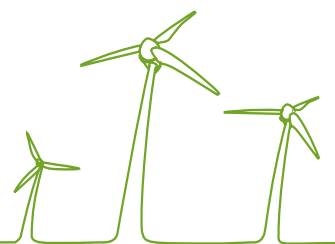
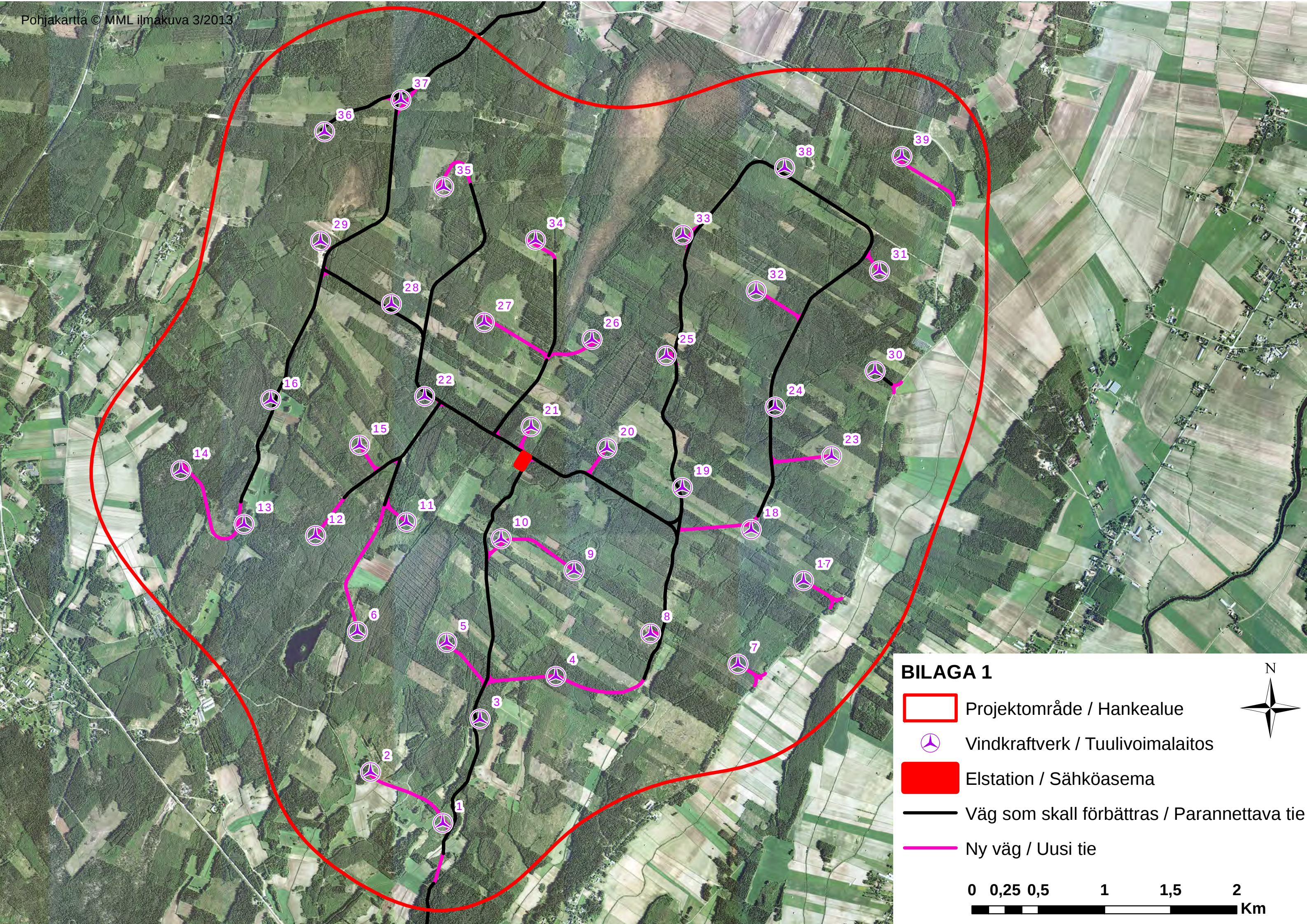


BILAGA 1

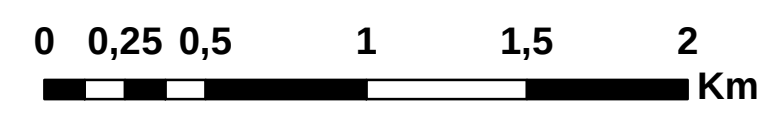
Vindkraftparkens tekniska plan





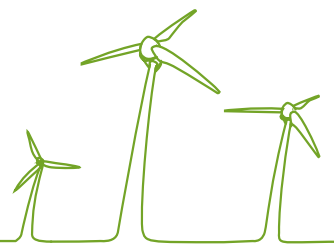
BILAGA 1

-  Projektområde / Hankealue
-  Vindkraftverk / Tuulivoimalaitos
-  Elstation / Sähköasema
-  Väg som skall förbättras / Parannettava tie
-  Ny väg / Uusi tie



BILAGA 2

Preliminära modellresultat av ljud, skugga och synlighet



Project:

Kalax, Närpes

Description:

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Janne Märsylä / janne.marsyla@fcg.fi

Calculated:

12.9.2013 9:11/2.8.579

DECIBEL - Main Result

Calculation: Kalax e.n.o. 3500 126 x 39 hh137 GF0,4

Noise calculation model:

ISO 9613-2 General

Wind speed:

8,0 m/s

Ground attenuation:

General, Ground factor: 0,4

Meteorological coefficient, C0:

0,0 dB

Type of demand in calculation:

1: WTG noise is compared to demand (DK, DE, SE, NL etc.)

Noise values in calculation:

All noise values are mean values (Lwa) (Normal)

Pure tones:

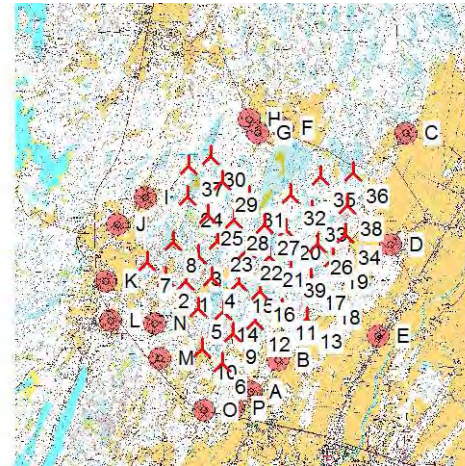
Pure and Impulse tone penalty are added to WTG source noise

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

4,0 m Allow override of model height with height from NSA object

Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:

0,0 dB(A)



Scale 1:200 000

New WTG

Noise sensitive area

WTGs

Finish TM ETRS-TM35FIN-ETRS89				WTG type		Noise data							Wind speed [m/s]	LwA,ref [dB(A)]	Pure tones
East	North	Z [m]	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Creator	Name				
1	204 512	6 944 993	20,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
2	203 972	6 945 080	17,5 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
3	204 844	6 945 676	25,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
4	205 199	6 945 095	20,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
5	204 828	6 944 269	19,3 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
6	205 473	6 942 822	20,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
7	203 495	6 945 487	15,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
8	204 174	6 946 018	19,8 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
9	205 755	6 943 608	20,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
10	204 927	6 943 209	14,6 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
11	207 041	6 944 256	25,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
12	206 327	6 943 931	18,8 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
13	207 702	6 944 022	24,2 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
14	205 503	6 944 187	20,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
15	205 913	6 944 969	20,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
16	206 465	6 944 729	25,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
17	207 802	6 945 040	22,5 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
18	208 199	6 944 653	25,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
19	208 410	6 945 594	27,9 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
20	207 162	6 946 353	20,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
21	206 713	6 945 654	20,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
22	206 141	6 945 816	22,5 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
23	205 336	6 946 045	23,3 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
24	204 549	6 947 217	25,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
25	205 085	6 946 743	25,7 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
26	207 984	6 945 966	25,8 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
27	206 600	6 946 474	20,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
28	205 785	6 946 605	22,5 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
29	205 479	6 947 628	32,5 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
30	205 157	6 948 285	28,6 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
31	206 174	6 947 226	23,1 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
32	207 287	6 947 264	27,5 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
33	207 841	6 946 841	25,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
34	208 738	6 946 235	22,5 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
35	208 056	6 947 770	25,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
36	208 941	6 947 857	20,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
37	204 579	6 948 043	27,5 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
38	208 772	6 946 992	30,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	
39	207 283	6 945 356	22,6 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	137,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h	

h) Generic octave distribution used

Calculation Results

Sound Level

Noise sensitive area

No.	Name	Finish TM ETRS-TM35FIN-ETRS89			Imission height	Noise	Sound Level	Demands fulfilled ?
		East	North	Z	[m]	[dB(A)]	From WTGs [dB(A)]	Noise
	A Asuinrakennus Blomberg	206 246	6 942 056	12,5	4,0	40,0	37,2	Yes
	B Asuinrakennus Österås	206 937	6 942 891	13,8	4,0	40,0	39,2	Yes

To be continued on next page...

Project:

Kalax, Närpes

Description:

VindIn Oy/Ab

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Janne Märsylä / janne.marsyla@fcg.fi

Calculated:

12.9.2013 9:11/2.8.579

DECIBEL - Main Result**Calculation:** Kalax e.n.o. 3500 126 x 39 hh137 GF0,4

...continued from previous page

Noise sensitive area		Finish TM ETRS-TM35FIN-ETRS89				Demands		Sound Level	Demands fulfilled ?	
No.	Name	East	North	Z	Imission height	Noise	From WTGs	Noise		
				[m]	[m]	[dB(A)]	[dB(A)]			
	C Asuinrakennus Eide	210 331	6 948 906	16,9	4,0	40,0	32,3		Yes	
	D Asuinrakennus Böcknäset	209 917	6 945 940	19,8	4,0	40,0	37,4		Yes	
	E Asuinrakennus Boslätan	209 601	6 943 532	10,0	4,0	40,0	34,4		Yes	
	F Asuinrakennus Södergran	207 068	6 949 027	17,5	4,0	40,0	36,4		Yes	
	G Asuinrakennus Mannström	206 407	6 948 891	25,0	4,0	40,0	37,5		Yes	
	H Asuinrakennus Brådd	206 186	6 949 267	19,2	4,0	40,0	36,2		Yes	
	I Asuinrakennus Mjödträsk	203 448	6 947 202	11,3	4,0	40,0	38,7		Yes	
	J Asuinrakennus Skatabacken	202 707	6 946 489	7,5	4,0	40,0	36,8		Yes	
	K Asuinrakennus Kambbacken	202 402	6 944 985	11,7	4,0	40,0	36,3		Yes	
	L Asuinrakennus Nämpnäs	202 510	6 943 937	7,5	4,0	40,0	34,6		Yes	
	M Asuinrakennus Vargstubacken	203 820	6 942 951	16,0	4,0	40,0	37,3		Yes	
	N Asuinrakennus Nordgådsbacken	203 702	6 943 856	14,8	4,0	40,0	39,2		Yes	
	O Asuinrakennus Fällan	205 000	6 941 586	22,5	4,0	40,0	35,2		Yes	
	P Asuinrakennus Västerkalax	205 775	6 941 638	7,5	4,0	40,0	35,7		Yes	

Distances (m)

WTG	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	3407	3205	7004	5482	5289	4770	4329	4585	2449	2342	2108	2261	2154	1395	3438	3581
2	3780	3682	7413	6001	5832	5011	4518	4731	2183	1891	1571	1853	2132	1253	3638	3882
3	3878	3480	6360	5075	5213	4018	3571	3830	2066	2284	2535	2907	2908	2147	4088	4140
4	3211	2804	6385	4789	4667	4349	3979	4282	2737	2852	2796	2924	2546	1942	3511	3502
5	2625	2516	7188	5351	4824	5253	4879	5174	3238	3067	2526	2339	1657	1199	2685	2794
6	1087	1464	7777	5424	4184	6400	6134	6478	4820	4588	3751	3162	1655	2048	1322	1221
7	4393	4306	7635	6431	6404	5024	4475	4635	1714	1273	1202	1834	2554	1643	4176	4469
8	4466	4168	6793	5738	5963	4170	3635	3817	1388	1539	2049	2661	3084	2211	4503	4659
9	1625	1380	6993	4766	3842	5570	5318	5670	4267	4190	3621	3258	2041	2066	2156	1968
10	1750	2033	7844	5683	4680	6193	5865	6181	4253	3956	3083	2521	1135	1383	1623	1784
11	2336	1367	5690	3330	2658	4766	4673	5078	4642	4870	4690	4537	3471	3359	3357	2905
12	1874	1204	6380	4110	3295	5145	4956	5333	4353	4428	4059	3813	2688	2624	2691	2356
13	2443	1363	5541	2928	1959	5040	5034	5454	5306	5565	5381	5187	4022	4000	3634	3062
14	2254	1930	6744	4745	4146	5082	4786	5121	3645	3618	3198	3000	2085	1829	2646	2561
15	2928	2314	5912	4117	3954	4215	3949	4302	3323	3544	3507	3551	2903	2473	3500	3331
16	2679	1895	5686	3655	3353	4336	4158	4542	3897	4145	4066	4028	3183	2895	3463	3164
17	3361	2314	4615	2297	2345	4050	4092	4521	4856	5291	5394	5399	4491	4263	4443	3956
18	3246	2165	4752	2145	1793	4513	4597	5028	5386	5785	5800	5727	4693	4563	4427	3865
19	4143	3075	3824	1545	2379	3683	3854	4289	5211	5767	6033	6122	5291	5014	5257	4749
20	4389	3465	4065	2783	3725	2673	2645	3070	3806	4452	4947	5236	4764	4263	5229	4910
21	3625	2769	4859	3213	3580	3388	3248	3647	3610	4088	4358	4536	3955	3504	4410	4121
22	3757	3027	5201	3774	4141	3339	3084	3448	3026	3496	3826	4083	3682	3126	4376	4190
23	4087	3533	5750	4577	4945	3445	3038	3329	2213	2664	3117	3522	3442	2729	4467	4425
24	5427	4936	6017	5513	6247	3099	2499	2621	1100	1978	3094	3857	4323	3463	5643	5707
25	4823	4269	5668	4893	5535	3022	2520	2751	1699	2389	3204	3804	3993	3198	5151	5146
26	4275	3245	3757	1931	2919	3192	3319	3755	4697	5297	5662	5832	5135	4769	5295	4855
27	4427	3595	4449	3356	4198	2593	2422	2821	3232	3889	4450	4807	4483	3902	5137	4901
28	4568	3885	5089	4181	4895	2738	2366	2689	2410	3077	3747	4219	4144	3446	5075	4963
29	5618	4951	5012	4743	5805	2115	1566	1783	2074	2994	4052	4731	4957	4166	6054	5991
30	6316	5674	5205	5301	6500	2047	1388	1421	2022	3035	4294	5084	5493	4657	6693	6669
31	5165	4397	4478	3954	5034	2008	1679	2038	2724	3541	4383	4918	4875	4176	5755	5597
32	5305	4382	3454	2941	4387	1775	1848	2283	3836	4641	5385	5815	5528	4942	6115	5820
33	5039	4048	3231	2261	3745	2316	2499	2933	4403	5140	5741	6064	5588	5098	5968	5593
34	4860	3794	3107	1214	2834	3251	3530	3959	5372	6030	6451	6631	5907	5564	5959	5464
35	5987	5000	2540	2607	4506	1598	1992	2393	4638	5494	6296	6734	6409	5849	6890	6536
36	6389	5349	1740	2149	4370	2206	2734	3091	5526	6375	7134	7523	7084	6585	7398	6971
37	6208	5660	5810	5731	6743	2673	2013	2018	1408	2430	3750	4593	5143	4274	6463	6509
38	5539	4488	2466	1553	3554	2652	3030	3440	5323	6080	6672	6960	6385	5956	6585	6130
39	3455	2486	4674	2695	2946	3674	3638	4058	4252	4710	4890	4974	4212	3879	4403	4009

Project:

Kalax, Närpes

Description:

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Calculated:

12.9.2013 9:11/2.8.579



DECIBEL - Assumptions for noise calculation

Calculation: Kalax e.n.o. 3500 126 x 39 hh137 GF0,4

Noise calculation model:

ISO 9613-2 General

Wind speed:

8,0 m/s

Ground attenuation:

General, Ground factor: 0,4

Meteorological coefficient, C0:

0,0 dB

Type of demand in calculation:

1: WTG noise is compared to demand (DK, DE, SE, NL etc.)

Noise values in calculation:

All noise values are mean values (Lwa) (Normal)

Pure tones:

Pure and Impulse tone penalty are added to WTG source noise

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

4,0 m Allow override of model height with height from NSA object

Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:

0,0 dB(A)

Octave data required

Air absorption

63	125	250	500	1 000	2 000	4 000	8 000
[db/km]	[db/km]	[db/km]	[db/km]	[db/km]	[db/km]	[db/km]	[db/km]
0,1	0,4	1,0	1,9	3,7	9,7	32,8	117,0

WTG: e.n.o. e.n.o. 126 3500 126.0 !O!

Noise: Level 0 - calculated - 3500 kW - 11/2012

Source

Source/Date Creator Edited

e.n.o. energy systems GmbH 29.11.2012 EMD 15.2.2013 14:49

According to manufacturer specification document

eno126_3 5_wtc_soupow_forecast_rev0.pdf

Octave data

Status	Hub height	Wind speed	LwA,ref	Pure tones	63	125	250	500	1000	2000	4000	8000
	[m]	[m/s]	[dB(A)]		[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
From Windcat	137,0	8,0	105,5	No	Generic data 87,1	94,1	97,5	100,1	99,9	97,0	92,2	82,7

NSA: Asuinrakennus Blomberg-A

Predefined calculation standard:

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

Noise demand: 40,0 dB(A)

Distance demand:

NSA: Asuinrakennus Österås-B

Predefined calculation standard:

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

Noise demand: 40,0 dB(A)

Distance demand:

NSA: Asuinrakennus Eide-C

Predefined calculation standard:

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

Noise demand: 40,0 dB(A)

Distance demand:

NSA: Asuinrakennus Börknäset-D

Predefined calculation standard:

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

Noise demand: 40,0 dB(A)

Distance demand:

Project:

Kalax, Närpes

Description:

VindIn Oy/Ab

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Janne Märsylä / janne.marsyla@fcg.fi

Calculated:

12.9.2013 9:11/2.8.579



DECIBEL - Assumptions for noise calculation

Calculation: Kalax e.n.o. 3500 126 x 39 hh137 GF0,4

NSA: Asuinrakennus Boslätan-E

Predefined calculation standard:

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

Noise demand: 40,0 dB(A)

Distance demand:

NSA: Asuinrakennus Södergran-F

Predefined calculation standard:

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

Noise demand: 40,0 dB(A)

Distance demand:

NSA: Asuinrakennus Mannström-G

Predefined calculation standard:

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

Noise demand: 40,0 dB(A)

Distance demand:

NSA: Asuinrakennus Brådd-H

Predefined calculation standard:

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

Noise demand: 40,0 dB(A)

Distance demand:

NSA: Asuinrakennus Mjödträsk-I

Predefined calculation standard:

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

Noise demand: 40,0 dB(A)

Distance demand:

NSA: Asuinrakennus Skatabacken-J

Predefined calculation standard:

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

Noise demand: 40,0 dB(A)

Distance demand:

NSA: Asuinrakennus Kambbacken-K

Predefined calculation standard:

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

Noise demand: 40,0 dB(A)

Distance demand:

NSA: Asuinrakennus Nämpnäs-L

Predefined calculation standard:

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

Noise demand: 40,0 dB(A)

Distance demand:

NSA: Asuinrakennus Vargstubacken-M

Predefined calculation standard:

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

Noise demand: 40,0 dB(A)

Distance demand:

Project:

Kalax, Närpes

Description:

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Calculated:

12.9.2013 9:11/2.8.579



DECIBEL - Assumptions for noise calculation

Calculation: Kalax e.n.o. 3500 126 x 39 hh137 GF0,4

NSA: Asuinrakennus Nordgårdsbacken-N

Predefined calculation standard:

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

Noise demand: 40,0 dB(A)

Distance demand:

NSA: Asuinrakennus Fällan-O

Predefined calculation standard:

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

Noise demand: 40,0 dB(A)

Distance demand:

NSA: Asuinrakennus Västerkalax-P

Predefined calculation standard:

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

Noise demand: 40,0 dB(A)

Distance demand:

Project:

Kalax, Närpes

Description:

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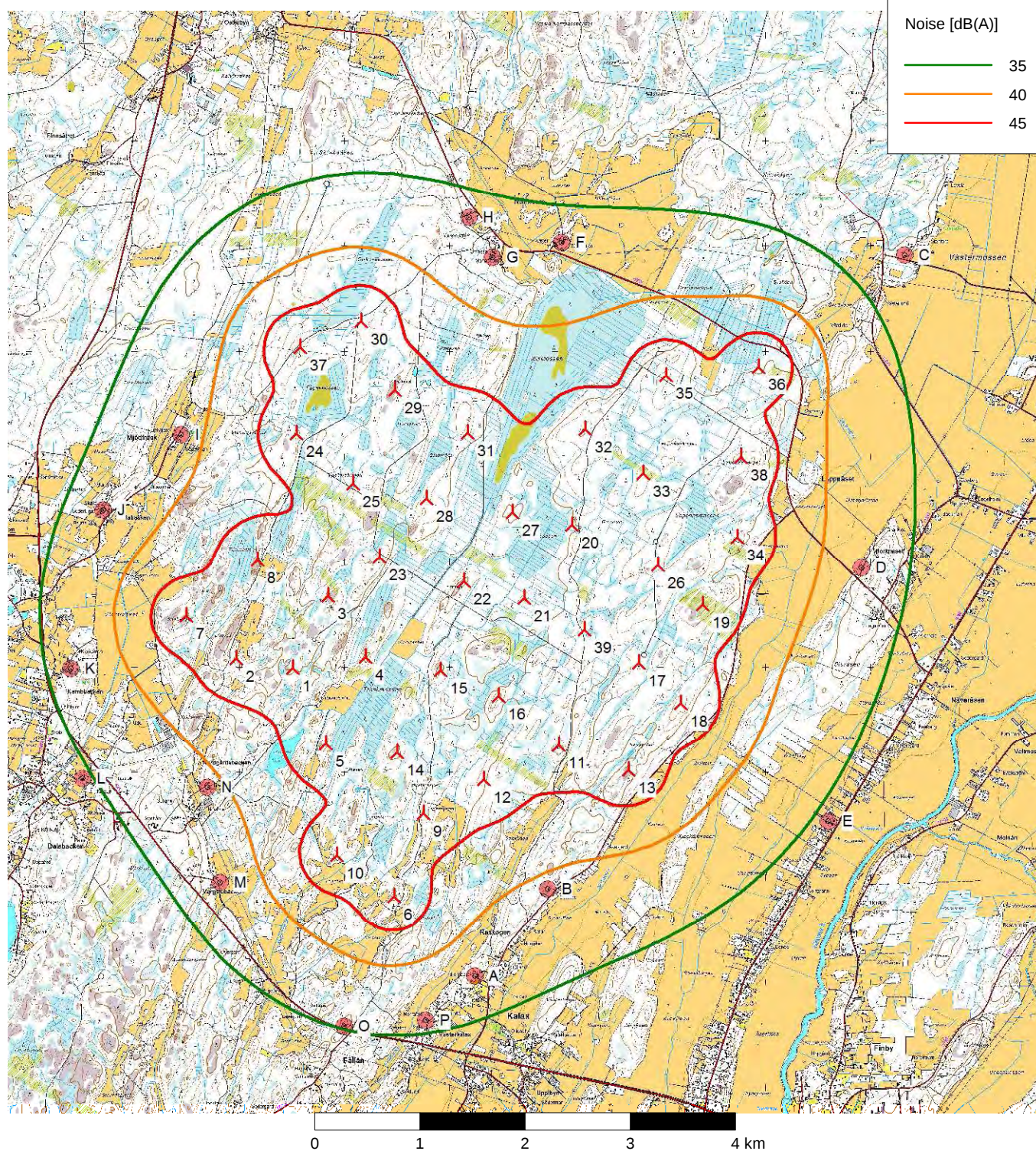
Janne Märsylä / janne.marsyla@fcg.fi

Calculated:

12.9.2013 9:11/2.8.579

DECIBEL - Map 8,0 m/s

Calculation: Kalax e.n.o. 3500 126 x 39 hh137 GF0,4



New WTG

Noise sensitive area

Noise calculation model: ISO 9613-2 General. Wind speed: 8,0 m/s

Height above sea level from active line object

Project:

Kalax, Närpes

Description:

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Calculated:

12.9.2013 8:59/2.8.579

DECIBEL - Main Result

Calculation: Kalax e.n.o. 3500 126 x 39 hh165 GF0,4

Noise calculation model:

ISO 9613-2 General

Wind speed:

8,0 m/s

Ground attenuation:

General, Ground factor: 0,4

Meteorological coefficient, C0:

0,0 dB

Type of demand in calculation:

1: WTG noise is compared to demand (DK, DE, SE, NL etc.)

Noise values in calculation:

All noise values are mean values (Lwa) (Normal)

Pure tones:

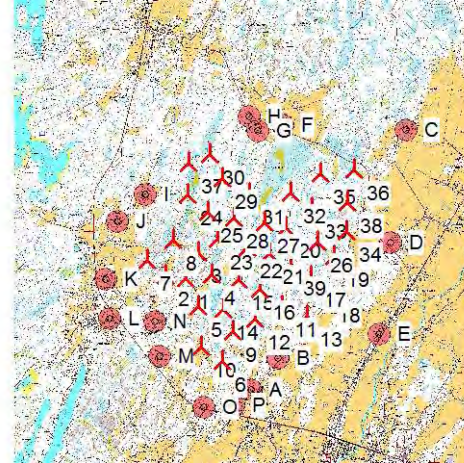
Pure and Impulse tone penalty are added to WTG source noise

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

4,0 m Allow override of model height with height from NSA object

Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:

0,0 dB(A)



Scale 1:200 000

✚ New WTG

📍 Noise sensitive area

WTGs

Finish TM ETRS-TM35FIN-ETRS89				WTG type				Noise data		Wind speed [m/s]	LwA,ref [dB(A)]	Pure tones		
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]				Creator	Name
1	204 512	6 944 993	20,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
2	203 972	6 945 080	17,5 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
3	204 844	6 945 676	25,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
4	205 199	6 945 095	20,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
5	204 828	6 944 269	19,3 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
6	205 473	6 942 822	20,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
7	203 495	6 945 487	15,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
8	204 174	6 946 018	19,8 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
9	205 755	6 943 608	20,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
10	204 927	6 943 209	14,6 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
11	207 041	6 944 256	25,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
12	206 327	6 943 931	18,8 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
13	207 702	6 944 022	24,2 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
14	205 503	6 944 187	20,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
15	205 913	6 944 969	20,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
16	206 465	6 944 729	25,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
17	207 802	6 945 040	22,5 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
18	208 199	6 944 653	25,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
19	208 410	6 945 594	27,9 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
20	207 162	6 946 353	20,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
21	206 713	6 945 654	20,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
22	206 141	6 945 816	22,5 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
23	205 336	6 946 045	23,3 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
24	204 549	6 947 217	25,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
25	205 085	6 946 743	25,7 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
26	207 984	6 945 966	25,8 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
27	206 600	6 946 474	20,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
28	205 785	6 946 605	22,5 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
29	205 479	6 947 628	32,5 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
30	205 157	6 948 285	28,6 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
31	206 174	6 947 226	23,1 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
32	207 287	6 947 264	27,5 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
33	207 841	6 946 841	25,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
34	208 738	6 946 235	22,5 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
35	208 056	6 947 770	25,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
36	208 941	6 947 857	20,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
37	204 579	6 948 043	27,5 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
38	208 772	6 946 992	30,0 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h
39	207 283	6 945 356	22,6 e.n.o. e.n.o. 126 3500 126,0 !... Yes	e.n.o.		e.n.o. 126-3 500	3 500	126,0	165,0	EMD	Level 0 - calculated - 3500 kW - 11/2012	8,0	105,5	0 dB h

h) Generic octave distribution used

Calculation Results

Project:

Kalax, Närpes

Description:

VindIn Oy/Ab

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Calculated:

12.9.2013 8:59/2.8.579

DECIBEL - Main Result

Calculation: Kalax e.n.o. 3500 126 x 39 hh165 GF0,4

Sound Level

Noise sensitive area		Finish TM ETRS-TM35FIN-ETRS89				Demands		Sound Level	Demands fulfilled ?	
No.	Name	East	North	Z	Imission height	Noise	From WTGs	Noise		
				[m]	[m]	[dB(A)]	[dB(A)]			
	A Asuinrakennus Blomberg	206 246	6 942 056	12,5	4,0	40,0	37,2	Yes		
	B Asuinrakennus Österås	206 937	6 942 891	13,8	4,0	40,0	39,2	Yes		
	C Asuinrakennus Eide	210 331	6 948 906	16,9	4,0	40,0	32,3	Yes		
	D Asuinrakennus Börknäset	209 917	6 945 940	19,8	4,0	40,0	37,3	Yes		
	E Asuinrakennus Boslätan	209 601	6 943 532	10,0	4,0	40,0	34,3	Yes		
	F Asuinrakennus Södergran	207 068	6 949 027	17,5	4,0	40,0	36,4	Yes		
	G Asuinrakennus Mannström	206 407	6 948 891	25,0	4,0	40,0	37,4	Yes		
	H Asuinrakennus Brådd	206 186	6 949 267	19,2	4,0	40,0	36,1	Yes		
	I Asuinrakennus Mjödträsk	203 448	6 947 202	11,3	4,0	40,0	38,7	Yes		
	J Asuinrakennus Skatabacken	202 707	6 946 489	7,5	4,0	40,0	36,8	Yes		
	K Asuinrakennus Kambacken	202 402	6 944 985	11,7	4,0	40,0	36,3	Yes		
	L Asuinrakennus Nämptäs	202 510	6 943 937	7,5	4,0	40,0	34,5	Yes		
	M Asuinrakennus Vargstucken	203 820	6 942 951	16,0	4,0	40,0	37,3	Yes		
	N Asuinrakennus Nordgårdsbacken	203 702	6 943 856	14,8	4,0	40,0	39,1	Yes		
	O Asuinrakennus Fällan	205 000	6 941 586	22,5	4,0	40,0	35,2	Yes		
	P Asuinrakennus Västerkalax	205 775	6 941 638	7,5	4,0	40,0	35,7	Yes		

Distances (m)

WTG	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	3407	3205	7004	5482	5289	4770	4329	4585	2449	2342	2108	2261	2154	1395	3438	3581
2	3780	3682	7413	6001	5832	5011	4518	4731	2183	1891	1571	1853	2132	1253	3638	3882
3	3878	3480	6360	5075	5213	4018	3571	3830	2066	2284	2535	2907	2908	2147	4088	4140
4	3211	2804	6385	4789	4667	4349	3979	4282	2737	2852	2796	2924	2546	1942	3511	3502
5	2625	2516	7188	5351	4824	5253	4879	5174	3238	3067	2526	2339	1657	1199	2685	2794
6	1087	1464	7777	5424	4184	6400	6134	6478	4820	4588	3751	3162	1655	2048	1322	1221
7	4393	4306	7635	6431	6404	5024	4475	4635	1714	1273	1202	1834	2554	1643	4176	4469
8	4466	4168	6793	5738	5963	4170	3635	3817	1388	1539	2049	2661	3084	2211	4503	4659
9	1625	1380	6993	4766	3842	5570	5318	5670	4267	4190	3621	3258	2041	2066	2156	1968
10	1750	2033	7844	5683	4680	6193	5865	6181	4253	3956	3083	2521	1135	1383	1623	1784
11	2336	1367	5912	3330	2658	4766	4673	5078	4642	4870	4690	4537	3471	3359	3357	2905
12	1874	1204	6380	4110	3295	5145	4956	5333	4353	4428	4059	3813	2688	2624	2691	2356
13	2443	1363	5541	2928	1959	5040	5034	5454	5306	5565	5381	5187	4022	4000	3634	3062
14	2254	1930	6744	4745	4146	5082	4786	5121	3645	3618	3198	3000	2085	1829	2646	2561
15	2928	2314	5912	4117	3954	4215	3949	4302	3323	3544	3507	3551	2903	2473	3500	3331
16	2679	1895	5686	3655	3353	4336	4158	4542	3897	4145	4066	4028	3183	2895	3463	3164
17	3361	2314	4615	2297	2345	4050	4092	4521	4856	5291	5394	5399	4491	4263	4443	3956
18	3246	2165	4752	2145	1793	4513	4597	5028	5386	5785	5800	5727	4693	4563	4427	3865
19	4143	3075	3824	1545	2379	3683	3854	4289	5211	5767	6033	6122	5291	5014	5257	4749
20	4389	3465	4065	2783	3725	2673	2645	3070	3806	4452	4947	5236	4764	4263	5229	4910
21	3625	2769	4859	3213	3580	3388	3248	3647	3610	4088	4358	4536	3955	3504	4410	4121
22	3757	3027	5201	3774	4141	3339	3084	3448	3026	3496	3826	4083	3682	3126	4376	4190
23	4087	3533	5750	4577	4945	3445	3038	3329	2213	2664	3117	3522	3442	2729	4467	4425
24	5427	4936	6017	5513	6247	3099	2499	2621	1100	1978	3094	3857	4323	3463	5643	5707
25	4823	4269	5668	4893	5535	3022	2520	2751	1699	2389	3204	3804	3993	3198	5151	5146
26	4275	3245	3757	1931	2919	3192	3319	3755	4697	5297	5662	5832	5135	4769	5295	4855
27	4427	3595	4449	3356	4198	2593	2422	2821	3232	3889	4450	4807	4483	3902	5137	4901
28	4568	3885	5089	4181	4895	2738	3366	2689	2410	3077	3747	4219	4144	3446	5075	4963
29	5618	4951	5012	4743	5805	2115	1566	1783	2074	2994	4052	4731	4957	4166	6054	5991
30	6316	5674	5205	5301	6500	2047	1388	1421	2022	3035	4294	5084	5493	4657	6693	6669
31	5165	4397	4478	3954	5034	2008	1679	2038	2724	3541	4383	4918	4875	4176	5755	5597
32	5305	4382	3454	2941	4387	1775	1848	2283	3836	4641	5385	5815	5528	4942	6115	5820
33	5039	4048	3231	2261	3745	2316	2499	2933	4403	5140	5741	6064	5588	5098	5968	5593
34	4860	3794	3107	1214	2834	3251	3530	3959	5372	6030	6451	6631	5907	5564	5959	5464
35	5987	5000	2540	2607	4506	1598	1992	2393	4638	5494	6296	6734	6409	5849	6890	6536
36	6389	5349	1740	2149	4370	2206	2734	3091	5526	6375	7134	7523	7084	6585	7398	6971
37	6208	5660	5810	5731	6743	2673	2013	2018	1408	2430	3750	4593	5143	4274	6463	6509
38	5539	4488	2466	1553	3554	2652	3030	3440	5323	6080	6672	6960	6385	5956	6585	6130
39	3455	2486	4674	2695	2946	3674	3638	4058	4252	4710	4890	4974	4212	3879	4403	4009

Project: **Kalax, Närpes**
 Description: **VindIn Oy/Ab**

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 Janne Märsylä / janne.marsyla@fcg.fi
 Calculated:
 12.9.2013 8:59/2.8.579



DECIBEL - Assumptions for noise calculation

Calculation: Kalax e.n.o. 3500 126 x 39 hh165 GF0,4

Noise calculation model:

ISO 9613-2 General

Wind speed:

8,0 m/s

Ground attenuation:

General, Ground factor: 0,4

Meteorological coefficient, C0:

0,0 dB

Type of demand in calculation:

1: WTG noise is compared to demand (DK, DE, SE, NL etc.)

Noise values in calculation:

All noise values are mean values (Lwa) (Normal)

Pure tones:

Pure and Impulse tone penalty are added to WTG source noise

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

4,0 m Allow override of model height with height from NSA object

Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:

0,0 dB(A)

Octave data required

Air absorption

63	125	250	500	1 000	2 000	4 000	8 000
[db/km]	[db/km]	[db/km]	[db/km]	[db/km]	[db/km]	[db/km]	[db/km]
0,1	0,4	1,0	1,9	3,7	9,7	32,8	117,0

WTG: e.n.o. e.n.o. 126 3500 126.0 !O!

Noise: Level 0 - calculated - 3500 kW - 11/2012

Source Source/Date Creator Edited
 e.n.o. energy systems GmbH 29.11.2012 EMD 15.2.2013 14:49
 According to manufacturer specification document
 eno126_3 5_wtc_soupow_forecast_rev0.pdf

Status	Hub height [m]	Wind speed [m/s]	LwA,ref [dB(A)]	Pure tones	Octave data								
					63 [dB]	125 [dB]	250 [dB]	500 [dB]	1000 [dB]	2000 [dB]	4000 [dB]	8000 [dB]	
From Windcat	165,0	8,0	105,5	No	Generic data	87,1	94,1	97,5	100,1	99,9	97,0	92,2	82,7

NSA: Asuinrakennus Blomberg-A

Predefined calculation standard:

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

Noise demand: 40,0 dB(A)

Distance demand:

NSA: Asuinrakennus Österås-B

Predefined calculation standard:

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

Noise demand: 40,0 dB(A)

Distance demand:

NSA: Asuinrakennus Eide-C

Predefined calculation standard:

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

Noise demand: 40,0 dB(A)

Distance demand:

NSA: Asuinrakennus Börknäset-D

Predefined calculation standard:

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

Noise demand: 40,0 dB(A)

Distance demand:

Project:

Kalax, Närpes

Description:

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Calculated:

12.9.2013 8:59/2.8.579



DECIBEL - Assumptions for noise calculation

Calculation: Kalax e.n.o. 3500 126 x 39 hh165 GF0,4

NSA: Asuinrakennus Boslätan-E

Predefined calculation standard:

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

Noise demand: 40,0 dB(A)

Distance demand:

NSA: Asuinrakennus Södergran-F

Predefined calculation standard:

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

Noise demand: 40,0 dB(A)

Distance demand:

NSA: Asuinrakennus Mannström-G

Predefined calculation standard:

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

Noise demand: 40,0 dB(A)

Distance demand:

NSA: Asuinrakennus Brådd-H

Predefined calculation standard:

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

Noise demand: 40,0 dB(A)

Distance demand:

NSA: Asuinrakennus Mjödträsk-I

Predefined calculation standard:

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

Noise demand: 40,0 dB(A)

Distance demand:

NSA: Asuinrakennus Skatabacken-J

Predefined calculation standard:

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

Noise demand: 40,0 dB(A)

Distance demand:

NSA: Asuinrakennus Kambbacken-K

Predefined calculation standard:

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

Noise demand: 40,0 dB(A)

Distance demand:

NSA: Asuinrakennus Nämpnäs-L

Predefined calculation standard:

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

Noise demand: 40,0 dB(A)

Distance demand:

NSA: Asuinrakennus Vargstubacken-M

Predefined calculation standard:

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

Noise demand: 40,0 dB(A)

Distance demand:

Project:

Kalax, Närpes

Description:

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Calculated:

12.9.2013 8:59/2.8.579



DECIBEL - Assumptions for noise calculation

Calculation: Kalax e.n.o. 3500 126 x 39 hh165 GF0,4

NSA: Asuinrakennus Nordgårdsbacken-N

Predefined calculation standard:

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

Noise demand: 40,0 dB(A)

Distance demand:

NSA: Asuinrakennus Fällan-O

Predefined calculation standard:

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

Noise demand: 40,0 dB(A)

Distance demand:

NSA: Asuinrakennus Västerkalax-P

Predefined calculation standard:

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

Noise demand: 40,0 dB(A)

Distance demand:

Project:

Kalax, Närpes

Description:

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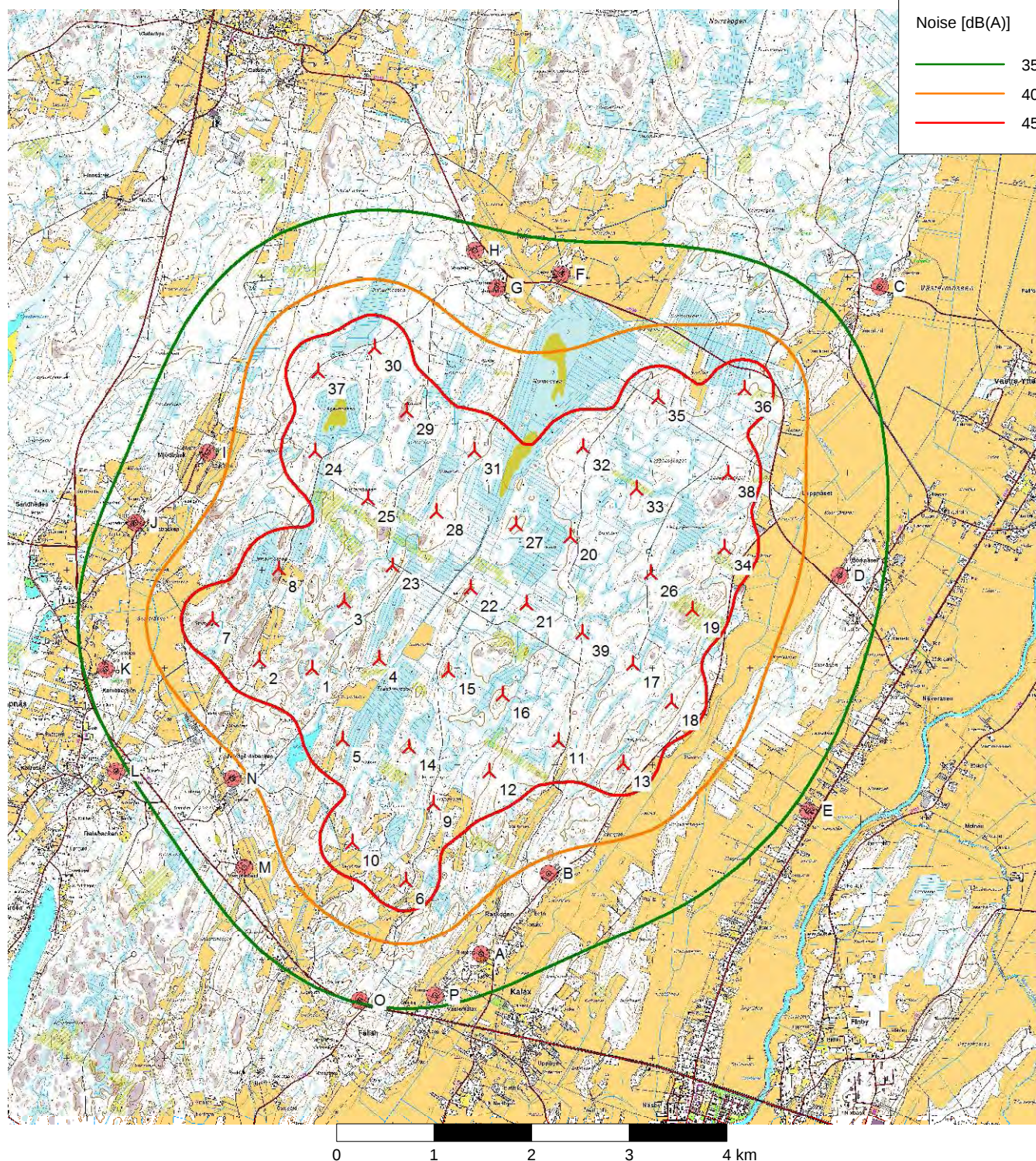
Janne Märsylä / janne.marsyla@fcg.fi

Calculated:

12.9.2013 8:59/2.8.579

DECIBEL - Map 8,0 m/s

Calculation: Kalax e.n.o. 3500 126 x 39 hh165 GF0,4



New WTG

Noise sensitive area

Noise calculation model: ISO 9613-2 General. Wind speed: 8,0 m/s

Height above sea level from active line object

Project:

Kalax, Närpes

Description:

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Calculated:

12.9.2013 10:42/2.8.579

SHADOW - Main Result

Calculation: Kalax e.n.o 3500 rd126 x 39x hh137

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) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational hours are calculated from WTGs in calculation and wind distribution:

MERRA_basic_E21.335_N62.500

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
780	695	499	412	466	681	1083	1215	627	570	623	627	8277

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

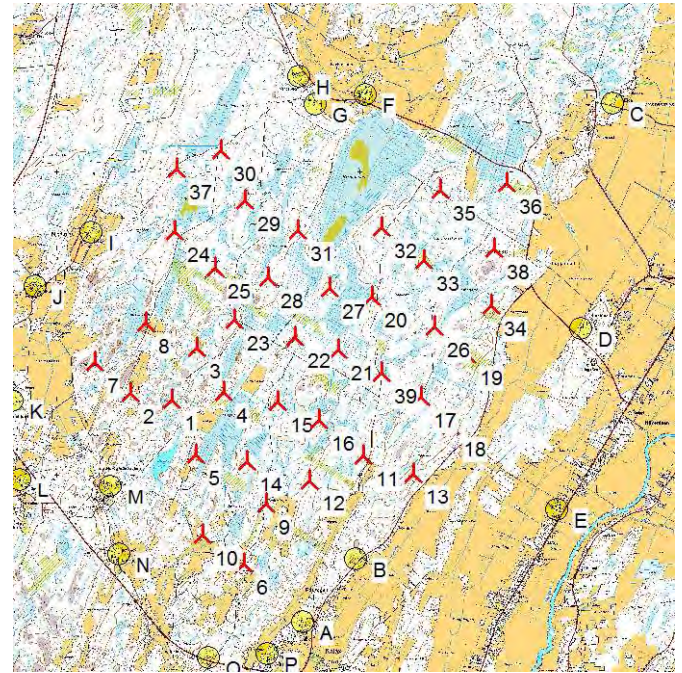
A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:

Height contours used: Height Contours: Närpes korkeuskäyrät(1).wpo (1)

Obstacles not used in calculation

Eye height: 1,5 m

Grid resolution: 25,0 m



Scale 1:100 000

▲ New WTG

● Shadow receptor

WTGs

Finish TM ETRS-TM35FIN-ETRS89				WTG type				Shadow data			
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Calculation distance	RPM
							[kW]	[m]	[m]	[m]	[RPM]
1	204 512	6 944 993	20,0 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
2	203 972	6 945 080	17,5 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
3	204 844	6 945 676	25,0 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
4	205 199	6 945 095	20,0 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
5	204 828	6 944 269	19,3 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
6	205 473	6 942 822	20,0 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
7	203 495	6 945 487	15,0 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
8	204 174	6 946 018	19,8 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
9	205 755	6 943 608	20,0 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
10	204 927	6 943 209	14,6 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
11	207 041	6 944 256	25,0 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
12	206 327	6 943 931	18,8 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
13	207 702	6 944 022	24,2 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
14	205 503	6 944 187	20,0 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
15	205 913	6 944 969	20,0 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
16	206 465	6 944 729	25,0 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
17	207 802	6 945 040	22,5 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
18	208 199	6 944 653	25,0 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
19	208 410	6 945 594	27,9 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
20	207 162	6 946 353	20,0 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
21	206 713	6 945 654	20,0 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
22	206 141	6 945 816	22,5 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
23	205 336	6 946 045	23,3 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
24	204 549	6 947 217	25,0 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
25	205 085	6 946 743	25,7 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
26	207 984	6 945 966	25,8 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
27	206 600	6 946 474	20,0 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
28	205 785	6 946 605	22,5 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
29	205 479	6 947 628	32,5 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4

To be continued on next page...

Project:

Kalax, Närpes

Description:

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Calculated:

12.9.2013 10:42/2.8.579

SHADOW - Main Result

Calculation: Kalax e.n.o 3500 rd126 x 39x hh137

...continued from previous page

Finish TM ETRS-TM35FIN-ETRS89				WTG type		Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Shadow data	
East	North	Z	Row data/Description	Valid	Manufact.					Calculation distance [m]	RPM [RPM]
		[m]									
30	205 157	6 948 285	28,6 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
31	206 174	6 947 226	23,1 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
32	207 287	6 947 264	27,5 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
33	207 841	6 946 841	25,0 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
34	208 738	6 946 235	22,5 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
35	208 056	6 947 770	25,0 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
36	208 941	6 947 857	20,0 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
37	204 579	6 948 043	27,5 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
38	208 772	6 946 992	30,0 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4
39	207 283	6 945 356	22,6 e.n.o. e.n.o. 126 3500 126.0 !O! ... Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	137,0	1 910	11,4

Shadow receptor-Input

Finish TM ETRS-TM35FIN-ETRS89				Width [m]	Height [m]	Height a.g.l. [m]	Degrees from south cw [°]	Slope of window [°]	Direction mode
No.	Name	East	North	Z					
				[m]	[m]	[m]	[°]	[°]	
A	Asuinrakennus Blomberg	206 246	6 942 056	12,5	1,0	1,0	0,0	90,0	"Green house mode"
B	Asuinrakennus Österås	206 937	6 942 891	13,8	1,0	1,0	0,0	90,0	"Green house mode"
C	Asuinrakennus Eide	210 331	6 948 906	16,9	1,0	1,0	0,0	90,0	"Green house mode"
D	Asuinrakennus Börknäset	209 917	6 945 940	19,8	1,0	1,0	0,0	90,0	"Green house mode"
E	Asuinrakennus Boslätan	209 601	6 943 532	10,0	1,0	1,0	0,0	90,0	"Green house mode"
F	Asuinrakennus Södergran	207 068	6 949 027	17,5	1,0	1,0	0,0	90,0	"Green house mode"
G	Asuinrakennus Mannström	206 407	6 948 891	25,0	1,0	1,0	0,0	90,0	"Green house mode"
H	Asuinrakennus Brädd	206 186	6 949 267	19,2	1,0	1,0	0,0	90,0	"Green house mode"
I	Asuinrakennus Mjödträsk	203 448	6 947 202	11,3	1,0	1,0	0,0	90,0	"Green house mode"
J	Asuinrakennus Skatabacken	202 707	6 946 489	7,5	1,0	1,0	0,0	90,0	"Green house mode"
K	Asuinrakennus Kammbacken	202 402	6 944 985	11,7	1,0	1,0	0,0	90,0	"Green house mode"
L	Asuinrakennus Nämpnäs	202 510	6 943 937	7,5	1,0	1,0	0,0	90,0	"Green house mode"
M	Asuinrakennus Nordgrådsbacken	203 702	6 943 856	14,8	1,0	1,0	0,0	90,0	"Green house mode"
N	Asuinrakennus Vargstubacken	203 820	6 942 951	16,0	1,0	1,0	0,0	90,0	"Green house mode"
O	Asuinrakennus Fällan	205 000	6 941 586	22,5	1,0	1,0	0,0	90,0	"Green house mode"
P	Asuinrakennus Västerkalax	205 775	6 941 638	7,5	1,0	1,0	0,0	90,0	"Green house mode"

Calculation Results

Shadow receptor

Shadow, expected values

No.	Name	Shadow hours per year [h/year]
A	Asuinrakennus Blomberg	8:20
B	Asuinrakennus Österås	3:44
C	Asuinrakennus Eide	0:57
D	Asuinrakennus Börknäset	7:57
E	Asuinrakennus Boslätan	2:02
F	Asuinrakennus Södergran	3:07
G	Asuinrakennus Mannström	5:24
H	Asuinrakennus Brädd	2:55
I	Asuinrakennus Mjödträsk	11:46
J	Asuinrakennus Skatabacken	3:48
K	Asuinrakennus Kammbacken	5:44
L	Asuinrakennus Nämpnäs	3:45
M	Asuinrakennus Nordgrådsbacken	5:44
N	Asuinrakennus Vargstubacken	3:48
O	Asuinrakennus Fällan	0:00
P	Asuinrakennus Västerkalax	0:00

Project:

Kalax, Närpes

Description:

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Calculated:

12.9.2013 10:42/2.8.579



SHADOW - Main Result

Calculation: Kalax e.n.o 3500 rd126 x 39x hh137

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (139)	0:00	0:00
2	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (140)	24:24	5:46
3	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (141)	0:00	0:00
4	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (142)	0:00	0:00
5	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (143)	15:19	3:31
6	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (144)	34:14	8:27
7	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (145)	44:18	8:26
8	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (146)	15:49	2:39
9	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (147)	11:14	2:37
10	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (148)	30:22	6:32
11	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (149)	0:00	0:00
12	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (150)	0:00	0:00
13	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (151)	0:00	0:00
14	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (152)	4:26	0:50
15	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (153)	0:00	0:00
16	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (154)	0:00	0:00
17	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (155)	0:00	0:00
18	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (156)	7:56	2:02
19	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (157)	5:54	1:01
20	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (158)	0:00	0:00
21	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (159)	0:00	0:00
22	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (160)	0:00	0:00
23	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (161)	0:00	0:00
24	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (162)	12:46	2:29
25	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (163)	4:46	0:49
26	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (164)	0:00	0:00
27	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (165)	0:00	0:00
28	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (166)	0:00	0:00
29	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (167)	19:59	2:33
30	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (168)	16:39	3:03
31	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (169)	14:53	1:50
32	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (170)	20:43	2:35
33	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (171)	0:00	0:00
34	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (172)	10:41	2:05
35	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (173)	6:58	1:15
36	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (174)	5:10	0:57
37	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (179)	17:11	4:41
38	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (180)	18:07	4:53
39	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 137,0 m (TOT: 200,0 m) (181)	0:00	0:00

Project:

Kalax, Närpes

Description:

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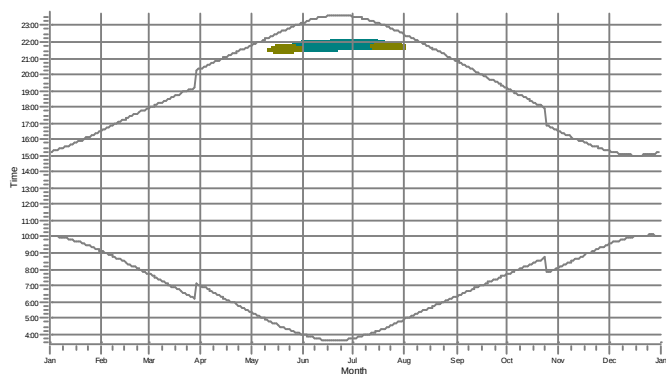
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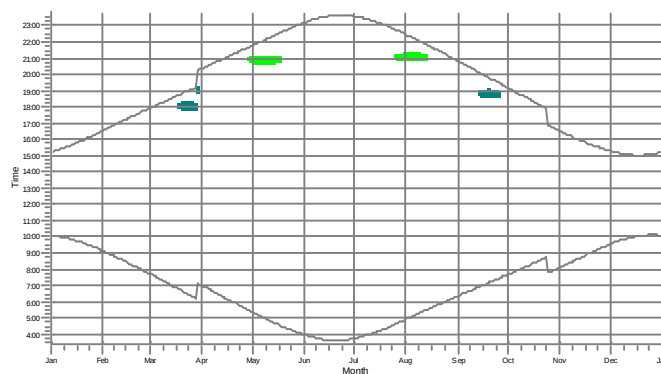
SHADOW - Calendar, graphical

Calculation: Kalax e.n.o 3500 rd126 x 39x hh137

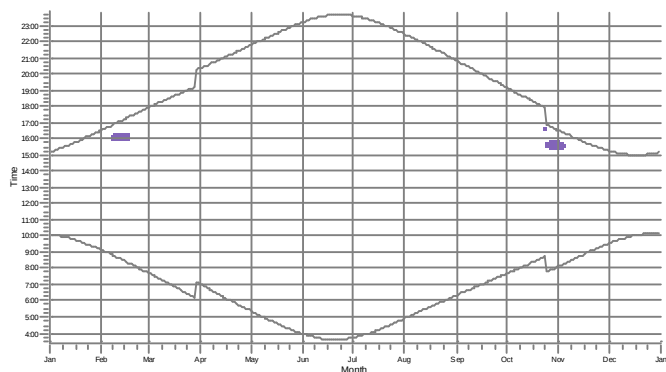
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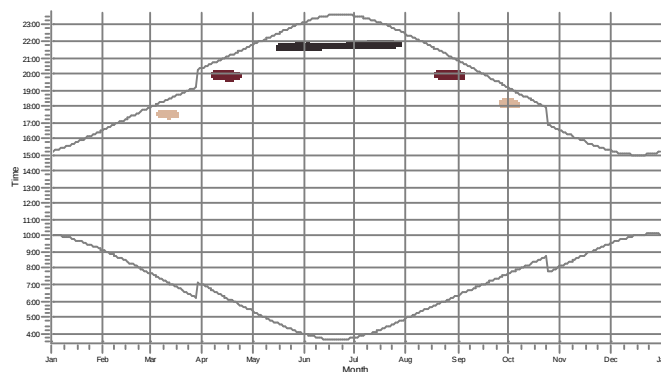
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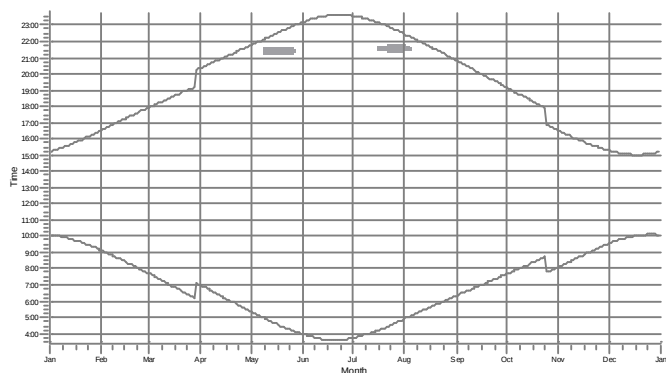
C: Asuinrakennus Eide



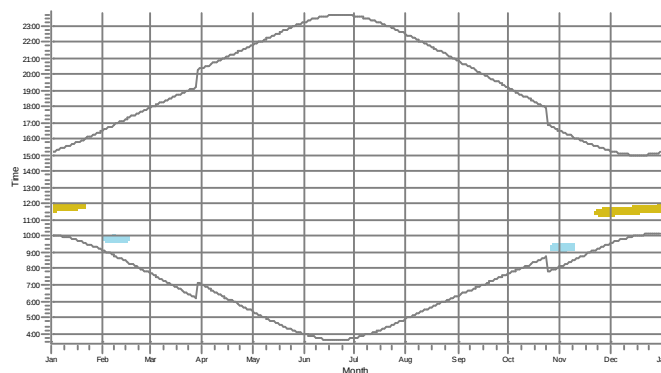
D: Asuinrakennus Börknäset



E: Asuinrakennus Boslätan



F: Asuinrakennus Södergran



WTGs

6: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 137,0 m (TOT: 200,0 m) (144)
 9: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 137,0 m (TOT: 200,0 m) (147)
 10: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 137,0 m (TOT: 200,0 m) (148)
 18: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 137,0 m (TOT: 200,0 m) (156)

19: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 137,0 m (TOT: 200,0 m) (157)
 32: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 137,0 m (TOT: 200,0 m) (170)
 34: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 137,0 m (TOT: 200,0 m) (172)
 35: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 137,0 m (TOT: 200,0 m) (173)

36: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 137,0 m (TOT: 200,0 m) (174)
 38: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 137,0 m (TOT: 200,0 m) (180)

Project:

Kalax, Närpes

Description:

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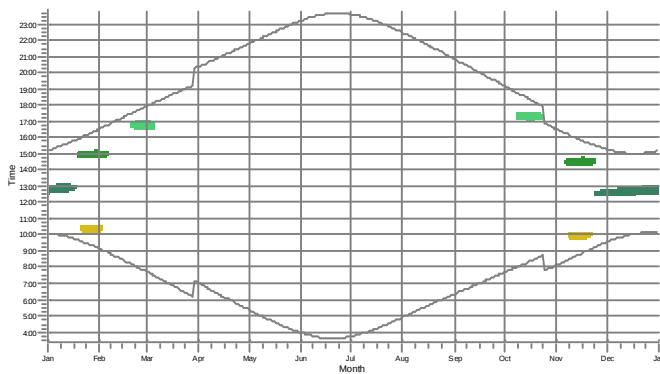
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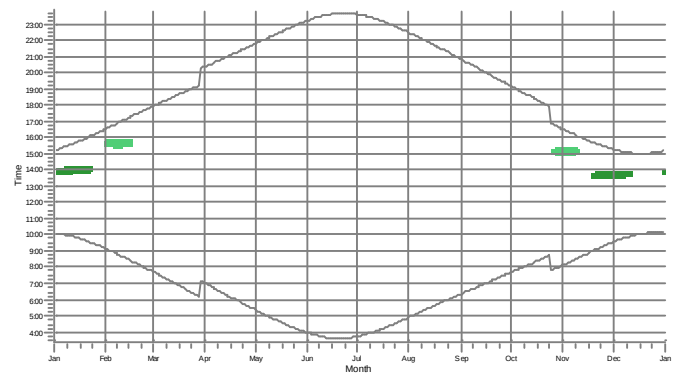
SHADOW - Calendar, graphical

Calculation: Kalax e.n.o 3500 rd126 x 39x hh137

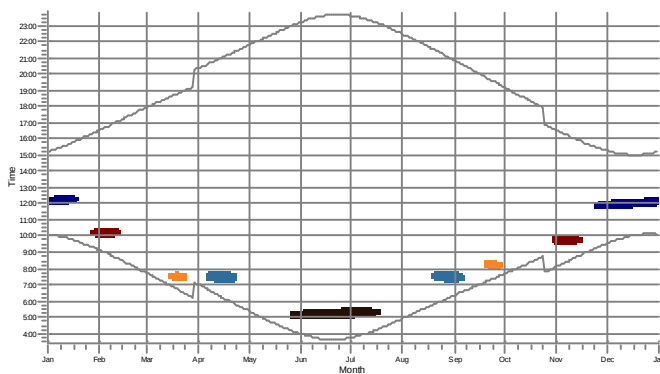
G: Asuinrakennus Männström



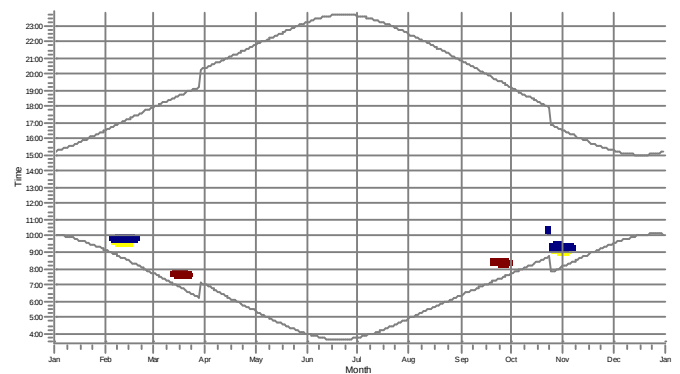
H: Asuinrakennus Brådd



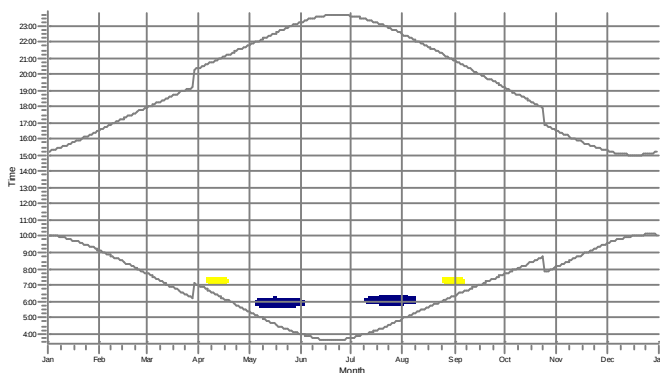
I: Asuinrakennus Mjödträsk



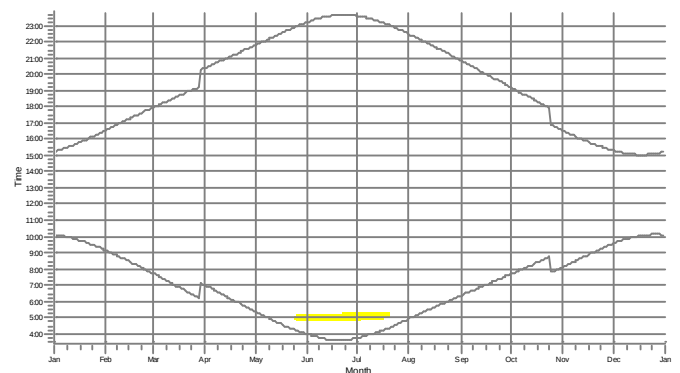
J: Asuinrakennus Skatabacken



K: Asuinrakennus Kambbacken



L: Asuinrakennus Nämphäs



WTGs

2: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 137,0 m (TOT: 200,0 m) (140)
 7: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 137,0 m (TOT: 200,0 m) (145)
 8: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 137,0 m (TOT: 200,0 m) (146)
 24: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 137,0 m (TOT: 200,0 m) (162)

25: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 137,0 m (TOT: 200,0 m) (163)
 29: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 137,0 m (TOT: 200,0 m) (167)
 30: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 137,0 m (TOT: 200,0 m) (168)
 31: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 137,0 m (TOT: 200,0 m) (169)

32: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 137,0 m (TOT: 200,0 m) (170)
 37: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 137,0 m (TOT: 200,0 m) (179)

Project:

Kalax, Närpes

Description:

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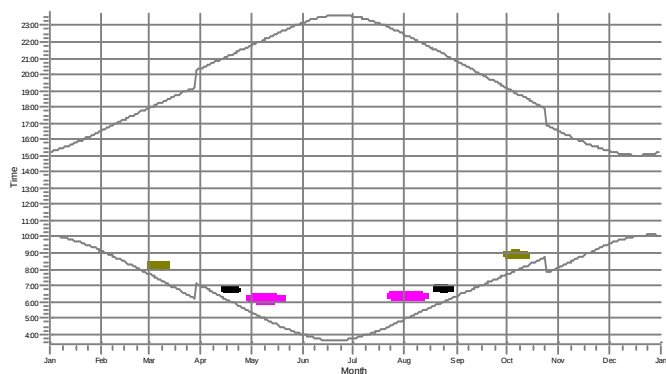
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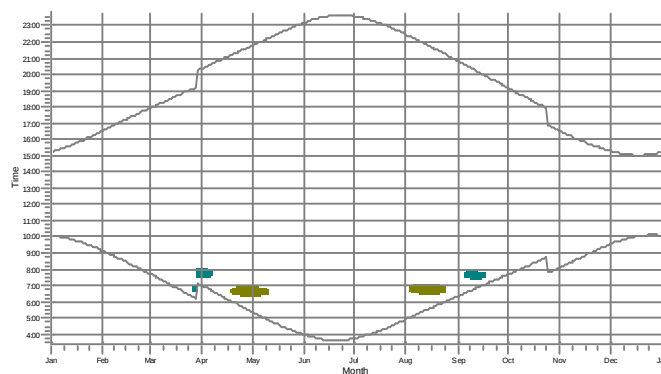
SHADOW - Calendar, graphical

Calculation: Kalax e.n.o 3500 rd126 x 39x hh137

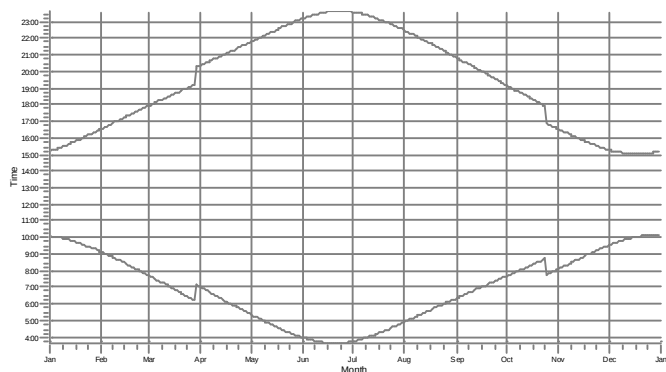
M: Asuinrakennus Nordgrådsbacken



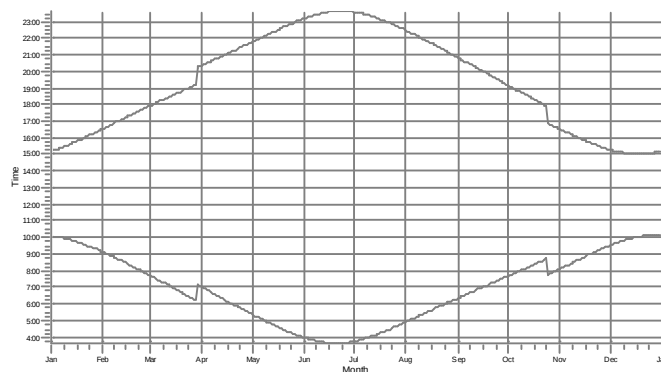
N: Asuinrakennus Vargstuckbacken



O: Asuinrakennus Fällan



P: Asuinrakennus Västerkalax



WTGs

5: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 137,0 m (TOT: 200,0 m) (143)

6: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 137,0 m (TOT: 200,0 m) (144)

10: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 137,0 m (TOT: 200,0 m) (148)

14: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 137,0 m (TOT: 200,0 m) (152)

Project:

Kalax, Närpes

Description:

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Calculated:

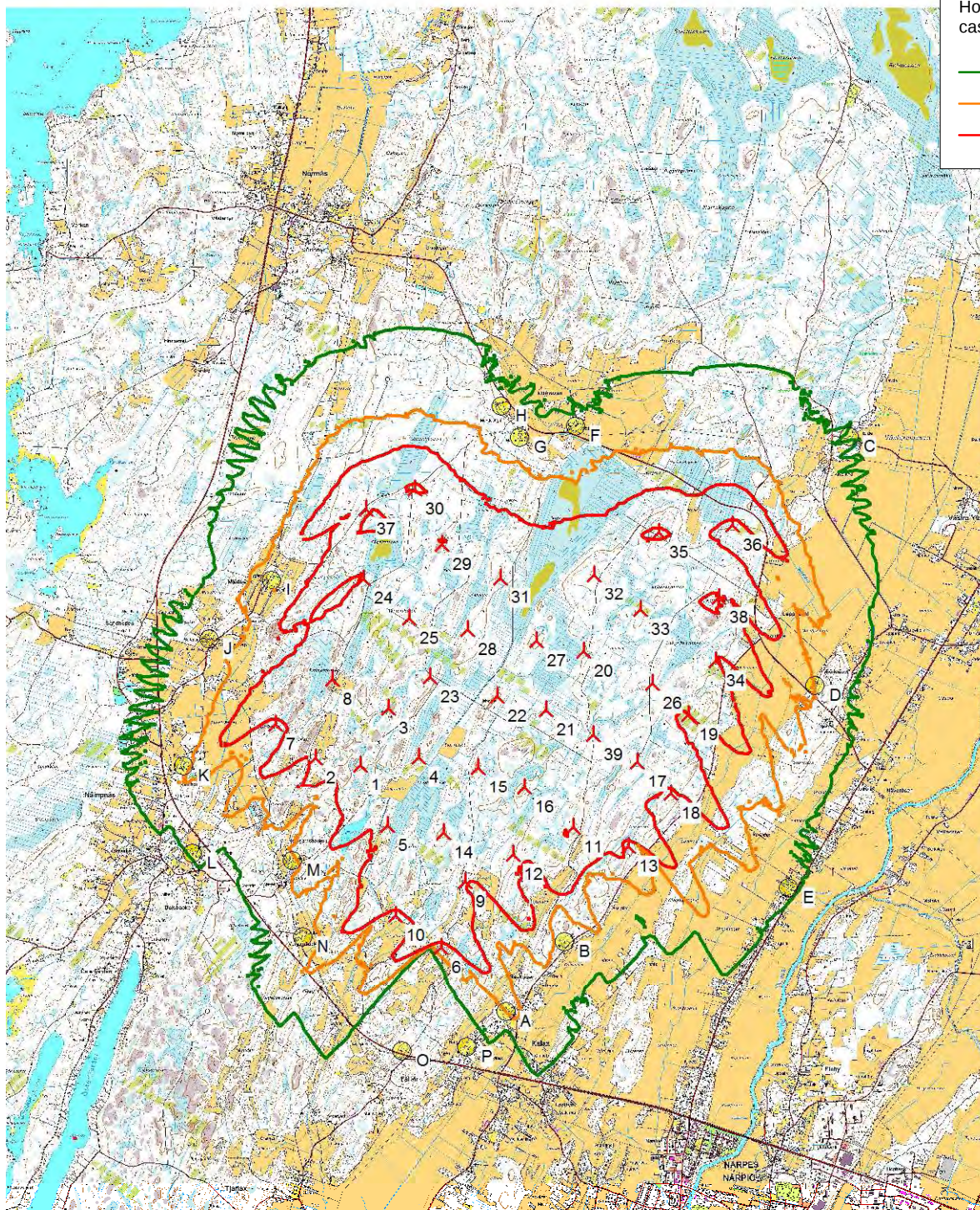
12.9.2013 10:42/2.8.579

SHADOW - Map

Calculation: Kalax e.n.o 3500 rd126 x 39x hh137

Hours per year, real case

— 1 h/a
 — 8 h/a
 — 20 h/a



0 1 2 3 4 km

Map: Peruskartat, Print scale 1:75 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 206 300 North: 6 946 320

New WTG

Shadow receptor

Flicker map level: Height Contours: Närpes korkeuskäyrät(1).wpo (1)

Project:

Kalax, Närpes

Description:

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Calculated:

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SHADOW - Main Result

Calculation: Kalax e.n.o 3500 rd126 x 39x hh165

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) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational hours are calculated from WTGs in calculation and wind distribution:

MERRA_basic_E21.335_N62.500

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
794	707	507	419	474	693	1101	1235	638	580	633	638	8418

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

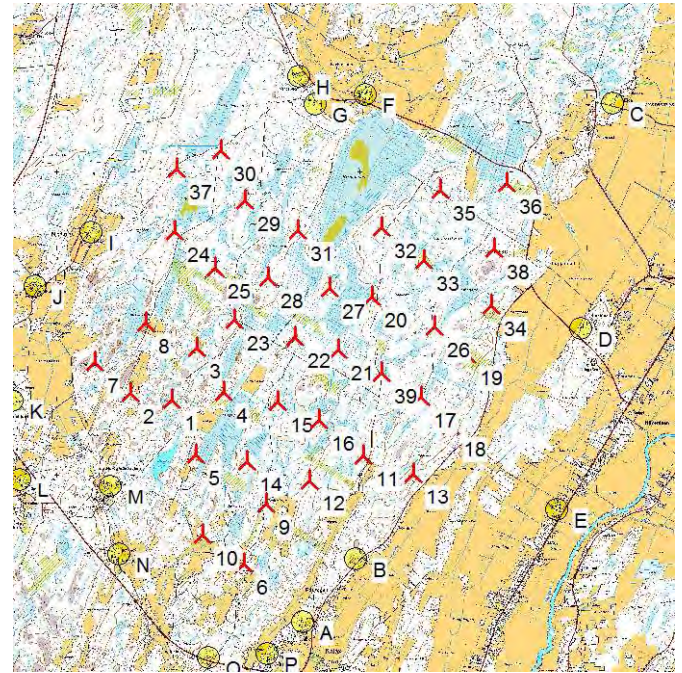
A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:

Height contours used: Height Contours: Närpes korkeuskäyrät(1).wpo (1)

Obstacles not used in calculation

Eye height: 1,5 m

Grid resolution: 25,0 m



Scale 1:100 000

▲ New WTG

● Shadow receptor

WTGs

Finish TM ETRS-TM35FIN-ETRS89												WTG type			Shadow data				
East	North	Z	Row data/Description									Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Calculation distance	RPM
															[kW]	[m]	[m]	[m]	[RPM]
1	204 512	6 944 993	20,0	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	165,0	1 908	11,4	
2	203 972	6 945 080	17,5	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	165,0	1 908	11,4	
3	204 844	6 945 676	25,0	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	165,0	1 908	11,4	
4	205 199	6 945 095	20,0	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	165,0	1 908	11,4	
5	204 828	6 944 269	19,3	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	165,0	1 908	11,4	
6	205 473	6 942 822	20,0	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	165,0	1 908	11,4	
7	203 495	6 945 487	15,0	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	165,0	1 908	11,4	
8	204 174	6 946 018	19,8	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	165,0	1 908	11,4	
9	205 755	6 943 608	20,0	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	165,0	1 908	11,4	
10	204 927	6 943 209	14,6	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	165,0	1 908	11,4	
11	207 041	6 944 256	25,0	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	165,0	1 908	11,4	
12	206 327	6 943 931	18,8	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	165,0	1 908	11,4	
13	207 702	6 944 022	24,2	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	165,0	1 908	11,4	
14	205 503	6 944 187	20,0	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	165,0	1 908	11,4	
15	205 913	6 944 969	20,0	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	165,0	1 908	11,4	
16	206 465	6 944 729	25,0	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	165,0	1 908	11,4	
17	207 802	6 945 040	22,5	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	165,0	1 908	11,4	
18	208 199	6 944 653	25,0	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	165,0	1 908	11,4	
19	208 410	6 945 594	27,9	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	165,0	1 908	11,4	
20	207 162	6 946 353	20,0	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	165,0	1 908	11,4	
21	206 713	6 945 654	20,0	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	165,0	1 908	11,4	
22	206 141	6 945 816	22,5	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	165,0	1 908	11,4	
23	205 336	6 946 045	23,3	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	165,0	1 908	11,4	
24	204 549	6 947 217	25,0	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	165,0	1 908	11,4	
25	205 085	6 946 743	25,7	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	165,0	1 908	11,4	
26	207 984	6 945 966	25,8	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	165,0	1 908	11,4	
27	206 600	6 946 474	20,0	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	165,0	1 908	11,4	
28	205 785	6 946 605	22,5	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	165,0	1 908	11,4	
29	205 479	6 947 628	32,5	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o.	126-3 500	3 500	126,0	165,0	1 908	11,4	

To be continued on next page...

Project:

Kalax, Närpes

Description:

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Calculated:

12.9.2013 12:29/2.8.579

SHADOW - Main Result

Calculation: Kalax e.n.o 3500 rd126 x 39x hh165

...continued from previous page

Finish TM ETRS-TM35FIN-ETRS89										WTG type			Shadow data				
East		North		Z	Row data/Description					Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Calculation distance	RPM
													[kW]	[m]	[m]	[m]	[RPM]
30	205 157	6 948 285	28,6	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o. 126-3 500	3 500	126,0	165,0	1 908	11,4
31	206 174	6 947 226	23,1	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o. 126-3 500	3 500	126,0	165,0	1 908	11,4
32	207 287	6 947 264	27,5	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o. 126-3 500	3 500	126,0	165,0	1 908	11,4
33	207 841	6 946 841	25,0	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o. 126-3 500	3 500	126,0	165,0	1 908	11,4
34	208 738	6 946 235	22,5	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o. 126-3 500	3 500	126,0	165,0	1 908	11,4
35	208 056	6 947 770	25,0	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o. 126-3 500	3 500	126,0	165,0	1 908	11,4
36	208 941	6 947 857	20,0	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o. 126-3 500	3 500	126,0	165,0	1 908	11,4
37	204 579	6 948 043	27,5	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o. 126-3 500	3 500	126,0	165,0	1 908	11,4
38	208 772	6 946 992	30,0	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o. 126-3 500	3 500	126,0	165,0	1 908	11,4
39	207 283	6 945 356	22,6	e.n.o.	e.n.o.	126 3500	126.0	!O!	...	Yes	e.n.o.	e.n.o. 126-3 500	3 500	126,0	165,0	1 908	11,4

Project:

Kalax, Närpes

Description:

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Janne Märsylä / janne.marsyla@fcg.fi

Calculated:

12.9.2013 12:29/2.8.579



SHADOW - Main Result

Calculation: Kalax e.n.o 3500 rd126 x 39x hh165

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (182)	0:00	0:00
2	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (183)	23:11	5:34
3	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (184)	0:00	0:00
4	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (185)	0:00	0:00
5	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (186)	17:04	4:05
6	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (187)	24:21	5:51
7	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (188)	49:15	10:06
8	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (189)	15:22	2:48
9	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (190)	12:12	2:58
10	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (191)	33:34	7:32
11	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (192)	0:00	0:00
12	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (193)	0:00	0:00
13	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (194)	0:00	0:00
14	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (195)	4:54	0:56
15	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (196)	0:00	0:00
16	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (197)	0:00	0:00
17	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (198)	0:00	0:00
18	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (199)	9:07	2:24
19	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (200)	5:51	1:02
20	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (201)	0:00	0:00
21	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (202)	0:00	0:00
22	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (203)	0:00	0:00
23	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (204)	0:00	0:00
24	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (205)	13:00	2:34
25	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (206)	4:47	0:50
26	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (207)	0:00	0:00
27	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (208)	0:00	0:00
28	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (209)	0:00	0:00
29	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (210)	17:45	2:28
30	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (211)	16:02	3:04
31	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (212)	16:13	2:03
32	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (213)	17:45	2:21
33	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (214)	0:00	0:00
34	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (215)	10:54	2:09
35	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (216)	6:47	1:18
36	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (217)	5:32	1:04
37	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (218)	10:52	3:04
38	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (219)	19:13	5:23
39	e.n.o. e.n.o. 126 3500 126.0 !O! hub: 165,0 m (TOT: 228,0 m) (220)	0:00	0:00

Project:

Kalax, Närpes

Description:

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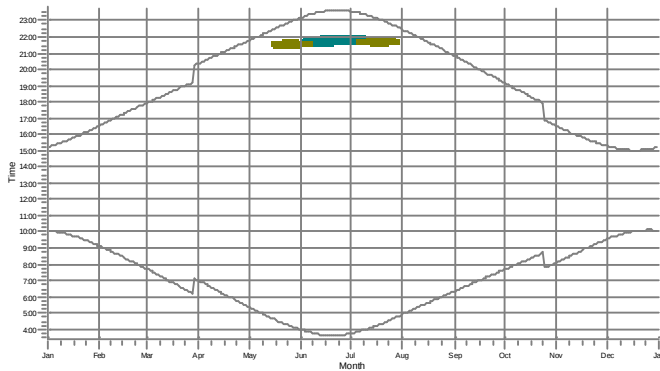
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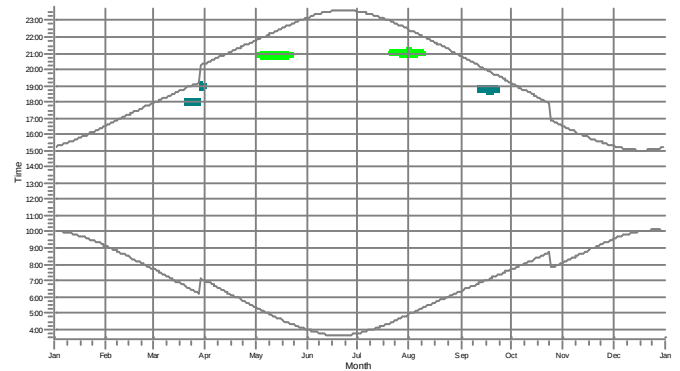
SHADOW - Calendar, graphical

Calculation: Kalax e.n.o 3500 rd126 x 39x hh165

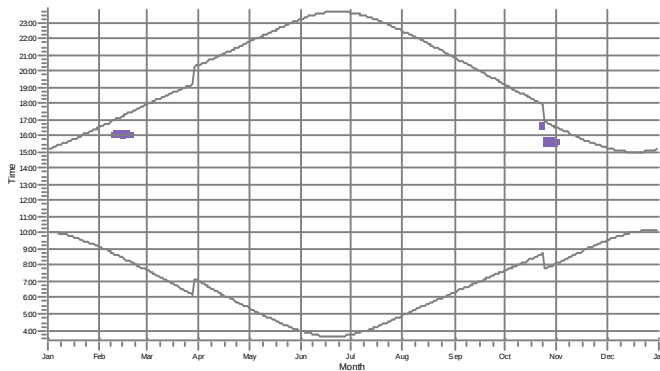
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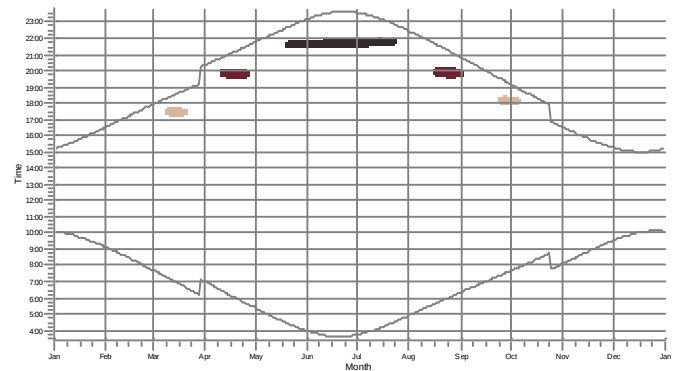
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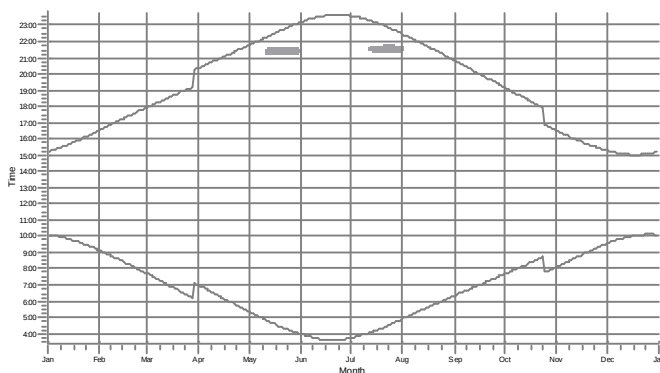
C: Asuinrakennus Eide



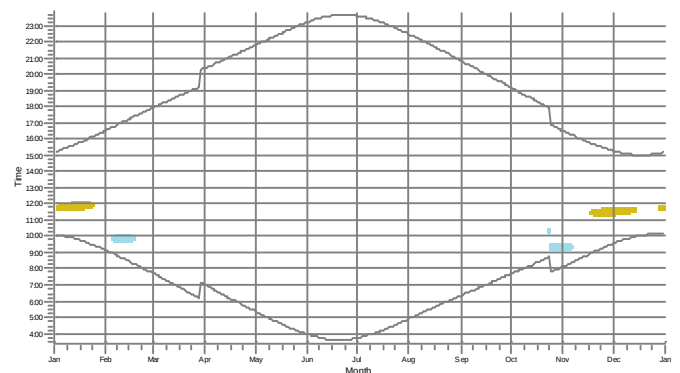
D: Asuinrakennus Börknäset



E: Asuinrakennus Boslätan



F: Asuinrakennus Södergran



WTGs

6: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 165,0 m (TOT: 228,0 m) (187)
 9: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 165,0 m (TOT: 228,0 m) (190)
 10: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 165,0 m (TOT: 228,0 m) (191)
 18: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 165,0 m (TOT: 228,0 m) (199)

19: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 165,0 m (TOT: 228,0 m) (200)
 32: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 165,0 m (TOT: 228,0 m) (213)
 34: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 165,0 m (TOT: 228,0 m) (215)
 35: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 165,0 m (TOT: 228,0 m) (216)

36: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 165,0 m (TOT: 228,0 m) (217)
 38: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 165,0 m (TOT: 228,0 m) (219)

Project:

Kalax, Närpes

Description:

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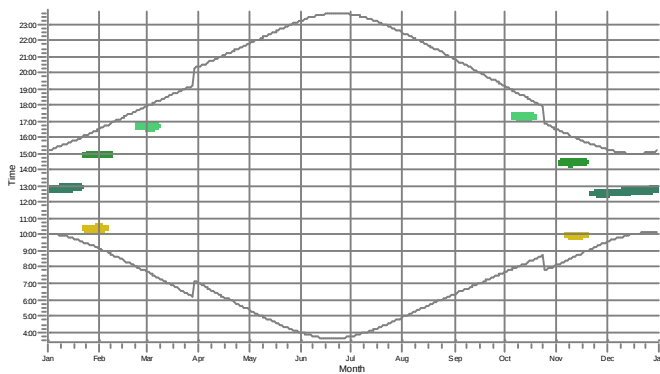
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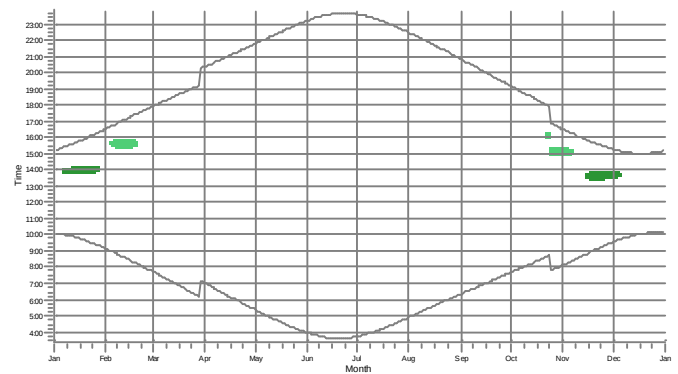
SHADOW - Calendar, graphical

Calculation: Kalax e.n.o 3500 rd126 x 39x hh165

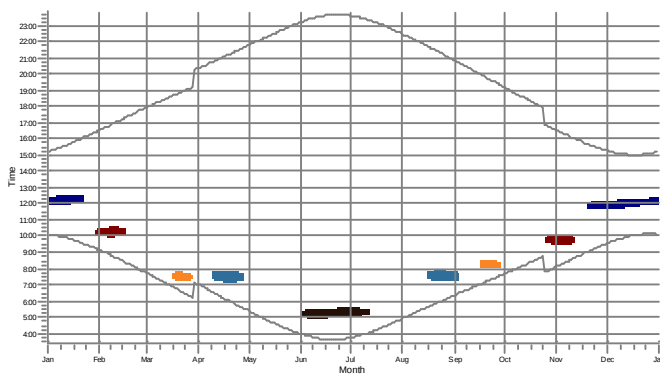
G: Asuinrakennus Männström



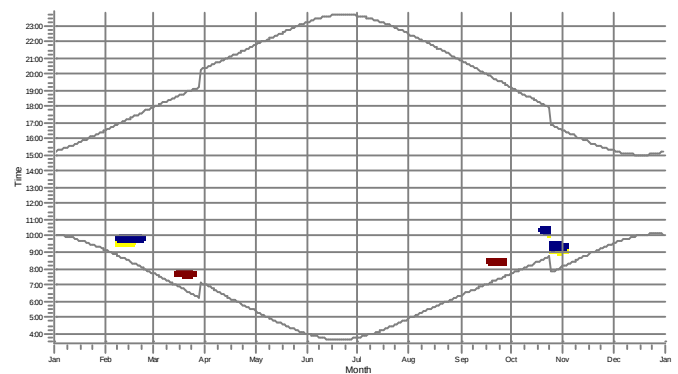
H: Asuinrakennus Brådd



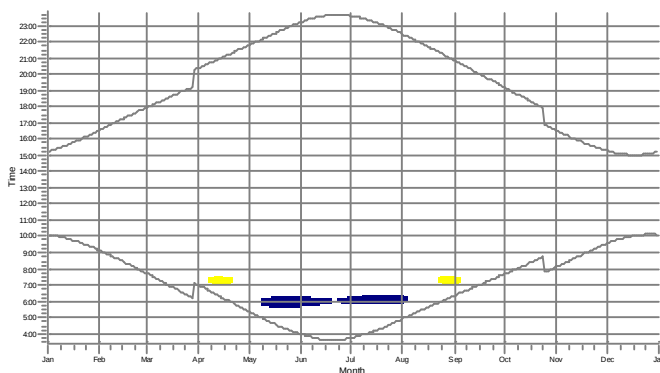
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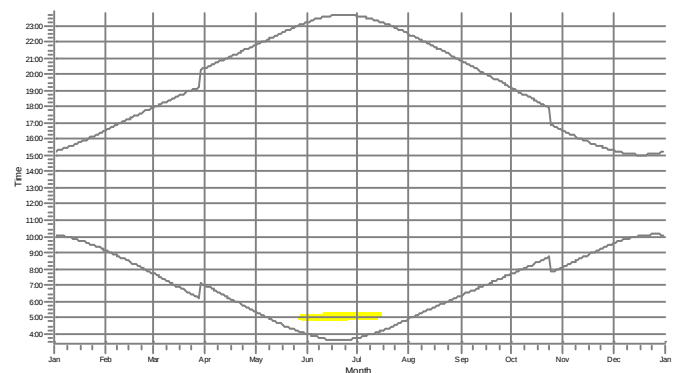
J: Asuinrakennus Skatabacken



K: Asuinrakennus Kambbacken



L: Asuinrakennus Nämphäs



WTGs

2: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 165,0 m (TOT: 228,0 m) (183)
 7: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 165,0 m (TOT: 228,0 m) (188)
 8: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 165,0 m (TOT: 228,0 m) (189)
 24: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 165,0 m (TOT: 228,0 m) (205)

25: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 165,0 m (TOT: 228,0 m) (206)
 29: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 165,0 m (TOT: 228,0 m) (210)
 30: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 165,0 m (TOT: 228,0 m) (211)
 31: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 165,0 m (TOT: 228,0 m) (212)

32: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 165,0 m (TOT: 228,0 m) (213)
 37: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 165,0 m (TOT: 228,0 m) (218)

Project:

Kalax, Närpes

Description:

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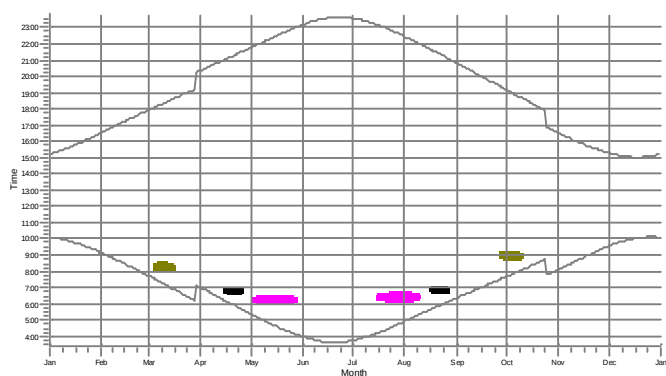
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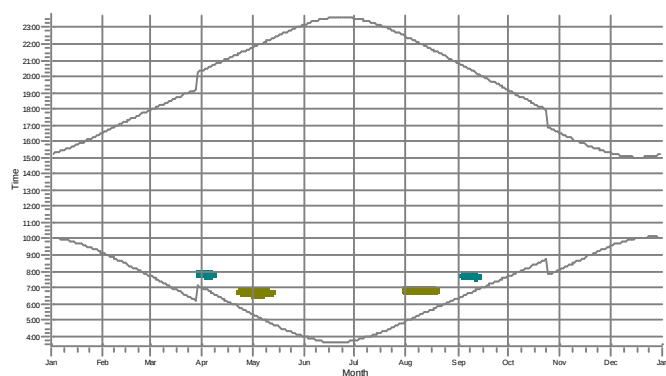
SHADOW - Calendar, graphical

Calculation: Kalax e.n.o 3500 rd126 x 39x hh165

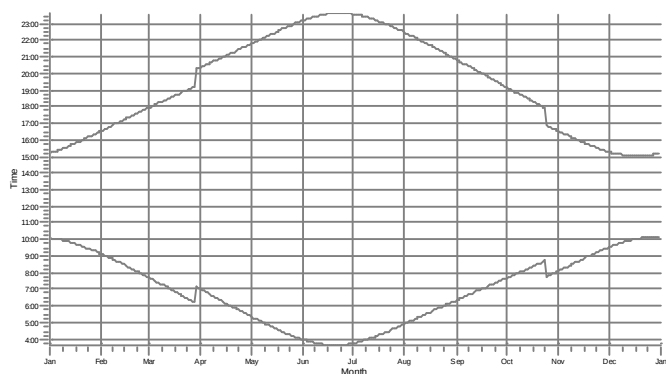
M: Asuinrakennus Nordgrådsbacken



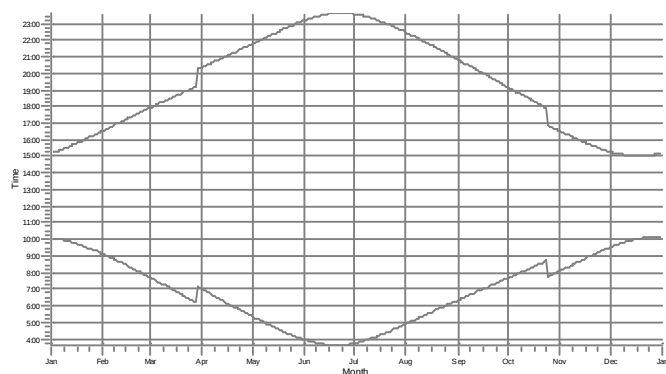
N: Asuinrakennus Vargstuckbacken



O: Asuinrakennus Fällan



P: Asuinrakennus Västerkalax



WTGs

5: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 165,0 m (TOT: 228,0 m) (186)

6: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 165,0 m (TOT: 228,0 m) (187)

10: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 165,0 m (TOT: 228,0 m) (191)

14: e.n.o. e.n.o. 126 3500 126.0 !OI! hub: 165,0 m (TOT: 228,0 m) (195)

Project:

Kalax, Närpes

Description:

VindIn Oy/Ab

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Calculated:

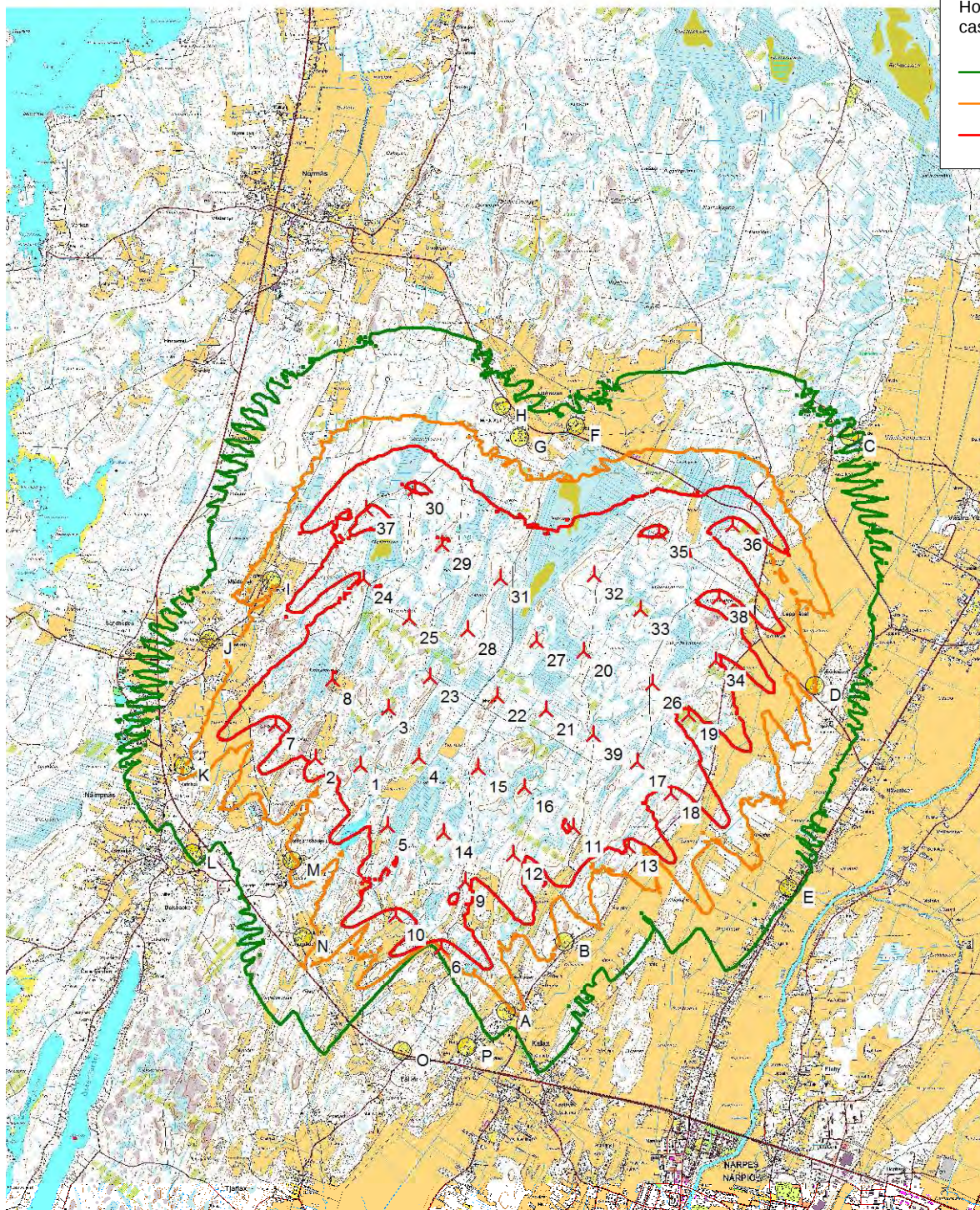
12.9.2013 12:29/2.8.579

SHADOW - Map

Calculation: Kalax e.n.o 3500 rd126 x 39x hh165

Hours per year, real case

1 h/a
 8 h/a
 20 h/a



0 1 2 3 4 km

Map: Peruskartat, Print scale 1:75 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 206 300 North: 6 946 320

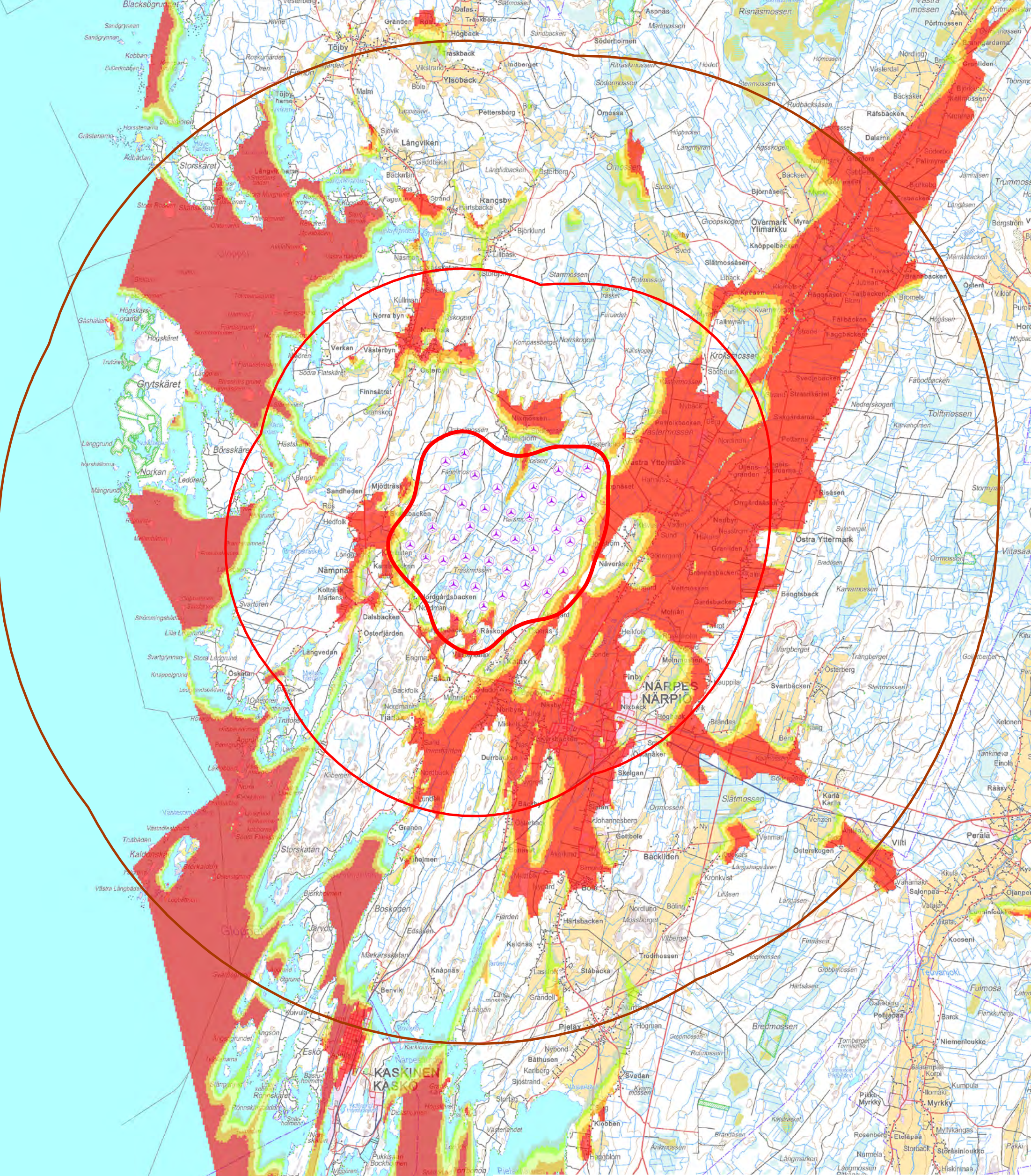


New WTG



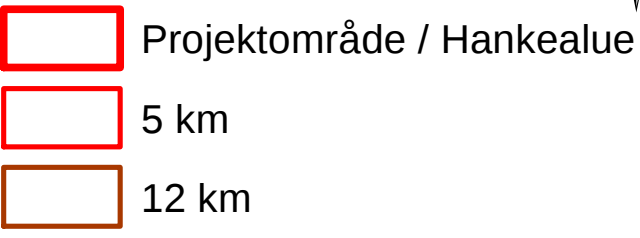
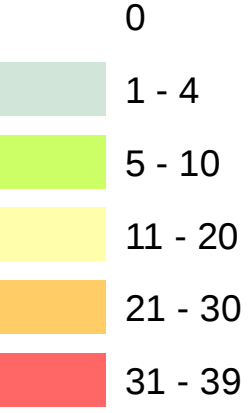
Shadow receptor

Flicker map level: Height Contours: Närpes korkeuskäyrät(1).wpo (1)

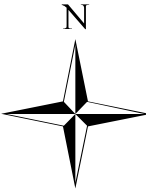
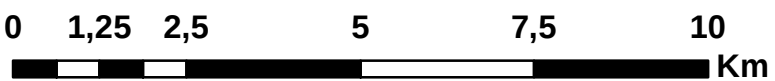


Vindkraftverkens synlighet (st)

Voimalaitosten näkyvyys (kpl)

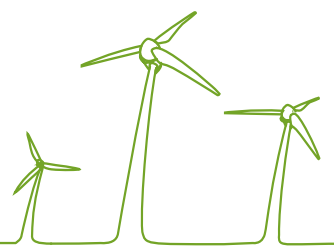


Vindkraftverk / Tuulivoimalaitos



BILAGA 3

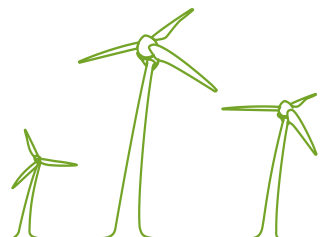
Fotomontage



VINDIN OY AB

Kalaxin tuulivoimahanke, Närpiö

Valokuvasovitteet e.n.o 3500 x 39 x HH165



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Kalaxin tuulivoimahanke, Närpiö

1 Maisema ja havainnekuvat

Havainnekuvat on laadittu alueesta laadittua maastomallinnusta hyödyntäen WindPROohjelmalla.

Maastomallinnustarkastelun pohjalta tuulivoimapuiston lähiympäristöstä otettuihin valokuvaan on mallinnettu tuulivoimalat. Mallinnusta varten otetut valokuvat on pyritty ottamaan kohteista, joille tuulivoimalat olisivat havaittavissa. Valokuvat otettu 6.5.2012 ja 1.6.2012 FCG Suunnittelu ja tekniikka Oy/Hans Vadbäck.

Valokuvasovitteet on laadittu e.n.o 3500 voimalalla, jonka roottorin halkaisija on 126 metriä ja voimalan napakorkeus 165 metriä. Voimalan kokonaiskorkeus on noin 228 metriä maapinnan yläpuolella.

2 Näkemäalueanalyysi

Tuulivoimaloiden havaittavuus maisemassa riippuu voimaloiden korkeudesta ja ympäröivien alueiden peitteisyydestä sekä korkeusvaihteluiden eroista. Laajoilta avoimilta alueilta tuulipuiston lähialueella tuulivoimalat voidaan havaita parhaiten. Peitteisessä ympäristössä voimaloiden havaittavuus on hyvin paikallista ja näkemäsektorit jäävät kapeiksi ja paikallisiksi.

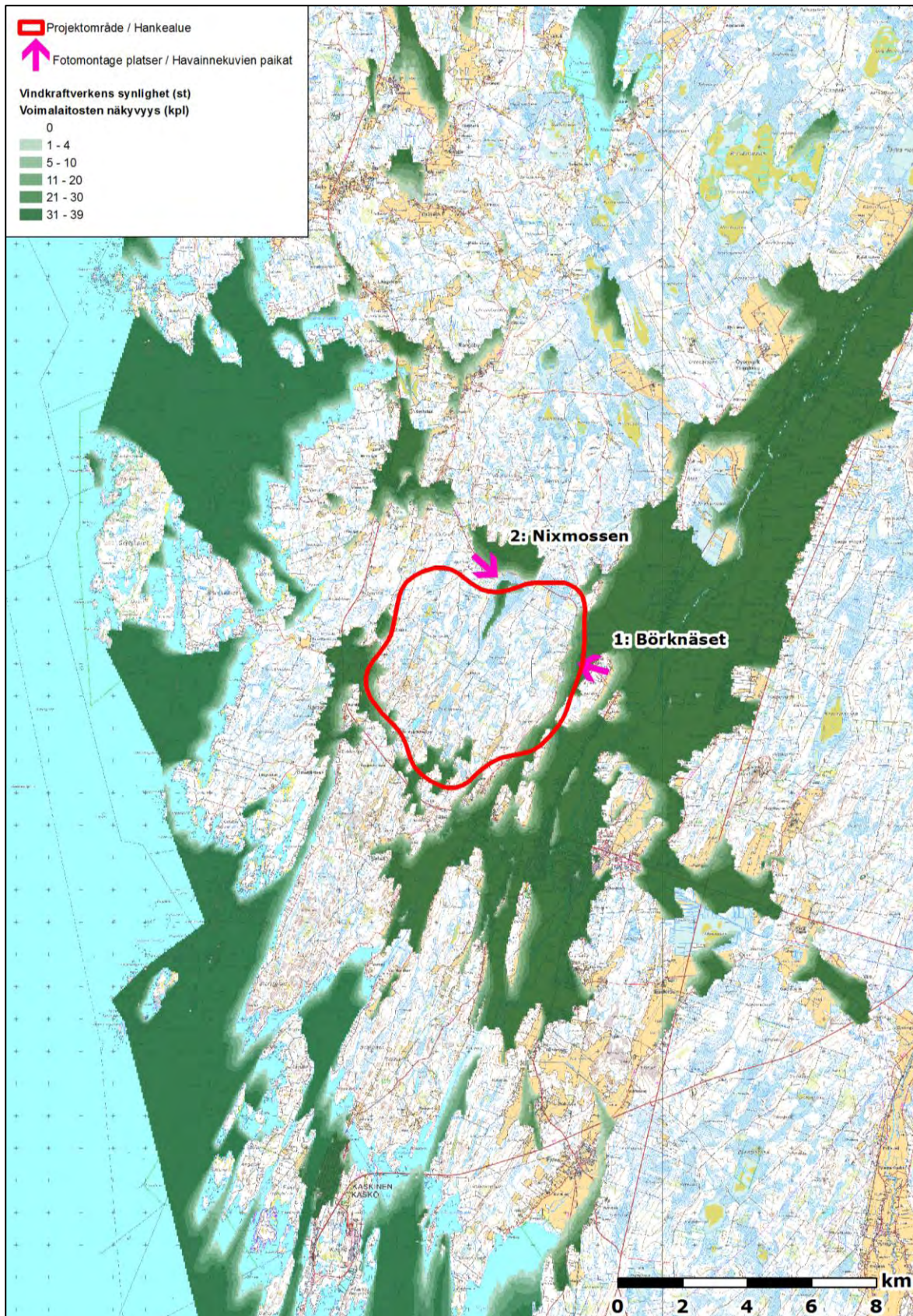
Kalaxin tuulivoimalat sijoittuvat ympäröiviä alueita hieman korkeammalle lakialueelle, mistä johtuen tuulivoimalat ovat teoreettisesti havaittavissa suhteellisen laajalla alueella. Ympäröivien alueiden peitteisyys, sekä maaston kumpuilevuus muodostavat kuitenkin selkeitä näkemäesteitä tuulivoimaloiden näkyvyydelle. Siten Kalaxin tuulivoimalat voidaankin parhaiten erottaa avoimilta peltoaukeilta hankealueen lähiympäristössä (0–5 km etäisyydellä voimaloista), sekä avoimilta merialueilta.

Näkemäalueanalyysi on laskennallinen malli voimaloiden näkyvyydestä, ja todellisuudessa hyvissä sääolosuhteissa voimalat tai niiden osia voidaan havaita myös kauempaa tuulipuistosta, kuin näkemäalueanalyysin tulokset osoittavat.

Merkittävimmät ja selkeimmät vaikutukset kohdistuvat kuitenkin niille alueille, josta näkemäalueanalyysin mukaan voimalat ovat selvästi havaittavissa. Etäisyyden kasvaessa voimaloiden havaittavuus heikkenee ja niiden maisemaa hallitseva ominaisuus pienenee.

Näkemäalueanalyysin pohjalta voidaan karkeasti arvioida myös lentoestevalojen näkyvyyttä. Lentoestevalot sijoitetaan voimalatornin päälle, eli niiden näkyvyys myötäilee tornin näkyvyysaluetta ja edustavat näin myös laskentatuloksia, (Kuva 1).

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Kuva 1. Näkymäalueanalyysi ja valokuvasovitteiden kuvauspisteet sekä numerointi

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Valokuvasovite 1 Börknäset. Etäisyys lähimpään voimalaan noin 1,2 kilometriä.

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Valokuvasovite 2 Nixmossen. Etäisyys lähimpään voimalaan noin 1,8 kilometriä.