Melu- ja varjostusmallinnuksen tulokset (WindPro)

Melu 1: YVA-vaihtoehto VE 1, 11 x 3 MW, voimala Enercon 101 (kokonaiskorkeus 185 m).

Melu 2: Modifioitu YVA-vaihtoehto VE 1, 11 x 3 MW, voimala Vestas 112 (kokonaiskorkeus 196 m).

Melu 3: Vaihtoehdon VE 1 alavaihtoehto, jossa kolme lähimpänä valtatietä 8 olevan voimalan sijainti on kauempana valtatiestä, 11 x 3 MW, voimala Enercon 101 (kokonaiskorkeus 185 m).

Melu 4: Vaihtoehdon VE 1 alavaihtoehto, jossa kolme lähimpänä valtatietä 8 olevan voimalan sijainti on kauempana valtatiestä ja jossa voimalana on mittasuhteiltaan korkeampi voimala, 11 x 3 MW, voimala Vestas 112 (kokonaiskorkeus 196 m).

Melu 5: YVA-vaihtoehto VE 2, 14 x 2,3 MW, voimala Enercon 82 (kokonaiskorkeus 179 m).

Melu 6: Vaihtoehdon VE 2 alavaihtoehto, jossa kolme lähimpänä valtatietä 8 olevan voimalan sijainti on kauempana valtatiestä, 14 x 2,3 MW, voimala Enercon 82 (kokonaiskorkeus 179 m).

Varjostus 1: *Todellinen tilanne*, YVA-vaihtoehto VE 1, 11 x 3 MW, voimala Enercon 101 (kokonaiskorkeus 185 m).

Varjostus 2: *Teoreettinen maksimitilanne,* YVA-vaihtoehto VE 1, 11 x 3 MW, voimala Enercon 101 (kokonaiskorkeus 185 m).

Varjostus 3: *Todellinen tilanne,* modifioitu YVA-vaihtoehto VE 1, 11 x 3 MW, voimala Vestas 112 (kokonaiskorkeus 196 m).

Varjostus 4: *Teoreettinen maksimitilanne,* modifioitu YVA-vaihtoehto VE 1, 11 x 3 MW, voimala Vestas 112 (kokonaiskorkeus 196 m).

Varjostus 5: *Todellinen tilanne,* vaihtoehdon VE 1 alavaihtoehto, jossa kolme lähimpänä valtatietä 8 olevan voimalan sijainti on kauempana valtatiestä, 11 x 3 MW, voimala Enercon 101 (kokonaiskorkeus 185 m).

Varjostus 6: *Teoreettinen maksimitilanne,* vaihtoehdon VE 1 alavaihtoehto, jossa kolme lähimpänä valtatietä 8 olevan voimalan sijainti on kauempana valtatiestä, 11 x 3 MW, voimala Enercon 101 (kokonaiskorkeus 185 m).

Varjostus 7: *Todellinen tilanne,* vaihtoehdon VE 1 alavaihtoehto, jossa kolme lähimpänä valtatietä 8 olevan voimalan sijainti on kauempana valtatiestä ja jossa voimalana on mittasuhteiltaan korkeampi voimala, 11 x 3 MW, voimala Vestas 112 (kokonaiskorkeus 196 m).

Varjostus 8: *Teoreettinen maksimitilanne,* vaihtoehdon VE 1 alavaihtoehto, jossa kolme lähimpänä valtatietä 8 olevan voimalan sijainti on kauempana valtatiestä ja jossa voimalana on mittasuhteiltaan korkeampi voimala, 11 x 3 MW, voimala Vestas 112 (kokonaiskorkeus 196 m).

Varjostus 9: *Todellinen tilanne,* YVA-vaihtoehto VE 2, 14 x 2,3 MW, voimala Enercon 82 (kokonaiskorkeus 179 m).

Varjostus 10: *Teoreettinen maksimitilanne,* YVA-vaihtoehto VE 2, 14 x 2,3 MW, voimala Enercon 82 (kokonaiskorkeus 179 m).

Varjostus 11: *Todellinen tilanne,* vaihtoehdon VE 2 alavaihtoehto, jossa kolme lähimpänä valtatietä 8 olevan voimalan sijainti on kauempana valtatiestä, 14 x 2,3 MW, voimala Enercon 82 (kokonaiskorkeus 179 m).

Varjostus 12: *Teoreettinen maksimitilanne,* vaihtoehdon VE 2 alavaihtoehto, jossa kolme lähimpänä valtatietä 8 olevan voimalan sijainti on kauempana valtatiestä, 14 x 2,3 MW, voimala Enercon 82 (kokonaiskorkeus 179 m).

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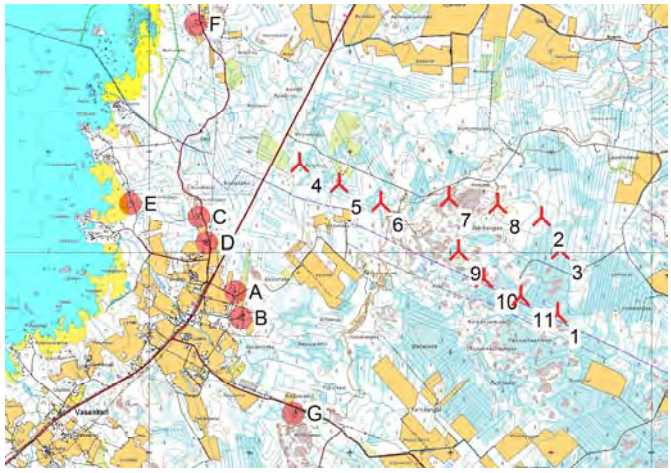
DECIBEL - Main Result

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)



Scale 1:75 000

New WTG Noise sensitive area

WTGs

	KKJ Zone: 2 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	Hub height	LwA,ref	Pure tones	Octave data	
	KKJ Zone: 2		[m]					[kW]	[m]	[m]			[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 I - 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 I - 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 I - 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 I - 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 I - 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 I - 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 I - 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 I - 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 I - 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 I - 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 I - 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 No.	Name	KKJ Zone: 2 East	North	Z [m]	Imission height [m]	Demands Noise [dB(A)]	Sound Level From WTGs [dB(A)]	Demands fulfilled ? 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	Rianperkkiö	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

WindPRO version 2.7.486 Jan 2011

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DECIBEL - Detailed results

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

Assumptions

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

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

Calculation Results

Noise sensitive area: A Talus 1

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	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

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	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

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

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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]
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

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	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

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	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

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	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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Calculated:
28.7.2011 11:09/2.7.486

DECIBEL - Detailed results

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

Noise sensitive area: G Rianperkkiö

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

WindPRO version 2.7.486 Jan 2011

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DECIBEL - Assumptions for noise calculation

Calculation: Decibel_minlayout_11WTG_EIAR_KJ **Noise 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 [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	1.0	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

						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]
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

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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

WindPRO version 2.7.486 Jan 2011

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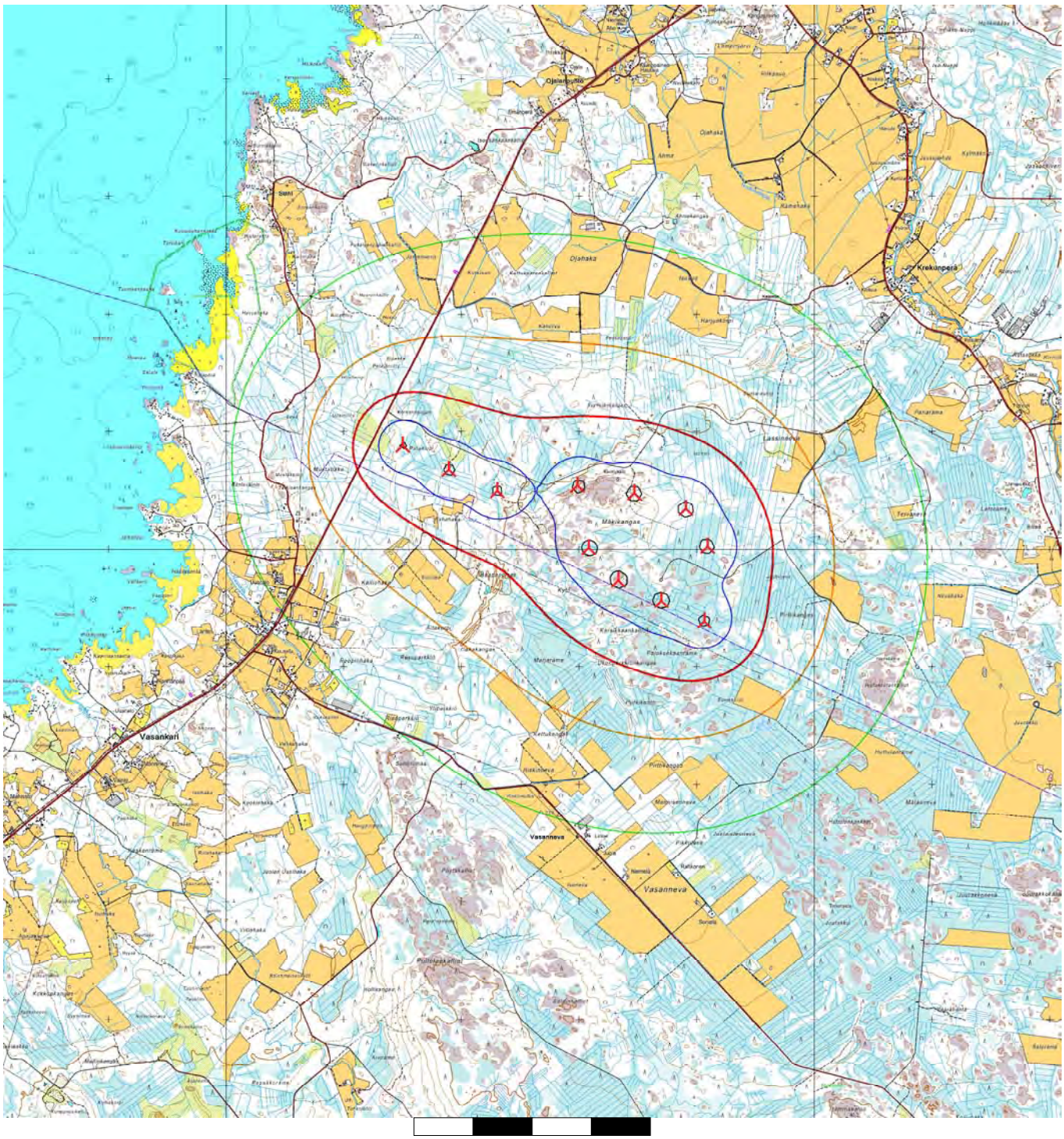
Calculated:
28.7.2011 11:09/2.7.486

DECIBEL - Map 95% rated power

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



0 500 1000 1500 2000 m

Map: , Print scale 1:50 000, Map center KKJ 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

Height above sea level from active line object

35.0 dB(A) 40.0 dB(A) 45.0 dB(A) 50.0 dB(A) 55.0 dB(A)

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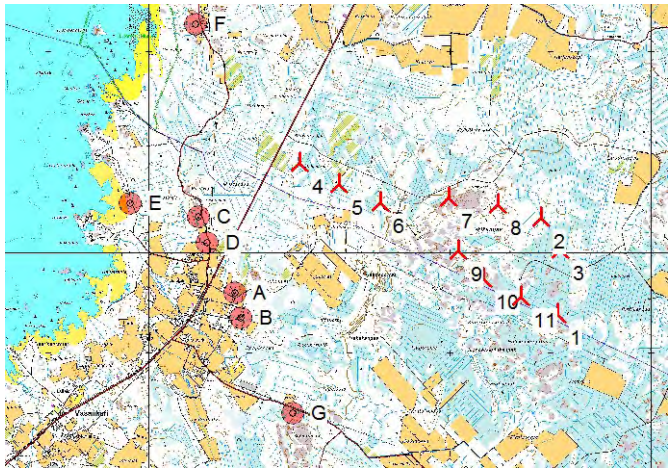
DECIBEL - Main Result

Calculation: V112

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)



Scale 1:75,000

New WTG Noise sensitive area

WTGs

	KKJ Zone: 2 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	Hub height	LwA,ref	Pure tones	Octave data	
	KKJ Zone: 2		[m]					[kW]	[m]	[m]			[m/s]		[m]	[dB(A)]			
1	2,504,067	7,139,390	25.0	WTG 7	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	USER	Level 0 - Mode 0 - - 08-2010	(95%)	User value	140.0	106.5	No	Generic	*)
2	2,503,910	7,140,349	25.0	WTG 9	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	USER	Level 0 - Mode 0 - - 08-2010	(95%)	User value	140.0	106.5	No	Generic	*)
3	2,504,094	7,140,025	25.2	WTG 8	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	USER	Level 0 - Mode 0 - - 08-2010	(95%)	User value	140.0	106.5	No	Generic	*)
4	2,501,501	7,140,887	10.0	WTG 1	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	USER	Level 0 - Mode 0 - - 08-2010	(95%)	User value	140.0	106.5	No	Generic	*)
5	2,501,894	7,140,680	14.0	WTG 2	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	USER	Level 0 - Mode 0 - - 08-2010	(95%)	User value	140.0	106.5	No	Generic	*)
6	2,502,308	7,140,499	18.3	WTG 3	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	USER	Level 0 - Mode 0 - - 08-2010	(95%)	User value	140.0	106.5	No	Generic	*)
7	2,502,987	7,140,546	22.4	WTG 11	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	USER	Level 0 - Mode 0 - - 08-2010	(95%)	User value	140.0	106.5	No	Generic	*)
8	2,503,470	7,140,480	28.3	WTG 10	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	USER	Level 0 - Mode 0 - - 08-2010	(95%)	User value	140.0	106.5	No	Generic	*)
9	2,503,083	7,140,015	30.0	WTG 4	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	USER	Level 0 - Mode 0 - - 08-2010	(95%)	User value	140.0	106.5	No	Generic	*)
10	2,503,335	7,139,737	29.8	WTG 5	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	USER	Level 0 - Mode 0 - - 08-2010	(95%)	User value	140.0	106.5	No	Generic	*)
11	2,503,700	7,139,561	25.0	WTG 6	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	USER	Level 0 - Mode 0 - - 08-2010	(95%)	User value	140.0	106.5	No	Generic	*)

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

Calculation Results

Sound Level

Noise sensitive area No.	Name	KKJ Zone: 2 East	North	Z [m]	Imission height [m]	Demands Noise [dB(A)]	Sound Level From WTGs [dB(A)]	Demands fulfilled ? Noise
A	Talus 1	2,500,864	7,139,600	9.9	1.5	50.0	37.7	Yes
B	Talus 2	2,500,916	7,139,352	10.0	1.5	50.0	37.0	Yes
C	Tarkisenkangas	2,500,498	7,140,353	5.0	1.5	50.0	38.1	Yes
D	Vainio	2,500,578	7,140,092	5.9	1.5	50.0	37.9	Yes
E	Rantavainio_holiday	2,499,818	7,140,485	0.9	1.5	40.0	34.1	Yes
F	Kivitolppa_holiday	2,500,468	7,142,273	1.7	1.5	40.0	34.0	Yes
G	Rianperkkiö	2,501,436	7,138,398	18.3	1.5	50.0	35.2	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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Calculated:
27.02.2012 13:15/2.7.490

DECIBEL - Detailed results

Calculation: V112**Noise calculation model:** ISO 9613-2 General 8.0 m/s

Assumptions

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

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

Calculation Results

Noise sensitive area: A Talus 1

WTG 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	**22.01**	106.5	3.00	81.14	6.36	0.00	0.00	0.00	87.50	0.00
2	3,137	3,140	**22.30**	106.5	3.00	80.94	6.27	0.00	0.00	0.00	87.21	0.00
3	3,258	3,261	**21.82**	106.5	3.00	81.27	6.43	0.00	0.00	0.00	87.69	0.00
4	1,436	1,443	**31.66**	106.5	3.00	74.18	3.67	0.00	0.00	0.00	77.85	0.00
5	1,492	1,499	**31.22**	106.5	3.00	74.52	3.77	0.00	0.00	0.00	78.29	0.00
6	1,701	1,707	**29.73**	106.5	3.00	75.65	4.13	0.00	0.00	0.00	79.78	0.00
7	2,324	2,329	**26.04**	106.5	3.00	78.34	5.13	0.00	0.00	0.00	83.47	0.00
8	2,750	2,755	**23.96**	106.5	3.00	79.80	5.75	0.00	0.00	0.00	85.55	0.00
9	2,257	2,263	**26.39**	106.5	3.00	78.09	5.03	0.00	0.00	0.00	83.12	0.00
10	2,475	2,480	**25.27**	106.5	3.00	78.89	5.35	0.00	0.00	0.00	84.24	0.00
11	2,836	2,840	**23.58**	106.5	3.00	80.07	5.87	0.00	0.00	0.00	85.93	0.00

Sum 37.68

Noise sensitive area: B Talus 2

WTG 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	**22.24**	106.5	3.00	80.98	6.29	0.00	0.00	0.00	87.27	0.00
2	3,156	3,159	**22.23**	106.5	3.00	80.99	6.29	0.00	0.00	0.00	87.28	0.00
3	3,248	3,251	**21.86**	106.5	3.00	81.24	6.41	0.00	0.00	0.00	87.65	0.00
4	1,643	1,648	**30.14**	106.5	3.00	75.34	4.03	0.00	0.00	0.00	79.37	0.00
5	1,649	1,655	**30.09**	106.5	3.00	75.38	4.05	0.00	0.00	0.00	79.42	0.00
6	1,804	1,809	**29.05**	106.5	3.00	76.15	4.31	0.00	0.00	0.00	80.46	0.00
7	2,390	2,395	**25.70**	106.5	3.00	78.59	5.23	0.00	0.00	0.00	83.81	0.00
8	2,792	2,796	**23.78**	106.5	3.00	79.93	5.80	0.00	0.00	0.00	85.73	0.00
9	2,266	2,271	**26.34**	106.5	3.00	78.12	5.04	0.00	0.00	0.00	83.17	0.00
10	2,450	2,455	**25.39**	106.5	3.00	78.80	5.32	0.00	0.00	0.00	84.12	0.00
11	2,792	2,796	**23.78**	106.5	3.00	79.93	5.80	0.00	0.00	0.00	85.73	0.00

Sum 36.96

Noise sensitive area: C Tarkisenkangas

WTG 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	3,700	**20.18**	106.5	3.00	82.36	6.97	0.00	0.00	0.00	89.34	0.00
2	3,412	3,415	**21.22**	106.5	3.00	81.67	6.62	0.00	0.00	0.00	88.29	0.00
3	3,611	3,614	**20.48**	106.5	3.00	82.16	6.87	0.00	0.00	0.00	89.03	0.00
4	1,137	1,146	**34.22**	106.5	3.00	72.18	3.11	0.00	0.00	0.00	75.29	0.00
5	1,435	1,442	**31.66**	106.5	3.00	74.18	3.67	0.00	0.00	0.00	77.85	0.00

To be continued on next page...

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27.02.2012 13:15/2.7.490

DECIBEL - Detailed results

Calculation: V112**Noise calculation model:** ISO 9613-2 General 8.0 m/s

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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]
6	1,816	1,822	**28.97**	106.5	3.00	76.21	4.33	0.00	0.00	0.00	80.54	0.00
7	2,497	2,501	**25.16**	106.5	3.00	78.96	5.39	0.00	0.00	0.00	84.35	0.00
8	2,975	2,979	**22.98**	106.5	3.00	80.48	6.05	0.00	0.00	0.00	86.54	0.00
9	2,607	2,612	**24.63**	106.5	3.00	79.34	5.55	0.00	0.00	0.00	84.88	0.00
10	2,904	2,908	**23.28**	106.5	3.00	80.27	5.96	0.00	0.00	0.00	86.23	0.00
11	3,299	3,302	**21.66**	106.5	3.00	81.38	6.48	0.00	0.00	0.00	87.85	0.00

Sum 38.08

Noise sensitive area: D Vainio

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	3,560	3,563	**20.67**	106.5	3.00	82.04	6.80	0.00	0.00	0.00	88.84	0.00
2	3,342	3,345	**21.49**	106.5	3.00	81.49	6.53	0.00	0.00	0.00	88.02	0.00
3	3,517	3,520	**20.83**	106.5	3.00	81.93	6.75	0.00	0.00	0.00	88.68	0.00
4	1,219	1,227	**33.47**	106.5	3.00	72.77	3.26	0.00	0.00	0.00	76.04	0.00
5	1,442	1,449	**31.61**	106.5	3.00	74.22	3.68	0.00	0.00	0.00	77.90	0.00
6	1,777	1,783	**29.22**	106.5	3.00	76.03	4.26	0.00	0.00	0.00	80.29	0.00
7	2,452	2,456	**25.39**	106.5	3.00	78.80	5.32	0.00	0.00	0.00	84.12	0.00
8	2,918	2,922	**23.22**	106.5	3.00	80.31	5.98	0.00	0.00	0.00	86.29	0.00
9	2,506	2,511	**25.11**	106.5	3.00	79.00	5.40	0.00	0.00	0.00	84.40	0.00
10	2,780	2,785	**23.83**	106.5	3.00	79.90	5.79	0.00	0.00	0.00	85.69	0.00
11	3,167	3,171	**22.18**	106.5	3.00	81.02	6.31	0.00	0.00	0.00	87.33	0.00

Sum 37.91

Noise sensitive area: E Rantavainio_holiday

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	4,389	4,391	**17.90**	106.5	3.00	83.85	7.76	0.00	0.00	0.00	91.61	0.00
2	4,095	4,097	**18.83**	106.5	3.00	83.25	7.43	0.00	0.00	0.00	90.68	0.00
3	4,301	4,303	**18.17**	106.5	3.00	83.68	7.67	0.00	0.00	0.00	91.34	0.00
4	1,731	1,737	**29.53**	106.5	3.00	75.80	4.19	0.00	0.00	0.00	79.98	0.00
5	2,086	2,091	**27.34**	106.5	3.00	77.41	4.76	0.00	0.00	0.00	82.17	0.00
6	2,490	2,495	**25.19**	106.5	3.00	78.94	5.38	0.00	0.00	0.00	84.32	0.00
7	3,170	3,174	**22.17**	106.5	3.00	81.03	6.31	0.00	0.00	0.00	87.34	0.00
8	3,652	3,655	**20.33**	106.5	3.00	82.26	6.92	0.00	0.00	0.00	89.18	0.00
9	3,299	3,303	**21.65**	106.5	3.00	81.38	6.48	0.00	0.00	0.00	87.86	0.00
10	3,596	3,600	**20.54**	106.5	3.00	82.13	6.85	0.00	0.00	0.00	88.97	0.00
11	3,991	3,993	**19.17**	106.5	3.00	83.03	7.32	0.00	0.00	0.00	90.34	0.00

Sum 34.13

Noise sensitive area: F Kivitolppa_holiday

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	4,612	4,614	**17.23**	106.5	3.00	84.28	8.00	0.00	0.00	0.00	92.28	0.00
2	3,943	3,946	**19.33**	106.5	3.00	82.92	7.26	0.00	0.00	0.00	90.18	0.00
3	4,266	4,269	**18.28**	106.5	3.00	83.61	7.63	0.00	0.00	0.00	91.23	0.00
4	1,729	1,735	**29.54**	106.5	3.00	75.78	4.18	0.00	0.00	0.00	79.97	0.00
5	2,139	2,144	**27.04**	106.5	3.00	77.62	4.85	0.00	0.00	0.00	82.47	0.00
6	2,555	2,560	**24.88**	106.5	3.00	79.16	5.47	0.00	0.00	0.00	84.63	0.00
7	3,055	3,058	**22.64**	106.5	3.00	80.71	6.16	0.00	0.00	0.00	86.87	0.00
8	3,497	3,500	**20.90**	106.5	3.00	81.88	6.73	0.00	0.00	0.00	88.61	0.00
9	3,455	3,459	**21.06**	106.5	3.00	81.78	6.68	0.00	0.00	0.00	88.45	0.00
10	3,828	3,831	**19.72**	106.5	3.00	82.67	7.13	0.00	0.00	0.00	89.79	0.00
11	4,219	4,221	**18.43**	106.5	3.00	83.51	7.57	0.00	0.00	0.00	91.08	0.00

Sum 34.01

Project:
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Paul Bade / p.bade@wpd.de
Calculated:
27.02.2012 13:15/2.7.490

DECIBEL - Detailed results

Calculation: V112**Noise calculation model:** ISO 9613-2 General 8.0 m/s

Noise sensitive area: G Rianperkkiö

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	2,815	**23.69**	106.5	3.00	79.99	5.83	0.00	0.00	0.00	85.82	0.00
2	3,151	3,154	**22.25**	106.5	3.00	80.98	6.29	0.00	0.00	0.00	87.26	0.00
3	3,116	3,119	**22.39**	106.5	3.00	80.88	6.24	0.00	0.00	0.00	87.12	0.00
4	2,490	2,493	**25.20**	106.5	3.00	78.93	5.37	0.00	0.00	0.00	84.31	0.00
5	2,327	2,330	**26.03**	106.5	3.00	78.35	5.13	0.00	0.00	0.00	83.48	0.00
6	2,275	2,279	**26.30**	106.5	3.00	78.15	5.05	0.00	0.00	0.00	83.21	0.00
7	2,649	2,652	**24.43**	106.5	3.00	79.47	5.60	0.00	0.00	0.00	85.08	0.00
8	2,910	2,914	**23.26**	106.5	3.00	80.29	5.97	0.00	0.00	0.00	86.25	0.00
9	2,308	2,312	**26.13**	106.5	3.00	78.28	5.11	0.00	0.00	0.00	83.39	0.00
10	2,324	2,328	**26.04**	106.5	3.00	78.34	5.13	0.00	0.00	0.00	83.47	0.00
11	2,545	2,549	**24.93**	106.5	3.00	79.13	5.46	0.00	0.00	0.00	84.58	0.00

Sum 35.25

Project:
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DECIBEL - Assumptions for noise calculation

Calculation: V112**Noise 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 [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	1.0	1.9	3.7	9.7	32.8	117.0

WTG: VESTAS V112 - 140m tower 3000 112.0 !O!
Noise: Level 0 - Mode 0 - - 08-2010

Source	Source/Date	Creator	Edited
Manufacturer	27.08.2010	USER	23.02.2012 12:19

						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]
User value	140.0	95% rated power	106.5	No	Generic data	88.1	95.1	98.5	101.1	100.9	98.0	93.2	83.7

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

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DECIBEL - Assumptions for noise calculation

Calculation: V112**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

WindPRO version 2.7.490 Sep 2011

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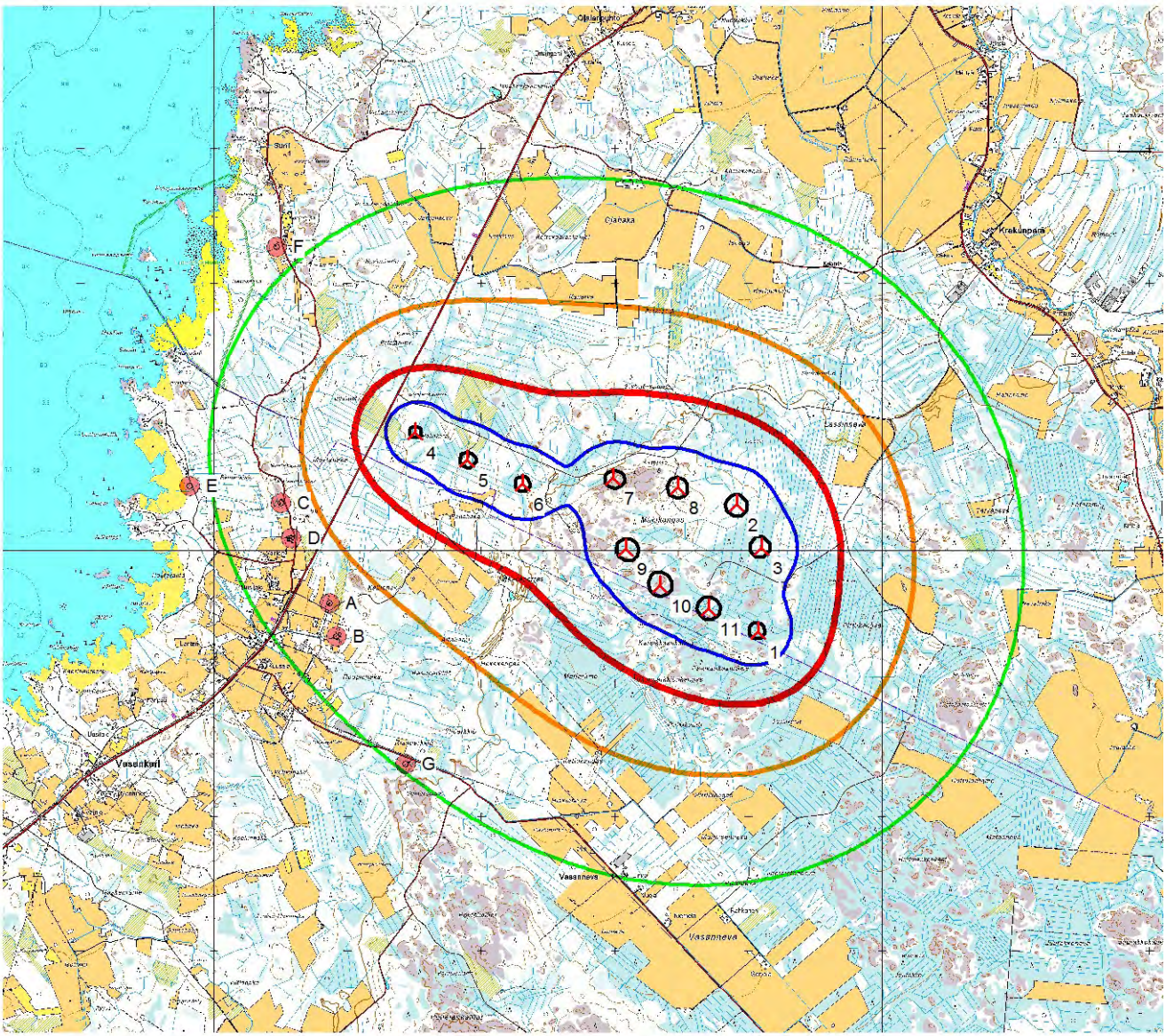
DECIBEL - Map 95% rated power

Calculation: V112**Noise calculation model:** ISO 9613-2 General 8.0 m/s



0 500 1000 1500 2000 m

Map: , Print scale 1:50,000, Map center KKJ 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 Noise sensitive area

Height above sea level from active line object

35.0 dB(A) 40.0 dB(A) 45.0 dB(A) 50.0 dB(A) 55.0 dB(A)

WindPRO is developed by EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tlf. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Project:

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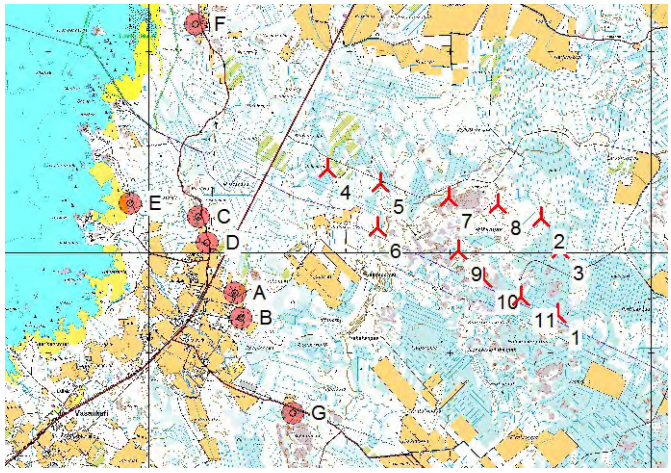
Calculated:
28.02.2012 18:41/2.7.490

DECIBEL - Main Result

Calculation: E101 road shift

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)



Scale 1:75,000

New WTG Noise sensitive area

WTGs

	KKJ Zone: 2 East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Noise data Creator	Name	Wind speed	Hub height	LwA,ref	Pure tones	Octave data	
	KKJ Zone: 2		[m]					[kW]	[m]	[m]			[m/s]	[m]	[dB(A)]			
1	2,504,067	7,139,390	25.0	WTG 01	Yes	ENERCON	E-101-3,000	3,000	101.0	135.4	EMD	Level 0 - calculated - Enercon Mode I - 06/2010	(95%)	135.4	106.0	No	Generic	*)
2	2,503,910	7,140,349	25.0	WTG 02	Yes	ENERCON	E-101-3,000	3,000	101.0	135.4	EMD	Level 0 - calculated - Enercon Mode I - 06/2010	(95%)	135.4	106.0	No	Generic	*)
3	2,504,094	7,140,025	25.2	WTG 03	Yes	ENERCON	E-101-3,000	3,000	101.0	135.4	EMD	Level 0 - calculated - Enercon Mode I - 06/2010	(95%)	135.4	106.0	No	Generic	*)
4	2,501,781	7,140,832	12.8	WTG 04	Yes	ENERCON	E-101-3,000	3,000	101.0	135.4	EMD	Level 0 - calculated - Enercon Mode I - 06/2010	(95%)	135.4	106.0	No	Generic	*)
5	2,502,310	7,140,691	16.9	WTG 05	Yes	ENERCON	E-101-3,000	3,000	101.0	135.4	EMD	Level 0 - calculated - Enercon Mode I - 06/2010	(95%)	135.4	106.0	No	Generic	*)
6	2,502,279	7,140,244	19.5	WTG 06	Yes	ENERCON	E-101-3,000	3,000	101.0	135.4	EMD	Level 0 - calculated - Enercon Mode I - 06/2010	(95%)	135.4	106.0	No	Generic	*)
7	2,502,987	7,140,546	22.4	WTG 07	Yes	ENERCON	E-101-3,000	3,000	101.0	135.4	EMD	Level 0 - calculated - Enercon Mode I - 06/2010	(95%)	135.4	106.0	No	Generic	*)
8	2,503,470	7,140,480	28.3	WTG 08	Yes	ENERCON	E-101-3,000	3,000	101.0	135.4	EMD	Level 0 - calculated - Enercon Mode I - 06/2010	(95%)	135.4	106.0	No	Generic	*)
9	2,503,083	7,140,015	30.0	WTG 09	Yes	ENERCON	E-101-3,000	3,000	101.0	135.4	EMD	Level 0 - calculated - Enercon Mode I - 06/2010	(95%)	135.4	106.0	No	Generic	*)
10	2,503,335	7,139,737	29.8	WTG 10	Yes	ENERCON	E-101-3,000	3,000	101.0	135.4	EMD	Level 0 - calculated - Enercon Mode I - 06/2010	(95%)	135.4	106.0	No	Generic	*)
11	2,503,700	7,139,561	25.0	WTG 11	Yes	ENERCON	E-101-3,000	3,000	101.0	135.4	EMD	Level 0 - calculated - Enercon Mode I - 06/2010	(95%)	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 No.	Name	KKJ Zone: 2 East	North	Z [m]	Imission height [m]	Demands Noise [dB(A)]	Sound Level From WTGs [dB(A)]	Demands fulfilled ? Noise
A	Talus 1	2,500,864	7,139,600	9.9	1.5	50.0	36.8	Yes
B	Talus 2	2,500,916	7,139,352	10.0	1.5	50.0	36.3	Yes
C	Tarkisenkangas	2,500,498	7,140,353	5.0	1.5	50.0	36.3	Yes
D	Vainio	2,500,578	7,140,092	5.9	1.5	50.0	36.4	Yes
E	Rantavainio_holiday	2,499,818	7,140,485	0.9	1.5	40.0	32.7	Yes
F	Kivitolppa_holiday	2,500,468	7,142,273	1.7	1.5	40.0	32.6	Yes
G	Rianperkkiö	2,501,436	7,138,398	18.3	1.5	50.0	34.9	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	1536	1714	1370	1413	1994	1950	2458
5	1812	1933	1844	1833	2501	2428	2454
6	1555	1629	1785	1708	2473	2720	2029
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

Project:
Makikangas_MASTER_corrected

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Calculated:
28.02.2012 18:41/2.7.490

DECIBEL - Detailed results

Calculation: E101 road shift**Noise calculation model:** ISO 9613-2 General 8.0 m/s

Assumptions

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

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

Calculation Results

Noise sensitive area: A Talus 1

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	3,211	3,214	**21.49**	106.0	3.00	81.14	6.36	0.00	0.00	0.00	87.50	0.00
2	3,137	3,140	**21.79**	106.0	3.00	80.94	6.27	0.00	0.00	0.00	87.21	0.00
3	3,258	3,261	**21.30**	106.0	3.00	81.27	6.42	0.00	0.00	0.00	87.69	0.00
4	1,536	1,542	**30.39**	106.0	3.00	74.76	3.85	0.00	0.00	0.00	78.61	0.00
5	1,812	1,817	**28.49**	106.0	3.00	76.19	4.32	0.00	0.00	0.00	80.51	0.00
6	1,555	1,561	**30.24**	106.0	3.00	74.87	3.88	0.00	0.00	0.00	78.75	0.00
7	2,324	2,328	**25.52**	106.0	3.00	78.34	5.13	0.00	0.00	0.00	83.47	0.00
8	2,750	2,754	**23.45**	106.0	3.00	79.80	5.75	0.00	0.00	0.00	85.55	0.00
9	2,257	2,262	**25.87**	106.0	3.00	78.09	5.03	0.00	0.00	0.00	83.12	0.00
10	2,475	2,480	**24.75**	106.0	3.00	78.89	5.35	0.00	0.00	0.00	84.24	0.00
11	2,836	2,840	**23.06**	106.0	3.00	80.07	5.87	0.00	0.00	0.00	85.93	0.00

Sum 36.77

Noise sensitive area: B Talus 2

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	3,152	3,155	**21.73**	106.0	3.00	80.98	6.29	0.00	0.00	0.00	87.27	0.00
2	3,156	3,159	**21.71**	106.0	3.00	80.99	6.29	0.00	0.00	0.00	87.28	0.00
3	3,248	3,251	**21.34**	106.0	3.00	81.24	6.41	0.00	0.00	0.00	87.65	0.00
4	1,714	1,720	**29.13**	106.0	3.00	75.71	4.16	0.00	0.00	0.00	79.87	0.00
5	1,933	1,938	**27.73**	106.0	3.00	76.75	4.52	0.00	0.00	0.00	81.27	0.00
6	1,629	1,635	**29.71**	106.0	3.00	75.27	4.01	0.00	0.00	0.00	79.28	0.00
7	2,390	2,394	**25.18**	106.0	3.00	78.58	5.23	0.00	0.00	0.00	83.81	0.00
8	2,792	2,796	**23.26**	106.0	3.00	79.93	5.80	0.00	0.00	0.00	85.73	0.00
9	2,266	2,271	**25.83**	106.0	3.00	78.12	5.04	0.00	0.00	0.00	83.17	0.00
10	2,450	2,454	**24.88**	106.0	3.00	78.80	5.32	0.00	0.00	0.00	84.12	0.00
11	2,792	2,796	**23.26**	106.0	3.00	79.93	5.80	0.00	0.00	0.00	85.73	0.00

Sum 36.26

Noise sensitive area: C Tarkisenkangas

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	3,697	3,700	**19.66**	106.0	3.00	82.36	6.97	0.00	0.00	0.00	89.33	0.00
2	3,412	3,415	**20.71**	106.0	3.00	81.67	6.62	0.00	0.00	0.00	88.29	0.00
3	3,611	3,614	**19.97**	106.0	3.00	82.16	6.87	0.00	0.00	0.00	89.03	0.00
4	1,370	1,378	**31.66**	106.0	3.00	73.78	3.55	0.00	0.00	0.00	77.33	0.00
5	1,844	1,850	**28.28**	106.0	3.00	76.34	4.37	0.00	0.00	0.00	80.72	0.00

To be continued on next page...

Project:
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28.02.2012 18:41/2.7.490

DECIBEL - Detailed results

Calculation: E101 road shift**Noise calculation model:** ISO 9613-2 General 8.0 m/s

...continued from previous page

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]
6	1,785	1,791	**28.66**	106.0	3.00	76.06	4.28	0.00	0.00	0.00	80.34	0.00
7	2,497	2,501	**24.65**	106.0	3.00	78.96	5.39	0.00	0.00	0.00	84.35	0.00
8	2,975	2,979	**22.46**	106.0	3.00	80.48	6.05	0.00	0.00	0.00	86.53	0.00
9	2,607	2,612	**24.11**	106.0	3.00	79.34	5.55	0.00	0.00	0.00	84.88	0.00
10	2,904	2,907	**22.77**	106.0	3.00	80.27	5.96	0.00	0.00	0.00	86.23	0.00
11	3,299	3,302	**21.14**	106.0	3.00	81.37	6.48	0.00	0.00	0.00	87.85	0.00
Sum	36.26											

Noise sensitive area: D Vainio

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	3,560	3,563	**20.16**	106.0	3.00	82.04	6.80	0.00	0.00	0.00	88.84	0.00
2	3,342	3,345	**20.97**	106.0	3.00	81.49	6.53	0.00	0.00	0.00	88.02	0.00
3	3,517	3,519	**20.31**	106.0	3.00	81.93	6.75	0.00	0.00	0.00	88.68	0.00
4	1,413	1,420	**31.32**	106.0	3.00	74.04	3.63	0.00	0.00	0.00	77.67	0.00
5	1,833	1,839	**28.35**	106.0	3.00	76.29	4.36	0.00	0.00	0.00	80.65	0.00
6	1,708	1,714	**29.16**	106.0	3.00	75.68	4.15	0.00	0.00	0.00	79.83	0.00
7	2,452	2,456	**24.87**	106.0	3.00	78.80	5.32	0.00	0.00	0.00	84.12	0.00
8	2,918	2,922	**22.70**	106.0	3.00	80.31	5.98	0.00	0.00	0.00	86.29	0.00
9	2,506	2,511	**24.60**	106.0	3.00	79.00	5.40	0.00	0.00	0.00	84.40	0.00
10	2,780	2,785	**23.31**	106.0	3.00	79.89	5.79	0.00	0.00	0.00	85.68	0.00
11	3,167	3,170	**21.66**	106.0	3.00	81.02	6.31	0.00	0.00	0.00	87.33	0.00
Sum	36.38											

Noise sensitive area: E Rantavainio_holiday

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	4,389	4,391	**17.38**	106.0	3.00	83.85	7.76	0.00	0.00	0.00	91.61	0.00
2	4,095	4,097	**18.31**	106.0	3.00	83.25	7.43	0.00	0.00	0.00	90.68	0.00
3	4,301	4,303	**17.65**	106.0	3.00	83.68	7.66	0.00	0.00	0.00	91.34	0.00
4	1,994	1,999	**27.36**	106.0	3.00	77.02	4.62	0.00	0.00	0.00	81.64	0.00
5	2,501	2,505	**24.63**	106.0	3.00	78.98	5.39	0.00	0.00	0.00	84.37	0.00
6	2,473	2,478	**24.76**	106.0	3.00	78.88	5.35	0.00	0.00	0.00	84.23	0.00
7	3,170	3,173	**21.65**	106.0	3.00	81.03	6.31	0.00	0.00	0.00	87.34	0.00
8	3,652	3,655	**19.82**	106.0	3.00	82.26	6.92	0.00	0.00	0.00	89.18	0.00
9	3,299	3,302	**21.14**	106.0	3.00	81.38	6.48	0.00	0.00	0.00	87.85	0.00
10	3,596	3,599	**20.02**	106.0	3.00	82.12	6.85	0.00	0.00	0.00	88.97	0.00
11	3,991	3,993	**18.65**	106.0	3.00	83.03	7.32	0.00	0.00	0.00	90.34	0.00
Sum	32.70											

Noise sensitive area: F Kivitolppa_holiday

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	4,612	4,614	**16.71**	106.0	3.00	84.28	8.00	0.00	0.00	0.00	92.28	0.00
2	3,943	3,946	**18.81**	106.0	3.00	82.92	7.26	0.00	0.00	0.00	90.18	0.00
3	4,266	4,269	**17.76**	106.0	3.00	83.61	7.63	0.00	0.00	0.00	91.23	0.00
4	1,950	1,955	**27.63**	106.0	3.00	76.82	4.55	0.00	0.00	0.00	81.37	0.00
5	2,428	2,432	**24.99**	106.0	3.00	78.72	5.28	0.00	0.00	0.00	84.01	0.00
6	2,720	2,724	**23.59**	106.0	3.00	79.70	5.70	0.00	0.00	0.00	85.41	0.00
7	3,055	3,058	**22.13**	106.0	3.00	80.71	6.16	0.00	0.00	0.00	86.87	0.00
8	3,497	3,500	**20.39**	106.0	3.00	81.88	6.73	0.00	0.00	0.00	88.61	0.00
9	3,455	3,458	**20.54**	106.0	3.00	81.78	6.68	0.00	0.00	0.00	88.45	0.00
10	3,828	3,831	**19.20**	106.0	3.00	82.67	7.13	0.00	0.00	0.00	89.79	0.00
11	4,219	4,221	**17.91**	106.0	3.00	83.51	7.57	0.00	0.00	0.00	91.08	0.00
Sum	32.64											

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DECIBEL - Detailed results

Calculation: E101 road shift**Noise calculation model:** ISO 9613-2 General 8.0 m/s

Noise sensitive area: G Rianperkkiö

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	2,815	**23.17**	106.0	3.00	79.99	5.83	0.00	0.00	0.00	85.82	0.00
2	3,151	3,153	**21.73**	106.0	3.00	80.98	6.29	0.00	0.00	0.00	87.26	0.00
3	3,116	3,119	**21.88**	106.0	3.00	80.88	6.24	0.00	0.00	0.00	87.12	0.00
4	2,458	2,461	**24.84**	106.0	3.00	78.82	5.33	0.00	0.00	0.00	84.15	0.00
5	2,454	2,457	**24.86**	106.0	3.00	78.81	5.32	0.00	0.00	0.00	84.13	0.00
6	2,029	2,034	**27.16**	106.0	3.00	77.16	4.67	0.00	0.00	0.00	81.84	0.00
7	2,649	2,652	**23.92**	106.0	3.00	79.47	5.60	0.00	0.00	0.00	85.07	0.00
8	2,910	2,913	**22.74**	106.0	3.00	80.29	5.97	0.00	0.00	0.00	86.25	0.00
9	2,308	2,312	**25.61**	106.0	3.00	78.28	5.10	0.00	0.00	0.00	83.38	0.00
10	2,324	2,328	**25.53**	106.0	3.00	78.34	5.13	0.00	0.00	0.00	83.47	0.00
11	2,545	2,549	**24.41**	106.0	3.00	79.13	5.46	0.00	0.00	0.00	84.58	0.00

Sum 34.88

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DECIBEL - Assumptions for noise calculation

Calculation: E101 road shift**Noise 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 [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	1.0	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	30.06.2010	EMD	21.01.2011 15:42

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

						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	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

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DECIBEL - Assumptions for noise calculation

Calculation: E101 road shift**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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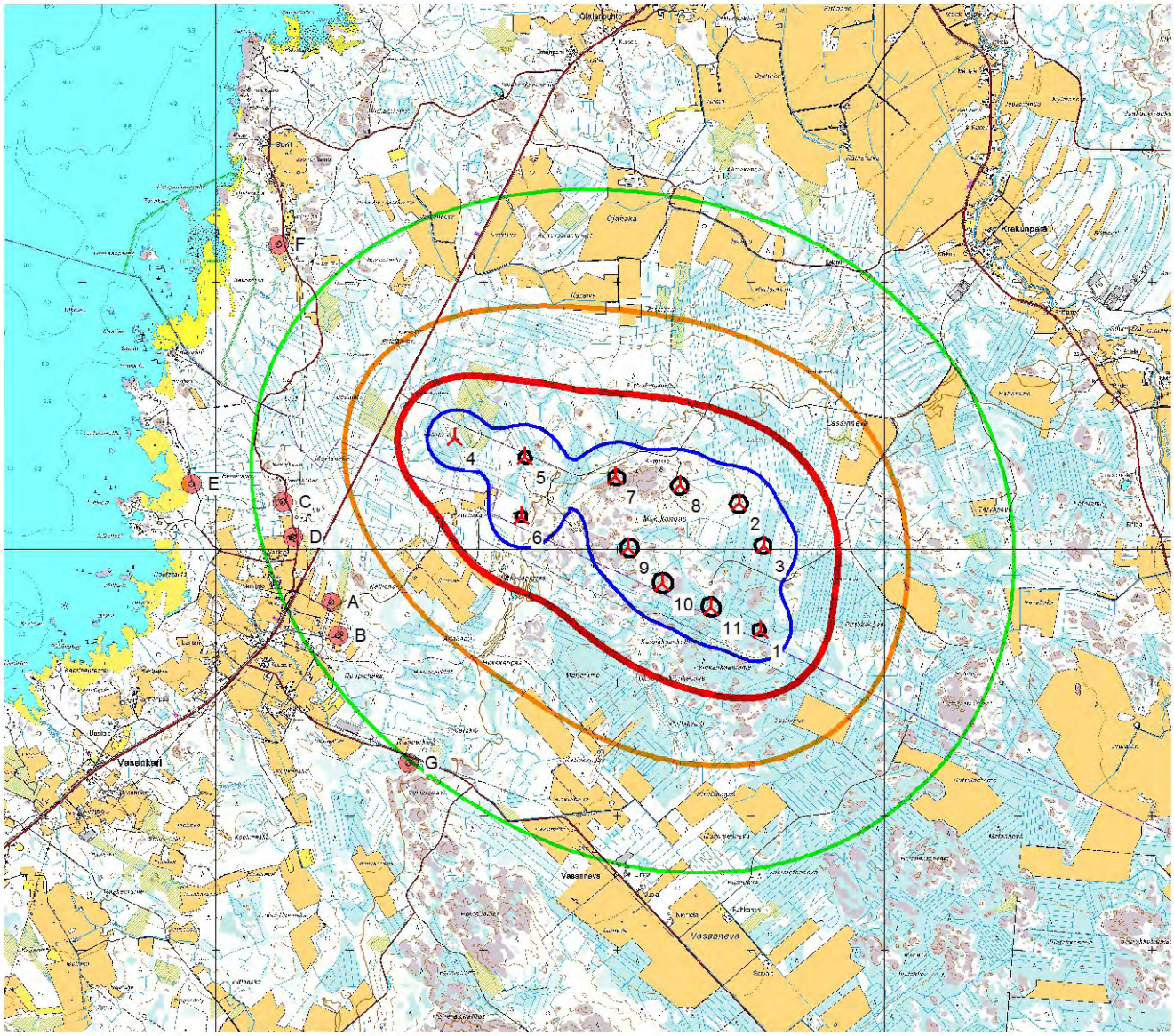
DECIBEL - Map 95% rated power

Calculation: E101 road shift**Noise calculation model:** ISO 9613-2 General 8.0 m/s



0 500 1000 1500 2000 m

Map: , Print scale 1:50,000, Map center KKJ Finland Zone: 2 East: 2,503,118 North: 7,140,075

Noise calculation model: ISO 9613-2 General. Wind speed: 95% rated power

New WTG Noise sensitive area

Height above sea level from active line object

35.0 dB(A) 40.0 dB(A) 45.0 dB(A) 50.0 dB(A) 55.0 dB(A)

WindPRO version 2.7.490 Sep 2011

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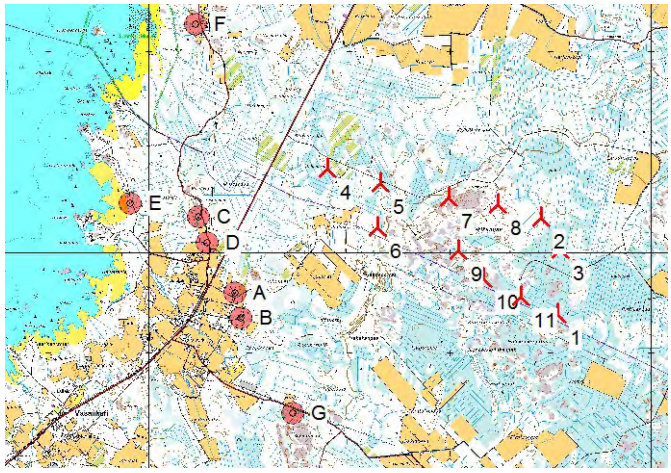
28.02.2012 18:42/2.7.490

DECIBEL - Main Result

Calculation: V112 road shift

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)



Scale 1:75,000

New WTG Noise sensitive area

WTGs

	KKJ Zone: 2 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	Hub height	LwA,ref	Pure tones	Octave data	
	KKJ Zone: 2		[m]					[kW]	[m]	[m]			[m/s]		[m]	[dB(A)]			
1	2,504,067	7,139,390	25.0	WTG 01	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	USER	Level 0 - Mode 0 - - 08-2010	(95%)	User value	140.0	106.5	No	Generic	*)
2	2,503,910	7,140,349	25.0	WTG 02	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	USER	Level 0 - Mode 0 - - 08-2010	(95%)	User value	140.0	106.5	No	Generic	*)
3	2,504,094	7,140,025	25.2	WTG 03	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	USER	Level 0 - Mode 0 - - 08-2010	(95%)	User value	140.0	106.5	No	Generic	*)
4	2,501,781	7,140,832	12.8	WTG 04	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	USER	Level 0 - Mode 0 - - 08-2010	(95%)	User value	140.0	106.5	No	Generic	*)
5	2,502,310	7,140,691	16.9	WTG 05	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	USER	Level 0 - Mode 0 - - 08-2010	(95%)	User value	140.0	106.5	No	Generic	*)
6	2,502,279	7,140,244	19.5	WTG 06	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	USER	Level 0 - Mode 0 - - 08-2010	(95%)	User value	140.0	106.5	No	Generic	*)
7	2,502,987	7,140,546	22.4	WTG 07	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	USER	Level 0 - Mode 0 - - 08-2010	(95%)	User value	140.0	106.5	No	Generic	*)
8	2,503,470	7,140,480	28.3	WTG 08	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	USER	Level 0 - Mode 0 - - 08-2010	(95%)	User value	140.0	106.5	No	Generic	*)
9	2,503,083	7,140,015	30.0	WTG 09	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	USER	Level 0 - Mode 0 - - 08-2010	(95%)	User value	140.0	106.5	No	Generic	*)
10	2,503,335	7,139,737	29.8	WTG 10	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	USER	Level 0 - Mode 0 - - 08-2010	(95%)	User value	140.0	106.5	No	Generic	*)
11	2,503,700	7,139,561	25.0	WTG 11	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	USER	Level 0 - Mode 0 - - 08-2010	(95%)	User value	140.0	106.5	No	Generic	*)

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

Calculation Results

Sound Level

Noise sensitive area No.	Name	KKJ Zone: 2 East	North	Z [m]	Imission height [m]	Demands Noise [dB(A)]	Sound Level From WTGs [dB(A)]	Demands fulfilled ? Noise
A	Talus 1	2,500,864	7,139,600	9.9	1.5	50.0	37.3	Yes
B	Talus 2	2,500,916	7,139,352	10.0	1.5	50.0	36.8	Yes
C	Tarkisenkangas	2,500,498	7,140,353	5.0	1.5	50.0	36.8	Yes
D	Vainio	2,500,578	7,140,092	5.9	1.5	50.0	36.9	Yes
E	Rantavainio_holiday	2,499,818	7,140,485	0.9	1.5	40.0	33.2	Yes
F	Kivitolppa_holiday	2,500,468	7,142,273	1.7	1.5	40.0	33.2	Yes
G	Rianperkkiö	2,501,436	7,138,398	18.3	1.5	50.0	35.4	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	1536	1714	1370	1413	1994	1950	2458
5	1812	1933	1844	1833	2501	2428	2454
6	1555	1629	1785	1708	2473	2720	2029
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: V112 road shift**Noise calculation model:** ISO 9613-2 General 8.0 m/s

Assumptions

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

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

Calculation Results

Noise sensitive area: A Talus 1

WTG 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	**22.01**	106.5	3.00	81.14	6.36	0.00	0.00	0.00	87.50	0.00
2	3,137	3,140	**22.30**	106.5	3.00	80.94	6.27	0.00	0.00	0.00	87.21	0.00
3	3,258	3,261	**21.82**	106.5	3.00	81.27	6.43	0.00	0.00	0.00	87.69	0.00
4	1,536	1,542	**30.90**	106.5	3.00	74.76	3.85	0.00	0.00	0.00	78.61	0.00
5	1,812	1,818	**29.00**	106.5	3.00	76.19	4.32	0.00	0.00	0.00	80.51	0.00
6	1,555	1,562	**30.76**	106.5	3.00	74.87	3.88	0.00	0.00	0.00	78.76	0.00
7	2,324	2,329	**26.04**	106.5	3.00	78.34	5.13	0.00	0.00	0.00	83.47	0.00
8	2,750	2,755	**23.96**	106.5	3.00	79.80	5.75	0.00	0.00	0.00	85.55	0.00
9	2,257	2,263	**26.39**	106.5	3.00	78.09	5.03	0.00	0.00	0.00	83.12	0.00
10	2,475	2,480	**25.27**	106.5	3.00	78.89	5.35	0.00	0.00	0.00	84.24	0.00
11	2,836	2,840	**23.58**	106.5	3.00	80.07	5.87	0.00	0.00	0.00	85.93	0.00

Sum 37.28

Noise sensitive area: B Talus 2

WTG 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	**22.24**	106.5	3.00	80.98	6.29	0.00	0.00	0.00	87.27	0.00
2	3,156	3,159	**22.23**	106.5	3.00	80.99	6.29	0.00	0.00	0.00	87.28	0.00
3	3,248	3,251	**21.86**	106.5	3.00	81.24	6.41	0.00	0.00	0.00	87.65	0.00
4	1,714	1,720	**29.64**	106.5	3.00	75.71	4.16	0.00	0.00	0.00	79.87	0.00
5	1,933	1,939	**28.24**	106.5	3.00	76.75	4.52	0.00	0.00	0.00	81.27	0.00
6	1,629	1,636	**30.22**	106.5	3.00	75.27	4.01	0.00	0.00	0.00	79.29	0.00
7	2,390	2,395	**25.70**	106.5	3.00	78.59	5.23	0.00	0.00	0.00	83.81	0.00
8	2,792	2,796	**23.78**	106.5	3.00	79.93	5.80	0.00	0.00	0.00	85.73	0.00
9	2,266	2,271	**26.34**	106.5	3.00	78.12	5.04	0.00	0.00	0.00	83.17	0.00
10	2,450	2,455	**25.39**	106.5	3.00	78.80	5.32	0.00	0.00	0.00	84.12	0.00
11	2,792	2,796	**23.78**	106.5	3.00	79.93	5.80	0.00	0.00	0.00	85.73	0.00

Sum 36.77

Noise sensitive area: C Tarkisenkangas

WTG 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	3,700	**20.18**	106.5	3.00	82.36	6.97	0.00	0.00	0.00	89.34	0.00
2	3,412	3,415	**21.22**	106.5	3.00	81.67	6.62	0.00	0.00	0.00	88.29	0.00
3	3,611	3,614	**20.48**	106.5	3.00	82.16	6.87	0.00	0.00	0.00	89.03	0.00
4	1,370	1,378	**32.18**	106.5	3.00	73.79	3.55	0.00	0.00	0.00	77.34	0.00
5	1,844	1,850	**28.79**	106.5	3.00	76.34	4.38	0.00	0.00	0.00	80.72	0.00

To be continued on next page...

Project:
Makikangas_MASTER_corrected

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Calculated:
28.02.2012 18:42/2.7.490

DECIBEL - Detailed results

Calculation: V112 road shift**Noise calculation model:** ISO 9613-2 General 8.0 m/s

...continued from previous page

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]
6	1,785	1,791	**29.17**	106.5	3.00	76.06	4.28	0.00	0.00	0.00	80.34	0.00
7	2,497	2,501	**25.16**	106.5	3.00	78.96	5.39	0.00	0.00	0.00	84.35	0.00
8	2,975	2,979	**22.98**	106.5	3.00	80.48	6.05	0.00	0.00	0.00	86.54	0.00
9	2,607	2,612	**24.63**	106.5	3.00	79.34	5.55	0.00	0.00	0.00	84.88	0.00
10	2,904	2,908	**23.28**	106.5	3.00	80.27	5.96	0.00	0.00	0.00	86.23	0.00
11	3,299	3,302	**21.66**	106.5	3.00	81.38	6.48	0.00	0.00	0.00	87.85	0.00

Sum 36.77

Noise sensitive area: D Vainio

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	3,560	3,563	**20.67**	106.5	3.00	82.04	6.80	0.00	0.00	0.00	88.84	0.00
2	3,342	3,345	**21.49**	106.5	3.00	81.49	6.53	0.00	0.00	0.00	88.02	0.00
3	3,517	3,520	**20.83**	106.5	3.00	81.93	6.75	0.00	0.00	0.00	88.68	0.00
4	1,413	1,420	**31.84**	106.5	3.00	74.05	3.63	0.00	0.00	0.00	77.67	0.00
5	1,833	1,839	**28.86**	106.5	3.00	76.29	4.36	0.00	0.00	0.00	80.65	0.00
6	1,708	1,715	**29.68**	106.5	3.00	75.68	4.15	0.00	0.00	0.00	79.83	0.00
7	2,452	2,456	**25.39**	106.5	3.00	78.80	5.32	0.00	0.00	0.00	84.12	0.00
8	2,918	2,922	**23.22**	106.5	3.00	80.31	5.98	0.00	0.00	0.00	86.29	0.00
9	2,506	2,511	**25.11**	106.5	3.00	79.00	5.40	0.00	0.00	0.00	84.40	0.00
10	2,780	2,785	**23.83**	106.5	3.00	79.90	5.79	0.00	0.00	0.00	85.69	0.00
11	3,167	3,171	**22.18**	106.5	3.00	81.02	6.31	0.00	0.00	0.00	87.33	0.00

Sum 36.89

Noise sensitive area: E Rantavainio_holiday

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	4,389	4,391	**17.90**	106.5	3.00	83.85	7.76	0.00	0.00	0.00	91.61	0.00
2	4,095	4,097	**18.83**	106.5	3.00	83.25	7.43	0.00	0.00	0.00	90.68	0.00
3	4,301	4,303	**18.17**	106.5	3.00	83.68	7.67	0.00	0.00	0.00	91.34	0.00
4	1,994	2,000	**27.87**	106.5	3.00	77.02	4.62	0.00	0.00	0.00	81.64	0.00
5	2,501	2,506	**25.14**	106.5	3.00	78.98	5.39	0.00	0.00	0.00	84.37	0.00
6	2,473	2,478	**25.28**	106.5	3.00	78.88	5.35	0.00	0.00	0.00	84.23	0.00
7	3,170	3,174	**22.17**	106.5	3.00	81.03	6.31	0.00	0.00	0.00	87.34	0.00
8	3,652	3,655	**20.33**	106.5	3.00	82.26	6.92	0.00	0.00	0.00	89.18	0.00
9	3,299	3,303	**21.65**	106.5	3.00	81.38	6.48	0.00	0.00	0.00	87.86	0.00
10	3,596	3,600	**20.54**	106.5	3.00	82.13	6.85	0.00	0.00	0.00	88.97	0.00
11	3,991	3,993	**19.17**	106.5	3.00	83.03	7.32	0.00	0.00	0.00	90.34	0.00

Sum 33.21

Noise sensitive area: F Kivitolppa_holiday

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	4,612	4,614	**17.23**	106.5	3.00	84.28	8.00	0.00	0.00	0.00	92.28	0.00
2	3,943	3,946	**19.33**	106.5	3.00	82.92	7.26	0.00	0.00	0.00	90.18	0.00
3	4,266	4,269	**18.28**	106.5	3.00	83.61	7.63	0.00	0.00	0.00	91.23	0.00
4	1,950	1,955	**28.14**	106.5	3.00	76.82	4.55	0.00	0.00	0.00	81.37	0.00
5	2,428	2,433	**25.50**	106.5	3.00	78.72	5.29	0.00	0.00	0.00	84.01	0.00
6	2,720	2,724	**24.10**	106.5	3.00	79.70	5.70	0.00	0.00	0.00	85.41	0.00
7	3,055	3,058	**22.64**	106.5	3.00	80.71	6.16	0.00	0.00	0.00	86.87	0.00
8	3,497	3,500	**20.90**	106.5	3.00	81.88	6.73	0.00	0.00	0.00	88.61	0.00
9	3,455	3,459	**21.06**	106.5	3.00	81.78	6.68	0.00	0.00	0.00	88.45	0.00
10	3,828	3,831	**19.72**	106.5	3.00	82.67	7.13	0.00	0.00	0.00	89.79	0.00
11	4,219	4,221	**18.43**	106.5	3.00	83.51	7.57	0.00	0.00	0.00	91.08	0.00

Sum 33.15

Project:
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Calculated:
28.02.2012 18:42/2.7.490

DECIBEL - Detailed results

Calculation: V112 road shift**Noise calculation model:** ISO 9613-2 General 8.0 m/s

Noise sensitive area: G Rianperkkiö

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	2,815	**23.69**	106.5	3.00	79.99	5.83	0.00	0.00	0.00	85.82	0.00
2	3,151	3,154	**22.25**	106.5	3.00	80.98	6.29	0.00	0.00	0.00	87.26	0.00
3	3,116	3,119	**22.39**	106.5	3.00	80.88	6.24	0.00	0.00	0.00	87.12	0.00
4	2,458	2,462	**25.36**	106.5	3.00	78.82	5.33	0.00	0.00	0.00	84.15	0.00
5	2,454	2,458	**25.38**	106.5	3.00	78.81	5.32	0.00	0.00	0.00	84.13	0.00
6	2,029	2,034	**27.67**	106.5	3.00	77.17	4.67	0.00	0.00	0.00	81.84	0.00
7	2,649	2,652	**24.43**	106.5	3.00	79.47	5.60	0.00	0.00	0.00	85.08	0.00
8	2,910	2,914	**23.26**	106.5	3.00	80.29	5.97	0.00	0.00	0.00	86.25	0.00
9	2,308	2,312	**26.13**	106.5	3.00	78.28	5.11	0.00	0.00	0.00	83.39	0.00
10	2,324	2,328	**26.04**	106.5	3.00	78.34	5.13	0.00	0.00	0.00	83.47	0.00
11	2,545	2,549	**24.93**	106.5	3.00	79.13	5.46	0.00	0.00	0.00	84.58	0.00

Sum 35.39

Project:
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DECIBEL - Assumptions for noise calculation

Calculation: V112 road shift**Noise 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 [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	1.0	1.9	3.7	9.7	32.8	117.0

WTG: VESTAS V112 - 140m tower 3000 112.0 !O!
Noise: Level 0 - Mode 0 - - 08-2010

Source	Source/Date	Creator	Edited
Manufacturer	27.08.2010	USER	23.02.2012 12:19

						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]
User value	140.0	95% rated power	106.5	No	Generic data	88.1	95.1	98.5	101.1	100.9	98.0	93.2	83.7

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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28.02.2012 18:42/2.7.490

DECIBEL - Assumptions for noise calculation

Calculation: V112 road shift**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

Project:
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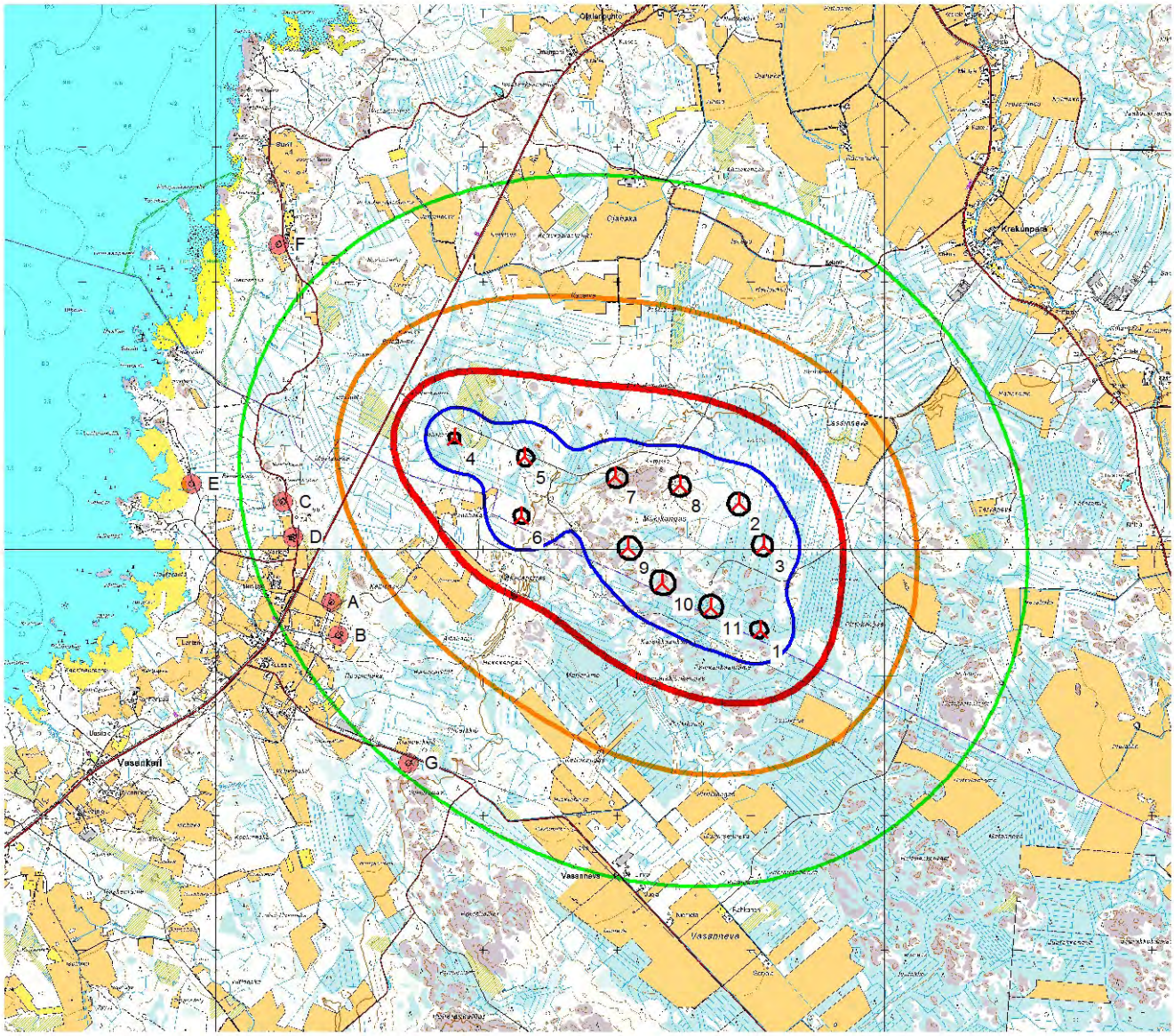
28.02.2012 18:42/2.7.490

DECIBEL - Map 95% rated power

Calculation: V112 road shift**Noise calculation model:** ISO 9613-2 General 8.0 m/s



0 500 1000 1500 2000 m

Map: , Print scale 1:50,000, Map center KKJ Finland Zone: 2 East: 2,503,118 North: 7,140,075

Noise calculation model: ISO 9613-2 General. Wind speed: 95% rated power

New WTG

Noise sensitive area

Height above sea level from active line object

35.0 dB(A) 40.0 dB(A) 45.0 dB(A) 50.0 dB(A) 55.0 dB(A)

Project:
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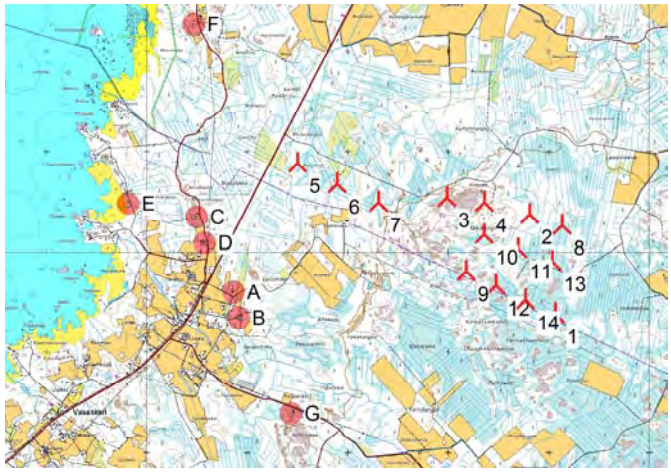
Calculated:
28.7.2011 11:03/2.7.486

DECIBEL - Main Result

Calculation: Decibel_maxlayout_14WTG_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)



Scale 1:75 000

New WTG Noise sensitive area

WTGs

	KKJ Zone: 2 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	Hub height	LwA,ref	Pure tones	Octave data	
	KKJ Zone: 2		[m]					[kW]	[m]	[m]			[m/s]		[m]	[dB(A)]			
1	2 504 067	7 139 390	25.0	WTG 7	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	EMD	Level 0 - man.spec. - Op.Mode I - 04/2010	(95%)	User value	138.4	104.0	No	Generic	*)
2	2 503 811	7 140 379	25.3	WTG 12	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	EMD	Level 0 - man.spec. - Op.Mode I - 04/2010	(95%)	User value	138.4	104.0	No	Generic	*)
3	2 502 987	7 140 546	22.4	WTG 14	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	EMD	Level 0 - man.spec. - Op.Mode I - 04/2010	(95%)	User value	138.4	104.0	No	Generic	*)
4	2 503 360	7 140 495	30.0	WTG 13	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	EMD	Level 0 - man.spec. - Op.Mode I - 04/2010	(95%)	User value	138.4	104.0	No	Generic	*)
5	2 501 501	7 140 887	10.0	WTG 1	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	EMD	Level 0 - man.spec. - Op.Mode I - 04/2010	(95%)	User value	138.4	104.0	No	Generic	*)
6	2 501 894	7 140 680	14.0	WTG 2	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	EMD	Level 0 - man.spec. - Op.Mode I - 04/2010	(95%)	User value	138.4	104.0	No	Generic	*)
7	2 502 308	7 140 499	18.3	WTG 3	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	EMD	Level 0 - man.spec. - Op.Mode I - 04/2010	(95%)	User value	138.4	104.0	No	Generic	*)
8	2 504 135	7 140 268	24.7	WTG 11	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	EMD	Level 0 - man.spec. - Op.Mode I - 04/2010	(95%)	User value	138.4	104.0	No	Generic	*)
9	2 503 178	7 139 811	30.0	WTG 4	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	EMD	Level 0 - man.spec. - Op.Mode I - 04/2010	(95%)	User value	138.4	104.0	No	Generic	*)
10	2 503 358	7 140 178	30.0	WTG 10	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	EMD	Level 0 - man.spec. - Op.Mode I - 04/2010	(95%)	User value	138.4	104.0	No	Generic	*)
11	2 503 695	7 140 033	28.2	WTG 9	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	EMD	Level 0 - man.spec. - Op.Mode I - 04/2010	(95%)	User value	138.4	104.0	No	Generic	*)
12	2 503 475	7 139 670	27.8	WTG 5	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	EMD	Level 0 - man.spec. - Op.Mode I - 04/2010	(95%)	User value	138.4	104.0	No	Generic	*)
13	2 504 035	7 139 907	26.0	WTG 8	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	EMD	Level 0 - man.spec. - Op.Mode I - 04/2010	(95%)	User value	138.4	104.0	No	Generic	*)
14	2 503 770	7 139 529	25.0	WTG 6	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	EMD	Level 0 - man.spec. - Op.Mode I - 04/2010	(95%)	User value	138.4	104.0	No	Generic	*)

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

Calculation Results

Sound Level

Noise sensitive area No.	Name	KKJ Zone: 2 East	North	Z [m]	Imission height [m]	Demands Noise [dB(A)]	Sound Level From WTGs [dB(A)]	Demands fulfilled ? Noise
A	Talus 1	2 500 864	7 139 600	9.9	1.5	50.0	35.6	Yes
B	Talus 2	2 500 916	7 139 352	10.0	1.5	50.0	35.0	Yes
C	Tarkisenkangas	2 500 498	7 140 353	5.0	1.5	50.0	35.9	Yes
D	Vainio	2 500 578	7 140 092	5.9	1.5	50.0	35.7	Yes
E	Rantavainio_holiday	2 499 818	7 140 485	0.9	1.5	40.0	32.0	Yes
F	Kivitolppa_holiday	2 500 468	7 142 273	1.7	1.5	40.0	31.9	Yes
G	Rianperkkiö	2 501 436	7 138 398	18.3	1.5	50.0	33.6	Yes

Distances (m)

WTG	A	B	C	D	E	F	G
1	3211	3152	3697	3560	4389	4612	2812
2	3048	3072	3313	3246	3995	3842	3092
3	2324	2390	2497	2452	3170	3055	2649
4	2652	2698	2866	2811	3542	3395	2846
5	1436	1643	1137	1219	1731	1729	2490
6	1492	1649	1435	1442	2086	2139	2327
7	1701	1804	1816	1777	2490	2555	2275
8	3339	3347	3638	3562	4323	4179	3284
9	2324	2308	2734	2615	3427	3662	2243
10	2561	2578	2866	2782	3554	3570	2620

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28.7.2011 11:03/2.7.486

DECIBEL - Main Result

Calculation: Decibel_maxlayout_14WTG_EIAR_KJ

...continued from previous page

WTG	A	B	C	D	E	F	G
11	2864	2861	3213	3118	3903	3928	2789
12	2612	2579	3055	2928	3747	3977	2403
13	3186	3168	3565	3462	4257	4280	3005
14	2908	2860	3375	3242	4067	4294	2594

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DECIBEL - Detailed results

Calculation: Decibel_maxlayout_14WTG_EIAR_KJ **Noise calculation model:** ISO 9613-2 General 8.0 m/s

Assumptions

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

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

Calculation Results

Noise sensitive area: A Talus 1

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	3 211	3 214	**19.50**	104.0	3.00	81.14	6.37	0.00	0.00	0.00	87.51	0.00
2	3 048	3 052	**20.17**	104.0	3.00	80.69	6.15	0.00	0.00	0.00	86.84	0.00
3	2 324	2 329	**23.54**	104.0	3.00	78.34	5.13	0.00	0.00	0.00	83.47	0.00
4	2 652	2 656	**21.92**	104.0	3.00	79.49	5.61	0.00	0.00	0.00	85.09	0.00
5	1 436	1 443	**29.16**	104.0	3.00	74.18	3.67	0.00	0.00	0.00	77.85	0.00
6	1 492	1 499	**28.72**	104.0	3.00	74.52	3.77	0.00	0.00	0.00	78.29	0.00
7	1 701	1 707	**27.23**	104.0	3.00	75.65	4.14	0.00	0.00	0.00	79.78	0.00
8	3 339	3 342	**19.00**	104.0	3.00	81.48	6.53	0.00	0.00	0.00	88.01	0.00
9	2 324	2 329	**23.54**	104.0	3.00	78.34	5.13	0.00	0.00	0.00	83.47	0.00
10	2 561	2 565	**22.35**	104.0	3.00	79.18	5.48	0.00	0.00	0.00	84.66	0.00
11	2 864	2 868	**20.95**	104.0	3.00	80.15	5.90	0.00	0.00	0.00	86.06	0.00
12	2 612	2 617	**22.10**	104.0	3.00	79.36	5.55	0.00	0.00	0.00	84.91	0.00
13	3 186	3 190	**19.60**	104.0	3.00	81.08	6.33	0.00	0.00	0.00	87.41	0.00
14	2 908	2 912	**20.76**	104.0	3.00	80.28	5.96	0.00	0.00	0.00	86.25	0.00

Sum 35.62

Noise sensitive area: B Talus 2

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	3 152	3 156	**19.74**	104.0	3.00	80.98	6.29	0.00	0.00	0.00	87.27	0.00
2	3 072	3 075	**20.07**	104.0	3.00	80.76	6.18	0.00	0.00	0.00	86.94	0.00
3	2 390	2 395	**23.19**	104.0	3.00	78.59	5.23	0.00	0.00	0.00	83.82	0.00
4	2 698	2 703	**21.70**	104.0	3.00	79.64	5.67	0.00	0.00	0.00	85.31	0.00
5	1 643	1 648	**27.64**	104.0	3.00	75.34	4.03	0.00	0.00	0.00	79.38	0.00
6	1 649	1 655	**27.59**	104.0	3.00	75.38	4.05	0.00	0.00	0.00	79.42	0.00
7	1 804	1 810	**26.55**	104.0	3.00	76.15	4.31	0.00	0.00	0.00	80.46	0.00
8	3 347	3 350	**18.97**	104.0	3.00	81.50	6.54	0.00	0.00	0.00	88.04	0.00
9	2 308	2 313	**23.62**	104.0	3.00	78.29	5.11	0.00	0.00	0.00	83.39	0.00
10	2 578	2 583	**22.26**	104.0	3.00	79.24	5.50	0.00	0.00	0.00	84.75	0.00
11	2 861	2 866	**20.97**	104.0	3.00	80.14	5.90	0.00	0.00	0.00	86.04	0.00
12	2 579	2 583	**22.26**	104.0	3.00	79.24	5.50	0.00	0.00	0.00	84.75	0.00
13	3 168	3 172	**19.67**	104.0	3.00	81.03	6.31	0.00	0.00	0.00	87.34	0.00
14	2 860	2 864	**20.97**	104.0	3.00	80.14	5.90	0.00	0.00	0.00	86.04	0.00

Sum 34.98

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Calculated:
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DECIBEL - Detailed results

Calculation: Decibel_maxlayout_14WTG_EIAR_KJ **Noise calculation model:** ISO 9613-2 General 8.0 m/s

Noise sensitive area: C Tarkisenkangas

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	3 697	3 701	**17.67**	104.0	3.00	82.37	6.97	0.00	0.00	0.00	89.34	0.00
2	3 313	3 317	**19.10**	104.0	3.00	81.41	6.50	0.00	0.00	0.00	87.91	0.00
3	2 497	2 502	**22.66**	104.0	3.00	78.96	5.39	0.00	0.00	0.00	84.35	0.00
4	2 866	2 870	**20.94**	104.0	3.00	80.16	5.91	0.00	0.00	0.00	86.07	0.00
5	1 137	1 146	**31.72**	104.0	3.00	72.18	3.11	0.00	0.00	0.00	75.29	0.00
6	1 435	1 442	**29.16**	104.0	3.00	74.18	3.67	0.00	0.00	0.00	77.85	0.00
7	1 816	1 822	**26.47**	104.0	3.00	76.21	4.33	0.00	0.00	0.00	80.54	0.00
8	3 638	3 642	**17.88**	104.0	3.00	82.23	6.90	0.00	0.00	0.00	89.13	0.00
9	2 734	2 739	**21.53**	104.0	3.00	79.75	5.73	0.00	0.00	0.00	85.48	0.00
10	2 866	2 871	**20.94**	104.0	3.00	80.16	5.91	0.00	0.00	0.00	86.07	0.00
11	3 213	3 217	**19.49**	104.0	3.00	81.15	6.37	0.00	0.00	0.00	87.52	0.00
12	3 055	3 059	**20.14**	104.0	3.00	80.71	6.16	0.00	0.00	0.00	86.87	0.00
13	3 565	3 569	**18.15**	104.0	3.00	82.05	6.81	0.00	0.00	0.00	88.86	0.00
14	3 375	3 379	**18.86**	104.0	3.00	81.57	6.58	0.00	0.00	0.00	88.15	0.00

Sum 35.87

Noise sensitive area: D Vainio

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	3 560	3 563	**18.17**	104.0	3.00	82.04	6.80	0.00	0.00	0.00	88.84	0.00
2	3 246	3 250	**19.36**	104.0	3.00	81.24	6.41	0.00	0.00	0.00	87.65	0.00
3	2 452	2 456	**22.88**	104.0	3.00	78.81	5.32	0.00	0.00	0.00	84.13	0.00
4	2 811	2 816	**21.19**	104.0	3.00	79.99	5.83	0.00	0.00	0.00	85.82	0.00
5	1 219	1 227	**30.97**	104.0	3.00	72.77	3.26	0.00	0.00	0.00	76.04	0.00
6	1 442	1 449	**29.11**	104.0	3.00	74.22	3.68	0.00	0.00	0.00	77.90	0.00
7	1 777	1 784	**26.72**	104.0	3.00	76.03	4.26	0.00	0.00	0.00	80.29	0.00
8	3 562	3 565	**18.16**	104.0	3.00	82.04	6.81	0.00	0.00	0.00	88.85	0.00
9	2 615	2 620	**22.09**	104.0	3.00	79.37	5.56	0.00	0.00	0.00	84.93	0.00
10	2 782	2 787	**21.32**	104.0	3.00	79.90	5.79	0.00	0.00	0.00	85.69	0.00
11	3 118	3 122	**19.88**	104.0	3.00	80.89	6.24	0.00	0.00	0.00	87.13	0.00
12	2 928	2 932	**20.68**	104.0	3.00	80.34	5.99	0.00	0.00	0.00	86.34	0.00
13	3 462	3 466	**18.53**	104.0	3.00	81.80	6.68	0.00	0.00	0.00	88.48	0.00
14	3 242	3 246	**19.38**	104.0	3.00	81.23	6.41	0.00	0.00	0.00	87.63	0.00

Sum 35.74

Noise sensitive area: E Rantavainio_holiday

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	4 389	4 392	**15.40**	104.0	3.00	83.85	7.76	0.00	0.00	0.00	91.61	0.00
2	3 995	3 998	**16.65**	104.0	3.00	83.04	7.32	0.00	0.00	0.00	90.36	0.00
3	3 170	3 174	**19.67**	104.0	3.00	81.03	6.31	0.00	0.00	0.00	87.34	0.00
4	3 542	3 546	**18.23**	104.0	3.00	82.00	6.78	0.00	0.00	0.00	88.78	0.00
5	1 731	1 737	**27.03**	104.0	3.00	75.80	4.19	0.00	0.00	0.00	79.98	0.00
6	2 086	2 091	**24.84**	104.0	3.00	77.41	4.76	0.00	0.00	0.00	82.17	0.00
7	2 490	2 495	**22.69**	104.0	3.00	78.94	5.38	0.00	0.00	0.00	84.32	0.00
8	4 323	4 326	**15.60**	104.0	3.00	83.72	7.69	0.00	0.00	0.00	91.41	0.00
9	3 427	3 431	**18.66**	104.0	3.00	81.71	6.64	0.00	0.00	0.00	88.35	0.00
10	3 554	3 558	**18.19**	104.0	3.00	82.02	6.80	0.00	0.00	0.00	88.82	0.00
11	3 903	3 907	**16.96**	104.0	3.00	82.84	7.22	0.00	0.00	0.00	90.05	0.00
12	3 747	3 751	**17.50**	104.0	3.00	82.48	7.03	0.00	0.00	0.00	89.51	0.00
13	4 257	4 260	**15.81**	104.0	3.00	83.59	7.62	0.00	0.00	0.00	91.20	0.00
14	4 067	4 070	**16.41**	104.0	3.00	83.19	7.40	0.00	0.00	0.00	90.60	0.00

Sum 32.04

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DECIBEL - Detailed results

Calculation: Decibel_maxlayout_14WTG_EIAR_KJ **Noise calculation model:** ISO 9613-2 General 8.0 m/s

Noise sensitive area: F Kivitolppa_holiday

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	4 612	4 615	**14.73**	104.0	3.00	84.28	8.00	0.00	0.00	0.00	92.28	0.00
2	3 842	3 846	**17.17**	104.0	3.00	82.70	7.14	0.00	0.00	0.00	89.84	0.00
3	3 055	3 059	**20.14**	104.0	3.00	80.71	6.16	0.00	0.00	0.00	86.87	0.00
4	3 395	3 399	**18.78**	104.0	3.00	81.63	6.60	0.00	0.00	0.00	88.23	0.00
5	1 729	1 735	**27.04**	104.0	3.00	75.78	4.18	0.00	0.00	0.00	79.97	0.00
6	2 139	2 144	**24.54**	104.0	3.00	77.62	4.85	0.00	0.00	0.00	82.47	0.00
7	2 555	2 560	**22.37**	104.0	3.00	79.16	5.47	0.00	0.00	0.00	84.64	0.00
8	4 179	4 182	**16.05**	104.0	3.00	83.43	7.53	0.00	0.00	0.00	90.96	0.00
9	3 662	3 665	**17.80**	104.0	3.00	82.28	6.93	0.00	0.00	0.00	89.21	0.00
10	3 570	3 574	**18.13**	104.0	3.00	82.06	6.82	0.00	0.00	0.00	88.88	0.00
11	3 928	3 931	**16.88**	104.0	3.00	82.89	7.24	0.00	0.00	0.00	90.14	0.00
12	3 977	3 981	**16.71**	104.0	3.00	83.00	7.30	0.00	0.00	0.00	90.30	0.00
13	4 280	4 283	**15.73**	104.0	3.00	83.64	7.64	0.00	0.00	0.00	91.28	0.00
14	4 294	4 297	**15.69**	104.0	3.00	83.66	7.66	0.00	0.00	0.00	91.32	0.00

Sum 31.93

Noise sensitive area: G Rianperkkiö

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	**21.19**	104.0	3.00	79.99	5.83	0.00	0.00	0.00	85.82	0.00
2	3 092	3 096	**19.99**	104.0	3.00	80.81	6.21	0.00	0.00	0.00	87.02	0.00
3	2 649	2 653	**21.93**	104.0	3.00	79.47	5.60	0.00	0.00	0.00	85.08	0.00
4	2 846	2 849	**21.04**	104.0	3.00	80.10	5.88	0.00	0.00	0.00	85.97	0.00
5	2 490	2 493	**22.70**	104.0	3.00	78.93	5.37	0.00	0.00	0.00	84.31	0.00
6	2 327	2 331	**23.53**	104.0	3.00	78.35	5.13	0.00	0.00	0.00	83.48	0.00
7	2 275	2 279	**23.80**	104.0	3.00	78.15	5.06	0.00	0.00	0.00	83.21	0.00
8	3 284	3 287	**19.22**	104.0	3.00	81.34	6.46	0.00	0.00	0.00	87.79	0.00
9	2 243	2 248	**23.97**	104.0	3.00	78.03	5.01	0.00	0.00	0.00	83.04	0.00
10	2 620	2 624	**22.07**	104.0	3.00	79.38	5.56	0.00	0.00	0.00	84.94	0.00
11	2 789	2 793	**21.29**	104.0	3.00	79.92	5.80	0.00	0.00	0.00	85.72	0.00
12	2 403	2 408	**23.13**	104.0	3.00	78.63	5.25	0.00	0.00	0.00	83.88	0.00
13	3 005	3 009	**20.35**	104.0	3.00	80.57	6.09	0.00	0.00	0.00	86.66	0.00
14	2 594	2 598	**22.19**	104.0	3.00	79.29	5.53	0.00	0.00	0.00	84.82	0.00

Sum 33.57

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Calculated:
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DECIBEL - Assumptions for noise calculation

Calculation: Decibel_maxlayout_14WTG_EIAR_KJ **Noise 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 [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	1.0	1.9	3.7	9.7	32.8	117.0

WTG: ENERCON E-82 E2 2300 82.0 !O!
Noise: Level 0 - man.spec. - Op.Mode I - 04/2010

Source	Source/Date	Creator	Edited
Enercon	2.4.2010	EMD	4.5.2010 14:27

According to manufacturer specification SIAS-04-SPL E-82 E2 OM I 2,3MW Rev1_0-ger-ger.pdf

						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]
User value	138.4	95% rated power	104.0	No	Generic data	85.6	92.6	96.0	98.6	98.4	95.5	90.7	81.2

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

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Calculated:
28.7.2011 11:03/2.7.486

DECIBEL - Assumptions for noise calculation

Calculation: Decibel_maxlayout_14WTG_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

WindPRO version 2.7.486 Jan 2011

Project:
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Calculated:
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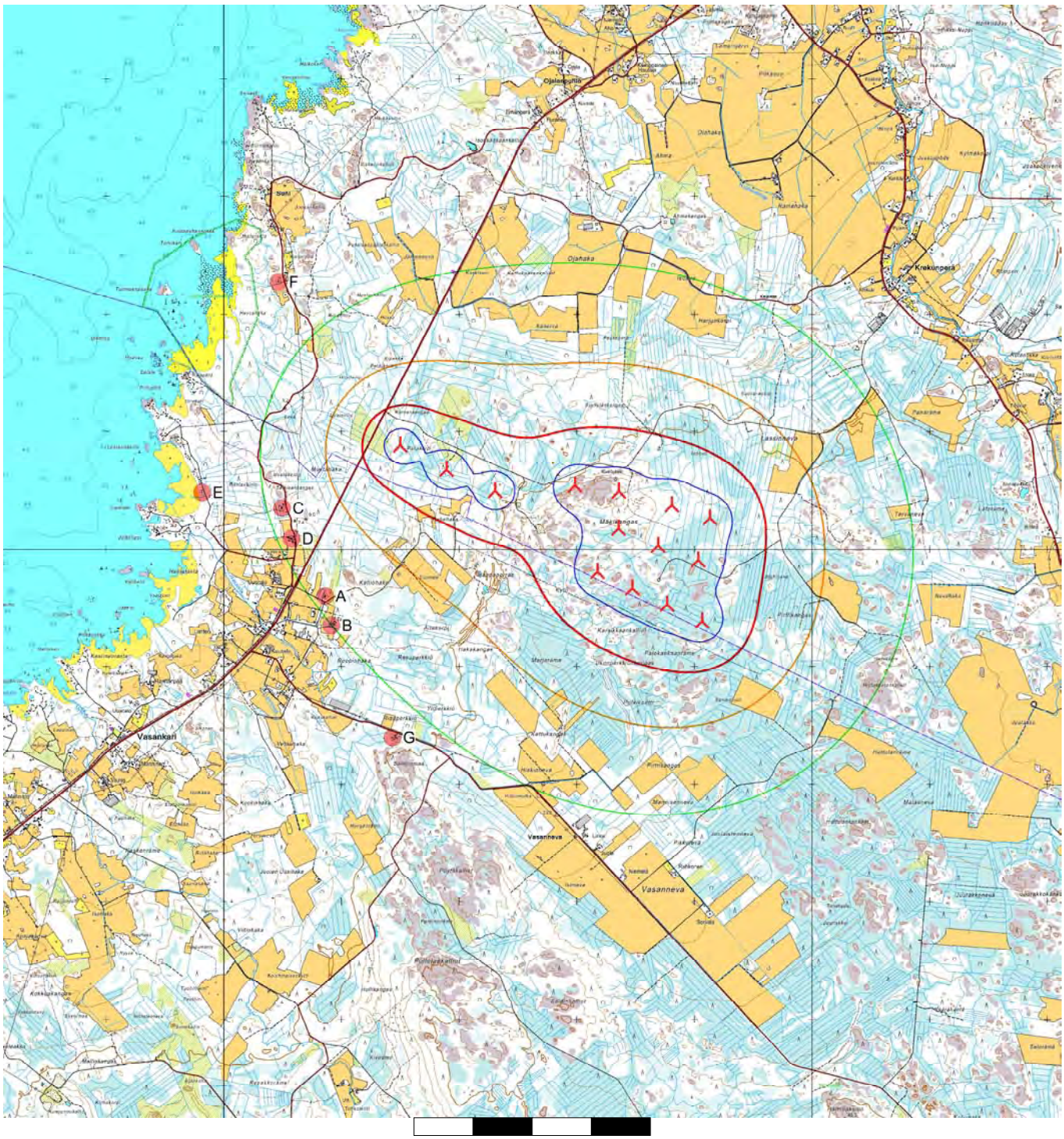
DECIBEL - Map 95% rated power

Calculation: Decibel_maxlayout_14WTG_EIAR_KJ **Noise calculation model:** ISO 9613-2 General 8.0 m/s



0 500 1000 1500 2000 m

Map: , Print scale 1:50 000, Map center KKJ Finland Zone: 2 East: 2 502 998 North: 7 140 103

Noise calculation model: ISO 9613-2 General. Wind speed: 95% rated power

New WTG Noise sensitive area

Height above sea level from active line object

35.0 dB(A) 40.0 dB(A) 45.0 dB(A) 50.0 dB(A) 55.0 dB(A)

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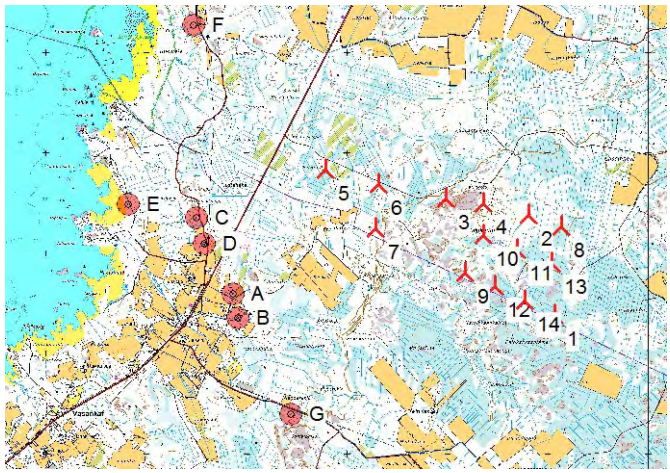
DECIBEL - Main Result

Calculation: E82 road shift

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)



Scale 1:75,000

New WTG Noise sensitive area

WTGs

	KKJ Zone: 2 East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Noise data Creator	Name	Wind speed	Hub height	LwA,ref	Pure tones	Octave data	
	KKJ Zone: 2		[m]					[kW]	[m]	[m]			[m/s]	[m]	[dB(A)]			
1	2,504,067	7,139,390	25.0	WTG 01	Yes	ENERCON	E-82 E2-2,300	2,300	82.0	138.4	EMD	Level 0 - man.spec. - Op.Mode I - 04/2010	(95%)	138.4	104.0	No	Generic	*)
2	2,503,811	7,140,379	25.3	WTG 02	Yes	ENERCON	E-82 E2-2,300	2,300	82.0	138.4	EMD	Level 0 - man.spec. - Op.Mode I - 04/2010	(95%)	138.4	104.0	No	Generic	*)
3	2,502,987	7,140,546	22.4	WTG 03	Yes	ENERCON	E-82 E2-2,300	2,300	82.0	138.4	EMD	Level 0 - man.spec. - Op.Mode I - 04/2010	(95%)	138.4	104.0	No	Generic	*)
4	2,503,360	7,140,495	30.0	WTG 04	Yes	ENERCON	E-82 E2-2,300	2,300	82.0	138.4	EMD	Level 0 - man.spec. - Op.Mode I - 04/2010	(95%)	138.4	104.0	No	Generic	*)
5	2,501,781	7,140,832	12.8	WTG 05	Yes	ENERCON	E-82 E2-2,300	2,300	82.0	138.4	EMD	Level 0 - man.spec. - Op.Mode I - 04/2010	(95%)	138.4	104.0	No	Generic	*)
6	2,502,310	7,140,691	16.9	WTG 06	Yes	ENERCON	E-82 E2-2,300	2,300	82.0	138.4	EMD	Level 0 - man.spec. - Op.Mode I - 04/2010	(95%)	138.4	104.0	No	Generic	*)
7	2,502,279	7,140,244	19.5	WTG 07	Yes	ENERCON	E-82 E2-2,300	2,300	82.0	138.4	EMD	Level 0 - man.spec. - Op.Mode I - 04/2010	(95%)	138.4	104.0	No	Generic	*)
8	2,504,135	7,140,268	24.7	WTG 08	Yes	ENERCON	E-82 E2-2,300	2,300	82.0	138.4	EMD	Level 0 - man.spec. - Op.Mode I - 04/2010	(95%)	138.4	104.0	No	Generic	*)
9	2,503,178	7,139,811	30.0	WTG 09	Yes	ENERCON	E-82 E2-2,300	2,300	82.0	138.4	EMD	Level 0 - man.spec. - Op.Mode I - 04/2010	(95%)	138.4	104.0	No	Generic	*)
10	2,503,358	7,140,178	30.0	WTG 10	Yes	ENERCON	E-82 E2-2,300	2,300	82.0	138.4	EMD	Level 0 - man.spec. - Op.Mode I - 04/2010	(95%)	138.4	104.0	No	Generic	*)
11	2,503,695	7,140,033	28.2	WTG 11	Yes	ENERCON	E-82 E2-2,300	2,300	82.0	138.4	EMD	Level 0 - man.spec. - Op.Mode I - 04/2010	(95%)	138.4	104.0	No	Generic	*)
12	2,503,475	7,139,670	27.8	WTG 12	Yes	ENERCON	E-82 E2-2,300	2,300	82.0	138.4	EMD	Level 0 - man.spec. - Op.Mode I - 04/2010	(95%)	138.4	104.0	No	Generic	*)
13	2,504,035	7,139,907	26.0	WTG 13	Yes	ENERCON	E-82 E2-2,300	2,300	82.0	138.4	EMD	Level 0 - man.spec. - Op.Mode I - 04/2010	(95%)	138.4	104.0	No	Generic	*)
14	2,503,770	7,139,529	25.0	WTG 14	Yes	ENERCON	E-82 E2-2,300	2,300	82.0	138.4	EMD	Level 0 - man.spec. - Op.Mode I - 04/2010	(95%)	138.4	104.0	No	Generic	*)

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

Calculation Results

Sound Level

Noise sensitive area No.	Name	KKJ Zone: 2 East	North	Z [m]	Imission height [m]	Demands Noise [dB(A)]	Sound Level From WTGs [dB(A)]	Demands fulfilled ? Noise
A	Talus 1	2,500,864	7,139,600	9.9	1.5	50.0	35.2	Yes
B	Talus 2	2,500,916	7,139,352	10.0	1.5	50.0	34.8	Yes
C	Tarkisenkangas	2,500,498	7,140,353	5.0	1.5	50.0	34.7	Yes
D	Vainio	2,500,578	7,140,092	5.9	1.5	50.0	34.8	Yes
E	Rantavainio_holiday	2,499,818	7,140,485	0.9	1.5	40.0	31.2	Yes
F	Kivitolppa_holiday	2,500,468	7,142,273	1.7	1.5	40.0	31.1	Yes
G	Rianperkkiö	2,501,436	7,138,398	18.3	1.5	50.0	33.7	Yes

Distances (m)

WTG	A	B	C	D	E	F	G
1	3211	3152	3697	3560	4389	4612	2812
2	3048	3072	3313	3246	3995	3842	3092
3	2324	2390	2497	2452	3170	3055	2649
4	2652	2698	2866	2811	3542	3395	2846
5	1536	1714	1370	1413	1994	1950	2458
6	1812	1933	1844	1833	2501	2428	2454
7	1555	1629	1785	1708	2473	2720	2029
8	3339	3347	3638	3562	4323	4179	3284
9	2324	2308	2734	2615	3427	3662	2243
10	2561	2578	2866	2782	3554	3570	2620

To be continued on next page...

Project:
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Calculated:
29.02.2012 11:27/2.7.490

DECIBEL - Main Result

Calculation: E82 road shift

...continued from previous page

WTG	A	B	C	D	E	F	G
11	2864	2861	3213	3118	3903	3928	2789
12	2612	2579	3055	2928	3747	3977	2403
13	3186	3168	3565	3462	4257	4280	3005
14	2908	2860	3375	3242	4067	4294	2594

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Calculated:
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DECIBEL - Detailed results

Calculation: E82 road shift**Noise calculation model:** ISO 9613-2 General 8.0 m/s

Assumptions

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

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

Calculation Results

Noise sensitive area: A Talus 1

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	3,211	3,214	**19.49**	104.0	3.00	81.14	6.36	0.00	0.00	0.00	87.50	0.00
2	3,048	3,051	**20.15**	104.0	3.00	80.69	6.15	0.00	0.00	0.00	86.84	0.00
3	2,324	2,329	**23.52**	104.0	3.00	78.34	5.13	0.00	0.00	0.00	83.47	0.00
4	2,652	2,656	**21.90**	104.0	3.00	79.48	5.61	0.00	0.00	0.00	85.09	0.00
5	1,536	1,542	**28.38**	104.0	3.00	74.76	3.85	0.00	0.00	0.00	78.61	0.00
6	1,812	1,817	**26.48**	104.0	3.00	76.19	4.32	0.00	0.00	0.00	80.51	0.00
7	1,555	1,562	**28.24**	104.0	3.00	74.87	3.88	0.00	0.00	0.00	78.75	0.00
8	3,339	3,342	**18.99**	104.0	3.00	81.48	6.53	0.00	0.00	0.00	88.01	0.00
9	2,324	2,329	**23.52**	104.0	3.00	78.34	5.13	0.00	0.00	0.00	83.47	0.00
10	2,561	2,565	**22.33**	104.0	3.00	79.18	5.48	0.00	0.00	0.00	84.66	0.00
11	2,864	2,868	**20.94**	104.0	3.00	80.15	5.90	0.00	0.00	0.00	86.05	0.00
12	2,612	2,616	**22.09**	104.0	3.00	79.35	5.55	0.00	0.00	0.00	84.91	0.00
13	3,186	3,189	**19.59**	104.0	3.00	81.07	6.33	0.00	0.00	0.00	87.41	0.00
14	2,908	2,911	**20.75**	104.0	3.00	80.28	5.96	0.00	0.00	0.00	86.24	0.00

Sum 35.24

Noise sensitive area: B Talus 2

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	3,152	3,155	**19.73**	104.0	3.00	80.98	6.29	0.00	0.00	0.00	87.27	0.00
2	3,072	3,075	**20.05**	104.0	3.00	80.76	6.18	0.00	0.00	0.00	86.94	0.00
3	2,390	2,395	**23.18**	104.0	3.00	78.58	5.23	0.00	0.00	0.00	83.81	0.00
4	2,698	2,702	**21.69**	104.0	3.00	79.63	5.67	0.00	0.00	0.00	85.31	0.00
5	1,714	1,720	**27.13**	104.0	3.00	75.71	4.16	0.00	0.00	0.00	79.87	0.00
6	1,933	1,938	**25.72**	104.0	3.00	76.75	4.52	0.00	0.00	0.00	81.27	0.00
7	1,629	1,636	**27.71**	104.0	3.00	75.27	4.01	0.00	0.00	0.00	79.28	0.00
8	3,347	3,350	**18.95**	104.0	3.00	81.50	6.54	0.00	0.00	0.00	88.04	0.00
9	2,308	2,313	**23.60**	104.0	3.00	78.28	5.11	0.00	0.00	0.00	83.39	0.00
10	2,578	2,583	**22.25**	104.0	3.00	79.24	5.50	0.00	0.00	0.00	84.74	0.00
11	2,861	2,865	**20.95**	104.0	3.00	80.14	5.90	0.00	0.00	0.00	86.04	0.00
12	2,579	2,583	**22.25**	104.0	3.00	79.24	5.50	0.00	0.00	0.00	84.75	0.00
13	3,168	3,171	**19.66**	104.0	3.00	81.02	6.31	0.00	0.00	0.00	87.33	0.00
14	2,860	2,864	**20.96**	104.0	3.00	80.14	5.90	0.00	0.00	0.00	86.04	0.00

Sum 34.79

Project:
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Calculated:
29.02.2012 11:27/2.7.490

DECIBEL - Detailed results

Calculation: E82 road shift**Noise calculation model:** ISO 9613-2 General 8.0 m/s

Noise sensitive area: C Tarkisenkangas

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	3,697	3,700	**17.66**	104.0	3.00	82.36	6.97	0.00	0.00	0.00	89.34	0.00
2	3,313	3,316	**19.08**	104.0	3.00	81.41	6.50	0.00	0.00	0.00	87.91	0.00
3	2,497	2,501	**22.65**	104.0	3.00	78.96	5.39	0.00	0.00	0.00	84.35	0.00
4	2,866	2,870	**20.93**	104.0	3.00	80.16	5.91	0.00	0.00	0.00	86.06	0.00
5	1,370	1,378	**29.66**	104.0	3.00	73.78	3.55	0.00	0.00	0.00	77.33	0.00
6	1,844	1,850	**26.28**	104.0	3.00	76.34	4.37	0.00	0.00	0.00	80.72	0.00
7	1,785	1,791	**26.65**	104.0	3.00	76.06	4.28	0.00	0.00	0.00	80.34	0.00
8	3,638	3,641	**17.87**	104.0	3.00	82.22	6.90	0.00	0.00	0.00	89.12	0.00
9	2,734	2,739	**21.52**	104.0	3.00	79.75	5.73	0.00	0.00	0.00	85.48	0.00
10	2,866	2,870	**20.93**	104.0	3.00	80.16	5.91	0.00	0.00	0.00	86.06	0.00
11	3,213	3,217	**19.48**	104.0	3.00	81.15	6.37	0.00	0.00	0.00	87.52	0.00
12	3,055	3,058	**20.12**	104.0	3.00	80.71	6.16	0.00	0.00	0.00	86.87	0.00
13	3,565	3,568	**18.13**	104.0	3.00	82.05	6.81	0.00	0.00	0.00	88.86	0.00
14	3,375	3,378	**18.85**	104.0	3.00	81.57	6.57	0.00	0.00	0.00	88.15	0.00

Sum 34.65

Noise sensitive area: D Vainio

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	3,560	3,563	**18.15**	104.0	3.00	82.04	6.80	0.00	0.00	0.00	88.84	0.00
2	3,246	3,249	**19.35**	104.0	3.00	81.24	6.41	0.00	0.00	0.00	87.64	0.00
3	2,452	2,456	**22.87**	104.0	3.00	78.80	5.32	0.00	0.00	0.00	84.12	0.00
4	2,811	2,815	**21.17**	104.0	3.00	79.99	5.83	0.00	0.00	0.00	85.82	0.00
5	1,413	1,420	**29.32**	104.0	3.00	74.05	3.63	0.00	0.00	0.00	77.67	0.00
6	1,833	1,839	**26.35**	104.0	3.00	76.29	4.36	0.00	0.00	0.00	80.65	0.00
7	1,708	1,715	**27.16**	104.0	3.00	75.68	4.15	0.00	0.00	0.00	79.83	0.00
8	3,562	3,565	**18.15**	104.0	3.00	82.04	6.81	0.00	0.00	0.00	88.85	0.00
9	2,615	2,620	**22.07**	104.0	3.00	79.37	5.56	0.00	0.00	0.00	84.92	0.00
10	2,782	2,786	**21.30**	104.0	3.00	79.90	5.79	0.00	0.00	0.00	85.69	0.00
11	3,118	3,121	**19.86**	104.0	3.00	80.89	6.24	0.00	0.00	0.00	87.13	0.00
12	2,928	2,932	**20.66**	104.0	3.00	80.34	5.99	0.00	0.00	0.00	86.33	0.00
13	3,462	3,465	**18.52**	104.0	3.00	81.79	6.68	0.00	0.00	0.00	88.48	0.00
14	3,242	3,246	**19.36**	104.0	3.00	81.23	6.41	0.00	0.00	0.00	87.63	0.00

Sum 34.79

Noise sensitive area: E Rantavainio_holiday

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	4,389	4,391	**15.38**	104.0	3.00	83.85	7.76	0.00	0.00	0.00	91.61	0.00
2	3,995	3,997	**16.64**	104.0	3.00	83.04	7.32	0.00	0.00	0.00	90.36	0.00
3	3,170	3,173	**19.65**	104.0	3.00	81.03	6.31	0.00	0.00	0.00	87.34	0.00
4	3,542	3,546	**18.22**	104.0	3.00	81.99	6.78	0.00	0.00	0.00	88.78	0.00
5	1,994	2,000	**25.36**	104.0	3.00	77.02	4.62	0.00	0.00	0.00	81.64	0.00
6	2,501	2,506	**22.62**	104.0	3.00	78.98	5.39	0.00	0.00	0.00	84.37	0.00
7	2,473	2,478	**22.76**	104.0	3.00	78.88	5.35	0.00	0.00	0.00	84.23	0.00
8	4,323	4,325	**15.58**	104.0	3.00	83.72	7.69	0.00	0.00	0.00	91.41	0.00
9	3,427	3,431	**18.65**	104.0	3.00	81.71	6.64	0.00	0.00	0.00	88.35	0.00
10	3,554	3,557	**18.17**	104.0	3.00	82.02	6.80	0.00	0.00	0.00	88.82	0.00
11	3,903	3,906	**16.94**	104.0	3.00	82.84	7.22	0.00	0.00	0.00	90.05	0.00
12	3,747	3,750	**17.48**	104.0	3.00	82.48	7.03	0.00	0.00	0.00	89.51	0.00
13	4,257	4,259	**15.79**	104.0	3.00	83.59	7.62	0.00	0.00	0.00	91.20	0.00
14	4,067	4,069	**16.40**	104.0	3.00	83.19	7.40	0.00	0.00	0.00	90.59	0.00

Sum 31.19

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DECIBEL - Detailed results

Calculation: E82 road shift**Noise calculation model:** ISO 9613-2 General 8.0 m/s

Noise sensitive area: F Kivitolppa_holiday

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	4,612	4,614	**14.71**	104.0	3.00	84.28	8.00	0.00	0.00	0.00	92.28	0.00
2	3,842	3,845	**17.15**	104.0	3.00	82.70	7.14	0.00	0.00	0.00	89.84	0.00
3	3,055	3,058	**20.12**	104.0	3.00	80.71	6.16	0.00	0.00	0.00	86.87	0.00
4	3,395	3,399	**18.77**	104.0	3.00	81.63	6.60	0.00	0.00	0.00	88.23	0.00
5	1,950	1,955	**25.62**	104.0	3.00	76.82	4.55	0.00	0.00	0.00	81.37	0.00
6	2,428	2,433	**22.99**	104.0	3.00	78.72	5.29	0.00	0.00	0.00	84.01	0.00
7	2,720	2,724	**21.59**	104.0	3.00	79.70	5.70	0.00	0.00	0.00	85.41	0.00
8	4,179	4,182	**16.04**	104.0	3.00	83.43	7.53	0.00	0.00	0.00	90.96	0.00
9	3,662	3,665	**17.78**	104.0	3.00	82.28	6.93	0.00	0.00	0.00	89.21	0.00
10	3,570	3,573	**18.12**	104.0	3.00	82.06	6.82	0.00	0.00	0.00	88.88	0.00
11	3,928	3,931	**16.86**	104.0	3.00	82.89	7.24	0.00	0.00	0.00	90.13	0.00
12	3,977	3,980	**16.70**	104.0	3.00	83.00	7.30	0.00	0.00	0.00	90.30	0.00
13	4,280	4,283	**15.72**	104.0	3.00	83.63	7.64	0.00	0.00	0.00	91.28	0.00
14	4,294	4,296	**15.67**	104.0	3.00	83.66	7.66	0.00	0.00	0.00	91.32	0.00

Sum 31.15

Noise sensitive area: G Rianperkkiö

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	2,815	**21.17**	104.0	3.00	79.99	5.83	0.00	0.00	0.00	85.82	0.00
2	3,092	3,095	**19.97**	104.0	3.00	80.81	6.21	0.00	0.00	0.00	87.02	0.00
3	2,649	2,652	**21.92**	104.0	3.00	79.47	5.60	0.00	0.00	0.00	85.08	0.00
4	2,846	2,849	**21.02**	104.0	3.00	80.09	5.88	0.00	0.00	0.00	85.97	0.00
5	2,458	2,461	**22.84**	104.0	3.00	78.82	5.33	0.00	0.00	0.00	84.15	0.00
6	2,454	2,458	**22.86**	104.0	3.00	78.81	5.32	0.00	0.00	0.00	84.13	0.00
7	2,029	2,034	**25.15**	104.0	3.00	77.17	4.67	0.00	0.00	0.00	81.84	0.00
8	3,284	3,286	**19.20**	104.0	3.00	81.33	6.46	0.00	0.00	0.00	87.79	0.00
9	2,243	2,247	**23.95**	104.0	3.00	78.03	5.01	0.00	0.00	0.00	83.04	0.00
10	2,620	2,623	**22.05**	104.0	3.00	79.38	5.56	0.00	0.00	0.00	84.94	0.00
11	2,789	2,792	**21.28**	104.0	3.00	79.92	5.80	0.00	0.00	0.00	85.72	0.00
12	2,403	2,407	**23.12**	104.0	3.00	78.63	5.25	0.00	0.00	0.00	83.88	0.00
13	3,005	3,008	**20.33**	104.0	3.00	80.57	6.09	0.00	0.00	0.00	86.66	0.00
14	2,594	2,598	**22.18**	104.0	3.00	79.29	5.53	0.00	0.00	0.00	84.82	0.00

Sum 33.67

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DECIBEL - Assumptions for noise calculation

Calculation: E82 road shift**Noise 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 [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	1.0	1.9	3.7	9.7	32.8	117.0

WTG: ENERCON E-82 E2 2300 82.0 !O!
Noise: Level 0 - man.spec. - Op.Mode I - 04/2010

Source	Source/Date	Creator	Edited
Enercon	02.04.2010	EMD	04.05.2010 14:27

According to manufacturer specification SIAS-04-SPL E-82 E2 OM I 2,3MW Rev1_0-ger-ger.pdf

						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	138.4	95% rated power	104.0	No	Generic data	85.6	92.6	96.0	98.6	98.4	95.5	90.7	81.2

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

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DECIBEL - Assumptions for noise calculation

Calculation: E82 road shift**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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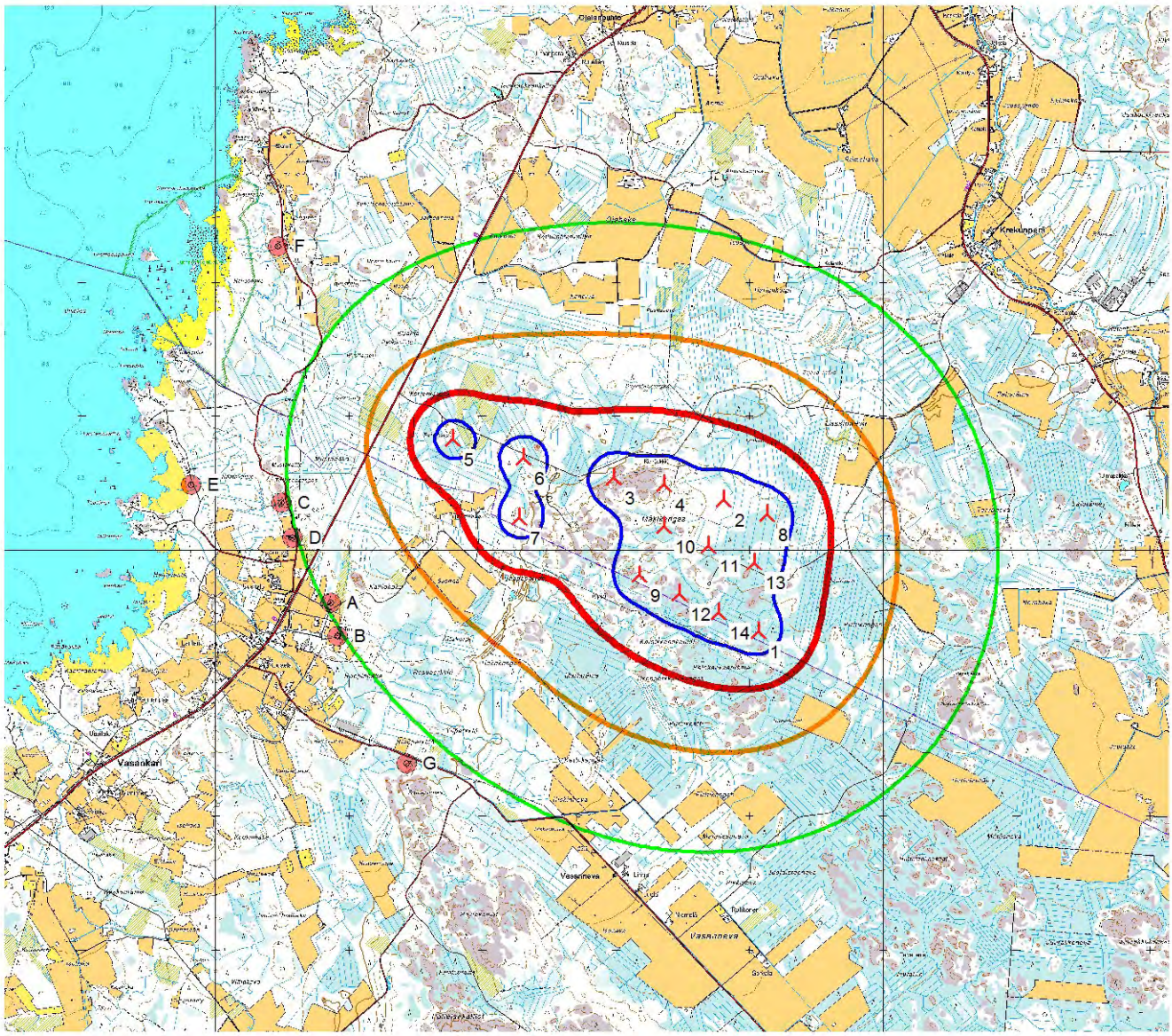
DECIBEL - Map 95% rated power

Calculation: E82 road shift**Noise calculation model:** ISO 9613-2 General 8.0 m/s



0 500 1000 1500 2000 m

Map: , Print scale 1:50,000, Map center KKJ Finland Zone: 2 East: 2,503,138 North: 7,140,075

Noise calculation model: ISO 9613-2 General. Wind speed: 95% rated power

New WTG | Noise sensitive area

Height above sea level from active line object

35.0 dB(A) | 40.0 dB(A) | 45.0 dB(A) | 50.0 dB(A) | 55.0 dB(A)

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SHADOW - Main Result

Calculation: Shadow_minlayout_11WTG_realcase_EIAR_KJ

Assumptions for shadow calculations

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

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

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.87	2.43	4.19	6.53	9.29	9.73	8.81	6.71	4.53	2.45	1.03	0.48

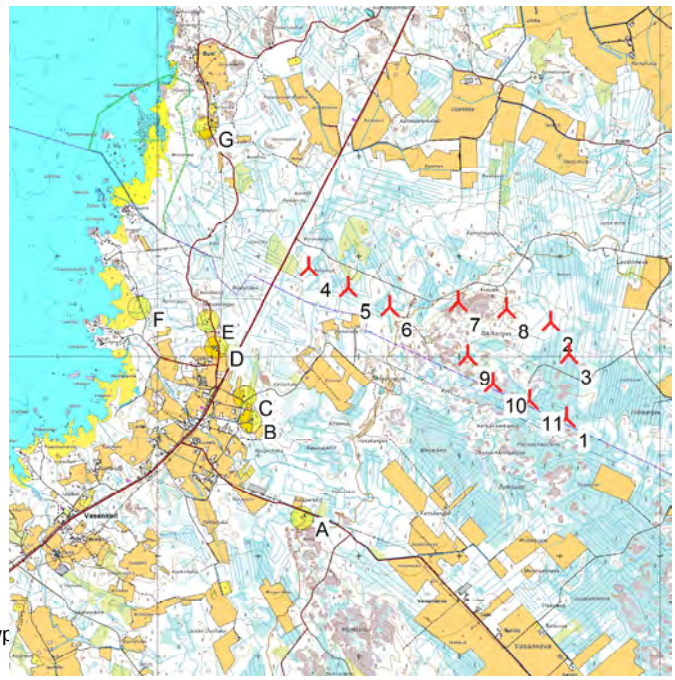
Operational hours are calculated from WTGs in calculation and wind distribution:
Default Meteo data description

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
772	532	339	400	596	801	887	1 191	1 601	604	483	506	8 712

Idle start wind speed: Cut in wind speed from power curve

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:
Height contours used: Height Contours: CONTOURLINE_ONLINEDATA_0.wp
Obstacles not used in calculation
Eye height: 1.5 m
Grid resolution: 10 m



Scale 1:75 000
New WTG
Shadow receptor

WTGs

	KKJ Zone: 2 East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
	KKJ Zone: 2		[m]					[kW]	[m]	[m]	[m]	[RPM]
1	2 504 067	7 139 390	25.0	WTG 7	Yes	ENERCON	E-101-3 000	3 000	101.0	135.4	2 214	14.5
2	2 503 910	7 140 349	25.0	WTG 9	Yes	ENERCON	E-101-3 000	3 000	101.0	135.4	2 214	14.5
3	2 504 094	7 140 025	25.2	WTG 8	Yes	ENERCON	E-101-3 000	3 000	101.0	135.4	2 214	14.5
4	2 501 501	7 140 887	10.0	WTG 1	Yes	ENERCON	E-101-3 000	3 000	101.0	135.4	2 214	14.5
5	2 501 894	7 140 680	14.0	WTG 2	Yes	ENERCON	E-101-3 000	3 000	101.0	135.4	2 214	14.5
6	2 502 308	7 140 499	18.3	WTG 3	Yes	ENERCON	E-101-3 000	3 000	101.0	135.4	2 214	14.5
7	2 502 987	7 140 546	22.4	WTG 11	Yes	ENERCON	E-101-3 000	3 000	101.0	135.4	2 214	14.5
8	2 503 470	7 140 480	28.3	WTG 10	Yes	ENERCON	E-101-3 000	3 000	101.0	135.4	2 214	14.5
9	2 503 083	7 140 015	30.0	WTG 4	Yes	ENERCON	E-101-3 000	3 000	101.0	135.4	2 214	14.5
10	2 503 335	7 139 737	29.8	WTG 5	Yes	ENERCON	E-101-3 000	3 000	101.0	135.4	2 214	14.5
11	2 503 700	7 139 561	25.0	WTG 6	Yes	ENERCON	E-101-3 000	3 000	101.0	135.4	2 214	14.5

Shadow receptor-Input

No.	Name	KKJ Zone: 2 East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
				[m]	[m]	[m]	[m]	[°]	[°]	
A	Rianperkkiö	2 501 436	7 138 392	18.4	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
B	Talus 2	2 500 920	7 139 360	10.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
C	Talus 1	2 500 868	7 139 596	9.9	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
D	Vainio	2 500 580	7 140 093	6.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
E	Tarkisenkangas	2 500 500	7 140 357	5.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
F	Rantavainio_holiday	2 499 816	7 140 485	0.9	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
G	Kivitolppa_holiday	2 500 468	7 142 274	1.7	1.0	1.0	2.0	-180.0	0.0	"Green house mode"

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SHADOW - Main Result

Calculation: Shadow_minlayout_11WTG_realcase_EIAR_KJ

Calculation Results

Shadow receptor

No.	Name	Shadow, expected values: Shadow hours per year [h/year]
A	Rianperkkiö	0:00
B	Talus 2	2:18
C	Talus 1	5:09
D	Vainio	8:09
E	Tarkisenkangas	5:16
F	Rantavainio_holiday	1:17
G	Kivitolppa_holiday	0:52

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	WTG 7	0:00	0:00
2	WTG 9	0:00	0:00
3	WTG 8	0:00	0:00
4	WTG 1	38:16	10:33
5	WTG 2	29:07	7:48
6	WTG 3	16:49	4:41
7	WTG 11	0:00	0:00
8	WTG 10	0:00	0:00
9	WTG 4	0:00	0:00
10	WTG 5	0:00	0:00
11	WTG 6	0:00	0:00

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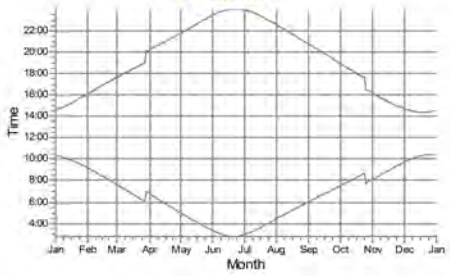
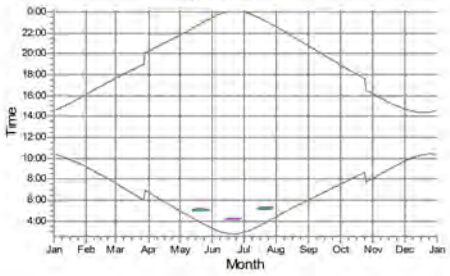
SHADOW - Calendar, graphical

Calculation: Shadow_minlayout_11WTG_realcase_EIAR_KJ

A: Rianperkkiö

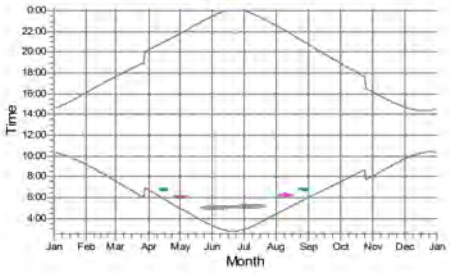


B: Talus 2

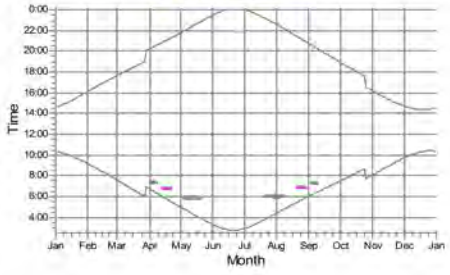


C: Talus 1

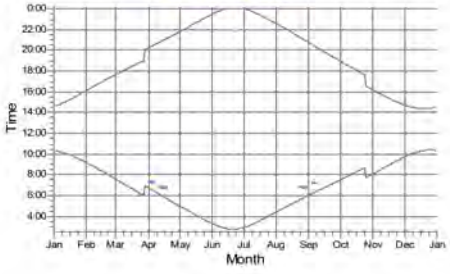
D: Vainio



E: Tarkisenkangas



F: Rantavainio_holiday



WTGs

4: WTG 1 5: WTG 2 6: WTG 3

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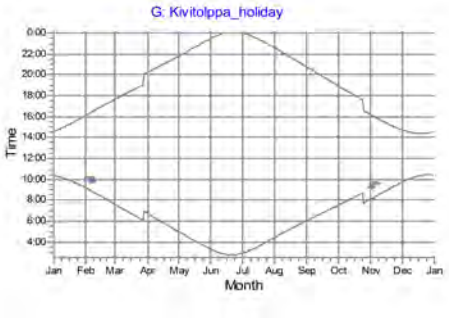
SHADOW - Calendar, graphical

Calculation: Shadow_minlayout_11WTG_realcase_EIAR_KJ



WTGs

4: WTG 1

5: WTG 2

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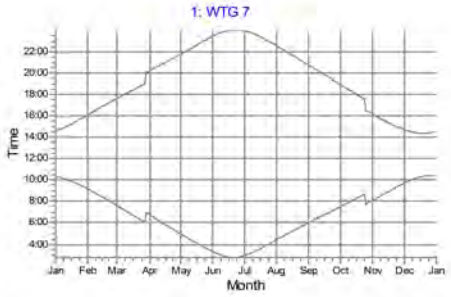
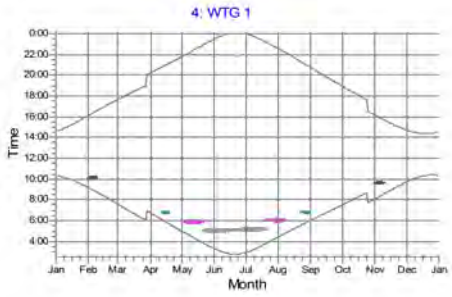
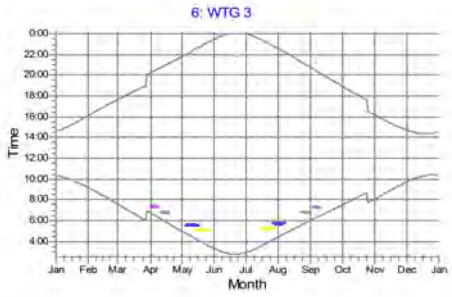
SHADOW - Calendar per WTG, graphical

Calculation: Shadow_minlayout_11WTG_realcase_EIAR_KJ







Shadow receptor

B: Talus 2	D: Vainio	F: Rantavainio_holiday
C: Talus 1	E: Tarkisenkangas	G: Kivitolppa_holiday

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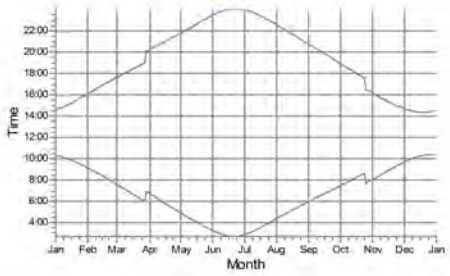
28.7.2011 15:11/2.7.486

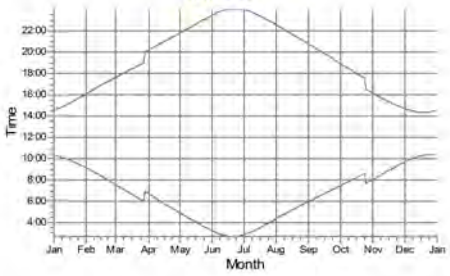
SHADOW - Calendar per WTG, graphical

Calculation: Shadow_minlayout_11WTG_realcase_EIAR_KJ

7: WTG 11



8: WTG 10



9: WTG 4

10: WTG 5

11: WTG 6

Shadow receptor

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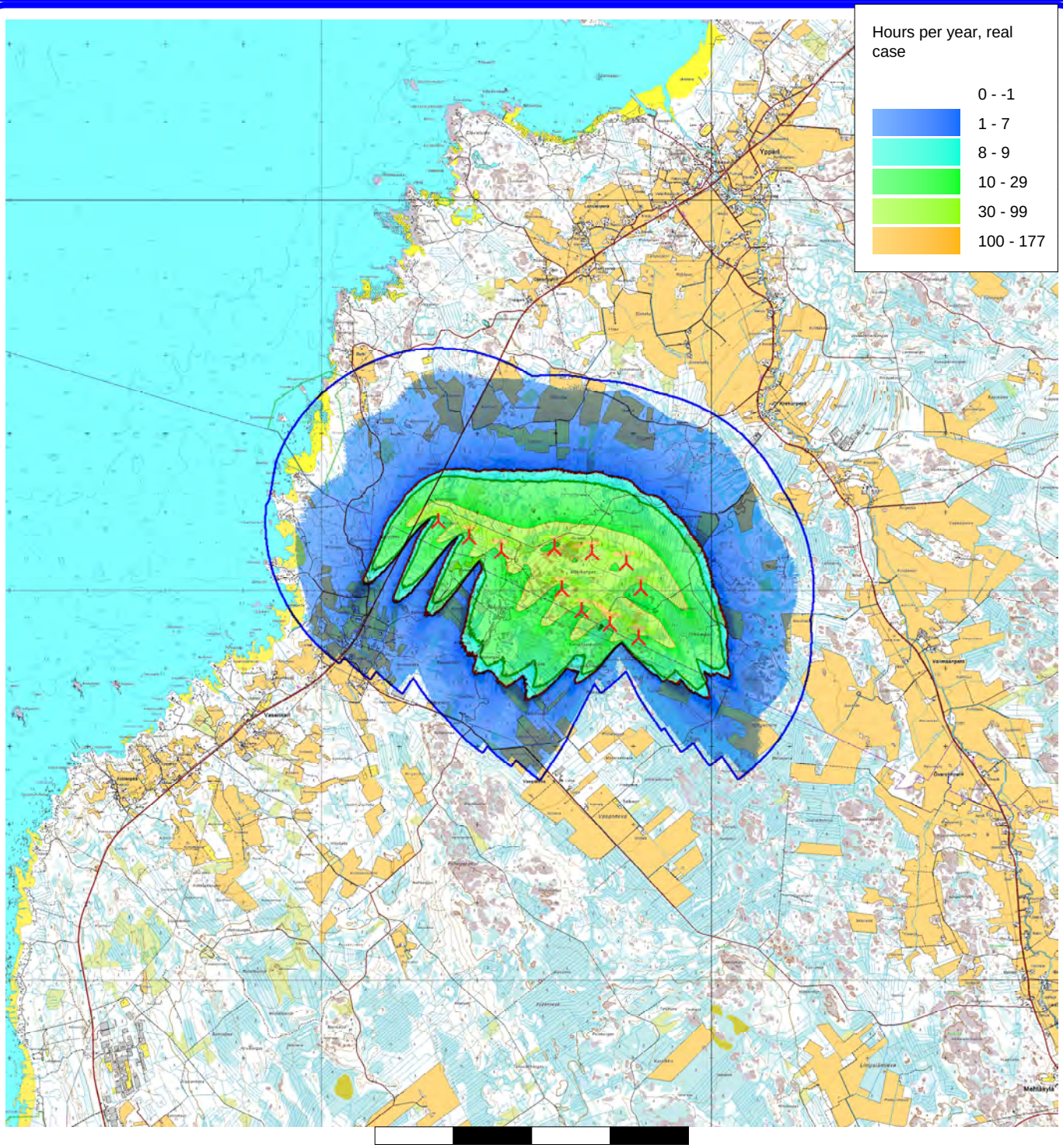
SHADOW - Map

Calculation: Shadow_minlayout_11WTG_realcase_EIAR_KJ



Map: , Print scale 1:75 000, Map center KKJ Finland Zone: 2 East: 2 503 170 North: 7 140 544

New WTG

Isolines showing shadow in Hours per year, real case

0 8 10 30

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Calculated:
28.7.2011 13:03/2.7.486

SHADOW - Main Result

Calculation: Shadow_minlayout_11WTG_worstcase_EIAR_KJ

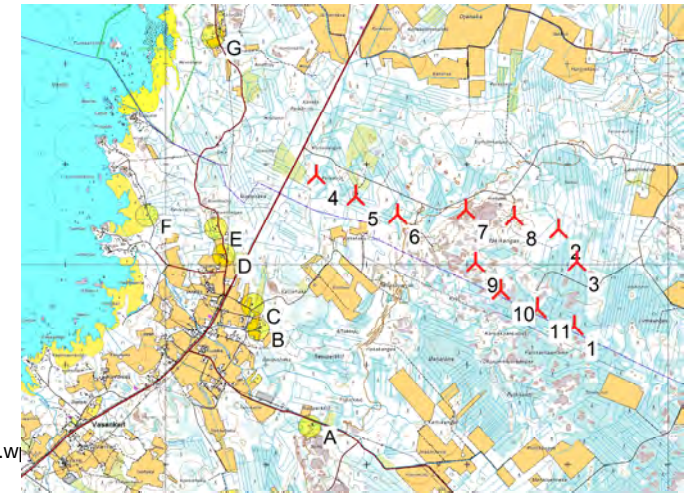
Assumptions for shadow calculations

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

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

The calculated times are "worst case" given by the following assumptions:
- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:
Height contours used: Height Contours: CONTOURLINE_ONLINEDATA_0.wp
Obstacles not used in calculation
Eye height: 1.5 m
Grid resolution: 10 m



Scale 1:75 000

New WTG Shadow receptor

WTGs

	KKJ Zone: 2 East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
	KKJ Zone: 2		[m]					[kW]	[m]	[m]	[m]	[RPM]
1	2 504 067	7 139 390	25.0	WTG 7	Yes	ENERCON	E-101-3 000	3 000	101.0	135.4	2 214	14.5
2	2 503 910	7 140 349	25.0	WTG 9	Yes	ENERCON	E-101-3 000	3 000	101.0	135.4	2 214	14.5
3	2 504 094	7 140 025	25.2	WTG 8	Yes	ENERCON	E-101-3 000	3 000	101.0	135.4	2 214	14.5
4	2 501 501	7 140 887	10.0	WTG 1	Yes	ENERCON	E-101-3 000	3 000	101.0	135.4	2 214	14.5
5	2 501 894	7 140 680	14.0	WTG 2	Yes	ENERCON	E-101-3 000	3 000	101.0	135.4	2 214	14.5
6	2 502 308	7 140 499	18.3	WTG 3	Yes	ENERCON	E-101-3 000	3 000	101.0	135.4	2 214	14.5
7	2 502 987	7 140 546	22.4	WTG 11	Yes	ENERCON	E-101-3 000	3 000	101.0	135.4	2 214	14.5
8	2 503 470	7 140 480	28.3	WTG 10	Yes	ENERCON	E-101-3 000	3 000	101.0	135.4	2 214	14.5
9	2 503 083	7 140 015	30.0	WTG 4	Yes	ENERCON	E-101-3 000	3 000	101.0	135.4	2 214	14.5
10	2 503 335	7 139 737	29.8	WTG 5	Yes	ENERCON	E-101-3 000	3 000	101.0	135.4	2 214	14.5
11	2 503 700	7 139 561	25.0	WTG 6	Yes	ENERCON	E-101-3 000	3 000	101.0	135.4	2 214	14.5

Shadow receptor-Input

No.	Name	KKJ Zone: 2 East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
				[m]	[m]	[m]	[m]	[°]	[°]	
A	Rianperkkiö	2 501 436	7 138 392	18.4	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
B	Talus 2	2 500 920	7 139 360	10.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
C	Talus 1	2 500 868	7 139 596	9.9	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
D	Vainio	2 500 580	7 140 093	6.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
E	Tarkisenkangas	2 500 500	7 140 357	5.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
F	Rantavainio_holiday	2 499 816	7 140 485	0.9	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
G	Kivitolppa_holiday	2 500 468	7 142 274	1.7	1.0	1.0	2.0	-180.0	0.0	"Green house mode"

Calculation Results

Shadow receptor

No.	Name	Shadow, worst case Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
A	Rianperkkiö	0:00	0	0:00
B	Talus 2	7:29	49	0:14
C	Talus 1	17:22	76	0:17

To be continued on next page...

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SHADOW - Main Result

Calculation: Shadow_minlayout_11WTG_worstcase_EIAR_KJ

...continued from previous page

		Shadow, worst case		
No.	Name	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
D	Vainio	28:19	108	0:21
E	Tarkisenkangas	19:28	82	0:22
F	Rantavainio_holiday	5:18	32	0:14
G	Kivitolppa_holiday	6:18	25	0:25

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	WTG 7	0:00	
2	WTG 9	0:00	
3	WTG 8	0:00	
4	WTG 1	38:16	
5	WTG 2	29:07	
6	WTG 3	16:49	
7	WTG 11	0:00	
8	WTG 10	0:00	
9	WTG 4	0:00	
10	WTG 5	0:00	
11	WTG 6	0:00	

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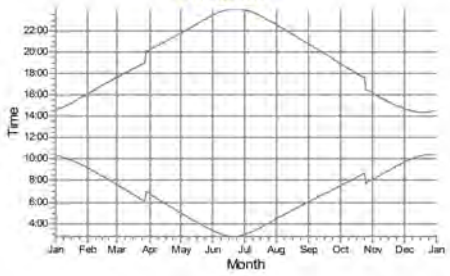
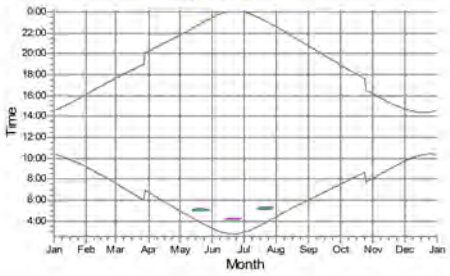
SHADOW - Calendar, graphical

Calculation: Shadow_minlayout_11WTG_worstcase_EIAR_KJ

A: Rianperkkiö

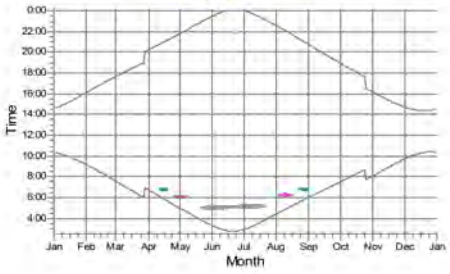


B: Talus 2

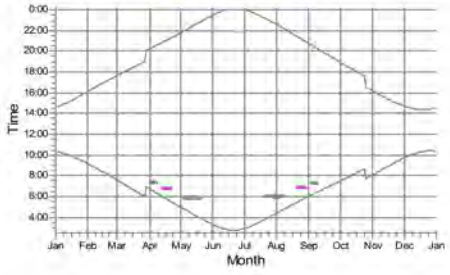


C: Talus 1

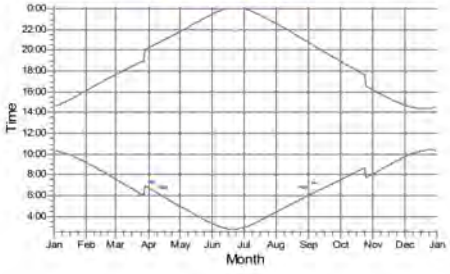
D: Vainio



E: Tarkisenkangas



F: Rantavainio_holiday



WTGs

4: WTG 1 5: WTG 2 6: WTG 3

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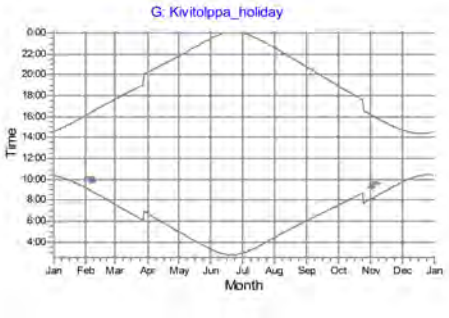
SHADOW - Calendar, graphical

Calculation: Shadow_minlayout_11WTG_worstcase_EIAR_KJ



WTGs

4: WTG 1

5: WTG 2

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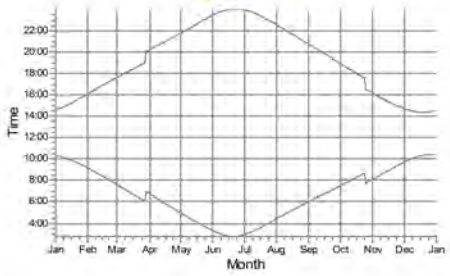
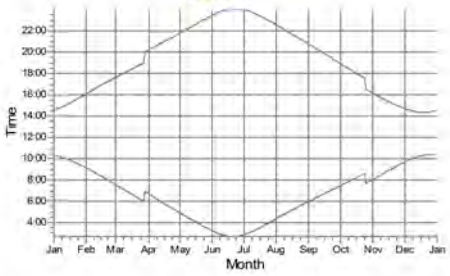
SHADOW - Calendar per WTG, graphical

Calculation: Shadow_minlayout_11WTG_worstcase_EIAR_KJ

1: WTG 7

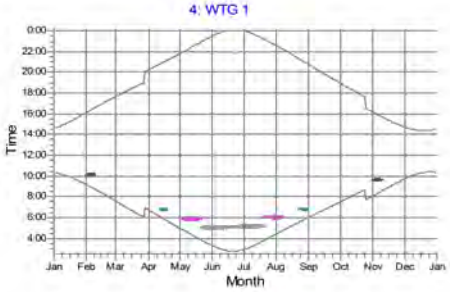


2: WTG 9



3: WTG 8

4: WTG 1



5: WTG 2

6: WTG 3

Shadow receptor

B: Talus 2	D: Vainio	F: Rantavainio_holiday
C: Talus 1	E: Tarkisenkangas	G: Kivitolppa_holiday

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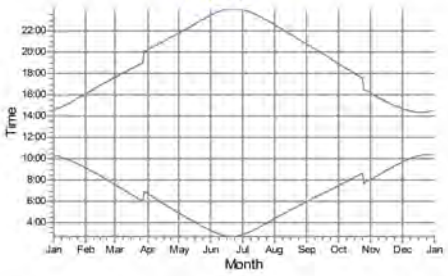
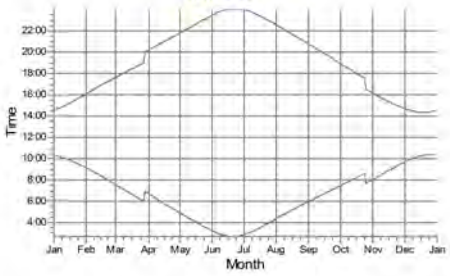
SHADOW - Calendar per WTG, graphical

Calculation: Shadow_minlayout_11WTG_worstcase_EIAR_KJ

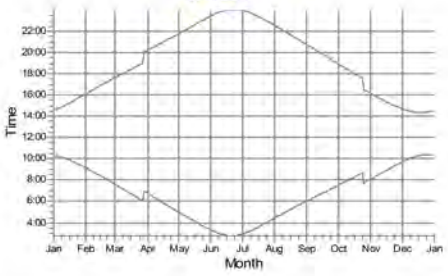
7: WTG 11



8: WTG 10

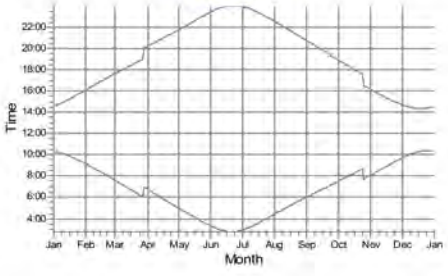


9: WTG 4



10: WTG 5

11: WTG 6



Shadow receptor

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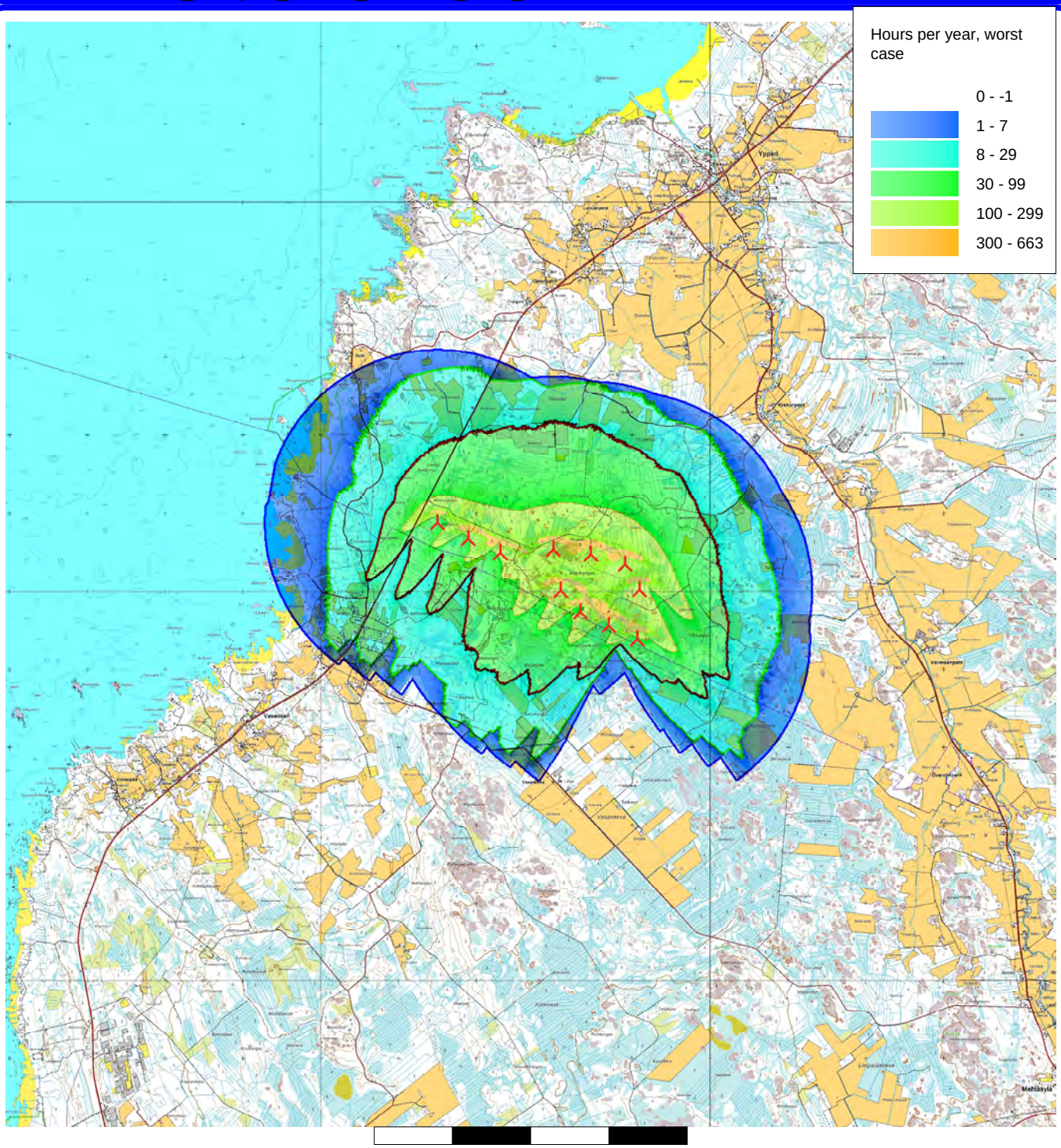
Calculated:
28.7.2011 13:03/2.7.486

SHADOW - Map

Calculation: Shadow_minlayout_11WTG_worstcase_EIAR_KJ



Map: , Print scale 1:75 000, Map center KKJ Finland Zone: 2 East: 2 503 170 North: 7 140 544

New WTG

Isolines showing shadow in Hours per year, worst case

0 8 30 100

Project:
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Calculated:
28.02.2012 10:30/2.7.490

SHADOW - Main Result

Calculation: V112 RC

Assumptions for shadow calculations

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

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

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.87	2.43	4.19	6.53	9.29	9.73	8.81	6.71	4.53	2.45	1.03	0.48

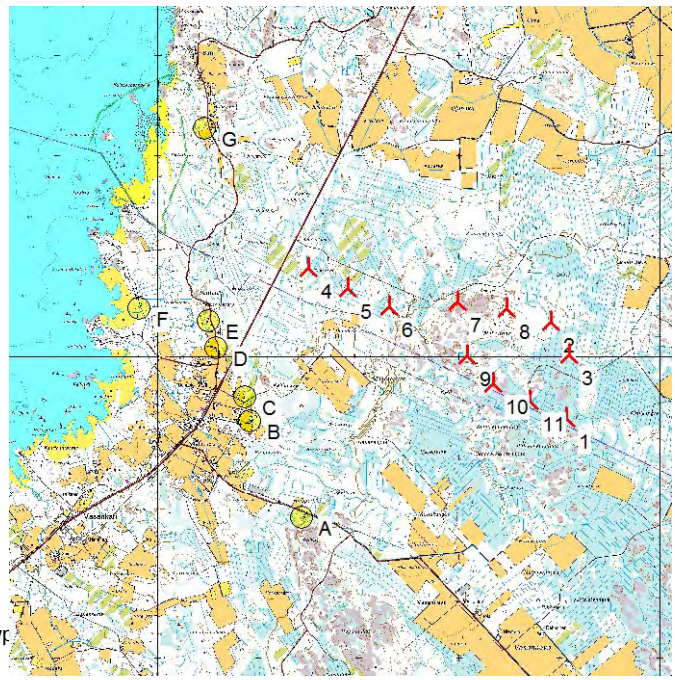
Operational hours are calculated from WTGs in calculation and wind distribution:
Default Meteo data description

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
755	521	331	391	583	784	867	1,165	1,566	591	473	495	8,522

Idle start wind speed: Cut in wind speed from power curve

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:
Height contours used: Height Contours: CONTOURLINE_ONLINEDATA_0.wp
Obstacles not used in calculation
Eye height: 1.5 m
Grid resolution: 10 m



Scale 1:75,000

New WTG Shadow receptor

WTGs

	KKJ Zone: 2 East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
	KKJ Zone: 2		[m]					[kW]	[m]	[m]	[m]	[RPM]
1	2,504,067	7,139,390	25.0	WTG 7	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
2	2,503,910	7,140,349	25.0	WTG 9	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
3	2,504,094	7,140,025	25.2	WTG 8	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
4	2,501,501	7,140,887	10.0	WTG 1	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
5	2,501,894	7,140,680	14.0	WTG 2	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
6	2,502,308	7,140,499	18.3	WTG 3	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
7	2,502,987	7,140,546	22.4	WTG 11	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
8	2,503,470	7,140,480	28.3	WTG 10	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
9	2,503,083	7,140,015	30.0	WTG 4	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
10	2,503,335	7,139,737	29.8	WTG 5	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
11	2,503,700	7,139,561	25.0	WTG 6	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8

Shadow receptor-Input

No.	Name	KKJ Zone: 2 East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
				[m]	[m]	[m]	[m]	[°]	[°]	
A	Rianperkkiö	2,501,436	7,138,392	18.4	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
B	Talus 2	2,500,920	7,139,360	10.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
C	Talus 1	2,500,868	7,139,596	9.9	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
D	Vainio	2,500,580	7,140,093	6.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
E	Tarkisenkangas	2,500,500	7,140,357	5.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
F	Rantavainio_holiday	2,499,816	7,140,485	0.9	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
G	Kivitolppa_holiday	2,500,468	7,142,274	1.7	1.0	1.0	2.0	-180.0	0.0	"Green house mode"

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Calculated:
28.02.2012 10:30/2.7.490

SHADOW - Main Result

Calculation: V112 RC

Calculation Results

Shadow receptor

No.	Name	Shadow, expected values Shadow hours per year [h/year]
A	Rianperkkiö	0:00
B	Talus 2	0:00
C	Talus 1	4:00
D	Vainio	8:22
E	Tarkisenkangas	5:37
F	Rantavainio_holiday	0:00
G	Kivitolppa_holiday	0:00

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	WTG 7	0:00	0:00
2	WTG 9	0:00	0:00
3	WTG 8	0:00	0:00
4	WTG 1	36:21	10:33
5	WTG 2	27:09	7:26
6	WTG 3	0:00	0:00
7	WTG 11	0:00	0:00
8	WTG 10	0:00	0:00
9	WTG 4	0:00	0:00
10	WTG 5	0:00	0:00
11	WTG 6	0:00	0:00

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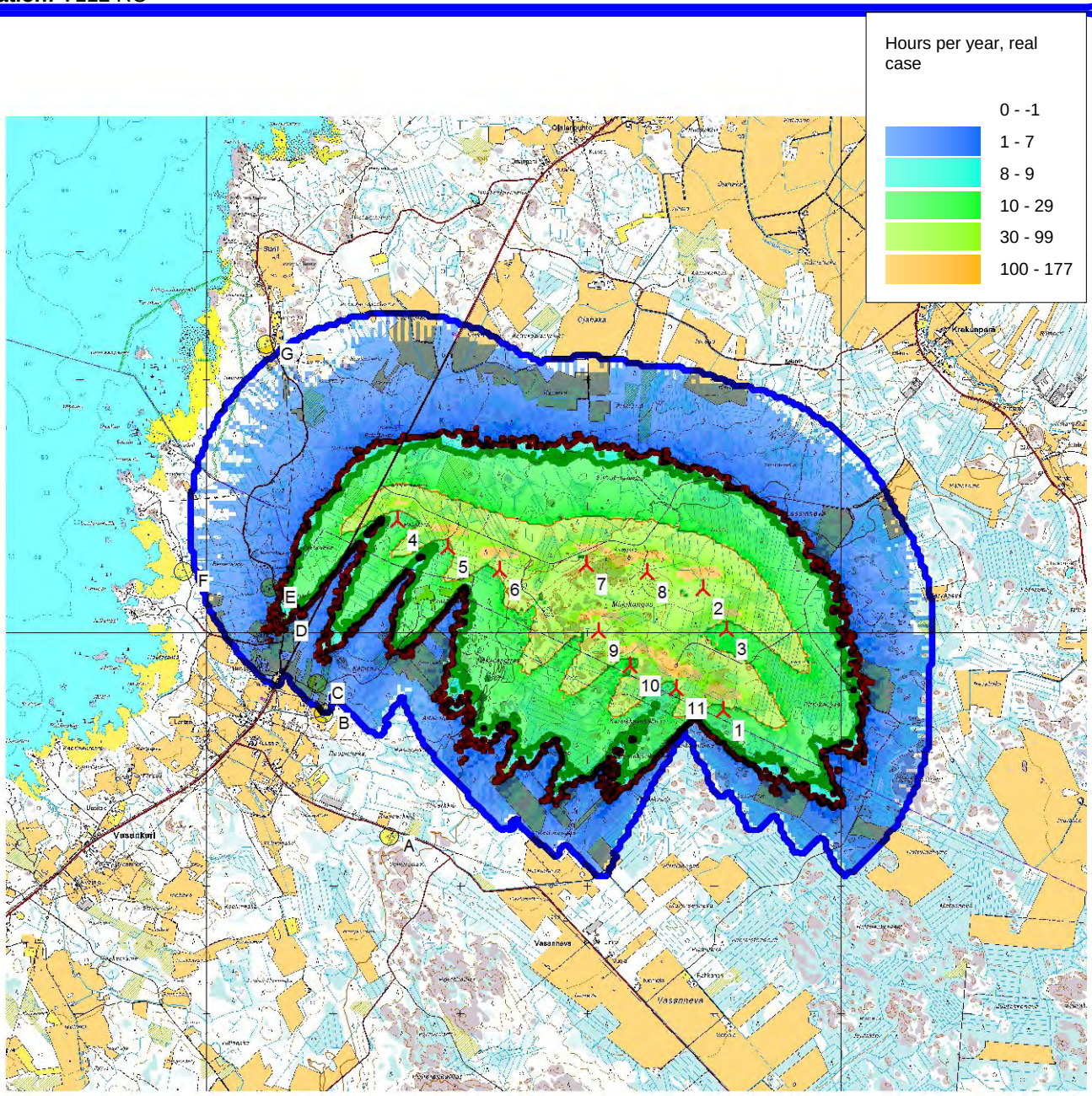
Calculated:
28.02.2012 10:30/2.7.490

SHADOW - Map

Calculation: V112 RC



Map: , Print scale 1:50,000, Map center KKJ Finland Zone: 2 East: 2,502,810 North: 7,140,234

New WTG Shadow receptor

Isolines showing shadow in Hours per year, real case

0 8 10 30

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Calculated:
28.02.2012 10:43/2.7.490

SHADOW - Main Result

Calculation: V112 WC

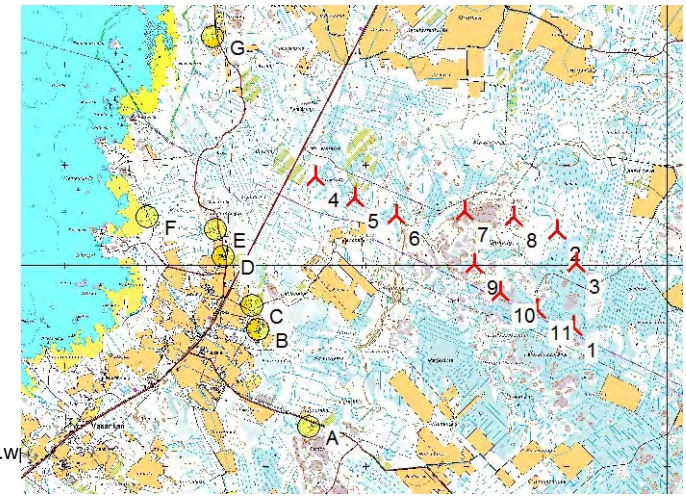
Assumptions for shadow calculations

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

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

The calculated times are "worst case" given by the following assumptions:
- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:
Height contours used: Height Contours: CONTOURLINE_ONLINEDATA_0.wf
Obstacles not used in calculation
Eye height: 1.5 m
Grid resolution: 10 m



Scale 1:75,000

New WTG Shadow receptor

WTGs

	KKJ Zone: 2 East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
	KKJ Zone: 2		[m]					[kW]	[m]	[m]	[m]	[RPM]
1	2,504,067	7,139,390	25.0	WTG 7	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
2	2,503,910	7,140,349	25.0	WTG 9	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
3	2,504,094	7,140,025	25.2	WTG 8	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
4	2,501,501	7,140,887	10.0	WTG 1	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
5	2,501,894	7,140,680	14.0	WTG 2	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
6	2,502,308	7,140,499	18.3	WTG 3	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
7	2,502,987	7,140,546	22.4	WTG 11	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
8	2,503,470	7,140,480	28.3	WTG 10	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
9	2,503,083	7,140,015	30.0	WTG 4	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
10	2,503,335	7,139,737	29.8	WTG 5	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
11	2,503,700	7,139,561	25.0	WTG 6	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8

Shadow receptor-Input

		KKJ Zone: 2 East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
				[m]	[m]	[m]	[m]	[°]	[°]	
A	Rianperkkiö	2,501,436	7,138,392	18.4	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
B	Talus 2	2,500,920	7,139,360	10.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
C	Talus 1	2,500,868	7,139,596	9.9	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
D	Vainio	2,500,580	7,140,093	6.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
E	Tarkisenkangas	2,500,500	7,140,357	5.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
F	Rantavainio_holiday	2,499,816	7,140,485	0.9	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
G	Kivitolppa_holiday	2,500,468	7,142,274	1.7	1.0	1.0	2.0	-180.0	0.0	"Green house mode"

Calculation Results

Shadow receptor

		Shadow, worst case Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
A	Rianperkkiö	0:00	0	0:00
B	Talus 2	0:00	0	0:00
C	Talus 1	13:43	50	0:19

To be continued on next page...

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28.02.2012 10:43/2.7.490

SHADOW - Main Result

Calculation: V112 WC

...continued from previous page

No.	Name	Shadow, worst case Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
D	Vainio	29:12	94	0:23
E	Tarkisenkangas	20:36	73	0:24
F	Rantavainio_holiday	0:00	0	0:00
G	Kivitolppa_holiday	0:00	0	0:00

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	WTG 7	0:00	
2	WTG 9	0:00	
3	WTG 8	0:00	
4	WTG 1	36:21	
5	WTG 2	27:09	
6	WTG 3	0:00	
7	WTG 11	0:00	
8	WTG 10	0:00	
9	WTG 4	0:00	
10	WTG 5	0:00	
11	WTG 6	0:00	

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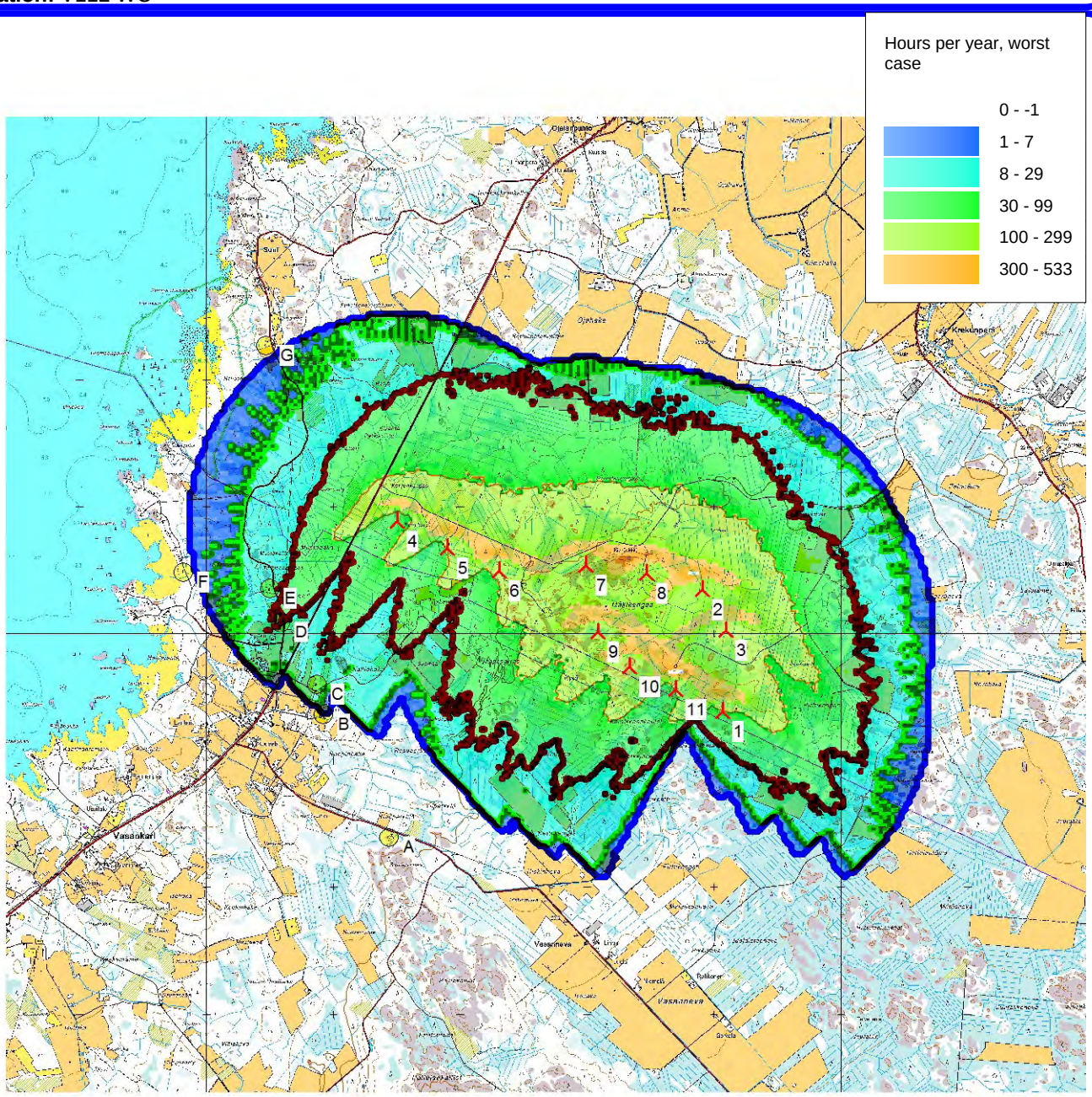
SHADOW - Map

Calculation: V112 WC



0 500 1000 1500 2000 m

Map: , Print scale 1:50,000, Map center KKJ Finland Zone: 2 East: 2,502,810 North: 7,140,234

New WTG Shadow receptor

Isolines showing shadow in Hours per year, worst case

0 8 30 100

Project:
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28.02.2012 18:46/2.7.490

SHADOW - Main Result

Calculation: E101 road shift RC

Assumptions for shadow calculations

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

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

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.87	2.43	4.19	6.53	9.29	9.73	8.81	6.71	4.53	2.45	1.03	0.48

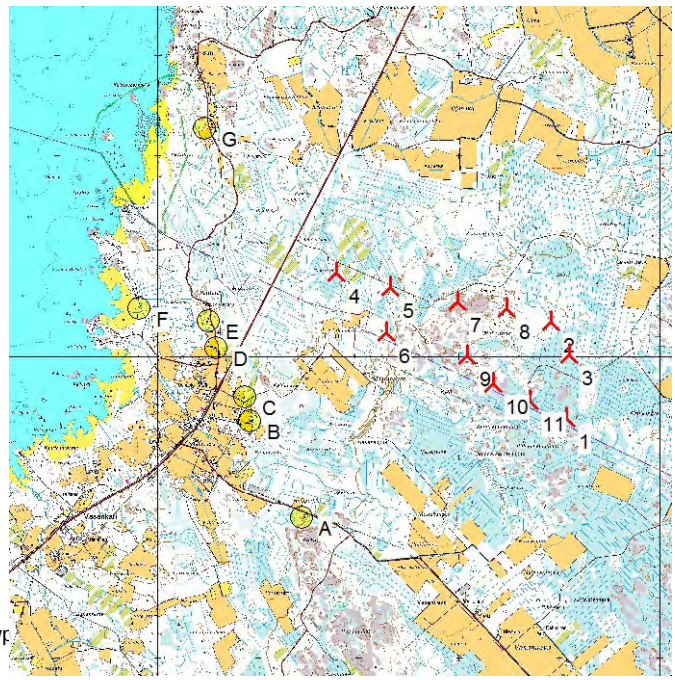
Operational hours are calculated from WTGs in calculation and wind distribution:
Default Meteo data description

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
772	532	339	400	596	801	887	1,191	1,601	604	483	506	8,712

Idle start wind speed: Cut in wind speed from power curve

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:
Height contours used: Height Contours: CONTOURLINE_ONLINEDATA_0.wp
Obstacles not used in calculation
Eye height: 1.5 m
Grid resolution: 10 m



Scale 1:75,000
New WTG
Shadow receptor

WTGs

	KKJ Zone: 2 East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
	KKJ Zone: 2		[m]					[kW]	[m]	[m]	[m]	[RPM]
1	2,504,067	7,139,390	25.0	WTG 01	Yes	ENERCON	E-101-3,000	3,000	101.0	135.4	2,214	14.5
2	2,503,910	7,140,349	25.0	WTG 02	Yes	ENERCON	E-101-3,000	3,000	101.0	135.4	2,214	14.5
3	2,504,094	7,140,025	25.2	WTG 03	Yes	ENERCON	E-101-3,000	3,000	101.0	135.4	2,214	14.5
4	2,501,781	7,140,832	12.8	WTG 04	Yes	ENERCON	E-101-3,000	3,000	101.0	135.4	2,214	14.5
5	2,502,310	7,140,691	16.9	WTG 05	Yes	ENERCON	E-101-3,000	3,000	101.0	135.4	2,214	14.5
6	2,502,279	7,140,244	19.5	WTG 06	Yes	ENERCON	E-101-3,000	3,000	101.0	135.4	2,214	14.5
7	2,502,987	7,140,546	22.4	WTG 07	Yes	ENERCON	E-101-3,000	3,000	101.0	135.4	2,214	14.5
8	2,503,470	7,140,480	28.3	WTG 08	Yes	ENERCON	E-101-3,000	3,000	101.0	135.4	2,214	14.5
9	2,503,083	7,140,015	30.0	WTG 09	Yes	ENERCON	E-101-3,000	3,000	101.0	135.4	2,214	14.5
10	2,503,335	7,139,737	29.8	WTG 10	Yes	ENERCON	E-101-3,000	3,000	101.0	135.4	2,214	14.5
11	2,503,700	7,139,561	25.0	WTG 11	Yes	ENERCON	E-101-3,000	3,000	101.0	135.4	2,214	14.5

Shadow receptor-Input

No.	Name	KKJ Zone: 2 East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
				[m]	[m]	[m]	[m]	[°]	[°]	
A	Rianperkkiö	2,501,436	7,138,392	18.4	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
B	Talus 2	2,500,920	7,139,360	10.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
C	Talus 1	2,500,868	7,139,596	9.9	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
D	Vainio	2,500,580	7,140,093	6.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
E	Tarkisenkangas	2,500,500	7,140,357	5.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
F	Rantavainio_holiday	2,499,816	7,140,485	0.9	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
G	Kivitolppa_holiday	2,500,468	7,142,274	1.7	1.0	1.0	2.0	-180.0	0.0	"Green house mode"

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Calculated:
28.02.2012 18:46/2.7.490

SHADOW - Main Result

Calculation: E101 road shift RC

Calculation Results

Shadow receptor

No.	Name	Shadow, expected values Shadow hours per year [h/year]
A	Rianperkkiö	0:00
B	Talus 2	3:36
C	Talus 1	3:07
D	Vainio	3:47
E	Tarkisenkangas	2:50
F	Rantavainio_holiday	0:33
G	Kivitolppa_holiday	0:24

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	WTG 01	0:00	0:00
2	WTG 02	0:00	0:00
3	WTG 03	0:00	0:00
4	WTG 04	19:40	5:01
5	WTG 05	17:19	4:54
6	WTG 06	16:51	4:24
7	WTG 07	0:00	0:00
8	WTG 08	0:00	0:00
9	WTG 09	0:00	0:00
10	WTG 10	0:00	0:00
11	WTG 11	0:00	0:00

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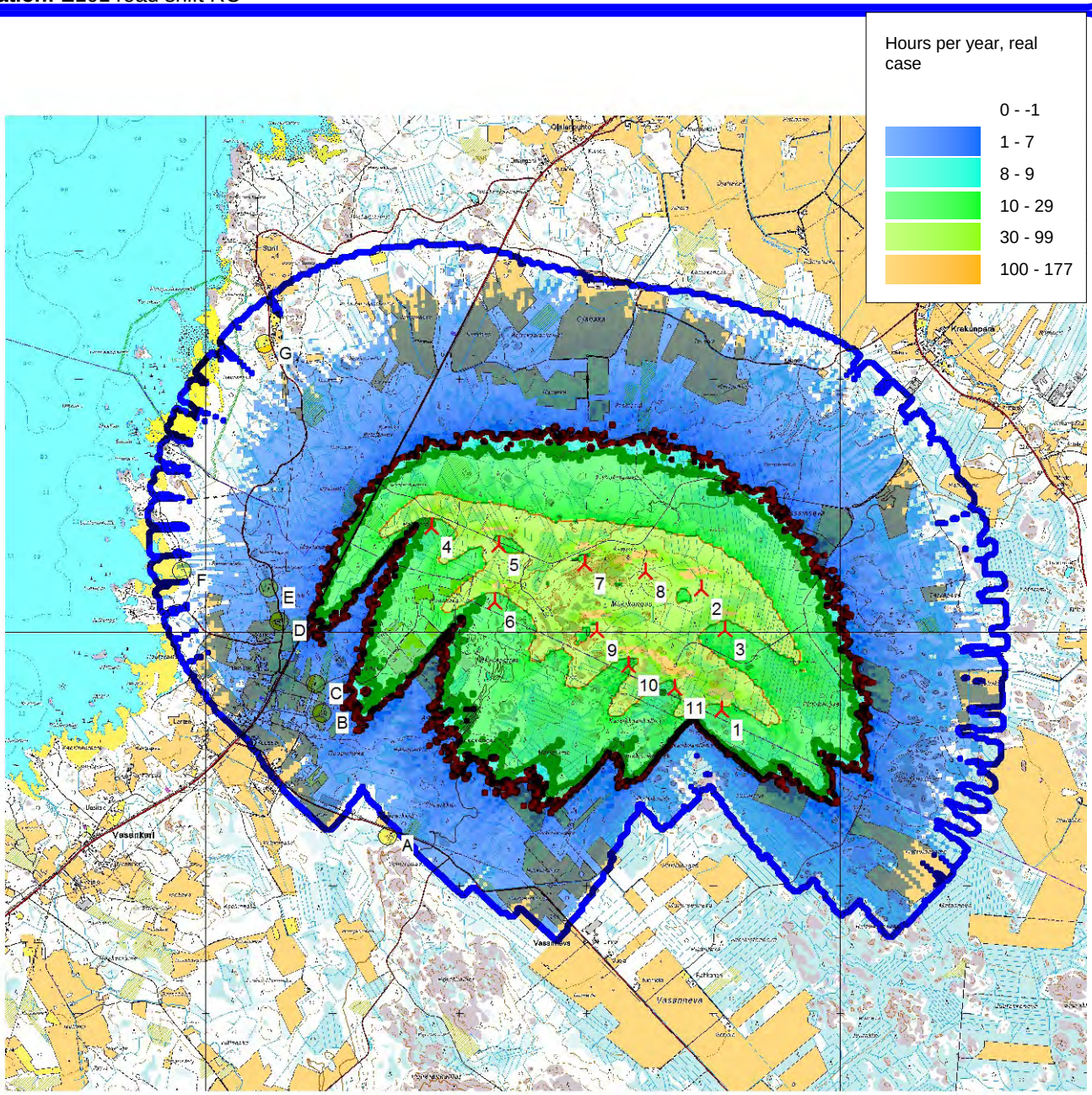
28.02.2012 18:46/2.7.490

SHADOW - Map

Calculation: E101 road shift RC



0 500 1000 1500 2000 m

Map: , Print scale 1:50,000, Map center KKJ Finland Zone: 2 East: 2,502,822 North: 7,140,229

New WTG Shadow receptor

Isolines showing shadow in Hours per year, real case

0 8 10 30

Project:
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Calculated:
28.02.2012 18:50/2.7.490

SHADOW - Main Result

Calculation: E101 road shift WC

Assumptions for shadow calculations

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

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

The calculated times are "worst case" given by the following assumptions:
- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:
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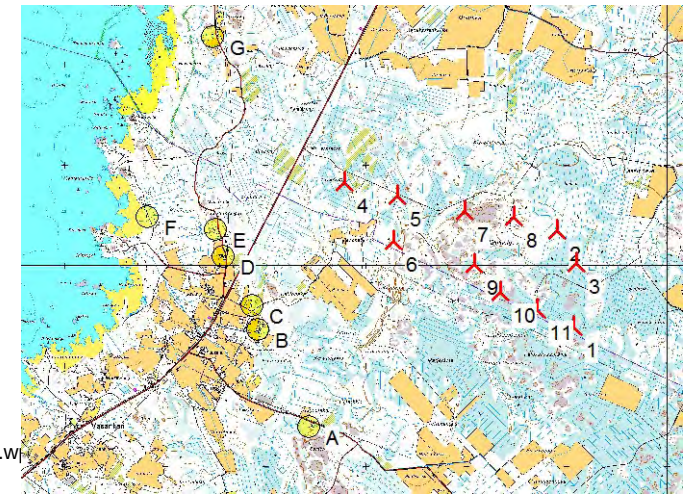
Obstacles not used in calculation
Eye height: 1.5 m
Grid resolution: 10 m



Scale 1:75,000
New WTG
Shadow receptor

WTGs

	KKJ Zone: 2 East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
	KKJ Zone: 2		[m]					[kW]	[m]	[m]	[m]	[RPM]
1	2,504,067	7,139,390	25.0	WTG 01	Yes	ENERCON	E-101-3,000	3,000	101.0	135.4	2,214	14.5
2	2,503,910	7,140,349	25.0	WTG 02	Yes	ENERCON	E-101-3,000	3,000	101.0	135.4	2,214	14.5
3	2,504,094	7,140,025	25.2	WTG 03	Yes	ENERCON	E-101-3,000	3,000	101.0	135.4	2,214	14.5
4	2,501,781	7,140,832	12.8	WTG 04	Yes	ENERCON	E-101-3,000	3,000	101.0	135.4	2,214	14.5
5	2,502,310	7,140,691	16.9	WTG 05	Yes	ENERCON	E-101-3,000	3,000	101.0	135.4	2,214	14.5
6	2,502,279	7,140,244	19.5	WTG 06	Yes	ENERCON	E-101-3,000	3,000	101.0	135.4	2,214	14.5
7	2,502,987	7,140,546	22.4	WTG 07	Yes	ENERCON	E-101-3,000	3,000	101.0	135.4	2,214	14.5
8	2,503,470	7,140,480	28.3	WTG 08	Yes	ENERCON	E-101-3,000	3,000	101.0	135.4	2,214	14.5
9	2,503,083	7,140,015	30.0	WTG 09	Yes	ENERCON	E-101-3,000	3,000	101.0	135.4	2,214	14.5
10	2,503,335	7,139,737	29.8	WTG 10	Yes	ENERCON	E-101-3,000	3,000	101.0	135.4	2,214	14.5
11	2,503,700	7,139,561	25.0	WTG 11	Yes	ENERCON	E-101-3,000	3,000	101.0	135.4	2,214	14.5

Shadow receptor-Input

		KKJ Zone: 2 East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
				[m]	[m]	[m]	[m]	[°]	[°]	
A	Rianperkkiö	2,501,436	7,138,392	18.4	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
B	Talus 2	2,500,920	7,139,360	10.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
C	Talus 1	2,500,868	7,139,596	9.9	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
D	Vainio	2,500,580	7,140,093	6.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
E	Tarkisenkangas	2,500,500	7,140,357	5.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
F	Rantavainio_holiday	2,499,816	7,140,485	0.9	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
G	Kivitolppa_holiday	2,500,468	7,142,274	1.7	1.0	1.0	2.0	-180.0	0.0	"Green house mode"

Calculation Results

Shadow receptor

		Shadow, worst case Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
A	Rianperkkiö	0:00	0	0:00
B	Talus 2	12:01	66	0:16
C	Talus 1	10:52	65	0:16

To be continued on next page...

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Calculated:
28.02.2012 18:50/2.7.490

SHADOW - Main Result

Calculation: E101 road shift WC

...continued from previous page

No.	Name	Shadow, worst case Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
D	Vainio	14:03	72	0:18
E	Tarkisenkangas	11:49	61	0:17
F	Rantavainio_holiday	2:22	16	0:12
G	Kivitolppa_holiday	2:52	18	0:13

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	WTG 01	0:00	
2	WTG 02	0:00	
3	WTG 03	0:00	
4	WTG 04	19:44	
5	WTG 05	17:19	
6	WTG 06	16:52	
7	WTG 07	0:00	
8	WTG 08	0:00	
9	WTG 09	0:00	
10	WTG 10	0:00	
11	WTG 11	0:00	

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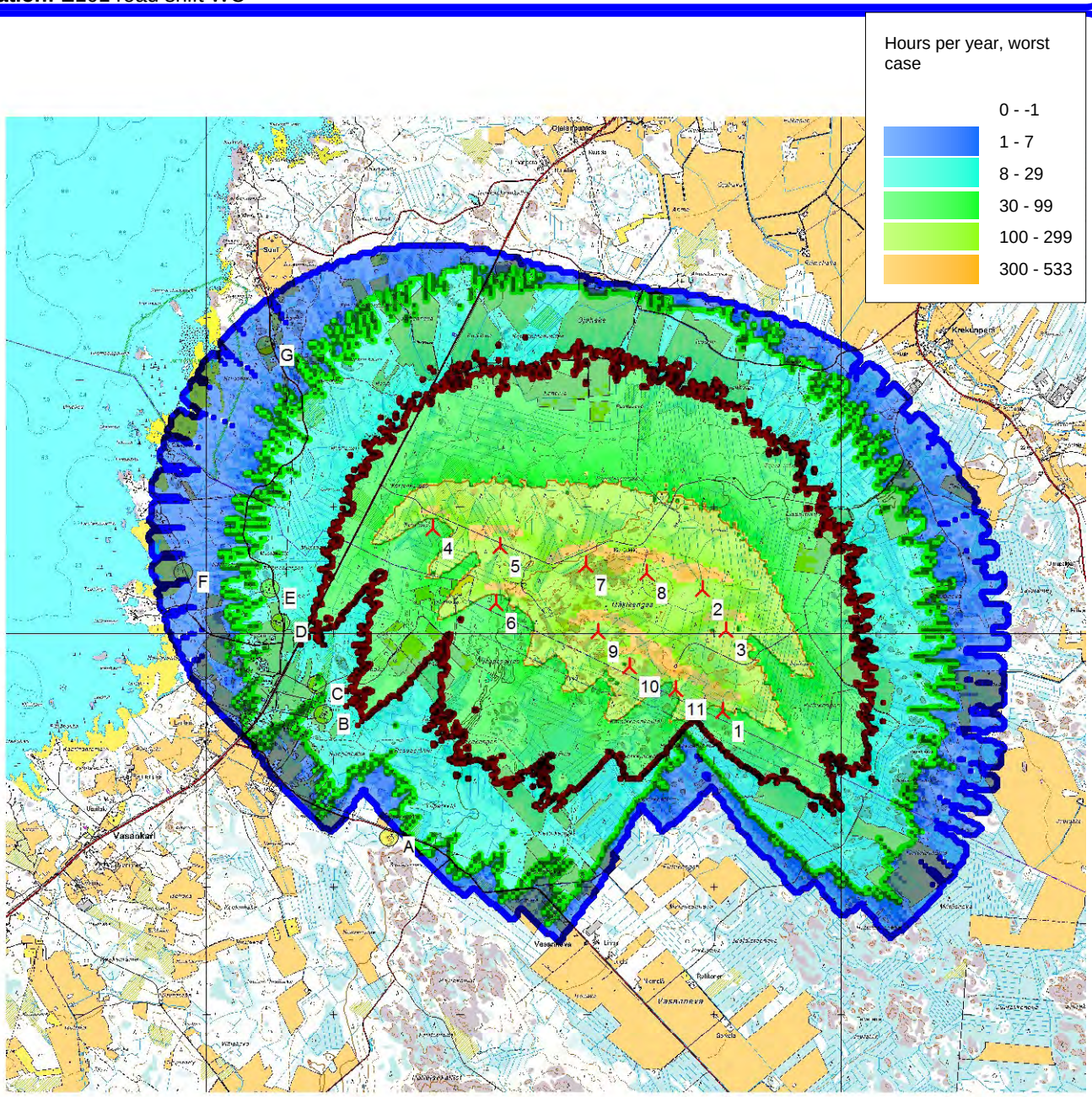
Calculated:
28.02.2012 18:50/2.7.490

SHADOW - Map

Calculation: E101 road shift WC



0 500 1000 1500 2000 m

Map: , Print scale 1:50,000, Map center KKJ Finland Zone: 2 East: 2,502,810 North: 7,140,234

New WTG Shadow receptor

Isolines showing shadow in Hours per year, worst case

0 8 30 100

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Calculated:
28.02.2012 18:53/2.7.490

SHADOW - Main Result

Calculation: V112 road shift RC

Assumptions for shadow calculations

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

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

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.87	2.43	4.19	6.53	9.29	9.73	8.81	6.71	4.53	2.45	1.03	0.48

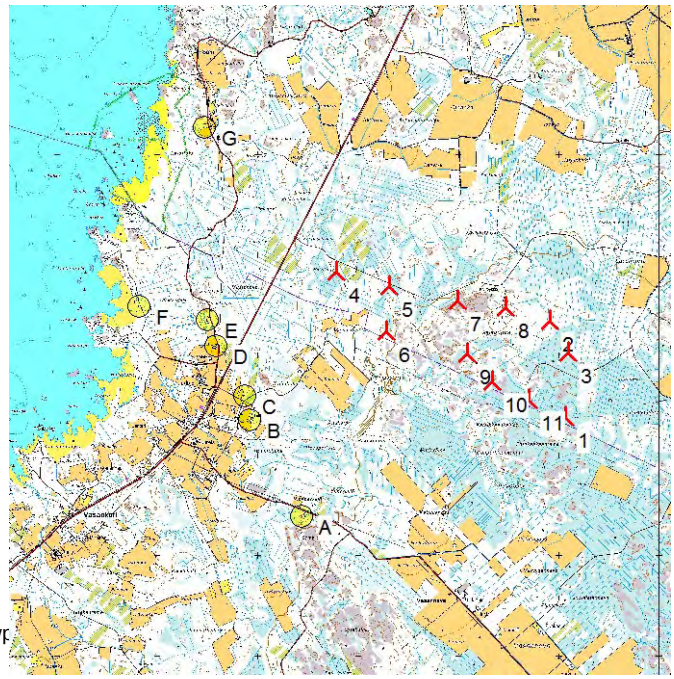
Operational hours are calculated from WTGs in calculation and wind distribution:
Default Meteo data description

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
755	521	331	391	583	784	867	1,165	1,566	591	473	495	8,522

Idle start wind speed: Cut in wind speed from power curve

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:
Height contours used: Height Contours: CONTOURLINE_ONLINEDATA_0.wp
Obstacles not used in calculation
Eye height: 1.5 m
Grid resolution: 10 m



Scale 1:75,000
New WTG
Shadow receptor

WTGs

	KKJ Zone: 2 East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
	KKJ Zone: 2		[m]					[kW]	[m]	[m]	[m]	[RPM]
1	2,504,067	7,139,390	25.0	WTG 01	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
2	2,503,910	7,140,349	25.0	WTG 02	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
3	2,504,094	7,140,025	25.2	WTG 03	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
4	2,501,781	7,140,832	12.8	WTG 04	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
5	2,502,310	7,140,691	16.9	WTG 05	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
6	2,502,279	7,140,244	19.5	WTG 06	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
7	2,502,987	7,140,546	22.4	WTG 07	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
8	2,503,470	7,140,480	28.3	WTG 08	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
9	2,503,083	7,140,015	30.0	WTG 09	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
10	2,503,335	7,139,737	29.8	WTG 10	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
11	2,503,700	7,139,561	25.0	WTG 11	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8

Shadow receptor-Input

No.	Name	KKJ Zone: 2 East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
				[m]	[m]	[m]	[m]	[°]	[°]	
A	Rianperkkiö	2,501,436	7,138,392	18.4	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
B	Talus 2	2,500,920	7,139,360	10.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
C	Talus 1	2,500,868	7,139,596	9.9	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
D	Vainio	2,500,580	7,140,093	6.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
E	Tarkisenkangas	2,500,500	7,140,357	5.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
F	Rantavainio_holiday	2,499,816	7,140,485	0.9	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
G	Kivitolppa_holiday	2,500,468	7,142,274	1.7	1.0	1.0	2.0	-180.0	0.0	"Green house mode"

Project:
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Calculated:
28.02.2012 18:53/2.7.490

SHADOW - Main Result

Calculation: V112 road shift RC

Calculation Results

Shadow receptor

No.	Name	Shadow, expected values Shadow hours per year [h/year]
A	Rianperkkiö	0:00
B	Talus 2	0:00
C	Talus 1	1:58
D	Vainio	2:46
E	Tarkisenkangas	1:54
F	Rantavainio_holiday	0:00
G	Kivitolppa_holiday	0:00

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	WTG 01	0:00	0:00
2	WTG 02	0:00	0:00
3	WTG 03	0:00	0:00
4	WTG 04	18:07	4:59
5	WTG 05	0:00	0:00
6	WTG 06	6:17	1:40
7	WTG 07	0:00	0:00
8	WTG 08	0:00	0:00
9	WTG 09	0:00	0:00
10	WTG 10	0:00	0:00
11	WTG 11	0:00	0:00

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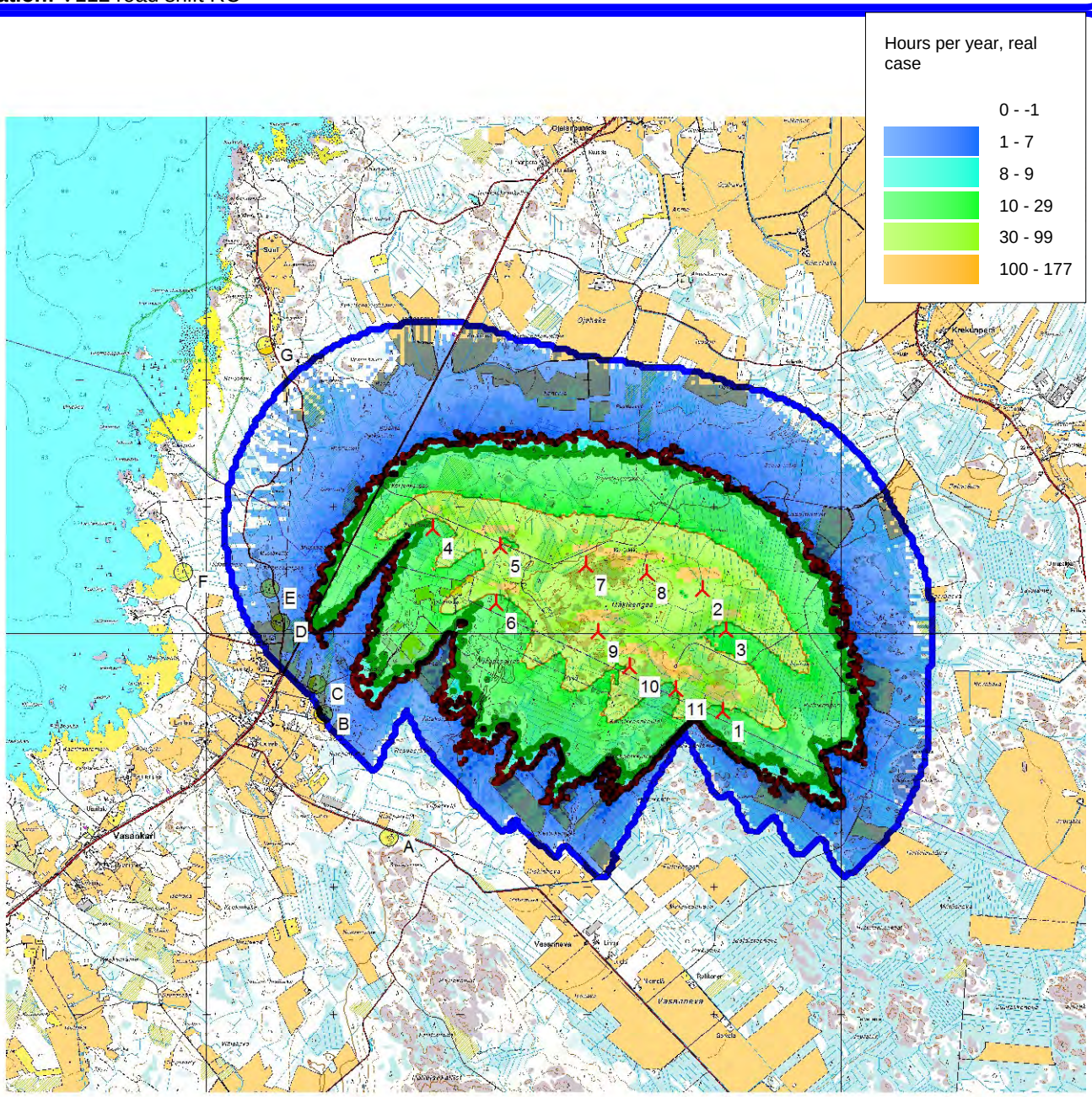
Calculated:
28.02.2012 18:53/2.7.490

SHADOW - Map

Calculation: V112 road shift RC



0 500 1000 1500 2000 m

Map: , Print scale 1:50,000, Map center KKJ Finland Zone: 2 East: 2,502,810 North: 7,140,234

New WTG Shadow receptor

Isolines showing shadow in Hours per year, real case

0 8 10 30

Project:
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Calculated:
28.02.2012 18:54/2.7.490

SHADOW - Main Result

Calculation: V112 road shift WC

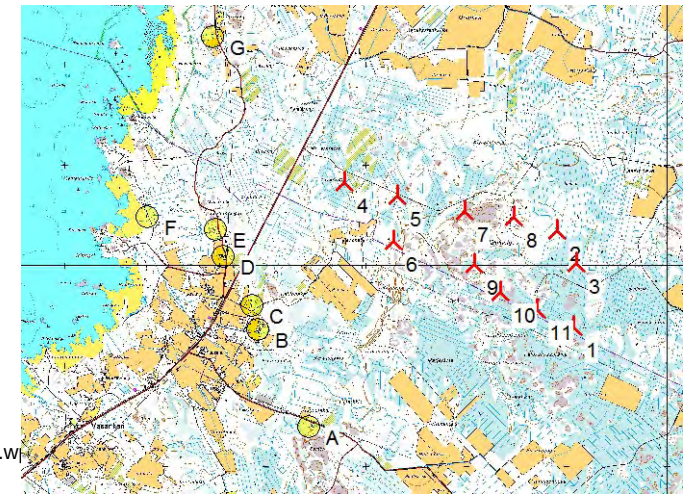
Assumptions for shadow calculations

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

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

The calculated times are "worst case" given by the following assumptions:
- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:
Height contours used: Height Contours: CONTOURLINE_ONLINEDATA_0.wf
Obstacles not used in calculation
Eye height: 1.5 m
Grid resolution: 10 m



Scale 1:75,000
New WTG
Shadow receptor

WTGs

	KKJ Zone: 2 East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
	KKJ Zone: 2		[m]					[kW]	[m]	[m]	[m]	[RPM]
1	2,504,067	7,139,390	25.0	WTG 01	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
2	2,503,910	7,140,349	25.0	WTG 02	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
3	2,504,094	7,140,025	25.2	WTG 03	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
4	2,501,781	7,140,832	12.8	WTG 04	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
5	2,502,310	7,140,691	16.9	WTG 05	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
6	2,502,279	7,140,244	19.5	WTG 06	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
7	2,502,987	7,140,546	22.4	WTG 07	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
8	2,503,470	7,140,480	28.3	WTG 08	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
9	2,503,083	7,140,015	30.0	WTG 09	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
10	2,503,335	7,139,737	29.8	WTG 10	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8
11	2,503,700	7,139,561	25.0	WTG 11	Yes	VESTAS	V112 - 140m tower-3,000	3,000	112.0	140.0	1,619	12.8

Shadow receptor-Input

No.	Name	KKJ Zone: 2 East	North	Z [m]	Width [m]	Height [m]	Height a.g.l. [m]	Degrees from south cw [°]	Slope of window [°]	Direction mode
A	Rianperkkiö	2,501,436	7,138,392	18.4	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
B	Talus 2	2,500,920	7,139,360	10.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
C	Talus 1	2,500,868	7,139,596	9.9	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
D	Vainio	2,500,580	7,140,093	6.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
E	Tarkisenkangas	2,500,500	7,140,357	5.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
F	Rantavainio_holiday	2,499,816	7,140,485	0.9	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
G	Kivitolppa_holiday	2,500,468	7,142,274	1.7	1.0	1.0	2.0	-180.0	0.0	"Green house mode"

Calculation Results

Shadow receptor

No.	Name	Shadow, worst case Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
A	Rianperkkiö	0:00	0	0:00
B	Talus 2	0:00	0	0:00
C	Talus 1	7:17	41	0:17

To be continued on next page...

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Calculated:
28.02.2012 18:54/2.7.490

SHADOW - Main Result

Calculation: V112 road shift WC

...continued from previous page

No.	Name	Shadow, worst case Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
D	Vainio	9:34	38	0:20
E	Tarkisenkangas	7:34	29	0:20
F	Rantavainio_holiday	0:00	0	0:00
G	Kivitolppa_holiday	0:00	0	0:00

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	WTG 01	0:00	
2	WTG 02	0:00	
3	WTG 03	0:00	
4	WTG 04	18:07	
5	WTG 05	0:00	
6	WTG 06	6:17	
7	WTG 07	0:00	
8	WTG 08	0:00	
9	WTG 09	0:00	
10	WTG 10	0:00	
11	WTG 11	0:00	

Project:
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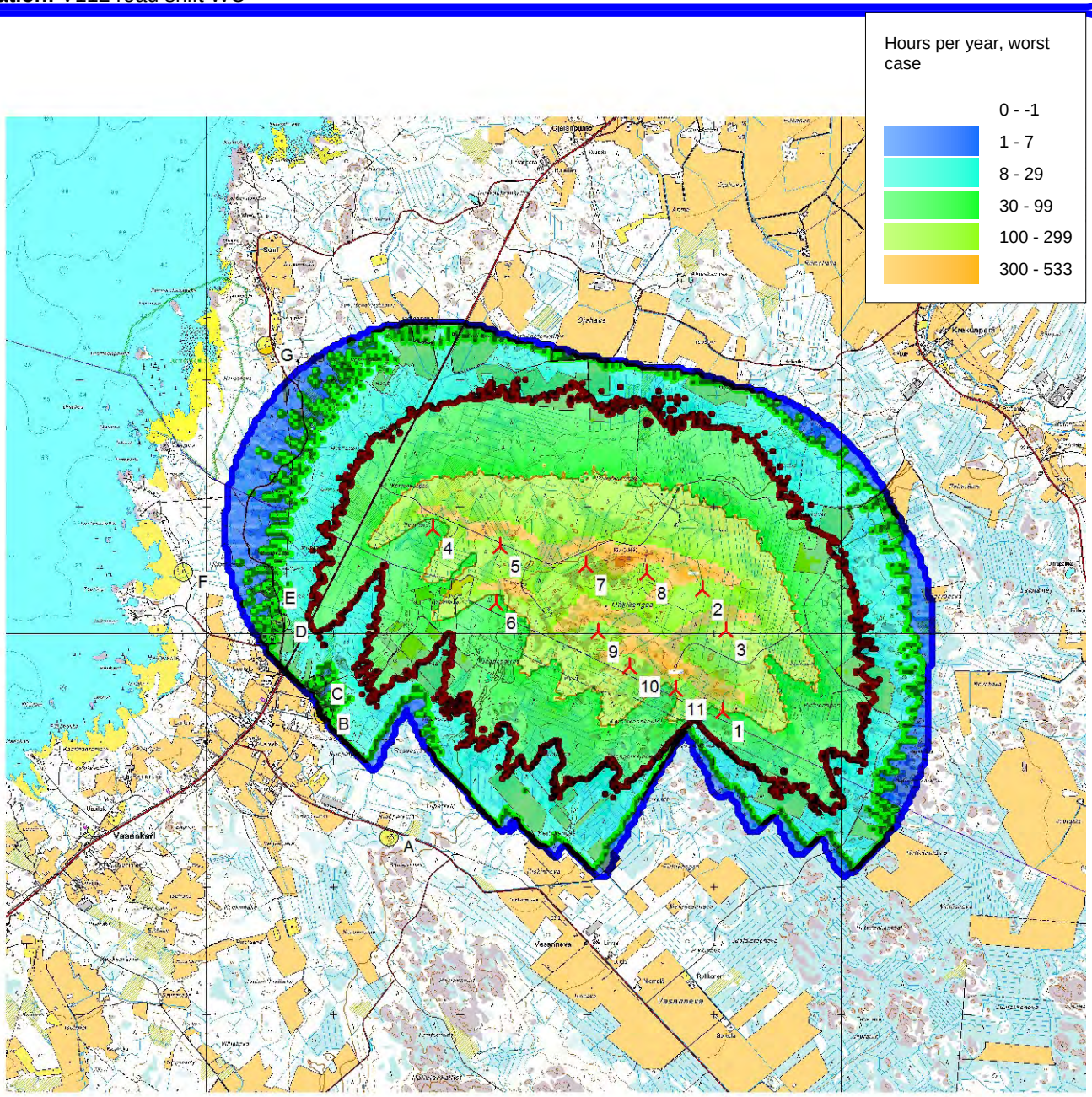
Calculated:
28.02.2012 18:54/2.7.490

SHADOW - Map

Calculation: V112 road shift WC



0 500 1000 1500 2000 m

Map: , Print scale 1:50,000, Map center KKJ Finland Zone: 2 East: 2,502,810 North: 7,140,234

New WTG Shadow receptor

Isolines showing shadow in Hours per year, worst case

0 8 30 100

Project:
Makikangas_MASTER

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Calculated:
28.7.2011 14:02/2.7.486

SHADOW - Main Result

Calculation: Shadow_maxlayout_14WTG_realcase_EIAR_KJ

Assumptions for shadow calculations

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

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

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.87	2.43	4.19	6.53	9.29	9.73	8.81	6.71	4.53	2.45	1.03	0.48

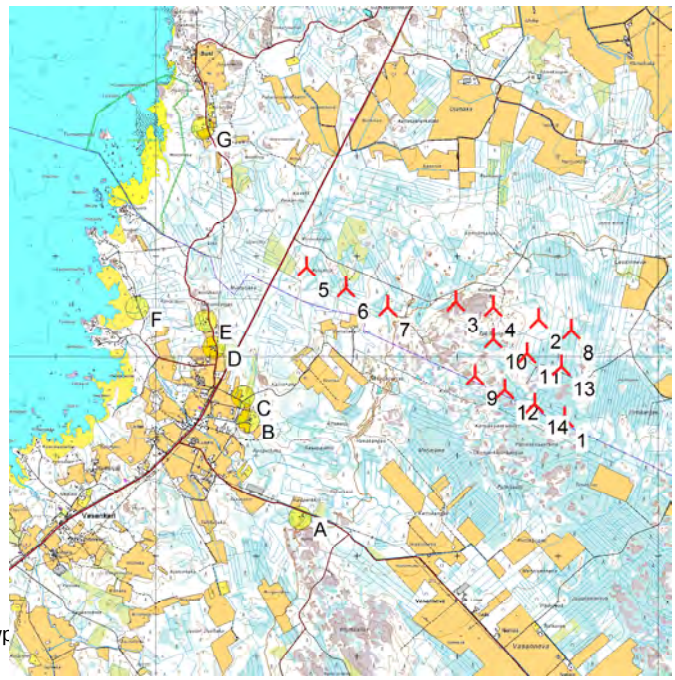
Operational hours are calculated from WTGs in calculation and wind distribution:
Default Meteo data description

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
772	532	339	400	596	802	887	1 191	1 602	604	484	506	8 715

Idle start wind speed: Cut in wind speed from power curve

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:
Height contours used: Height Contours: CONTOURLINE_ONLINEDATA_0.wp
Obstacles not used in calculation
Eye height: 1.5 m
Grid resolution: 10 m



Scale 1:75 000
New WTG
Shadow receptor

WTGs

	KKJ Zone: 2 East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
	KKJ Zone: 2		[m]					[kW]	[m]	[m]	[m]	[RPM]
1	2 504 067	7 139 390	25.0	WTG 7	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	1 599	18.0
2	2 503 811	7 140 379	25.3	WTG 12	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	1 599	18.0
3	2 502 987	7 140 546	22.4	WTG 14	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	1 599	18.0
4	2 503 360	7 140 495	30.0	WTG 13	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	1 599	18.0
5	2 501 501	7 140 887	10.0	WTG 1	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	1 599	18.0
6	2 501 894	7 140 680	14.0	WTG 2	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	1 599	18.0
7	2 502 308	7 140 499	18.3	WTG 3	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	1 599	18.0
8	2 504 135	7 140 268	24.7	WTG 11	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	1 599	18.0
9	2 503 178	7 139 811	30.0	WTG 4	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	1 599	18.0
10	2 503 358	7 140 178	30.0	WTG 10	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	1 599	18.0
11	2 503 695	7 140 033	28.2	WTG 9	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	1 599	18.0
12	2 503 475	7 139 670	27.8	WTG 5	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	1 599	18.0
13	2 504 035	7 139 907	26.0	WTG 8	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	1 599	18.0
14	2 503 770	7 139 529	25.0	WTG 6	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	1 599	18.0

Shadow receptor-Input

No.	Name	KKJ Zone: 2 East	North	Z [m]	Width [m]	Height [m]	Height a.g.l. [m]	Degrees from south cw [°]	Slope of window [°]	Direction mode
A	Rianperkkiö	2 501 436	7 138 392	18.4	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
B	Talus 2	2 500 920	7 139 360	10.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
C	Talus 1	2 500 868	7 139 596	9.9	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
D	Vainio	2 500 580	7 140 093	6.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
E	Tarkisenkangas	2 500 500	7 140 357	5.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
F	Rantavainio_holiday	2 499 816	7 140 485	0.9	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
G	Kivitolppa_holiday	2 500 468	7 142 274	1.7	1.0	1.0	2.0	-180.0	0.0	"Green house mode"

Project:
Makikangas_MASTER

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Calculated:
28.7.2011 14:02/2.7.486

SHADOW - Main Result

Calculation: Shadow_maxlayout_14WTG_realcase_EIAR_KJ

Calculation Results

Shadow receptor

No.	Name	Shadow, expected values Shadow hours per year [h/year]
A	Rianperkkiö	0:00
B	Talus 2	0:00
C	Talus 1	2:38
D	Vainio	5:20
E	Tarkisenkangas	3:04
F	Rantavainio_holiday	0:00
G	Kivitolppa_holiday	0:00

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	WTG 7	0:00	0:00
2	WTG 12	0:00	0:00
3	WTG 14	0:00	0:00
4	WTG 13	0:00	0:00
5	WTG 1	21:56	6:30
6	WTG 2	16:08	4:32
7	WTG 3	0:00	0:00
8	WTG 11	0:00	0:00
9	WTG 4	0:00	0:00
10	WTG 10	0:00	0:00
11	WTG 9	0:00	0:00
12	WTG 5	0:00	0:00
13	WTG 8	0:00	0:00
14	WTG 6	0:00	0:00

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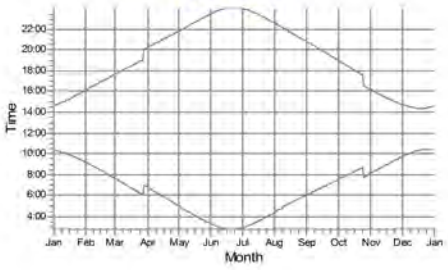
SHADOW - Calendar, graphical

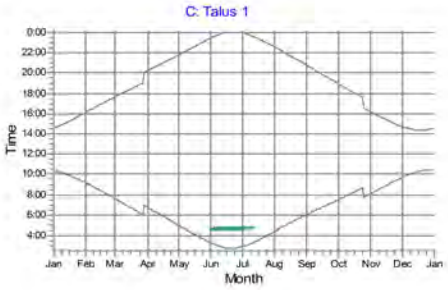
Calculation: Shadow_maxlayout_14WTG_realcase_EIAR_KJ

A: Rianperkkiö

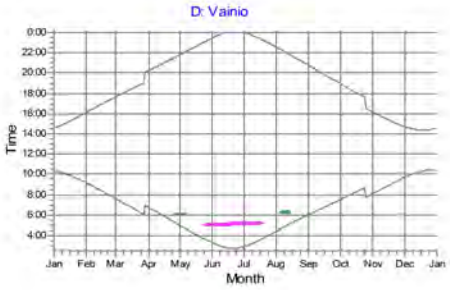


B: Talus 2

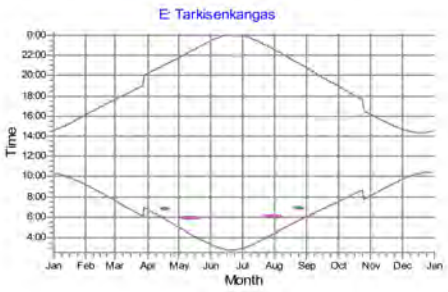
C: Talus 1



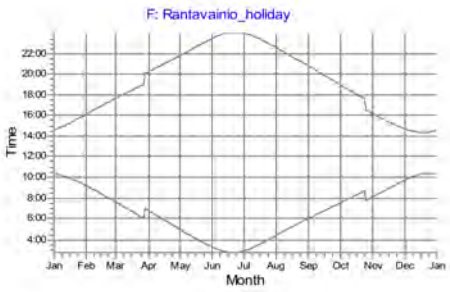
D: Vainio



E: Tarkisenkangas



F: Rantavainio_holiday



WTGs

5: WTG 1

6: WTG 2

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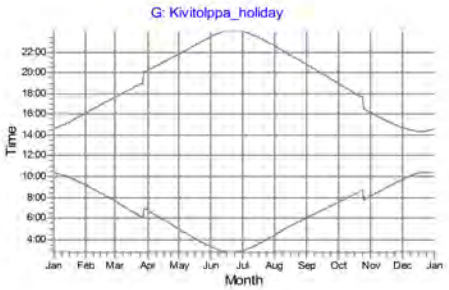
SHADOW - Calendar, graphical

Calculation: Shadow_maxlayout_14WTG_realcase_EIAR_KJ



WTGs

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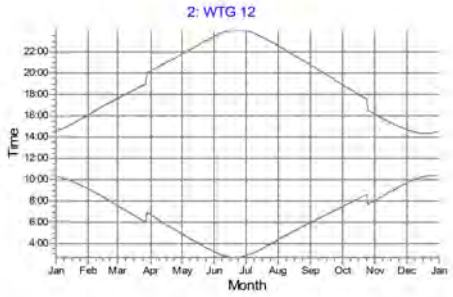
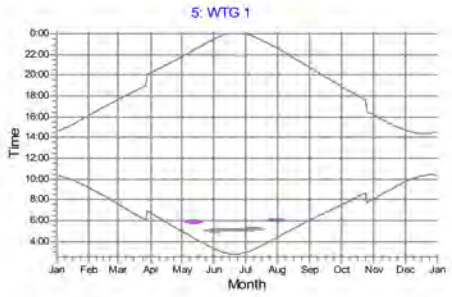
SHADOW - Calendar per WTG, graphical

Calculation: Shadow_maxlayout_14WTG_realcase_EIAR_KJ





Shadow receptor

C: Talus 1 D: Vainio E: Tarkisenkangas

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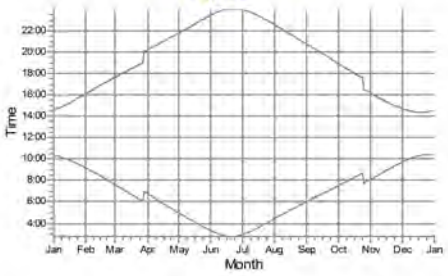
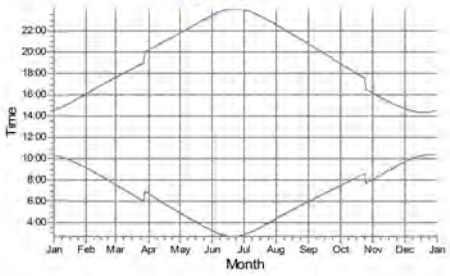
SHADOW - Calendar per WTG, graphical

Calculation: Shadow_maxlayout_14WTG_realcase_EIAR_KJ

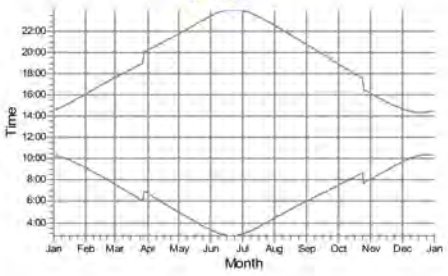
7: WTG 3



8: WTG 11

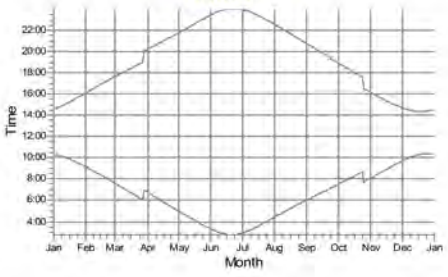


9: WTG 4

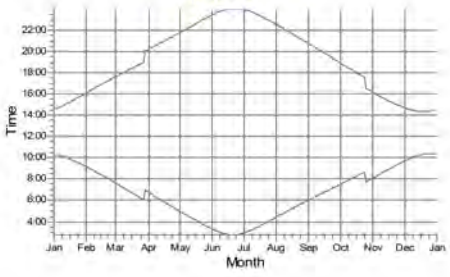


10: WTG 10

11: WTG 9



12: WTG 5



Shadow receptor

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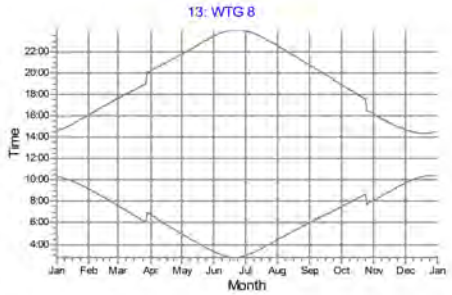
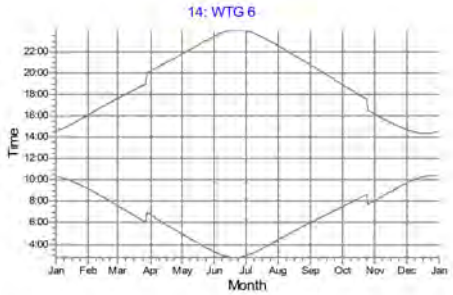
SHADOW - Calendar per WTG, graphical

Calculation: Shadow_maxlayout_14WTG_realcase_EIAR_KJ





Shadow receptor

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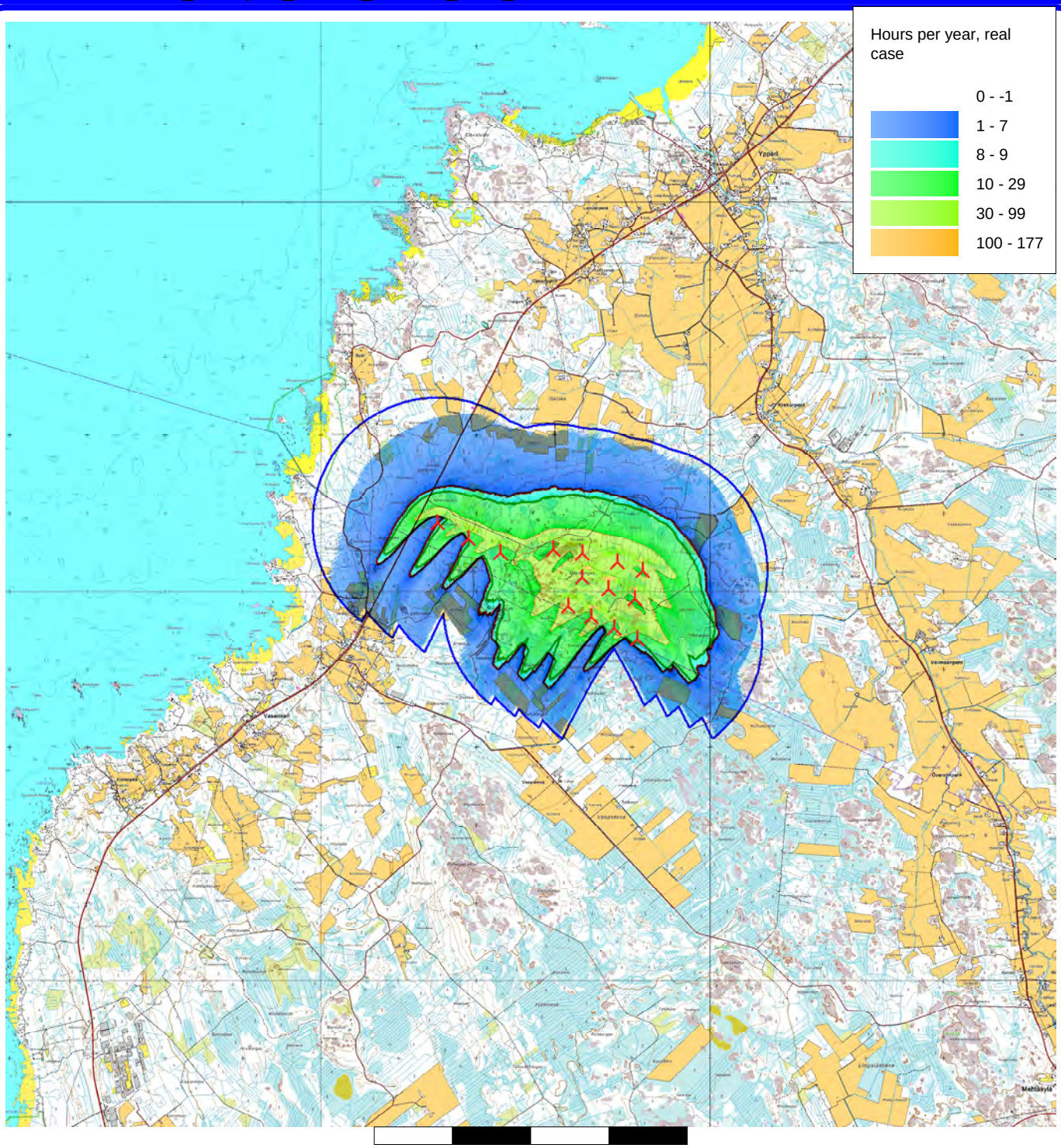
SHADOW - Map

Calculation: Shadow_maxlayout_14WTG_realcase_EIAR_KJ



Map: , Print scale 1:75 000, Map center KKJ Finland Zone: 2 East: 2 503 170 North: 7 140 544

New WTG

Isolines showing shadow in Hours per year, real case

0 8 10 30

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SHADOW - Main Result

Calculation: Shadow_maxlayout_14WTG_worstcase_EIAR_KJ

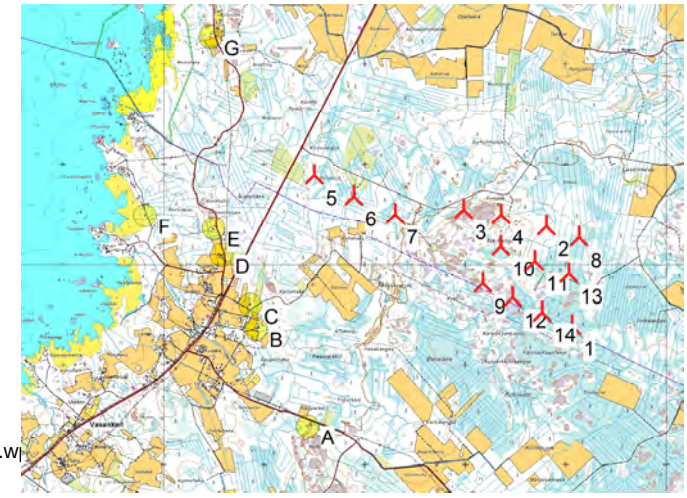
Assumptions for shadow calculations

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

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

The calculated times are "worst case" given by the following assumptions:
- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:
Height contours used: Height Contours: CONTOURLINE_ONLINEDATA_0.wp
Obstacles not used in calculation
Eye height: 1.5 m
Grid resolution: 10 m



Scale 1:75 000

New WTG Shadow receptor

WTGs

	KKJ Zone: 2 East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
	KKJ Zone: 2		[m]					[kW]	[m]	[m]	[m]	[RPM]
1	2 504 067	7 139 390	25.0	WTG 7	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	1 599	18.0
2	2 503 811	7 140 379	25.3	WTG 12	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	1 599	18.0
3	2 502 987	7 140 546	22.4	WTG 14	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	1 599	18.0
4	2 503 360	7 140 495	30.0	WTG 13	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	1 599	18.0
5	2 501 501	7 140 887	10.0	WTG 1	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	1 599	18.0
6	2 501 894	7 140 680	14.0	WTG 2	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	1 599	18.0
7	2 502 308	7 140 499	18.3	WTG 3	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	1 599	18.0
8	2 504 135	7 140 268	24.7	WTG 11	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	1 599	18.0
9	2 503 178	7 139 811	30.0	WTG 4	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	1 599	18.0
10	2 503 358	7 140 178	30.0	WTG 10	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	1 599	18.0
11	2 503 695	7 140 033	28.2	WTG 9	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	1 599	18.0
12	2 503 475	7 139 670	27.8	WTG 5	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	1 599	18.0
13	2 504 035	7 139 907	26.0	WTG 8	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	1 599	18.0
14	2 503 770	7 139 529	25.0	WTG 6	Yes	ENERCON	E-82 E2-2 300	2 300	82.0	138.4	1 599	18.0

Shadow receptor-Input

No.	Name	KKJ Zone: 2 East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
				[m]	[m]	[m]	[m]	[°]	[°]	
A	Rianperkkiö	2 501 436	7 138 392	18.4	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
B	Talus 2	2 500 920	7 139 360	10.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
C	Talus 1	2 500 868	7 139 596	9.9	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
D	Vainio	2 500 580	7 140 093	6.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
E	Tarkisenkangas	2 500 500	7 140 357	5.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
F	Rantavainio_holiday	2 499 816	7 140 485	0.9	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
G	Kivitolppa_holiday	2 500 468	7 142 274	1.7	1.0	1.0	2.0	-180.0	0.0	"Green house mode"

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SHADOW - Main Result

Calculation: Shadow_maxlayout_14WTG_worstcase_EIAR_KJ

Calculation Results

Shadow receptor

No.	Name	Shadow, worst case: Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
A	Rianperkkiö	0:00	0	0:00
B	Talus 2	0:00	0	0:00
C	Talus 1	8:53	44	0:14
D	Vainio	18:13	80	0:17
E	Tarkisenkangas	11:01	53	0:18
F	Rantavainio_holiday	0:00	0	0:00
G	Kivitolppa_holiday	0:00	0	0:00

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	WTG 7	0:00	
2	WTG 12	0:00	
3	WTG 14	0:00	
4	WTG 13	0:00	
5	WTG 1	21:56	
6	WTG 2	16:08	
7	WTG 3	0:00	
8	WTG 11	0:00	
9	WTG 4	0:00	
10	WTG 10	0:00	
11	WTG 9	0:00	
12	WTG 5	0:00	
13	WTG 8	0:00	
14	WTG 6	0:00	

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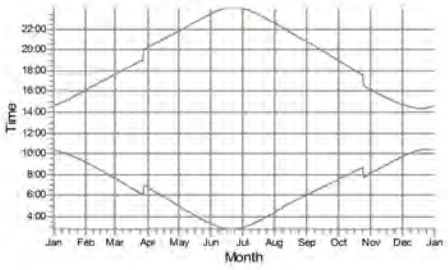
SHADOW - Calendar, graphical

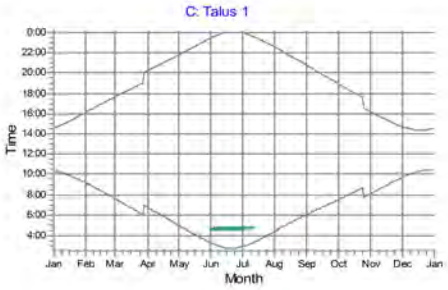
Calculation: Shadow_maxlayout_14WTG_worstcase_EIAR_KJ

A: Rianperkkiö

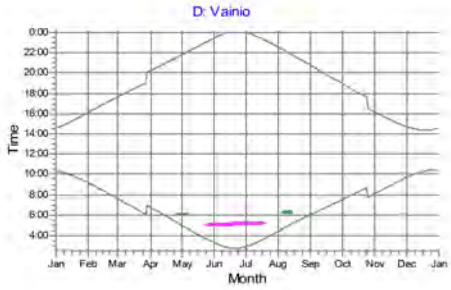


B: Talus 2

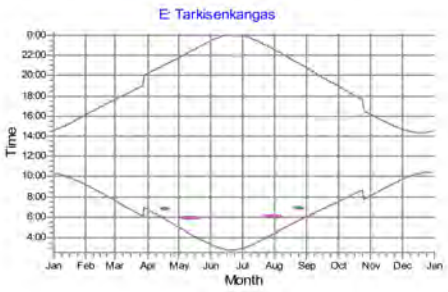
C: Talus 1



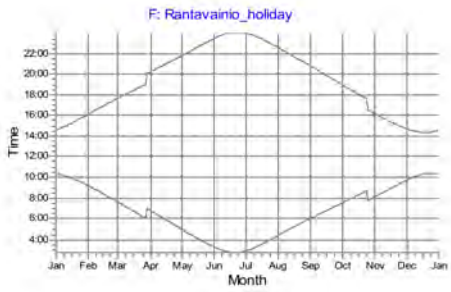
D: Vainio



E: Tarkisenkangas



F: Rantavainio_holiday



WTGs

5: WTG 1

6: WTG 2

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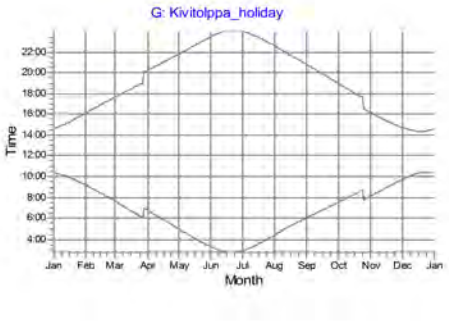
SHADOW - Calendar, graphical

Calculation: Shadow_maxlayout_14WTG_worstcase_EIAR_KJ



WTGs

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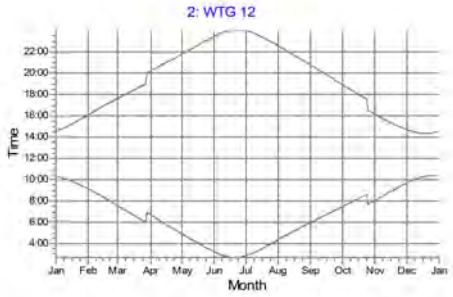
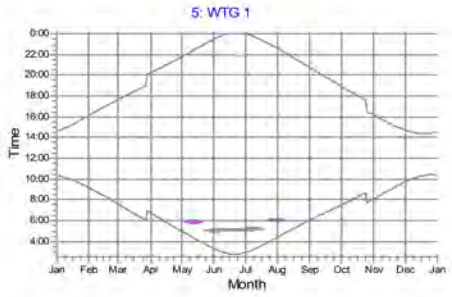
SHADOW - Calendar per WTG, graphical

Calculation: Shadow_maxlayout_14WTG_worstcase_EIAR_KJ





Shadow receptor

C: Talus 1 D: Vainio E: Tarkisenkangas

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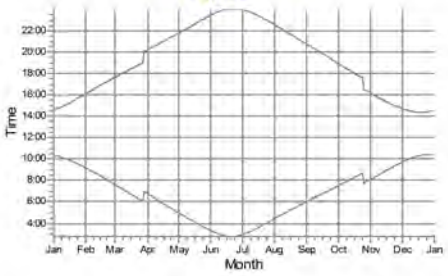
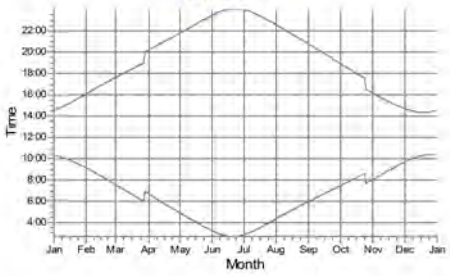
SHADOW - Calendar per WTG, graphical

Calculation: Shadow_maxlayout_14WTG_worstcase_EIAR_KJ

7: WTG 3

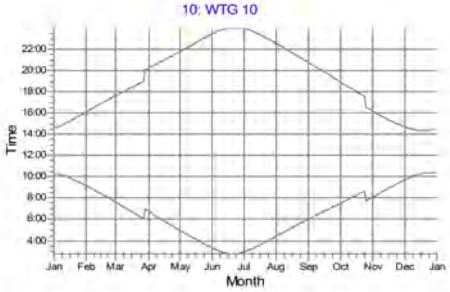


8: WTG 11



9: WTG 4

10: WTG 10



11: WTG 9

12: WTG 5

Shadow receptor

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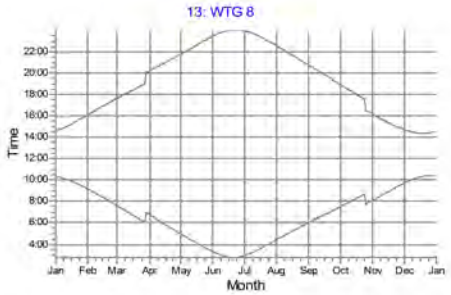
Karoliina Joensuu / karoliina.joensuu@wpd.fi
Calculated:
28.7.2011 11:57/2.7.486

SHADOW - Calendar per WTG, graphical

Calculation: Shadow_maxlayout_14WTG_worstcase_EIAR_KJ



Shadow receptor

Project:
Makikangas_MASTER

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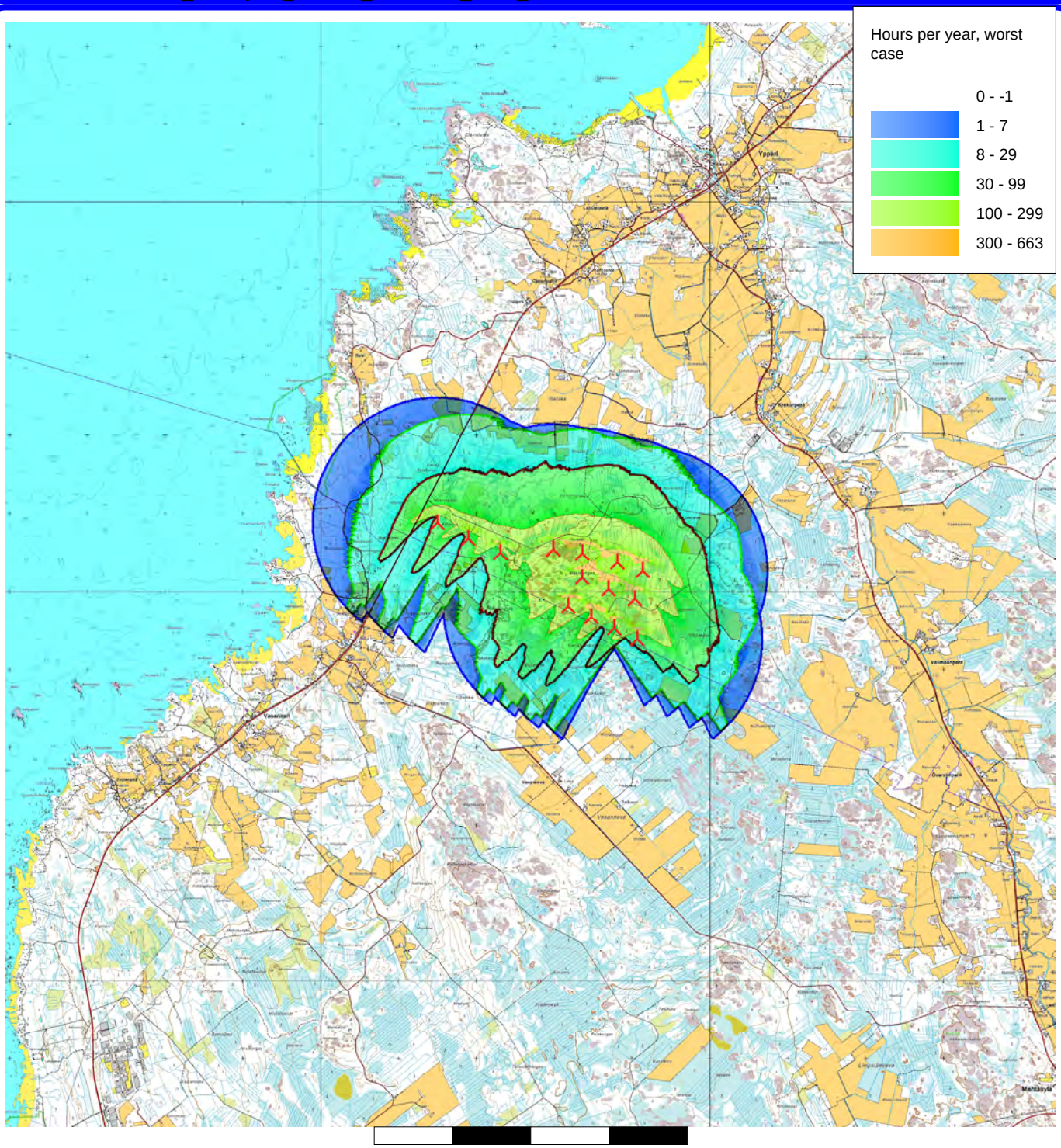
Calculated:
28.7.2011 11:57/2.7.486

SHADOW - Map

Calculation: Shadow_maxlayout_14WTG_worstcase_EIAR_KJ



Map: , Print scale 1:75 000, Map center KKJ Finland Zone: 2 East: 2 503 170 North: 7 140 544

New WTG

Isolines showing shadow in Hours per year, worst case

0 8 30 100

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Calculated:
29.02.2012 11:37/2.7.490

SHADOW - Main Result

Calculation: E82 road shift RC

Assumptions for shadow calculations

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

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

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.87	2.43	4.19	6.53	9.29	9.73	8.81	6.71	4.53	2.45	1.03	0.48

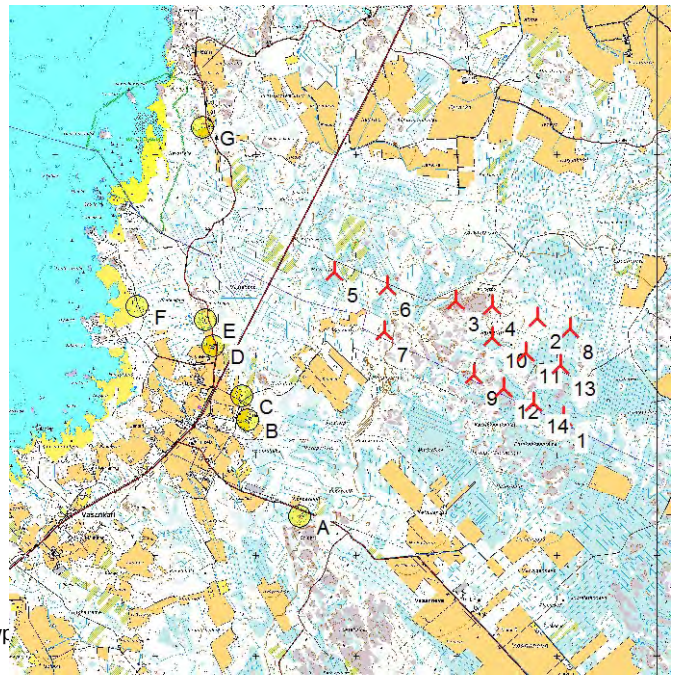
Operational hours are calculated from WTGs in calculation and wind distribution:
Default Meteo data description

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
772	532	339	400	596	802	887	1,191	1,602	604	484	506	8,715

Idle start wind speed: Cut in wind speed from power curve

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:
Height contours used: Height Contours: CONTOURLINE_ONLINEDATA_0.wp
Obstacles not used in calculation
Eye height: 1.5 m
Grid resolution: 10 m



Scale 1:75,000
New WTG
Shadow receptor

WTGs

	KKJ Zone: 2 East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
	KKJ Zone: 2		[m]					[kW]	[m]	[m]	[m]	[RPM]
1	2,504,067	7,139,390	25.0	WTG 01	Yes	ENERCON	E-82 E2-2,300	2,300	82.0	138.4	1,599	18.0
2	2,503,811	7,140,379	25.3	WTG 02	Yes	ENERCON	E-82 E2-2,300	2,300	82.0	138.4	1,599	18.0
3	2,502,987	7,140,546	22.4	WTG 03	Yes	ENERCON	E-82 E2-2,300	2,300	82.0	138.4	1,599	18.0
4	2,503,360	7,140,495	30.0	WTG 04	Yes	ENERCON	E-82 E2-2,300	2,300	82.0	138.4	1,599	18.0
5	2,501,781	7,140,832	12.8	WTG 05	Yes	ENERCON	E-82 E2-2,300	2,300	82.0	138.4	1,599	18.0
6	2,502,310	7,140,691	16.9	WTG 06	Yes	ENERCON	E-82 E2-2,300	2,300	82.0	138.4	1,599	18.0
7	2,502,279	7,140,244	19.5	WTG 07	Yes	ENERCON	E-82 E2-2,300	2,300	82.0	138.4	1,599	18.0
8	2,504,135	7,140,268	24.7	WTG 08	Yes	ENERCON	E-82 E2-2,300	2,300	82.0	138.4	1,599	18.0
9	2,503,178	7,139,811	30.0	WTG 09	Yes	ENERCON	E-82 E2-2,300	2,300	82.0	138.4	1,599	18.0
10	2,503,358	7,140,178	30.0	WTG 10	Yes	ENERCON	E-82 E2-2,300	2,300	82.0	138.4	1,599	18.0
11	2,503,695	7,140,033	28.2	WTG 11	Yes	ENERCON	E-82 E2-2,300	2,300	82.0	138.4	1,599	18.0
12	2,503,475	7,139,670	27.8	WTG 12	Yes	ENERCON	E-82 E2-2,300	2,300	82.0	138.4	1,599	18.0
13	2,504,035	7,139,907	26.0	WTG 13	Yes	ENERCON	E-82 E2-2,300	2,300	82.0	138.4	1,599	18.0
14	2,503,770	7,139,529	25.0	WTG 14	Yes	ENERCON	E-82 E2-2,300	2,300	82.0	138.4	1,599	18.0

Shadow receptor-Input

No.	Name	KKJ Zone: 2 East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
				[m]	[m]	[m]	[m]	[°]	[°]	
A	Rianperkkiö	2,501,436	7,138,392	18.4	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
B	Talus 2	2,500,920	7,139,360	10.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
C	Talus 1	2,500,868	7,139,596	9.9	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
D	Vainio	2,500,580	7,140,093	6.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
E	Tarkisenkangas	2,500,500	7,140,357	5.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
F	Rantavainio_holiday	2,499,816	7,140,485	0.9	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
G	Kivitolppa_holiday	2,500,468	7,142,274	1.7	1.0	1.0	2.0	-180.0	0.0	"Green house mode"

Project:
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Calculated:
29.02.2012 11:37/2.7.490

SHADOW - Main Result

Calculation: E82 road shift RC

Calculation Results

Shadow receptor

No.	Name	Shadow, expected values Shadow hours per year [h/year]
A	Rianperkkiö	0:00
B	Talus 2	0:00
C	Talus 1	0:55
D	Vainio	1:30
E	Tarkisenkangas	1:02
F	Rantavainio_holiday	0:00
G	Kivitolppa_holiday	0:00

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	WTG 01	0:00	0:00
2	WTG 02	0:00	0:00
3	WTG 03	0:00	0:00
4	WTG 04	0:00	0:00
5	WTG 05	9:10	2:33
6	WTG 06	0:00	0:00
7	WTG 07	3:23	0:55
8	WTG 08	0:00	0:00
9	WTG 09	0:00	0:00
10	WTG 10	0:00	0:00
11	WTG 11	0:00	0:00
12	WTG 12	0:00	0:00
13	WTG 13	0:00	0:00
14	WTG 14	0:00	0:00

WindPRO version 2.7.490 Sep 2011

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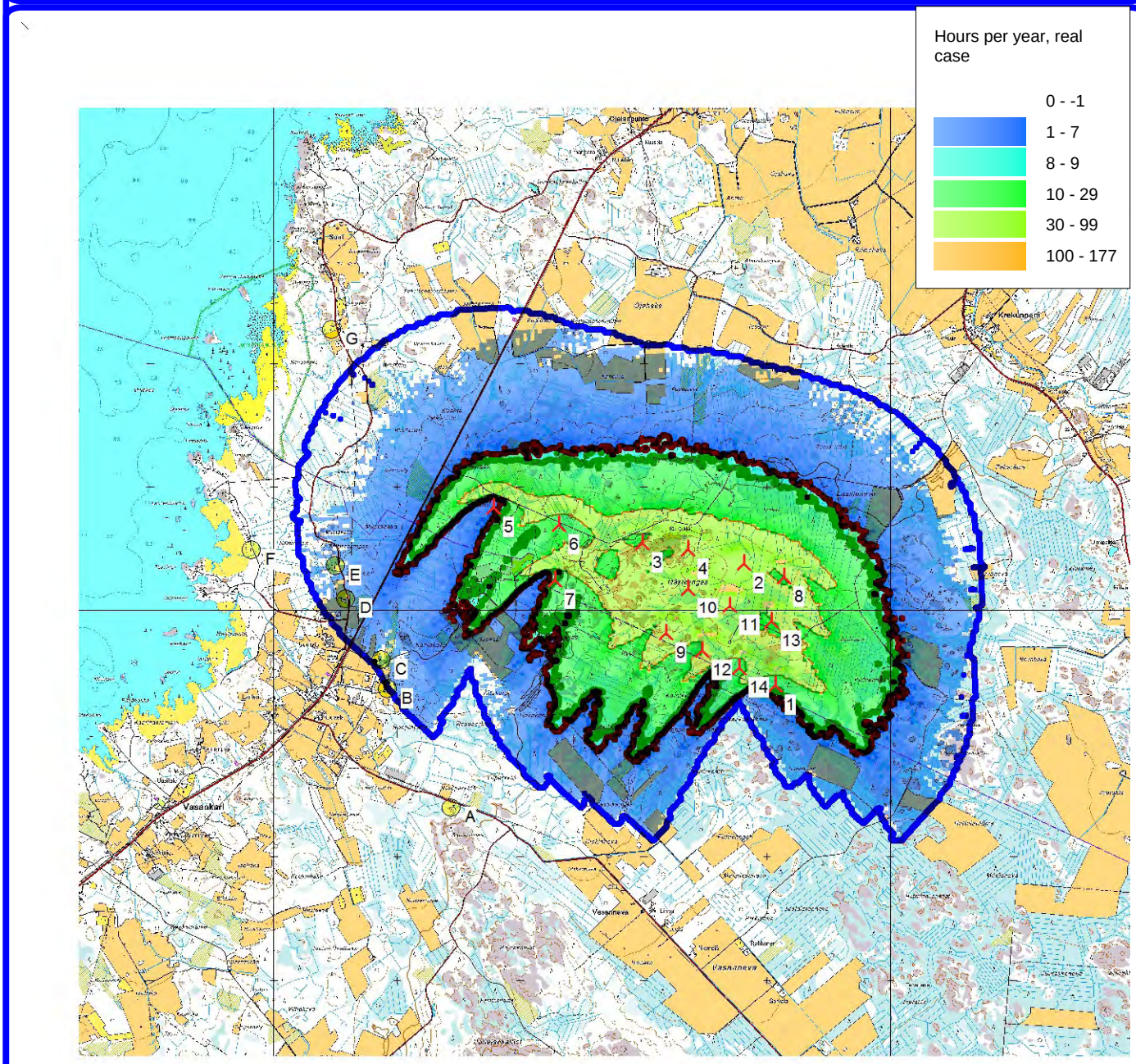
Paul Bade / p.bade@wpd.de

Calculated:
29.02.2012 11:37/2.7.490

SHADOW - Map

Calculation: E82 road shift RC



Map: , Print scale 1:50,000, Map center KKJ Finland Zone: 2 East: 2,502,822 North: 7,140,229

New WTG Shadow receptor

Isolines showing shadow in Hours per year, real case

0 8 10 30

Project:
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Calculated:
29.02.2012 12:05/2.7.490

SHADOW - Main Result

Calculation: E82 road shift WC

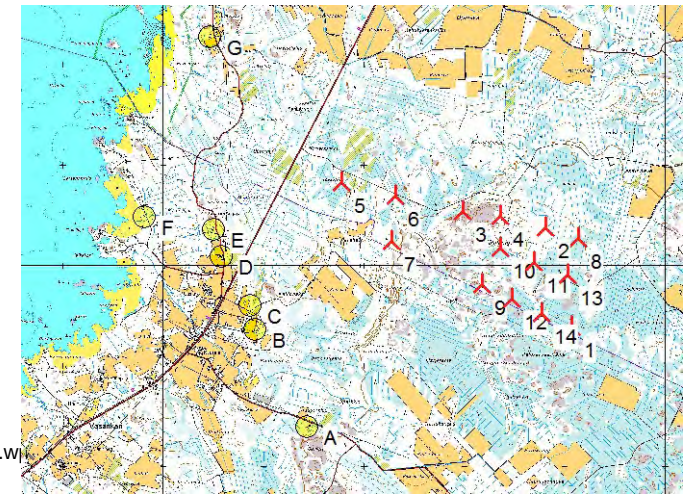
Assumptions for shadow calculations

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

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

The calculated times are "worst case" given by the following assumptions:
The sun is shining all the day, from sunrise to sunset
The rotor plane is always perpendicular to the line from the WTG to the sun
The WTG is always operating

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:
Height contours used: Height Contours: CONTOURLINE_ONLINEDATA_0.wi
Obstacles not used in calculation
Eye height: 1.5 m
Grid resolution: 10 m



Scale 1:75,000
New WTG
Shadow receptor

WTGs

	KKJ Zone: 2 East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
	KKJ Zone: 2		[m]					[kW]	[m]	[m]	[m]	[RPM]
1	2,504,067	7,139,390	25.0	WTG 01	Yes	ENERCON	E-82 E2-2,300	2,300	82.0	138.4	1,599	18.0
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3	2,502,987	7,140,546	22.4	WTG 03	Yes	ENERCON	E-82 E2-2,300	2,300	82.0	138.4	1,599	18.0
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5	2,501,781	7,140,832	12.8	WTG 05	Yes	ENERCON	E-82 E2-2,300	2,300	82.0	138.4	1,599	18.0
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13	2,504,035	7,139,907	26.0	WTG 13	Yes	ENERCON	E-82 E2-2,300	2,300	82.0	138.4	1,599	18.0
14	2,503,770	7,139,529	25.0	WTG 14	Yes	ENERCON	E-82 E2-2,300	2,300	82.0	138.4	1,599	18.0

Shadow receptor-Input

No.	Name	KKJ Zone: 2 East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
				[m]	[m]	[m]	[m]	[°]	[°]	
A	Rianperkkiö	2,501,436	7,138,392	18.4	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
B	Talus 2	2,500,920	7,139,360	10.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
C	Talus 1	2,500,868	7,139,596	9.9	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
D	Vainio	2,500,580	7,140,093	6.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
E	Tarkisenkangas	2,500,500	7,140,357	5.0	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
F	Rantavainio_holiday	2,499,816	7,140,485	0.9	1.0	1.0	2.0	-180.0	0.0	"Green house mode"
G	Kivitolppa_holiday	2,500,468	7,142,274	1.7	1.0	1.0	2.0	-180.0	0.0	"Green house mode"

Project:
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Calculated:
29.02.2012 12:05/2.7.490

SHADOW - Main Result

Calculation: E82 road shift WC

Calculation Results

Shadow receptor

No.	Name	Shadow, worst case: Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
A	Rianperkkiö	0:00	0	0:00
B	Talus 2	0:00	0	0:00
C	Talus 1	3:24	21	0:13
D	Vainio	5:05	28	0:14
E	Tarkisenkangas	4:05	22	0:15
F	Rantavainio_holiday	0:00	0	0:00
G	Kivitolppa_holiday	0:00	0	0:00

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	WTG 01	0:00	
2	WTG 02	0:00	
3	WTG 03	0:00	
4	WTG 04	0:00	
5	WTG 05	9:10	
6	WTG 06	0:00	
7	WTG 07	3:23	
8	WTG 08	0:00	
9	WTG 09	0:00	
10	WTG 10	0:00	
11	WTG 11	0:00	
12	WTG 12	0:00	
13	WTG 13	0:00	
14	WTG 14	0:00	

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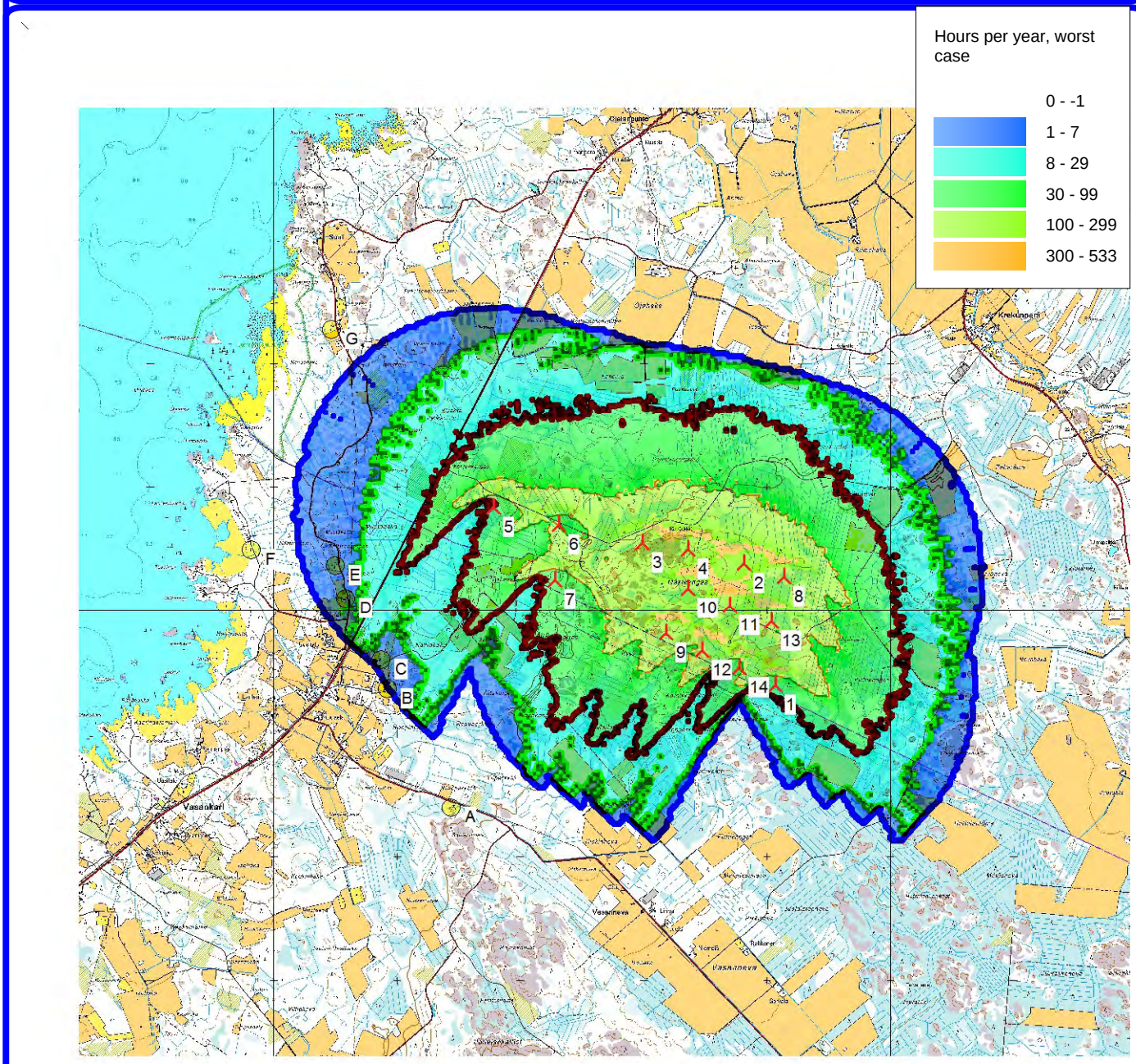
Calculated:
29.02.2012 12:05/2.7.490

SHADOW - Map

Calculation: E82 road shift WC



0 500 1000 1500 2000 m

Map: , Print scale 1:50,000, Map center KKJ Finland Zone: 2 East: 2,502,822 North: 7,140,229

New WTG Shadow receptor

Isolines showing shadow in Hours per year, worst case

0 8 30 100