

VSB UUSIUTUVA ENERGIA SUOMI OY

Puutionsaaren tuulivoimahanke VE1, Haapavesi

Melu- ja varjostusmallinnukset

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Rintamäki, Henna-Riikka

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Puutionsaaren tuulivoimahanke VE1, Haapavesi

1 MELU- JA VARJOSTUSMALLINNUKSEN TAVOITTEET

Haapaveden kunnassa sijaitsevan Puutionsaaren tuulivoimahankkeen hankeomistaja suunnittelee 43 voimalan rakentamista. Varjostusmallinuksissa hankkeen voimaloiden kokonaiskorkeus on 300 metriä, roottorin halkaisija 200 metriä ja napakorkeus 200 metriä. Melumallinuksissa voimaloiden kokonaiskorkeus on 279 metriä, roottorin halkaisija 158 metriä ja napakorkeus 200 metriä. Voimaloiden GE158-5,3MW melupäästö on 106,0 dB(A) + 2,0 dB(A).

Mallinuksissa on otettu huomioon hankkeen lähellä sijaitsevien Tuomiperän ja Rahkolan tuulivoimapuistojen yhteisvaikutukset.

Tuulivoimaloiden aiheuttamia meluvaikutuksia on arvioitu melun laskentamallin avulla, joiden mukaan on tehty melumallinnus WindPRO-ohjelmalla tuulivoimapuistosta DECIBEL-modulilla. Tuulivoimaloiden aiheuttamat varjostusvaikutukset on mallinnettu WindPro-ohjelman SHADOW-moduulilla alustavien voimalapaikkojen sijoitusten mukaisesti.

Melu- ja varjostusmallinnukset on laatinut ins Henna-Riikka Rintamäki FCG Suunnittelu ja tekniikka Oy:stä ja laaduntarkistuksen on tehnyt FM Liisa Karhu FCG Suunnittelu ja tekniikka Oy:stä.

2 LÄHTÖTIEDOT JA MENETELMÄT

2.1 Melu

2.1.1 Melumallinnus

Tuulivoimaloiden aiheuttamat äänenpainetasot on mallinnettu WindPRO-laskentaohjelmalla ISO 9613-2 standardin mukaisesti. Ympäristöhallinnon tuulivoimaloiden melun mallintamista koskevan ohjeen 2/2014 mukaisesti tuulen nopeutena käytettiin 8 m/s, ilman lämpötilana 15 °C, ilmanpaineena 101,325 kPa, ilman suhteellisenä kosteutena 70 % ja maanpinnan kovuutena arvoa 0,4. Laskenta on tehty 4,0 m maan pinnan tasosta. Laskennan pystysuora resoluutio on 0,5 m ja vaakasuora resoluutio on 1 m.

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

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Taulukko 1. Käytetyt mallinnusparametrit ISO 9613-2 laskelmissa sekä melulle altistuvat kohteet

| MALLINNUSOHJELMA JA VERSIO: | | | |
|---|---------------------|-----------------------------------|----------------------|
| WindPRO version 3.3 | | Mallinnusmenetelmä: ISO 9613-2 | |
| AKUSTISET TIEDOT/LASKENNAN LÄHTÖTIEDOT | | | |
| Laskenta korkeus | | Laskentaruudun koko [m·m] | |
| 4,0 m | | 25x25 m | |
| Suhteellinen kosteus | | Lämpötila | |
| 70 % | Muu, mikä ja miksi: | 15 C° | |
| Maastomallin lähde ja tarkkuus | | | |
| Maastomallin lähde: MML maastotietokanta | | Vaakaresoluutio: 1,0 | Pystyresoluutio: 0,5 |
| Maan- ja vedenpinnan absorptioon ja heijastuksen huomioiminen, käytetyt kertoimet | | | |
| Maa | | 0,4 | HUOM |
| Vesistö | | 0,0 | |
| Ilmakehän stabiilius laskennassa/meteorologinen korjaus | | | |
| Neutraali, (0): Neutraali | | Muu, mikä ja miksi: | |
| Sääolosuhteiden huomiointi; laskennassa käytetty tuulen suunnat ja nopeus | | | |
| Tuulen suunta: 0-360° | | Tuulenoisuus: 8 m/s | |
| Voimalan äänen suuntaavuus ja vaimentuminen | | | |
| Vapaa avaruus: kyllä | Muu, mikä, miksi: | | |

2.1.2 Yhteismelumallinnus

Yhteismelumallinnuksessa on mallinnettu tuulivoimahankkeiden Tuomiperä ja Rahkola yhteisvaikutukset. Tuomiperän voimaloiden melupäästö on 106,0 dB(A) + 1,8 dB(A). Voimaloiden kokonaiskorkeus on 240 metriä, roottorin halkaisija 175 metriä ja napakorkeus 152,5 metriä.

Rahkolan voimaloiden V150-4,2MW melupäästö on 104,9 dB(A). Voimalan kokonaiskorkeus on 230 metriä, roottorin halkaisija 150 metriä ja napakorkeus 155 metriä.

2.1.3 Matalataajuinen melu

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

Ohje 2/2014 antaa menetelmän matalataajuisen melun laskentaan rakennusten ulkopuolelle. Sosiaali- ja terveysministeriön Asumisterveysasetus 2015 antaa matalataajuiselle melulle toimenpiderajat asuinhuoneissa. Rakennusten sisälle kantautuva äänitaso arvioitiin Turun AMK:n (Keränen, Hakala ja Hongisto, 2017) julkistamien ääneneristävyysarvoin ja tuloksia verrattiin toimenpiderajoihin.

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YM 2/2014 ohjeistaa arvioimaan rakennusten sisälle kantautuvat äänitasot DSO 1284 mukaisesti. Keräsen, Hakalan ja Hongiston (2017) antamat eristysarvot, tersseille 20-200 Hz, ovat 0,6-10,2 dB heikkomat kuin vastaavat arvot DSO 1284:ssa. On siten perusteltu arvioida, mikäli melutasot sisällä alittavat asumisterveysasetuksessa annetut toimenpiderajat asuinhuoneissa Keräsen, Hakalan ja Hongiston (2017) arvoilla, ne myös alittuisivat DSO 1284 eristysarvioilla.

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

2.2 Varjostusmallinnus

2.2.1 Varjostusmallinnus

Tuulivoimaloiden varjostusvaikutuksia mallinnettiin WindPRO-ohjelman Shadow-moduulilla. Laskennoissa varjot huomioidaan, jos aurinko on yli 3 astetta horisontin yläpuolella ja varjoksi lasketaan, kun siipi peittää vähintään 20 % auringosta.

Varjostusmallin laskennassa on huomioitu hankealueen korkeustiedot, tuulivoimaloiden sijainnit, tuulivoimalan napakorkeudet ja roottorin halkaisija ja hankealueen aikavyöhyke. 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 koko oli 5,0 x 5,0 metriä. Laskentaikkunoiden suunnat asennettiin voimaloita kohti ns "greenhouse mode".

Auringon keskimääräiset paistetunnit perustuvat Uumajan sääaseman pitkäaikaisiin mitattuihin säätietoihin 1981-2010, (Ilmatieteenlaitos raportti 2012:1. Laskentojen tuulen suunta ja nopeusjakaumana käytettiin NASA:n MERRA-dataa (Modern Era Retrospective-analysis for Research and Applications) hankealueen läheisyydeltä.

Varjostusmallinnuksen tuloksia on havainnollistettu kartan avulla. Kartalla esitetään varjostusvaikutuksen (1, 8 ja 20 tuntia vuodessa) laajuus. Sen lisäksi mallinnuksessa on erikseen laskettu vaikutus tuulivoimapuistoalueen ympäristössä oleviin herkkiin kohteisiin.

Varjostusmallinnuksessa on huomioitu puuston suojaava vaikutus käyttäen Luonnonvarakeskuksen aineistoa vuodelta 2017.

2.2.2 Varjostuksen yhteisvaikutusmallinnus

Yhteismelumallinnuksessa on mallinnettu tuulivoimahankkeiden Tuomiperä ja Rahkola yhteisvaikutukset. Tuomiperän voimaloiden koko on (RD) 175 metriä, napakorkeus (HH) 152,5 metriä ja kokonaiskorkeus on 240 metriä.

Rahkolan voimaloiden V150-4,2MW kokonaiskorkeus on 230 metriä, roottorin halkaisija 150 metriä ja napakorkeus 155 metriä.

Voimaloiden käyttötuntimäärä on ilman yhteisvaikutusvoimaloita 8674 tuntia vuodessa ja yhteisvaikutusvoimaloilla mallinnettuna 8673 tuntia vuodessa. Yhteisvaikutusmallinnusten varjostuslaskelmien vaikutukset ovat mallinnuksen mukaan joidenkin laskentapisteidien osalta vähäisemmät, koska voimaloiden käyttötuntimäärä on mallinnuksessa pienempi.

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Yhteisvarjostusmallinnuksessa on huomioitu puuston suojaava vaikutus käyttäen Luonnonvarakeskuksen vuoden 2017 aineistoa.

2.3 Kartta-aineisto

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

Rakennusten käyttötarkoitus on arvoitu MML:n maastotietokannan asuin-, liike- tai julkisen-, loma- teollisen-, kirkollisen, tai muun rakennuksen mukaisesti.

Tulokset on esitetty taajuuskohtaisena taulukkona hankealueen ympäröidyille taloille.

2.4 Voimalat

Tuulivoimaloiden melumallinnuksen lähtöarvoina on käytetty valmistajan ilmoittamia tuulivoimaloiden melupäästön arvoja.

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Taulukko 2. Hankkeen tuulivoimaloiden kokotiedot varjostusmallinuksissa Generic RD200 HH200.

| TUULIVOIMALAN (TUULIVOIMALOIDEN TIEDOT) | | | | | |
|--|------|--------------------|---------------|-----------------------------|----------------------|
| Tuulivoimalan valmistaja: Generic | | | Tyyppi: RD200 | | Sarjanumero/t: - |
| Nimellisteho: | | Napakorkeus: 200 m | | Roottorin halkaisija: 200 m | Tornin tyyppi: teräs |
| Mahdollisuudet vaikuttaa tuulivoimalan melupäästöön käytön aikana ja sen vaikutus meluun | | | | | |
| Lapakulman säätö | | Pyörimisnopeus | | Muu, mikä | |
| Kyllä | - dB | Kyllä | - dB | Noise mode säätö: | - |
| Ei | | Ei | | Noise mode, lähtömelutaso | - |

Taulukko 3. Hankkeen tuulivoimaloiden GE158-5.3MW HH200 tyyppitiedot ja äänitehotasot sekä melun erityispiirteet.

| TUULIVOIMALAN (TUULIVOIMALOIDEN TIEDOT) | | | | | | | |
|--|-------|-------------------------------|---------------|--|------|-----------------------|------|
| Tuulivoimalan valmistaja: General Electric | | | Tyyppi: GE158 | | | Sarjanumero/t: - | |
| Nimellisteho: 5,3 MW | | Napakorkeus: 200 m | | Roottorin halkaisija: 158 m | | Tornin tyyppi: teräs | |
| Mahdollisuudet vaikuttaa tuulivoimalan melupäästöön käytön aikana ja sen vaikutus meluun | | | | | | | |
| Lapakulman säätö | | Pyörimisnopeus | | Muu, mikä | | | |
| Kyllä | - dB | Kyllä | - dB | Noise mode säätö: | | Mode 0 STE – Level 06 | |
| Ei | | Ei | | Noise mode, lähtömelutaso | | 106,0 dB(A) | |
| AKUSTISET TIEDOT/LASKENNAN LÄHTÖTIEDOT | | | | | | | |
| Melupäästötiedot perustuvat dokumenttiin: Noise_Emission-NO_5.3-158-50Hz_IEC_EN_r01.pdf | | | | | | | |
| Valmistajan ilmoittama tuulivoimalan tuottama äänitehotaso vastaa keskiäänitasoa, jolloin voimalan lähtöarvoihin lisätään mallinuksissa +2 dB vastaamaan ylempää luottamusväliä 95%. | | | | | | | |
| Oktaaveittain [Hz], dB(A) | | 1/3-oktaaveittain [Hz], dB(A) | | | | | |
| 31,5 | - | 20 | 63,1 | 200 | 90,8 | 2000 | 94,3 |
| 63 | 87,2 | 25 | 67,8 | 250 | 92,3 | 2500 | 92,3 |
| 125 | 92,6 | 31,5 | 72,2 | 315 | 93,6 | 3150 | 89,7 |
| 250 | 97,2 | 40 | 76,1 | 400 | 94,1 | 4000 | 85,9 |
| 500 | 99,6 | 50 | 79,4 | 500 | 94,9 | 5000 | 81,8 |
| 1000 | 101,3 | 63 | 82,2 | 630 | 95,5 | 6300 | 75,5 |
| 2000 | 99,1 | 80 | 84,4 | 800 | 96 | 8000 | 65,9 |
| 4000 | 91,7 | 100 | 86,1 | 1000 | 96,5 | 10000 | 53,3 |
| 8000 | 76 | 125 | 87,7 | 1250 | 97 | | |
| 106,0 dB(A) | | 160 | 89,2 | 1600 | 95,7 | | |
| Melun erityispiirteiden mittaust ja havainnot: | | | | | | | |
| Kapeakaistaisuus / Tonaalisuus | | Impulssimaisuus | | Merkityksellinen sykintä (amplitudimodulaatio) | | Muu, Mikä: | |
| kyllä | Ei | kyllä | ei | kyllä | ei | kyllä | ei |

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Taulukko 4. Rahkolan hankkeen tuulivoimaloiden V150-4.2MW HH155 tyyppitiedot ja äänitehotasot sekä melun erityispiirteet.

| TUULIVOIMALAN (TUULIVOIMALOIDEN TIEDOT) | | | | | | | |
|---|------|-------------------------------|-------|--|------|---------------------------|---------------------|
| Tuulivoimalan valmistaja: Vestas | | | | Tyyppi: V150-4.2 | | Sarjanumero/t: - | |
| Nimellisteho: 4,2 MW | | Napakorkeus: 155 m | | Roottorin halkaisija: 150 m | | Tornin tyyppi: teräs | |
| Mahdollisuudet vaikuttaa tuulivoimalan melupäästöön käytön aikana ja sen vaikutus meluun | | | | | | | |
| Lapakulman säätö | | Pyörimisnopeus | | Muu, mikä | | | |
| Kyllä | - | dB | Kyllä | - | dB | Noise mode säätö: | Mode PO1 – Mode OS |
| Ei | | | Ei | | | Noise mode, lähtömelutaso | 104,9 – 108,0 dB(A) |
| AKUSTISET TIEDOT/LASKENNAN LÄHTÖTIEDOT | | | | | | | |
| Melupäästötiedot perustuvat dokumenttiin " DMS 0067-4767_V03_V150-4.0/4.2 MW- Third Octave noise emission. Valmistajan ilmoittama tuulivoimalan tuottaman äänitehotaso perustuu todellisiin mittaustuloksiin ja vastaa ylempää luottamusväliä 95%, | | | | | | | |
| Oktaaveittain [Hz], dB(A) | | 1/3-oktaaveittain [Hz], dB(A) | | | | | |
| 31,5 | - | 20 | 62,2 | 200 | 92,2 | 2000 | 90,2 |
| 63 | 86,5 | 25 | 66,5 | 250 | 93,4 | 2500 | 88,3 |
| 125 | 93,7 | 31,5 | 70,6 | 315 | 94,3 | 3150 | 86,0 |
| 250 | 98,2 | 40 | 74,6 | 400 | 94,9 | 4000 | 83,4 |
| 500 | 99,9 | 50 | 77,9 | 500 | 95,2 | 5000 | 80,5 |
| 1000 | 98,9 | 63 | 81,1 | 630 | 95,2 | 6300 | 77,3 |
| 2000 | 95,1 | 80 | 84,1 | 800 | 94,8 | 8000 | 73,6 |
| 4000 | 88,6 | 100 | 86,5 | 1000 | 94,2 | 10000 | 69,8 |
| 8000 | 79,4 | 125 | 88,6 | 1250 | 93,2 | | |
| 104,9 dB(A) | | 160 | 90,7 | 1600 | 91,8 | | |
| Melun erityispiirteiden mittaustulos ja havainnot: | | | | | | | |
| Kapeakaistaisuus / Tonaalisuus | | Impulssimaisuus | | Merkityksellinen sykintä (amplitudimodulaatio) | | Muu, Mikä: | |
| kyllä | Ei | kyllä | ei | kyllä | ei | kyllä | ei |

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Taulukko 5. Tuomiperän hankkeen tuulivoimaloiden GE158-5.3MW RD175 HH152,5 tyyppitiedot ja äänitehotasot sekä melun erityispiirteet.

| TUULIVOIMALAN (TUULIVOIMALOIDEN TIEDOT) | | | | | | | |
|---|-------|-------------------------------|-------|--|------|---------------------------|-----------------------|
| Tuulivoimalan valmistaja: General Electric | | | | Tyyppi: GE158 | | Sarjanumero/t: - | |
| Nimellisteho: 5,3 MW | | Napakorkeus: 152,5 m | | Roottorin halkaisija: 175 m | | Tornin tyyppi: hybridi | |
| Mahdollisuudet vaikuttaa tuulivoimalan melupäästöön käytön aikana ja sen vaikutus meluun | | | | | | | |
| Lapakulman säätö | | Pyörimisnopeus | | Muu, mikä | | | |
| Kyllä | - | dB | Kyllä | - | dB | Noise mode säätö: | Mode 0 STE – Level 06 |
| Ei | | | Ei | | | Noise mode, lähtömelutaso | 107,8 dB(A) |
| AKUSTISET TIEDOT/LASKENNAN LÄHTÖTIEDOT | | | | | | | |
| Melupäästötiedot perustuvat dokumenttiin: | | | | | | | |
| Technical Documentation Wind Turbine Generator Systems 5.3-158 - 50 Hz, Noise_Emission-NO_5.3-158-50Hz_IEC_EN_r03.docx. | | | | | | | |
| Melupäästötiedot (valmistajan ilmoittamat melupäästön takuuarvot). | | | | | | | |
| Oktaaveittain [Hz], dB(A) | | 1/3-oktaaveittain [Hz], dB(A) | | | | | |
| 31,5 | - | 20 | 64,9 | 200 | 92,6 | 2000 | 96,1 |
| 63 | 79,8 | 25 | 69,6 | 250 | 94,1 | 2500 | 94,1 |
| 125 | 89 | 31,5 | 74 | 315 | 95,4 | 3150 | 91,5 |
| 250 | 94,4 | 40 | 77,9 | 400 | 95,9 | 4000 | 87,7 |
| 500 | 99 | 50 | 81,2 | 500 | 96,7 | 5000 | 83,6 |
| 1000 | 101,5 | 63 | 84 | 630 | 97,3 | 6300 | 77,3 |
| 2000 | 103,1 | 80 | 86,2 | 800 | 97,8 | 8000 | 67,7 |
| 4000 | 100,9 | 100 | 87,9 | 1000 | 98,3 | 10000 | 55,1 |
| 8000 | 93,5 | 125 | 89,5 | 1250 | 98,8 | | |
| 107,8 dB(A) | | 160 | 91 | 1600 | 97,5 | | |
| Melun erityispiirteiden mittaust ja havainnot: | | | | | | | |
| Kapeakaistaisuus / Tonaalisuus | | Impulssimaisuus | | Merkityksellinen sykintä (amplitudimodulaatio) | | Muu, Mikä: | |
| kyllä | Ei | kyllä | ei | kyllä | ei | kyllä | ei |

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2.5 Raja- ja ohjearvot

2.5.1 Melu

Valtioneuvoston asetuksessa (1107/2015) tuulivoimaloille on määritelty ohjearvot päivä- ja yöajan keskiäänitasojen maksimiarvolle. Asetus tuli voimaan 1.9.2015. Jos tuulivoimalan melu sisältää tonaalisia, kapeakaistaisia tai impulssimaisia komponentteja, tai se on selvästi amplitudimoduloitunutta, mallinnustuloksiin tulee ohjeen mukaan lisätä viisi desibeliä ennen ohjearvoon vertaamista. Koska ohjearvo sisältää jo tyypillisen tuulivoimamelun piirteet, edellä mainitut äänenpiirteiden tulee olla tuulivoimalalle epätyypillisen voimakkaita, jotta mallinnustuloksissa täytyy huomioida viiden desibelin lisä äänenvoimakkuuteen.

Taulukko 6. Valtioneuvoston asetuksen mukaiset tuulivoimaloiden melutason ohjearvot (Valtioneuvoston asetus 1107/2015).

| 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. Asetus tuli voimaan 15.5.2015. 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.

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2.5.2 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 2012).

Useissa maissa on annettu raja-arvoja tai suosituksia hyväksyttävän välkevaikutuksen määrästä. Esimerkiksi Ruotsissa suositus on kahdeksan tuntia vuodessa ja 30 minuuttia päivässä.

Arvioinnissa on tarkasteltu vaikutuksia alueella, jossa varjoja tai välkettä mallinnuksen mukaisessa todellisessa tilanteessa ("real case") esiintyy vähintään kahdeksan tuntia vuodessa.

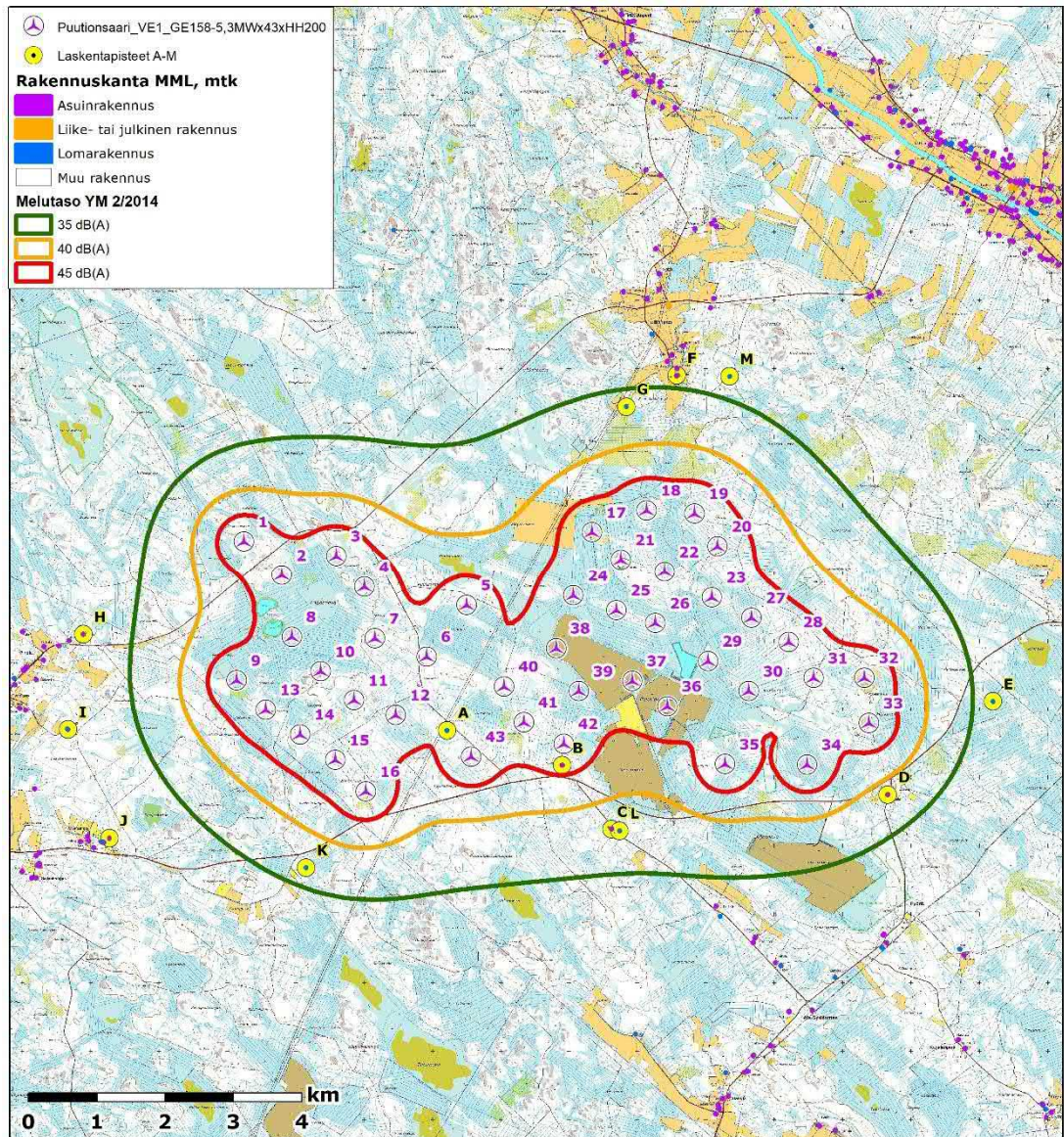
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3 MELU- JA VARJOSTUSMALLINNUSTEN TULOKSET

3.1 Melun laskentatulokset ISO 9613-2

3.1.1 Melumallinnus

Tuulivoimamelu ylittää nykytilanteessa 40 dB tuulivoimahankkeen läheisyydessä sijaitsevilla laskentapisteillä lomarakennus A ja asuinrakennus B (taulukko 10).



Kuva 1. Laskennalliset melutasot standardin ISO 9613-2 mukaisesti.

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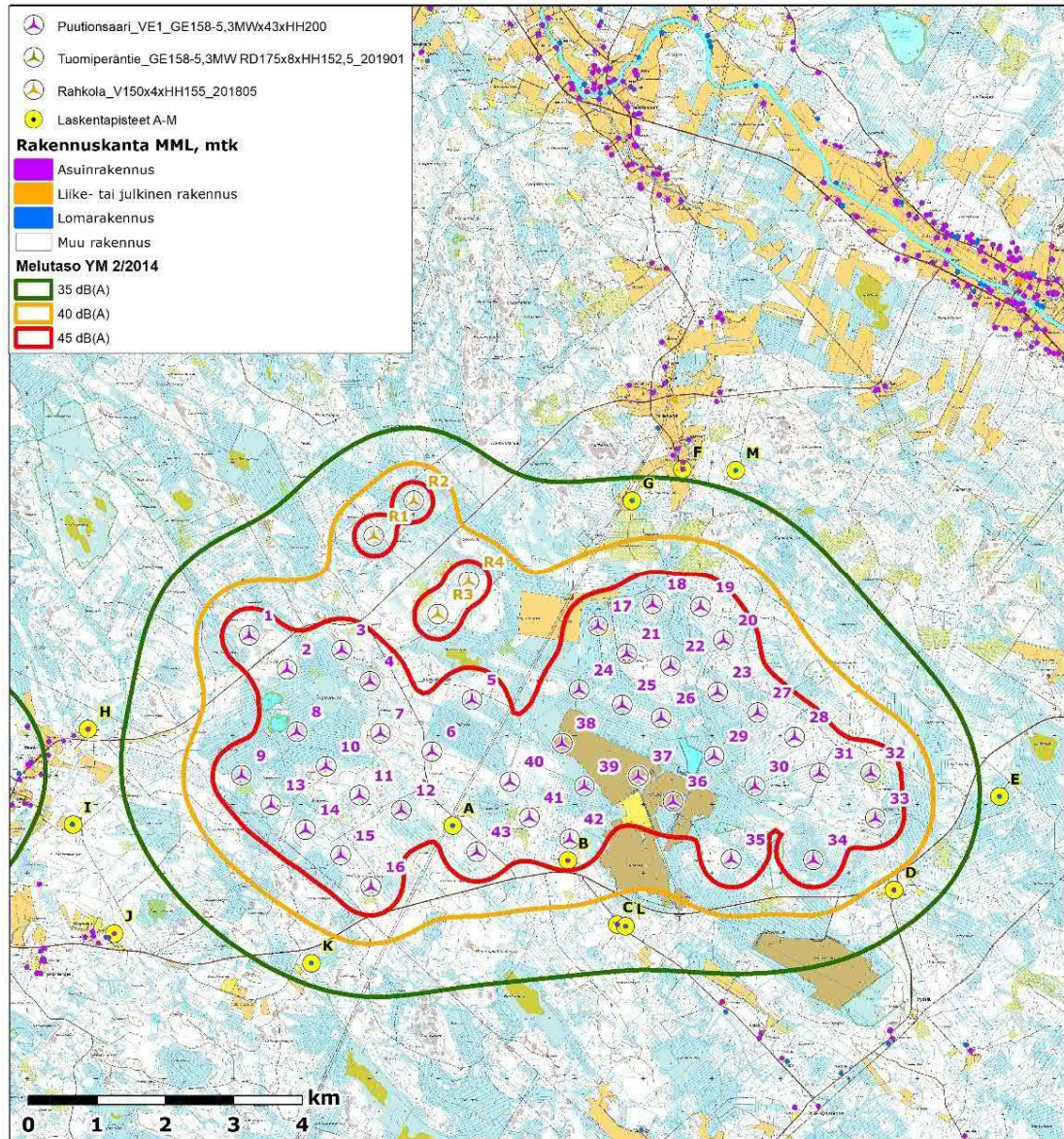
Taulukko 8. Laskennalliset melutasot standardin ISO 9613-2 mukaisesti.

| Laskentapiste | ETRS89- TM35 Itä | ETRS89- TM35 Pohjoinen | Kohteen korkeus- asema (m) | Melutaso dB(A) |
|---|------------------------|------------------------------|----------------------------------|-------------------|
| Lomarakennus A (Vesiperän metsätie, Kivikaarto) | 402212 | 7109691 | 112,5 | 45,6 |
| Asuinrakennus B (Ylivieskantie, Pöhlölä) | 403894 | 7109182 | 114,4 | 47,3 |
| Asuinrakennus C (Perkkiontie 382) | 404620 | 7108247 | 113,6 | 37,7 |
| Asuinrakennus D (Alakyläntie 243) | 408659 | 7108752 | 119,4 | 38,4 |
| Lomarakennus E (Kellokankaan metsätie) | 410199 | 7110115 | 122,5 | 33,4 |
| Asuinrakennus F (Ollilantie 112) | 405573 | 7114900 | 87,7 | 34,1 |
| Lomarakennus G (Ollilantie, Siliäkuru) | 404837 | 7114441 | 100 | 36,3 |
| Asuinrakennus H (Pinolantie 406) | 396893 | 7111098 | 88,1 | 31,8 |
| Asuinrakennus I (Kortenevantie 116) | 396670 | 7109704 | 87,5 | 30,6 |
| Asuinrakennus J (Haapavesitie 1406) | 397273 | 7108116 | 89,3 | 30,2 |
| Lomarakennus K (Kurunoja) | 400152 | 7107685 | 102,3 | 36,6 |
| Lomarakennus L (Perkkiontie, Ilmola) | 404739 | 7108222 | 113,7 | 37,6 |
| Lomarakennus M (Riskalan metsätie) | 406348 | 7114887 | 102,7 | 33,5 |

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3.1.2 Yhteismelumallinnus

Yhteismelumallinnuksessa tuulivoimamelu ylittää 40 dB tuulivoimahankkeen läheisyydessä sijaitsevilla laskentapisteillä lomarakennus A ja asuinrakennus B (taulukko 11).



Kuva 2. Laskennalliset yhteismelutasot standardin ISO 9613-2 mukaisesti.

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Taulukko 9. Laskennalliset yhteismelumallinnuksen melutasot standardin ISO 9613-2 mukaisesti.

| Laskentapiste | ETRS89- TM35 Itä | ETRS89- TM35 Pohjoinen | Kohteen korkeus- asema (m) | Melutaso dB(A) |
|---|------------------------|------------------------------|----------------------------------|-------------------|
| Lomarakennus A (Vesiperän metsätie, Kivikaarto) | 402212 | 7109691 | 112,5 | 45,6 |
| Asuinrakennus B (Ylivieskantie, Pöhlölä) | 403894 | 7109182 | 114,4 | 47,3 |
| Asuinrakennus C (Perkkiontie 382) | 404620 | 7108247 | 113,6 | 37,8 |
| Asuinrakennus D (Alakyläntie 243) | 408659 | 7108752 | 119,4 | 38,4 |
| Lomarakennus E (Kellokankaan metsätie) | 410199 | 7110115 | 122,5 | 33,4 |
| Asuinrakennus F (Ollilantie 112) | 405573 | 7114900 | 87,7 | 34,3 |
| Lomarakennus G (Ollilantie, Siliäkuru) | 404837 | 7114441 | 100 | 36,6 |
| Asuinrakennus H (Pinolantie 406) | 396893 | 7111098 | 88,1 | 34 |
| Asuinrakennus I (Kortenevantie 116) | 396670 | 7109704 | 87,5 | 33,7 |
| Asuinrakennus J (Haapavesitie 1406) | 397273 | 7108116 | 89,3 | 31,6 |
| Lomarakennus K (Kurunoja) | 400152 | 7107685 | 102,3 | 36,7 |
| Lomarakennus L (Perkkiontie, Ilmola) | 404739 | 7108222 | 113,7 | 37,6 |
| Lomarakennus M (Riskalan metsätie) | 406348 | 7114887 | 102,7 | 33,6 |

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3.2 Matalataajuiset melutasot

3.2.1 Matalataajuinen melutaso

Mallinnettaessa voimalaitostyyppillä, on matalataajuinen melu voimakkainta kohteen asuinrakennus B luona, jossa se ulkona enimmillään ylittää Sosiaali- ja terveysministeriön asumisterveysohjeen asuinhuoneiden ohjearvon noin 13,2 dB taajuudella 63 Hz. Sisällä ohjearvo ylittyy ja enimmillään melu on noin 4,9 dB yli ohjearvon taajuudella 50 Hz. Ohjearvo ylittyy myös kohteessa lomarakennus A (Taulukko 12).

Taulukko 10. Matalataajuisen melun mallinnustulokset herkissä kohteissa verrattuna Sosiaali- ja terveysministeriön asumisterveysohjearvoon.

| Rakennus | Äänitaso ulkona | | Äänitaso sisällä | |
|---|--|----|--|----|
| | L eq,1h - Asumisterveys- ohje sisällä | Hz | L eq,1h - Asumisterveys- ohje sisällä | Hz |
| Lomarakennus A (Vesiperän metsätie, Kivikaarto) | 12,5 | 63 | 4,1 | 50 |
| Asuinrakennus B (Ylivieskantie, Pöhlölä) | 13,2 | 63 | 4,9 | 50 |
| Asuinrakennus C (Perkkiontie 382) | 7,7 | 63 | -0,6 | 50 |
| Asuinrakennus D (Alakyläntie 243) | 7,1 | 63 | -1,2 | 50 |
| Lomarakennus E (Kellokankaan metsätie) | 4,1 | 63 | -4,1 | 50 |
| Asuinrakennus F (Ollilantie 112) | 5,1 | 63 | -3,1 | 50 |
| Lomarakennus G (Ollilantie, Siliäkuru) | 6,5 | 63 | -1,8 | 50 |
| Asuinrakennus H (Pinolantie 406) | 3,4 | 63 | -4,8 | 50 |
| Asuinrakennus I (Kortenevantie 116) | 2,7 | 63 | -5,5 | 50 |
| Asuinrakennus J (Haapavesitie 1406) | 2,5 | 63 | -5,7 | 50 |
| Lomarakennus K (Kurunoja) | 6,4 | 63 | -1,9 | 50 |
| Lomarakennus L (Perkkiontie, Ilmola) | 7,6 | 63 | -0,7 | 50 |
| Lomarakennus M (Riskalan metsätie) | 4,7 | 63 | -3,5 | 50 |

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3.2.2 Matalataajuinen melu yhteismallinnus

Mallinnettaessa voimalaitostyyppillä, on matalataajuinen melu voimakkainta kohteen asuinrakennus B luona, jossa se ulkona enimmillään ylittää Sosiaali- ja terveysministeriön asumisterveysohjeen asuinhuoneiden ohjearvon noin 13,3 dB taajuudella 63 Hz. Sisällä ohjearvo ylittyy ja enimmillään melu on noin 4,9 dB yli ohjearvon taajuudella 50 Hz. Ohjearvo ylittyy myös kohteissa lomarakennus A ja lomarakennus L (Taulukko 13).

Taulukko 11. Matalataajuisen melun yhteismallinnuksen tulokset herkissä kohteissa verrattuna Sosiaali- ja terveysministeriön asumisterveysohjearvoon.

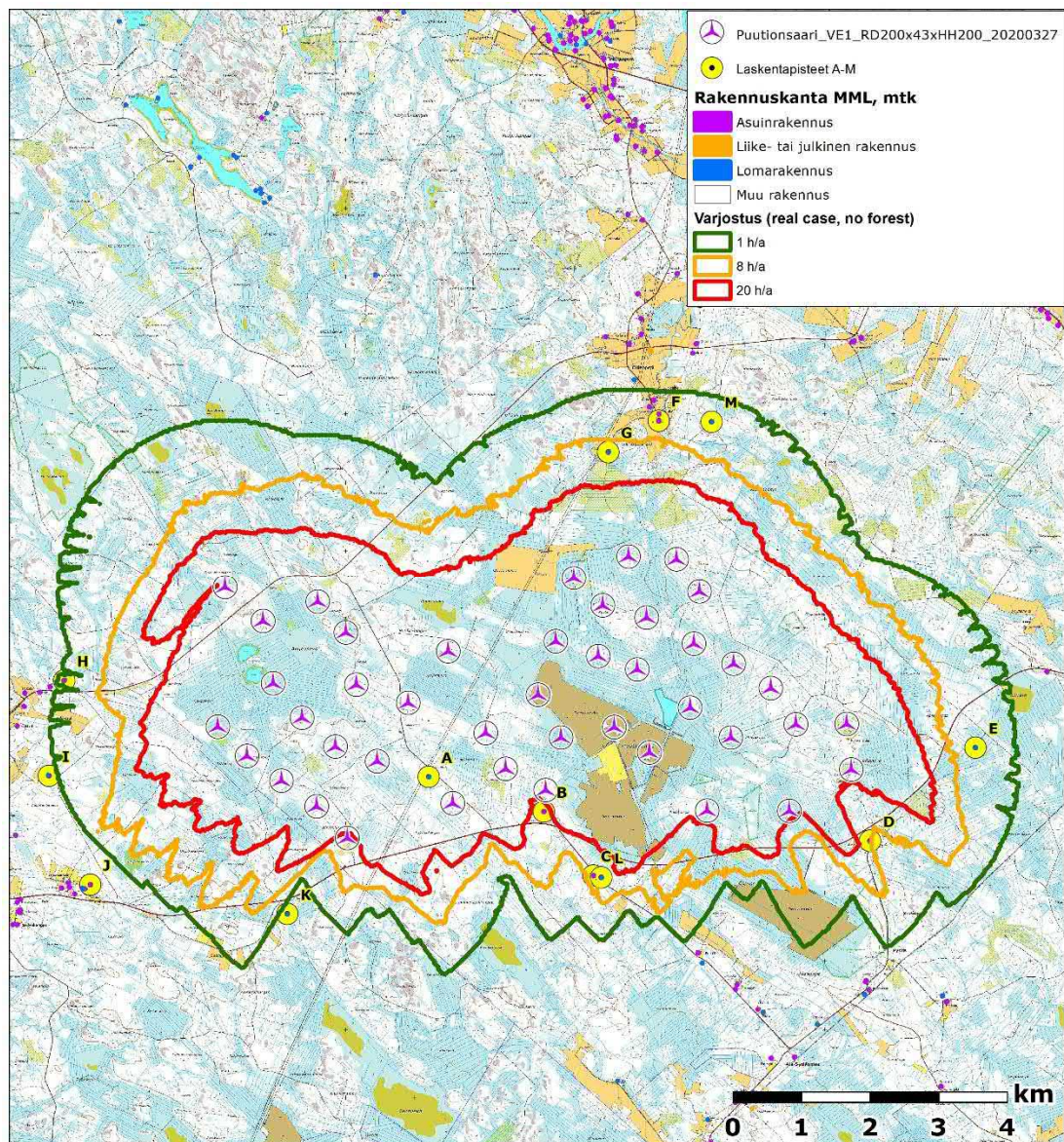
| Rakennus | Äänitaso ulkona | | Äänitaso sisällä | |
|---|--|----|--|----|
| | L eq,1h - Asumisterveys- ohje sisällä | Hz | L eq,1h - Asumisterveys- ohje sisällä | Hz |
| Lomarakennus A (Vesiperän metsätie, Kivikaarto) | 12,6 | 63 | 4,2 | 50 |
| Asuinrakennus B (Ylivieskantie, Pöhlölä) | 13,3 | 63 | 4,9 | 50 |
| Asuinrakennus C (Perkkiontie 382) | 7,8 | 63 | -0,5 | 50 |
| Asuinrakennus D (Alakyläntie 243) | 7,1 | 63 | -1,2 | 50 |
| Lomarakennus E (Kellokankaan metsätie) | 4,2 | 63 | -4,0 | 50 |
| Asuinrakennus F (Ollilantie 112) | 5,4 | 63 | -2,8 | 50 |
| Lomarakennus G (Ollilantie, Siliäkuru) | 6,8 | 63 | -1,5 | 50 |
| Asuinrakennus H (Pinolantie 406) | 5,2 | 63 | -3,0 | 50 |
| Asuinrakennus I (Kortenevantie 116) | 5,0 | 63 | -3,3 | 50 |
| Asuinrakennus J (Haapavesitie 1406) | 3,9 | 63 | -4,4 | 50 |
| Lomarakennus K (Kurunoja) | 6,6 | 63 | -1,6 | 50 |
| Lomarakennus L (Perkkiontie, Iimola) | 7,7 | 63 | -0,6 | 50 |
| Lomarakennus M (Riskalan metsätie) | 5,0 | 63 | -3,3 | 50 |

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3.3 Varjostusmallinnuksen tulokset

3.3.1 Varjostusmallinnus

Tuulivoimapuistoa lähimpien asuinrakennusten pihapiirissä kohteissa lomarakennus A (93 tuntia 10 minuuttia), asuinrakennus B (14 tuntia 8 minuuttia), asuinrakennus C (10 tuntia 51 minuuttia), asuinrakennus D (9 tuntia 15 minuuttia), lomarakennus G (11 tuntia 22 minuuttia) ja lomarakennus L (13 tuntia 5 minuuttia) on varjostusvaikutusta yli 8 tuntia vuodessa. Mallinnuksessa ei otettu huomioon puustoa (Taulukko 14).



Kuva 3. Laskennalliset varjostusmallinnuksen tulokset "real case, no forest".

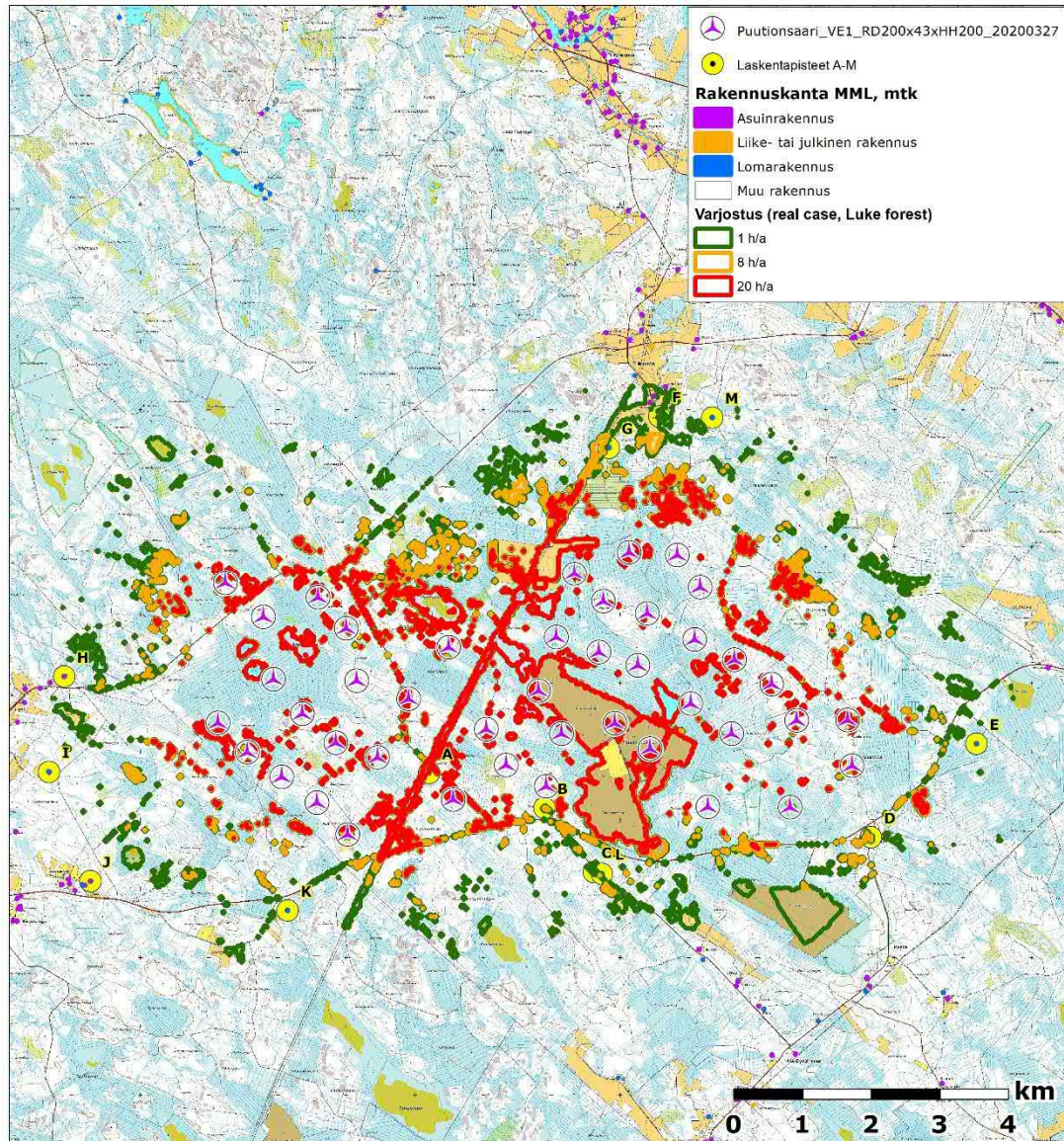
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Taulukko 12. Laskennalliset varjostustunnit vuodessa lähialueen laskentapisteissä, kun puuston suojaavaa vaikutusta ei ole huomioitu "real case, no forest".

| Laskentapiste | ETRS89- TM35 Itä | ETRS89- TM35 Pohjoinen | Kohteen korkeus- asema | Varjostus (h/a) |
|---|------------------------|------------------------------|------------------------------|--------------------|
| Lomarakennus A (Vesiperän metsätie, Kivikaarto) | 402212 | 7109691 | 112,5 | 93:10 |
| Asuinrakennus B (Ylivieskantie, Pöhlölä) | 403894 | 7109182 | 114,4 | 14:08 |
| Asuinrakennus C (Perkkiöntie 382) | 404620 | 7108247 | 113,6 | 10:51 |
| Asuinrakennus D (Alakyläntie 243) | 408659 | 7108752 | 119,4 | 9:15 |
| Lomarakennus E (Kellokankaan metsätie) | 410199 | 7110115 | 122,5 | 4:29 |
| Asuinrakennus F (Ollilantie 112) | 405573 | 7114900 | 87,7 | 4:45 |
| Lomarakennus G (Ollilantie, Siliäkuru) | 404837 | 7114441 | 100 | 11:22 |
| Asuinrakennus H (Pinolantie 406) | 396893 | 7111098 | 88,1 | 1:16 |
| Asuinrakennus I (Kortenevantie 116) | 396670 | 7109704 | 87,5 | 0:00 |
| Asuinrakennus J (Haapavesitie 1406) | 397273 | 7108116 | 89,3 | 0:00 |
| Lomarakennus K (Kurunoja) | 400152 | 7107685 | 102,3 | 0:00 |
| Lomarakennus L (Perkkiontie, Ilmola) | 404739 | 7108222 | 113,7 | 13:05 |
| Lomarakennus M (Riskalan metsätie) | 406348 | 7114887 | 102,7 | 3:37 |

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Kun puuston suojaava vaikutus huomioitiin, tuulivoimapuistoa lähimpien asuinrakennusten pihapiirissä kohteissa lomarakennus A (58 tuntia 25 minuuttia), asuinrakennus B (9 tuntia 9 minuuttia), asuinrakennus C (10 tuntia 51 minuuttia), asuinrakennus D (9 tuntia 15 minuuttia) ja lomarakennus L (13 tuntia 5 minuuttia) on varjostusvaikutusta yli 8 tuntia vuodessa (Taulukko 15).



Kuva 4. Laskennalliset varjostusmallinnuksen tulokset "real case, Luke forest".

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Taulukko 13. Laskennalliset varjostustunnit vuodessa lähialueen laskentapisteissä, kun puuston suojaavaa vaikutus on huomioitu "real case, Luke forest".

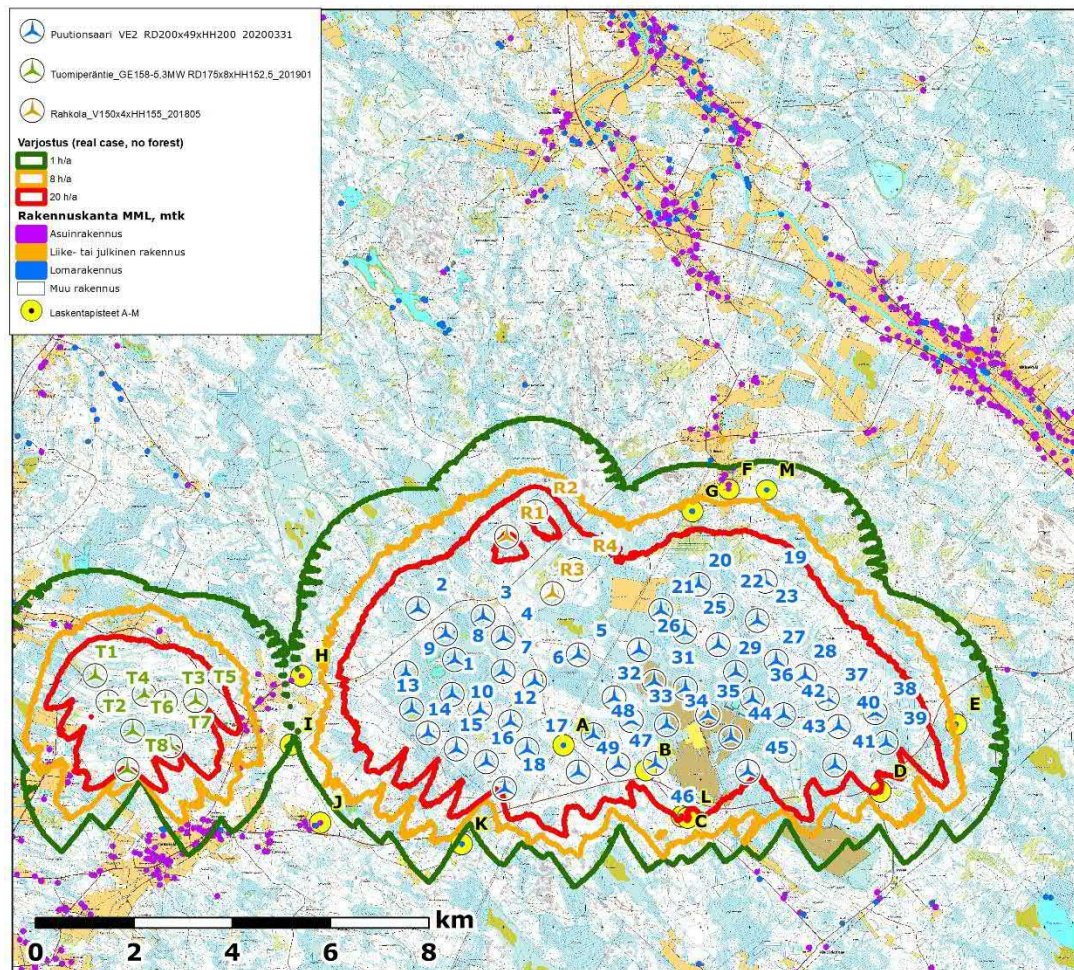
| Laskentapiste | ETRS89-TM35 Itä | ETRS89-TM35 Pohjoinen | Kohteen korkeus-asema | Varjostus (h/a) |
|---|-----------------|-----------------------|-----------------------|-----------------|
| Lomarakennus A (Vesiperän metsätie, Kivikaarto) | 402212 | 7109691 | 112,5 | 58:25 |
| Asuinrakennus B (Ylivieskantie, Pöhlölä) | 403894 | 7109182 | 114,4 | 9:09 |
| Asuinrakennus C (Perkkiöntie 382) | 404620 | 7108247 | 113,6 | 10:51 |
| Asuinrakennus D (Alakyläntie 243) | 408659 | 7108752 | 119,4 | 9:15 |
| Lomarakennus E (Kellokankaan metsätie) | 410199 | 7110115 | 122,5 | 0:00 |
| Asuinrakennus F (Ollilantie 112) | 405573 | 7114900 | 87,7 | 4:45 |
| Lomarakennus G (Ollilantie, Siliäkuru) | 404837 | 7114441 | 100 | 0:00 |
| Asuinrakennus H (Pinolantie 406) | 396893 | 7111098 | 88,1 | 0:00 |
| Asuinrakennus I (Kortenevantie 116) | 396670 | 7109704 | 87,5 | 0:00 |
| Asuinrakennus J (Haapavesitie 1406) | 397273 | 7108116 | 89,3 | 0:00 |
| Lomarakennus K (Kurunoja) | 400152 | 7107685 | 102,3 | 0:00 |
| Lomarakennus L (Perkkiontie, Ilmola) | 404739 | 7108222 | 113,7 | 13:05 |
| Lomarakennus M (Riskalan metsätie) | 406348 | 7114887 | 102,7 | 0:00 |

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3.3.2 Varjostuksen yhteismallinnus

Tuulivoimapuistoa lähimpien asuinrakennusten pihapiirissä kohteissa lomarakennus A (93 tuntia 9 minuuttia), asuinrakennus B (14 tuntia 8 minuuttia), asuinrakennus C (10 tuntia 50 minuuttia), asuinrakennus D (9 tuntia 15 minuuttia), lomarakennus G (11 tuntia 22 minuuttia) ja lomarakennus L (13 tuntia 5 minuuttia) on varjostusvaikutusta yli 8 tuntia vuodessa. Mallinnuksessa ei huomioitu puustoa.

Muissa kohteissa varjostusvaikutusta on mallinnuksen mukaan alle 8 tuntia vuodessa (Taulukko 16).



Kuva 4. Laskennalliset yhteisvarjostusmallinnuksen tulokset.

Taulukko 14. Yhteismallinnuksen laskennalliset varjostustunnit vuodessa lähialueen laskentapisteissä, kun puuston suojaavaa vaikutusta ei ole huomioitu "real case, no forest".

| Laskentapiste | ETRS89-TM35 Itä | ETRS89-TM35 Pohjoinen | Kohteen korkeus-asema | Varjostus (h/a) |
|---|-----------------|-----------------------|-----------------------|-----------------|
| Lomarakennus A (Vesiperän metsätie, Kivikaarto) | 402212 | 7109691 | 112,5 | 93:09 |
| Asuinrakennus B (Ylivieskantie, Pöhlölä) | 403894 | 7109182 | 114,4 | 14:08 |

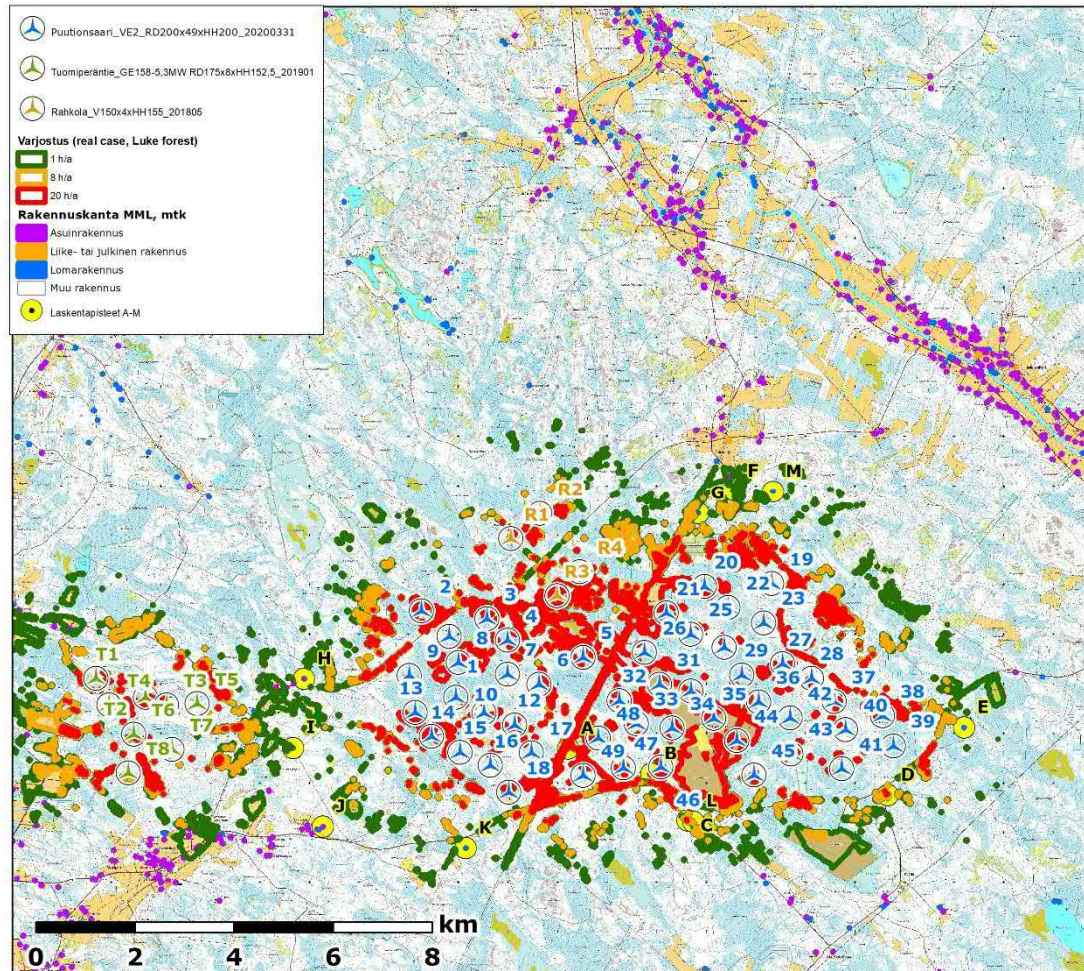
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| | | | | |
|--|--------|---------|-------|-------|
| Asuinrakennus C (Perkkiontie 382) | 404620 | 7108247 | 113,6 | 10:50 |
| Asuinrakennus D (Alakyläntie 243) | 408659 | 7108752 | 119,4 | 9:15 |
| Lomarakennus E (Kellokankaan metsätie) | 410199 | 7110115 | 122,5 | 4:29 |
| Asuinrakennus F (Ollilantie 112) | 405573 | 7114900 | 87,7 | 4:45 |
| Lomarakennus G (Ollilantie, Siliäkuru) | 404837 | 7114441 | 100 | 11:22 |
| Asuinrakennus H (Pinolantie 406) | 396893 | 7111098 | 88,1 | 1:16 |
| Asuinrakennus I (Kortenevantie 116) | 396670 | 7109704 | 87,5 | 1:25 |
| Asuinrakennus J (Haapavesitie 1406) | 397273 | 7108116 | 89,3 | 0:00 |
| Lomarakennus K (Kurunoja) | 400152 | 7107685 | 102,3 | 0:00 |
| Lomarakennus L (Perkkiontie, Ilmola) | 404739 | 7108222 | 113,7 | 13:05 |
| Lomarakennus M (Riskalan metsätie) | 406348 | 7114887 | 102,7 | 3:37 |

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Kun puuston suojaava vaikutus huomioitiin, tuulivoimapuistoa lähimpien asuinrakennusten pihapiirissä kohteissa lomarakennus A (58 tuntia 25 minuuttia), asuinrakennus B (9 tuntia 79 minuuttia), asuinrakennus C (10 tuntia 50 minuuttia), asuinrakennus D (9 tuntia 15 minuuttia) ja lomarakennus L (13 tuntia 5 minuuttia) on varjostusvaikutusta yli 8 tuntia vuodessa.

Muissa kohteissa varjostusvaikutusta on mallinnuksen mukaan alle 8 tuntia vuodessa (Taulukko 17).



Kuva 5. Laskennalliset yhteisvarjostusmallinnuksen tulokset, kun huomioitiin puuston suojaava vaikutus.

Taulukko 15. Yhteismallinnuksen laskennalliset varjostustunnit vuodessa lähialueen laskentapisteissä, kun puuston suojaavaa vaikutus on huomioitu "real case, Luke forest".

| Laskentapiste | ETRS89-TM35 Itä | ETRS89-TM35 Pohjoinen | Kohteen korkeus- asema | Varjostus (h/a) |
|---|--------------------|--------------------------|---------------------------|--------------------|
| Lomarakennus A (Vesiperän metsätie, Kivikaarto) | 402212 | 7109691 | 112,5 | 58:25 |
| Asuinrakennus B (Ylivieskantie, Pöhlölä) | 403894 | 7109182 | 114,4 | 9:09 |
| Asuinrakennus C (Perkkiöntie 382) | 404620 | 7108247 | 113,6 | 10:50 |
| Asuinrakennus D (Alakyläntie 243) | 408659 | 7108752 | 119,4 | 9:15 |

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| | | | | |
|--|--------|---------|-------|-------|
| Lomarakennus E (Kellokankaan metsätie) | 410199 | 7110115 | 122,5 | 0:00 |
| Asuinrakennus F (Ollilantie 112) | 405573 | 7114900 | 87,7 | 4:45 |
| Lomarakennus G (Ollilantie, Siliäkuru) | 404837 | 7114441 | 100 | 0:00 |
| Asuinrakennus H (Pinolantie 406) | 396893 | 7111098 | 88,1 | 0:00 |
| Asuinrakennus I (Kortenevantie 116) | 396670 | 7109704 | 87,5 | 1:25 |
| Asuinrakennus J (Haapavesitie 1406) | 397273 | 7108116 | 89,3 | 0:00 |
| Lomarakennus K (Kurunoja) | 400152 | 7107685 | 102,3 | 0:00 |
| Lomarakennus L (Perkkiontie, Ilmola) | 404739 | 7108222 | 113,7 | 13:05 |
| Lomarakennus M (Riskalan metsätie) | 406348 | 7114887 | 102,7 | 0:00 |

FCG Suunnittelu ja tekniikka Oy

Laatija

Tarkastaja

17.4.2020

Liite 1: Puutionsaari VE1 - Melun leviämismallinnuksen tulokset ISO 9613-2, YM
2/2014

DECIBEL - Main Result

Calculation: VE1_GE158x43xHH200_20200327

Noise calculation model:

ISO 9613-2 General

Wind speed (in 10 m height):

8,0 m/s

Ground attenuation:

General, terrain specific

Ground factor for porous ground: 0,4

Area object with hard ground: Area object (vesistot): (5)

Area type with hard ground: Vesistot

Ground factor for hard ground: 0,0

Meteorological coefficient, CO:

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:

Fixed penalty added to source noise of WTGs with pure tones

WTG catalogue

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:

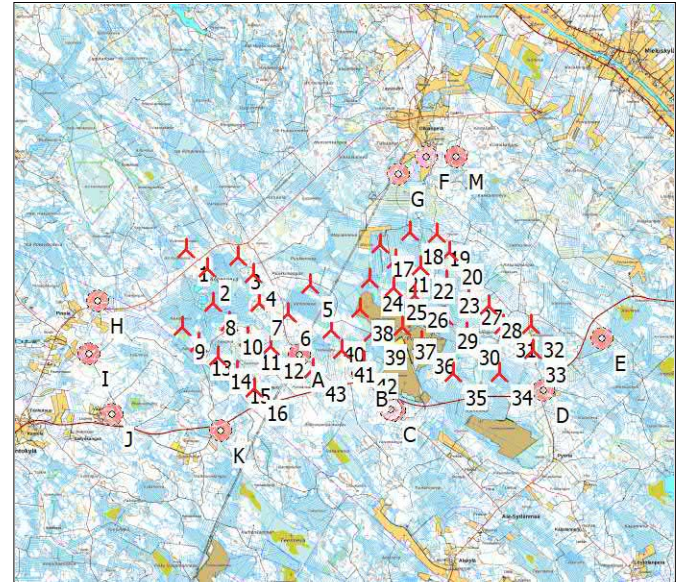
0,0 dB; Uncertainty margin in NSA has priority

Deviation from "official" noise demands. Negative is more

restrictive, positive is less restrictive.:

0,0 dB(A)

WTGs



New WTG

Noise sensitive area

| East | North | Z | Row data/Description | WTG type | | Type-generator | Power, rated [kW] | Rotor diameter [m] | Hub height [m] | Noise data | | Wind speed [m/s] | Lwa_ref [dB(A)] | Pure tones |
|------|--------|---------|--------------------------------|----------|----------------|-------------------------|-------------------|--------------------|----------------|------------|------------|------------------|-----------------|------------|
| | | | | Valid | Manufact. | | | | | Creator | Name | | | |
| 1 | 399241 | 7112464 | 94,0 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 2 | 399796 | 7111966 | 97,5 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 3 | 400591 | 7112251 | 97,8 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 4 | 401005 | 7111796 | 100,0 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 5 | 402495 | 7111524 | 106,6 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 6 | 401910 | 7110769 | 107,4 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 7 | 401156 | 7111035 | 104,5 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 8 | 399940 | 7111056 | 97,5 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 9 | 399132 | 7110420 | 95,8 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 10 | 400364 | 7110552 | 98,6 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 11 | 400851 | 7110131 | 101,8 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 12 | 401462 | 7109916 | 102,8 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 13 | 399562 | 7109992 | 97,5 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 14 | 400065 | 7109631 | 100,0 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 15 | 400578 | 7109257 | 102,8 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 16 | 401021 | 7108796 | 105,1 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 17 | 404336 | 7112600 | 102,7 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 18 | 405133 | 7112922 | 100,3 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 19 | 405834 | 7112878 | 101,2 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 20 | 406171 | 7112395 | 103,9 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 21 | 404759 | 7112195 | 105,0 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 22 | 405399 | 7112017 | 102,5 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 23 | 406086 | 7111637 | 103,0 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 24 | 404064 | 7111669 | 104,9 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 25 | 404693 | 7111450 | 105,5 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 26 | 405262 | 7111259 | 104,6 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 27 | 406667 | 7111338 | 106,6 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 28 | 407209 | 7110982 | 111,9 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 29 | 406033 | 7110701 | 104,0 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 30 | 406628 | 7110262 | 105,0 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 31 | 407576 | 7110456 | 114,2 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 32 | 408319 | 7110460 | 119,2 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 33 | 408384 | 7109795 | 116,1 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 34 | 407482 | 7109189 | 112,5 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 35 | 406283 | 7109196 | 110,2 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 36 | 405436 | 7110043 | 106,4 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 37 | 404925 | 7110413 | 105,8 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 38 | 403807 | 7110889 | 106,8 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 39 | 404142 | 7110263 | 107,4 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 40 | 403047 | 7110331 | 108,1 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 41 | 403334 | 7109808 | 111,9 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 42 | 403921 | 7109494 | 109,9 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |
| 43 | 402563 | 7109304 | 112,5 GE WIND ENERGY 5.3-15... | Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 NO | 8,0 | 106,0 | Yes |

Calculation Results

DECIBEL - Main Result

Calculation: VE1_GE158x43xHH200_20200327

Sound level

| No. | Name | East | North | Z | Imission height | Demands | | Distance to noise demand |
|-----|---|--------|---------|-------|-----------------|---------|-------------|--------------------------|
| | | | | | | Noise | Sound level | |
| | | | | [m] | [m] | [dB(A)] | [dB(A)] | [m] |
| A | Lomarakennus A (Vesiperän metsätie, Kivikaarto) | 402212 | 7109691 | 112,5 | 4,0 | 40,0 | 45,6 | -1324 |
| B | Asuinrakennus B (Ylivieskantie, Pöhlölä) | 403894 | 7109182 | 114,4 | 4,0 | 40,0 | 47,3 | -661 |
| C | Asuinrakennus C (Perkköntie 382) | 404620 | 7108247 | 113,6 | 4,0 | 40,0 | 37,7 | 429 |
| D | Asuinrakennus D (Alakyläntie 243) | 408659 | 7108752 | 119,4 | 4,0 | 40,0 | 38,4 | 209 |
| E | Lomarakennus E (Kellokankaan metsätie) | 410199 | 7110115 | 122,5 | 4,0 | 40,0 | 33,4 | 968 |
| F | Asuinrakennus F (Ollilantie 112) | 405573 | 7114900 | 87,7 | 4,0 | 40,0 | 34,1 | 1006 |
| G | Lomarakennus G (Ollilantie, Siliäkuru) | 404837 | 7114441 | 100,0 | 4,0 | 40,0 | 36,3 | 579 |
| H | Asuinrakennus H (Pinolantie 406) | 396893 | 7111098 | 88,1 | 4,0 | 40,0 | 31,8 | 1496 |
| I | Asuinrakennus I (Kortenevantie 116) | 396670 | 7109704 | 87,5 | 4,0 | 40,0 | 30,6 | 1720 |
| J | Asuinrakennus J (Haapavesitie 1406) | 397273 | 7108116 | 89,3 | 4,0 | 40,0 | 30,2 | 1944 |
| K | Lomarakennus K (Kurunoja) | 400152 | 7107685 | 102,3 | 4,0 | 40,0 | 36,6 | 500 |
| L | Lomarakennus L (Perkköntie, Ilmola) | 404739 | 7108222 | 113,7 | 4,0 | 40,0 | 37,6 | 490 |
| M | Lomarakennus M (Riskalan metsätie) | 406348 | 7114887 | 102,7 | 4,0 | 40,0 | 33,5 | 1130 |

Distances (m)

| WTG | A | B | C | D | E | F | G | H | I | J | K | L | M |
|-----|------|------|------|-------|-------|------|------|-------|-------|-------|------|------|------|
| 1 | 4064 | 5694 | 6835 | 10123 | 11207 | 6785 | 5935 | 2717 | 3772 | 4773 | 4865 | 6944 | 7508 |
| 2 | 3319 | 4955 | 6092 | 9428 | 10567 | 6480 | 5616 | 3030 | 3858 | 4603 | 4296 | 6201 | 7173 |
| 3 | 3030 | 4508 | 5680 | 8793 | 9842 | 5642 | 4777 | 3875 | 4676 | 5302 | 4587 | 5782 | 6331 |
| 4 | 2427 | 3896 | 5066 | 8237 | 9347 | 5524 | 4657 | 4171 | 4813 | 5241 | 4198 | 5168 | 6173 |
| 5 | 1855 | 2728 | 3906 | 6758 | 7832 | 4569 | 3741 | 5618 | 6102 | 6235 | 4497 | 3992 | 5114 |
| 6 | 1120 | 2541 | 3702 | 7043 | 8315 | 5522 | 4696 | 5028 | 5347 | 5343 | 3550 | 3806 | 6054 |
| 7 | 1709 | 3306 | 4446 | 7842 | 9089 | 5869 | 5015 | 4264 | 4680 | 4858 | 3497 | 4554 | 6464 |
| 8 | 2650 | 4375 | 5458 | 9018 | 10302 | 6820 | 5953 | 3048 | 3539 | 3970 | 3378 | 5573 | 7465 |
| 9 | 3165 | 4920 | 5902 | 9671 | 11071 | 7846 | 6980 | 2340 | 2564 | 2961 | 2919 | 6022 | 8486 |
| 10 | 2039 | 3787 | 4840 | 8488 | 9845 | 6786 | 5927 | 3514 | 3790 | 3936 | 2875 | 4957 | 7389 |
| 11 | 1430 | 3187 | 4213 | 7928 | 9348 | 6712 | 5871 | 4075 | 4203 | 4107 | 2544 | 4331 | 7269 |
| 12 | 783 | 2540 | 3572 | 7290 | 8740 | 6462 | 5646 | 4720 | 4796 | 4559 | 2587 | 3689 | 6971 |
| 13 | 2667 | 4407 | 5351 | 9181 | 10638 | 7761 | 6901 | 2889 | 2906 | 2960 | 2381 | 5471 | 8367 |
| 14 | 2148 | 3856 | 4761 | 8639 | 10146 | 7623 | 6776 | 3495 | 3395 | 3176 | 1948 | 4882 | 8192 |
| 15 | 1691 | 3317 | 4167 | 8097 | 9659 | 7536 | 6709 | 4119 | 3933 | 3497 | 1629 | 4288 | 8061 |
| 16 | 1489 | 2899 | 3640 | 7638 | 9272 | 7615 | 6814 | 4727 | 4445 | 3810 | 1410 | 3762 | 8092 |
| 17 | 3603 | 3447 | 4363 | 5787 | 6368 | 2612 | 1908 | 7594 | 8195 | 8366 | 6455 | 4396 | 3046 |
| 18 | 4356 | 3940 | 4703 | 5460 | 5791 | 2027 | 1548 | 8440 | 9054 | 9213 | 7227 | 4716 | 2311 |
| 19 | 4825 | 4174 | 4788 | 5000 | 5166 | 2039 | 1854 | 9117 | 9698 | 9797 | 7698 | 4783 | 2074 |
| 20 | 4794 | 3938 | 4428 | 4411 | 4629 | 2576 | 2442 | 9368 | 9874 | 9873 | 7642 | 4411 | 2498 |
| 21 | 3572 | 3135 | 3951 | 5202 | 5824 | 2825 | 2247 | 7943 | 8464 | 8526 | 6447 | 3973 | 3126 |
| 22 | 3946 | 3210 | 3850 | 4614 | 5163 | 2889 | 2488 | 8556 | 9030 | 9014 | 6804 | 3852 | 3023 |
| 23 | 4336 | 3291 | 3693 | 3865 | 4385 | 3304 | 3070 | 9210 | 9613 | 9491 | 7130 | 3671 | 3261 |
| 24 | 2710 | 2493 | 3467 | 5442 | 6329 | 3567 | 2878 | 7194 | 7650 | 7664 | 5583 | 3512 | 3946 |
| 25 | 3042 | 2405 | 3204 | 4796 | 5665 | 3561 | 2994 | 7809 | 8211 | 8135 | 5899 | 3228 | 3814 |
| 26 | 3430 | 2487 | 3080 | 4221 | 5067 | 3655 | 3211 | 8371 | 8732 | 8586 | 6236 | 3081 | 3787 |
| 27 | 4750 | 3512 | 3707 | 3264 | 3738 | 3727 | 3603 | 9777 | 10130 | 9932 | 7469 | 3664 | 3564 |
| 28 | 5162 | 3772 | 3767 | 2660 | 3113 | 4246 | 4194 | 10317 | 10616 | 10342 | 7790 | 3704 | 3999 |
| 29 | 3952 | 2623 | 2831 | 3270 | 4207 | 4225 | 3927 | 9149 | 9416 | 9133 | 6609 | 2796 | 4198 |
| 30 | 4453 | 2939 | 2845 | 2531 | 3575 | 4757 | 4546 | 9771 | 9973 | 9598 | 6970 | 2780 | 4633 |
| 31 | 5419 | 3897 | 3691 | 2019 | 2645 | 4875 | 4835 | 10703 | 10932 | 10566 | 7925 | 3611 | 4598 |
| 32 | 6156 | 4606 | 4311 | 1741 | 1911 | 5221 | 5289 | 11445 | 11674 | 11293 | 8626 | 4222 | 4847 |
| 33 | 6173 | 4532 | 4070 | 1078 | 1843 | 5828 | 5845 | 11565 | 11714 | 11238 | 8498 | 3970 | 5484 |
| 34 | 5294 | 3588 | 3013 | 1255 | 2870 | 6022 | 5881 | 10760 | 10824 | 10266 | 7483 | 2909 | 5810 |
| 35 | 4101 | 2389 | 1915 | 2417 | 4022 | 5748 | 5441 | 9581 | 9627 | 9075 | 6315 | 1826 | 5691 |
| 36 | 3243 | 1766 | 1972 | 3471 | 4764 | 4860 | 4439 | 8608 | 8772 | 8388 | 5786 | 1949 | 4929 |
| 37 | 2808 | 1606 | 2188 | 4087 | 5283 | 4534 | 4029 | 8061 | 8285 | 7990 | 5498 | 2199 | 4695 |
| 38 | 1995 | 1709 | 2765 | 5301 | 6439 | 4383 | 3698 | 6918 | 7235 | 7098 | 4861 | 2825 | 4737 |
| 39 | 2013 | 1109 | 2072 | 4763 | 6059 | 4854 | 4236 | 7297 | 7492 | 7197 | 4750 | 2126 | 5124 |
| 40 | 1052 | 1427 | 2611 | 5829 | 7155 | 5221 | 4483 | 6202 | 6408 | 6185 | 3922 | 2703 | 5626 |
| 41 | 1128 | 840 | 2023 | 5429 | 6872 | 5563 | 4871 | 6569 | 6664 | 6293 | 3825 | 2119 | 5906 |
| 42 | 1721 | 313 | 1429 | 4795 | 6309 | 5653 | 5031 | 7209 | 7254 | 6790 | 4181 | 1512 | 5914 |
| 43 | 522 | 1337 | 2313 | 6121 | 7679 | 6355 | 5618 | 5947 | 5907 | 5422 | 2904 | 2430 | 6745 |

DECIBEL - Detailed results

Calculation: VE1_GE158x43xHH200_20200327Noise calculation model: ISO 9613-2 General 8,0 m/s

Assumptions

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

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

Calculation Results

Noise sensitive area: A Lomarakennus A (Vesiperän metsätie, Kivikaarto)

Wind speed: 8,0 m/s

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|--------------|--------------------|--------------------|-----------------|-----------------|---------|-----------|-----------|----------|-----------|------------|--------|
| 1 | 4064 | 4068 | 16,98 | 106,0 | 2 | 0,00 | 83,19 | - | - | 0,00 | 0,00 | - |
| 10 | 2039 | 2047 | 26,30 | 106,0 | 2 | 0,00 | 77,22 | - | - | 0,00 | 0,00 | - |
| 11 | 1430 | 1442 | 30,72 | 106,0 | 2 | 0,00 | 74,18 | - | - | 0,00 | 0,00 | - |
| 12 | 783 | 805 | 37,53 | 106,0 | 2 | 0,00 | 69,11 | - | - | 0,00 | 0,00 | - |
| 13 | 2667 | 2673 | 22,77 | 106,0 | 2 | 0,00 | 79,54 | - | - | 0,00 | 0,00 | - |
| 14 | 2148 | 2156 | 25,63 | 106,0 | 2 | 0,00 | 77,67 | - | - | 0,00 | 0,00 | - |
| 15 | 1691 | 1701 | 28,67 | 106,0 | 2 | 0,00 | 75,61 | - | - | 0,00 | 0,00 | - |
| 16 | 1489 | 1501 | 30,22 | 106,0 | 2 | 0,00 | 74,53 | - | - | 0,00 | 0,00 | - |
| 17 | 3603 | 3607 | 18,66 | 106,0 | 2 | 0,00 | 82,14 | - | - | 0,00 | 0,00 | - |
| 18 | 4356 | 4360 | 16,01 | 106,0 | 2 | 0,00 | 83,79 | - | - | 0,00 | 0,00 | - |
| 19 | 4825 | 4828 | 14,57 | 106,0 | 2 | 0,00 | 84,68 | - | - | 0,00 | 0,00 | - |
| 2 | 3319 | 3324 | 19,79 | 106,0 | 2 | 0,00 | 81,43 | - | - | 0,00 | 0,00 | - |
| 20 | 4794 | 4798 | 14,66 | 106,0 | 2 | 0,00 | 84,62 | - | - | 0,00 | 0,00 | - |
| 21 | 3572 | 3577 | 18,78 | 106,0 | 2 | 0,00 | 82,07 | - | - | 0,00 | 0,00 | - |
| 22 | 3946 | 3950 | 17,39 | 106,0 | 2 | 0,00 | 82,93 | - | - | 0,00 | 0,00 | - |
| 23 | 4336 | 4340 | 16,07 | 106,0 | 2 | 0,00 | 83,75 | - | - | 0,00 | 0,00 | - |
| 24 | 2710 | 2717 | 22,55 | 106,0 | 2 | 0,00 | 79,68 | - | - | 0,00 | 0,00 | - |
| 25 | 3042 | 3048 | 20,99 | 106,0 | 2 | 0,00 | 80,68 | - | - | 0,00 | 0,00 | - |
| 26 | 3430 | 3435 | 19,34 | 106,0 | 2 | 0,00 | 81,72 | - | - | 0,00 | 0,00 | - |
| 27 | 4750 | 4754 | 14,79 | 106,0 | 2 | 0,00 | 84,54 | - | - | 0,00 | 0,00 | - |
| 28 | 5162 | 5165 | 13,62 | 106,0 | 2 | 0,00 | 85,26 | - | - | 0,00 | 0,00 | - |
| 29 | 3952 | 3957 | 17,37 | 106,0 | 2 | 0,00 | 82,95 | - | - | 0,00 | 0,00 | - |
| 3 | 3030 | 3036 | 21,04 | 106,0 | 2 | 0,00 | 80,64 | - | - | 0,00 | 0,00 | - |
| 30 | 4453 | 4457 | 15,70 | 106,0 | 2 | 0,00 | 83,98 | - | - | 0,00 | 0,00 | - |
| 31 | 5419 | 5422 | 12,93 | 106,0 | 2 | 0,00 | 85,68 | - | - | 0,00 | 0,00 | - |
| 32 | 6156 | 6159 | 11,15 | 106,0 | 2 | 0,00 | 86,79 | - | - | 0,00 | 0,00 | - |
| 33 | 6173 | 6176 | 11,11 | 106,0 | 2 | 0,00 | 86,81 | - | - | 0,00 | 0,00 | - |
| 34 | 5294 | 5298 | 13,26 | 106,0 | 2 | 0,00 | 85,48 | - | - | 0,00 | 0,00 | - |
| 35 | 4101 | 4106 | 16,85 | 106,0 | 2 | 0,00 | 83,27 | - | - | 0,00 | 0,00 | - |
| 36 | 3243 | 3249 | 20,11 | 106,0 | 2 | 0,00 | 81,23 | - | - | 0,00 | 0,00 | - |
| 37 | 2808 | 2814 | 22,08 | 106,0 | 2 | 0,00 | 79,99 | - | - | 0,00 | 0,00 | - |
| 38 | 1995 | 2004 | 26,57 | 106,0 | 2 | 0,00 | 77,04 | - | - | 0,00 | 0,00 | - |
| 39 | 2013 | 2022 | 26,46 | 106,0 | 2 | 0,00 | 77,11 | - | - | 0,00 | 0,00 | - |
| 4 | 2427 | 2434 | 24,03 | 106,0 | 2 | 0,00 | 78,73 | - | - | 0,00 | 0,00 | - |
| 40 | 1052 | 1070 | 34,29 | 106,0 | 2 | 0,00 | 71,59 | - | - | 0,00 | 0,00 | - |
| 41 | 1128 | 1145 | 33,49 | 106,0 | 2 | 0,00 | 72,17 | - | - | 0,00 | 0,00 | - |
| 42 | 1721 | 1731 | 28,44 | 106,0 | 2 | 0,00 | 75,77 | - | - | 0,00 | 0,00 | - |
| 43 | 522 | 558 | 41,51 | 106,0 | 2 | 0,00 | 65,93 | - | - | 0,00 | 0,00 | - |
| 5 | 1855 | 1865 | 27,50 | 106,0 | 2 | 0,00 | 76,41 | - | - | 0,00 | 0,00 | - |
| 6 | 1120 | 1136 | 33,58 | 106,0 | 2 | 0,00 | 72,11 | - | - | 0,00 | 0,00 | - |
| 7 | 1709 | 1719 | 28,53 | 106,0 | 2 | 0,00 | 75,71 | - | - | 0,00 | 0,00 | - |
| 8 | 2650 | 2657 | 22,85 | 106,0 | 2 | 0,00 | 79,49 | - | - | 0,00 | 0,00 | - |
| 9 | 3165 | 3170 | 20,45 | 106,0 | 2 | 0,00 | 81,02 | - | - | 0,00 | 0,00 | - |
| Sum | | | 45,55 | | | | | | | | | |

- Data undefined due to calculation with octave data

DECIBEL - Detailed results

Calculation: VE1_GE158x43xHH200_20200327Noise calculation model: ISO 9613-2 General 8,0 m/s
Noise sensitive area: B Asuinrakennus B (Ylivieskantie, Pöhlölä)

Wind speed: 8,0 m/s
WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|-----------------|-----------------------|-----------------------|--------------------|--------------------|------------|--------------|--------------|-------------|--------------|---------------|-----------|
| 1 | 5694 | 5697 | 12,23 | 106,0 | 2 | 0,00 | 86,11 | - | - | 0,00 | 0,00 | - |
| 10 | 3787 | 3791 | 17,97 | 106,0 | 2 | 0,00 | 82,58 | - | - | 0,00 | 0,00 | - |
| 11 | 3187 | 3193 | 20,35 | 106,0 | 2 | 0,00 | 81,08 | - | - | 0,00 | 0,00 | - |
| 12 | 2540 | 2547 | 23,42 | 106,0 | 2 | 0,00 | 79,12 | - | - | 0,00 | 0,00 | - |
| 13 | 4407 | 4411 | 15,84 | 106,0 | 2 | 0,00 | 83,89 | - | - | 0,00 | 0,00 | - |
| 14 | 3856 | 3860 | 17,72 | 106,0 | 2 | 0,00 | 82,73 | - | - | 0,00 | 0,00 | - |
| 15 | 3317 | 3322 | 19,80 | 106,0 | 2 | 0,00 | 81,43 | - | - | 0,00 | 0,00 | - |
| 16 | 2899 | 2905 | 21,64 | 106,0 | 2 | 0,00 | 80,26 | - | - | 0,00 | 0,00 | - |
| 17 | 3447 | 3452 | 19,27 | 106,0 | 2 | 0,00 | 81,76 | - | - | 0,00 | 0,00 | - |
| 18 | 3940 | 3944 | 17,41 | 106,0 | 2 | 0,00 | 82,92 | - | - | 0,00 | 0,00 | - |
| 19 | 4174 | 4178 | 16,60 | 106,0 | 2 | 0,00 | 83,42 | - | - | 0,00 | 0,00 | - |
| 2 | 4955 | 4958 | 14,19 | 106,0 | 2 | 0,00 | 84,91 | - | - | 0,00 | 0,00 | - |
| 20 | 3938 | 3942 | 17,42 | 106,0 | 2 | 0,00 | 82,91 | - | - | 0,00 | 0,00 | - |
| 21 | 3135 | 3140 | 20,58 | 106,0 | 2 | 0,00 | 80,94 | - | - | 0,00 | 0,00 | - |
| 22 | 3210 | 3215 | 20,25 | 106,0 | 2 | 0,00 | 81,14 | - | - | 0,00 | 0,00 | - |
| 23 | 3291 | 3296 | 19,91 | 106,0 | 2 | 0,00 | 81,36 | - | - | 0,00 | 0,00 | - |
| 24 | 2493 | 2500 | 23,67 | 106,0 | 2 | 0,00 | 78,96 | - | - | 0,00 | 0,00 | - |
| 25 | 2405 | 2412 | 24,14 | 106,0 | 2 | 0,00 | 78,65 | - | - | 0,00 | 0,00 | - |
| 26 | 2487 | 2494 | 23,70 | 106,0 | 2 | 0,00 | 78,94 | - | - | 0,00 | 0,00 | - |
| 27 | 3512 | 3518 | 19,01 | 106,0 | 2 | 0,00 | 81,92 | - | - | 0,00 | 0,00 | - |
| 28 | 3772 | 3777 | 18,02 | 106,0 | 2 | 0,00 | 82,54 | - | - | 0,00 | 0,00 | - |
| 29 | 2623 | 2630 | 22,99 | 106,0 | 2 | 0,00 | 79,40 | - | - | 0,00 | 0,00 | - |
| 3 | 4508 | 4512 | 15,52 | 106,0 | 2 | 0,00 | 84,09 | - | - | 0,00 | 0,00 | - |
| 30 | 2939 | 2945 | 21,46 | 106,0 | 2 | 0,00 | 80,38 | - | - | 0,00 | 0,00 | - |
| 31 | 3897 | 3901 | 17,57 | 106,0 | 2 | 0,00 | 82,82 | - | - | 0,00 | 0,00 | - |
| 32 | 4606 | 4611 | 15,22 | 106,0 | 2 | 0,00 | 84,27 | - | - | 0,00 | 0,00 | - |
| 33 | 4532 | 4536 | 15,45 | 106,0 | 2 | 0,00 | 84,13 | - | - | 0,00 | 0,00 | - |
| 34 | 3588 | 3593 | 18,71 | 106,0 | 2 | 0,00 | 82,11 | - | - | 0,00 | 0,00 | - |
| 35 | 2389 | 2397 | 24,23 | 106,0 | 2 | 0,00 | 78,59 | - | - | 0,00 | 0,00 | - |
| 36 | 1766 | 1776 | 28,12 | 106,0 | 2 | 0,00 | 75,99 | - | - | 0,00 | 0,00 | - |
| 37 | 1606 | 1617 | 29,30 | 106,0 | 2 | 0,00 | 75,17 | - | - | 0,00 | 0,00 | - |
| 38 | 1709 | 1720 | 28,53 | 106,0 | 2 | 0,00 | 75,71 | - | - | 0,00 | 0,00 | - |
| 39 | 1109 | 1125 | 33,70 | 106,0 | 2 | 0,00 | 72,02 | - | - | 0,00 | 0,00 | - |
| 4 | 3896 | 3900 | 17,57 | 106,0 | 2 | 0,00 | 82,82 | - | - | 0,00 | 0,00 | - |
| 40 | 1427 | 1440 | 30,74 | 106,0 | 2 | 0,00 | 74,17 | - | - | 0,00 | 0,00 | - |
| 41 | 840 | 862 | 36,76 | 106,0 | 2 | 0,00 | 69,71 | - | - | 0,00 | 0,00 | - |
| 42 | 313 | 367 | 45,83 | 106,0 | 2 | 0,00 | 62,29 | - | - | 0,00 | 0,00 | - |
| 43 | 1337 | 1351 | 31,51 | 106,0 | 2 | 0,00 | 73,61 | - | - | 0,00 | 0,00 | - |
| 5 | 2728 | 2735 | 22,46 | 106,0 | 2 | 0,00 | 79,74 | - | - | 0,00 | 0,00 | - |
| 6 | 2541 | 2548 | 23,42 | 106,0 | 2 | 0,00 | 79,12 | - | - | 0,00 | 0,00 | - |
| 7 | 3306 | 3311 | 19,85 | 106,0 | 2 | 0,00 | 81,40 | - | - | 0,00 | 0,00 | - |
| 8 | 4375 | 4379 | 15,94 | 106,0 | 2 | 0,00 | 83,83 | - | - | 0,00 | 0,00 | - |
| 9 | 4920 | 4923 | 14,29 | 106,0 | 2 | 0,00 | 84,85 | - | - | 0,00 | 0,00 | - |
| Sum | | | 47,31 | | | | | | | | | |

- Data undefined due to calculation with octave data

Noise sensitive area: C Asuinrakennus C (Perkkiöntie 382)

Wind speed: 8,0 m/s
WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|-----------------|-----------------------|-----------------------|--------------------|--------------------|------------|--------------|--------------|-------------|--------------|---------------|-----------|
| 1 | 6835 | 6837 | 9,89 | 106,0 | 2 | 0,00 | 87,70 | - | - | 0,00 | 0,00 | - |
| 10 | 4840 | 4844 | 14,52 | 106,0 | 2 | 0,00 | 84,70 | - | - | 0,00 | 0,00 | - |
| 11 | 4213 | 4217 | 16,47 | 106,0 | 2 | 0,00 | 83,50 | - | - | 0,00 | 0,00 | - |
| 12 | 3572 | 3577 | 18,78 | 106,0 | 2 | 0,00 | 82,07 | - | - | 0,00 | 0,00 | - |
| 13 | 5351 | 5354 | 13,11 | 106,0 | 2 | 0,00 | 85,57 | - | - | 0,00 | 0,00 | - |
| 14 | 4761 | 4764 | 14,76 | 106,0 | 2 | 0,00 | 84,56 | - | - | 0,00 | 0,00 | - |
| 15 | 4167 | 4171 | 16,63 | 106,0 | 2 | 0,00 | 83,40 | - | - | 0,00 | 0,00 | - |
| 16 | 3640 | 3645 | 18,51 | 106,0 | 2 | 0,00 | 82,23 | - | - | 0,00 | 0,00 | - |
| 17 | 4363 | 4367 | 15,98 | 106,0 | 2 | 0,00 | 83,80 | - | - | 0,00 | 0,00 | - |
| 18 | 4703 | 4706 | 14,93 | 106,0 | 2 | 0,00 | 84,45 | - | - | 0,00 | 0,00 | - |
| 19 | 4788 | 4791 | 14,68 | 106,0 | 2 | 0,00 | 84,61 | - | - | 0,00 | 0,00 | - |
| 2 | 6092 | 6094 | 11,28 | 106,0 | 2 | 0,00 | 86,70 | - | - | 0,00 | 0,00 | - |

To be continued on next page...

DECIBEL - Detailed results

Calculation: VE1_GE158x43xHH200_20200327Noise calculation model: ISO 9613-2 General 8,0 m/s

...continued from previous page

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|-----------------|-----------------------|-----------------------|--------------------|--------------------|------------|--------------|--------------|-------------|--------------|---------------|-----------|
| 20 | 4428 | 4432 | 15,77 | 106,0 | 2 | 0,00 | 83,93 | - | - | 0,00 | 0,00 | - |
| 21 | 3951 | 3955 | 17,37 | 106,0 | 2 | 0,00 | 82,94 | - | - | 0,00 | 0,00 | - |
| 22 | 3850 | 3854 | 17,74 | 106,0 | 2 | 0,00 | 82,72 | - | - | 0,00 | 0,00 | - |
| 23 | 3693 | 3698 | 18,31 | 106,0 | 2 | 0,00 | 82,36 | - | - | 0,00 | 0,00 | - |
| 24 | 3467 | 3472 | 19,19 | 106,0 | 2 | 0,00 | 81,81 | - | - | 0,00 | 0,00 | - |
| 25 | 3204 | 3210 | 20,28 | 106,0 | 2 | 0,00 | 81,13 | - | - | 0,00 | 0,00 | - |
| 26 | 3080 | 3085 | 20,82 | 106,0 | 2 | 0,00 | 80,79 | - | - | 0,00 | 0,00 | - |
| 27 | 3707 | 3712 | 18,26 | 106,0 | 2 | 0,00 | 82,39 | - | - | 0,00 | 0,00 | - |
| 28 | 3767 | 3772 | 18,04 | 106,0 | 2 | 0,00 | 82,53 | - | - | 0,00 | 0,00 | - |
| 29 | 2831 | 2838 | 21,96 | 106,0 | 2 | 0,00 | 80,06 | - | - | 0,00 | 0,00 | - |
| 3 | 5680 | 5683 | 12,27 | 106,0 | 2 | 0,00 | 86,09 | - | - | 0,00 | 0,00 | - |
| 30 | 2845 | 2851 | 21,90 | 106,0 | 2 | 0,00 | 80,10 | - | - | 0,00 | 0,00 | - |
| 31 | 3691 | 3696 | 18,32 | 106,0 | 2 | 0,00 | 82,35 | - | - | 0,00 | 0,00 | - |
| 32 | 4311 | 4315 | 16,15 | 106,0 | 2 | 0,00 | 83,70 | - | - | 0,00 | 0,00 | - |
| 33 | 4070 | 4075 | 16,96 | 106,0 | 2 | 0,00 | 83,20 | - | - | 0,00 | 0,00 | - |
| 34 | 3013 | 3020 | 21,12 | 106,0 | 2 | 0,00 | 80,60 | - | - | 0,00 | 0,00 | - |
| 35 | 1915 | 1925 | 27,09 | 106,0 | 2 | 0,00 | 76,69 | - | - | 0,00 | 0,00 | - |
| 36 | 1972 | 1981 | 26,72 | 106,0 | 2 | 0,00 | 76,94 | - | - | 0,00 | 0,00 | - |
| 37 | 2188 | 2196 | 25,39 | 106,0 | 2 | 0,00 | 77,83 | - | - | 0,00 | 0,00 | - |
| 38 | 2765 | 2771 | 22,28 | 106,0 | 2 | 0,00 | 79,85 | - | - | 0,00 | 0,00 | - |
| 39 | 2072 | 2080 | 26,09 | 106,0 | 2 | 0,00 | 77,36 | - | - | 0,00 | 0,00 | - |
| 4 | 5066 | 5069 | 13,88 | 106,0 | 2 | 0,00 | 85,10 | - | - | 0,00 | 0,00 | - |
| 40 | 2611 | 2618 | 23,05 | 106,0 | 2 | 0,00 | 79,36 | - | - | 0,00 | 0,00 | - |
| 41 | 2023 | 2032 | 26,40 | 106,0 | 2 | 0,00 | 77,16 | - | - | 0,00 | 0,00 | - |
| 42 | 1429 | 1442 | 30,72 | 106,0 | 2 | 0,00 | 74,18 | - | - | 0,00 | 0,00 | - |
| 43 | 2313 | 2321 | 24,66 | 106,0 | 2 | 0,00 | 78,31 | - | - | 0,00 | 0,00 | - |
| 5 | 3906 | 3910 | 17,53 | 106,0 | 2 | 0,00 | 82,84 | - | - | 0,00 | 0,00 | - |
| 6 | 3702 | 3707 | 18,28 | 106,0 | 2 | 0,00 | 82,38 | - | - | 0,00 | 0,00 | - |
| 7 | 4446 | 4450 | 15,72 | 106,0 | 2 | 0,00 | 83,97 | - | - | 0,00 | 0,00 | - |
| 8 | 5458 | 5461 | 12,83 | 106,0 | 2 | 0,00 | 85,75 | - | - | 0,00 | 0,00 | - |
| 9 | 5902 | 5905 | 11,73 | 106,0 | 2 | 0,00 | 86,42 | - | - | 0,00 | 0,00 | - |
| Sum | | | 37,74 | | | | | | | | | |

- Data undefined due to calculation with octave data

Noise sensitive area: D Asuinrakennus D (Alakyläntie 243)

Wind speed: 8,0 m/s

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|-----------------|-----------------------|-----------------------|--------------------|--------------------|------------|--------------|--------------|-------------|--------------|---------------|-----------|
| 1 | 10123 | 10124 | 5,13 | 106,0 | 2 | 0,00 | 91,11 | - | - | 0,00 | 0,00 | - |
| 10 | 8488 | 8490 | 7,27 | 106,0 | 2 | 0,00 | 89,58 | - | - | 0,00 | 0,00 | - |
| 11 | 7928 | 7930 | 8,10 | 106,0 | 2 | 0,00 | 88,99 | - | - | 0,00 | 0,00 | - |
| 12 | 7290 | 7293 | 9,11 | 106,0 | 2 | 0,00 | 88,26 | - | - | 0,00 | 0,00 | - |
| 13 | 9181 | 9183 | 6,32 | 106,0 | 2 | 0,00 | 90,26 | - | - | 0,00 | 0,00 | - |
| 14 | 8639 | 8641 | 7,05 | 106,0 | 2 | 0,00 | 89,73 | - | - | 0,00 | 0,00 | - |
| 15 | 8097 | 8099 | 7,84 | 106,0 | 2 | 0,00 | 89,17 | - | - | 0,00 | 0,00 | - |
| 16 | 7638 | 7640 | 8,55 | 106,0 | 2 | 0,00 | 88,66 | - | - | 0,00 | 0,00 | - |
| 17 | 5787 | 5790 | 12,01 | 106,0 | 2 | 0,00 | 86,25 | - | - | 0,00 | 0,00 | - |
| 18 | 5460 | 5463 | 12,82 | 106,0 | 2 | 0,00 | 85,75 | - | - | 0,00 | 0,00 | - |
| 19 | 5000 | 5003 | 14,07 | 106,0 | 2 | 0,00 | 84,98 | - | - | 0,00 | 0,00 | - |
| 2 | 9428 | 9429 | 5,99 | 106,0 | 2 | 0,00 | 90,49 | - | - | 0,00 | 0,00 | - |
| 20 | 4411 | 4415 | 15,83 | 106,0 | 2 | 0,00 | 83,90 | - | - | 0,00 | 0,00 | - |
| 21 | 5202 | 5205 | 13,51 | 106,0 | 2 | 0,00 | 85,33 | - | - | 0,00 | 0,00 | - |
| 22 | 4614 | 4617 | 15,20 | 106,0 | 2 | 0,00 | 84,29 | - | - | 0,00 | 0,00 | - |
| 23 | 3865 | 3869 | 17,68 | 106,0 | 2 | 0,00 | 82,75 | - | - | 0,00 | 0,00 | - |
| 24 | 5442 | 5445 | 12,87 | 106,0 | 2 | 0,00 | 85,72 | - | - | 0,00 | 0,00 | - |
| 25 | 4796 | 4800 | 14,65 | 106,0 | 2 | 0,00 | 84,62 | - | - | 0,00 | 0,00 | - |
| 26 | 4221 | 4225 | 16,45 | 106,0 | 2 | 0,00 | 83,52 | - | - | 0,00 | 0,00 | - |
| 27 | 3264 | 3269 | 20,03 | 106,0 | 2 | 0,00 | 81,29 | - | - | 0,00 | 0,00 | - |
| 28 | 2660 | 2666 | 22,80 | 106,0 | 2 | 0,00 | 79,52 | - | - | 0,00 | 0,00 | - |
| 29 | 3270 | 3275 | 20,00 | 106,0 | 2 | 0,00 | 81,30 | - | - | 0,00 | 0,00 | - |
| 3 | 8793 | 8795 | 6,84 | 106,0 | 2 | 0,00 | 89,88 | - | - | 0,00 | 0,00 | - |
| 30 | 2531 | 2537 | 23,47 | 106,0 | 2 | 0,00 | 79,09 | - | - | 0,00 | 0,00 | - |
| 31 | 2019 | 2028 | 26,42 | 106,0 | 2 | 0,00 | 77,14 | - | - | 0,00 | 0,00 | - |

To be continued on next page...

DECIBEL - Detailed results

Calculation: VE1_GE158x43xHH200_20200327 Noise calculation model: ISO 9613-2 General 8,0 m/s

...continued from previous page

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|-----------------|-----------------------|-----------------------|--------------------|--------------------|------------|--------------|--------------|-------------|--------------|---------------|-----------|
| 32 | 1741 | 1752 | 28,30 | 106,0 | 2 | 0,00 | 75,87 | - | - | 0,00 | 0,00 | - |
| 33 | 1078 | 1095 | 34,01 | 106,0 | 2 | 0,00 | 71,79 | - | - | 0,00 | 0,00 | - |
| 34 | 1255 | 1269 | 32,26 | 106,0 | 2 | 0,00 | 73,07 | - | - | 0,00 | 0,00 | - |
| 35 | 2417 | 2424 | 24,08 | 106,0 | 2 | 0,00 | 78,69 | - | - | 0,00 | 0,00 | - |
| 36 | 3471 | 3476 | 19,17 | 106,0 | 2 | 0,00 | 81,82 | - | - | 0,00 | 0,00 | - |
| 37 | 4087 | 4091 | 16,90 | 106,0 | 2 | 0,00 | 83,24 | - | - | 0,00 | 0,00 | - |
| 38 | 5301 | 5305 | 13,24 | 106,0 | 2 | 0,00 | 85,49 | - | - | 0,00 | 0,00 | - |
| 39 | 4763 | 4766 | 14,75 | 106,0 | 2 | 0,00 | 84,56 | - | - | 0,00 | 0,00 | - |
| 4 | 8237 | 8239 | 7,63 | 106,0 | 2 | 0,00 | 89,32 | - | - | 0,00 | 0,00 | - |
| 40 | 5829 | 5832 | 11,90 | 106,0 | 2 | 0,00 | 86,32 | - | - | 0,00 | 0,00 | - |
| 41 | 5429 | 5432 | 12,91 | 106,0 | 2 | 0,00 | 85,70 | - | - | 0,00 | 0,00 | - |
| 42 | 4795 | 4799 | 14,65 | 106,0 | 2 | 0,00 | 84,62 | - | - | 0,00 | 0,00 | - |
| 43 | 6121 | 6124 | 11,22 | 106,0 | 2 | 0,00 | 86,74 | - | - | 0,00 | 0,00 | - |
| 5 | 6758 | 6761 | 10,03 | 106,0 | 2 | 0,00 | 87,60 | - | - | 0,00 | 0,00 | - |
| 6 | 7043 | 7046 | 9,53 | 106,0 | 2 | 0,00 | 87,96 | - | - | 0,00 | 0,00 | - |
| 7 | 7842 | 7844 | 8,23 | 106,0 | 2 | 0,00 | 88,89 | - | - | 0,00 | 0,00 | - |
| 8 | 9018 | 9019 | 6,53 | 106,0 | 2 | 0,00 | 90,10 | - | - | 0,00 | 0,00 | - |
| 9 | 9671 | 9673 | 5,69 | 106,0 | 2 | 0,00 | 90,71 | - | - | 0,00 | 0,00 | - |
| Sum | | | 38,35 | | | | | | | | | |

- Data undefined due to calculation with octave data

Noise sensitive area: E Lomarakennus E (Kellokankaan metsätie)

Wind speed: 8,0 m/s

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|-----------------|-----------------------|-----------------------|--------------------|--------------------|------------|--------------|--------------|-------------|--------------|---------------|-----------|
| 1 | 11207 | 11208 | 3,90 | 106,0 | 2 | 0,00 | 91,99 | - | - | 0,00 | 0,00 | - |
| 10 | 9845 | 9846 | 5,47 | 106,0 | 2 | 0,00 | 90,87 | - | - | 0,00 | 0,00 | - |
| 11 | 9348 | 9349 | 6,10 | 106,0 | 2 | 0,00 | 90,42 | - | - | 0,00 | 0,00 | - |
| 12 | 8740 | 8741 | 6,91 | 106,0 | 2 | 0,00 | 89,83 | - | - | 0,00 | 0,00 | - |
| 13 | 10638 | 10639 | 4,53 | 106,0 | 2 | 0,00 | 91,54 | - | - | 0,00 | 0,00 | - |
| 14 | 10146 | 10147 | 5,11 | 106,0 | 2 | 0,00 | 91,13 | - | - | 0,00 | 0,00 | - |
| 15 | 9659 | 9661 | 5,70 | 106,0 | 2 | 0,00 | 90,70 | - | - | 0,00 | 0,00 | - |
| 16 | 9272 | 9274 | 6,20 | 106,0 | 2 | 0,00 | 90,35 | - | - | 0,00 | 0,00 | - |
| 17 | 6368 | 6370 | 10,74 | 106,0 | 2 | 0,00 | 87,08 | - | - | 0,00 | 0,00 | - |
| 18 | 5791 | 5794 | 12,00 | 106,0 | 2 | 0,00 | 86,26 | - | - | 0,00 | 0,00 | - |
| 19 | 5166 | 5169 | 13,61 | 106,0 | 2 | 0,00 | 85,27 | - | - | 0,00 | 0,00 | - |
| 2 | 10567 | 10568 | 4,61 | 106,0 | 2 | 0,00 | 91,48 | - | - | 0,00 | 0,00 | - |
| 20 | 4629 | 4632 | 15,15 | 106,0 | 2 | 0,00 | 84,32 | - | - | 0,00 | 0,00 | - |
| 21 | 5824 | 5827 | 11,92 | 106,0 | 2 | 0,00 | 86,31 | - | - | 0,00 | 0,00 | - |
| 22 | 5163 | 5166 | 13,61 | 106,0 | 2 | 0,00 | 85,26 | - | - | 0,00 | 0,00 | - |
| 23 | 4385 | 4389 | 15,91 | 106,0 | 2 | 0,00 | 83,85 | - | - | 0,00 | 0,00 | - |
| 24 | 6329 | 6331 | 10,82 | 106,0 | 2 | 0,00 | 87,03 | - | - | 0,00 | 0,00 | - |
| 25 | 5665 | 5668 | 12,30 | 106,0 | 2 | 0,00 | 86,07 | - | - | 0,00 | 0,00 | - |
| 26 | 5067 | 5070 | 13,88 | 106,0 | 2 | 0,00 | 85,10 | - | - | 0,00 | 0,00 | - |
| 27 | 3738 | 3742 | 18,15 | 106,0 | 2 | 0,00 | 82,46 | - | - | 0,00 | 0,00 | - |
| 28 | 3113 | 3119 | 20,67 | 106,0 | 2 | 0,00 | 80,88 | - | - | 0,00 | 0,00 | - |
| 29 | 4207 | 4211 | 16,49 | 106,0 | 2 | 0,00 | 83,49 | - | - | 0,00 | 0,00 | - |
| 3 | 9842 | 9844 | 5,47 | 106,0 | 2 | 0,00 | 90,86 | - | - | 0,00 | 0,00 | - |
| 30 | 3575 | 3579 | 18,77 | 106,0 | 2 | 0,00 | 82,08 | - | - | 0,00 | 0,00 | - |
| 31 | 2645 | 2651 | 22,88 | 106,0 | 2 | 0,00 | 79,47 | - | - | 0,00 | 0,00 | - |
| 32 | 1911 | 1921 | 27,12 | 106,0 | 2 | 0,00 | 76,67 | - | - | 0,00 | 0,00 | - |
| 33 | 1843 | 1853 | 27,58 | 106,0 | 2 | 0,00 | 76,36 | - | - | 0,00 | 0,00 | - |
| 34 | 2870 | 2876 | 21,78 | 106,0 | 2 | 0,00 | 80,18 | - | - | 0,00 | 0,00 | - |
| 35 | 4022 | 4026 | 17,12 | 106,0 | 2 | 0,00 | 83,10 | - | - | 0,00 | 0,00 | - |
| 36 | 4764 | 4767 | 14,75 | 106,0 | 2 | 0,00 | 84,56 | - | - | 0,00 | 0,00 | - |
| 37 | 5283 | 5286 | 13,29 | 106,0 | 2 | 0,00 | 85,46 | - | - | 0,00 | 0,00 | - |
| 38 | 6439 | 6441 | 10,61 | 106,0 | 2 | 0,00 | 87,18 | - | - | 0,00 | 0,00 | - |
| 39 | 6059 | 6062 | 11,36 | 106,0 | 2 | 0,00 | 86,65 | - | - | 0,00 | 0,00 | - |
| 4 | 9347 | 9348 | 6,10 | 106,0 | 2 | 0,00 | 90,41 | - | - | 0,00 | 0,00 | - |
| 40 | 7155 | 7157 | 9,34 | 106,0 | 2 | 0,00 | 88,10 | - | - | 0,00 | 0,00 | - |
| 41 | 6872 | 6875 | 9,82 | 106,0 | 2 | 0,00 | 87,75 | - | - | 0,00 | 0,00 | - |
| 42 | 6309 | 6311 | 10,85 | 106,0 | 2 | 0,00 | 87,00 | - | - | 0,00 | 0,00 | - |
| 43 | 7679 | 7681 | 8,48 | 106,0 | 2 | 0,00 | 88,71 | - | - | 0,00 | 0,00 | - |

To be continued on next page...

DECIBEL - Detailed results

Calculation: VE1_GE158x43xHH200_20200327Noise calculation model: ISO 9613-2 General 8,0 m/s

...continued from previous page

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|--------------|--------------------|--------------------|-----------------|-----------------|---------|-----------|-----------|----------|-----------|------------|--------|
| 5 | 7832 | 7834 | 8,24 | 106,0 | 2 | 0,00 | 88,88 | - | - | 0,00 | 0,00 | - |
| 6 | 8315 | 8317 | 7,52 | 106,0 | 2 | 0,00 | 89,40 | - | - | 0,00 | 0,00 | - |
| 7 | 9089 | 9091 | 6,44 | 106,0 | 2 | 0,00 | 90,17 | - | - | 0,00 | 0,00 | - |
| 8 | 10302 | 10303 | 4,92 | 106,0 | 2 | 0,00 | 91,26 | - | - | 0,00 | 0,00 | - |
| 9 | 11071 | 11072 | 4,05 | 106,0 | 2 | 0,00 | 91,88 | - | - | 0,00 | 0,00 | - |
| Sum | | | 33,38 | | | | | | | | | |

- Data undefined due to calculation with octave data

Noise sensitive area: F Asuinrakennus F (Ollilantie 112)

Wind speed: 8,0 m/s

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|--------------|--------------------|--------------------|-----------------|-----------------|---------|-----------|-----------|----------|-----------|------------|--------|
| 1 | 6785 | 6788 | 9,98 | 106,0 | 2 | 0,00 | 87,63 | - | - | 0,00 | 0,00 | - |
| 10 | 6786 | 6789 | 9,98 | 106,0 | 2 | 0,00 | 87,64 | - | - | 0,00 | 0,00 | - |
| 11 | 6712 | 6715 | 10,11 | 106,0 | 2 | 0,00 | 87,54 | - | - | 0,00 | 0,00 | - |
| 12 | 6462 | 6465 | 10,56 | 106,0 | 2 | 0,00 | 87,21 | - | - | 0,00 | 0,00 | - |
| 13 | 7761 | 7763 | 8,35 | 106,0 | 2 | 0,00 | 88,80 | - | - | 0,00 | 0,00 | - |
| 14 | 7623 | 7626 | 8,57 | 106,0 | 2 | 0,00 | 88,65 | - | - | 0,00 | 0,00 | - |
| 15 | 7536 | 7539 | 8,71 | 106,0 | 2 | 0,00 | 88,55 | - | - | 0,00 | 0,00 | - |
| 16 | 7615 | 7618 | 8,58 | 106,0 | 2 | 0,00 | 88,64 | - | - | 0,00 | 0,00 | - |
| 17 | 2612 | 2620 | 23,04 | 106,0 | 2 | 0,00 | 79,37 | - | - | 0,00 | 0,00 | - |
| 18 | 2027 | 2038 | 26,36 | 106,0 | 2 | 0,00 | 77,18 | - | - | 0,00 | 0,00 | - |
| 19 | 2039 | 2050 | 26,28 | 106,0 | 2 | 0,00 | 77,23 | - | - | 0,00 | 0,00 | - |
| 2 | 6480 | 6483 | 10,53 | 106,0 | 2 | 0,00 | 87,24 | - | - | 0,00 | 0,00 | - |
| 20 | 2576 | 2584 | 23,22 | 106,0 | 2 | 0,00 | 79,25 | - | - | 0,00 | 0,00 | - |
| 21 | 2825 | 2833 | 21,98 | 106,0 | 2 | 0,00 | 80,05 | - | - | 0,00 | 0,00 | - |
| 22 | 2889 | 2896 | 21,68 | 106,0 | 2 | 0,00 | 80,24 | - | - | 0,00 | 0,00 | - |
| 23 | 3304 | 3311 | 19,85 | 106,0 | 2 | 0,00 | 81,40 | - | - | 0,00 | 0,00 | - |
| 24 | 3567 | 3573 | 18,79 | 106,0 | 2 | 0,00 | 82,06 | - | - | 0,00 | 0,00 | - |
| 25 | 3561 | 3567 | 18,82 | 106,0 | 2 | 0,00 | 82,05 | - | - | 0,00 | 0,00 | - |
| 26 | 3655 | 3661 | 18,45 | 106,0 | 2 | 0,00 | 82,27 | - | - | 0,00 | 0,00 | - |
| 27 | 3727 | 3733 | 18,18 | 106,0 | 2 | 0,00 | 82,44 | - | - | 0,00 | 0,00 | - |
| 28 | 4246 | 4252 | 16,36 | 106,0 | 2 | 0,00 | 83,57 | - | - | 0,00 | 0,00 | - |
| 29 | 4225 | 4230 | 16,43 | 106,0 | 2 | 0,00 | 83,53 | - | - | 0,00 | 0,00 | - |
| 3 | 5642 | 5646 | 12,36 | 106,0 | 2 | 0,00 | 86,04 | - | - | 0,00 | 0,00 | - |
| 30 | 4757 | 4761 | 14,76 | 106,0 | 2 | 0,00 | 84,55 | - | - | 0,00 | 0,00 | - |
| 31 | 4875 | 4880 | 14,42 | 106,0 | 2 | 0,00 | 84,77 | - | - | 0,00 | 0,00 | - |
| 32 | 5221 | 5226 | 13,45 | 106,0 | 2 | 0,00 | 85,36 | - | - | 0,00 | 0,00 | - |
| 33 | 5828 | 5832 | 11,90 | 106,0 | 2 | 0,00 | 86,32 | - | - | 0,00 | 0,00 | - |
| 34 | 6022 | 6026 | 11,44 | 106,0 | 2 | 0,00 | 86,60 | - | - | 0,00 | 0,00 | - |
| 35 | 5748 | 5752 | 12,10 | 106,0 | 2 | 0,00 | 86,20 | - | - | 0,00 | 0,00 | - |
| 36 | 4860 | 4864 | 14,46 | 106,0 | 2 | 0,00 | 84,74 | - | - | 0,00 | 0,00 | - |
| 37 | 4534 | 4539 | 15,44 | 106,0 | 2 | 0,00 | 84,14 | - | - | 0,00 | 0,00 | - |
| 38 | 4383 | 4388 | 15,92 | 106,0 | 2 | 0,00 | 83,85 | - | - | 0,00 | 0,00 | - |
| 39 | 4854 | 4858 | 14,48 | 106,0 | 2 | 0,00 | 84,73 | - | - | 0,00 | 0,00 | - |
| 4 | 5524 | 5528 | 12,66 | 106,0 | 2 | 0,00 | 85,85 | - | - | 0,00 | 0,00 | - |
| 40 | 5221 | 5226 | 13,45 | 106,0 | 2 | 0,00 | 85,36 | - | - | 0,00 | 0,00 | - |
| 41 | 5563 | 5568 | 12,56 | 106,0 | 2 | 0,00 | 85,91 | - | - | 0,00 | 0,00 | - |
| 42 | 5653 | 5658 | 12,33 | 106,0 | 2 | 0,00 | 86,05 | - | - | 0,00 | 0,00 | - |
| 43 | 6355 | 6358 | 10,76 | 106,0 | 2 | 0,00 | 87,07 | - | - | 0,00 | 0,00 | - |
| 5 | 4569 | 4574 | 15,33 | 106,0 | 2 | 0,00 | 84,21 | - | - | 0,00 | 0,00 | - |
| 6 | 5522 | 5526 | 12,66 | 106,0 | 2 | 0,00 | 85,85 | - | - | 0,00 | 0,00 | - |
| 7 | 5869 | 5873 | 11,80 | 106,0 | 2 | 0,00 | 86,38 | - | - | 0,00 | 0,00 | - |
| 8 | 6820 | 6823 | 9,92 | 106,0 | 2 | 0,00 | 87,68 | - | - | 0,00 | 0,00 | - |
| 9 | 7846 | 7849 | 8,22 | 106,0 | 2 | 0,00 | 88,90 | - | - | 0,00 | 0,00 | - |
| Sum | | | 34,10 | | | | | | | | | |

- Data undefined due to calculation with octave data

DECIBEL - Detailed results

Calculation: VE1_GE158x43xHH200_20200327Noise calculation model: ISO 9613-2 General 8,0 m/s
Noise sensitive area: G Lomarakennus G (Ollilantie, Siliäkuru)

Wind speed: 8,0 m/s

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|-----------------|-----------------------|-----------------------|--------------------|--------------------|------------|--------------|--------------|-------------|--------------|---------------|-----------|
| 1 | 5935 | 5938 | 11,65 | 106,0 | 2 | 0,00 | 86,47 | - | - | 0,00 | 0,00 | - |
| 10 | 5927 | 5931 | 11,67 | 106,0 | 2 | 0,00 | 86,46 | - | - | 0,00 | 0,00 | - |
| 11 | 5871 | 5874 | 11,80 | 106,0 | 2 | 0,00 | 86,38 | - | - | 0,00 | 0,00 | - |
| 12 | 5646 | 5649 | 12,35 | 106,0 | 2 | 0,00 | 86,04 | - | - | 0,00 | 0,00 | - |
| 13 | 6901 | 6904 | 9,77 | 106,0 | 2 | 0,00 | 87,78 | - | - | 0,00 | 0,00 | - |
| 14 | 6776 | 6779 | 9,99 | 106,0 | 2 | 0,00 | 87,62 | - | - | 0,00 | 0,00 | - |
| 15 | 6709 | 6712 | 10,11 | 106,0 | 2 | 0,00 | 87,54 | - | - | 0,00 | 0,00 | - |
| 16 | 6814 | 6817 | 9,93 | 106,0 | 2 | 0,00 | 87,67 | - | - | 0,00 | 0,00 | - |
| 17 | 1908 | 1918 | 27,14 | 106,0 | 2 | 0,00 | 76,66 | - | - | 0,00 | 0,00 | - |
| 18 | 1548 | 1560 | 29,74 | 106,0 | 2 | 0,00 | 74,86 | - | - | 0,00 | 0,00 | - |
| 19 | 1854 | 1864 | 27,50 | 106,0 | 2 | 0,00 | 76,41 | - | - | 0,00 | 0,00 | - |
| 2 | 5616 | 5619 | 12,43 | 106,0 | 2 | 0,00 | 85,99 | - | - | 0,00 | 0,00 | - |
| 20 | 2442 | 2450 | 23,94 | 106,0 | 2 | 0,00 | 78,78 | - | - | 0,00 | 0,00 | - |
| 21 | 2247 | 2256 | 25,03 | 106,0 | 2 | 0,00 | 78,07 | - | - | 0,00 | 0,00 | - |
| 22 | 2488 | 2496 | 23,69 | 106,0 | 2 | 0,00 | 78,95 | - | - | 0,00 | 0,00 | - |
| 23 | 3070 | 3077 | 20,86 | 106,0 | 2 | 0,00 | 80,76 | - | - | 0,00 | 0,00 | - |
| 24 | 2878 | 2885 | 21,74 | 106,0 | 2 | 0,00 | 80,20 | - | - | 0,00 | 0,00 | - |
| 25 | 2994 | 3001 | 21,20 | 106,0 | 2 | 0,00 | 80,55 | - | - | 0,00 | 0,00 | - |
| 26 | 3211 | 3217 | 20,25 | 106,0 | 2 | 0,00 | 81,15 | - | - | 0,00 | 0,00 | - |
| 27 | 3603 | 3608 | 18,66 | 106,0 | 2 | 0,00 | 82,15 | - | - | 0,00 | 0,00 | - |
| 28 | 4194 | 4199 | 16,53 | 106,0 | 2 | 0,00 | 83,46 | - | - | 0,00 | 0,00 | - |
| 29 | 3927 | 3932 | 17,46 | 106,0 | 2 | 0,00 | 82,89 | - | - | 0,00 | 0,00 | - |
| 3 | 4777 | 4781 | 14,71 | 106,0 | 2 | 0,00 | 84,59 | - | - | 0,00 | 0,00 | - |
| 30 | 4546 | 4551 | 15,40 | 106,0 | 2 | 0,00 | 84,16 | - | - | 0,00 | 0,00 | - |
| 31 | 4835 | 4840 | 14,53 | 106,0 | 2 | 0,00 | 84,70 | - | - | 0,00 | 0,00 | - |
| 32 | 5289 | 5294 | 13,27 | 106,0 | 2 | 0,00 | 85,48 | - | - | 0,00 | 0,00 | - |
| 33 | 5845 | 5849 | 11,86 | 106,0 | 2 | 0,00 | 86,34 | - | - | 0,00 | 0,00 | - |
| 34 | 5881 | 5884 | 11,78 | 106,0 | 2 | 0,00 | 86,39 | - | - | 0,00 | 0,00 | - |
| 35 | 5441 | 5445 | 12,87 | 106,0 | 2 | 0,00 | 85,72 | - | - | 0,00 | 0,00 | - |
| 36 | 4439 | 4444 | 15,74 | 106,0 | 2 | 0,00 | 83,95 | - | - | 0,00 | 0,00 | - |
| 37 | 4029 | 4034 | 17,10 | 106,0 | 2 | 0,00 | 83,11 | - | - | 0,00 | 0,00 | - |
| 38 | 3698 | 3704 | 18,29 | 106,0 | 2 | 0,00 | 82,37 | - | - | 0,00 | 0,00 | - |
| 39 | 4236 | 4241 | 16,40 | 106,0 | 2 | 0,00 | 83,55 | - | - | 0,00 | 0,00 | - |
| 4 | 4657 | 4661 | 15,07 | 106,0 | 2 | 0,00 | 84,37 | - | - | 0,00 | 0,00 | - |
| 40 | 4483 | 4488 | 15,60 | 106,0 | 2 | 0,00 | 84,04 | - | - | 0,00 | 0,00 | - |
| 41 | 4871 | 4876 | 14,43 | 106,0 | 2 | 0,00 | 84,76 | - | - | 0,00 | 0,00 | - |
| 42 | 5031 | 5036 | 13,97 | 106,0 | 2 | 0,00 | 85,04 | - | - | 0,00 | 0,00 | - |
| 43 | 5618 | 5622 | 12,42 | 106,0 | 2 | 0,00 | 86,00 | - | - | 0,00 | 0,00 | - |
| 5 | 3741 | 3747 | 18,13 | 106,0 | 2 | 0,00 | 82,47 | - | - | 0,00 | 0,00 | - |
| 6 | 4696 | 4700 | 14,95 | 106,0 | 2 | 0,00 | 84,44 | - | - | 0,00 | 0,00 | - |
| 7 | 5015 | 5019 | 14,02 | 106,0 | 2 | 0,00 | 85,01 | - | - | 0,00 | 0,00 | - |
| 8 | 5953 | 5956 | 11,61 | 106,0 | 2 | 0,00 | 86,50 | - | - | 0,00 | 0,00 | - |
| 9 | 6980 | 6982 | 9,64 | 106,0 | 2 | 0,00 | 87,88 | - | - | 0,00 | 0,00 | - |
| Sum | | | 36,31 | | | | | | | | | |

- Data undefined due to calculation with octave data

Noise sensitive area: H Asuinrakennus H (Pinolantie 406)

Wind speed: 8,0 m/s

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|-----------------|-----------------------|-----------------------|--------------------|--------------------|------------|--------------|--------------|-------------|--------------|---------------|-----------|
| 1 | 2717 | 2725 | 22,51 | 106,0 | 2 | 0,00 | 79,71 | - | - | 0,00 | 0,00 | - |
| 10 | 3514 | 3520 | 19,00 | 106,0 | 2 | 0,00 | 81,93 | - | - | 0,00 | 0,00 | - |
| 11 | 4075 | 4080 | 16,94 | 106,0 | 2 | 0,00 | 83,21 | - | - | 0,00 | 0,00 | - |
| 12 | 4720 | 4724 | 14,87 | 106,0 | 2 | 0,00 | 84,49 | - | - | 0,00 | 0,00 | - |
| 13 | 2889 | 2896 | 21,68 | 106,0 | 2 | 0,00 | 80,24 | - | - | 0,00 | 0,00 | - |
| 14 | 3495 | 3501 | 19,08 | 106,0 | 2 | 0,00 | 81,88 | - | - | 0,00 | 0,00 | - |
| 15 | 4119 | 4124 | 16,79 | 106,0 | 2 | 0,00 | 83,31 | - | - | 0,00 | 0,00 | - |
| 16 | 4727 | 4732 | 14,85 | 106,0 | 2 | 0,00 | 84,50 | - | - | 0,00 | 0,00 | - |
| 17 | 7594 | 7596 | 8,63 | 106,0 | 2 | 0,00 | 88,61 | - | - | 0,00 | 0,00 | - |
| 18 | 8440 | 8442 | 7,35 | 106,0 | 2 | 0,00 | 89,53 | - | - | 0,00 | 0,00 | - |
| 19 | 9117 | 9119 | 6,42 | 106,0 | 2 | 0,00 | 90,20 | - | - | 0,00 | 0,00 | - |
| 2 | 3030 | 3037 | 21,04 | 106,0 | 2 | 0,00 | 80,65 | - | - | 0,00 | 0,00 | - |

To be continued on next page...

DECIBEL - Detailed results

Calculation: VE1_GE158x43xHH200_20200327Noise calculation model: ISO 9613-2 General 8,0 m/s

...continued from previous page

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|-----------------|-----------------------|-----------------------|--------------------|--------------------|------------|--------------|--------------|-------------|--------------|---------------|-----------|
| 20 | 9368 | 9371 | 6,07 | 106,0 | 2 | 0,00 | 90,44 | - | - | 0,00 | 0,00 | - |
| 21 | 7943 | 7946 | 8,07 | 106,0 | 2 | 0,00 | 89,00 | - | - | 0,00 | 0,00 | - |
| 22 | 8556 | 8558 | 7,18 | 106,0 | 2 | 0,00 | 89,65 | - | - | 0,00 | 0,00 | - |
| 23 | 9210 | 9212 | 6,29 | 106,0 | 2 | 0,00 | 90,29 | - | - | 0,00 | 0,00 | - |
| 24 | 7194 | 7197 | 9,29 | 106,0 | 2 | 0,00 | 88,14 | - | - | 0,00 | 0,00 | - |
| 25 | 7809 | 7811 | 8,28 | 106,0 | 2 | 0,00 | 88,85 | - | - | 0,00 | 0,00 | - |
| 26 | 8371 | 8374 | 7,43 | 106,0 | 2 | 0,00 | 89,46 | - | - | 0,00 | 0,00 | - |
| 27 | 9777 | 9780 | 5,55 | 106,0 | 2 | 0,00 | 90,81 | - | - | 0,00 | 0,00 | - |
| 28 | 10317 | 10320 | 4,90 | 106,0 | 2 | 0,00 | 91,27 | - | - | 0,00 | 0,00 | - |
| 29 | 9149 | 9151 | 6,36 | 106,0 | 2 | 0,00 | 90,23 | - | - | 0,00 | 0,00 | - |
| 3 | 3875 | 3880 | 17,64 | 106,0 | 2 | 0,00 | 82,78 | - | - | 0,00 | 0,00 | - |
| 30 | 9771 | 9773 | 5,56 | 106,0 | 2 | 0,00 | 90,80 | - | - | 0,00 | 0,00 | - |
| 31 | 10703 | 10705 | 4,46 | 106,0 | 2 | 0,00 | 91,59 | - | - | 0,00 | 0,00 | - |
| 32 | 11445 | 11447 | 3,65 | 106,0 | 2 | 0,00 | 92,17 | - | - | 0,00 | 0,00 | - |
| 33 | 11565 | 11567 | 3,52 | 106,0 | 2 | 0,00 | 92,26 | - | - | 0,00 | 0,00 | - |
| 34 | 10760 | 10762 | 4,39 | 106,0 | 2 | 0,00 | 91,64 | - | - | 0,00 | 0,00 | - |
| 35 | 9581 | 9584 | 5,80 | 106,0 | 2 | 0,00 | 90,63 | - | - | 0,00 | 0,00 | - |
| 36 | 8608 | 8611 | 7,10 | 106,0 | 2 | 0,00 | 89,70 | - | - | 0,00 | 0,00 | - |
| 37 | 8061 | 8064 | 7,89 | 106,0 | 2 | 0,00 | 89,13 | - | - | 0,00 | 0,00 | - |
| 38 | 6918 | 6921 | 9,74 | 106,0 | 2 | 0,00 | 87,80 | - | - | 0,00 | 0,00 | - |
| 39 | 7297 | 7300 | 9,10 | 106,0 | 2 | 0,00 | 88,27 | - | - | 0,00 | 0,00 | - |
| 4 | 4171 | 4176 | 16,64 | 106,0 | 2 | 0,00 | 83,42 | - | - | 0,00 | 0,00 | - |
| 40 | 6202 | 6206 | 11,06 | 106,0 | 2 | 0,00 | 86,86 | - | - | 0,00 | 0,00 | - |
| 41 | 6569 | 6572 | 10,37 | 106,0 | 2 | 0,00 | 87,35 | - | - | 0,00 | 0,00 | - |
| 42 | 7209 | 7213 | 9,24 | 106,0 | 2 | 0,00 | 88,16 | - | - | 0,00 | 0,00 | - |
| 43 | 5947 | 5951 | 11,62 | 106,0 | 2 | 0,00 | 86,49 | - | - | 0,00 | 0,00 | - |
| 5 | 5618 | 5622 | 12,44 | 106,0 | 2 | 0,00 | 86,00 | - | - | 0,00 | 0,00 | - |
| 6 | 5028 | 5033 | 13,98 | 106,0 | 2 | 0,00 | 85,04 | - | - | 0,00 | 0,00 | - |
| 7 | 4264 | 4270 | 16,30 | 106,0 | 2 | 0,00 | 83,61 | - | - | 0,00 | 0,00 | - |
| 8 | 3048 | 3055 | 20,96 | 106,0 | 2 | 0,00 | 80,70 | - | - | 0,00 | 0,00 | - |
| 9 | 2340 | 2349 | 24,50 | 106,0 | 2 | 0,00 | 78,42 | - | - | 0,00 | 0,00 | - |
| Sum | | | 31,84 | | | | | | | | | |

- Data undefined due to calculation with octave data

Noise sensitive area: I Asuinrakennus I (Kortenevantie 116)

Wind speed: 8,0 m/s

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|-----------------|-----------------------|-----------------------|--------------------|--------------------|------------|--------------|--------------|-------------|--------------|---------------|-----------|
| 1 | 3772 | 3777 | 18,02 | 106,0 | 2 | 0,00 | 82,54 | - | - | 0,00 | 0,00 | - |
| 10 | 3790 | 3795 | 17,95 | 106,0 | 2 | 0,00 | 82,59 | - | - | 0,00 | 0,00 | - |
| 11 | 4203 | 4208 | 16,50 | 106,0 | 2 | 0,00 | 83,48 | - | - | 0,00 | 0,00 | - |
| 12 | 4796 | 4801 | 14,65 | 106,0 | 2 | 0,00 | 84,63 | - | - | 0,00 | 0,00 | - |
| 13 | 2906 | 2913 | 21,60 | 106,0 | 2 | 0,00 | 80,29 | - | - | 0,00 | 0,00 | - |
| 14 | 3395 | 3402 | 19,47 | 106,0 | 2 | 0,00 | 81,63 | - | - | 0,00 | 0,00 | - |
| 15 | 3933 | 3939 | 17,43 | 106,0 | 2 | 0,00 | 82,91 | - | - | 0,00 | 0,00 | - |
| 16 | 4445 | 4450 | 15,72 | 106,0 | 2 | 0,00 | 83,97 | - | - | 0,00 | 0,00 | - |
| 17 | 8195 | 8197 | 7,69 | 106,0 | 2 | 0,00 | 89,27 | - | - | 0,00 | 0,00 | - |
| 18 | 9054 | 9056 | 6,48 | 106,0 | 2 | 0,00 | 90,14 | - | - | 0,00 | 0,00 | - |
| 19 | 9698 | 9700 | 5,65 | 106,0 | 2 | 0,00 | 90,74 | - | - | 0,00 | 0,00 | - |
| 2 | 3858 | 3864 | 17,70 | 106,0 | 2 | 0,00 | 82,74 | - | - | 0,00 | 0,00 | - |
| 20 | 9874 | 9877 | 5,43 | 106,0 | 2 | 0,00 | 90,89 | - | - | 0,00 | 0,00 | - |
| 21 | 8464 | 8467 | 7,30 | 106,0 | 2 | 0,00 | 89,55 | - | - | 0,00 | 0,00 | - |
| 22 | 9030 | 9032 | 6,52 | 106,0 | 2 | 0,00 | 90,12 | - | - | 0,00 | 0,00 | - |
| 23 | 9613 | 9615 | 5,76 | 106,0 | 2 | 0,00 | 90,66 | - | - | 0,00 | 0,00 | - |
| 24 | 7650 | 7653 | 8,53 | 106,0 | 2 | 0,00 | 88,68 | - | - | 0,00 | 0,00 | - |
| 25 | 8211 | 8214 | 7,67 | 106,0 | 2 | 0,00 | 89,29 | - | - | 0,00 | 0,00 | - |
| 26 | 8732 | 8735 | 6,92 | 106,0 | 2 | 0,00 | 89,82 | - | - | 0,00 | 0,00 | - |
| 27 | 10130 | 10132 | 5,12 | 106,0 | 2 | 0,00 | 91,11 | - | - | 0,00 | 0,00 | - |
| 28 | 10616 | 10619 | 4,56 | 106,0 | 2 | 0,00 | 91,52 | - | - | 0,00 | 0,00 | - |
| 29 | 9416 | 9418 | 6,01 | 106,0 | 2 | 0,00 | 90,48 | - | - | 0,00 | 0,00 | - |
| 3 | 4676 | 4680 | 15,03 | 106,0 | 2 | 0,00 | 84,41 | - | - | 0,00 | 0,00 | - |
| 30 | 9973 | 9975 | 5,31 | 106,0 | 2 | 0,00 | 90,98 | - | - | 0,00 | 0,00 | - |
| 31 | 10932 | 10934 | 4,20 | 106,0 | 2 | 0,00 | 91,78 | - | - | 0,00 | 0,00 | - |

To be continued on next page...

DECIBEL - Detailed results

Calculation: VE1_GE158x43xHH200_20200327 Noise calculation model: ISO 9613-2 General 8,0 m/s

...continued from previous page

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|--------------|--------------------|--------------------|-----------------|-----------------|---------|-----------|-----------|----------|-----------|------------|--------|
| 32 | 11674 | 11676 | 3,41 | 106,0 | 2 | 0,00 | 92,35 | - | - | 0,00 | 0,00 | - |
| 33 | 11714 | 11717 | 3,36 | 106,0 | 2 | 0,00 | 92,38 | - | - | 0,00 | 0,00 | - |
| 34 | 10824 | 10827 | 4,32 | 106,0 | 2 | 0,00 | 91,69 | - | - | 0,00 | 0,00 | - |
| 35 | 9627 | 9629 | 5,74 | 106,0 | 2 | 0,00 | 90,67 | - | - | 0,00 | 0,00 | - |
| 36 | 8772 | 8775 | 6,87 | 106,0 | 2 | 0,00 | 89,87 | - | - | 0,00 | 0,00 | - |
| 37 | 8285 | 8288 | 7,56 | 106,0 | 2 | 0,00 | 89,37 | - | - | 0,00 | 0,00 | - |
| 38 | 7235 | 7238 | 9,20 | 106,0 | 2 | 0,00 | 88,19 | - | - | 0,00 | 0,00 | - |
| 39 | 7492 | 7496 | 8,78 | 106,0 | 2 | 0,00 | 88,50 | - | - | 0,00 | 0,00 | - |
| 4 | 4813 | 4817 | 14,62 | 106,0 | 2 | 0,00 | 84,66 | - | - | 0,00 | 0,00 | - |
| 40 | 6408 | 6412 | 10,66 | 106,0 | 2 | 0,00 | 87,14 | - | - | 0,00 | 0,00 | - |
| 41 | 6664 | 6668 | 10,19 | 106,0 | 2 | 0,00 | 87,48 | - | - | 0,00 | 0,00 | - |
| 42 | 7254 | 7257 | 9,17 | 106,0 | 2 | 0,00 | 88,22 | - | - | 0,00 | 0,00 | - |
| 43 | 5907 | 5911 | 11,71 | 106,0 | 2 | 0,00 | 86,43 | - | - | 0,00 | 0,00 | - |
| 5 | 6102 | 6106 | 11,26 | 106,0 | 2 | 0,00 | 86,72 | - | - | 0,00 | 0,00 | - |
| 6 | 5347 | 5351 | 13,12 | 106,0 | 2 | 0,00 | 85,57 | - | - | 0,00 | 0,00 | - |
| 7 | 4680 | 4684 | 14,99 | 106,0 | 2 | 0,00 | 84,41 | - | - | 0,00 | 0,00 | - |
| 8 | 3539 | 3545 | 18,90 | 106,0 | 2 | 0,00 | 81,99 | - | - | 0,00 | 0,00 | - |
| 9 | 2564 | 2572 | 23,29 | 106,0 | 2 | 0,00 | 79,21 | - | - | 0,00 | 0,00 | - |
| Sum | | | 30,60 | | | | | | | | | |

- Data undefined due to calculation with octave data

Noise sensitive area: J Asuinrakennus J (Haapavesitie 1406)

Wind speed: 8,0 m/s

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|--------------|--------------------|--------------------|-----------------|-----------------|---------|-----------|-----------|----------|-----------|------------|--------|
| 1 | 4773 | 4777 | 14,72 | 106,0 | 2 | 0,00 | 84,58 | - | - | 0,00 | 0,00 | - |
| 10 | 3936 | 3941 | 17,42 | 106,0 | 2 | 0,00 | 82,91 | - | - | 0,00 | 0,00 | - |
| 11 | 4107 | 4112 | 16,83 | 106,0 | 2 | 0,00 | 83,28 | - | - | 0,00 | 0,00 | - |
| 12 | 4559 | 4564 | 15,36 | 106,0 | 2 | 0,00 | 84,19 | - | - | 0,00 | 0,00 | - |
| 13 | 2960 | 2967 | 21,36 | 106,0 | 2 | 0,00 | 80,45 | - | - | 0,00 | 0,00 | - |
| 14 | 3176 | 3183 | 20,39 | 106,0 | 2 | 0,00 | 81,06 | - | - | 0,00 | 0,00 | - |
| 15 | 3497 | 3503 | 19,07 | 106,0 | 2 | 0,00 | 81,89 | - | - | 0,00 | 0,00 | - |
| 16 | 3810 | 3816 | 17,88 | 106,0 | 2 | 0,00 | 82,63 | - | - | 0,00 | 0,00 | - |
| 17 | 8366 | 8369 | 7,44 | 106,0 | 2 | 0,00 | 89,45 | - | - | 0,00 | 0,00 | - |
| 18 | 9213 | 9215 | 6,27 | 106,0 | 2 | 0,00 | 90,29 | - | - | 0,00 | 0,00 | - |
| 19 | 9797 | 9799 | 5,53 | 106,0 | 2 | 0,00 | 90,82 | - | - | 0,00 | 0,00 | - |
| 2 | 4603 | 4608 | 15,25 | 106,0 | 2 | 0,00 | 84,27 | - | - | 0,00 | 0,00 | - |
| 20 | 9873 | 9876 | 5,43 | 106,0 | 2 | 0,00 | 90,89 | - | - | 0,00 | 0,00 | - |
| 21 | 8526 | 8528 | 7,21 | 106,0 | 2 | 0,00 | 89,62 | - | - | 0,00 | 0,00 | - |
| 22 | 9014 | 9016 | 6,54 | 106,0 | 2 | 0,00 | 90,10 | - | - | 0,00 | 0,00 | - |
| 23 | 9491 | 9493 | 5,91 | 106,0 | 2 | 0,00 | 90,55 | - | - | 0,00 | 0,00 | - |
| 24 | 7664 | 7667 | 8,50 | 106,0 | 2 | 0,00 | 88,69 | - | - | 0,00 | 0,00 | - |
| 25 | 8135 | 8138 | 7,78 | 106,0 | 2 | 0,00 | 89,21 | - | - | 0,00 | 0,00 | - |
| 26 | 8586 | 8588 | 7,13 | 106,0 | 2 | 0,00 | 89,68 | - | - | 0,00 | 0,00 | - |
| 27 | 9932 | 9934 | 5,36 | 106,0 | 2 | 0,00 | 90,94 | - | - | 0,00 | 0,00 | - |
| 28 | 10342 | 10344 | 4,87 | 106,0 | 2 | 0,00 | 91,29 | - | - | 0,00 | 0,00 | - |
| 29 | 9133 | 9136 | 6,38 | 106,0 | 2 | 0,00 | 90,21 | - | - | 0,00 | 0,00 | - |
| 3 | 5302 | 5306 | 13,25 | 106,0 | 2 | 0,00 | 85,50 | - | - | 0,00 | 0,00 | - |
| 30 | 9598 | 9600 | 5,78 | 106,0 | 2 | 0,00 | 90,65 | - | - | 0,00 | 0,00 | - |
| 31 | 10566 | 10568 | 4,61 | 106,0 | 2 | 0,00 | 91,48 | - | - | 0,00 | 0,00 | - |
| 32 | 11293 | 11295 | 3,81 | 106,0 | 2 | 0,00 | 92,06 | - | - | 0,00 | 0,00 | - |
| 33 | 11238 | 11240 | 3,87 | 106,0 | 2 | 0,00 | 92,02 | - | - | 0,00 | 0,00 | - |
| 34 | 10266 | 10268 | 4,96 | 106,0 | 2 | 0,00 | 91,23 | - | - | 0,00 | 0,00 | - |
| 35 | 9075 | 9078 | 6,46 | 106,0 | 2 | 0,00 | 90,16 | - | - | 0,00 | 0,00 | - |
| 36 | 8388 | 8390 | 7,41 | 106,0 | 2 | 0,00 | 89,48 | - | - | 0,00 | 0,00 | - |
| 37 | 7990 | 7992 | 8,00 | 106,0 | 2 | 0,00 | 89,05 | - | - | 0,00 | 0,00 | - |
| 38 | 7098 | 7102 | 9,43 | 106,0 | 2 | 0,00 | 88,03 | - | - | 0,00 | 0,00 | - |
| 39 | 7197 | 7200 | 9,27 | 106,0 | 2 | 0,00 | 88,15 | - | - | 0,00 | 0,00 | - |
| 4 | 5241 | 5245 | 13,40 | 106,0 | 2 | 0,00 | 85,40 | - | - | 0,00 | 0,00 | - |
| 40 | 6185 | 6188 | 11,09 | 106,0 | 2 | 0,00 | 86,83 | - | - | 0,00 | 0,00 | - |
| 41 | 6293 | 6296 | 10,88 | 106,0 | 2 | 0,00 | 86,98 | - | - | 0,00 | 0,00 | - |
| 42 | 6790 | 6793 | 9,97 | 106,0 | 2 | 0,00 | 87,64 | - | - | 0,00 | 0,00 | - |
| 43 | 5422 | 5427 | 12,92 | 106,0 | 2 | 0,00 | 85,69 | - | - | 0,00 | 0,00 | - |

To be continued on next page...

DECIBEL - Detailed results

Calculation: VE1_GE158x43xHH200_20200327 Noise calculation model: ISO 9613-2 General 8,0 m/s

...continued from previous page

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|-----------------|-----------------------|-----------------------|--------------------|--------------------|------------|--------------|--------------|-------------|--------------|---------------|-----------|
| 5 | 6235 | 6239 | 10,99 | 106,0 | 2 | 0,00 | 86,90 | - | - | 0,00 | 0,00 | - |
| 6 | 5343 | 5347 | 13,13 | 106,0 | 2 | 0,00 | 85,56 | - | - | 0,00 | 0,00 | - |
| 7 | 4858 | 4863 | 14,47 | 106,0 | 2 | 0,00 | 84,74 | - | - | 0,00 | 0,00 | - |
| 8 | 3970 | 3975 | 17,30 | 106,0 | 2 | 0,00 | 82,99 | - | - | 0,00 | 0,00 | - |
| 9 | 2961 | 2968 | 21,35 | 106,0 | 2 | 0,00 | 80,45 | - | - | 0,00 | 0,00 | - |
| Sum | | | 30,19 | | | | | | | | | |

- Data undefined due to calculation with octave data

Noise sensitive area: K Lomarakennus K (Kurunoja)

Wind speed: 8,0 m/s

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|-----------------|-----------------------|-----------------------|--------------------|--------------------|------------|--------------|--------------|-------------|--------------|---------------|-----------|
| 1 | 4865 | 4868 | 14,47 | 106,0 | 2 | 0,00 | 84,75 | - | - | 0,00 | 0,00 | - |
| 10 | 2875 | 2881 | 21,76 | 106,0 | 2 | 0,00 | 80,19 | - | - | 0,00 | 0,00 | - |
| 11 | 2544 | 2551 | 23,40 | 106,0 | 2 | 0,00 | 79,13 | - | - | 0,00 | 0,00 | - |
| 12 | 2587 | 2594 | 23,17 | 106,0 | 2 | 0,00 | 79,28 | - | - | 0,00 | 0,00 | - |
| 13 | 2381 | 2389 | 24,28 | 106,0 | 2 | 0,00 | 78,56 | - | - | 0,00 | 0,00 | - |
| 14 | 1948 | 1957 | 26,88 | 106,0 | 2 | 0,00 | 76,83 | - | - | 0,00 | 0,00 | - |
| 15 | 1629 | 1641 | 29,12 | 106,0 | 2 | 0,00 | 75,30 | - | - | 0,00 | 0,00 | - |
| 16 | 1410 | 1424 | 30,87 | 106,0 | 2 | 0,00 | 74,07 | - | - | 0,00 | 0,00 | - |
| 17 | 6455 | 6458 | 10,58 | 106,0 | 2 | 0,00 | 87,20 | - | - | 0,00 | 0,00 | - |
| 18 | 7227 | 7230 | 9,22 | 106,0 | 2 | 0,00 | 88,18 | - | - | 0,00 | 0,00 | - |
| 19 | 7698 | 7700 | 8,45 | 106,0 | 2 | 0,00 | 88,73 | - | - | 0,00 | 0,00 | - |
| 2 | 4296 | 4300 | 16,20 | 106,0 | 2 | 0,00 | 83,67 | - | - | 0,00 | 0,00 | - |
| 20 | 7642 | 7645 | 8,54 | 106,0 | 2 | 0,00 | 88,67 | - | - | 0,00 | 0,00 | - |
| 21 | 6447 | 6450 | 10,59 | 106,0 | 2 | 0,00 | 87,19 | - | - | 0,00 | 0,00 | - |
| 22 | 6804 | 6807 | 9,94 | 106,0 | 2 | 0,00 | 87,66 | - | - | 0,00 | 0,00 | - |
| 23 | 7130 | 7132 | 9,38 | 106,0 | 2 | 0,00 | 88,06 | - | - | 0,00 | 0,00 | - |
| 24 | 5583 | 5587 | 12,51 | 106,0 | 2 | 0,00 | 85,94 | - | - | 0,00 | 0,00 | - |
| 25 | 5899 | 5902 | 11,73 | 106,0 | 2 | 0,00 | 86,42 | - | - | 0,00 | 0,00 | - |
| 26 | 6236 | 6239 | 10,99 | 106,0 | 2 | 0,00 | 86,90 | - | - | 0,00 | 0,00 | - |
| 27 | 7469 | 7472 | 8,82 | 106,0 | 2 | 0,00 | 88,47 | - | - | 0,00 | 0,00 | - |
| 28 | 7790 | 7792 | 8,31 | 106,0 | 2 | 0,00 | 88,83 | - | - | 0,00 | 0,00 | - |
| 29 | 6609 | 6612 | 10,29 | 106,0 | 2 | 0,00 | 87,41 | - | - | 0,00 | 0,00 | - |
| 3 | 4587 | 4591 | 15,28 | 106,0 | 2 | 0,00 | 84,24 | - | - | 0,00 | 0,00 | - |
| 30 | 6970 | 6972 | 9,65 | 106,0 | 2 | 0,00 | 87,87 | - | - | 0,00 | 0,00 | - |
| 31 | 7925 | 7927 | 8,10 | 106,0 | 2 | 0,00 | 88,98 | - | - | 0,00 | 0,00 | - |
| 32 | 8626 | 8629 | 7,07 | 106,0 | 2 | 0,00 | 89,72 | - | - | 0,00 | 0,00 | - |
| 33 | 8498 | 8501 | 7,25 | 106,0 | 2 | 0,00 | 89,59 | - | - | 0,00 | 0,00 | - |
| 34 | 7483 | 7486 | 8,79 | 106,0 | 2 | 0,00 | 88,48 | - | - | 0,00 | 0,00 | - |
| 35 | 6315 | 6318 | 10,84 | 106,0 | 2 | 0,00 | 87,01 | - | - | 0,00 | 0,00 | - |
| 36 | 5786 | 5790 | 12,01 | 106,0 | 2 | 0,00 | 86,25 | - | - | 0,00 | 0,00 | - |
| 37 | 5498 | 5501 | 12,73 | 106,0 | 2 | 0,00 | 85,81 | - | - | 0,00 | 0,00 | - |
| 38 | 4861 | 4865 | 14,46 | 106,0 | 2 | 0,00 | 84,74 | - | - | 0,00 | 0,00 | - |
| 39 | 4750 | 4754 | 14,79 | 106,0 | 2 | 0,00 | 84,54 | - | - | 0,00 | 0,00 | - |
| 4 | 4198 | 4203 | 16,52 | 106,0 | 2 | 0,00 | 83,47 | - | - | 0,00 | 0,00 | - |
| 40 | 3922 | 3927 | 17,47 | 106,0 | 2 | 0,00 | 82,88 | - | - | 0,00 | 0,00 | - |
| 41 | 3825 | 3830 | 17,82 | 106,0 | 2 | 0,00 | 82,66 | - | - | 0,00 | 0,00 | - |
| 42 | 4181 | 4186 | 16,58 | 106,0 | 2 | 0,00 | 83,44 | - | - | 0,00 | 0,00 | - |
| 43 | 2904 | 2912 | 21,61 | 106,0 | 2 | 0,00 | 80,28 | - | - | 0,00 | 0,00 | - |
| 5 | 4497 | 4501 | 15,56 | 106,0 | 2 | 0,00 | 84,07 | - | - | 0,00 | 0,00 | - |
| 6 | 3550 | 3555 | 18,86 | 106,0 | 2 | 0,00 | 82,02 | - | - | 0,00 | 0,00 | - |
| 7 | 3497 | 3503 | 19,07 | 106,0 | 2 | 0,00 | 81,89 | - | - | 0,00 | 0,00 | - |
| 8 | 3378 | 3383 | 19,55 | 106,0 | 2 | 0,00 | 81,59 | - | - | 0,00 | 0,00 | - |
| 9 | 2919 | 2925 | 21,55 | 106,0 | 2 | 0,00 | 80,32 | - | - | 0,00 | 0,00 | - |
| Sum | | | 36,55 | | | | | | | | | |

- Data undefined due to calculation with octave data

DECIBEL - Detailed results

Calculation: VE1_GE158x43xHH200_20200327Noise calculation model: ISO 9613-2 General 8,0 m/s

Noise sensitive area: L Lomarakennus L (Perkkiontie, Ilmola)

Wind speed: 8,0 m/s

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|-----------------|-----------------------|-----------------------|--------------------|--------------------|------------|--------------|--------------|-------------|--------------|---------------|-----------|
| 1 | 6944 | 6946 | 9,70 | 106,0 | 2 | 0,00 | 87,83 | - | - | 0,00 | 0,00 | - |
| 10 | 4957 | 4960 | 14,19 | 106,0 | 2 | 0,00 | 84,91 | - | - | 0,00 | 0,00 | - |
| 11 | 4331 | 4335 | 16,09 | 106,0 | 2 | 0,00 | 83,74 | - | - | 0,00 | 0,00 | - |
| 12 | 3689 | 3693 | 18,33 | 106,0 | 2 | 0,00 | 82,35 | - | - | 0,00 | 0,00 | - |
| 13 | 5471 | 5474 | 12,80 | 106,0 | 2 | 0,00 | 85,77 | - | - | 0,00 | 0,00 | - |
| 14 | 4882 | 4885 | 14,40 | 106,0 | 2 | 0,00 | 84,78 | - | - | 0,00 | 0,00 | - |
| 15 | 4288 | 4292 | 16,23 | 106,0 | 2 | 0,00 | 83,65 | - | - | 0,00 | 0,00 | - |
| 16 | 3762 | 3766 | 18,06 | 106,0 | 2 | 0,00 | 82,52 | - | - | 0,00 | 0,00 | - |
| 17 | 4396 | 4400 | 15,88 | 106,0 | 2 | 0,00 | 83,87 | - | - | 0,00 | 0,00 | - |
| 18 | 4716 | 4719 | 14,89 | 106,0 | 2 | 0,00 | 84,48 | - | - | 0,00 | 0,00 | - |
| 19 | 4783 | 4786 | 14,69 | 106,0 | 2 | 0,00 | 84,60 | - | - | 0,00 | 0,00 | - |
| 2 | 6201 | 6204 | 11,06 | 106,0 | 2 | 0,00 | 86,85 | - | - | 0,00 | 0,00 | - |
| 20 | 4411 | 4415 | 15,83 | 106,0 | 2 | 0,00 | 83,90 | - | - | 0,00 | 0,00 | - |
| 21 | 3973 | 3977 | 17,30 | 106,0 | 2 | 0,00 | 82,99 | - | - | 0,00 | 0,00 | - |
| 22 | 3852 | 3856 | 17,73 | 106,0 | 2 | 0,00 | 82,72 | - | - | 0,00 | 0,00 | - |
| 23 | 3671 | 3675 | 18,40 | 106,0 | 2 | 0,00 | 82,31 | - | - | 0,00 | 0,00 | - |
| 24 | 3512 | 3517 | 19,01 | 106,0 | 2 | 0,00 | 81,92 | - | - | 0,00 | 0,00 | - |
| 25 | 3228 | 3234 | 20,17 | 106,0 | 2 | 0,00 | 81,19 | - | - | 0,00 | 0,00 | - |
| 26 | 3081 | 3087 | 20,81 | 106,0 | 2 | 0,00 | 80,79 | - | - | 0,00 | 0,00 | - |
| 27 | 3664 | 3669 | 18,42 | 106,0 | 2 | 0,00 | 82,29 | - | - | 0,00 | 0,00 | - |
| 28 | 3704 | 3709 | 18,27 | 106,0 | 2 | 0,00 | 82,39 | - | - | 0,00 | 0,00 | - |
| 29 | 2796 | 2802 | 22,13 | 106,0 | 2 | 0,00 | 79,95 | - | - | 0,00 | 0,00 | - |
| 3 | 5782 | 5785 | 12,02 | 106,0 | 2 | 0,00 | 86,25 | - | - | 0,00 | 0,00 | - |
| 30 | 2780 | 2786 | 22,21 | 106,0 | 2 | 0,00 | 79,90 | - | - | 0,00 | 0,00 | - |
| 31 | 3611 | 3617 | 18,62 | 106,0 | 2 | 0,00 | 82,17 | - | - | 0,00 | 0,00 | - |
| 32 | 4222 | 4227 | 16,44 | 106,0 | 2 | 0,00 | 83,52 | - | - | 0,00 | 0,00 | - |
| 33 | 3970 | 3975 | 17,30 | 106,0 | 2 | 0,00 | 82,99 | - | - | 0,00 | 0,00 | - |
| 34 | 2909 | 2915 | 21,60 | 106,0 | 2 | 0,00 | 80,29 | - | - | 0,00 | 0,00 | - |
| 35 | 1826 | 1836 | 27,70 | 106,0 | 2 | 0,00 | 76,28 | - | - | 0,00 | 0,00 | - |
| 36 | 1949 | 1958 | 26,87 | 106,0 | 2 | 0,00 | 76,84 | - | - | 0,00 | 0,00 | - |
| 37 | 2199 | 2207 | 25,32 | 106,0 | 2 | 0,00 | 77,88 | - | - | 0,00 | 0,00 | - |
| 38 | 2825 | 2831 | 21,99 | 106,0 | 2 | 0,00 | 80,04 | - | - | 0,00 | 0,00 | - |
| 39 | 2126 | 2134 | 25,76 | 106,0 | 2 | 0,00 | 77,59 | - | - | 0,00 | 0,00 | - |
| 4 | 5168 | 5172 | 13,60 | 106,0 | 2 | 0,00 | 85,27 | - | - | 0,00 | 0,00 | - |
| 40 | 2703 | 2710 | 22,59 | 106,0 | 2 | 0,00 | 79,66 | - | - | 0,00 | 0,00 | - |
| 41 | 2119 | 2127 | 25,80 | 106,0 | 2 | 0,00 | 77,56 | - | - | 0,00 | 0,00 | - |
| 42 | 1512 | 1524 | 30,04 | 106,0 | 2 | 0,00 | 74,66 | - | - | 0,00 | 0,00 | - |
| 43 | 2430 | 2438 | 24,01 | 106,0 | 2 | 0,00 | 78,74 | - | - | 0,00 | 0,00 | - |
| 5 | 3992 | 3996 | 17,23 | 106,0 | 2 | 0,00 | 83,03 | - | - | 0,00 | 0,00 | - |
| 6 | 3806 | 3811 | 17,89 | 106,0 | 2 | 0,00 | 82,62 | - | - | 0,00 | 0,00 | - |
| 7 | 4554 | 4558 | 15,38 | 106,0 | 2 | 0,00 | 84,18 | - | - | 0,00 | 0,00 | - |
| 8 | 5573 | 5576 | 12,54 | 106,0 | 2 | 0,00 | 85,93 | - | - | 0,00 | 0,00 | - |
| 9 | 6022 | 6024 | 11,45 | 106,0 | 2 | 0,00 | 86,60 | - | - | 0,00 | 0,00 | - |
| Sum | | | 37,56 | | | | | | | | | |

- Data undefined due to calculation with octave data

Noise sensitive area: M Lomarakennus M (Riskalan metsatie)

Wind speed: 8,0 m/s

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|-----------------|-----------------------|-----------------------|--------------------|--------------------|------------|--------------|--------------|-------------|--------------|---------------|-----------|
| 1 | 7508 | 7511 | 8,75 | 106,0 | 2 | 0,00 | 88,51 | - | - | 0,00 | 0,00 | - |
| 10 | 7389 | 7392 | 8,95 | 106,0 | 2 | 0,00 | 88,37 | - | - | 0,00 | 0,00 | - |
| 11 | 7269 | 7271 | 9,15 | 106,0 | 2 | 0,00 | 88,23 | - | - | 0,00 | 0,00 | - |
| 12 | 6971 | 6973 | 9,65 | 106,0 | 2 | 0,00 | 87,87 | - | - | 0,00 | 0,00 | - |
| 13 | 8367 | 8369 | 7,44 | 106,0 | 2 | 0,00 | 89,45 | - | - | 0,00 | 0,00 | - |
| 14 | 8192 | 8194 | 7,70 | 106,0 | 2 | 0,00 | 89,27 | - | - | 0,00 | 0,00 | - |
| 15 | 8061 | 8064 | 7,89 | 106,0 | 2 | 0,00 | 89,13 | - | - | 0,00 | 0,00 | - |
| 16 | 8092 | 8094 | 7,85 | 106,0 | 2 | 0,00 | 89,16 | - | - | 0,00 | 0,00 | - |
| 17 | 3046 | 3052 | 20,97 | 106,0 | 2 | 0,00 | 80,69 | - | - | 0,00 | 0,00 | - |
| 18 | 2311 | 2319 | 24,67 | 106,0 | 2 | 0,00 | 78,30 | - | - | 0,00 | 0,00 | - |
| 19 | 2074 | 2083 | 26,07 | 106,0 | 2 | 0,00 | 77,37 | - | - | 0,00 | 0,00 | - |
| 2 | 7173 | 7176 | 9,31 | 106,0 | 2 | 0,00 | 88,12 | - | - | 0,00 | 0,00 | - |

To be continued on next page...

DECIBEL - Detailed results

Calculation: VE1_GE158x43xHH200_20200327 Noise calculation model: ISO 9613-2 General 8,0 m/s

...continued from previous page

| WTG | | | | | | | | | | | | |
|-----|-----------------|-----------------------|-----------------------|--------------------|--------------------|------------|--------------|--------------|-------------|--------------|---------------|-----------|
| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
| 20 | 2498 | 2506 | 23,64 | 106,0 | 2 | 0,00 | 78,98 | - | - | 0,00 | 0,00 | - |
| 21 | 3126 | 3132 | 20,61 | 106,0 | 2 | 0,00 | 80,92 | - | - | 0,00 | 0,00 | - |
| 22 | 3023 | 3029 | 21,07 | 106,0 | 2 | 0,00 | 80,63 | - | - | 0,00 | 0,00 | - |
| 23 | 3261 | 3267 | 20,03 | 106,0 | 2 | 0,00 | 81,28 | - | - | 0,00 | 0,00 | - |
| 24 | 3946 | 3951 | 17,39 | 106,0 | 2 | 0,00 | 82,93 | - | - | 0,00 | 0,00 | - |
| 25 | 3814 | 3820 | 17,86 | 106,0 | 2 | 0,00 | 82,64 | - | - | 0,00 | 0,00 | - |
| 26 | 3787 | 3792 | 17,96 | 106,0 | 2 | 0,00 | 82,58 | - | - | 0,00 | 0,00 | - |
| 27 | 3564 | 3569 | 18,81 | 106,0 | 2 | 0,00 | 82,05 | - | - | 0,00 | 0,00 | - |
| 28 | 3999 | 4004 | 17,20 | 106,0 | 2 | 0,00 | 83,05 | - | - | 0,00 | 0,00 | - |
| 29 | 4198 | 4203 | 16,52 | 106,0 | 2 | 0,00 | 83,47 | - | - | 0,00 | 0,00 | - |
| 3 | 6331 | 6334 | 10,81 | 106,0 | 2 | 0,00 | 87,03 | - | - | 0,00 | 0,00 | - |
| 30 | 4633 | 4638 | 15,14 | 106,0 | 2 | 0,00 | 84,33 | - | - | 0,00 | 0,00 | - |
| 31 | 4598 | 4603 | 15,24 | 106,0 | 2 | 0,00 | 84,26 | - | - | 0,00 | 0,00 | - |
| 32 | 4847 | 4851 | 14,50 | 106,0 | 2 | 0,00 | 84,72 | - | - | 0,00 | 0,00 | - |
| 33 | 5484 | 5488 | 12,76 | 106,0 | 2 | 0,00 | 85,79 | - | - | 0,00 | 0,00 | - |
| 34 | 5810 | 5814 | 11,95 | 106,0 | 2 | 0,00 | 86,29 | - | - | 0,00 | 0,00 | - |
| 35 | 5691 | 5695 | 12,24 | 106,0 | 2 | 0,00 | 86,11 | - | - | 0,00 | 0,00 | - |
| 36 | 4929 | 4934 | 14,26 | 106,0 | 2 | 0,00 | 84,86 | - | - | 0,00 | 0,00 | - |
| 37 | 4695 | 4699 | 14,95 | 106,0 | 2 | 0,00 | 84,44 | - | - | 0,00 | 0,00 | - |
| 38 | 4737 | 4741 | 14,83 | 106,0 | 2 | 0,00 | 84,52 | - | - | 0,00 | 0,00 | - |
| 39 | 5124 | 5128 | 13,72 | 106,0 | 2 | 0,00 | 85,20 | - | - | 0,00 | 0,00 | - |
| 4 | 6173 | 6176 | 11,11 | 106,0 | 2 | 0,00 | 86,81 | - | - | 0,00 | 0,00 | - |
| 40 | 5626 | 5630 | 12,40 | 106,0 | 2 | 0,00 | 86,01 | - | - | 0,00 | 0,00 | - |
| 41 | 5906 | 5910 | 11,72 | 106,0 | 2 | 0,00 | 86,43 | - | - | 0,00 | 0,00 | - |
| 42 | 5914 | 5918 | 11,70 | 106,0 | 2 | 0,00 | 86,44 | - | - | 0,00 | 0,00 | - |
| 43 | 6745 | 6748 | 10,05 | 106,0 | 2 | 0,00 | 87,58 | - | - | 0,00 | 0,00 | - |
| 5 | 5114 | 5118 | 13,74 | 106,0 | 2 | 0,00 | 85,18 | - | - | 0,00 | 0,00 | - |
| 6 | 6054 | 6057 | 11,37 | 106,0 | 2 | 0,00 | 86,65 | - | - | 0,00 | 0,00 | - |
| 7 | 6464 | 6467 | 10,56 | 106,0 | 2 | 0,00 | 87,21 | - | - | 0,00 | 0,00 | - |
| 8 | 7465 | 7468 | 8,82 | 106,0 | 2 | 0,00 | 88,46 | - | - | 0,00 | 0,00 | - |
| 9 | 8486 | 8488 | 7,27 | 106,0 | 2 | 0,00 | 89,58 | - | - | 0,00 | 0,00 | - |
| Sum | | | 33,46 | | | | | | | | | |

- Data undefined due to calculation with octave data

Project:
Puutionsaari_Riskalankangas_20200327

Description:
VSB

Licensed user:
FCG Suunnittelu ja tekniikka Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka Rintamäki / henna-riikka.rintamaki@fcg.fi
Calculated:
7.4.2020 15.06/3.3.247

DECIBEL - Assumptions for noise calculation

Calculation: VE1_GE158x43xHH200_20200327

Noise calculation model:

ISO 9613-2 General

Wind speed (in 10 m height):

8,0 m/s

Ground attenuation:

General, terrain specific

Ground factor for porous ground: 0,4

Area object with hard ground: Area object (vesistot): (5)

Area type with hard ground: Vesistot

Ground factor for hard ground: 0,0

Meteorological coefficient, CO:

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:

Fixed penalty added to source noise of WTGs with pure tones

WTG catalogue

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 |

WTG: GE WIND ENERGY 5.3-158 Thrust 700 5300 158.0 !O!

Noise: 5.3-158 NO

| Source | Source/Date | Creator | Edited |
|---|-------------|---------|----------------|
| Noise_Emission-NO_5.3-158-50Hz_IEC_EN_r01 | 12.3.2018 | USER | 7.4.2020 13.45 |

| Status | Hub height [m] | Wind speed [m/s] | LwA_ref [dB(A)] | Pure tones | Penalty [dB] | Octave data | | | | | | | | |
|--------------|-------------------|---------------------|--------------------|------------|-----------------|-------------|------|------|------|-------|------|------|------|------|
| | | | | | | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | |
| | | | | | | [dB] | [dB] | [dB] | [dB] | [dB] | [dB] | [dB] | [dB] | [dB] |
| From Windcat | 200,0 | 8,0 | 106,0 | Yes | 2,0 | 87,2 | 92,6 | 97,2 | 99,6 | 101,3 | 99,1 | 91,7 | 76,0 | |

Noise sensitive area: A Lomarakennus A (Vesiperän metsätie, Kivikaarto)

Predefined calculation standard:

Emission height(a.g.l.): Use standard value from calculation model

Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)

No distance demand

Noise sensitive area: B Asuinrakennus B (Ylivieskantie, Pöhlölä)

Predefined calculation standard:

Emission height(a.g.l.): Use standard value from calculation model

Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)

No distance demand

Noise sensitive area: C Asuinrakennus C (Perkkiöntie 382)

Predefined calculation standard:

Emission 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

Project: Puutionsaari_Riskalankangas_20200327
Description: VSB

Licensed user:
FCG Suunnittelu ja tekniikka Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka Rintamäki / henna-riikka.rintamaki@fcg.fi
Calculated:
7.4.2020 15.06/3.3.247

DECIBEL - Assumptions for noise calculation

Calculation: VE1_GE158x43xHH200_20200327
Noise sensitive area: D Asuinrakennus D (Alakyläntie 243)
Predefined calculation standard:
Emission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

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

Noise sensitive area: E Lomarakennus E (Kellokankaan metsätie)
Predefined calculation standard:
Emission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

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

Noise sensitive area: F Asuinrakennus F (Ollilantie 112)
Predefined calculation standard:
Emission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

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

Noise sensitive area: G Lomarakennus G (Ollilantie, Siliäkuru)
Predefined calculation standard:
Emission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

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

Noise sensitive area: H Asuinrakennus H (Pinolantie 406)
Predefined calculation standard:
Emission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

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

Noise sensitive area: I Asuinrakennus I (Kortenevantie 116)
Predefined calculation standard:
Emission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

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

Noise sensitive area: J Asuinrakennus J (Haapavesitie 1406)
Predefined calculation standard:
Emission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

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

Noise sensitive area: K Lomarakennus K (Kurunoja)
Predefined calculation standard:
Emission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

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

Noise sensitive area: L Lomarakennus L (Perkkiontie, Ilmola)
Predefined calculation standard:
Emission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Project:

Puutionsaari_Riskalankangas_20200327

Description:

VSB

Licensed user:

FCG Suunnittelu ja tekniikka Oy

Osmontie 34, PO Box 950

FI-00601 Helsinki

+358104095666

Henna-Riikka Rintamäki / henna-riikka.rintamaki@fcg.fi

Calculated:

7.4.2020 15.06/3.3.247

DECIBEL - Assumptions for noise calculation

Calculation: VE1_GE158x43xHH200_20200327

Noise demand: 40,0 dB(A)

No distance demand

Noise sensitive area: M Lomarakennus M (Riskalan metsätie)

Predefined calculation standard:

Emission height(a.g.l.): Use standard value from calculation model

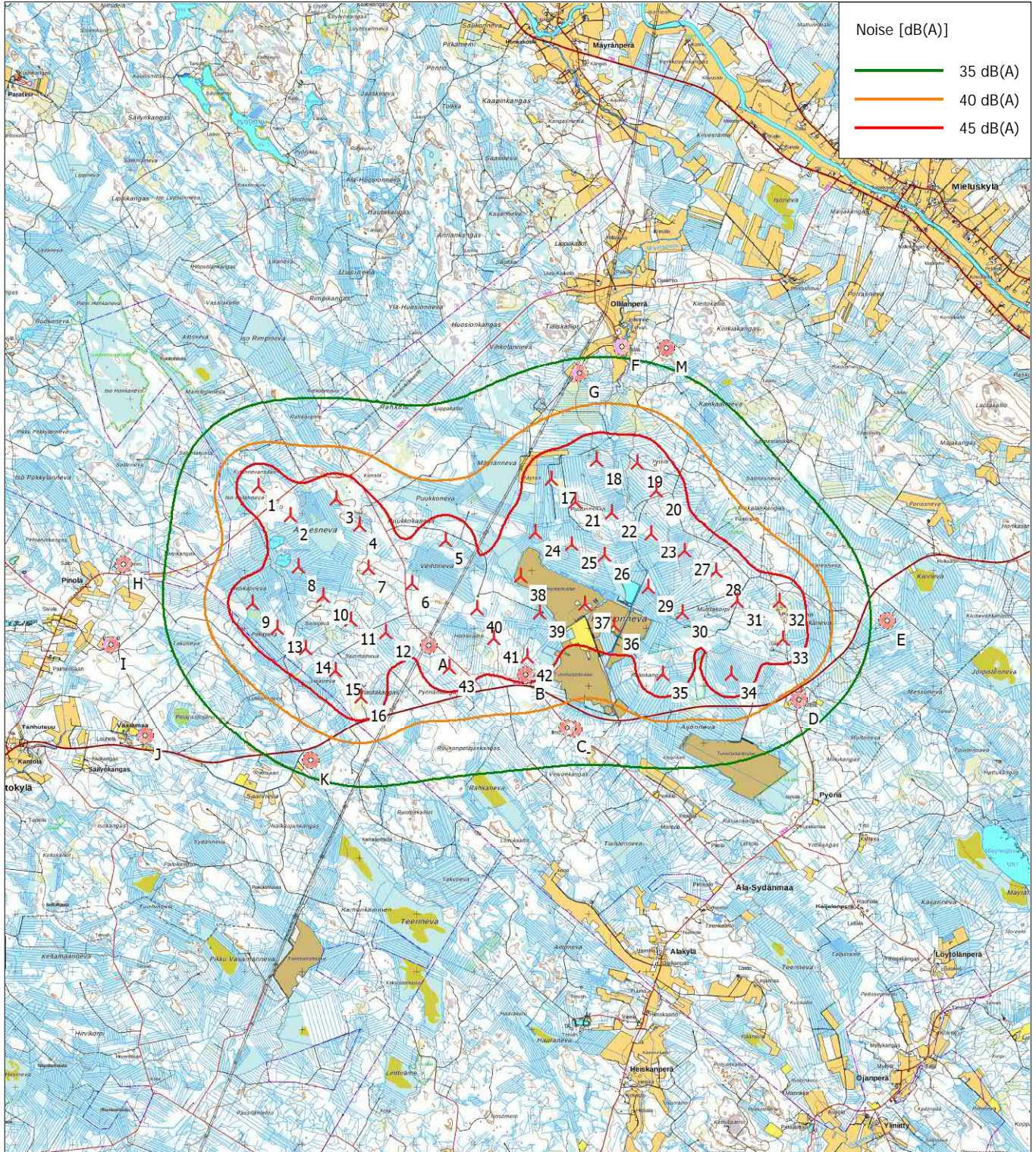
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)

No distance demand

DECIBEL - Map 8,0 m/s

Calculation: VE1_GE158x43xHH200_20200327



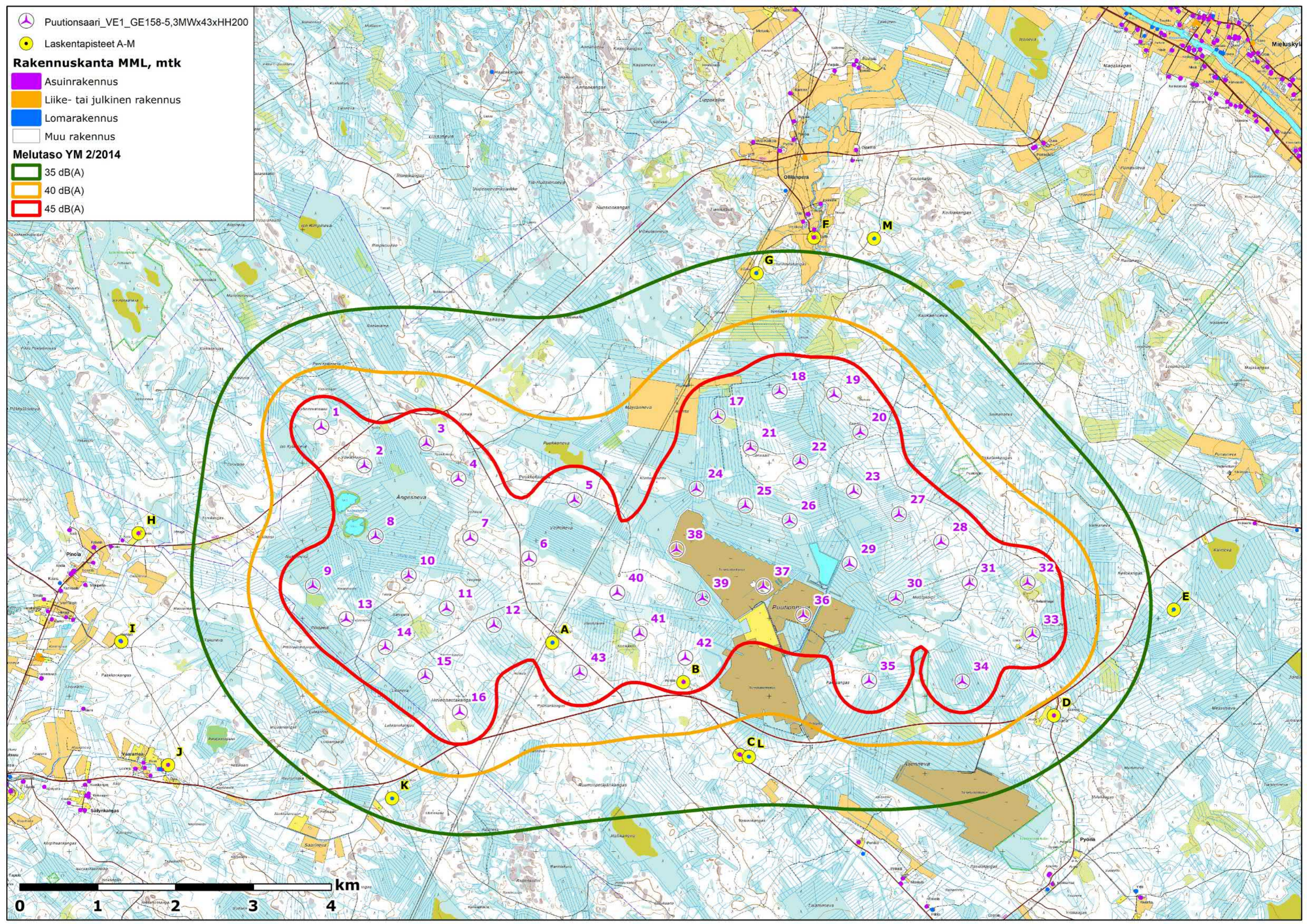
Map: Maastokarttarasteri50K , Print scale 1:100 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 403 758 North: 7 110 859

🚧 New WTG

🏠 Noise sensitive area

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

 Puutionsaari_VE1_GE158-5,3MWx43xHH200
 Laskentapisteeet A-M
Rakennuskanta MML, mtk
 Asuinrakennus
 Liike- tai julkinen rakennus
 Lomarakennus
 Muu rakennus
Melutaso YM 2/2014
 35 dB(A)
 40 dB(A)
 45 dB(A)



17.4.2020

Liite 2: Puutionsaari VE1 - Yhteismelun leviämismallinnuksen tulokset ISO 9613-2,
YM 2/2014

DECIBEL - Main Result

Calculation: VE1_GE158x43xHH200+Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_20200408

Noise calculation model:

ISO 9613-2 General

Wind speed (in 10 m height):

8,0 m/s

Ground attenuation:

General, terrain specific

Ground factor for porous ground: 0,4

Area object with hard ground: Area object (vesistot): (5)

Area type with hard ground: Vesistot

Ground factor for hard ground: 0,0

Meteorological coefficient, CO:

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:

Fixed penalty added to source noise of WTGs with pure tones

WTG catalogue

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:

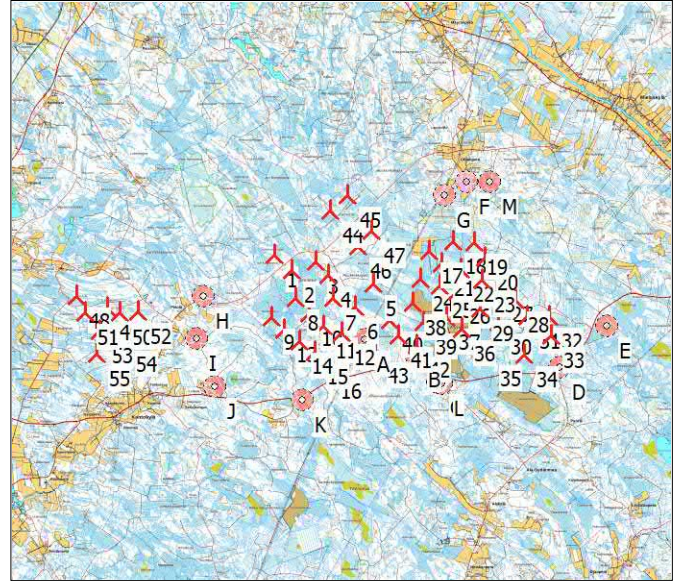
0,0 dB; Uncertainty margin in NSA has priority

Deviation from "official" noise demands. Negative is more

restrictive, positive is less restrictive.:

0,0 dB(A)

WTGs



New WTG

Noise sensitive area

| East | North | Z | Row data/Description | WTG type | | Type-generator | Power, rated [kW] | Rotor diameter [m] | Hub height [m] | Noise data | | Wind speed [m/s] | LwA.ref [dB(A)] | Pure tones |
|------|--------|---------|---|----------------|-------------------------|----------------|-------------------|--------------------|----------------|--|------|------------------|-----------------|------------|
| | | | | Valid | Manufact. | | | | | Creator | Name | | | |
| 1 | 399241 | 7112464 | 94,0 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 2 | 399796 | 7111966 | 97,5 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 3 | 400591 | 7112251 | 97,8 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 4 | 401005 | 7111796 | 100,0 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 5 | 402495 | 7111524 | 106,6 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 6 | 401910 | 7110769 | 107,4 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 7 | 401156 | 7111035 | 104,5 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 8 | 399940 | 7111056 | 97,5 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 9 | 399132 | 7110420 | 95,8 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 10 | 400364 | 7110552 | 98,6 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 11 | 400851 | 7110131 | 101,8 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 12 | 401462 | 7109916 | 102,8 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 13 | 399562 | 7109992 | 97,5 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 14 | 400065 | 7109631 | 100,0 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 15 | 400578 | 7109257 | 102,8 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 16 | 401021 | 7108796 | 105,1 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 17 | 404336 | 7112600 | 102,7 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 18 | 405133 | 7112922 | 100,3 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 19 | 405834 | 7112878 | 101,2 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 20 | 406171 | 7112395 | 103,9 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 21 | 404759 | 7112195 | 105,0 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 22 | 405399 | 7112017 | 102,5 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 23 | 406086 | 7111637 | 103,0 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 24 | 404064 | 7111669 | 104,9 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 25 | 404693 | 7111450 | 105,5 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 26 | 405262 | 7111259 | 104,6 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 27 | 406667 | 7111338 | 106,6 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 28 | 407209 | 7110982 | 111,9 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 29 | 406033 | 7110701 | 104,0 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 30 | 406628 | 7110262 | 105,0 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 31 | 407576 | 7110456 | 114,2 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 32 | 408319 | 7110460 | 119,2 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 33 | 408384 | 7109795 | 116,1 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 34 | 407482 | 7109189 | 112,5 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 35 | 406283 | 7109196 | 110,2 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 36 | 405436 | 7110043 | 106,4 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 37 | 404925 | 7110413 | 105,8 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 38 | 403807 | 7110889 | 106,8 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 39 | 404142 | 7110263 | 107,4 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 40 | 403047 | 7110331 | 108,1 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 41 | 403334 | 7109808 | 111,9 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 42 | 403921 | 7109494 | 109,9 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 43 | 402563 | 7109304 | 112,5 GE WIND ENERGY 5.3-158 Thrus...Yes | GE WIND ENERGY | 5.3-158 Thrust 700-5300 | 5300 | 158,0 | 200,0 | USER | 5.3-158 | NO | 8,0 | 106,0 | Yes |
| 44 | 401061 | 7113928 | 105,0 VESTAS V150-4.2 HH155 4200 1... Yes | VESTAS | V150-4.2 HH155-4200 | 4200 | 150,0 | 155,0 | USER | Level 00 - Measured - Mode PO1 - 03-2018 | | 8,0 | 104,9 | No |
| 45 | 401644 | 7114439 | 105,3 VESTAS V150-4.2 HH155 4200 1... Yes | VESTAS | V150-4.2 HH155-4200 | 4200 | 150,0 | 155,0 | USER | Level 00 - Measured - Mode PO1 - 03-2018 | | 8,0 | 104,9 | No |
| 46 | 401997 | 7112772 | 109,2 VESTAS V150-4.2 HH155 4200 1... Yes | VESTAS | V150-4.2 HH155-4200 | 4200 | 150,0 | 155,0 | USER | Level 00 - Measured - Mode PO1 - 03-2018 | | 8,0 | 104,9 | No |
| 47 | 402450 | 7113258 | 106,6 VESTAS V150-4.2 HH155 4200 1... Yes | VESTAS | V150-4.2 HH155-4200 | 4200 | 150,0 | 155,0 | USER | Level 00 - Measured - Mode PO1 - 03-2018 | | 8,0 | 104,9 | No |
| 48 | 392697 | 7111104 | 81,3 GE WIND ENERGY 5.3-158 RD17... Yes | GE WIND ENERGY | 5.3-158 RD175-5300 | 5300 | 175,0 | 152,5 | USER | 5.3-158 NO_107,8 dB | | 8,0 | 107,8 | No |
| 49 | 393696 | 7110723 | 85,7 GE WIND ENERGY 5.3-158 RD17... Yes | GE WIND ENERGY | 5.3-158 RD175-5300 | 5300 | 175,0 | 152,5 | USER | 5.3-158 NO_107,8 dB | | 8,0 | 107,8 | No |
| 50 | 394124 | 7110573 | 88,4 GE WIND ENERGY 5.3-158 RD17... Yes | GE WIND ENERGY | 5.3-158 RD175-5300 | 5300 | 175,0 | 152,5 | USER | 5.3-158 NO_107,8 dB | | 8,0 | 107,8 | No |
| 51 | 392964 | 7110572 | 83,6 GE WIND ENERGY 5.3-158 RD17... Yes | GE WIND ENERGY | 5.3-158 RD175-5300 | 5300 | 175,0 | 152,5 | USER | 5.3-158 NO_107,8 dB | | 8,0 | 107,8 | No |
| 52 | 394736 | 7110600 | 90,0 GE WIND ENERGY 5.3-158 RD17... Yes | GE WIND ENERGY | 5.3-158 RD175-5300 | 5300 | 175,0 | 152,5 | USER | 5.3-158 NO_107,8 dB | | 8,0 | 107,8 | No |
| 53 | 393462 | 7109982 | 84,9 GE WIND ENERGY 5.3-158 RD17... Yes | GE WIND ENERGY | 5.3-158 RD175-5300 | 5300 | 175,0 | 152,5 | USER | 5.3-158 NO_107,8 dB | | 8,0 | 107,8 | No |
| 54 | 394233 | 7109674 | 87,5 GE WIND ENERGY 5.3-158 RD17... Yes | GE WIND ENERGY | 5.3-158 RD175-5300 | 5300 | 175,0 | 152,5 | USER | 5.3-158 NO_107,8 dB | | 8,0 | 107,8 | No |
| 55 | 393349 | 7109200 | 83,7 GE WIND ENERGY 5.3-158 RD17... Yes | GE WIND ENERGY | 5.3-158 RD175-5300 | 5300 | 175,0 | 152,5 | USER | 5.3-158 NO_107,8 dB | | 8,0 | 107,8 | No |

Calculation Results

DECIBEL - Main Result

Calculation: VE1_GE158x43xHH200+Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_20200408

Sound level

| No. | Name | East | North | Z | Imission height | Demands | | Distance to noise demand |
|-----|---|--------|---------|-------|-----------------|---------|-------------|--------------------------|
| | | | | | | Noise | Sound level | |
| | | | | | [m] | [dB(A)] | [dB(A)] | [m] |
| A | Lomarakennus A (Vesiperän metsätie, Kivikaarto) | 402212 | 7109691 | 112,5 | 4,0 | 40,0 | 45,6 | -1331 |
| B | Asuinrakennus B (Ylivieskantie, Pöhlölä) | 403894 | 7109182 | 114,4 | 4,0 | 40,0 | 47,3 | -666 |
| C | Asuinrakennus C (Perkköntie 382) | 404620 | 7108247 | 113,6 | 4,0 | 40,0 | 37,8 | 424 |
| D | Asuinrakennus D (Alakyläntie 243) | 408659 | 7108752 | 119,4 | 4,0 | 40,0 | 38,4 | 207 |
| E | Lomarakennus E (Kellokankaan metsätie) | 410199 | 7110115 | 122,5 | 4,0 | 40,0 | 33,4 | 966 |
| F | Asuinrakennus F (Ollilantie 112) | 405573 | 7114900 | 87,7 | 4,0 | 40,0 | 34,3 | 996 |
| G | Lomarakennus G (Ollilantie, Siliäkuru) | 404837 | 7114441 | 100,0 | 4,0 | 40,0 | 36,6 | 562 |
| H | Asuinrakennus H (Pinolantie 406) | 396893 | 7111098 | 88,1 | 4,0 | 40,0 | 34,0 | 1450 |
| I | Asuinrakennus I (Kortenevantie 116) | 396670 | 7109704 | 87,5 | 4,0 | 40,0 | 33,7 | 1326 |
| J | Asuinrakennus J (Haapavesitie 1406) | 397273 | 7108116 | 89,3 | 4,0 | 40,0 | 31,6 | 1930 |
| K | Lomarakennus K (Kurunoja) | 400152 | 7107685 | 102,3 | 4,0 | 40,0 | 36,7 | 493 |
| L | Lomarakennus L (Perkköntie, Ilmola) | 404739 | 7108222 | 113,7 | 4,0 | 40,0 | 37,6 | 485 |
| M | Lomarakennus M (Riskalan metsätie) | 406348 | 7114887 | 102,7 | 4,0 | 40,0 | 33,6 | 1124 |

Distances (m)

| WTG | A | B | C | D | E | F | G | H | I | J | K | L | M |
|-----|------|------|------|-------|-------|------|------|-------|-------|-------|------|------|------|
| 1 | 4064 | 5694 | 6835 | 10123 | 11207 | 6785 | 5935 | 2717 | 3772 | 4773 | 4865 | 6944 | 7508 |
| 2 | 3319 | 4955 | 6092 | 9428 | 10567 | 6480 | 5616 | 3030 | 3858 | 4603 | 4296 | 6201 | 7173 |
| 3 | 3030 | 4508 | 5680 | 8793 | 9842 | 5642 | 4777 | 3875 | 4676 | 5302 | 4587 | 5782 | 6331 |
| 4 | 2427 | 3896 | 5066 | 8237 | 9347 | 5524 | 4657 | 4171 | 4813 | 5241 | 4198 | 5168 | 6173 |
| 5 | 1855 | 2728 | 3906 | 6758 | 7832 | 4569 | 3741 | 5618 | 6102 | 6235 | 4497 | 3992 | 5114 |
| 6 | 1120 | 2541 | 3702 | 7043 | 8315 | 5522 | 4696 | 5028 | 5347 | 5343 | 3550 | 3806 | 6054 |
| 7 | 1709 | 3306 | 4446 | 7842 | 9089 | 5869 | 5015 | 4264 | 4680 | 4858 | 3497 | 4554 | 6464 |
| 8 | 2650 | 4375 | 5458 | 9018 | 10302 | 6820 | 5953 | 3048 | 3539 | 3970 | 3378 | 5573 | 7465 |
| 9 | 3165 | 4920 | 5902 | 9671 | 11071 | 7846 | 6980 | 2340 | 2564 | 2961 | 2919 | 6022 | 8486 |
| 10 | 2039 | 3787 | 4840 | 8488 | 9845 | 6786 | 5927 | 3514 | 3790 | 3936 | 2875 | 4957 | 7389 |
| 11 | 1430 | 3187 | 4213 | 7928 | 9348 | 6712 | 5871 | 4075 | 4203 | 4107 | 2544 | 4331 | 7269 |
| 12 | 783 | 2540 | 3572 | 7290 | 8740 | 6462 | 5646 | 4720 | 4796 | 4559 | 2587 | 3689 | 6971 |
| 13 | 2667 | 4407 | 5351 | 9181 | 10638 | 7761 | 6901 | 2889 | 2906 | 2960 | 2381 | 5471 | 8367 |
| 14 | 2148 | 3856 | 4761 | 8639 | 10146 | 7623 | 6776 | 3495 | 3395 | 3176 | 1948 | 4882 | 8192 |
| 15 | 1691 | 3317 | 4167 | 8097 | 9659 | 7536 | 6709 | 4119 | 3933 | 3497 | 1629 | 4288 | 8061 |
| 16 | 1489 | 2899 | 3640 | 7638 | 9272 | 7615 | 6814 | 4727 | 4445 | 3810 | 1410 | 3762 | 8092 |
| 17 | 3603 | 3447 | 4363 | 5787 | 6368 | 2612 | 1908 | 7594 | 8195 | 8366 | 6455 | 4396 | 3046 |
| 18 | 4356 | 3940 | 4703 | 5460 | 5791 | 2027 | 1548 | 8440 | 9054 | 9213 | 7227 | 4716 | 2311 |
| 19 | 4825 | 4174 | 4788 | 5000 | 5166 | 2039 | 1854 | 9117 | 9698 | 9797 | 7698 | 4783 | 2074 |
| 20 | 4794 | 3938 | 4428 | 4411 | 4629 | 2576 | 2442 | 9368 | 9874 | 9873 | 7642 | 4411 | 2498 |
| 21 | 3572 | 3135 | 3951 | 5202 | 5824 | 2825 | 2247 | 7943 | 8464 | 8526 | 6447 | 3973 | 3126 |
| 22 | 3946 | 3210 | 3850 | 4614 | 5163 | 2889 | 2488 | 8556 | 9030 | 9014 | 6804 | 3852 | 3023 |
| 23 | 4336 | 3291 | 3693 | 3865 | 4385 | 3304 | 3070 | 9210 | 9613 | 9491 | 7130 | 3671 | 3261 |
| 24 | 2710 | 2493 | 3467 | 5442 | 6329 | 3567 | 2878 | 7194 | 7650 | 7664 | 5583 | 3512 | 3946 |
| 25 | 3042 | 2405 | 3204 | 4796 | 5665 | 3561 | 2994 | 7809 | 8211 | 8135 | 5899 | 3228 | 3814 |
| 26 | 3430 | 2487 | 3080 | 4221 | 5067 | 3655 | 3211 | 8371 | 8732 | 8586 | 6236 | 3081 | 3787 |
| 27 | 4750 | 3512 | 3707 | 3264 | 3738 | 3727 | 3603 | 9777 | 10130 | 9932 | 7469 | 3664 | 3564 |
| 28 | 5162 | 3772 | 3767 | 2660 | 3113 | 4246 | 4194 | 10317 | 10616 | 10342 | 7790 | 3704 | 3999 |
| 29 | 3952 | 2623 | 2831 | 3270 | 4207 | 4225 | 3927 | 9149 | 9416 | 9133 | 6609 | 2796 | 4198 |
| 30 | 4453 | 2939 | 2845 | 2531 | 3575 | 4757 | 4546 | 9771 | 9973 | 9598 | 6970 | 2780 | 4633 |
| 31 | 5419 | 3897 | 3691 | 2019 | 2645 | 4875 | 4835 | 10703 | 10932 | 10566 | 7925 | 3611 | 4598 |
| 32 | 6156 | 4606 | 4311 | 1741 | 1911 | 5221 | 5289 | 11445 | 11674 | 11293 | 8626 | 4222 | 4847 |
| 33 | 6173 | 4532 | 4070 | 1078 | 1843 | 5828 | 5845 | 11565 | 11714 | 11238 | 8498 | 3970 | 5484 |
| 34 | 5294 | 3588 | 3013 | 1255 | 2870 | 6022 | 5881 | 10760 | 10824 | 10266 | 7483 | 2909 | 5810 |
| 35 | 4101 | 2389 | 1915 | 2417 | 4022 | 5748 | 5441 | 9581 | 9627 | 9075 | 6315 | 1826 | 5691 |
| 36 | 3243 | 1766 | 1972 | 3471 | 4764 | 4860 | 4439 | 8608 | 8772 | 8388 | 5786 | 1949 | 4929 |
| 37 | 2808 | 1606 | 2188 | 4087 | 5283 | 4534 | 4029 | 8061 | 8285 | 7990 | 5498 | 2199 | 4695 |
| 38 | 1995 | 1709 | 2765 | 5301 | 6439 | 4383 | 3698 | 6918 | 7235 | 7098 | 4861 | 2825 | 4737 |
| 39 | 2013 | 1109 | 2072 | 4763 | 6059 | 4854 | 4236 | 7297 | 7492 | 7197 | 4750 | 2126 | 5124 |
| 40 | 1052 | 1427 | 2611 | 5829 | 7155 | 5221 | 4483 | 6202 | 6408 | 6185 | 3922 | 2703 | 5626 |
| 41 | 1128 | 840 | 2023 | 5429 | 6872 | 5563 | 4871 | 6569 | 6664 | 6293 | 3825 | 2119 | 5906 |
| 42 | 1721 | 313 | 1429 | 4795 | 6309 | 5653 | 5031 | 7209 | 7254 | 6790 | 4181 | 1512 | 5914 |
| 43 | 522 | 1337 | 2313 | 6121 | 7679 | 6355 | 5618 | 5947 | 5907 | 5422 | 2904 | 2430 | 6745 |
| 44 | 4391 | 5527 | 6703 | 9193 | 9901 | 4616 | 3811 | 5038 | 6092 | 6937 | 6308 | 6788 | 5373 |
| 45 | 4782 | 5718 | 6870 | 9030 | 9586 | 3956 | 3193 | 5809 | 6867 | 7687 | 6917 | 6944 | 4725 |

To be continued on next page...

Project:
Puutionsaari_Riskalankangas_20200327

Description:
VSB

Licensed user:
FCG Suunnittelu ja tekniikka Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka Rintamäki / henna-riikka.rintamaki@fcg.fi
Calculated:
8.4.2020 15.17/3.3.247

DECIBEL - Main Result

Calculation: VE1_GE158x43xHH200+Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_20200408

...continued from previous page

| WTG | A | B | C | D | E | F | G | H | I | J | K | L | M |
|-----|------|-------|-------|-------|-------|-------|-------|------|------|------|------|-------|-------|
| 46 | 3089 | 4061 | 5231 | 7781 | 8622 | 4162 | 3294 | 5372 | 6147 | 6633 | 5411 | 5312 | 4838 |
| 47 | 3575 | 4324 | 5461 | 7672 | 8362 | 3529 | 2665 | 5962 | 6785 | 7296 | 6028 | 5531 | 4225 |
| 48 | 9619 | 11361 | 12260 | 16134 | 17530 | 13424 | 12590 | 4196 | 4212 | 5465 | 8201 | 12382 | 14165 |
| 49 | 8578 | 10314 | 11201 | 15092 | 16514 | 12590 | 11745 | 3218 | 3144 | 4426 | 7135 | 11322 | 13319 |
| 50 | 8136 | 9869 | 10751 | 14648 | 16082 | 12240 | 11390 | 2818 | 2690 | 3994 | 6684 | 10872 | 12963 |
| 51 | 9290 | 11018 | 11886 | 15800 | 17241 | 13331 | 12488 | 3964 | 3806 | 4960 | 7746 | 12007 | 14062 |
| 52 | 7531 | 9267 | 10160 | 14045 | 15471 | 11659 | 10807 | 2213 | 2131 | 3550 | 6150 | 10281 | 12378 |
| 53 | 8755 | 10463 | 11292 | 15246 | 16738 | 13072 | 12218 | 3607 | 3220 | 4243 | 7073 | 11413 | 13788 |
| 54 | 7979 | 9674 | 10484 | 14455 | 15972 | 12487 | 11626 | 3017 | 2437 | 3416 | 6244 | 10606 | 13189 |
| 55 | 8876 | 10545 | 11311 | 15316 | 16875 | 13488 | 12627 | 4020 | 3359 | 4071 | 6969 | 11432 | 14188 |

DECIBEL - Detailed results

Calculation: VE1_GE158x43xHH200+Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_20200408 Noise calculation model: ISO 9613-2 General 8,0 m/s

Assumptions

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

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

Calculation Results

Noise sensitive area: A Lomarakennus A (Vesiperän metsätie, Kivikaarto)

Wind speed: 8,0 m/s

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|--------------|--------------------|--------------------|-----------------|-----------------|---------|-----------|-----------|----------|-----------|------------|--------|
| 1 | 4064 | 4068 | 16,98 | 106,0 | 2 | 0,00 | 83,19 | - | - | 0,00 | 0,00 | - |
| 10 | 2039 | 2047 | 26,30 | 106,0 | 2 | 0,00 | 77,22 | - | - | 0,00 | 0,00 | - |
| 11 | 1430 | 1442 | 30,72 | 106,0 | 2 | 0,00 | 74,18 | - | - | 0,00 | 0,00 | - |
| 12 | 783 | 805 | 37,53 | 106,0 | 2 | 0,00 | 69,11 | - | - | 0,00 | 0,00 | - |
| 13 | 2667 | 2673 | 22,77 | 106,0 | 2 | 0,00 | 79,54 | - | - | 0,00 | 0,00 | - |
| 14 | 2148 | 2156 | 25,63 | 106,0 | 2 | 0,00 | 77,67 | - | - | 0,00 | 0,00 | - |
| 15 | 1691 | 1701 | 28,67 | 106,0 | 2 | 0,00 | 75,61 | - | - | 0,00 | 0,00 | - |
| 16 | 1489 | 1501 | 30,22 | 106,0 | 2 | 0,00 | 74,53 | - | - | 0,00 | 0,00 | - |
| 17 | 3603 | 3607 | 18,66 | 106,0 | 2 | 0,00 | 82,14 | - | - | 0,00 | 0,00 | - |
| 18 | 4356 | 4360 | 16,01 | 106,0 | 2 | 0,00 | 83,79 | - | - | 0,00 | 0,00 | - |
| 19 | 4825 | 4828 | 14,57 | 106,0 | 2 | 0,00 | 84,68 | - | - | 0,00 | 0,00 | - |
| 2 | 3319 | 3324 | 19,79 | 106,0 | 2 | 0,00 | 81,43 | - | - | 0,00 | 0,00 | - |
| 20 | 4794 | 4798 | 14,66 | 106,0 | 2 | 0,00 | 84,62 | - | - | 0,00 | 0,00 | - |
| 21 | 3572 | 3577 | 18,78 | 106,0 | 2 | 0,00 | 82,07 | - | - | 0,00 | 0,00 | - |
| 22 | 3946 | 3950 | 17,39 | 106,0 | 2 | 0,00 | 82,93 | - | - | 0,00 | 0,00 | - |
| 23 | 4336 | 4340 | 16,07 | 106,0 | 2 | 0,00 | 83,75 | - | - | 0,00 | 0,00 | - |
| 24 | 2710 | 2717 | 22,55 | 106,0 | 2 | 0,00 | 79,68 | - | - | 0,00 | 0,00 | - |
| 25 | 3042 | 3048 | 20,99 | 106,0 | 2 | 0,00 | 80,68 | - | - | 0,00 | 0,00 | - |
| 26 | 3430 | 3435 | 19,34 | 106,0 | 2 | 0,00 | 81,72 | - | - | 0,00 | 0,00 | - |
| 27 | 4750 | 4754 | 14,79 | 106,0 | 2 | 0,00 | 84,54 | - | - | 0,00 | 0,00 | - |
| 28 | 5162 | 5165 | 13,62 | 106,0 | 2 | 0,00 | 85,26 | - | - | 0,00 | 0,00 | - |
| 29 | 3952 | 3957 | 17,37 | 106,0 | 2 | 0,00 | 82,95 | - | - | 0,00 | 0,00 | - |
| 3 | 3030 | 3036 | 21,04 | 106,0 | 2 | 0,00 | 80,64 | - | - | 0,00 | 0,00 | - |
| 30 | 4453 | 4457 | 15,70 | 106,0 | 2 | 0,00 | 83,98 | - | - | 0,00 | 0,00 | - |
| 31 | 5419 | 5422 | 12,93 | 106,0 | 2 | 0,00 | 85,68 | - | - | 0,00 | 0,00 | - |
| 32 | 6156 | 6159 | 11,15 | 106,0 | 2 | 0,00 | 86,79 | - | - | 0,00 | 0,00 | - |
| 33 | 6173 | 6176 | 11,11 | 106,0 | 2 | 0,00 | 86,81 | - | - | 0,00 | 0,00 | - |
| 34 | 5294 | 5298 | 13,26 | 106,0 | 2 | 0,00 | 85,48 | - | - | 0,00 | 0,00 | - |
| 35 | 4101 | 4106 | 16,85 | 106,0 | 2 | 0,00 | 83,27 | - | - | 0,00 | 0,00 | - |
| 36 | 3243 | 3249 | 20,11 | 106,0 | 2 | 0,00 | 81,23 | - | - | 0,00 | 0,00 | - |
| 37 | 2808 | 2814 | 22,08 | 106,0 | 2 | 0,00 | 79,99 | - | - | 0,00 | 0,00 | - |
| 38 | 1995 | 2004 | 26,57 | 106,0 | 2 | 0,00 | 77,04 | - | - | 0,00 | 0,00 | - |
| 39 | 2013 | 2022 | 26,46 | 106,0 | 2 | 0,00 | 77,11 | - | - | 0,00 | 0,00 | - |
| 4 | 2427 | 2434 | 24,03 | 106,0 | 2 | 0,00 | 78,73 | - | - | 0,00 | 0,00 | - |
| 40 | 1052 | 1070 | 34,29 | 106,0 | 2 | 0,00 | 71,59 | - | - | 0,00 | 0,00 | - |
| 41 | 1128 | 1145 | 33,49 | 106,0 | 2 | 0,00 | 72,17 | - | - | 0,00 | 0,00 | - |
| 42 | 1721 | 1731 | 28,44 | 106,0 | 2 | 0,00 | 75,77 | - | - | 0,00 | 0,00 | - |
| 43 | 522 | 558 | 41,51 | 106,0 | 2 | 0,00 | 65,93 | - | - | 0,00 | 0,00 | - |
| 44 | 4391 | 4393 | 13,49 | 104,9 | | 0,00 | 83,86 | - | - | 0,00 | 0,00 | - |
| 45 | 4782 | 4784 | 12,26 | 104,9 | | 0,00 | 84,60 | - | - | 0,00 | 0,00 | - |
| 46 | 3089 | 3093 | 18,41 | 104,9 | | 0,00 | 80,81 | - | - | 0,00 | 0,00 | - |
| 47 | 3575 | 3578 | 16,39 | 104,9 | | 0,00 | 82,07 | - | - | 0,00 | 0,00 | - |
| 48 | 9619 | 9620 | 5,89 | 107,8 | | 0,00 | 90,66 | - | - | 0,00 | 0,00 | - |

To be continued on next page...

DECIBEL - Detailed results

Calculation: VE1_GE158x43xHH200+Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_20200408 Noise calculation model: ISO 9613-2 General 8,0 m/s

...continued from previous page

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|-----------------|-----------------------|-----------------------|--------------------|--------------------|------------|--------------|--------------|-------------|--------------|---------------|-----------|
| 49 | 8578 | 8579 | 7,31 | 107,8 | | 0,00 | 89,67 | - | - | 0,00 | 0,00 | - |
| 5 | 1855 | 1865 | 27,50 | 106,0 | 2 | 0,00 | 76,41 | - | - | 0,00 | 0,00 | - |
| 50 | 8136 | 8137 | 7,97 | 107,8 | | 0,00 | 89,21 | - | - | 0,00 | 0,00 | - |
| 51 | 9290 | 9291 | 6,32 | 107,8 | | 0,00 | 90,36 | - | - | 0,00 | 0,00 | - |
| 52 | 7531 | 7532 | 8,93 | 107,8 | | 0,00 | 88,54 | - | - | 0,00 | 0,00 | - |
| 53 | 8755 | 8756 | 7,06 | 107,8 | | 0,00 | 89,85 | - | - | 0,00 | 0,00 | - |
| 54 | 7979 | 7980 | 8,21 | 107,8 | | 0,00 | 89,04 | - | - | 0,00 | 0,00 | - |
| 55 | 8876 | 8877 | 6,89 | 107,8 | | 0,00 | 89,97 | - | - | 0,00 | 0,00 | - |
| 6 | 1120 | 1136 | 33,58 | 106,0 | 2 | 0,00 | 72,11 | - | - | 0,00 | 0,00 | - |
| 7 | 1709 | 1719 | 28,53 | 106,0 | 2 | 0,00 | 75,71 | - | - | 0,00 | 0,00 | - |
| 8 | 2650 | 2657 | 22,85 | 106,0 | 2 | 0,00 | 79,49 | - | - | 0,00 | 0,00 | - |
| 9 | 3165 | 3170 | 20,45 | 106,0 | 2 | 0,00 | 81,02 | - | - | 0,00 | 0,00 | - |
| Sum | | | 45,58 | | | | | | | | | |

- Data undefined due to calculation with octave data

Noise sensitive area: B Asuinrakennus B (Ylivieskantie, Pöhlölä)

Wind speed: 8,0 m/s

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|-----------------|-----------------------|-----------------------|--------------------|--------------------|------------|--------------|--------------|-------------|--------------|---------------|-----------|
| 1 | 5694 | 5697 | 12,23 | 106,0 | 2 | 0,00 | 86,11 | - | - | 0,00 | 0,00 | - |
| 10 | 3787 | 3791 | 17,97 | 106,0 | 2 | 0,00 | 82,58 | - | - | 0,00 | 0,00 | - |
| 11 | 3187 | 3193 | 20,35 | 106,0 | 2 | 0,00 | 81,08 | - | - | 0,00 | 0,00 | - |
| 12 | 2540 | 2547 | 23,42 | 106,0 | 2 | 0,00 | 79,12 | - | - | 0,00 | 0,00 | - |
| 13 | 4407 | 4411 | 15,84 | 106,0 | 2 | 0,00 | 83,89 | - | - | 0,00 | 0,00 | - |
| 14 | 3856 | 3860 | 17,72 | 106,0 | 2 | 0,00 | 82,73 | - | - | 0,00 | 0,00 | - |
| 15 | 3317 | 3322 | 19,80 | 106,0 | 2 | 0,00 | 81,43 | - | - | 0,00 | 0,00 | - |
| 16 | 2899 | 2905 | 21,64 | 106,0 | 2 | 0,00 | 80,26 | - | - | 0,00 | 0,00 | - |
| 17 | 3447 | 3452 | 19,27 | 106,0 | 2 | 0,00 | 81,76 | - | - | 0,00 | 0,00 | - |
| 18 | 3940 | 3944 | 17,41 | 106,0 | 2 | 0,00 | 82,92 | - | - | 0,00 | 0,00 | - |
| 19 | 4174 | 4178 | 16,60 | 106,0 | 2 | 0,00 | 83,42 | - | - | 0,00 | 0,00 | - |
| 2 | 4955 | 4958 | 14,19 | 106,0 | 2 | 0,00 | 84,91 | - | - | 0,00 | 0,00 | - |
| 20 | 3938 | 3942 | 17,42 | 106,0 | 2 | 0,00 | 82,91 | - | - | 0,00 | 0,00 | - |
| 21 | 3135 | 3140 | 20,58 | 106,0 | 2 | 0,00 | 80,94 | - | - | 0,00 | 0,00 | - |
| 22 | 3210 | 3215 | 20,25 | 106,0 | 2 | 0,00 | 81,14 | - | - | 0,00 | 0,00 | - |
| 23 | 3291 | 3296 | 19,91 | 106,0 | 2 | 0,00 | 81,36 | - | - | 0,00 | 0,00 | - |
| 24 | 2493 | 2500 | 23,67 | 106,0 | 2 | 0,00 | 78,96 | - | - | 0,00 | 0,00 | - |
| 25 | 2405 | 2412 | 24,14 | 106,0 | 2 | 0,00 | 78,65 | - | - | 0,00 | 0,00 | - |
| 26 | 2487 | 2494 | 23,70 | 106,0 | 2 | 0,00 | 78,94 | - | - | 0,00 | 0,00 | - |
| 27 | 3512 | 3518 | 19,01 | 106,0 | 2 | 0,00 | 81,92 | - | - | 0,00 | 0,00 | - |
| 28 | 3772 | 3777 | 18,02 | 106,0 | 2 | 0,00 | 82,54 | - | - | 0,00 | 0,00 | - |
| 29 | 2623 | 2630 | 22,99 | 106,0 | 2 | 0,00 | 79,40 | - | - | 0,00 | 0,00 | - |
| 3 | 4508 | 4512 | 15,52 | 106,0 | 2 | 0,00 | 84,09 | - | - | 0,00 | 0,00 | - |
| 30 | 2939 | 2945 | 21,46 | 106,0 | 2 | 0,00 | 80,38 | - | - | 0,00 | 0,00 | - |
| 31 | 3897 | 3901 | 17,57 | 106,0 | 2 | 0,00 | 82,82 | - | - | 0,00 | 0,00 | - |
| 32 | 4606 | 4611 | 15,22 | 106,0 | 2 | 0,00 | 84,27 | - | - | 0,00 | 0,00 | - |
| 33 | 4532 | 4536 | 15,45 | 106,0 | 2 | 0,00 | 84,13 | - | - | 0,00 | 0,00 | - |
| 34 | 3588 | 3593 | 18,71 | 106,0 | 2 | 0,00 | 82,11 | - | - | 0,00 | 0,00 | - |
| 35 | 2389 | 2397 | 24,23 | 106,0 | 2 | 0,00 | 78,59 | - | - | 0,00 | 0,00 | - |
| 36 | 1766 | 1776 | 28,12 | 106,0 | 2 | 0,00 | 75,99 | - | - | 0,00 | 0,00 | - |
| 37 | 1606 | 1617 | 29,30 | 106,0 | 2 | 0,00 | 75,17 | - | - | 0,00 | 0,00 | - |
| 38 | 1709 | 1720 | 28,53 | 106,0 | 2 | 0,00 | 75,71 | - | - | 0,00 | 0,00 | - |
| 39 | 1109 | 1125 | 33,70 | 106,0 | 2 | 0,00 | 72,02 | - | - | 0,00 | 0,00 | - |
| 4 | 3896 | 3900 | 17,57 | 106,0 | 2 | 0,00 | 82,82 | - | - | 0,00 | 0,00 | - |
| 40 | 1427 | 1440 | 30,74 | 106,0 | 2 | 0,00 | 74,17 | - | - | 0,00 | 0,00 | - |
| 41 | 840 | 862 | 36,76 | 106,0 | 2 | 0,00 | 69,71 | - | - | 0,00 | 0,00 | - |
| 42 | 313 | 367 | 45,83 | 106,0 | 2 | 0,00 | 62,29 | - | - | 0,00 | 0,00 | - |
| 43 | 1337 | 1351 | 31,51 | 106,0 | 2 | 0,00 | 73,61 | - | - | 0,00 | 0,00 | - |
| 44 | 5527 | 5529 | 10,42 | 104,9 | | 0,00 | 85,85 | - | - | 0,00 | 0,00 | - |
| 45 | 5718 | 5720 | 9,97 | 104,9 | | 0,00 | 86,15 | - | - | 0,00 | 0,00 | - |
| 46 | 4061 | 4063 | 14,60 | 104,9 | | 0,00 | 83,18 | - | - | 0,00 | 0,00 | - |
| 47 | 4324 | 4327 | 13,71 | 104,9 | | 0,00 | 83,72 | - | - | 0,00 | 0,00 | - |
| 48 | 11361 | 11361 | 3,83 | 107,8 | | 0,00 | 92,11 | - | - | 0,00 | 0,00 | - |
| 49 | 10314 | 10315 | 5,03 | 107,8 | | 0,00 | 91,27 | - | - | 0,00 | 0,00 | - |

To be continued on next page...

DECIBEL - Detailed results

Calculation: VE1_GE158x43xHH200+Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_20200408 Noise calculation model: ISO 9613-2 General 8,0 m/s

...continued from previous page

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|-----------------|-----------------------|-----------------------|--------------------|--------------------|------------|--------------|--------------|-------------|--------------|---------------|-----------|
| 5 | 2728 | 2735 | 22,46 | 106,0 | 2 | 0,00 | 79,74 | - | - | 0,00 | 0,00 | - |
| 50 | 9869 | 9869 | 5,57 | 107,8 | | 0,00 | 90,89 | - | - | 0,00 | 0,00 | - |
| 51 | 11018 | 11019 | 4,21 | 107,8 | | 0,00 | 91,84 | - | - | 0,00 | 0,00 | - |
| 52 | 9267 | 9268 | 6,35 | 107,8 | | 0,00 | 90,34 | - | - | 0,00 | 0,00 | - |
| 53 | 10463 | 10463 | 4,85 | 107,8 | | 0,00 | 91,39 | - | - | 0,00 | 0,00 | - |
| 54 | 9674 | 9674 | 5,82 | 107,8 | | 0,00 | 90,71 | - | - | 0,00 | 0,00 | - |
| 55 | 10545 | 10546 | 4,75 | 107,8 | | 0,00 | 91,46 | - | - | 0,00 | 0,00 | - |
| 6 | 2541 | 2548 | 23,42 | 106,0 | 2 | 0,00 | 79,12 | - | - | 0,00 | 0,00 | - |
| 7 | 3306 | 3311 | 19,85 | 106,0 | 2 | 0,00 | 81,40 | - | - | 0,00 | 0,00 | - |
| 8 | 4375 | 4379 | 15,94 | 106,0 | 2 | 0,00 | 83,83 | - | - | 0,00 | 0,00 | - |
| 9 | 4920 | 4923 | 14,29 | 106,0 | 2 | 0,00 | 84,85 | - | - | 0,00 | 0,00 | - |
| Sum | | | 47,32 | | | | | | | | | |

- Data undefined due to calculation with octave data

Noise sensitive area: C Asuinrakennus C (Perkkiöntie 382)

Wind speed: 8,0 m/s

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|-----------------|-----------------------|-----------------------|--------------------|--------------------|------------|--------------|--------------|-------------|--------------|---------------|-----------|
| 1 | 6835 | 6837 | 9,89 | 106,0 | 2 | 0,00 | 87,70 | - | - | 0,00 | 0,00 | - |
| 10 | 4840 | 4844 | 14,52 | 106,0 | 2 | 0,00 | 84,70 | - | - | 0,00 | 0,00 | - |
| 11 | 4213 | 4217 | 16,47 | 106,0 | 2 | 0,00 | 83,50 | - | - | 0,00 | 0,00 | - |
| 12 | 3572 | 3577 | 18,78 | 106,0 | 2 | 0,00 | 82,07 | - | - | 0,00 | 0,00 | - |
| 13 | 5351 | 5354 | 13,11 | 106,0 | 2 | 0,00 | 85,57 | - | - | 0,00 | 0,00 | - |
| 14 | 4761 | 4764 | 14,76 | 106,0 | 2 | 0,00 | 84,56 | - | - | 0,00 | 0,00 | - |
| 15 | 4167 | 4171 | 16,63 | 106,0 | 2 | 0,00 | 83,40 | - | - | 0,00 | 0,00 | - |
| 16 | 3640 | 3645 | 18,51 | 106,0 | 2 | 0,00 | 82,23 | - | - | 0,00 | 0,00 | - |
| 17 | 4363 | 4367 | 15,98 | 106,0 | 2 | 0,00 | 83,80 | - | - | 0,00 | 0,00 | - |
| 18 | 4703 | 4706 | 14,93 | 106,0 | 2 | 0,00 | 84,45 | - | - | 0,00 | 0,00 | - |
| 19 | 4788 | 4791 | 14,68 | 106,0 | 2 | 0,00 | 84,61 | - | - | 0,00 | 0,00 | - |
| 2 | 6092 | 6094 | 11,28 | 106,0 | 2 | 0,00 | 86,70 | - | - | 0,00 | 0,00 | - |
| 20 | 4428 | 4432 | 15,77 | 106,0 | 2 | 0,00 | 83,93 | - | - | 0,00 | 0,00 | - |
| 21 | 3951 | 3955 | 17,37 | 106,0 | 2 | 0,00 | 82,94 | - | - | 0,00 | 0,00 | - |
| 22 | 3850 | 3854 | 17,74 | 106,0 | 2 | 0,00 | 82,72 | - | - | 0,00 | 0,00 | - |
| 23 | 3693 | 3698 | 18,31 | 106,0 | 2 | 0,00 | 82,36 | - | - | 0,00 | 0,00 | - |
| 24 | 3467 | 3472 | 19,19 | 106,0 | 2 | 0,00 | 81,81 | - | - | 0,00 | 0,00 | - |
| 25 | 3204 | 3210 | 20,28 | 106,0 | 2 | 0,00 | 81,13 | - | - | 0,00 | 0,00 | - |
| 26 | 3080 | 3085 | 20,82 | 106,0 | 2 | 0,00 | 80,79 | - | - | 0,00 | 0,00 | - |
| 27 | 3707 | 3712 | 18,26 | 106,0 | 2 | 0,00 | 82,39 | - | - | 0,00 | 0,00 | - |
| 28 | 3767 | 3772 | 18,04 | 106,0 | 2 | 0,00 | 82,53 | - | - | 0,00 | 0,00 | - |
| 29 | 2831 | 2838 | 21,96 | 106,0 | 2 | 0,00 | 80,06 | - | - | 0,00 | 0,00 | - |
| 3 | 5680 | 5683 | 12,27 | 106,0 | 2 | 0,00 | 86,09 | - | - | 0,00 | 0,00 | - |
| 30 | 2845 | 2851 | 21,90 | 106,0 | 2 | 0,00 | 80,10 | - | - | 0,00 | 0,00 | - |
| 31 | 3691 | 3696 | 18,32 | 106,0 | 2 | 0,00 | 82,35 | - | - | 0,00 | 0,00 | - |
| 32 | 4311 | 4315 | 16,15 | 106,0 | 2 | 0,00 | 83,70 | - | - | 0,00 | 0,00 | - |
| 33 | 4070 | 4075 | 16,96 | 106,0 | 2 | 0,00 | 83,20 | - | - | 0,00 | 0,00 | - |
| 34 | 3013 | 3020 | 21,12 | 106,0 | 2 | 0,00 | 80,60 | - | - | 0,00 | 0,00 | - |
| 35 | 1915 | 1925 | 27,09 | 106,0 | 2 | 0,00 | 76,69 | - | - | 0,00 | 0,00 | - |
| 36 | 1972 | 1981 | 26,72 | 106,0 | 2 | 0,00 | 76,94 | - | - | 0,00 | 0,00 | - |
| 37 | 2188 | 2196 | 25,39 | 106,0 | 2 | 0,00 | 77,83 | - | - | 0,00 | 0,00 | - |
| 38 | 2765 | 2771 | 22,28 | 106,0 | 2 | 0,00 | 79,85 | - | - | 0,00 | 0,00 | - |
| 39 | 2072 | 2080 | 26,09 | 106,0 | 2 | 0,00 | 77,36 | - | - | 0,00 | 0,00 | - |
| 4 | 5066 | 5069 | 13,88 | 106,0 | 2 | 0,00 | 85,10 | - | - | 0,00 | 0,00 | - |
| 40 | 2611 | 2618 | 23,05 | 106,0 | 2 | 0,00 | 79,36 | - | - | 0,00 | 0,00 | - |
| 41 | 2023 | 2032 | 26,40 | 106,0 | 2 | 0,00 | 77,16 | - | - | 0,00 | 0,00 | - |
| 42 | 1429 | 1442 | 30,72 | 106,0 | 2 | 0,00 | 74,18 | - | - | 0,00 | 0,00 | - |
| 43 | 2313 | 2321 | 24,66 | 106,0 | 2 | 0,00 | 78,31 | - | - | 0,00 | 0,00 | - |
| 44 | 6703 | 6705 | 7,88 | 104,9 | | 0,00 | 87,53 | - | - | 0,00 | 0,00 | - |
| 45 | 6870 | 6872 | 7,55 | 104,9 | | 0,00 | 87,74 | - | - | 0,00 | 0,00 | - |
| 46 | 5231 | 5233 | 11,12 | 104,9 | | 0,00 | 85,37 | - | - | 0,00 | 0,00 | - |
| 47 | 5461 | 5463 | 10,57 | 104,9 | | 0,00 | 85,75 | - | - | 0,00 | 0,00 | - |
| 48 | 12260 | 12261 | 2,89 | 107,8 | | 0,00 | 92,77 | - | - | 0,00 | 0,00 | - |
| 49 | 11201 | 11202 | 4,01 | 107,8 | | 0,00 | 91,99 | - | - | 0,00 | 0,00 | - |
| 5 | 3906 | 3910 | 17,53 | 106,0 | 2 | 0,00 | 82,84 | - | - | 0,00 | 0,00 | - |

To be continued on next page...

DECIBEL - Detailed results

Calculation: VE1_GE158x43xHH200+Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_20200408 Noise calculation model: ISO 9613-2 General 8,0 m/s

...continued from previous page

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|-----------------|-----------------------|-----------------------|--------------------|--------------------|------------|--------------|--------------|-------------|--------------|---------------|-----------|
| 50 | 10751 | 10751 | 4,51 | 107,8 | | 0,00 | 91,63 | - | - | 0,00 | 0,00 | - |
| 51 | 11886 | 11886 | 3,28 | 107,8 | | 0,00 | 92,50 | - | - | 0,00 | 0,00 | - |
| 52 | 10160 | 10161 | 5,21 | 107,8 | | 0,00 | 91,14 | - | - | 0,00 | 0,00 | - |
| 53 | 11292 | 11293 | 3,91 | 107,8 | | 0,00 | 92,06 | - | - | 0,00 | 0,00 | - |
| 54 | 10484 | 10485 | 4,82 | 107,8 | | 0,00 | 91,41 | - | - | 0,00 | 0,00 | - |
| 55 | 11311 | 11312 | 3,89 | 107,8 | | 0,00 | 92,07 | - | - | 0,00 | 0,00 | - |
| 6 | 3702 | 3707 | 18,28 | 106,0 | 2 | 0,00 | 82,38 | - | - | 0,00 | 0,00 | - |
| 7 | 4446 | 4450 | 15,72 | 106,0 | 2 | 0,00 | 83,97 | - | - | 0,00 | 0,00 | - |
| 8 | 5458 | 5461 | 12,83 | 106,0 | 2 | 0,00 | 85,75 | - | - | 0,00 | 0,00 | - |
| 9 | 5902 | 5905 | 11,73 | 106,0 | 2 | 0,00 | 86,42 | - | - | 0,00 | 0,00 | - |
| Sum | | | 37,79 | | | | | | | | | |

- Data undefined due to calculation with octave data

Noise sensitive area: D Asuinrakennus D (Alakyläntie 243)

Wind speed: 8,0 m/s

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|-----------------|-----------------------|-----------------------|--------------------|--------------------|------------|--------------|--------------|-------------|--------------|---------------|-----------|
| 1 | 10123 | 10124 | 5,13 | 106,0 | 2 | 0,00 | 91,11 | - | - | 0,00 | 0,00 | - |
| 10 | 8488 | 8490 | 7,27 | 106,0 | 2 | 0,00 | 89,58 | - | - | 0,00 | 0,00 | - |
| 11 | 7928 | 7930 | 8,10 | 106,0 | 2 | 0,00 | 88,99 | - | - | 0,00 | 0,00 | - |
| 12 | 7290 | 7293 | 9,11 | 106,0 | 2 | 0,00 | 88,26 | - | - | 0,00 | 0,00 | - |
| 13 | 9181 | 9183 | 6,32 | 106,0 | 2 | 0,00 | 90,26 | - | - | 0,00 | 0,00 | - |
| 14 | 8639 | 8641 | 7,05 | 106,0 | 2 | 0,00 | 89,73 | - | - | 0,00 | 0,00 | - |
| 15 | 8097 | 8099 | 7,84 | 106,0 | 2 | 0,00 | 89,17 | - | - | 0,00 | 0,00 | - |
| 16 | 7638 | 7640 | 8,55 | 106,0 | 2 | 0,00 | 88,66 | - | - | 0,00 | 0,00 | - |
| 17 | 5787 | 5790 | 12,01 | 106,0 | 2 | 0,00 | 86,25 | - | - | 0,00 | 0,00 | - |
| 18 | 5460 | 5463 | 12,82 | 106,0 | 2 | 0,00 | 85,75 | - | - | 0,00 | 0,00 | - |
| 19 | 5000 | 5003 | 14,07 | 106,0 | 2 | 0,00 | 84,98 | - | - | 0,00 | 0,00 | - |
| 2 | 9428 | 9429 | 5,99 | 106,0 | 2 | 0,00 | 90,49 | - | - | 0,00 | 0,00 | - |
| 20 | 4411 | 4415 | 15,83 | 106,0 | 2 | 0,00 | 83,90 | - | - | 0,00 | 0,00 | - |
| 21 | 5202 | 5205 | 13,51 | 106,0 | 2 | 0,00 | 85,33 | - | - | 0,00 | 0,00 | - |
| 22 | 4614 | 4617 | 15,20 | 106,0 | 2 | 0,00 | 84,29 | - | - | 0,00 | 0,00 | - |
| 23 | 3865 | 3869 | 17,68 | 106,0 | 2 | 0,00 | 82,75 | - | - | 0,00 | 0,00 | - |
| 24 | 5442 | 5445 | 12,87 | 106,0 | 2 | 0,00 | 85,72 | - | - | 0,00 | 0,00 | - |
| 25 | 4796 | 4800 | 14,65 | 106,0 | 2 | 0,00 | 84,62 | - | - | 0,00 | 0,00 | - |
| 26 | 4221 | 4225 | 16,45 | 106,0 | 2 | 0,00 | 83,52 | - | - | 0,00 | 0,00 | - |
| 27 | 3264 | 3269 | 20,03 | 106,0 | 2 | 0,00 | 81,29 | - | - | 0,00 | 0,00 | - |
| 28 | 2660 | 2666 | 22,80 | 106,0 | 2 | 0,00 | 79,52 | - | - | 0,00 | 0,00 | - |
| 29 | 3270 | 3275 | 20,00 | 106,0 | 2 | 0,00 | 81,30 | - | - | 0,00 | 0,00 | - |
| 3 | 8793 | 8795 | 6,84 | 106,0 | 2 | 0,00 | 89,88 | - | - | 0,00 | 0,00 | - |
| 30 | 2531 | 2537 | 23,47 | 106,0 | 2 | 0,00 | 79,09 | - | - | 0,00 | 0,00 | - |
| 31 | 2019 | 2028 | 26,42 | 106,0 | 2 | 0,00 | 77,14 | - | - | 0,00 | 0,00 | - |
| 32 | 1741 | 1752 | 28,30 | 106,0 | 2 | 0,00 | 75,87 | - | - | 0,00 | 0,00 | - |
| 33 | 1078 | 1095 | 34,01 | 106,0 | 2 | 0,00 | 71,79 | - | - | 0,00 | 0,00 | - |
| 34 | 1255 | 1269 | 32,26 | 106,0 | 2 | 0,00 | 73,07 | - | - | 0,00 | 0,00 | - |
| 35 | 2417 | 2424 | 24,08 | 106,0 | 2 | 0,00 | 78,69 | - | - | 0,00 | 0,00 | - |
| 36 | 3471 | 3476 | 19,17 | 106,0 | 2 | 0,00 | 81,82 | - | - | 0,00 | 0,00 | - |
| 37 | 4087 | 4091 | 16,90 | 106,0 | 2 | 0,00 | 83,24 | - | - | 0,00 | 0,00 | - |
| 38 | 5301 | 5305 | 13,24 | 106,0 | 2 | 0,00 | 85,49 | - | - | 0,00 | 0,00 | - |
| 39 | 4763 | 4766 | 14,75 | 106,0 | 2 | 0,00 | 84,56 | - | - | 0,00 | 0,00 | - |
| 4 | 8237 | 8239 | 7,63 | 106,0 | 2 | 0,00 | 89,32 | - | - | 0,00 | 0,00 | - |
| 40 | 5829 | 5832 | 11,90 | 106,0 | 2 | 0,00 | 86,32 | - | - | 0,00 | 0,00 | - |
| 41 | 5429 | 5432 | 12,91 | 106,0 | 2 | 0,00 | 85,70 | - | - | 0,00 | 0,00 | - |
| 42 | 4795 | 4799 | 14,65 | 106,0 | 2 | 0,00 | 84,62 | - | - | 0,00 | 0,00 | - |
| 43 | 6121 | 6124 | 11,22 | 106,0 | 2 | 0,00 | 86,74 | - | - | 0,00 | 0,00 | - |
| 44 | 9193 | 9194 | 3,62 | 104,9 | | 0,00 | 90,27 | - | - | 0,00 | 0,00 | - |
| 45 | 9030 | 9031 | 3,87 | 104,9 | | 0,00 | 90,11 | - | - | 0,00 | 0,00 | - |
| 46 | 7781 | 7782 | 5,88 | 104,9 | | 0,00 | 88,82 | - | - | 0,00 | 0,00 | - |
| 47 | 7672 | 7673 | 6,07 | 104,9 | | 0,00 | 88,70 | - | - | 0,00 | 0,00 | - |
| 48 | 16134 | 16134 | -0,48 | 107,8 | | 0,00 | 95,16 | - | - | 0,00 | 0,00 | - |
| 49 | 15092 | 15092 | 0,34 | 107,8 | | 0,00 | 94,58 | - | - | 0,00 | 0,00 | - |
| 5 | 6758 | 6761 | 10,03 | 106,0 | 2 | 0,00 | 87,60 | - | - | 0,00 | 0,00 | - |
| 50 | 14648 | 14649 | 0,71 | 107,8 | | 0,00 | 94,32 | - | - | 0,00 | 0,00 | - |

To be continued on next page...

DECIBEL - Detailed results

Calculation: VE1_GE158x43xHH200+Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_20200408 Noise calculation model: ISO 9613-2 General 8,0 m/s

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| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|--------------|--------------------|--------------------|-----------------|-----------------|---------|-----------|-----------|----------|-----------|------------|--------|
| 51 | 15800 | 15800 | -0,22 | 107,8 | | 0,00 | 94,97 | - | - | 0,00 | 0,00 | - |
| 52 | 14045 | 14045 | 1,22 | 107,8 | | 0,00 | 93,95 | - | - | 0,00 | 0,00 | - |
| 53 | 15246 | 15247 | 0,21 | 107,8 | | 0,00 | 94,66 | - | - | 0,00 | 0,00 | - |
| 54 | 14455 | 14456 | 0,87 | 107,8 | | 0,00 | 94,20 | - | - | 0,00 | 0,00 | - |
| 55 | 15316 | 15317 | 0,16 | 107,8 | | 0,00 | 94,70 | - | - | 0,00 | 0,00 | - |
| 6 | 7043 | 7046 | 9,53 | 106,0 | 2 | 0,00 | 87,96 | - | - | 0,00 | 0,00 | - |
| 7 | 7842 | 7844 | 8,23 | 106,0 | 2 | 0,00 | 88,89 | - | - | 0,00 | 0,00 | - |
| 8 | 9018 | 9019 | 6,53 | 106,0 | 2 | 0,00 | 90,10 | - | - | 0,00 | 0,00 | - |
| 9 | 9671 | 9673 | 5,69 | 106,0 | 2 | 0,00 | 90,71 | - | - | 0,00 | 0,00 | - |
| Sum | | | 38,37 | | | | | | | | | |

- Data undefined due to calculation with octave data

Noise sensitive area: E Lomarakennus E (Kellokankaan metsätie)

Wind speed: 8,0 m/s

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|--------------|--------------------|--------------------|-----------------|-----------------|---------|-----------|-----------|----------|-----------|------------|--------|
| 1 | 11207 | 11208 | 3,90 | 106,0 | 2 | 0,00 | 91,99 | - | - | 0,00 | 0,00 | - |
| 10 | 9845 | 9846 | 5,47 | 106,0 | 2 | 0,00 | 90,87 | - | - | 0,00 | 0,00 | - |
| 11 | 9348 | 9349 | 6,10 | 106,0 | 2 | 0,00 | 90,42 | - | - | 0,00 | 0,00 | - |
| 12 | 8740 | 8741 | 6,91 | 106,0 | 2 | 0,00 | 89,83 | - | - | 0,00 | 0,00 | - |
| 13 | 10638 | 10639 | 4,53 | 106,0 | 2 | 0,00 | 91,54 | - | - | 0,00 | 0,00 | - |
| 14 | 10146 | 10147 | 5,11 | 106,0 | 2 | 0,00 | 91,13 | - | - | 0,00 | 0,00 | - |
| 15 | 9659 | 9661 | 5,70 | 106,0 | 2 | 0,00 | 90,70 | - | - | 0,00 | 0,00 | - |
| 16 | 9272 | 9274 | 6,20 | 106,0 | 2 | 0,00 | 90,35 | - | - | 0,00 | 0,00 | - |
| 17 | 6368 | 6370 | 10,74 | 106,0 | 2 | 0,00 | 87,08 | - | - | 0,00 | 0,00 | - |
| 18 | 5791 | 5794 | 12,00 | 106,0 | 2 | 0,00 | 86,26 | - | - | 0,00 | 0,00 | - |
| 19 | 5166 | 5169 | 13,61 | 106,0 | 2 | 0,00 | 85,27 | - | - | 0,00 | 0,00 | - |
| 2 | 10567 | 10568 | 4,61 | 106,0 | 2 | 0,00 | 91,48 | - | - | 0,00 | 0,00 | - |
| 20 | 4629 | 4632 | 15,15 | 106,0 | 2 | 0,00 | 84,32 | - | - | 0,00 | 0,00 | - |
| 21 | 5824 | 5827 | 11,92 | 106,0 | 2 | 0,00 | 86,31 | - | - | 0,00 | 0,00 | - |
| 22 | 5163 | 5166 | 13,61 | 106,0 | 2 | 0,00 | 85,26 | - | - | 0,00 | 0,00 | - |
| 23 | 4385 | 4389 | 15,91 | 106,0 | 2 | 0,00 | 83,85 | - | - | 0,00 | 0,00 | - |
| 24 | 6329 | 6331 | 10,82 | 106,0 | 2 | 0,00 | 87,03 | - | - | 0,00 | 0,00 | - |
| 25 | 5665 | 5668 | 12,30 | 106,0 | 2 | 0,00 | 86,07 | - | - | 0,00 | 0,00 | - |
| 26 | 5067 | 5070 | 13,88 | 106,0 | 2 | 0,00 | 85,10 | - | - | 0,00 | 0,00 | - |
| 27 | 3738 | 3742 | 18,15 | 106,0 | 2 | 0,00 | 82,46 | - | - | 0,00 | 0,00 | - |
| 28 | 3113 | 3119 | 20,67 | 106,0 | 2 | 0,00 | 80,88 | - | - | 0,00 | 0,00 | - |
| 29 | 4207 | 4211 | 16,49 | 106,0 | 2 | 0,00 | 83,49 | - | - | 0,00 | 0,00 | - |
| 3 | 9842 | 9844 | 5,47 | 106,0 | 2 | 0,00 | 90,86 | - | - | 0,00 | 0,00 | - |
| 30 | 3575 | 3579 | 18,77 | 106,0 | 2 | 0,00 | 82,08 | - | - | 0,00 | 0,00 | - |
| 31 | 2645 | 2651 | 22,88 | 106,0 | 2 | 0,00 | 79,47 | - | - | 0,00 | 0,00 | - |
| 32 | 1911 | 1921 | 27,12 | 106,0 | 2 | 0,00 | 76,67 | - | - | 0,00 | 0,00 | - |
| 33 | 1843 | 1853 | 27,58 | 106,0 | 2 | 0,00 | 76,36 | - | - | 0,00 | 0,00 | - |
| 34 | 2870 | 2876 | 21,78 | 106,0 | 2 | 0,00 | 80,18 | - | - | 0,00 | 0,00 | - |
| 35 | 4022 | 4026 | 17,12 | 106,0 | 2 | 0,00 | 83,10 | - | - | 0,00 | 0,00 | - |
| 36 | 4764 | 4767 | 14,75 | 106,0 | 2 | 0,00 | 84,56 | - | - | 0,00 | 0,00 | - |
| 37 | 5283 | 5286 | 13,29 | 106,0 | 2 | 0,00 | 85,46 | - | - | 0,00 | 0,00 | - |
| 38 | 6439 | 6441 | 10,61 | 106,0 | 2 | 0,00 | 87,18 | - | - | 0,00 | 0,00 | - |
| 39 | 6059 | 6062 | 11,36 | 106,0 | 2 | 0,00 | 86,65 | - | - | 0,00 | 0,00 | - |
| 4 | 9347 | 9348 | 6,10 | 106,0 | 2 | 0,00 | 90,41 | - | - | 0,00 | 0,00 | - |
| 40 | 7155 | 7157 | 9,34 | 106,0 | 2 | 0,00 | 88,10 | - | - | 0,00 | 0,00 | - |
| 41 | 6872 | 6875 | 9,82 | 106,0 | 2 | 0,00 | 87,75 | - | - | 0,00 | 0,00 | - |
| 42 | 6309 | 6311 | 10,85 | 106,0 | 2 | 0,00 | 87,00 | - | - | 0,00 | 0,00 | - |
| 43 | 7679 | 7681 | 8,48 | 106,0 | 2 | 0,00 | 88,71 | - | - | 0,00 | 0,00 | - |
| 44 | 9901 | 9902 | 2,61 | 104,9 | | 0,00 | 90,91 | - | - | 0,00 | 0,00 | - |
| 45 | 9586 | 9586 | 3,06 | 104,9 | | 0,00 | 90,63 | - | - | 0,00 | 0,00 | - |
| 46 | 8622 | 8623 | 4,49 | 104,9 | | 0,00 | 89,71 | - | - | 0,00 | 0,00 | - |
| 47 | 8362 | 8364 | 4,91 | 104,9 | | 0,00 | 89,45 | - | - | 0,00 | 0,00 | - |
| 48 | 17530 | 17530 | -1,50 | 107,8 | | 0,00 | 95,88 | - | - | 0,00 | 0,00 | - |
| 49 | 16514 | 16515 | -0,77 | 107,8 | | 0,00 | 95,36 | - | - | 0,00 | 0,00 | - |
| 5 | 7832 | 7834 | 8,24 | 106,0 | 2 | 0,00 | 88,88 | - | - | 0,00 | 0,00 | - |
| 50 | 16082 | 16082 | -0,44 | 107,8 | | 0,00 | 95,13 | - | - | 0,00 | 0,00 | - |
| 51 | 17241 | 17241 | -1,30 | 107,8 | | 0,00 | 95,73 | - | - | 0,00 | 0,00 | - |

To be continued on next page...

DECIBEL - Detailed results

Calculation: VE1_GE158x43xHH200+Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_20200408 Noise calculation model: ISO 9613-2 General 8,0 m/s

...continued from previous page

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|--------------|--------------------|--------------------|-----------------|-----------------|---------|-----------|-----------|----------|-----------|------------|--------|
| 52 | 15471 | 15471 | 0,04 | 107,8 | | 0,00 | 94,79 | - | - | 0,00 | 0,00 | - |
| 53 | 16738 | 16738 | -0,93 | 107,8 | | 0,00 | 95,47 | - | - | 0,00 | 0,00 | - |
| 54 | 15972 | 15973 | -0,36 | 107,8 | | 0,00 | 95,07 | - | - | 0,00 | 0,00 | - |
| 55 | 16875 | 16875 | -1,03 | 107,8 | | 0,00 | 95,54 | - | - | 0,00 | 0,00 | - |
| 6 | 8315 | 8317 | 7,52 | 106,0 | 2 | 0,00 | 89,40 | - | - | 0,00 | 0,00 | - |
| 7 | 9089 | 9091 | 6,44 | 106,0 | 2 | 0,00 | 90,17 | - | - | 0,00 | 0,00 | - |
| 8 | 10302 | 10303 | 4,92 | 106,0 | 2 | 0,00 | 91,26 | - | - | 0,00 | 0,00 | - |
| 9 | 11071 | 11072 | 4,05 | 106,0 | 2 | 0,00 | 91,88 | - | - | 0,00 | 0,00 | - |
| Sum | | | 33,41 | | | | | | | | | |

- Data undefined due to calculation with octave data

Noise sensitive area: F Asuinrakennus F (Ollilantie 112)

Wind speed: 8,0 m/s

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|--------------|--------------------|--------------------|-----------------|-----------------|---------|-----------|-----------|----------|-----------|------------|--------|
| 1 | 6785 | 6788 | 9,98 | 106,0 | 2 | 0,00 | 87,63 | - | - | 0,00 | 0,00 | - |
| 10 | 6786 | 6789 | 9,98 | 106,0 | 2 | 0,00 | 87,64 | - | - | 0,00 | 0,00 | - |
| 11 | 6712 | 6715 | 10,11 | 106,0 | 2 | 0,00 | 87,54 | - | - | 0,00 | 0,00 | - |
| 12 | 6462 | 6465 | 10,56 | 106,0 | 2 | 0,00 | 87,21 | - | - | 0,00 | 0,00 | - |
| 13 | 7761 | 7763 | 8,35 | 106,0 | 2 | 0,00 | 88,80 | - | - | 0,00 | 0,00 | - |
| 14 | 7623 | 7626 | 8,57 | 106,0 | 2 | 0,00 | 88,65 | - | - | 0,00 | 0,00 | - |
| 15 | 7536 | 7539 | 8,71 | 106,0 | 2 | 0,00 | 88,55 | - | - | 0,00 | 0,00 | - |
| 16 | 7615 | 7618 | 8,58 | 106,0 | 2 | 0,00 | 88,64 | - | - | 0,00 | 0,00 | - |
| 17 | 2612 | 2620 | 23,04 | 106,0 | 2 | 0,00 | 79,37 | - | - | 0,00 | 0,00 | - |
| 18 | 2027 | 2038 | 26,36 | 106,0 | 2 | 0,00 | 77,18 | - | - | 0,00 | 0,00 | - |
| 19 | 2039 | 2050 | 26,28 | 106,0 | 2 | 0,00 | 77,23 | - | - | 0,00 | 0,00 | - |
| 2 | 6480 | 6483 | 10,53 | 106,0 | 2 | 0,00 | 87,24 | - | - | 0,00 | 0,00 | - |
| 20 | 2576 | 2584 | 23,22 | 106,0 | 2 | 0,00 | 79,25 | - | - | 0,00 | 0,00 | - |
| 21 | 2825 | 2833 | 21,98 | 106,0 | 2 | 0,00 | 80,05 | - | - | 0,00 | 0,00 | - |
| 22 | 2889 | 2896 | 21,68 | 106,0 | 2 | 0,00 | 80,24 | - | - | 0,00 | 0,00 | - |
| 23 | 3304 | 3311 | 19,85 | 106,0 | 2 | 0,00 | 81,40 | - | - | 0,00 | 0,00 | - |
| 24 | 3567 | 3573 | 18,79 | 106,0 | 2 | 0,00 | 82,06 | - | - | 0,00 | 0,00 | - |
| 25 | 3561 | 3567 | 18,82 | 106,0 | 2 | 0,00 | 82,05 | - | - | 0,00 | 0,00 | - |
| 26 | 3655 | 3661 | 18,45 | 106,0 | 2 | 0,00 | 82,27 | - | - | 0,00 | 0,00 | - |
| 27 | 3727 | 3733 | 18,18 | 106,0 | 2 | 0,00 | 82,44 | - | - | 0,00 | 0,00 | - |
| 28 | 4246 | 4252 | 16,36 | 106,0 | 2 | 0,00 | 83,57 | - | - | 0,00 | 0,00 | - |
| 29 | 4225 | 4230 | 16,43 | 106,0 | 2 | 0,00 | 83,53 | - | - | 0,00 | 0,00 | - |
| 3 | 5642 | 5646 | 12,36 | 106,0 | 2 | 0,00 | 86,04 | - | - | 0,00 | 0,00 | - |
| 30 | 4757 | 4761 | 14,76 | 106,0 | 2 | 0,00 | 84,55 | - | - | 0,00 | 0,00 | - |
| 31 | 4875 | 4880 | 14,42 | 106,0 | 2 | 0,00 | 84,77 | - | - | 0,00 | 0,00 | - |
| 32 | 5221 | 5226 | 13,45 | 106,0 | 2 | 0,00 | 85,36 | - | - | 0,00 | 0,00 | - |
| 33 | 5828 | 5832 | 11,90 | 106,0 | 2 | 0,00 | 86,32 | - | - | 0,00 | 0,00 | - |
| 34 | 6022 | 6026 | 11,44 | 106,0 | 2 | 0,00 | 86,60 | - | - | 0,00 | 0,00 | - |
| 35 | 5748 | 5752 | 12,10 | 106,0 | 2 | 0,00 | 86,20 | - | - | 0,00 | 0,00 | - |
| 36 | 4860 | 4864 | 14,46 | 106,0 | 2 | 0,00 | 84,74 | - | - | 0,00 | 0,00 | - |
| 37 | 4534 | 4539 | 15,44 | 106,0 | 2 | 0,00 | 84,14 | - | - | 0,00 | 0,00 | - |
| 38 | 4383 | 4388 | 15,92 | 106,0 | 2 | 0,00 | 83,85 | - | - | 0,00 | 0,00 | - |
| 39 | 4854 | 4858 | 14,48 | 106,0 | 2 | 0,00 | 84,73 | - | - | 0,00 | 0,00 | - |
| 4 | 5524 | 5528 | 12,66 | 106,0 | 2 | 0,00 | 85,85 | - | - | 0,00 | 0,00 | - |
| 40 | 5221 | 5226 | 13,45 | 106,0 | 2 | 0,00 | 85,36 | - | - | 0,00 | 0,00 | - |
| 41 | 5563 | 5568 | 12,56 | 106,0 | 2 | 0,00 | 85,91 | - | - | 0,00 | 0,00 | - |
| 42 | 5653 | 5658 | 12,33 | 106,0 | 2 | 0,00 | 86,05 | - | - | 0,00 | 0,00 | - |
| 43 | 6355 | 6358 | 10,76 | 106,0 | 2 | 0,00 | 87,07 | - | - | 0,00 | 0,00 | - |
| 44 | 4616 | 4619 | 12,77 | 104,9 | | 0,00 | 84,29 | - | - | 0,00 | 0,00 | - |
| 45 | 3956 | 3960 | 14,97 | 104,9 | | 0,00 | 82,95 | - | - | 0,00 | 0,00 | - |
| 46 | 4162 | 4165 | 14,25 | 104,9 | | 0,00 | 83,39 | - | - | 0,00 | 0,00 | - |
| 47 | 3529 | 3533 | 16,57 | 104,9 | | 0,00 | 81,96 | - | - | 0,00 | 0,00 | - |
| 48 | 13424 | 13425 | 1,78 | 107,8 | | 0,00 | 93,56 | - | - | 0,00 | 0,00 | - |
| 49 | 12590 | 12591 | 2,57 | 107,8 | | 0,00 | 93,00 | - | - | 0,00 | 0,00 | - |
| 5 | 4569 | 4574 | 15,33 | 106,0 | 2 | 0,00 | 84,21 | - | - | 0,00 | 0,00 | - |
| 50 | 12240 | 12241 | 2,91 | 107,8 | | 0,00 | 92,76 | - | - | 0,00 | 0,00 | - |
| 51 | 13331 | 13332 | 1,86 | 107,8 | | 0,00 | 93,50 | - | - | 0,00 | 0,00 | - |
| 52 | 11659 | 11660 | 3,51 | 107,8 | | 0,00 | 92,33 | - | - | 0,00 | 0,00 | - |

To be continued on next page...

DECIBEL - Detailed results

Calculation: VE1_GE158x43xHH200+Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_20200408 Noise calculation model: ISO 9613-2 General 8,0 m/s

...continued from previous page

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|--------------|--------------------|--------------------|-----------------|-----------------|---------|-----------|-----------|----------|-----------|------------|--------|
| 53 | 13072 | 13073 | 2,10 | 107,8 | | 0,00 | 93,33 | - | - | 0,00 | 0,00 | - |
| 54 | 12487 | 12487 | 2,67 | 107,8 | | 0,00 | 92,93 | - | - | 0,00 | 0,00 | - |
| 55 | 13488 | 13489 | 1,72 | 107,8 | | 0,00 | 93,60 | - | - | 0,00 | 0,00 | - |
| 6 | 5522 | 5526 | 12,66 | 106,0 | 2 | 0,00 | 85,85 | - | - | 0,00 | 0,00 | - |
| 7 | 5869 | 5873 | 11,80 | 106,0 | 2 | 0,00 | 86,38 | - | - | 0,00 | 0,00 | - |
| 8 | 6820 | 6823 | 9,92 | 106,0 | 2 | 0,00 | 87,68 | - | - | 0,00 | 0,00 | - |
| 9 | 7846 | 7849 | 8,22 | 106,0 | 2 | 0,00 | 88,90 | - | - | 0,00 | 0,00 | - |
| Sum | | | 34,33 | | | | | | | | | |

- Data undefined due to calculation with octave data

Noise sensitive area: G Lomarakennus G (Ollilantie, Siliäkuru)

Wind speed: 8,0 m/s

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|--------------|--------------------|--------------------|-----------------|-----------------|---------|-----------|-----------|----------|-----------|------------|--------|
| 1 | 5935 | 5938 | 11,65 | 106,0 | 2 | 0,00 | 86,47 | - | - | 0,00 | 0,00 | - |
| 10 | 5927 | 5931 | 11,67 | 106,0 | 2 | 0,00 | 86,46 | - | - | 0,00 | 0,00 | - |
| 11 | 5871 | 5874 | 11,80 | 106,0 | 2 | 0,00 | 86,38 | - | - | 0,00 | 0,00 | - |
| 12 | 5646 | 5649 | 12,35 | 106,0 | 2 | 0,00 | 86,04 | - | - | 0,00 | 0,00 | - |
| 13 | 6901 | 6904 | 9,77 | 106,0 | 2 | 0,00 | 87,78 | - | - | 0,00 | 0,00 | - |
| 14 | 6776 | 6779 | 9,99 | 106,0 | 2 | 0,00 | 87,62 | - | - | 0,00 | 0,00 | - |
| 15 | 6709 | 6712 | 10,11 | 106,0 | 2 | 0,00 | 87,54 | - | - | 0,00 | 0,00 | - |
| 16 | 6814 | 6817 | 9,93 | 106,0 | 2 | 0,00 | 87,67 | - | - | 0,00 | 0,00 | - |
| 17 | 1908 | 1918 | 27,14 | 106,0 | 2 | 0,00 | 76,66 | - | - | 0,00 | 0,00 | - |
| 18 | 1548 | 1560 | 29,74 | 106,0 | 2 | 0,00 | 74,86 | - | - | 0,00 | 0,00 | - |
| 19 | 1854 | 1864 | 27,50 | 106,0 | 2 | 0,00 | 76,41 | - | - | 0,00 | 0,00 | - |
| 2 | 5616 | 5619 | 12,43 | 106,0 | 2 | 0,00 | 85,99 | - | - | 0,00 | 0,00 | - |
| 20 | 2442 | 2450 | 23,94 | 106,0 | 2 | 0,00 | 78,78 | - | - | 0,00 | 0,00 | - |
| 21 | 2247 | 2256 | 25,03 | 106,0 | 2 | 0,00 | 78,07 | - | - | 0,00 | 0,00 | - |
| 22 | 2488 | 2496 | 23,69 | 106,0 | 2 | 0,00 | 78,95 | - | - | 0,00 | 0,00 | - |
| 23 | 3070 | 3077 | 20,86 | 106,0 | 2 | 0,00 | 80,76 | - | - | 0,00 | 0,00 | - |
| 24 | 2878 | 2885 | 21,74 | 106,0 | 2 | 0,00 | 80,20 | - | - | 0,00 | 0,00 | - |
| 25 | 2994 | 3001 | 21,20 | 106,0 | 2 | 0,00 | 80,55 | - | - | 0,00 | 0,00 | - |
| 26 | 3211 | 3217 | 20,25 | 106,0 | 2 | 0,00 | 81,15 | - | - | 0,00 | 0,00 | - |
| 27 | 3603 | 3608 | 18,66 | 106,0 | 2 | 0,00 | 82,15 | - | - | 0,00 | 0,00 | - |
| 28 | 4194 | 4199 | 16,53 | 106,0 | 2 | 0,00 | 83,46 | - | - | 0,00 | 0,00 | - |
| 29 | 3927 | 3932 | 17,46 | 106,0 | 2 | 0,00 | 82,89 | - | - | 0,00 | 0,00 | - |
| 3 | 4777 | 4781 | 14,71 | 106,0 | 2 | 0,00 | 84,59 | - | - | 0,00 | 0,00 | - |
| 30 | 4546 | 4551 | 15,40 | 106,0 | 2 | 0,00 | 84,16 | - | - | 0,00 | 0,00 | - |
| 31 | 4835 | 4840 | 14,53 | 106,0 | 2 | 0,00 | 84,70 | - | - | 0,00 | 0,00 | - |
| 32 | 5289 | 5294 | 13,27 | 106,0 | 2 | 0,00 | 85,48 | - | - | 0,00 | 0,00 | - |
| 33 | 5845 | 5849 | 11,86 | 106,0 | 2 | 0,00 | 86,34 | - | - | 0,00 | 0,00 | - |
| 34 | 5881 | 5884 | 11,78 | 106,0 | 2 | 0,00 | 86,39 | - | - | 0,00 | 0,00 | - |
| 35 | 5441 | 5445 | 12,87 | 106,0 | 2 | 0,00 | 85,72 | - | - | 0,00 | 0,00 | - |
| 36 | 4439 | 4444 | 15,74 | 106,0 | 2 | 0,00 | 83,95 | - | - | 0,00 | 0,00 | - |
| 37 | 4029 | 4034 | 17,10 | 106,0 | 2 | 0,00 | 83,11 | - | - | 0,00 | 0,00 | - |
| 38 | 3698 | 3704 | 18,29 | 106,0 | 2 | 0,00 | 82,37 | - | - | 0,00 | 0,00 | - |
| 39 | 4236 | 4241 | 16,40 | 106,0 | 2 | 0,00 | 83,55 | - | - | 0,00 | 0,00 | - |
| 4 | 4657 | 4661 | 15,07 | 106,0 | 2 | 0,00 | 84,37 | - | - | 0,00 | 0,00 | - |
| 40 | 4483 | 4488 | 15,60 | 106,0 | 2 | 0,00 | 84,04 | - | - | 0,00 | 0,00 | - |
| 41 | 4871 | 4876 | 14,43 | 106,0 | 2 | 0,00 | 84,76 | - | - | 0,00 | 0,00 | - |
| 42 | 5031 | 5036 | 13,97 | 106,0 | 2 | 0,00 | 85,04 | - | - | 0,00 | 0,00 | - |
| 43 | 5618 | 5622 | 12,42 | 106,0 | 2 | 0,00 | 86,00 | - | - | 0,00 | 0,00 | - |
| 44 | 3811 | 3814 | 15,50 | 104,9 | | 0,00 | 82,63 | - | - | 0,00 | 0,00 | - |
| 45 | 3193 | 3197 | 17,95 | 104,9 | | 0,00 | 81,09 | - | - | 0,00 | 0,00 | - |
| 46 | 3294 | 3298 | 17,53 | 104,9 | | 0,00 | 81,37 | - | - | 0,00 | 0,00 | - |
| 47 | 2665 | 2669 | 20,39 | 104,9 | | 0,00 | 79,53 | - | - | 0,00 | 0,00 | - |
| 48 | 12590 | 12591 | 2,57 | 107,8 | | 0,00 | 93,00 | - | - | 0,00 | 0,00 | - |
| 49 | 11745 | 11746 | 3,42 | 107,8 | | 0,00 | 92,40 | - | - | 0,00 | 0,00 | - |
| 5 | 3741 | 3747 | 18,13 | 106,0 | 2 | 0,00 | 82,47 | - | - | 0,00 | 0,00 | - |
| 50 | 11390 | 11391 | 3,80 | 107,8 | | 0,00 | 92,13 | - | - | 0,00 | 0,00 | - |
| 51 | 12488 | 12488 | 2,67 | 107,8 | | 0,00 | 92,93 | - | - | 0,00 | 0,00 | - |
| 52 | 10807 | 10808 | 4,45 | 107,8 | | 0,00 | 91,67 | - | - | 0,00 | 0,00 | - |
| 53 | 12218 | 12219 | 2,94 | 107,8 | | 0,00 | 92,74 | - | - | 0,00 | 0,00 | - |

To be continued on next page...

DECIBEL - Detailed results

Calculation: VE1_GE158x43xHH200+Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_20200408 Noise calculation model: ISO 9613-2 General 8,0 m/s

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WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|-----------------|-----------------------|-----------------------|--------------------|--------------------|------------|--------------|--------------|-------------|--------------|---------------|-----------|
| 54 | 11626 | 11627 | 3,55 | 107,8 | | 0,00 | 92,31 | - | - | 0,00 | 0,00 | - |
| 55 | 12627 | 12628 | 2,53 | 107,8 | | 0,00 | 93,03 | - | - | 0,00 | 0,00 | - |
| 6 | 4696 | 4700 | 14,95 | 106,0 | 2 | 0,00 | 84,44 | - | - | 0,00 | 0,00 | - |
| 7 | 5015 | 5019 | 14,02 | 106,0 | 2 | 0,00 | 85,01 | - | - | 0,00 | 0,00 | - |
| 8 | 5953 | 5956 | 11,61 | 106,0 | 2 | 0,00 | 86,50 | - | - | 0,00 | 0,00 | - |
| 9 | 6980 | 6982 | 9,64 | 106,0 | 2 | 0,00 | 87,88 | - | - | 0,00 | 0,00 | - |
| Sum | | | 36,58 | | | | | | | | | |

- Data undefined due to calculation with octave data

Noise sensitive area: H Asuinrakennus H (Pinolantie 406)

Wind speed: 8,0 m/s

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|-----------------|-----------------------|-----------------------|--------------------|--------------------|------------|--------------|--------------|-------------|--------------|---------------|-----------|
| 1 | 2717 | 2725 | 22,51 | 106,0 | 2 | 0,00 | 79,71 | - | - | 0,00 | 0,00 | - |
| 10 | 3514 | 3520 | 19,00 | 106,0 | 2 | 0,00 | 81,93 | - | - | 0,00 | 0,00 | - |
| 11 | 4075 | 4080 | 16,94 | 106,0 | 2 | 0,00 | 83,21 | - | - | 0,00 | 0,00 | - |
| 12 | 4720 | 4724 | 14,87 | 106,0 | 2 | 0,00 | 84,49 | - | - | 0,00 | 0,00 | - |
| 13 | 2889 | 2896 | 21,68 | 106,0 | 2 | 0,00 | 80,24 | - | - | 0,00 | 0,00 | - |
| 14 | 3495 | 3501 | 19,08 | 106,0 | 2 | 0,00 | 81,88 | - | - | 0,00 | 0,00 | - |
| 15 | 4119 | 4124 | 16,79 | 106,0 | 2 | 0,00 | 83,31 | - | - | 0,00 | 0,00 | - |
| 16 | 4727 | 4732 | 14,85 | 106,0 | 2 | 0,00 | 84,50 | - | - | 0,00 | 0,00 | - |
| 17 | 7594 | 7596 | 8,63 | 106,0 | 2 | 0,00 | 88,61 | - | - | 0,00 | 0,00 | - |
| 18 | 8440 | 8442 | 7,35 | 106,0 | 2 | 0,00 | 89,53 | - | - | 0,00 | 0,00 | - |
| 19 | 9117 | 9119 | 6,42 | 106,0 | 2 | 0,00 | 90,20 | - | - | 0,00 | 0,00 | - |
| 2 | 3030 | 3037 | 21,04 | 106,0 | 2 | 0,00 | 80,65 | - | - | 0,00 | 0,00 | - |
| 20 | 9368 | 9371 | 6,07 | 106,0 | 2 | 0,00 | 90,44 | - | - | 0,00 | 0,00 | - |
| 21 | 7943 | 7946 | 8,07 | 106,0 | 2 | 0,00 | 89,00 | - | - | 0,00 | 0,00 | - |
| 22 | 8556 | 8558 | 7,18 | 106,0 | 2 | 0,00 | 89,65 | - | - | 0,00 | 0,00 | - |
| 23 | 9210 | 9212 | 6,29 | 106,0 | 2 | 0,00 | 90,29 | - | - | 0,00 | 0,00 | - |
| 24 | 7194 | 7197 | 9,29 | 106,0 | 2 | 0,00 | 88,14 | - | - | 0,00 | 0,00 | - |
| 25 | 7809 | 7811 | 8,28 | 106,0 | 2 | 0,00 | 88,85 | - | - | 0,00 | 0,00 | - |
| 26 | 8371 | 8374 | 7,43 | 106,0 | 2 | 0,00 | 89,46 | - | - | 0,00 | 0,00 | - |
| 27 | 9777 | 9780 | 5,55 | 106,0 | 2 | 0,00 | 90,81 | - | - | 0,00 | 0,00 | - |
| 28 | 10317 | 10320 | 4,90 | 106,0 | 2 | 0,00 | 91,27 | - | - | 0,00 | 0,00 | - |
| 29 | 9149 | 9151 | 6,36 | 106,0 | 2 | 0,00 | 90,23 | - | - | 0,00 | 0,00 | - |
| 3 | 3875 | 3880 | 17,64 | 106,0 | 2 | 0,00 | 82,78 | - | - | 0,00 | 0,00 | - |
| 30 | 9771 | 9773 | 5,56 | 106,0 | 2 | 0,00 | 90,80 | - | - | 0,00 | 0,00 | - |
| 31 | 10703 | 10705 | 4,46 | 106,0 | 2 | 0,00 | 91,59 | - | - | 0,00 | 0,00 | - |
| 32 | 11445 | 11447 | 3,65 | 106,0 | 2 | 0,00 | 92,17 | - | - | 0,00 | 0,00 | - |
| 33 | 11565 | 11567 | 3,52 | 106,0 | 2 | 0,00 | 92,26 | - | - | 0,00 | 0,00 | - |
| 34 | 10760 | 10762 | 4,39 | 106,0 | 2 | 0,00 | 91,64 | - | - | 0,00 | 0,00 | - |
| 35 | 9581 | 9584 | 5,80 | 106,0 | 2 | 0,00 | 90,63 | - | - | 0,00 | 0,00 | - |
| 36 | 8608 | 8611 | 7,10 | 106,0 | 2 | 0,00 | 89,70 | - | - | 0,00 | 0,00 | - |
| 37 | 8061 | 8064 | 7,89 | 106,0 | 2 | 0,00 | 89,13 | - | - | 0,00 | 0,00 | - |
| 38 | 6918 | 6921 | 9,74 | 106,0 | 2 | 0,00 | 87,80 | - | - | 0,00 | 0,00 | - |
| 39 | 7297 | 7300 | 9,10 | 106,0 | 2 | 0,00 | 88,27 | - | - | 0,00 | 0,00 | - |
| 4 | 4171 | 4176 | 16,64 | 106,0 | 2 | 0,00 | 83,42 | - | - | 0,00 | 0,00 | - |
| 40 | 6202 | 6206 | 11,06 | 106,0 | 2 | 0,00 | 86,86 | - | - | 0,00 | 0,00 | - |
| 41 | 6569 | 6572 | 10,37 | 106,0 | 2 | 0,00 | 87,35 | - | - | 0,00 | 0,00 | - |
| 42 | 7209 | 7213 | 9,24 | 106,0 | 2 | 0,00 | 88,16 | - | - | 0,00 | 0,00 | - |
| 43 | 5947 | 5951 | 11,62 | 106,0 | 2 | 0,00 | 86,49 | - | - | 0,00 | 0,00 | - |
| 44 | 5038 | 5041 | 11,60 | 104,9 | | 0,00 | 85,05 | - | - | 0,00 | 0,00 | - |
| 45 | 5809 | 5811 | 9,77 | 104,9 | | 0,00 | 86,29 | - | - | 0,00 | 0,00 | - |
| 46 | 5372 | 5375 | 10,78 | 104,9 | | 0,00 | 85,61 | - | - | 0,00 | 0,00 | - |
| 47 | 5962 | 5964 | 9,43 | 104,9 | | 0,00 | 86,51 | - | - | 0,00 | 0,00 | - |
| 48 | 4196 | 4198 | 16,34 | 107,8 | | 0,00 | 83,46 | - | - | 0,00 | 0,00 | - |
| 49 | 3218 | 3222 | 20,03 | 107,8 | | 0,00 | 81,16 | - | - | 0,00 | 0,00 | - |
| 5 | 5618 | 5622 | 12,44 | 106,0 | 2 | 0,00 | 86,00 | - | - | 0,00 | 0,00 | - |
| 50 | 2818 | 2822 | 21,84 | 107,8 | | 0,00 | 80,01 | - | - | 0,00 | 0,00 | - |
| 51 | 3964 | 3966 | 17,14 | 107,8 | | 0,00 | 82,97 | - | - | 0,00 | 0,00 | - |
| 52 | 2213 | 2218 | 25,05 | 107,8 | | 0,00 | 77,92 | - | - | 0,00 | 0,00 | - |
| 53 | 3607 | 3610 | 18,45 | 107,8 | | 0,00 | 82,15 | - | - | 0,00 | 0,00 | - |
| 54 | 3017 | 3020 | 20,91 | 107,8 | | 0,00 | 80,60 | - | - | 0,00 | 0,00 | - |

To be continued on next page...

DECIBEL - Detailed results

Calculation: VE1_GE158x43xHH200+Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_20200408 Noise calculation model: ISO 9613-2 General 8,0 m/s

...continued from previous page

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|--------------|--------------------|--------------------|-----------------|-----------------|---------|-----------|-----------|----------|-----------|------------|--------|
| 55 | 4020 | 4022 | 16,94 | 107,8 | | 0,00 | 83,09 | - | - | 0,00 | 0,00 | - |
| 6 | 5028 | 5033 | 13,98 | 106,0 | 2 | 0,00 | 85,04 | - | - | 0,00 | 0,00 | - |
| 7 | 4264 | 4270 | 16,30 | 106,0 | 2 | 0,00 | 83,61 | - | - | 0,00 | 0,00 | - |
| 8 | 3048 | 3055 | 20,96 | 106,0 | 2 | 0,00 | 80,70 | - | - | 0,00 | 0,00 | - |
| 9 | 2340 | 2349 | 24,50 | 106,0 | 2 | 0,00 | 78,42 | - | - | 0,00 | 0,00 | - |
| Sum | | | 33,95 | | | | | | | | | |

- Data undefined due to calculation with octave data

Noise sensitive area: I Asuinrakennus I (Kortenevantie 116)

Wind speed: 8,0 m/s

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|--------------|--------------------|--------------------|-----------------|-----------------|---------|-----------|-----------|----------|-----------|------------|--------|
| 1 | 3772 | 3777 | 18,02 | 106,0 | 2 | 0,00 | 82,54 | - | - | 0,00 | 0,00 | - |
| 10 | 3790 | 3795 | 17,95 | 106,0 | 2 | 0,00 | 82,59 | - | - | 0,00 | 0,00 | - |
| 11 | 4203 | 4208 | 16,50 | 106,0 | 2 | 0,00 | 83,48 | - | - | 0,00 | 0,00 | - |
| 12 | 4796 | 4801 | 14,65 | 106,0 | 2 | 0,00 | 84,63 | - | - | 0,00 | 0,00 | - |
| 13 | 2906 | 2913 | 21,60 | 106,0 | 2 | 0,00 | 80,29 | - | - | 0,00 | 0,00 | - |
| 14 | 3395 | 3402 | 19,47 | 106,0 | 2 | 0,00 | 81,63 | - | - | 0,00 | 0,00 | - |
| 15 | 3933 | 3939 | 17,43 | 106,0 | 2 | 0,00 | 82,91 | - | - | 0,00 | 0,00 | - |
| 16 | 4445 | 4450 | 15,72 | 106,0 | 2 | 0,00 | 83,97 | - | - | 0,00 | 0,00 | - |
| 17 | 8195 | 8197 | 7,69 | 106,0 | 2 | 0,00 | 89,27 | - | - | 0,00 | 0,00 | - |
| 18 | 9054 | 9056 | 6,48 | 106,0 | 2 | 0,00 | 90,14 | - | - | 0,00 | 0,00 | - |
| 19 | 9698 | 9700 | 5,65 | 106,0 | 2 | 0,00 | 90,74 | - | - | 0,00 | 0,00 | - |
| 2 | 3858 | 3864 | 17,70 | 106,0 | 2 | 0,00 | 82,74 | - | - | 0,00 | 0,00 | - |
| 20 | 9874 | 9877 | 5,43 | 106,0 | 2 | 0,00 | 90,89 | - | - | 0,00 | 0,00 | - |
| 21 | 8464 | 8467 | 7,30 | 106,0 | 2 | 0,00 | 89,55 | - | - | 0,00 | 0,00 | - |
| 22 | 9030 | 9032 | 6,52 | 106,0 | 2 | 0,00 | 90,12 | - | - | 0,00 | 0,00 | - |
| 23 | 9613 | 9615 | 5,76 | 106,0 | 2 | 0,00 | 90,66 | - | - | 0,00 | 0,00 | - |
| 24 | 7650 | 7653 | 8,53 | 106,0 | 2 | 0,00 | 88,68 | - | - | 0,00 | 0,00 | - |
| 25 | 8211 | 8214 | 7,67 | 106,0 | 2 | 0,00 | 89,29 | - | - | 0,00 | 0,00 | - |
| 26 | 8732 | 8735 | 6,92 | 106,0 | 2 | 0,00 | 89,82 | - | - | 0,00 | 0,00 | - |
| 27 | 10130 | 10132 | 5,12 | 106,0 | 2 | 0,00 | 91,11 | - | - | 0,00 | 0,00 | - |
| 28 | 10616 | 10619 | 4,56 | 106,0 | 2 | 0,00 | 91,52 | - | - | 0,00 | 0,00 | - |
| 29 | 9416 | 9418 | 6,01 | 106,0 | 2 | 0,00 | 90,48 | - | - | 0,00 | 0,00 | - |
| 3 | 4676 | 4680 | 15,03 | 106,0 | 2 | 0,00 | 84,41 | - | - | 0,00 | 0,00 | - |
| 30 | 9973 | 9975 | 5,31 | 106,0 | 2 | 0,00 | 90,98 | - | - | 0,00 | 0,00 | - |
| 31 | 10932 | 10934 | 4,20 | 106,0 | 2 | 0,00 | 91,78 | - | - | 0,00 | 0,00 | - |
| 32 | 11674 | 11676 | 3,41 | 106,0 | 2 | 0,00 | 92,35 | - | - | 0,00 | 0,00 | - |
| 33 | 11714 | 11717 | 3,36 | 106,0 | 2 | 0,00 | 92,38 | - | - | 0,00 | 0,00 | - |
| 34 | 10824 | 10827 | 4,32 | 106,0 | 2 | 0,00 | 91,69 | - | - | 0,00 | 0,00 | - |
| 35 | 9627 | 9629 | 5,74 | 106,0 | 2 | 0,00 | 90,67 | - | - | 0,00 | 0,00 | - |
| 36 | 8772 | 8775 | 6,87 | 106,0 | 2 | 0,00 | 89,87 | - | - | 0,00 | 0,00 | - |
| 37 | 8285 | 8288 | 7,56 | 106,0 | 2 | 0,00 | 89,37 | - | - | 0,00 | 0,00 | - |
| 38 | 7235 | 7238 | 9,20 | 106,0 | 2 | 0,00 | 88,19 | - | - | 0,00 | 0,00 | - |
| 39 | 7492 | 7496 | 8,78 | 106,0 | 2 | 0,00 | 88,50 | - | - | 0,00 | 0,00 | - |
| 4 | 4813 | 4817 | 14,62 | 106,0 | 2 | 0,00 | 84,66 | - | - | 0,00 | 0,00 | - |
| 40 | 6408 | 6412 | 10,66 | 106,0 | 2 | 0,00 | 87,14 | - | - | 0,00 | 0,00 | - |
| 41 | 6664 | 6668 | 10,19 | 106,0 | 2 | 0,00 | 87,48 | - | - | 0,00 | 0,00 | - |
| 42 | 7254 | 7257 | 9,17 | 106,0 | 2 | 0,00 | 88,22 | - | - | 0,00 | 0,00 | - |
| 43 | 5907 | 5911 | 11,71 | 106,0 | 2 | 0,00 | 86,43 | - | - | 0,00 | 0,00 | - |
| 44 | 6092 | 6095 | 9,14 | 104,9 | | 0,00 | 86,70 | - | - | 0,00 | 0,00 | - |
| 45 | 6867 | 6869 | 7,56 | 104,9 | | 0,00 | 87,74 | - | - | 0,00 | 0,00 | - |
| 46 | 6147 | 6150 | 9,02 | 104,9 | | 0,00 | 86,78 | - | - | 0,00 | 0,00 | - |
| 47 | 6785 | 6787 | 7,72 | 104,9 | | 0,00 | 87,63 | - | - | 0,00 | 0,00 | - |
| 48 | 4212 | 4215 | 16,28 | 107,8 | | 0,00 | 83,50 | - | - | 0,00 | 0,00 | - |
| 49 | 3144 | 3147 | 20,35 | 107,8 | | 0,00 | 80,96 | - | - | 0,00 | 0,00 | - |
| 5 | 6102 | 6106 | 11,26 | 106,0 | 2 | 0,00 | 86,72 | - | - | 0,00 | 0,00 | - |
| 50 | 2690 | 2694 | 22,46 | 107,8 | | 0,00 | 79,61 | - | - | 0,00 | 0,00 | - |
| 51 | 3806 | 3809 | 17,70 | 107,8 | | 0,00 | 82,62 | - | - | 0,00 | 0,00 | - |
| 52 | 2131 | 2137 | 25,54 | 107,8 | | 0,00 | 77,59 | - | - | 0,00 | 0,00 | - |
| 53 | 3220 | 3223 | 20,02 | 107,8 | | 0,00 | 81,17 | - | - | 0,00 | 0,00 | - |
| 54 | 2437 | 2442 | 23,78 | 107,8 | | 0,00 | 78,75 | - | - | 0,00 | 0,00 | - |
| 55 | 3359 | 3362 | 19,44 | 107,8 | | 0,00 | 81,53 | - | - | 0,00 | 0,00 | - |

To be continued on next page...

DECIBEL - Detailed results

Calculation: VE1_GE158x43xHH200+Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_20200408 Noise calculation model: ISO 9613-2 General 8,0 m/s

...continued from previous page

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|--------------|--------------------|--------------------|-----------------|-----------------|---------|-----------|-----------|----------|-----------|------------|--------|
| 6 | 5347 | 5351 | 13,12 | 106,0 | 2 | 0,00 | 85,57 | - | - | 0,00 | 0,00 | - |
| 7 | 4680 | 4684 | 14,99 | 106,0 | 2 | 0,00 | 84,41 | - | - | 0,00 | 0,00 | - |
| 8 | 3539 | 3545 | 18,90 | 106,0 | 2 | 0,00 | 81,99 | - | - | 0,00 | 0,00 | - |
| 9 | 2564 | 2572 | 23,29 | 106,0 | 2 | 0,00 | 79,21 | - | - | 0,00 | 0,00 | - |
| Sum | | | 33,71 | | | | | | | | | |

- Data undefined due to calculation with octave data

Noise sensitive area: J Asuinrakennus J (Haapavesitie 1406)

Wind speed: 8,0 m/s

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|--------------|--------------------|--------------------|-----------------|-----------------|---------|-----------|-----------|----------|-----------|------------|--------|
| 1 | 4773 | 4777 | 14,72 | 106,0 | 2 | 0,00 | 84,58 | - | - | 0,00 | 0,00 | - |
| 10 | 3936 | 3941 | 17,42 | 106,0 | 2 | 0,00 | 82,91 | - | - | 0,00 | 0,00 | - |
| 11 | 4107 | 4112 | 16,83 | 106,0 | 2 | 0,00 | 83,28 | - | - | 0,00 | 0,00 | - |
| 12 | 4559 | 4564 | 15,36 | 106,0 | 2 | 0,00 | 84,19 | - | - | 0,00 | 0,00 | - |
| 13 | 2960 | 2967 | 21,36 | 106,0 | 2 | 0,00 | 80,45 | - | - | 0,00 | 0,00 | - |
| 14 | 3176 | 3183 | 20,39 | 106,0 | 2 | 0,00 | 81,06 | - | - | 0,00 | 0,00 | - |
| 15 | 3497 | 3503 | 19,07 | 106,0 | 2 | 0,00 | 81,89 | - | - | 0,00 | 0,00 | - |
| 16 | 3810 | 3816 | 17,88 | 106,0 | 2 | 0,00 | 82,63 | - | - | 0,00 | 0,00 | - |
| 17 | 8366 | 8369 | 7,44 | 106,0 | 2 | 0,00 | 89,45 | - | - | 0,00 | 0,00 | - |
| 18 | 9213 | 9215 | 6,27 | 106,0 | 2 | 0,00 | 90,29 | - | - | 0,00 | 0,00 | - |
| 19 | 9797 | 9799 | 5,53 | 106,0 | 2 | 0,00 | 90,82 | - | - | 0,00 | 0,00 | - |
| 2 | 4603 | 4608 | 15,25 | 106,0 | 2 | 0,00 | 84,27 | - | - | 0,00 | 0,00 | - |
| 20 | 9873 | 9876 | 5,43 | 106,0 | 2 | 0,00 | 90,89 | - | - | 0,00 | 0,00 | - |
| 21 | 8526 | 8528 | 7,21 | 106,0 | 2 | 0,00 | 89,62 | - | - | 0,00 | 0,00 | - |
| 22 | 9014 | 9016 | 6,54 | 106,0 | 2 | 0,00 | 90,10 | - | - | 0,00 | 0,00 | - |
| 23 | 9491 | 9493 | 5,91 | 106,0 | 2 | 0,00 | 90,55 | - | - | 0,00 | 0,00 | - |
| 24 | 7664 | 7667 | 8,50 | 106,0 | 2 | 0,00 | 88,69 | - | - | 0,00 | 0,00 | - |
| 25 | 8135 | 8138 | 7,78 | 106,0 | 2 | 0,00 | 89,21 | - | - | 0,00 | 0,00 | - |
| 26 | 8586 | 8588 | 7,13 | 106,0 | 2 | 0,00 | 89,68 | - | - | 0,00 | 0,00 | - |
| 27 | 9932 | 9934 | 5,36 | 106,0 | 2 | 0,00 | 90,94 | - | - | 0,00 | 0,00 | - |
| 28 | 10342 | 10344 | 4,87 | 106,0 | 2 | 0,00 | 91,29 | - | - | 0,00 | 0,00 | - |
| 29 | 9133 | 9136 | 6,38 | 106,0 | 2 | 0,00 | 90,21 | - | - | 0,00 | 0,00 | - |
| 3 | 5302 | 5306 | 13,25 | 106,0 | 2 | 0,00 | 85,50 | - | - | 0,00 | 0,00 | - |
| 30 | 9598 | 9600 | 5,78 | 106,0 | 2 | 0,00 | 90,65 | - | - | 0,00 | 0,00 | - |
| 31 | 10566 | 10568 | 4,61 | 106,0 | 2 | 0,00 | 91,48 | - | - | 0,00 | 0,00 | - |
| 32 | 11293 | 11295 | 3,81 | 106,0 | 2 | 0,00 | 92,06 | - | - | 0,00 | 0,00 | - |
| 33 | 11238 | 11240 | 3,87 | 106,0 | 2 | 0,00 | 92,02 | - | - | 0,00 | 0,00 | - |
| 34 | 10266 | 10268 | 4,96 | 106,0 | 2 | 0,00 | 91,23 | - | - | 0,00 | 0,00 | - |
| 35 | 9075 | 9078 | 6,46 | 106,0 | 2 | 0,00 | 90,16 | - | - | 0,00 | 0,00 | - |
| 36 | 8388 | 8390 | 7,41 | 106,0 | 2 | 0,00 | 89,48 | - | - | 0,00 | 0,00 | - |
| 37 | 7990 | 7992 | 8,00 | 106,0 | 2 | 0,00 | 89,05 | - | - | 0,00 | 0,00 | - |
| 38 | 7098 | 7102 | 9,43 | 106,0 | 2 | 0,00 | 88,03 | - | - | 0,00 | 0,00 | - |
| 39 | 7197 | 7200 | 9,27 | 106,0 | 2 | 0,00 | 88,15 | - | - | 0,00 | 0,00 | - |
| 4 | 5241 | 5245 | 13,40 | 106,0 | 2 | 0,00 | 85,40 | - | - | 0,00 | 0,00 | - |
| 40 | 6185 | 6188 | 11,09 | 106,0 | 2 | 0,00 | 86,83 | - | - | 0,00 | 0,00 | - |
| 41 | 6293 | 6296 | 10,88 | 106,0 | 2 | 0,00 | 86,98 | - | - | 0,00 | 0,00 | - |
| 42 | 6790 | 6793 | 9,97 | 106,0 | 2 | 0,00 | 87,64 | - | - | 0,00 | 0,00 | - |
| 43 | 5422 | 5427 | 12,92 | 106,0 | 2 | 0,00 | 85,69 | - | - | 0,00 | 0,00 | - |
| 44 | 6937 | 6939 | 7,45 | 104,9 | | 0,00 | 87,83 | - | - | 0,00 | 0,00 | - |
| 45 | 7687 | 7689 | 6,05 | 104,9 | | 0,00 | 88,72 | - | - | 0,00 | 0,00 | - |
| 46 | 6633 | 6635 | 8,02 | 104,9 | | 0,00 | 87,44 | - | - | 0,00 | 0,00 | - |
| 47 | 7296 | 7298 | 6,75 | 104,9 | | 0,00 | 88,26 | - | - | 0,00 | 0,00 | - |
| 48 | 5465 | 5467 | 12,90 | 107,8 | | 0,00 | 85,75 | - | - | 0,00 | 0,00 | - |
| 49 | 4426 | 4428 | 15,59 | 107,8 | | 0,00 | 83,92 | - | - | 0,00 | 0,00 | - |
| 5 | 6235 | 6239 | 10,99 | 106,0 | 2 | 0,00 | 86,90 | - | - | 0,00 | 0,00 | - |
| 50 | 3994 | 3997 | 17,03 | 107,8 | | 0,00 | 83,03 | - | - | 0,00 | 0,00 | - |
| 51 | 4960 | 4962 | 14,09 | 107,8 | | 0,00 | 84,91 | - | - | 0,00 | 0,00 | - |
| 52 | 3550 | 3554 | 18,67 | 107,8 | | 0,00 | 82,01 | - | - | 0,00 | 0,00 | - |
| 53 | 4243 | 4246 | 16,18 | 107,8 | | 0,00 | 83,56 | - | - | 0,00 | 0,00 | - |
| 54 | 3416 | 3419 | 19,20 | 107,8 | | 0,00 | 81,68 | - | - | 0,00 | 0,00 | - |
| 55 | 4071 | 4073 | 16,76 | 107,8 | | 0,00 | 83,20 | - | - | 0,00 | 0,00 | - |
| 6 | 5343 | 5347 | 13,13 | 106,0 | 2 | 0,00 | 85,56 | - | - | 0,00 | 0,00 | - |

To be continued on next page...

DECIBEL - Detailed results

Calculation: VE1_GE158x43xHH200+Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_20200408 Noise calculation model: ISO 9613-2 General 8,0 m/s

...continued from previous page

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|-----------------|-----------------------|-----------------------|--------------------|--------------------|------------|--------------|--------------|-------------|--------------|---------------|-----------|
| 7 | 4858 | 4863 | 14,47 | 106,0 | 2 | 0,00 | 84,74 | - | - | 0,00 | 0,00 | - |
| 8 | 3970 | 3975 | 17,30 | 106,0 | 2 | 0,00 | 82,99 | - | - | 0,00 | 0,00 | - |
| 9 | 2961 | 2968 | 21,35 | 106,0 | 2 | 0,00 | 80,45 | - | - | 0,00 | 0,00 | - |
| Sum | | | 31,60 | | | | | | | | | |

- Data undefined due to calculation with octave data

Noise sensitive area: K Lomarakennus K (Kurunoja)

Wind speed: 8,0 m/s

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|-----------------|-----------------------|-----------------------|--------------------|--------------------|------------|--------------|--------------|-------------|--------------|---------------|-----------|
| 1 | 4865 | 4868 | 14,47 | 106,0 | 2 | 0,00 | 84,75 | - | - | 0,00 | 0,00 | - |
| 10 | 2875 | 2881 | 21,76 | 106,0 | 2 | 0,00 | 80,19 | - | - | 0,00 | 0,00 | - |
| 11 | 2544 | 2551 | 23,40 | 106,0 | 2 | 0,00 | 79,13 | - | - | 0,00 | 0,00 | - |
| 12 | 2587 | 2594 | 23,17 | 106,0 | 2 | 0,00 | 79,28 | - | - | 0,00 | 0,00 | - |
| 13 | 2381 | 2389 | 24,28 | 106,0 | 2 | 0,00 | 78,56 | - | - | 0,00 | 0,00 | - |
| 14 | 1948 | 1957 | 26,88 | 106,0 | 2 | 0,00 | 76,83 | - | - | 0,00 | 0,00 | - |
| 15 | 1629 | 1641 | 29,12 | 106,0 | 2 | 0,00 | 75,30 | - | - | 0,00 | 0,00 | - |
| 16 | 1410 | 1424 | 30,87 | 106,0 | 2 | 0,00 | 74,07 | - | - | 0,00 | 0,00 | - |
| 17 | 6455 | 6458 | 10,58 | 106,0 | 2 | 0,00 | 87,20 | - | - | 0,00 | 0,00 | - |
| 18 | 7227 | 7230 | 9,22 | 106,0 | 2 | 0,00 | 88,18 | - | - | 0,00 | 0,00 | - |
| 19 | 7698 | 7700 | 8,45 | 106,0 | 2 | 0,00 | 88,73 | - | - | 0,00 | 0,00 | - |
| 2 | 4296 | 4300 | 16,20 | 106,0 | 2 | 0,00 | 83,67 | - | - | 0,00 | 0,00 | - |
| 20 | 7642 | 7645 | 8,54 | 106,0 | 2 | 0,00 | 88,67 | - | - | 0,00 | 0,00 | - |
| 21 | 6447 | 6450 | 10,59 | 106,0 | 2 | 0,00 | 87,19 | - | - | 0,00 | 0,00 | - |
| 22 | 6804 | 6807 | 9,94 | 106,0 | 2 | 0,00 | 87,66 | - | - | 0,00 | 0,00 | - |
| 23 | 7130 | 7132 | 9,38 | 106,0 | 2 | 0,00 | 88,06 | - | - | 0,00 | 0,00 | - |
| 24 | 5583 | 5587 | 12,51 | 106,0 | 2 | 0,00 | 85,94 | - | - | 0,00 | 0,00 | - |
| 25 | 5899 | 5902 | 11,73 | 106,0 | 2 | 0,00 | 86,42 | - | - | 0,00 | 0,00 | - |
| 26 | 6236 | 6239 | 10,99 | 106,0 | 2 | 0,00 | 86,90 | - | - | 0,00 | 0,00 | - |
| 27 | 7469 | 7472 | 8,82 | 106,0 | 2 | 0,00 | 88,47 | - | - | 0,00 | 0,00 | - |
| 28 | 7790 | 7792 | 8,31 | 106,0 | 2 | 0,00 | 88,83 | - | - | 0,00 | 0,00 | - |
| 29 | 6609 | 6612 | 10,29 | 106,0 | 2 | 0,00 | 87,41 | - | - | 0,00 | 0,00 | - |
| 3 | 4587 | 4591 | 15,28 | 106,0 | 2 | 0,00 | 84,24 | - | - | 0,00 | 0,00 | - |
| 30 | 6970 | 6972 | 9,65 | 106,0 | 2 | 0,00 | 87,87 | - | - | 0,00 | 0,00 | - |
| 31 | 7925 | 7927 | 8,10 | 106,0 | 2 | 0,00 | 88,98 | - | - | 0,00 | 0,00 | - |
| 32 | 8626 | 8629 | 7,07 | 106,0 | 2 | 0,00 | 89,72 | - | - | 0,00 | 0,00 | - |
| 33 | 8498 | 8501 | 7,25 | 106,0 | 2 | 0,00 | 89,59 | - | - | 0,00 | 0,00 | - |
| 34 | 7483 | 7486 | 8,79 | 106,0 | 2 | 0,00 | 88,48 | - | - | 0,00 | 0,00 | - |
| 35 | 6315 | 6318 | 10,84 | 106,0 | 2 | 0,00 | 87,01 | - | - | 0,00 | 0,00 | - |
| 36 | 5786 | 5790 | 12,01 | 106,0 | 2 | 0,00 | 86,25 | - | - | 0,00 | 0,00 | - |
| 37 | 5498 | 5501 | 12,73 | 106,0 | 2 | 0,00 | 85,81 | - | - | 0,00 | 0,00 | - |
| 38 | 4861 | 4865 | 14,46 | 106,0 | 2 | 0,00 | 84,74 | - | - | 0,00 | 0,00 | - |
| 39 | 4750 | 4754 | 14,79 | 106,0 | 2 | 0,00 | 84,54 | - | - | 0,00 | 0,00 | - |
| 4 | 4198 | 4203 | 16,52 | 106,0 | 2 | 0,00 | 83,47 | - | - | 0,00 | 0,00 | - |
| 40 | 3922 | 3927 | 17,47 | 106,0 | 2 | 0,00 | 82,88 | - | - | 0,00 | 0,00 | - |
| 41 | 3825 | 3830 | 17,82 | 106,0 | 2 | 0,00 | 82,66 | - | - | 0,00 | 0,00 | - |
| 42 | 4181 | 4186 | 16,58 | 106,0 | 2 | 0,00 | 83,44 | - | - | 0,00 | 0,00 | - |
| 43 | 2904 | 2912 | 21,61 | 106,0 | 2 | 0,00 | 80,28 | - | - | 0,00 | 0,00 | - |
| 44 | 6308 | 6310 | 8,68 | 104,9 | | 0,00 | 87,00 | - | - | 0,00 | 0,00 | - |
| 45 | 6917 | 6918 | 7,46 | 104,9 | | 0,00 | 87,80 | - | - | 0,00 | 0,00 | - |
| 46 | 5411 | 5414 | 10,69 | 104,9 | | 0,00 | 85,67 | - | - | 0,00 | 0,00 | - |
| 47 | 6028 | 6030 | 9,28 | 104,9 | | 0,00 | 86,61 | - | - | 0,00 | 0,00 | - |
| 48 | 8201 | 8202 | 7,87 | 107,8 | | 0,00 | 89,28 | - | - | 0,00 | 0,00 | - |
| 49 | 7135 | 7136 | 9,60 | 107,8 | | 0,00 | 88,07 | - | - | 0,00 | 0,00 | - |
| 5 | 4497 | 4501 | 15,56 | 106,0 | 2 | 0,00 | 84,07 | - | - | 0,00 | 0,00 | - |
| 50 | 6684 | 6685 | 10,41 | 107,8 | | 0,00 | 87,50 | - | - | 0,00 | 0,00 | - |
| 51 | 7746 | 7747 | 8,58 | 107,8 | | 0,00 | 88,78 | - | - | 0,00 | 0,00 | - |
| 52 | 6150 | 6152 | 11,45 | 107,8 | | 0,00 | 86,78 | - | - | 0,00 | 0,00 | - |
| 53 | 7073 | 7074 | 9,71 | 107,8 | | 0,00 | 87,99 | - | - | 0,00 | 0,00 | - |
| 54 | 6244 | 6245 | 11,26 | 107,8 | | 0,00 | 86,91 | - | - | 0,00 | 0,00 | - |
| 55 | 6969 | 6971 | 9,89 | 107,8 | | 0,00 | 87,87 | - | - | 0,00 | 0,00 | - |
| 6 | 3550 | 3555 | 18,86 | 106,0 | 2 | 0,00 | 82,02 | - | - | 0,00 | 0,00 | - |
| 7 | 3497 | 3503 | 19,07 | 106,0 | 2 | 0,00 | 81,89 | - | - | 0,00 | 0,00 | - |

To be continued on next page...

DECIBEL - Detailed results

Calculation: VE1_GE158x43xHH200+Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_20200408 Noise calculation model: ISO 9613-2 General 8,0 m/s

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WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|-----------------|-----------------------|-----------------------|--------------------|--------------------|------------|--------------|--------------|-------------|--------------|---------------|-----------|
| 8 | 3378 | 3383 | 19,55 | 106,0 | 2 | 0,00 | 81,59 | - | - | 0,00 | 0,00 | - |
| 9 | 2919 | 2925 | 21,55 | 106,0 | 2 | 0,00 | 80,32 | - | - | 0,00 | 0,00 | - |
| Sum | | | 36,66 | | | | | | | | | |

- Data undefined due to calculation with octave data

Noise sensitive area: L Lomarakennus L (Perkkiontie, Ilmola)

Wind speed: 8,0 m/s

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|-----------------|-----------------------|-----------------------|--------------------|--------------------|------------|--------------|--------------|-------------|--------------|---------------|-----------|
| 1 | 6944 | 6946 | 9,70 | 106,0 | 2 | 0,00 | 87,83 | - | - | 0,00 | 0,00 | - |
| 10 | 4957 | 4960 | 14,19 | 106,0 | 2 | 0,00 | 84,91 | - | - | 0,00 | 0,00 | - |
| 11 | 4331 | 4335 | 16,09 | 106,0 | 2 | 0,00 | 83,74 | - | - | 0,00 | 0,00 | - |
| 12 | 3689 | 3693 | 18,33 | 106,0 | 2 | 0,00 | 82,35 | - | - | 0,00 | 0,00 | - |
| 13 | 5471 | 5474 | 12,80 | 106,0 | 2 | 0,00 | 85,77 | - | - | 0,00 | 0,00 | - |
| 14 | 4882 | 4885 | 14,40 | 106,0 | 2 | 0,00 | 84,78 | - | - | 0,00 | 0,00 | - |
| 15 | 4288 | 4292 | 16,23 | 106,0 | 2 | 0,00 | 83,65 | - | - | 0,00 | 0,00 | - |
| 16 | 3762 | 3766 | 18,06 | 106,0 | 2 | 0,00 | 82,52 | - | - | 0,00 | 0,00 | - |
| 17 | 4396 | 4400 | 15,88 | 106,0 | 2 | 0,00 | 83,87 | - | - | 0,00 | 0,00 | - |
| 18 | 4716 | 4719 | 14,89 | 106,0 | 2 | 0,00 | 84,48 | - | - | 0,00 | 0,00 | - |
| 19 | 4783 | 4786 | 14,69 | 106,0 | 2 | 0,00 | 84,60 | - | - | 0,00 | 0,00 | - |
| 2 | 6201 | 6204 | 11,06 | 106,0 | 2 | 0,00 | 86,85 | - | - | 0,00 | 0,00 | - |
| 20 | 4411 | 4415 | 15,83 | 106,0 | 2 | 0,00 | 83,90 | - | - | 0,00 | 0,00 | - |
| 21 | 3973 | 3977 | 17,30 | 106,0 | 2 | 0,00 | 82,99 | - | - | 0,00 | 0,00 | - |
| 22 | 3852 | 3856 | 17,73 | 106,0 | 2 | 0,00 | 82,72 | - | - | 0,00 | 0,00 | - |
| 23 | 3671 | 3675 | 18,40 | 106,0 | 2 | 0,00 | 82,31 | - | - | 0,00 | 0,00 | - |
| 24 | 3512 | 3517 | 19,01 | 106,0 | 2 | 0,00 | 81,92 | - | - | 0,00 | 0,00 | - |
| 25 | 3228 | 3234 | 20,17 | 106,0 | 2 | 0,00 | 81,19 | - | - | 0,00 | 0,00 | - |
| 26 | 3081 | 3087 | 20,81 | 106,0 | 2 | 0,00 | 80,79 | - | - | 0,00 | 0,00 | - |
| 27 | 3664 | 3669 | 18,42 | 106,0 | 2 | 0,00 | 82,29 | - | - | 0,00 | 0,00 | - |
| 28 | 3704 | 3709 | 18,27 | 106,0 | 2 | 0,00 | 82,39 | - | - | 0,00 | 0,00 | - |
| 29 | 2796 | 2802 | 22,13 | 106,0 | 2 | 0,00 | 79,95 | - | - | 0,00 | 0,00 | - |
| 3 | 5782 | 5785 | 12,02 | 106,0 | 2 | 0,00 | 86,25 | - | - | 0,00 | 0,00 | - |
| 30 | 2780 | 2786 | 22,21 | 106,0 | 2 | 0,00 | 79,90 | - | - | 0,00 | 0,00 | - |
| 31 | 3611 | 3617 | 18,62 | 106,0 | 2 | 0,00 | 82,17 | - | - | 0,00 | 0,00 | - |
| 32 | 4222 | 4227 | 16,44 | 106,0 | 2 | 0,00 | 83,52 | - | - | 0,00 | 0,00 | - |
| 33 | 3970 | 3975 | 17,30 | 106,0 | 2 | 0,00 | 82,99 | - | - | 0,00 | 0,00 | - |
| 34 | 2909 | 2915 | 21,60 | 106,0 | 2 | 0,00 | 80,29 | - | - | 0,00 | 0,00 | - |
| 35 | 1826 | 1836 | 27,70 | 106,0 | 2 | 0,00 | 76,28 | - | - | 0,00 | 0,00 | - |
| 36 | 1949 | 1958 | 26,87 | 106,0 | 2 | 0,00 | 76,84 | - | - | 0,00 | 0,00 | - |
| 37 | 2199 | 2207 | 25,32 | 106,0 | 2 | 0,00 | 77,88 | - | - | 0,00 | 0,00 | - |
| 38 | 2825 | 2831 | 21,99 | 106,0 | 2 | 0,00 | 80,04 | - | - | 0,00 | 0,00 | - |
| 39 | 2126 | 2134 | 25,76 | 106,0 | 2 | 0,00 | 77,59 | - | - | 0,00 | 0,00 | - |
| 4 | 5168 | 5172 | 13,60 | 106,0 | 2 | 0,00 | 85,27 | - | - | 0,00 | 0,00 | - |
| 40 | 2703 | 2710 | 22,59 | 106,0 | 2 | 0,00 | 79,66 | - | - | 0,00 | 0,00 | - |
| 41 | 2119 | 2127 | 25,80 | 106,0 | 2 | 0,00 | 77,56 | - | - | 0,00 | 0,00 | - |
| 42 | 1512 | 1524 | 30,04 | 106,0 | 2 | 0,00 | 74,66 | - | - | 0,00 | 0,00 | - |
| 43 | 2430 | 2438 | 24,01 | 106,0 | 2 | 0,00 | 78,74 | - | - | 0,00 | 0,00 | - |
| 44 | 6788 | 6789 | 7,71 | 104,9 | | 0,00 | 87,64 | - | - | 0,00 | 0,00 | - |
| 45 | 6944 | 6946 | 7,41 | 104,9 | | 0,00 | 87,83 | - | - | 0,00 | 0,00 | - |
| 46 | 5312 | 5314 | 10,93 | 104,9 | | 0,00 | 85,51 | - | - | 0,00 | 0,00 | - |
| 47 | 5531 | 5533 | 10,40 | 104,9 | | 0,00 | 85,86 | - | - | 0,00 | 0,00 | - |
| 48 | 12382 | 12382 | 2,77 | 107,8 | | 0,00 | 92,86 | - | - | 0,00 | 0,00 | - |
| 49 | 11322 | 11323 | 3,87 | 107,8 | | 0,00 | 92,08 | - | - | 0,00 | 0,00 | - |
| 5 | 3992 | 3996 | 17,23 | 106,0 | 2 | 0,00 | 83,03 | - | - | 0,00 | 0,00 | - |
| 50 | 10872 | 10873 | 4,37 | 107,8 | | 0,00 | 91,73 | - | - | 0,00 | 0,00 | - |
| 51 | 12007 | 12007 | 3,15 | 107,8 | | 0,00 | 92,59 | - | - | 0,00 | 0,00 | - |
| 52 | 10281 | 10282 | 5,06 | 107,8 | | 0,00 | 91,24 | - | - | 0,00 | 0,00 | - |
| 53 | 11413 | 11414 | 3,78 | 107,8 | | 0,00 | 92,15 | - | - | 0,00 | 0,00 | - |
| 54 | 10606 | 10606 | 4,68 | 107,8 | | 0,00 | 91,51 | - | - | 0,00 | 0,00 | - |
| 55 | 11432 | 11432 | 3,76 | 107,8 | | 0,00 | 92,16 | - | - | 0,00 | 0,00 | - |
| 6 | 3806 | 3811 | 17,89 | 106,0 | 2 | 0,00 | 82,62 | - | - | 0,00 | 0,00 | - |
| 7 | 4554 | 4558 | 15,38 | 106,0 | 2 | 0,00 | 84,18 | - | - | 0,00 | 0,00 | - |
| 8 | 5573 | 5576 | 12,54 | 106,0 | 2 | 0,00 | 85,93 | - | - | 0,00 | 0,00 | - |

To be continued on next page...

DECIBEL - Detailed results

Calculation: VE1_GE158x43xHH200+Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_20200408 Noise calculation model: ISO 9613-2 General 8,0 m/s

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WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|-----------------|-----------------------|-----------------------|--------------------|--------------------|------------|--------------|--------------|-------------|--------------|---------------|-----------|
| 9 | 6022 | 6024 | 11,45 | 106,0 | 2 | 0,00 | 86,60 | - | - | 0,00 | 0,00 | - |
| Sum | | | 37,61 | | | | | | | | | |

- Data undefined due to calculation with octave data

Noise sensitive area: M Lomarakennus M (Riskalan metsatie)

Wind speed: 8,0 m/s

WTG

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Pure tones [dB] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] |
|-----|-----------------|-----------------------|-----------------------|--------------------|--------------------|------------|--------------|--------------|-------------|--------------|---------------|-----------|
| 1 | 7508 | 7511 | 8,75 | 106,0 | 2 | 0,00 | 88,51 | - | - | 0,00 | 0,00 | - |
| 10 | 7389 | 7392 | 8,95 | 106,0 | 2 | 0,00 | 88,37 | - | - | 0,00 | 0,00 | - |
| 11 | 7269 | 7271 | 9,15 | 106,0 | 2 | 0,00 | 88,23 | - | - | 0,00 | 0,00 | - |
| 12 | 6971 | 6973 | 9,65 | 106,0 | 2 | 0,00 | 87,87 | - | - | 0,00 | 0,00 | - |
| 13 | 8367 | 8369 | 7,44 | 106,0 | 2 | 0,00 | 89,45 | - | - | 0,00 | 0,00 | - |
| 14 | 8192 | 8194 | 7,70 | 106,0 | 2 | 0,00 | 89,27 | - | - | 0,00 | 0,00 | - |
| 15 | 8061 | 8064 | 7,89 | 106,0 | 2 | 0,00 | 89,13 | - | - | 0,00 | 0,00 | - |
| 16 | 8092 | 8094 | 7,85 | 106,0 | 2 | 0,00 | 89,16 | - | - | 0,00 | 0,00 | - |
| 17 | 3046 | 3052 | 20,97 | 106,0 | 2 | 0,00 | 80,69 | - | - | 0,00 | 0,00 | - |
| 18 | 2311 | 2319 | 24,67 | 106,0 | 2 | 0,00 | 78,30 | - | - | 0,00 | 0,00 | - |
| 19 | 2074 | 2083 | 26,07 | 106,0 | 2 | 0,00 | 77,37 | - | - | 0,00 | 0,00 | - |
| 2 | 7173 | 7176 | 9,31 | 106,0 | 2 | 0,00 | 88,12 | - | - | 0,00 | 0,00 | - |
| 20 | 2498 | 2506 | 23,64 | 106,0 | 2 | 0,00 | 78,98 | - | - | 0,00 | 0,00 | - |
| 21 | 3126 | 3132 | 20,61 | 106,0 | 2 | 0,00 | 80,92 | - | - | 0,00 | 0,00 | - |
| 22 | 3023 | 3029 | 21,07 | 106,0 | 2 | 0,00 | 80,63 | - | - | 0,00 | 0,00 | - |
| 23 | 3261 | 3267 | 20,03 | 106,0 | 2 | 0,00 | 81,28 | - | - | 0,00 | 0,00 | - |
| 24 | 3946 | 3951 | 17,39 | 106,0 | 2 | 0,00 | 82,93 | - | - | 0,00 | 0,00 | - |
| 25 | 3814 | 3820 | 17,86 | 106,0 | 2 | 0,00 | 82,64 | - | - | 0,00 | 0,00 | - |
| 26 | 3787 | 3792 | 17,96 | 106,0 | 2 | 0,00 | 82,58 | - | - | 0,00 | 0,00 | - |
| 27 | 3564 | 3569 | 18,81 | 106,0 | 2 | 0,00 | 82,05 | - | - | 0,00 | 0,00 | - |
| 28 | 3999 | 4004 | 17,20 | 106,0 | 2 | 0,00 | 83,05 | - | - | 0,00 | 0,00 | - |
| 29 | 4198 | 4203 | 16,52 | 106,0 | 2 | 0,00 | 83,47 | - | - | 0,00 | 0,00 | - |
| 3 | 6331 | 6334 | 10,81 | 106,0 | 2 | 0,00 | 87,03 | - | - | 0,00 | 0,00 | - |
| 30 | 4633 | 4638 | 15,14 | 106,0 | 2 | 0,00 | 84,33 | - | - | 0,00 | 0,00 | - |
| 31 | 4598 | 4603 | 15,24 | 106,0 | 2 | 0,00 | 84,26 | - | - | 0,00 | 0,00 | - |
| 32 | 4847 | 4851 | 14,50 | 106,0 | 2 | 0,00 | 84,72 | - | - | 0,00 | 0,00 | - |
| 33 | 5484 | 5488 | 12,76 | 106,0 | 2 | 0,00 | 85,79 | - | - | 0,00 | 0,00 | - |
| 34 | 5810 | 5814 | 11,95 | 106,0 | 2 | 0,00 | 86,29 | - | - | 0,00 | 0,00 | - |
| 35 | 5691 | 5695 | 12,24 | 106,0 | 2 | 0,00 | 86,11 | - | - | 0,00 | 0,00 | - |
| 36 | 4929 | 4934 | 14,26 | 106,0 | 2 | 0,00 | 84,86 | - | - | 0,00 | 0,00 | - |
| 37 | 4695 | 4699 | 14,95 | 106,0 | 2 | 0,00 | 84,44 | - | - | 0,00 | 0,00 | - |
| 38 | 4737 | 4741 | 14,83 | 106,0 | 2 | 0,00 | 84,52 | - | - | 0,00 | 0,00 | - |
| 39 | 5124 | 5128 | 13,72 | 106,0 | 2 | 0,00 | 85,20 | - | - | 0,00 | 0,00 | - |
| 4 | 6173 | 6176 | 11,11 | 106,0 | 2 | 0,00 | 86,81 | - | - | 0,00 | 0,00 | - |
| 40 | 5626 | 5630 | 12,40 | 106,0 | 2 | 0,00 | 86,01 | - | - | 0,00 | 0,00 | - |
| 41 | 5906 | 5910 | 11,72 | 106,0 | 2 | 0,00 | 86,43 | - | - | 0,00 | 0,00 | - |
| 42 | 5914 | 5918 | 11,70 | 106,0 | 2 | 0,00 | 86,44 | - | - | 0,00 | 0,00 | - |
| 43 | 6745 | 6748 | 10,05 | 106,0 | 2 | 0,00 | 87,58 | - | - | 0,00 | 0,00 | - |
| 44 | 5373 | 5375 | 10,78 | 104,9 | | 0,00 | 85,61 | - | - | 0,00 | 0,00 | - |
| 45 | 4725 | 4727 | 12,43 | 104,9 | | 0,00 | 84,49 | - | - | 0,00 | 0,00 | - |
| 46 | 4838 | 4840 | 12,12 | 104,9 | | 0,00 | 84,70 | - | - | 0,00 | 0,00 | - |
| 47 | 4225 | 4228 | 14,04 | 104,9 | | 0,00 | 83,52 | - | - | 0,00 | 0,00 | - |
| 48 | 14165 | 14166 | 1,12 | 107,8 | | 0,00 | 94,02 | - | - | 0,00 | 0,00 | - |
| 49 | 13319 | 13320 | 1,87 | 107,8 | | 0,00 | 93,49 | - | - | 0,00 | 0,00 | - |
| 5 | 5114 | 5118 | 13,74 | 106,0 | 2 | 0,00 | 85,18 | - | - | 0,00 | 0,00 | - |
| 50 | 12963 | 12963 | 2,21 | 107,8 | | 0,00 | 93,25 | - | - | 0,00 | 0,00 | - |
| 51 | 14062 | 14063 | 1,21 | 107,8 | | 0,00 | 93,96 | - | - | 0,00 | 0,00 | - |
| 52 | 12378 | 12378 | 2,78 | 107,8 | | 0,00 | 92,85 | - | - | 0,00 | 0,00 | - |
| 53 | 13788 | 13788 | 1,45 | 107,8 | | 0,00 | 93,79 | - | - | 0,00 | 0,00 | - |
| 54 | 13189 | 13189 | 2,00 | 107,8 | | 0,00 | 93,40 | - | - | 0,00 | 0,00 | - |
| 55 | 14188 | 14189 | 1,10 | 107,8 | | 0,00 | 94,04 | - | - | 0,00 | 0,00 | - |
| 6 | 6054 | 6057 | 11,37 | 106,0 | 2 | 0,00 | 86,65 | - | - | 0,00 | 0,00 | - |
| 7 | 6464 | 6467 | 10,56 | 106,0 | 2 | 0,00 | 87,21 | - | - | 0,00 | 0,00 | - |
| 8 | 7465 | 7468 | 8,82 | 106,0 | 2 | 0,00 | 88,46 | - | - | 0,00 | 0,00 | - |
| 9 | 8486 | 8488 | 7,27 | 106,0 | 2 | 0,00 | 89,58 | - | - | 0,00 | 0,00 | - |
| Sum | | | 33,62 | | | | | | | | | |

- Data undefined due to calculation with octave data

Project:
Puutionsaari_Riskalankangas_20200327

Description:
VSB

Licensed user:
FCG Suunnittelu ja tekniikka Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka Rintamäki / henna-riikka.rintamaki@fcg.fi
Calculated:
8.4.2020 15.17/3.3.247

DECIBEL - Assumptions for noise calculation

Calculation: VE1_GE158x43xHH200+Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_20200408

Noise calculation model:

ISO 9613-2 General

Wind speed (in 10 m height):

8,0 m/s

Ground attenuation:

General, terrain specific

Ground factor for porous ground: 0,4

Area object with hard ground: Area object (vesistot): (5)

Area type with hard ground: Vesistot

Ground factor for hard ground: 0,0

Meteorological coefficient, CO:

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:

Fixed penalty added to source noise of WTGs with pure tones

WTG catalogue

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 |

WTG: GE WIND ENERGY 5.3-158 Thrust 700 5300 158.0 !O!

Noise: 5.3-158 NO

| Source | Source/Date | Creator | Edited |
|---|-------------|---------|----------------|
| Noise_Emission-NO_5.3-158-50Hz_IEC_EN_r01 | 12.3.2018 | USER | 7.4.2020 13.45 |

Octave data

| Status | Hub height | Wind speed | LwA,ref | Pure tones | Penalty | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 |
|--------------|------------|------------|---------|------------|---------|------|------|------|------|-------|------|------|------|
| | [m] | [m/s] | [dB(A)] | | [dB] | [dB] | [dB] | [dB] | [dB] | [dB] | [dB] | [dB] | [dB] |
| From Windcat | 200,0 | 8,0 | 106,0 | Yes | 2,0 | 87,2 | 92,6 | 97,2 | 99,6 | 101,3 | 99,1 | 91,7 | 76,0 |

WTG: VESTAS V150-4.2 HH155 4200 150.0 !O!

Noise: Level 00 - Measured - Mode PO1 - 03-2018

| Source | Source/Date | Creator | Edited |
|--------------|-------------|---------|----------------|
| Manufacturer | 15.3.2018 | USER | 8.4.2020 10.36 |

Document n. 0067-4767 V06.

Octave data

| Status | Hub height | Wind speed | LwA,ref | Pure tones | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 |
|--------------|------------|------------|---------|------------|------|------|------|------|------|------|------|------|
| | [m] | [m/s] | [dB(A)] | | [dB] | [dB] | [dB] | [dB] | [dB] | [dB] | [dB] | [dB] |
| From Windcat | 155,0 | 8,0 | 104,9 | No | 84,2 | 92,2 | 97,4 | 99,8 | 99,4 | 96,1 | 90,0 | 81,0 |

WTG: GE WIND ENERGY 5.3-158 RD175 5300 175.0 !O!

Noise: 5.3-158 NO_107,8 dB

| Source | Source/Date | Creator | Edited |
|---|-------------|---------|----------------|
| Noise_Emission-NO_5.3-158-50Hz_IEC_EN_r01 | 12.3.2018 | USER | 8.4.2020 13.24 |

Octave data

| Status | Hub height | Wind speed | LwA,ref | Pure tones | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 |
|--------------|------------|------------|---------|------------|------|------|------|-------|-------|-------|------|------|
| | [m] | [m/s] | [dB(A)] | | [dB] | [dB] | [dB] | [dB] | [dB] | [dB] | [dB] | [dB] |
| From Windcat | 152,5 | 8,0 | 107,8 | No | 89,0 | 94,4 | 99,0 | 101,4 | 103,1 | 100,9 | 93,5 | 77,8 |

Project: Puutionsaari_Riskalankangas_20200327
Description: VSB

Licensed user:
FCG Suunnittelu ja tekniikka Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka Rintamäki / henna-riikka.rintamaki@fcg.fi
Calculated:
8.4.2020 15.17/3.3.247

DECIBEL - Assumptions for noise calculation

Calculation: VE1_GE158x43xHH200+Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_20200408

Noise sensitive area: A Lomarakenus A (Vesiperän metsätie, Kivikaarto)

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)

No distance demand

Noise sensitive area: B Asuinrakennus B (Ylivieskantie, Pöhlölä)

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)

No distance demand

Noise sensitive area: C Asuinrakennus C (Perkkiöntie 382)

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)

No distance demand

Noise sensitive area: D Asuinrakennus D (Alakyläntie 243)

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)

No distance demand

Noise sensitive area: E Lomarakenus E (Kellokankaan metsätie)

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)

No distance demand

Noise sensitive area: F Asuinrakennus F (Ollilantie 112)

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)

No distance demand

Noise sensitive area: G Lomarakenus G (Ollilantie, Siliäkuru)

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)

No distance demand

Noise sensitive area: H Asuinrakennus H (Pinolantie 406)

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)

No distance demand

Noise sensitive area: I Asuinrakennus I (Kortenevantie 116)

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Uncertainty margin: Use default value from calculation model

Project: Puutionsaari_Riskalankangas_20200327
Description: VSB

Licensed user:
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Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka Rintamäki / henna-riikka.rintamaki@fcg.fi
Calculated:
8.4.2020 15.17/3.3.247

DECIBEL - Assumptions for noise calculation

Calculation: VE1_GE158x43xHH200+Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_20200408

Noise demand: 40,0 dB(A)

No distance demand

Noise sensitive area: J Asuinrakennus J (Haapavesitie 1406)

Predefined calculation standard:

Emission height(a.g.l.): Use standard value from calculation model

Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)

No distance demand

Noise sensitive area: K Lomarakennus K (Kurunoja)

Predefined calculation standard:

Emission height(a.g.l.): Use standard value from calculation model

Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)

No distance demand

Noise sensitive area: L Lomarakennus L (Perkkiontie, Ilmola)

Predefined calculation standard:

Emission height(a.g.l.): Use standard value from calculation model

Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)

No distance demand

Noise sensitive area: M Lomarakennus M (Riskalan metsätie)

Predefined calculation standard:

Emission height(a.g.l.): Use standard value from calculation model

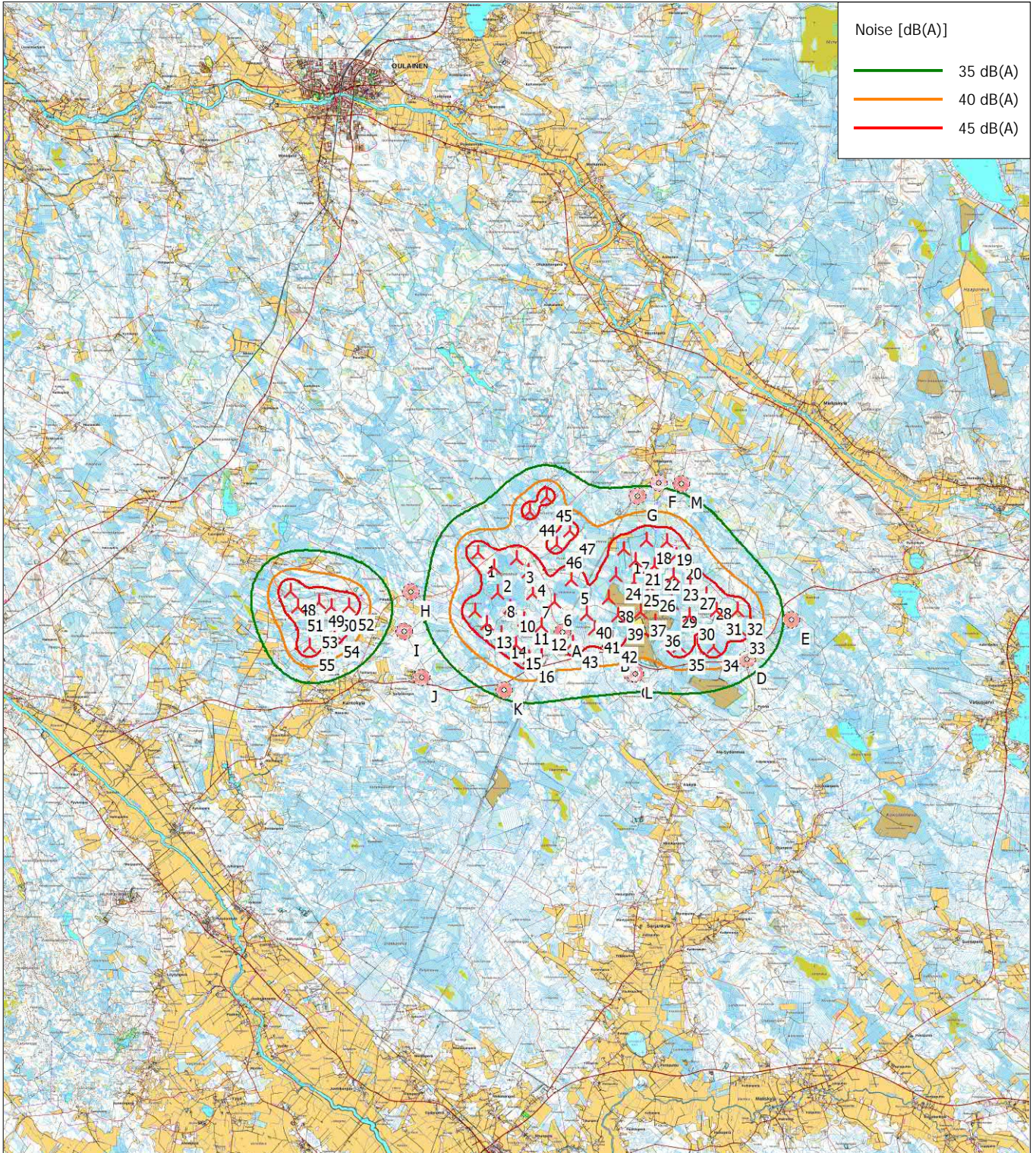
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)

No distance demand

DECIBEL - Map 8,0 m/s

Calculation: VE1_GE158x43xHH200+Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_20200408



0 2,5 5 7,5 10km

Map: Maastokarttarasteri50K , Print scale 1:200 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 400 541 North: 7 111 617





New WTG

Noise sensitive area

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

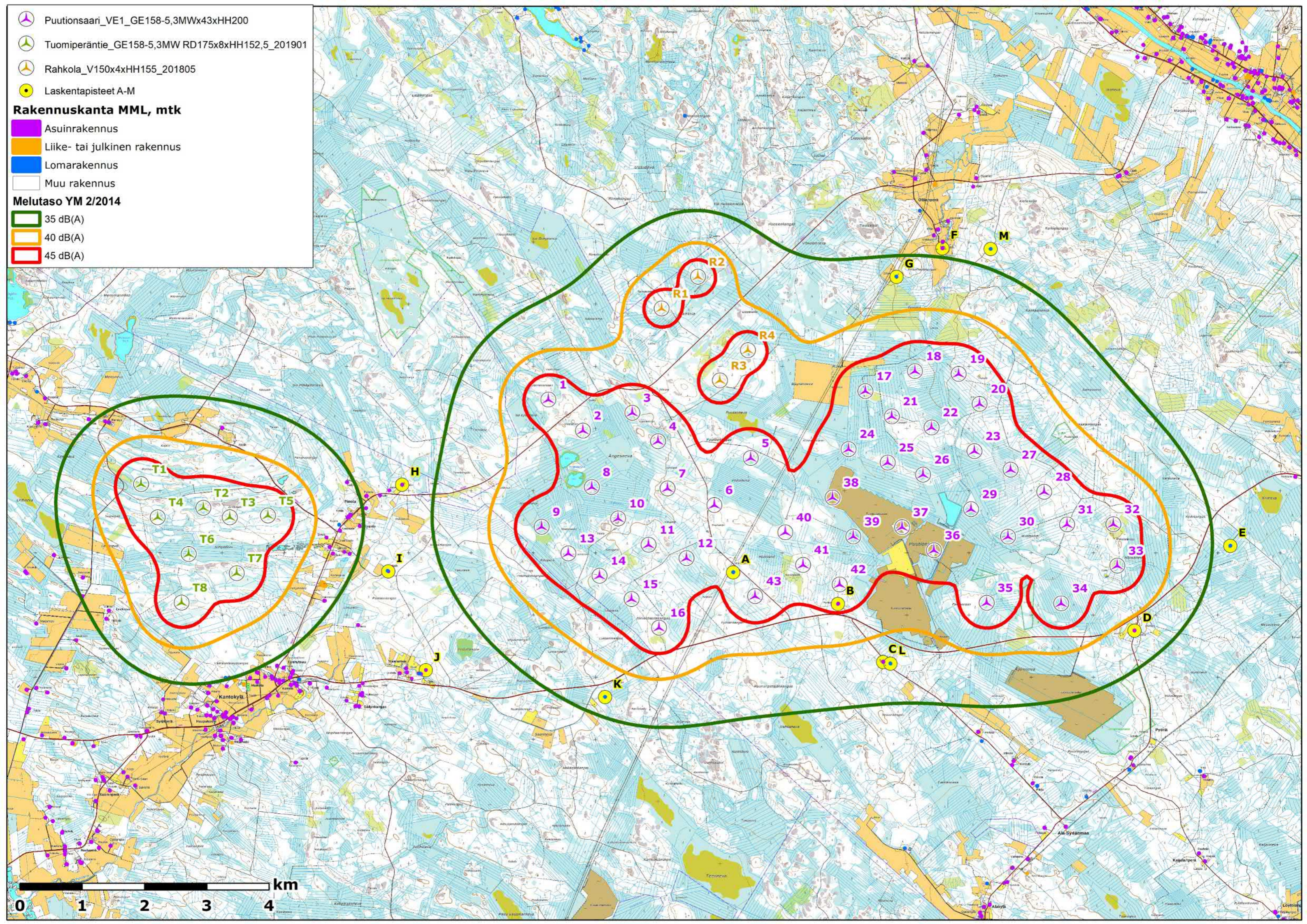
-  Puutionsaari_VE1_GE158-5,3MWx43xHH200
-  Tuomiperäntie_GE158-5,3MW RD175x8xHH152,5_201901
-  Rahkola_V150x4xHH155_201805
-  Laskentapisteeet A-M

Rakennuskanta MML, mtk

-  Asuinrakennus
-  Liike- tai julkinen rakennus
-  Lomarakennus
-  Muu rakennus

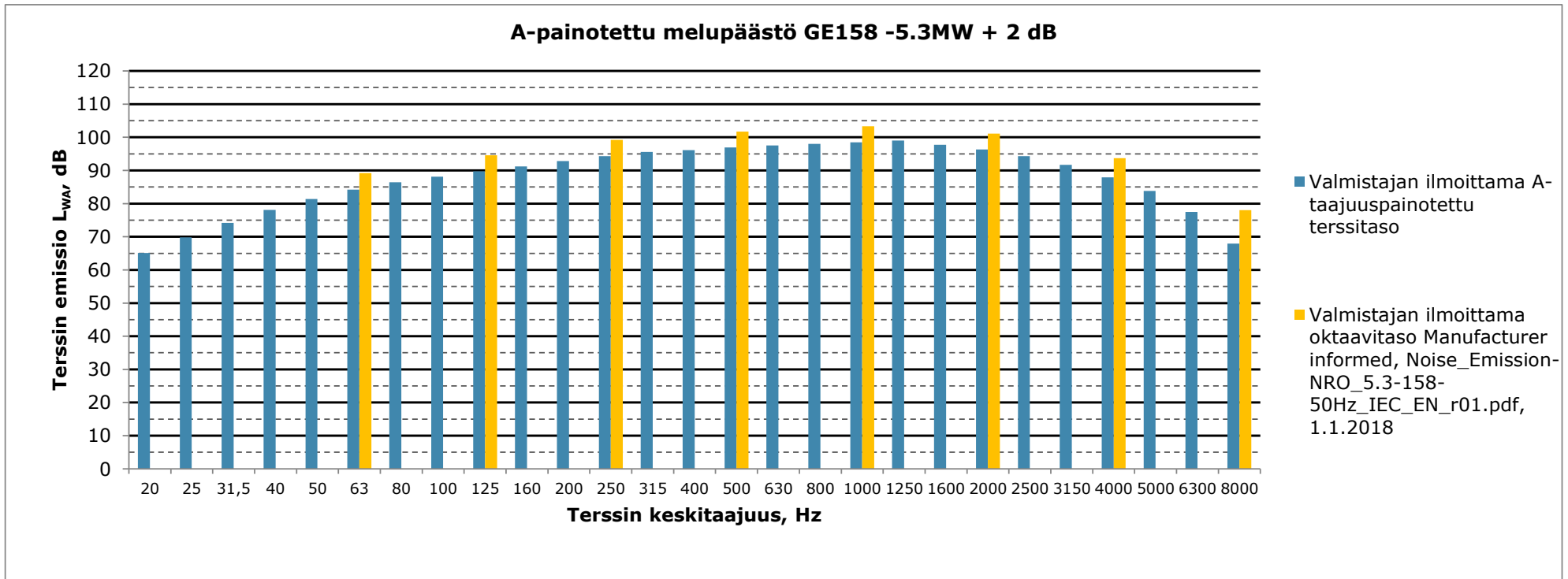
Melutaso YM 2/2014

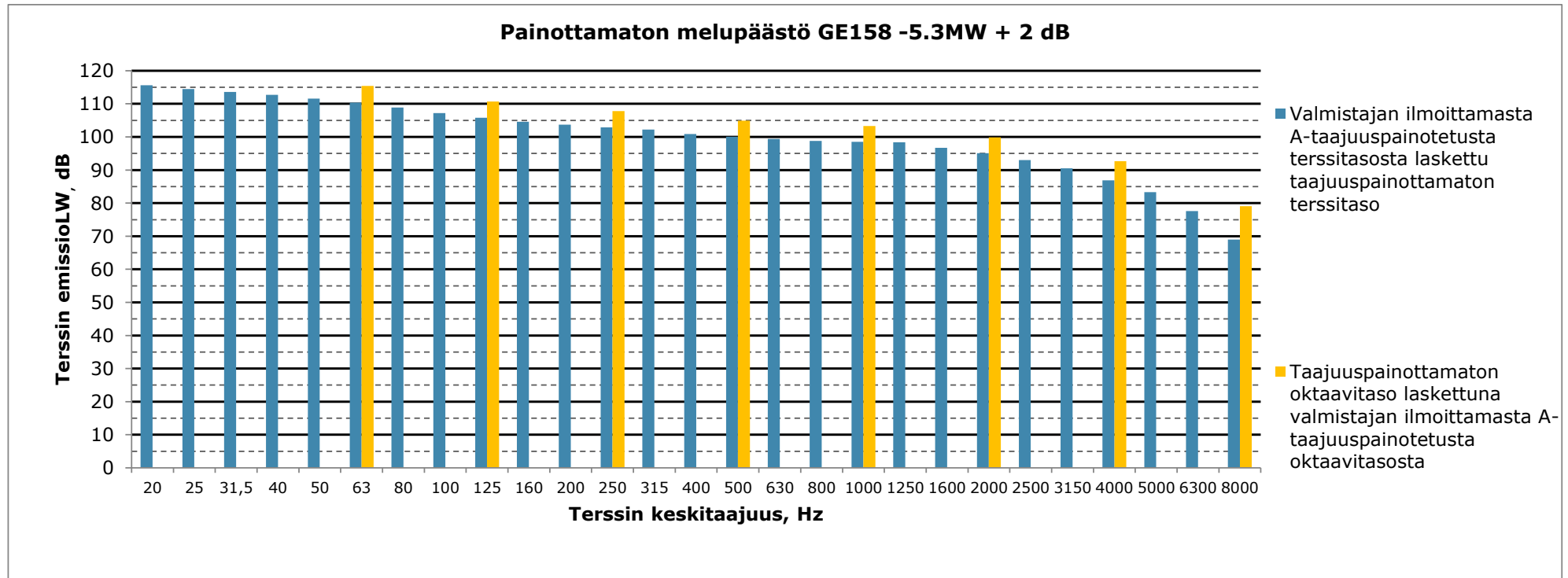
-  35 dB(A)
-  40 dB(A)
-  45 dB(A)



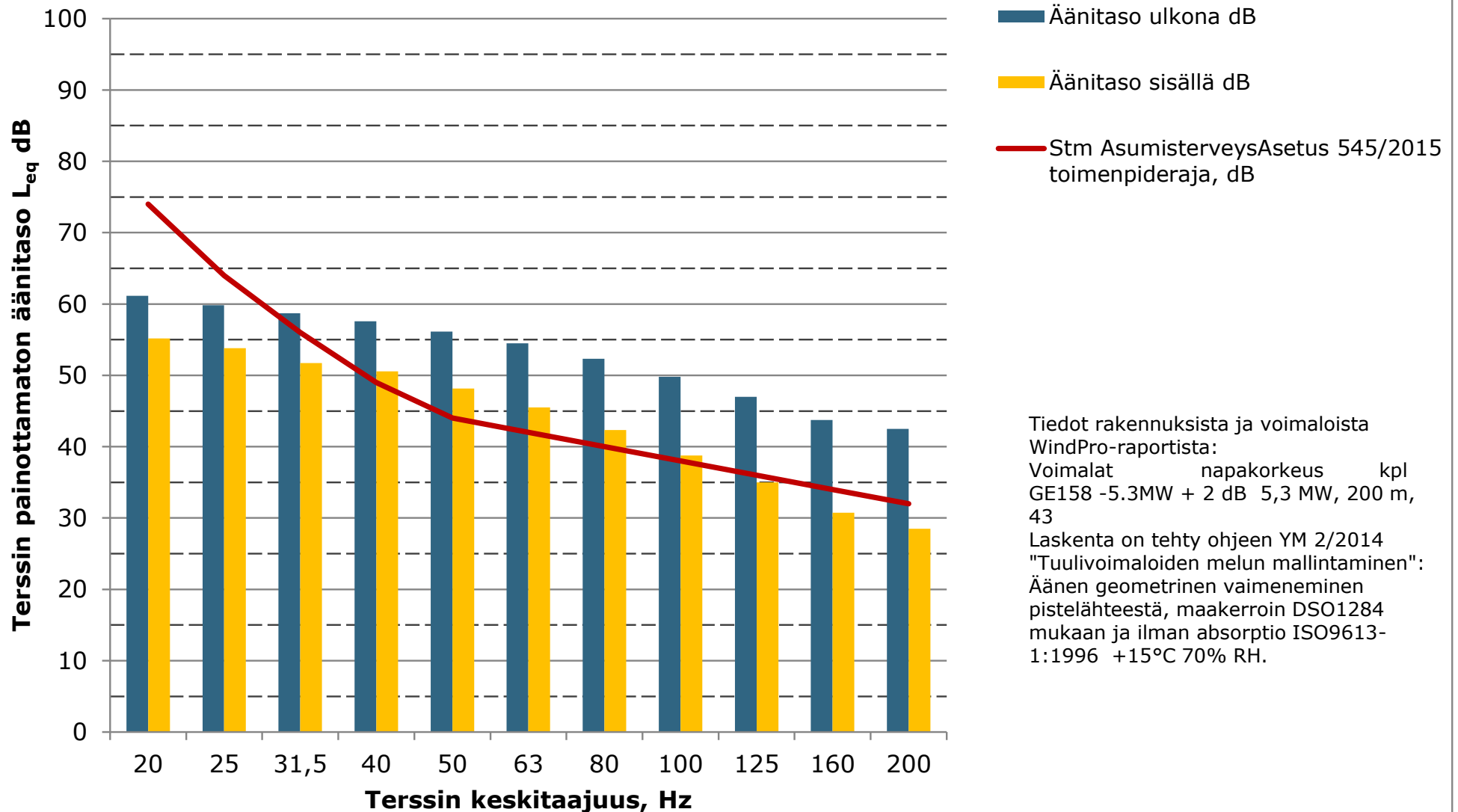
17.4.2020

Liite 3: Puutionsaari VE1 - Matalataajuisen melun rakennuskohtaiset arvot

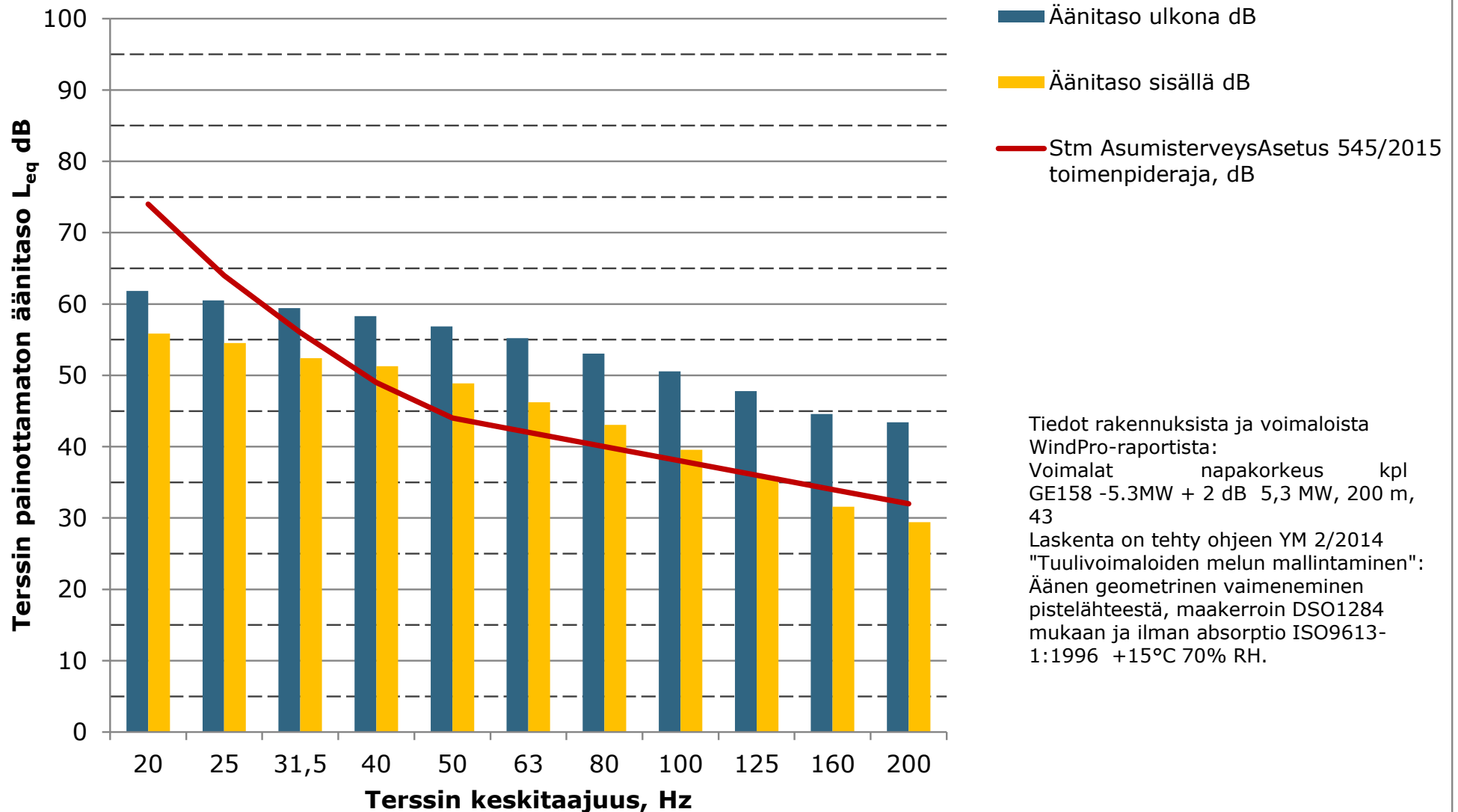




Matalien taajuuksien äänitasot ulkona ja sisällä, Lomarakennus A (Vesiperän metsätie, Kivikaarto), ääneneristävyyden Keränen, Hakala, Hongisto 2017, vähimmäisarvon estimaatti DL90 mukaan

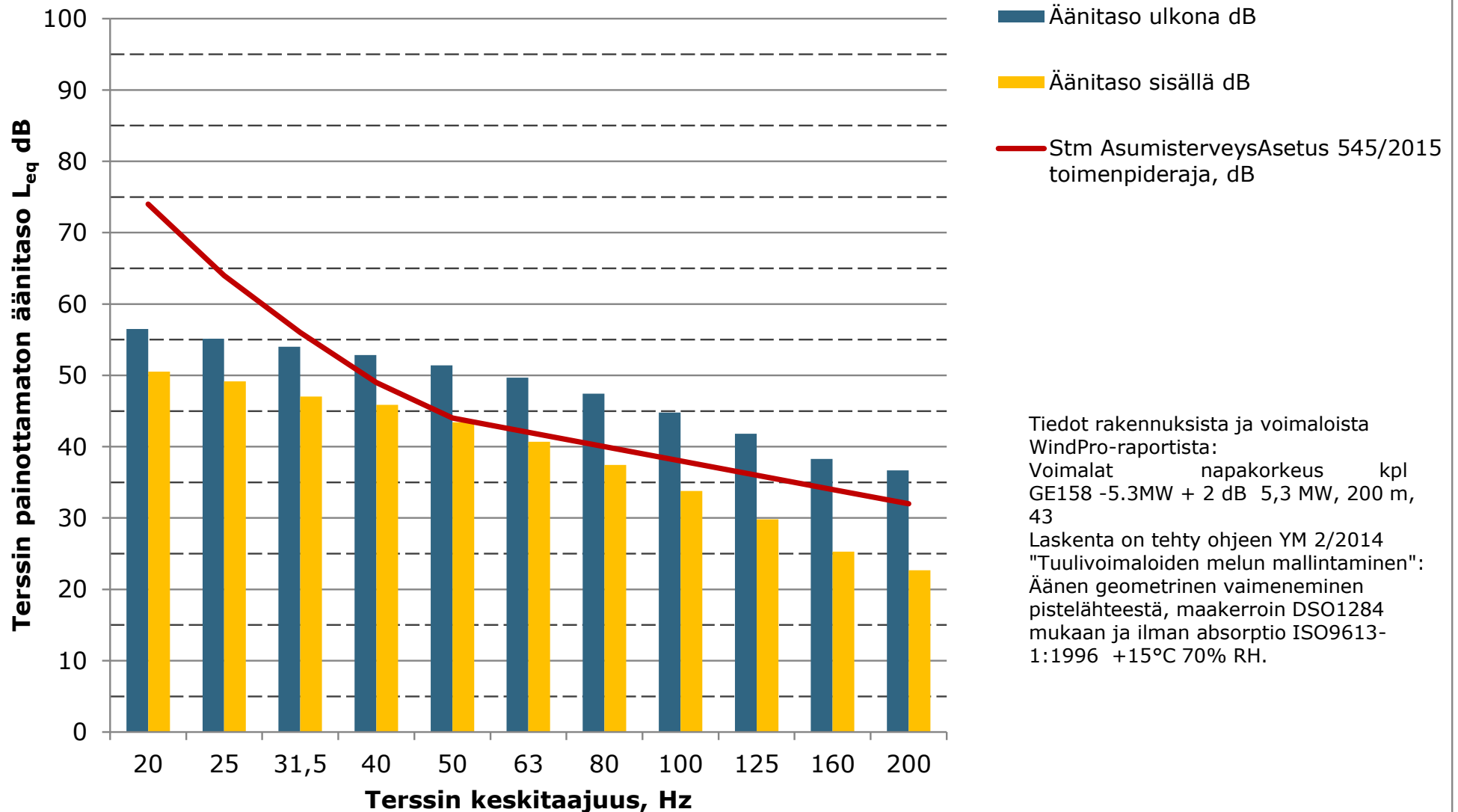


**Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus B
(Ylivieskantie, Pöhlölä), ääneneristävyys Keränen, Hakala, Hongisto 2017,
vähimmäisarvon estimaatti DL90 mukaan**



Tiedot rakennuksista ja voimaloista
WindPro-raportista:
Voimalat napakorkeus kpl
GE158 -5.3MW + 2 dB 5,3 MW, 200 m,
43
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 (Perkkiöntie 382), ääneneristävyys Keränen,Hakala,Hongisto 2017, vähimmäisarvon estimaatti DL90 mukaan

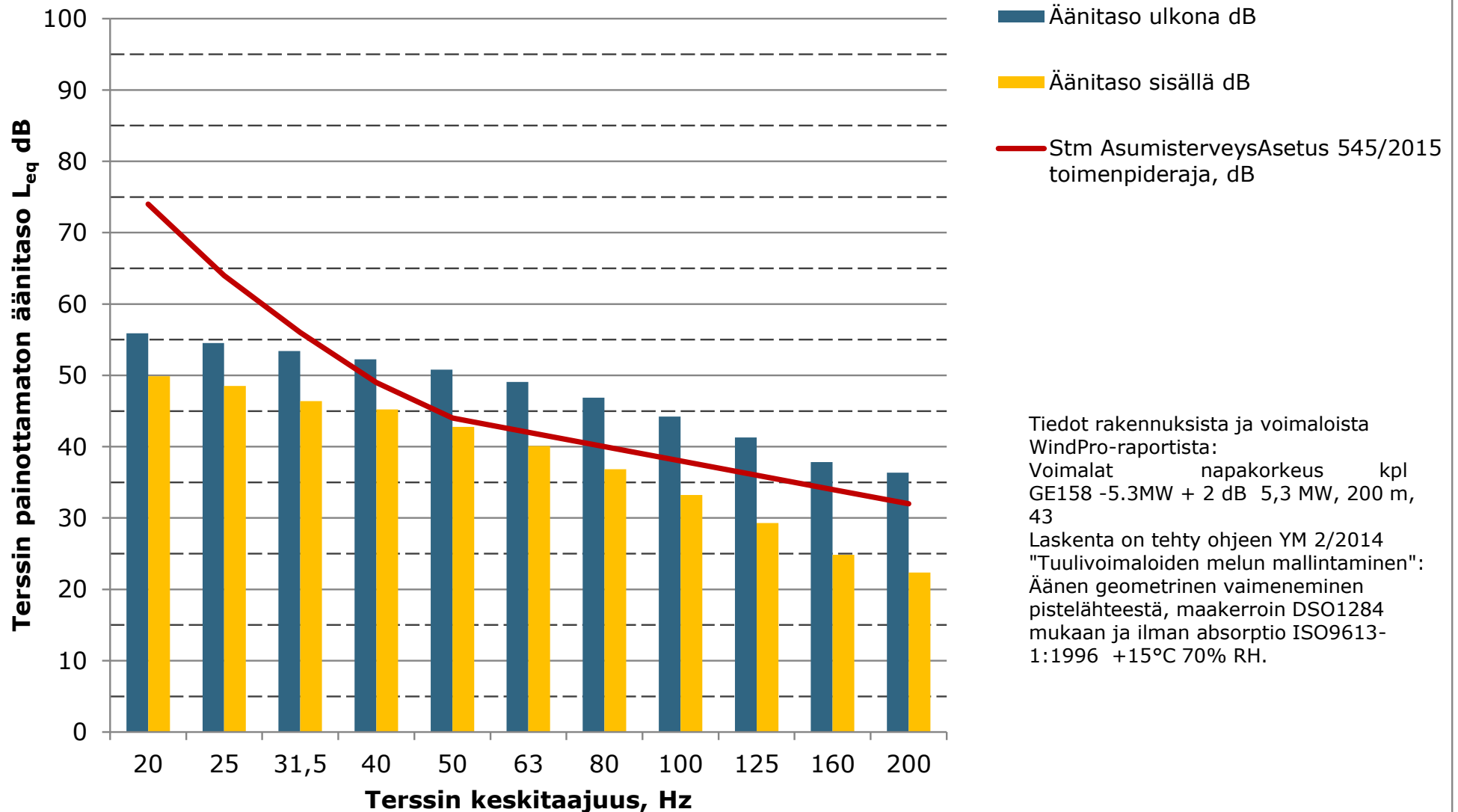


Tiedot rakennuksista ja voimaloista
WindPro-raportista:

Voimalat napakorkeus kpl
GE158 -5.3MW + 2 dB 5,3 MW, 200 m,
43

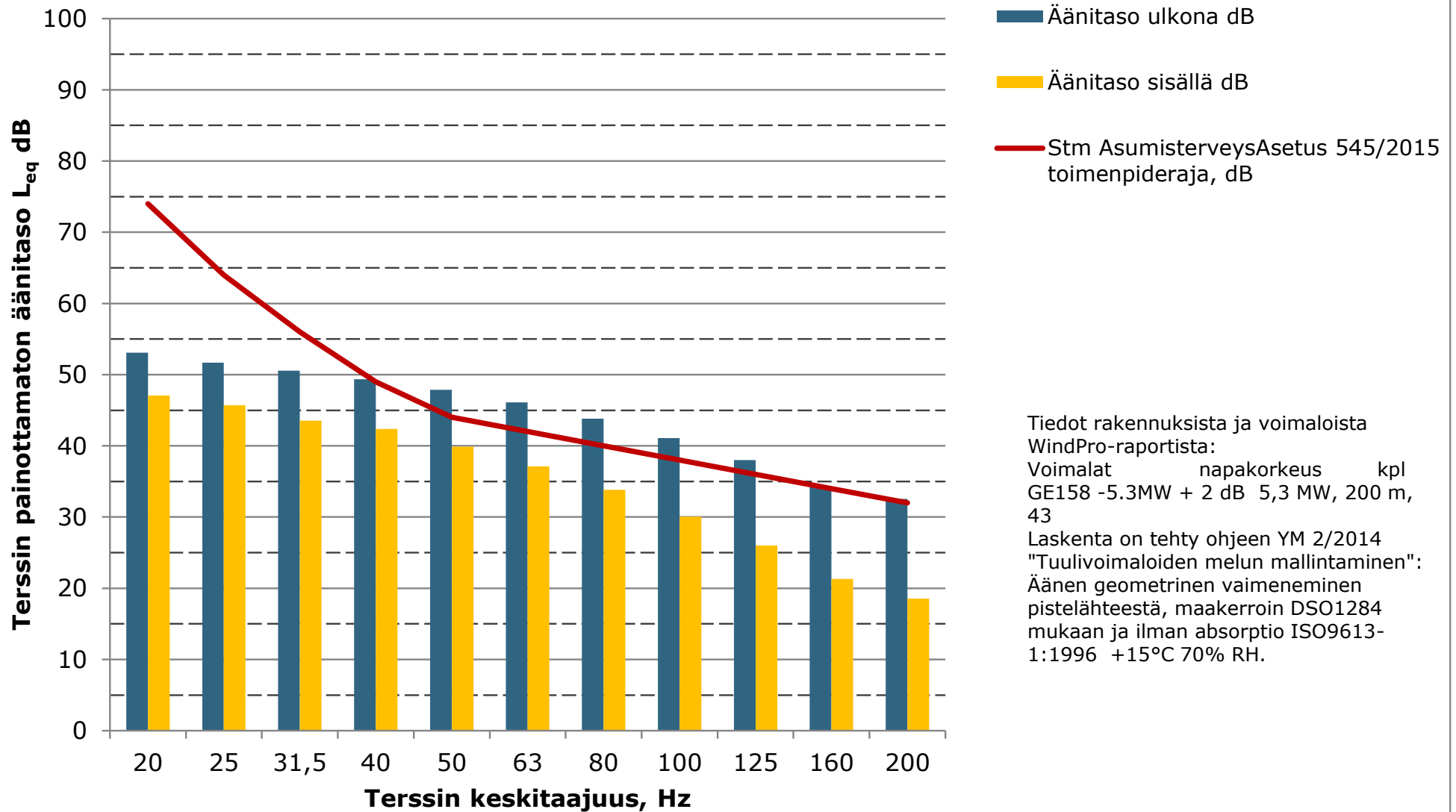
Laskenta on tehty ohjeen YM 2/2014
"Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen
pistelähteestä, maakerroin DSO1284
mukaan ja ilman absorptio ISO9613-
1:1996 +15°C 70% RH.

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus D (Alakyläntie 243), ääneneristävyys Keränen,Hakala,Hongisto 2017, vähimmäisarvon estimaatti DL90 mukaan



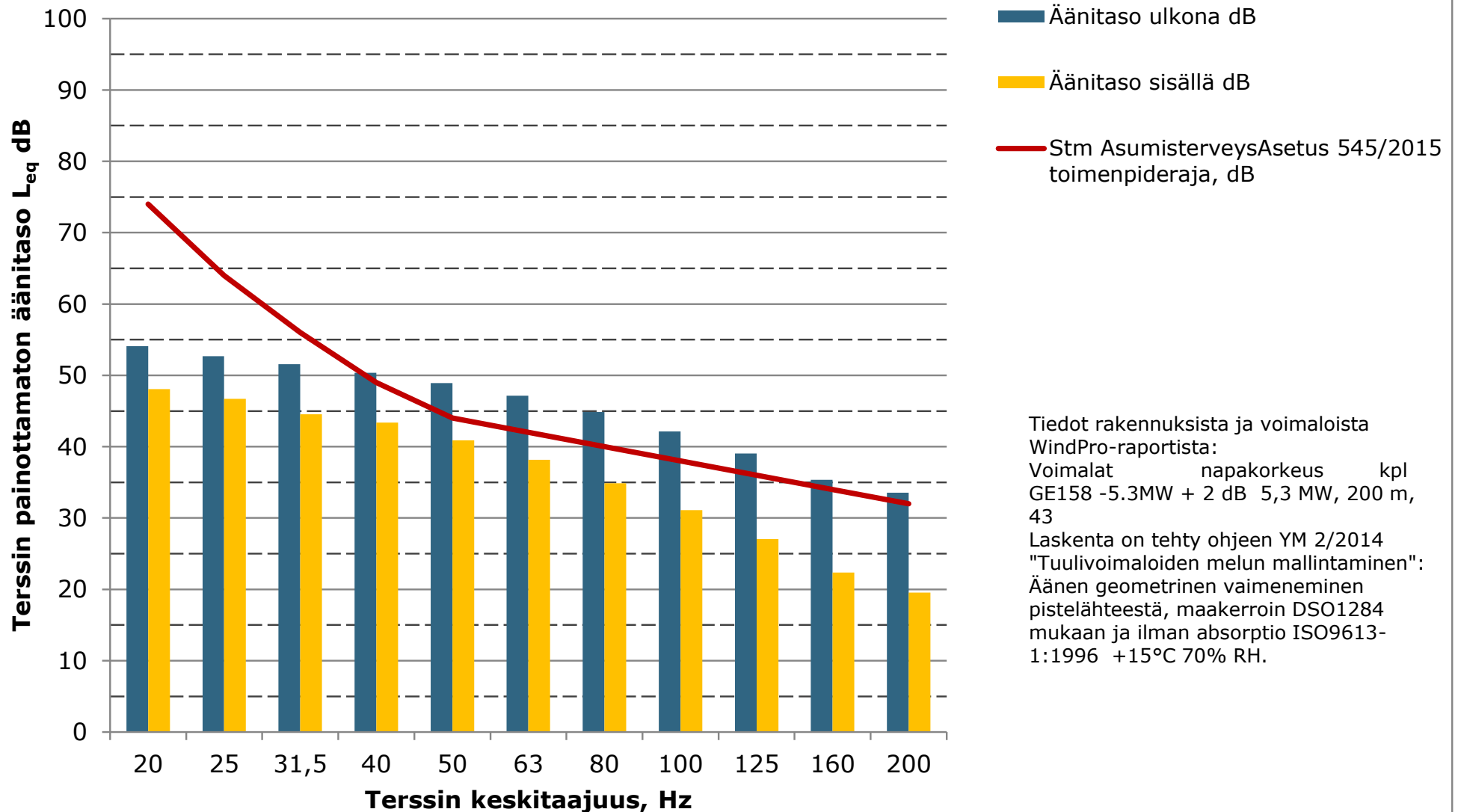
Tiedot rakennuksista ja voimaloista
WindPro-raportista:
Voimalat napakorkeus kpl
GE158 -5.3MW + 2 dB 5,3 MW, 200 m,
43
Laskenta on tehty ohjeen YM 2/2014
"Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen
pistelähteestä, maakerroin DSO1284
mukaan ja ilman absorptio ISO9613-
1:1996 +15°C 70% RH.

**Matalien taajuuksien äänitasot ulkona ja sisällä, Lomarakennus E
(Kellokankaan metsätie), ääneneristävyys Keränen, Hakala, Hongisto 2017,
vähimmäisarvon estimaatti DL90 mukaan**



Tiedot rakennuksista ja voimaloista
WindPro-raportista:
Voimalat napakorkeus kpl
GE158 -5.3MW + 2 dB 5,3 MW, 200 m,
43
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 (Ollilantie 112), ääneneristävyys Keränen,Hakala,Hongisto 2017, vähimmäisarvon estimaatti DL90 mukaan



Tiedot rakennuksista ja voimaloista

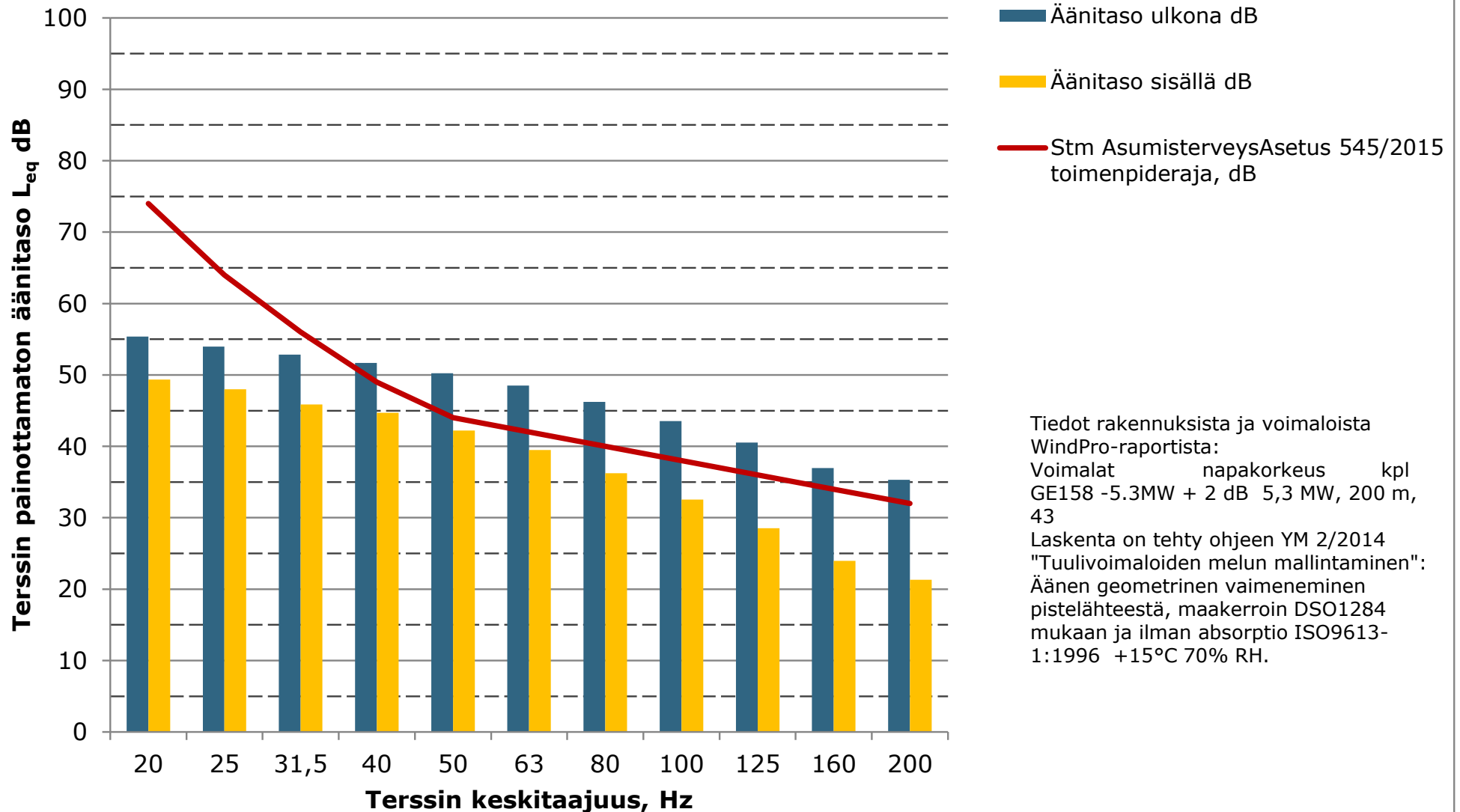
WindPro-raportista:

Voimalat napakorkeus kpl
GE158 -5.3MW + 2 dB 5,3 MW, 200 m, 43

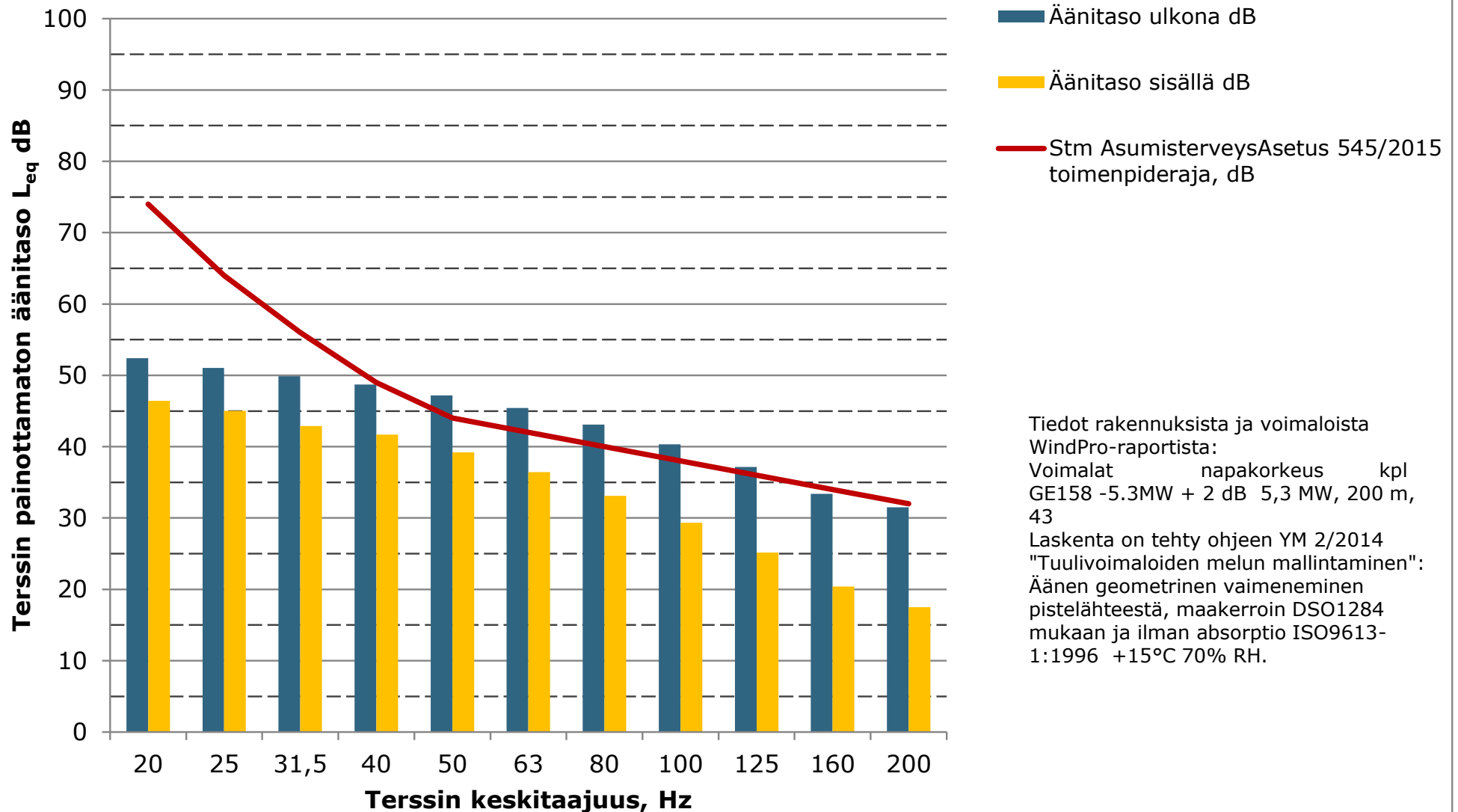
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":

Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Matalien taajuuksien äänitasot ulkona ja sisällä, Lomarakennus G (Ollilantie, Siliäkuru), ääneneristävyys Keränen, Hakala, Hongisto 2017, vähimmäisarvon estimaatti DL90 mukaan



Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus H (Pinolantie 406), ääneneristävyys Keränen, Hakala, Hongisto 2017, vähimmäisarvon estimaatti DL90 mukaan



Tiedot rakennuksista ja voimaloista

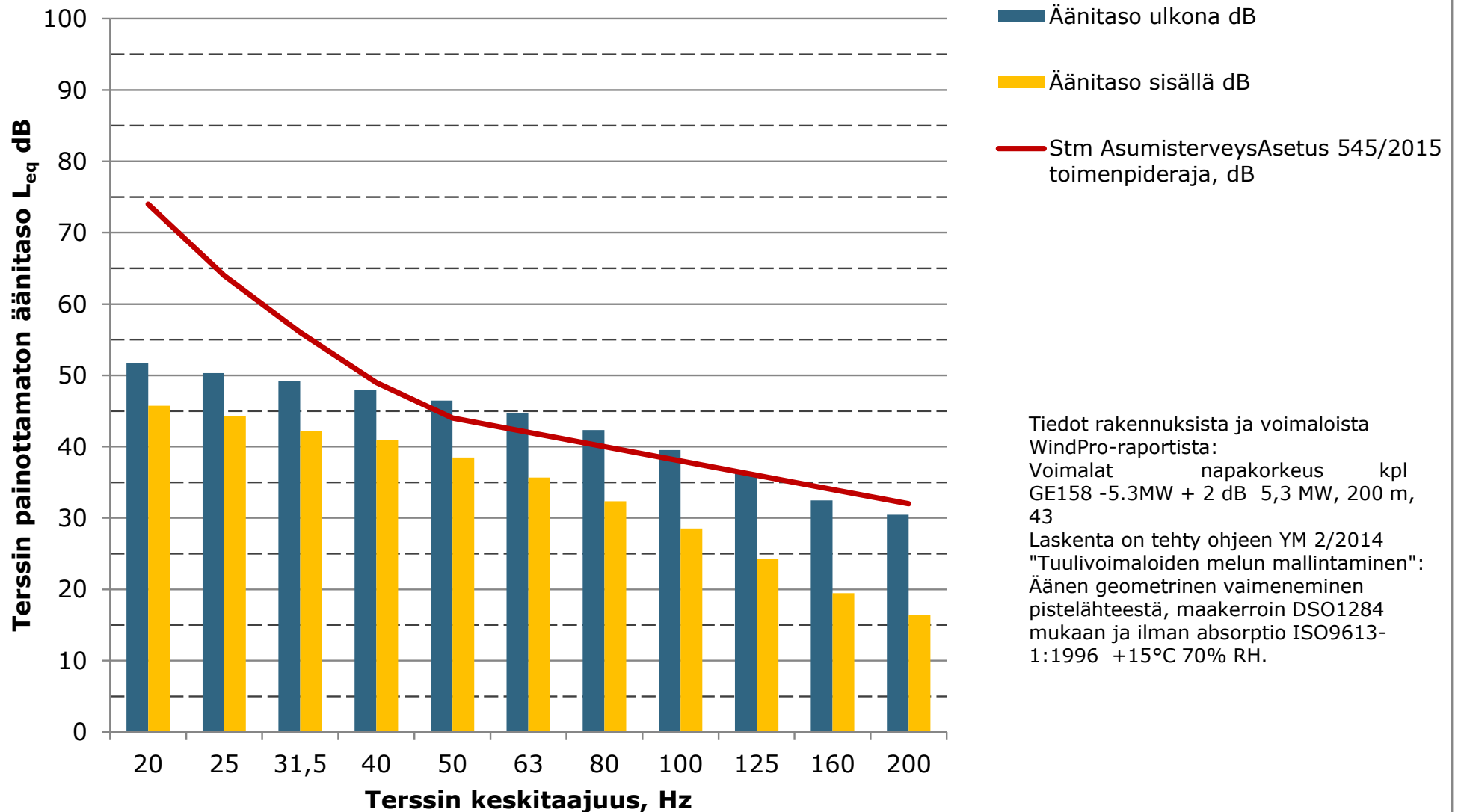
WindPro-raportista:

Voimalat napakorkeus kpl
GE158 -5.3MW + 2 dB 5,3 MW, 200 m,
43

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
(Kortenevantie 116), ääneneristävyys Keränen, Hakala, Hongisto 2017,
vähimmäisarvon estimaatti DL90 mukaan**



Tiedot rakennuksista ja voimaloista

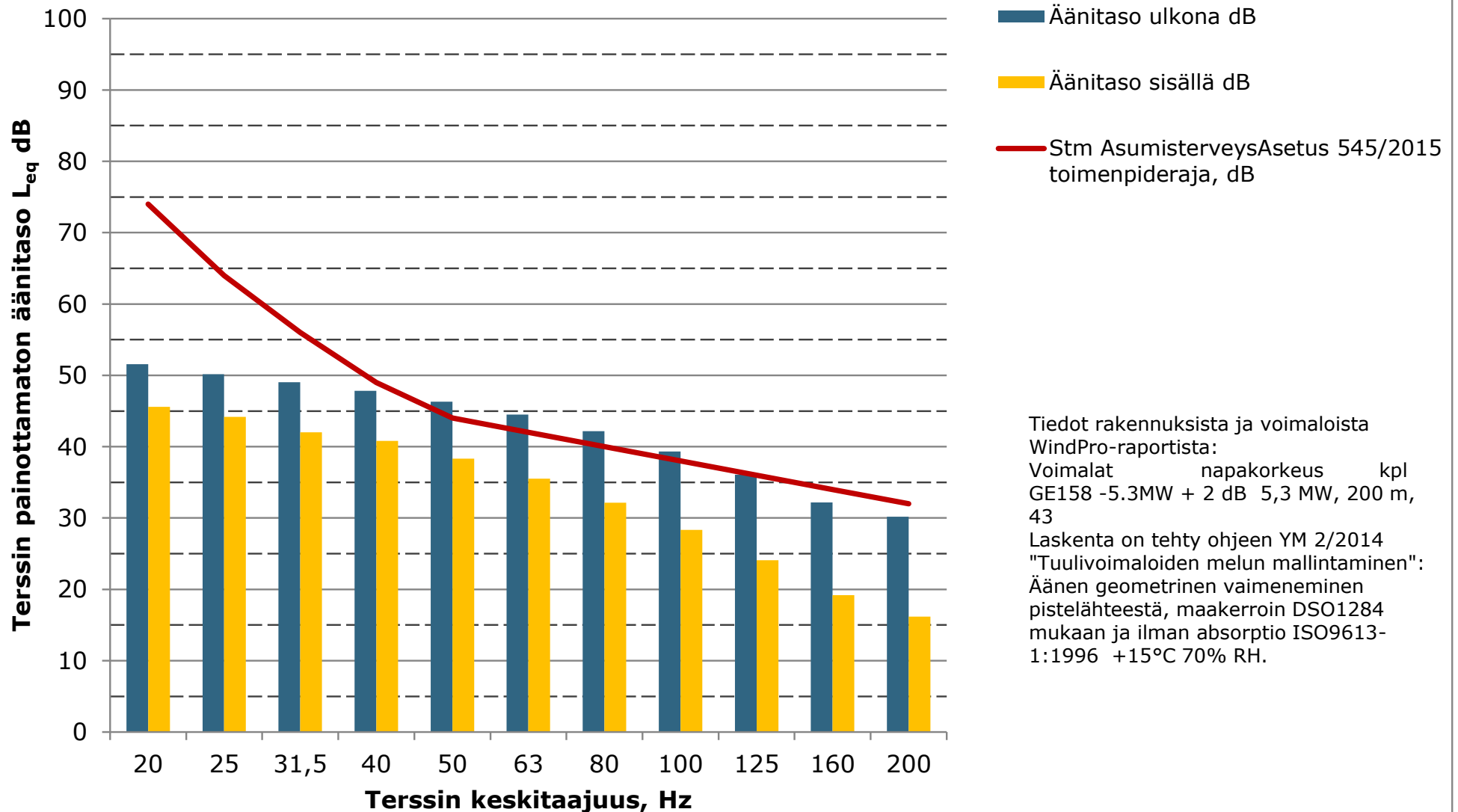
WindPro-raportista:

Voimalat napakorkeus kpl
GE158 -5.3MW + 2 dB 5,3 MW, 200 m,
43

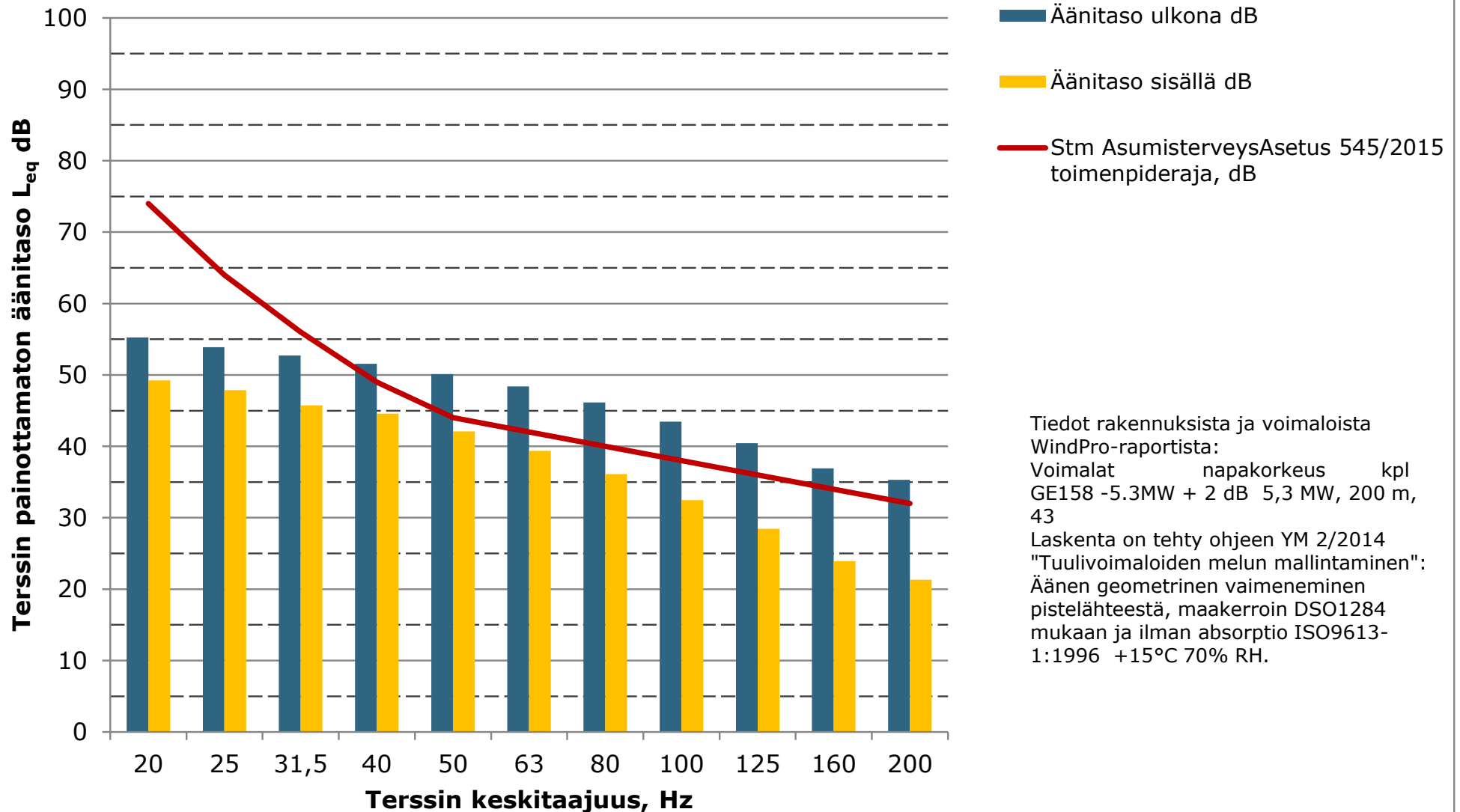
Laskenta on tehty ohjeen YM 2/2014
"Tuulivoimaloiden melun mallintaminen":

Äänen geometrinen vaimeneminen
pistelähteestä, maakerroin DSO1284
mukaan ja ilman absorptio ISO9613-
1:1996 +15°C 70% RH.

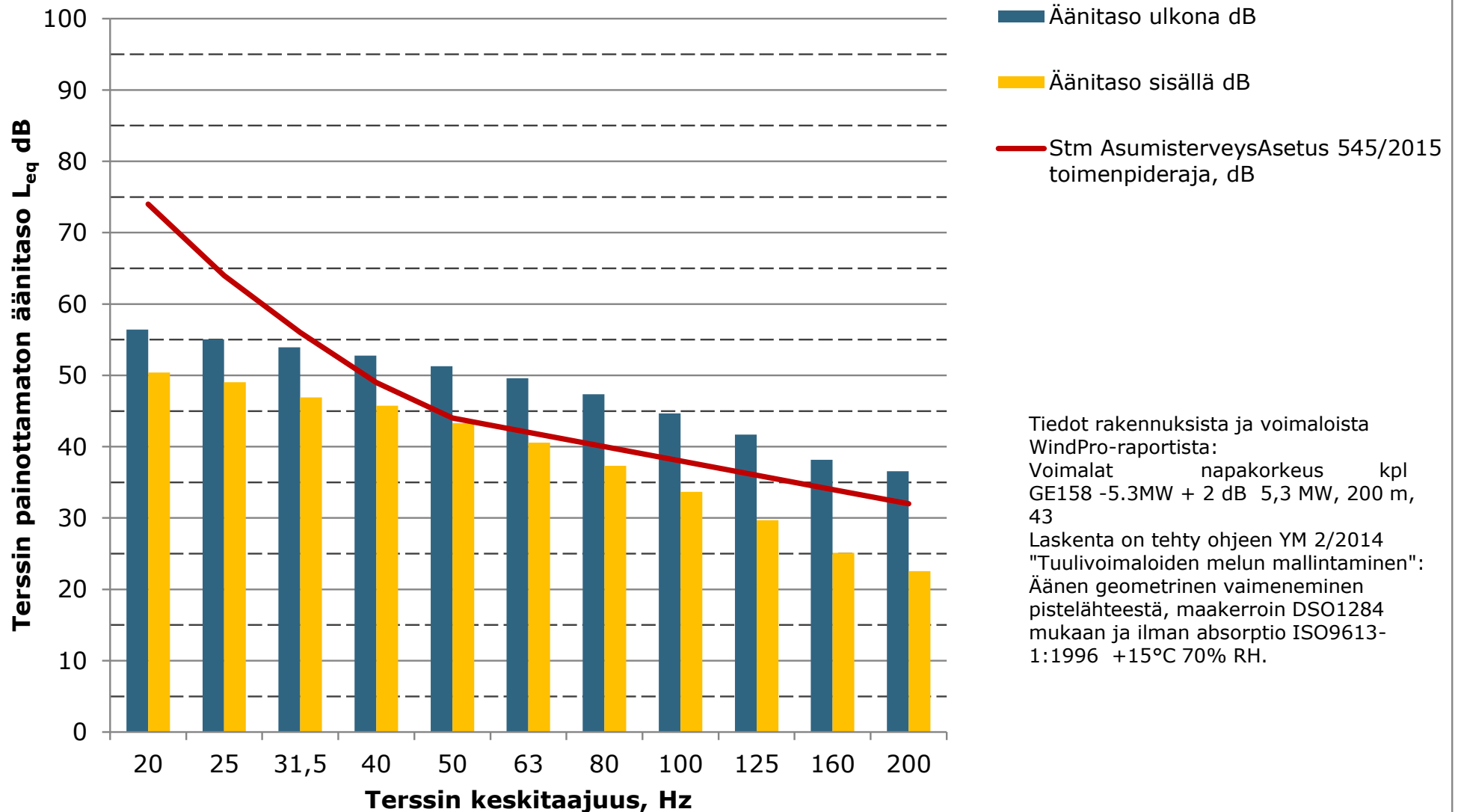
**Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus J
(Haapavesitie 1406), ääneneristävyys Keränen, Hakala, Hongisto 2017,
vähimmäisarvon estimaatti DL90 mukaan**



**Matalien taajuuksien äänitasot ulkona ja sisällä, Lomarakennus K (Kurunoja),
ääneneristävyys Keränen,Hakala,Hongisto 2017, vähimmäisarvon estimaatti
DL90 mukaan**



Matalien taajuuksien äänitasot ulkona ja sisällä, Lomarakenus L (Perkkiontie, Ilmola), ääneneristävyyden Keränen, Hakala, Hongisto 2017, vähimmäisarvon estimaatti DL90 mukaan

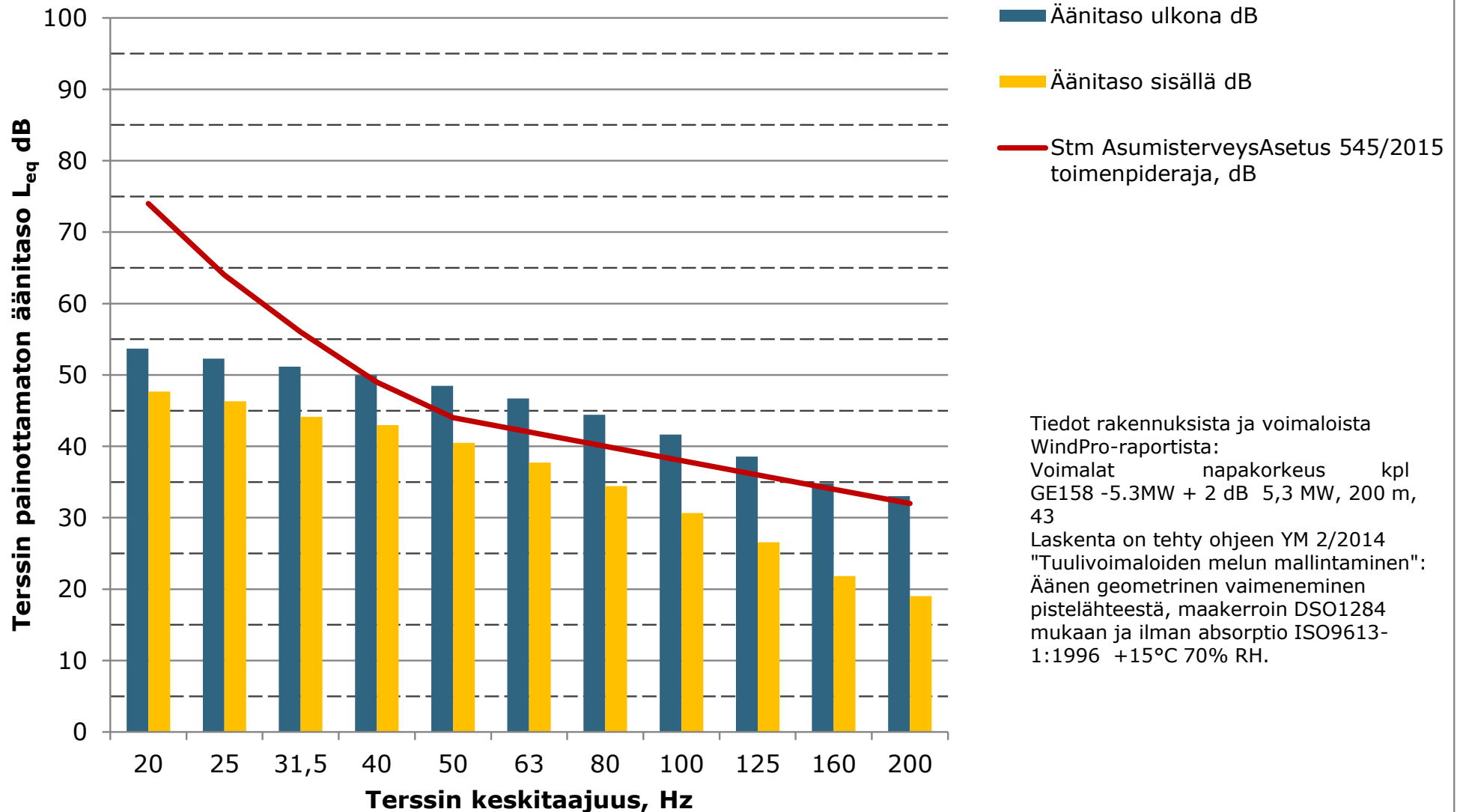


Tiedot rakennuksista ja voimaloista
WindPro-raportista:

Voimalat napakorkeus kpl
GE158 -5.3MW + 2 dB 5,3 MW, 200 m,
43

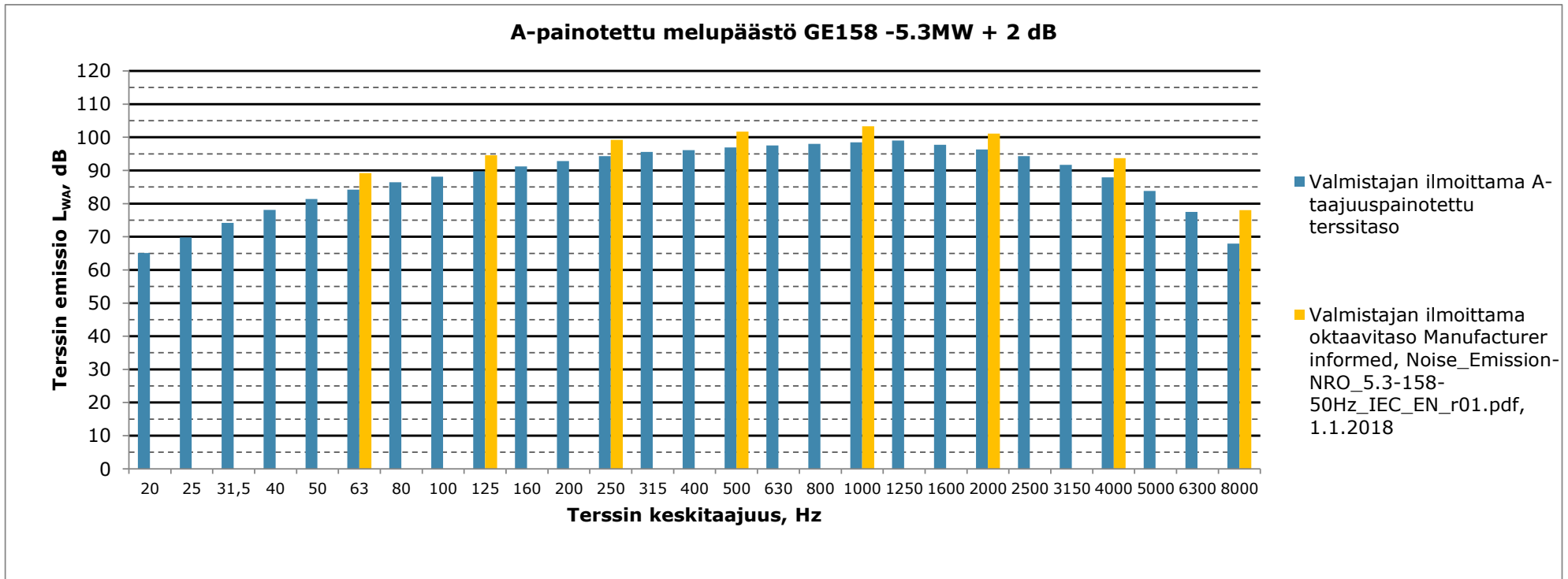
Laskenta on tehty ohjeen YM 2/2014
"Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen
pistelähteestä, maakerroin DSO1284
mukaan ja ilman absorptio ISO9613-
1:1996 +15°C 70% RH.

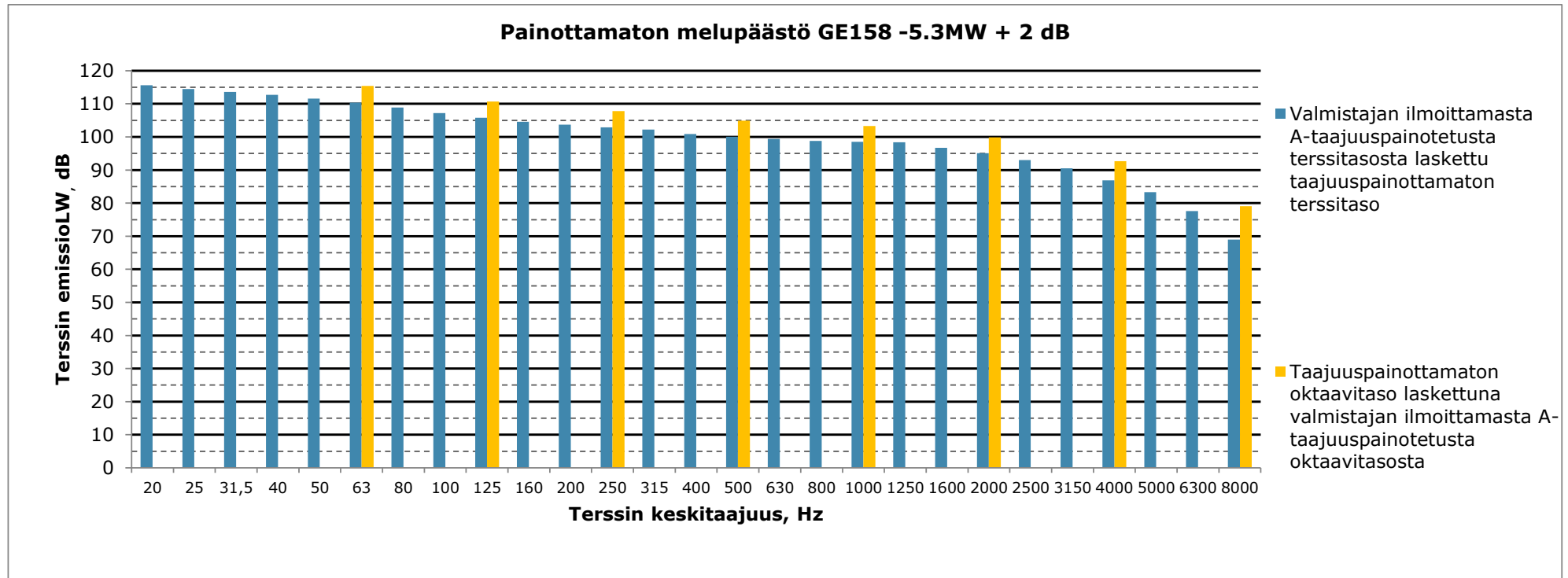
Matalien taajuuksien äänitasot ulkona ja sisällä, Lomarakennus M (Riskalan metsatie), ääneneristävyys Keränen, Hakala, Hongisto 2017, vähimmäisarvon estimaatti DL90 mukaan

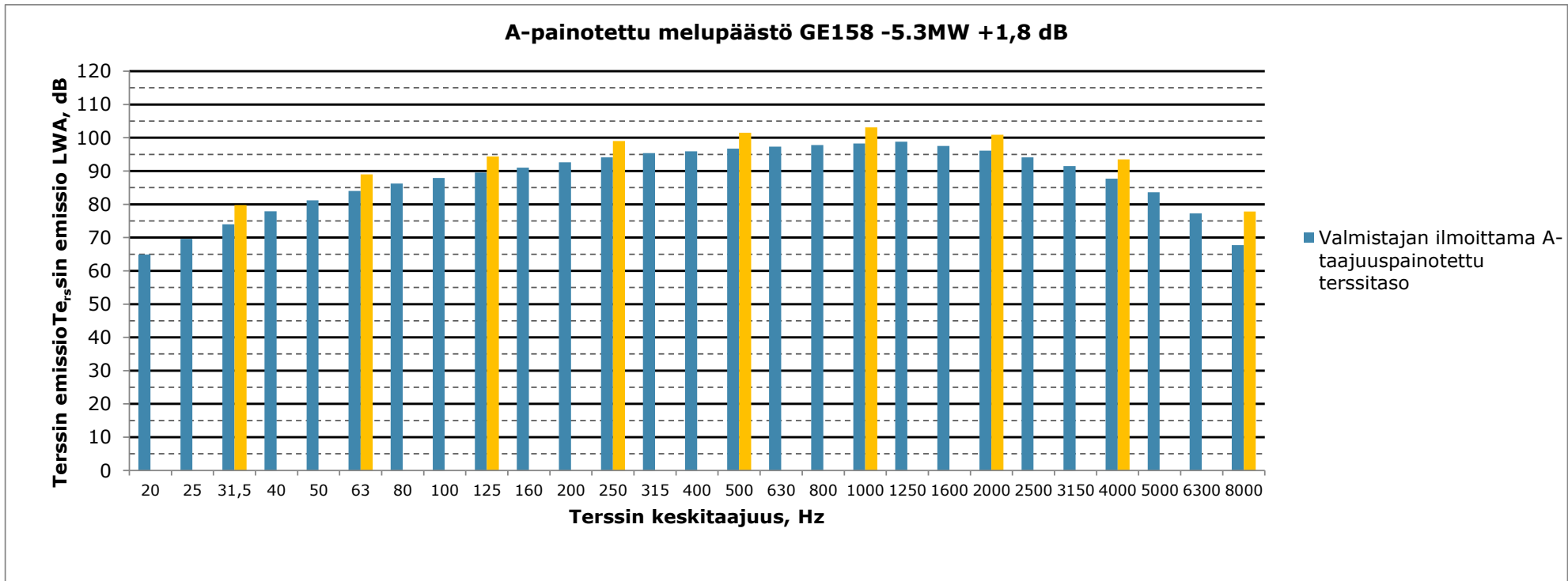


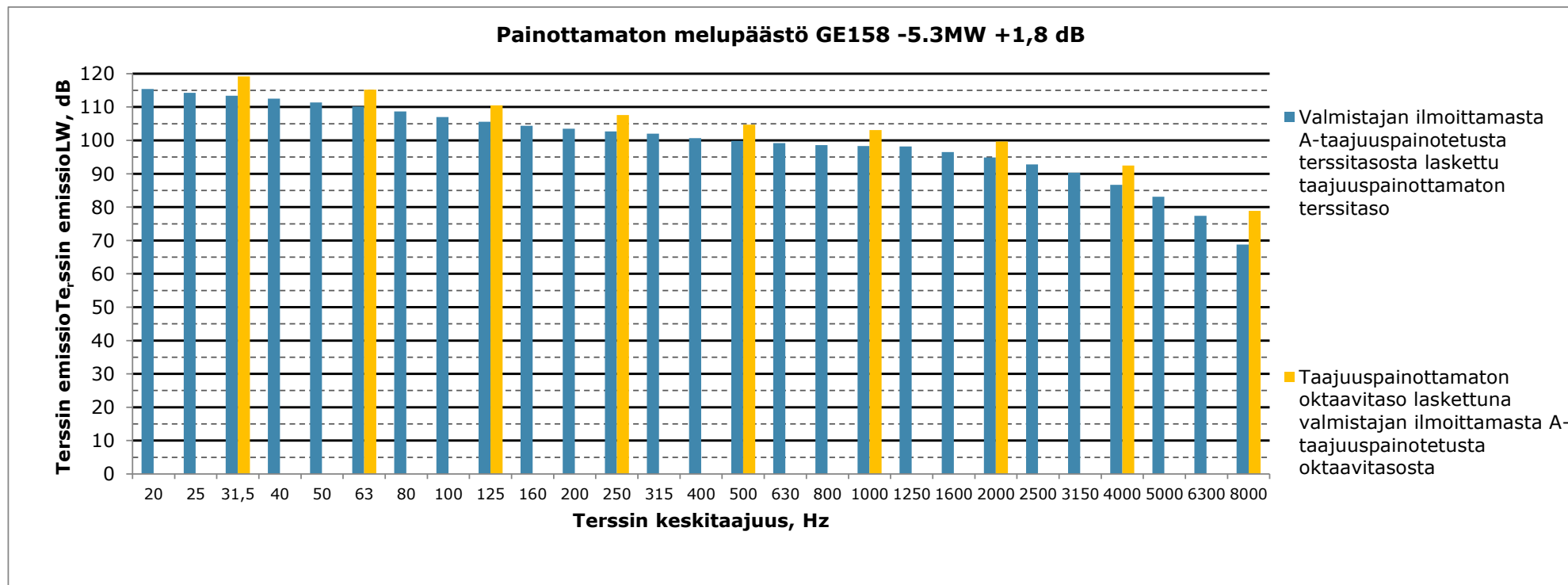
17.4.2020

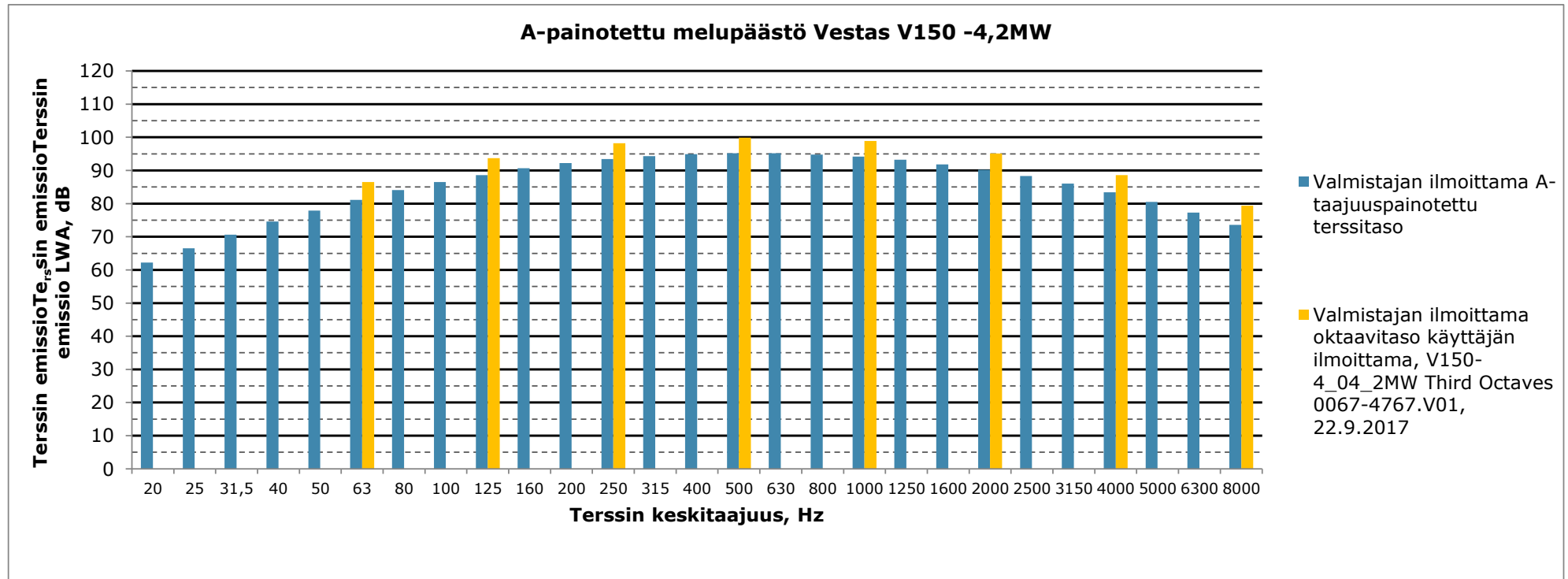
Liite 4: Puutionsaari VE1 - Matalataajuisen melun yhteismallinnuksen
rakennuskohtaiset arvot

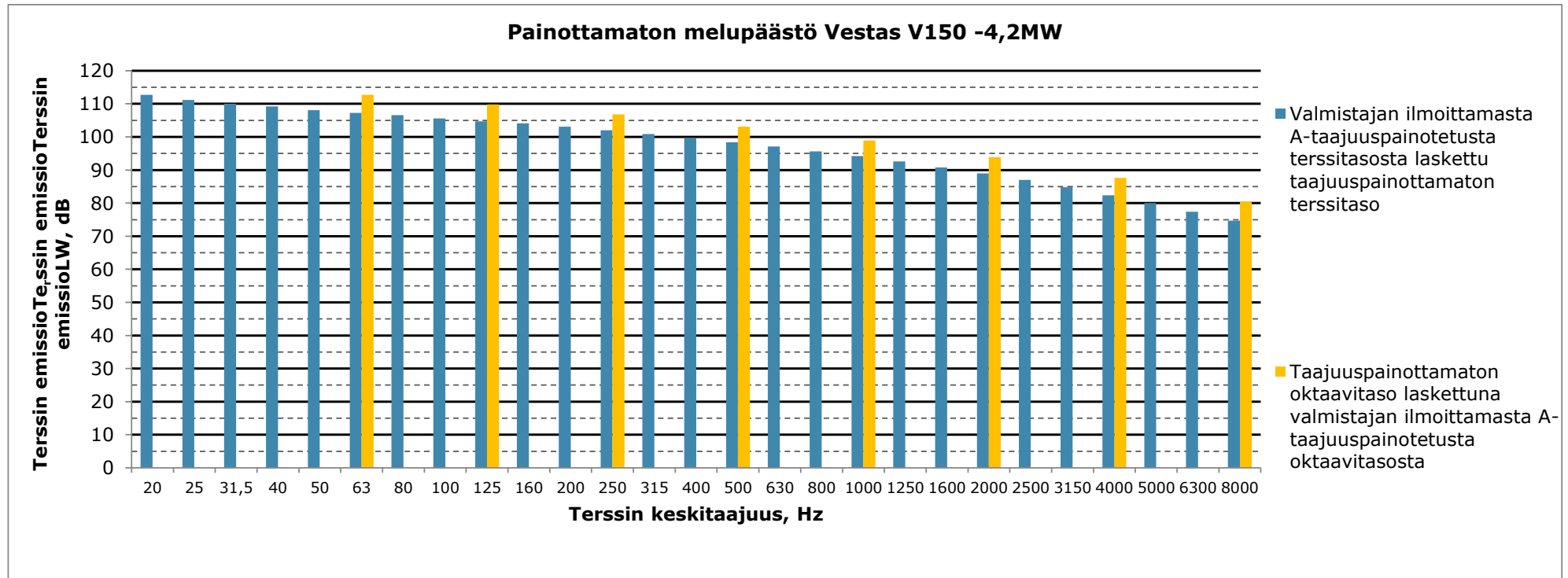




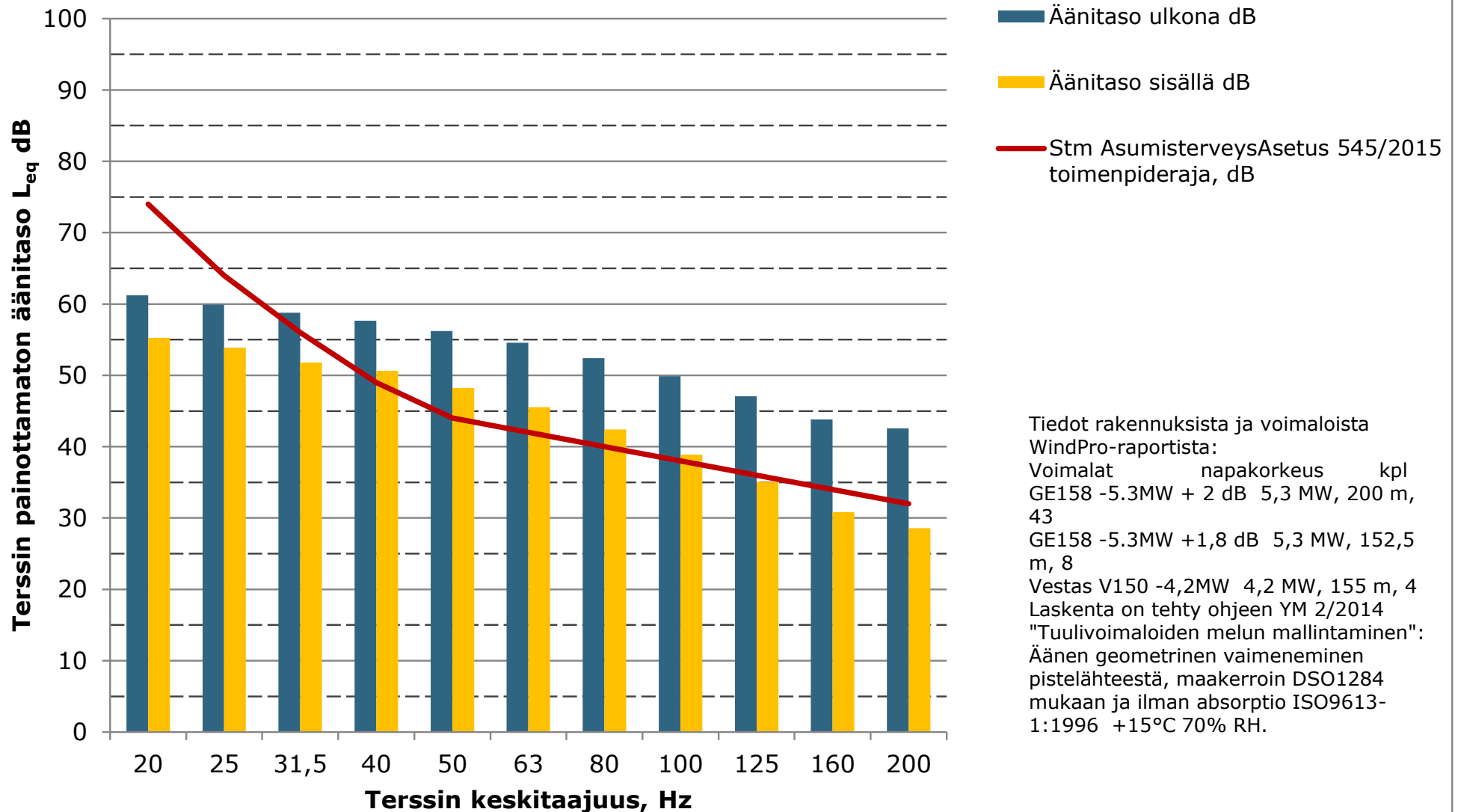




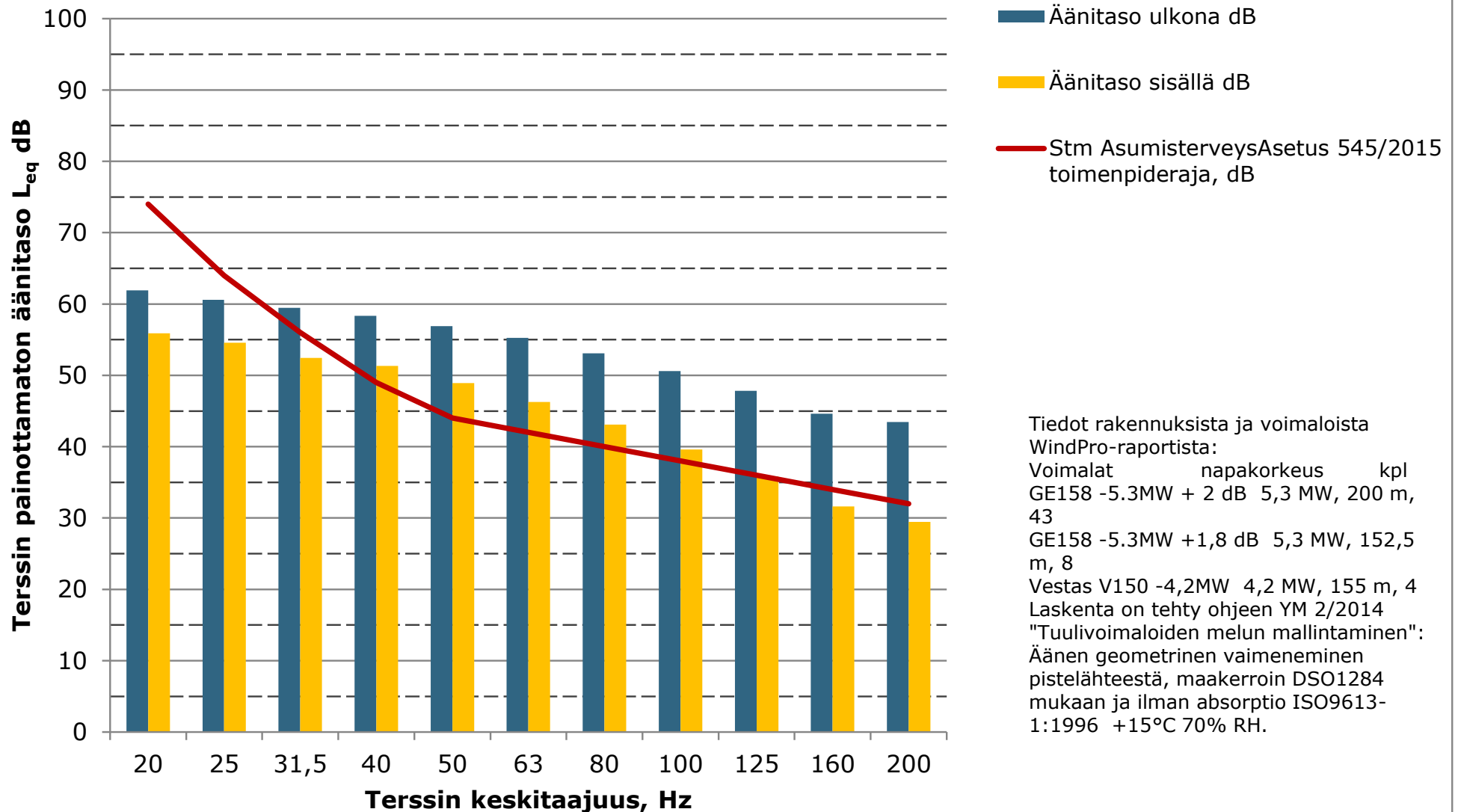




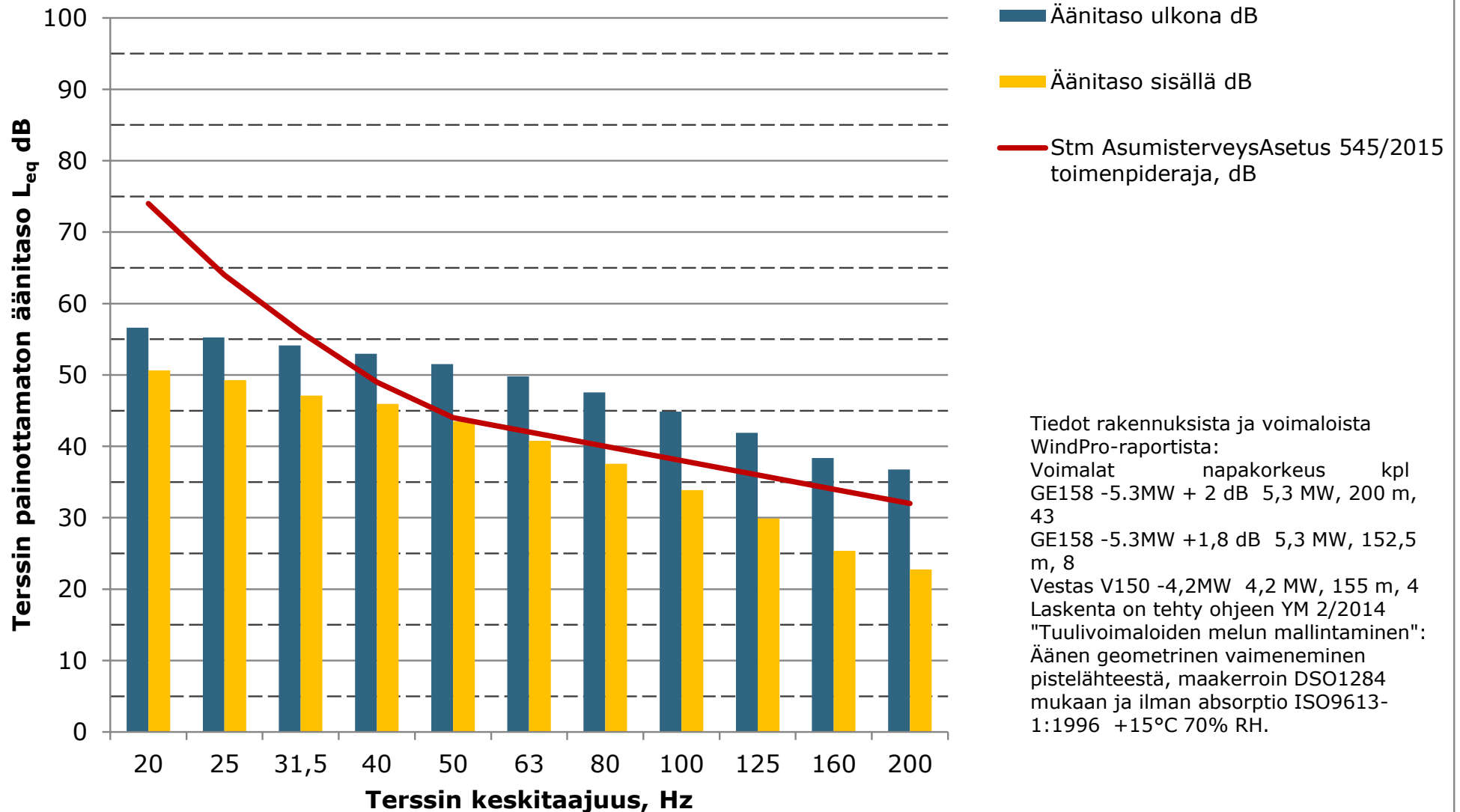
Matalien taajuuksien äänitasot ulkona ja sisällä, Lomarakennus A (Vesiperän metsätie, Kivikaarto), ääneneristävyys Keränen, Hakala, Hongisto 2017, vähimmäisarvon estimaatti DL90 mukaan



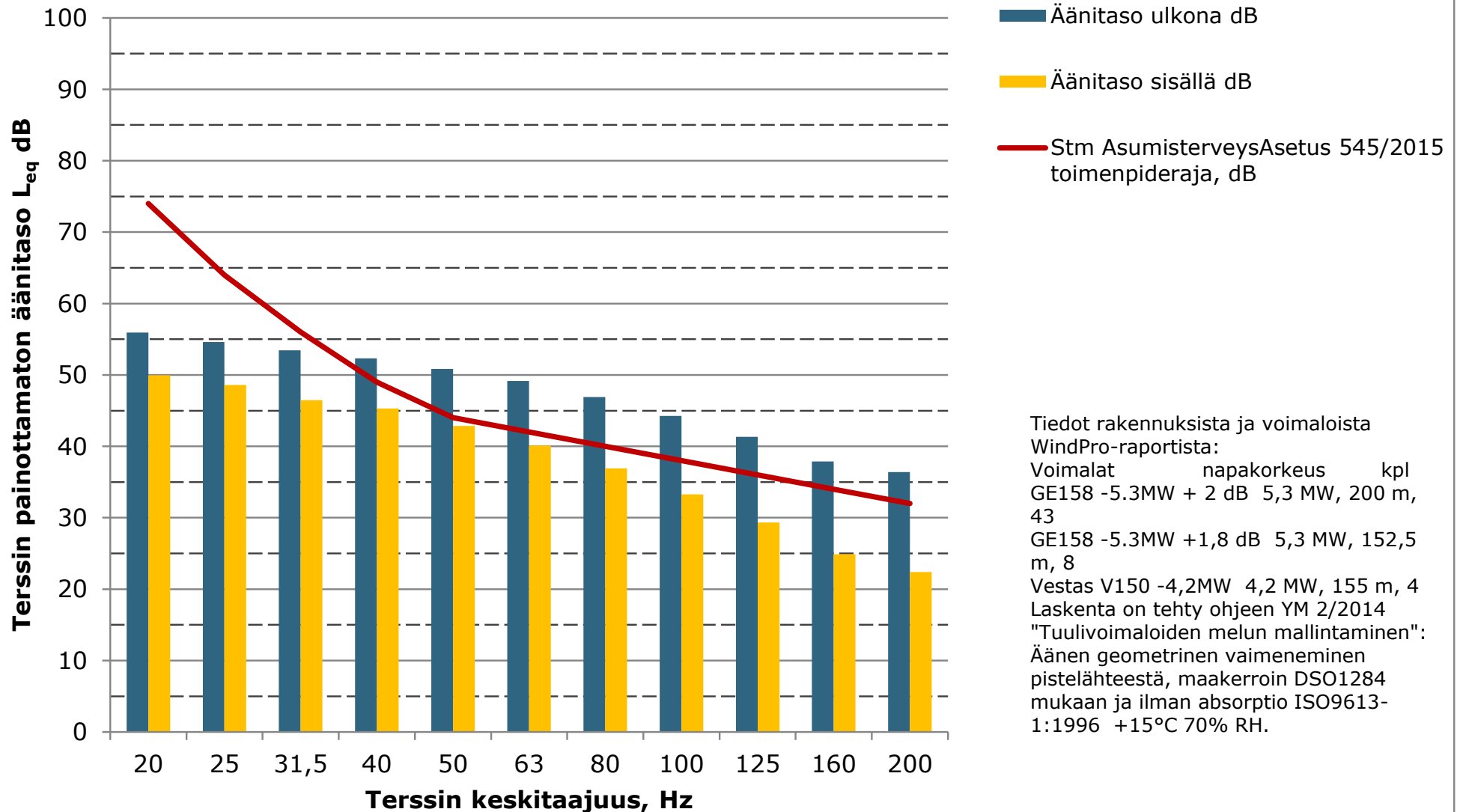
**Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus B
(Ylivieskantie, Pöhlölä), ääneneristävyys Keränen, Hakala, Hongisto 2017,
vähimmäisarvon estimaatti DL90 mukaan**



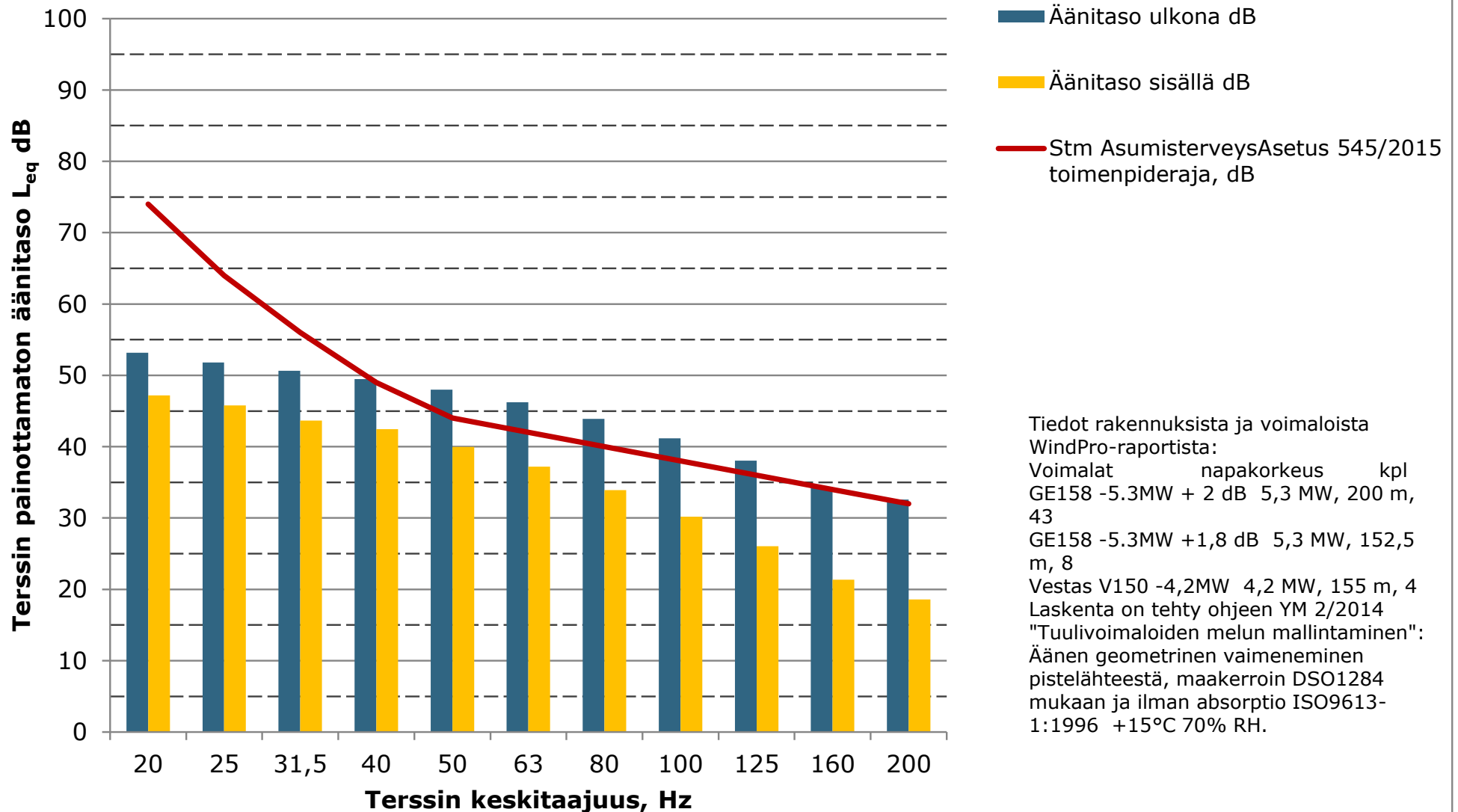
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus C (Perkkiöntie 382), ääneneristävyys Keränen,Hakala,Hongisto 2017, vähimmäisarvon estimaatti DL90 mukaan



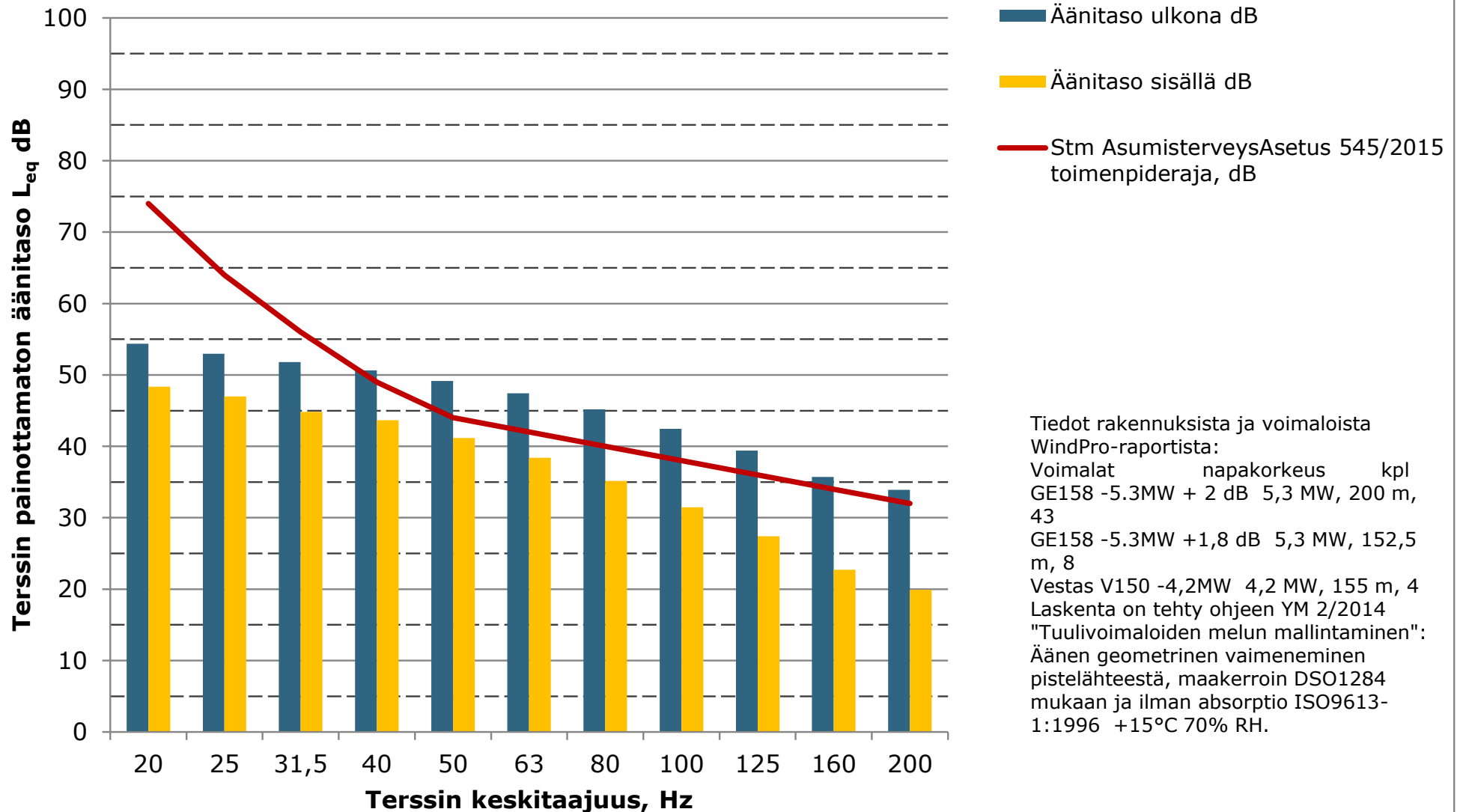
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus D (Alakyläntie 243), ääneneristävyys Keränen, Hakala, Hongisto 2017, vähimmäisarvon estimaatti DL90 mukaan



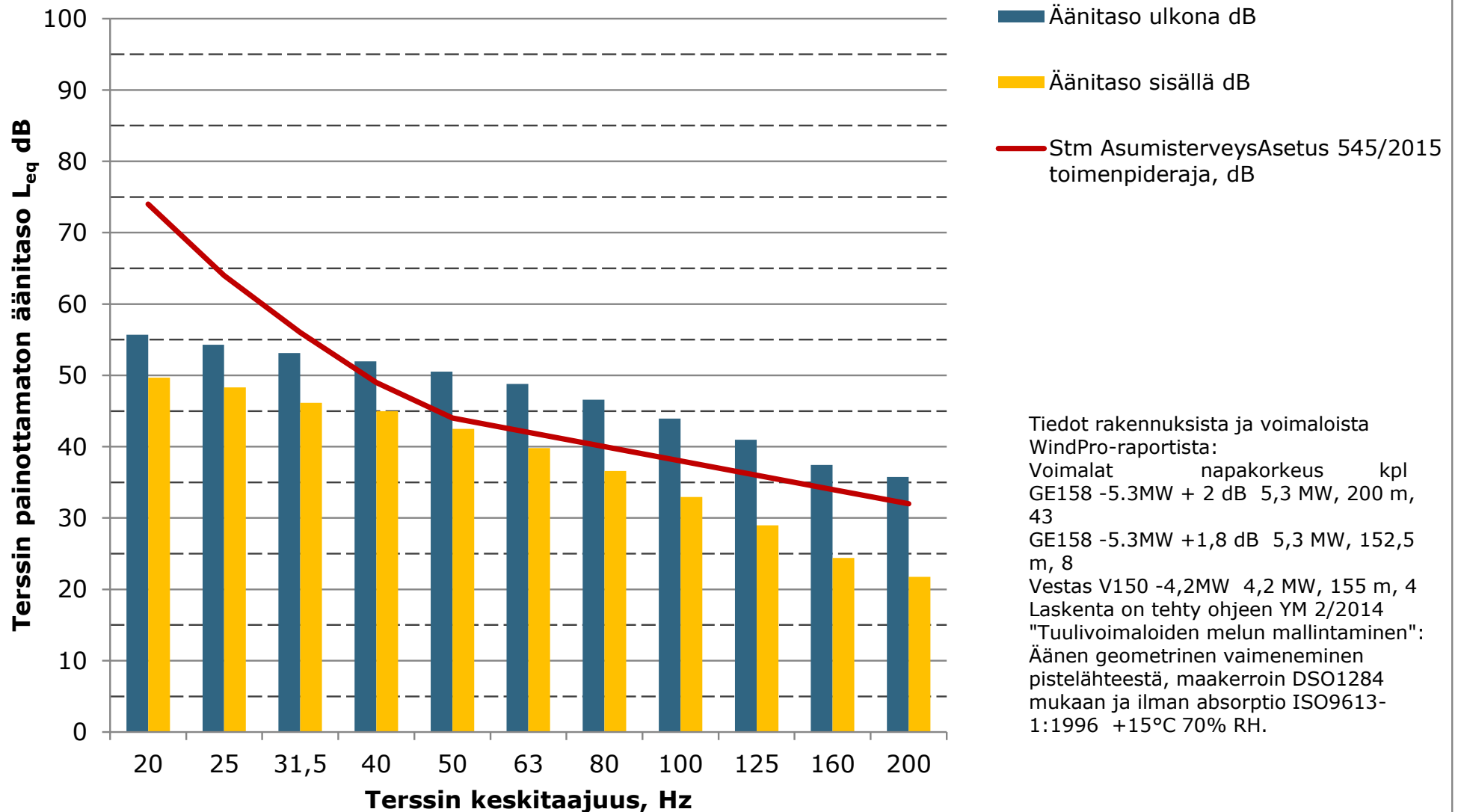
**Matalien taajuuksien äänitasot ulkona ja sisällä, Lomarakennus E
(Kellokankaan metsätie), ääneneristävyys Keränen, Hakala, Hongisto 2017,
vähimmäisarvon estimaatti DL90 mukaan**



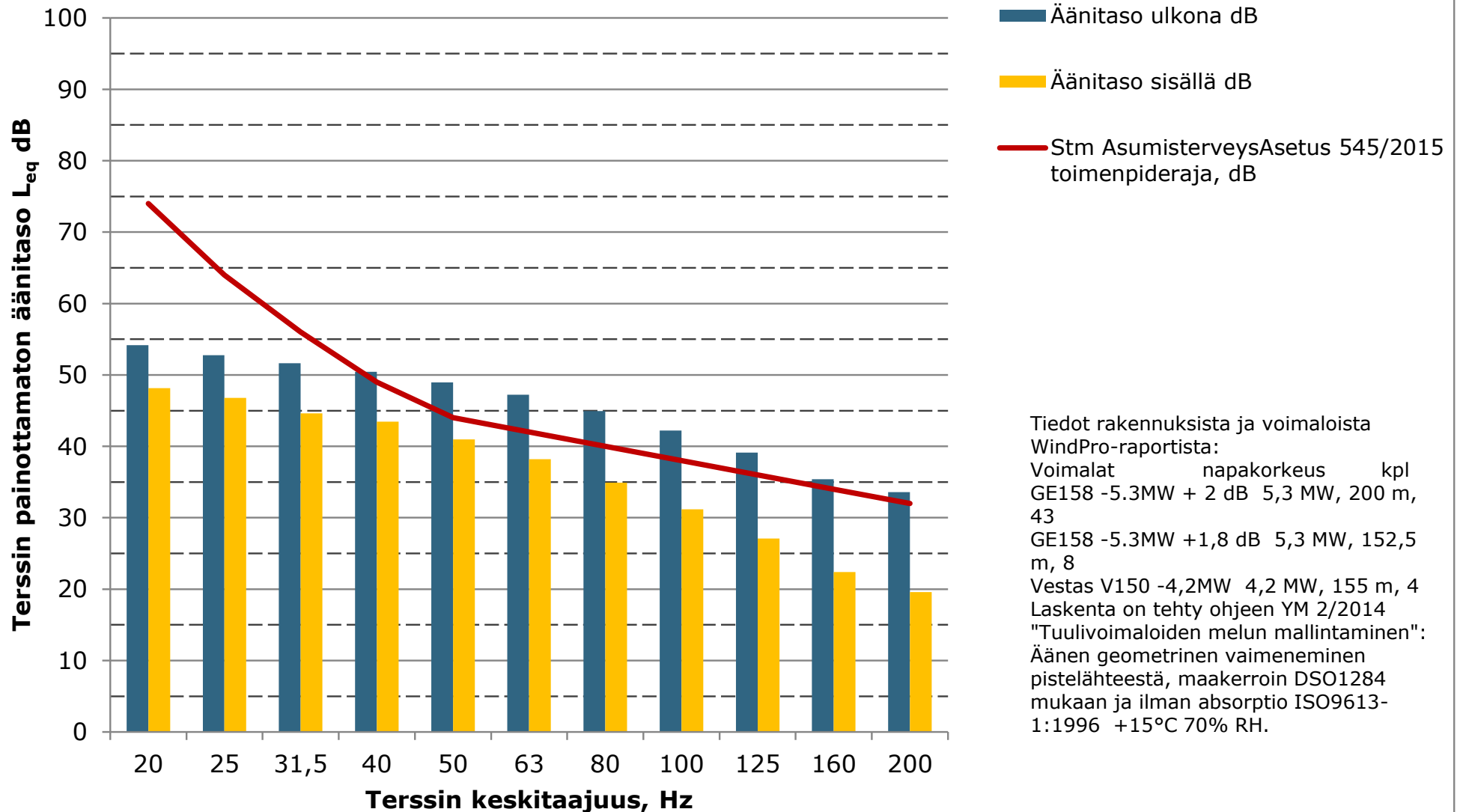
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus F (Ollilantie 112), ääneneristävyys Keränen,Hakala,Hongisto 2017, vähimmäisarvon estimaatti DL90 mukaan



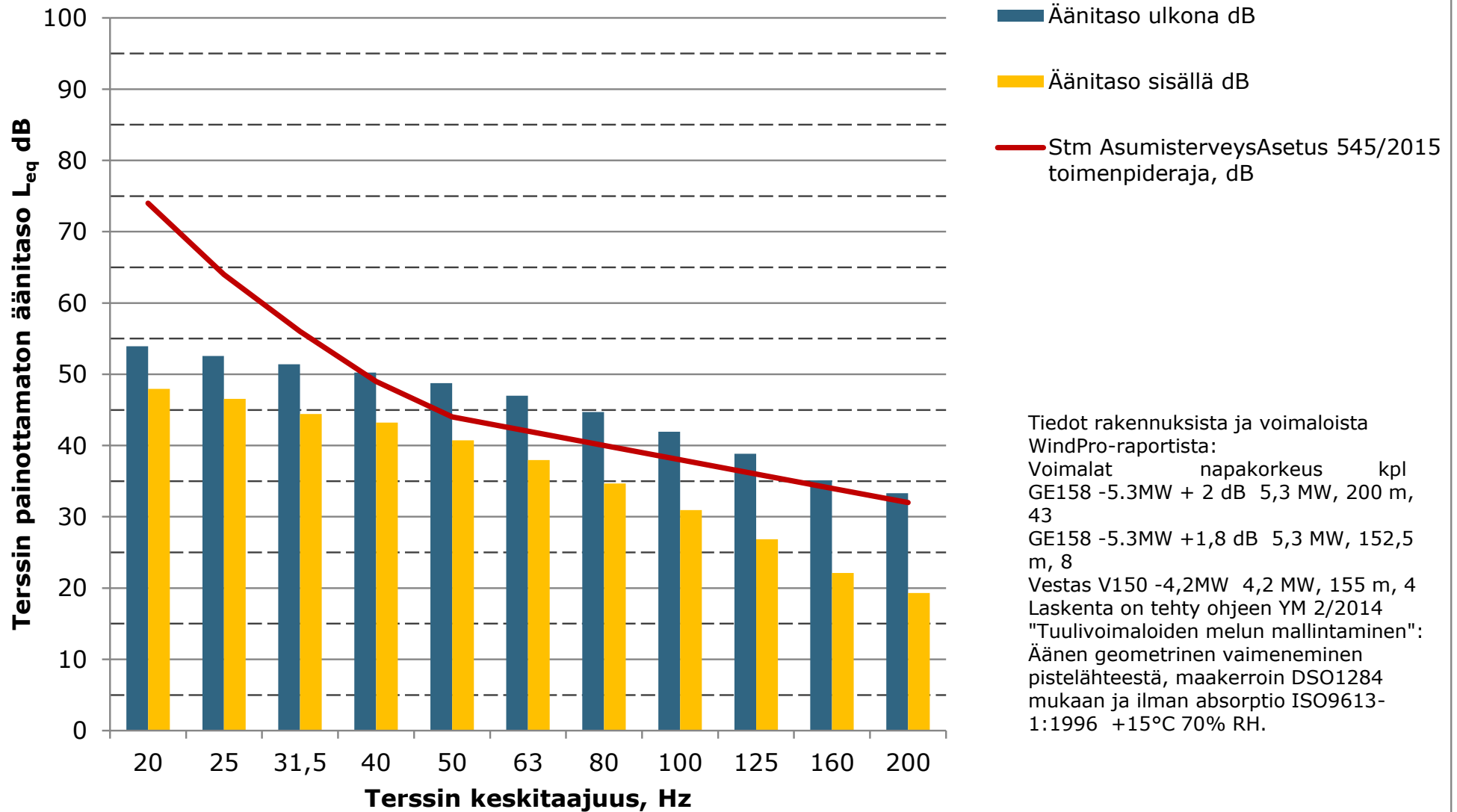
Matalien taajuuksien äänitasot ulkona ja sisällä, Lomarakennus G (Ollilantie, Siliäkuru), ääneneristävyys Keränen, Hakala, Hongisto 2017, vähimmäisarvon estimaatti DL90 mukaan



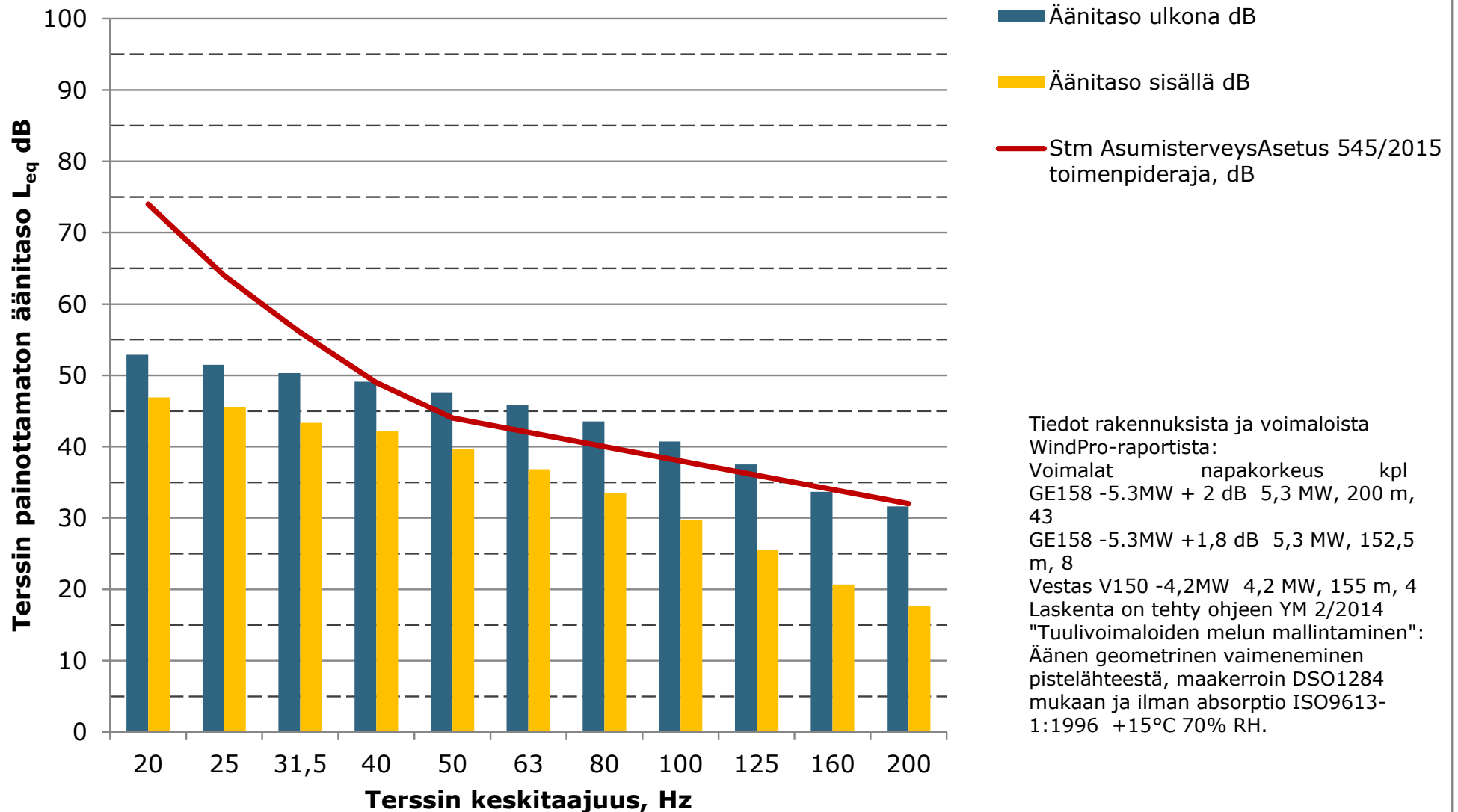
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus H (Pinolantie 406), ääneneristävyys Keränen,Hakala,Hongisto 2017, vähimmäisarvon estimaatti DL90 mukaan



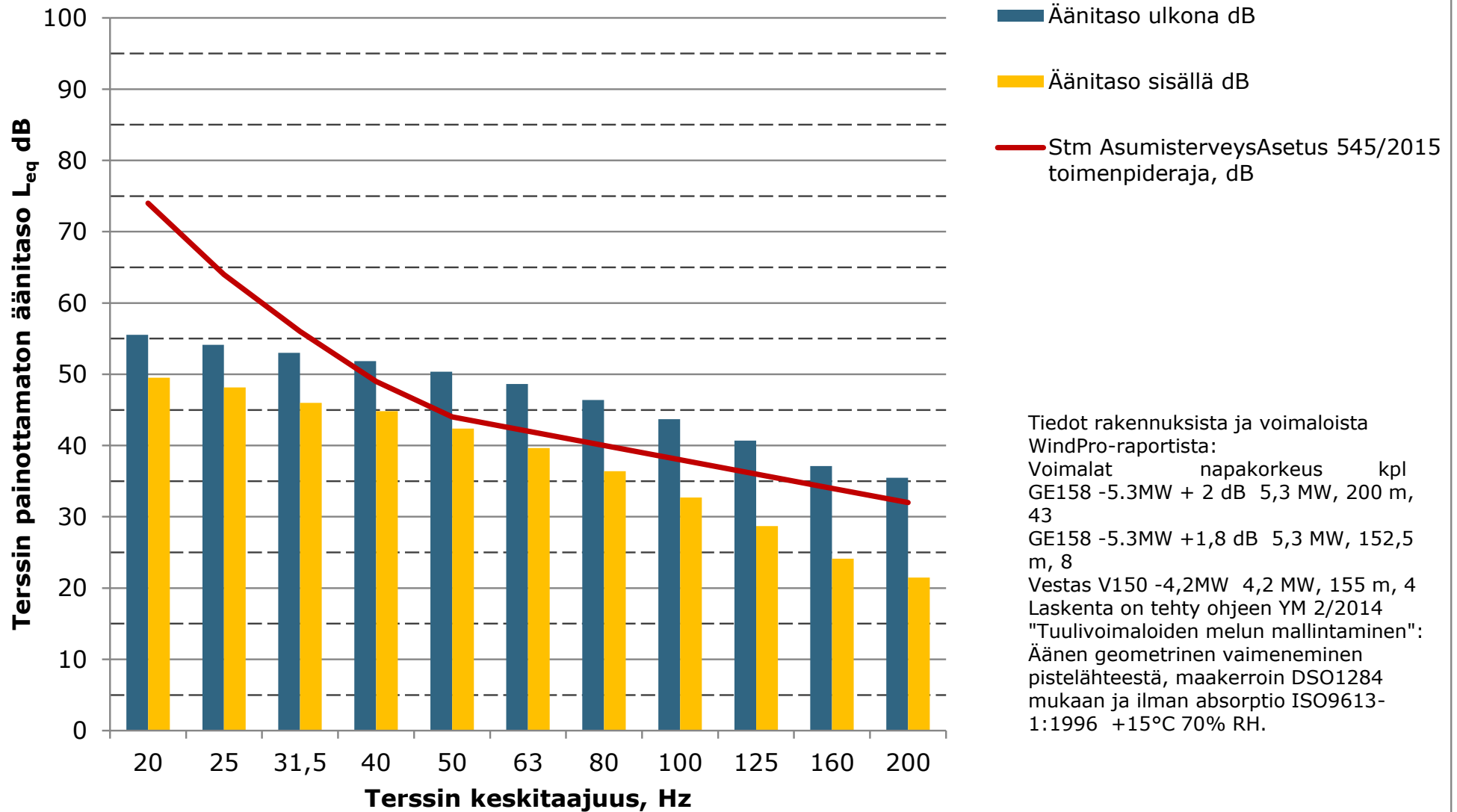
**Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus I
(Kortenevantie 116), ääneneristävyys Keränen, Hakala, Hongisto 2017,
vähimmäisarvon estimaatti DL90 mukaan**



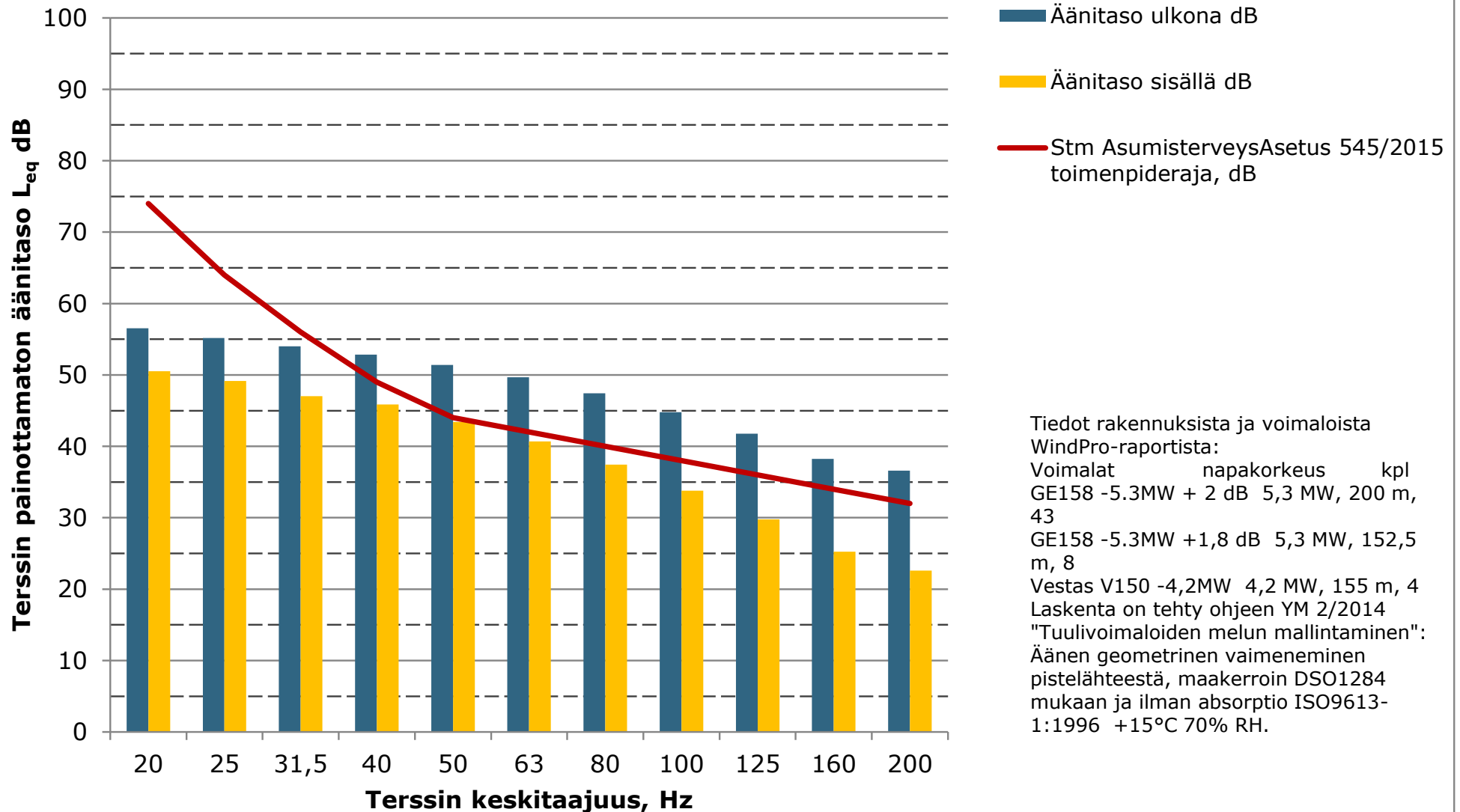
**Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus J
(Haapavesitie 1406), ääneneristävyys Keränen, Hakala, Hongisto 2017,
vähimmäisarvon estimaatti DL90 mukaan**



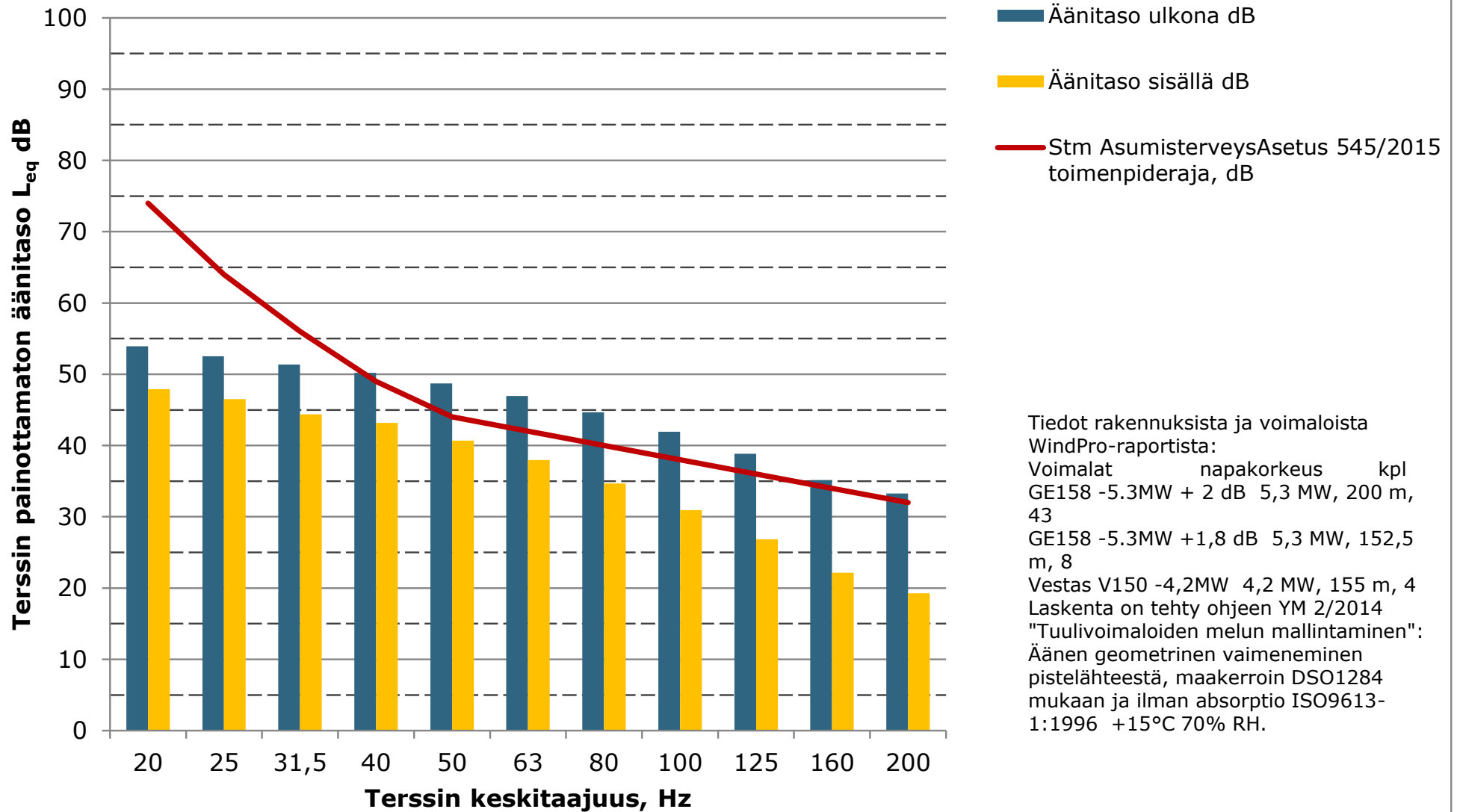
**Matalien taajuuksien äänitasot ulkona ja sisällä, Lomarakenus K (Kurunoja),
ääneneristävyys Keränen, Hakala, Hongisto 2017, vähimmäisarvon estimaatti
DL90 mukaan**



Matalien taajuuksien äänitasot ulkona ja sisällä, Lomarakennus L (Perkkiontie, Ilmola), ääneneristävyyden Keränen, Hakala, Hongisto 2017, vähimmäisarvon estimaatti DL90 mukaan



Matalien taajuuksien äänitasot ulkona ja sisällä, Lomarakennus M (Riskalan metsatie), ääneneristävyys Keränen, Hakala, Hongisto 2017, vähimmäisarvon estimaatti DL90 mukaan



17.4.2020

Liite 5: Puutionsaari VE1 - Varjostusmallinnusten tulokset "real case, no forest"

SHADOW - Main Result

Calculation: Puutionsaari_VE1_RD200x43xHH200_no forest_20200402

Assumptions for shadow calculations

Maximum distance for influence
Calculate only when more than 20 % of sun is covered by the blade
Please look in WTG table

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

Sunshine probability S (Average daily sunshine hours) [UMEA]
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
1,02 2,84 3,78 6,14 8,62 9,94 7,42 5,13 4,32 3,43 1,58 0,96

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

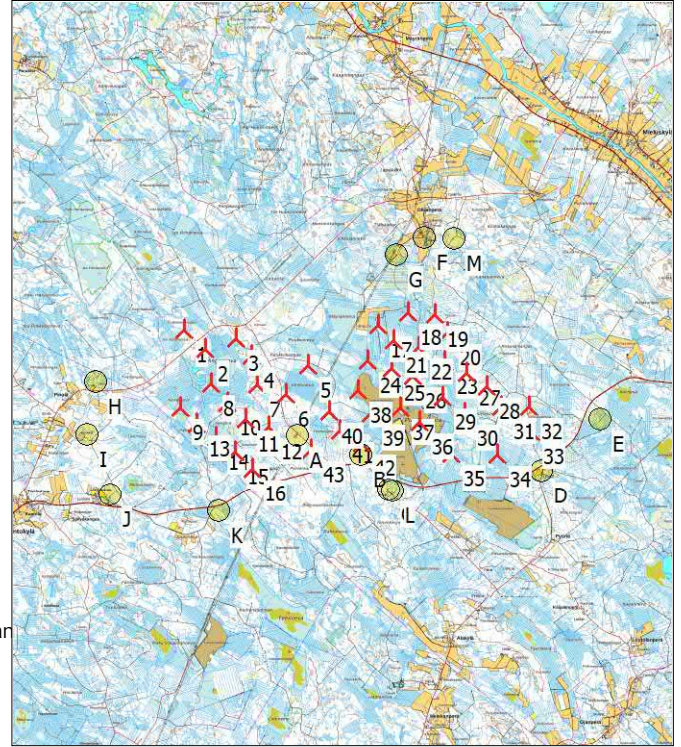
MERRA_basic_E25.335_N64.000 (3)

Operational time
N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
576 423 402 429 548 894 1047 1090 994 842 717 711 8674
Idle start wind speed: Cut in wind speed from power curve

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:
Height contours used: Height Contours: CONTOURLINE_Puutionsaari_Riskalan
Obstacles used in calculation
Eye height for map: 1,5 m
Grid resolution: 1,0 m

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89

WTGs



Scale 1:200 000
New WTG Shadow receptor

| | East | North | Z | Row data/Description | WTG type | | | Shadow data | | | |
|----|--------|---------|-------|---|----------|------------|----------------|-------------------|--------------------|----------------|--------------------------|
| | | | | | Valid | Manufact. | Type-generator | Power, rated [kW] | Rotor diameter [m] | Hub height [m] | Calculation distance [m] |
| 1 | 399241 | 7112464 | 94,0 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 2 | 399796 | 7111966 | 97,5 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 3 | 400591 | 7112251 | 97,8 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 4 | 401005 | 7111796 | 100,0 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 5 | 402495 | 7111524 | 106,6 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 6 | 401910 | 7110769 | 107,4 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 7 | 401156 | 7111035 | 104,5 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 8 | 399940 | 7111056 | 97,5 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 9 | 399132 | 7110420 | 95,8 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 10 | 400364 | 7110552 | 98,6 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 11 | 400851 | 7110131 | 101,8 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 12 | 401462 | 7109916 | 102,8 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 13 | 399562 | 7109992 | 97,5 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 14 | 400065 | 7109631 | 100,0 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 15 | 400578 | 7109257 | 102,8 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 16 | 401021 | 7108796 | 105,1 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 17 | 404336 | 7112600 | 102,7 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 18 | 405133 | 7112922 | 100,3 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 19 | 405834 | 7112878 | 101,2 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 20 | 406171 | 7112395 | 103,9 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 21 | 404759 | 7112195 | 105,0 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 22 | 405399 | 7112017 | 102,5 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 23 | 406086 | 7111637 | 103,0 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 24 | 404064 | 7111669 | 104,9 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 25 | 404693 | 7111450 | 105,5 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 26 | 405262 | 7111259 | 104,6 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 27 | 406667 | 7111338 | 106,6 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 28 | 407209 | 7110982 | 111,9 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 29 | 406033 | 7110701 | 104,0 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 30 | 406628 | 7110262 | 105,0 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 31 | 407576 | 7110456 | 114,2 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |

To be continued on next page...

SHADOW - Main Result

Calculation: Puutionsaari_VE1_RD200x43xHH200_no forest_20200402

...continued from previous page

| | East | North | Z | Row data/Description | WTG type | | | Power, rated [kW] | Rotor diameter [m] | Hub height [m] | Shadow data | |
|----|--------|---------|-------|---|----------|------------|----------------|-------------------------|--------------------------|----------------------|--------------------------------|--------------|
| | | | | | Valid | Manufact. | Type-generator | | | | Calculation distance [m] | RPM [RPM] |
| | | | [m] | | | | | | | | | |
| 32 | 408319 | 7110460 | 119,2 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 | |
| 33 | 408384 | 7109795 | 116,1 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 | |
| 34 | 407482 | 7109189 | 112,5 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 | |
| 35 | 406283 | 7109196 | 110,2 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 | |
| 36 | 405436 | 7110043 | 106,4 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 | |
| 37 | 404925 | 7110413 | 105,8 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 | |
| 38 | 403807 | 7110889 | 106,8 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 | |
| 39 | 404142 | 7110263 | 107,4 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 | |
| 40 | 403047 | 7110331 | 108,1 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 | |
| 41 | 403334 | 7109808 | 111,9 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 | |
| 42 | 403921 | 7109494 | 109,9 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 | |
| 43 | 402563 | 7109304 | 112,5 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 | |

Shadow receptor-Input

| No. | Name | East | North | Z | Width | Height | Elevation a.g.l. | Slope of window [°] | Direction mode | Eye height (ZVI) a.g.l. [m] |
|-----|--|--------|---------|-------|-------|--------|---------------------|------------------------------|--------------------|-----------------------------------|
| A | Lomarakenus A (Vesiperän metsätie, Kivikaarto) | 402212 | 7109691 | 112,5 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| B | Asuinrakennus B (Ylivieskantie, Pohlola) | 403894 | 7109182 | 114,4 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| C | Asuinrakennus C (Perkkiontie 382) | 404620 | 7108247 | 113,6 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| D | Asuinrakennus D (Alakylantie 243) | 408659 | 7108752 | 119,4 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| E | Lomarakenus E (Kellokankaan metsätie) | 410199 | 7110115 | 122,5 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| F | Asuinrakennus F (Ollilantie 112) | 405573 | 7114900 | 87,7 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| G | Lomarakenus G (Ollilantie, Siliakuru) | 404837 | 7114441 | 100,0 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| H | Asuinrakennus H (Pinolantie 406) | 396893 | 7111098 | 88,1 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| I | Asuinrakennus I (Kortenevantie 116) | 396670 | 7109704 | 87,5 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| J | Asuinrakennus J (Haapavesitie 1406) | 397273 | 7108116 | 89,3 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| K | Lomarakenus K (Kurunoja) | 400152 | 7107685 | 102,3 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| L | Lomarakenus L (Perkkiontie, Ilmola) | 404739 | 7108222 | 113,7 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| M | Lomarakenus M (Riskalan metsätie) | 406348 | 7114887 | 102,7 | 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 | Lomarakenus A (Vesiperän metsätie, Kivikaarto) | 93:10 |
| B | Asuinrakennus B (Ylivieskantie, Pohlola) | 14:08 |
| C | Asuinrakennus C (Perkkiontie 382) | 10:51 |
| D | Asuinrakennus D (Alakylantie 243) | 9:15 |
| E | Lomarakenus E (Kellokankaan metsätie) | 4:29 |
| F | Asuinrakennus F (Ollilantie 112) | 4:45 |
| G | Lomarakenus G (Ollilantie, Siliakuru) | 11:22 |
| H | Asuinrakennus H (Pinolantie 406) | 1:16 |
| I | Asuinrakennus I (Kortenevantie 116) | 0:00 |
| J | Asuinrakennus J (Haapavesitie 1406) | 0:00 |
| K | Lomarakenus K (Kurunoja) | 0:00 |
| L | Lomarakenus L (Perkkiontie, Ilmola) | 13:05 |
| M | Lomarakenus M (Riskalan metsätie) | 3:37 |

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

| No. | Name | Worst case [h/year] | Expected [h/year] |
|-----|--|------------------------|----------------------|
| 1 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1) | 0:00 | 0:00 |
| 2 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (2) | 0:00 | 0:00 |
| 3 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (3) | 0:00 | 0:00 |
| 4 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (4) | 0:00 | 0:00 |
| 5 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (5) | 0:00 | 0:00 |
| 6 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (6) | 0:00 | 0:00 |

To be continued on next page...

SHADOW - Main Result

Calculation: Puutionsaari_VE1_RD200x43xHH200_no forest_20200402

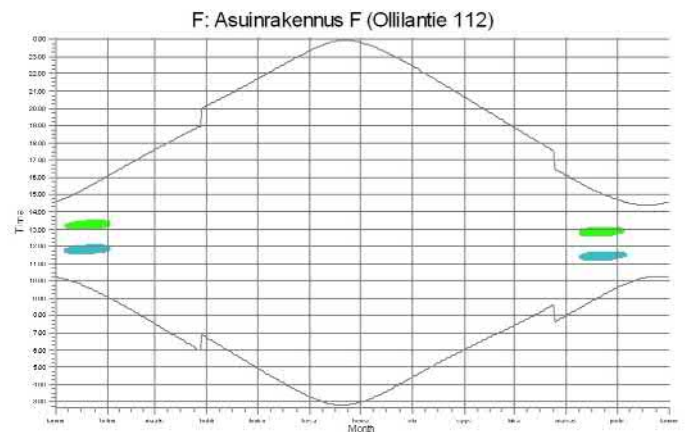
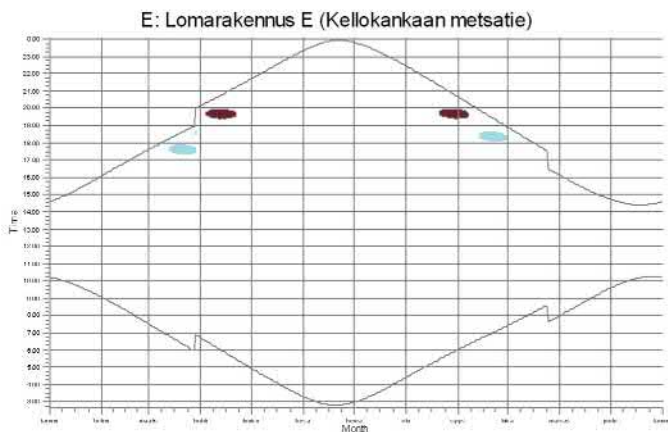
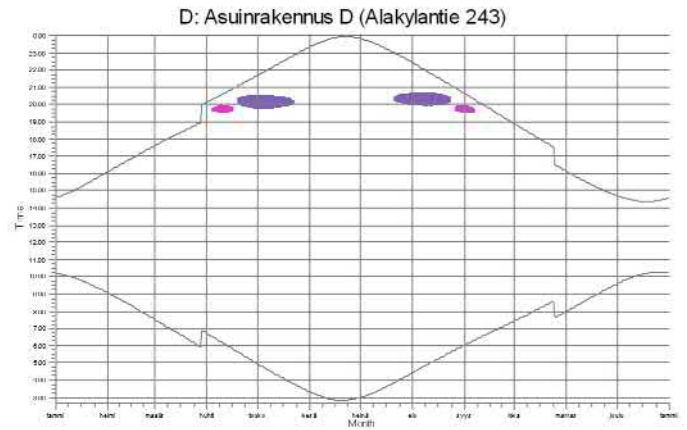
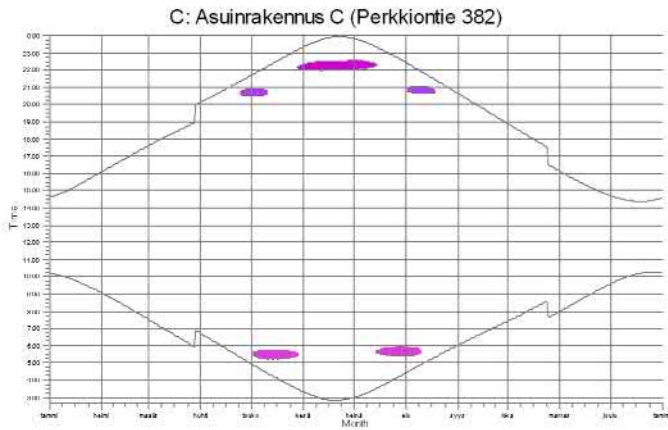
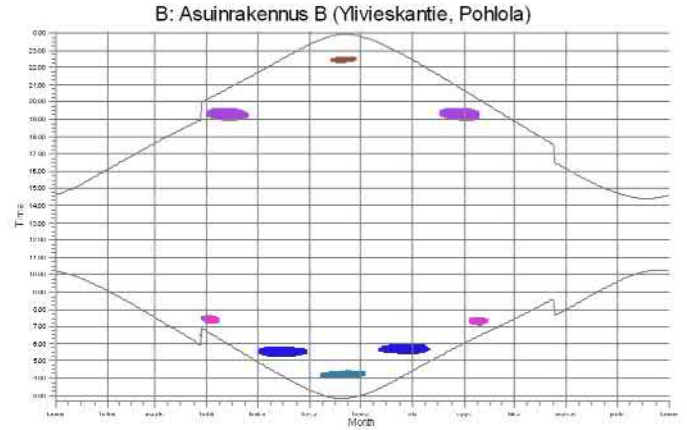
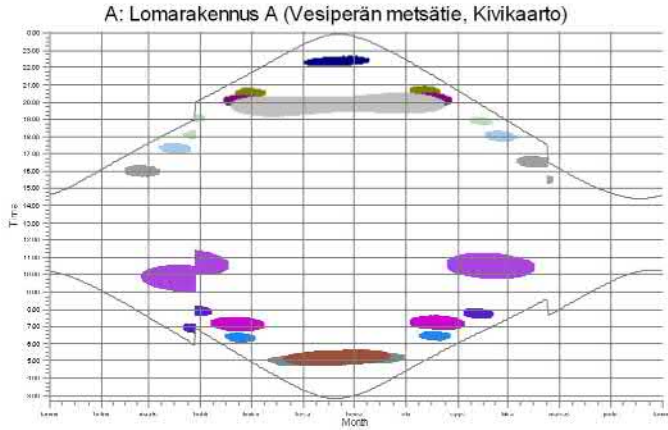
...continued from previous page

| No. | Name | Worst case [h/year] | Expected [h/year] |
|-----|---|------------------------|----------------------|
| 7 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (7) | 12:15 | 3:37 |
| 8 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (8) | 0:00 | 0:00 |
| 9 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (9) | 6:21 | 1:16 |
| 10 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (10) | 10:57 | 2:35 |
| 11 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (11) | 22:52 | 5:10 |
| 12 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (12) | 108:57 | 27:30 |
| 13 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (13) | 0:00 | 0:00 |
| 14 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (14) | 7:12 | 1:28 |
| 15 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (15) | 12:46 | 2:27 |
| 16 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (16) | 17:46 | 3:41 |
| 17 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (17) | 18:18 | 2:33 |
| 18 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (18) | 51:00 | 7:37 |
| 19 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (19) | 47:16 | 7:17 |
| 20 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (20) | 7:44 | 1:22 |
| 21 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (21) | 15:58 | 2:12 |
| 22 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (22) | 0:00 | 0:00 |
| 23 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (23) | 0:00 | 0:00 |
| 24 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (24) | 0:00 | 0:00 |
| 25 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (25) | 0:00 | 0:00 |
| 26 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (26) | 0:00 | 0:00 |
| 27 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (27) | 0:00 | 0:00 |
| 28 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (28) | 0:00 | 0:00 |
| 29 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (29) | 0:00 | 0:00 |
| 30 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (30) | 0:00 | 0:00 |
| 31 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (31) | 0:00 | 0:00 |
| 32 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (32) | 10:54 | 2:24 |
| 33 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (33) | 10:36 | 2:04 |
| 34 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (34) | 33:15 | 7:59 |
| 35 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (35) | 42:33 | 10:28 |
| 36 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (36) | 21:00 | 5:18 |
| 37 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (37) | 6:27 | 1:51 |
| 38 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (38) | 26:12 | 6:58 |
| 39 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (39) | 10:50 | 2:19 |
| 40 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (40) | 40:14 | 11:02 |
| 41 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (41) | 57:46 | 14:23 |
| 42 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (42) | 12:39 | 2:39 |
| 43 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (43) | 147:25 | 32:21 |

Total times in Receptor wise and WTG wise tables can differ, as a WTG can lead to flicker at 2 or more receptors simultaneously and/or receptors may receive flicker from 2 or more WTGs simultaneously.

SHADOW - Calendar, graphical

Calculation: Puutionsaari_VE1_RD200x43xHH200_no forest_20200402

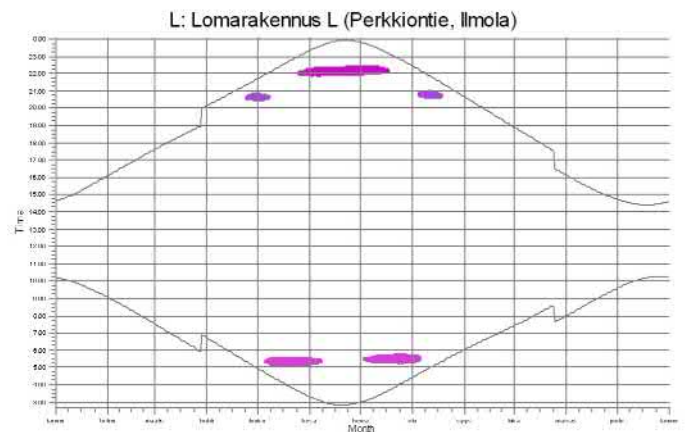
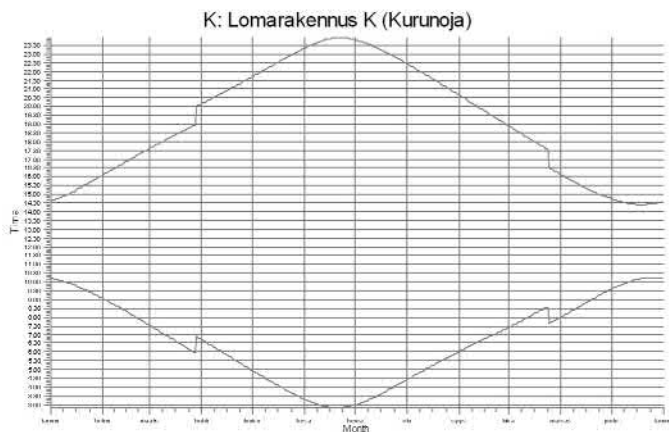
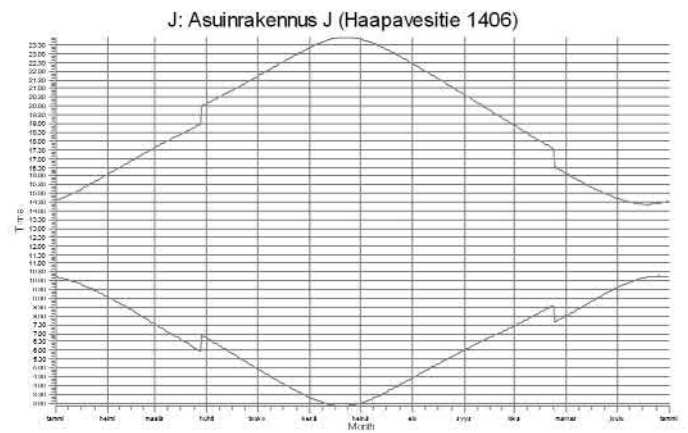
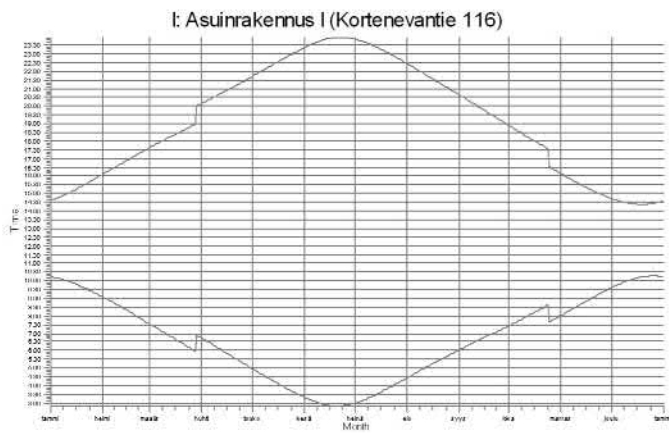
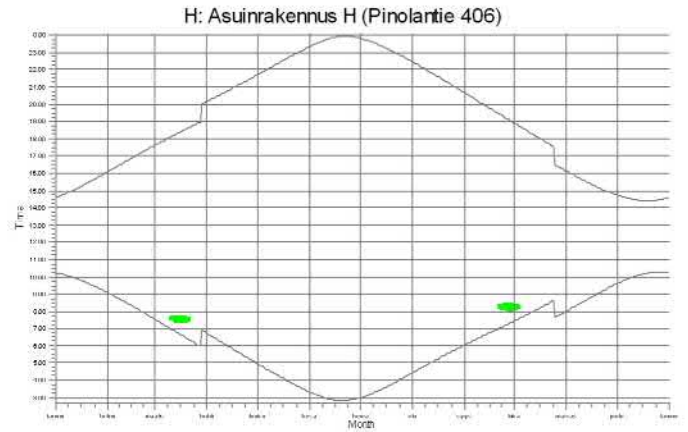
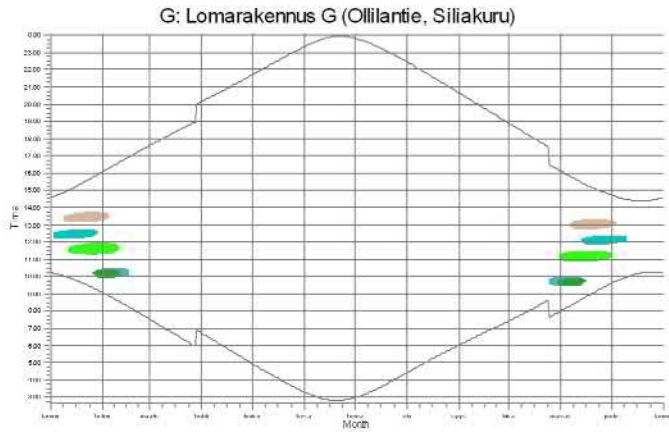


WTGs

| | | | |
|--|--|--|--|
| 7: Generic RD200 5600 200.0 IOI | 10: Generic RD200 5600 200.0 IOI | 13: Generic RD200 5600 200.0 IOI | 16: Generic RD200 5600 200.0 IOI |
| 8: Generic RD200 5600 200.0 IOI | 11: Generic RD200 5600 200.0 IOI | 14: Generic RD200 5600 200.0 IOI | 17: Generic RD200 5600 200.0 IOI |
| 9: Generic RD200 5600 200.0 IOI | 12: Generic RD200 5600 200.0 IOI | 15: Generic RD200 5600 200.0 IOI | 18: Generic RD200 5600 200.0 IOI |
| 19: Generic RD200 5600 200.0 IOI | 20: Generic RD200 5600 200.0 IOI | 21: Generic RD200 5600 200.0 IOI | 22: Generic RD200 5600 200.0 IOI |
| 23: Generic RD200 5600 200.0 IOI | 24: Generic RD200 5600 200.0 IOI | 25: Generic RD200 5600 200.0 IOI | 26: Generic RD200 5600 200.0 IOI |
| 27: Generic RD200 5600 200.0 IOI | 28: Generic RD200 5600 200.0 IOI | 29: Generic RD200 5600 200.0 IOI | 30: Generic RD200 5600 200.0 IOI |
| 31: Generic RD200 5600 200.0 IOI | 32: Generic RD200 5600 200.0 IOI | 33: Generic RD200 5600 200.0 IOI | 34: Generic RD200 5600 200.0 IOI |
| 35: Generic RD200 5600 200.0 IOI | 36: Generic RD200 5600 200.0 IOI | 37: Generic RD200 5600 200.0 IOI hub: 200.0 m (TOT: 300.0 m) | 38: Generic RD200 5600 200.0 IOI hub: 200.0 m (TOT: 300.0 m) |
| 39: Generic RD200 5600 200.0 IOI hub: 200.0 m (TOT: 300.0 m) | 40: Generic RD200 5600 200.0 IOI hub: 200.0 m (TOT: 300.0 m) | 41: Generic RD200 5600 200.0 IOI hub: 200.0 m (TOT: 300.0 m) | 42: Generic RD200 5600 200.0 IOI hub: 200.0 m (TOT: 300.0 m) |
| 43: Generic RD200 5600 200.0 IOI hub: 200.0 m (TOT: 300.0 m) | 44: Generic RD200 5600 200.0 IOI hub: 200.0 m (TOT: 300.0 m) | 45: Generic RD200 5600 200.0 IOI hub: 200.0 m (TOT: 300.0 m) | 46: Generic RD200 5600 200.0 IOI hub: 200.0 m (TOT: 300.0 m) |

SHADOW - Calendar, graphical

Calculation: Puutionsaari_VE1_RD200x43xHH200_no forest_20200402



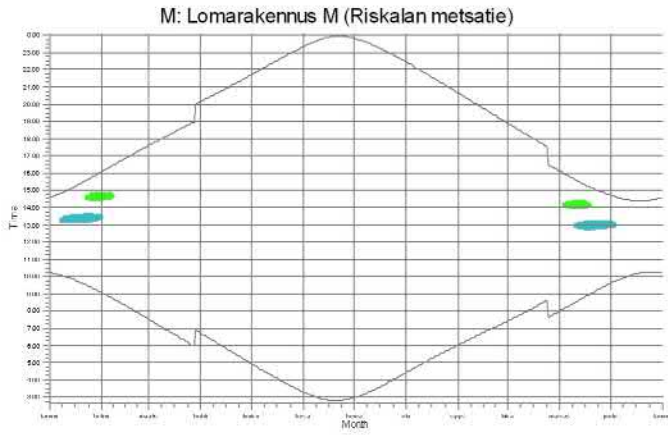
- WTGs
- 9: Generic RD200 5600 200.0 IOI (TOT: 300.0 m) (35)
 - 17: Generic RD200 5600 200.0 IOI (TOT: 300.0 m) (41)
 - 18: Generic RD200 5600 200.0 IOI (TOT: 300.0 m) (43)

Project: Puutionsaari_Riskalankangas_20200327
Description: VSB

Licensed user:
FCG Suunnittelu ja tekniikka Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+ 358104095666
Henna-Riikka Rintamäki / henna-riikka.rintamaki@fcg.fi
Calculated:
2.4.2020 13.56/3.3.247

SHADOW - Calendar, graphical

Calculation: Puutionsaari_VE1_RD200x43xHH200_no forest_20200402

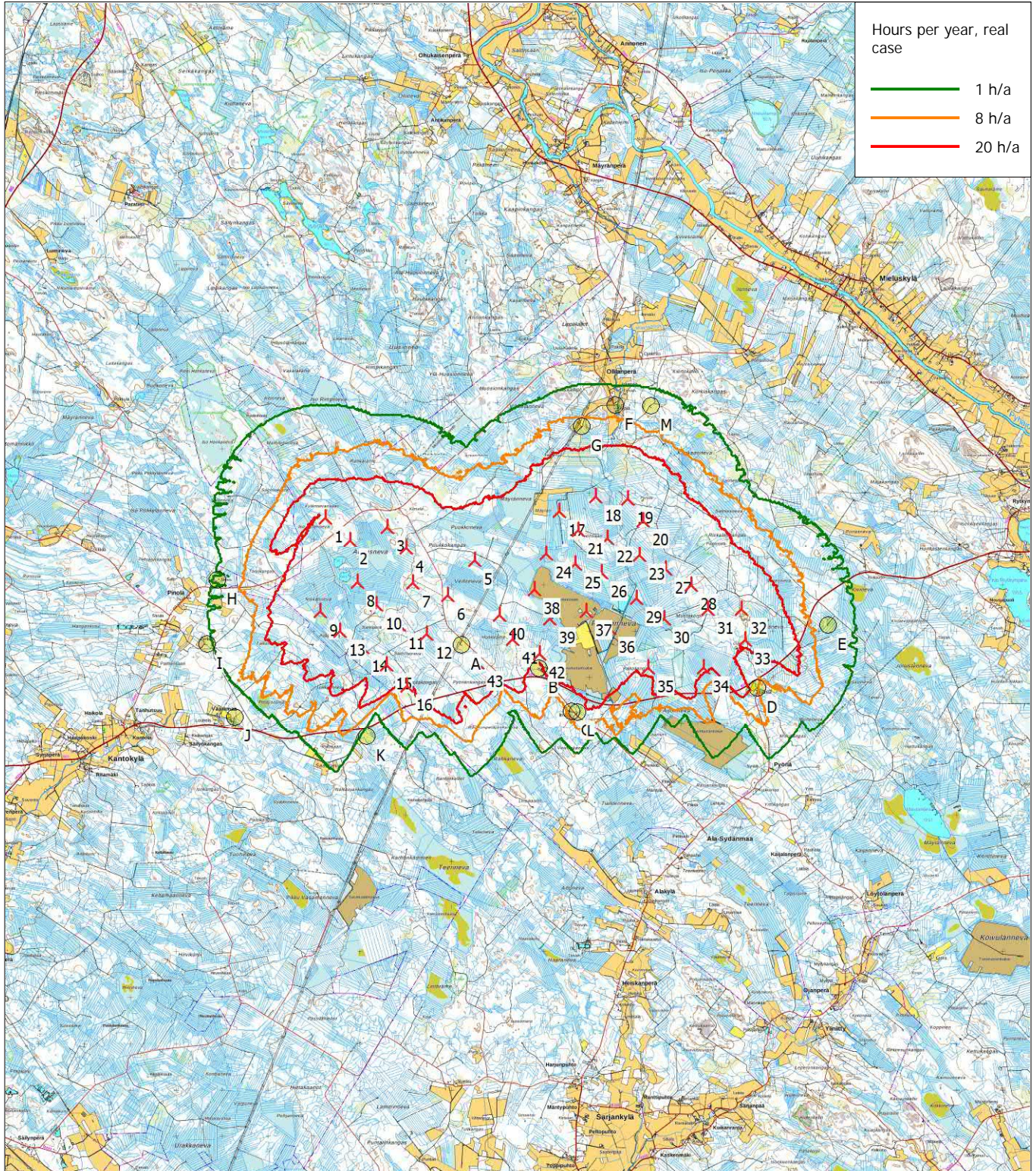


WTGs

18: Generic RD200 5600 200.0 10! 19: Generic RD200 5600 200.0 10! hub: 200.0 m (TOT: 300.0 m) (19)

SHADOW - Map

Calculation: Puutionsaari_VE1_RD200x43xHH200_no forest_20200402



0 2,5 5 7,5 10km

Map: Maastokarttarasteri50K , Print scale 1:125 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 403 440 North: 7 110 930

New WTG

Shadow receptor

Flicker map level: Height Contours: CONTOURLINE_Puutionsaari_Riskalankangas_20200327_1.wpo (2)

Puutionsaari_VE1_RD200x43xHH200_20200327

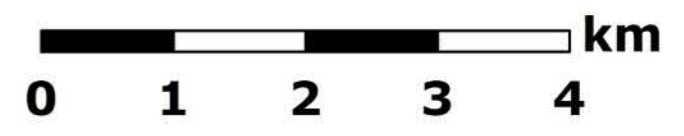
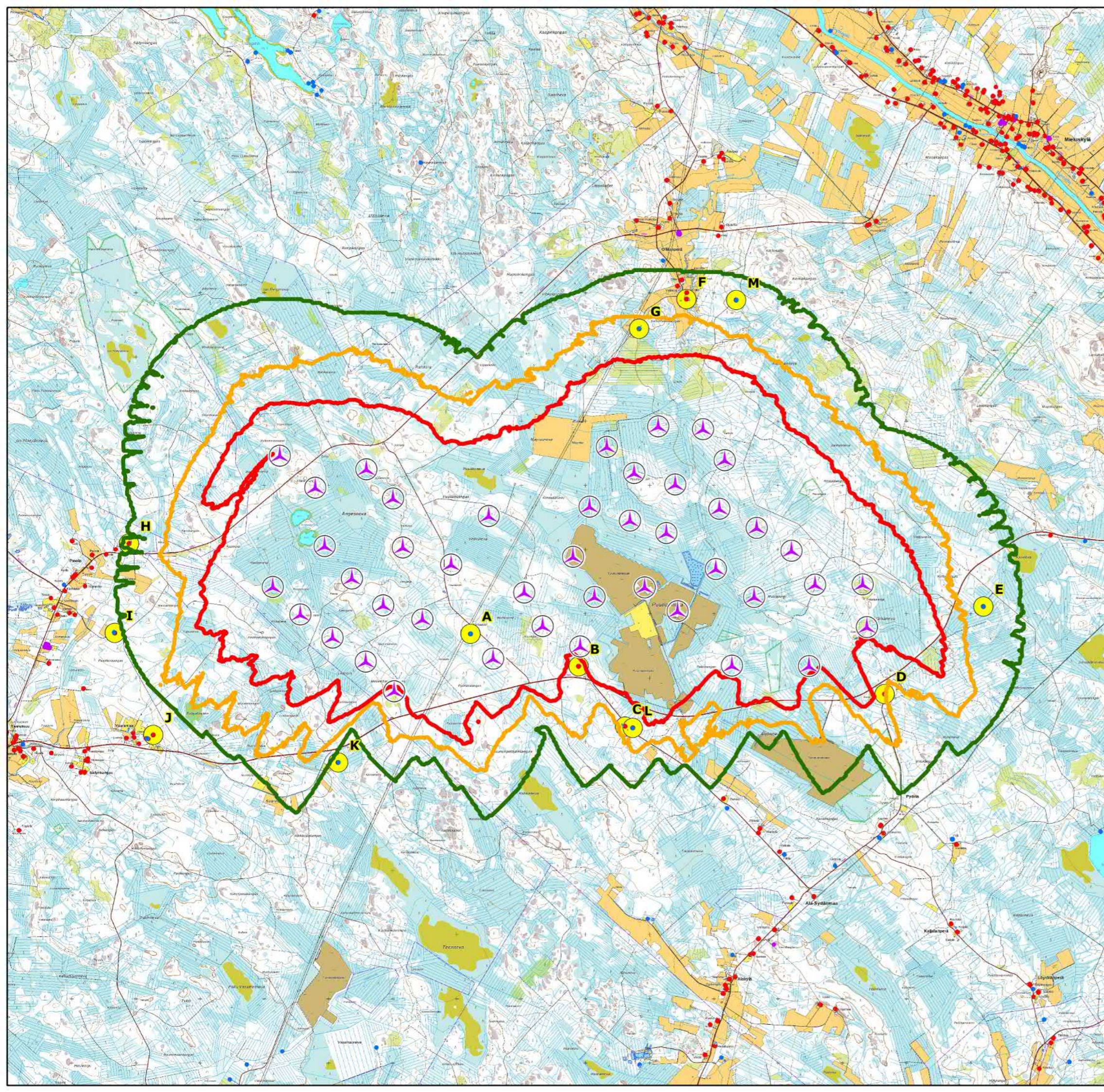
Laskentapisteet A-M

Rakennuskanta MML, mtk

- Asuinrakennus
- Liike- tai julkinen rakennus
- Lomarakennus
- Teollinen rakennus
- Kirkko tai kirkollinen rakennus
- Muu rakennus
- Allas

Varjostus (real case, no forest)

- 1 h/a
- 8 h/a
- 20 h/a



17.4.2020

Liite 6: Puutionsaari VE1 - Varjostusmallinnusten tulokset "real case, Luke forest"

SHADOW - Main Result

Calculation: Puutionsaari_VE1_RD200x43xHH200_Luke forest_20200402

Assumptions for shadow calculations

Maximum distance for influence
 Calculate only when more than 20 % of sun is covered by the blade
 Please look in WTG table

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

Sunshine probability S (Average daily sunshine hours) [UMEA]
 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 1,02 2,84 3,78 6,14 8,62 9,94 7,42 5,13 4,32 3,43 1,58 0,96

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

MERRA_basic_E25.335_N64.000 (3)

Operational time
 N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
 576 423 402 429 548 894 1047 1090 994 842 717 711 8674
 Idle start wind speed: Cut in wind speed from power curve

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:

Height contours used: Height Contours: CONTOURLINE_Puutionsaari_Riskalan

Area object(s) used in calculation:

Area object (Luke2017_SE): (1)

Area object (Luke2017_SW): (2)

Area object (Luke2017_NE): (3)

Area object (Luke2017_NW): (4)

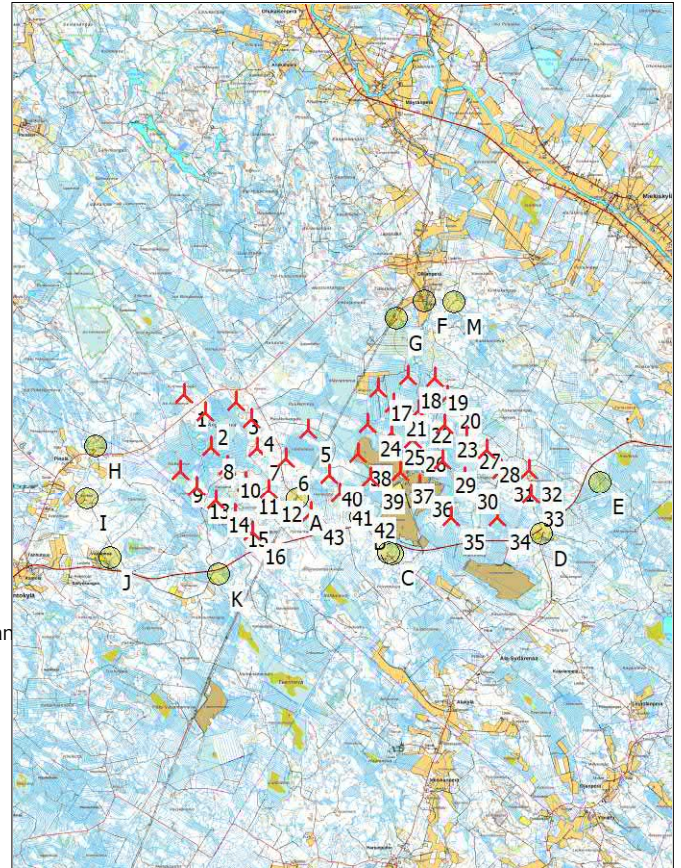
Obstacles used in calculation

Eye height for map: 1,5 m

Grid resolution: 1,0 m

All coordinates are in
 Finish TM ETRS-TM35FIN-ETRS89

WTGs



New WTG

Shadow receptor

Scale 1:200 000

| | East | North | Z | Row data/Description | WTG type | | | Shadow data | | | |
|----|--------|---------|-------|---|----------|------------|----------------|-------------------|--------------------|----------------|--------------------------|
| | | | | | Valid | Manufact. | Type-generator | Power, rated [kW] | Rotor diameter [m] | Hub height [m] | Calculation distance [m] |
| 1 | 399241 | 7112464 | 94,0 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 2 | 399796 | 7111966 | 97,5 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 3 | 400591 | 7112251 | 97,8 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 4 | 401005 | 7111796 | 100,0 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 5 | 402495 | 7111524 | 106,6 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 6 | 401910 | 7110769 | 107,4 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 7 | 401156 | 7111035 | 104,5 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 8 | 399940 | 7111056 | 97,5 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 9 | 399132 | 7110420 | 95,8 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 10 | 400364 | 7110552 | 98,6 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 11 | 400851 | 7110131 | 101,8 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 12 | 401462 | 7109916 | 102,8 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 13 | 399562 | 7109992 | 97,5 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 14 | 400065 | 7109631 | 100,0 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 15 | 400578 | 7109257 | 102,8 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 16 | 401021 | 7108796 | 105,1 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 17 | 404336 | 7112600 | 102,7 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 18 | 405133 | 7112922 | 100,3 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 19 | 405834 | 7112878 | 101,2 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 20 | 406171 | 7112395 | 103,9 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 21 | 404759 | 7112195 | 105,0 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 22 | 405399 | 7112017 | 102,5 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 23 | 406086 | 7111637 | 103,0 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 24 | 404064 | 7111669 | 104,9 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 25 | 404693 | 7111450 | 105,5 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 26 | 405262 | 7111259 | 104,6 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |

To be continued on next page...

SHADOW - Main Result

Calculation: Puutionsaari_VE1_RD200x43xHH200_Luke forest_20200402

...continued from previous page

| | East | North | Z | Row data/Description | WTG type | | | Power, rated [kW] | Rotor diameter [m] | Hub height [m] | Shadow data | |
|----|--------|---------|-------|---|----------|------------|----------------|-------------------------|--------------------------|----------------------|--------------------------------|--------------|
| | | | | | Valid | Manufact. | Type-generator | | | | Calculation distance [m] | RPM [RPM] |
| | | | [m] | | | | | | | | | |
| 27 | 406667 | 7111338 | 106,6 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 | |
| 28 | 407209 | 7110982 | 111,9 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 | |
| 29 | 406033 | 7110701 | 104,0 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 | |
| 30 | 406628 | 7110262 | 105,0 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 | |
| 31 | 407576 | 7110456 | 114,2 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 | |
| 32 | 408319 | 7110460 | 119,2 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 | |
| 33 | 408384 | 7109795 | 116,1 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 | |
| 34 | 407482 | 7109189 | 112,5 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 | |
| 35 | 406283 | 7109196 | 110,2 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 | |
| 36 | 405436 | 7110043 | 106,4 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 | |
| 37 | 404925 | 7110413 | 105,8 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 | |
| 38 | 403807 | 7110889 | 106,8 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 | |
| 39 | 404142 | 7110263 | 107,4 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 | |
| 40 | 403047 | 7110331 | 108,1 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 | |
| 41 | 403334 | 7109808 | 111,9 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 | |
| 42 | 403921 | 7109494 | 109,9 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 | |
| 43 | 402563 | 7109304 | 112,5 | Generic RD200 5600 200.0 !O! hub:...Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 | |

Shadow receptor-Input

| No. | Name | East | North | Z | Width | Height | Elevation a.g.l. | Slope of window [°] | Direction mode | Eye height (ZVI) a.g.l. [m] |
|-----|---|--------|---------|-------|-------|--------|---------------------|------------------------------|--------------------|-----------------------------------|
| A | Lomarakennus A (Vesiperän metsätie, Kivikaarto) | 402212 | 7109691 | 112,5 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| B | Asuinrakennus B (Ylivieskantie, Pohlola) | 403894 | 7109182 | 114,4 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| C | Asuinrakennus C (Perkkiontie 382) | 404620 | 7108247 | 113,6 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| D | Asuinrakennus D (Alakylantie 243) | 408659 | 7108752 | 119,4 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| E | Lomarakennus E (Kellokankaan metsätie) | 410199 | 7110115 | 122,5 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| F | Asuinrakennus F (Ollilantie 112) | 405573 | 7114900 | 87,7 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| G | Lomarakennus G (Ollilantie, Siliakuru) | 404837 | 7114441 | 100,0 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| H | Asuinrakennus H (Pinolantie 406) | 396893 | 7111098 | 88,1 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| I | Asuinrakennus I (Kortenevantie 116) | 396670 | 7109704 | 87,5 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| J | Asuinrakennus J (Haapavesitie 1406) | 397273 | 7108116 | 89,3 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| K | Lomarakennus K (Kurunoja) | 400152 | 7107685 | 102,3 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| L | Lomarakennus L (Perkkiontie, Ilmola) | 404739 | 7108222 | 113,7 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| M | Lomarakennus M (Riskalan metsätie) | 406348 | 7114887 | 102,7 | 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] | Shadow hours per year [h/year] |
| A | Lomarakennus A (Vesiperän metsätie, Kivikaarto) | 58:25 | |
| B | Asuinrakennus B (Ylivieskantie, Pohlola) | 9:09 | |
| C | Asuinrakennus C (Perkkiontie 382) | 10:51 | |
| D | Asuinrakennus D (Alakylantie 243) | 9:15 | |
| E | Lomarakennus E (Kellokankaan metsätie) | 0:00 | |
| F | Asuinrakennus F (Ollilantie 112) | 4:45 | |
| G | Lomarakennus G (Ollilantie, Siliakuru) | 0:00 | |
| H | Asuinrakennus H (Pinolantie 406) | 0:00 | |
| I | Asuinrakennus I (Kortenevantie 116) | 0:00 | |
| J | Asuinrakennus J (Haapavesitie 1406) | 0:00 | |
| K | Lomarakennus K (Kurunoja) | 0:00 | |
| L | Lomarakennus L (Perkkiontie, Ilmola) | 13:05 | |
| M | Lomarakennus M (Riskalan metsätie) | 0:00 | |

SHADOW - Main Result

Calculation: Puutionsaari_VE1_RD200x43xHH200_Luke forest_20200402

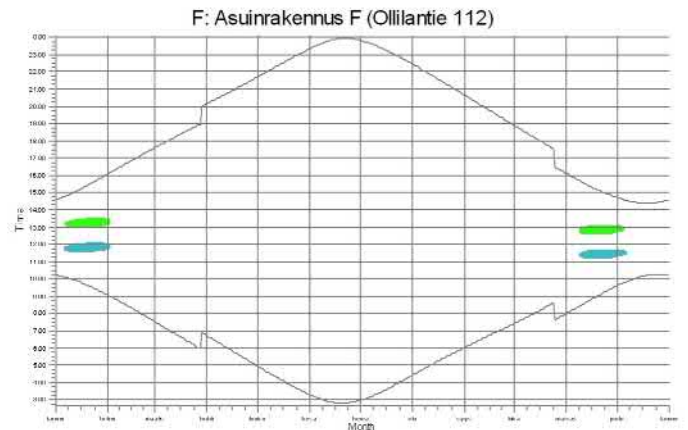
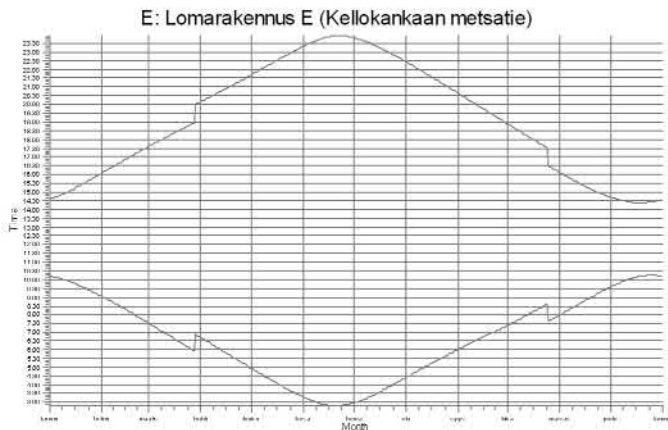
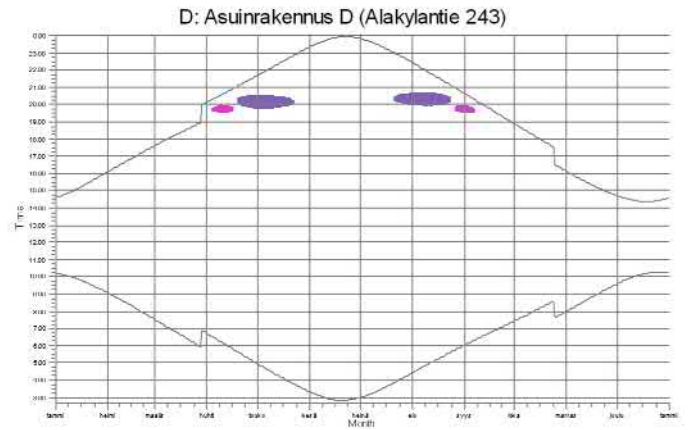
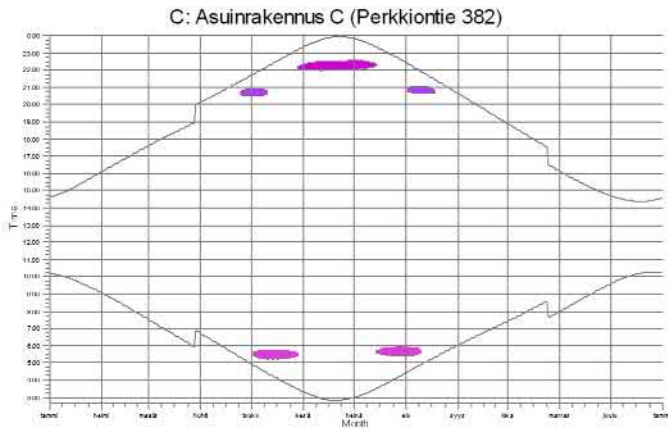
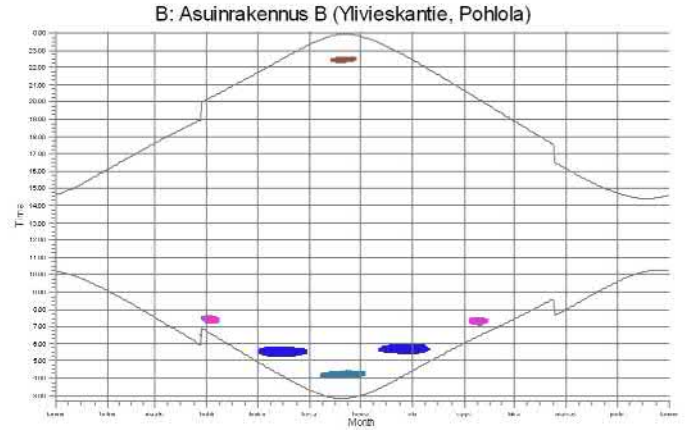
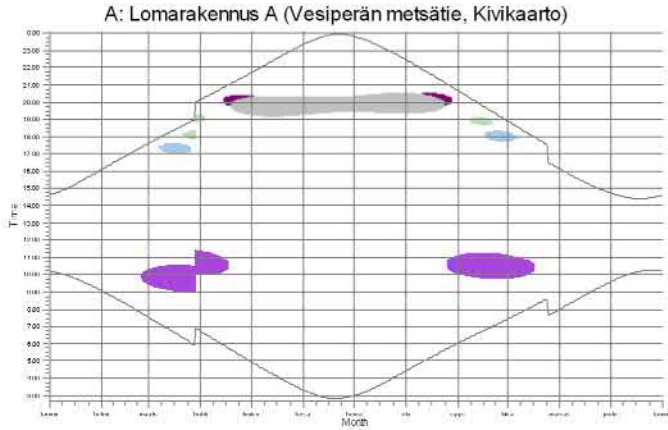
Total amount of flickering on the shadow receptors caused by each WTG

| No. | Name | Worst case [h/year] | Expected [h/year] |
|-----|---|------------------------|----------------------|
| 1 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1) | 0:00 | 0:00 |
| 2 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (2) | 0:00 | 0:00 |
| 3 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (3) | 0:00 | 0:00 |
| 4 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (4) | 0:00 | 0:00 |
| 5 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (5) | 0:00 | 0:00 |
| 6 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (6) | 0:00 | 0:00 |
| 7 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (7) | 0:00 | 0:00 |
| 8 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (8) | 0:00 | 0:00 |
| 9 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (9) | 0:00 | 0:00 |
| 10 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (10) | 0:00 | 0:00 |
| 11 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (11) | 22:52 | 5:10 |
| 12 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (12) | 108:57 | 27:30 |
| 13 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (13) | 0:00 | 0:00 |
| 14 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (14) | 7:12 | 1:28 |
| 15 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (15) | 12:46 | 2:27 |
| 16 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (16) | 0:00 | 0:00 |
| 17 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (17) | 0:00 | 0:00 |
| 18 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (18) | 16:59 | 2:20 |
| 19 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (19) | 17:09 | 2:25 |
| 20 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (20) | 0:00 | 0:00 |
| 21 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (21) | 0:00 | 0:00 |
| 22 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (22) | 0:00 | 0:00 |
| 23 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (23) | 0:00 | 0:00 |
| 24 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (24) | 0:00 | 0:00 |
| 25 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (25) | 0:00 | 0:00 |
| 26 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (26) | 0:00 | 0:00 |
| 27 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (27) | 0:00 | 0:00 |
| 28 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (28) | 0:00 | 0:00 |
| 29 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (29) | 0:00 | 0:00 |
| 30 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (30) | 0:00 | 0:00 |
| 31 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (31) | 0:00 | 0:00 |
| 32 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (32) | 0:00 | 0:00 |
| 33 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (33) | 0:00 | 0:00 |
| 34 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (34) | 33:15 | 7:59 |
| 35 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (35) | 42:33 | 10:28 |
| 36 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (36) | 21:00 | 5:18 |
| 37 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (37) | 6:27 | 1:51 |
| 38 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (38) | 0:00 | 0:00 |
| 39 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (39) | 0:00 | 0:00 |
| 40 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (40) | 2:14 | 0:41 |
| 41 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (41) | 23:20 | 6:42 |
| 42 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (42) | 0:00 | 0:00 |
| 43 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (43) | 125:04 | 27:21 |

Total times in Receptor wise and WTG wise tables can differ, as a WTG can lead to flicker at 2 or more receptors simultaneously and/or receptors may receive flicker from 2 or more WTGs simultaneously.

SHADOW - Calendar, graphical

Calculation: Puutionsaari_VE1_RD200x43xHH200_Luke forest_20200402



WTGs

| | | |
|----------------------------------|----------------------------------|----------------------------------|
| 11: Generic RD200 5600 200.0 IOI | 13: Generic RD200 5600 200.0 IOI | 15: Generic RD200 5600 200.0 IOI |
| 12: Generic RD200 5600 200.0 IOI | 14: Generic RD200 5600 200.0 IOI | 16: Generic RD200 5600 200.0 IOI |
| 17: Generic RD200 5600 200.0 IOI | 18: Generic RD200 5600 200.0 IOI | |

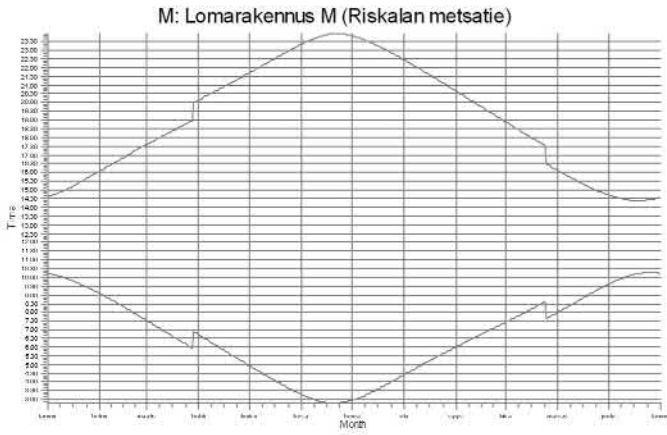
(TOT: 300,0 m) (40)
 (TOT: 300,0 m) (41)
 (TOT: 300,0 m) (36)
 (TOT: 300,0 m) (37)

Project: Puutionsaari_Riskalankangas_20200327
Description: VSB

Licensed user:
FCG Suunnittelu ja tekniikka Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+ 358104095666
Henna-Riikka Rintamäki / henna-riikka.rintamaki@fcg.fi
Calculated:
2.4.2020 15.37/3.3.247

SHADOW - Calendar, graphical

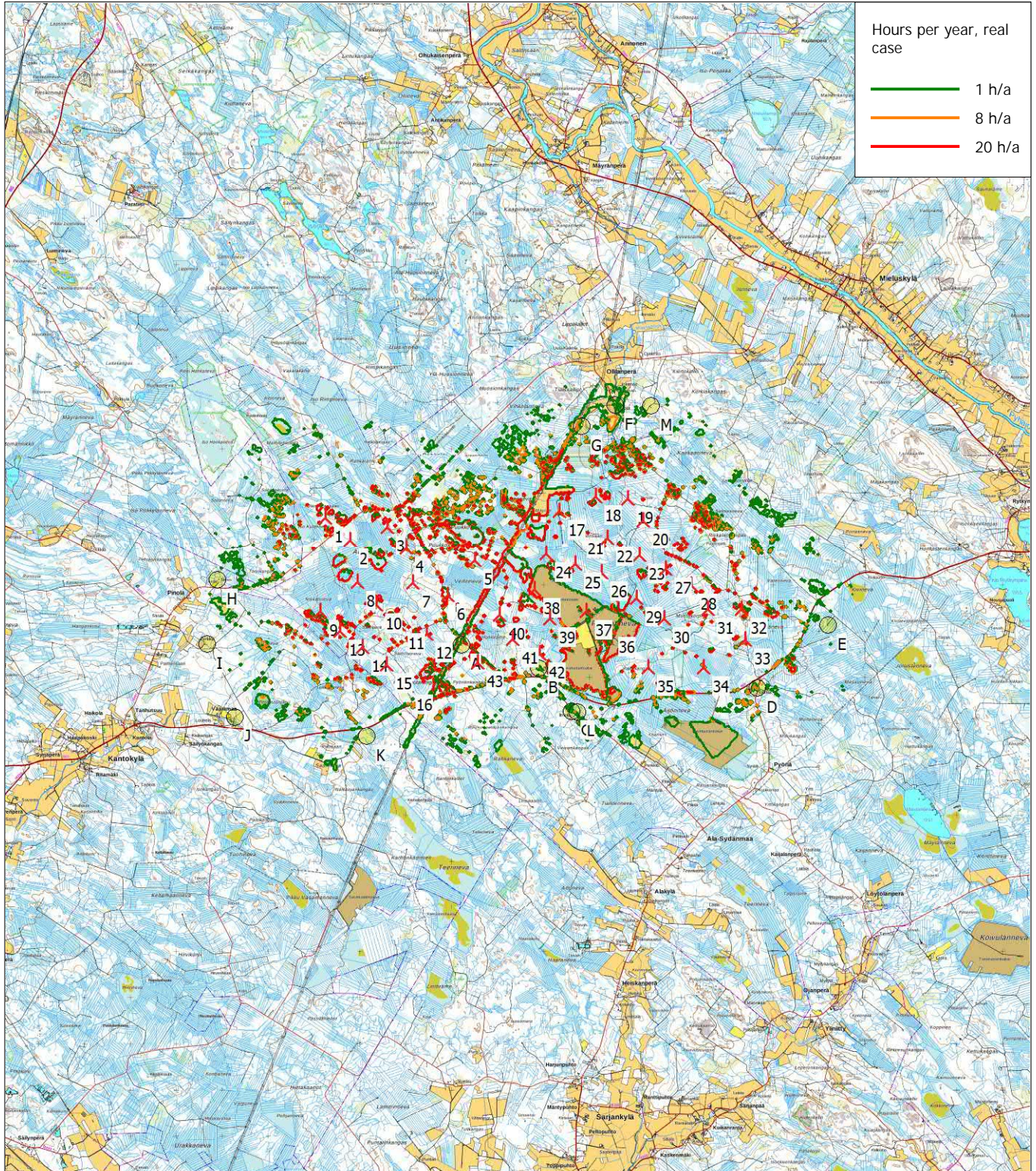
Calculation: Puutionsaari_VE1_RD200x43xHH200_Luke forest_20200402



WTGs

SHADOW - Map

Calculation: Puutionsaari_VE1_RD200x43xHH200_Luke forest_20200402



0 2,5 5 7,5 10km

Map: Maastokarttarasteri50K , Print scale 1:125 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 403 440 North: 7 110 930

New WTG

Shadow receptor

Flicker map level: Height Contours: CONTOURLINE_Puutionsaari_Riskalankangas_20200327_1.wpo (2)

Puutionsaari_VE1_RD200x43xHH200_20200327

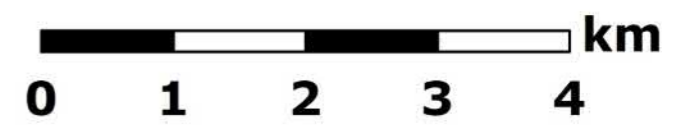
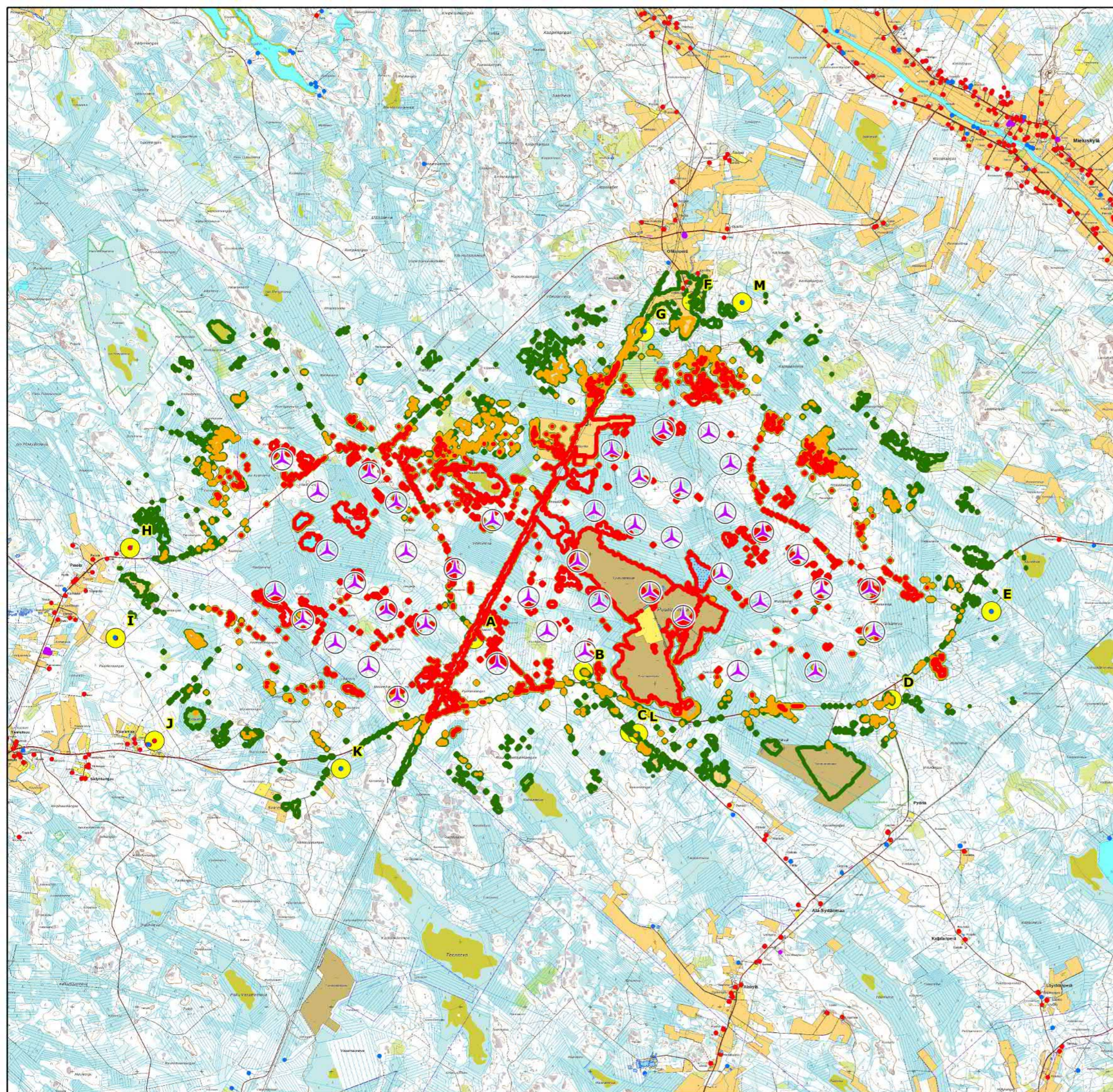
Laskentapisteet A-M

Rakennuskanta MML, mtk

- Asuinrakennus
- Liike- tai julkinen rakennus
- Lomarakennus
- Teollinen rakennus
- Kirkko tai kirkollinen rakennus
- Muu rakennus
- Allas

Varjostus (real case, Luke forest)

- 1 h/a
- 8 h/a
- 20 h/a



17.4.2020

Liite 7: Puutionsaari VE1 – Varjostuksen yhteismallinnusten tulokset "real case, no forest"

SHADOW - Main Result

Calculation: Puutionsaari_VE1_RD200x43xHH200+Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_no forest_20200408
Assumptions for shadow calculations

Maximum distance for influence
Calculate only when more than 20 % of sun is covered by the blade
Please look in WTG table

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

Sunshine probability S (Average daily sunshine hours) [UMEA]
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
1,02 2,84 3,78 6,14 8,62 9,94 7,42 5,13 4,32 3,43 1,58 0,96

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

MERRA_basic_E25.335_N64.000 (3)

Operational time
N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
576 423 402 429 548 894 1047 1090 994 842 717 710 8673
Idle start wind speed: Cut in wind speed from power curve

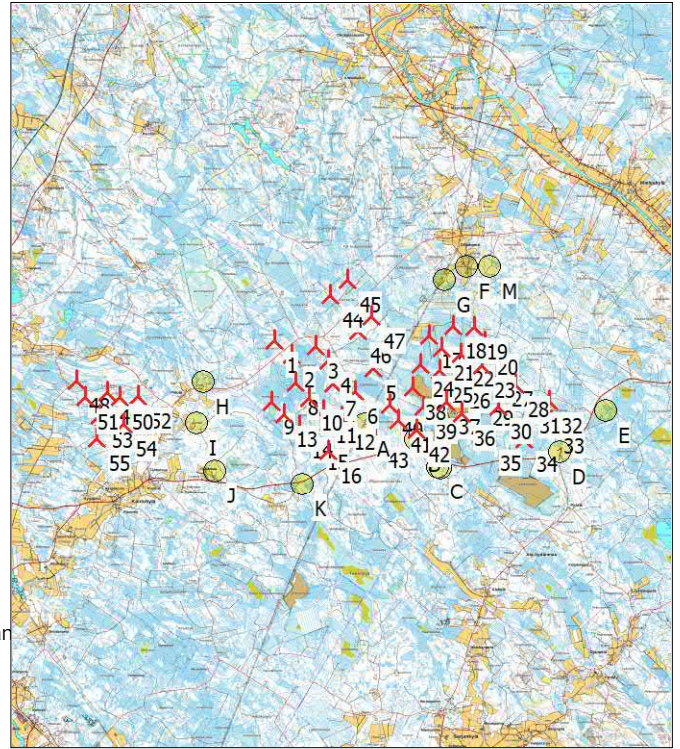
A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:
Height contours used: Height Contours: CONTOURLINE_Puutionsaari_Riskalan
Obstacles used in calculation
Eye height for map: 1,5 m
Grid resolution: 1,0 m

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89

WTGs

| | East | North | Z [m] | Row data/Description | WTG type | | Type-generator | Power, rated [kW] | Rotor diameter [m] | Hub height [m] | Shadow data | |
|----|--------|---------|----------|------------------------|----------|-----------|----------------|-------------------------|--------------------------|----------------------|--------------------------------|------|
| | | | | | Valid | Manufact. | | | | | Calculation distance [m] | RPM |
| 1 | 399241 | 7112464 | 94,0 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 2 | 399796 | 7111966 | 97,5 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 3 | 400591 | 7112251 | 97,8 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 4 | 401005 | 7111796 | 100,0 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 5 | 402495 | 7111524 | 106,6 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 6 | 401910 | 7110769 | 107,4 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 7 | 401156 | 7111035 | 104,5 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 8 | 399940 | 7111056 | 97,5 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 9 | 399132 | 7110420 | 95,8 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 10 | 400364 | 7110552 | 98,6 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 11 | 400851 | 7110131 | 101,8 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 12 | 401462 | 7109916 | 102,8 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 13 | 399562 | 7109992 | 97,5 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 14 | 400065 | 7109631 | 100,0 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 15 | 400578 | 7109257 | 102,8 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 16 | 401021 | 7108796 | 105,1 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 17 | 404336 | 7112600 | 102,7 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 18 | 405133 | 7112922 | 100,3 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 19 | 405834 | 7112878 | 101,2 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 20 | 404671 | 7112395 | 103,9 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 21 | 404759 | 7112195 | 105,0 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 22 | 405399 | 7112017 | 102,5 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 23 | 406086 | 7111637 | 103,0 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 24 | 404064 | 7111669 | 104,9 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 25 | 404693 | 7111450 | 105,5 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 26 | 405262 | 7111259 | 104,6 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 27 | 406667 | 7111338 | 106,6 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 28 | 407209 | 7110982 | 111,9 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 29 | 406033 | 7110701 | 104,0 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 30 | 406628 | 7110262 | 105,0 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 31 | 407576 | 7110456 | 114,2 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |

To be continued on next page...



Scale 1:250 000
New WTG Shadow receptor

SHADOW - Main Result

Calculation: Puutionsaari_VE1_RD200x43xHH200+Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_no forest_20200408

...continued from previous page

| | East | North | Z | Row data/Description | WTG type | | Type-generator | Power, rated [kW] | Rotor diameter [m] | Hub height [m] | Shadow data | |
|----|--------|---------|-------|------------------------|----------|----------------|---------------------|-------------------------|--------------------------|----------------------|--------------------------------|--------------|
| | | | | | Valid | Manufact. | | | | | Calculation distance [m] | RPM [RPM] |
| | | | [m] | | | | | | | | | |
| 32 | 408319 | 7110460 | 119,2 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 33 | 408384 | 7109795 | 116,1 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 34 | 407482 | 7109189 | 112,5 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 35 | 406283 | 7109196 | 110,2 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 36 | 405436 | 7110043 | 106,4 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 37 | 404925 | 7110413 | 105,8 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 38 | 403807 | 7110889 | 106,8 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 39 | 404142 | 7110263 | 107,4 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 40 | 403047 | 7110331 | 108,1 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 41 | 403334 | 7109808 | 111,9 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 42 | 403921 | 7109494 | 109,9 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 43 | 402563 | 7109304 | 112,5 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 44 | 401061 | 7113928 | 105,0 | VESTAS V150-4.2 HH... | Yes | VESTAS | V150-4.2 HH155-4200 | 4200 | 150,0 | 155,0 | 1902 | 10,4 |
| 45 | 401644 | 7114439 | 105,3 | VESTAS V150-4.2 HH... | Yes | VESTAS | V150-4.2 HH155-4200 | 4200 | 150,0 | 155,0 | 1902 | 10,4 |
| 46 | 401997 | 7112772 | 109,2 | VESTAS V150-4.2 HH... | Yes | VESTAS | V150-4.2 HH155-4200 | 4200 | 150,0 | 155,0 | 1902 | 10,4 |
| 47 | 402450 | 7113258 | 106,6 | VESTAS V150-4.2 HH... | Yes | VESTAS | V150-4.2 HH155-4200 | 4200 | 150,0 | 155,0 | 1902 | 10,4 |
| 48 | 392697 | 7111104 | 81,3 | GE WIND ENERGY 5.... | Yes | GE WIND ENERGY | 5.3-158 RD175-5300 | 5300 | 175,0 | 152,5 | 2141 | 0,0 |
| 49 | 393696 | 7110723 | 85,7 | GE WIND ENERGY 5.... | Yes | GE WIND ENERGY | 5.3-158 RD175-5300 | 5300 | 175,0 | 152,5 | 2141 | 0,0 |
| 50 | 394124 | 7110573 | 88,4 | GE WIND ENERGY 5.... | Yes | GE WIND ENERGY | 5.3-158 RD175-5300 | 5300 | 175,0 | 152,5 | 2141 | 0,0 |
| 51 | 392964 | 7110572 | 83,6 | GE WIND ENERGY 5.... | Yes | GE WIND ENERGY | 5.3-158 RD175-5300 | 5300 | 175,0 | 152,5 | 2141 | 0,0 |
| 52 | 394736 | 7110600 | 90,0 | GE WIND ENERGY 5.... | Yes | GE WIND ENERGY | 5.3-158 RD175-5300 | 5300 | 175,0 | 152,5 | 2141 | 0,0 |
| 53 | 393462 | 7109982 | 84,9 | GE WIND ENERGY 5.... | Yes | GE WIND ENERGY | 5.3-158 RD175-5300 | 5300 | 175,0 | 152,5 | 2141 | 0,0 |
| 54 | 394233 | 7109674 | 87,5 | GE WIND ENERGY 5.... | Yes | GE WIND ENERGY | 5.3-158 RD175-5300 | 5300 | 175,0 | 152,5 | 2141 | 0,0 |
| 55 | 393349 | 7109200 | 83,7 | GE WIND ENERGY 5.... | Yes | GE WIND ENERGY | 5.3-158 RD175-5300 | 5300 | 175,0 | 152,5 | 2141 | 0,0 |

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] |
|-----|--|--------|---------|-------|-------|--------|---------------------|------------------------------|--------------------|-----------------------------------|
| A | Lomarakenus A (Vesiperän metsätie, Kivikaarto) | 402212 | 7109691 | 112,5 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| B | Asuinrakennus B (Ylivieskantie, Pohlola) | 403894 | 7109182 | 114,4 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| C | Asuinrakennus C (Perkkiontie 382) | 404620 | 7108247 | 113,6 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| D | Asuinrakennus D (Alakyläntie 243) | 408659 | 7108752 | 119,4 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| E | Lomarakenus E (Kellokankaan metsätie) | 410199 | 7110115 | 122,5 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| F | Asuinrakennus F (Ollilantie 112) | 405573 | 7114900 | 87,7 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| G | Lomarakenus G (Ollilantie, Siliakuru) | 404837 | 7114441 | 100,0 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| H | Asuinrakennus H (Pinolantie 406) | 396893 | 7111098 | 88,1 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| I | Asuinrakennus I (Kortenevantie 116) | 396670 | 7109704 | 87,5 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| J | Asuinrakennus J (Haapavesitie 1406) | 397273 | 7108116 | 89,3 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| K | Lomarakenus K (Kurunoja) | 400152 | 7107685 | 102,3 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| L | Lomarakenus L (Perkkiontie, Ilmola) | 404739 | 7108222 | 113,7 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| M | Lomarakenus M (Riskalan metsätie) | 406348 | 7114887 | 102,7 | 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 | Lomarakenus A (Vesiperän metsätie, Kivikaarto) | 93:09 |
| B | Asuinrakennus B (Ylivieskantie, Pohlola) | 14:08 |
| C | Asuinrakennus C (Perkkiontie 382) | 10:50 |
| D | Asuinrakennus D (Alakyläntie 243) | 9:15 |
| E | Lomarakenus E (Kellokankaan metsätie) | 4:29 |
| F | Asuinrakennus F (Ollilantie 112) | 4:45 |
| G | Lomarakenus G (Ollilantie, Siliakuru) | 11:22 |
| H | Asuinrakennus H (Pinolantie 406) | 1:16 |
| I | Asuinrakennus I (Kortenevantie 116) | 1:25 |
| J | Asuinrakennus J (Haapavesitie 1406) | 0:00 |
| K | Lomarakenus K (Kurunoja) | 0:00 |
| L | Lomarakenus L (Perkkiontie, Ilmola) | 13:05 |
| M | Lomarakenus M (Riskalan metsätie) | 3:37 |

SHADOW - Main Result

Calculation: Puutionsaari_VE1_RD200x43xHH200+Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_no forest_20200408

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

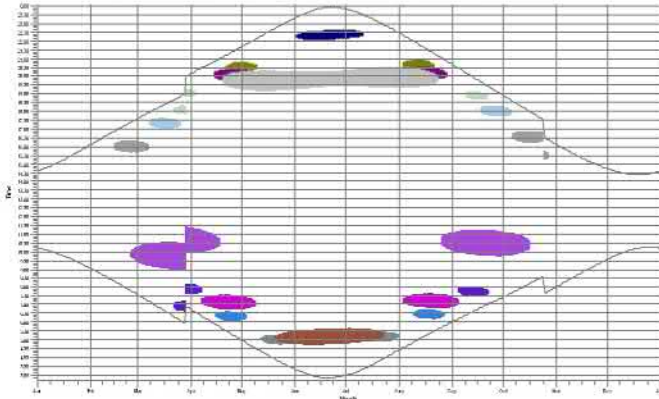
| No. | Name | Worst case [h/year] | Expected [h/year] |
|-----|---|------------------------|----------------------|
| 1 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1) | 0:00 | 0:00 |
| 2 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (2) | 0:00 | 0:00 |
| 3 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (3) | 0:00 | 0:00 |
| 4 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (4) | 0:00 | 0:00 |
| 5 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (5) | 0:00 | 0:00 |
| 6 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (6) | 0:00 | 0:00 |
| 7 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (7) | 12:15 | 3:37 |
| 8 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (8) | 0:00 | 0:00 |
| 9 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (9) | 6:21 | 1:16 |
| 10 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (10) | 10:57 | 2:34 |
| 11 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (11) | 22:52 | 5:10 |
| 12 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (12) | 108:57 | 27:30 |
| 13 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (13) | 0:00 | 0:00 |
| 14 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (14) | 7:12 | 1:28 |
| 15 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (15) | 12:46 | 2:27 |
| 16 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (16) | 17:46 | 3:41 |
| 17 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (17) | 18:18 | 2:33 |
| 18 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (18) | 51:00 | 7:37 |
| 19 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (19) | 47:16 | 7:17 |
| 20 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (20) | 7:44 | 1:22 |
| 21 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (21) | 15:58 | 2:12 |
| 22 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (22) | 0:00 | 0:00 |
| 23 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (23) | 0:00 | 0:00 |
| 24 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (24) | 0:00 | 0:00 |
| 25 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (25) | 0:00 | 0:00 |
| 26 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (26) | 0:00 | 0:00 |
| 27 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (27) | 0:00 | 0:00 |
| 28 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (28) | 0:00 | 0:00 |
| 29 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (29) | 0:00 | 0:00 |
| 30 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (30) | 0:00 | 0:00 |
| 31 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (31) | 0:00 | 0:00 |
| 32 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (32) | 10:54 | 2:24 |
| 33 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (33) | 10:36 | 2:04 |
| 34 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (34) | 33:15 | 7:59 |
| 35 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (35) | 42:33 | 10:28 |
| 36 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (36) | 21:00 | 5:18 |
| 37 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (37) | 6:27 | 1:51 |
| 38 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (38) | 26:12 | 6:57 |
| 39 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (39) | 10:50 | 2:19 |
| 40 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (40) | 40:14 | 11:01 |
| 41 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (41) | 57:46 | 14:23 |
| 42 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (42) | 12:39 | 2:39 |
| 43 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (43) | 147:25 | 32:21 |
| 44 | VESTAS V150-4.2 HH155 4200 150.0 !O! hub: 155,0 m (TOT: 230,0 m) (235) | 0:00 | 0:00 |
| 45 | VESTAS V150-4.2 HH155 4200 150.0 !O! hub: 155,0 m (TOT: 230,0 m) (236) | 0:00 | 0:00 |
| 46 | VESTAS V150-4.2 HH155 4200 150.0 !O! hub: 155,0 m (TOT: 230,0 m) (237) | 0:00 | 0:00 |
| 47 | VESTAS V150-4.2 HH155 4200 150.0 !O! hub: 155,0 m (TOT: 230,0 m) (238) | 0:00 | 0:00 |
| 48 | GE WIND ENERGY 5.3-158 RD175 5300 175.0 !O! hub: 152,5 m (TOT: 240,0 m) (239) | 0:00 | 0:00 |
| 49 | GE WIND ENERGY 5.3-158 RD175 5300 175.0 !O! hub: 152,5 m (TOT: 240,0 m) (240) | 0:00 | 0:00 |
| 50 | GE WIND ENERGY 5.3-158 RD175 5300 175.0 !O! hub: 152,5 m (TOT: 240,0 m) (241) | 0:00 | 0:00 |
| 51 | GE WIND ENERGY 5.3-158 RD175 5300 175.0 !O! hub: 152,5 m (TOT: 240,0 m) (242) | 0:00 | 0:00 |
| 52 | GE WIND ENERGY 5.3-158 RD175 5300 175.0 !O! hub: 152,5 m (TOT: 240,0 m) (243) | 6:12 | 1:25 |
| 53 | GE WIND ENERGY 5.3-158 RD175 5300 175.0 !O! hub: 152,5 m (TOT: 240,0 m) (244) | 0:00 | 0:00 |
| 54 | GE WIND ENERGY 5.3-158 RD175 5300 175.0 !O! hub: 152,5 m (TOT: 240,0 m) (245) | 0:00 | 0:00 |
| 55 | GE WIND ENERGY 5.3-158 RD175 5300 175.0 !O! hub: 152,5 m (TOT: 240,0 m) (246) | 0:00 | 0:00 |

Total times in Receptor wise and WTG wise tables can differ, as a WTG can lead to flicker at 2 or more receptors simultaneously and/or receptors may receive flicker from 2 or more WTGs simultaneously.

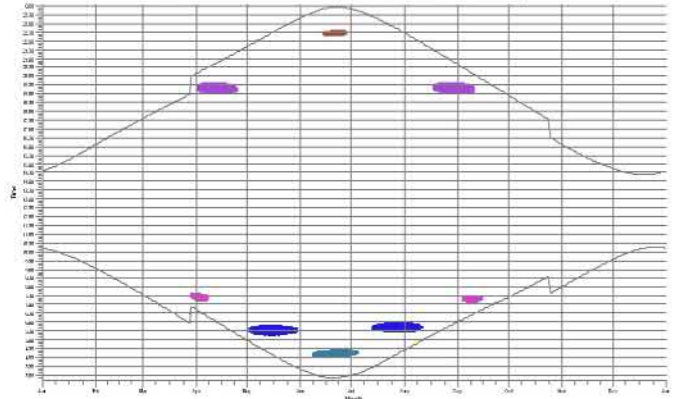
SHADOW - Calendar, graphical

Calculation: Puutionsaari_VE1_RD200x43xHH200+Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_no forest_20200408

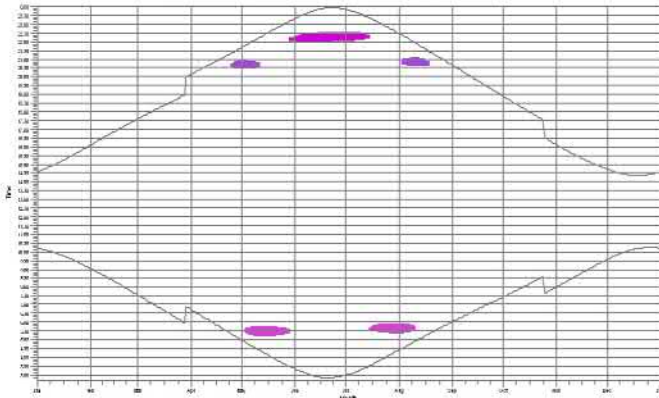
A: Lomarakennus A (Vesiperän metsätie, Kivikaarto)



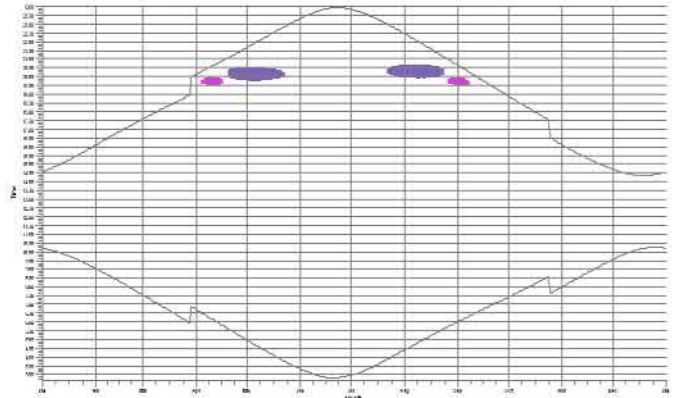
B: Asuinrakennus B (Ylivieskantie, Pohlola)



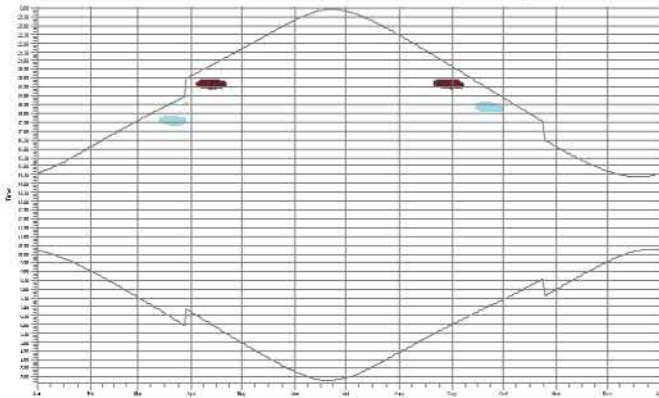
C: Asuinrakennus C (Perkkiontie 382)



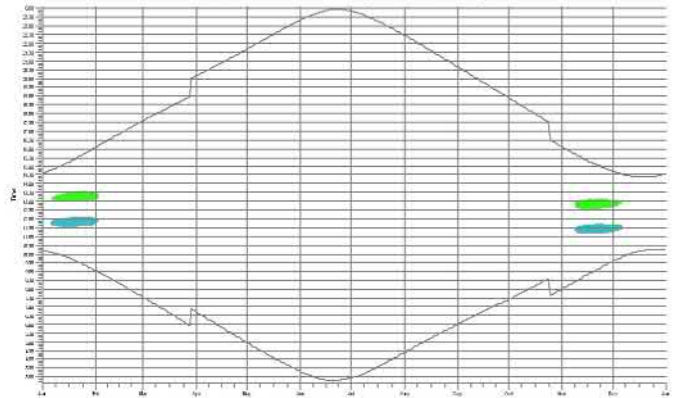
D: Asuinrakennus D (Alakyläntie 243)



E: Lomarakennus E (Kellokankaan metsätie)



F: Asuinrakennus F (Ollilantie 112)



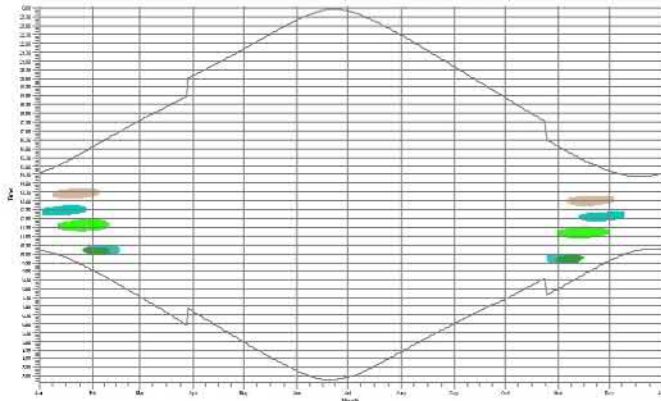
WTGs

| | | |
|----------------------------------|----------------------------------|----------------------------------|
| 7: Generic RD200 5600 200.0 IOI | 17: Generic RD200 5600 200.0 IOI | 27: Generic RD200 5600 200.0 IOI |
| 10: Generic RD200 5600 200.0 IOI | 18: Generic RD200 5600 200.0 IOI | 28: Generic RD200 5600 200.0 IOI |
| 11: Generic RD200 5600 200.0 IOI | 19: Generic RD200 5600 200.0 IOI | 29: Generic RD200 5600 200.0 IOI |
| 12: Generic RD200 5600 200.0 IOI | 20: Generic RD200 5600 200.0 IOI | 40: Generic RD200 5600 200.0 IOI |
| 14: Generic RD200 5600 200.0 IOI | 21: Generic RD200 5600 200.0 IOI | 41: Generic RD200 5600 200.0 IOI |
| 15: Generic RD200 5600 200.0 IOI | 22: Generic RD200 5600 200.0 IOI | 42: Generic RD200 5600 200.0 IOI |
| 16: Generic RD200 5600 200.0 IOI | 23: Generic RD200 5600 200.0 IOI | 43: Generic RD200 5600 200.0 IOI |

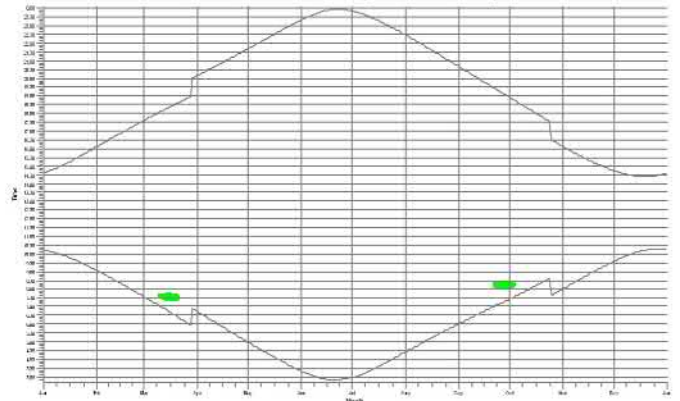
SHADOW - Calendar, graphical

Calculation: Puutionsaari_VE1_RD200x43xHH200+Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_no forest_20200408

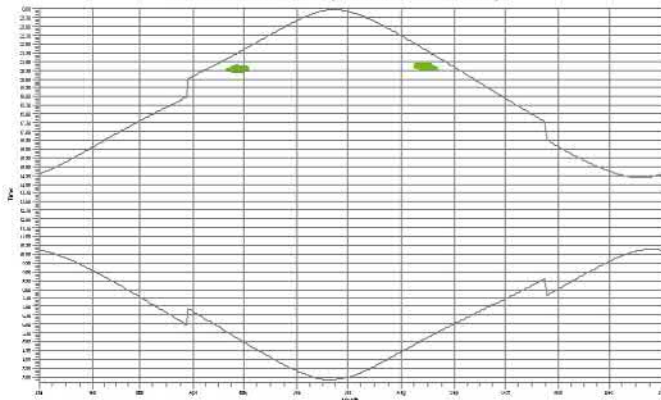
G: Lomarakenus G (Ollilantie, Siliakuru)



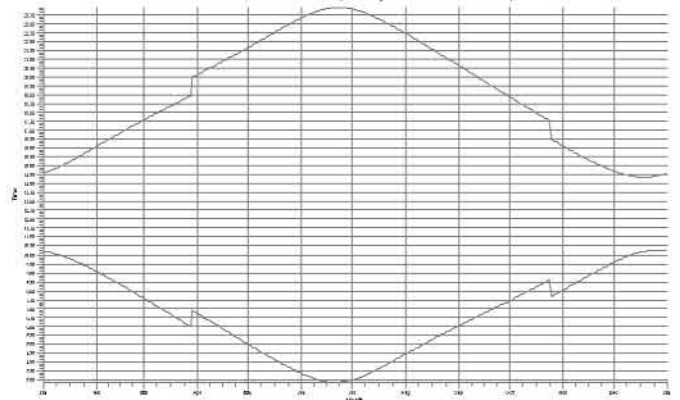
H: Asuinrakennus H (Pinolantie 406)



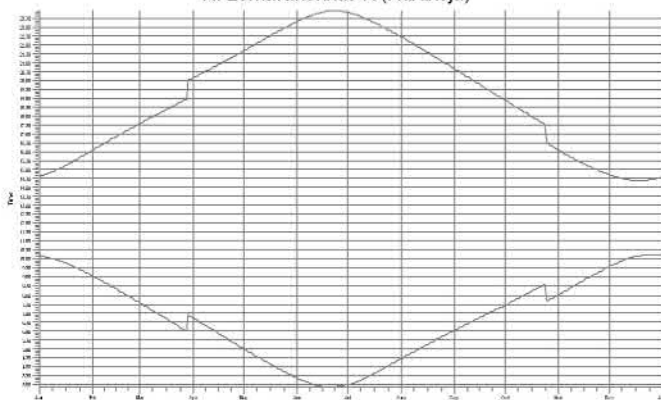
I: Asuinrakennus I (Kortenevantie 116)



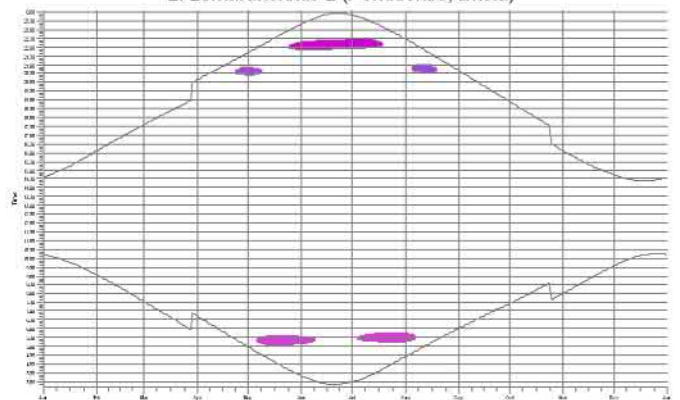
J: Asuinrakennus J (Haapavesitie 1406)



K: Lomarakenus K (Kurunoja)



L: Lomarakenus L (Perkkiontie, Ilmola)



WTGs

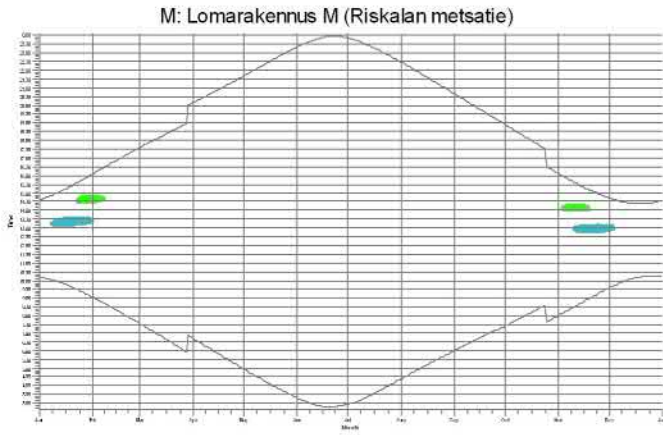
| | | | |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| 9: Generic RD200 5600 200.0 IOI 18 | 17: Generic RD200 5600 200.0 IOI 17 | 18: Generic RD200 5600 200.0 IOI 18 | 19: Generic RD200 5600 200.0 IOI 19 |
| 10: Generic RD200 5600 200.0 IOI 19 | 16: Generic RD200 5600 200.0 IOI 16 | 17: Generic RD200 5600 200.0 IOI 17 | 18: Generic RD200 5600 200.0 IOI 18 |
| 11: Generic RD200 5600 200.0 IOI 16 | 12: Generic RD200 5600 200.0 IOI 15 | 13: Generic RD200 5600 200.0 IOI 14 | 14: Generic RD200 5600 200.0 IOI 13 |
| 15: Generic RD200 5600 200.0 IOI 12 | 16: Generic RD200 5600 200.0 IOI 11 | 17: Generic RD200 5600 200.0 IOI 10 | 18: Generic RD200 5600 200.0 IOI 9 |

Project: Puutionsaari_Riskalankangas_20200327
Description: VSB

Licensed user:
FCG Suunnittelu ja tekniikka Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka Rintamäki / henna-riikka.rintamaki@fcg.fi
Calculated:
15.4.2020 11.03/3.3.247

SHADOW - Calendar, graphical

Calculation: Puutionsaari_VE1_RD200x43xHH200+Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_no forest_20200408

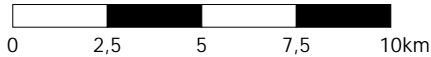
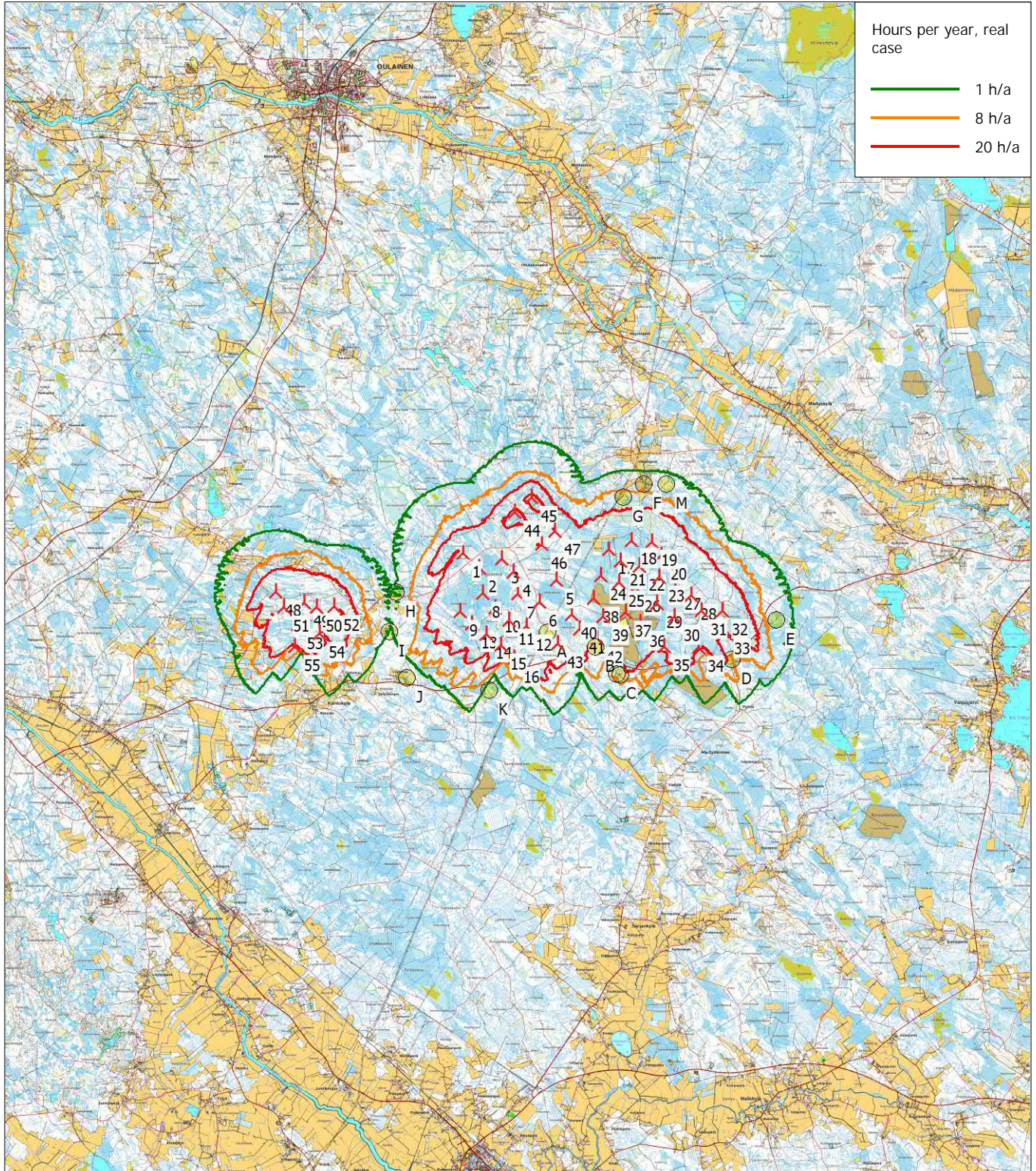


WTGs

18: Generic RD200 5600 200.0 101 (19) 19: Generic RD200 5600 200.0 101 hub: 200.0 m (TOT: 300.0 m) (19)

SHADOW - Map

Calculation: Puutionsaari_VE1_RD200x43xHH200+Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_no forest_20200408



Map: Maastokarttarasteri50K , Print scale 1:200 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 401 100 North: 7 111 320

New WTG

Shadow receptor

Flicker map level: Height Contours: CONTOURLINE_Puutionsaari_Riskalankangas_20200327_1.wpo (2)

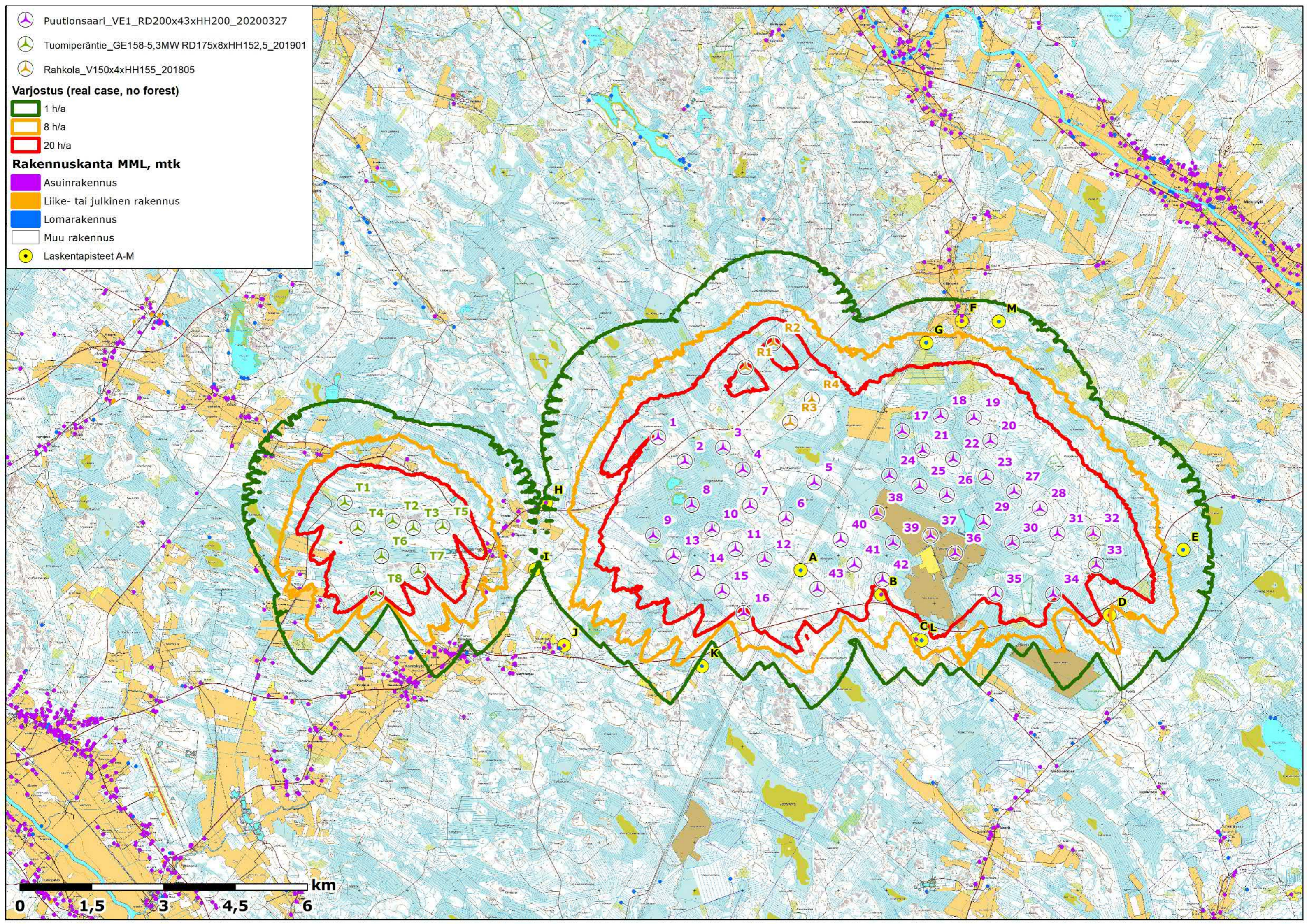
- Puutionsaari_VE1_RD200x43xHH200_20200327
- Tuomiperäntie_GE158-5,3MW RD175x8xHH152,5_201901
- Rahkola_V150x4xHH155_201805

Varjostus (real case, no forest)

- 1 h/a
- 8 h/a
- 20 h/a

Rakennuskanta MML, mtk

- Asuinrakennus
- Liike- tai julkinen rakennus
- Lomarakennus
- Muu rakennus
- Laskentapisteeet A-M



17.4.2020

Liite 8: Puutionsaari VE1 – Varjostuksen yhteismallinnusten tulokset "real case, Luke forest"

SHADOW - Main Result

Calculation: Puutionsaari_VE1_RD200x43xHH200_Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_Luke forest_20200408
Assumptions for shadow calculations

Maximum distance for influence
Calculate only when more than 20 % of sun is covered by the blade
Please look in WTG table

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

Sunshine probability S (Average daily sunshine hours) [UMEA]
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
1,02 2,84 3,78 6,14 8,62 9,94 7,42 5,13 4,32 3,43 1,58 0,96

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

MERRA_basic_E25.335_N64.000 (3)

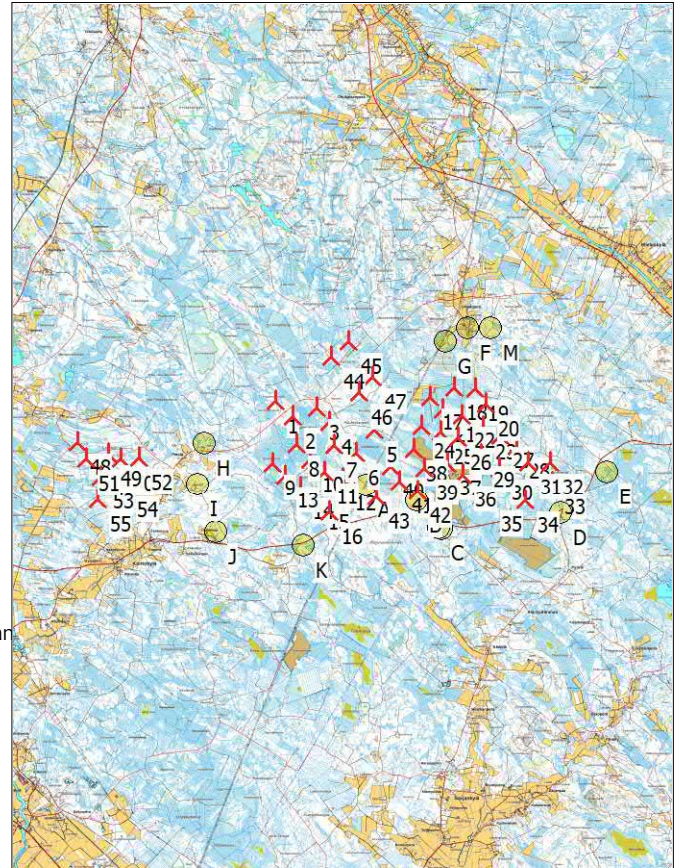
Operational time
N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
576 423 402 429 548 894 1047 1090 994 842 717 710 8673
Idle start wind speed: Cut in wind speed from power curve

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:

Height contours used: Height Contours: CONTOURLINE_Puutionsaari_Riskalan
Area object(s) used in calculation:
Area object (Luke2017_SE): (1)
Area object (Luke2017_SW): (2)
Area object (Luke2017_NE): (3)
Area object (Luke2017_NW): (4)
Obstacles used in calculation
Eye height for map: 1,5 m
Grid resolution: 1,0 m

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89

WTGs



🚩 New WTG

🟡 Shadow receptor

| | East | North | Z [m] | Row data/Description | WTG type | | Type-generator | Power, rated [kW] | Rotor diameter [m] | Hub height [m] | Shadow data | |
|----|--------|---------|----------|------------------------|----------|-----------|----------------|-------------------------|--------------------------|----------------------|--------------------------------|------|
| | | | | | Valid | Manufact. | | | | | Calculation distance [m] | RPM |
| 1 | 399241 | 7112464 | 94,0 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 2 | 399796 | 7111966 | 97,5 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 3 | 400591 | 7112251 | 97,8 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 4 | 401005 | 7111796 | 100,0 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 5 | 402495 | 7111524 | 106,6 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 6 | 401910 | 7110769 | 107,4 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 7 | 401156 | 7111035 | 104,5 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 8 | 399940 | 7111056 | 97,5 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 9 | 399132 | 7110420 | 95,8 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 10 | 400364 | 7110552 | 98,6 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 11 | 400851 | 7110131 | 101,8 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 12 | 401462 | 7109916 | 102,8 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 13 | 399562 | 7109992 | 97,5 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 14 | 400065 | 7109631 | 100,0 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 15 | 400578 | 7109257 | 102,8 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 16 | 401021 | 7108796 | 105,1 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 17 | 404336 | 7112600 | 102,7 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 18 | 405133 | 7112922 | 100,3 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 19 | 405834 | 7112878 | 101,2 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 20 | 406171 | 7112395 | 103,9 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 21 | 404759 | 7112195 | 105,0 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 22 | 405399 | 7112017 | 102,5 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 23 | 406086 | 7111637 | 103,0 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 24 | 404064 | 7111669 | 104,9 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 25 | 404693 | 7111450 | 105,5 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 26 | 405262 | 7111259 | 104,6 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |

To be continued on next page...

SHADOW - Main Result

Calculation: Puutionsaari_VE1_RD200x43xHH200_Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_Luke forest_20200408

...continued from previous page

| | East | North | Z | Row data/Description | WTG type | | Type-generator | Power, rated [kW] | Rotor diameter [m] | Hub height [m] | Shadow data | |
|----|--------|---------|-------|------------------------|----------|----------------|---------------------|-------------------------|--------------------------|----------------------|--------------------------------|--------------|
| | | | | | Valid | Manufact. | | | | | Calculation distance [m] | RPM [RPM] |
| | | | [m] | | | | | | | | | |
| 27 | 406667 | 7111338 | 106,6 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 28 | 407209 | 7110982 | 111,9 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 29 | 406033 | 7110701 | 104,0 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 30 | 406628 | 7110262 | 105,0 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 31 | 407576 | 7110456 | 114,2 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 32 | 408319 | 7110460 | 119,2 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 33 | 408384 | 7109795 | 116,1 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 34 | 407482 | 7109189 | 112,5 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 35 | 406283 | 7109196 | 110,2 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 36 | 405436 | 7110043 | 106,4 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 37 | 404925 | 7110413 | 105,8 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 38 | 403807 | 7110889 | 106,8 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 39 | 404142 | 7110263 | 107,4 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 40 | 403047 | 7110331 | 108,1 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 41 | 403334 | 7109808 | 111,9 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 42 | 403921 | 7109494 | 109,9 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 43 | 402563 | 7109304 | 112,5 | Generic RD200 5600 ... | Yes | Generic | RD200-5600 | 5600 | 200,0 | 200,0 | 2448 | 10,4 |
| 44 | 401061 | 7113928 | 105,0 | VESTAS V150-4.2 HH... | Yes | VESTAS | V150-4.2 HH155-4200 | 4200 | 150,0 | 155,0 | 1902 | 10,4 |
| 45 | 401644 | 7114439 | 105,3 | VESTAS V150-4.2 HH... | Yes | VESTAS | V150-4.2 HH155-4200 | 4200 | 150,0 | 155,0 | 1902 | 10,4 |
| 46 | 401997 | 7112772 | 109,2 | VESTAS V150-4.2 HH... | Yes | VESTAS | V150-4.2 HH155-4200 | 4200 | 150,0 | 155,0 | 1902 | 10,4 |
| 47 | 402450 | 7113258 | 106,6 | VESTAS V150-4.2 HH... | Yes | VESTAS | V150-4.2 HH155-4200 | 4200 | 150,0 | 155,0 | 1902 | 10,4 |
| 48 | 392697 | 7111104 | 81,3 | GE WIND ENERGY 5.... | Yes | GE WIND ENERGY | 5.3-158 RD175-5300 | 5300 | 175,0 | 152,5 | 2141 | 0,0 |
| 49 | 393696 | 7110723 | 85,7 | GE WIND ENERGY 5.... | Yes | GE WIND ENERGY | 5.3-158 RD175-5300 | 5300 | 175,0 | 152,5 | 2141 | 0,0 |
| 50 | 394124 | 7110573 | 88,4 | GE WIND ENERGY 5.... | Yes | GE WIND ENERGY | 5.3-158 RD175-5300 | 5300 | 175,0 | 152,5 | 2141 | 0,0 |
| 51 | 392964 | 7110572 | 83,6 | GE WIND ENERGY 5.... | Yes | GE WIND ENERGY | 5.3-158 RD175-5300 | 5300 | 175,0 | 152,5 | 2141 | 0,0 |
| 52 | 394736 | 7110600 | 90,0 | GE WIND ENERGY 5.... | Yes | GE WIND ENERGY | 5.3-158 RD175-5300 | 5300 | 175,0 | 152,5 | 2141 | 0,0 |
| 53 | 393462 | 7109982 | 84,9 | GE WIND ENERGY 5.... | Yes | GE WIND ENERGY | 5.3-158 RD175-5300 | 5300 | 175,0 | 152,5 | 2141 | 0,0 |
| 54 | 394233 | 7109674 | 87,5 | GE WIND ENERGY 5.... | Yes | GE WIND ENERGY | 5.3-158 RD175-5300 | 5300 | 175,0 | 152,5 | 2141 | 0,0 |
| 55 | 393349 | 7109200 | 83,7 | GE WIND ENERGY 5.... | Yes | GE WIND ENERGY | 5.3-158 RD175-5300 | 5300 | 175,0 | 152,5 | 2141 | 0,0 |

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] |
|-----|--|--------|---------|-------|-------|--------|---------------------|------------------------------|--------------------|-----------------------------------|
| A | Lomarakenus A (Vesiperän metsätie, Kivikaarto) | 402212 | 7109691 | 112,5 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| B | Asuinrakennus B (Ylivieskantie, Pohlola) | 403894 | 7109182 | 114,4 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| C | Asuinrakennus C (Perkkiontie 382) | 404620 | 7108247 | 113,6 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| D | Asuinrakennus D (Alakylantie 243) | 408659 | 7108752 | 119,4 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| E | Lomarakenus E (Kellokankaan metsätie) | 410199 | 7110115 | 122,5 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| F | Asuinrakennus F (Ollilantie 112) | 405573 | 7114900 | 87,7 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| G | Lomarakenus G (Ollilantie, Siliakuru) | 404837 | 7114441 | 100,0 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| H | Asuinrakennus H (Pinolantie 406) | 396893 | 7111098 | 88,1 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| I | Asuinrakennus I (Kortenevantie 116) | 396670 | 7109704 | 87,5 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| J | Asuinrakennus J (Haapavesitie 1406) | 397273 | 7108116 | 89,3 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| K | Lomarakenus K (Kurunoja) | 400152 | 7107685 | 102,3 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| L | Lomarakenus L (Perkkiontie, Ilmola) | 404739 | 7108222 | 113,7 | 5,0 | 5,0 | 1,0 | 90,0 | "Green house mode" | 6,0 |
| M | Lomarakenus M (Riskalan metsätie) | 406348 | 7114887 | 102,7 | 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 | Lomarakenus A (Vesiperän metsätie, Kivikaarto) | 58:25 |
| B | Asuinrakennus B (Ylivieskantie, Pohlola) | 9:09 |
| C | Asuinrakennus C (Perkkiontie 382) | 10:50 |
| D | Asuinrakennus D (Alakylantie 243) | 9:15 |
| E | Lomarakenus E (Kellokankaan metsätie) | 0:00 |
| F | Asuinrakennus F (Ollilantie 112) | 4:45 |
| G | Lomarakenus G (Ollilantie, Siliakuru) | 0:00 |

To be continued on next page...

SHADOW - Main Result

Calculation: Puutionsaari_VE1_RD200x43xHH200_Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_Luke forest_20200408

...continued from previous page

| No. | Name | Shadow, expected values Shadow hours per year [h/year] |
|-----|--|---|
| | H Asuinrakennus H (Pinolantie 406) | 0:00 |
| | I Asuinrakennus I (Kortenevantie 116) | 1:25 |
| | J Asuinrakennus J (Haapavesitie 1406) | 0:00 |
| | K Lomarakennus K (Kurunoja) | 0:00 |
| | L Lomarakennus L (Perkkiontie, Ilmola) | 13:05 |
| | M Lomarakennus M (Riskalan metsatie) | 0:00 |

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

| No. | Name | Worst case [h/year] | Expected [h/year] |
|-----|---|------------------------|----------------------|
| 1 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1) | 0:00 | 0:00 |
| 2 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (2) | 0:00 | 0:00 |
| 3 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (3) | 0:00 | 0:00 |
| 4 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (4) | 0:00 | 0:00 |
| 5 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (5) | 0:00 | 0:00 |
| 6 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (6) | 0:00 | 0:00 |
| 7 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (7) | 0:00 | 0:00 |
| 8 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (8) | 0:00 | 0:00 |
| 9 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (9) | 0:00 | 0:00 |
| 10 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (10) | 0:00 | 0:00 |
| 11 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (11) | 22:52 | 5:10 |
| 12 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (12) | 108:57 | 27:30 |
| 13 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (13) | 0:00 | 0:00 |
| 14 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (14) | 7:12 | 1:28 |
| 15 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (15) | 12:46 | 2:27 |
| 16 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (16) | 0:00 | 0:00 |
| 17 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (17) | 0:00 | 0:00 |
| 18 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (18) | 16:59 | 2:20 |
| 19 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (19) | 17:09 | 2:24 |
| 20 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (20) | 0:00 | 0:00 |
| 21 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (21) | 0:00 | 0:00 |
| 22 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (22) | 0:00 | 0:00 |
| 23 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (23) | 0:00 | 0:00 |
| 24 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (24) | 0:00 | 0:00 |
| 25 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (25) | 0:00 | 0:00 |
| 26 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (26) | 0:00 | 0:00 |
| 27 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (27) | 0:00 | 0:00 |
| 28 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (28) | 0:00 | 0:00 |
| 29 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (29) | 0:00 | 0:00 |
| 30 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (30) | 0:00 | 0:00 |
| 31 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (31) | 0:00 | 0:00 |
| 32 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (32) | 0:00 | 0:00 |
| 33 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (33) | 0:00 | 0:00 |
| 34 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (34) | 33:15 | 7:59 |
| 35 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (35) | 42:33 | 10:28 |
| 36 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (36) | 21:00 | 5:18 |
| 37 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (37) | 6:27 | 1:51 |
| 38 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (38) | 0:00 | 0:00 |
| 39 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (39) | 0:00 | 0:00 |
| 40 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (40) | 2:14 | 0:41 |
| 41 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (41) | 23:20 | 6:42 |
| 42 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (42) | 0:00 | 0:00 |
| 43 | Generic RD200 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (43) | 125:04 | 27:21 |
| 44 | VESTAS V150-4.2 HH155 4200 150.0 !O! hub: 155,0 m (TOT: 230,0 m) (235) | 0:00 | 0:00 |
| 45 | VESTAS V150-4.2 HH155 4200 150.0 !O! hub: 155,0 m (TOT: 230,0 m) (236) | 0:00 | 0:00 |
| 46 | VESTAS V150-4.2 HH155 4200 150.0 !O! hub: 155,0 m (TOT: 230,0 m) (237) | 0:00 | 0:00 |
| 47 | VESTAS V150-4.2 HH155 4200 150.0 !O! hub: 155,0 m (TOT: 230,0 m) (238) | 0:00 | 0:00 |
| 48 | GE WIND ENERGY 5.3-158 RD175 5300 175.0 !O! hub: 152,5 m (TOT: 240,0 m) (239) | 0:00 | 0:00 |
| 49 | GE WIND ENERGY 5.3-158 RD175 5300 175.0 !O! hub: 152,5 m (TOT: 240,0 m) (240) | 0:00 | 0:00 |
| 50 | GE WIND ENERGY 5.3-158 RD175 5300 175.0 !O! hub: 152,5 m (TOT: 240,0 m) (241) | 0:00 | 0:00 |
| 51 | GE WIND ENERGY 5.3-158 RD175 5300 175.0 !O! hub: 152,5 m (TOT: 240,0 m) (242) | 0:00 | 0:00 |
| 52 | GE WIND ENERGY 5.3-158 RD175 5300 175.0 !O! hub: 152,5 m (TOT: 240,0 m) (243) | 6:12 | 1:25 |

To be continued on next page...

Project: Puutionsaari_Riskalankangas_20200327
Description: VSB

Licensed user:
FCG Suunnittelu ja tekniikka Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
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Henna-Riikka Rintamäki / henna-riikka.rintamaki@fcg.fi
Calculated:
15.4.2020 12.10/3.3.247

SHADOW - Main Result

Calculation: Puutionsaari_VE1_RD200x43xHH200_Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_Luke forest_20200408

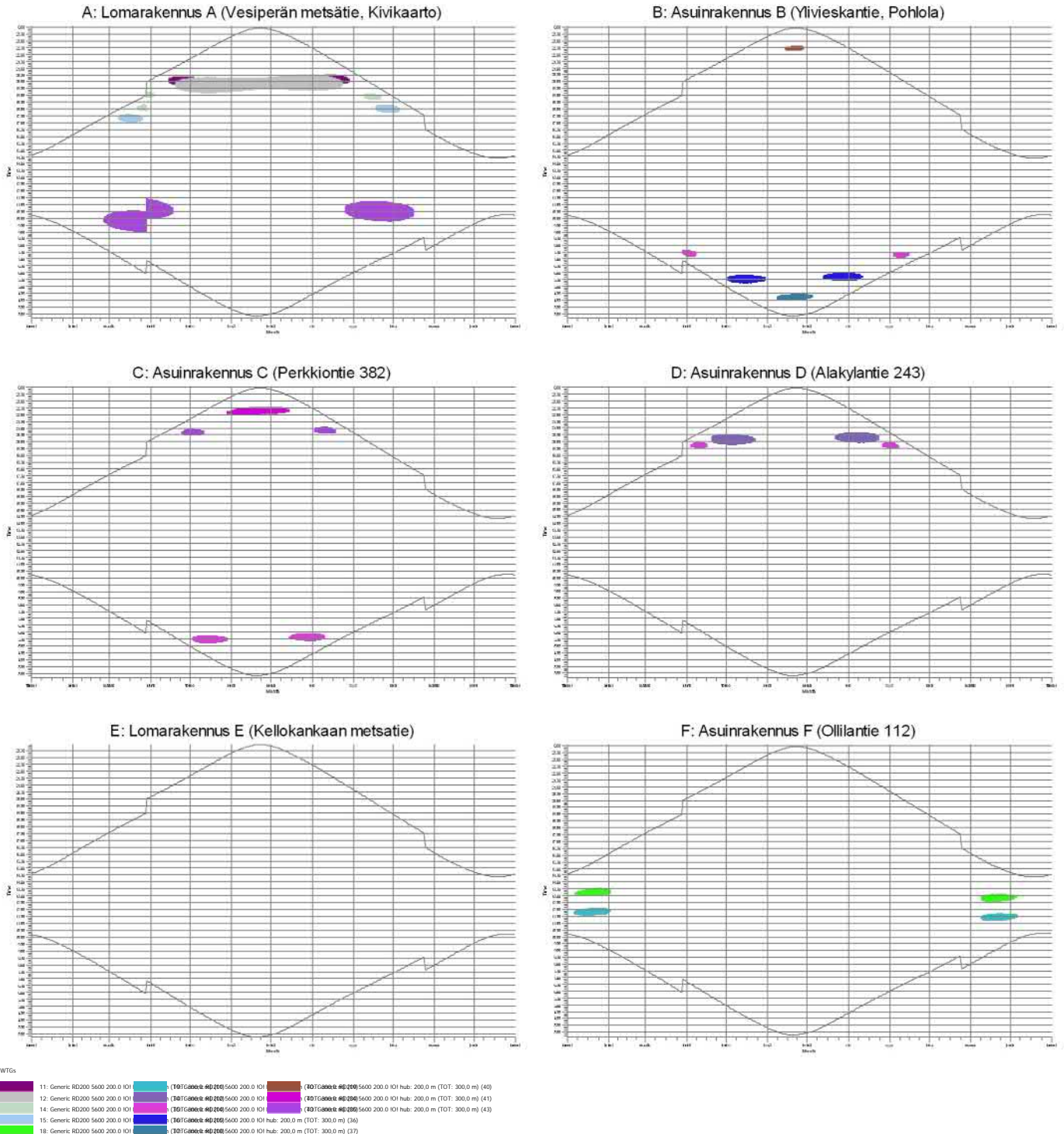
...continued from previous page

| No. | Name | Worst case [h/year] | Expected [h/year] |
|-----|---|------------------------|----------------------|
| 53 | GE WIND ENERGY 5.3-158 RD175 5300 175.0 !O! hub: 152,5 m (TOT: 240,0 m) (244) | 0:00 | 0:00 |
| 54 | GE WIND ENERGY 5.3-158 RD175 5300 175.0 !O! hub: 152,5 m (TOT: 240,0 m) (245) | 0:00 | 0:00 |
| 55 | GE WIND ENERGY 5.3-158 RD175 5300 175.0 !O! hub: 152,5 m (TOT: 240,0 m) (246) | 0:00 | 0:00 |

Total times in Receptor wise and WTG wise tables can differ, as a WTG can lead to flicker at 2 or more receptors simultaneously and/or receptors may receive flicker from 2 or more WTGs simultaneously.

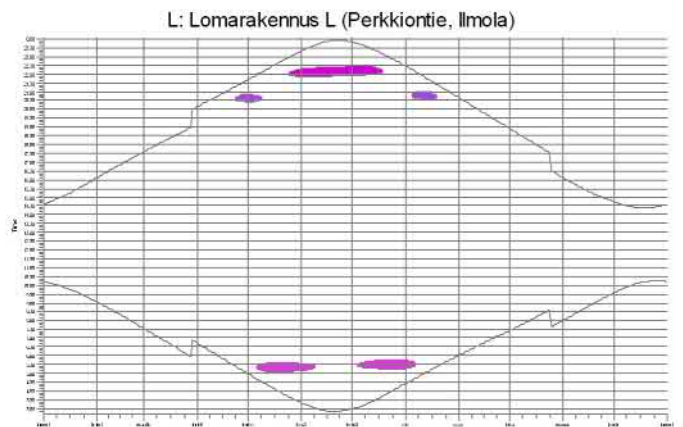
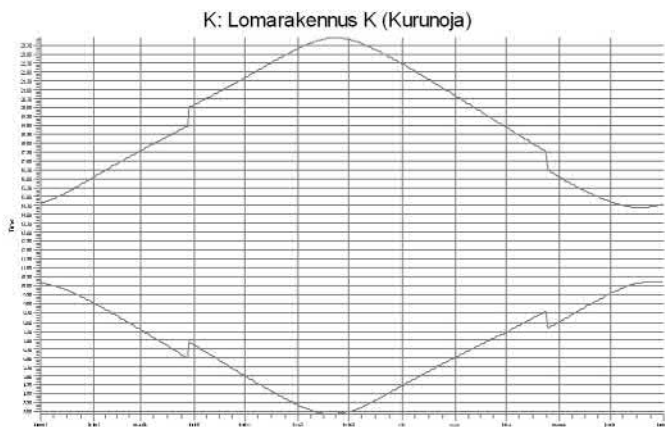
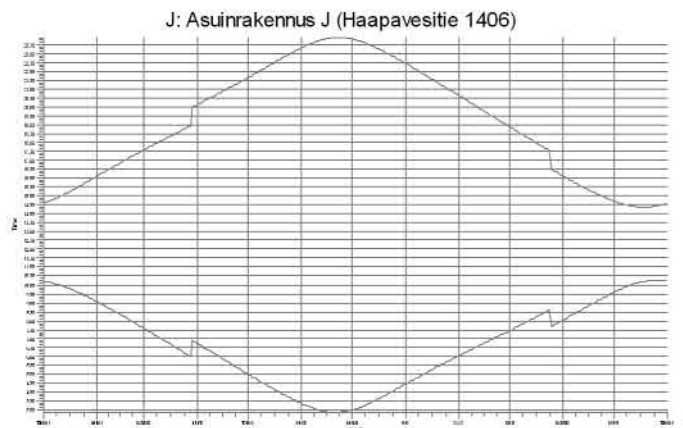
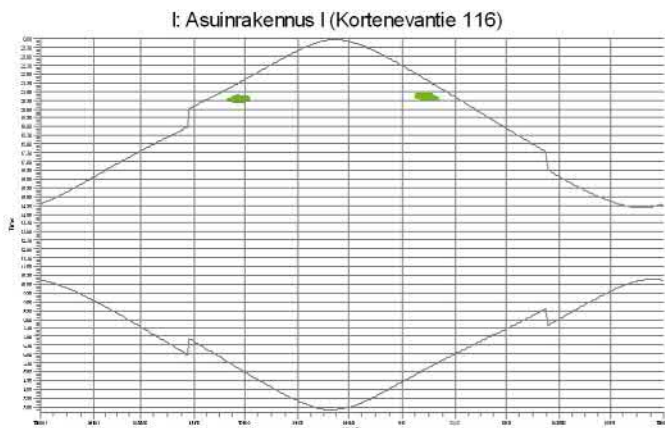
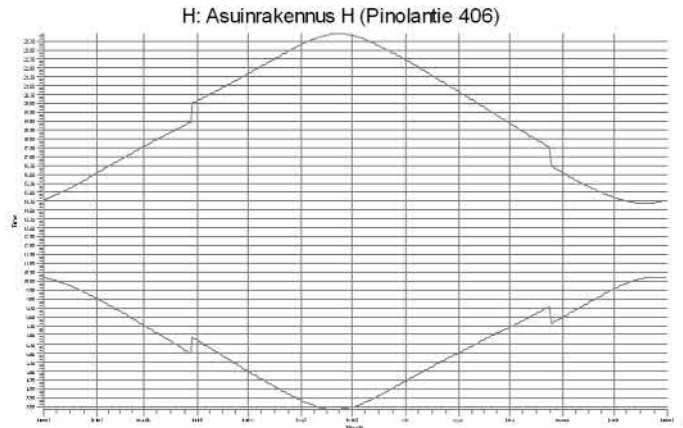
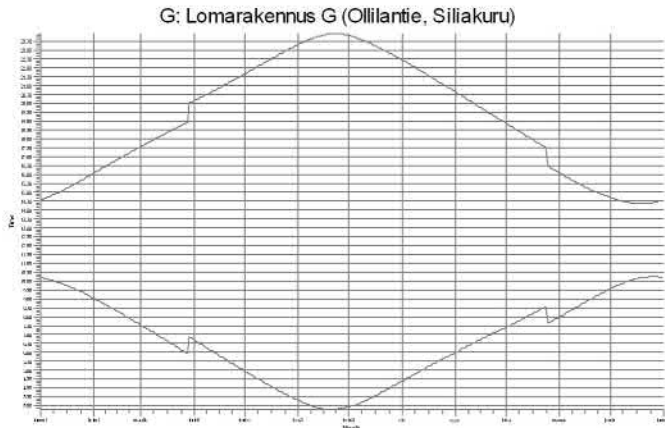
SHADOW - Calendar, graphical

Calculation: Puutionsaari_VE1_RD200x43xHH200_Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_Luke forest_20200408



SHADOW - Calendar, graphical

Calculation: Puutionsaari_VE1_RD200x43xHH200_Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_Luke forest_20200408



WTGs
 35: Generic RD200 5600 200.0 I01
 41: Generic RD200 5600 200.0 I01
 1:10T1Cane 48 (200) 5600 200.0 I01 hub: 290.0 m (TOT: 300.0 m) (43)
 1:10T1Cane 48 (200) 5600 200.0 I01 hub: 152.5 m (TOT: 240.0 m) (243)

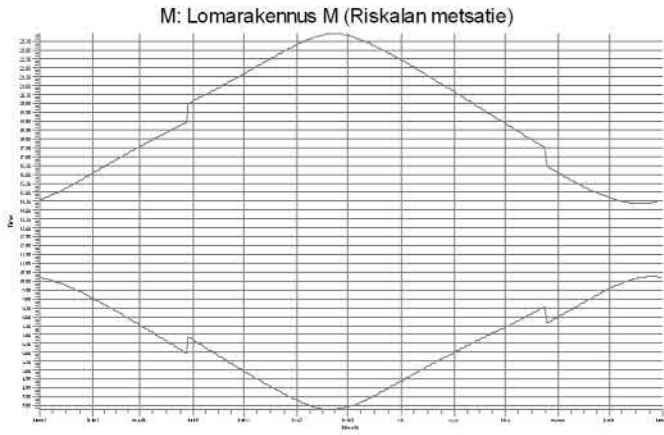
Project:
Puutionsaari_Riskalankangas_20200327

Description:
VSB

Licensed user:
FCG Suunnittelu ja tekniikka Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka Rintamäki / henna-riikka.rintamaki@fcg.fi
Calculated:
15.4.2020 12.10/3.3.247

SHADOW - Calendar, graphical

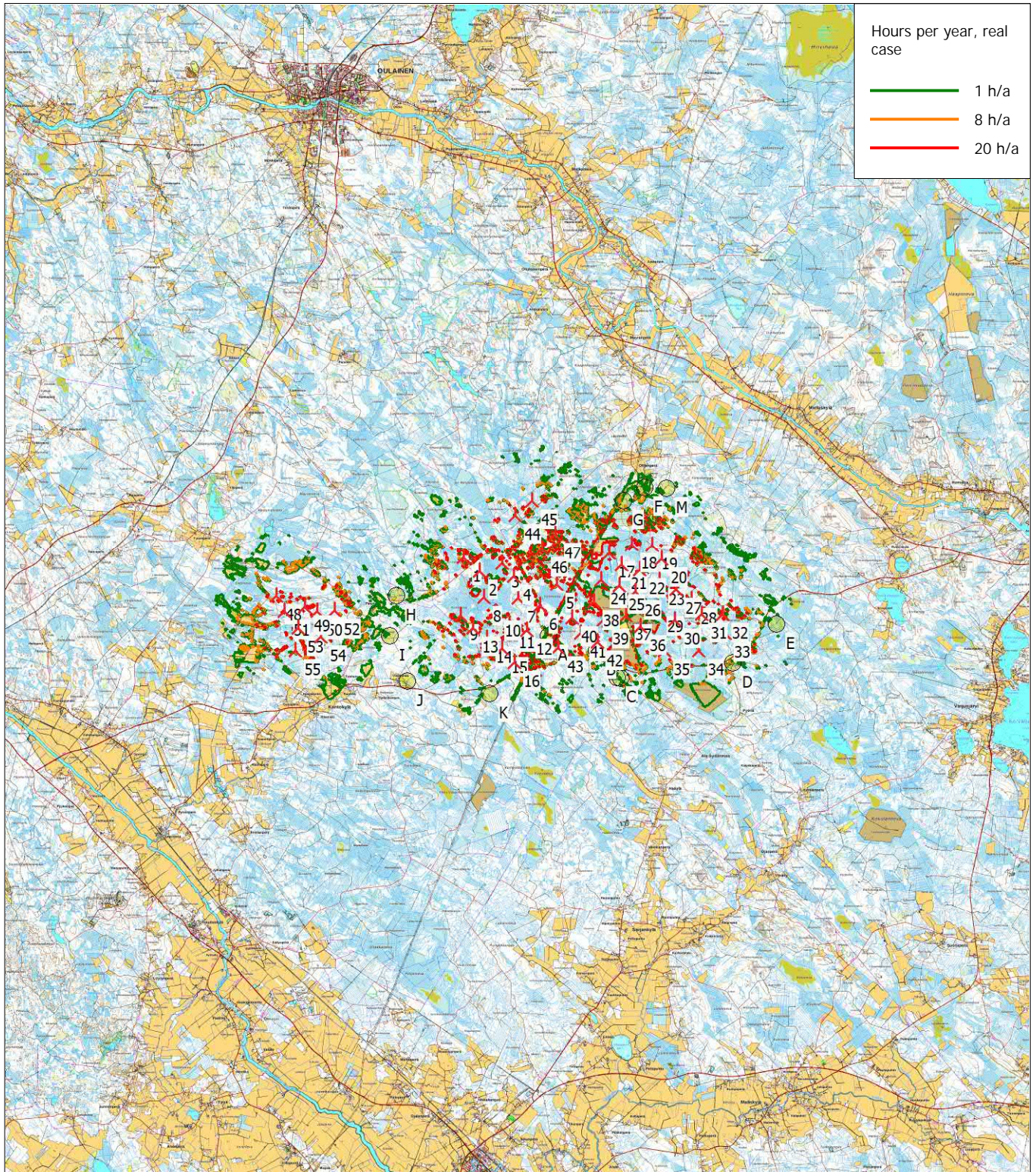
Calculation: Puutionsaari_VE1_RD200x43xHH200_Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_Luke forest_20200408



WTGs

SHADOW - Map

Calculation: Puutionsaari_VE1_RD200x43xHH200_Rahkola_V150x4xHH155+Tuomiperä_RD175x8xHH152,5_Luke forest_20200408



Map: Maastokarttarasteri50K , Print scale 1:200 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 401 070 North: 7 111 410

New WTG

Shadow receptor




Flicker map level: Height Contours: CONTOURLINE_Puutionsaari_Riskalankangas_20200327_1.wpo (2)

-  Puutionsaari_VE1_RD200x43xHH200_20200327
-  Tuomiperäntie_GE158-5,3MW RD175x8xHH152,5_201901
-  Rahkola_V150x4xHH155_201805

Varjostus (real case, Luke forest)

-  1 h/a
-  8 h/a
-  20 h/a

Rakennuskanta MML, mtk

-  Asuinrakennus
-  Liike- tai julkinen rakennus
-  Lomarakennus
-  Muu rakennus
-  Laskentapisteeet A-M

