

Project:
Makikangas_MASTER

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28.7.2011 11:11 / 1
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Calculated:
28.7.2011 11:09/2.7.486

DECIBEL - Main Result

Calculation: Decibel minlayout 11WTG EIAR KJ

Noise calculation model:

ISO 9613-2 General

Wind speed:

95% rated power

Ground attenuation:

None

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:

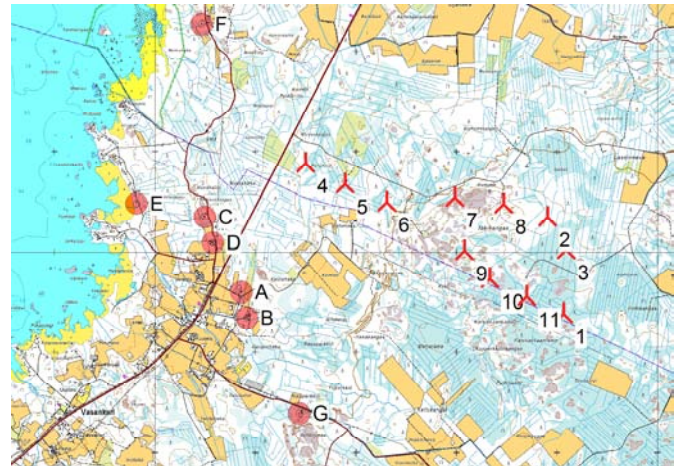
Pure tone penalty are added to demand: 0.0 dB(A)

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

1.5 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)



New WTG

Scale 1:75 000
Noise sensitive area

WTGs

KKJ Zone: 2				WTG type				Noise data				Wind speed	Status	Hub height	LwA,ref	Pure tones	Octave data
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Creator	Name	[m/s]		[m]	[dB(A)]		
1	2 504 067	7 139 390	25.0 WTG 7	Yes	ENERCON	E-101-3 000	3 000	101.0	135.4	EMD	Level 0 - calculated - Enercon Mode 1 - 06/2010 (95%)	User value	135.4	106.0	No	Generic *	
2	2 503 910	7 140 349	25.0 WTG 9	Yes	ENERCON	E-101-3 000	3 000	101.0	135.4	EMD	Level 0 - calculated - Enercon Mode 1 - 06/2010 (95%)	User value	135.4	106.0	No	Generic *	
3	2 504 094	7 140 025	25.2 WTG 8	Yes	ENERCON	E-101-3 000	3 000	101.0	135.4	EMD	Level 0 - calculated - Enercon Mode 1 - 06/2010 (95%)	User value	135.4	106.0	No	Generic *	
4	2 501 501	7 140 887	10.0 WTG 1	Yes	ENERCON	E-101-3 000	3 000	101.0	135.4	EMD	Level 0 - calculated - Enercon Mode 1 - 06/2010 (95%)	User value	135.4	106.0	No	Generic *	
5	2 501 894	7 140 680	14.0 WTG 2	Yes	ENERCON	E-101-3 000	3 000	101.0	135.4	EMD	Level 0 - calculated - Enercon Mode 1 - 06/2010 (95%)	User value	135.4	106.0	No	Generic *	
6	2 502 308	7 140 499	18.3 WTG 3	Yes	ENERCON	E-101-3 000	3 000	101.0	135.4	EMD	Level 0 - calculated - Enercon Mode 1 - 06/2010 (95%)	User value	135.4	106.0	No	Generic *	
7	2 502 987	7 140 546	22.4 WTG 11	Yes	ENERCON	E-101-3 000	3 000	101.0	135.4	EMD	Level 0 - calculated - Enercon Mode 1 - 06/2010 (95%)	User value	135.4	106.0	No	Generic *	
8	2 503 470	7 140 480	28.3 WTG 10	Yes	ENERCON	E-101-3 000	3 000	101.0	135.4	EMD	Level 0 - calculated - Enercon Mode 1 - 06/2010 (95%)	User value	135.4	106.0	No	Generic *	
9	2 503 083	7 140 015	30.0 WTG 4	Yes	ENERCON	E-101-3 000	3 000	101.0	135.4	EMD	Level 0 - calculated - Enercon Mode 1 - 06/2010 (95%)	User value	135.4	106.0	No	Generic *	
10	2 503 335	7 139 737	29.8 WTG 5	Yes	ENERCON	E-101-3 000	3 000	101.0	135.4	EMD	Level 0 - calculated - Enercon Mode 1 - 06/2010 (95%)	User value	135.4	106.0	No	Generic *	
11	2 503 700	7 139 561	25.0 WTG 6	Yes	ENERCON	E-101-3 000	3 000	101.0	135.4	EMD	Level 0 - calculated - Enercon Mode 1 - 06/2010 (95%)	User value	135.4	106.0	No	Generic *	

*Notice: One or more noise data for this WTG is generic or input by user

Calculation Results

Sound Level

Noise sensitive area		KKJ Zone: 2			Demands		Sound Level	Demands fulfilled ?	
No.	Name	East	North	Z	Imission height [m]	Noise [dB(A)]	From WTGs [dB(A)]	Noise	
	A Talus 1	2 500 864	7 139 600	9.9	1.5	50.0	37.2	Yes	
	B Talus 2	2 500 916	7 139 352	10.0	1.5	50.0	36.5	Yes	
	C Tarkisenkangas	2 500 498	7 140 353	5.0	1.5	50.0	37.6	Yes	
	D Vainio	2 500 578	7 140 092	5.9	1.5	50.0	37.4	Yes	
	E Rantavainio_holiday	2 499 818	7 140 485	0.9	1.5	40.0	33.6	Yes	
	F Kivitolppa_holiday	2 500 468	7 142 273	1.7	1.5	40.0	33.5	Yes	
	G Rianperkiö	2 501 436	7 138 398	18.3	1.5	50.0	34.7	Yes	

Distances (m)

WTG	A	B	C	D	E	F	G
1	3211	3152	3697	3560	4389	4612	2812
2	3137	3156	3412	3342	4095	3943	3151
3	3258	3248	3611	3517	4301	4266	3116
4	1436	1643	1137	1219	1731	1729	2490
5	1492	1649	1435	1442	2086	2139	2327
6	1701	1804	1816	1777	2490	2555	2275
7	2324	2390	2497	2452	3170	3055	2649
8	2750	2792	2975	2918	3652	3497	2910
9	2257	2266	2607	2506	3299	3455	2308
10	2475	2450	2904	2780	3596	3828	2324
11	2836	2792	3299	3167	3991	4219	2545

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DECIBEL - Detailed results**Calculation:** Decibel_minlayout 11WTG EIAR **KJNoise calculation model:** ISO 9613-2 General 8.0 m/s**Assumptions**

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

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

Calculation Results**Noise sensitive area: A Talus 1**

No.	Distance [m]	Sound distance [m]	95% rated power									
			Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	3 211	3 214	21.50	106.0	3.00	81.14	6.36	0.00	0.00	0.00	87.51	0.00
2	3 137	3 140	21.80	106.0	3.00	80.94	6.27	0.00	0.00	0.00	87.21	0.00
3	3 258	3 261	21.32	106.0	3.00	81.27	6.43	0.00	0.00	0.00	87.69	0.00
4	1 436	1 442	31.16	106.0	3.00	74.18	3.67	0.00	0.00	0.00	77.85	0.00
5	1 492	1 499	30.73	106.0	3.00	74.51	3.77	0.00	0.00	0.00	78.28	0.00
6	1 701	1 707	29.23	106.0	3.00	75.64	4.13	0.00	0.00	0.00	79.78	0.00
7	2 324	2 329	25.54	106.0	3.00	78.34	5.13	0.00	0.00	0.00	83.47	0.00
8	2 750	2 755	23.46	106.0	3.00	79.80	5.75	0.00	0.00	0.00	85.55	0.00
9	2 257	2 263	25.89	106.0	3.00	78.09	5.03	0.00	0.00	0.00	83.12	0.00
10	2 475	2 480	24.77	106.0	3.00	78.89	5.36	0.00	0.00	0.00	84.24	0.00
11	2 836	2 840	23.08	106.0	3.00	80.07	5.87	0.00	0.00	0.00	85.93	0.00
Sum	37.18											

Noise sensitive area: B Talus 2

No.	Distance [m]	Sound distance [m]	95% rated power									
			Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	3 152	3 155	21.74	106.0	3.00	80.98	6.29	0.00	0.00	0.00	87.27	0.00
2	3 156	3 159	21.73	106.0	3.00	80.99	6.29	0.00	0.00	0.00	87.29	0.00
3	3 248	3 252	21.36	106.0	3.00	81.24	6.41	0.00	0.00	0.00	87.66	0.00
4	1 643	1 648	29.64	106.0	3.00	75.34	4.03	0.00	0.00	0.00	79.37	0.00
5	1 649	1 655	29.59	106.0	3.00	75.37	4.04	0.00	0.00	0.00	79.42	0.00
6	1 804	1 809	28.55	106.0	3.00	76.15	4.31	0.00	0.00	0.00	80.46	0.00
7	2 390	2 395	25.20	106.0	3.00	78.59	5.23	0.00	0.00	0.00	83.81	0.00
8	2 792	2 796	23.28	106.0	3.00	79.93	5.80	0.00	0.00	0.00	85.74	0.00
9	2 266	2 271	25.84	106.0	3.00	78.13	5.04	0.00	0.00	0.00	83.17	0.00
10	2 450	2 455	24.89	106.0	3.00	78.80	5.32	0.00	0.00	0.00	84.12	0.00
11	2 792	2 796	23.27	106.0	3.00	79.93	5.80	0.00	0.00	0.00	85.74	0.00
Sum	36.46											

Noise sensitive area: C Tarkisenkangas

No.	Distance [m]	Sound distance [m]	95% rated power									
			Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	3 697	3 701	19.67	106.0	3.00	82.37	6.97	0.00	0.00	0.00	89.34	0.00
2	3 412	3 416	20.72	106.0	3.00	81.67	6.62	0.00	0.00	0.00	88.29	0.00
3	3 611	3 614	19.98	106.0	3.00	82.16	6.87	0.00	0.00	0.00	89.03	0.00
4	1 137	1 146	33.72	106.0	3.00	72.18	3.11	0.00	0.00	0.00	75.29	0.00
5	1 435	1 442	31.17	106.0	3.00	74.18	3.67	0.00	0.00	0.00	77.84	0.00

To be continued on next page...

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DECIBEL - Detailed results**Calculation:** Decibel_minlayout 11WTG EIAR KJNoise calculation model: ISO 9613-2 General 8.0 m/s

...continued from previous page

		95% rated power											
WTG	No.	Distance	Sound distance	Calculated	LwA,ref	Dc	Adiv	Aatm	Agr	Abar	Amisc	A	Cmet
		[m]	[m]	[dB(A)]	[dB(A)]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
	6	1 816	1 822	28.47	106.0	3.00	76.21	4.33	0.00	0.00	0.00	80.54	0.00
	7	2 497	2 501	24.66	106.0	3.00	78.96	5.39	0.00	0.00	0.00	84.35	0.00
	8	2 975	2 979	22.47	106.0	3.00	80.48	6.05	0.00	0.00	0.00	86.54	0.00
	9	2 607	2 612	24.13	106.0	3.00	79.34	5.55	0.00	0.00	0.00	84.89	0.00
	10	2 904	2 908	22.78	106.0	3.00	80.27	5.96	0.00	0.00	0.00	86.23	0.00
	11	3 299	3 302	21.16	106.0	3.00	81.38	6.48	0.00	0.00	0.00	87.85	0.00
	Sum	37.58											

Noise sensitive area: D Vainio

		95% rated power											
WTG	No.	Distance	Sound distance	Calculated	LwA,ref	Dc	Adiv	Aatm	Agr	Abar	Amisc	A	Cmet
		[m]	[m]	[dB(A)]	[dB(A)]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
	1	3 560	3 563	20.17	106.0	3.00	82.04	6.80	0.00	0.00	0.00	88.84	0.00
	2	3 342	3 346	20.99	106.0	3.00	81.49	6.53	0.00	0.00	0.00	88.02	0.00
	3	3 517	3 520	20.33	106.0	3.00	81.93	6.75	0.00	0.00	0.00	88.68	0.00
	4	1 219	1 226	32.98	106.0	3.00	72.77	3.26	0.00	0.00	0.00	76.04	0.00
	5	1 442	1 449	31.11	106.0	3.00	74.22	3.68	0.00	0.00	0.00	77.90	0.00
	6	1 777	1 783	28.72	106.0	3.00	76.02	4.26	0.00	0.00	0.00	80.29	0.00
	7	2 452	2 456	24.89	106.0	3.00	78.81	5.32	0.00	0.00	0.00	84.13	0.00
	8	2 918	2 922	22.72	106.0	3.00	80.31	5.98	0.00	0.00	0.00	86.29	0.00
	9	2 506	2 511	24.61	106.0	3.00	79.00	5.40	0.00	0.00	0.00	84.40	0.00
	10	2 780	2 785	23.33	106.0	3.00	79.90	5.79	0.00	0.00	0.00	85.69	0.00
	11	3 167	3 171	21.68	106.0	3.00	81.02	6.31	0.00	0.00	0.00	87.33	0.00
	Sum	37.41											

Noise sensitive area: E Rantavainio_holiday

		95% rated power											
WTG	No.	Distance	Sound distance	Calculated	LwA,ref	Dc	Adiv	Aatm	Agr	Abar	Amisc	A	Cmet
		[m]	[m]	[dB(A)]	[dB(A)]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
	1	4 389	4 391	17.40	106.0	3.00	83.85	7.76	0.00	0.00	0.00	91.61	0.00
	2	4 095	4 098	18.32	106.0	3.00	83.25	7.44	0.00	0.00	0.00	90.69	0.00
	3	4 301	4 304	17.67	106.0	3.00	83.68	7.67	0.00	0.00	0.00	91.34	0.00
	4	1 731	1 737	29.03	106.0	3.00	75.80	4.19	0.00	0.00	0.00	79.98	0.00
	5	2 086	2 091	26.84	106.0	3.00	77.41	4.76	0.00	0.00	0.00	82.17	0.00
	6	2 490	2 495	24.69	106.0	3.00	78.94	5.38	0.00	0.00	0.00	84.32	0.00
	7	3 170	3 174	21.67	106.0	3.00	81.03	6.31	0.00	0.00	0.00	87.34	0.00
	8	3 652	3 656	19.83	106.0	3.00	82.26	6.92	0.00	0.00	0.00	89.18	0.00
	9	3 299	3 303	21.15	106.0	3.00	81.38	6.48	0.00	0.00	0.00	87.86	0.00
	10	3 596	3 600	20.04	106.0	3.00	82.13	6.85	0.00	0.00	0.00	88.98	0.00
	11	3 991	3 994	18.67	106.0	3.00	83.03	7.32	0.00	0.00	0.00	90.34	0.00
	Sum	33.63											

Noise sensitive area: F Kivitolppa_holiday

		95% rated power											
WTG	No.	Distance	Sound distance	Calculated	LwA,ref	Dc	Adiv	Aatm	Agr	Abar	Amisc	A	Cmet
		[m]	[m]	[dB(A)]	[dB(A)]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
	1	4 612	4 615	16.73	106.0	3.00	84.28	8.00	0.00	0.00	0.00	92.28	0.00
	2	3 943	3 946	18.83	106.0	3.00	82.92	7.26	0.00	0.00	0.00	90.19	0.00
	3	4 266	4 269	17.78	106.0	3.00	83.61	7.63	0.00	0.00	0.00	91.23	0.00
	4	1 729	1 734	29.05	106.0	3.00	75.78	4.18	0.00	0.00	0.00	79.96	0.00
	5	2 139	2 144	26.54	106.0	3.00	77.62	4.85	0.00	0.00	0.00	82.47	0.00
	6	2 555	2 560	24.38	106.0	3.00	79.16	5.47	0.00	0.00	0.00	84.64	0.00
	7	3 055	3 058	22.14	106.0	3.00	80.71	6.16	0.00	0.00	0.00	86.87	0.00
	8	3 497	3 501	20.40	106.0	3.00	81.88	6.73	0.00	0.00	0.00	88.61	0.00
	9	3 455	3 459	20.56	106.0	3.00	81.78	6.68	0.00	0.00	0.00	88.45	0.00
	10	3 828	3 831	19.22	106.0	3.00	82.67	7.13	0.00	0.00	0.00	89.79	0.00
	11	4 219	4 222	17.93	106.0	3.00	83.51	7.57	0.00	0.00	0.00	91.08	0.00
	Sum	33.51											

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DECIBEL - Detailed results**Calculation:** Decibel_minlayout_11WTG_EIAR_KJNoise calculation model: ISO 9613-2 General 8.0 m/s**Noise sensitive area: G Rianperkkö****WTG****95% rated power**

No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	2 812	2 816	23.19	106.0	3.00	79.99	5.83	0.00	0.00	0.00	85.82	0.00
2	3 151	3 154	21.75	106.0	3.00	80.98	6.29	0.00	0.00	0.00	87.26	0.00
3	3 116	3 119	21.89	106.0	3.00	80.88	6.24	0.00	0.00	0.00	87.12	0.00
4	2 490	2 493	24.70	106.0	3.00	78.93	5.37	0.00	0.00	0.00	84.31	0.00
5	2 327	2 330	25.53	106.0	3.00	78.35	5.13	0.00	0.00	0.00	83.48	0.00
6	2 275	2 279	25.80	106.0	3.00	78.15	5.05	0.00	0.00	0.00	83.21	0.00
7	2 649	2 653	23.93	106.0	3.00	79.47	5.60	0.00	0.00	0.00	85.08	0.00
8	2 910	2 914	22.76	106.0	3.00	80.29	5.97	0.00	0.00	0.00	86.26	0.00
9	2 308	2 312	25.63	106.0	3.00	78.28	5.11	0.00	0.00	0.00	83.39	0.00
10	2 324	2 329	25.54	106.0	3.00	78.34	5.13	0.00	0.00	0.00	83.47	0.00
11	2 545	2 549	24.43	106.0	3.00	79.13	5.46	0.00	0.00	0.00	84.58	0.00

Sum 34.74

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DECIBEL - Assumptions for noise calculation**Calculation:** Decibel_minlayout_11WTG_EIAR_KJNoise calculation model: ISO 9613-2 General 8.0 m/s**Noise calculation model:**

ISO 9613-2 General

Wind speed:

95% rated power

Ground attenuation:

None

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 tone penalty are added to demand: 0.0 dB(A)

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

1.5 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	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	1.0	1.9	3.7	9.7	32.8	117.0

WTG: ENERCON E-101 3000 101.0 !-!**Noise:** Level 0 - calculated - Enercon Mode I - 06/2010

Source Source/Date Creator Edited

Enercon 30.6.2010 EMD 21.1.2011 15:42

preliminary values from specification document SIAS-04-SPL E-101 OM I 3MW Est Rev1_0-ger-ger.pdf

Status	Hub height [m]	Wind speed [m/s]	LwA,ref [dB(A)]	Pure tones	Octave data									
						Generic data	63	125	250	500	1000	2000	4000	8000
						[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
User value	135.4	95% rated power	106.0	No	Generic data	87.6	94.6	98.0	100.6	100.4	97.5	92.7	83.2	

NSA: Talus 1-A**Predefined calculation standard:****Imission height(a.g.l.):** Use standard value from calculation model**Noise demand:** 50.0 dB(A)**Distance demand:** 0.0 m**NSA:** Talus 2-B**Predefined calculation standard:****Imission height(a.g.l.):** Use standard value from calculation model**Noise demand:** 50.0 dB(A)**Distance demand:** 0.0 m**NSA:** Tarkisenkangas-C**Predefined calculation standard:****Imission height(a.g.l.):** Use standard value from calculation model**Noise demand:** 50.0 dB(A)**Distance demand:** 0.0 m**NSA:** Vainio-D**Predefined calculation standard:****Imission height(a.g.l.):** Use standard value from calculation model**Noise demand:** 50.0 dB(A)**Distance demand:** 0.0 m

Project:

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Calculated:

28.7.2011 11:09/2.7.486

DECIBEL - Assumptions for noise calculation

Calculation: Decibel_minlayout_11WTG_EIAR_KJ **Noise calculation model:** ISO 9613-2 General 8.0 m/s

NSA: Rantavainio_holiday-E

Predefined calculation standard:

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

Noise demand: 40.0 dB(A)

Distance demand: 0.0 m

NSA: Kivitolppa_holiday-F

Predefined calculation standard:

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

Noise demand: 40.0 dB(A)

Distance demand: 0.0 m

NSA: Rianperkkiö-G

Predefined calculation standard:

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

Noise demand: 50.0 dB(A)

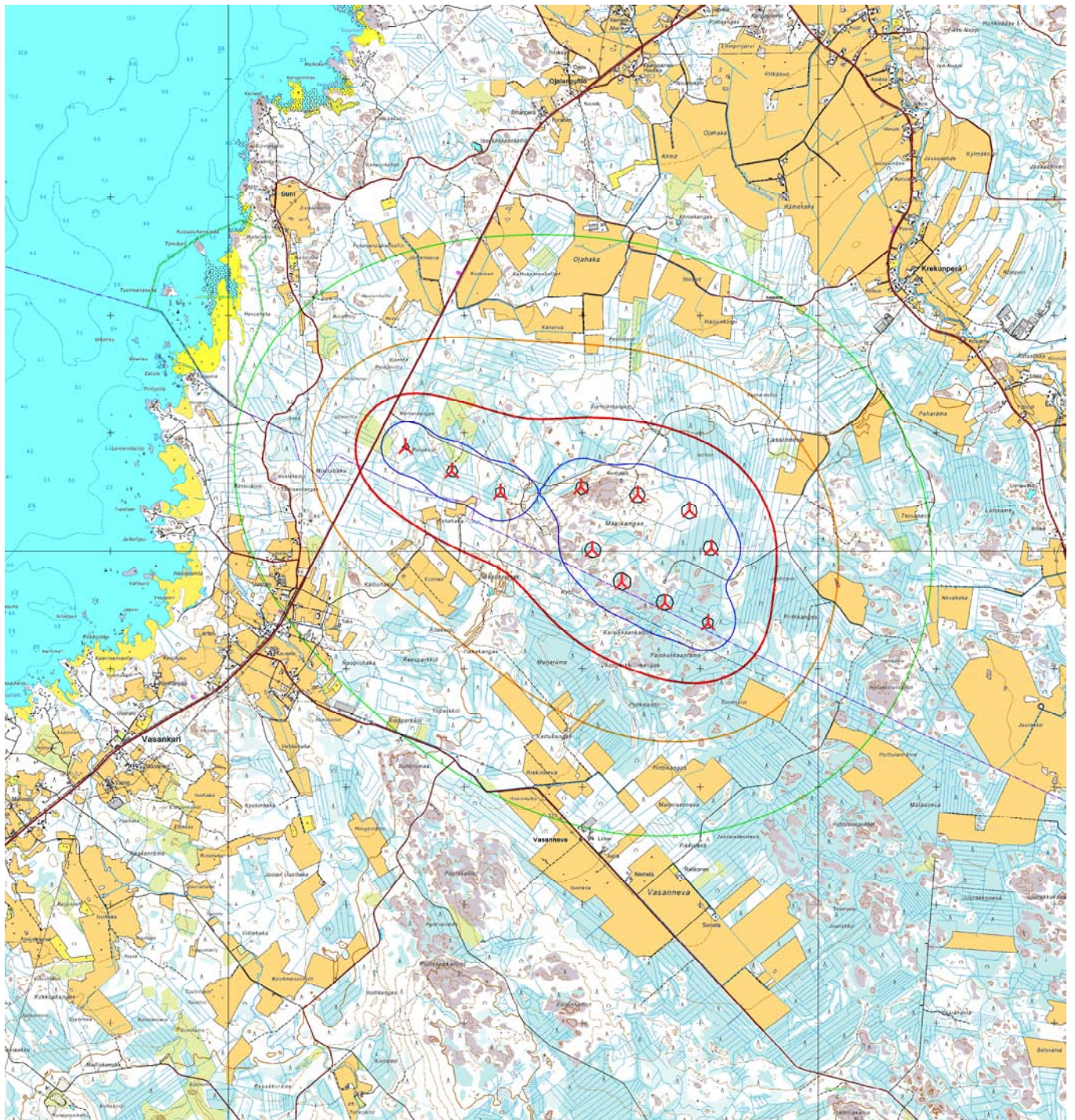
Distance demand: 0.0 m

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DECIBEL - Map 95% rated power

Calculation: Decibel minlayout 11WTG EIAR KJNoise calculation model: ISO 9613-2 General 8.0 m/s



0 500 1000 1500 2000 m

Map: , Print scale 1:50 000, Map center KJ Finland Zone: 2 East: 2 502 978 North: 7 140 103
Noise calculation model: ISO 9613-2 General. Wind speed: 95% rated power

New WTG

35.0 dB(A)

40.0 dB(A)

Height above sea level from active line object

45.0 dB(A)

50.0 dB(A)

55.0 dB(A)