

VINDIN AB OY

BÖLE VINDKRAFTPARK

PROGRAM FÖR MILJÖKONSEKVENSBEDÖMNING

BILAGA 2



Project:

Pjelas

Printed/Page

28.8.2014 16:24 / 1

Licensed user:

FCG Suunnittelu ja tekniikka Oy

Osmontie 34, PO Box 950

FI-00601 Helsinki

+358104095666

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

Calculated:

27.8.2014 10:37/2.9.269

DECIBEL - Main Result**Calculation:** Böle V126 x 29 x HH137 (107,5 dB)**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:

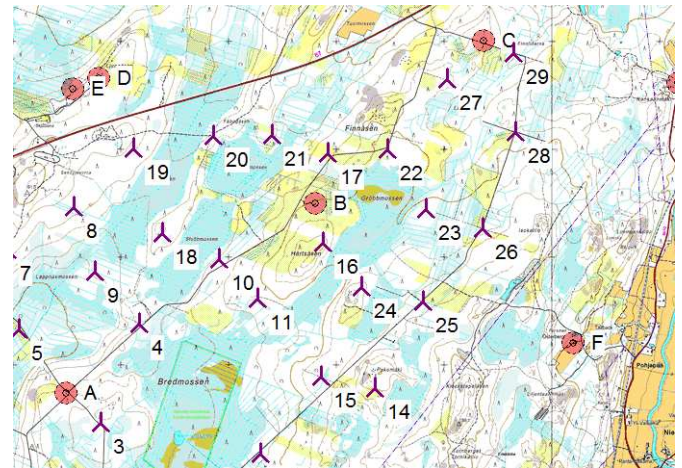
Pure and Impulse tone penalty are added to WTG source noise

Height above ground level, when no value in NSA object:

4,0 m 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 1:70 000

New WTG

Noise sensitive area

WTGs

ETRS 89 Zone: 35				WTG type			Noise data				Wind speed [m/s]	Lwa,ref [dB(A)]	Pure tones
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Creator Name			
1	215 364	6 928 951	61,3 VESTAS V126-3.3 GridStrea...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	EMD Level 0 -- Mode 0 - 08-2013	8,0	107,5	0 dB h
2	214 868	6 929 311	53,7 VESTAS V126-3.3 GridStrea...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	EMD Level 0 -- Mode 0 - 08-2013	8,0	107,5	0 dB h
3	213 812	6 930 466	57,3 VESTAS V126-3.3 GridStrea...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	EMD Level 0 -- Mode 0 - 08-2013	8,0	107,5	0 dB h
4	214 167	6 931 384	47,6 VESTAS V126-3.3 GridStrea...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	EMD Level 0 -- Mode 0 - 08-2013	8,0	107,5	0 dB h
5	213 057	6 931 331	40,0 VESTAS V126-3.3 GridStrea...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	EMD Level 0 -- Mode 0 - 08-2013	8,0	107,5	0 dB h
6	212 534	6 932 364	46,0 VESTAS V126-3.3 GridStrea...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	EMD Level 0 -- Mode 0 - 08-2013	8,0	107,5	0 dB h
7	212 950	6 932 071	50,0 VESTAS V126-3.3 GridStrea...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	EMD Level 0 -- Mode 0 - 08-2013	8,0	107,5	0 dB h
8	213 565	6 932 463	51,9 VESTAS V126-3.3 GridStrea...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	EMD Level 0 -- Mode 0 - 08-2013	8,0	107,5	0 dB h
9	213 762	6 931 864	42,5 VESTAS V126-3.3 GridStrea...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	EMD Level 0 -- Mode 0 - 08-2013	8,0	107,5	0 dB h
10	214 911	6 931 981	50,1 VESTAS V126-3.3 GridStrea...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	EMD Level 0 -- Mode 0 - 08-2013	8,0	107,5	0 dB h
11	215 266	6 931 617	57,7 VESTAS V126-3.3 GridStrea...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	EMD Level 0 -- Mode 0 - 08-2013	8,0	107,5	0 dB h
12	215 294	6 930 177	54,9 VESTAS V126-3.3 GridStrea...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	EMD Level 0 -- Mode 0 - 08-2013	8,0	107,5	0 dB h
13	215 824	6 929 738	62,7 VESTAS V126-3.3 GridStrea...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	EMD Level 0 -- Mode 0 - 08-2013	8,0	107,5	0 dB h
14	216 360	6 930 783	75,3 VESTAS V126-3.3 GridStrea...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	EMD Level 0 -- Mode 0 - 08-2013	8,0	107,5	0 dB h
15	215 853	6 930 889	62,9 VESTAS V126-3.3 GridStrea...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	EMD Level 0 -- Mode 0 - 08-2013	8,0	107,5	0 dB h
16	215 871	6 932 133	66,8 VESTAS V126-3.3 GridStrea...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	EMD Level 0 -- Mode 0 - 08-2013	8,0	107,5	0 dB h
17	215 919	6 932 966	53,5 VESTAS V126-3.3 GridStrea...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	EMD Level 0 -- Mode 0 - 08-2013	8,0	107,5	0 dB h
18	214 386	6 932 218	52,5 VESTAS V126-3.3 GridStrea...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	EMD Level 0 -- Mode 0 - 08-2013	8,0	107,5	0 dB h
19	214 116	6 933 007	53,4 VESTAS V126-3.3 GridStrea...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	EMD Level 0 -- Mode 0 - 08-2013	8,0	107,5	0 dB h
20	214 853	6 933 123	47,5 VESTAS V126-3.3 GridStrea...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	EMD Level 0 -- Mode 0 - 08-2013	8,0	107,5	0 dB h
21	215 403	6 933 128	47,5 VESTAS V126-3.3 GridStrea...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	EMD Level 0 -- Mode 0 - 08-2013	8,0	107,5	0 dB h
22	216 470	6 932 998	60,0 VESTAS V126-3.3 GridStrea...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	EMD Level 0 -- Mode 0 - 08-2013	8,0	107,5	0 dB h
23	216 828	6 932 444	60,4 VESTAS V126-3.3 GridStrea...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	EMD Level 0 -- Mode 0 - 08-2013	8,0	107,5	0 dB h
24	216 236	6 931 720	65,0 VESTAS V126-3.3 GridStrea...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	EMD Level 0 -- Mode 0 - 08-2013	8,0	107,5	0 dB h
25	216 806	6 931 590	67,7 VESTAS V126-3.3 GridStrea...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	EMD Level 0 -- Mode 0 - 08-2013	8,0	107,5	0 dB h
26	217 358	6 932 262	62,5 VESTAS V126-3.3 GndStrea...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	EMD Level 0 -- Mode 0 - 08-2013	8,0	107,5	0 dB h
27	217 027	6 933 653	57,5 VESTAS V126-3.3 GridStrea...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	EMD Level 0 -- Mode 0 - 08-2013	8,0	107,5	0 dB h
28	217 665	6 933 157	57,6 VESTAS V126-3.3 GridStrea...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	EMD Level 0 -- Mode 0 - 08-2013	8,0	107,5	0 dB h
29	217 639	6 933 894	49,9 VESTAS V126-3.3 GridStrea...	Yes	VESTAS	V126-3.3 GridStreame-3 300	3 300	126,0	137,0	EMD Level 0 -- Mode 0 - 08-2013	8,0	107,5	0 dB h

h) Generic octave distribution used

Calculation Results**Sound Level**

Noise sensitive area			ETRS 89 Zone: 35			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 (Vikens skogsväg)		213 494	6 930 739	52,7	4,0	40,0	46,3	-839	No	
B	Lomarakennus (Vikens skogsväg)		215 808	6 932 495	60,3	4,0	40,0	49,1	-1 860	No	
C	Lomarakennus (Finnås skogsväg)		217 367	6 934 011	55,0	4,0	40,0	48,6	-721	No	
D	Lomarakennus (Ljungåsen)		213 798	6 933 662	52,6	4,0	40,0	42,3	-296	No	
E	Lomarakennus (Ljungåsen)		213 556	6 933 557	49,7	4,0	40,0	42,1	-280	No	
F	Asuinrakennus (Lähteenmäentie 70)		218 199	6 931 203	60,0	4,0	40,0	38,5	246	Yes	
G	Asuinrakennus (Myrkyntie 467)		219 169	6 933 613	43,6	4,0	40,0	36,0	596	Yes	
H	Asuinrakennus (Kaskistentie 1305)		217 798	6 934 887	31,0	4,0	40,0	38,3	196	Yes	

Project:

Pjelax

Printed/Page

28.8.2014 16:24 / 2

Licensed user:

FCG Suunnittelu ja tekniikka Oy

Osmontie 34, PO Box 950

FI-00601 Helsinki

+358104095666

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

Calculated:

27.8.2014 10:37/2.9.269

DECIBEL - Main Result**Calculation:** Böle V126 x 29 x HH137 (107,5 dB)**Distances (m)**

WTG	A	B	C	D	E	F	G	H
1	2585	3568	5437	4960	4943	3617	6012	6409
2	1980	3317	5318	4477	4440	3827	6078	6293
3	418	2844	5016	3193	3098	4445	6207	5947
4	931	1980	4136	2306	2255	4032	5471	5041
5	735	2984	5071	2444	2279	5139	6518	5921
6	1886	3273	5101	1809	1569	5777	6745	5831
7	1437	2887	4820	1801	1603	5315	6401	5601
8	1724	2241	4100	1220	1093	4797	5715	4873
9	1155	2139	4192	1797	1704	4482	5677	5038
10	1882	1033	3183	2014	2076	3376	4556	4092
11	1976	1031	3182	2515	2584	2959	4380	4132
12	1884	2372	4354	3789	3797	3078	5174	5329
13	2533	2754	4539	4412	4437	2788	5114	5509
14	2863	1797	3379	3850	3940	1885	3984	4345
15	2362	1605	3466	3448	3517	2364	4287	4441
16	2753	367	2399	2573	2715	2504	3612	3358
17	3289	484	1784	2230	2433	2880	3311	2685
18	1725	1447	3475	1558	1574	3941	4977	4328
19	2350	1766	3399	727	784	4460	5085	4130
20	2741	1141	2663	1184	1367	3853	4339	3429
21	3055	751	2151	1690	1894	3391	3793	2969
22	3732	830	1352	2750	2964	2490	2766	2307
23	3741	1020	1656	3262	3453	1848	2614	2626
24	2910	884	2552	3114	3246	2028	3487	3527
25	3416	1346	2483	3649	3795	1444	3108	3440
26	4149	1566	1747	3821	4012	1351	2257	2659
27	4575	1680	493	3226	3469	2713	2140	1453
28	4816	1969	903	3896	4124	2024	1570	1733
29	5204	2302	296	3844	4093	2746	1554	1005

Project:

Pjelas

Printed/Page

28.8.2014 16:24 / 3

Licensed user:

FCG Suunnittelu ja tekniikka Oy

Osmontie 34, PO Box 950

FI-00601 Helsinki

+358104095666

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

Calculated:

27.8.2014 10:37/2.9.269

DECIBEL - Assumptions for noise calculation**Calculation:** Böle V126 x 29 x HH137 (107,5 dB)**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 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	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]
0,1	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.

Status	Hub height [m]	Wind speed [m/s]	LwA,ref [dB(A)]	Pure tones	Octave data							
					63 [dB]	125 [dB]	250 [dB]	500 [dB]	1000 [dB]	2000 [dB]	4000 [dB]	8000 [dB]
From Windcat	137,0	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 (Vikens skogsväg)-A**Predefined calculation standard:****Imission height(a.g.l.):** 4,0 m**Noise demand:** 40,0 dB(A)**Distance demand:****NSA:** Lomarakennus (Vikens skogsväg)-B**Predefined calculation standard:****Imission height(a.g.l.):** 4,0 m**Noise demand:** 40,0 dB(A)**Distance demand:****NSA:** Lomarakennus (Finnås skogsväg)-C**Predefined calculation standard:****Imission height(a.g.l.):** 4,0 m**Noise demand:** 40,0 dB(A)**Distance demand:****NSA:** Lomarakennus (Ljungåsen)-D**Predefined calculation standard:****Imission height(a.g.l.):** 4,0 m**Noise demand:** 40,0 dB(A)**Distance demand:**

Project:

Pjelas

Printed/Page

28.8.2014 16:24 / 4

Licensed user:

FCG Suunnittelu ja tekniikka Oy

Osmontie 34, PO Box 950

FI-00601 Helsinki

+358104095666

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

Calculated:

27.8.2014 10:37/2.9.269

DECIBEL - Assumptions for noise calculation**Calculation:** Böle V126 x 29 x HH137 (107,5 dB)**NSA:** Lomarakennus (Ljungåsen)-E**Predefined calculation standard:****Imission height(a.g.l.):** 4,0 m**Noise demand:** 40,0 dB(A)**Distance demand:****NSA:** Asuinrakennus (Lähteenmäentie 70)-F**Predefined calculation standard:****Imission height(a.g.l.):** 4,0 m**Noise demand:** 40,0 dB(A)**Distance demand:****NSA:** Asuinrakennus (Myrkyntie 467)-G**Predefined calculation standard:****Imission height(a.g.l.):** 4,0 m**Noise demand:** 40,0 dB(A)**Distance demand:****NSA:** Asuinrakennus (Kaskistentie 1305)-H**Predefined calculation standard:****Imission height(a.g.l.):** 4,0 m**Noise demand:** 40,0 dB(A)**Distance demand:**

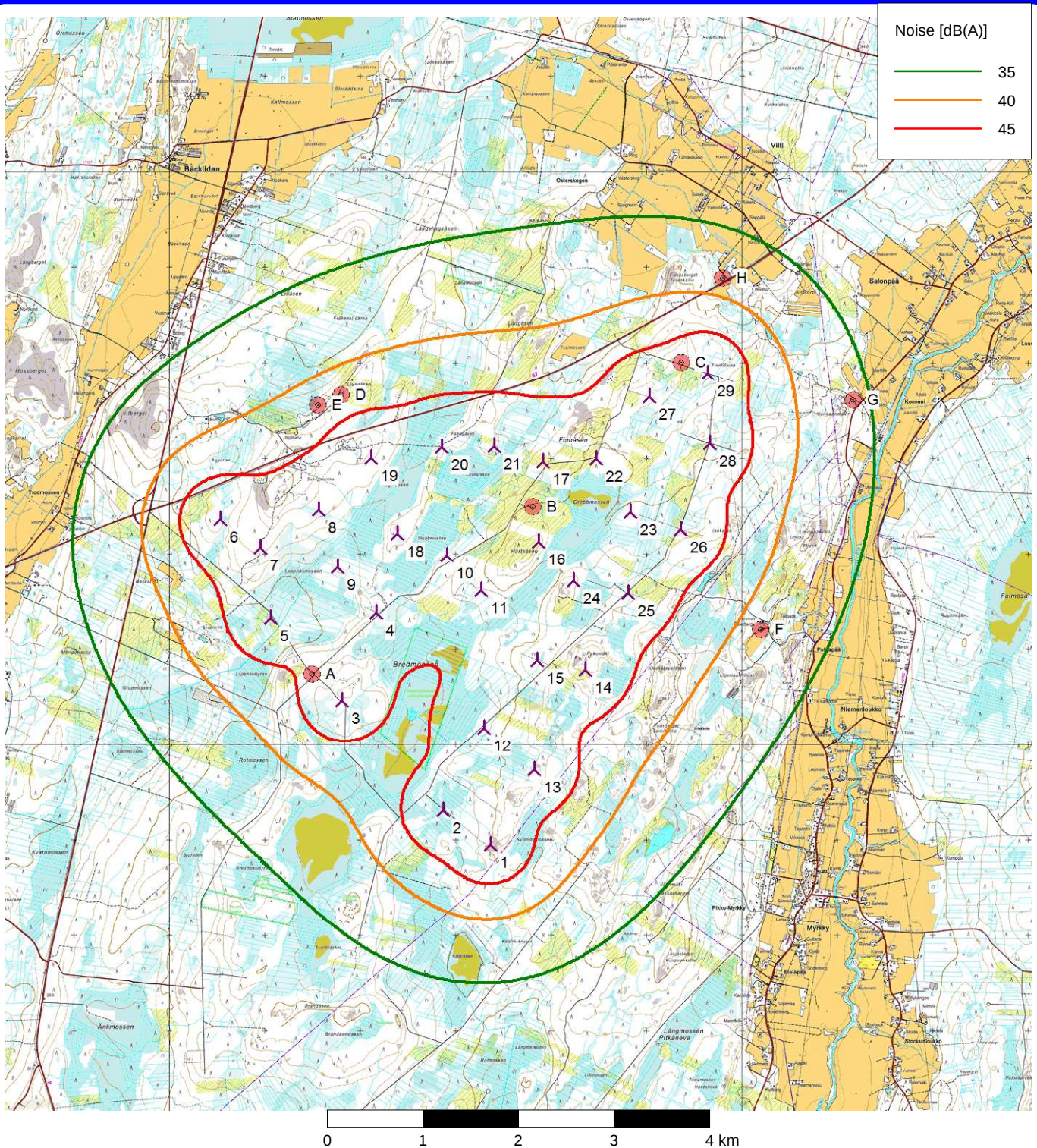
Project:
Pjelax

Printed/Page
28.8.2014 16:24 / 5

Licensed user:
FCG Suunnittelu ja tekniikka Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Paulina Kaivo-oja / paulina.kaivo-oja@fcg.fi
Calculated:
27.8.2014 10:37/2.9.269

DECIBEL - Map 8,0 m/s

Calculation: Böle V126 x 29 x HH137 (107,5 dB)



⚡ New WTG

■ Noise sensitive area

Map: Peruskartat, Print scale 1:60 000, Map center ETRS 89 Zone: 35 East: 215 099 North: 6 931 423

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

Böle vindkraftspark Bölen tuulivoimapuisto

 Kraftverk / Voimlaitos ALT1

Bostad - Asuinrakennus

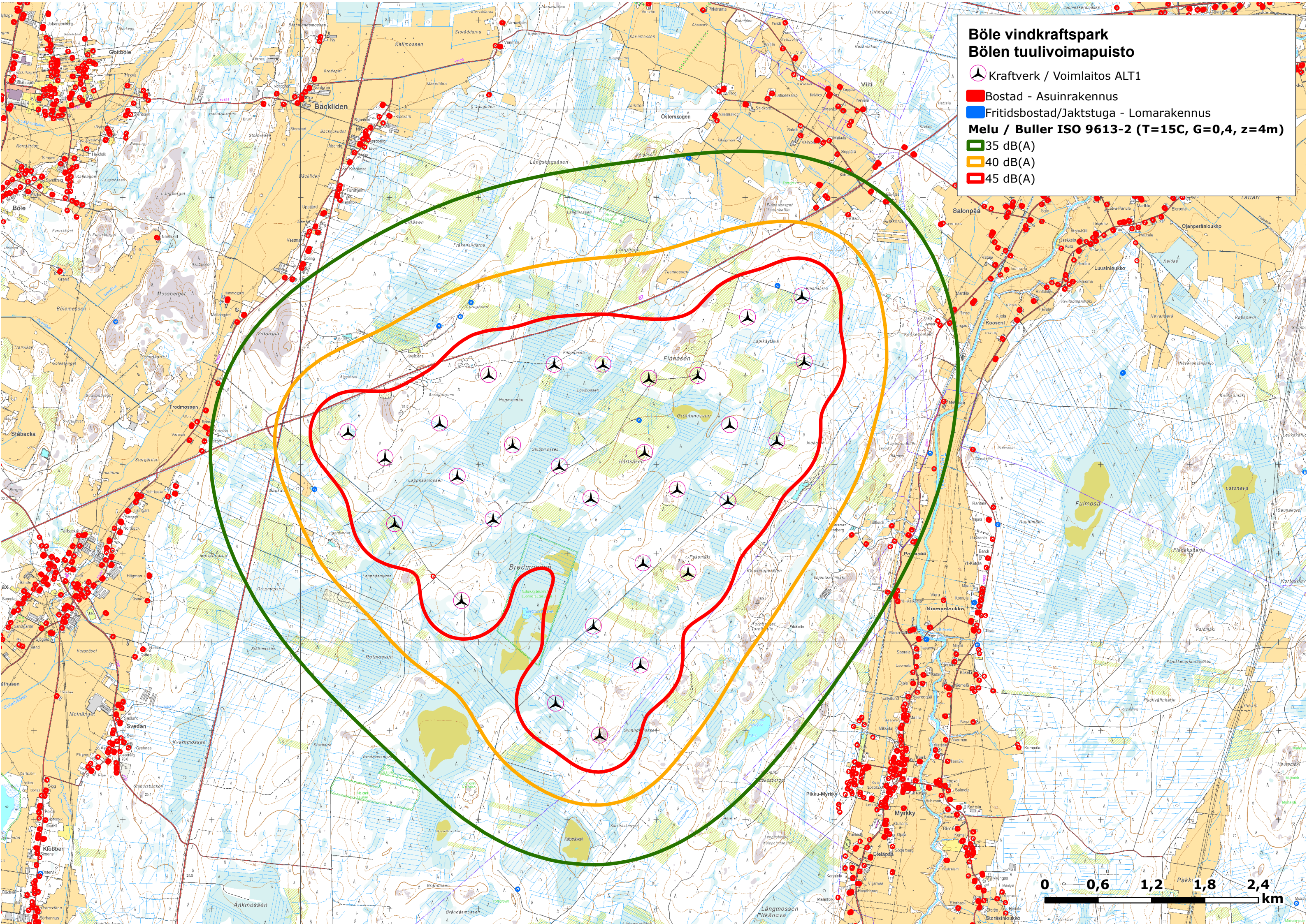
☐ Fritidsbostad/Jaktstuga - Lomarakennus

Melu / Buller ISO 9613-2 (T=15C, G=0,4, z=4m)

35 dB(A)

40 dB(A)

45 dB(A)



A horizontal scale bar with markings at 0, 0,6, 1,2, 1,8, and 2,4 km. The bar is divided into segments corresponding to these distances.