	15.53	17.30	18.51	21.22	22.53	23.37	22.33	20.52	19.05	16.24	14.57	14.35
28	09.07	07.31	05.55	05.09	03.37	03.06	04.17	05.49	07.15	07.42	09.17	10.02
	15.56	17.33	18.54	21.25	22.56	23.36	22.30	20.49	19.02	16.21	14.55	14.37
29	09.05		06.52	05.06	03.35	03.07	04.20	05.52	07.18	07.45	09.20	10.02
	15.59		19.57	21.28	22.58	23.35	22.27	20.45	18.58	16.18	14.53	14.38
30	09.02		06.48	05.02	03.32	03.08	04.23	05.54	07.21	07.48	09.22	10.02
	16.02		20.00	21.31	23.01	23.34	22.24	20.42	18.55	16.15	14.51	14.39
31	08.59		06.45		03.30		04.26	05.57		07.51		10.01
	16.05		20.03		23.04		22.21	20.38		16.11		14.41
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
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:
31.1.2024 9.03/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE1_RD200x21xHH200_+_Hallakallio_No_Forest Shadow receptor: G - G - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.00	08.56	07.28	06.41	04.59	03.28	03.10	04.29	06.00	07.24	07.55	09.25
	14.43	16.08	17.36	20.06	21.34	23.06	23.33	22.18	20.35	18.51	16.08	14.49
2	09.59	08.53	07.24	06.38	04.56	03.25	03.11	04.32	06.03	07.27	07.58	09.28
	14.45	16.12	17.39	20.08	21.37	23.09	23.32	22.15	20.32	18.48	16.05	14.47
3	09.59	08.50	07.21	06.34	04.52	03.23	03.13	04.35	06.06	07.29	08.01	09.30
	14.47	16.15	17.42	20.11	21.41	23.11	23.31	22.12	20.28	18.45	16.02	14.45
4	09.57	08.47	07.17	06.31	04.49	03.21	03.15	04.38	06.09	07.32	08.04	09.33
	14.49	16.18	17.45	20.14	21.44	23.14	23.29	22.09	20.25	18.41	15.59	14.43
5	09.56	08.45	07.14	06.27	04.46	03.19	03.17	04.41	06.12	07.35	08.07	09.35
	14.51	16.21	17.48	20.17	21.47	23.16	23.28	22.06	20.21	18.38	15.56	14.42
6	09.55	08.42	07.11	06.24	04.43	03.17	03.19	04.44	06.14	07.38	08.10	09.37
	14.53	16.24	17.51	20.20	21.50	23.18	23.26	22.02	20.18	18.34	15.53	14.40
7	09.54	08.38	07.07	06.21	04.39	03.15	03.21	04.47	06.17	07.41	08.13	09.40
	14.56	16.28	17.53	20.23	21.53	23.20	23.24	21.59	20.14	18.31	15.50	14.39
8	09.52	08.35	07.04	06.17	04.36	03.14	03.23	04.50	06.20	07.44	08.16	09.42
	14.58	16.31	17.56	20.26	21.56	23.22	23.22	21.56	20.11	18.27	15.47	14.38
9	09.51	08.32	07.00	06.14	04.33	03.12	03.25	04.53	06.23	07.46	08.19	09.44
	15.00	16.34	17.59	20.29	21.59	23.24	23.20	21.53	20.07	18.24	15.44	14.36
10	09.49	08.29	06.57	06.10	04.30	03.10	03.27	04.56	06.26	07.49	08.22	09.46
	15.03	16.37	18.02	20.32	22.02	23.26	23.18	21.49	20.04	18.21	15.41	14.35
11	09.47	08.26	06.54	06.07	04.27	03.09	03.30	04.59	06.28	07.52	08.26	09.48
	15.05	16.40	18.05	20.35	22.05	23.28	23.16	21.46	20.01	18.17	15.38	14.34
12	09.45	08.23	06.50	06.03	04.24	03.08	03.32	05.02	06.31	07.55	08.29	09.50
	15.08	16.43	18.08	20.37	22.08	23.30	23.14	21.43	19.57	18.14	15.35	14.33
13	09.43	08.20	06.47	06.00	04.20	03.06	03.35	05.05	06.34	07.58	08.32	09.51
	15.11	16.47	18.11	20.40	22.11	23.31	23.11	21.40	19.54	18.11	15.32	14.33
14	09.42	08.17	06.43	05.56	04.17	03.05	03.37	05.08	06.37	08.01	08.35	09.53
	15.14	16.50	18.14	20.43	22.14	23.32	23.09	21.36	19.50	18.07	15.30	14.32
15	09.39	08.13	06.40	05.53	04.14	03.04	03.40	05.11	06.39	08.04	08.38	09.55
	15.16	16.53	18.17	20.46	22.17	23.34	23.07	21.33	19.47	18.04	15.27	14.31
16	09.37	08.10	06.37	05.50	04.11	03.04	03.42	05.14	06.42	08.07	08.41	09.56
	15.19	16.56	18.20	20.49	22.21	23.35	23.04	21.30	19.43	18.00	15.24	14.31
17	09.35	08.07	06.33	05.46	04.08	03.03	03.45	05.17	06.45	08.09	08.44	09.57
	15.22	16.59	18.23	20.52	22.24	23.36	23.02	21.26	19.40	17.57	15.21	14.31
18	09.33	08.04	06.30	05.43	04.05	03.03	03.48	05.20	06.48	08.12	08.47	09.58
	15.25	17.02	18.25	20.55	22.27	23.36	22.59	21.23	19.36	17.54	15.19	14.31
19	09.31	08.01	06.26	05.39	04.02	03.02	03.51	05.23	06.50	08.15	08.50	09.59
	15.28	17.05	18.28	20.58	22.30	23.37	22.56	21.19	19.33	17.50	15.16	14.31
20	09.28	07.57	06.23	05.36	03.59	03.02	03.54	05.26	06.53	08.18	08.53	10.00
	15.31	17.08	18.31	21.01	22.33	23.38	22.54	21.16	19.29	17.47	15.14	14.31
21	09.26	07.54	06.19	05.33	03.56	03.02	03.56	05.29	06.56	08.21	08.56	10.01
	15.34	17.11	18.34	21.04	22.36	23.38	22.51	21.13	19.26	17.44	15.11	14.31
22	09.23	07.51	06.16	05.29	03.54	03.02	03.59	05.32	06.59	08.24	08.59	10.02
	15.37	17.15	18.37	21.07	22.39	23.38	22.48	21.09	19.22	17.41	15.08	14.32
23	09.21	07.48	06.12	05.26	03.51	03.02	04.02	05.34	07.02	08.27	09.02	10.02
	15.40	17.18	18.40	21.10	22.42	23.38	22.45	21.06	19.19	17.37	15.06	14.32
24	09.18	07.44	06.09	05.22	03.48	03.03	04.05	05.37	07.04	08.30	09.05	10.02
	15.43	17.21	18.43	21.13	22.44	23.38	22.42	21.03	19.15	17.34	15.04	14.33
25	09.16	07.41	06.05	05.19	03.45	03.03	04.08	05.40	07.07	07.33	09.08	10.03
	15.46	17.24	18.46	21.16	22.47	23.38	22.39	20.59	19.12	16.31	15.01	14.34
26	09.13	07.38	06.02	05.16	03.43	03.04	04.11	05.43	07.10	07.36	09.11	10.03
	15.49	17.27	18.48	21.19	22.50	23.37	22.37	20.56	19.09	16.28	14.59	14.35
27	09.10	07.34	05.59	05.12	03.40	03.05	04.14	05.46	07.13	07.39	09.14	10.03
	15.53	17.30	18.51	21.22	22.53	23.37	22.34	20.52	19.05	16.24	14.57	14.36
28	09.08	07.31	05.55	05.09	03.37	03.06	04.17	05.49	07.15	07.42	09.17	10.02
	15.56	17.33	18.54	21.25	22.56	23.36	22.31	20.49	19.02	16.21	14.55	14.37
29	09.05		06.52	05.06	03.35	03.07	04.20	05.52	07.18	07.45	09.20	10.02
	15.59		19.57	21.28	22.59	23.35	22.28	20.45	18.58	16.18	14.53	14.38
30	09.02		06.48	05.02	03.32	03.08	04.23	05.55	07.21	07.48	09.22	10.02
	16.02		20.00	21.31	23.01	23.34	22.24	20.42	18.55	16.15	14.51	14.40
31	08.59		06.45		03.30		04.26	05.57		07.51		10.01
	16.05		20.03		23.04		22.21	20.39		16.12		14.41
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
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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Henri Korhonen / henri.korhonen@fcg.fi
Calculated:
31.1.2024 9.03/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE1_RD200x21xHH200_+_Hallakallio_No_Forest Shadow receptor: H - H - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.00	08.56	07.28	06.41	04.59	03.28	03.10	04.29	06.00	07.24	07.55	09.25
	14.43	16.09	17.36	20.06	21.34	23.06	23.33	22.18	20.35	18.51	16.08	14.49
2	10.00	08.53	07.24	06.38	04.56	03.25	03.11	04.32	06.03	07.27	07.58	09.28
	14.45	16.12	17.39	20.09	21.37	23.09	23.32	22.15	20.32	18.48	16.05	14.47
3	09.59	08.50	07.21	06.34	04.52	03.23	03.13	04.35	06.06	07.29	08.01	09.30
	14.47	16.15	17.42	20.11	21.41	23.11	23.31	22.12	20.28	18.45	16.02	14.45
4	09.58	08.48	07.17	06.31	04.49	03.21	03.15	04.38	06.09	07.32	08.04	09.33
	14.49	16.18	17.45	20.14	21.44	23.14	23.29	22.09	20.25	18.41	15.59	14.43
5	09.56	08.45	07.14	06.27	04.46	03.19	03.17	04.41	06.12	07.35	08.07	09.35
	14.51	16.21	17.48	20.17	21.47	23.16	23.28	22.06	20.21	18.38	15.56	14.42
6	09.55	08.42	07.11	06.24	04.43	03.17	03.19	04.44	06.14	07.38	08.10	09.38
	14.53	16.24	17.51	20.20	21.50	23.18	23.26	22.02	20.18	18.34	15.53	14.40
7	09.54	08.39	07.07	06.21	04.39	03.15	03.21	04.47	06.17	07.41	08.13	09.40
	14.56	16.28	17.54	20.23	21.53	23.20	23.24	21.59	20.14	18.31	15.50	14.39
8	09.52	08.35	07.04	06.17	04.36	03.14	03.23	04.50	06.20	07.44	08.16	09.42
	14.58	16.31	17.56	20.26	21.56	23.23	23.22	21.56	20.11	18.27	15.47	14.38
9	09.51	08.32	07.01	06.14	04.33	03.12	03.25	04.53	06.23	07.46	08.19	09.44
	15.00	16.34	17.59	20.29	21.59	23.24	23.20	21.53	20.08	18.24	15.44	14.36
10	09.49	08.29	06.57	06.10	04.30	03.10	03.27	04.56	06.26	07.49	08.23	09.46
	15.03	16.37	18.02	20.32	22.02	23.26	23.18	21.49	20.04	18.21	15.41	14.35
11	09.47	08.26	06.54	06.07	04.27	03.09	03.30	04.59	06.28	07.52	08.26	09.48
	15.06	16.40	18.05	20.35	22.05	23.28	23.16	21.46	20.01	18.17	15.38	14.34
12	09.45	08.23	06.50	06.03	04.24	03.08	03.32	05.02	06.31	07.55	08.29	09.50
	15.08	16.44	18.08	20.38	22.08	23.30	23.14	21.43	19.57	18.14	15.35	14.33
13	09.44	08.20	06.47	06.00	04.20	03.07	03.35	05.05	06.34	07.58	08.32	09.52
	15.11	16.47	18.11	20.40	22.11	23.31	23.11	21.40	19.54	18.11	15.32	14.33
14	09.42	08.17	06.43	05.56	04.17	03.05	03.37	05.08	06.37	08.01	08.35	09.53
	15.14	16.50	18.14	20.43	22.14	23.32	23.09	21.36	19.50	18.07	15.30	14.32
15	09.39	08.14	06.40	05.53	04.14	03.05	03.40	05.11	06.39	08.04	08.38	09.55
	15.16	16.53	18.17	20.46	22.18	23.34	23.07	21.33	19.47	18.04	15.27	14.32
16	09.37	08.10	06.37	05.50	04.11	03.04	03.42	05.14	06.42	08.07	08.41	09.56
	15.19	16.56	18.20	20.49	22.21	23.35	23.04	21.30	19.43	18.00	15.24	14.31
17	09.35	08.07	06.33	05.46	04.08	03.03	03.45	05.17	06.45	08.10	08.44	09.57
	15.22	16.59	18.23	20.52	22.24	23.36	23.02	21.26	19.40	17.57	15.21	14.31
18	09.33	08.04	06.30	05.43	04.05	03.03	03.48	05.20	06.48	08.12	08.47	09.58
	15.25	17.02	18.25	20.55	22.27	23.37	22.59	21.23	19.36	17.54	15.19	14.31
19	09.31	08.01	06.26	05.39	04.02	03.02	03.51	05.23	06.51	08.15	08.50	09.59
	15.28	17.05	18.28	20.58	22.30	23.37	22.56	21.20	19.33	17.50	15.16	14.31
20	09.28	07.57	06.23	05.36	03.59	03.02	03.54	05.26	06.53	08.18	08.53	10.00
	15.31	17.08	18.31	21.01	22.33	23.38	22.54	21.16	19.29	17.47	15.14	14.31
21	09.26	07.54	06.19	05.33	03.56	03.02	03.56	05.29	06.56	08.21	08.56	10.01
	15.34	17.12	18.34	21.04	22.36	23.38	22.51	21.13	19.26	17.44	15.11	14.31
22	09.23	07.51	06.16	05.29	03.54	03.02	03.59	05.32	06.59	08.24	08.59	10.02
	15.37	17.15	18.37	21.07	22.39	23.38	22.48	21.09	19.22	17.41	15.09	14.32
23	09.21	07.48	06.12	05.26	03.51	03.02	04.02	05.34	07.02	08.27	09.02	10.02
	15.40	17.18	18.40	21.10	22.42	23.38	22.45	21.06	19.19	17.37	15.06	14.32
24	09.18	07.44	06.09	05.22	03.48	03.03	04.05	05.37	07.04	08.30	09.05	10.02
	15.43	17.21	18.43	21.13	22.44	23.38	22.42	21.03	19.16	17.34	15.04	14.33
25	09.16	07.41	06.06	05.19	03.45	03.03	04.08	05.40	07.07	07.33	09.08	10.03
	15.46	17.24	18.46	21.16	22.47	23.38	22.39	20.59	19.12	16.31	15.01	14.34
26	09.13	07.38	06.02	05.16	03.43	03.04	04.11	05.43	07.10	07.36	09.11	10.03
	15.50	17.27	18.48	21.19	22.50	23.37	22.37	20.56	19.09	16.28	14.59	14.35
27	09.10	07.34	05.59	05.12	03.40	03.05	04.14	05.46	07.13	07.39	09.14	10.03
	15.53	17.30	18.51	21.22	22.53	23.37	22.34	20.52	19.05	16.24	14.57	14.36
28	09.08	07.31	05.55	05.09	03.37	03.06	04.17	05.49	07.15	07.42	09.17	10.02
	15.56	17.33	18.54	21.25	22.56	23.36	22.31	20.49	19.02	16.21	14.55	14.37
29	09.05		06.52	05.06	03.35	03.07	04.20	05.52	07.18	07.45	09.20	10.02
	15.59		19.57	21.28	22.59	23.35	22.28	20.45	18.58	16.18	14.53	14.38
30	09.02		06.48	05.02	03.32	03.08	04.23	05.55	07.21	07.48	09.22	10.02
	16.02		20.00	21.31	23.01	23.34	22.24	20.42	18.55	16.15	14.51	14.40
31	08.59		06.45		03.30		04.26	05.57		07.52		10.01
	16.05		20.03		23.04		22.21	20.39		16.12		14.41
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
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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Henri Korhonen / henri.korhonen@fcg.fi
Calculated:
31.1.2024 9.03/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE1_RD200x21xHH200_+_Hallakallio_No_Forest Shadow receptor: I - I - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.00	08.56	07.28	06.42	04.59	03.28	03.10	04.29	06.01	07.24	07.55	09.25
	14.44	16.09	17.36	20.06	21.35	23.06	23.33	22.18	20.35	18.52	16.09	14.49
2	09.59	08.54	07.24	06.38	04.56	03.26	03.12	04.32	06.03	07.27	07.58	09.28
	14.46	16.12	17.39	20.09	21.38	23.09	23.32	22.15	20.32	18.48	16.06	14.47
3	09.59	08.51	07.21	06.35	04.53	03.24	03.13	04.35	06.06	07.30	08.01	09.30
	14.47	16.15	17.42	20.12	21.41	23.11	23.31	22.12	20.28	18.45	16.03	14.46
4	09.57	08.48	07.18	06.31	04.50	03.22	03.15	04.38	06.09	07.32	08.04	09.33
	14.49	16.18	17.45	20.14	21.44	23.14	23.29	22.09	20.25	18.41	15.59	14.44
5	09.56	08.45	07.14	06.28	04.46	03.20	03.17	04.41	06.12	07.35	08.07	09.35
	14.52	16.22	17.48	20.17	21.47	23.16	23.28	22.06	20.22	18.38	15.56	14.42
6	09.55	08.42	07.11	06.24	04.43	03.18	03.19	04.44	06.15	07.38	08.10	09.38
	14.54	16.25	17.51	20.20	21.50	23.18	23.26	22.03	20.18	18.35	15.53	14.41
7	09.54	08.39	07.08	06.21	04.40	03.16	03.21	04.47	06.17	07.41	08.13	09.40
	14.56	16.28	17.54	20.23	21.53	23.20	23.24	21.59	20.15	18.31	15.50	14.39
8	09.52	08.36	07.04	06.17	04.37	03.14	03.23	04.50	06.20	07.44	08.16	09.42
	14.58	16.31	17.57	20.26	21.56	23.22	23.22	21.56	20.11	18.28	15.47	14.38
9	09.51	08.33	07.01	06.14	04.33	03.12	03.25	04.53	06.23	07.47	08.20	09.44
	15.01	16.34	18.00	20.29	21.59	23.24	23.20	21.53	20.08	18.24	15.44	14.37
10	09.49	08.29	06.57	06.10	04.30	03.11	03.28	04.56	06.26	07.49	08.23	09.46
	15.03	16.38	18.03	20.32	22.02	23.26	23.18	21.50	20.04	18.21	15.41	14.36
11	09.47	08.26	06.54	06.07	04.27	03.09	03.30	04.59	06.29	07.52	08.26	09.48
	15.06	16.41	18.05	20.35	22.05	23.28	23.16	21.46	20.01	18.18	15.39	14.35
12	09.45	08.23	06.50	06.04	04.24	03.08	03.33	05.02	06.31	07.55	08.29	09.50
	15.09	16.44	18.08	20.38	22.08	23.30	23.14	21.43	19.57	18.14	15.36	14.34
13	09.44	08.20	06.47	06.00	04.21	03.07	03.35	05.05	06.34	07.58	08.32	09.52
	15.11	16.47	18.11	20.41	22.11	23.31	23.11	21.40	19.54	18.11	15.33	14.33
14	09.42	08.17	06.44	05.57	04.18	03.06	03.38	05.08	06.37	08.01	08.35	09.53
	15.14	16.50	18.14	20.44	22.15	23.32	23.09	21.36	19.50	18.07	15.30	14.32
15	09.40	08.14	06.40	05.53	04.15	03.05	03.40	05.11	06.40	08.04	08.38	09.55
	15.17	16.53	18.17	20.46	22.18	23.34	23.07	21.33	19.47	18.04	15.27	14.32
16	09.37	08.10	06.37	05.50	04.12	03.04	03.43	05.14	06.42	08.07	08.41	09.56
	15.20	16.56	18.20	20.49	22.21	23.35	23.04	21.30	19.43	18.01	15.24	14.32
17	09.35	08.07	06.33	05.46	04.09	03.04	03.46	05.17	06.45	08.10	08.44	09.57
	15.23	16.59	18.23	20.52	22.24	23.36	23.02	21.26	19.40	17.57	15.22	14.31
18	09.33	08.04	06.30	05.43	04.06	03.03	03.48	05.20	06.48	08.13	08.47	09.58
	15.25	17.03	18.26	20.55	22.27	23.36	22.59	21.23	19.36	17.54	15.19	14.31
19	09.31	08.01	06.26	05.40	04.03	03.03	03.51	05.23	06.51	08.16	08.50	09.59
	15.28	17.06	18.29	20.58	22.30	23.37	22.56	21.20	19.33	17.51	15.16	14.31
20	09.28	07.58	06.23	05.36	04.00	03.03	03.54	05.26	06.53	08.18	08.53	10.00
	15.31	17.09	18.31	21.01	22.33	23.38	22.54	21.16	19.30	17.47	15.14	14.31
21	09.26	07.54	06.20	05.33	03.57	03.03	03.57	05.29	06.56	08.21	08.57	10.01
	15.34	17.12	18.34	21.04	22.36	23.38	22.51	21.13	19.26	17.44	15.11	14.32
22	09.23	07.51	06.16	05.29	03.54	03.03	04.00	05.32	06.59	08.24	09.00	10.02
	15.37	17.15	18.37	21.07	22.39	23.38	22.48	21.09	19.23	17.41	15.09	14.32
23	09.21	07.48	06.13	05.26	03.51	03.03	04.03	05.35	07.02	08.27	09.02	10.02
	15.41	17.18	18.40	21.10	22.42	23.38	22.45	21.06	19.19	17.38	15.06	14.33
24	09.18	07.44	06.09	05.23	03.48	03.03	04.06	05.38	07.05	08.30	09.05	10.02
	15.44	17.21	18.43	21.13	22.44	23.38	22.42	21.03	19.16	17.34	15.04	14.33
25	09.16	07.41	06.06	05.19	03.46	03.04	04.08	05.41	07.07	07.33	09.08	10.03
	15.47	17.24	18.46	21.16	22.47	23.38	22.40	20.59	19.12	16.31	15.02	14.34
26	09.13	07.38	06.02	05.16	03.43	03.05	04.11	05.43	07.10	07.36	09.11	10.03
	15.50	17.27	18.49	21.19	22.50	23.37	22.37	20.56	19.09	16.28	14.59	14.35
27	09.10	07.34	05.59	05.13	03.40	03.06	04.14	05.46	07.13	07.39	09.14	10.03
	15.53	17.30	18.51	21.22	22.53	23.37	22.34	20.52	19.05	16.25	14.57	14.36
28	09.08	07.31	05.55	05.09	03.38	03.07	04.17	05.49	07.16	07.42	09.17	10.02
	15.56	17.33	18.54	21.25	22.56	23.36	22.31	20.49	19.02	16.21	14.55	14.37
29	09.05		06.52	05.06	03.35	03.08	04.20	05.52	07.18	07.46	09.20	10.02
	15.59		19.57	21.28	22.59	23.35	22.28	20.46	18.59	16.18	14.53	14.39
30	09.02		06.48	05.03	03.33	03.09	04.23	05.55	07.21	07.49	09.22	10.02
	16.03		20.00	21.31	23.01	23.34	22.25	20.42	18.55	16.15	14.51	14.40
31	08.59		06.45		03.30		04.26	05.58		07.52		10.01
	16.06		20.03		23.04		22.21	20.39		16.12		14.42
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
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:
31.1.2024 9.03/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE1_RD200x21xHH200_+_Hallakallio_No_Forest Shadow receptor: J - J - Lomarakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.00	08.57	07.28	06.42	04.59	03.28	03.10	04.29	06.01	07.24	07.55	09.25
	14.44	16.09	17.36	20.06	21.35	23.07	23.33	22.18	20.35	18.52	16.09	14.49
2	10.00	08.54	07.24	06.38	04.56	03.26	03.12	04.32	06.03	07.27	07.58	09.28
	14.46	16.12	17.39	20.09	21.38	23.09	23.32	22.15	20.32	18.48	16.06	14.47
3	09.59	08.51	07.21	06.35	04.53	03.24	03.14	04.35	06.06	07.30	08.01	09.30
	14.47	16.15	17.42	20.12	21.41	23.12	23.31	22.12	20.29	18.45	16.03	14.46
4	09.58	08.48	07.18	06.31	04.50	03.22	03.15	04.38	06.09	07.33	08.04	09.33
	14.50	16.19	17.45	20.15	21.44	23.14	23.29	22.09	20.25	18.41	16.00	14.44
5	09.56	08.45	07.14	06.28	04.46	03.20	03.17	04.41	06.12	07.35	08.07	09.35
	14.52	16.22	17.48	20.17	21.47	23.16	23.28	22.06	20.22	18.38	15.56	14.42
6	09.55	08.42	07.11	06.24	04.43	03.18	03.19	04.44	06.15	07.38	08.10	09.38
	14.54	16.25	17.51	20.20	21.50	23.18	23.26	22.03	20.18	18.35	15.53	14.41
7	09.54	08.39	07.08	06.21	04.40	03.16	03.21	04.47	06.18	07.41	08.13	09.40
	14.56	16.28	17.54	20.23	21.53	23.21	23.24	21.59	20.15	18.31	15.50	14.39
8	09.52	08.36	07.04	06.17	04.37	03.14	03.23	04.50	06.20	07.44	08.16	09.42
	14.58	16.31	17.57	20.26	21.56	23.23	23.22	21.56	20.11	18.28	15.47	14.38
9	09.51	08.33	07.01	06.14	04.33	03.12	03.26	04.53	06.23	07.47	08.20	09.44
	15.01	16.34	18.00	20.29	21.59	23.25	23.20	21.53	20.08	18.24	15.44	14.37
10	09.49	08.30	06.57	06.11	04.30	03.11	03.28	04.56	06.26	07.50	08.23	09.46
	15.03	16.38	18.03	20.32	22.02	23.26	23.18	21.50	20.04	18.21	15.42	14.36
11	09.47	08.26	06.54	06.07	04.27	03.10	03.30	04.59	06.29	07.52	08.26	09.48
	15.06	16.41	18.06	20.35	22.05	23.28	23.16	21.46	20.01	18.18	15.39	14.35
12	09.46	08.23	06.51	06.04	04.24	03.08	03.33	05.02	06.31	07.55	08.29	09.50
	15.09	16.44	18.08	20.38	22.08	23.30	23.14	21.43	19.57	18.14	15.36	14.34
13	09.44	08.20	06.47	06.00	04.21	03.07	03.35	05.05	06.34	07.58	08.32	09.52
	15.11	16.47	18.11	20.41	22.12	23.31	23.12	21.40	19.54	18.11	15.33	14.33
14	09.42	08.17	06.44	05.57	04.18	03.06	03.38	05.08	06.37	08.01	08.35	09.53
	15.14	16.50	18.14	20.44	22.15	23.33	23.09	21.36	19.50	18.08	15.30	14.33
15	09.40	08.14	06.40	05.53	04.15	03.05	03.40	05.11	06.40	08.04	08.38	09.55
	15.17	16.53	18.17	20.47	22.18	23.34	23.07	21.33	19.47	18.04	15.27	14.32
16	09.38	08.11	06.37	05.50	04.12	03.04	03.43	05.14	06.43	08.07	08.41	09.56
	15.20	16.56	18.20	20.50	22.21	23.35	23.04	21.30	19.44	18.01	15.25	14.32
17	09.35	08.07	06.33	05.47	04.09	03.04	03.46	05.17	06.45	08.10	08.44	09.57
	15.23	17.00	18.23	20.52	22.24	23.36	23.02	21.26	19.40	17.57	15.22	14.31
18	09.33	08.04	06.30	05.43	04.06	03.03	03.48	05.20	06.48	08.13	08.48	09.58
	15.26	17.03	18.26	20.55	22.27	23.37	22.59	21.23	19.37	17.54	15.19	14.31
19	09.31	08.01	06.27	05.40	04.03	03.03	03.51	05.23	06.51	08.16	08.51	09.59
	15.28	17.06	18.29	20.58	22.30	23.37	22.56	21.20	19.33	17.51	15.17	14.31
20	09.28	07.58	06.23	05.36	04.00	03.03	03.54	05.26	06.54	08.19	08.54	10.00
	15.31	17.09	18.32	21.01	22.33	23.38	22.54	21.16	19.30	17.48	15.14	14.31
21	09.26	07.54	06.20	05.33	03.57	03.03	03.57	05.29	06.56	08.22	08.57	10.01
	15.34	17.12	18.34	21.04	22.36	23.38	22.51	21.13	19.26	17.44	15.11	14.32
22	09.24	07.51	06.16	05.30	03.54	03.03	04.00	05.32	06.59	08.25	09.00	10.02
	15.38	17.15	18.37	21.07	22.39	23.38	22.48	21.10	19.23	17.41	15.09	14.32
23	09.21	07.48	06.13	05.26	03.51	03.03	04.03	05.35	07.02	08.27	09.03	10.02
	15.41	17.18	18.40	21.10	22.42	23.38	22.45	21.06	19.19	17.38	15.07	14.33
24	09.18	07.44	06.09	05.23	03.49	03.03	04.06	05.38	07.05	08.30	09.06	10.03
	15.44	17.21	18.43	21.13	22.45	23.38	22.43	21.03	19.16	17.34	15.04	14.33
25	09.16	07.41	06.06	05.19	03.46	03.04	04.08	05.41	07.07	07.33	09.08	10.03
	15.47	17.24	18.46	21.16	22.48	23.38	22.40	20.59	19.12	16.31	15.02	14.34
26	09.13	07.38	06.02	05.16	03.43	03.05	04.11	05.44	07.10	07.37	09.11	10.03
	15.50	17.27	18.49	21.19	22.50	23.37	22.37	20.56	19.09	16.28	15.00	14.35
27	09.11	07.35	05.59	05.13	03.40	03.06	04.14	05.46	07.13	07.40	09.14	10.03
	15.53	17.30	18.52	21.22	22.53	23.37	22.34	20.53	19.05	16.25	14.57	14.36
28	09.08	07.31	05.55	05.09	03.38	03.07	04.17	05.49	07.16	07.43	09.17	10.03
	15.56	17.33	18.54	21.25	22.56	23.36	22.31	20.49	19.02	16.21	14.55	14.37
29	09.05		06.52	05.06	03.35	03.08	04.20	05.52	07.19	07.46	09.20	10.02
	15.59		19.57	21.29	22.59	23.35	22.28	20.46	18.59	16.18	14.53	14.39
30	09.02		06.49	05.03	03.33	03.09	04.23	05.55	07.21	07.49	09.23	10.02
	16.03		20.00	21.32	23.01	23.34	22.25	20.42	18.55	16.15	14.51	14.40
31	08.59		06.45		03.31		04.26	05.58		07.52		10.01
	16.06		20.03		23.04		22.22	20.39		16.12		14.42
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
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:
31.1.2024 9.03/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE1_RD200x21xHH200_+_Hallakallio_No_Forest Shadow receptor: K - K - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.01	08.57	07.28	06.42	04.59	03.28	03.10	04.29	06.01 06.40 (WTG01)	07.24	07.55	09.25
	14.44	16.09	17.36	20.06	21.35	23.07	23.34	22.19	20.36 3 06.43 (WTG01)	18.52	16.09	14.49
2	10.00	08.54	07.25	06.38	04.56	03.26	03.12	04.32	06.04	07.27	07.58	09.28
	14.46	16.12	17.39	20.09	21.38	23.09	23.32	22.16	20.32	18.48	16.06	14.47
3	09.59	08.51	07.21	06.35	04.53	03.24	03.13	04.35	06.06	07.30	08.01	09.31
	14.47	16.15	17.42	20.12	21.41	23.12	23.31	22.12	20.29	18.45	16.03	14.46
4	09.58	08.48	07.18	06.31	04.50	03.22	03.15	04.38	06.09	07.33	08.04	09.33
	14.49	16.19	17.45	20.15	21.44	23.14	23.30	22.09	20.25	18.41	16.00	14.44
5	09.57	08.45	07.14	06.28	04.46	03.20	03.17	04.41	06.12	07.35	08.07	09.36
	14.52	16.22	17.48	20.18	21.47	23.16	23.28	22.06	20.22	18.38	15.56	14.42
6	09.55	08.42	07.11	06.24	04.43	03.18	03.19	04.44	06.15	07.38	08.10	09.38
	14.54	16.25	17.51	20.20	21.50	23.19	23.26	22.03	20.18	18.35	15.53	14.41
7	09.54	08.39	07.08	06.21	04.40	03.16	03.21	04.47	06.18	07.41	08.14	09.40
	14.56	16.28	17.54	20.23	21.53	23.21	23.24	22.00	20.15	18.31	15.50	14.39
8	09.53	08.36	07.04	06.18	04.37	03.14	03.23	04.50	06.20	07.44	08.17	09.42
	14.58	16.31	17.57	20.26	21.56	23.23	23.23	21.56	20.11	18.28	15.47	14.38
9	09.51	08.33	07.01	06.14	04.33	03.12	03.25	04.53	06.23	07.47	08.20	09.44
	15.01	16.34	18.00	20.29	21.59	23.25	23.21	21.53	20.08	18.24	15.44	14.37
10	09.49	08.30	06.57	06.11	04.30	03.11	03.28	04.56	06.26	07.50	08.23	09.46
	15.03	16.38	18.03	20.32	22.03	23.27	23.18	21.50	20.04	18.21	15.42	14.36
11	09.48	08.27	06.54	06.07 06.40 (WTG01)	04.27	03.09	03.30	04.59	06.29	07.53	08.26	09.48
	15.06	16.41	18.06	20.35 4 06.44 (WTG01)	22.06	23.28	23.16	21.47	20.01	18.18	15.39	14.35
12	09.46	08.23	06.51	06.04 06.36 (WTG01)	04.24	03.08	03.33	05.02	06.32	07.55	08.29	09.50
	15.09	16.44	18.09	20.38 12 06.48 (WTG01)	22.09	23.30	23.14	21.43	19.57	18.14	15.36	14.34
13	09.44	08.20	06.47	06.00 06.34 (WTG01)	04.21	03.07	03.35	05.05	06.34	07.58	08.32	09.52
	15.11	16.47	18.11	20.41 16 06.50 (WTG01)	22.12	23.31	23.12	21.40	19.54	18.11	15.33	14.33
14	09.42	08.17	06.44	05.57 06.32 (WTG01)	04.18	03.06	03.38	05.08	06.37	08.01	08.35	09.53
	15.14	16.50	18.14	20.44 19 06.51 (WTG01)	22.15	23.33	23.09	21.37	19.51	18.08	15.30	14.32
15	09.40	08.14	06.40	05.53 06.31 (WTG01)	04.15	03.05	03.40	05.11	06.40	08.04	08.38	09.55
	15.17	16.53	18.17	20.47 20 06.51 (WTG01)	22.18	23.34	23.07	21.33	19.47	18.04	15.27	14.32
16	09.38	08.11	06.37	05.50 06.30 (WTG01)	04.12	03.04	03.43	05.14 06.41 (WTG01)	06.43	08.07	08.42	09.56
	15.20	16.56	18.20	20.50 22 06.52 (WTG01)	22.21	23.35	23.05	21.30 9 06.50 (WTG01)	19.44	18.01	15.25	14.32
17	09.36	08.07	06.33	05.47 06.30 (WTG01)	04.09	03.04	03.46	05.17 06.39 (WTG01)	06.45	08.10	08.45	09.58
	15.23	17.00	18.23	20.53 23 06.53 (WTG01)	22.24	23.36	23.02	21.27 14 06.53 (WTG01)	19.40	17.58	15.22	14.31
18	09.33	08.04	06.30	05.43 06.29 (WTG01)	04.06	03.03	03.48	05.20 06.37 (WTG01)	06.48	08.13	08.48	09.59
	15.25	17.03	18.26	20.56 23 06.52 (WTG01)	22.27	23.37	22.59	21.23 16 06.53 (WTG01)	19.37	17.54	15.19	14.31
19	09.31	08.01	06.27	05.40 06.28 (WTG01)	04.03	03.03	03.51	05.23 06.36 (WTG01)	06.51	08.16	08.51	10.00
	15.28	17.06	18.29	20.59 24 06.52 (WTG01)	22.30	23.37	22.57	21.20 19 06.55 (WTG01)	19.33	17.51	15.17	14.31
20	09.29	07.58	06.23	05.36 06.29 (WTG01)	04.00	03.03	03.54	05.26 06.34 (WTG01)	06.54	08.19	08.54	10.01
	15.31	17.09	18.32	21.02 23 06.52 (WTG01)	22.33	23.38	22.54	21.17 21 06.55 (WTG01)	19.30	17.48	15.14	14.31
21	09.26	07.54	06.20	05.33 06.29 (WTG01)	03.57	03.02	03.57	05.29 06.34 (WTG01)	06.56	08.22	08.57	10.01
	15.34	17.12	18.34	21.05 22 06.51 (WTG01)	22.36	23.38	22.51	21.13 21 06.55 (WTG01)	19.26	17.44	15.11	14.32
22	09.24	07.51	06.16	05.30 06.29 (WTG01)	03.54	03.03	04.00	05.32 06.33 (WTG01)	06.59	08.25	09.00	10.02
	15.38	17.15	18.37	21.08 22 06.51 (WTG01)	22.39	23.39	22.48	21.10 23 06.56 (WTG01)	19.23	17.41	15.09	14.32
23	09.21	07.48	06.13	05.26 06.29 (WTG01)	03.51	03.03	04.03	05.35 06.32 (WTG01)	07.02	08.28	09.03	10.02
	15.41	17.18	18.40	21.11 20 06.49 (WTG01)	22.42	23.39	22.46	21.06 23 06.55 (WTG01)	19.19	17.38	15.06	14.33
24	09.19	07.45	06.09	05.23 06.29 (WTG01)	03.48	03.03	04.06	05.38 06.32 (WTG01)	07.05	08.31	09.06	10.03
	15.44	17.21	18.43	21.14 19 06.48 (WTG01)	22.45	23.38	22.43	21.03 23 06.55 (WTG01)	19.16	17.34	15.04	14.33
25	09.16	07.41	06.06	05.19 06.30 (WTG01)	03.46	03.04	04.08	05.41 06.32 (WTG01)	07.07	07.34	09.09	10.03
	15.47	17.24	18.46	21.17 17 06.47 (WTG01)	22.48	23.38	22.40	21.00 23 06.55 (WTG01)	19.12	16.31	15.02	14.34
26	09.13	07.38	06.02	05.16 06.32 (WTG01)	03.43	03.05	04.11	05.44 06.32 (WTG01)	07.10	07.37	09.12	10.03
	15.50	17.27	18.49	21.20 13 06.45 (WTG01)	22.51	23.38	22.37	20.56 22 06.54 (WTG01)	19.09	16.28	15.00	14.35
27	09.11	07.35	05.59	05.13 06.34 (WTG01)	03.40	03.05	04.14	05.46 06.32 (WTG01)	07.13	07.40	09.14	10.03
	15.53	17.30	18.52	21.23 8 06.42 (WTG01)	22.53	23.37	22.34	20.53 22 06.54 (WTG01)	19.06	16.25	14.57	14.36
28	09.08	07.31	05.56	05.09	03.38	03.06	04.17	05.49 06.33 (WTG01)	07.16	07.43	09.17	10.03
	15.56	17.33	18.55	21.26	22.56	23.37	22.31	20.49 20 06.53 (WTG01)	19.02	16.22	14.55	14.37
29	09.05		06.52	05.06	03.35	03.08	04.20	05.52 06.33 (WTG01)	07.19	07.46	09.20	10.03
	15.59		19.57	21.29	22.59	23.36	22.28	20.46 18 06.51 (WTG01)	18.59	16.18	14.53	14.39
30	09.02		06.49	05.03	03.33	03.09	04.23	05.55 06.34 (WTG01)	07.21	07.49	09.23	10.02
	16.03		20.00	21.32	23.02	23.35	22.25	20.42 16 06.50 (WTG01)	18.55	16.15	14.51	14.40
31	09.00		06.45		03.30		04.26	05.58 06.36 (WTG01)		07.52		10.02
	16.06		20.03		23.04		22.22	20.39 12 06.48 (WTG01)		16.12		14.42
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
Total, worst case				307				302	3			
Sun reduction				0,44				0,42	0,36			
Oper. time red.				0,90				0,90	0,90			
Wind dir. red.				0,56				0,56	0,56			
Total reduction				0,22				0,21	0,18			
Total, real				68				63	1			

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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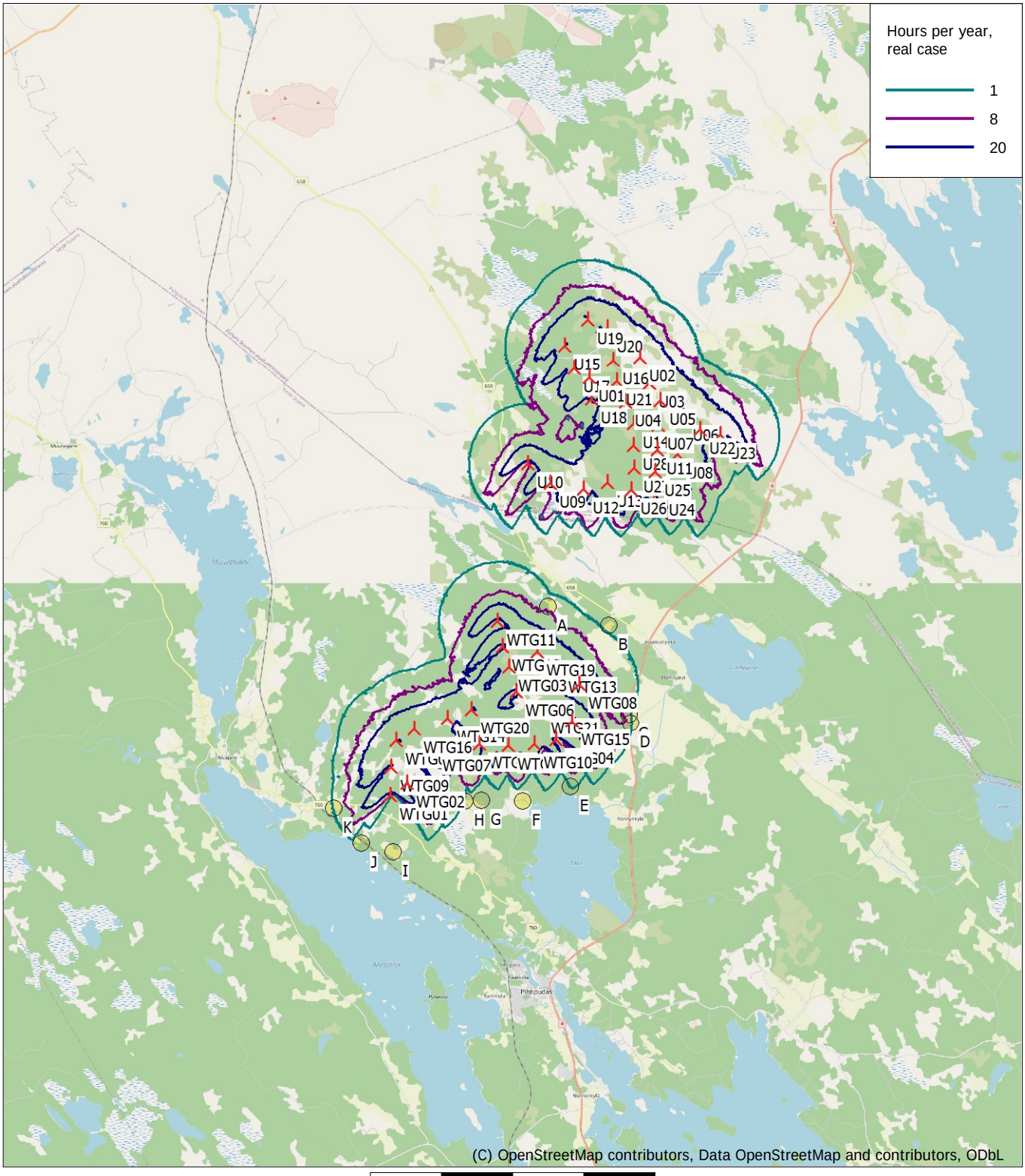
Calculated:
31.1.2024 9.03/3.6.355

SHADOW - Map

Calculation: Uusimo_VE1_RD200x21xHH200_+_Hallakallio_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: 428 730 North: 7 042 500

New WTG Shadow receptor

Flicker map level: Height Contours: CONTOURLINE_Pyhäntä_Pilpankangas_0.wpo (2)

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

Liite 17. Yhteisvaikutus varjostusmallinnuksen tulokset ”Real Case, No forest” – VE2

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SHADOW - Main Result

Calculation: Uusimo_VE2_RD200x18xHH200+Hallakallio_No_Forest

Assumptions for shadow calculations

Maximum distance for influence	2 089	m
Minimum sun height over horizon for influence	3	°
Day step for calculation	1	days
Time step for calculation	1	minutes

Sunshine probability S (Average daily sunshine hours) []

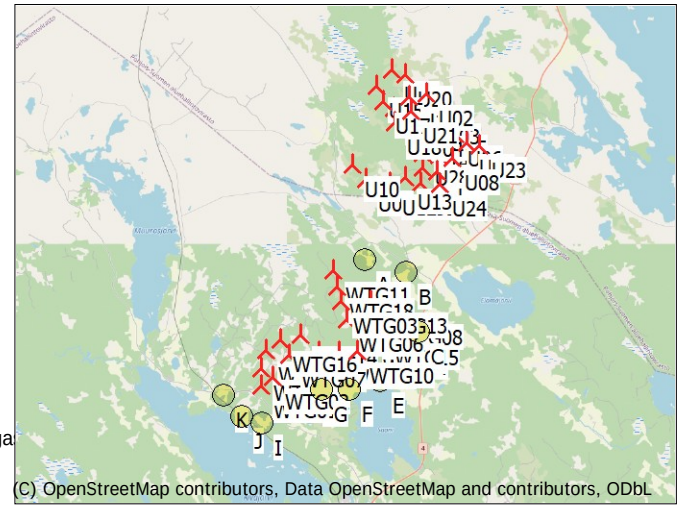
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

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_Pyhäntä_Pilpankanga
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]
U01	431 115	7 049 309	180,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U02	432 899	7 049 975	165,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U03	433 219	7 049 043	157,9	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U04	432 357	7 048 412	161,1	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U05	433 583	7 048 416	162,1	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U06	434 401	7 047 858	177,5	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U07	433 498	7 047 578	151,3	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U08	434 177	7 046 539	155,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U09	429 630	7 045 604	152,5	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U10	428 881	7 046 314	155,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U11	433 458	7 046 695	150,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U12	430 826	7 045 372	159,7	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U13	431 674	7 045 617	154,9	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U14	432 637	7 047 640	156,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U15	430 255	7 050 454	184,4	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U16	431 960	7 049 903	171,3	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U17	430 574	7 049 631	185,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U18	431 166	7 048 552	187,4	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U19	431 088	7 051 329	168,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U20	431 779	7 051 064	168,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U21	432 087	7 049 133	170,8	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U22	434 959	7 047 391	165,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U23	435 671	7 047 205	164,4	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U24	433 480	7 045 242	149,2	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U25	433 379	7 045 931	149,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U26	432 492	7 045 311	146,4	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U27	432 629	7 046 106	161,5	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U28	432 609	7 046 872	165,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
WTG01	423 751	7 034 716	140,0	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG02	424 350	7 035 191	132,5	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG03	428 122	7 039 102	160,0	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG04	429 639	7 036 890	128,0	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG05	424 051	7 036 638	139,7	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG06	428 401	7 038 173	148,0	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG07	425 267	7 036 341	132,5	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG08	430 501	7 038 489	132,6	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG09	423 801	7 035 688	141,0	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG10	428 913	7 036 410	128,2	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG11	427 690	7 040 789	140,8	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG12	426 874	7 036 449	125,0	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5

To be continued on next page...

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SHADOW - Main Result

Calculation: Uusimo_VE2_RD200x18xHH200+Hallakallio_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]
WTG13	429 650	7 039 089	140,0	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG14	425 900	7 037 389	133,7	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG15	430 250	7 037 340	128,9	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG16	424 812	7 037 139	142,1	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG17	427 951	7 036 390	122,3	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG18	427 892	7 039 889	150,0	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5

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	429 470	7 041 260	145,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
B	B - Asuinrakennus	431 627	7 040 548	144,9	5,0	5,0	1,0	90,0	"Green house mode"	6,0
C	C - Asuinrakennus	432 261	7 037 387	122,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
D	D - Asuinrakennus	432 294	7 037 094	122,1	5,0	5,0	1,0	90,0	"Green house mode"	6,0
E	E - Lomarakennus	430 111	7 034 859	117,3	5,0	5,0	1,0	90,0	"Green house mode"	6,0
F	F - Asuinrakennus	428 445	7 034 384	122,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
G	G - Asuinrakennus	426 978	7 034 448	122,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0
H	H - Asuinrakennus	426 394	7 034 428	122,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
I	I - Asuinrakennus	423 788	7 032 711	125,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
J	J - Lomarakennus	422 689	7 033 070	114,2	5,0	5,0	1,0	90,0	"Green house mode"	6,0
K	K - Asuinrakennus	421 745	7 034 298	125,0	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	1:43
B	B - Asuinrakennus	0:00
C	C - Asuinrakennus	5:23
D	D - Asuinrakennus	1:51
E	E - Lomarakennus	0:47
F	F - Asuinrakennus	0:00
G	G - Asuinrakennus	0:00
H	H - Asuinrakennus	0:00
I	I - Asuinrakennus	0:00
J	J - Lomarakennus	0:00
K	K - Asuinrakennus	2:11

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

No.	Name	Expected [h/year]
U01	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (388)	0:00
U02	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (389)	0:00
U03	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (390)	0:00
U04	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (391)	0:00
U05	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (392)	0:00
U06	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (393)	0:00
U07	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (394)	0:00
U08	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (395)	0:00
U09	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (396)	0:00
U10	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (397)	0:00
U11	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (398)	0:00
U12	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (399)	0:00
U13	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (400)	0:00
U14	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (401)	0:00
U15	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (402)	0:00
U16	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (403)	0:00

To be continued on next page...

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31.1.2024 11.18/3.6.355

SHADOW - Main Result

Calculation: Uusimo_VE2_RD200x18xHH200+Hallakallio_No_Forest

...continued from previous page

No.	Name	Expected [h/year]
U17	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (404)	0:00
U18	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (405)	0:00
U19	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (406)	0:00
U20	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (407)	0:00
U21	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (408)	0:00
U22	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (409)	0:00
U23	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (410)	0:00
U24	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (411)	0:00
U25	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (412)	0:00
U26	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (413)	0:00
U27	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (414)	0:00
U28	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (415)	0:00
WTG01	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (437)	2:11
WTG02	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (438)	0:00
WTG03	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (439)	0:00
WTG04	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (440)	0:00
WTG05	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (441)	0:00
WTG06	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (442)	0:00
WTG07	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (443)	0:00
WTG08	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (444)	3:42
WTG09	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (445)	0:00
WTG10	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (446)	0:47
WTG11	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (447)	1:43
WTG12	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (448)	0:00
WTG13	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (449)	0:00
WTG14	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (450)	0:00
WTG15	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (454)	3:34
WTG16	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (451)	0:00
WTG17	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (452)	0:00
WTG18	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (453)	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:
31.1.2024 11.18/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE2_RD200x18xHH200+Hallakallio_No_Forest Shadow receptor: A - A - Lomarakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March		April	May	June	July	August	September		October		November	December
1	10.01	08.57	07.28		06.41	04.58	03.27	03.08	04.28	06.00		07.24		07.55	09.26
	14.42	16.08	17.35		20.06	21.35	23.07	23.34	22.19	20.35		18.51	22	18.10 (WTG11)	16.08	14.48
2	10.00	08.54	07.24		06.37	04.55	03.24	03.10	04.31	06.03		07.26		17.47 (WTG11)	07.58	09.28
	14.44	16.11	17.38		20.08	21.38	23.10	23.33	22.16	20.32		18.48	21	18.08 (WTG11)	16.05	14.46
3	09.59	08.51	07.21		06.34	04.52	03.22	03.12	04.34	06.06		07.29		17.48 (WTG11)	08.01	09.31
	14.46	16.14	17.41		20.11	21.41	23.12	23.32	22.12	20.28		18.44	18	18.06 (WTG11)	16.02	14.44
4	09.58	08.48	07.17		06.31	04.48	03.20	03.13	04.37	06.08		07.32		17.50 (WTG11)	08.04	09.33
	14.48	16.17	17.44		20.14	21.44	23.15	23.30	22.09	20.25		18.41	12	18.02 (WTG11)	15.59	14.42
5	09.57	08.45	07.14		06.27	04.45	03.18	03.15	04.40	06.11		07.35		17.52 (WTG11)	08.07	09.36
	14.50	16.21	17.47		20.17	21.47	23.17	23.28	22.06	20.21		18.37	7	17.59 (WTG11)	15.55	14.41
6	09.56	08.42	07.11		06.24	04.42	03.16	03.17	04.43	06.14		07.38			08.10	09.38
	14.52	16.24	17.50		20.20	21.50	23.19	23.27	22.03	20.18		18.34			15.52	14.39
7	09.54	08.39	07.07		06.20	04.39	03.14	03.19	04.46	06.17		07.41			08.13	09.40
	14.55	16.27	17.53		20.23	21.53	23.21	23.25	22.00	20.14		18.31			15.49	14.38
8	09.53	08.36	07.04		17.19 (WTG11)	06.17	04.35	03.12	03.21	04.49	06.20	07.43			08.16	09.43
	14.57	16.30	17.56	2	17.21 (WTG11)	20.26	21.56	23.23	23.23	21.56	20.11	18.27			15.46	14.37
9	09.51	08.33	07.00		17.13 (WTG11)	06.13	04.32	03.11	03.24	04.52	06.22	07.46			08.20	09.45
	14.59	16.33	17.59	10	17.23 (WTG11)	20.29	21.59	23.25	23.21	21.53	20.07	18.24			15.43	14.35
10	09.50	08.29	06.57		17.12 (WTG11)	06.10	04.29	03.09	03.26	04.55	06.25	07.49			08.23	09.47
	15.02	16.37	18.02	15	17.27 (WTG11)	20.32	22.02	23.27	23.19	21.50	20.04	18.20			15.40	14.34
11	09.48	08.26	06.54		17.09 (WTG11)	06.06	04.26	03.08	03.28	04.58	06.28	07.52			08.26	09.49
	15.05	16.40	18.05	20	17.29 (WTG11)	20.35	22.06	23.29	23.17	21.46	20.00	18.17			15.38	14.33
12	09.46	08.23	06.50		17.09 (WTG11)	06.03	04.23	03.06	03.31	05.01	06.31	07.55			08.29	09.50
	15.07	16.43	18.08	22	17.31 (WTG11)	20.38	22.09	23.31	23.15	21.43	19.57	18.14			15.35	14.32
13	09.44	08.20	06.47		17.07 (WTG11)	05.59	04.20	03.05	03.33	05.04	06.34	07.58			08.32	09.52
	15.10	16.46	18.11	24	17.31 (WTG11)	20.40	22.12	23.32	23.12	21.40	19.54	18.10			15.32	14.32
14	09.42	08.17	06.43		17.07 (WTG11)	05.56	04.17	03.04	03.36	05.07	06.36	08.01			08.35	09.54
	15.13	16.49	18.14	25	17.32 (WTG11)	20.43	22.15	23.33	23.10	21.36	19.50	18.07			15.29	14.31
15	09.40	08.14	06.40		17.06 (WTG11)	05.53	04.13	03.03	03.39	05.10	06.39	08.04			08.38	09.55
	15.15	16.52	18.17	25	17.31 (WTG11)	20.46	22.18	23.35	23.07	21.33	19.47	18.03			15.26	14.30
16	09.38	08.10	06.36		17.06 (WTG11)	05.49	04.10	03.02	03.41	05.13	06.42	08.07			08.41	09.57
	15.18	16.56	18.19	25	17.31 (WTG11)	20.49	22.21	23.36	23.05	21.30	19.43	18.00			15.23	14.30
17	09.36	08.07	06.33		17.05 (WTG11)	05.46	04.07	03.02	03.44	05.16	06.45	08.09			08.45	09.58
	15.21	16.59	18.22	26	17.31 (WTG11)	20.52	22.24	23.37	23.02	21.26	19.40	17.57			15.21	14.30
18	09.33	08.04	06.29		17.06 (WTG11)	05.42	04.04	03.01	03.47	05.19	06.47	08.12			08.48	09.59
	15.24	17.02	18.25	24	17.30 (WTG11)	20.55	22.27	23.38	23.00	21.23	19.36	17.53			15.18	14.30
19	09.31	08.01	06.26		17.05 (WTG11)	05.39	04.01	03.01	03.50	05.22	06.50	08.15			08.51	10.00
	15.27	17.05	18.28	24	17.29 (WTG11)	20.58	22.30	23.38	22.57	21.20	19.33	17.50			15.15	14.30
20	09.29	07.57	06.23		17.06 (WTG11)	05.35	03.58	03.01	03.53	05.25	06.53	17.58 (WTG11)		08.18	08.54	10.01
	15.30	17.08	18.31	23	17.29 (WTG11)	21.01	22.33	23.39	22.54	21.16	19.29	11	18.09 (WTG11)	17.47	15.13	14.30
21	09.26	07.54	06.19		17.07 (WTG11)	05.32	03.56	03.01	03.55	05.28	06.56		17.54 (WTG11)	08.21	08.57	10.02
	15.33	17.11	18.34	20	17.27 (WTG11)	21.04	22.36	23.39	22.51	21.13	19.26	16	18.10 (WTG11)	17.43	15.10	14.30
22	09.24	07.51	06.16		17.08 (WTG11)	05.29	03.53	03.01	03.58	05.31	06.59		17.52 (WTG11)	08.24	09.00	10.02
	15.36	17.14	18.37	18	17.26 (WTG11)	21.07	22.39	23.39	22.49	21.09	19.22	19	18.11 (WTG11)	17.40	15.08	14.30
23	09.21	07.48	06.12		17.10 (WTG11)	05.25	03.50	03.01	04.01	05.34	07.01		17.51 (WTG11)	08.27	09.03	10.03
	15.39	17.17	18.40	13	17.23 (WTG11)	21.10	22.42	23.39	22.46	21.06	19.19	21	18.12 (WTG11)	17.37	15.05	14.31
24	09.19	07.44	06.09		17.15 (WTG11)	05.22	03.47	03.01	04.04	05.37	07.04		17.50 (WTG11)	08.30	09.06	10.03
	15.42	17.20	18.42	3	17.18 (WTG11)	21.13	22.45	23.39	22.43	21.03	19.15	23	18.13 (WTG11)	17.34	15.03	14.32
25	09.16	07.41	06.05			05.18	03.44	03.02	04.07	05.40	07.07		17.49 (WTG11)	07.33	09.09	10.03
	15.46	17.23	18.45			21.16	22.48	23.39	22.40	20.59	19.12	24	18.13 (WTG11)	16.30	15.01	14.32
26	09.13	07.38	06.02			05.15	03.42	03.03	04.10	05.43	07.10		17.47 (WTG11)	07.36	09.12	10.03
	15.49	17.26	18.48			21.19	22.51	23.38	22.37	20.56	19.08	26	18.13 (WTG11)	16.27	14.58	14.33
27	09.11	07.34	05.58			05.12	03.39	03.03	04.13	05.46	07.12		17.47 (WTG11)	07.39	09.15	10.03
	15.52	17.29	18.51			21.22	22.54	23.38	22.34	20.52	19.05	26	18.13 (WTG11)	16.24	14.56	14.34
28	09.08	07.31	05.55			05.08	03.36	03.04	04.16	05.48	07.15		17.47 (WTG11)	07.42	09.17	10.03
	15.55	17.32	18.54			21.25	22.56	23.37	22.31	20.49	19.01	25	18.12 (WTG11)	16.21	14.54	14.36
29	09.05		06.51			05.05	03.34	03.06	04.19	05.51	07.18		17.47 (WTG11)	07.45	09.20	10.03
	15.58		19.57			21.28	22.59	23.36	22.28	20.45	18.58	25	18.12 (WTG11)	16.17	14.52	14.37
30	09.02		06.48			05.02	03.31	03.07	04.22	05.54	07.21		17.47 (WTG11)	07.49	09.23	10.02
	16.01		20.00			21.32	23.02	23.35	22.25	20.42	18.55	24	18.11 (WTG11)	16.14	14.50	14.38
31	08.59		06.44				03.29		04.25	05.57				07.52		10.02
	16.05		20.03				23.05		22.22	20.39				16.11		14.40
Potential sun hours	178	241	363		449	563	611	599	504	392		307		203	146
Total, worst case				319							240		80		
Sun reduction				0,32							0,36		0,25		
Oper. time red.				0,90							0,90		0,90		
Wind dir. red.				0,55							0,55		0,55		
Total reduction				0,16							0,18		0,13		
Total, real				51							43		10		

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: Uusimo_VE2_RD200x18xHH200+Hallakallio_No_Forest Shadow receptor: B - B - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.01	08.56	07.27	06.41	04.58	03.26	03.08	04.28	06.00	07.23	07.54	09.25
	14.42	16.08	17.35	20.05	21.34	23.07	23.34	22.18	20.35	18.51	16.08	14.48
2	10.00	08.53	07.24	06.37	04.55	03.24	03.10	04.31	06.03	07.26	07.58	09.28
	14.44	16.11	17.38	20.08	21.37	23.09	23.33	22.15	20.31	18.48	16.05	14.46
3	09.59	08.50	07.21	06.34	04.52	03.22	03.11	04.34	06.05	07.29	08.01	09.31
	14.46	16.14	17.41	20.11	21.41	23.12	23.31	22.12	20.28	18.44	16.02	14.44
4	09.58	08.48	07.17	06.30	04.48	03.20	03.13	04.37	06.08	07.32	08.04	09.33
	14.48	16.17	17.44	20.14	21.44	23.14	23.30	22.09	20.25	18.41	15.58	14.42
5	09.57	08.45	07.14	06.27	04.45	03.18	03.15	04.40	06.11	07.35	08.07	09.35
	14.50	16.21	17.47	20.17	21.47	23.17	23.28	22.06	20.21	18.37	15.55	14.41
6	09.55	08.42	07.10	06.23	04.42	03.16	03.17	04.43	06.14	07.38	08.10	09.38
	14.52	16.24	17.50	20.20	21.50	23.19	23.26	22.03	20.18	18.34	15.52	14.39
7	09.54	08.38	07.07	06.20	04.39	03.14	03.19	04.46	06.17	07.40	08.13	09.40
	14.54	16.27	17.53	20.23	21.53	23.21	23.25	21.59	20.14	18.30	15.49	14.38
8	09.53	08.35	07.04	06.17	04.35	03.12	03.21	04.49	06.19	07.43	08.16	09.42
	14.57	16.30	17.56	20.26	21.56	23.23	23.23	21.56	20.11	18.27	15.46	14.36
9	09.51	08.32	07.00	06.13	04.32	03.11	03.24	04.52	06.22	07.46	08.19	09.44
	14.59	16.33	17.59	20.29	21.59	23.25	23.21	21.53	20.07	18.24	15.43	14.35
10	09.49	08.29	06.57	06.10	04.29	03.09	03.26	04.55	06.25	07.49	08.23	09.46
	15.02	16.36	18.02	20.31	22.02	23.27	23.19	21.49	20.04	18.20	15.40	14.34
11	09.48	08.26	06.53	06.06	04.26	03.08	03.28	04.58	06.28	07.52	08.26	09.48
	15.04	16.40	18.05	20.34	22.05	23.29	23.16	21.46	20.00	18.17	15.37	14.33
12	09.46	08.23	06.50	06.03	04.23	03.06	03.31	05.01	06.31	07.55	08.29	09.50
	15.07	16.43	18.08	20.37	22.08	23.30	23.14	21.43	19.57	18.13	15.35	14.32
13	09.44	08.20	06.47	05.59	04.20	03.05	03.33	05.04	06.33	07.58	08.32	09.52
	15.10	16.46	18.11	20.40	22.12	23.32	23.12	21.40	19.53	18.10	15.32	14.31
14	09.42	08.17	06.43	05.56	04.16	03.04	03.36	05.07	06.36	08.01	08.35	09.54
	15.13	16.49	18.13	20.43	22.15	23.33	23.10	21.36	19.50	18.07	15.29	14.31
15	09.40	08.13	06.40	05.52	04.13	03.03	03.39	05.10	06.39	08.03	08.38	09.55
	15.15	16.52	18.16	20.46	22.18	23.34	23.07	21.33	19.46	18.03	15.26	14.30
16	09.38	08.10	06.36	05.49	04.10	03.02	03.41	05.13	06.42	08.06	08.41	09.56
	15.18	16.55	18.19	20.49	22.21	23.36	23.05	21.30	19.43	18.00	15.23	14.30
17	09.35	08.07	06.33	05.46	04.07	03.02	03.44	05.16	06.44	08.09	08.44	09.58
	15.21	16.59	18.22	20.52	22.24	23.36	23.02	21.26	19.39	17.57	15.21	14.30
18	09.33	08.04	06.29	05.42	04.04	03.01	03.47	05.19	06.47	08.12	08.47	09.59
	15.24	17.02	18.25	20.55	22.27	23.37	22.59	21.23	19.36	17.53	15.18	14.30
19	09.31	08.00	06.26	05.39	04.01	03.01	03.50	05.22	06.50	08.15	08.50	10.00
	15.27	17.05	18.28	20.58	22.30	23.38	22.57	21.19	19.32	17.50	15.15	14.30
20	09.28	07.57	06.22	05.35	03.58	03.01	03.52	05.25	06.53	08.18	08.54	10.01
	15.30	17.08	18.31	21.01	22.33	23.38	22.54	21.16	19.29	17.47	15.13	14.30
21	09.26	07.54	06.19	05.32	03.55	03.00	03.55	05.28	06.56	08.21	08.57	10.01
	15.33	17.11	18.34	21.04	22.36	23.39	22.51	21.13	19.26	17.43	15.10	14.30
22	09.24	07.51	06.15	05.28	03.53	03.01	03.58	05.31	06.58	08.24	09.00	10.02
	15.36	17.14	18.37	21.07	22.39	23.39	22.48	21.09	19.22	17.40	15.08	14.30
23	09.21	07.47	06.12	05.25	03.50	03.01	04.01	05.34	07.01	08.27	09.03	10.03
	15.39	17.17	18.39	21.10	22.42	23.39	22.46	21.06	19.19	17.37	15.05	14.31
24	09.18	07.44	06.09	05.22	03.47	03.01	04.04	05.37	07.04	08.30	09.06	10.03
	15.42	17.20	18.42	21.13	22.45	23.39	22.43	21.02	19.15	17.33	15.03	14.32
25	09.16	07.41	06.05	05.18	03.44	03.02	04.07	05.40	07.07	07.33	09.09	10.03
	15.45	17.23	18.45	21.16	22.48	23.39	22.40	20.59	19.12	16.30	15.00	14.32
26	09.13	07.37	06.02	05.15	03.41	03.03	04.10	05.42	07.09	07.36	09.11	10.03
	15.49	17.26	18.48	21.19	22.51	23.38	22.37	20.56	19.08	16.27	14.58	14.33
27	09.10	07.34	05.58	05.12	03.39	03.03	04.13	05.45	07.12	07.39	09.14	10.03
	15.52	17.29	18.51	21.22	22.53	23.38	22.34	20.52	19.05	16.24	14.56	14.34
28	09.08	07.31	05.55	05.08	03.36	03.04	04.16	05.48	07.15	07.42	09.17	10.03
	15.55	17.32	18.54	21.25	22.56	23.37	22.31	20.49	19.01	16.20	14.54	14.36
29	09.05		06.51	05.05	03.34	03.06	04.19	05.51	07.18	07.45	09.20	10.03
	15.58		19.57	21.28	22.59	23.36	22.28	20.45	18.58	16.17	14.52	14.37
30	09.02		06.48	05.02	03.31	03.07	04.22	05.54	07.21	07.48	09.23	10.02
	16.01		20.00	21.31	23.02	23.35	22.25	20.42	18.54	16.14	14.50	14.38
31	08.59		06.44		03.29		04.25	05.57		07.51		10.02
	16.05		20.02		23.04		22.22	20.38		16.11		14.40
Potential sun hours	178	241	363	449	563	611	599	504	392	307	203	146
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:
31.1.2024 11.18/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE2_RD200x18xHH200+Hallakallio_No_Forest Shadow receptor: C - C - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March			April			May			June
1	10.00	08.56	07.27			06.41		18.50 (WTG15)	04.58			03.27
	14.42	16.08	17.35			20.05	24	19.14 (WTG15)	21.34			23.06
2	09.59	08.53	07.24			06.37		18.51 (WTG15)	04.55			03.25
	14.44	16.11	17.38			20.08	22	19.13 (WTG15)	21.37			23.09
3	09.58	08.50	07.20			06.34		18.51 (WTG15)	04.52		20.54 (WTG08)	03.22
	14.46	16.14	17.41			20.11	21	19.12 (WTG15)	21.40	3	20.57 (WTG08)	23.11
4	09.57	08.47	07.17			06.30		18.52 (WTG15)	04.49		20.51 (WTG08)	03.20
	14.48	16.17	17.44			20.14	19	19.11 (WTG15)	21.43	9	21.00 (WTG08)	23.14
5	09.56	08.44	07.14			06.27		18.52 (WTG15)	04.45		20.50 (WTG08)	03.18
	14.50	16.21	17.47			20.17	17	19.09 (WTG15)	21.46	13	21.03 (WTG08)	23.16
6	09.55	08.41	07.10			06.23		18.54 (WTG15)	04.42		20.48 (WTG08)	03.16
	14.53	16.24	17.50			20.20	13	19.07 (WTG15)	21.50	17	21.05 (WTG08)	23.18
7	09.54	08.38	07.07			06.20		18.58 (WTG15)	04.39		20.47 (WTG08)	03.14
	14.55	16.27	17.53			20.23	6	19.04 (WTG15)	21.53	19	21.06 (WTG08)	23.21
8	09.52	08.35	07.04			06.17			04.36		20.46 (WTG08)	03.13
	14.57	16.30	17.56			20.25			21.56	21	21.07 (WTG08)	23.23
9	09.51	08.32	07.00			06.13			04.32		20.45 (WTG08)	03.11
	15.00	16.33	17.59			20.28			21.59	22	21.07 (WTG08)	23.25
10	09.49	08.29	06.57			06.10			04.29		20.45 (WTG08)	03.09
	15.02	16.37	18.02			20.31			22.02	23	21.08 (WTG08)	23.26
11	09.47	08.26	06.53			06.06			04.26		20.44 (WTG08)	03.08
	15.05	16.40	18.05			20.34			22.05	24	21.08 (WTG08)	23.28
12	09.45	08.23	06.50			06.03			04.23		20.44 (WTG08)	03.07
	15.07	16.43	18.08			20.37			22.08	24	21.08 (WTG08)	23.30
13	09.43	08.20	06.46			05.59			04.20		20.44 (WTG08)	03.06
	15.10	16.46	18.11			20.40			22.11	24	21.08 (WTG08)	23.31
14	09.41	08.16	06.43			05.56			04.17		20.44 (WTG08)	03.04
	15.13	16.49	18.13			20.43			22.14	24	21.08 (WTG08)	23.33
15	09.39	08.13	06.40			05.52			04.14		20.44 (WTG08)	03.04
	15.16	16.52	18.16			20.46			22.17	24	21.08 (WTG08)	23.34
16	09.37	08.10	06.36			05.49			04.11		20.44 (WTG08)	03.03
	15.18	16.55	18.19			20.49			22.20	23	21.07 (WTG08)	23.35
17	09.35	08.07	06.33			05.46			04.07		20.45 (WTG08)	03.02
	15.21	16.59	18.22			20.52			22.23	23	21.08 (WTG08)	23.36
18	09.33	08.04	06.29			05.42			04.04		20.45 (WTG08)	03.02
	15.24	17.02	18.25			20.55			22.27	22	21.07 (WTG08)	23.37
19	09.30	08.00	06.26			05.39			04.02		20.45 (WTG08)	03.01
	15.27	17.05	18.28			20.58			22.30	22	21.07 (WTG08)	23.37
20	09.28	07.57	06.22			05.35			03.59		20.46 (WTG08)	03.01
	15.30	17.08	18.31			21.01			22.33	20	21.06 (WTG08)	23.38
21	09.26	07.54	06.19			05.32			03.56		20.47 (WTG08)	03.01
	15.33	17.11	18.34			21.04			22.36	19	21.06 (WTG08)	23.38
22	09.23	07.50	06.15			05.29			03.53		20.47 (WTG08)	03.01
	15.36	17.14	18.37			21.07			22.39	18	21.05 (WTG08)	23.38
23	09.21	07.47	06.12			05.25			03.50		20.48 (WTG08)	03.01
	15.39	17.17	18.39			21.10			22.41	16	21.04 (WTG08)	23.38
24	09.18	07.44	06.08		17.59 (WTG15)	05.22			03.47		20.50 (WTG08)	03.02
	15.43	17.20	18.42	8	18.07 (WTG15)	21.13			22.44	13	21.03 (WTG08)	23.38
25	09.15	07.41	06.05		17.56 (WTG15)	05.18			03.44		20.51 (WTG08)	03.02
	15.46	17.23	18.45	15	18.11 (WTG15)	21.16			22.47	11	21.02 (WTG08)	23.38
26	09.13	07.37	06.02		17.55 (WTG15)	05.15			03.42		20.53 (WTG08)	03.03
	15.49	17.26	18.48	18	18.13 (WTG15)	21.19			22.50	8	21.01 (WTG08)	23.38
27	09.10	07.34	05.58		17.53 (WTG15)	05.12			03.39			03.04
	15.52	17.29	18.51	21	18.14 (WTG15)	21.22			22.53			23.37
28	09.07	07.31	05.55		17.53 (WTG15)	05.08			03.37			03.05
	15.55	17.32	18.54	22	18.15 (WTG15)	21.25			22.56			23.36
29	09.05		06.51		18.51 (WTG15)	05.05			03.34			03.06
	15.58		19.57	23	19.14 (WTG15)	21.28			22.59			23.35
30	09.02		06.48		18.51 (WTG15)	05.02			03.32			03.07
	16.01		19.59	23	19.14 (WTG15)	21.31			23.01			23.34
31	08.59		06.44		18.50 (WTG15)				03.29			
	16.05		20.02	24	19.14 (WTG15)				23.04			
Potential sun hours	179	241	363			448			562			611
Total, worst case				154			122			442		
Sun reduction				0,32			0,44			0,48		
Oper. time red.				0,90			0,90			0,90		
Wind dir. red.				0,56			0,56			0,60		
Total reduction				0,16			0,22			0,26		
Total, real				25			27			115		

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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31.1.2024 11.18/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE2_RD200x18xHH200+Hallakallio_No_Forest Shadow receptor: C - C - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	July			August			September			October	November	December
1	03.09			04.28		20.55 (WTG08)	06.00			07.23	07.54	09.25
	23.33			22.18	23	21.18 (WTG08)	20.35			18.51	16.08	14.48
2	03.10			04.31		20.55 (WTG08)	06.03			07.26	07.57	09.28
	23.32			22.15	23	21.18 (WTG08)	20.31			18.47	16.05	14.46
3	03.12			04.34		20.55 (WTG08)	06.05			07.29	08.00	09.30
	23.31			22.12	23	21.18 (WTG08)	20.28			18.44	16.02	14.44
4	03.14			04.37		20.56 (WTG08)	06.08			07.32	08.04	09.33
	23.29			22.09	22	21.18 (WTG08)	20.24			18.41	15.59	14.43
5	03.16			04.40		20.56 (WTG08)	06.11		18.54 (WTG15)	07.35	08.07	09.35
	23.28			22.05	20	21.16 (WTG08)	20.21	6	19.00 (WTG15)	18.37	15.55	14.41
6	03.18			04.43		20.57 (WTG08)	06.14		18.50 (WTG15)	07.37	08.10	09.37
	23.26			22.02	19	21.16 (WTG08)	20.18	13	19.03 (WTG15)	18.34	15.52	14.40
7	03.20			04.46		20.57 (WTG08)	06.17		18.47 (WTG15)	07.40	08.13	09.40
	23.24			21.59	17	21.14 (WTG08)	20.14	17	19.04 (WTG15)	18.30	15.49	14.38
8	03.22			04.49		20.59 (WTG08)	06.19		18.46 (WTG15)	07.43	08.16	09.42
	23.22			21.56	13	21.12 (WTG08)	20.11	19	19.05 (WTG15)	18.27	15.46	14.37
9	03.24			04.52		21.01 (WTG08)	06.22		18.45 (WTG15)	07.46	08.19	09.44
	23.20			21.52	8	21.09 (WTG08)	20.07	21	19.06 (WTG15)	18.24	15.43	14.36
10	03.26			04.55			06.25		18.43 (WTG15)	07.49	08.22	09.46
	23.18			21.49			20.04	22	19.05 (WTG15)	18.20	15.40	14.34
11	03.29			04.58			06.28		18.43 (WTG15)	07.52	08.25	09.48
	23.16			21.46			20.00	23	19.06 (WTG15)	18.17	15.38	14.33
12	03.31			05.01			06.31		18.43 (WTG15)	07.55	08.28	09.50
	23.14			21.43			19.57	23	19.06 (WTG15)	18.13	15.35	14.33
13	03.34			05.04			06.33		18.42 (WTG15)	07.57	08.32	09.51
	23.11			21.39			19.53	23	19.05 (WTG15)	18.10	15.32	14.32
14	03.36			05.07			06.36		18.42 (WTG15)	08.00	08.35	09.53
	23.09			21.36			19.50	23	19.05 (WTG15)	18.07	15.29	14.31
15	03.39			05.10			06.39		18.42 (WTG15)	08.03	08.38	09.55
	23.07			21.33			19.46	22	19.04 (WTG15)	18.03	15.26	14.31
16	03.42			05.13			06.42		18.43 (WTG15)	08.06	08.41	09.56
	23.04			21.29			19.43	20	19.03 (WTG15)	18.00	15.23	14.30
17	03.44		21.03 (WTG08)	05.16			06.44		18.43 (WTG15)	08.09	08.44	09.57
	23.02	5	21.08 (WTG08)	21.26			19.39	18	19.01 (WTG15)	17.57	15.21	14.30
18	03.47		21.02 (WTG08)	05.19			06.47		18.44 (WTG15)	08.12	08.47	09.58
	22.59	10	21.12 (WTG08)	21.23			19.36	15	18.59 (WTG15)	17.53	15.18	14.30
19	03.50		21.00 (WTG08)	05.22			06.50		18.46 (WTG15)	08.15	08.50	09.59
	22.56	13	21.13 (WTG08)	21.19			19.32	10	18.56 (WTG15)	17.50	15.15	14.30
20	03.53		20.59 (WTG08)	05.25			06.53		18.49 (WTG15)	08.18	08.53	10.00
	22.54	15	21.14 (WTG08)	21.16			19.29	3	18.52 (WTG15)	17.47	15.13	14.30
21	03.56		20.58 (WTG08)	05.28			06.56			08.21	08.56	10.01
	22.51	17	21.15 (WTG08)	21.12			19.25			17.43	15.10	14.30
22	03.58		20.57 (WTG08)	05.31			06.58			08.24	08.59	10.02
	22.48	18	21.15 (WTG08)	21.09			19.22			17.40	15.08	14.31
23	04.01		20.57 (WTG08)	05.34			07.01			08.27	09.02	10.02
	22.45	19	21.16 (WTG08)	21.06			19.19			17.37	15.05	14.31
24	04.04		20.56 (WTG08)	05.37			07.04			08.30	09.05	10.02
	22.42	21	21.17 (WTG08)	21.02			19.15			17.33	15.03	14.32
25	04.07		20.56 (WTG08)	05.40			07.07			07.33	09.08	10.03
	22.39	22	21.18 (WTG08)	20.59			19.12			16.30	15.01	14.33
26	04.10		20.55 (WTG08)	05.43			07.09			07.36	09.11	10.03
	22.36	23	21.18 (WTG08)	20.55			19.08			16.27	14.58	14.34
27	04.13		20.55 (WTG08)	05.45			07.12			07.39	09.14	10.03
	22.33	23	21.18 (WTG08)	20.52			19.05			16.24	14.56	14.35
28	04.16		20.55 (WTG08)	05.48			07.15			07.42	09.17	10.02
	22.30	23	21.18 (WTG08)	20.49			19.01			16.21	14.54	14.36
29	04.19		20.54 (WTG08)	05.51			07.18			07.45	09.20	10.02
	22.27	24	21.18 (WTG08)	20.45			18.58			16.17	14.52	14.37
30	04.22		20.55 (WTG08)	05.54			07.21			07.48	09.22	10.02
	22.24	24	21.19 (WTG08)	20.42			18.54			16.14	14.50	14.39
31	04.25		20.54 (WTG08)	05.57						07.51		10.01
	22.21	24	21.18 (WTG08)	20.38						16.11		14.40
Potential sun hours	598			504			392			307	204	147
Total, worst case		281			168			278				
Sun reduction		0,46			0,42			0,36				
Oper. time red.		0,90			0,90			0,90				
Wind dir. red.		0,60			0,60			0,56				
Total reduction		0,25			0,22			0,18				
Total, real		69			38			50				

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:
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SHADOW - Calendar

Calculation: Uusimo_VE2_RD200x18xHH200+Hallakallio_No_Forest Shadow receptor: D - D - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.00	08.56	07.27	06.41	04.58	03.27	03.09	04.28	06.00 19.16 (WTG15)	07.23	07.54	09.25
	14.42	16.08	17.35	20.05	21.34	23.06	23.33	22.18	20.35 22 19.38 (WTG15)	18.51	16.08	14.48
2	09.59	08.53	07.24	06.37 19.27 (WTG15)	04.55	03.25	03.10	04.31	06.03 19.16 (WTG15)	07.26	07.57	09.28
	14.44	16.11	17.38	20.08 7 19.34 (WTG15)	21.37	23.09	23.32	22.15	20.31 22 19.38 (WTG15)	18.47	16.05	14.46
3	09.58	08.50	07.20	06.34 19.24 (WTG15)	04.52	03.22	03.12	04.34	06.05 19.16 (WTG15)	07.29	08.00	09.30
	14.46	16.14	17.41	20.11 12 19.36 (WTG15)	21.40	23.11	23.31	22.12	20.28 23 19.39 (WTG15)	18.44	16.02	14.44
4	09.57	08.47	07.17	06.30 19.22 (WTG15)	04.49	03.20	03.14	04.37	06.08 19.15 (WTG15)	07.32	08.04	09.33
	14.48	16.17	17.44	20.14 17 19.39 (WTG15)	21.43	23.14	23.29	22.09	20.24 23 19.38 (WTG15)	18.41	15.59	14.43
5	09.56	08.44	07.14	06.27 19.20 (WTG15)	04.45	03.18	03.16	04.40	06.11 19.15 (WTG15)	07.35	08.07	09.35
	14.50	16.21	17.47	20.17 20 19.40 (WTG15)	21.46	23.16	23.28	22.05	20.21 22 19.37 (WTG15)	18.37	15.55	14.41
6	09.55	08.41	07.10	06.23 19.19 (WTG15)	04.42	03.16	03.18	04.43	06.14 19.15 (WTG15)	07.37	08.10	09.37
	14.53	16.24	17.50	20.20 22 19.41 (WTG15)	21.50	23.18	23.26	22.02	20.17 22 19.37 (WTG15)	18.34	15.52	14.40
7	09.54	08.38	07.07	06.20 19.19 (WTG15)	04.39	03.14	03.20	04.46	06.17 19.15 (WTG15)	07.40	08.13	09.40
	14.55	16.27	17.53	20.23 22 19.41 (WTG15)	21.53	23.20	23.24	21.59	20.14 20 19.35 (WTG15)	18.30	15.49	14.38
8	09.52	08.35	07.04	06.17 19.18 (WTG15)	04.36	03.13	03.22	04.49	06.19 19.16 (WTG15)	07.43	08.16	09.42
	14.57	16.30	17.56	20.25 22 19.40 (WTG15)	21.56	23.23	23.22	21.56	20.11 17 19.33 (WTG15)	18.27	15.46	14.37
9	09.50	08.32	07.00	06.13 19.18 (WTG15)	04.32	03.11	03.24	04.52	06.22 19.18 (WTG15)	07.46	08.19	09.44
	15.00	16.33	17.59	20.28 23 19.41 (WTG15)	21.59	23.24	23.20	21.52	20.07 12 19.30 (WTG15)	18.24	15.43	14.36
10	09.49	08.29	06.57	06.10 19.18 (WTG15)	04.29	03.09	03.26	04.55	06.25 19.19 (WTG15)	07.49	08.22	09.46
	15.02	16.37	18.02	20.31 23 19.41 (WTG15)	22.02	23.26	23.18	21.49	20.04 7 19.26 (WTG15)	18.20	15.40	14.34
11	09.47	08.26	06.53	06.06 19.17 (WTG15)	04.26	03.08	03.29	04.58	06.28	07.52	08.25	09.48
	15.05	16.40	18.05	20.34 22 19.39 (WTG15)	22.05	23.28	23.16	21.46	20.00	18.17	15.38	14.34
12	09.45	08.23	06.50	06.03 19.18 (WTG15)	04.23	03.07	03.31	05.01	06.31	07.55	08.28	09.50
	15.07	16.43	18.08	20.37 21 19.39 (WTG15)	22.08	23.30	23.14	21.43	19.57	18.13	15.35	14.33
13	09.43	08.20	06.46	05.59 19.18 (WTG15)	04.20	03.06	03.34	05.04	06.33	07.57	08.32	09.51
	15.10	16.46	18.11	20.40 20 19.38 (WTG15)	22.11	23.31	23.11	21.39	19.53	18.10	15.32	14.32
14	09.41	08.16	06.43	05.56 19.18 (WTG15)	04.17	03.05	03.36	05.07	06.36	08.00	08.35	09.53
	15.13	16.49	18.13	20.43 18 19.36 (WTG15)	22.14	23.33	23.09	21.36	19.50	18.07	15.29	14.31
15	09.39	08.13	06.40	05.52 19.20 (WTG15)	04.14	03.04	03.39	05.10	06.39	08.03	08.38	09.55
	15.16	16.52	18.16	20.46 15 19.35 (WTG15)	22.17	23.34	23.07	21.33	19.46	18.03	15.26	14.31
16	09.37	08.10	06.36	05.49 19.22 (WTG15)	04.11	03.03	03.42	05.13	06.42	08.06	08.41	09.56
	15.19	16.55	18.19	20.49 10 19.32 (WTG15)	22.20	23.35	23.04	21.29	19.43	18.00	15.23	14.30
17	09.35	08.07	06.33	05.46	04.08	03.02	03.44	05.16	06.44	08.09	08.44	09.57
	15.21	16.59	18.22	20.52	22.23	23.36	23.01	21.26	19.39	17.57	15.21	14.30
18	09.33	08.04	06.29	05.42	04.05	03.02	03.47	05.19	06.47	08.12	08.47	09.58
	15.24	17.02	18.25	20.55	22.26	23.37	22.59	21.23	19.36	17.53	15.18	14.30
19	09.30	08.00	06.26	05.39	04.02	03.01	03.50	05.22	06.50	08.15	08.50	09.59
	15.27	17.05	18.28	20.58	22.30	23.37	22.56	21.19	19.32	17.50	15.15	14.30
20	09.28	07.57	06.22	05.35	03.59	03.01	03.53	05.25	06.53	08.18	08.53	10.00
	15.30	17.08	18.31	21.01	22.33	23.38	22.54	21.16	19.29	17.47	15.13	14.30
21	09.26	07.54	06.19	05.32	03.56	03.01	03.56	05.28	06.56	08.21	08.56	10.01
	15.33	17.11	18.34	21.04	22.36	23.38	22.51	21.12	19.25	17.43	15.10	14.30
22	09.23	07.50	06.15	05.29	03.53	03.01	03.59	05.31	06.58	08.24	08.59	10.02
	15.36	17.14	18.37	21.07	22.38	23.38	22.48	21.09	19.22	17.40	15.08	14.31
23	09.21	07.47	06.12	05.25	03.50	03.01	04.01	05.34	07.01	08.27	09.02	10.02
	15.39	17.17	18.39	21.10	22.41	23.38	22.45	21.06	19.19	17.37	15.05	14.31
24	09.18	07.44	06.08	05.22	03.47	03.02	04.04	05.37	07.04	08.30	09.05	10.02
	15.43	17.20	18.42	21.13	22.44	23.38	22.42	21.02	19.15	17.33	15.03	14.32
25	09.15	07.41	06.05	05.18	03.45	03.02	04.07	05.40	07.07	07.33	09.08	10.03
	15.46	17.23	18.45	21.16	22.47	23.38	22.39	20.59	19.12	16.30	15.01	14.33
26	09.13	07.37	06.02	05.15	03.42	03.03	04.10	05.43	07.09	07.36	09.11	10.03
	15.49	17.26	18.48	21.19	22.50	23.37	22.36	20.55	19.08	16.27	14.58	14.34
27	09.10	07.34	05.58	05.12	03.39	03.04	04.13	05.45 19.24 (WTG15)	07.12	07.39	09.14	10.03
	15.52	17.29	18.51	21.22	22.53	23.37	22.33	20.52 10 19.34 (WTG15)	19.05	16.24	14.56	14.35
28	09.07	07.31	05.55	05.08	03.37	03.05	04.16	05.48 19.22 (WTG15)	07.15	07.42	09.17	10.02
	15.55	17.32	18.54	21.25	22.56	23.36	22.30	20.49 14 19.36 (WTG15)	19.01	16.21	14.54	14.36
29	09.05		06.51	05.05	03.34	03.06	04.19	05.51 19.19 (WTG15)	07.18	07.45	09.19	10.02
	15.58		19.57	21.28	22.58	23.35	22.27	20.45 18 19.37 (WTG15)	18.58	16.17	14.52	14.37
30	09.02		06.48	05.02	03.32	03.07	04.22	05.54 19.18 (WTG15)	07.21	07.48	09.22	10.02
	16.02		19.59	21.31	23.01	23.34	22.24	20.42 20 19.38 (WTG15)	18.54	16.14	14.50	14.39
31	08.59		06.44		03.29		04.25	05.57 19.17 (WTG15)		07.51		10.01
	16.05		20.02		23.04		22.21	20.38 22 19.39 (WTG15)		16.11		14.40
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
Total, worst case				274				84	190			
Sun reduction				0,44				0,42	0,36			
Oper. time red.				0,90				0,90	0,90			
Wind dir. red.				0,56				0,56	0,56			
Total reduction				0,22				0,21	0,18			
Total, real				60				17	34			

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:
31.1.2024 11.18/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE2_RD200x18xHH200+Hallakallio_No_Forest Shadow receptor: E - E - Lomarakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June			July	August	September	October	November	December
1	10.00	08.56	07.27	06.41	04.59	03.27			03.09	04.29	06.00	07.24	07.54	09.25
	14.43	16.08	17.35	20.05	21.34	23.06			23.33	22.18	20.35	18.51	16.08	14.48
2	09.59	08.53	07.24	06.38	04.55	03.25			03.11	04.32	06.03	07.26	07.57	09.27
	14.45	16.11	17.38	20.08	21.37	23.09			23.32	22.15	20.31	18.48	16.05	14.47
3	09.58	08.50	07.21	06.34	04.52	03.23			03.13	04.35	06.06	07.29	08.00	09.30
	14.47	16.15	17.41	20.11	21.40	23.11			23.30	22.12	20.28	18.44	16.02	14.45
4	09.57	08.47	07.17	06.31	04.49	03.21			03.14	04.38	06.08	07.32	08.04	09.33
	14.49	16.18	17.44	20.14	21.43	23.14			23.29	22.09	20.25	18.41	15.59	14.43
5	09.56	08.44	07.14	06.27	04.46	03.19			03.16	04.41	06.11	07.35	08.07	09.35
	14.51	16.21	17.47	20.17	21.46	23.16			23.27	22.05	20.21	18.37	15.56	14.41
6	09.55	08.41	07.10	06.24	04.42	03.17			03.18	04.44	06.14	07.38	08.10	09.37
	14.53	16.24	17.50	20.20	21.50	23.18			23.26	22.02	20.18	18.34	15.53	14.40
7	09.53	08.38	07.07	06.20	04.39	03.15			03.20	04.47	06.17	07.40	08.13	09.40
	14.55	16.27	17.53	20.23	21.53	23.20			23.24	21.59	20.14	18.31	15.50	14.39
8	09.52	08.35	07.04	06.17	04.36	03.13			03.22	04.50	06.20	07.43	08.16	09.42
	14.58	16.31	17.56	20.26	21.56	23.22			23.22	21.56	20.11	18.27	15.47	14.37
9	09.50	08.32	07.00	06.13	04.33	03.12			03.25	04.53	06.22	07.46	08.19	09.44
	15.00	16.34	17.59	20.28	21.59	23.24			23.20	21.52	20.07	18.24	15.44	14.36
10	09.49	08.29	06.57	06.10	04.30	03.10			03.27	04.56	06.25	07.49	08.22	09.46
	15.03	16.37	18.02	20.31	22.02	23.26			23.18	21.49	20.04	18.20	15.41	14.35
11	09.47	08.26	06.53	06.06	04.26	03.09			03.29	04.59	06.28	07.52	08.25	09.48
	15.05	16.40	18.05	20.34	22.05	23.28			23.16	21.46	20.00	18.17	15.38	14.34
12	09.45	08.23	06.50	06.03	04.23	03.07		22.18 (WTG10)	03.32	05.02	06.31	07.55	08.28	09.50
	15.08	16.43	18.08	20.37	22.08	23.29	4	22.22 (WTG10)	23.14	21.43	19.57	18.14	15.35	14.33
13	09.43	08.20	06.47	06.00	04.20	03.06		22.17 (WTG10)	03.34	05.05	06.34	07.58	08.32	09.51
	15.10	16.46	18.11	20.40	22.11	23.31	6	22.23 (WTG10)	23.11	21.39	19.53	18.10	15.32	14.32
14	09.41	08.16	06.43	05.56	04.17	03.05		22.17 (WTG10)	03.37	05.08	06.36	08.00	08.35	09.53
	15.13	16.49	18.14	20.43	22.14	23.32	8	22.25 (WTG10)	23.09	21.36	19.50	18.07	15.29	14.32
15	09.39	08.13	06.40	05.53	04.14	03.04		22.16 (WTG10)	03.39	05.11	06.39	08.03	08.38	09.54
	15.16	16.53	18.17	20.46	22.17	23.33	9	22.25 (WTG10)	23.06	21.33	19.46	18.04	15.27	14.31
16	09.37	08.10	06.36	05.49	04.11	03.03		22.16 (WTG10)	03.42	05.14	06.42	08.06	08.41	09.56
	15.19	16.56	18.19	20.49	22.20	23.35	10	22.26 (WTG10)	23.04	21.29	19.43	18.00	15.24	14.31
17	09.35	08.07	06.33	05.46	04.08	03.03		22.16 (WTG10)	03.45	05.17	06.45	08.09	08.44	09.57
	15.22	16.59	18.22	20.52	22.23	23.36	11	22.27 (WTG10)	23.01	21.26	19.39	17.57	15.21	14.31
18	09.33	08.04	06.29	05.42	04.05	03.02		22.15 (WTG10)	03.48	05.20	06.47	08.12	08.47	09.58
	15.25	17.02	18.25	20.55	22.26	23.36	12	22.27 (WTG10)	22.59	21.23	19.36	17.54	15.18	14.30
19	09.30	08.00	06.26	05.39	04.02	03.02		22.15 (WTG10)	03.50	05.22	06.50	08.15	08.50	09.59
	15.28	17.05	18.28	20.58	22.29	23.37	12	22.27 (WTG10)	22.56	21.19	19.33	17.50	15.16	14.30
20	09.28	07.57	06.22	05.36	03.59	03.02		22.15 (WTG10)	03.53	05.25	06.53	08.18	08.53	10.00
	15.31	17.08	18.31	21.01	22.32	23.37	12	22.27 (WTG10)	22.53	21.16	19.29	17.47	15.13	14.31
21	09.26	07.54	06.19	05.32	03.56	03.02		22.16 (WTG10)	03.56	05.28	06.56	08.21	08.56	10.01
	15.34	17.11	18.34	21.04	22.35	23.38	12	22.28 (WTG10)	22.51	21.12	19.26	17.44	15.11	14.31
22	09.23	07.51	06.16	05.29	03.53	03.02		22.16 (WTG10)	03.59	05.31	06.59	08.24	08.59	10.01
	15.37	17.14	18.37	21.07	22.38	23.38	12	22.28 (WTG10)	22.48	21.09	19.22	17.40	15.08	14.31
23	09.21	07.47	06.12	05.25	03.50	03.02		22.16 (WTG10)	04.02	05.34	07.01	08.27	09.02	10.02
	15.40	17.17	18.40	21.10	22.41	23.38	12	22.28 (WTG10)	22.45	21.06	19.19	17.37	15.06	14.32
24	09.18	07.44	06.09	05.22	03.48	03.02		22.17 (WTG10)	04.05	05.37	07.04	08.30	09.05	10.02
	15.43	17.20	18.42	21.13	22.44	23.38	12	22.29 (WTG10)	22.42	21.02	19.15	17.34	15.03	14.32
25	09.15	07.41	06.05	05.19	03.45	03.03		22.17 (WTG10)	04.08	05.40	07.07	07.33	09.08	10.02
	15.46	17.23	18.45	21.16	22.47	23.38	11	22.28 (WTG10)	22.39	20.59	19.12	16.30	15.01	14.33
26	09.13	07.37	06.02	05.15	03.42	03.04		22.18 (WTG10)	04.11	05.43	07.10	07.36	09.11	10.02
	15.49	17.26	18.48	21.19	22.50	23.37	10	22.28 (WTG10)	22.36	20.55	19.08	16.27	14.59	14.34
27	09.10	07.34	05.58	05.12	03.40	03.05		22.18 (WTG10)	04.14	05.46	07.12	07.39	09.14	10.02
	15.52	17.29	18.51	21.22	22.53	23.37	10	22.28 (WTG10)	22.33	20.52	19.05	16.24	14.57	14.35
28	09.07	07.31	05.55	05.09	03.37	03.06		22.19 (WTG10)	04.17	05.49	07.15	07.42	09.17	10.02
	15.56	17.32	18.54	21.25	22.56	23.36	8	22.27 (WTG10)	22.30	20.49	19.01	16.21	14.54	14.36
29	09.05		06.51	05.05	03.35	03.07		22.20 (WTG10)	04.20	05.51	07.18	07.45	09.19	10.02
	15.59		19.57	21.28	22.58	23.35	7	22.27 (WTG10)	22.27	20.45	18.58	16.18	14.52	14.38
30	09.02		06.48	05.02	03.32	03.08		22.21 (WTG10)	04.23	05.54	07.21	07.48	09.22	10.02
	16.02		20.00	21.31	23.01	23.34	5	22.26 (WTG10)	22.24	20.42	18.55	16.14	14.50	14.39
31	08.59		06.44		03.30				04.26	05.57		07.51		10.01
	16.05		20.02		23.04				22.21	20.38		16.11		14.41
Potential sun hours	179	241	363	448	562	610			598	504	392	307	204	147
Total, worst case							183							
Sun reduction							0,45							
Oper. time red.							0,90							
Wind dir. red.							0,65							
Total reduction							0,26							
Total, real							48							

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:
31.1.2024 11.18/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE2_RD200x18xHH200+Hallakallio_No_Forest Shadow receptor: F - F - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.00	08.56	07.27	06.41	04.59	03.28	03.10	04.29	06.00	07.24	07.54	09.25
	14.43	16.08	17.36	20.05	21.34	23.06	23.33	22.18	20.35	18.51	16.08	14.49
2	09.59	08.53	07.24	06.38	04.56	03.25	03.11	04.32	06.03	07.26	07.58	09.28
	14.45	16.12	17.39	20.08	21.37	23.09	23.32	22.15	20.32	18.48	16.05	14.47
3	09.58	08.50	07.21	06.34	04.52	03.23	03.13	04.35	06.06	07.29	08.01	09.30
	14.47	16.15	17.42	20.11	21.40	23.11	23.30	22.12	20.28	18.44	16.02	14.45
4	09.57	08.47	07.17	06.31	04.49	03.21	03.15	04.38	06.09	07.32	08.04	09.33
	14.49	16.18	17.44	20.14	21.43	23.14	23.29	22.09	20.25	18.41	15.59	14.43
5	09.56	08.44	07.14	06.27	04.46	03.19	03.16	04.41	06.11	07.35	08.07	09.35
	14.51	16.21	17.47	20.17	21.47	23.16	23.27	22.06	20.21	18.38	15.56	14.42
6	09.55	08.41	07.11	06.24	04.43	03.17	03.18	04.44	06.14	07.38	08.10	09.37
	14.53	16.24	17.50	20.20	21.50	23.18	23.26	22.02	20.18	18.34	15.53	14.40
7	09.54	08.38	07.07	06.20	04.39	03.15	03.20	04.47	06.17	07.41	08.13	09.40
	14.55	16.28	17.53	20.23	21.53	23.20	23.24	21.59	20.14	18.31	15.50	14.39
8	09.52	08.35	07.04	06.17	04.36	03.13	03.23	04.50	06.20	07.43	08.16	09.42
	14.58	16.31	17.56	20.26	21.56	23.22	23.22	21.56	20.11	18.27	15.47	14.37
9	09.50	08.32	07.00	06.14	04.33	03.12	03.25	04.53	06.23	07.46	08.19	09.44
	15.00	16.34	17.59	20.29	21.59	23.24	23.20	21.53	20.07	18.24	15.44	14.36
10	09.49	08.29	06.57	06.10	04.30	03.10	03.27	04.56	06.25	07.49	08.22	09.46
	15.03	16.37	18.02	20.32	22.02	23.26	23.18	21.49	20.04	18.21	15.41	14.35
11	09.47	08.26	06.54	06.07	04.27	03.09	03.30	04.59	06.28	07.52	08.25	09.48
	15.05	16.40	18.05	20.34	22.05	23.28	23.16	21.46	20.00	18.17	15.38	14.34
12	09.45	08.23	06.50	06.03	04.23	03.08	03.32	05.02	06.31	07.55	08.29	09.50
	15.08	16.43	18.08	20.37	22.08	23.29	23.14	21.43	19.57	18.14	15.35	14.33
13	09.43	08.20	06.47	06.00	04.20	03.06	03.34	05.05	06.34	07.58	08.32	09.51
	15.11	16.47	18.11	20.40	22.11	23.31	23.11	21.39	19.53	18.10	15.32	14.33
14	09.41	08.17	06.43	05.56	04.17	03.05	03.37	05.08	06.37	08.01	08.35	09.53
	15.13	16.50	18.14	20.43	22.14	23.32	23.09	21.36	19.50	18.07	15.30	14.32
15	09.39	08.13	06.40	05.53	04.14	03.04	03.40	05.11	06.39	08.04	08.38	09.54
	15.16	16.53	18.17	20.46	22.17	23.34	23.07	21.33	19.47	18.04	15.27	14.31
16	09.37	08.10	06.36	05.49	04.11	03.04	03.42	05.14	06.42	08.06	08.41	09.56
	15.19	16.56	18.20	20.49	22.20	23.35	23.04	21.29	19.43	18.00	15.24	14.31
17	09.35	08.07	06.33	05.46	04.08	03.03	03.45	05.17	06.45	08.09	08.44	09.57
	15.22	16.59	18.22	20.52	22.23	23.36	23.01	21.26	19.40	17.57	15.21	14.31
18	09.33	08.04	06.30	05.43	04.05	03.02	03.48	05.20	06.48	08.12	08.47	09.58
	15.25	17.02	18.25	20.55	22.27	23.36	22.59	21.23	19.36	17.54	15.19	14.31
19	09.30	08.00	06.26	05.39	04.02	03.02	03.51	05.23	06.50	08.15	08.50	09.59
	15.28	17.05	18.28	20.58	22.30	23.37	22.56	21.19	19.33	17.50	15.16	14.31
20	09.28	07.57	06.23	05.36	03.59	03.02	03.53	05.26	06.53	08.18	08.53	10.00
	15.31	17.08	18.31	21.01	22.33	23.38	22.53	21.16	19.29	17.47	15.13	14.31
21	09.26	07.54	06.19	05.32	03.56	03.02	03.56	05.28	06.56	08.21	08.56	10.01
	15.34	17.11	18.34	21.04	22.36	23.38	22.51	21.13	19.26	17.44	15.11	14.31
22	09.23	07.51	06.16	05.29	03.53	03.02	03.59	05.31	06.59	08.24	08.59	10.01
	15.37	17.14	18.37	21.07	22.38	23.38	22.48	21.09	19.22	17.40	15.08	14.31
23	09.21	07.47	06.12	05.26	03.51	03.02	04.02	05.34	07.01	08.27	09.02	10.02
	15.40	17.17	18.40	21.10	22.41	23.38	22.45	21.06	19.19	17.37	15.06	14.32
24	09.18	07.44	06.09	05.22	03.48	03.03	04.05	05.37	07.04	08.30	09.05	10.02
	15.43	17.20	18.43	21.13	22.44	23.38	22.42	21.02	19.15	17.34	15.04	14.33
25	09.16	07.41	06.05	05.19	03.45	03.03	04.08	05.40	07.07	07.33	09.08	10.02
	15.46	17.24	18.45	21.16	22.47	23.38	22.39	20.59	19.12	16.31	15.01	14.33
26	09.13	07.37	06.02	05.16	03.42	03.04	04.11	05.43	07.10	07.36	09.11	10.03
	15.49	17.27	18.48	21.19	22.50	23.37	22.36	20.56	19.08	16.27	14.59	14.34
27	09.10	07.34	05.58	05.12	03.40	03.05	04.14	05.46	07.13	07.39	09.14	10.03
	15.53	17.30	18.51	21.22	22.53	23.37	22.33	20.52	19.05	16.24	14.57	14.35
28	09.07	07.31	05.55	05.09	03.37	03.06	04.17	05.49	07.15	07.42	09.17	10.02
	15.56	17.33	18.54	21.25	22.56	23.36	22.30	20.49	19.02	16.21	14.55	14.37
29	09.05		06.52	05.06	03.35	03.07	04.20	05.52	07.18	07.45	09.20	10.02
	15.59		19.57	21.28	22.58	23.35	22.27	20.45	18.58	16.18	14.53	14.38
30	09.02		06.48	05.02	03.32	03.08	04.23	05.54	07.21	07.48	09.22	10.02
	16.02		20.00	21.31	23.01	23.34	22.24	20.42	18.55	16.15	14.51	14.39
31	08.59		06.45		03.30		04.26	05.57		07.51		10.01
	16.05		20.03		23.04		22.21	20.38		16.11		14.41
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
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:
31.1.2024 11.18/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE2_RD200x18xHH200+Hallakallio_No_Forest Shadow receptor: G - G - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.00	08.56	07.28	06.41	04.59	03.28	03.10	04.29	06.00	07.24	07.55	09.25
	14.43	16.08	17.36	20.06	21.34	23.06	23.33	22.18	20.35	18.51	16.08	14.49
2	09.59	08.53	07.24	06.38	04.56	03.25	03.11	04.32	06.03	07.27	07.58	09.28
	14.45	16.12	17.39	20.08	21.37	23.09	23.32	22.15	20.32	18.48	16.05	14.47
3	09.59	08.50	07.21	06.34	04.52	03.23	03.13	04.35	06.06	07.29	08.01	09.30
	14.47	16.15	17.42	20.11	21.41	23.11	23.31	22.12	20.28	18.45	16.02	14.45
4	09.57	08.47	07.17	06.31	04.49	03.21	03.15	04.38	06.09	07.32	08.04	09.33
	14.49	16.18	17.45	20.14	21.44	23.14	23.29	22.09	20.25	18.41	15.59	14.43
5	09.56	08.45	07.14	06.27	04.46	03.19	03.17	04.41	06.12	07.35	08.07	09.35
	14.51	16.21	17.48	20.17	21.47	23.16	23.28	22.06	20.21	18.38	15.56	14.42
6	09.55	08.42	07.11	06.24	04.43	03.17	03.19	04.44	06.14	07.38	08.10	09.37
	14.53	16.24	17.51	20.20	21.50	23.18	23.26	22.02	20.18	18.34	15.53	14.40
7	09.54	08.38	07.07	06.21	04.39	03.15	03.21	04.47	06.17	07.41	08.13	09.40
	14.56	16.28	17.53	20.23	21.53	23.20	23.24	21.59	20.14	18.31	15.50	14.39
8	09.52	08.35	07.04	06.17	04.36	03.14	03.23	04.50	06.20	07.44	08.16	09.42
	14.58	16.31	17.56	20.26	21.56	23.22	23.22	21.56	20.11	18.27	15.47	14.38
9	09.51	08.32	07.00	06.14	04.33	03.12	03.25	04.53	06.23	07.46	08.19	09.44
	15.00	16.34	17.59	20.29	21.59	23.24	23.20	21.53	20.07	18.24	15.44	14.36
10	09.49	08.29	06.57	06.10	04.30	03.10	03.27	04.56	06.26	07.49	08.22	09.46
	15.03	16.37	18.02	20.32	22.02	23.26	23.18	21.49	20.04	18.21	15.41	14.35
11	09.47	08.26	06.54	06.07	04.27	03.09	03.30	04.59	06.28	07.52	08.26	09.48
	15.05	16.40	18.05	20.35	22.05	23.28	23.16	21.46	20.01	18.17	15.38	14.34
12	09.45	08.23	06.50	06.03	04.24	03.08	03.32	05.02	06.31	07.55	08.29	09.50
	15.08	16.43	18.08	20.37	22.08	23.30	23.14	21.43	19.57	18.14	15.35	14.33
13	09.43	08.20	06.47	06.00	04.20	03.06	03.35	05.05	06.34	07.58	08.32	09.51
	15.11	16.47	18.11	20.40	22.11	23.31	23.11	21.40	19.54	18.11	15.32	14.33
14	09.42	08.17	06.43	05.56	04.17	03.05	03.37	05.08	06.37	08.01	08.35	09.53
	15.14	16.50	18.14	20.43	22.14	23.32	23.09	21.36	19.50	18.07	15.30	14.32
15	09.39	08.13	06.40	05.53	04.14	03.04	03.40	05.11	06.39	08.04	08.38	09.55
	15.16	16.53	18.17	20.46	22.17	23.34	23.07	21.33	19.47	18.04	15.27	14.31
16	09.37	08.10	06.37	05.50	04.11	03.04	03.42	05.14	06.42	08.07	08.41	09.56
	15.19	16.56	18.20	20.49	22.21	23.35	23.04	21.30	19.43	18.00	15.24	14.31
17	09.35	08.07	06.33	05.46	04.08	03.03	03.45	05.17	06.45	08.09	08.44	09.57
	15.22	16.59	18.23	20.52	22.24	23.36	23.02	21.26	19.40	17.57	15.21	14.31
18	09.33	08.04	06.30	05.43	04.05	03.03	03.48	05.20	06.48	08.12	08.47	09.58
	15.25	17.02	18.25	20.55	22.27	23.36	22.59	21.23	19.36	17.54	15.19	14.31
19	09.31	08.01	06.26	05.39	04.02	03.02	03.51	05.23	06.50	08.15	08.50	09.59
	15.28	17.05	18.28	20.58	22.30	23.37	22.56	21.19	19.33	17.50	15.16	14.31
20	09.28	07.57	06.23	05.36	03.59	03.02	03.54	05.26	06.53	08.18	08.53	10.00
	15.31	17.08	18.31	21.01	22.33	23.38	22.54	21.16	19.29	17.47	15.14	14.31
21	09.26	07.54	06.19	05.33	03.56	03.02	03.56	05.29	06.56	08.21	08.56	10.01
	15.34	17.11	18.34	21.04	22.36	23.38	22.51	21.13	19.26	17.44	15.11	14.31
22	09.23	07.51	06.16	05.29	03.54	03.02	03.59	05.32	06.59	08.24	08.59	10.02
	15.37	17.15	18.37	21.07	22.39	23.38	22.48	21.09	19.22	17.41	15.08	14.32
23	09.21	07.48	06.12	05.26	03.51	03.02	04.02	05.34	07.02	08.27	09.02	10.02
	15.40	17.18	18.40	21.10	22.42	23.38	22.45	21.06	19.19	17.37	15.06	14.32
24	09.18	07.44	06.09	05.22	03.48	03.03	04.05	05.37	07.04	08.30	09.05	10.02
	15.43	17.21	18.43	21.13	22.44	23.38	22.42	21.03	19.15	17.34	15.04	14.33
25	09.16	07.41	06.05	05.19	03.45	03.03	04.08	05.40	07.07	07.33	09.08	10.03
	15.46	17.24	18.46	21.16	22.47	23.38	22.39	20.59	19.12	16.31	15.01	14.34
26	09.13	07.38	06.02	05.16	03.43	03.04	04.11	05.43	07.10	07.36	09.11	10.03
	15.49	17.27	18.48	21.19	22.50	23.37	22.37	20.56	19.09	16.28	14.59	14.35
27	09.10	07.34	05.59	05.12	03.40	03.05	04.14	05.46	07.13	07.39	09.14	10.03
	15.53	17.30	18.51	21.22	22.53	23.37	22.34	20.52	19.05	16.24	14.57	14.36
28	09.08	07.31	05.55	05.09	03.37	03.06	04.17	05.49	07.15	07.42	09.17	10.02
	15.56	17.33	18.54	21.25	22.56	23.36	22.31	20.49	19.02	16.21	14.55	14.37
29	09.05		06.52	05.06	03.35	03.07	04.20	05.52	07.18	07.45	09.20	10.02
	15.59		19.57	21.28	22.59	23.35	22.28	20.45	18.58	16.18	14.53	14.38
30	09.02		06.48	05.02	03.32	03.08	04.23	05.55	07.21	07.48	09.22	10.02
	16.02		20.00	21.31	23.01	23.34	22.24	20.42	18.55	16.15	14.51	14.40
31	08.59		06.45		03.30		04.26	05.57		07.51		10.01
	16.05		20.03		23.04		22.21	20.39		16.12		14.41
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
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:
31.1.2024 11.18/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE2_RD200x18xHH200+Hallakallio_No_Forest Shadow receptor: H - H - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.00	08.56	07.28	06.41	04.59	03.28	03.10	04.29	06.00	07.24	07.55	09.25
	14.43	16.09	17.36	20.06	21.34	23.06	23.33	22.18	20.35	18.51	16.08	14.49
2	10.00	08.53	07.24	06.38	04.56	03.25	03.11	04.32	06.03	07.27	07.58	09.28
	14.45	16.12	17.39	20.09	21.37	23.09	23.32	22.15	20.32	18.48	16.05	14.47
3	09.59	08.50	07.21	06.34	04.52	03.23	03.13	04.35	06.06	07.29	08.01	09.30
	14.47	16.15	17.42	20.11	21.41	23.11	23.31	22.12	20.28	18.45	16.02	14.45
4	09.58	08.48	07.17	06.31	04.49	03.21	03.15	04.38	06.09	07.32	08.04	09.33
	14.49	16.18	17.45	20.14	21.44	23.14	23.29	22.09	20.25	18.41	15.59	14.43
5	09.56	08.45	07.14	06.27	04.46	03.19	03.17	04.41	06.12	07.35	08.07	09.35
	14.51	16.21	17.48	20.17	21.47	23.16	23.28	22.06	20.21	18.38	15.56	14.42
6	09.55	08.42	07.11	06.24	04.43	03.17	03.19	04.44	06.14	07.38	08.10	09.38
	14.53	16.24	17.51	20.20	21.50	23.18	23.26	22.02	20.18	18.34	15.53	14.40
7	09.54	08.39	07.07	06.21	04.39	03.15	03.21	04.47	06.17	07.41	08.13	09.40
	14.56	16.28	17.54	20.23	21.53	23.20	23.24	21.59	20.14	18.31	15.50	14.39
8	09.52	08.35	07.04	06.17	04.36	03.14	03.23	04.50	06.20	07.44	08.16	09.42
	14.58	16.31	17.56	20.26	21.56	23.23	23.22	21.56	20.11	18.27	15.47	14.38
9	09.51	08.32	07.01	06.14	04.33	03.12	03.25	04.53	06.23	07.46	08.19	09.44
	15.00	16.34	17.59	20.29	21.59	23.24	23.20	21.53	20.08	18.24	15.44	14.36
10	09.49	08.29	06.57	06.10	04.30	03.10	03.27	04.56	06.26	07.49	08.23	09.46
	15.03	16.37	18.02	20.32	22.02	23.26	23.18	21.49	20.04	18.21	15.41	14.35
11	09.47	08.26	06.54	06.07	04.27	03.09	03.30	04.59	06.28	07.52	08.26	09.48
	15.06	16.40	18.05	20.35	22.05	23.28	23.16	21.46	20.01	18.17	15.38	14.34
12	09.45	08.23	06.50	06.03	04.24	03.08	03.32	05.02	06.31	07.55	08.29	09.50
	15.08	16.44	18.08	20.38	22.08	23.30	23.14	21.43	19.57	18.14	15.35	14.33
13	09.44	08.20	06.47	06.00	04.20	03.07	03.35	05.05	06.34	07.58	08.32	09.52
	15.11	16.47	18.11	20.40	22.11	23.31	23.11	21.40	19.54	18.11	15.32	14.33
14	09.42	08.17	06.43	05.56	04.17	03.05	03.37	05.08	06.37	08.01	08.35	09.53
	15.14	16.50	18.14	20.43	22.14	23.32	23.09	21.36	19.50	18.07	15.30	14.32
15	09.39	08.14	06.40	05.53	04.14	03.05	03.40	05.11	06.39	08.04	08.38	09.55
	15.16	16.53	18.17	20.46	22.18	23.34	23.07	21.33	19.47	18.04	15.27	14.32
16	09.37	08.10	06.37	05.50	04.11	03.04	03.42	05.14	06.42	08.07	08.41	09.56
	15.19	16.56	18.20	20.49	22.21	23.35	23.04	21.30	19.43	18.00	15.24	14.31
17	09.35	08.07	06.33	05.46	04.08	03.03	03.45	05.17	06.45	08.10	08.44	09.57
	15.22	16.59	18.23	20.52	22.24	23.36	23.02	21.26	19.40	17.57	15.21	14.31
18	09.33	08.04	06.30	05.43	04.05	03.03	03.48	05.20	06.48	08.12	08.47	09.58
	15.25	17.02	18.25	20.55	22.27	23.37	22.59	21.23	19.36	17.54	15.19	14.31
19	09.31	08.01	06.26	05.39	04.02	03.02	03.51	05.23	06.51	08.15	08.50	09.59
	15.28	17.05	18.28	20.58	22.30	23.37	22.56	21.20	19.33	17.50	15.16	14.31
20	09.28	07.57	06.23	05.36	03.59	03.02	03.54	05.26	06.53	08.18	08.53	10.00
	15.31	17.08	18.31	21.01	22.33	23.38	22.54	21.16	19.29	17.47	15.14	14.31
21	09.26	07.54	06.19	05.33	03.56	03.02	03.56	05.29	06.56	08.21	08.56	10.01
	15.34	17.12	18.34	21.04	22.36	23.38	22.51	21.13	19.26	17.44	15.11	14.31
22	09.23	07.51	06.16	05.29	03.54	03.02	03.59	05.32	06.59	08.24	08.59	10.02
	15.37	17.15	18.37	21.07	22.39	23.38	22.48	21.09	19.22	17.41	15.09	14.32
23	09.21	07.48	06.12	05.26	03.51	03.02	04.02	05.34	07.02	08.27	09.02	10.02
	15.40	17.18	18.40	21.10	22.42	23.38	22.45	21.06	19.19	17.37	15.06	14.32
24	09.18	07.44	06.09	05.22	03.48	03.03	04.05	05.37	07.04	08.30	09.05	10.02
	15.43	17.21	18.43	21.13	22.44	23.38	22.42	21.03	19.16	17.34	15.04	14.33
25	09.16	07.41	06.06	05.19	03.45	03.03	04.08	05.40	07.07	07.33	09.08	10.03
	15.46	17.24	18.46	21.16	22.47	23.38	22.39	20.59	19.12	16.31	15.01	14.34
26	09.13	07.38	06.02	05.16	03.43	03.04	04.11	05.43	07.10	07.36	09.11	10.03
	15.50	17.27	18.48	21.19	22.50	23.37	22.37	20.56	19.09	16.28	14.59	14.35
27	09.10	07.34	05.59	05.12	03.40	03.05	04.14	05.46	07.13	07.39	09.14	10.03
	15.53	17.30	18.51	21.22	22.53	23.37	22.34	20.52	19.05	16.24	14.57	14.36
28	09.08	07.31	05.55	05.09	03.37	03.06	04.17	05.49	07.15	07.42	09.17	10.02
	15.56	17.33	18.54	21.25	22.56	23.36	22.31	20.49	19.02	16.21	14.55	14.37
29	09.05		06.52	05.06	03.35	03.07	04.20	05.52	07.18	07.45	09.20	10.02
	15.59		19.57	21.28	22.59	23.35	22.28	20.45	18.58	16.18	14.53	14.38
30	09.02		06.48	05.02	03.32	03.08	04.23	05.55	07.21	07.48	09.22	10.02
	16.02		20.00	21.31	23.01	23.34	22.24	20.42	18.55	16.15	14.51	14.40
31	08.59		06.45		03.30		04.26	05.57		07.52		10.01
	16.05		20.03		23.04		22.21	20.39		16.12		14.41
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
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:
31.1.2024 11.18/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE2_RD200x18xHH200+Hallakallio_No_Forest Shadow receptor: I - I - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.00	08.56	07.28	06.42	04.59	03.28	03.10	04.29	06.01	07.24	07.55	09.25
	14.44	16.09	17.36	20.06	21.35	23.06	23.33	22.18	20.35	18.52	16.09	14.49
2	09.59	08.54	07.24	06.38	04.56	03.26	03.12	04.32	06.03	07.27	07.58	09.28
	14.46	16.12	17.39	20.09	21.38	23.09	23.32	22.15	20.32	18.48	16.06	14.47
3	09.59	08.51	07.21	06.35	04.53	03.24	03.13	04.35	06.06	07.30	08.01	09.30
	14.47	16.15	17.42	20.12	21.41	23.11	23.31	22.12	20.28	18.45	16.03	14.46
4	09.57	08.48	07.18	06.31	04.50	03.22	03.15	04.38	06.09	07.32	08.04	09.33
	14.49	16.18	17.45	20.14	21.44	23.14	23.29	22.09	20.25	18.41	15.59	14.44
5	09.56	08.45	07.14	06.28	04.46	03.20	03.17	04.41	06.12	07.35	08.07	09.35
	14.52	16.22	17.48	20.17	21.47	23.16	23.28	22.06	20.22	18.38	15.56	14.42
6	09.55	08.42	07.11	06.24	04.43	03.18	03.19	04.44	06.15	07.38	08.10	09.38
	14.54	16.25	17.51	20.20	21.50	23.18	23.26	22.03	20.18	18.35	15.53	14.41
7	09.54	08.39	07.08	06.21	04.40	03.16	03.21	04.47	06.17	07.41	08.13	09.40
	14.56	16.28	17.54	20.23	21.53	23.20	23.24	21.59	20.15	18.31	15.50	14.39
8	09.52	08.36	07.04	06.17	04.37	03.14	03.23	04.50	06.20	07.44	08.16	09.42
	14.58	16.31	17.57	20.26	21.56	23.22	23.22	21.56	20.11	18.28	15.47	14.38
9	09.51	08.33	07.01	06.14	04.33	03.12	03.25	04.53	06.23	07.47	08.20	09.44
	15.01	16.34	18.00	20.29	21.59	23.24	23.20	21.53	20.08	18.24	15.44	14.37
10	09.49	08.29	06.57	06.10	04.30	03.11	03.28	04.56	06.26	07.49	08.23	09.46
	15.03	16.38	18.03	20.32	22.02	23.26	23.18	21.50	20.04	18.21	15.41	14.36
11	09.47	08.26	06.54	06.07	04.27	03.09	03.30	04.59	06.29	07.52	08.26	09.48
	15.06	16.41	18.05	20.35	22.05	23.28	23.16	21.46	20.01	18.18	15.39	14.35
12	09.45	08.23	06.50	06.04	04.24	03.08	03.33	05.02	06.31	07.55	08.29	09.50
	15.09	16.44	18.08	20.38	22.08	23.30	23.14	21.43	19.57	18.14	15.36	14.34
13	09.44	08.20	06.47	06.00	04.21	03.07	03.35	05.05	06.34	07.58	08.32	09.52
	15.11	16.47	18.11	20.41	22.11	23.31	23.11	21.40	19.54	18.11	15.33	14.33
14	09.42	08.17	06.44	05.57	04.18	03.06	03.38	05.08	06.37	08.01	08.35	09.53
	15.14	16.50	18.14	20.44	22.15	23.32	23.09	21.36	19.50	18.07	15.30	14.32
15	09.40	08.14	06.40	05.53	04.15	03.05	03.40	05.11	06.40	08.04	08.38	09.55
	15.17	16.53	18.17	20.46	22.18	23.34	23.07	21.33	19.47	18.04	15.27	14.32
16	09.37	08.10	06.37	05.50	04.12	03.04	03.43	05.14	06.42	08.07	08.41	09.56
	15.20	16.56	18.20	20.49	22.21	23.35	23.04	21.30	19.43	18.01	15.24	14.32
17	09.35	08.07	06.33	05.46	04.09	03.04	03.46	05.17	06.45	08.10	08.44	09.57
	15.23	16.59	18.23	20.52	22.24	23.36	23.02	21.26	19.40	17.57	15.22	14.31
18	09.33	08.04	06.30	05.43	04.06	03.03	03.48	05.20	06.48	08.13	08.47	09.58
	15.25	17.03	18.26	20.55	22.27	23.36	22.59	21.23	19.36	17.54	15.19	14.31
19	09.31	08.01	06.26	05.40	04.03	03.03	03.51	05.23	06.51	08.16	08.50	09.59
	15.28	17.06	18.29	20.58	22.30	23.37	22.56	21.20	19.33	17.51	15.16	14.31
20	09.28	07.58	06.23	05.36	04.00	03.03	03.54	05.26	06.53	08.18	08.53	10.00
	15.31	17.09	18.31	21.01	22.33	23.38	22.54	21.16	19.30	17.47	15.14	14.31
21	09.26	07.54	06.20	05.33	03.57	03.03	03.57	05.29	06.56	08.21	08.57	10.01
	15.34	17.12	18.34	21.04	22.36	23.38	22.51	21.13	19.26	17.44	15.11	14.32
22	09.23	07.51	06.16	05.29	03.54	03.03	04.00	05.32	06.59	08.24	09.00	10.02
	15.37	17.15	18.37	21.07	22.39	23.38	22.48	21.09	19.23	17.41	15.09	14.32
23	09.21	07.48	06.13	05.26	03.51	03.03	04.03	05.35	07.02	08.27	09.02	10.02
	15.41	17.18	18.40	21.10	22.42	23.38	22.45	21.06	19.19	17.38	15.06	14.33
24	09.18	07.44	06.09	05.23	03.48	03.03	04.06	05.38	07.05	08.30	09.05	10.02
	15.44	17.21	18.43	21.13	22.44	23.38	22.42	21.03	19.16	17.34	15.04	14.33
25	09.16	07.41	06.06	05.19	03.46	03.04	04.08	05.41	07.07	07.33	09.08	10.03
	15.47	17.24	18.46	21.16	22.47	23.38	22.40	20.59	19.12	16.31	15.02	14.34
26	09.13	07.38	06.02	05.16	03.43	03.05	04.11	05.43	07.10	07.36	09.11	10.03
	15.50	17.27	18.49	21.19	22.50	23.37	22.37	20.56	19.09	16.28	14.59	14.35
27	09.10	07.34	05.59	05.13	03.40	03.06	04.14	05.46	07.13	07.39	09.14	10.03
	15.53	17.30	18.51	21.22	22.53	23.37	22.34	20.52	19.05	16.25	14.57	14.36
28	09.08	07.31	05.55	05.09	03.38	03.07	04.17	05.49	07.16	07.42	09.17	10.02
	15.56	17.33	18.54	21.25	22.56	23.36	22.31	20.49	19.02	16.21	14.55	14.37
29	09.05		06.52	05.06	03.35	03.08	04.20	05.52	07.18	07.46	09.20	10.02
	15.59		19.57	21.28	22.59	23.35	22.28	20.46	18.59	16.18	14.53	14.39
30	09.02		06.48	05.03	03.33	03.09	04.23	05.55	07.21	07.49	09.22	10.02
	16.03		20.00	21.31	23.01	23.34	22.25	20.42	18.55	16.15	14.51	14.40
31	08.59		06.45		03.30		04.26	05.58		07.52		10.01
	16.06		20.03		23.04		22.21	20.39		16.12		14.42
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
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:
31.1.2024 11.18/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE2_RD200x18xHH200+Hallakallio_No_Forest Shadow receptor: J - J - Lomarakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.00	08.57	07.28	06.42	04.59	03.28	03.10	04.29	06.01	07.24	07.55	09.25
	14.44	16.09	17.36	20.06	21.35	23.07	23.33	22.18	20.35	18.52	16.09	14.49
2	10.00	08.54	07.24	06.38	04.56	03.26	03.12	04.32	06.03	07.27	07.58	09.28
	14.46	16.12	17.39	20.09	21.38	23.09	23.32	22.15	20.32	18.48	16.06	14.47
3	09.59	08.51	07.21	06.35	04.53	03.24	03.14	04.35	06.06	07.30	08.01	09.30
	14.47	16.15	17.42	20.12	21.41	23.12	23.31	22.12	20.29	18.45	16.03	14.46
4	09.58	08.48	07.18	06.31	04.50	03.22	03.15	04.38	06.09	07.33	08.04	09.33
	14.50	16.19	17.45	20.15	21.44	23.14	23.29	22.09	20.25	18.41	16.00	14.44
5	09.56	08.45	07.14	06.28	04.46	03.20	03.17	04.41	06.12	07.35	08.07	09.35
	14.52	16.22	17.48	20.17	21.47	23.16	23.28	22.06	20.22	18.38	15.56	14.42
6	09.55	08.42	07.11	06.24	04.43	03.18	03.19	04.44	06.15	07.38	08.10	09.38
	14.54	16.25	17.51	20.20	21.50	23.18	23.26	22.03	20.18	18.35	15.53	14.41
7	09.54	08.39	07.08	06.21	04.40	03.16	03.21	04.47	06.18	07.41	08.13	09.40
	14.56	16.28	17.54	20.23	21.53	23.21	23.24	21.59	20.15	18.31	15.50	14.39
8	09.52	08.36	07.04	06.17	04.37	03.14	03.23	04.50	06.20	07.44	08.16	09.42
	14.58	16.31	17.57	20.26	21.56	23.23	23.22	21.56	20.11	18.28	15.47	14.38
9	09.51	08.33	07.01	06.14	04.33	03.12	03.26	04.53	06.23	07.47	08.20	09.44
	15.01	16.34	18.00	20.29	21.59	23.25	23.20	21.53	20.08	18.24	15.44	14.37
10	09.49	08.30	06.57	06.11	04.30	03.11	03.28	04.56	06.26	07.50	08.23	09.46
	15.03	16.38	18.03	20.32	22.02	23.26	23.18	21.50	20.04	18.21	15.42	14.36
11	09.47	08.26	06.54	06.07	04.27	03.10	03.30	04.59	06.29	07.52	08.26	09.48
	15.06	16.41	18.06	20.35	22.05	23.28	23.16	21.46	20.01	18.18	15.39	14.35
12	09.46	08.23	06.51	06.04	04.24	03.08	03.33	05.02	06.31	07.55	08.29	09.50
	15.09	16.44	18.08	20.38	22.08	23.30	23.14	21.43	19.57	18.14	15.36	14.34
13	09.44	08.20	06.47	06.00	04.21	03.07	03.35	05.05	06.34	07.58	08.32	09.52
	15.11	16.47	18.11	20.41	22.12	23.31	23.12	21.40	19.54	18.11	15.33	14.33
14	09.42	08.17	06.44	05.57	04.18	03.06	03.38	05.08	06.37	08.01	08.35	09.53
	15.14	16.50	18.14	20.44	22.15	23.33	23.09	21.36	19.50	18.08	15.30	14.33
15	09.40	08.14	06.40	05.53	04.15	03.05	03.40	05.11	06.40	08.04	08.38	09.55
	15.17	16.53	18.17	20.47	22.18	23.34	23.07	21.33	19.47	18.04	15.27	14.32
16	09.38	08.11	06.37	05.50	04.12	03.04	03.43	05.14	06.43	08.07	08.41	09.56
	15.20	16.56	18.20	20.50	22.21	23.35	23.04	21.30	19.44	18.01	15.25	14.32
17	09.35	08.07	06.33	05.47	04.09	03.04	03.46	05.17	06.45	08.10	08.44	09.57
	15.23	17.00	18.23	20.52	22.24	23.36	23.02	21.26	19.40	17.57	15.22	14.31
18	09.33	08.04	06.30	05.43	04.06	03.03	03.48	05.20	06.48	08.13	08.48	09.58
	15.26	17.03	18.26	20.55	22.27	23.37	22.59	21.23	19.37	17.54	15.19	14.31
19	09.31	08.01	06.27	05.40	04.03	03.03	03.51	05.23	06.51	08.16	08.51	09.59
	15.28	17.06	18.29	20.58	22.30	23.37	22.56	21.20	19.33	17.51	15.17	14.31
20	09.28	07.58	06.23	05.36	04.00	03.03	03.54	05.26	06.54	08.19	08.54	10.00
	15.31	17.09	18.32	21.01	22.33	23.38	22.54	21.16	19.30	17.48	15.14	14.31
21	09.26	07.54	06.20	05.33	03.57	03.03	03.57	05.29	06.56	08.22	08.57	10.01
	15.34	17.12	18.34	21.04	22.36	23.38	22.51	21.13	19.26	17.44	15.11	14.32
22	09.24	07.51	06.16	05.30	03.54	03.03	04.00	05.32	06.59	08.25	09.00	10.02
	15.38	17.15	18.37	21.07	22.39	23.38	22.48	21.10	19.23	17.41	15.09	14.32
23	09.21	07.48	06.13	05.26	03.51	03.03	04.03	05.35	07.02	08.27	09.03	10.02
	15.41	17.18	18.40	21.10	22.42	23.38	22.45	21.06	19.19	17.38	15.07	14.33
24	09.18	07.44	06.09	05.23	03.49	03.03	04.06	05.38	07.05	08.30	09.06	10.03
	15.44	17.21	18.43	21.13	22.45	23.38	22.43	21.03	19.16	17.34	15.04	14.33
25	09.16	07.41	06.06	05.19	03.46	03.04	04.08	05.41	07.07	07.33	09.08	10.03
	15.47	17.24	18.46	21.16	22.48	23.38	22.40	20.59	19.12	16.31	15.02	14.34
26	09.13	07.38	06.02	05.16	03.43	03.05	04.11	05.44	07.10	07.37	09.11	10.03
	15.50	17.27	18.49	21.19	22.50	23.37	22.37	20.56	19.09	16.28	15.00	14.35
27	09.11	07.35	05.59	05.13	03.40	03.06	04.14	05.46	07.13	07.40	09.14	10.03
	15.53	17.30	18.52	21.22	22.53	23.37	22.34	20.53	19.05	16.25	14.57	14.36
28	09.08	07.31	05.55	05.09	03.38	03.07	04.17	05.49	07.16	07.43	09.17	10.03
	15.56	17.33	18.54	21.25	22.56	23.36	22.31	20.49	19.02	16.21	14.55	14.37
29	09.05		06.52	05.06	03.35	03.08	04.20	05.52	07.19	07.46	09.20	10.02
	15.59		19.57	21.29	22.59	23.35	22.28	20.46	18.59	16.18	14.53	14.39
30	09.02		06.49	05.03	03.33	03.09	04.23	05.55	07.21	07.49	09.23	10.02
	16.03		20.00	21.32	23.01	23.34	22.25	20.42	18.55	16.15	14.51	14.40
31	08.59		06.45		03.31		04.26	05.58		07.52		10.01
	16.06		20.03		23.04		22.22	20.39		16.12		14.42
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
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:
31.1.2024 11.18/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE2_RD200x18xHH200+Hallakallio_No_Forest Shadow receptor: K - K - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.01	08.57	07.28	06.42	04.59	03.28	03.10	04.29	06.01 06.40 (WTG01)	07.24	07.55	09.25
	14.44	16.09	17.36	20.06	21.35	23.07	23.34	22.19	20.36 3 06.43 (WTG01)	18.52	16.09	14.49
2	10.00	08.54	07.25	06.38	04.56	03.26	03.12	04.32	06.04	07.27	07.58	09.28
	14.46	16.12	17.39	20.09	21.38	23.09	23.32	22.16	20.32	18.48	16.06	14.47
3	09.59	08.51	07.21	06.35	04.53	03.24	03.13	04.35	06.06	07.30	08.01	09.31
	14.47	16.15	17.42	20.12	21.41	23.12	23.31	22.12	20.29	18.45	16.03	14.46
4	09.58	08.48	07.18	06.31	04.50	03.22	03.15	04.38	06.09	07.33	08.04	09.33
	14.49	16.19	17.45	20.15	21.44	23.14	23.30	22.09	20.25	18.41	16.00	14.44
5	09.57	08.45	07.14	06.28	04.46	03.20	03.17	04.41	06.12	07.35	08.07	09.36
	14.52	16.22	17.48	20.18	21.47	23.16	23.28	22.06	20.22	18.38	15.56	14.42
6	09.55	08.42	07.11	06.24	04.43	03.18	03.19	04.44	06.15	07.38	08.10	09.38
	14.54	16.25	17.51	20.20	21.50	23.19	23.26	22.03	20.18	18.35	15.53	14.41
7	09.54	08.39	07.08	06.21	04.40	03.16	03.21	04.47	06.18	07.41	08.14	09.40
	14.56	16.28	17.54	20.23	21.53	23.21	23.24	22.00	20.15	18.31	15.50	14.39
8	09.53	08.36	07.04	06.18	04.37	03.14	03.23	04.50	06.20	07.44	08.17	09.42
	14.58	16.31	17.57	20.26	21.56	23.23	23.23	21.56	20.11	18.28	15.47	14.38
9	09.51	08.33	07.01	06.14	04.33	03.12	03.25	04.53	06.23	07.47	08.20	09.44
	15.01	16.34	18.00	20.29	21.59	23.25	23.21	21.53	20.08	18.24	15.44	14.37
10	09.49	08.30	06.57	06.11	04.30	03.11	03.28	04.56	06.26	07.50	08.23	09.46
	15.03	16.38	18.03	20.32	22.03	23.27	23.18	21.50	20.04	18.21	15.42	14.36
11	09.48	08.27	06.54	06.07 06.41 (WTG01)	04.27	03.09	03.30	04.59	06.29	07.53	08.26	09.48
	15.06	16.41	18.06	20.35 3 06.44 (WTG01)	22.06	23.28	23.16	21.47	20.01	18.18	15.39	14.35
12	09.46	08.23	06.51	06.04 06.36 (WTG01)	04.24	03.08	03.33	05.02	06.32	07.55	08.29	09.50
	15.09	16.44	18.09	20.38 12 06.48 (WTG01)	22.09	23.30	23.14	21.43	19.57	18.14	15.36	14.34
13	09.44	08.20	06.47	06.00 06.34 (WTG01)	04.21	03.07	03.35	05.05	06.34	07.58	08.32	09.52
	15.11	16.47	18.11	20.41 16 06.50 (WTG01)	22.12	23.31	23.12	21.40	19.54	18.11	15.33	14.33
14	09.42	08.17	06.44	05.57 06.32 (WTG01)	04.18	03.06	03.38	05.08	06.37	08.01	08.35	09.53
	15.14	16.50	18.14	20.44 18 06.50 (WTG01)	22.15	23.33	23.09	21.37	19.51	18.08	15.30	14.32
15	09.40	08.14	06.40	05.53 06.31 (WTG01)	04.15	03.05	03.40	05.11	06.40	08.04	08.38	09.55
	15.17	16.53	18.17	20.47 20 06.51 (WTG01)	22.18	23.34	23.07	21.33	19.47	18.04	15.27	14.32
16	09.38	08.11	06.37	05.50 06.30 (WTG01)	04.12	03.04	03.43	05.14 06.41 (WTG01)	06.43	08.07	08.42	09.56
	15.20	16.56	18.20	20.50 22 06.52 (WTG01)	22.21	23.35	23.05	21.30 9 06.50 (WTG01)	19.44	18.01	15.25	14.32
17	09.36	08.07	06.33	05.47 06.30 (WTG01)	04.09	03.04	03.46	05.17 06.39 (WTG01)	06.45	08.10	08.45	09.58
	15.23	17.00	18.23	20.53 23 06.53 (WTG01)	22.24	23.36	23.02	21.27 14 06.53 (WTG01)	19.40	17.58	15.22	14.31
18	09.33	08.04	06.30	05.43 06.29 (WTG01)	04.06	03.03	03.48	05.20 06.37 (WTG01)	06.48	08.13	08.48	09.59
	15.25	17.03	18.26	20.56 23 06.52 (WTG01)	22.27	23.37	22.59	21.23 16 06.53 (WTG01)	19.37	17.54	15.19	14.31
19	09.31	08.01	06.27	05.40 06.28 (WTG01)	04.03	03.03	03.51	05.23 06.36 (WTG01)	06.51	08.16	08.51	10.00
	15.28	17.06	18.29	20.59 24 06.52 (WTG01)	22.30	23.37	22.57	21.20 19 06.55 (WTG01)	19.33	17.51	15.17	14.31
20	09.29	07.58	06.23	05.36 06.28 (WTG01)	04.00	03.03	03.54	05.26 06.34 (WTG01)	06.54	08.19	08.54	10.01
	15.31	17.09	18.32	21.02 24 06.52 (WTG01)	22.33	23.38	22.54	21.17 21 06.55 (WTG01)	19.30	17.48	15.14	14.31
21	09.26	07.54	06.20	05.33 06.29 (WTG01)	03.57	03.02	03.57	05.29 06.34 (WTG01)	06.56	08.22	08.57	10.01
	15.34	17.12	18.34	21.05 22 06.51 (WTG01)	22.36	23.38	22.51	21.13 21 06.55 (WTG01)	19.26	17.44	15.11	14.32
22	09.24	07.51	06.16	05.30 06.29 (WTG01)	03.54	03.03	04.00	05.32 06.33 (WTG01)	06.59	08.25	09.00	10.02
	15.38	17.15	18.37	21.08 22 06.51 (WTG01)	22.39	23.39	22.48	21.10 23 06.56 (WTG01)	19.23	17.41	15.09	14.32
23	09.21	07.48	06.13	05.26 06.29 (WTG01)	03.51	03.03	04.03	05.35 06.32 (WTG01)	07.02	08.28	09.03	10.02
	15.41	17.18	18.40	21.11 20 06.49 (WTG01)	22.42	23.39	22.46	21.06 23 06.55 (WTG01)	19.19	17.38	15.06	14.33
24	09.19	07.45	06.09	05.23 06.29 (WTG01)	03.48	03.03	04.06	05.38 06.32 (WTG01)	07.05	08.31	09.06	10.03
	15.44	17.21	18.43	21.14 19 06.48 (WTG01)	22.45	23.38	22.43	21.03 23 06.55 (WTG01)	19.16	17.34	15.04	14.33
25	09.16	07.41	06.06	05.19 06.30 (WTG01)	03.46	03.04	04.08	05.41 06.32 (WTG01)	07.07	07.34	09.09	10.03
	15.47	17.24	18.46	21.17 17 06.47 (WTG01)	22.48	23.38	22.40	21.00 23 06.55 (WTG01)	19.12	16.31	15.02	14.34
26	09.13	07.38	06.02	05.16 06.32 (WTG01)	03.43	03.05	04.11	05.44 06.32 (WTG01)	07.10	07.37	09.12	10.03
	15.50	17.27	18.49	21.20 13 06.45 (WTG01)	22.51	23.38	22.37	20.56 22 06.54 (WTG01)	19.09	16.28	15.00	14.35
27	09.11	07.35	05.59	05.13 06.34 (WTG01)	03.40	03.05	04.14	05.46 06.32 (WTG01)	07.13	07.40	09.14	10.03
	15.53	17.30	18.52	21.23 8 06.42 (WTG01)	22.53	23.37	22.34	20.53 22 06.54 (WTG01)	19.06	16.25	14.57	14.36
28	09.08	07.31	05.56	05.09	03.38	03.06	04.17	05.49 06.33 (WTG01)	07.16	07.43	09.17	10.03
	15.56	17.33	18.55	21.26	22.56	23.37	22.31	20.49 20 06.53 (WTG01)	19.02	16.22	14.55	14.37
29	09.05		06.52	05.06	03.35	03.08	04.20	05.52 06.33 (WTG01)	07.19	07.46	09.20	10.03
	15.59		19.57	21.29	22.59	23.36	22.28	20.46 18 06.51 (WTG01)	18.59	16.18	14.53	14.39
30	09.02		06.49	05.03	03.33	03.09	04.23	05.55 06.34 (WTG01)	07.21	07.49	09.23	10.02
	16.03		20.00	21.32	23.02	23.35	22.25	20.42 16 06.50 (WTG01)	18.55	16.15	14.51	14.40
31	09.00		06.45		03.30		04.26	05.58 06.36 (WTG01)		07.52		10.02
	16.06		20.03		23.04		22.22	20.39 12 06.48 (WTG01)		16.12		14.42
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
Total, worst case				306				302	3			
Sun reduction				0,44				0,42	0,36			
Oper. time red.				0,90				0,90	0,90			
Wind dir. red.				0,56				0,56	0,56			
Total reduction				0,22				0,21	0,18			
Total, real				68				63	1			

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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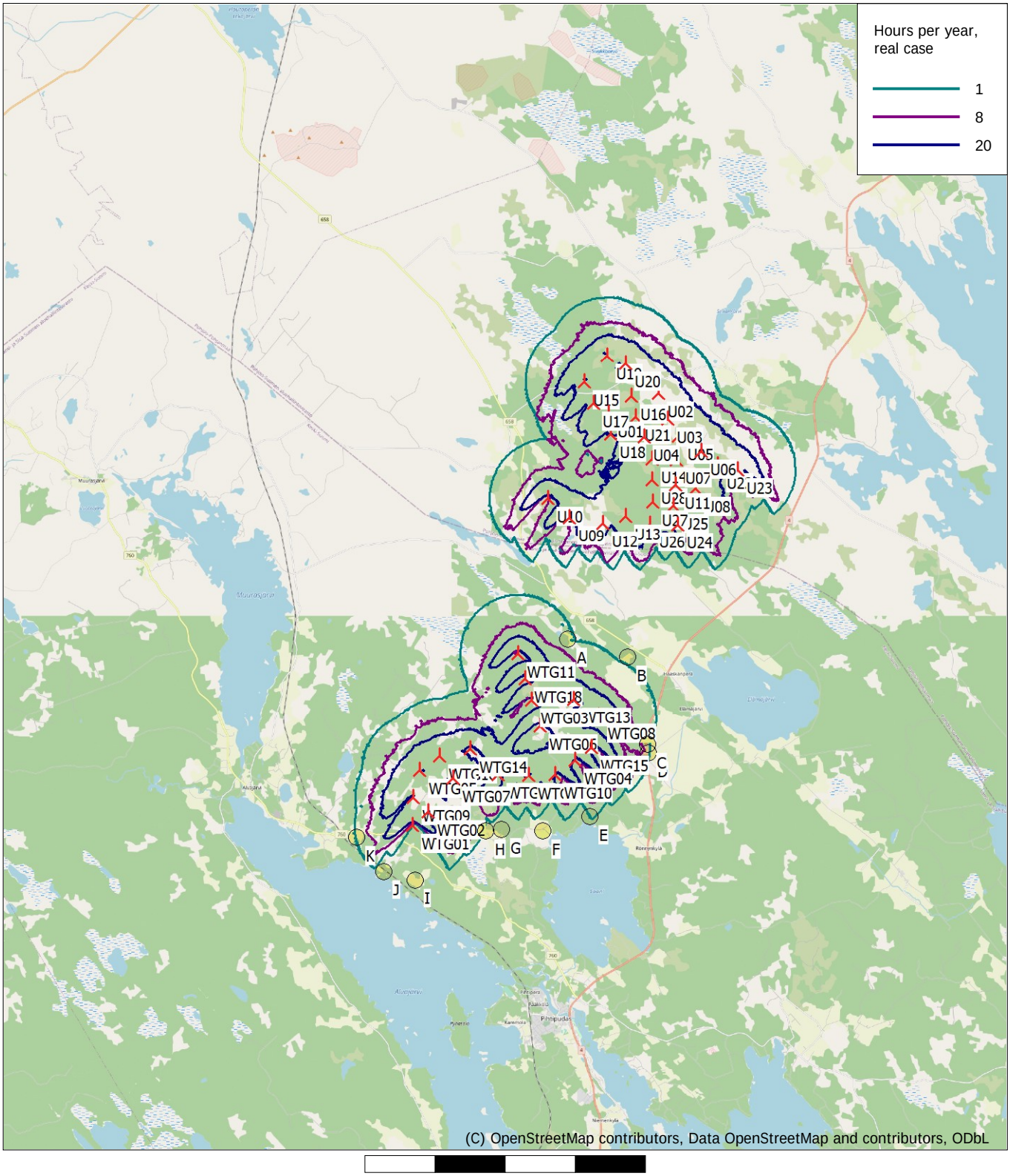
Henri Korhonen / henri.korhonen@fcg.fi
Calculated:
31.1.2024 11.18/3.6.355

SHADOW - Map

Calculation: Uusimo_VE2_RD200x18xHH200+Hallakallio_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: 427 770 North: 7 044 000

New WTG Shadow receptor

Flicker map level: Height Contours: CONTOURLINE_Pyhäntä_Pilpankangas_0.wpo (2)

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

Liite 18. Yhteisvaikutus varjostusmallinnuksen tulokset ”Real Case, No forest” – VE3

Project:

Pihtipudas_Uusimo_melu_ja_varjostus

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Calculated:
31.1.2024 11.42/3.6.355

SHADOW - Main Result

Calculation: Uusimo_VE3_RD200x10xHH200+Hallakallio_No_Forest

Assumptions for shadow calculations

Maximum distance for influence	2 089	m
Minimum sun height over horizon for influence	3	°
Day step for calculation	1	days
Time step for calculation	1	minutes

Sunshine probability S (Average daily sunshine hours) []

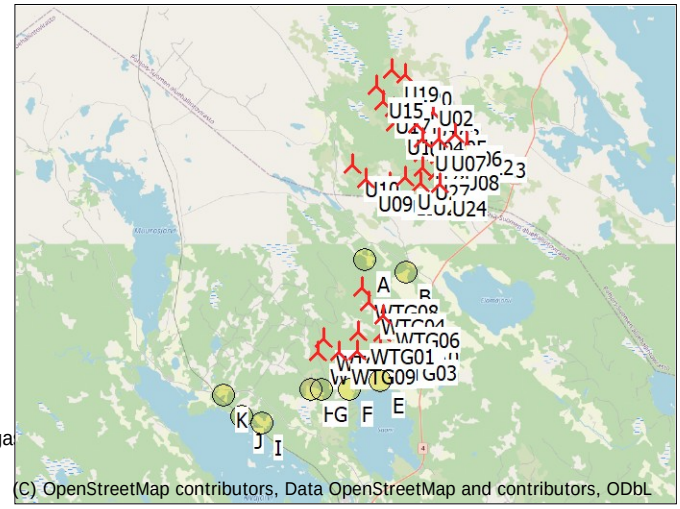
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

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_Pyhäntä_Pilpankanga
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]
U01	431 115	7 049 309	180,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U02	432 899	7 049 975	165,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U03	433 219	7 049 043	157,9	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U04	432 357	7 048 412	161,1	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U05	433 583	7 048 416	162,1	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U06	434 401	7 047 858	177,5	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U07	433 498	7 047 578	151,3	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U08	434 177	7 046 539	155,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U09	429 630	7 045 604	152,5	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U10	428 881	7 046 314	155,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U11	433 458	7 046 695	150,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U12	430 826	7 045 372	159,7	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U13	431 674	7 045 617	154,9	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U14	432 637	7 047 640	156,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U15	430 255	7 050 454	184,4	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U16	431 960	7 049 903	171,3	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U17	430 574	7 049 631	185,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U18	431 166	7 048 552	187,4	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U19	431 088	7 051 329	168,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U20	431 779	7 051 064	168,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U21	432 087	7 049 133	170,8	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U22	434 959	7 047 391	165,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U23	435 671	7 047 205	164,4	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U24	433 480	7 045 242	149,2	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U25	433 379	7 045 931	149,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U26	432 492	7 045 311	146,4	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U27	432 629	7 046 106	161,5	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
U28	432 609	7 046 872	165,0	Generic RD210 HH215 7...	Yes	Generic	RD210 HH215-7 200	7 200	210,0	215,0	2 089	10,5
WTG01	429 051	7 037 493	138,6	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG02	426 831	7 036 447	125,0	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG03	430 151	7 036 555	125,8	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG04	429 601	7 039 051	140,0	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG05	428 904	7 036 410	128,2	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG06	430 350	7 038 339	134,3	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG07	427 156	7 037 144	126,0	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG08	429 300	7 039 773	141,1	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG09	427 951	7 036 390	122,3	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5
WTG10	430 251	7 037 388	129,2	Generic RD200 HH200 7...	Yes	Generic	RD200 HH200-7 200	7 200	200,0	200,0	2 089	10,5

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Calculated:
31.1.2024 11.42/3.6.355

SHADOW - Main Result

Calculation: Uusimo_VE3_RD200x10xHH200+Hallakallio_No_Forest

Shadow receptor-Input

No.	Name	East	North	Z [m]	Width [m]	Height [m]	Elevation a.g.l. [m]	Slope of window [°]	Direction mode	Eye height (ZVI) a.g.l. [m]
A	A - Lomarakennus	429 470	7 041 260	145,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
B	B - Asuinrakennus	431 627	7 040 548	144,9	5,0	5,0	1,0	90,0	"Green house mode"	6,0
C	C - Asuinrakennus	432 261	7 037 387	122,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
D	D - Asuinrakennus	432 294	7 037 094	122,1	5,0	5,0	1,0	90,0	"Green house mode"	6,0
E	E - Lomarakennus	430 111	7 034 859	117,3	5,0	5,0	1,0	90,0	"Green house mode"	6,0
F	F - Asuinrakennus	428 445	7 034 384	122,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
G	G - Asuinrakennus	426 978	7 034 448	122,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0
H	H - Asuinrakennus	426 394	7 034 428	122,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
I	I - Asuinrakennus	423 788	7 032 711	125,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
J	J - Lomarakennus	422 689	7 033 070	114,2	5,0	5,0	1,0	90,0	"Green house mode"	6,0
K	K - Asuinrakennus	421 745	7 034 298	125,0	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	3:34
B	B - Asuinrakennus	0:00
C	C - Asuinrakennus	1:44
D	D - Asuinrakennus	1:52
E	E - Lomarakennus	0:58
F	F - Asuinrakennus	0:00
G	G - Asuinrakennus	0:00
H	H - Asuinrakennus	0:00
I	I - Asuinrakennus	0:00
J	J - Lomarakennus	0:00
K	K - Asuinrakennus	0:00

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

No.	Name	Expected [h/year]
U01	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (388)	0:00
U02	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (389)	0:00
U03	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (390)	0:00
U04	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (391)	0:00
U05	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (392)	0:00
U06	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (393)	0:00
U07	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (394)	0:00
U08	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (395)	0:00
U09	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (396)	0:00
U10	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (397)	0:00
U11	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (398)	0:00
U12	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (399)	0:00
U13	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (400)	0:00
U14	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (401)	0:00
U15	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (402)	0:00
U16	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (403)	0:00
U17	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (404)	0:00
U18	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (405)	0:00
U19	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (406)	0:00
U20	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (407)	0:00
U21	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (408)	0:00
U22	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (409)	0:00
U23	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (410)	0:00
U24	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (411)	0:00
U25	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (412)	0:00
U26	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (413)	0:00
U27	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (414)	0:00
U28	Generic RD210 HH215 7200 210.0 !O! hub: 215,0 m (TOT: 320,0 m) (415)	0:00
WTG01	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (455)	0:00

To be continued on next page...

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SHADOW - Main Result

Calculation: Uusimo_VE3_RD200x10xHH200+Hallakallio_No_Forest

...continued from previous page

No.	Name	Expected [h/year]
WTG02	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (456)	0:00
WTG03	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (457)	0:00
WTG04	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (458)	0:00
WTG05	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (459)	0:58
WTG06	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (460)	0:00
WTG07	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (461)	0:00
WTG08	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (462)	3:34
WTG09	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (463)	0:00
WTG10	Generic RD200 HH200 7200 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (464)	3:36

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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31.1.2024 11.42/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE3_RD200x10xHH200+Hallakallio_No_Forest Shadow receptor: A - A - Lomarakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January			February			March	April	May	June
1	10.01			08.57		12.38 (WTG08)	07.28	06.41	04.58	03.27
	14.42			16.08	28	13.06 (WTG08)	17.35	20.06	21.35	23.07
2	10.00		12.39 (WTG08)	08.54		12.40 (WTG08)	07.24	06.37	04.55	03.24
	14.44	6	12.45 (WTG08)	16.11	26	13.06 (WTG08)	17.38	20.08	21.38	23.10
3	09.59		12.38 (WTG08)	08.51		12.40 (WTG08)	07.21	06.34	04.52	03.22
	14.46	10	12.48 (WTG08)	16.14	25	13.05 (WTG08)	17.41	20.11	21.41	23.12
4	09.58		12.37 (WTG08)	08.48		12.41 (WTG08)	07.17	06.31	04.48	03.20
	14.48	12	12.49 (WTG08)	16.17	23	13.04 (WTG08)	17.44	20.14	21.44	23.15
5	09.57		12.37 (WTG08)	08.45		12.44 (WTG08)	07.14	06.27	04.45	03.18
	14.50	14	12.51 (WTG08)	16.21	19	13.03 (WTG08)	17.47	20.17	21.47	23.17
6	09.56		12.36 (WTG08)	08.42		12.46 (WTG08)	07.11	06.24	04.42	03.16
	14.52	16	12.52 (WTG08)	16.24	14	13.00 (WTG08)	17.50	20.20	21.50	23.19
7	09.54		12.36 (WTG08)	08.39		12.51 (WTG08)	07.07	06.20	04.39	03.14
	14.55	18	12.54 (WTG08)	16.27	6	12.57 (WTG08)	17.53	20.23	21.53	23.21
8	09.53		12.35 (WTG08)	08.36			07.04	06.17	04.35	03.12
	14.57	20	12.55 (WTG08)	16.30			17.56	20.26	21.56	23.23
9	09.51		12.34 (WTG08)	08.33			07.00	06.13	04.32	03.11
	14.59	22	12.56 (WTG08)	16.33			17.59	20.29	21.59	23.25
10	09.50		12.35 (WTG08)	08.29			06.57	06.10	04.29	03.09
	15.02	23	12.58 (WTG08)	16.37			18.02	20.32	22.02	23.27
11	09.48		12.34 (WTG08)	08.26			06.54	06.06	04.26	03.08
	15.05	24	12.58 (WTG08)	16.40			18.05	20.35	22.06	23.29
12	09.46		12.34 (WTG08)	08.23			06.50	06.03	04.23	03.06
	15.07	26	13.00 (WTG08)	16.43			18.08	20.38	22.09	23.31
13	09.44		12.34 (WTG08)	08.20			06.47	05.59	04.20	03.05
	15.10	26	13.00 (WTG08)	16.46			18.11	20.40	22.12	23.32
14	09.42		12.33 (WTG08)	08.17			06.43	05.56	04.17	03.04
	15.13	28	13.01 (WTG08)	16.49			18.14	20.43	22.15	23.33
15	09.40		12.34 (WTG08)	08.14			06.40	05.53	04.13	03.03
	15.15	28	13.02 (WTG08)	16.52			18.17	20.46	22.18	23.35
16	09.38		12.33 (WTG08)	08.10			06.36	05.49	04.10	03.02
	15.18	30	13.03 (WTG08)	16.56			18.19	20.49	22.21	23.36
17	09.36		12.33 (WTG08)	08.07			06.33	05.46	04.07	03.02
	15.21	30	13.03 (WTG08)	16.59			18.22	20.52	22.24	23.37
18	09.33		12.34 (WTG08)	08.04			06.29	05.42	04.04	03.01
	15.24	30	13.04 (WTG08)	17.02			18.25	20.55	22.27	23.38
19	09.31		12.33 (WTG08)	08.01			06.26	05.39	04.01	03.01
	15.27	32	13.05 (WTG08)	17.05			18.28	20.58	22.30	23.38
20	09.29		12.34 (WTG08)	07.57			06.23	05.35	03.58	03.01
	15.30	32	13.06 (WTG08)	17.08			18.31	21.01	22.33	23.39
21	09.26		12.34 (WTG08)	07.54			06.19	05.32	03.56	03.01
	15.33	32	13.06 (WTG08)	17.11			18.34	21.04	22.36	23.39
22	09.24		12.33 (WTG08)	07.51			06.16	05.29	03.53	03.01
	15.36	33	13.06 (WTG08)	17.14			18.37	21.07	22.39	23.39
23	09.21		12.34 (WTG08)	07.48			06.12	05.25	03.50	03.01
	15.39	33	13.07 (WTG08)	17.17			18.40	21.10	22.42	23.39
24	09.19		12.34 (WTG08)	07.44			06.09	05.22	03.47	03.01
	15.42	33	13.07 (WTG08)	17.20			18.42	21.13	22.45	23.39
25	09.16		12.34 (WTG08)	07.41			06.05	05.18	03.44	03.02
	15.46	33	13.07 (WTG08)	17.23			18.45	21.16	22.48	23.39
26	09.13		12.35 (WTG08)	07.38			06.02	05.15	03.42	03.03
	15.49	33	13.08 (WTG08)	17.26			18.48	21.19	22.51	23.38
27	09.11		12.35 (WTG08)	07.34			05.58	05.12	03.39	03.03
	15.52	32	13.07 (WTG08)	17.29			18.51	21.22	22.54	23.38
28	09.08		12.36 (WTG08)	07.31			05.55	05.08	03.36	03.04
	15.55	32	13.08 (WTG08)	17.32			18.54	21.25	22.56	23.37
29	09.05		12.36 (WTG08)				06.51	05.05	03.34	03.06
	15.58	32	13.08 (WTG08)				19.57	21.28	22.59	23.36
30	09.02		12.36 (WTG08)				06.48	05.02	03.31	03.07
	16.01	31	13.07 (WTG08)				20.00	21.32	23.02	23.35
31	08.59		12.38 (WTG08)				06.44		03.29	
	16.05	29	13.07 (WTG08)				20.03		23.05	
Potential sun hours	178			241			363	449	563	611
Total, worst case		780			141					
Sun reduction		0,17			0,33					
Oper. time red.		0,90			0,90					
Wind dir. red.		0,72			0,72					
Total reduction		0,11			0,21					
Total, real		87			30					

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: Uusimo_VE3_RD200x10xHH200+Hallakallio_No_Forest Shadow receptor: A - A - Lomarakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	July	August	September	October	November			December		
1	03.08	04.28	06.00	07.24	07.55			09.26		12.16 (WTG08)
	23.34	22.19	20.35	18.51	16.08			14.48	25	12.41 (WTG08)
2	03.10	04.31	06.03	07.26	07.58			09.28		12.17 (WTG08)
	23.33	22.16	20.32	18.48	16.05			14.46	23	12.40 (WTG08)
3	03.12	04.34	06.06	07.29	08.01			09.31		12.19 (WTG08)
	23.32	22.12	20.28	18.44	16.02			14.44	21	12.40 (WTG08)
4	03.13	04.37	06.08	07.32	08.04		12.19 (WTG08)	09.33		12.19 (WTG08)
	23.30	22.09	20.25	18.41	15.59	8	12.27 (WTG08)	14.42	20	12.39 (WTG08)
5	03.15	04.40	06.11	07.35	08.07		12.16 (WTG08)	09.36		12.20 (WTG08)
	23.28	22.06	20.21	18.37	15.55	15	12.31 (WTG08)	14.41	19	12.39 (WTG08)
6	03.17	04.43	06.14	07.38	08.10		12.13 (WTG08)	09.38		12.22 (WTG08)
	23.27	22.03	20.18	18.34	15.52	20	12.33 (WTG08)	14.39	17	12.39 (WTG08)
7	03.19	04.46	06.17	07.41	08.13		12.12 (WTG08)	09.40		12.23 (WTG08)
	23.25	22.00	20.14	18.31	15.49	22	12.34 (WTG08)	14.38	15	12.38 (WTG08)
8	03.21	04.49	06.20	07.43	08.16		12.11 (WTG08)	09.43		12.25 (WTG08)
	23.23	21.56	20.11	18.27	15.46	25	12.36 (WTG08)	14.37	13	12.38 (WTG08)
9	03.24	04.52	06.22	07.46	08.20		12.10 (WTG08)	09.45		12.27 (WTG08)
	23.21	21.53	20.07	18.24	15.43	27	12.37 (WTG08)	14.35	10	12.37 (WTG08)
10	03.26	04.55	06.25	07.49	08.23		12.09 (WTG08)	09.47		12.28 (WTG08)
	23.19	21.50	20.04	18.20	15.40	28	12.37 (WTG08)	14.34	7	12.35 (WTG08)
11	03.28	04.58	06.28	07.52	08.26		12.08 (WTG08)	09.49		
	23.17	21.46	20.00	18.17	15.38	30	12.38 (WTG08)	14.33		
12	03.31	05.01	06.31	07.55	08.29		12.08 (WTG08)	09.50		
	23.15	21.43	19.57	18.14	15.35	31	12.39 (WTG08)	14.32		
13	03.33	05.04	06.34	07.58	08.32		12.08 (WTG08)	09.52		
	23.12	21.40	19.54	18.10	15.32	31	12.39 (WTG08)	14.32		
14	03.36	05.07	06.36	08.01	08.35		12.08 (WTG08)	09.54		
	23.10	21.36	19.50	18.07	15.29	32	12.40 (WTG08)	14.31		
15	03.39	05.10	06.39	08.04	08.38		12.08 (WTG08)	09.55		
	23.07	21.33	19.47	18.03	15.26	32	12.40 (WTG08)	14.30		
16	03.41	05.13	06.42	08.07	08.41		12.08 (WTG08)	09.57		
	23.05	21.30	19.43	18.00	15.23	33	12.41 (WTG08)	14.30		
17	03.44	05.16	06.45	08.09	08.45		12.08 (WTG08)	09.58		
	23.02	21.26	19.40	17.57	15.21	33	12.41 (WTG08)	14.30		
18	03.47	05.19	06.47	08.12	08.48		12.08 (WTG08)	09.59		
	23.00	21.23	19.36	17.53	15.18	33	12.41 (WTG08)	14.30		
19	03.50	05.22	06.50	08.15	08.51		12.08 (WTG08)	10.00		
	22.57	21.20	19.33	17.50	15.15	33	12.41 (WTG08)	14.30		
20	03.53	05.25	06.53	08.18	08.54		12.08 (WTG08)	10.01		
	22.54	21.16	19.29	17.47	15.13	33	12.41 (WTG08)	14.30		
21	03.55	05.28	06.56	08.21	08.57		12.09 (WTG08)	10.02		
	22.51	21.13	19.26	17.43	15.10	32	12.41 (WTG08)	14.30		
22	03.58	05.31	06.59	08.24	09.00		12.10 (WTG08)	10.02		
	22.49	21.09	19.22	17.40	15.08	32	12.42 (WTG08)	14.30		
23	04.01	05.34	07.01	08.27	09.03		12.10 (WTG08)	10.03		
	22.46	21.06	19.19	17.37	15.05	32	12.42 (WTG08)	14.31		
24	04.04	05.37	07.04	08.30	09.06		12.11 (WTG08)	10.03		
	22.43	21.03	19.15	17.34	15.03	31	12.42 (WTG08)	14.32		
25	04.07	05.40	07.07	07.33	09.09		12.11 (WTG08)	10.03		
	22.40	20.59	19.12	16.30	15.01	30	12.41 (WTG08)	14.32		
26	04.10	05.43	07.10	07.36	09.12		12.12 (WTG08)	10.03		
	22.37	20.56	19.08	16.27	14.58	29	12.41 (WTG08)	14.33		
27	04.13	05.46	07.12	07.39	09.15		12.13 (WTG08)	10.03		
	22.34	20.52	19.05	16.24	14.56	29	12.42 (WTG08)	14.34		
28	04.16	05.48	07.15	07.42	09.17		12.14 (WTG08)	10.03		
	22.31	20.49	19.01	16.21	14.54	27	12.41 (WTG08)	14.36		
29	04.19	05.51	07.18	07.45	09.20		12.14 (WTG08)	10.03		
	22.28	20.45	18.58	16.17	14.52	27	12.41 (WTG08)	14.37		
30	04.22	05.54	07.21	07.49	09.23		12.16 (WTG08)	10.02		
	22.25	20.42	18.55	16.14	14.50	25	12.41 (WTG08)	14.38		
31	04.25	05.57		07.52				10.02		
	22.22	20.39		16.11				14.40		
Potential sun hours	599	504	392	307	203			146		
Total, worst case						760			170	
Sun reduction						0,17			0,12	
Oper. time red.						0,90			0,90	
Wind dir. red.						0,72			0,72	
Total reduction						0,11			0,08	
Total, real						84			13	

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:
31.1.2024 11.42/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE3_RD200x10xHH200+Hallakallio_No_Forest Shadow receptor: B - B - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.01	08.56	07.27	06.41	04.58	03.26	03.08	04.28	06.00	07.23	07.54	09.25
	14.42	16.08	17.35	20.05	21.34	23.07	23.34	22.18	20.35	18.51	16.08	14.48
2	10.00	08.53	07.24	06.37	04.55	03.24	03.10	04.31	06.03	07.26	07.58	09.28
	14.44	16.11	17.38	20.08	21.37	23.09	23.33	22.15	20.31	18.48	16.05	14.46
3	09.59	08.50	07.21	06.34	04.52	03.22	03.11	04.34	06.05	07.29	08.01	09.31
	14.46	16.14	17.41	20.11	21.41	23.12	23.31	22.12	20.28	18.44	16.02	14.44
4	09.58	08.48	07.17	06.30	04.48	03.20	03.13	04.37	06.08	07.32	08.04	09.33
	14.48	16.17	17.44	20.14	21.44	23.14	23.30	22.09	20.25	18.41	15.58	14.42
5	09.57	08.45	07.14	06.27	04.45	03.18	03.15	04.40	06.11	07.35	08.07	09.35
	14.50	16.21	17.47	20.17	21.47	23.17	23.28	22.06	20.21	18.37	15.55	14.41
6	09.55	08.42	07.10	06.23	04.42	03.16	03.17	04.43	06.14	07.38	08.10	09.38
	14.52	16.24	17.50	20.20	21.50	23.19	23.26	22.03	20.18	18.34	15.52	14.39
7	09.54	08.38	07.07	06.20	04.39	03.14	03.19	04.46	06.17	07.40	08.13	09.40
	14.54	16.27	17.53	20.23	21.53	23.21	23.25	21.59	20.14	18.30	15.49	14.38
8	09.53	08.35	07.04	06.17	04.35	03.12	03.21	04.49	06.19	07.43	08.16	09.42
	14.57	16.30	17.56	20.26	21.56	23.23	23.23	21.56	20.11	18.27	15.46	14.36
9	09.51	08.32	07.00	06.13	04.32	03.11	03.24	04.52	06.22	07.46	08.19	09.44
	14.59	16.33	17.59	20.29	21.59	23.25	23.21	21.53	20.07	18.24	15.43	14.35
10	09.49	08.29	06.57	06.10	04.29	03.09	03.26	04.55	06.25	07.49	08.23	09.46
	15.02	16.36	18.02	20.31	22.02	23.27	23.19	21.49	20.04	18.20	15.40	14.34
11	09.48	08.26	06.53	06.06	04.26	03.08	03.28	04.58	06.28	07.52	08.26	09.48
	15.04	16.40	18.05	20.34	22.05	23.29	23.16	21.46	20.00	18.17	15.37	14.33
12	09.46	08.23	06.50	06.03	04.23	03.06	03.31	05.01	06.31	07.55	08.29	09.50
	15.07	16.43	18.08	20.37	22.08	23.30	23.14	21.43	19.57	18.13	15.35	14.32
13	09.44	08.20	06.47	05.59	04.20	03.05	03.33	05.04	06.33	07.58	08.32	09.52
	15.10	16.46	18.11	20.40	22.12	23.32	23.12	21.40	19.53	18.10	15.32	14.31
14	09.42	08.17	06.43	05.56	04.16	03.04	03.36	05.07	06.36	08.01	08.35	09.54
	15.13	16.49	18.13	20.43	22.15	23.33	23.10	21.36	19.50	18.07	15.29	14.31
15	09.40	08.13	06.40	05.52	04.13	03.03	03.39	05.10	06.39	08.03	08.38	09.55
	15.15	16.52	18.16	20.46	22.18	23.34	23.07	21.33	19.46	18.03	15.26	14.30
16	09.38	08.10	06.36	05.49	04.10	03.02	03.41	05.13	06.42	08.06	08.41	09.56
	15.18	16.55	18.19	20.49	22.21	23.36	23.05	21.30	19.43	18.00	15.23	14.30
17	09.35	08.07	06.33	05.46	04.07	03.02	03.44	05.16	06.44	08.09	08.44	09.58
	15.21	16.59	18.22	20.52	22.24	23.36	23.02	21.26	19.39	17.57	15.21	14.30
18	09.33	08.04	06.29	05.42	04.04	03.01	03.47	05.19	06.47	08.12	08.47	09.59
	15.24	17.02	18.25	20.55	22.27	23.37	22.59	21.23	19.36	17.53	15.18	14.30
19	09.31	08.00	06.26	05.39	04.01	03.01	03.50	05.22	06.50	08.15	08.50	10.00
	15.27	17.05	18.28	20.58	22.30	23.38	22.57	21.19	19.32	17.50	15.15	14.30
20	09.28	07.57	06.22	05.35	03.58	03.01	03.52	05.25	06.53	08.18	08.54	10.01
	15.30	17.08	18.31	21.01	22.33	23.38	22.54	21.16	19.29	17.47	15.13	14.30
21	09.26	07.54	06.19	05.32	03.55	03.00	03.55	05.28	06.56	08.21	08.57	10.01
	15.33	17.11	18.34	21.04	22.36	23.39	22.51	21.13	19.26	17.43	15.10	14.30
22	09.24	07.51	06.15	05.28	03.53	03.01	03.58	05.31	06.58	08.24	09.00	10.02
	15.36	17.14	18.37	21.07	22.39	23.39	22.48	21.09	19.22	17.40	15.08	14.30
23	09.21	07.47	06.12	05.25	03.50	03.01	04.01	05.34	07.01	08.27	09.03	10.03
	15.39	17.17	18.39	21.10	22.42	23.39	22.46	21.06	19.19	17.37	15.05	14.31
24	09.18	07.44	06.09	05.22	03.47	03.01	04.04	05.37	07.04	08.30	09.06	10.03
	15.42	17.20	18.42	21.13	22.45	23.39	22.43	21.02	19.15	17.33	15.03	14.32
25	09.16	07.41	06.05	05.18	03.44	03.02	04.07	05.40	07.07	07.33	09.09	10.03
	15.45	17.23	18.45	21.16	22.48	23.39	22.40	20.59	19.12	16.30	15.00	14.32
26	09.13	07.37	06.02	05.15	03.41	03.03	04.10	05.42	07.09	07.36	09.11	10.03
	15.49	17.26	18.48	21.19	22.51	23.38	22.37	20.56	19.08	16.27	14.58	14.33
27	09.10	07.34	05.58	05.12	03.39	03.03	04.13	05.45	07.12	07.39	09.14	10.03
	15.52	17.29	18.51	21.22	22.53	23.38	22.34	20.52	19.05	16.24	14.56	14.34
28	09.08	07.31	05.55	05.08	03.36	03.04	04.16	05.48	07.15	07.42	09.17	10.03
	15.55	17.32	18.54	21.25	22.56	23.37	22.31	20.49	19.01	16.20	14.54	14.36
29	09.05		06.51	05.05	03.34	03.06	04.19	05.51	07.18	07.45	09.20	10.03
	15.58		19.57	21.28	22.59	23.36	22.28	20.45	18.58	16.17	14.52	14.37
30	09.02		06.48	05.02	03.31	03.07	04.22	05.54	07.21	07.48	09.23	10.02
	16.01		20.00	21.31	23.02	23.35	22.25	20.42	18.54	16.14	14.50	14.38
31	08.59		06.44		03.29		04.25	05.57		07.51		10.02
	16.05		20.02		23.04		22.22	20.38		16.11		14.40
Potential sun hours	178	241	363	449	563	611	599	504	392	307	203	146
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:
31.1.2024 11.42/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE3_RD200x10xHH200+Hallakallio_No_Forest Shadow receptor: C - C - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March			April			May	June	July	August	September			October	November	December
1	10.00	08.56	07.27			06.41		18.55 (WTG10)	04.58	03.27	03.09	04.28	06.00			07.23	07.54	09.25
	14.42	16.08	17.35			20.05	24	19.19 (WTG10)	21.34	23.06	23.33	22.18	20.35			18.51	16.08	14.48
2	09.59	08.53	07.24			06.37		18.55 (WTG10)	04.55	03.25	03.10	04.31	06.03			07.26	07.57	09.28
	14.44	16.11	17.38			20.08	24	19.19 (WTG10)	21.37	23.09	23.32	22.15	20.31			18.47	16.05	14.46
3	09.58	08.50	07.20			06.34		18.55 (WTG10)	04.52	03.22	03.12	04.34	06.05			07.29	08.00	09.30
	14.46	16.14	17.41			20.11	23	19.18 (WTG10)	21.40	23.11	23.31	22.12	20.28			18.44	16.02	14.44
4	09.57	08.47	07.17			06.30		18.55 (WTG10)	04.49	03.20	03.14	04.37	06.08		18.56 (WTG10)	07.32	08.04	09.33
	14.48	16.17	17.44			20.14	22	19.17 (WTG10)	21.43	23.14	23.29	22.09	20.24	11	19.07 (WTG10)	18.41	15.59	14.43
5	09.56	08.44	07.14			06.27		18.55 (WTG10)	04.45	03.18	03.16	04.40	06.11		18.54 (WTG10)	07.35	08.07	09.35
	14.50	16.21	17.47			20.17	20	19.15 (WTG10)	21.46	23.16	23.28	22.05	20.21	15	19.09 (WTG10)	18.37	15.55	14.41
6	09.55	08.41	07.10			06.23		18.56 (WTG10)	04.42	03.16	03.18	04.43	06.14		18.52 (WTG10)	07.37	08.10	09.37
	14.53	16.24	17.50			20.20	19	19.15 (WTG10)	21.50	23.18	23.26	22.02	20.18	19	19.11 (WTG10)	18.34	15.52	14.40
7	09.54	08.38	07.07			06.20		18.58 (WTG10)	04.39	03.14	03.20	04.46	06.17		18.50 (WTG10)	07.40	08.13	09.40
	14.55	16.27	17.53			20.23	15	19.13 (WTG10)	21.53	23.21	23.24	21.59	20.14	21	19.11 (WTG10)	18.30	15.49	14.38
8	09.52	08.35	07.04			06.17		18.59 (WTG10)	04.36	03.13	03.22	04.49	06.19		18.49 (WTG10)	07.43	08.16	09.42
	14.57	16.30	17.56			20.25	11	19.10 (WTG10)	21.56	23.23	23.22	21.56	20.11	22	19.11 (WTG10)	18.27	15.46	14.37
9	09.51	08.32	07.00			06.13			04.32	03.11	03.24	04.52	06.22		18.49 (WTG10)	07.46	08.19	09.44
	15.00	16.33	17.59			20.28			21.59	23.25	23.20	21.52	20.07	23	19.12 (WTG10)	18.24	15.43	14.36
10	09.49	08.29	06.57			06.10			04.29	03.09	03.26	04.55	06.25		18.48 (WTG10)	07.49	08.22	09.46
	15.02	16.37	18.02			20.31			22.02	23.26	23.18	21.49	20.04	23	19.11 (WTG10)	18.20	15.40	14.34
11	09.47	08.26	06.53			06.06			04.26	03.08	03.29	04.58	06.28		18.48 (WTG10)	07.52	08.25	09.48
	15.05	16.40	18.05			20.34			22.05	23.28	23.16	21.46	20.00	23	19.11 (WTG10)	18.17	15.38	14.33
12	09.45	08.23	06.50			06.03			04.23	03.07	03.31	05.01	06.31		18.48 (WTG10)	07.55	08.28	09.50
	15.07	16.43	18.08			20.37			22.08	23.30	23.14	21.43	19.57	23	19.11 (WTG10)	18.13	15.35	14.33
13	09.43	08.20	06.46			05.59			04.20	03.06	03.34	05.04	06.33		18.47 (WTG10)	07.57	08.32	09.51
	15.10	16.46	18.11			20.40			22.11	23.31	23.11	21.39	19.53	22	19.09 (WTG10)	18.10	15.32	14.32
14	09.41	08.16	06.43			05.56			04.17	03.04	03.36	05.07	06.36		18.48 (WTG10)	08.00	08.35	09.53
	15.13	16.49	18.13			20.43			22.14	23.33	23.09	21.36	19.50	21	19.09 (WTG10)	18.07	15.29	14.31
15	09.39	08.13	06.40			05.52			04.14	03.04	03.39	05.10	06.39		18.48 (WTG10)	08.03	08.38	09.55
	15.16	16.52	18.16			20.46			22.17	23.34	23.07	21.33	19.46	20	19.08 (WTG10)	18.03	15.26	14.31
16	09.37	08.10	06.36			05.49			04.11	03.03	03.42	05.13	06.42		18.49 (WTG10)	08.06	08.41	09.56
	15.18	16.55	18.19			20.49			22.20	23.35	23.04	21.29	19.43	17	19.06 (WTG10)	18.00	15.23	14.30
17	09.35	08.07	06.33			05.46			04.07	03.02	03.44	05.16	06.44		18.50 (WTG10)	08.09	08.44	09.57
	15.21	16.59	18.22			20.52			22.23	23.36	23.02	21.26	19.39	12	19.02 (WTG10)	17.57	15.21	14.30
18	09.33	08.04	06.29			05.42			04.04	03.02	03.47	05.19	06.47		18.53 (WTG10)	08.12	08.47	09.58
	15.24	17.02	18.25			20.55			22.27	23.37	22.59	21.23	19.36	6	18.59 (WTG10)	17.53	15.18	14.30
19	09.30	08.00	06.26			05.39			04.02	03.01	03.50	05.22	06.50			08.15	08.50	09.59
	15.27	17.05	18.28			20.58			22.30	23.37	22.56	21.19	19.32			17.50	15.15	14.30
20	09.28	07.57	06.22			05.35			03.59	03.01	03.53	05.25	06.53			08.18	08.53	10.00
	15.30	17.08	18.31			21.01			22.33	23.38	22.54	21.16	19.29			17.47	15.13	14.30
21	09.26	07.54	06.19			05.32			03.56	03.01	03.56	05.28	06.56			08.21	08.56	10.01
	15.33	17.11	18.34			21.04			22.36	23.38	22.51	21.12	19.25			17.43	15.10	14.30
22	09.23	07.50	06.15			05.29			03.53	03.01	03.58	05.31	06.58			08.24	08.59	10.02
	15.36	17.14	18.37			21.07			22.39	23.38	22.48	21.09	19.22			17.40	15.08	14.31
23	09.21	07.47	06.12			05.25			03.50	03.01	04.01	05.34	07.01			08.27	09.02	10.02
	15.39	17.17	18.39			21.10			22.41	23.38	22.45	21.06	19.19			17.37	15.05	14.31
24	09.18	07.44	06.08			05.22			03.47	03.02	04.04	05.37	07.04			08.30	09.05	10.02
	15.43	17.20	18.42			21.13			22.44	23.38	22.42	21.02	19.15			17.33	15.03	14.32
25	09.15	07.41	06.05		18.06 (WTG10)	05.18			03.44	03.02	04.07	05.40	07.07			07.33	09.08	10.03
	15.46	17.23	18.45	5	18.11 (WTG10)	21.16			22.47	23.38	22.39	20.59	19.12			16.30	15.01	14.33
26	09.13	07.37	06.02		18.03 (WTG10)	05.15			03.42	03.03	04.10	05.43	07.09			07.36	09.11	10.03
	15.49	17.26	18.48	11	18.14 (WTG10)	21.19			22.50	23.38	22.36	20.55	19.08			16.27	14.58	14.34
27	09.10	07.34	05.58		18.00 (WTG10)	05.12			03.39	03.04	04.13	05.45	07.12			07.39	09.14	10.03
	15.52	17.29	18.51	16	18.16 (WTG10)	21.22			22.53	23.37	22.33	20.52	19.05			16.24	14.56	14.35
28	09.07	07.31	05.55		17.59 (WTG10)	05.08			03.37	03.05	04.16	05.48	07.15			07.42	09.17	10.02
	15.55	17.32	18.54	19	18.18 (WTG10)	21.25			22.56	23.36	22.30	20.49	19.01			16.21	14.54	14.36
29	09.05		06.51		18.57 (WTG10)	05.05			03.34	03.06	04.19	05.51	07.18			07.45	09.20	10.02
	15.58		19.57	21	19.18 (WTG10)	21.28			22.59	23.35	22.27	20.45	18.58			16.17	14.52	14.37
30	09.02		06.48		18.57 (WTG10)	05.02			03.32	03.07	04.22	05.54	07.21			07.48	09.22	10.02
	16.01		19.59	22	19.19 (WTG10)	21.31			23.01	23.34	22.24	20.42	18.54			16.14	14.50	14.39
31	08.59		06.44		18.55 (WTG10)				03.29		04.25	05.57				07.51		10.01
	16.05		20.02	23	19.18 (WTG10)				23.04		22.21	20.38				16.11		14.40
Potential sun hours	179	241	363			448			562	611	598	504	392			307	204	147
Total, worst case				117			158							278				
Sun reduction				0,32			0,44							0,36				
Oper. time red.				0,90			0,90							0,90				
Wind dir. red.				0,56			0,56							0,56				
Total reduction				0,16			0,22							0,18				
Total, real				19			35							50				

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:
31.1.2024 11.42/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE3_RD200x10xHH200+Hallakallio_No_Forest Shadow receptor: D - D - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April		May	June	July	August		September		October	November	December
1	10.00	08.56	07.27	06.41		04.58	03.27	03.09	04.28		06.00	19.20 (WTG10)	07.23	07.54	09.25
	14.42	16.08	17.35	20.05		21.34	23.06	23.33	22.18		20.35 23	19.43 (WTG10)	18.51	16.08	14.48
2	09.59	08.53	07.24	06.37		04.55	03.25	03.10	04.31		06.03	19.20 (WTG10)	07.26	07.57	09.28
	14.44	16.11	17.38	20.08		21.37	23.09	23.32	22.15		20.31 23	19.43 (WTG10)	18.47	16.05	14.46
3	09.58	08.50	07.20	06.34		04.52	03.22	03.12	04.34		06.05	19.21 (WTG10)	07.29	08.00	09.30
	14.46	16.14	17.41	20.11		21.40	23.11	23.31	22.12		20.28 22	19.43 (WTG10)	18.44	16.02	14.44
4	09.57	08.47	07.17	06.30	19.30 (WTG10)	04.49	03.20	03.14	04.37		06.08	19.20 (WTG10)	07.32	08.04	09.33
	14.48	16.17	17.44	20.14 9	19.39 (WTG10)	21.43	23.14	23.29	22.09		20.24 22	19.42 (WTG10)	18.41	15.59	14.43
5	09.56	08.44	07.14	06.27	19.27 (WTG10)	04.45	03.18	03.16	04.40		06.11	19.21 (WTG10)	07.35	08.07	09.35
	14.50	16.21	17.47	20.17 14	19.41 (WTG10)	21.46	23.16	23.28	22.05		20.21 20	19.41 (WTG10)	18.37	15.55	14.41
6	09.55	08.41	07.10	06.23	19.26 (WTG10)	04.42	03.16	03.18	04.43		06.14	19.22 (WTG10)	07.37	08.10	09.37
	14.53	16.24	17.50	20.20 18	19.44 (WTG10)	21.50	23.18	23.26	22.02		20.17 18	19.40 (WTG10)	18.34	15.52	14.40
7	09.54	08.38	07.07	06.20	19.25 (WTG10)	04.39	03.14	03.20	04.46		06.17	19.22 (WTG10)	07.40	08.13	09.40
	14.55	16.27	17.53	20.23 20	19.45 (WTG10)	21.53	23.20	23.24	21.59		20.14 14	19.36 (WTG10)	18.30	15.49	14.38
8	09.52	08.35	07.04	06.17	19.23 (WTG10)	04.36	03.13	03.22	04.49		06.19	19.24 (WTG10)	07.43	08.16	09.42
	14.57	16.30	17.56	20.25 22	19.45 (WTG10)	21.56	23.23	23.22	21.56		20.11 9	19.33 (WTG10)	18.27	15.46	14.37
9	09.50	08.32	07.00	06.13	19.23 (WTG10)	04.32	03.11	03.24	04.52		06.22	19.28 (WTG10)	07.46	08.19	09.44
	15.00	16.33	17.59	20.28 22	19.45 (WTG10)	21.59	23.24	23.20	21.52		20.07 2	19.30 (WTG10)	18.24	15.43	14.36
10	09.49	08.29	06.57	06.10	19.22 (WTG10)	04.29	03.09	03.26	04.55		06.25		07.49	08.22	09.46
	15.02	16.37	18.02	20.31 23	19.45 (WTG10)	22.02	23.26	23.18	21.49		20.04		18.20	15.40	14.34
11	09.47	08.26	06.53	06.06	19.21 (WTG10)	04.26	03.08	03.29	04.58		06.28		07.52	08.25	09.48
	15.05	16.40	18.05	20.34 23	19.44 (WTG10)	22.05	23.28	23.16	21.46		20.00		18.17	15.38	14.34
12	09.45	08.23	06.50	06.03	19.22 (WTG10)	04.23	03.07	03.31	05.01		06.31		07.55	08.28	09.50
	15.07	16.43	18.08	20.37 22	19.44 (WTG10)	22.08	23.30	23.14	21.43		19.57		18.13	15.35	14.33
13	09.43	08.20	06.46	05.59	19.22 (WTG10)	04.20	03.06	03.34	05.04		06.33		07.57	08.32	09.51
	15.10	16.46	18.11	20.40 22	19.44 (WTG10)	22.11	23.31	23.11	21.39		19.53		18.10	15.32	14.32
14	09.41	08.16	06.43	05.56	19.22 (WTG10)	04.17	03.05	03.36	05.07		06.36		08.00	08.35	09.53
	15.13	16.49	18.13	20.43 20	19.42 (WTG10)	22.14	23.33	23.09	21.36		19.50		18.07	15.29	14.31
15	09.39	08.13	06.40	05.52	19.23 (WTG10)	04.14	03.04	03.39	05.10		06.39		08.03	08.38	09.55
	15.16	16.52	18.16	20.46 19	19.42 (WTG10)	22.17	23.34	23.07	21.33		19.46		18.03	15.26	14.31
16	09.37	08.10	06.36	05.49	19.24 (WTG10)	04.11	03.03	03.42	05.13		06.42		08.06	08.41	09.56
	15.19	16.55	18.19	20.49 16	19.40 (WTG10)	22.20	23.35	23.04	21.29		19.43		18.00	15.23	14.30
17	09.35	08.07	06.33	05.46	19.25 (WTG10)	04.08	03.02	03.44	05.16		06.44		08.09	08.44	09.57
	15.21	16.59	18.22	20.52 14	19.39 (WTG10)	22.23	23.36	23.01	21.26		19.39		17.57	15.21	14.30
18	09.33	08.04	06.29	05.42	19.27 (WTG10)	04.05	03.02	03.47	05.19		06.47		08.12	08.47	09.58
	15.24	17.02	18.25	20.55 8	19.35 (WTG10)	22.26	23.37	22.59	21.23		19.36		17.53	15.18	14.30
19	09.30	08.00	06.26	05.39		04.02	03.01	03.50	05.22		06.50		08.15	08.50	09.59
	15.27	17.05	18.28	20.58		22.30	23.37	22.56	21.19		19.32		17.50	15.15	14.30
20	09.28	07.57	06.22	05.35		03.59	03.01	03.53	05.25		06.53		08.18	08.53	10.00
	15.30	17.08	18.31	21.01		22.33	23.38	22.54	21.16		19.29		17.47	15.13	14.30
21	09.26	07.54	06.19	05.32		03.56	03.01	03.56	05.28		06.56		08.21	08.56	10.01
	15.33	17.11	18.34	21.04		22.36	23.38	22.51	21.12		19.25		17.43	15.10	14.30
22	09.23	07.50	06.15	05.29		03.53	03.01	03.59	05.31		06.58		08.24	08.59	10.02
	15.36	17.14	18.37	21.07		22.38	23.38	22.48	21.09		19.22		17.40	15.08	14.31
23	09.21	07.47	06.12	05.25		03.50	03.01	04.01	05.34		07.01		08.27	09.02	10.02
	15.39	17.17	18.39	21.10		22.41	23.38	22.45	21.06		19.19		17.37	15.05	14.31
24	09.18	07.44	06.08	05.22		03.47	03.02	04.04	05.37		07.04		08.30	09.05	10.02
	15.43	17.20	18.42	21.13		22.44	23.38	22.42	21.02		19.15		17.33	15.03	14.32
25	09.15	07.41	06.05	05.18		03.45	03.02	04.07	05.40	19.31 (WTG10)	07.07		07.33	09.08	10.03
	15.46	17.23	18.45	21.16		22.47	23.38	22.39	20.59 8	19.39 (WTG10)	19.12		16.30	15.01	14.33
26	09.13	07.37	06.02	05.15		03.42	03.03	04.10	05.43	19.27 (WTG10)	07.09		07.36	09.11	10.03
	15.49	17.26	18.48	21.19		22.50	23.37	22.36	20.55 14	19.41 (WTG10)	19.08		16.27	14.58	14.34
27	09.10	07.34	05.58	05.12		03.39	03.04	04.13	05.45	19.25 (WTG10)	07.12		07.39	09.14	10.03
	15.52	17.29	18.51	21.22		22.53	23.37	22.33	20.52 17	19.42 (WTG10)	19.05		16.24	14.56	14.35
28	09.07	07.31	05.55	05.08		03.37	03.05	04.16	05.48	19.24 (WTG10)	07.15		07.42	09.17	10.02
	15.55	17.32	18.54	21.25		22.56	23.36	22.30	20.49 19	19.43 (WTG10)	19.01		16.21	14.54	14.36
29	09.05		06.51	05.05		03.34	03.06	04.19	05.51	19.22 (WTG10)	07.18		07.45	09.19	10.02
	15.58		19.57	21.28		22.58	23.35	22.27	20.45 21	19.43 (WTG10)	18.58		16.17	14.52	14.37
30	09.02		06.48	05.02		03.32	03.07	04.22	05.54	19.22 (WTG10)	07.21		07.48	09.22	10.02
	16.02		19.59	21.31		23.01	23.34	22.24	20.42 22	19.44 (WTG10)	18.54		16.14	14.50	14.39
31	08.59		06.44			03.29		04.25	05.57	19.22 (WTG10)			07.51		10.01
	16.05		20.02			23.04		22.21	20.38 22	19.44 (WTG10)			16.11		14.40
Potential sun hours	179	241	363	448		562	610	598	504		392		307	204	147
Total, worst case					272					123		153			
Sun reduction					0,44					0,42		0,36			
Oper. time red.					0,90					0,90		0,90			
Wind dir. red.					0,55					0,55		0,55			
Total reduction					0,22					0,21		0,18			
Total, real					60					26		27			

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:
31.1.2024 11.42/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE3_RD200x10xHH200+Hallakallio_No_Forest Shadow receptor: E - E - Lomarakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June		July		August	September	October	November	December
1	10.00	08.56	07.27	06.41	04.59	03.27		03.09	22.20 (WTG05)	04.29	06.00	07.24	07.54	09.25
	14.43	16.08	17.35	20.05	21.34	23.06		23.33	6 22.26 (WTG05)	22.18	20.35	18.51	16.08	14.48
2	09.59	08.53	07.24	06.38	04.55	03.25		03.11		04.32	06.03	07.26	07.57	09.27
	14.45	16.11	17.38	20.08	21.37	23.09		23.32		22.15	20.31	18.48	16.05	14.47
3	09.58	08.50	07.21	06.34	04.52	03.23		03.13		04.35	06.06	07.29	08.00	09.30
	14.47	16.15	17.41	20.11	21.40	23.11		23.30		22.12	20.28	18.44	16.02	14.45
4	09.57	08.47	07.17	06.31	04.49	03.21		03.14		04.38	06.08	07.32	08.04	09.33
	14.49	16.18	17.44	20.14	21.43	23.14		23.29		22.09	20.25	18.41	15.59	14.43
5	09.56	08.44	07.14	06.27	04.46	03.19		03.16		04.41	06.11	07.35	08.07	09.35
	14.51	16.21	17.47	20.17	21.46	23.16		23.27		22.05	20.21	18.37	15.56	14.41
6	09.55	08.41	07.10	06.24	04.42	03.17		03.18		04.44	06.14	07.38	08.10	09.37
	14.53	16.24	17.50	20.20	21.50	23.18		23.26		22.02	20.18	18.34	15.53	14.40
7	09.53	08.38	07.07	06.20	04.39	03.15		03.20		04.47	06.17	07.40	08.13	09.40
	14.55	16.27	17.53	20.23	21.53	23.20		23.24		21.59	20.14	18.31	15.50	14.39
8	09.52	08.35	07.04	06.17	04.36	03.13		03.22		04.50	06.20	07.43	08.16	09.42
	14.58	16.31	17.56	20.26	21.56	23.22		23.22		21.56	20.11	18.27	15.47	14.37
9	09.50	08.32	07.00	06.13	04.33	03.12		03.25		04.53	06.22	07.46	08.19	09.44
	15.00	16.34	17.59	20.28	21.59	23.24		23.20		21.52	20.07	18.24	15.44	14.36
10	09.49	08.29	06.57	06.10	04.30	03.10		03.27		04.56	06.25	07.49	08.22	09.46
	15.03	16.37	18.02	20.31	22.02	23.26		23.18		21.49	20.04	18.20	15.41	14.35
11	09.47	08.26	06.53	06.06	04.26	03.09	22.16 (WTG05)	03.29		04.59	06.28	07.52	08.25	09.48
	15.05	16.40	18.05	20.34	22.05	23.28	5 22.21 (WTG05)	23.16		21.46	20.00	18.17	15.38	14.34
12	09.45	08.23	06.50	06.03	04.23	03.07	22.16 (WTG05)	03.32		05.02	06.31	07.55	08.28	09.50
	15.08	16.43	18.08	20.37	22.08	23.29	7 22.23 (WTG05)	23.14		21.43	19.57	18.14	15.35	14.33
13	09.43	08.20	06.47	06.00	04.20	03.06	22.15 (WTG05)	03.34		05.05	06.34	07.58	08.32	09.51
	15.10	16.46	18.11	20.40	22.11	23.31	9 22.24 (WTG05)	23.11		21.39	19.53	18.10	15.32	14.32
14	09.41	08.16	06.43	05.56	04.17	03.05	22.15 (WTG05)	03.37		05.08	06.36	08.00	08.35	09.53
	15.13	16.49	18.14	20.43	22.14	23.32	10 22.25 (WTG05)	23.09		21.36	19.50	18.07	15.29	14.32
15	09.39	08.13	06.40	05.53	04.14	03.04	22.14 (WTG05)	03.39		05.11	06.39	08.03	08.38	09.54
	15.16	16.53	18.17	20.46	22.17	23.33	11 22.25 (WTG05)	23.06		21.33	19.46	18.04	15.27	14.31
16	09.37	08.10	06.36	05.49	04.11	03.03	22.14 (WTG05)	03.42		05.14	06.42	08.06	08.41	09.56
	15.19	16.56	18.19	20.49	22.20	23.35	12 22.26 (WTG05)	23.04		21.29	19.43	18.00	15.24	14.31
17	09.35	08.07	06.33	05.46	04.08	03.03	22.15 (WTG05)	03.45		05.17	06.45	08.09	08.44	09.57
	15.22	16.59	18.22	20.52	22.23	23.36	12 22.27 (WTG05)	23.01		21.26	19.39	17.57	15.21	14.31
18	09.33	08.04	06.29	05.42	04.05	03.02	22.14 (WTG05)	03.48		05.20	06.47	08.12	08.47	09.58
	15.25	17.02	18.25	20.55	22.26	23.36	12 22.26 (WTG05)	22.59		21.23	19.36	17.54	15.18	14.30
19	09.30	08.00	06.26	05.39	04.02	03.02	22.14 (WTG05)	03.50		05.22	06.50	08.15	08.50	09.59
	15.28	17.05	18.28	20.58	22.29	23.37	13 22.27 (WTG05)	22.56		21.19	19.33	17.50	15.16	14.30
20	09.28	07.57	06.22	05.36	03.59	03.02	22.14 (WTG05)	03.53		05.25	06.53	08.18	08.53	10.00
	15.31	17.08	18.31	21.01	22.32	23.37	13 22.27 (WTG05)	22.53		21.16	19.29	17.47	15.13	14.31
21	09.26	07.54	06.19	05.32	03.56	03.02	22.15 (WTG05)	03.56		05.28	06.56	08.21	08.56	10.01
	15.34	17.11	18.34	21.04	22.35	23.38	13 22.28 (WTG05)	22.51		21.12	19.26	17.44	15.11	14.31
22	09.23	07.51	06.16	05.29	03.53	03.02	22.15 (WTG05)	03.59		05.31	06.59	08.24	08.59	10.01
	15.37	17.14	18.37	21.07	22.38	23.38	13 22.28 (WTG05)	22.48		21.09	19.22	17.40	15.08	14.31
23	09.21	07.47	06.12	05.25	03.50	03.02	22.15 (WTG05)	04.02		05.34	07.01	08.27	09.02	10.02
	15.40	17.17	18.40	21.10	22.41	23.38	13 22.28 (WTG05)	22.45		21.06	19.19	17.37	15.06	14.32
24	09.18	07.44	06.09	05.22	03.48	03.02	22.16 (WTG05)	04.05		05.37	07.04	08.30	09.05	10.02
	15.43	17.20	18.42	21.13	22.44	23.38	13 22.29 (WTG05)	22.42		21.02	19.15	17.34	15.03	14.32
25	09.15	07.41	06.05	05.19	03.45	03.03	22.16 (WTG05)	04.08		05.40	07.07	07.33	09.08	10.02
	15.46	17.23	18.45	21.16	22.47	23.38	12 22.28 (WTG05)	22.39		20.59	19.12	16.30	15.01	14.33
26	09.13	07.37	06.02	05.15	03.42	03.04	22.17 (WTG05)	04.11		05.43	07.10	07.36	09.11	10.02
	15.49	17.26	18.48	21.19	22.50	23.37	11 22.28 (WTG05)	22.36		20.55	19.08	16.27	14.59	14.34
27	09.10	07.34	05.58	05.12	03.40	03.05	22.16 (WTG05)	04.14		05.46	07.12	07.39	09.14	10.02
	15.52	17.29	18.51	21.22	22.53	23.37	11 22.27 (WTG05)	22.33		20.52	19.05	16.24	14.57	14.35
28	09.07	07.31	05.55	05.09	03.37	03.06	22.17 (WTG05)	04.17		05.49	07.15	07.42	09.17	10.02
	15.56	17.32	18.54	21.25	22.56	23.36	10 22.27 (WTG05)	22.30		20.49	19.01	16.21	14.54	14.36
29	09.05		06.51	05.05	03.35	03.07	22.18 (WTG05)	04.20		05.51	07.18	07.45	09.19	10.02
	15.59		19.57	21.28	22.58	23.35	9 22.27 (WTG05)	22.27		20.45	18.58	16.18	14.52	14.38
30	09.02		06.48	05.02	03.32	03.08	22.19 (WTG05)	04.23		05.54	07.21	07.48	09.22	10.02
	16.02		20.00	21.31	23.01	23.34	8 22.27 (WTG05)	22.24		20.42	18.55	16.14	14.50	14.39
31	08.59		06.44		03.30			04.26		05.57		07.51		10.01
	16.05		20.02		23.04			22.21		20.38		16.11		14.41
Potential sun hours	179	241	363	448	562	610		598		504	392	307	204	147
Total, worst case						217		6						
Sun reduction						0,45		0,46						
Oper. time red.						0,90		0,90						
Wind dir. red.						0,65		0,65						
Total reduction						0,26		0,27						
Total, real						56		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:
31.1.2024 11.42/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE3_RD200x10xHH200+Hallakallio_No_Forest Shadow receptor: F - F - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.00	08.56	07.27	06.41	04.59	03.28	03.10	04.29	06.00	07.24	07.54	09.25
	14.43	16.08	17.36	20.05	21.34	23.06	23.33	22.18	20.35	18.51	16.08	14.49
2	09.59	08.53	07.24	06.38	04.56	03.25	03.11	04.32	06.03	07.26	07.58	09.28
	14.45	16.12	17.39	20.08	21.37	23.09	23.32	22.15	20.32	18.48	16.05	14.47
3	09.58	08.50	07.21	06.34	04.52	03.23	03.13	04.35	06.06	07.29	08.01	09.30
	14.47	16.15	17.42	20.11	21.40	23.11	23.30	22.12	20.28	18.44	16.02	14.45
4	09.57	08.47	07.17	06.31	04.49	03.21	03.15	04.38	06.09	07.32	08.04	09.33
	14.49	16.18	17.44	20.14	21.43	23.14	23.29	22.09	20.25	18.41	15.59	14.43
5	09.56	08.44	07.14	06.27	04.46	03.19	03.16	04.41	06.11	07.35	08.07	09.35
	14.51	16.21	17.47	20.17	21.47	23.16	23.27	22.06	20.21	18.38	15.56	14.42
6	09.55	08.41	07.11	06.24	04.43	03.17	03.18	04.44	06.14	07.38	08.10	09.37
	14.53	16.24	17.50	20.20	21.50	23.18	23.26	22.02	20.18	18.34	15.53	14.40
7	09.54	08.38	07.07	06.20	04.39	03.15	03.20	04.47	06.17	07.41	08.13	09.40
	14.55	16.28	17.53	20.23	21.53	23.20	23.24	21.59	20.14	18.31	15.50	14.39
8	09.52	08.35	07.04	06.17	04.36	03.13	03.23	04.50	06.20	07.43	08.16	09.42
	14.58	16.31	17.56	20.26	21.56	23.22	23.22	21.56	20.11	18.27	15.47	14.37
9	09.50	08.32	07.00	06.14	04.33	03.12	03.25	04.53	06.23	07.46	08.19	09.44
	15.00	16.34	17.59	20.29	21.59	23.24	23.20	21.53	20.07	18.24	15.44	14.36
10	09.49	08.29	06.57	06.10	04.30	03.10	03.27	04.56	06.25	07.49	08.22	09.46
	15.03	16.37	18.02	20.32	22.02	23.26	23.18	21.49	20.04	18.21	15.41	14.35
11	09.47	08.26	06.54	06.07	04.27	03.09	03.30	04.59	06.28	07.52	08.25	09.48
	15.05	16.40	18.05	20.34	22.05	23.28	23.16	21.46	20.00	18.17	15.38	14.34
12	09.45	08.23	06.50	06.03	04.23	03.08	03.32	05.02	06.31	07.55	08.29	09.50
	15.08	16.43	18.08	20.37	22.08	23.29	23.14	21.43	19.57	18.14	15.35	14.33
13	09.43	08.20	06.47	06.00	04.20	03.06	03.34	05.05	06.34	07.58	08.32	09.51
	15.11	16.47	18.11	20.40	22.11	23.31	23.11	21.39	19.53	18.10	15.32	14.33
14	09.41	08.17	06.43	05.56	04.17	03.05	03.37	05.08	06.37	08.01	08.35	09.53
	15.13	16.50	18.14	20.43	22.14	23.32	23.09	21.36	19.50	18.07	15.30	14.32
15	09.39	08.13	06.40	05.53	04.14	03.04	03.40	05.11	06.39	08.04	08.38	09.54
	15.16	16.53	18.17	20.46	22.17	23.34	23.07	21.33	19.47	18.04	15.27	14.31
16	09.37	08.10	06.36	05.49	04.11	03.04	03.42	05.14	06.42	08.06	08.41	09.56
	15.19	16.56	18.20	20.49	22.20	23.35	23.04	21.29	19.43	18.00	15.24	14.31
17	09.35	08.07	06.33	05.46	04.08	03.03	03.45	05.17	06.45	08.09	08.44	09.57
	15.22	16.59	18.22	20.52	22.23	23.36	23.01	21.26	19.40	17.57	15.21	14.31
18	09.33	08.04	06.30	05.43	04.05	03.02	03.48	05.20	06.48	08.12	08.47	09.58
	15.25	17.02	18.25	20.55	22.27	23.36	22.59	21.23	19.36	17.54	15.19	14.31
19	09.30	08.00	06.26	05.39	04.02	03.02	03.51	05.23	06.50	08.15	08.50	09.59
	15.28	17.05	18.28	20.58	22.30	23.37	22.56	21.19	19.33	17.50	15.16	14.31
20	09.28	07.57	06.23	05.36	03.59	03.02	03.53	05.26	06.53	08.18	08.53	10.00
	15.31	17.08	18.31	21.01	22.33	23.38	22.53	21.16	19.29	17.47	15.13	14.31
21	09.26	07.54	06.19	05.32	03.56	03.02	03.56	05.28	06.56	08.21	08.56	10.01
	15.34	17.11	18.34	21.04	22.36	23.38	22.51	21.13	19.26	17.44	15.11	14.31
22	09.23	07.51	06.16	05.29	03.53	03.02	03.59	05.31	06.59	08.24	08.59	10.01
	15.37	17.14	18.37	21.07	22.38	23.38	22.48	21.09	19.22	17.40	15.08	14.31
23	09.21	07.47	06.12	05.26	03.51	03.02	04.02	05.34	07.01	08.27	09.02	10.02
	15.40	17.17	18.40	21.10	22.41	23.38	22.45	21.06	19.19	17.37	15.06	14.32
24	09.18	07.44	06.09	05.22	03.48	03.03	04.05	05.37	07.04	08.30	09.05	10.02
	15.43	17.20	18.43	21.13	22.44	23.38	22.42	21.02	19.15	17.34	15.04	14.33
25	09.16	07.41	06.05	05.19	03.45	03.03	04.08	05.40	07.07	07.33	09.08	10.02
	15.46	17.24	18.45	21.16	22.47	23.38	22.39	20.59	19.12	16.31	15.01	14.33
26	09.13	07.37	06.02	05.16	03.42	03.04	04.11	05.43	07.10	07.36	09.11	10.03
	15.49	17.27	18.48	21.19	22.50	23.37	22.36	20.56	19.08	16.27	14.59	14.34
27	09.10	07.34	05.58	05.12	03.40	03.05	04.14	05.46	07.13	07.39	09.14	10.03
	15.53	17.30	18.51	21.22	22.53	23.37	22.33	20.52	19.05	16.24	14.57	14.35
28	09.07	07.31	05.55	05.09	03.37	03.06	04.17	05.49	07.15	07.42	09.17	10.02
	15.56	17.33	18.54	21.25	22.56	23.36	22.30	20.49	19.02	16.21	14.55	14.37
29	09.05		06.52	05.06	03.35	03.07	04.20	05.52	07.18	07.45	09.20	10.02
	15.59		19.57	21.28	22.58	23.35	22.27	20.45	18.58	16.18	14.53	14.38
30	09.02		06.48	05.02	03.32	03.08	04.23	05.54	07.21	07.48	09.22	10.02
	16.02		20.00	21.31	23.01	23.34	22.24	20.42	18.55	16.15	14.51	14.39
31	08.59		06.45		03.30		04.26	05.57		07.51		10.01
	16.05		20.03		23.04		22.21	20.38		16.11		14.41
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
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:
31.1.2024 11.42/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE3_RD200x10xHH200+Hallakallio_No_Forest Shadow receptor: G - G - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.00	08.56	07.28	06.41	04.59	03.28	03.10	04.29	06.00	07.24	07.55	09.25
	14.43	16.08	17.36	20.06	21.34	23.06	23.33	22.18	20.35	18.51	16.08	14.49
2	09.59	08.53	07.24	06.38	04.56	03.25	03.11	04.32	06.03	07.27	07.58	09.28
	14.45	16.12	17.39	20.08	21.37	23.09	23.32	22.15	20.32	18.48	16.05	14.47
3	09.59	08.50	07.21	06.34	04.52	03.23	03.13	04.35	06.06	07.29	08.01	09.30
	14.47	16.15	17.42	20.11	21.41	23.11	23.31	22.12	20.28	18.45	16.02	14.45
4	09.57	08.47	07.17	06.31	04.49	03.21	03.15	04.38	06.09	07.32	08.04	09.33
	14.49	16.18	17.45	20.14	21.44	23.14	23.29	22.09	20.25	18.41	15.59	14.43
5	09.56	08.45	07.14	06.27	04.46	03.19	03.17	04.41	06.12	07.35	08.07	09.35
	14.51	16.21	17.48	20.17	21.47	23.16	23.28	22.06	20.21	18.38	15.56	14.42
6	09.55	08.42	07.11	06.24	04.43	03.17	03.19	04.44	06.14	07.38	08.10	09.37
	14.53	16.24	17.51	20.20	21.50	23.18	23.26	22.02	20.18	18.34	15.53	14.40
7	09.54	08.38	07.07	06.21	04.39	03.15	03.21	04.47	06.17	07.41	08.13	09.40
	14.56	16.28	17.53	20.23	21.53	23.20	23.24	21.59	20.14	18.31	15.50	14.39
8	09.52	08.35	07.04	06.17	04.36	03.14	03.23	04.50	06.20	07.44	08.16	09.42
	14.58	16.31	17.56	20.26	21.56	23.22	23.22	21.56	20.11	18.27	15.47	14.38
9	09.51	08.32	07.00	06.14	04.33	03.12	03.25	04.53	06.23	07.46	08.19	09.44
	15.00	16.34	17.59	20.29	21.59	23.24	23.20	21.53	20.07	18.24	15.44	14.36
10	09.49	08.29	06.57	06.10	04.30	03.10	03.27	04.56	06.26	07.49	08.22	09.46
	15.03	16.37	18.02	20.32	22.02	23.26	23.18	21.49	20.04	18.21	15.41	14.35
11	09.47	08.26	06.54	06.07	04.27	03.09	03.30	04.59	06.28	07.52	08.26	09.48
	15.05	16.40	18.05	20.35	22.05	23.28	23.16	21.46	20.01	18.17	15.38	14.34
12	09.45	08.23	06.50	06.03	04.24	03.08	03.32	05.02	06.31	07.55	08.29	09.50
	15.08	16.43	18.08	20.37	22.08	23.30	23.14	21.43	19.57	18.14	15.35	14.33
13	09.43	08.20	06.47	06.00	04.20	03.06	03.35	05.05	06.34	07.58	08.32	09.51
	15.11	16.47	18.11	20.40	22.11	23.31	23.11	21.40	19.54	18.11	15.32	14.33
14	09.42	08.17	06.43	05.56	04.17	03.05	03.37	05.08	06.37	08.01	08.35	09.53
	15.14	16.50	18.14	20.43	22.14	23.32	23.09	21.36	19.50	18.07	15.30	14.32
15	09.39	08.13	06.40	05.53	04.14	03.04	03.40	05.11	06.39	08.04	08.38	09.55
	15.16	16.53	18.17	20.46	22.17	23.34	23.07	21.33	19.47	18.04	15.27	14.31
16	09.37	08.10	06.37	05.50	04.11	03.04	03.42	05.14	06.42	08.07	08.41	09.56
	15.19	16.56	18.20	20.49	22.21	23.35	23.04	21.30	19.43	18.00	15.24	14.31
17	09.35	08.07	06.33	05.46	04.08	03.03	03.45	05.17	06.45	08.09	08.44	09.57
	15.22	16.59	18.23	20.52	22.24	23.36	23.02	21.26	19.40	17.57	15.21	14.31
18	09.33	08.04	06.30	05.43	04.05	03.03	03.48	05.20	06.48	08.12	08.47	09.58
	15.25	17.02	18.25	20.55	22.27	23.36	22.59	21.23	19.36	17.54	15.19	14.31
19	09.31	08.01	06.26	05.39	04.02	03.02	03.51	05.23	06.50	08.15	08.50	09.59
	15.28	17.05	18.28	20.58	22.30	23.37	22.56	21.19	19.33	17.50	15.16	14.31
20	09.28	07.57	06.23	05.36	03.59	03.02	03.54	05.26	06.53	08.18	08.53	10.00
	15.31	17.08	18.31	21.01	22.33	23.38	22.54	21.16	19.29	17.47	15.14	14.31
21	09.26	07.54	06.19	05.33	03.56	03.02	03.56	05.29	06.56	08.21	08.56	10.01
	15.34	17.11	18.34	21.04	22.36	23.38	22.51	21.13	19.26	17.44	15.11	14.31
22	09.23	07.51	06.16	05.29	03.54	03.02	03.59	05.32	06.59	08.24	08.59	10.02
	15.37	17.15	18.37	21.07	22.39	23.38	22.48	21.09	19.22	17.41	15.08	14.32
23	09.21	07.48	06.12	05.26	03.51	03.02	04.02	05.34	07.02	08.27	09.02	10.02
	15.40	17.18	18.40	21.10	22.42	23.38	22.45	21.06	19.19	17.37	15.06	14.32
24	09.18	07.44	06.09	05.22	03.48	03.03	04.05	05.37	07.04	08.30	09.05	10.02
	15.43	17.21	18.43	21.13	22.44	23.38	22.42	21.03	19.15	17.34	15.04	14.33
25	09.16	07.41	06.05	05.19	03.45	03.03	04.08	05.40	07.07	07.33	09.08	10.03
	15.46	17.24	18.46	21.16	22.47	23.38	22.39	20.59	19.12	16.31	15.01	14.34
26	09.13	07.38	06.02	05.16	03.43	03.04	04.11	05.43	07.10	07.36	09.11	10.03
	15.49	17.27	18.48	21.19	22.50	23.37	22.37	20.56	19.09	16.28	14.59	14.35
27	09.10	07.34	05.59	05.12	03.40	03.05	04.14	05.46	07.13	07.39	09.14	10.03
	15.53	17.30	18.51	21.22	22.53	23.37	22.34	20.52	19.05	16.24	14.57	14.36
28	09.08	07.31	05.55	05.09	03.37	03.06	04.17	05.49	07.15	07.42	09.17	10.02
	15.56	17.33	18.54	21.25	22.56	23.36	22.31	20.49	19.02	16.21	14.55	14.37
29	09.05		06.52	05.06	03.35	03.07	04.20	05.52	07.18	07.45	09.20	10.02
	15.59		19.57	21.28	22.59	23.35	22.28	20.45	18.58	16.18	14.53	14.38
30	09.02		06.48	05.02	03.32	03.08	04.23	05.55	07.21	07.48	09.22	10.02
	16.02		20.00	21.31	23.01	23.34	22.24	20.42	18.55	16.15	14.51	14.40
31	08.59		06.45		03.30		04.26	05.57		07.51		10.01
	16.05		20.03		23.04		22.21	20.39		16.12		14.41
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
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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Henri Korhonen / henri.korhonen@fcg.fi
Calculated:
31.1.2024 11.42/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE3_RD200x10xHH200+Hallakallio_No_Forest Shadow receptor: H - H - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.00	08.56	07.28	06.41	04.59	03.28	03.10	04.29	06.00	07.24	07.55	09.25
	14.43	16.09	17.36	20.06	21.34	23.06	23.33	22.18	20.35	18.51	16.08	14.49
2	10.00	08.53	07.24	06.38	04.56	03.25	03.11	04.32	06.03	07.27	07.58	09.28
	14.45	16.12	17.39	20.09	21.37	23.09	23.32	22.15	20.32	18.48	16.05	14.47
3	09.59	08.50	07.21	06.34	04.52	03.23	03.13	04.35	06.06	07.29	08.01	09.30
	14.47	16.15	17.42	20.11	21.41	23.11	23.31	22.12	20.28	18.45	16.02	14.45
4	09.58	08.48	07.17	06.31	04.49	03.21	03.15	04.38	06.09	07.32	08.04	09.33
	14.49	16.18	17.45	20.14	21.44	23.14	23.29	22.09	20.25	18.41	15.59	14.43
5	09.56	08.45	07.14	06.27	04.46	03.19	03.17	04.41	06.12	07.35	08.07	09.35
	14.51	16.21	17.48	20.17	21.47	23.16	23.28	22.06	20.21	18.38	15.56	14.42
6	09.55	08.42	07.11	06.24	04.43	03.17	03.19	04.44	06.14	07.38	08.10	09.38
	14.53	16.24	17.51	20.20	21.50	23.18	23.26	22.02	20.18	18.34	15.53	14.40
7	09.54	08.39	07.07	06.21	04.39	03.15	03.21	04.47	06.17	07.41	08.13	09.40
	14.56	16.28	17.54	20.23	21.53	23.20	23.24	21.59	20.14	18.31	15.50	14.39
8	09.52	08.35	07.04	06.17	04.36	03.14	03.23	04.50	06.20	07.44	08.16	09.42
	14.58	16.31	17.56	20.26	21.56	23.23	23.22	21.56	20.11	18.27	15.47	14.38
9	09.51	08.32	07.01	06.14	04.33	03.12	03.25	04.53	06.23	07.46	08.19	09.44
	15.00	16.34	17.59	20.29	21.59	23.24	23.20	21.53	20.08	18.24	15.44	14.36
10	09.49	08.29	06.57	06.10	04.30	03.10	03.27	04.56	06.26	07.49	08.23	09.46
	15.03	16.37	18.02	20.32	22.02	23.26	23.18	21.49	20.04	18.21	15.41	14.35
11	09.47	08.26	06.54	06.07	04.27	03.09	03.30	04.59	06.28	07.52	08.26	09.48
	15.06	16.40	18.05	20.35	22.05	23.28	23.16	21.46	20.01	18.17	15.38	14.34
12	09.45	08.23	06.50	06.03	04.24	03.08	03.32	05.02	06.31	07.55	08.29	09.50
	15.08	16.44	18.08	20.38	22.08	23.30	23.14	21.43	19.57	18.14	15.35	14.33
13	09.44	08.20	06.47	06.00	04.20	03.07	03.35	05.05	06.34	07.58	08.32	09.52
	15.11	16.47	18.11	20.40	22.11	23.31	23.11	21.40	19.54	18.11	15.32	14.33
14	09.42	08.17	06.43	05.56	04.17	03.05	03.37	05.08	06.37	08.01	08.35	09.53
	15.14	16.50	18.14	20.43	22.14	23.32	23.09	21.36	19.50	18.07	15.30	14.32
15	09.39	08.14	06.40	05.53	04.14	03.05	03.40	05.11	06.39	08.04	08.38	09.55
	15.16	16.53	18.17	20.46	22.18	23.34	23.07	21.33	19.47	18.04	15.27	14.32
16	09.37	08.10	06.37	05.50	04.11	03.04	03.42	05.14	06.42	08.07	08.41	09.56
	15.19	16.56	18.20	20.49	22.21	23.35	23.04	21.30	19.43	18.00	15.24	14.31
17	09.35	08.07	06.33	05.46	04.08	03.03	03.45	05.17	06.45	08.10	08.44	09.57
	15.22	16.59	18.23	20.52	22.24	23.36	23.02	21.26	19.40	17.57	15.21	14.31
18	09.33	08.04	06.30	05.43	04.05	03.03	03.48	05.20	06.48	08.12	08.47	09.58
	15.25	17.02	18.25	20.55	22.27	23.37	22.59	21.23	19.36	17.54	15.19	14.31
19	09.31	08.01	06.26	05.39	04.02	03.02	03.51	05.23	06.51	08.15	08.50	09.59
	15.28	17.05	18.28	20.58	22.30	23.37	22.56	21.20	19.33	17.50	15.16	14.31
20	09.28	07.57	06.23	05.36	03.59	03.02	03.54	05.26	06.53	08.18	08.53	10.00
	15.31	17.08	18.31	21.01	22.33	23.38	22.54	21.16	19.29	17.47	15.14	14.31
21	09.26	07.54	06.19	05.33	03.56	03.02	03.56	05.29	06.56	08.21	08.56	10.01
	15.34	17.12	18.34	21.04	22.36	23.38	22.51	21.13	19.26	17.44	15.11	14.31
22	09.23	07.51	06.16	05.29	03.54	03.02	03.59	05.32	06.59	08.24	08.59	10.02
	15.37	17.15	18.37	21.07	22.39	23.38	22.48	21.09	19.22	17.41	15.09	14.32
23	09.21	07.48	06.12	05.26	03.51	03.02	04.02	05.34	07.02	08.27	09.02	10.02
	15.40	17.18	18.40	21.10	22.42	23.38	22.45	21.06	19.19	17.37	15.06	14.32
24	09.18	07.44	06.09	05.22	03.48	03.03	04.05	05.37	07.04	08.30	09.05	10.02
	15.43	17.21	18.43	21.13	22.44	23.38	22.42	21.03	19.16	17.34	15.04	14.33
25	09.16	07.41	06.06	05.19	03.45	03.03	04.08	05.40	07.07	07.33	09.08	10.03
	15.46	17.24	18.46	21.16	22.47	23.38	22.39	20.59	19.12	16.31	15.01	14.34
26	09.13	07.38	06.02	05.16	03.43	03.04	04.11	05.43	07.10	07.36	09.11	10.03
	15.50	17.27	18.48	21.19	22.50	23.37	22.37	20.56	19.09	16.28	14.59	14.35
27	09.10	07.34	05.59	05.12	03.40	03.05	04.14	05.46	07.13	07.39	09.14	10.03
	15.53	17.30	18.51	21.22	22.53	23.37	22.34	20.52	19.05	16.24	14.57	14.36
28	09.08	07.31	05.55	05.09	03.37	03.06	04.17	05.49	07.15	07.42	09.17	10.02
	15.56	17.33	18.54	21.25	22.56	23.36	22.31	20.49	19.02	16.21	14.55	14.37
29	09.05		06.52	05.06	03.35	03.07	04.20	05.52	07.18	07.45	09.20	10.02
	15.59		19.57	21.28	22.59	23.35	22.28	20.45	18.58	16.18	14.53	14.38
30	09.02		06.48	05.02	03.32	03.08	04.23	05.55	07.21	07.48	09.22	10.02
	16.02		20.00	21.31	23.01	23.34	22.24	20.42	18.55	16.15	14.51	14.40
31	08.59		06.45		03.30		04.26	05.57		07.52		10.01
	16.05		20.03		23.04		22.21	20.39		16.12		14.41
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
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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Henri Korhonen / henri.korhonen@fcg.fi
Calculated:
31.1.2024 11.42/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE3_RD200x10xHH200+Hallakallio_No_Forest Shadow receptor: I - I - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.00	08.56	07.28	06.42	04.59	03.28	03.10	04.29	06.01	07.24	07.55	09.25
	14.44	16.09	17.36	20.06	21.35	23.06	23.33	22.18	20.35	18.52	16.09	14.49
2	09.59	08.54	07.24	06.38	04.56	03.26	03.12	04.32	06.03	07.27	07.58	09.28
	14.46	16.12	17.39	20.09	21.38	23.09	23.32	22.15	20.32	18.48	16.06	14.47
3	09.59	08.51	07.21	06.35	04.53	03.24	03.13	04.35	06.06	07.30	08.01	09.30
	14.47	16.15	17.42	20.12	21.41	23.11	23.31	22.12	20.28	18.45	16.03	14.46
4	09.57	08.48	07.18	06.31	04.50	03.22	03.15	04.38	06.09	07.32	08.04	09.33
	14.49	16.18	17.45	20.14	21.44	23.14	23.29	22.09	20.25	18.41	15.59	14.44
5	09.56	08.45	07.14	06.28	04.46	03.20	03.17	04.41	06.12	07.35	08.07	09.35
	14.52	16.22	17.48	20.17	21.47	23.16	23.28	22.06	20.22	18.38	15.56	14.42
6	09.55	08.42	07.11	06.24	04.43	03.18	03.19	04.44	06.15	07.38	08.10	09.38
	14.54	16.25	17.51	20.20	21.50	23.18	23.26	22.03	20.18	18.35	15.53	14.41
7	09.54	08.39	07.08	06.21	04.40	03.16	03.21	04.47	06.17	07.41	08.13	09.40
	14.56	16.28	17.54	20.23	21.53	23.20	23.24	21.59	20.15	18.31	15.50	14.39
8	09.52	08.36	07.04	06.17	04.37	03.14	03.23	04.50	06.20	07.44	08.16	09.42
	14.58	16.31	17.57	20.26	21.56	23.22	23.22	21.56	20.11	18.28	15.47	14.38
9	09.51	08.33	07.01	06.14	04.33	03.12	03.25	04.53	06.23	07.47	08.20	09.44
	15.01	16.34	18.00	20.29	21.59	23.24	23.20	21.53	20.08	18.24	15.44	14.37
10	09.49	08.29	06.57	06.10	04.30	03.11	03.28	04.56	06.26	07.49	08.23	09.46
	15.03	16.38	18.03	20.32	22.02	23.26	23.18	21.50	20.04	18.21	15.41	14.36
11	09.47	08.26	06.54	06.07	04.27	03.09	03.30	04.59	06.29	07.52	08.26	09.48
	15.06	16.41	18.05	20.35	22.05	23.28	23.16	21.46	20.01	18.18	15.39	14.35
12	09.45	08.23	06.50	06.04	04.24	03.08	03.33	05.02	06.31	07.55	08.29	09.50
	15.09	16.44	18.08	20.38	22.08	23.30	23.14	21.43	19.57	18.14	15.36	14.34
13	09.44	08.20	06.47	06.00	04.21	03.07	03.35	05.05	06.34	07.58	08.32	09.52
	15.11	16.47	18.11	20.41	22.11	23.31	23.11	21.40	19.54	18.11	15.33	14.33
14	09.42	08.17	06.44	05.57	04.18	03.06	03.38	05.08	06.37	08.01	08.35	09.53
	15.14	16.50	18.14	20.44	22.15	23.32	23.09	21.36	19.50	18.07	15.30	14.32
15	09.40	08.14	06.40	05.53	04.15	03.05	03.40	05.11	06.40	08.04	08.38	09.55
	15.17	16.53	18.17	20.46	22.18	23.34	23.07	21.33	19.47	18.04	15.27	14.32
16	09.37	08.10	06.37	05.50	04.12	03.04	03.43	05.14	06.42	08.07	08.41	09.56
	15.20	16.56	18.20	20.49	22.21	23.35	23.04	21.30	19.43	18.01	15.24	14.32
17	09.35	08.07	06.33	05.46	04.09	03.04	03.46	05.17	06.45	08.10	08.44	09.57
	15.23	16.59	18.23	20.52	22.24	23.36	23.02	21.26	19.40	17.57	15.22	14.31
18	09.33	08.04	06.30	05.43	04.06	03.03	03.48	05.20	06.48	08.13	08.47	09.58
	15.25	17.03	18.26	20.55	22.27	23.36	22.59	21.23	19.36	17.54	15.19	14.31
19	09.31	08.01	06.26	05.40	04.03	03.03	03.51	05.23	06.51	08.16	08.50	09.59
	15.28	17.06	18.29	20.58	22.30	23.37	22.56	21.20	19.33	17.51	15.16	14.31
20	09.28	07.58	06.23	05.36	04.00	03.03	03.54	05.26	06.53	08.18	08.53	10.00
	15.31	17.09	18.31	21.01	22.33	23.38	22.54	21.16	19.30	17.47	15.14	14.31
21	09.26	07.54	06.20	05.33	03.57	03.03	03.57	05.29	06.56	08.21	08.57	10.01
	15.34	17.12	18.34	21.04	22.36	23.38	22.51	21.13	19.26	17.44	15.11	14.32
22	09.23	07.51	06.16	05.29	03.54	03.03	04.00	05.32	06.59	08.24	09.00	10.02
	15.37	17.15	18.37	21.07	22.39	23.38	22.48	21.09	19.23	17.41	15.09	14.32
23	09.21	07.48	06.13	05.26	03.51	03.03	04.03	05.35	07.02	08.27	09.02	10.02
	15.41	17.18	18.40	21.10	22.42	23.38	22.45	21.06	19.19	17.38	15.06	14.33
24	09.18	07.44	06.09	05.23	03.48	03.03	04.06	05.38	07.05	08.30	09.05	10.02
	15.44	17.21	18.43	21.13	22.44	23.38	22.42	21.03	19.16	17.34	15.04	14.33
25	09.16	07.41	06.06	05.19	03.46	03.04	04.08	05.41	07.07	07.33	09.08	10.03
	15.47	17.24	18.46	21.16	22.47	23.38	22.40	20.59	19.12	16.31	15.02	14.34
26	09.13	07.38	06.02	05.16	03.43	03.05	04.11	05.43	07.10	07.36	09.11	10.03
	15.50	17.27	18.49	21.19	22.50	23.37	22.37	20.56	19.09	16.28	14.59	14.35
27	09.10	07.34	05.59	05.13	03.40	03.06	04.14	05.46	07.13	07.39	09.14	10.03
	15.53	17.30	18.51	21.22	22.53	23.37	22.34	20.52	19.05	16.25	14.57	14.36
28	09.08	07.31	05.55	05.09	03.38	03.07	04.17	05.49	07.16	07.42	09.17	10.02
	15.56	17.33	18.54	21.25	22.56	23.36	22.31	20.49	19.02	16.21	14.55	14.37
29	09.05		06.52	05.06	03.35	03.08	04.20	05.52	07.18	07.46	09.20	10.02
	15.59		19.57	21.28	22.59	23.35	22.28	20.46	18.59	16.18	14.53	14.39
30	09.02		06.48	05.03	03.33	03.09	04.23	05.55	07.21	07.49	09.22	10.02
	16.03		20.00	21.31	23.01	23.34	22.25	20.42	18.55	16.15	14.51	14.40
31	08.59		06.45		03.30		04.26	05.58		07.52		10.01
	16.06		20.03		23.04		22.21	20.39		16.12		14.42
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
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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Henri Korhonen / henri.korhonen@fcg.fi
Calculated:
31.1.2024 11.42/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE3_RD200x10xHH200+Hallakallio_No_Forest Shadow receptor: J - J - Lomarakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.00	08.57	07.28	06.42	04.59	03.28	03.10	04.29	06.01	07.24	07.55	09.25
	14.44	16.09	17.36	20.06	21.35	23.07	23.33	22.18	20.35	18.52	16.09	14.49
2	10.00	08.54	07.24	06.38	04.56	03.26	03.12	04.32	06.03	07.27	07.58	09.28
	14.46	16.12	17.39	20.09	21.38	23.09	23.32	22.15	20.32	18.48	16.06	14.47
3	09.59	08.51	07.21	06.35	04.53	03.24	03.14	04.35	06.06	07.30	08.01	09.30
	14.47	16.15	17.42	20.12	21.41	23.12	23.31	22.12	20.29	18.45	16.03	14.46
4	09.58	08.48	07.18	06.31	04.50	03.22	03.15	04.38	06.09	07.33	08.04	09.33
	14.50	16.19	17.45	20.15	21.44	23.14	23.29	22.09	20.25	18.41	16.00	14.44
5	09.56	08.45	07.14	06.28	04.46	03.20	03.17	04.41	06.12	07.35	08.07	09.35
	14.52	16.22	17.48	20.17	21.47	23.16	23.28	22.06	20.22	18.38	15.56	14.42
6	09.55	08.42	07.11	06.24	04.43	03.18	03.19	04.44	06.15	07.38	08.10	09.38
	14.54	16.25	17.51	20.20	21.50	23.18	23.26	22.03	20.18	18.35	15.53	14.41
7	09.54	08.39	07.08	06.21	04.40	03.16	03.21	04.47	06.18	07.41	08.13	09.40
	14.56	16.28	17.54	20.23	21.53	23.21	23.24	21.59	20.15	18.31	15.50	14.39
8	09.52	08.36	07.04	06.17	04.37	03.14	03.23	04.50	06.20	07.44	08.16	09.42
	14.58	16.31	17.57	20.26	21.56	23.23	23.22	21.56	20.11	18.28	15.47	14.38
9	09.51	08.33	07.01	06.14	04.33	03.12	03.26	04.53	06.23	07.47	08.20	09.44
	15.01	16.34	18.00	20.29	21.59	23.25	23.20	21.53	20.08	18.24	15.44	14.37
10	09.49	08.30	06.57	06.11	04.30	03.11	03.28	04.56	06.26	07.50	08.23	09.46
	15.03	16.38	18.03	20.32	22.02	23.26	23.18	21.50	20.04	18.21	15.42	14.36
11	09.47	08.26	06.54	06.07	04.27	03.10	03.30	04.59	06.29	07.52	08.26	09.48
	15.06	16.41	18.06	20.35	22.05	23.28	23.16	21.46	20.01	18.18	15.39	14.35
12	09.46	08.23	06.51	06.04	04.24	03.08	03.33	05.02	06.31	07.55	08.29	09.50
	15.09	16.44	18.08	20.38	22.08	23.30	23.14	21.43	19.57	18.14	15.36	14.34
13	09.44	08.20	06.47	06.00	04.21	03.07	03.35	05.05	06.34	07.58	08.32	09.52
	15.11	16.47	18.11	20.41	22.12	23.31	23.12	21.40	19.54	18.11	15.33	14.33
14	09.42	08.17	06.44	05.57	04.18	03.06	03.38	05.08	06.37	08.01	08.35	09.53
	15.14	16.50	18.14	20.44	22.15	23.33	23.09	21.36	19.50	18.08	15.30	14.33
15	09.40	08.14	06.40	05.53	04.15	03.05	03.40	05.11	06.40	08.04	08.38	09.55
	15.17	16.53	18.17	20.47	22.18	23.34	23.07	21.33	19.47	18.04	15.27	14.32
16	09.38	08.11	06.37	05.50	04.12	03.04	03.43	05.14	06.43	08.07	08.41	09.56
	15.20	16.56	18.20	20.50	22.21	23.35	23.04	21.30	19.44	18.01	15.25	14.32
17	09.35	08.07	06.33	05.47	04.09	03.04	03.46	05.17	06.45	08.10	08.44	09.57
	15.23	17.00	18.23	20.52	22.24	23.36	23.02	21.26	19.40	17.57	15.22	14.31
18	09.33	08.04	06.30	05.43	04.06	03.03	03.48	05.20	06.48	08.13	08.48	09.58
	15.26	17.03	18.26	20.55	22.27	23.37	22.59	21.23	19.37	17.54	15.19	14.31
19	09.31	08.01	06.27	05.40	04.03	03.03	03.51	05.23	06.51	08.16	08.51	09.59
	15.28	17.06	18.29	20.58	22.30	23.37	22.56	21.20	19.33	17.51	15.17	14.31
20	09.28	07.58	06.23	05.36	04.00	03.03	03.54	05.26	06.54	08.19	08.54	10.00
	15.31	17.09	18.32	21.01	22.33	23.38	22.54	21.16	19.30	17.48	15.14	14.31
21	09.26	07.54	06.20	05.33	03.57	03.03	03.57	05.29	06.56	08.22	08.57	10.01
	15.34	17.12	18.34	21.04	22.36	23.38	22.51	21.13	19.26	17.44	15.11	14.32
22	09.24	07.51	06.16	05.30	03.54	03.03	04.00	05.32	06.59	08.25	09.00	10.02
	15.38	17.15	18.37	21.07	22.39	23.38	22.48	21.10	19.23	17.41	15.09	14.32
23	09.21	07.48	06.13	05.26	03.51	03.03	04.03	05.35	07.02	08.27	09.03	10.02
	15.41	17.18	18.40	21.10	22.42	23.38	22.45	21.06	19.19	17.38	15.07	14.33
24	09.18	07.44	06.09	05.23	03.49	03.03	04.06	05.38	07.05	08.30	09.06	10.03
	15.44	17.21	18.43	21.13	22.45	23.38	22.43	21.03	19.16	17.34	15.04	14.33
25	09.16	07.41	06.06	05.19	03.46	03.04	04.08	05.41	07.07	07.33	09.08	10.03
	15.47	17.24	18.46	21.16	22.48	23.38	22.40	20.59	19.12	16.31	15.02	14.34
26	09.13	07.38	06.02	05.16	03.43	03.05	04.11	05.44	07.10	07.37	09.11	10.03
	15.50	17.27	18.49	21.19	22.50	23.37	22.37	20.56	19.09	16.28	15.00	14.35
27	09.11	07.35	05.59	05.13	03.40	03.06	04.14	05.46	07.13	07.40	09.14	10.03
	15.53	17.30	18.52	21.22	22.53	23.37	22.34	20.53	19.05	16.25	14.57	14.36
28	09.08	07.31	05.55	05.09	03.38	03.07	04.17	05.49	07.16	07.43	09.17	10.03
	15.56	17.33	18.54	21.25	22.56	23.36	22.31	20.49	19.02	16.21	14.55	14.37
29	09.05		06.52	05.06	03.35	03.08	04.20	05.52	07.19	07.46	09.20	10.02
	15.59		19.57	21.29	22.59	23.35	22.28	20.46	18.59	16.18	14.53	14.39
30	09.02		06.49	05.03	03.33	03.09	04.23	05.55	07.21	07.49	09.23	10.02
	16.03		20.00	21.32	23.01	23.34	22.25	20.42	18.55	16.15	14.51	14.40
31	08.59		06.45		03.31		04.26	05.58		07.52		10.01
	16.06		20.03		23.04		22.22	20.39		16.12		14.42
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
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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Henri Korhonen / henri.korhonen@fcg.fi
Calculated:
31.1.2024 11.42/3.6.355

SHADOW - Calendar

Calculation: Uusimo_VE3_RD200x10xHH200+Hallakallio_No_Forest Shadow receptor: K - K - Asuinrakennus

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,00	2,84	3,78	6,60	8,77	9,10	8,87	6,80	4,67	2,52	1,17	0,58

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
717	652	423	350	431	669	978	1 225	840	592	472	499	7 848

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.01	08.57	07.28	06.42	04.59	03.28	03.10	04.29	06.01	07.24	07.55	09.25
	14.44	16.09	17.36	20.06	21.35	23.07	23.34	22.19	20.36	18.52	16.09	14.49
2	10.00	08.54	07.25	06.38	04.56	03.26	03.12	04.32	06.04	07.27	07.58	09.28
	14.46	16.12	17.39	20.09	21.38	23.09	23.32	22.16	20.32	18.48	16.06	14.47
3	09.59	08.51	07.21	06.35	04.53	03.24	03.13	04.35	06.06	07.30	08.01	09.31
	14.47	16.15	17.42	20.12	21.41	23.12	23.31	22.12	20.29	18.45	16.03	14.46
4	09.58	08.48	07.18	06.31	04.50	03.22	03.15	04.38	06.09	07.33	08.04	09.33
	14.49	16.19	17.45	20.15	21.44	23.14	23.30	22.09	20.25	18.41	16.00	14.44
5	09.57	08.45	07.14	06.28	04.46	03.20	03.17	04.41	06.12	07.35	08.07	09.36
	14.52	16.22	17.48	20.18	21.47	23.16	23.28	22.06	20.22	18.38	15.56	14.42
6	09.55	08.42	07.11	06.24	04.43	03.18	03.19	04.44	06.15	07.38	08.10	09.38
	14.54	16.25	17.51	20.20	21.50	23.19	23.26	22.03	20.18	18.35	15.53	14.41
7	09.54	08.39	07.08	06.21	04.40	03.16	03.21	04.47	06.18	07.41	08.14	09.40
	14.56	16.28	17.54	20.23	21.53	23.21	23.24	22.00	20.15	18.31	15.50	14.39
8	09.53	08.36	07.04	06.18	04.37	03.14	03.23	04.50	06.20	07.44	08.17	09.42
	14.58	16.31	17.57	20.26	21.56	23.23	23.23	21.56	20.11	18.28	15.47	14.38
9	09.51	08.33	07.01	06.14	04.33	03.12	03.25	04.53	06.23	07.47	08.20	09.44
	15.01	16.34	18.00	20.29	21.59	23.25	23.21	21.53	20.08	18.24	15.44	14.37
10	09.49	08.30	06.57	06.11	04.30	03.11	03.28	04.56	06.26	07.50	08.23	09.46
	15.03	16.38	18.03	20.32	22.03	23.27	23.18	21.50	20.04	18.21	15.42	14.36
11	09.48	08.27	06.54	06.07	04.27	03.09	03.30	04.59	06.29	07.53	08.26	09.48
	15.06	16.41	18.06	20.35	22.06	23.28	23.16	21.47	20.01	18.18	15.39	14.35
12	09.46	08.23	06.51	06.04	04.24	03.08	03.33	05.02	06.32	07.55	08.29	09.50
	15.09	16.44	18.09	20.38	22.09	23.30	23.14	21.43	19.57	18.14	15.36	14.34
13	09.44	08.20	06.47	06.00	04.21	03.07	03.35	05.05	06.34	07.58	08.32	09.52
	15.11	16.47	18.11	20.41	22.12	23.31	23.12	21.40	19.54	18.11	15.33	14.33
14	09.42	08.17	06.44	05.57	04.18	03.06	03.38	05.08	06.37	08.01	08.35	09.53
	15.14	16.50	18.14	20.44	22.15	23.33	23.09	21.37	19.51	18.08	15.30	14.32
15	09.40	08.14	06.40	05.53	04.15	03.05	03.40	05.11	06.40	08.04	08.38	09.55
	15.17	16.53	18.17	20.47	22.18	23.34	23.07	21.33	19.47	18.04	15.27	14.32
16	09.38	08.11	06.37	05.50	04.12	03.04	03.43	05.14	06.43	08.07	08.42	09.56
	15.20	16.56	18.20	20.50	22.21	23.35	23.05	21.30	19.44	18.01	15.25	14.32
17	09.36	08.07	06.33	05.47	04.09	03.04	03.46	05.17	06.45	08.10	08.45	09.58
	15.23	17.00	18.23	20.53	22.24	23.36	23.02	21.27	19.40	17.58	15.22	14.31
18	09.33	08.04	06.30	05.43	04.06	03.03	03.48	05.20	06.48	08.13	08.48	09.59
	15.25	17.03	18.26	20.56	22.27	23.37	22.59	21.23	19.37	17.54	15.19	14.31
19	09.31	08.01	06.27	05.40	04.03	03.03	03.51	05.23	06.51	08.16	08.51	10.00
	15.28	17.06	18.29	20.59	22.30	23.37	22.57	21.20	19.33	17.51	15.17	14.31
20	09.29	07.58	06.23	05.36	04.00	03.03	03.54	05.26	06.54	08.19	08.54	10.01
	15.31	17.09	18.32	21.02	22.33	23.38	22.54	21.17	19.30	17.48	15.14	14.31
21	09.26	07.54	06.20	05.33	03.57	03.02	03.57	05.29	06.56	08.22	08.57	10.01
	15.34	17.12	18.34	21.05	22.36	23.38	22.51	21.13	19.26	17.44	15.11	14.32
22	09.24	07.51	06.16	05.30	03.54	03.03	04.00	05.32	06.59	08.25	09.00	10.02
	15.38	17.15	18.37	21.08	22.39	23.39	22.48	21.10	19.23	17.41	15.09	14.32
23	09.21	07.48	06.13	05.26	03.51	03.03	04.03	05.35	07.02	08.28	09.03	10.02
	15.41	17.18	18.40	21.11	22.42	23.39	22.46	21.06	19.19	17.38	15.06	14.33
24	09.19	07.45	06.09	05.23	03.48	03.03	04.06	05.38	07.05	08.31	09.06	10.03
	15.44	17.21	18.43	21.14	22.45	23.38	22.43	21.03	19.16	17.34	15.04	14.33
25	09.16	07.41	06.06	05.19	03.46	03.04	04.08	05.41	07.07	07.34	09.09	10.03
	15.47	17.24	18.46	21.17	22.48	23.38	22.40	21.00	19.12	16.31	15.02	14.34
26	09.13	07.38	06.02	05.16	03.43	03.05	04.11	05.44	07.10	07.37	09.12	10.03
	15.50	17.27	18.49	21.20	22.51	23.38	22.37	20.56	19.09	16.28	15.00	14.35
27	09.11	07.35	05.59	05.13	03.40	03.05	04.14	05.46	07.13	07.40	09.14	10.03
	15.53	17.30	18.52	21.23	22.53	23.37	22.34	20.53	19.06	16.25	14.57	14.36
28	09.08	07.31	05.56	05.09	03.38	03.06	04.17	05.49	07.16	07.43	09.17	10.03
	15.56	17.33	18.55	21.26	22.56	23.37	22.31	20.49	19.02	16.22	14.55	14.37
29	09.05		06.52	05.06	03.35	03.08	04.20	05.52	07.19	07.46	09.20	10.03
	15.59		19.57	21.29	22.59	23.36	22.28	20.46	18.59	16.18	14.53	14.39
30	09.02		06.49	05.03	03.33	03.09	04.23	05.55	07.21	07.49	09.23	10.02
	16.03		20.00	21.32	23.02	23.35	22.25	20.42	18.55	16.15	14.51	14.40
31	09.00		06.45		03.30		04.26	05.58		07.52		10.02
	16.06		20.03		23.04		22.22	20.39		16.12		14.42
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
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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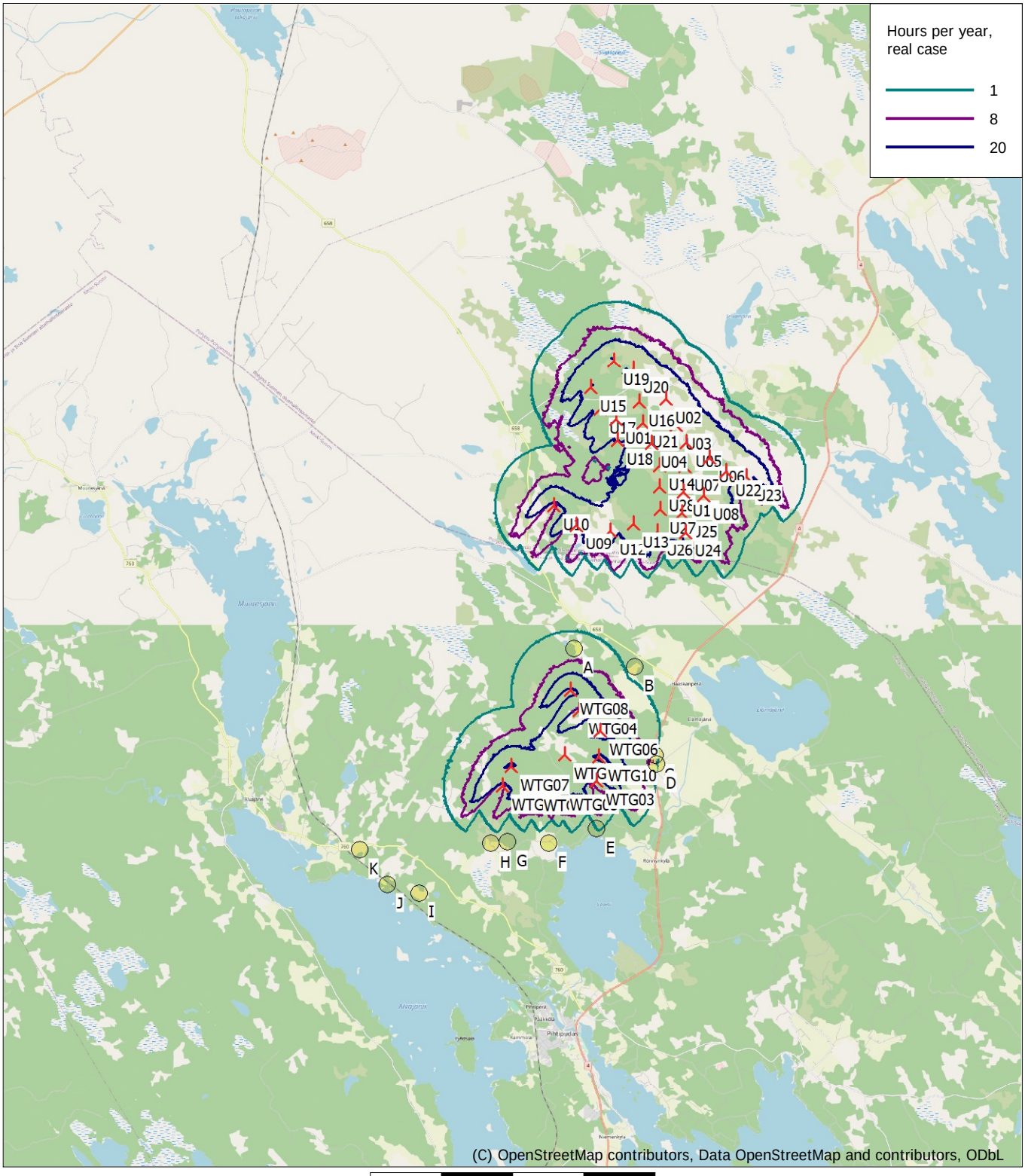
Calculated:
31.1.2024 11.42/3.6.355

SHADOW - Map

Calculation: Uusimo_VE3_RD200x10xHH200+Hallakallio_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: 427 830 North: 7 044 000

New WTG Shadow receptor

Flicker map level: Height Contours: CONTOURLINE_Pyhäntä_Pilpankangas_0.wpo (2)

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