Project:
**Storbötet**

Description:
PROKON Wind Energy Finland oy
Uusikaarleby / Vöyri

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3.9.2014 9:36 / 1

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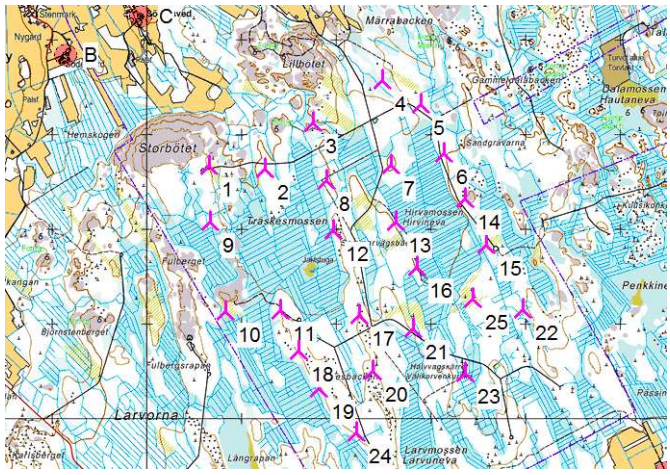
Calculated:
3.9.2014 8:53/2.9.269

# DECIBEL - Main Result

**Calculation:** VE1: Nykarleby, 25 x V126 rd126 HH145 T=15C

**Noise calculation model:**
ISO 9613-2 General
**Wind speed:**
8,0 m/s
**Ground attenuation:**
General, Ground factor: 0,4
**Meteorological coefficient, C0:**
0,0 dB
**Type of demand in calculation:**
1: WTG noise is compared to demand (DK, DE, SE, NL etc.)
**Noise values in calculation:**
All noise values are mean values (Lwa) (Normal)
**Pure tones:**
Pure and Impulse tone penalty are added to WTG source noise
**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
**Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:**
0,0 dB(A)




Scale 1:80 000

New WTG  Noise sensitive area

## WTGs

| | Finish TM ETRS-TM35FIN-ETRS89 | | | | WTG type | | | | | | | Noise data | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | East | North | Z | Row data/Description | Valid | Manufact. | Type-generator | Power, rated | Rotor diameter | Hub height | Creator | Name | Wind speed | Status | LwA,ref | Pure tones | |
| | | | [m] | | | | | [kW] | [m] | [m] | | | [m/s] | | [dB(A)] | | |
| 1 | 278 654 | 7 028 670 | 44,7 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 2 | 279 246 | 7 028 640 | 42,5 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 3 | 279 753 | 7 029 129 | 40,0 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 4 | 280 491 | 7 029 568 | 33,6 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 5 | 280 897 | 7 029 323 | 37,5 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 6 | 281 134 | 7 028 801 | 39,0 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 7 | 280 577 | 7 028 680 | 40,0 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 8 | 279 897 | 7 028 516 | 41,1 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 9 | 278 671 | 7 028 075 | 45,0 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 10 | 278 834 | 7 027 133 | 47,5 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 11 | 279 410 | 7 027 143 | 48,9 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 12 | 279 972 | 7 027 985 | 44,4 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 13 | 280 633 | 7 028 083 | 39,7 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 14 | 281 366 | 7 028 324 | 44,9 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 15 | 281 588 | 7 027 831 | 42,5 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 16 | 280 853 | 7 027 601 | 40,0 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 17 | 280 241 | 7 027 097 | 50,0 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 18 | 279 605 | 7 026 721 | 50,0 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 19 | 279 814 | 7 026 321 | 49,8 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 20 | 280 389 | 7 026 505 | 50,5 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 21 | 280 809 | 7 026 950 | 44,8 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 22 | 281 974 | 7 027 156 | 44,8 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 23 | 281 361 | 7 026 486 | 45,0 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 24 | 280 212 | 7 025 857 | 51,1 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 25 | 281 444 | 7 027 269 | 42,5 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |

**h) Generic octave distribution used**

# Calculation Results

## Sound Level

| Noise sensitive area | | Finish TM ETRS-TM35FIN-ETRS89 | | | | Demands | Sound Level | | Demands fulfilled ? |
|---|---|---|---|---|---|---|---|---|---|
| No. | Name | East | North | Z | Imission height | Noise | From WTGs | Distance to noise demand | Noise |
| | | | | [m] | [m] | [dB(A)] | [dB(A)] | [m] | |
| A | Asuinrakennus Österby | 276 064 | 7 029 689 | 22,1 | 4,0 | 40,0 | 30,7 | 1 871 | Yes |
| B | Asuinrakennus Södergård | 277 148 | 7 029 839 | 22,6 | 4,0 | 40,0 | 34,1 | 1 002 | Yes |
| C | Asuinrakennus Södersved | 277 936 | 7 030 242 | 25,0 | 4,0 | 40,0 | 35,5 | 754 | Yes |
| D | Asuinrakennus Söderkulla | 279 601 | 7 030 557 | 27,9 | 4,0 | 40,0 | 38,4 | 244 | Yes |
| E | Asuinrakennus Björkholma | 285 116 | 7 029 347 | 35,0 | 4,0 | 40,0 | 29,1 | 2 608 | Yes |
| F | Lomarakennus Katiska | 284 929 | 7 027 331 | 46,0 | 4,0 | 40,0 | 30,5 | 2 007 | Yes |
| G | Asuinrakennus Koivuranta | 283 472 | 7 025 429 | 38,1 | 4,0 | 40,0 | 33,3 | 1 255 | Yes |
| H | Asuinrakennus Perä-Koski | 282 881 | 7 025 017 | 38,6 | 4,0 | 40,0 | 34,0 | 1 104 | Yes |

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Calculated:
3.9.2014 8:53/2.9.269

# DECIBEL - Main Result

**Calculation:** VE1: Nykarleby, 25 x V126 rd126 HH145 T=15C

## Distances (m)

| WTG | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 1 | 2782 | 1905 | 1727 | 2110 | 6494 | 6413 | 5804 | 5583 |
| 2 | 3348 | 2415 | 2068 | 1948 | 5910 | 5829 | 5305 | 5129 |
| 3 | 3729 | 2699 | 2129 | 1435 | 5365 | 5477 | 5243 | 5163 |
| 4 | 4426 | 3353 | 2641 | 1329 | 4628 | 4967 | 5098 | 5137 |
| 5 | 4844 | 3783 | 3099 | 1788 | 4218 | 4495 | 4666 | 4738 |
| 6 | 5144 | 4117 | 3506 | 2330 | 4017 | 4067 | 4101 | 4165 |
| 7 | 4621 | 3617 | 3066 | 2114 | 4586 | 4554 | 4351 | 4325 |
| 8 | 4006 | 3049 | 2611 | 2061 | 5282 | 5167 | 4721 | 4596 |
| 9 | 3064 | 2329 | 2287 | 2649 | 6566 | 6299 | 5479 | 5200 |
| 10 | 3767 | 3186 | 3234 | 3507 | 6658 | 6095 | 4939 | 4564 |
| 11 | 4202 | 3517 | 3429 | 3417 | 6114 | 5520 | 4407 | 4068 |
| 12 | 4261 | 3377 | 3038 | 2597 | 5319 | 4997 | 4331 | 4153 |
| 13 | 4840 | 3901 | 3453 | 2679 | 4656 | 4359 | 3884 | 3799 |
| 14 | 5472 | 4480 | 3928 | 2845 | 3885 | 3697 | 3578 | 3635 |
| 15 | 5825 | 4871 | 4374 | 3371 | 3838 | 3376 | 3051 | 3095 |
| 16 | 5221 | 4326 | 3932 | 3208 | 4605 | 4083 | 3401 | 3283 |
| 17 | 4913 | 4131 | 3897 | 3517 | 5367 | 4691 | 3634 | 3359 |
| 18 | 4618 | 3968 | 3894 | 3834 | 6102 | 5356 | 4075 | 3690 |
| 19 | 5037 | 4412 | 4345 | 4239 | 6102 | 5212 | 3764 | 3331 |
| 20 | 5368 | 4647 | 4468 | 4125 | 5513 | 4612 | 3264 | 2900 |
| 21 | 5476 | 4662 | 4367 | 3802 | 4927 | 4136 | 3065 | 2831 |
| 22 | 6426 | 5519 | 5079 | 4145 | 3829 | 2959 | 2285 | 2321 |
| 23 | 6186 | 5381 | 5080 | 4432 | 4718 | 3665 | 2360 | 2113 |
| 24 | 5644 | 5022 | 4937 | 4736 | 6016 | 4939 | 3286 | 2796 |
| 25 | 5896 | 5004 | 4596 | 3767 | 4217 | 3484 | 2737 | 2669 |

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Calculated:
3.9.2014 8:53/2.9.269

# DECIBEL - Assumptions for noise calculation

**Calculation:** VE1: Nykarleby, 25 x V126 rd126 HH145 T=15C

**Noise calculation model:**
ISO 9613-2 General
**Wind speed:**
8,0 m/s
**Ground attenuation:**
General, Ground factor: 0,4
**Meteorological coefficient, C0:**
0,0 dB
**Type of demand in calculation:**
1: WTG noise is compared to demand (DK, DE, SE, NL etc.)
**Noise values in calculation:**
All noise values are mean values (Lwa) (Normal)
**Pure tones:**
Pure and Impulse tone penalty are added to WTG source noise
**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
**Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:**
0,0 dB(A)
**Octave data required**
Air absorption

| 63 [db/km] | 125 [db/km] | 250 [db/km] | 500 [db/km] | 1 000 [db/km] | 2 000 [db/km] | 4 000 [db/km] | 8 000 [db/km] |
|---|---|---|---|---|---|---|---|
| 0,1 | 0,4 | 1,1 | 2,4 | 4,1 | 8,8 | 26,6 | 95,0 |

**WTG:** VESTAS V126-3.3 GridStreame 3300 126.0 !O!
**Noise:** Level 0 - - Mode 0 - 04-2014

| Source | Source/Date | Creator | Edited |
|---|---|---|---|
| Manufacturer | 1.4.2014 | EMD | 11.6.2014 15:36 |

Based on Document no.: 0034-7616 V09.

| | | | | | | **Octave data** | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Status | Hub height [m] | Wind speed [m/s] | LwA,ref [dB(A)] | Pure tones | | 63 [dB] | 125 [dB] | 250 [dB] | 500 [dB] | 1000 [dB] | 2000 [dB] | 4000 [dB] | 8000 [dB] |
| From other hub height | 145,0 | 8,0 | 107,5 | No | Generic data | 89,1 | 96,1 | 99,5 | 102,1 | 101,9 | 99,0 | 94,2 | 84,7 |

**NSA:** Asuinrakennus Österby-A
**Predefined calculation standard:**
**Imission height(a.g.l.):** 4,0 m

**Noise demand:** 40,0 dB(A)
**Distance demand:**

**NSA:** Asuinrakennus Södergård-B
**Predefined calculation standard:**
**Imission height(a.g.l.):** 4,0 m

**Noise demand:** 40,0 dB(A)
**Distance demand:**

**NSA:** Asuinrakennus Södersved-C
**Predefined calculation standard:**
**Imission height(a.g.l.):** 4,0 m

**Noise demand:** 40,0 dB(A)
**Distance demand:**

**NSA:** Asuinrakennus Söderkulla-D
**Predefined calculation standard:**
**Imission height(a.g.l.):** 4,0 m

**Noise demand:** 40,0 dB(A)
**Distance demand:**

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Calculated:
3.9.2014 8:53/2.9.269

# DECIBEL - Assumptions for noise calculation

**Calculation:** VE1: Nykarleby, 25 x V126 rd126 HH145 T=15C

**NSA:** Asuinrakennus Björkholma-E
**Predefined calculation standard:**
**Imission height(a.g.l.):** 4,0 m

**Noise demand:** 40,0 dB(A)
**Distance demand:**

**NSA:** Lomarakennus Katiska-F
**Predefined calculation standard:**
**Imission height(a.g.l.):** 4,0 m

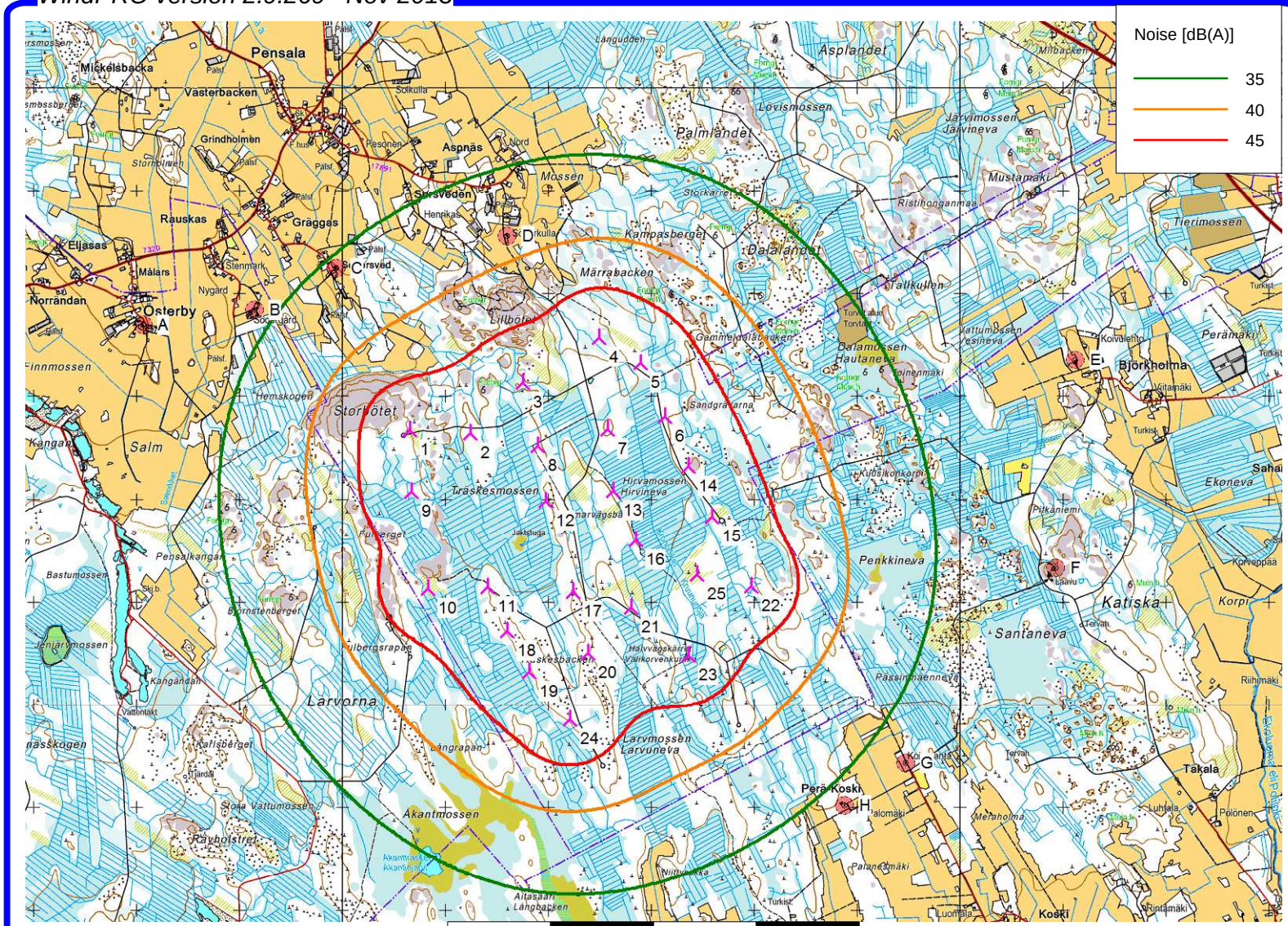
**Noise demand:** 40,0 dB(A)
**Distance demand:**

**NSA:** Asuinrakennus Koivuranta-G
**Predefined calculation standard:**
**Imission height(a.g.l.):** 4,0 m

**Noise demand:** 40,0 dB(A)
**Distance demand:**

**NSA:** Asuinrakennus Perä-Koski-H
**Predefined calculation standard:**
**Imission height(a.g.l.):** 4,0 m

**Noise demand:** 40,0 dB(A)
**Distance demand:**




Map: Peruskartat , Print scale 1:60 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 280 590 North: 7 027 713

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

Project:

**Storbötet**

Description:

PROKON Wind Energy Finland oy
Uusikaarleby / Vöyri

## DECIBEL -
## Map 8,0 m/s

**Calculation:**

VE1: Nykarleby, 25 x V126 rd126 HH145 T=15C

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Calculated:
3.9.2014 8:53/2.9.269

Project:
**Storbötet**

Description:
PROKON Wind Energy Finland oy
Uusikaarleby / Vöyri

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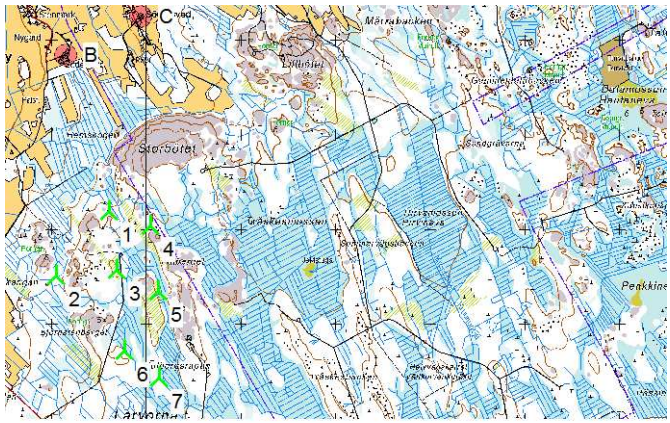
Calculated:
4.6.2014 13:11/2.9.269

# DECIBEL - Main Result

**Calculation:** VE2: Vörå, 7 x V126 rd126 HH145 T=15C

**Noise calculation model:**
ISO 9613-2 General
**Wind speed:**
8,0 m/s
**Ground attenuation:**
General, Ground factor: 0,4
**Meteorological coefficient, C0:**
0,0 dB
**Type of demand in calculation:**
1: WTG noise is compared to demand (DK, DE, SE, NL etc.)
**Noise values in calculation:**
All noise values are mean values (Lwa) (Normal)
**Pure tones:**
Pure and Impulse tone penalty are added to WTG source noise
**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
**Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:**
0,0 dB(A)




Scale 1:80 000
New WTG
Noise sensitive area

## WTGs

| | Finish TM ETRS-TM35FIN-ETRS89 East | North | Z | Row data/Description | WTG type Valid | Manufact. | Type-generator | Power, rated | Rotor diameter | Hub height | Noise data Creator | Name | Wind speed | Status | LwA,ref | Pure tones |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | | | | | [kW] | [m] | [m] | | | [m/s] | | [dB(A)] | |
| 1 | 277 601 | 7 028 185 | 38,1 | VESTAS V126-3.3 GridStreame ... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 08-2013 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 2 | 277 042 | 7 027 506 | 35,0 | VESTAS V126-3.3 GridStreame ... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 08-2013 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 3 | 277 688 | 7 027 568 | 45,0 | VESTAS V126-3.3 GridStreame ... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 08-2013 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 4 | 278 035 | 7 028 034 | 43,5 | VESTAS V126-3.3 GridStreame ... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 08-2013 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 5 | 278 122 | 7 027 348 | 45,0 | VESTAS V126-3.3 GridStreame ... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 08-2013 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 6 | 277 768 | 7 026 715 | 45,0 | VESTAS V126-3.3 GridStreame ... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 08-2013 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 7 | 278 133 | 7 026 428 | 44,2 | VESTAS V126-3.3 GridStreame ... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 08-2013 | 8,0 | From other hub height | 107,5 | 0 dB h |

**h) Generic octave distribution used**

# Calculation Results

## Sound Level

| Noise sensitive area No. | Name | Finish TM ETRS-TM35FIN-ETRS89 East | North | Z [m] | Imission height [m] | Demands Noise [dB(A)] | Sound Level From WTGs [dB(A)] | Demands fulfilled ? Noise |
|---|---|---|---|---|---|---|---|---|
| A | Asuinrakennus Österby | 276 064 | 7 029 689 | 22,1 | 4,0 | 40,0 | 31,3 | Yes |
| B | Asuinrakennus Södergård | 277 148 | 7 029 839 | 22,6 | 4,0 | 40,0 | 33,4 | Yes |
| C | Asuinrakennus Södersved | 277 936 | 7 030 242 | 25,0 | 4,0 | 40,0 | 31,5 | Yes |
| D | Asuinrakennus Söderkulla | 279 601 | 7 030 557 | 27,9 | 4,0 | 40,0 | 27,7 | Yes |
| E | Asuinrakennus Björkholma | 285 116 | 7 029 347 | 35,0 | 4,0 | 40,0 | 18,1 | Yes |
| F | Lomarakennus Katiska | 284 929 | 7 027 331 | 46,0 | 4,0 | 40,0 | 18,8 | Yes |
| G | Asuinrakennus Koivuranta | 283 472 | 7 025 429 | 38,1 | 4,0 | 40,0 | 21,0 | Yes |
| H | Asuinrakennus Perä-Koski | 282 881 | 7 025 017 | 38,6 | 4,0 | 40,0 | 21,9 | Yes |

## Distances (m)

| | WTG | | | | | | |
|---|---|---|---|---|---|---|---|
| NSA | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| A | 2148 | 2390 | 2670 | 2572 | 3115 | 3426 | 3860 |
| B | 1713 | 2334 | 2333 | 2010 | 2673 | 3183 | 3548 |
| C | 2082 | 2877 | 2684 | 2209 | 2898 | 3529 | 3816 |
| D | 3101 | 3980 | 3547 | 2968 | 3531 | 4254 | 4379 |
| E | 7601 | 8278 | 7635 | 7198 | 7271 | 7801 | 7564 |
| F | 7374 | 7885 | 7241 | 6926 | 6803 | 7184 | 6852 |
| G | 6483 | 6754 | 6164 | 6026 | 5681 | 5844 | 5428 |
| H | 6154 | 6344 | 5782 | 5705 | 5296 | 5384 | 4950 |

Project:
**Storbötet**

Description:
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Paulina Kaivo-oja / paulina.kaivo-oja@fcg.fi

Calculated:
4.6.2014 13:11/2.9.269

# DECIBEL - Assumptions for noise calculation

**Calculation:** VE2: Vörå, 7 x V126 rd126 HH145 T=15C

**Noise calculation model:**
ISO 9613-2 General
**Wind speed:**
8,0 m/s
**Ground attenuation:**
General, Ground factor: 0,4
**Meteorological coefficient, C0:**
0,0 dB
**Type of demand in calculation:**
1: WTG noise is compared to demand (DK, DE, SE, NL etc.)
**Noise values in calculation:**
All noise values are mean values (Lwa) (Normal)
**Pure tones:**
Pure and Impulse tone penalty are added to WTG source noise
**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
**Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:**
0,0 dB(A)
**Octave data required**
Air absorption

| 63 [db/km] | 125 [db/km] | 250 [db/km] | 500 [db/km] | 1 000 [db/km] | 2 000 [db/km] | 4 000 [db/km] | 8 000 [db/km] |
|---|---|---|---|---|---|---|---|
| 0,1 | 0,4 | 1,1 | 2,4 | 4,1 | 8,8 | 26,6 | 95,0 |

**WTG:** VESTAS V126-3.3 GridStreame 3300 126.0 !O!
**Noise:** Level 0 - - Mode 0 - 08-2013

| Source | Source/Date | Creator | Edited |
|---|---|---|---|
| Manufacturer | 22.8.2013 | EMD | 17.1.2014 9:51 |

Based on Document no.: 0034-7616 V07 2013-08-22.

| | | | | | | Octave data | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Status | Hub height [m] | Wind speed [m/s] | LwA,ref [dB(A)] | Pure tones | | 63 [dB] | 125 [dB] | 250 [dB] | 500 [dB] | 1000 [dB] | 2000 [dB] | 4000 [dB] | 8000 [dB] |
| From other hub height | 145,0 | 8,0 | 107,5 | No | Generic data | 89,1 | 96,1 | 99,5 | 102,1 | 101,9 | 99,0 | 94,2 | 84,7 |

**NSA:** Asuinrakennus Österby-A
**Predefined calculation standard:**
**Imission height(a.g.l.):** 4,0 m

**Noise demand:** 40,0 dB(A)
**Distance demand:**

**NSA:** Asuinrakennus Södergård-B
**Predefined calculation standard:**
**Imission height(a.g.l.):** 4,0 m

**Noise demand:** 40,0 dB(A)
**Distance demand:**

**NSA:** Asuinrakennus Södersved-C
**Predefined calculation standard:**
**Imission height(a.g.l.):** 4,0 m

**Noise demand:** 40,0 dB(A)
**Distance demand:**

**NSA:** Asuinrakennus Söderkulla-D
**Predefined calculation standard:**
**Imission height(a.g.l.):** 4,0 m

**Noise demand:** 40,0 dB(A)
**Distance demand:**

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Calculated:
4.6.2014 13:11/2.9.269

# DECIBEL - Assumptions for noise calculation

**Calculation:** VE2: Vörå, 7 x V126 rd126 HH145 T=15C

**NSA:** Asuinrakennus Björkholma-E
**Predefined calculation standard:**
**Imission height(a.g.l.):** 4,0 m

**Noise demand:** 40,0 dB(A)
**Distance demand:**

**NSA:** Lomarakennus Katiska-F
**Predefined calculation standard:**
**Imission height(a.g.l.):** 4,0 m

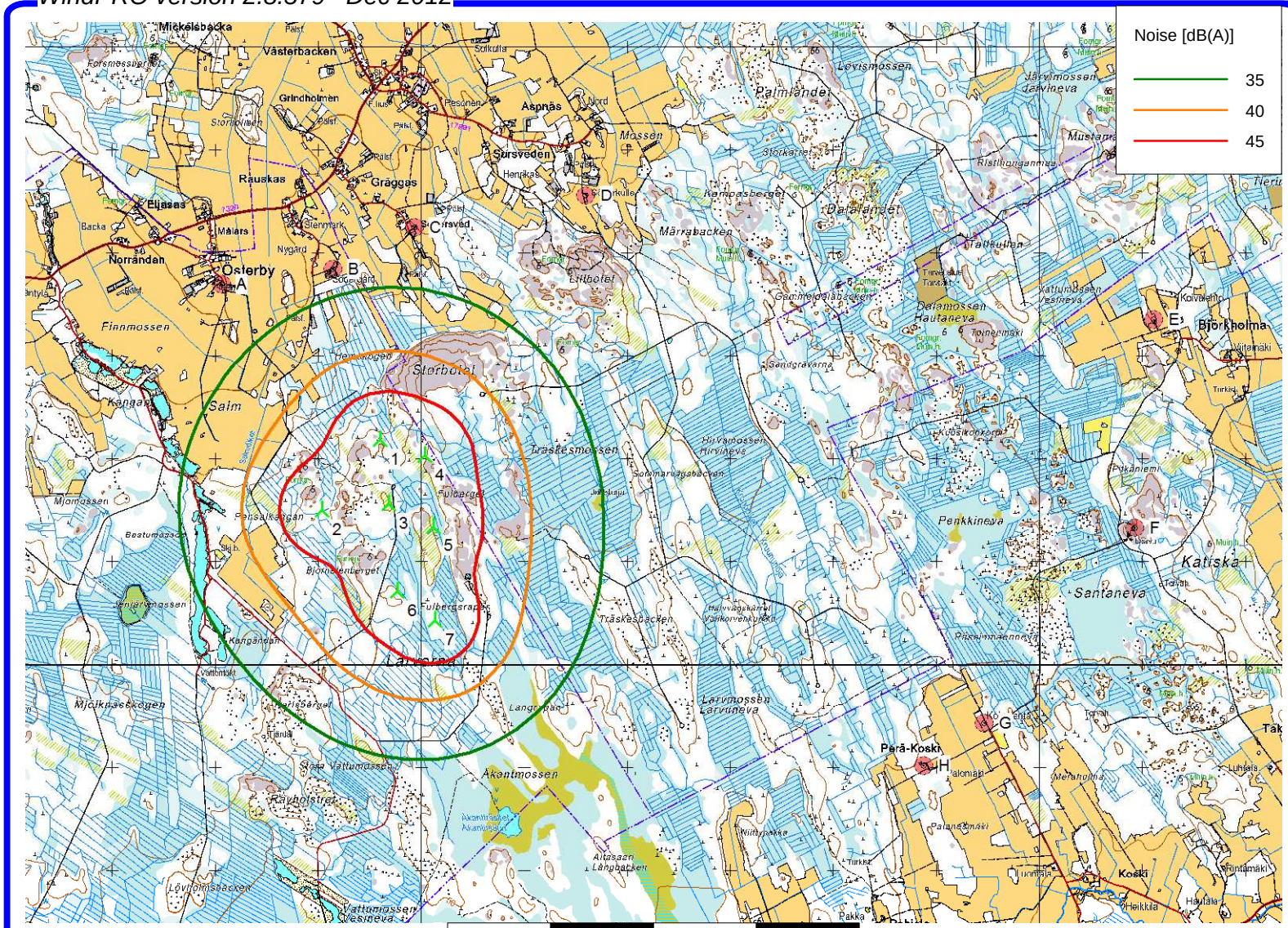
**Noise demand:** 40,0 dB(A)
**Distance demand:**

**NSA:** Asuinrakennus Koivuranta-G
**Predefined calculation standard:**
**Imission height(a.g.l.):** 4,0 m

**Noise demand:** 40,0 dB(A)
**Distance demand:**

**NSA:** Asuinrakennus Perä-Koski-H
**Predefined calculation standard:**
**Imission height(a.g.l.):** 4,0 m

**Noise demand:** 40,0 dB(A)
**Distance demand:**




Map: Peruskartat , Print scale 1:60 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 279 829 North: 7 027 307

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

Project:
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## DECIBEL -
## Map 8,0 m/s

**Calculation:**
VE2: Vörå, 7 x V126 rd126 HH145 T=15C

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Calculated:
4.6.2014 13:11/2.9.269

Project:
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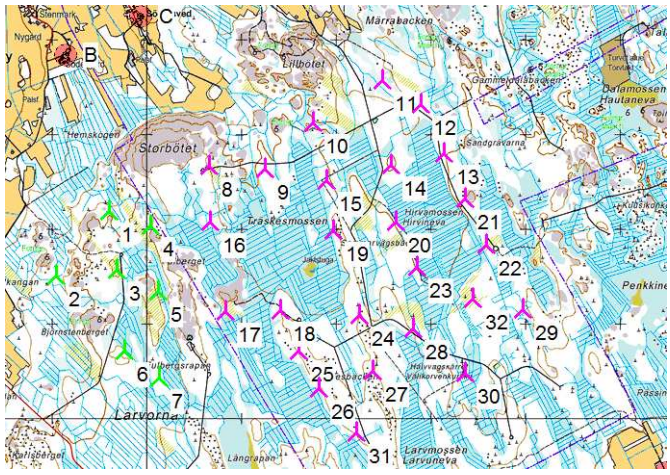
Calculated:
3.9.2014 8:58/2.9.269

# DECIBEL - Main Result

**Calculation:** VE3: Vörå + Nykarleby, 32 x V126 rd126 HH145 T=15C

**Noise calculation model:**
ISO 9613-2 General
**Wind speed:**
8,0 m/s
**Ground attenuation:**
General, Ground factor: 0,4
**Meteorological coefficient, C0:**
0,0 dB
**Type of demand in calculation:**
1: WTG noise is compared to demand (DK, DE, SE, NL etc.)
**Noise values in calculation:**
All noise values are mean values (Lwa) (Normal)
**Pure tones:**
Pure and Impulse tone penalty are added to WTG source noise
**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
**Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:**
0,0 dB(A)




Scale 1:80 000

New WTG  Noise sensitive area

## WTGs

| | Finish TM ETRS-TM35FIN-ETRS89 | | | | WTG type | | | | | | Noise data | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | East | North | Z | Row data/Description | Valid | Manufact. | Type-generator | Power, rated | Rotor diameter | Hub height | Creator | Name | Wind speed | Status | LwA,ref | Pure tones | |
| | | | [m] | | | | | [kW] | [m] | [m] | | | [m/s] | | [dB(A)] | | |
| 1 | 277 601 | 7 028 185 | 38,1 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 2 | 277 042 | 7 027 506 | 35,0 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 3 | 277 688 | 7 027 568 | 45,0 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 4 | 278 035 | 7 028 034 | 43,5 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 5 | 278 122 | 7 027 348 | 45,0 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 6 | 277 768 | 7 026 715 | 45,0 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 7 | 278 133 | 7 026 428 | 44,2 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 8 | 278 654 | 7 028 670 | 44,7 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 9 | 279 246 | 7 028 640 | 42,5 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 10 | 279 753 | 7 029 129 | 40,0 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 11 | 280 491 | 7 029 568 | 33,6 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 12 | 280 897 | 7 029 323 | 37,5 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 13 | 281 134 | 7 028 801 | 39,0 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 14 | 280 577 | 7 028 680 | 40,0 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 15 | 279 897 | 7 028 516 | 41,1 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 16 | 278 671 | 7 028 075 | 45,0 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 17 | 278 834 | 7 027 133 | 47,5 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 18 | 279 410 | 7 027 143 | 48,9 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 19 | 279 972 | 7 027 985 | 44,4 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 20 | 280 633 | 7 028 083 | 39,7 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 21 | 281 366 | 7 028 324 | 44,9 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 22 | 281 588 | 7 027 831 | 42,5 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 23 | 280 853 | 7 027 601 | 40,0 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 24 | 280 241 | 7 027 097 | 50,0 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 25 | 279 605 | 7 026 721 | 50,0 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 26 | 279 814 | 7 026 321 | 49,8 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 27 | 280 389 | 7 026 505 | 50,5 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 28 | 280 809 | 7 026 950 | 44,8 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 29 | 281 974 | 7 027 156 | 44,8 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 30 | 281 361 | 7 026 486 | 45,0 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 31 | 280 212 | 7 025 857 | 51,1 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |
| 32 | 281 444 | 7 027 269 | 42,5 | VESTAS V126-3.3 GridStreame 3... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB | h |

**h) Generic octave distribution used**

# Calculation Results

## Sound Level

| Noise sensitive area | | Finish TM ETRS-TM35FIN-ETRS89 | | | | Demands | Sound Level | | Demands fulfilled ? |
|---|---|---|---|---|---|---|---|---|---|
| No. | Name | East | North | Z | Imission height | Noise | From WTGs | Distance to noise demand | Noise |
| | | | | [m] | [m] | [dB(A)] | [dB(A)] | [m] | |
| A | Asuinrakennus Österby | 276 064 | 7 029 689 | 22,1 | 4,0 | 40,0 | 34,0 | 1 124 | Yes |
| B | Asuinrakennus Södergård | 277 148 | 7 029 839 | 22,6 | 4,0 | 40,0 | 36,7 | 592 | Yes |
| C | Asuinrakennus Södersved | 277 936 | 7 030 242 | 25,0 | 4,0 | 40,0 | 37,0 | 571 | Yes |
| D | Asuinrakennus Söderkulla | 279 601 | 7 030 557 | 27,9 | 4,0 | 40,0 | 38,8 | 201 | Yes |
| E | Asuinrakennus Björkholma | 285 116 | 7 029 347 | 35,0 | 4,0 | 40,0 | 29,5 | 2 593 | Yes |
| F | Lomarakennus Katiska | 284 929 | 7 027 331 | 46,0 | 4,0 | 40,0 | 30,8 | 1 996 | Yes |
| G | Asuinrakennus Koivuranta | 283 472 | 7 025 429 | 38,1 | 4,0 | 40,0 | 33,5 | 1 241 | Yes |
| H | Asuinrakennus Perä-Koski | 282 881 | 7 025 017 | 38,6 | 4,0 | 40,0 | 34,2 | 1 088 | Yes |

Project:
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Calculated:
3.9.2014 8:58/2.9.269

# DECIBEL - Main Result

**Calculation:** VE3: Vörå + Nykarleby, 32 x V126 rd126 HH145 T=15C

## Distances (m)

| WTG | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 1 | 2148 | 1713 | 2082 | 3101 | 7601 | 7374 | 6483 | 6154 |
| 2 | 2390 | 2334 | 2877 | 3980 | 8278 | 7885 | 6754 | 6344 |
| 3 | 2670 | 2333 | 2684 | 3547 | 7635 | 7241 | 6164 | 5782 |
| 4 | 2572 | 2010 | 2209 | 2968 | 7198 | 6926 | 6026 | 5705 |
| 5 | 3115 | 2673 | 2898 | 3531 | 7271 | 6803 | 5681 | 5296 |
| 6 | 3426 | 3183 | 3529 | 4254 | 7801 | 7184 | 5844 | 5384 |
| 7 | 3860 | 3548 | 3816 | 4379 | 7564 | 6852 | 5428 | 4950 |
| 8 | 2782 | 1905 | 1727 | 2110 | 6494 | 6413 | 5804 | 5583 |
| 9 | 3348 | 2415 | 2068 | 1948 | 5910 | 5829 | 5305 | 5129 |
| 10 | 3729 | 2699 | 2129 | 1435 | 5365 | 5477 | 5243 | 5163 |
| 11 | 4426 | 3353 | 2641 | 1329 | 4628 | 4967 | 5098 | 5137 |
| 12 | 4844 | 3783 | 3099 | 1788 | 4218 | 4495 | 4666 | 4738 |
| 13 | 5144 | 4117 | 3506 | 2330 | 4017 | 4067 | 4101 | 4165 |
| 14 | 4621 | 3617 | 3066 | 2114 | 4586 | 4554 | 4351 | 4325 |
| 15 | 4006 | 3049 | 2611 | 2061 | 5282 | 5167 | 4721 | 4596 |
| 16 | 3064 | 2329 | 2287 | 2649 | 6566 | 6299 | 5479 | 5200 |
| 17 | 3767 | 3186 | 3234 | 3507 | 6658 | 6095 | 4939 | 4564 |
| 18 | 4202 | 3517 | 3429 | 3417 | 6114 | 5520 | 4407 | 4068 |
| 19 | 4261 | 3377 | 3038 | 2597 | 5319 | 4997 | 4331 | 4153 |
| 20 | 4840 | 3901 | 3453 | 2679 | 4656 | 4359 | 3884 | 3799 |
| 21 | 5472 | 4480 | 3928 | 2845 | 3885 | 3697 | 3578 | 3635 |
| 22 | 5825 | 4871 | 4374 | 3371 | 3838 | 3376 | 3051 | 3095 |
| 23 | 5221 | 4326 | 3932 | 3208 | 4605 | 4083 | 3401 | 3283 |
| 24 | 4913 | 4131 | 3897 | 3517 | 5367 | 4691 | 3634 | 3359 |
| 25 | 4618 | 3968 | 3894 | 3834 | 6102 | 5356 | 4075 | 3690 |
| 26 | 5037 | 4412 | 4345 | 4239 | 6102 | 5212 | 3764 | 3331 |
| 27 | 5368 | 4647 | 4468 | 4125 | 5513 | 4612 | 3264 | 2900 |
| 28 | 5476 | 4662 | 4367 | 3802 | 4927 | 4136 | 3065 | 2831 |
| 29 | 6426 | 5519 | 5079 | 4145 | 3829 | 2959 | 2285 | 2321 |
| 30 | 6186 | 5381 | 5080 | 4432 | 4718 | 3665 | 2360 | 2113 |
| 31 | 5644 | 5022 | 4937 | 4736 | 6016 | 4939 | 3286 | 2796 |
| 32 | 5896 | 5004 | 4596 | 3767 | 4217 | 3484 | 2737 | 2669 |

Project:
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Calculated:
3.9.2014 8:58/2.9.269

# DECIBEL - Assumptions for noise calculation

**Calculation:** VE3: Vörå + Nykarleby, 32 x V126 rd126 HH145 T=15C

**Noise calculation model:**
ISO 9613-2 General
**Wind speed:**
8,0 m/s
**Ground attenuation:**
General, Ground factor: 0,4
**Meteorological coefficient, C0:**
0,0 dB
**Type of demand in calculation:**
1: WTG noise is compared to demand (DK, DE, SE, NL etc.)
**Noise values in calculation:**
All noise values are mean values (Lwa) (Normal)
**Pure tones:**
Pure and Impulse tone penalty are added to WTG source noise
**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
**Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:**
0,0 dB(A)
**Octave data required**
Air absorption

| 63 [db/km] | 125 [db/km] | 250 [db/km] | 500 [db/km] | 1 000 [db/km] | 2 000 [db/km] | 4 000 [db/km] | 8 000 [db/km] |
|---|---|---|---|---|---|---|---|
| 0,1 | 0,4 | 1,1 | 2,4 | 4,1 | 8,8 | 26,6 | 95,0 |

**WTG:** VESTAS V126-3.3 GridStreame 3300 126.0 !O!
**Noise:** Level 0 - - Mode 0 - 04-2014

| Source | Source/Date | Creator | Edited |
|---|---|---|---|
| Manufacturer | 1.4.2014 | EMD | 11.6.2014 15:36 |

Based on Document no.: 0034-7616 V09.

| | | | | | | **Octave data** | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Status | Hub height [m] | Wind speed [m/s] | LwA,ref [dB(A)] | Pure tones | | 63 [dB] | 125 [dB] | 250 [dB] | 500 [dB] | 1000 [dB] | 2000 [dB] | 4000 [dB] | 8000 [dB] |
| From other hub height | 145,0 | 8,0 | 107,5 | No | Generic data | 89,1 | 96,1 | 99,5 | 102,1 | 101,9 | 99,0 | 94,2 | 84,7 |

**NSA:** Asuinrakennus Österby-A
**Predefined calculation standard:**
**Imission height(a.g.l.):** 4,0 m

**Noise demand:** 40,0 dB(A)
**Distance demand:**

**NSA:** Asuinrakennus Södergård-B
**Predefined calculation standard:**
**Imission height(a.g.l.):** 4,0 m

**Noise demand:** 40,0 dB(A)
**Distance demand:**

**NSA:** Asuinrakennus Södersved-C
**Predefined calculation standard:**
**Imission height(a.g.l.):** 4,0 m

**Noise demand:** 40,0 dB(A)
**Distance demand:**

**NSA:** Asuinrakennus Söderkulla-D
**Predefined calculation standard:**
**Imission height(a.g.l.):** 4,0 m

**Noise demand:** 40,0 dB(A)
**Distance demand:**

Project:
**Storbötet**

Description:
PROKON Wind Energy Finland oy
Uusikaarleby / Vöyri

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Paulina Kaivo-oja / paulina.kaivo-oja@fcg.fi

Calculated:
3.9.2014 8:58/2.9.269

# DECIBEL - Assumptions for noise calculation

**Calculation:** VE3: Vörå + Nykarleby, 32 x V126 rd126 HH145 T=15C

**NSA:** Asuinrakennus Björkholma-E
**Predefined calculation standard:**
**Imission height(a.g.l.):** 4,0 m

**Noise demand:** 40,0 dB(A)
**Distance demand:**

**NSA:** Lomarakennus Katiska-F
**Predefined calculation standard:**
**Imission height(a.g.l.):** 4,0 m

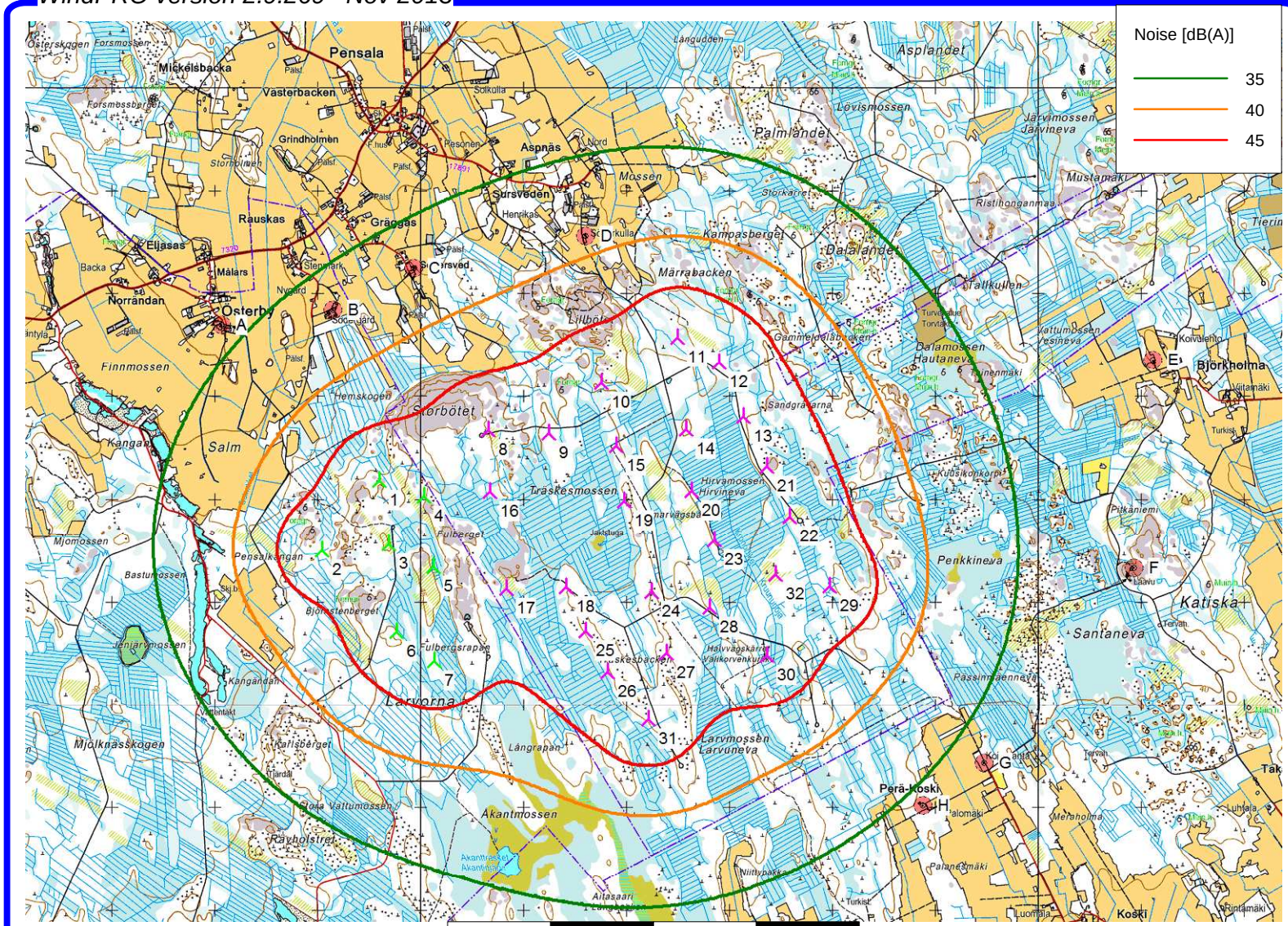
**Noise demand:** 40,0 dB(A)
**Distance demand:**

**NSA:** Asuinrakennus Koivuranta-G
**Predefined calculation standard:**
**Imission height(a.g.l.):** 4,0 m

**Noise demand:** 40,0 dB(A)
**Distance demand:**

**NSA:** Asuinrakennus Perä-Koski-H
**Predefined calculation standard:**
**Imission height(a.g.l.):** 4,0 m

**Noise demand:** 40,0 dB(A)
**Distance demand:**




Project:

**Storbötet**

Description:

PROKON Wind Energy Finland oy
Uusikaarleby / Vöyri

## DECIBEL -
## Map 8,0 m/s

**Calculation:**

VE3: Vörå + Nykarleby, 32 x V126 rd126 HH145 T=15C

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3.9.2014 9:38 / 5

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Paulina Kaivo-oja / paulina.kaivo-oja@fcg.fi

Calculated:
3.9.2014 8:58/2.9.269

Project:
**Storbötet**

Description:
PROKON Wind Energy Finland oy
Uusikaarleby / Vöyri

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10.9.2014 9:59 / 1

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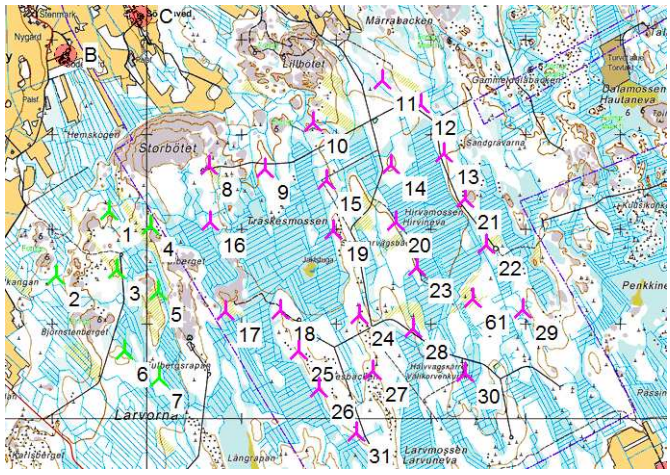
Calculated:
10.9.2014 9:50/2.9.269

# DECIBEL - Main Result

**Calculation:** Yhteisvaikutukset Sandbacka, Keppo, Norrpigg 10.9.2014

**Noise calculation model:**
ISO 9613-2 General
**Wind speed:**
8,0 m/s
**Ground attenuation:**
General, Ground factor: 0,4
**Meteorological coefficient, C0:**
0,0 dB
**Type of demand in calculation:**
1: WTG noise is compared to demand (DK, DE, SE, NL etc.)
**Noise values in calculation:**
All noise values are mean values (Lwa) (Normal)
**Pure tones:**
Pure and Impulse tone penalty are added to WTG source noise
**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
**Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:**
0,0 dB(A)




Scale 1:80 000

New WTG  Noise sensitive area

## WTGs

| | Finish TM ETRS-TM35FIN-ETRS89 East | North | Z | Row data/Description | WTG type Valid | Manufact. | Type-generator | Power, rated [kW] | Rotor diameter [m] | Hub height [m] | Noise data Creator | Name | Wind speed [m/s] | Status | LwA,ref [dB(A)] | Pure tones |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | [m] | | | | | | | | | | | | | |
| 1 | 277 601 | 7 028 185 | 38,1 | VESTAS V126-3.3 GridStreame 330... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 2 | 277 042 | 7 027 506 | 35,0 | VESTAS V126-3.3 GridStreame 330... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 3 | 277 688 | 7 027 568 | 45,0 | VESTAS V126-3.3 GridStreame 330... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 4 | 278 035 | 7 028 034 | 43,5 | VESTAS V126-3.3 GridStreame 330... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 5 | 278 122 | 7 027 348 | 45,0 | VESTAS V126-3.3 GridStreame 330... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 6 | 277 768 | 7 026 715 | 45,0 | VESTAS V126-3.3 GridStreame 330... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 7 | 278 133 | 7 026 428 | 44,2 | VESTAS V126-3.3 GridStreame 330... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 8 | 278 654 | 7 028 670 | 44,7 | VESTAS V126-3.3 GridStreame 330... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 9 | 279 246 | 7 028 640 | 42,5 | VESTAS V126-3.3 GridStreame 330... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 10 | 279 753 | 7 029 129 | 40,0 | VESTAS V126-3.3 GridStreame 330... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 11 | 280 491 | 7 029 568 | 33,6 | VESTAS V126-3.3 GridStreame 330... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 12 | 280 897 | 7 029 323 | 37,5 | VESTAS V126-3.3 GridStreame 330... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 13 | 281 134 | 7 028 801 | 39,0 | VESTAS V126-3.3 GridStreame 330... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 14 | 280 577 | 7 028 680 | 40,0 | VESTAS V126-3.3 GridStreame 330... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 15 | 279 897 | 7 028 516 | 41,1 | VESTAS V126-3.3 GridStreame 330... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 16 | 278 671 | 7 028 075 | 45,0 | VESTAS V126-3.3 GridStreame 330... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 17 | 278 834 | 7 027 133 | 47,5 | VESTAS V126-3.3 GridStreame 330... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 18 | 279 410 | 7 027 143 | 48,9 | VESTAS V126-3.3 GridStreame 330... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 19 | 279 972 | 7 027 985 | 44,4 | VESTAS V126-3.3 GridStreame 330... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 20 | 280 633 | 7 028 083 | 39,7 | VESTAS V126-3.3 GridStreame 330... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 21 | 281 366 | 7 028 324 | 44,9 | VESTAS V126-3.3 GridStreame 330... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 22 | 281 588 | 7 027 831 | 42,5 | VESTAS V126-3.3 GridStreame 330... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 23 | 280 853 | 7 027 601 | 40,0 | VESTAS V126-3.3 GridStreame 330... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 24 | 280 241 | 7 027 097 | 50,0 | VESTAS V126-3.3 GridStreame 330... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 25 | 279 605 | 7 026 721 | 50,0 | VESTAS V126-3.3 GridStreame 330... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 26 | 279 814 | 7 026 321 | 49,8 | VESTAS V126-3.3 GridStreame 330... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 27 | 280 389 | 7 026 505 | 50,5 | VESTAS V126-3.3 GridStreame 330... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 28 | 280 809 | 7 026 950 | 44,8 | VESTAS V126-3.3 GridStreame 330... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 29 | 281 974 | 7 027 156 | 44,8 | VESTAS V126-3.3 GridStreame 330... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 30 | 281 361 | 7 026 486 | 45,0 | VESTAS V126-3.3 GridStreame 330... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 31 | 280 212 | 7 025 857 | 51,1 | VESTAS V126-3.3 GridStreame 330... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 32 | 272 217 | 7 030 506 | 17,5 | NORDEX N131/3000 3000 131.0 !O!... | Yes | NORDEX | N131/3000-3 000 | 3 000 | 131,0 | 144,0 | EMD | Level - 104.5 dB(A) - R00 | 8,0 | | 104,5 | 0 dB h |
| 33 | 271 975 | 7 030 974 | 20,0 | NORDEX N131/3000 3000 131.0 !O!... | Yes | NORDEX | N131/3000-3 000 | 3 000 | 131,0 | 144,0 | EMD | Level - 104.5 dB(A) - R00 | 8,0 | | 104,5 | 0 dB h |
| 34 | 272 536 | 7 031 182 | 18,9 | NORDEX N131/3000 3000 131.0 !O!... | Yes | NORDEX | N131/3000-3 000 | 3 000 | 131,0 | 144,0 | EMD | Level - 104.5 dB(A) - R00 | 8,0 | | 104,5 | 0 dB h |
| 35 | 271 790 | 7 031 536 | 17,0 | NORDEX N131/3000 3000 131.0 !O!... | Yes | NORDEX | N131/3000-3 000 | 3 000 | 131,0 | 144,0 | EMD | Level - 104.5 dB(A) - R00 | 8,0 | | 104,5 | 0 dB h |
| 36 | 271 574 | 7 032 104 | 15,3 | NORDEX N131/3000 3000 131.0 !O!... | Yes | NORDEX | N131/3000-3 000 | 3 000 | 131,0 | 144,0 | EMD | Level - 104.5 dB(A) - R00 | 8,0 | | 104,5 | 0 dB h |
| 37 | 272 845 | 7 031 861 | 22,5 | NORDEX N131/3000 3000 131.0 !O!... | Yes | NORDEX | N131/3000-3 000 | 3 000 | 131,0 | 144,0 | EMD | Level - 104.5 dB(A) - R00 | 8,0 | | 104,5 | 0 dB h |
| 38 | 272 339 | 7 031 903 | 22,8 | NORDEX N131/3000 3000 131.0 !O!... | Yes | NORDEX | N131/3000-3 000 | 3 000 | 131,0 | 144,0 | EMD | Level - 104.5 dB(A) - R00 | 8,0 | | 104,5 | 0 dB h |
| 39 | 272 131 | 7 032 340 | 25,0 | NORDEX N131/3000 3000 131.0 !O!... | Yes | NORDEX | N131/3000-3 000 | 3 000 | 131,0 | 144,0 | EMD | Level - 104.5 dB(A) - R00 | 8,0 | | 104,5 | 0 dB h |
| 40 | 271 558 | 7 032 764 | 14,2 | NORDEX N131/3000 3000 131.0 !O!... | Yes | NORDEX | N131/3000-3 000 | 3 000 | 131,0 | 144,0 | EMD | Level - 104.5 dB(A) - R00 | 8,0 | | 104,5 | 0 dB h |
| 41 | 272 114 | 7 033 125 | 28,2 | NORDEX N131/3000 3000 131.0 !O!... | Yes | NORDEX | N131/3000-3 000 | 3 000 | 131,0 | 144,0 | EMD | Level - 104.5 dB(A) - R00 | 8,0 | | 104,5 | 0 dB h |
| 42 | 272 760 | 7 032 585 | 24,7 | NORDEX N131/3000 3000 131.0 !O!... | Yes | NORDEX | N131/3000-3 000 | 3 000 | 131,0 | 144,0 | EMD | Level - 104.5 dB(A) - R00 | 8,0 | | 104,5 | 0 dB h |
| 43 | 272 590 | 7 033 118 | 27,5 | NORDEX N131/3000 3000 131.0 !O!... | Yes | NORDEX | N131/3000-3 000 | 3 000 | 131,0 | 144,0 | EMD | Level - 104.5 dB(A) - R00 | 8,0 | | 104,5 | 0 dB h |
| 44 | 271 825 | 7 033 497 | 30,0 | NORDEX N131/3000 3000 131.0 !O!... | Yes | NORDEX | N131/3000-3 000 | 3 000 | 131,0 | 144,0 | EMD | Level - 104.5 dB(A) - R00 | 8,0 | | 104,5 | 0 dB h |
| 45 | 272 381 | 7 033 839 | 29,0 | NORDEX N131/3000 3000 131.0 !O!... | Yes | NORDEX | N131/3000-3 000 | 3 000 | 131,0 | 144,0 | EMD | Level - 104.5 dB(A) - R00 | 8,0 | | 104,5 | 0 dB h |
| 46 | 271 935 | 7 034 312 | 23,3 | NORDEX N131/3000 3000 131.0 !O!... | Yes | NORDEX | N131/3000-3 000 | 3 000 | 131,0 | 144,0 | EMD | Level - 104.5 dB(A) - R00 | 8,0 | | 104,5 | 0 dB h |
| 47 | 272 502 | 7 034 584 | 30,0 | NORDEX N131/3000 3000 131.0 !O!... | Yes | NORDEX | N131/3000-3 000 | 3 000 | 131,0 | 144,0 | EMD | Level - 104.5 dB(A) - R00 | 8,0 | | 104,5 | 0 dB h |
| 48 | 272 518 | 7 035 190 | 27,5 | NORDEX N131/3000 3000 131.0 !O!... | Yes | NORDEX | N131/3000-3 000 | 3 000 | 131,0 | 144,0 | EMD | Level - 104.5 dB(A) - R00 | 8,0 | | 104,5 | 0 dB h |
| 49 | 271 991 | 7 034 984 | 26,3 | NORDEX N131/3000 3000 131.0 !O!... | Yes | NORDEX | N131/3000-3 000 | 3 000 | 131,0 | 144,0 | EMD | Level - 104.5 dB(A) - R00 | 8,0 | | 104,5 | 0 dB h |
| 50 | 272 287 | 7 035 624 | 26,7 | NORDEX N131/3000 3000 131.0 !O!... | Yes | NORDEX | N131/3000-3 000 | 3 000 | 131,0 | 144,0 | EMD | Level - 104.5 dB(A) - R00 | 8,0 | | 104,5 | 0 dB h |
| 51 | 272 685 | 7 027 336 | 30,0 | WTG 7 | Yes | Siemens | SWT-3.0-113-3 000 | 3 000 | 113,0 | 142,5 | EMD | Level 0 - - Standard setting 0dB - 03-2011 | 8,0 | From other hub height | 107,0 | 0 dB f |
| 52 | 272 930 | 7 026 868 | 30,0 | WTG 5 | Yes | Siemens | SWT-3.0-113-3 000 | 3 000 | 113,0 | 142,5 | EMD | Level 0 - - Standard setting 0dB - 03-2011 | 8,0 | From other hub height | 107,0 | 0 dB f |
| 53 | 272 572 | 7 026 127 | 29,5 | WTG 2 | Yes | Siemens | SWT-3.0-113-3 000 | 3 000 | 113,0 | 142,5 | EMD | Level 0 - - Standard setting 0dB - 03-2011 | 8,0 | From other hub height | 107,0 | 0 dB f |
| 54 | 272 509 | 7 025 465 | 32,5 | WTG 1 | Yes | Siemens | SWT-3.0-113-3 000 | 3 000 | 113,0 | 142,5 | EMD | Level 0 - - Standard setting 0dB - 03-2011 | 8,0 | From other hub height | 107,0 | 0 dB f |
| 55 | 271 945 | 7 027 176 | 31,5 | WTG 6 | Yes | Siemens | SWT-3.0-113-3 000 | 3 000 | 113,0 | 142,5 | EMD | Level 0 - - Standard setting 0dB - 03-2011 | 8,0 | From other hub height | 107,0 | 0 dB f |
| 56 | 273 108 | 7 026 259 | 30,7 | WTG 3 | Yes | Siemens | SWT-3.0-113-3 000 | 3 000 | 113,0 | 142,5 | EMD | Level 0 - - Standard setting 0dB - 03-2011 | 8,0 | From other hub height | 107,0 | 0 dB f |
| 57 | 273 223 | 7 027 613 | 30,9 | WTG 8 | Yes | Siemens | SWT-3.0-113-3 000 | 3 000 | 113,0 | 142,5 | EMD | Level 0 - - Standard setting 0dB - 03-2011 | 8,0 | From other hub height | 107,0 | 0 dB f |
| 58 | 272 140 | 7 026 702 | 25,9 | WTG 4 | Yes | Siemens | SWT-3.0-113-3 000 | 3 000 | 113,0 | 142,5 | EMD | Level 0 - - Standard setting 0dB - 03-2011 | 8,0 | From other hub height | 107,0 | 0 dB f |
| 59 | 272 500 | 7 027 935 | 24,9 | WTG 9 | Yes | Siemens | SWT-3.0-113-3 000 | 3 000 | 113,0 | 142,5 | EMD | Level 0 - - Standard setting 0dB - 03-2011 | 8,0 | From other hub height | 107,0 | 0 dB f |
| 60 | 274 382 | 7 030 316 | 17,5 | NORDTANK 150 24.6 !O! hub: 38,0... | No | NORDTANK | -150 | 150 | 24,6 | 38,0 | EMD | Noise (1) | 8,0 | | 97,8 | 0 dB h |
| 61 | 281 444 | 7 027 269 | 42,5 | VESTAS V126-3.3 GridStreame 330... | Yes | VESTAS | V126-3.3 GridStreame-3 300 | 3 300 | 126,0 | 145,0 | EMD | Level 0 - - Mode 0 - 04-2014 | 8,0 | From other hub height | 107,5 | 0 dB h |
| 62 | 274 330 | 7 030 389 | 17,5 | LAGERWEY L100-2.5MW 2520 100... | Yes | LAGERWEY | L100-2.5MW-2 520 | 2 520 | 100,0 | 98,0 | EMD | Level 0 - - Standard mode - 01-2014 | 8,0 | | 105,0 | 0 dB h |

**f) From other hub height**
**h) Generic octave distribution used**

# Calculation Results

Project:
**Storbötet**

Description:
PROKON Wind Energy Finland oy
Uusikaarleby / Vöyri

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10.9.2014 9:59 / 2

Licensed user:
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Paulina Kaivo-oja / paulina.kaivo-oja@fcg.fi

Calculated:
10.9.2014 9:50/2.9.269

# DECIBEL - Main Result

**Calculation:** Yhteisvaikutukset Sandbacka, Keppo, Norrpigg 10.9.2014

## Sound Level

| Noise sensitive area | | Finish TM ETRS-TM35FIN-ETRS89 | | | | Demands | Sound Level | | Demands fulfilled ? |
|---|---|---|---|---|---|---|---|---|---|
| No. | Name | East | North | Z | Imission height | Noise | From WTGs | Distance to noise demand | Noise |
| | | | | [m] | [m] | [dB(A)] | [dB(A)] | [m] | |
| A | Asuinrakennus Österby | 276 064 | 7 029 689 | 22,1 | 4,0 | 40,0 | 35,6 | 1 087 | Yes |
| B | Asuinrakennus Södergård | 277 148 | 7 029 839 | 22,6 | 4,0 | 40,0 | 37,2 | 562 | Yes |
| C | Asuinrakennus Södersved | 277 936 | 7 030 242 | 25,0 | 4,0 | 40,0 | 37,3 | 549 | Yes |
| D | Asuinrakennus Söderkulla | 279 601 | 7 030 557 | 27,9 | 4,0 | 40,0 | 38,9 | 190 | Yes |
| E | Asuinrakennus Björkholma | 285 116 | 7 029 347 | 35,0 | 4,0 | 40,0 | 29,6 | 2 589 | Yes |
| F | Lomarakennus Katiska | 284 929 | 7 027 331 | 46,0 | 4,0 | 40,0 | 30,9 | 1 993 | Yes |
| G | Asuinrakennus Koivuranta | 283 472 | 7 025 429 | 38,1 | 4,0 | 40,0 | 33,6 | 1 238 | Yes |
| H | Asuinrakennus Perä-Koski | 282 881 | 7 025 017 | 38,6 | 4,0 | 40,0 | 34,3 | 1 084 | Yes |

## Distances (m)

| WTG | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 1 | 2148 | 1713 | 2082 | 3101 | 7601 | 7374 | 6483 | 6154 |
| 2 | 2390 | 2334 | 2877 | 3980 | 8278 | 7885 | 6754 | 6344 |
| 3 | 2670 | 2333 | 2684 | 3547 | 7635 | 7241 | 6164 | 5782 |
| 4 | 2572 | 2010 | 2209 | 2968 | 7198 | 6926 | 6026 | 5705 |
| 5 | 3115 | 2673 | 2898 | 3531 | 7271 | 6803 | 5681 | 5296 |
| 6 | 3426 | 3183 | 3529 | 4254 | 7801 | 7184 | 5844 | 5384 |
| 7 | 3860 | 3548 | 3816 | 4379 | 7564 | 6852 | 5428 | 4950 |
| 8 | 2782 | 1905 | 1727 | 2110 | 6494 | 6413 | 5804 | 5583 |
| 9 | 3348 | 2415 | 2068 | 1948 | 5910 | 5829 | 5305 | 5129 |
| 10 | 3729 | 2699 | 2129 | 1435 | 5365 | 5477 | 5243 | 5163 |
| 11 | 4426 | 3353 | 2641 | 1329 | 4628 | 4967 | 5098 | 5137 |
| 12 | 4844 | 3783 | 3099 | 1788 | 4218 | 4495 | 4666 | 4738 |
| 13 | 5144 | 4117 | 3506 | 2330 | 4017 | 4067 | 4101 | 4165 |
| 14 | 4621 | 3617 | 3066 | 2114 | 4586 | 4554 | 4351 | 4325 |
| 15 | 4006 | 3049 | 2611 | 2061 | 5282 | 5167 | 4721 | 4596 |
| 16 | 3064 | 2329 | 2287 | 2649 | 6566 | 6299 | 5479 | 5200 |
| 17 | 3767 | 3186 | 3234 | 3507 | 6658 | 6095 | 4939 | 4564 |
| 18 | 4202 | 3517 | 3429 | 3417 | 6114 | 5520 | 4407 | 4068 |
| 19 | 4261 | 3377 | 3038 | 2597 | 5319 | 4997 | 4331 | 4153 |
| 20 | 4840 | 3901 | 3453 | 2679 | 4656 | 4359 | 3884 | 3799 |
| 21 | 5472 | 4480 | 3928 | 2845 | 3885 | 3697 | 3578 | 3635 |
| 22 | 5825 | 4871 | 4374 | 3371 | 3838 | 3376 | 3051 | 3095 |
| 23 | 5221 | 4326 | 3932 | 3208 | 4605 | 4083 | 3401 | 3283 |
| 24 | 4913 | 4131 | 3897 | 3517 | 5367 | 4691 | 3634 | 3359 |
| 25 | 4618 | 3968 | 3894 | 3834 | 6102 | 5356 | 4075 | 3690 |
| 26 | 5037 | 4412 | 4345 | 4239 | 6102 | 5212 | 3764 | 3331 |
| 27 | 5368 | 4647 | 4468 | 4125 | 5513 | 4612 | 3264 | 2900 |
| 28 | 5476 | 4662 | 4367 | 3802 | 4927 | 4136 | 3065 | 2831 |
| 29 | 6426 | 5519 | 5079 | 4145 | 3829 | 2959 | 2285 | 2321 |
| 30 | 6186 | 5381 | 5080 | 4432 | 4718 | 3665 | 2360 | 2113 |
| 31 | 5644 | 5022 | 4937 | 4736 | 6016 | 4939 | 3286 | 2796 |
| 32 | 3931 | 4973 | 5722 | 7381 | 12945 | 13096 | 12341 | 11987 |
| 33 | 4284 | 5293 | 6003 | 7634 | 13235 | 13450 | 12758 | 12420 |
| 34 | 3829 | 4801 | 5479 | 7089 | 12707 | 12971 | 12350 | 12036 |
| 35 | 4654 | 5617 | 6278 | 7868 | 13498 | 13788 | 13175 | 12858 |
| 36 | 5096 | 6013 | 6626 | 8171 | 13813 | 14175 | 13635 | 13337 |
| 37 | 3881 | 4752 | 5340 | 6877 | 12520 | 12898 | 12415 | 12141 |
| 38 | 4331 | 5230 | 5835 | 7382 | 13024 | 13387 | 12872 | 12585 |
| 39 | 4741 | 5603 | 6170 | 7676 | 13319 | 13736 | 13274 | 13000 |
| 40 | 5452 | 6306 | 6855 | 8336 | 13975 | 14425 | 13983 | 13712 |
| 41 | 5233 | 6008 | 6494 | 7911 | 13533 | 14057 | 13712 | 13471 |
| 42 | 4391 | 5174 | 5679 | 7132 | 12767 | 13248 | 12876 | 12630 |
| 43 | 4879 | 5612 | 6068 | 7461 | 13075 | 13622 | 13317 | 13090 |
| 44 | 5695 | 6455 | 6921 | 8309 | 13917 | 14475 | 14161 | 13926 |
| 45 | 5546 | 6220 | 6615 | 7927 | 13498 | 14128 | 13912 | 13706 |
| 46 | 6195 | 6865 | 7247 | 8532 | 14079 | 14743 | 14553 | 14352 |

*To be continued on next page...*

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**Storbötet**

Description:
PROKON Wind Energy Finland oy
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Calculated:
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# DECIBEL - Main Result

**Calculation:** Yhteisvaikutukset Sandbacka, Keppo, Norrpigg 10.9.2014

*...continued from previous page*

| WTG | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 47 | 6051 | 6637 | 6952 | 8158 | 13652 | 14381 | 14281 | 14108 |
| 48 | 6541 | 7072 | 7334 | 8460 | 13881 | 14682 | 14664 | 14514 |
| 49 | 6677 | 7280 | 7601 | 8799 | 14277 | 15024 | 14929 | 14754 |
| 50 | 7031 | 7552 | 7798 | 8893 | 14276 | 15111 | 15126 | 14983 |
| 51 | 4116 | 5114 | 5998 | 7625 | 12587 | 12238 | 10949 | 10451 |
| 52 | 4215 | 5156 | 6033 | 7619 | 12429 | 12002 | 10634 | 10116 |
| 53 | 4986 | 5889 | 6757 | 8304 | 12944 | 12409 | 10917 | 10363 |
| 54 | 5518 | 6372 | 7226 | 8726 | 13185 | 12553 | 10957 | 10376 |
| 55 | 4823 | 5841 | 6726 | 8365 | 13342 | 12978 | 11652 | 11141 |
| 56 | 4526 | 5395 | 6255 | 7782 | 12393 | 11863 | 10392 | 9846 |
| 57 | 3517 | 4510 | 5394 | 7021 | 12013 | 11704 | 10474 | 9995 |
| 58 | 4929 | 5906 | 6788 | 8394 | 13236 | 12798 | 11397 | 10866 |
| 59 | 3971 | 5020 | 5902 | 7566 | 12689 | 12438 | 11249 | 10778 |
| 60 | 1795 | 2805 | 3553 | 5222 | 10773 | 10956 | 10315 | 10010 |
| 61 | 5896 | 5004 | 4596 | 3767 | 4217 | 3484 | 2737 | 2669 |
| 62 | 1869 | 2869 | 3607 | 5271 | 10831 | 11025 | 10395 | 10093 |

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Calculated:
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# DECIBEL - Assumptions for noise calculation

**Calculation:** Yhteisvaikutukset Sandbacka, Keppo, Norrpigg 10.9.2014

**Noise calculation model:**
ISO 9613-2 General
**Wind speed:**
8,0 m/s
**Ground attenuation:**
General, Ground factor: 0,4
**Meteorological coefficient, C0:**
0,0 dB
**Type of demand in calculation:**
1: WTG noise is compared to demand (DK, DE, SE, NL etc.)
**Noise values in calculation:**
All noise values are mean values (Lwa) (Normal)
**Pure tones:**
Pure and Impulse tone penalty are added to WTG source noise
**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
**Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:**
0,0 dB(A)
**Octave data required**
Air absorption

| 63 [db/km] | 125 [db/km] | 250 [db/km] | 500 [db/km] | 1 000 [db/km] | 2 000 [db/km] | 4 000 [db/km] | 8 000 [db/km] |
|---|---|---|---|---|---|---|---|
| 0,1 | 0,4 | 1,1 | 2,4 | 4,1 | 8,8 | 26,6 | 95,0 |

**WTG:** VESTAS V126-3.3 GridStreame 3300 126.0 !O!
**Noise:** Level 0 - - Mode 0 - 04-2014

| Source | Source/Date | Creator | Edited |
|---|---|---|---|
| Manufacturer | 1.4.2014 | EMD | 11.6.2014 15:36 |

Based on Document no.: 0034-7616 V09.

| | | | | | | Octave data | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Status | Hub height [m] | Wind speed [m/s] | LwA,ref [dB(A)] | Pure tones | | 63 [dB] | 125 [dB] | 250 [dB] | 500 [dB] | 1000 [dB] | 2000 [dB] | 4000 [dB] | 8000 [dB] |
| From other hub height | 145,0 | 8,0 | 107,5 | No | Generic data | 89,1 | 96,1 | 99,5 | 102,1 | 101,9 | 99,0 | 94,2 | 84,7 |

**WTG:** NORDEX N131/3000 3000 131.0 !O!
**Noise:** Level - 104.5 dB(A) - R00

| Source | Source/Date | Creator | Edited |
|---|---|---|---|
| NORDEX | 3.12.2013 | EMD | 24.4.2014 12:39 |

F008_245_A03_R00, 21.11.2013

| | | | | | | Octave data | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Status | Hub height [m] | Wind speed [m/s] | LwA,ref [dB(A)] | Pure tones | | 63 [dB] | 125 [dB] | 250 [dB] | 500 [dB] | 1000 [dB] | 2000 [dB] | 4000 [dB] | 8000 [dB] |
| From Windcat | 144,0 | 8,0 | 104,5 | No | Generic data | 86,1 | 93,1 | 96,5 | 99,1 | 98,9 | 96,0 | 91,2 | 81,7 |

**WTG:** Siemens SWT-3.0-113 3000 113.0 !O!
**Noise:** Level 0 - - Standard setting 0dB - 03-2011

| Source | Source/Date | Creator | Edited |
|---|---|---|---|
| Siemens | 28.11.2012 | EMD | 28.11.2012 11:28 |

Based on document E W EN OEN DES TLS-10-0000-65777-00

| | | | | | | Octave data | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Status | Hub height [m] | Wind speed [m/s] | LwA,ref [dB(A)] | Pure tones | | 63 [dB] | 125 [dB] | 250 [dB] | 500 [dB] | 1000 [dB] | 2000 [dB] | 4000 [dB] | 8000 [dB] |
| From other hub height | 142,5 | 8,0 | 107,0 | No | | 86,9 | 94,8 | 100,2 | 101,1 | 100,7 | 99,7 | 92,6 | 76,2 |

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# DECIBEL - Assumptions for noise calculation

**Calculation:** Yhteisvaikutukset Sandbacka, Keppo, Norrpigg 10.9.2014

**WTG:** NORDTANK 150 24.6 !O!
**Noise:** Noise (1)

| Source | Source/Date | Creator | Edited |
|---|---|---|---|
| Rambøll (Memo) | 1.4.1989 | EMD | 18.9.1998 0:00 |

| | | | | | Octave data | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Status | Wind speed [m/s] | LwA,ref [dB(A)] | Pure tones | | 63 [dB] | 125 [dB] | 250 [dB] | 500 [dB] | 1000 [dB] | 2000 [dB] | 4000 [dB] | 8000 [dB] |
| From Windcat | 8,0 | 97,8 | No | Generic data | 79,4 | 86,4 | 89,8 | 92,4 | 92,2 | 89,3 | 84,5 | 75,0 |

**WTG:** LAGERWEY L100-2.5MW 2520 100.0 !O!
**Noise:** Level 0 - - Standard mode - 01-2014

| Source | Source/Date | Creator | Edited |
|---|---|---|---|
| L100-2.5MW rev 27-1-2014 | 27.1.2014 | EMD | 24.3.2014 14:40 |

| | | | | | | Octave data | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Status | Hub height [m] | Wind speed [m/s] | LwA,ref [dB(A)] | Pure tones | | 63 [dB] | 125 [dB] | 250 [dB] | 500 [dB] | 1000 [dB] | 2000 [dB] | 4000 [dB] | 8000 [dB] |
| From Windcat | 98,0 | 8,0 | 105,0 | No | Generic data | 86,6 | 93,6 | 97,0 | 99,6 | 99,4 | 96,5 | 91,7 | 82,2 |

**NSA:** Asuinrakennus Österby-A
**Predefined calculation standard:**
**Imission height(a.g.l.):** 4,0 m

**Noise demand:** 40,0 dB(A)
**Distance demand:**

**NSA:** Asuinrakennus Södergård-B
**Predefined calculation standard:**
**Imission height(a.g.l.):** 4,0 m

**Noise demand:** 40,0 dB(A)
**Distance demand:**

**NSA:** Asuinrakennus Södersved-C
**Predefined calculation standard:**
**Imission height(a.g.l.):** 4,0 m

**Noise demand:** 40,0 dB(A)
**Distance demand:**

**NSA:** Asuinrakennus Söderkulla-D
**Predefined calculation standard:**
**Imission height(a.g.l.):** 4,0 m

**Noise demand:** 40,0 dB(A)
**Distance demand:**

**NSA:** Asuinrakennus Björkholma-E
**Predefined calculation standard:**
**Imission height(a.g.l.):** 4,0 m

**Noise demand:** 40,0 dB(A)
**Distance demand:**

**NSA:** Lomarakennus Katiska-F
**Predefined calculation standard:**
**Imission height(a.g.l.):** 4,0 m

**Noise demand:** 40,0 dB(A)
**Distance demand:**

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Calculated:
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# DECIBEL - Assumptions for noise calculation

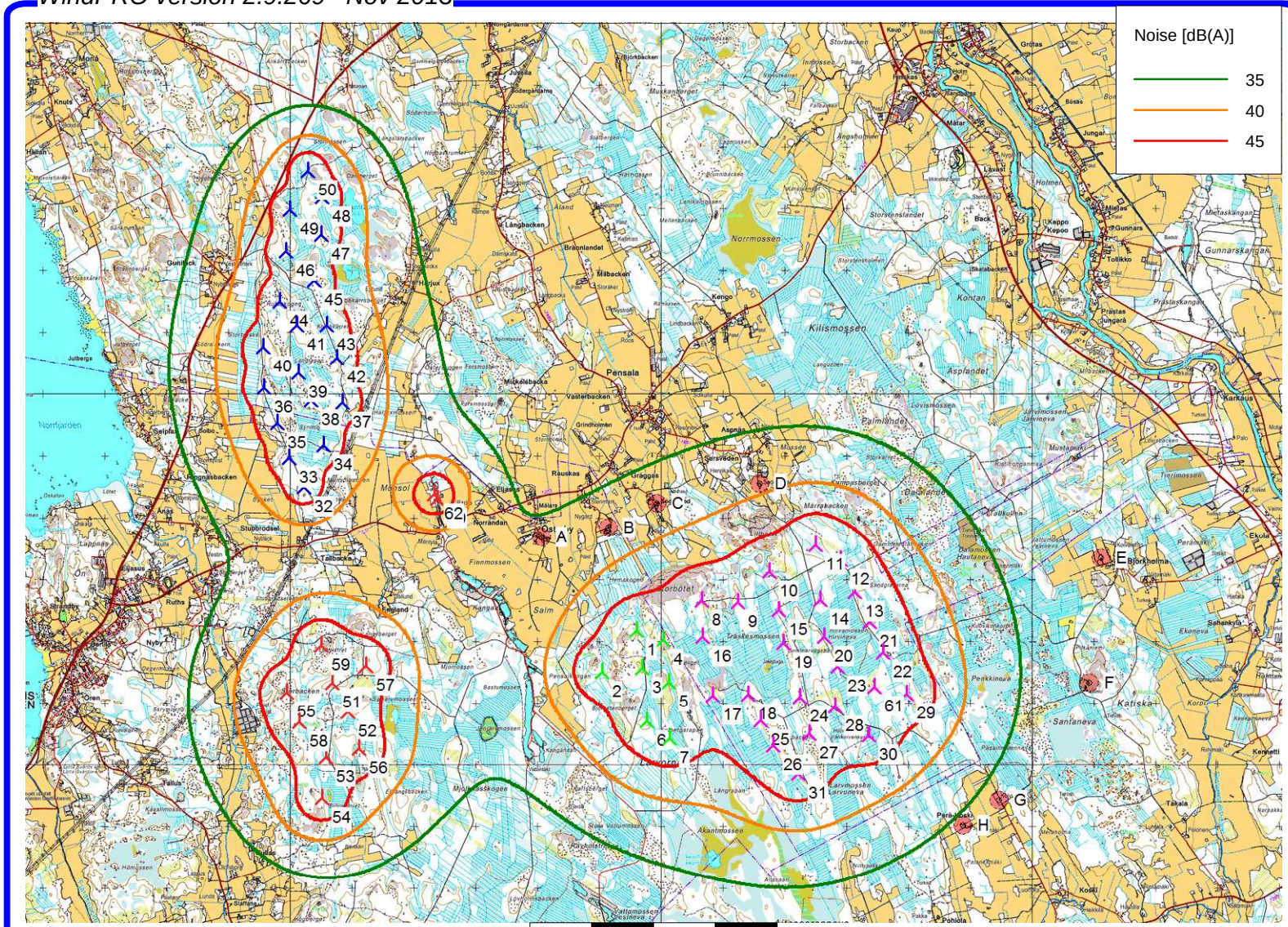
**Calculation:** Yhteisvaikutukset Sandbacka, Keppo, Norrpigg 10.9.2014

**NSA:** Asuinrakennus Koivuranta-G
**Predefined calculation standard:**
**Imission height(a.g.l.):** 4,0 m

**Noise demand:** 40,0 dB(A)
**Distance demand:**

**NSA:** Asuinrakennus Perä-Koski-H
**Predefined calculation standard:**
**Imission height(a.g.l.):** 4,0 m

**Noise demand:** 40,0 dB(A)
**Distance demand:**




Map: Peruskartat , Print scale 1:100 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 277 165 North: 7 029 801

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

Project:
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## DECIBEL -
## Map 8,0 m/s

**Calculation:**

Yhteisvaikutukset Sandbacka, Keppo, Norrpigg 10.9.2014

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