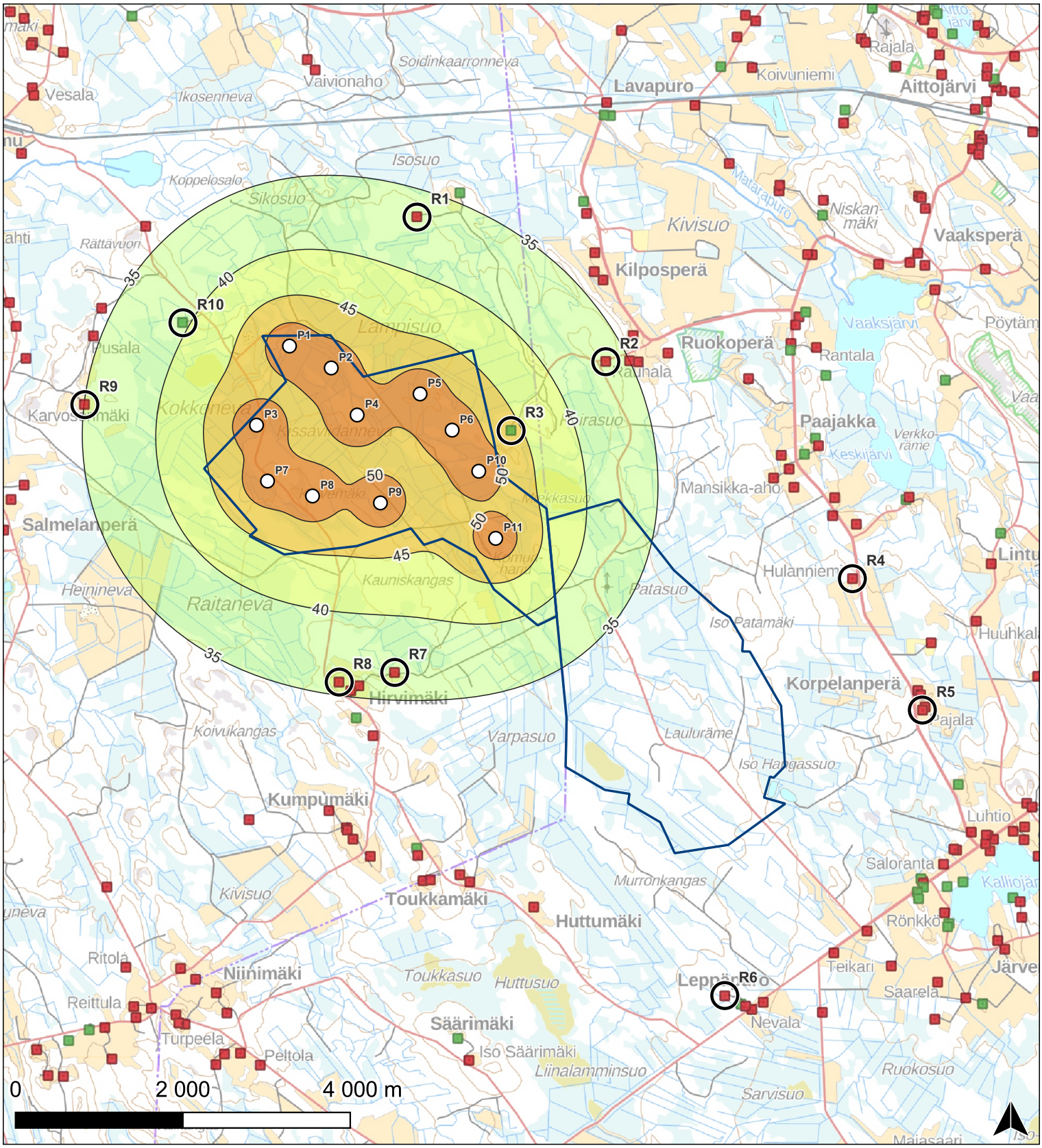


Reseptori	Käyttötarkoitus	dB(A)
1	Asuinrakennus	34.5
2	Asuinrakennus	34.2
3	Lomarakennus*	44.3
4	Asuinrakennus	24.7
5	Asuinrakennus	22.0
6	Asuinrakennus	21.0
7	Asuinrakennus	34.5
8	Asuinrakennus	33.7
9	Asuinrakennus	33.0
10	Lomarakennus	37.5

*Käyttötarkoituksen muutos hyväksytty 12.3.2025

Tuulivoimala

Rakennukset

Asuinrakennus

Lomarakennus

Äänitaso dB(A)

35-40

40-45

45-50

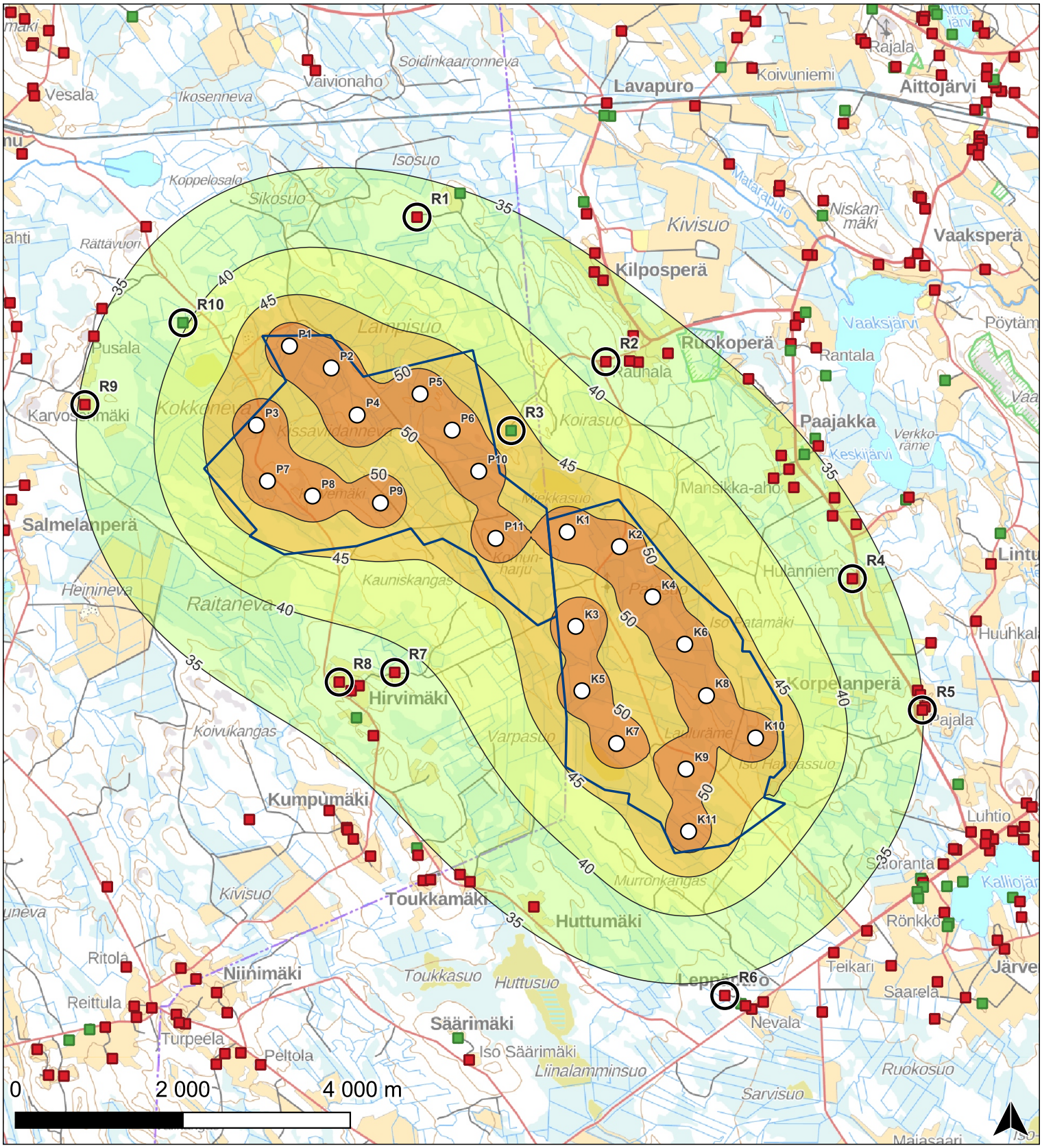
>50

Winda Energy 3/2025 | AJu

Mallinnuksen tiedot:
Laskentamalli: ISO 9613-2
Laskentaohjelmisto: WindPro 4.0 DECIBEL-moduuli
Laskentakorkeus: maanpinta + 4 m

Mallinnuksessa käytetty tuulivoimala:
Nordex N163/6.X
Napakorkeus: 220 m
Lähtömelutaso: 108,6 dB + 2 dB epävarmuus

Mallinnuksessa käytetyt äänitehotasot ovat samat kuin Laulurämeen tuulivoimahankkeen YVA-Selostuksessa



Reseptori	Käyttötarkoitus	dB(A)
1	Asuinrakennus	36.9
2	Asuinrakennus	38.4
3	Lomarakennus*	46.8
4	Asuinrakennus	36.7
5	Asuinrakennus	35.0
6	Asuinrakennus	34.1
7	Asuinrakennus	38.9
8	Asuinrakennus	37.4
9	Asuinrakennus	35.4
10	Lomarakennus	39.6

*Käyttötarkoituksen muutos hyväksytty 12.3.2025

Tuulivoimala

Rakennukset

Asuinrakennus

Lomarakennus

Äänitaso dB(A)

35-40

40-45

45-50

>50

Winda Energy 3/2025 | AJu

Mallinnuksen tiedot:
Laskentamalli: ISO 9613-2
Laskentaohjelmisto: WindPro 4.0 DECIBEL-moduuli
Laskentakorkeus: maanpinta + 4 m

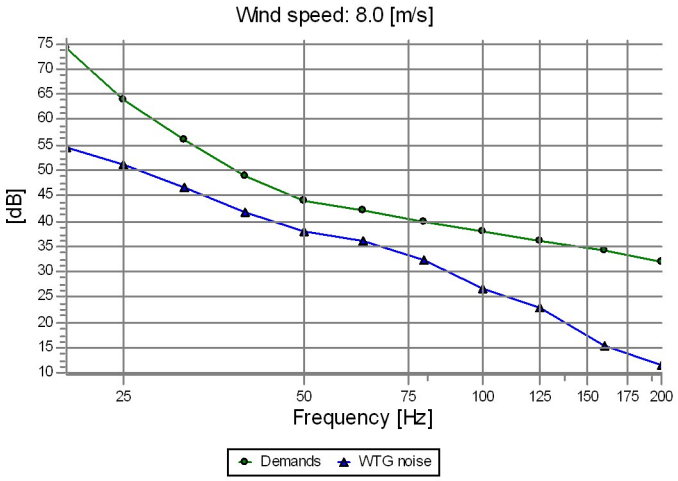
Mallinnuksessa käytetty tuulivoimala:
Nordex N163/6.X
Napakorkeus: 220 m
Lähtömelutaso: 108,6 dB + 2 dB epävarmuus

Mallinnuksessa käytetyt äänitehotasot ovat samat kuin Laulurämeen tuulivoimahankkeen YVA-Selostuksessa

DECIBEL - Detailed results, graphic

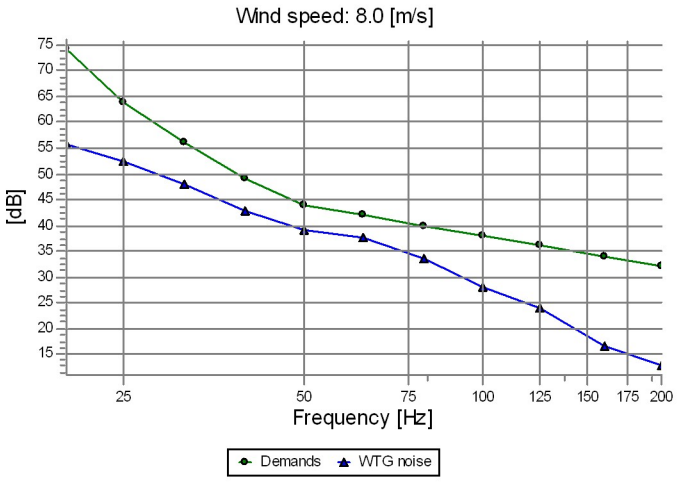
Calculation: Lauluräme + Pyhäjärvi N163 Mode 0 108.6 dBA + 2 dBA unc. | Low frequency model Noise calculation model: Finland Low frequency 8.0 m/s

A R1 Asuinrakennus



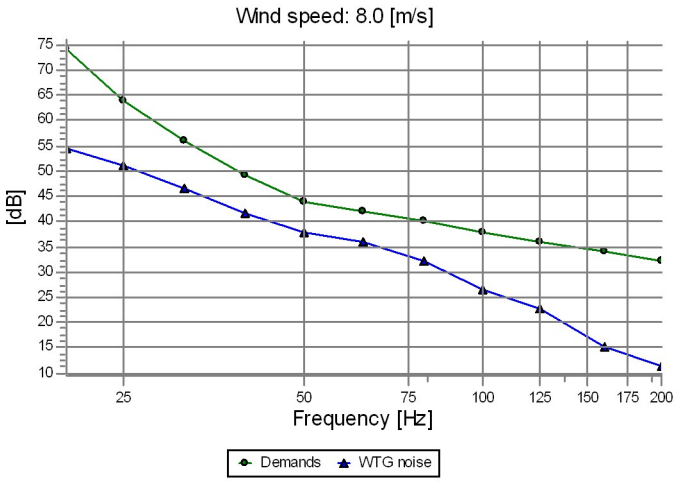
Frequency [Hz]	Sound level Demands [dB]	WTG noise [dB]	Demands fulfilled ?
20.0	74.0	54.6	Yes
25.0	64.0	51.2	Yes
31.5	56.0	46.7	Yes
40.0	49.0	41.7	Yes
50.0	44.0	38.0	Yes
63.0	42.0	36.2	Yes
80.0	40.0	32.5	Yes
100.0	38.0	26.7	Yes
125.0	36.0	22.7	Yes
160.0	34.0	15.3	Yes
200.0	32.0	11.7	Yes

B R2 Asuinrakennus



Frequency [Hz]	Sound level Demands [dB]	WTG noise [dB]	Demands fulfilled ?
20.0	74.0	55.8	Yes
25.0	64.0	52.5	Yes
31.5	56.0	47.9	Yes
40.0	49.0	43.0	Yes
50.0	44.0	39.2	Yes
63.0	42.0	37.5	Yes
80.0	40.0	33.8	Yes
100.0	38.0	28.0	Yes
125.0	36.0	24.0	Yes
160.0	34.0	16.7	Yes
200.0	32.0	13.1	Yes

C R4 Asuinrakennus

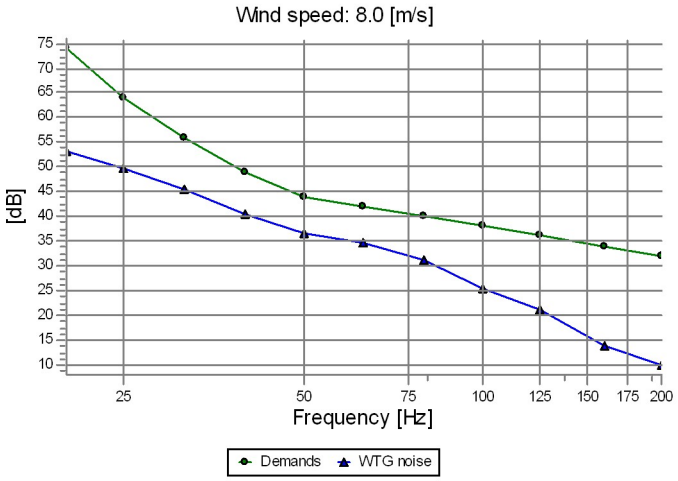


Frequency [Hz]	Sound level Demands [dB]	WTG noise [dB]	Demands fulfilled ?
20.0	74.0	54.5	Yes
25.0	64.0	51.1	Yes
31.5	56.0	46.6	Yes
40.0	49.0	41.6	Yes
50.0	44.0	37.8	Yes
63.0	42.0	36.1	Yes
80.0	40.0	32.3	Yes
100.0	38.0	26.6	Yes
125.0	36.0	22.5	Yes
160.0	34.0	15.2	Yes
200.0	32.0	11.5	Yes

DECIBEL - Detailed results, graphic

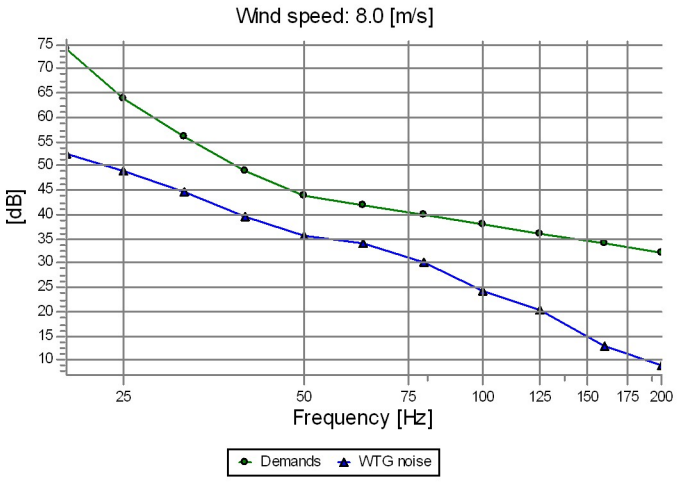
Calculation: Lauluräme + Pyhäjärvi N163 Mode 0 108.6 dBA + 2 dBA unc. | Low frequency model Noise calculation model: Finland Low frequency 8.0 m/s

D R5 Asuinrakennus



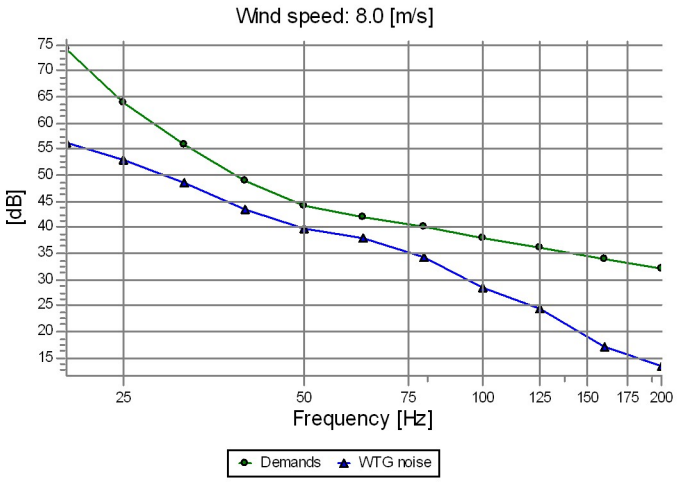
Frequency [Hz]	Sound level Demands [dB]	WTG noise [dB]	Demands fulfilled ?
20.0	74.0	53.2	Yes
25.0	64.0	49.8	Yes
31.5	56.0	45.3	Yes
40.0	49.0	40.3	Yes
50.0	44.0	36.5	Yes
63.0	42.0	34.8	Yes
80.0	40.0	31.0	Yes
100.0	38.0	25.2	Yes
125.0	36.0	21.1	Yes
160.0	34.0	13.6	Yes
200.0	32.0	9.9	Yes

E R6 Asuinrakennus



Frequency [Hz]	Sound level Demands [dB]	WTG noise [dB]	Demands fulfilled ?
20.0	74.0	52.4	Yes
25.0	64.0	49.0	Yes
31.5	56.0	44.5	Yes
40.0	49.0	39.5	Yes
50.0	44.0	35.7	Yes
63.0	42.0	34.0	Yes
80.0	40.0	30.2	Yes
100.0	38.0	24.3	Yes
125.0	36.0	20.2	Yes
160.0	34.0	12.8	Yes
200.0	32.0	9.0	Yes

F R7 Asuinrakennus

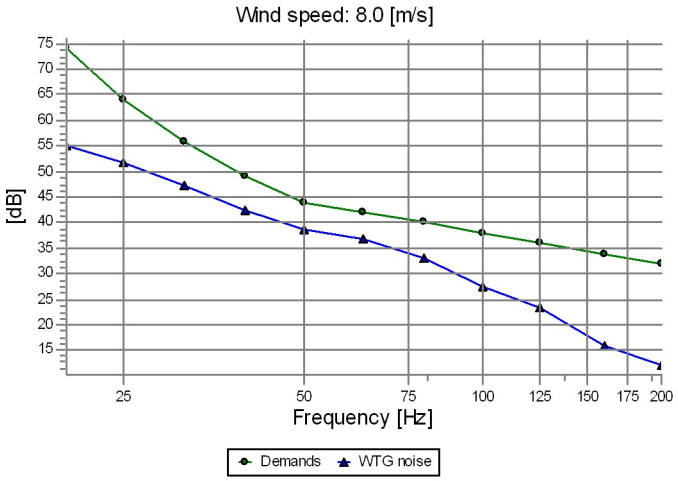


Frequency [Hz]	Sound level Demands [dB]	WTG noise [dB]	Demands fulfilled ?
20.0	74.0	56.3	Yes
25.0	64.0	52.9	Yes
31.5	56.0	48.4	Yes
40.0	49.0	43.4	Yes
50.0	44.0	39.7	Yes
63.0	42.0	38.0	Yes
80.0	40.0	34.2	Yes
100.0	38.0	28.5	Yes
125.0	36.0	24.5	Yes
160.0	34.0	17.2	Yes
200.0	32.0	13.6	Yes

DECIBEL - Detailed results, graphic

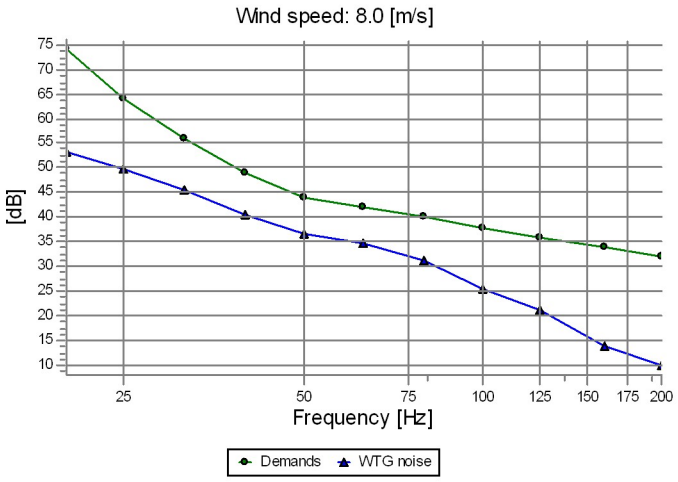
Calculation: Lauluräme + Pyhäjärvi N163 Mode 0 108.6 dBA + 2 dBA unc. | Low frequency model Noise calculation model: Finland Low frequency 8.0 m/s

G R8 Asuinrakennus



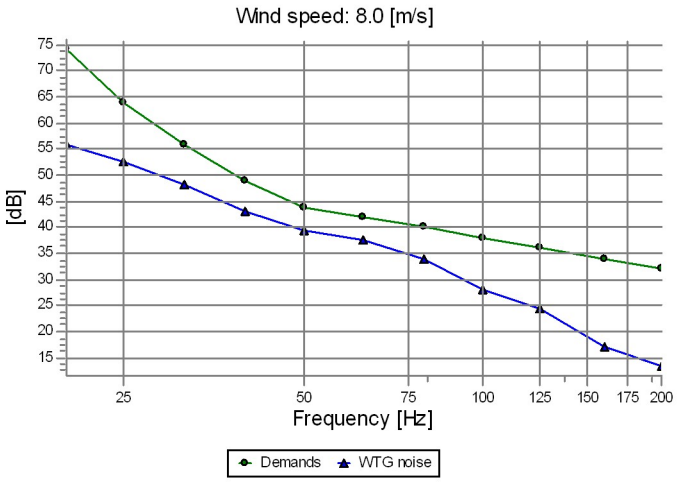
Frequency [Hz]	Sound level Demands [dB]	WTG noise [dB]	Demands fulfilled ?
20.0	74.0	55.3	Yes
25.0	64.0	51.9	Yes
31.5	56.0	47.4	Yes
40.0	49.0	42.4	Yes
50.0	44.0	38.6	Yes
63.0	42.0	36.9	Yes
80.0	40.0	33.2	Yes
100.0	38.0	27.4	Yes
125.0	36.0	23.4	Yes
160.0	34.0	16.0	Yes
200.0	32.0	12.3	Yes

H R9 Asuinrakennus



Frequency [Hz]	Sound level Demands [dB]	WTG noise [dB]	Demands fulfilled ?
20.0	74.0	53.3	Yes
25.0	64.0	50.0	Yes
31.5	56.0	45.4	Yes
40.0	49.0	40.4	Yes
50.0	44.0	36.7	Yes
63.0	42.0	34.9	Yes
80.0	40.0	31.2	Yes
100.0	38.0	25.3	Yes
125.0	36.0	21.3	Yes
160.0	34.0	13.9	Yes
200.0	32.0	10.2	Yes

I R10 Lomarakennus

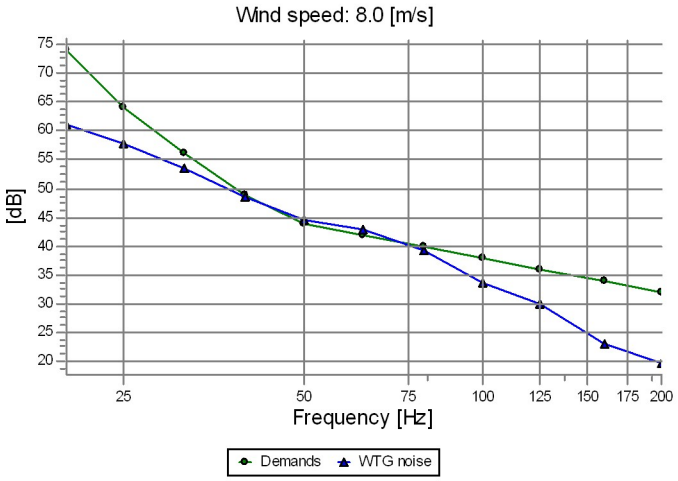


Frequency [Hz]	Sound level Demands [dB]	WTG noise [dB]	Demands fulfilled ?
20.0	74.0	56.0	Yes
25.0	64.0	52.6	Yes
31.5	56.0	48.1	Yes
40.0	49.0	43.1	Yes
50.0	44.0	39.4	Yes
63.0	42.0	37.7	Yes
80.0	40.0	34.0	Yes
100.0	38.0	28.2	Yes
125.0	36.0	24.3	Yes
160.0	34.0	17.1	Yes
200.0	32.0	13.7	Yes

DECIBEL - Detailed results, graphic

Calculation: Lauluräme + Pyhäjärvi N163 Mode 0 108.6 dBA + 2 dBA unc. | Low frequency model Noise calculation model: Finland Low frequency 8.0 m/s

J R3 Lomarakennus (käyttötarkoituksen muutos)



Frequency [Hz]	Sound level Demands [dB]	WTG noise [dB]	Demands fulfilled ?
20.0	74.0	61.2	Yes
25.0	64.0	57.9	Yes
31.5	56.0	53.3	Yes
40.0	49.0	48.4	Yes
50.0	44.0	44.7	No
63.0	42.0	43.0	No
80.0	40.0	39.4	Yes
100.0	38.0	33.8	Yes
125.0	36.0	30.0	Yes
160.0	34.0	22.9	Yes
200.0	32.0	19.7	Yes

Project:
Lauluräme ja Pyhäjärvi kaavaluonnos

Description:
464705.6,7054521.5

Licensed user:
Winda Energy Oy
Mikonkatu 2 D, 4th floor
FI-00100 Helsinki

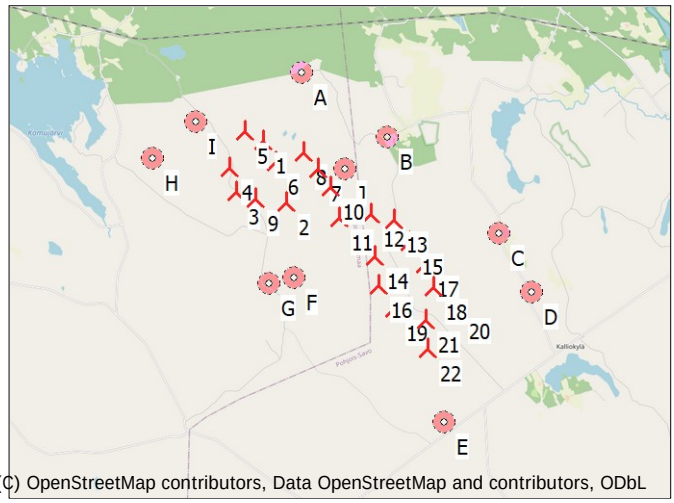
Calculated:
26/03/2025 13.20/4.0.552

DECIBEL - Main Result

Calculation: Lauluräme + Pyhäjärvi N163 Mode 0 108.6 dBA + 2 dBA unc.

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

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89



(C) OpenStreetMap contributors, Data OpenStreetMap and contributors, ODbL

Scale 1:200 000

New WTG Noise sensitive area

WTGs

	East	North	Z [m]	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Noise data Creator	Name	Wind speed [m/s]	LwA,ref [dB(A)]	Uncertainty [dB(A)]
1	462 064	7 056 896	155.6	Pyhäjärvi 02	Yes	NORDEX	N163/6.X M-7 000	7 000	163.0	220.0	USER	M0 Clean blade	8.0	108.6	2.0
2	462 651	7 055 284	163.8	Pyhäjärvi 09	Yes	NORDEX	N163/6.X M-7 000	7 000	163.0	220.0	USER	M0 Clean blade	8.0	108.6	2.0
3	461 302	7 055 545	169.4	Pyhäjärvi 07	Yes	NORDEX	N163/6.X M-7 000	7 000	163.0	220.0	USER	M0 Clean blade	8.0	108.6	2.0
4	461 171	7 056 213	161.3	Pyhäjärvi 03	Yes	NORDEX	N163/6.X M-7 000	7 000	163.0	220.0	USER	M0 Clean blade	8.0	108.6	2.0
5	461 564	7 057 157	156.4	Pyhäjärvi 01	Yes	NORDEX	N163/6.X M-7 000	7 000	163.0	220.0	USER	M0 Clean blade	8.0	108.6	2.0
6	462 373	7 056 334	156.7	Pyhäjärvi 04	Yes	NORDEX	N163/6.X M-7 000	7 000	163.0	220.0	USER	M0 Clean blade	8.0	108.6	2.0
7	463 508	7 056 153	161.4	Pyhäjärvi 06	Yes	NORDEX	N163/6.X M-7 000	7 000	163.0	220.0	USER	M0 Clean blade	8.0	108.6	2.0
8	463 125	7 056 586	160.1	Pyhäjärvi 05	Yes	NORDEX	N163/6.X M-7 000	7 000	163.0	220.0	USER	M0 Clean blade	8.0	108.6	2.0
9	461 840	7 055 367	175.3	Pyhäjärvi 08	Yes	NORDEX	N163/6.X M-7 000	7 000	163.0	220.0	USER	M0 Clean blade	8.0	108.6	2.0
10	463 826	7 055 662	164.6	Pyhäjärvi 10	Yes	NORDEX	N163/6.X M-7 000	7 000	163.0	220.0	USER	M0 Clean blade	8.0	108.6	2.0
11	464 028	7 054 861	173.9	Pyhäjärvi 11	Yes	NORDEX	N163/6.X M-7 000	7 000	163.0	220.0	USER	M0 Clean blade	8.0	108.6	2.0
12	464 883	7 054 937	167.5	Lauluräme 01	Yes	NORDEX	N163/6.X M-7 000	7 000	163.0	220.0	USER	M0 Clean blade	8.0	108.6	2.0
13	465 508	7 054 762	165.2	Lauluräme 02	Yes	NORDEX	N163/6.X M-7 000	7 000	163.0	220.0	USER	M0 Clean blade	8.0	108.6	2.0
14	464 985	7 053 810	175.7	Lauluräme 03	Yes	NORDEX	N163/6.X M-7 000	7 000	163.0	220.0	USER	M0 Clean blade	8.0	108.6	2.0
15	465 903	7 054 162	162.0	Lauluräme 04	Yes	NORDEX	N163/6.X M-7 000	7 000	163.0	220.0	USER	M0 Clean blade	8.0	108.6	2.0
16	465 059	7 053 040	171.9	Lauluräme 05	Yes	NORDEX	N163/6.X M-7 000	7 000	163.0	220.0	USER	M0 Clean blade	8.0	108.6	2.0
17	466 287	7 053 597	164.9	Lauluräme 06	Yes	NORDEX	N163/6.X M-7 000	7 000	163.0	220.0	USER	M0 Clean blade	8.0	108.6	2.0
18	466 547	7 052 983	166.9	Lauluräme 08	Yes	NORDEX	N163/6.X M-7 000	7 000	163.0	220.0	USER	M0 Clean blade	8.0	108.6	2.0
19	465 473	7 052 410	174.3	Lauluräme 07	Yes	NORDEX	N163/6.X M-7 000	7 000	163.0	220.0	USER	M0 Clean blade	8.0	108.6	2.0
20	467 134	7 052 477	159.6	Lauluräme 10	Yes	NORDEX	N163/6.X M-7 000	7 000	163.0	220.0	USER	M0 Clean blade	8.0	108.6	2.0
21	466 302	7 052 106	174.1	Lauluräme 09	Yes	NORDEX	N163/6.X M-7 000	7 000	163.0	220.0	USER	M0 Clean blade	8.0	108.6	2.0
22	466 333	7 051 362	173.1	Lauluräme 11	Yes	NORDEX	N163/6.X M-7 000	7 000	163.0	220.0	USER	M0 Clean blade	8.0	108.6	2.0

Calculation Results

Sound level

Noise sensitive area No.	Name	East	North	Z [m]	Immission height [m]	Demands Noise [dB(A)]	Sound level From WTGs [dB(A)]	Uncertainty margin [dB]	WTG+Uncertainty margin [dB(A)]	Distance to noise demand [m]	Demands fulfilled ? Noise	2 dB penalty applied for one or more WTGs
A	R1 Asuinrakennus	463 088	7 058 697	167.5	4.0	40.0	34.9	2.0	36.9	598	Yes	No
B	R2 Asuinrakennus	465 344	7 056 971	167.0	4.0	40.0	36.4	2.0	38.4	352	Yes	No
C	R4 Asuinrakennus	468 290	7 054 379	148.7	4.0	40.0	34.7	2.0	36.7	669	Yes	No
D	R5 Asuinrakennus	469 126	7 052 810	152.9	4.0	40.0	33.0	2.0	35.0	909	Yes	No
E	R6 Asuinrakennus	466 766	7 049 401	163.7	4.0	40.0	32.1	2.0	34.1	996	Yes	No
F	R7 Asuinrakennus	462 822	7 053 260	189.7	4.0	40.0	36.9	2.0	38.9	303	Yes	No
G	R8 Asuinrakennus	462 159	7 053 145	194.0	4.0	40.0	35.4	2.0	37.4	664	Yes	No
H	R9 Asuinrakennus	459 120	7 056 458	168.2	4.0	40.0	33.4	2.0	35.4	852	Yes	No
I	R10 Lomarakennus	460 292	7 057 436	161.5	4.0	40.0	37.6	2.0	39.6	59	Yes	No
J	R3 Lomarakennus (käyttötarkoituksen muutos)	464 213	7 056 148	168.7	4.0	40.0	44.8	2.0	46.8	-1 020	No	No

DECIBEL - Main Result

Calculation: Lauluräme + Pyhäjärvi N163 Mode 0 108.6 dBA + 2 dBA unc.

Distances (m)

WTG	A	B	C	D	E	F	G	H	I	J
1	2073	3281	6716	8159	8848	3714	3752	2976	1852	2276
2	3442	3178	5711	6932	7179	2031	2195	3722	3193	1785
3	3623	4286	7085	8289	8222	2745	2549	2365	2143	2973
4	3139	4242	7352	8653	8815	3384	3223	2066	1506	3043
5	2167	3784	7277	8722	9339	4096	4057	2543	1303	2834
6	2469	3039	6232	7617	8208	3107	3196	3256	2355	1849
7	2578	2010	5101	6538	7497	2974	3297	4399	3463	705
8	2112	2252	5617	7090	8055	3340	3574	4007	2958	1173
9	3557	3854	6526	7722	7737	2325	2245	2931	2584	2498
10	3123	2004	4645	6019	6917	2604	3019	4773	3954	621
11	3950	2486	4289	5495	6108	2005	2538	5162	4538	1300
12	4167	2085	3453	4746	5848	2657	3261	5961	5227	1384
13	4620	2215	2808	4111	5507	3077	3719	6610	5862	1897
14	5242	3181	3354	4260	4755	2232	2903	6435	5931	2462
15	5338	2863	2397	3495	4839	3211	3880	7162	6496	2607
16	5991	3941	3498	4074	4020	2247	2902	6853	6484	3221
17	6021	3503	2150	2946	4223	3481	4153	7718	7119	3288
18	6680	4165	2234	2585	3589	3735	4391	8200	7678	3933
19	6724	4562	3437	3675	3275	2784	3395	7533	7218	3944
20	7420	4837	2226	2020	3098	4382	5019	8948	8450	4691
21	7333	4958	3020	2911	2745	3666	4271	8398	8033	4550
22	8021	5695	3596	3146	2008	3991	4539	8832	8567	5234

DECIBEL - Detailed results

Calculation: Lauluräme + Pyhäjärvi N163 Mode 0 108.6 dBA + 2 dBA unc. Noise calculation model: ISO 9613-2 Finland 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 R1 Asuinrakennus

Wind speed: 8.0 m/s

WTG No.	Distance [m]	Sound distance [m]	Penalty [dB]	From WTGs [dB(A)]	Uncertainty margin [dB]	WTG+Uncertainty margin [dB]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	2 073	2 083	0	27.22	2.00	29.22	108.6	0.00	77.37	-	-	0.00	0.00	-
10	3 123	3 131	0	22.05	2.00	24.05	108.6	0.00	80.91	-	-	0.00	0.00	-
11	3 950	3 956	0	19.01	2.00	21.01	108.6	0.00	82.95	-	-	0.00	0.00	-
12	4 167	4 172	0	18.32	2.00	20.32	108.6	0.00	83.41	-	-	0.00	0.00	-
13	4 620	4 625	0	16.97	2.00	18.97	108.6	0.00	84.30	-	-	0.00	0.00	-
14	5 242	5 247	0	15.32	2.00	17.32	108.6	0.00	85.40	-	-	0.00	0.00	-
15	5 338	5 342	0	15.09	2.00	17.09	108.6	0.00	85.55	-	-	0.00	0.00	-
16	5 991	5 995	0	13.58	2.00	15.58	108.6	0.00	86.56	-	-	0.00	0.00	-
17	6 021	6 024	0	13.52	2.00	15.52	108.6	0.00	86.60	-	-	0.00	0.00	-
18	6 680	6 683	0	12.17	2.00	14.17	108.6	0.00	87.50	-	-	0.00	0.00	-
19	6 724	6 728	0	12.09	2.00	14.09	108.6	0.00	87.56	-	-	0.00	0.00	-
2	3 442	3 448	0	20.83	2.00	22.83	108.6	0.00	81.75	-	-	0.00	0.00	-
20	7 420	7 423	0	11.02	2.00	13.02	108.6	0.00	88.41	-	-	0.00	0.00	-
21	7 333	7 337	0	11.15	2.00	13.15	108.6	0.00	88.31	-	-	0.00	0.00	-
22	8 021	8 024	0	10.17	2.00	12.17	108.6	0.00	89.09	-	-	0.00	0.00	-
3	3 623	3 630	0	20.14	2.00	22.14	108.6	0.00	82.20	-	-	0.00	0.00	-
4	3 139	3 146	0	21.99	2.00	23.99	108.6	0.00	80.95	-	-	0.00	0.00	-
5	2 167	2 176	0	26.67	2.00	28.67	108.6	0.00	77.75	-	-	0.00	0.00	-
6	2 469	2 478	0	25.06	2.00	27.06	108.6	0.00	78.88	-	-	0.00	0.00	-
7	2 578	2 587	0	24.50	2.00	26.50	108.6	0.00	79.26	-	-	0.00	0.00	-
8	2 112	2 122	0	26.99	2.00	28.99	108.6	0.00	77.54	-	-	0.00	0.00	-
9	3 557	3 564	0	20.37	2.00	22.37	108.6	0.00	82.04	-	-	0.00	0.00	-
Sum						36.95								

- Data undefined due to calculation with octave data

Noise sensitive area: B R2 Asuinrakennus

Wind speed: 8.0 m/s

WTG No.	Distance [m]	Sound distance [m]	Penalty [dB]	From WTGs [dB(A)]	Uncertainty margin [dB]	WTG+Uncertainty margin [dB]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	3 281	3 288	0	21.43	2.00	23.43	108.6	0.00	81.34	-	-	0.00	0.00	-
10	2 004	2 015	0	27.63	2.00	29.63	108.6	0.00	77.09	-	-	0.00	0.00	-
11	2 486	2 496	0	24.95	2.00	26.95	108.6	0.00	78.95	-	-	0.00	0.00	-
12	2 085	2 096	0	27.14	2.00	29.14	108.6	0.00	77.43	-	-	0.00	0.00	-
13	2 215	2 225	0	26.40	2.00	28.40	108.6	0.00	77.95	-	-	0.00	0.00	-
14	3 181	3 189	0	21.82	2.00	23.82	108.6	0.00	81.07	-	-	0.00	0.00	-
15	2 863	2 871	0	23.17	2.00	25.17	108.6	0.00	80.16	-	-	0.00	0.00	-
16	3 941	3 947	0	19.04	2.00	21.04	108.6	0.00	82.93	-	-	0.00	0.00	-
17	3 503	3 510	0	20.57	2.00	22.57	108.6	0.00	81.90	-	-	0.00	0.00	-
18	4 165	4 171	0	18.32	2.00	20.32	108.6	0.00	83.40	-	-	0.00	0.00	-
19	4 562	4 567	0	17.14	2.00	19.14	108.6	0.00	84.19	-	-	0.00	0.00	-

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DECIBEL - Detailed results

Calculation: Lauluräme + Pyhäjärvi N163 Mode 0 108.6 dBA + 2 dBA unc. Noise calculation model: ISO 9613-2 Finland 8.0 m/s

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WTG No.	Distance [m]	Sound distance [m]	Penalty [dB]	From WTGs [dB(A)]	Uncertainty margin [dB]	WTG+Uncertainty margin [dB]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
2	3 178	3 185	0	21.83	2.00	23.83	108.6	0.00	81.06	-	-	0.00	0.00	-
20	4 837	4 841	0	16.38	2.00	18.38	108.6	0.00	84.70	-	-	0.00	0.00	-
21	4 958	4 963	0	16.05	2.00	18.05	108.6	0.00	84.92	-	-	0.00	0.00	-
22	5 695	5 699	0	14.24	2.00	16.24	108.6	0.00	86.12	-	-	0.00	0.00	-
3	4 286	4 292	0	17.95	2.00	19.95	108.6	0.00	83.65	-	-	0.00	0.00	-
4	4 242	4 247	0	18.09	2.00	20.09	108.6	0.00	83.56	-	-	0.00	0.00	-
5	3 784	3 790	0	19.59	2.00	21.59	108.6	0.00	82.57	-	-	0.00	0.00	-
6	3 039	3 046	0	22.41	2.00	24.41	108.6	0.00	80.67	-	-	0.00	0.00	-
7	2 010	2 021	0	27.59	2.00	29.59	108.6	0.00	77.11	-	-	0.00	0.00	-
8	2 252	2 262	0	26.19	2.00	28.19	108.6	0.00	78.09	-	-	0.00	0.00	-
9	3 854	3 860	0	19.33	2.00	21.33	108.6	0.00	82.73	-	-	0.00	0.00	-
Sum						38.42								

- Data undefined due to calculation with octave data

Noise sensitive area: C R4 Asuinrakennus

Wind speed: 8.0 m/s

WTG No.	Distance [m]	Sound distance [m]	Penalty [dB]	From WTGs [dB(A)]	Uncertainty margin [dB]	WTG+Uncertainty margin [dB]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	6 716	6 720	0	12.10	2.00	14.10	108.6	0.00	87.55	-	-	0.00	0.00	-
10	4 645	4 651	0	16.90	2.00	18.90	108.6	0.00	84.35	-	-	0.00	0.00	-
11	4 289	4 296	0	17.94	2.00	19.94	108.6	0.00	83.66	-	-	0.00	0.00	-
12	3 453	3 461	0	20.76	2.00	22.76	108.6	0.00	81.78	-	-	0.00	0.00	-
13	2 808	2 818	0	23.40	2.00	25.40	108.6	0.00	80.00	-	-	0.00	0.00	-
14	3 354	3 363	0	21.13	2.00	23.13	108.6	0.00	81.53	-	-	0.00	0.00	-
15	2 397	2 408	0	25.40	2.00	27.40	108.6	0.00	78.63	-	-	0.00	0.00	-
16	3 498	3 506	0	20.59	2.00	22.59	108.6	0.00	81.90	-	-	0.00	0.00	-
17	2 150	2 163	0	26.75	2.00	28.75	108.6	0.00	77.70	-	-	0.00	0.00	-
18	2 234	2 246	0	26.28	2.00	28.28	108.6	0.00	78.03	-	-	0.00	0.00	-
19	3 437	3 445	0	20.81	2.00	22.81	108.6	0.00	81.74	-	-	0.00	0.00	-
2	5 711	5 716	0	14.21	2.00	16.21	108.6	0.00	86.14	-	-	0.00	0.00	-
20	2 226	2 238	0	26.32	2.00	28.32	108.6	0.00	78.00	-	-	0.00	0.00	-
21	3 020	3 030	0	22.47	2.00	24.47	108.6	0.00	80.63	-	-	0.00	0.00	-
22	3 596	3 605	0	20.23	2.00	22.23	108.6	0.00	82.14	-	-	0.00	0.00	-
3	7 085	7 089	0	11.52	2.00	13.52	108.6	0.00	88.01	-	-	0.00	0.00	-
4	7 352	7 355	0	11.12	2.00	13.12	108.6	0.00	88.33	-	-	0.00	0.00	-
5	7 277	7 281	0	11.23	2.00	13.23	108.6	0.00	88.24	-	-	0.00	0.00	-
6	6 232	6 236	0	13.07	2.00	15.07	108.6	0.00	86.90	-	-	0.00	0.00	-
7	5 101	5 106	0	15.68	2.00	17.68	108.6	0.00	85.16	-	-	0.00	0.00	-
8	5 617	5 621	0	14.42	2.00	16.42	108.6	0.00	86.00	-	-	0.00	0.00	-
9	6 526	6 530	0	12.47	2.00	14.47	108.6	0.00	87.30	-	-	0.00	0.00	-
Sum						36.71								

- Data undefined due to calculation with octave data

Noise sensitive area: D R5 Asuinrakennus

Wind speed: 8.0 m/s

WTG No.	Distance [m]	Sound distance [m]	Penalty [dB]	From WTGs [dB(A)]	Uncertainty margin [dB]	WTG+Uncertainty margin [dB]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	8 159	8 162	0	9.98	2.00	11.98	108.6	0.00	89.24	-	-	0.00	0.00	-
10	6 019	6 023	0	13.52	2.00	15.52	108.6	0.00	86.60	-	-	0.00	0.00	-
11	5 495	5 500	0	14.71	2.00	16.71	108.6	0.00	85.81	-	-	0.00	0.00	-
12	4 746	4 752	0	16.62	2.00	18.62	108.6	0.00	84.54	-	-	0.00	0.00	-
13	4 111	4 117	0	18.49	2.00	20.49	108.6	0.00	83.29	-	-	0.00	0.00	-
14	4 260	4 267	0	18.03	2.00	20.03	108.6	0.00	83.60	-	-	0.00	0.00	-
15	3 495	3 502	0	20.60	2.00	22.60	108.6	0.00	81.89	-	-	0.00	0.00	-
16	4 074	4 081	0	18.61	2.00	20.61	108.6	0.00	83.21	-	-	0.00	0.00	-
17	2 946	2 955	0	22.80	2.00	24.80	108.6	0.00	80.41	-	-	0.00	0.00	-
18	2 585	2 595	0	24.45	2.00	26.45	108.6	0.00	79.28	-	-	0.00	0.00	-
19	3 675	3 682	0	19.95	2.00	21.95	108.6	0.00	82.32	-	-	0.00	0.00	-
2	6 932	6 935	0	11.76	2.00	13.76	108.6	0.00	87.82	-	-	0.00	0.00	-

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DECIBEL - Detailed results

Calculation: Lauluräme + Pyhäjärvi N163 Mode 0 108.6 dBA + 2 dBA unc. Noise calculation model: ISO 9613-2 Finland 8.0 m/s

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WTG No.	Distance [m]	Sound distance [m]	Penalty [dB]	From WTGs [dB(A)]	Uncertainty margin [dB]	WTG+Uncertainty margin [dB]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
20	2 020	2 033	0	27.52	2.00	29.52	108.6	0.00	77.16	-	-	0.00	0.00	-
21	2 911	2 921	0	22.95	2.00	24.95	108.6	0.00	80.31	-	-	0.00	0.00	-
22	3 146	3 155	0	21.97	2.00	23.97	108.6	0.00	80.98	-	-	0.00	0.00	-
3	8 289	8 292	0	9.81	2.00	11.81	108.6	0.00	89.37	-	-	0.00	0.00	-
4	8 653	8 656	0	9.34	2.00	11.34	108.6	0.00	89.75	-	-	0.00	0.00	-
5	8 722	8 725	0	9.25	2.00	11.25	108.6	0.00	89.82	-	-	0.00	0.00	-
6	7 617	7 621	0	10.73	2.00	12.73	108.6	0.00	88.64	-	-	0.00	0.00	-
7	6 538	6 541	0	12.45	2.00	14.45	108.6	0.00	87.31	-	-	0.00	0.00	-
8	7 090	7 094	0	11.51	2.00	13.51	108.6	0.00	88.02	-	-	0.00	0.00	-
9	7 722	7 726	0	10.58	2.00	12.58	108.6	0.00	88.76	-	-	0.00	0.00	-
Sum						35.04								

- Data undefined due to calculation with octave data

Noise sensitive area: E R6 Asuinrakennus

Wind speed: 8.0 m/s

WTG No.	Distance [m]	Sound distance [m]	Penalty [dB]	From WTGs [dB(A)]	Uncertainty margin [dB]	WTG+Uncertainty margin [dB]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	8 848	8 850	0	9.09	2.00	11.09	108.6	0.00	89.94	-	-	0.00	0.00	-
10	6 917	6 921	0	11.78	2.00	13.78	108.6	0.00	87.80	-	-	0.00	0.00	-
11	6 108	6 112	0	13.33	2.00	15.33	108.6	0.00	86.72	-	-	0.00	0.00	-
12	5 848	5 852	0	13.90	2.00	15.90	108.6	0.00	86.35	-	-	0.00	0.00	-
13	5 507	5 511	0	14.68	2.00	16.68	108.6	0.00	85.82	-	-	0.00	0.00	-
14	4 755	4 761	0	16.59	2.00	18.59	108.6	0.00	84.55	-	-	0.00	0.00	-
15	4 839	4 844	0	16.37	2.00	18.37	108.6	0.00	84.70	-	-	0.00	0.00	-
16	4 020	4 026	0	18.79	2.00	20.79	108.6	0.00	83.10	-	-	0.00	0.00	-
17	4 223	4 229	0	18.14	2.00	20.14	108.6	0.00	83.52	-	-	0.00	0.00	-
18	3 589	3 595	0	20.26	2.00	22.26	108.6	0.00	82.11	-	-	0.00	0.00	-
19	3 275	3 283	0	21.44	2.00	23.44	108.6	0.00	81.33	-	-	0.00	0.00	-
2	7 179	7 182	0	11.38	2.00	13.38	108.6	0.00	88.13	-	-	0.00	0.00	-
20	3 098	3 106	0	22.16	2.00	24.16	108.6	0.00	80.84	-	-	0.00	0.00	-
21	2 745	2 754	0	23.70	2.00	25.70	108.6	0.00	79.80	-	-	0.00	0.00	-
22	2 008	2 021	0	27.59	2.00	29.59	108.6	0.00	77.11	-	-	0.00	0.00	-
3	8 222	8 225	0	9.90	2.00	11.90	108.6	0.00	89.30	-	-	0.00	0.00	-
4	8 815	8 818	0	9.13	2.00	11.13	108.6	0.00	89.91	-	-	0.00	0.00	-
5	9 339	9 342	0	8.49	2.00	10.49	108.6	0.00	90.41	-	-	0.00	0.00	-
6	8 208	8 210	0	9.92	2.00	11.92	108.6	0.00	89.29	-	-	0.00	0.00	-
7	7 497	7 500	0	10.91	2.00	12.91	108.6	0.00	88.50	-	-	0.00	0.00	-
8	8 055	8 058	0	10.12	2.00	12.12	108.6	0.00	89.12	-	-	0.00	0.00	-
9	7 737	7 740	0	10.56	2.00	12.56	108.6	0.00	88.78	-	-	0.00	0.00	-
Sum						34.12								

- Data undefined due to calculation with octave data

Noise sensitive area: F R7 Asuinrakennus

Wind speed: 8.0 m/s

WTG No.	Distance [m]	Sound distance [m]	Penalty [dB]	From WTGs [dB(A)]	Uncertainty margin [dB]	WTG+Uncertainty margin [dB]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	3 714	3 719	0	19.82	2.00	21.82	108.6	0.00	82.41	-	-	0.00	0.00	-
10	2 604	2 611	0	24.38	2.00	26.38	108.6	0.00	79.34	-	-	0.00	0.00	-
11	2 005	2 015	0	27.63	2.00	29.63	108.6	0.00	77.08	-	-	0.00	0.00	-
12	2 657	2 664	0	24.12	2.00	26.12	108.6	0.00	79.51	-	-	0.00	0.00	-
13	3 077	3 083	0	22.25	2.00	24.25	108.6	0.00	80.78	-	-	0.00	0.00	-
14	2 232	2 241	0	26.31	2.00	28.31	108.6	0.00	78.01	-	-	0.00	0.00	-
15	3 211	3 216	0	21.70	2.00	23.70	108.6	0.00	81.15	-	-	0.00	0.00	-
16	2 247	2 256	0	26.22	2.00	28.22	108.6	0.00	78.07	-	-	0.00	0.00	-
17	3 481	3 487	0	20.66	2.00	22.66	108.6	0.00	81.85	-	-	0.00	0.00	-
18	3 735	3 740	0	19.75	2.00	21.75	108.6	0.00	82.46	-	-	0.00	0.00	-
19	2 784	2 791	0	23.53	2.00	25.53	108.6	0.00	79.91	-	-	0.00	0.00	-
2	2 031	2 040	0	27.47	2.00	29.47	108.6	0.00	77.19	-	-	0.00	0.00	-
20	4 382	4 386	0	17.67	2.00	19.67	108.6	0.00	83.84	-	-	0.00	0.00	-

To be continued on next page...

DECIBEL - Detailed results

Calculation: Lauluräme + Pyhäjärvi N163 Mode 0 108.6 dBA + 2 dBA unc. Noise calculation model: ISO 9613-2 Finland 8.0 m/s

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WTG No.	Distance [m]	Sound distance [m]	Penalty [dB]	From WTGs [dB(A)]	Uncertainty margin [dB]	WTG+Uncertainty margin [dB]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
21	3 666	3 671	0	19.99	2.00	21.99	108.6	0.00	82.30	-	-	0.00	0.00	-
22	3 991	3 996	0	18.88	2.00	20.88	108.6	0.00	83.03	-	-	0.00	0.00	-
3	2 745	2 752	0	23.71	2.00	25.71	108.6	0.00	79.79	-	-	0.00	0.00	-
4	3 384	3 389	0	21.03	2.00	23.03	108.6	0.00	81.60	-	-	0.00	0.00	-
5	4 096	4 100	0	18.55	2.00	20.55	108.6	0.00	83.26	-	-	0.00	0.00	-
6	3 107	3 113	0	22.13	2.00	24.13	108.6	0.00	80.86	-	-	0.00	0.00	-
7	2 974	2 980	0	22.69	2.00	24.69	108.6	0.00	80.48	-	-	0.00	0.00	-
8	3 340	3 345	0	21.20	2.00	23.20	108.6	0.00	81.49	-	-	0.00	0.00	-
9	2 325	2 334	0	25.80	2.00	27.80	108.6	0.00	78.36	-	-	0.00	0.00	-
Sum						38.90								

- Data undefined due to calculation with octave data

Noise sensitive area: G R8 Asuinrakennus

Wind speed: 8.0 m/s

WTG No.	Distance [m]	Sound distance [m]	Penalty [dB]	From WTGs [dB(A)]	Uncertainty margin [dB]	WTG+Uncertainty margin [dB]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	3 752	3 756	0	19.69	2.00	21.69	108.6	0.00	82.50	-	-	0.00	0.00	-
10	3 019	3 025	0	22.49	2.00	24.49	108.6	0.00	80.61	-	-	0.00	0.00	-
11	2 538	2 545	0	24.70	2.00	26.70	108.6	0.00	79.11	-	-	0.00	0.00	-
12	3 261	3 266	0	21.51	2.00	23.51	108.6	0.00	81.28	-	-	0.00	0.00	-
13	3 719	3 724	0	19.80	2.00	21.80	108.6	0.00	82.42	-	-	0.00	0.00	-
14	2 903	2 910	0	22.99	2.00	24.99	108.6	0.00	80.28	-	-	0.00	0.00	-
15	3 880	3 884	0	19.25	2.00	21.25	108.6	0.00	82.79	-	-	0.00	0.00	-
16	2 902	2 908	0	23.00	2.00	25.00	108.6	0.00	80.27	-	-	0.00	0.00	-
17	4 153	4 157	0	18.37	2.00	20.37	108.6	0.00	83.38	-	-	0.00	0.00	-
18	4 391	4 395	0	17.64	2.00	19.64	108.6	0.00	83.86	-	-	0.00	0.00	-
19	3 395	3 400	0	20.98	2.00	22.98	108.6	0.00	81.63	-	-	0.00	0.00	-
2	2 195	2 203	0	26.52	2.00	28.52	108.6	0.00	77.86	-	-	0.00	0.00	-
20	5 019	5 022	0	15.90	2.00	17.90	108.6	0.00	85.02	-	-	0.00	0.00	-
21	4 271	4 276	0	18.00	2.00	20.00	108.6	0.00	83.62	-	-	0.00	0.00	-
22	4 539	4 543	0	17.21	2.00	19.21	108.6	0.00	84.15	-	-	0.00	0.00	-
3	2 549	2 556	0	24.65	2.00	26.65	108.6	0.00	79.15	-	-	0.00	0.00	-
4	3 223	3 229	0	21.65	2.00	23.65	108.6	0.00	81.18	-	-	0.00	0.00	-
5	4 057	4 061	0	18.67	2.00	20.67	108.6	0.00	83.17	-	-	0.00	0.00	-
6	3 196	3 201	0	21.76	2.00	23.76	108.6	0.00	81.11	-	-	0.00	0.00	-
7	3 297	3 302	0	21.36	2.00	23.36	108.6	0.00	81.38	-	-	0.00	0.00	-
8	3 574	3 579	0	20.32	2.00	22.32	108.6	0.00	82.07	-	-	0.00	0.00	-
9	2 245	2 254	0	26.24	2.00	28.24	108.6	0.00	78.06	-	-	0.00	0.00	-
Sum						37.40								

- Data undefined due to calculation with octave data

Noise sensitive area: H R9 Asuinrakennus

Wind speed: 8.0 m/s

WTG No.	Distance [m]	Sound distance [m]	Penalty [dB]	From WTGs [dB(A)]	Uncertainty margin [dB]	WTG+Uncertainty margin [dB]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1	2 976	2 983	0	22.67	2.00	24.67	108.6	0.00	80.49	-	-	0.00	0.00	-
10	4 773	4 778	0	16.55	2.00	18.55	108.6	0.00	84.58	-	-	0.00	0.00	-
11	5 162	5 167	0	15.53	2.00	17.53	108.6	0.00	85.26	-	-	0.00	0.00	-
12	5 961	5 965	0	13.65	2.00	15.65	108.6	0.00	86.51	-	-	0.00	0.00	-
13	6 610	6 613	0	12.31	2.00	14.31	108.6	0.00	87.41	-	-	0.00	0.00	-
14	6 435	6 439	0	12.65	2.00	14.65	108.6	0.00	87.18	-	-	0.00	0.00	-
15	7 162	7 165	0	11.40	2.00	13.40	108.6	0.00	88.10	-	-	0.00	0.00	-
16	6 853	6 856	0	11.88	2.00	13.88	108.6	0.00	87.72	-	-	0.00	0.00	-
17	7 718	7 721	0	10.59	2.00	12.59	108.6	0.00	88.75	-	-	0.00	0.00	-
18	8 200	8 203	0	9.93	2.00	11.93	108.6	0.00	89.28	-	-	0.00	0.00	-
19	7 533	7 537	0	10.85	2.00	12.85	108.6	0.00	88.54	-	-	0.00	0.00	-
2	3 722	3 728	0	19.79	2.00	21.79	108.6	0.00	82.43	-	-	0.00	0.00	-
20	8 948	8 951	0	8.97	2.00	10.97	108.6	0.00	90.04	-	-	0.00	0.00	-
21	8 398	8 401	0	9.66	2.00	11.66	108.6	0.00	89.49	-	-	0.00	0.00	-

To be continued on next page...

DECIBEL - Detailed results

Calculation: Lauluräme + Pyhäjärvi N163 Mode 0 108.6 dBA + 2 dBA unc. Noise calculation model: ISO 9613-2 Finland 8.0 m/s

...continued from previous page

WTG No.	Distance	Sound distance	Penalty	From WTGs	Uncertainty margin	WTG+Uncertainty margin	LwA,ref	Dc	Adiv	Aatm	Agr	Abar	Amisc	A
	[m]	[m]	[dB]	[dB(A)]	[dB]	[dB]	[dB(A)]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
22	8 832	8 835	0	9.11	2.00	11.11	108.6	0.00	89.92	-	-	0.00	0.00	-
3	2 365	2 375	0	25.58	2.00	27.58	108.6	0.00	78.51	-	-	0.00	0.00	-
4	2 066	2 076	0	27.26	2.00	29.26	108.6	0.00	77.35	-	-	0.00	0.00	-
5	2 543	2 551	0	24.67	2.00	26.67	108.6	0.00	79.13	-	-	0.00	0.00	-
6	3 256	3 262	0	21.52	2.00	23.52	108.6	0.00	81.27	-	-	0.00	0.00	-
7	4 399	4 404	0	17.61	2.00	19.61	108.6	0.00	83.88	-	-	0.00	0.00	-
8	4 007	4 013	0	18.83	2.00	20.83	108.6	0.00	83.07	-	-	0.00	0.00	-
9	2 931	2 939	0	22.86	2.00	24.86	108.6	0.00	80.36	-	-	0.00	0.00	-
Sum						35.35								

- Data undefined due to calculation with octave data

Noise sensitive area: I R10 Lomarakennus

Wind speed: 8.0 m/s

WTG No.	Distance	Sound distance	Penalty	From WTGs	Uncertainty margin	WTG+Uncertainty margin	LwA,ref	Dc	Adiv	Aatm	Agr	Abar	Amisc	A
	[m]	[m]	[dB]	[dB(A)]	[dB]	[dB]	[dB(A)]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
1	1 852	1 864	0	28.59	2.00	30.59	108.6	0.00	76.41	-	-	0.00	0.00	-
10	3 954	3 960	0	19.00	2.00	21.00	108.6	0.00	82.95	-	-	0.00	0.00	-
11	4 538	4 544	0	17.21	2.00	19.21	108.6	0.00	84.15	-	-	0.00	0.00	-
12	5 227	5 232	0	15.36	2.00	17.36	108.6	0.00	85.37	-	-	0.00	0.00	-
13	5 862	5 866	0	13.87	2.00	15.87	108.6	0.00	86.37	-	-	0.00	0.00	-
14	5 931	5 935	0	13.72	2.00	15.72	108.6	0.00	86.47	-	-	0.00	0.00	-
15	6 496	6 500	0	12.53	2.00	14.53	108.6	0.00	87.26	-	-	0.00	0.00	-
16	6 484	6 488	0	12.56	2.00	14.56	108.6	0.00	87.24	-	-	0.00	0.00	-
17	7 119	7 123	0	11.47	2.00	13.47	108.6	0.00	88.05	-	-	0.00	0.00	-
18	7 678	7 682	0	10.65	2.00	12.65	108.6	0.00	88.71	-	-	0.00	0.00	-
19	7 218	7 222	0	11.32	2.00	13.32	108.6	0.00	88.17	-	-	0.00	0.00	-
2	3 193	3 201	0	21.77	2.00	23.77	108.6	0.00	81.11	-	-	0.00	0.00	-
20	8 450	8 453	0	9.60	2.00	11.60	108.6	0.00	89.54	-	-	0.00	0.00	-
21	8 033	8 036	0	10.15	2.00	12.15	108.6	0.00	89.10	-	-	0.00	0.00	-
22	8 567	8 570	0	9.45	2.00	11.45	108.6	0.00	89.66	-	-	0.00	0.00	-
3	2 143	2 155	0	26.80	2.00	28.80	108.6	0.00	77.67	-	-	0.00	0.00	-
4	1 506	1 521	0	31.05	2.00	33.05	108.6	0.00	74.64	-	-	0.00	0.00	-
5	1 303	1 320	0	32.73	2.00	34.73	108.6	0.00	73.41	-	-	0.00	0.00	-
6	2 355	2 364	0	25.63	2.00	27.63	108.6	0.00	78.47	-	-	0.00	0.00	-
7	3 463	3 469	0	20.72	2.00	22.72	108.6	0.00	81.80	-	-	0.00	0.00	-
8	2 958	2 966	0	22.75	2.00	24.75	108.6	0.00	80.44	-	-	0.00	0.00	-
9	2 584	2 594	0	24.46	2.00	26.46	108.6	0.00	79.28	-	-	0.00	0.00	-
Sum						39.61								

- Data undefined due to calculation with octave data

Noise sensitive area: J R3 Lomarakennus (käyttötarkoituksen muutos)

Wind speed: 8.0 m/s

WTG No.	Distance	Sound distance	Penalty	From WTGs	Uncertainty margin	WTG+Uncertainty margin	LwA,ref	Dc	Adiv	Aatm	Agr	Abar	Amisc	A
	[m]	[m]	[dB]	[dB(A)]	[dB]	[dB]	[dB(A)]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
1	2 276	2 285	0	26.06	2.00	28.06	108.6	0.00	78.18	-	-	0.00	0.00	-
10	621	656	0	40.55	2.00	42.55	108.6	0.00	67.33	-	-	0.00	0.00	-
11	1 300	1 319	0	32.74	2.00	34.74	108.6	0.00	73.40	-	-	0.00	0.00	-
12	1 384	1 400	0	32.03	2.00	34.03	108.6	0.00	73.92	-	-	0.00	0.00	-
13	1 897	1 909	0	28.30	2.00	30.30	108.6	0.00	76.61	-	-	0.00	0.00	-
14	2 462	2 472	0	25.07	2.00	27.07	108.6	0.00	78.86	-	-	0.00	0.00	-
15	2 607	2 616	0	24.35	2.00	26.35	108.6	0.00	79.35	-	-	0.00	0.00	-
16	3 221	3 228	0	21.66	2.00	23.66	108.6	0.00	81.18	-	-	0.00	0.00	-
17	3 288	3 295	0	21.39	2.00	23.39	108.6	0.00	81.36	-	-	0.00	0.00	-
18	3 933	3 939	0	19.07	2.00	21.07	108.6	0.00	82.91	-	-	0.00	0.00	-
19	3 944	3 950	0	19.03	2.00	21.03	108.6	0.00	82.93	-	-	0.00	0.00	-
2	1 785	1 797	0	29.04	2.00	31.04	108.6	0.00	76.09	-	-	0.00	0.00	-
20	4 691	4 696	0	16.78	2.00	18.78	108.6	0.00	84.43	-	-	0.00	0.00	-
21	4 550	4 555	0	17.17	2.00	19.17	108.6	0.00	84.17	-	-	0.00	0.00	-
22	5 234	5 239	0	15.34	2.00	17.34	108.6	0.00	85.38	-	-	0.00	0.00	-

To be continued on next page...

DECIBEL - Detailed results

Calculation: Lauluräme + Pyhäjärvi N163 Mode 0 108.6 dBA + 2 dBA unc. Noise calculation model: ISO 9613-2 Finland 8.0 m/s

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WTG No.	Distance	Sound distance	Penalty	From WTGs	Uncertainty margin	WTG+Uncertainty margin	LwA,ref	Dc	Adiv	Aatm	Agr	Abar	Amisc	A
	[m]	[m]	[dB]	[dB(A)]	[dB]	[dB]	[dB(A)]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
3	2 973	2 980	0	22.69	2.00	24.69	108.6	0.00	80.49	-	-	0.00	0.00	-
4	3 043	3 050	0	22.39	2.00	24.39	108.6	0.00	80.69	-	-	0.00	0.00	-
5	2 834	2 842	0	23.30	2.00	25.30	108.6	0.00	80.07	-	-	0.00	0.00	-
6	1 849	1 860	0	28.61	2.00	30.61	108.6	0.00	76.39	-	-	0.00	0.00	-
7	705	735	0	39.32	2.00	41.32	108.6	0.00	68.32	-	-	0.00	0.00	-
8	1 173	1 191	0	33.92	2.00	35.92	108.6	0.00	72.52	-	-	0.00	0.00	-
9	2 498	2 508	0	24.89	2.00	26.89	108.6	0.00	78.99	-	-	0.00	0.00	-
Sum						46.84								

- Data undefined due to calculation with octave data

DECIBEL - Assumptions for noise calculation

Calculation: Lauluräme + Pyhäjärvi N163 Mode 0 108.6 dBA + 2 dBA unc.

Noise calculation model:
ISO 9613-2 Finland
Wind speed (at 10 m height):
8.0 m/s
Ground attenuation:
General, terrain specific
Ground factor for porous ground: 0.4
Area object with hard ground: Project Wizard Roughness Areas (Corine land cover 2018 - 100 m grid)
Area type with hard ground: 0.0000m(cl.0.0) Lake 5.1.2
Ground factor for hard ground: 0.0
Meteorological coefficient, C0:
Selected option: Fixed value: 0.0 dB
Type of demand in calculation:
1: WTG noise is compared to demand (DK, DE, SE, NL etc.)
Noise values in calculation:
All noise values are mean values (Lwa) (Normal)
Pure tones:
Pure tones penalty is added to total noise impact at receptors
Noise sensitive area
Height above ground level, when no value in NSA object:
4.0 m; Don't allow override of model height with height from NSA object
Uncertainty margin:
Uncertainty added to source noise level of the WTGs in the calculation
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 [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]
0.10	0.38	1.12	2.36	4.08	8.78	26.60	95.00

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89

WTG: NORDEX N163/6.X M 7000 163.0 !O!
Noise: M0 Clean blade

Source	Source/Date	Creator	Edited
Nordex: F008_277_A17_EN	26/03/2025	USER	26/03/2025 9.48

Status	Wind speed [m/s]	LwA,ref [dB(A)]	Uncertainty [dB(A)]	Pure tones	Octave data 63 [dB]	125 [dB]	250 [dB]	500 [dB]	1000 [dB]	2000 [dB]	4000 [dB]	8000 [dB]
From Windcat	8.0	108.6	2.0	No	92.5	97.3	100.4	101.9	103.5	101.7	90.2	70.0

Noise sensitive area: A R1 Asuinrakennus
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: 0.0 dB
No temporal binning
Noise demand: 40.0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: B R2 Asuinrakennus
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: 0.0 dB
No temporal binning
Noise demand: 40.0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: C R4 Asuinrakennus
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: 0.0 dB
No temporal binning

DECIBEL - Assumptions for noise calculation

Calculation: Lauluräme + Pyhäjärvi N163 Mode 0 108.6 dBA + 2 dBA unc.

Noise demand: 40.0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: D R5 Asuinrakennus

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: 0.0 dB
No temporal binning
Noise demand: 40.0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: E R6 Asuinrakennus

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: 0.0 dB
No temporal binning
Noise demand: 40.0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: F R7 Asuinrakennus

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: 0.0 dB
No temporal binning
Noise demand: 40.0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: G R8 Asuinrakennus

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: 0.0 dB
No temporal binning
Noise demand: 40.0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: H R9 Asuinrakennus

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: 0.0 dB
No temporal binning
Noise demand: 40.0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: I R10 Lomarakennus

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: 0.0 dB
No temporal binning
Noise demand: 40.0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: J R3 Lomarakennus (käyttötarkoituksen muutos)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: 0.0 dB
No temporal binning
Noise demand: 40.0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Project:
Lauluräme ja Pyhäjärvi kaavaluonnos

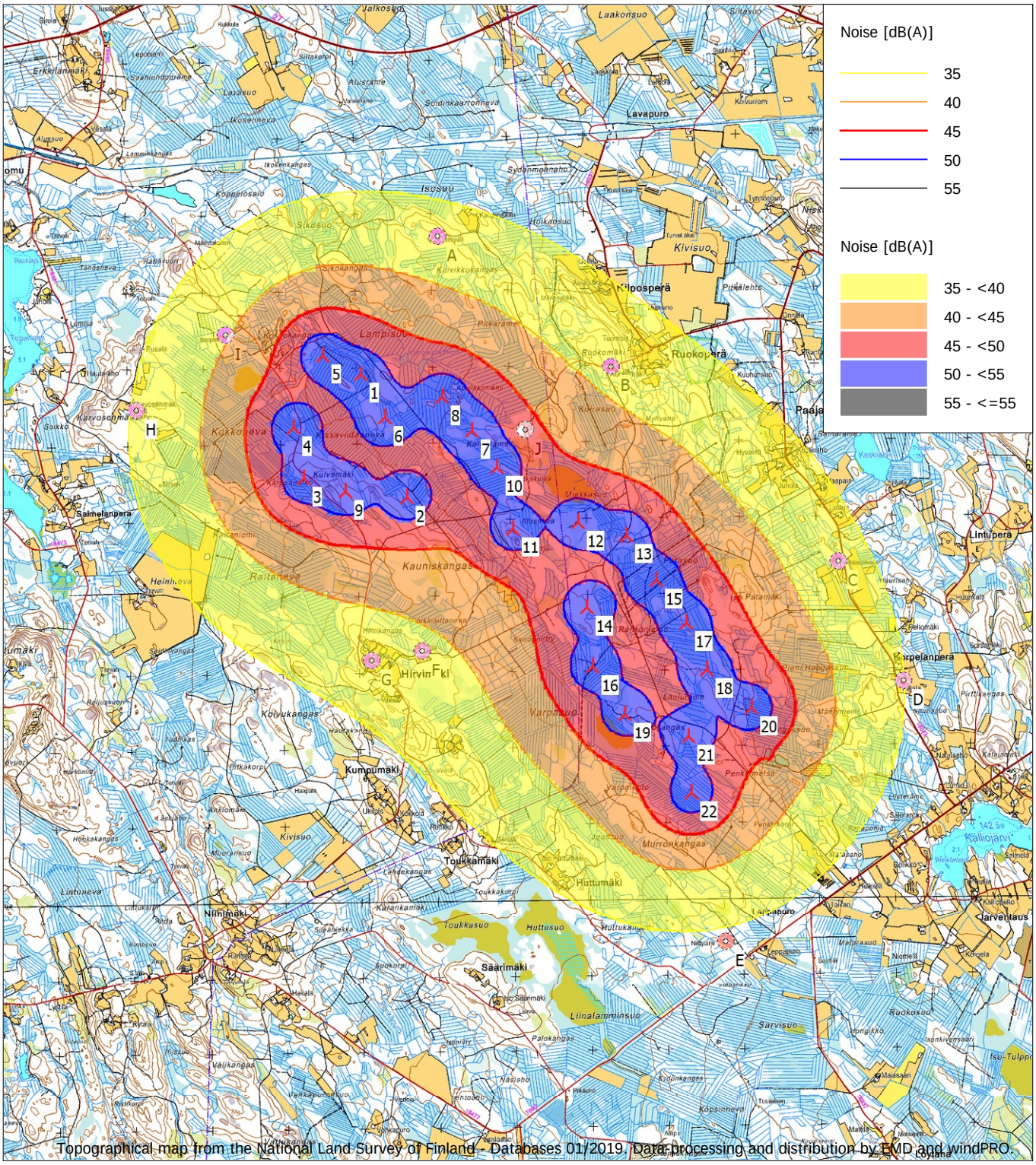
Description:
464705.6,7054521.5

Licensed user:
Winda Energy Oy
Mikonkatu 2 D, 4th floor
FI-00100 Helsinki

Calculated:
26/03/2025 13.20/4.0.552

DECIBEL - Map 8.0 m/s

Calculation: Lauluräme + Pyhäjärvi N163 Mode 0 108.6 dBA + 2 dBA unc.

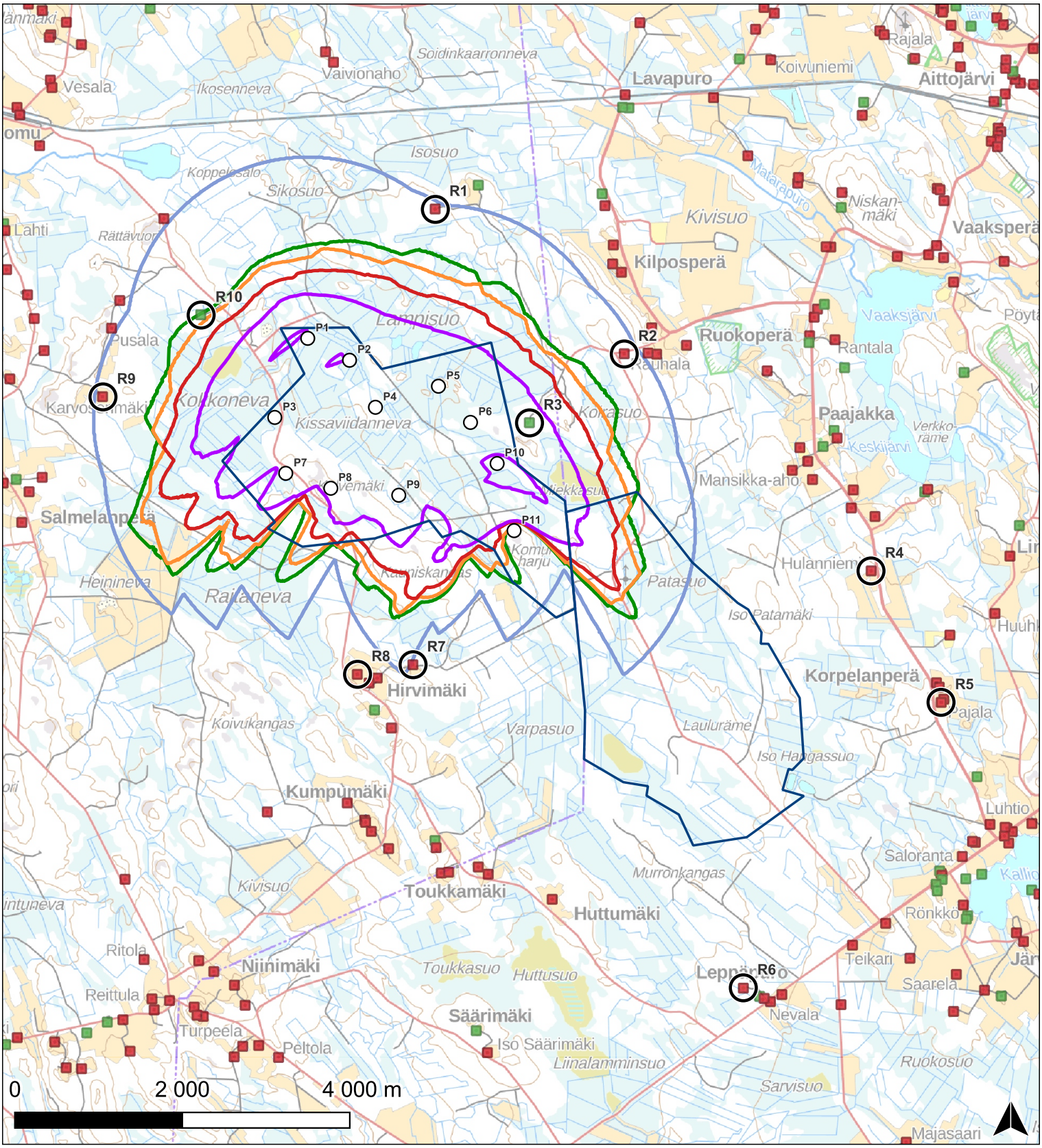


0 1 2 3 4 km

Map: Finnish Topographic Map , Print scale 1:75 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 464 152 North: 7 054 260

New WTG Noise sensitive area

Noise calculation model: ISO 9613-2 Finland. Wind speed: 8.0 m/s
Height above sea level from active line object



Reseptori	Käyttötarkoitus	h/a
1	Asuinrakennus	2:26
2	Asuinrakennus	2:48
3	Lomarakennus*	56:18
4	Asuinrakennus	0:00
5	Asuinrakennus	0:00
6	Asuinrakennus	0:00
7	Asuinrakennus	0:00
8	Asuinrakennus	0.00
9	Asuinrakennus	1:39
10	Lomarakennus	8:57

*Käyttötarkoituksen muutos hyväksytty 12.3.2025

Tuulivoimala

Rakennukset

Asuinrakennus

Lomarakennus

Välketunnit (h/a)

0

8

10

15

30

Winda Energy 3/2025 | AJu

Mallinnuksen tiedot:

Mallinnuksen tyyppi: **Real Case**

(Auringon paisteen todennäköisyys ja tuulivoimalan käyttötunnit huomioitu)

Laskentaohjelmisto: WindPro 4.0, SHADOW-moduuli

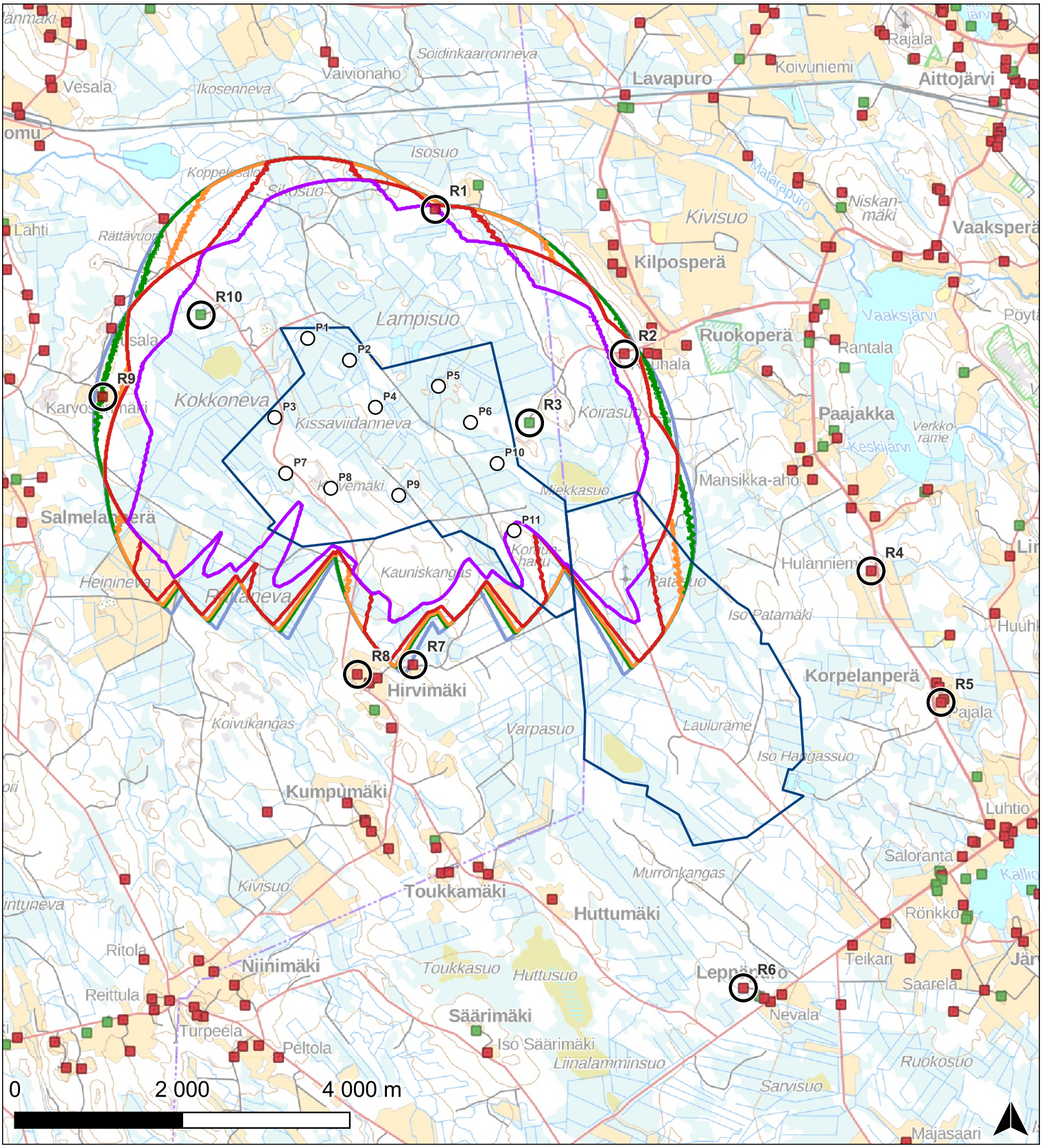
Laskentakorkeus: maanpinta + 2 m

Mallinnuksessa käytetty tuulivoimala:

Roottorin halkaisija 200 m

Napakorkeus: 220 m

Roottorin geometria perustuu Nordex N175 turbiiniin



Reseptori	Käyttötarkoitus	h/a
1	Asuinrakennus	31:04
2	Asuinrakennus	18:41
3	Lomarakennus*	268:47
4	Asuinrakennus	0:00
5	Asuinrakennus	0:00
6	Asuinrakennus	0:00
7	Asuinrakennus	0:00
8	Asuinrakennus	0.00
9	Asuinrakennus	8:17
10	Lomarakennus	57:28

*Käyttötarkoituksen muutos hyväksytty 12.3.2025

Tuulivoimala

Rakennukset

Asuinrakennus

Lomarakennus

Välketunnit (h/a)

0

8

10

15

30

Winda Energy 3/2025 | AJu

Mallinnuksen tiedot:

Mallinnuksen tyyppi: **Worst Case**

(Aurinko paistaa aina päivisin ja tuulivoimalat pyörivät jatkuvasti)

Laskentaohjelmisto: WindPro 4.0, SHADOW-moduuli

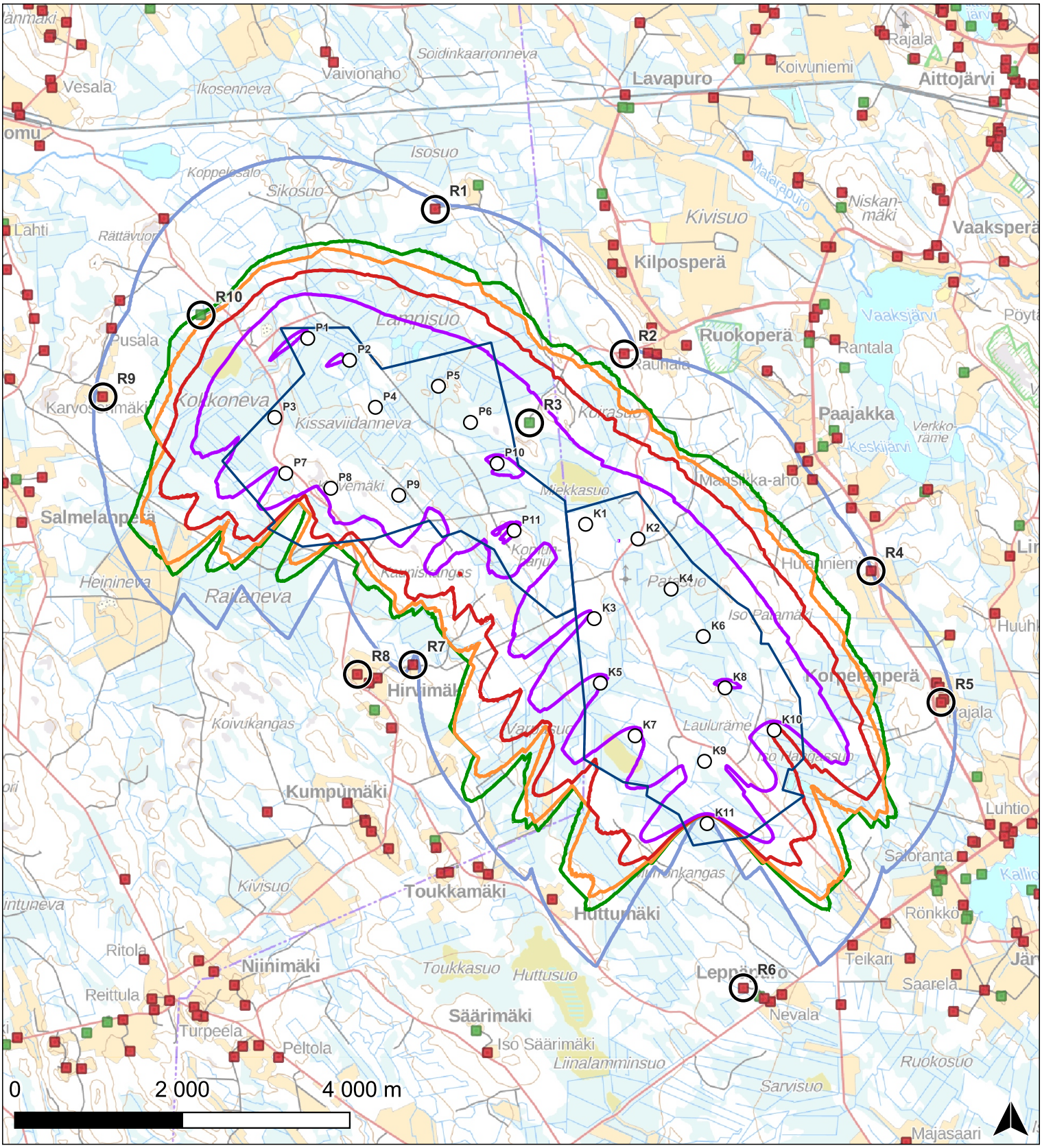
Laskentakorkeus: maanpinta + 2 m

Mallinnuksessa käytetty tuulivoimala:

Roottorin halkaisija 200 m

Napakorkeus: 220 m

Roottorin geometria perustuu Nordex N175 turbiiniin



Reseptori	Käyttötarkoitus	h/a
1	Asuinrakennus	2:26
2	Asuinrakennus	3:58
3	Lomarakennus*	60:34
4	Asuinrakennus	1:19
5	Asuinrakennus	1:41
6	Asuinrakennus	0:00
7	Asuinrakennus	0:00
8	Asuinrakennus	0:00
9	Asuinrakennus	1:39
10	Lomarakennus	8:57

*Käyttötarkoituksen muutos hyväksytty 12.3.2025

Tuulivoimala

Rakennukset

Asuinrakennus

Lomarakennus

Välketunnit (h/a)

0

8

10

15

30

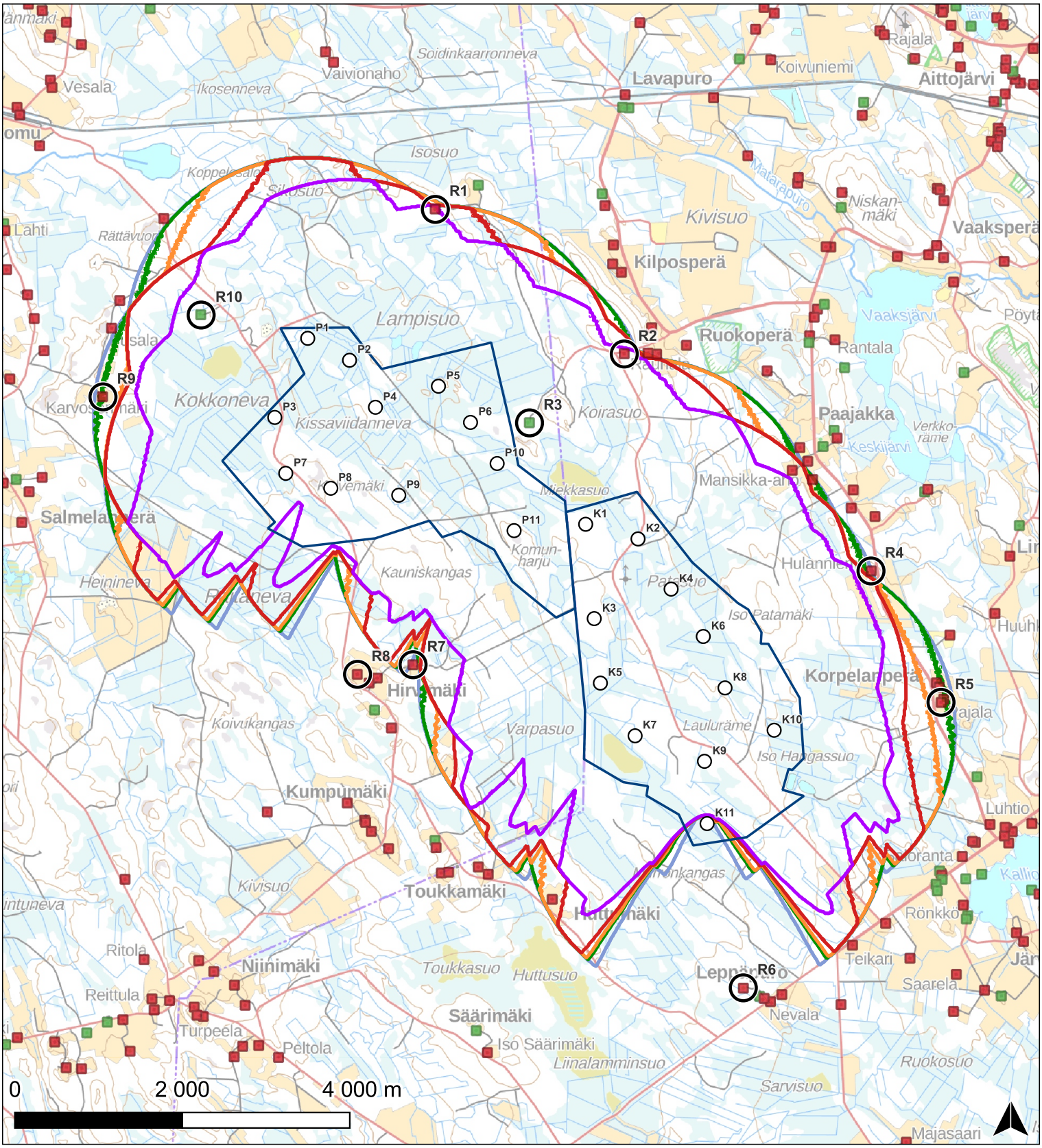
Winda Energy 3/2025 | AJu

Mallinnuksen tiedot:

Mallinnuksen tyyppi: **Real Case**
(Aurinkonpaisteen todennäköisyys ja tuulipuiston toimintatunnit huomioitu)

Laskentaohjelmisto: WindPro 4.0, SHADOW-moduuli
Laskentakorkeus: maanpinta + 2 m

Mallinnuksessa käytetty tuulivoimala:
Roottorin halkaisija 200 m
Napakorkeus: 220 m
Roottorin geometria perustuu Nordex N175 turbiiniin



Reseptori	Käyttötarkoitus	h/a
1	Asuinrakennus	31:04
2	Asuinrakennus	34:32
3	Lomarakennus*	302:40
4	Asuinrakennus	7:38
5	Asuinrakennus	8:32
6	Asuinrakennus	0:00
7	Asuinrakennus	0:00
8	Asuinrakennus	0.00
9	Asuinrakennus	8:17
10	Lomarakennus	57:28

*Käyttötarkoituksen muutos hyväksytty 12.3.2025

Tuulivoimala

Rakennukset

Asuinrakennus

Lomarakennus

Välketunnit (h/a)

0

8

10

15

30

Winda Energy 3/2025 | AJu

Mallinnuksen tiedot:

Mallinnuksen tyyppi: **Worst Case**

(Aurinko paistaa aina päivisin ja tuulivoimalat pyörivät jatkuvasti)

Laskentaohjelmisto: WindPro 4.0, SHADOW-moduuli

Laskentakorkeus: maanpinta + 2 m

Mallinnuksessa käytetty tuulivoimala:

Roottorin halkaisija 200 m

Napakorkeus: 220 m

Roottorin geometria perustuu Nordex N175 turbiiniin