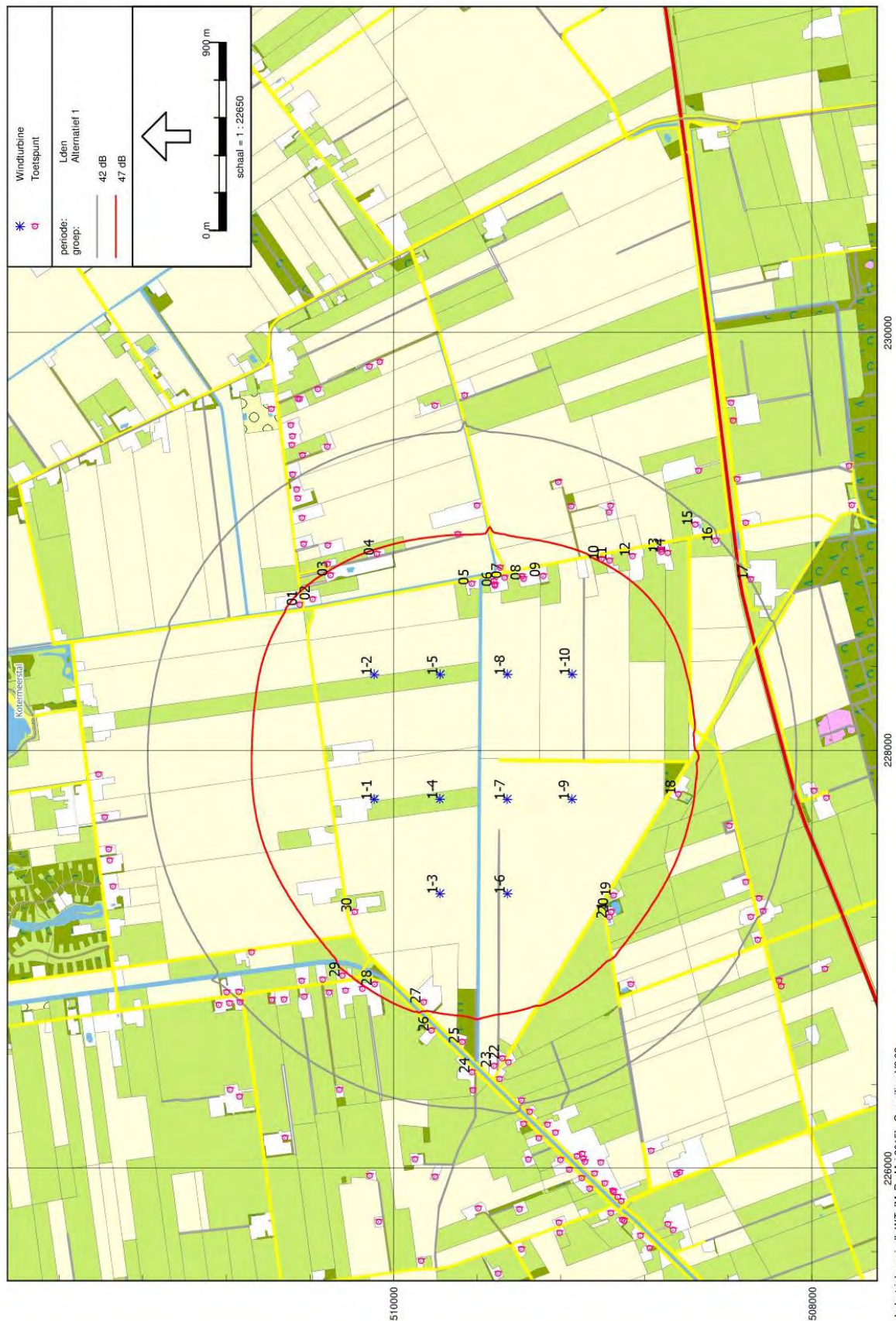
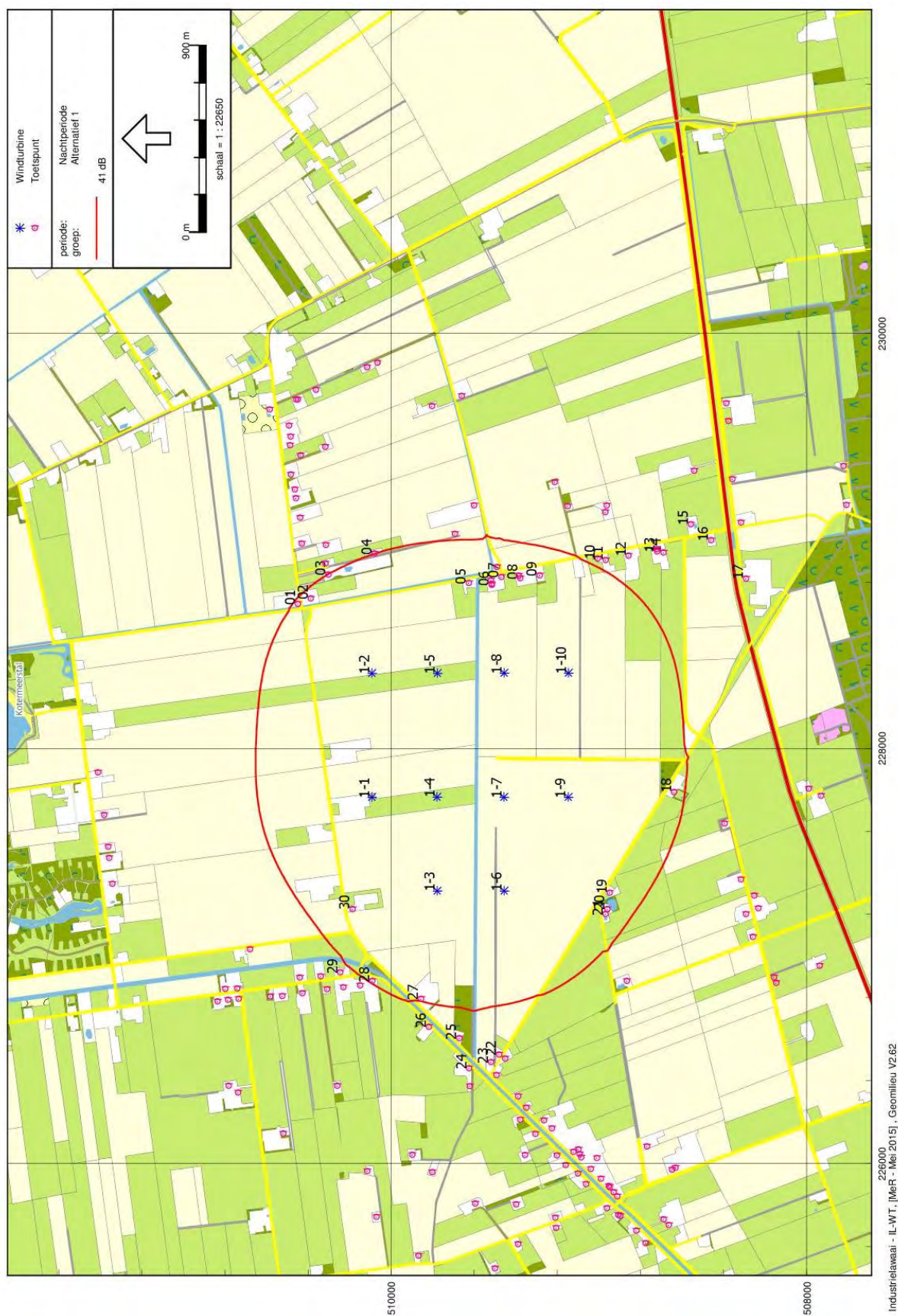


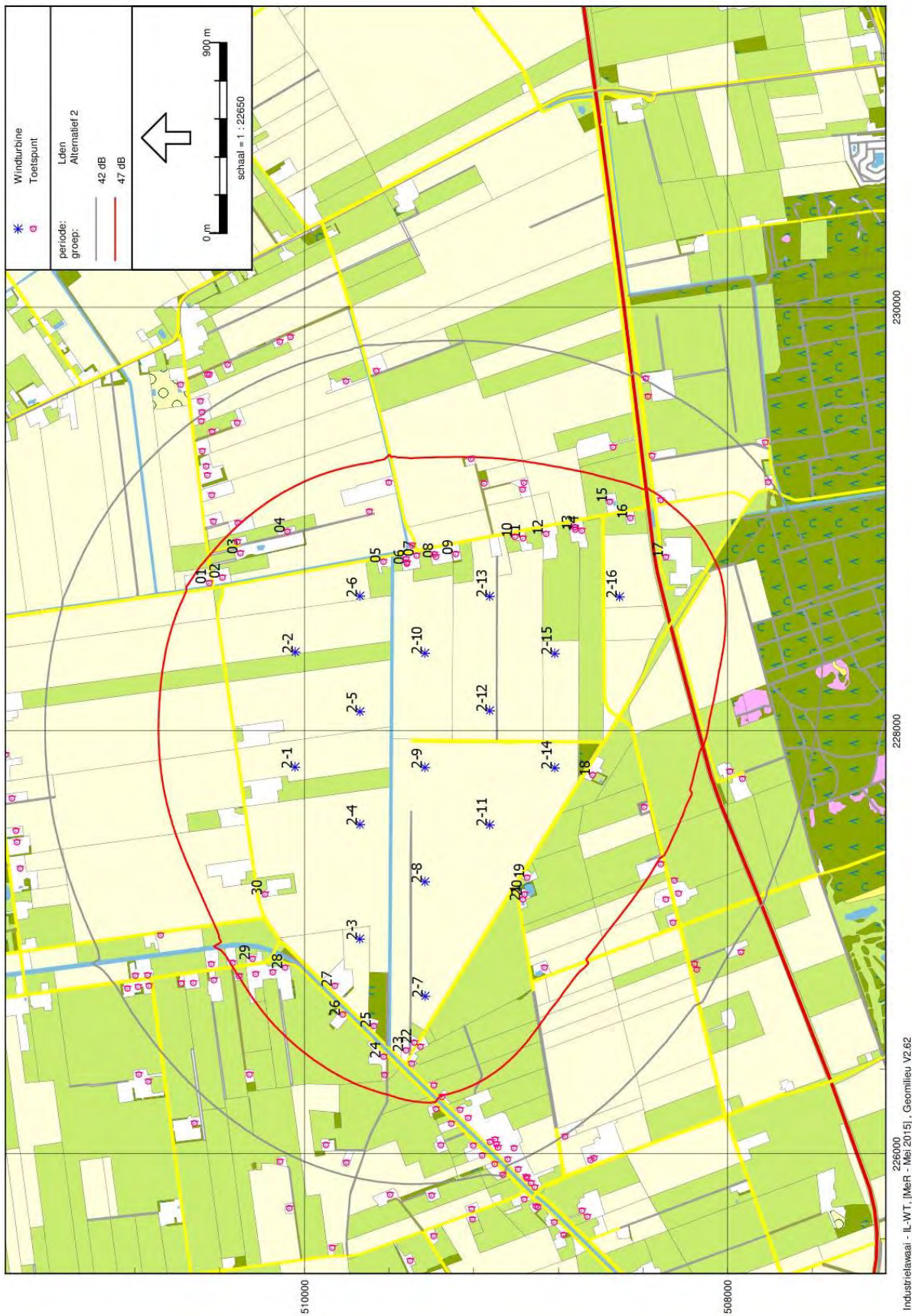
BIJLAGE 4 GELUIDCONTOUR L_{DEN} ALT 1

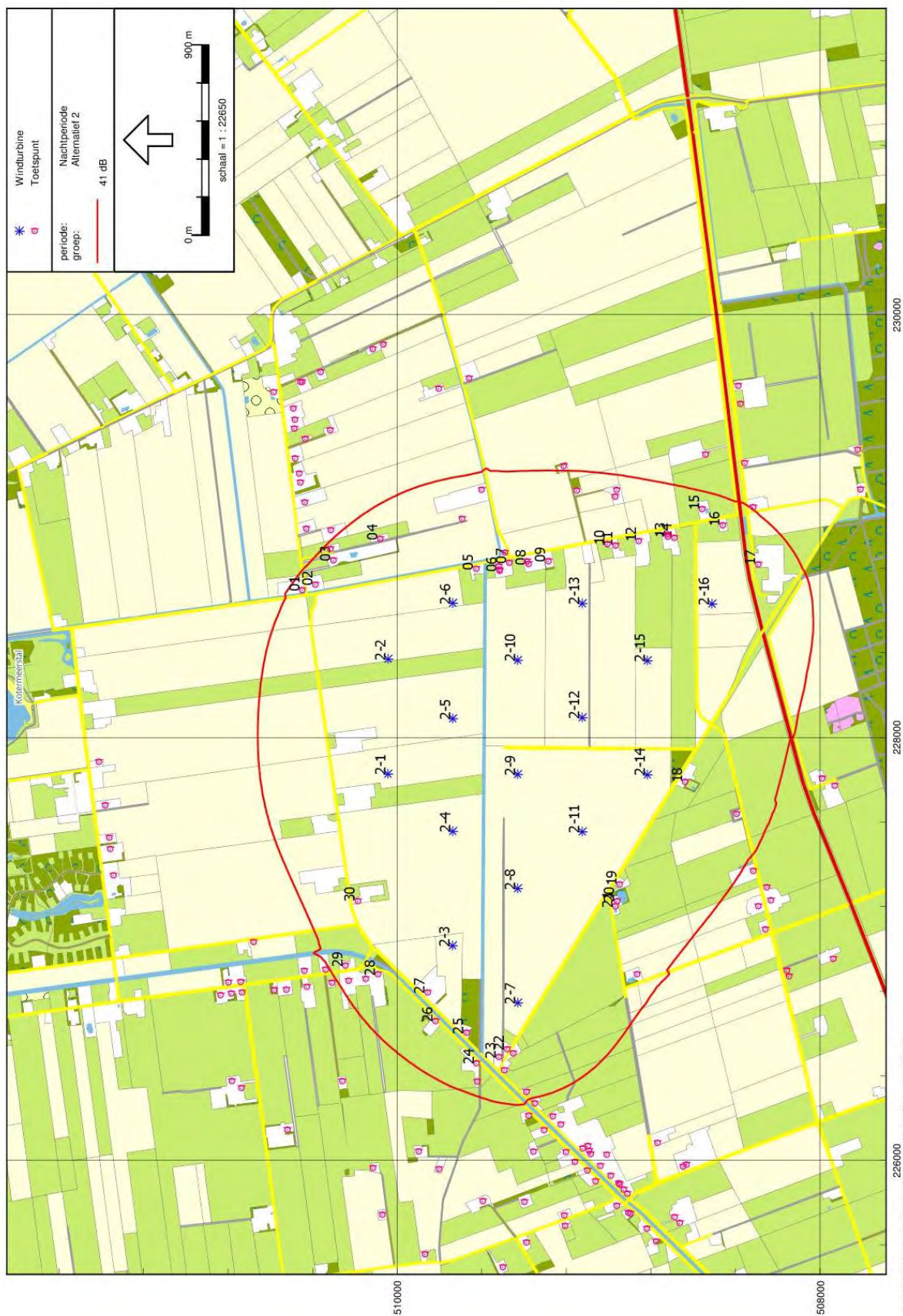


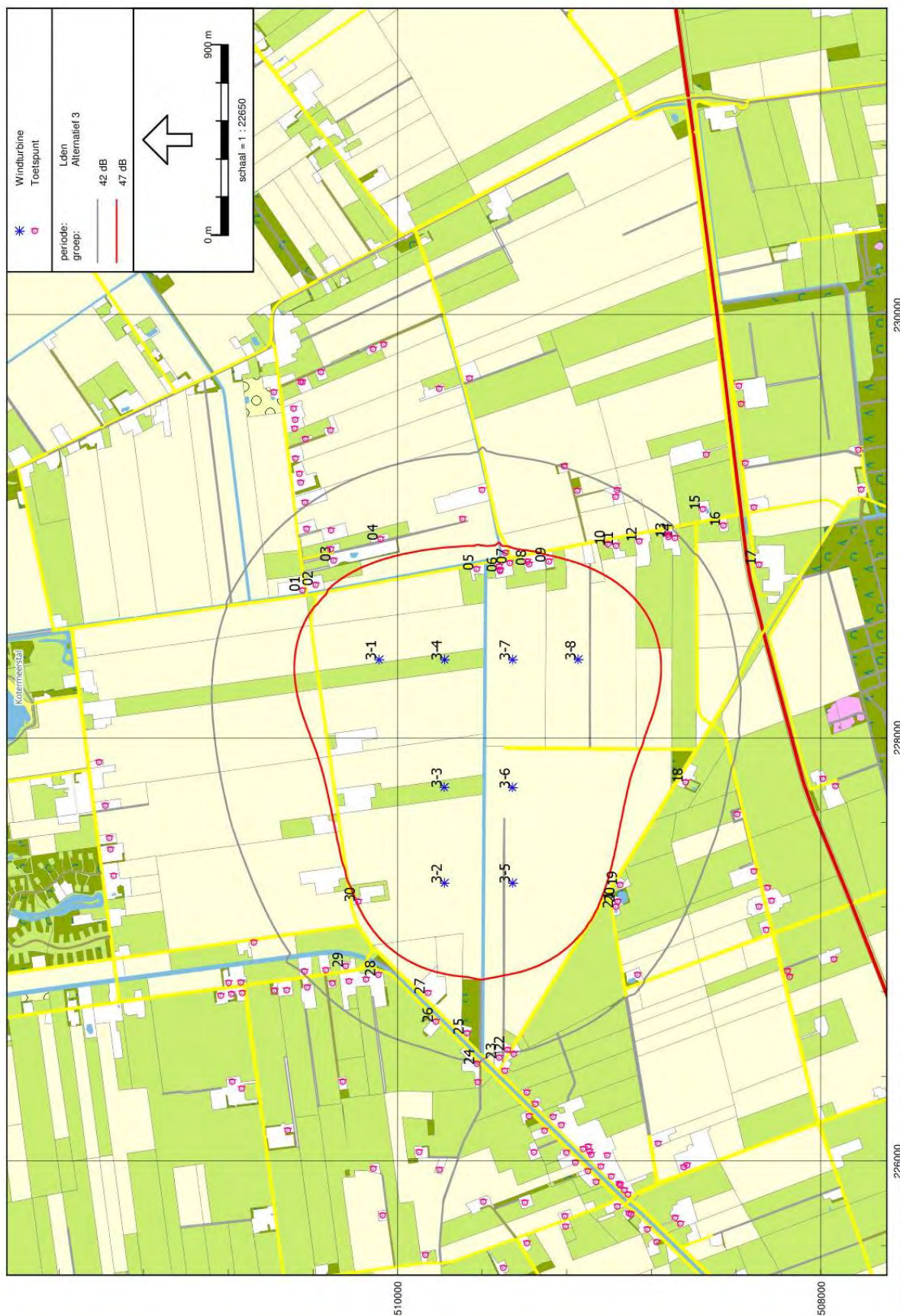
BIJLAGE 5 GELUIDCONTOUR L_{NIGHT} ALT 1

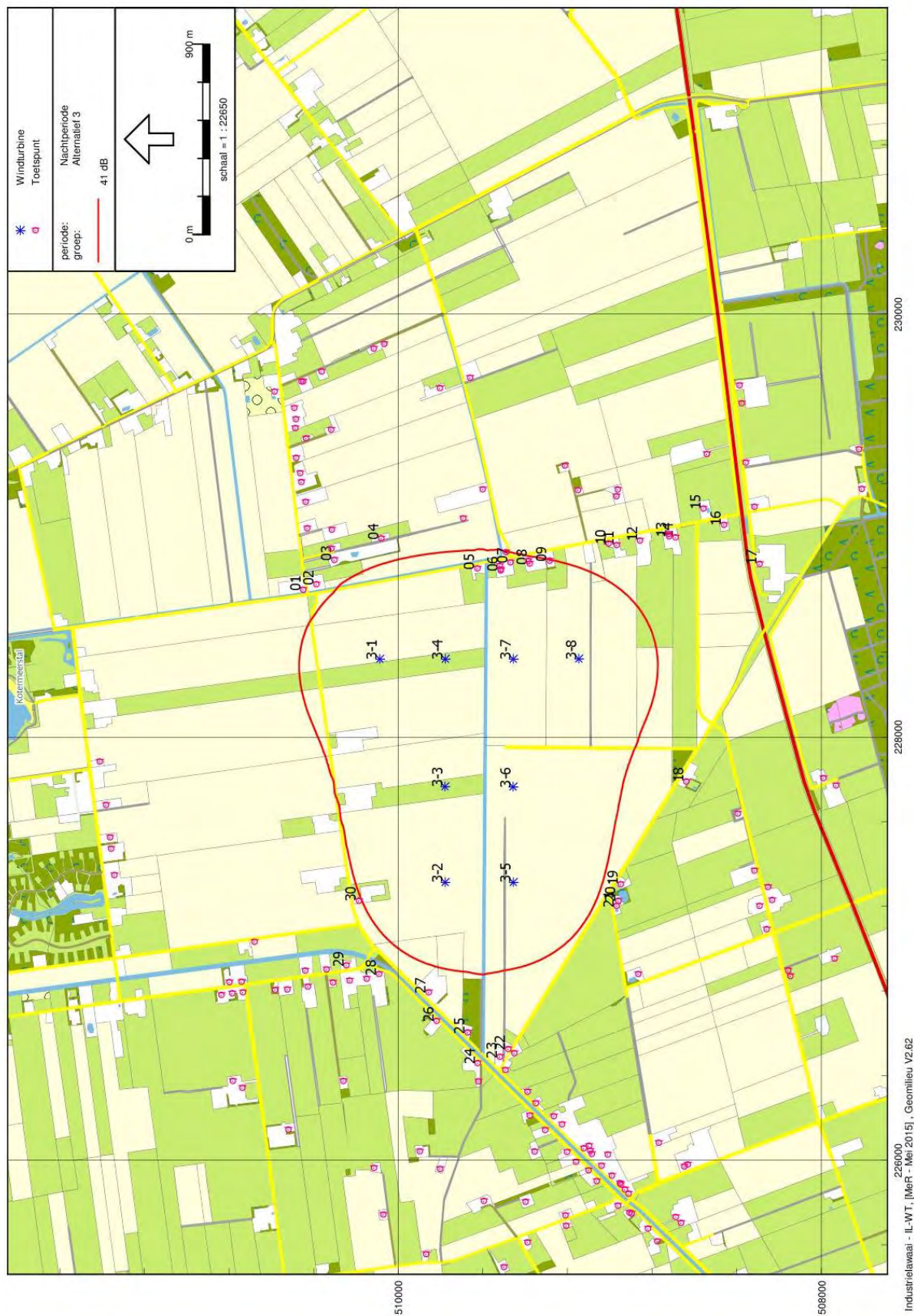


BIJLAGE 6 GELUIDCONTOUR L_{DEN} ALT 2

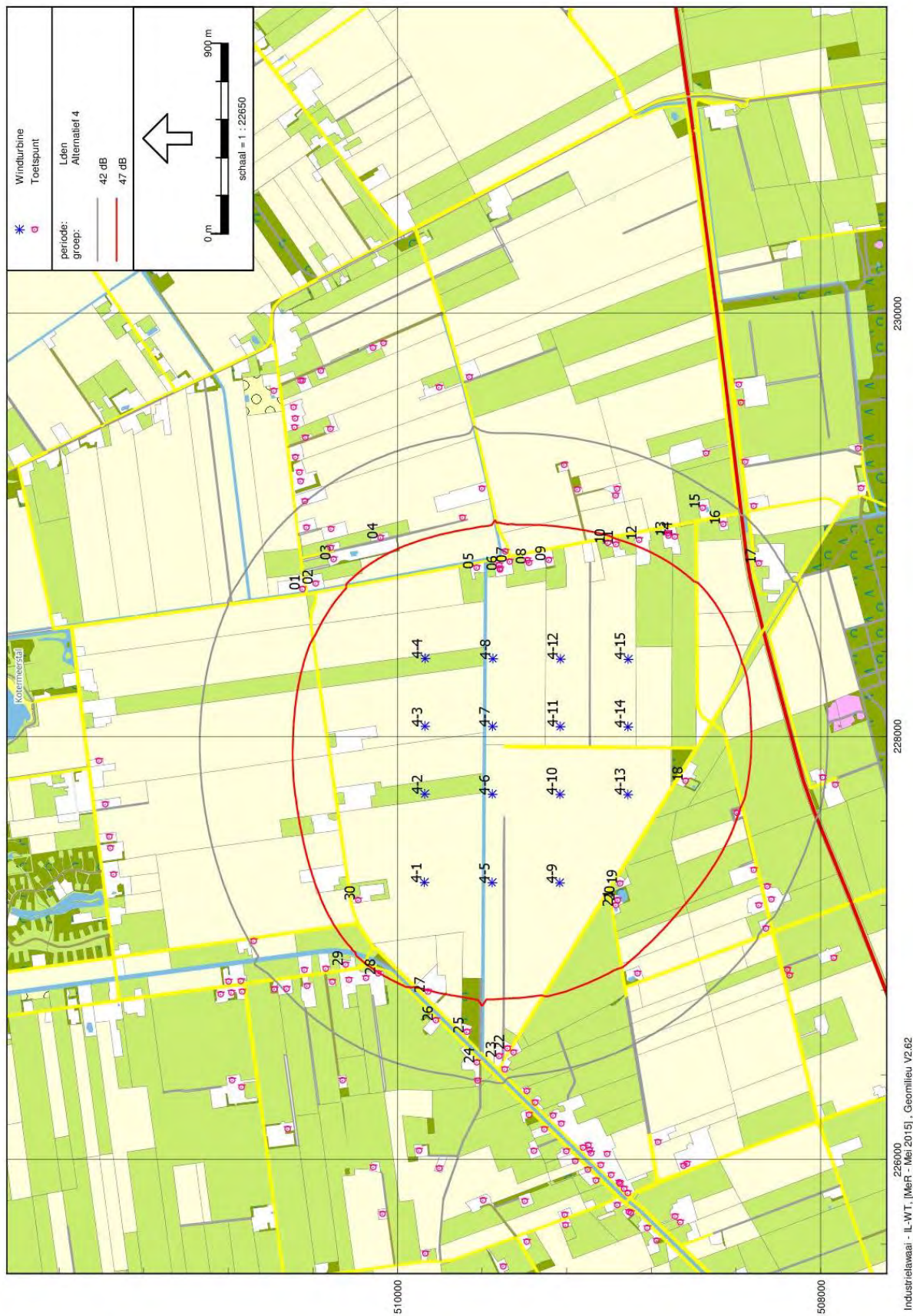


BIJLAGE 7 GELUIDCONTOUR L_{NIGHT} ALT 2

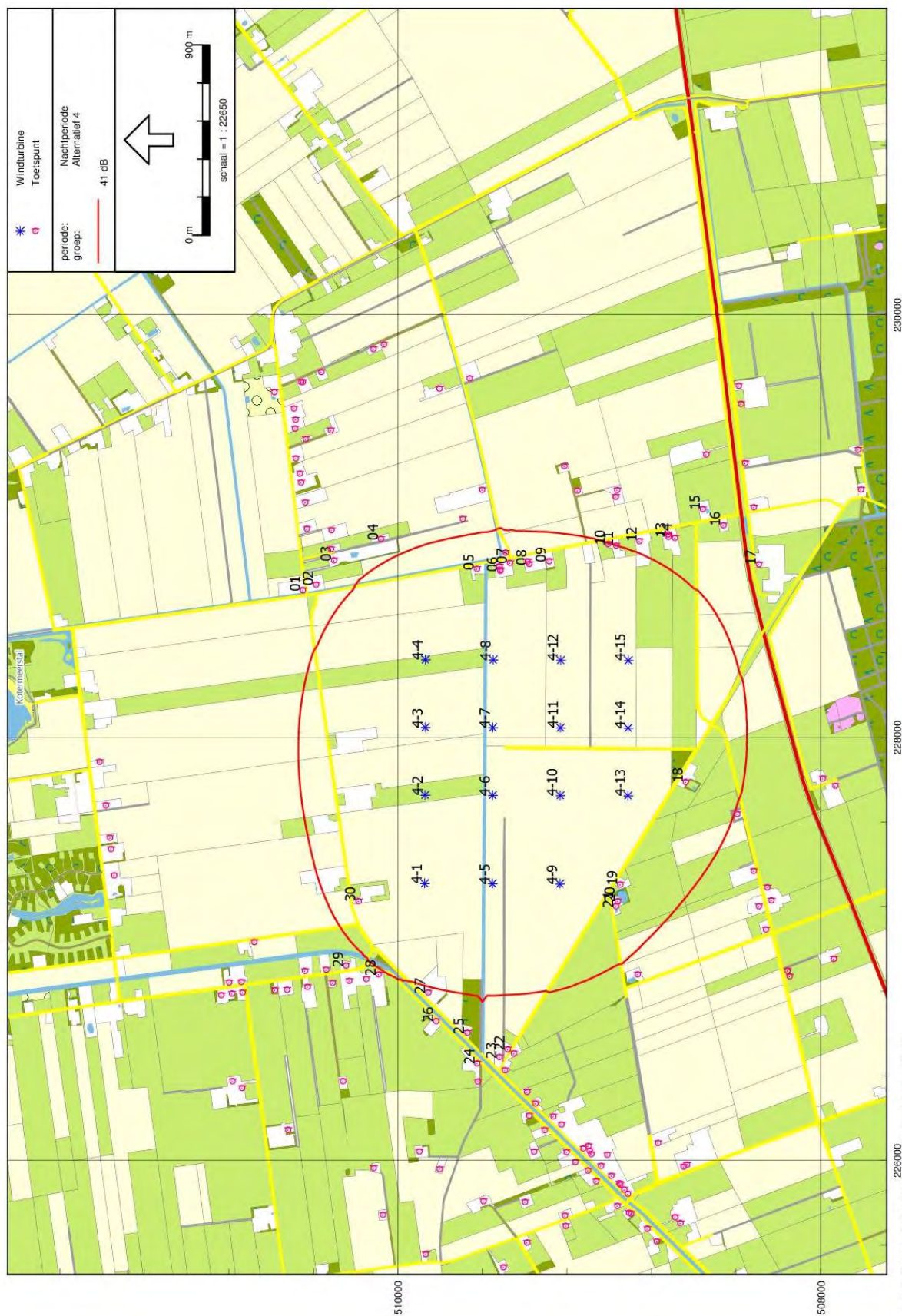
BIJLAGE 8 GELUIDCONTOUR L_{DEN} ALT 3

BIJLAGE 9 GELUIDCONTOUR L_{NIGHT} ALT 3

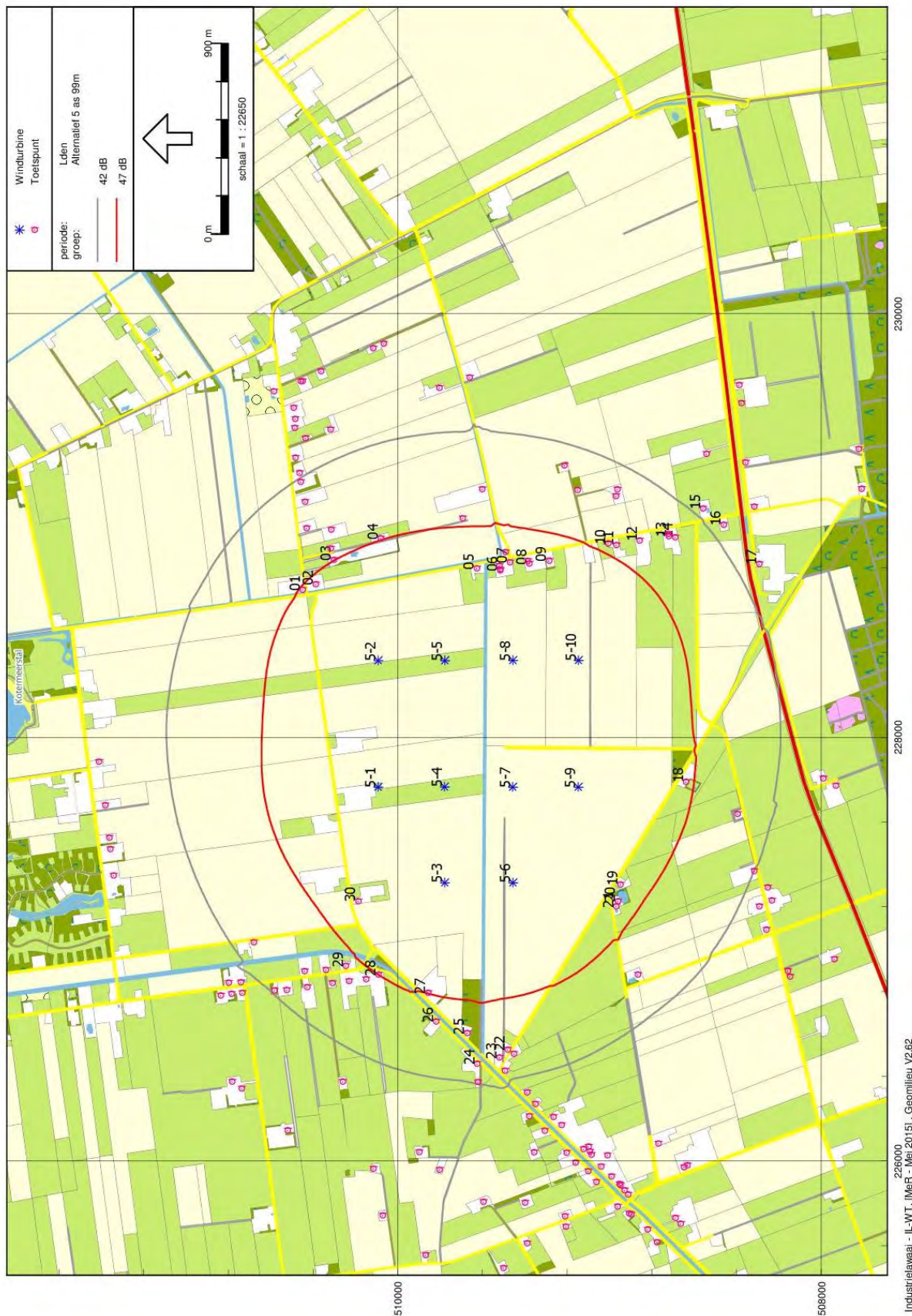
BIJLAGE 10 GELUIDCONTOUR L_{DEN} ALT 4



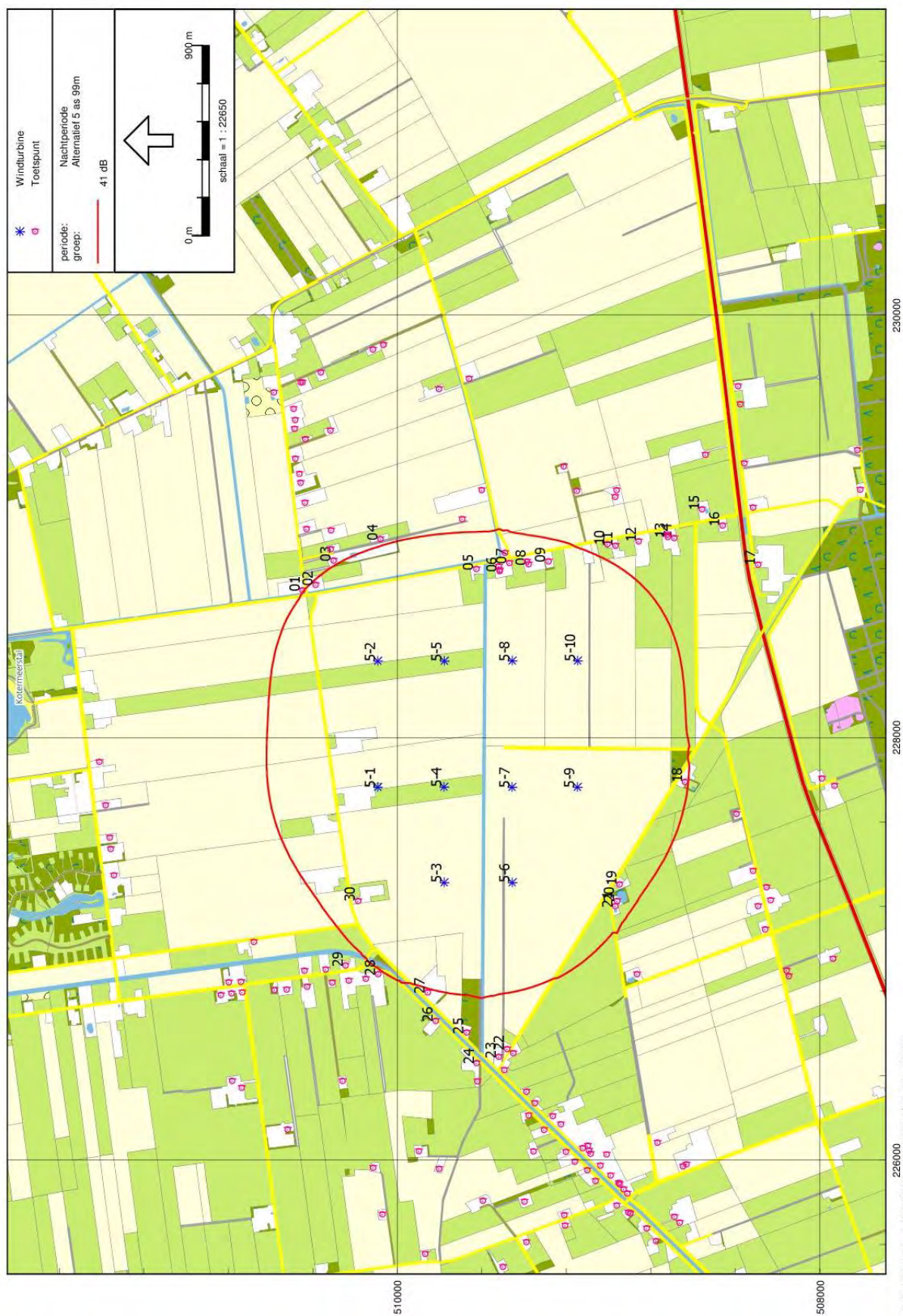
BIJLAGE 11 GELUIDCONTOUR L_{NIGHT} ALT 4



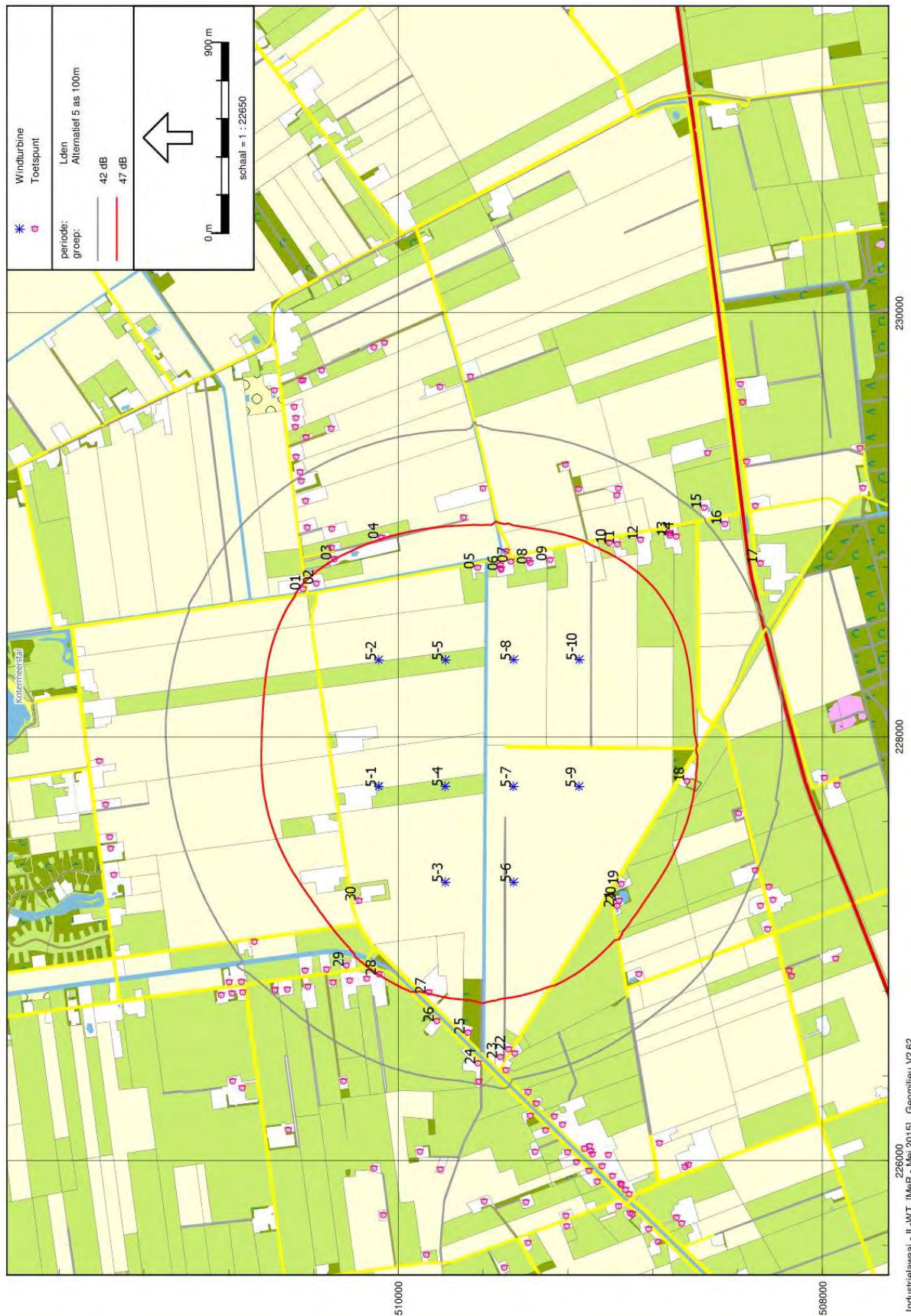
BIJLAGE 12 GELUIDCONTOUR L_{DEN} ALT 5 AS 99M



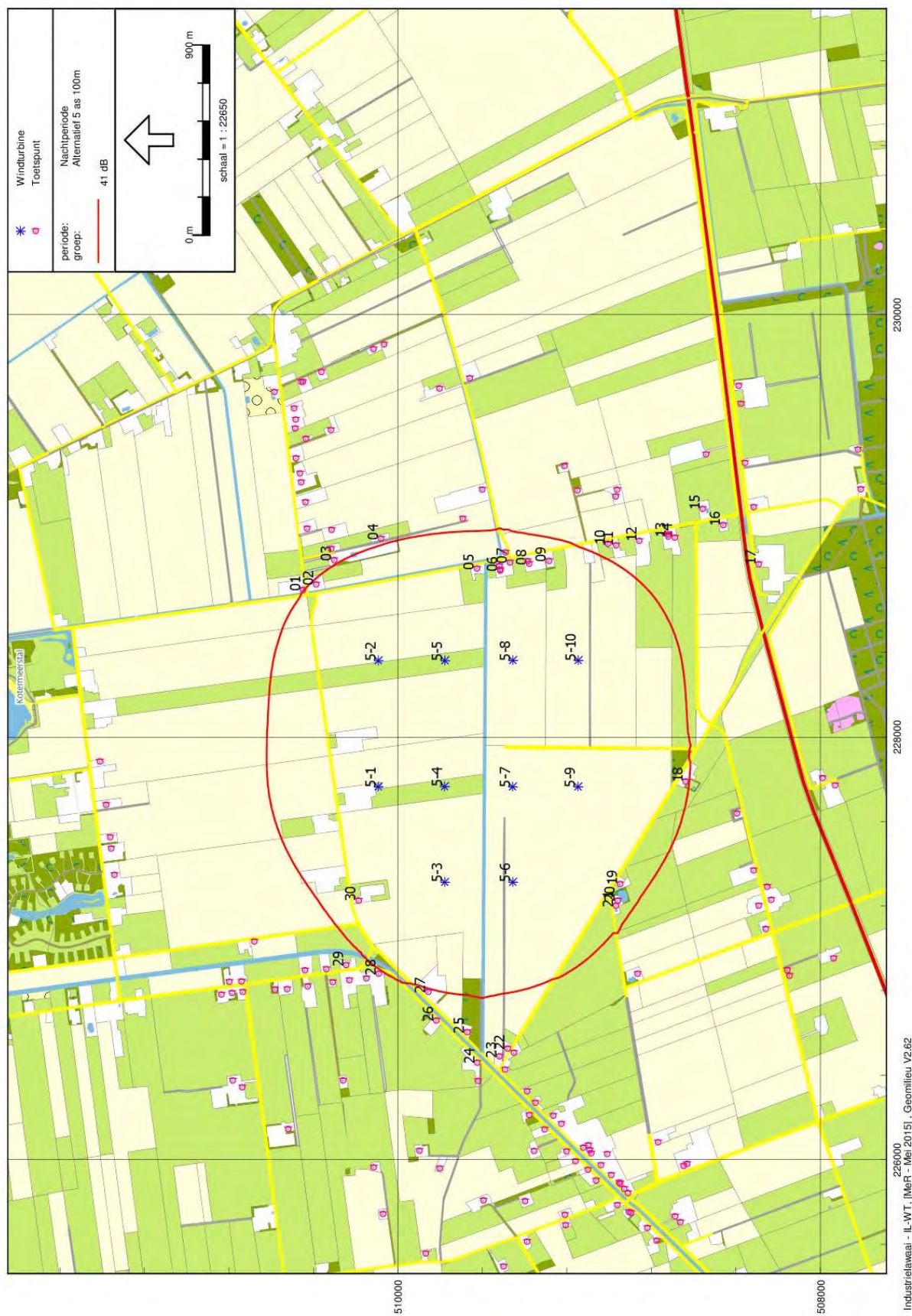
BIJLAGE 13 GELUIDCONTOUR L_{NIGHT} ALT 5 AS 99M



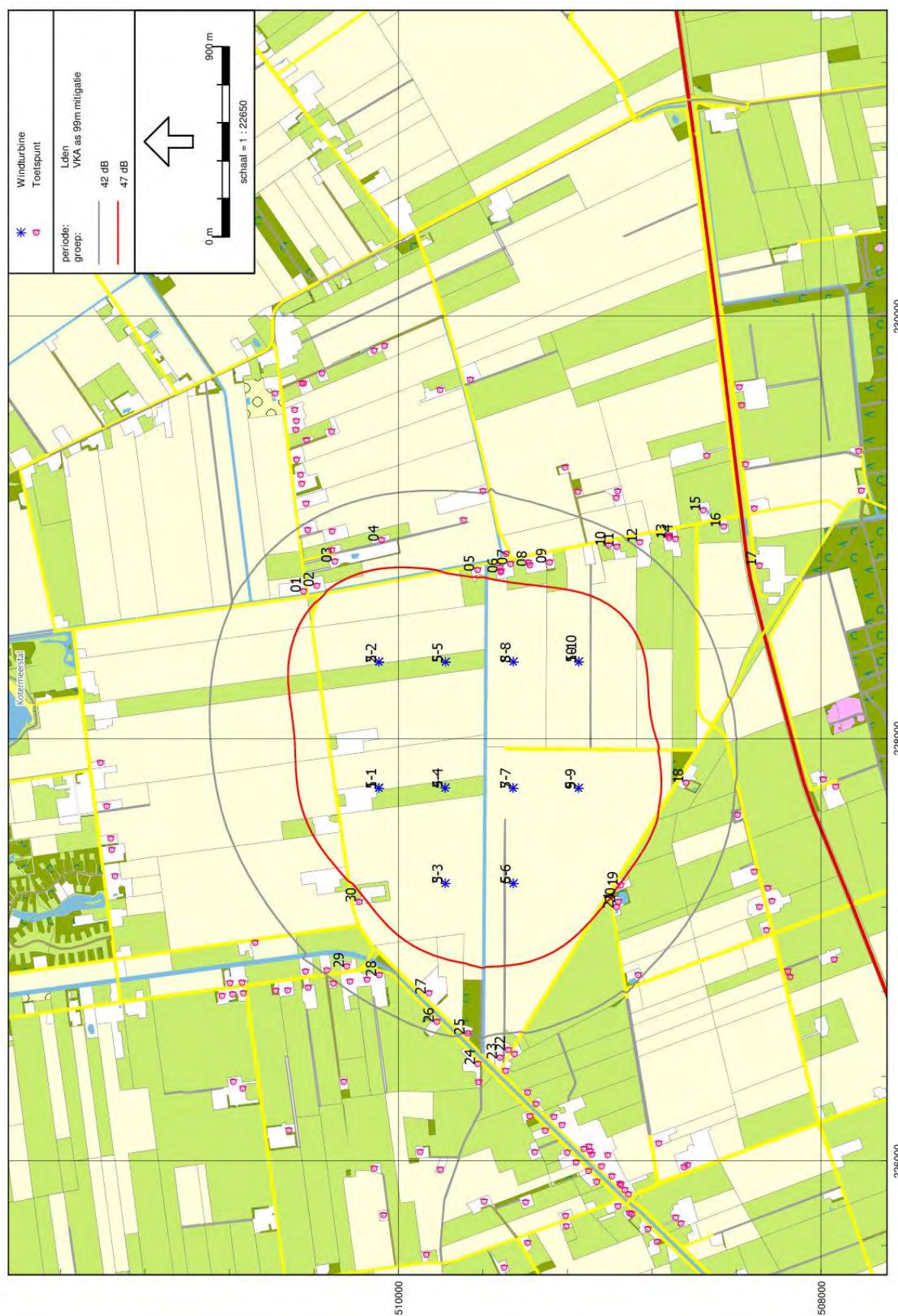
BIJLAGE 14 GELUIDCONTOUR L_{DEN} ALT 5 AS 100M

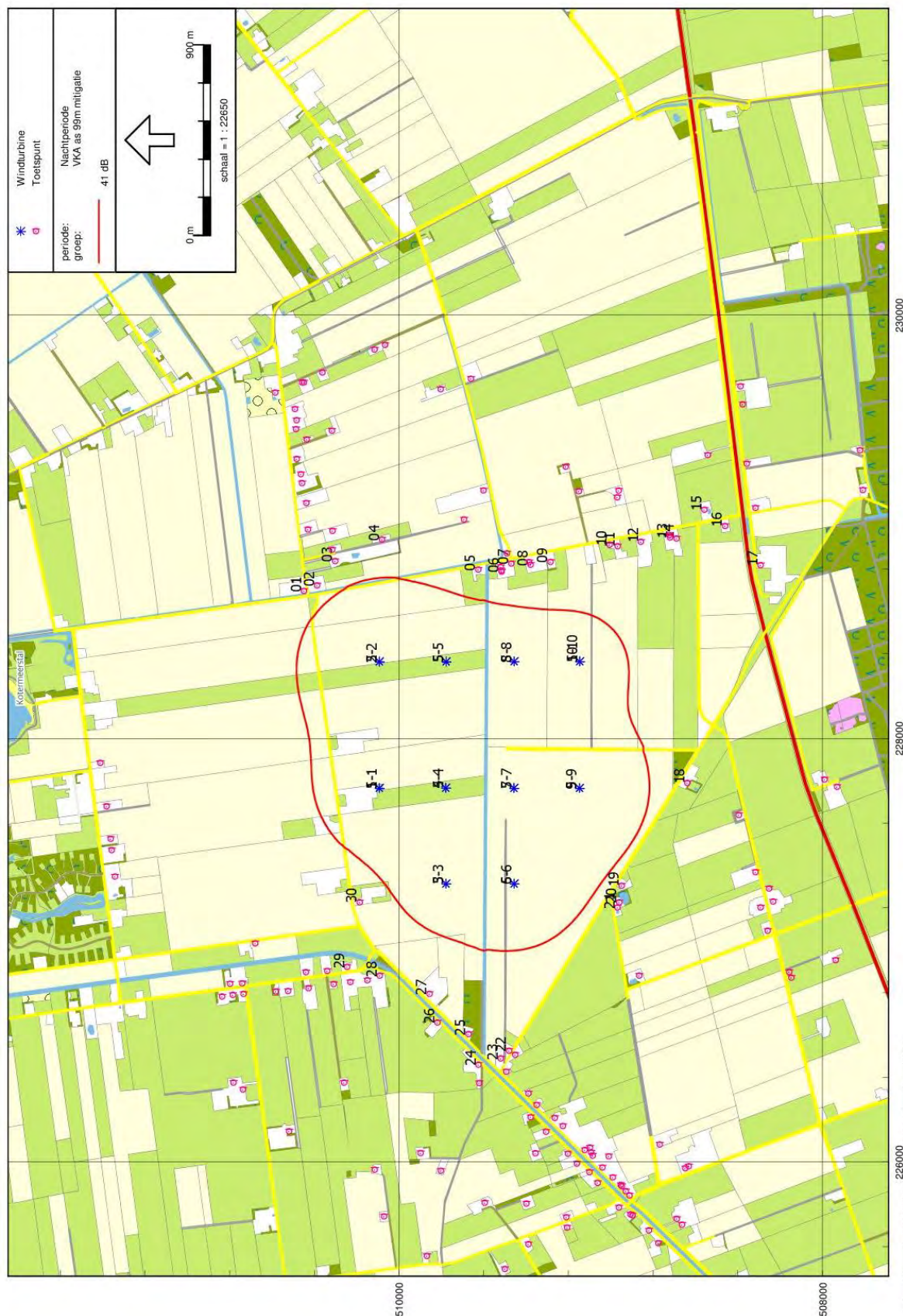


BIJLAGE 15 GELUIDCONTOUR L_{NIGHT} ALT 5 AS 100M

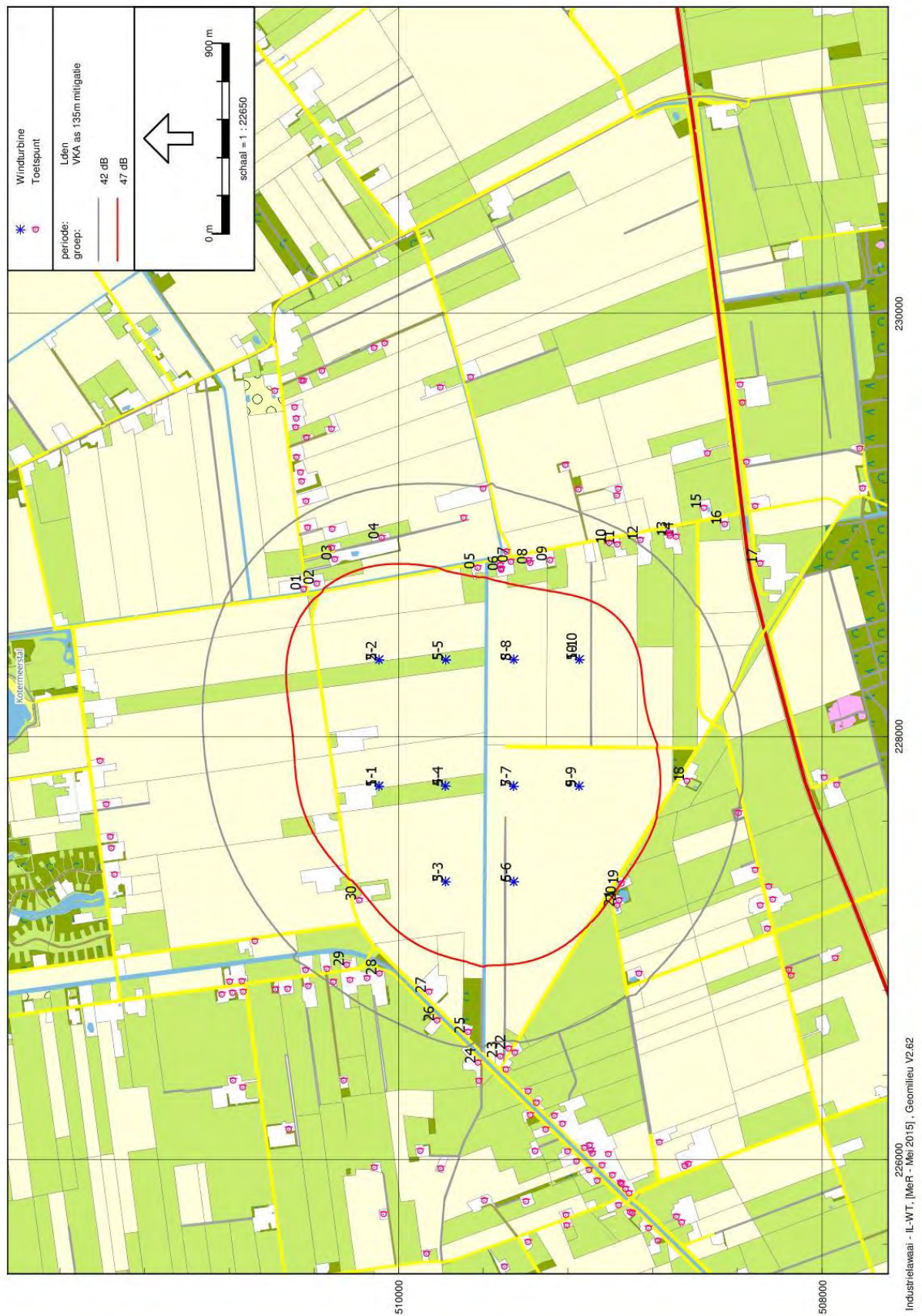


BIJLAGE 16 GELUIDCONTOUR L_{DEN} VKA AS 99M - MITIGATIE

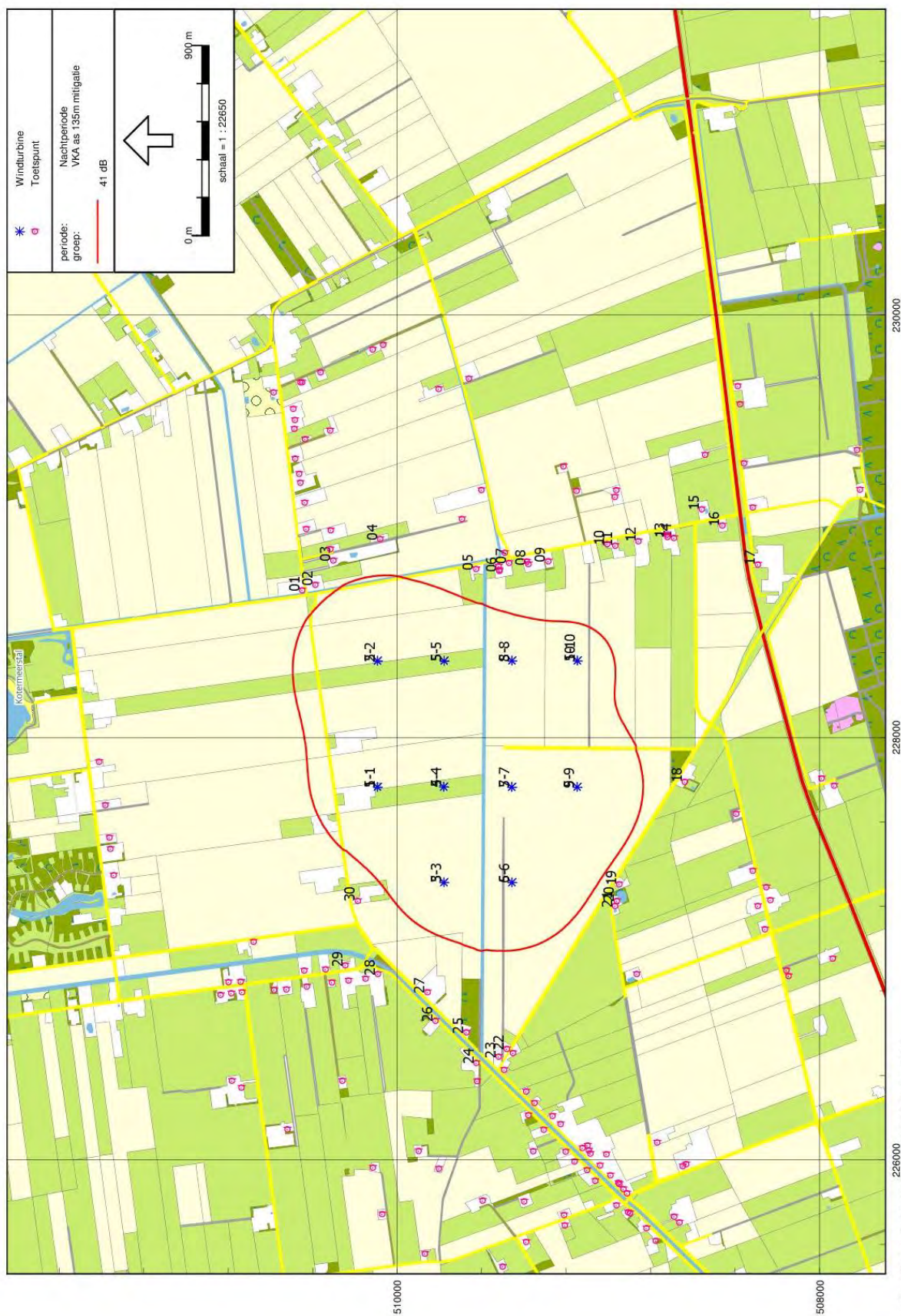


BIJLAGE 17 GELUIDCONTOUR L_{NIGHT} VKA AS 99M - MITIGATIE

BIJLAGE 18 GELUIDCONTOUR L_{DEN} VKA AS 135M - MITIGATIE



BIJLAGE 19 GELUIDCONTOUR L_{NIGHT} VKA AS 135M - MITIGATIE



BIJLAGE 20 GELUIDBELASTING VKA, ENERCON E-101 TURBINES, AS 135M

Inleiding

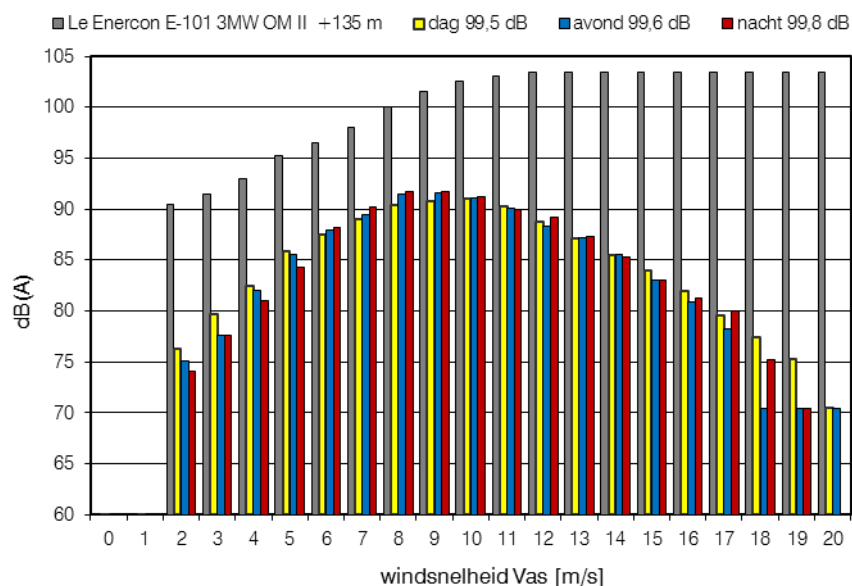
In de hoofdttekst van dit rapport is voor het VKA uitgegaan van een akoestische worst-case turbine. Voor deze turbine blijken zeer grote maatregelen nodig te zijn om te kunnen voldoen aan de geluidnormen. In deze bijlage wordt ter informatie gerekend met een voorbeeldturbine met een lagere geluiduitstraling, te weten de Enercon E-101 turbine op een ashoogte van 135 meter.

Geluidbron Enercon E-101

Door Kötter zijn geluidmetingen uitgevoerd aan de Enercon E-101 windturbine¹ in de standaard instelling van de turbinebesturing. De bronsterkte bedraagt 103,3 dB(A) bij een windsnelheid V_{10} van 8 m/s boven een vlak landbouwgebied ($z_0=0,05$) en een rotoras op 99 meter hoogte. De bronsterkten zijn gerapporteerd bij windsnelheden V_{10} van 5 tot en met 10 m/s. Voor de overdrachtsberekeningen is het octaafspectrum gebruikt² wat is gemeten bij een windsnelheid van $V_{10}=8$ m/s en wat overeenkomt met $V_{as(135m)}=12,4$ m/s.

De gerapporteerde bronsterkten van de Enercon E-101 turbine zijn omgerekend naar bronsterkten in relatie tot de windsnelheid op een ashoogte. Hierbij is de distributie voor windsnelheden gebruikt zoals weergegeven in Figuur 2.4. Dit levert de waarden op die in figuur 20-1 zijn weergegeven met grijze staven.

Figuur 20-1 Verdeling bronsterkten Enercon E-101, ashoogte 135 m.



¹ Sound Power Level of the Enercon E-101 Operational Mode II, doc D0346061-0.doc, Enercon augustus 2014

² Extract of Test Report 213122-02.01 IEC on noise emission of wind turbine generator op type E-101, Kötter 23-4-2013

Ter informatie zijn in bovenstaande grafiek ook de gecorrigeerde bronsterkten van de Enercon E-101 weergegeven per windsnelheidsklasse voor de dag, de avond en de nacht. De gele, blauwe en rode staven representeren de bronsterkten gecorrigeerd voor het percentage van de tijd dat de betreffende windsnelheidsklasse optreedt. Cumulatie van deze bronsterkten over alle windsnelheidsklassen levert de jaargemiddelde bronsterkten op. Deze waarden L_E bedragen 99,5 99,6 en 99,8 dB(A) voor respectievelijk de dag, de avond en de nacht.

Rekenresultaten

In Tabel 20-1 zijn per referentie(toets)punt de jaargemiddelde geluidniveaus L_{night} en L_{den} gegeven die optreden op +5 m hoogte.

In Figuur 20-2 en Figuur 20-3 zijn de berekende geluidcontouren op een waarneemhoogte van +5 m weergegeven voor $L_{den}=47$ dB en $L_{night}=41$ dB.

Op alle woningen van derden wordt voldaan aan de geluidnorm. Mitigerende voorzieningen zijn niet nodig.

Tabel 20-1 Rekenresultaten VKA, voorbeeld Enercon E-101 op 135 meter ashoogte.

toetspunt nr	jaargemiddeld geluidniveau WP De Veenwijken [dB]	
	Enercon E-101, VKA opstelling, as 135m	
	L_{night}	L_{den}
1	40	46
2	40	47
3	39	46
4	38	45
5	39	47
6	39	47
7	38	46
8	38	46
9	38	45
10	36	43
11	35	43
12	35	42
13	33	41
14	33	41
15	32	39
16	31	39
17	31	39
18	38	46
19	40	47
20	40	47
21	40	47
22	35	42
23	34	42
24	35	42
25	36	43
26	36	44
27	37	45
28	37	45
29	37	44
30	40	47

Figuur 20-2 Geluidcontour L_{den} VKA, voorbeeld E101 turbines, as 135 meterFiguur 20-3 Geluidcontour L_{night} VKA, voorbeeld E101 turbines, as 135 meter

BIJLAGE 21 REKENMODEL EN RESULTATEN SLAGSCHADUW

Project:
714068

Licensed user:
Pondera Consult B.V.
Welbergweg 49
NL-7556 PE Hengelo
0031742489940
Dion Oude Lansink / d.oudelansink@ponderaconsult.com
Calculated:
12-5-2015 17:20/3.0.578

SHADOW - Main Result

Calculation: Variant 1 - 10 x V110 op 135m

Assumptions for shadow calculations

Maximum distance for influence 1. WTG distance circle radius 5 °
Minimum sun height over horizon for influence 1 days
Day step for calculation 1 minutes
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0,21	0,30	0,33	0,41	0,42	0,37	0,40	0,41	0,36	0,34	0,23	0,19

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
304	385	547	603	447	405	728	1.237	1.048	771	487	397	7.359

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: Elevation Grid Data Object: 714068_EMDGrid_0.wpg (1
Obstacles used in calculation
Eye height: 1,5 m
Grid resolution: 10,0 m

All coordinates are in
Dutch Stereo-RD/NAP 2000

WTGs

X (east)	Y (north)	Z	Row data/Description	WTG type			Shadow data		
				Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]
1	227.765	510.093	4,0 VESTAS V110-2.0 2000 110.0 IOI hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	135,0
2	228.362	510.093	4,5 VESTAS V110-2.0 2000 110.0 IOI hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	135,0
3	227.313	509.779	5,0 VESTAS V110-2.0 2000 110.0 IOI hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	135,0
4	227.765	509.779	3,0 VESTAS V110-2.0 2000 110.0 IOI hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	135,0
5	228.362	509.777	3,5 VESTAS V110-2.0 2000 110.0 IOI hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	135,0
6	227.313	509.457	4,8 VESTAS V110-2.0 2000 110.0 IOI hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	135,0
7	227.765	509.457	4,3 VESTAS V110-2.0 2000 110.0 IOI hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	135,0
8	228.363	509.457	4,0 VESTAS V110-2.0 2000 110.0 IOI hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	135,0
9	227.765	509.147	4,0 VESTAS V110-2.0 2000 110.0 IOI hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	135,0
10	228.363	509.147	3,4 VESTAS V110-2.0 2000 110.0 IOI hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	135,0

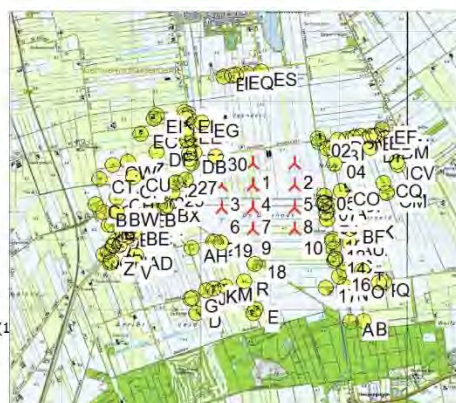
Shadow receptor-Input

No.	X (east)	Y (north)	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
01	228.696	510.451	6,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
02	228.721	510.389	6,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
03	228.836	510.303	6,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
04	228.938	510.082	4,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
05	228.796	509.627	7,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
06	228.787	509.517	8,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
07	228.825	509.471	8,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
08	228.819	509.380	4,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
09	228.833	509.286	5,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
10	228.914	509.007	6,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
11	228.906	508.969	6,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
12	228.927	508.859	4,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
13	228.948	508.721	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
14	228.943	508.690	7,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
15	229.079	508.559	4,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
16	229.002	508.461	7,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
17	228.817	508.294	4,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
18	227.789	508.640	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
19	227.303	508.949	5,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
20	227.225	508.961	7,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
21	227.201	508.969	6,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"

To be continued on next page...

windPRO 3.0.578 by EMD International A/S, Tel. +45 96 35 44 44, www.emd.dk, windpro@emd.dk

15-5-2015 16:35 / 1



Project:
714068

Licensed user:
Pondera Consult B.V.
Welbergweg 49
NL-7556 PE Hengelo
0031742489940
Dion Oude Lansink / d.oudelansink@ponderaconsult.com
Calculated:
12-5-2015 17:20/3.0.578

SHADOW - Main Result

Calculation: Variant 1 - 10 x V110 op 135m

...continued from previous page

No.	X (east)	Y (north)	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
22	226.524	509.481	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
23	226.487	509.520	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
24	226.458	509.626	6,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
25	226.603	509.674	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
26	226.658	509.820	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
27	226.793	509.857	5,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
28	226.879	510.092	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
29	226.919	510.246	8,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
30	227.225	510.187	4,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
A	229.172	507.810	9,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AC	228.959	508.723	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AD	226.081	508.770	6,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AE	225.615	508.777	7,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AF	225.675	508.821	6,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AH	226.879	508.867	7,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AI	225.746	508.899	6,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AJ	225.751	508.908	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AK	225.840	508.913	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AL	225.860	508.930	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AN	225.884	508.950	7,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AO	225.890	508.954	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AQ	225.784	508.963	5,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AR	229.169	508.964	4,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AU	229.138	508.970	5,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AV	225.926	508.991	6,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AX	226.025	509.011	7,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AY	225.973	509.040	8,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AZ	225.900	509.063	5,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
B	229.360	507.824	7,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BA	226.028	509.086	7,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BB	226.043	509.094	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BC	226.066	509.100	7,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BD	225.951	509.102	6,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BE	226.055	509.124	7,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BF	229.166	509.152	5,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BG	225.991	509.161	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BH	226.038	509.203	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BI	225.689	509.207	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BJ	225.738	509.211	7,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BK	229.282	509.214	5,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BL	226.168	509.228	6,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BM	226.207	509.266	5,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BO	226.141	509.307	8,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BP	226.268	509.351	8,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BQ	226.040	509.357	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BR	226.210	509.380	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BT	228.832	509.388	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BU	225.610	509.390	7,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BV	226.323	509.390	6,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BW	225.802	509.400	5,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BX	226.505	509.453	7,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
C	227.770	507.932	3,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CA	228.873	509.492	5,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CB	226.425	509.495	7,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CC	225.493	509.502	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CE	228.791	509.518	8,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CF	228.809	509.521	8,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CH	225.806	509.596	6,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CI	229.170	509.602	5,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CJ	226.372	509.622	4,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CM	229.698	509.662	5,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CO	229.034	509.695	3,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CP	225.958	509.804	5,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CQ	229.649	509.805	4,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"

To be continued on next page...

Project:
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Pondera Consult B.V.
Welbergweg 49
NL-7556 PE Hengelo
0031742489940
Dion Oude Lansink / d.oudelansink@ponderaconsult.com
Calculated:
12-5-2015 17:20/3.0.578

SHADOW - Main Result

Calculation: Variant 1 - 10 x V110 op 135m

...continued from previous page

No.	X (east)	Y (north)	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
CT	225.555	509.869	5,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CU	226.040	509.900	8,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CV	229.858	510.067	4,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CW	225.742	510.072	7,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CZ	225.962	510.116	6,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
D	226.952	507.939	7,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DA	229.836	510.117	5,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DB	226.857	510.150	8,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DD	226.848	510.232	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DF	226.373	510.261	7,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DH	226.838	510.310	6,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DI	228.980	510.315	4,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DJ	228.890	510.318	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DK	229.452	510.318	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DL	226.900	510.340	7,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DM	229.728	510.364	7,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DO	226.819	510.429	7,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DP	228.986	510.431	5,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DQ	229.411	510.438	5,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DR	229.111	510.440	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DS	226.895	510.441	8,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DU	229.681	510.451	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DV	229.205	510.459	6,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DW	229.680	510.459	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DX	229.247	510.465	6,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DY	229.319	510.484	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DZ	229.502	510.485	7,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
E	227.805	507.991	6,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EA	229.460	510.488	7,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EB	229.554	510.493	5,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EC	226.144	510.521	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
ED	226.806	510.525	8,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EE	226.804	510.583	6,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EF	229.632	510.586	3,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EG	227.031	510.681	5,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EH	226.793	510.735	10,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EI	226.341	510.739	7,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EJ	226.842	510.742	8,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EK	226.374	510.783	8,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EL	226.787	510.787	9,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EM	226.840	510.800	7,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EN	226.780	510.837	7,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EO	227.347	511.343	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EP	227.471	511.359	7,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EQ	227.524	511.364	6,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
ER	227.678	511.383	7,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
ES	227.884	511.412	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
F	226.869	508.148	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
G	226.896	508.158	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
H	227.229	508.234	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
I	227.290	508.253	6,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
J	227.091	508.260	6,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
K	227.201	508.293	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
M	227.368	508.317	7,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
N	229.088	508.317	6,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
O	229.296	508.358	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
P	229.577	508.378	4,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
Q	229.662	508.388	6,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
R	227.637	508.396	7,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
T	229.337	508.543	2,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
V	225.978	508.633	6,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
X	225.969	508.649	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
Y	225.702	508.665	6,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
Z	225.730	508.689	5,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"

Project:
714068

Licensed user:
Pondera Consult B.V.
Welbergweg 49
NL-7556 PE Hengelo
0031742489940
Dion Oude Lansink / d.oudelansink@ponderaconsult.com
Calculated:
12-5-2015 17:20/3.0.578

SHADOW - Main Result

Calculation: Variant 1 - 10 x V110 op 135m

Calculation Results

Shadow receptor				
No.	Shadow, worst case		Shadow, expected values	
	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow hours per year [h/year]
01	113:56	165	1:17	17:57
02	124:24	168	1:13	20:23
03	111:28	197	1:14	18:19
04	122:19	239	0:49	21:48
05	212:11	292	1:22	39:24
06	155:35	243	1:18	30:43
07	139:44	223	1:10	28:09
08	176:24	223	1:25	34:30
09	150:18	185	1:19	28:52
10	92:51	143	1:11	17:50
11	90:39	130	1:09	17:21
12	47:06	103	0:44	8:49
13	8:32	37	0:22	1:41
14	8:49	40	0:21	1:44
15	0:00	0	0:00	0:00
16	0:00	0	0:00	0:00
17	0:00	0	0:00	0:00
18	0:00	0	0:00	0:00
19	83:18	122	1:04	18:32
20	90:58	133	1:07	20:00
21	88:25	139	1:08	19:23
22	63:20	175	0:37	13:18
23	47:37	123	0:39	9:53
24	40:04	101	0:43	7:46
25	74:19	158	0:57	14:21
26	74:34	157	0:48	13:21
27	111:46	181	1:06	19:03
28	136:26	207	1:11	18:27
29	107:32	178	1:09	13:21
30	227:22	217	1:36	30:11
A	0:00	0	0:00	0:00
AC	8:14	36	0:21	1:38
AD	0:00	0	0:00	0:00
AE	0:00	0	0:00	0:00
AF	0:00	0	0:00	0:00
AH	27:55	94	0:30	6:15
AI	0:00	0	0:00	0:00
AJ	0:00	0	0:00	0:00
AK	0:00	0	0:00	0:00
AL	0:00	0	0:00	0:00
AN	0:00	0	0:00	0:00
AO	0:00	0	0:00	0:00
AQ	0:00	0	0:00	0:00
AR	35:00	97	0:34	6:39
AU	34:18	93	0:35	6:33
AV	0:00	0	0:00	0:00
AX	0:00	0	0:00	0:00
AY	0:00	0	0:00	0:00
AZ	0:00	0	0:00	0:00
B	0:00	0	0:00	0:00
BA	0:00	0	0:00	0:00
BB	0:00	0	0:00	0:00
BC	6:16	30	0:20	1:24
BD	0:00	0	0:00	0:00
BE	6:01	29	0:19	1:20
BF	58:53	140	0:34	11:33
BG	0:00	0	0:00	0:00
BH	5:43	27	0:20	1:16
BI	0:00	0	0:00	0:00
BJ	0:00	0	0:00	0:00
BK	41:04	131	0:30	7:53
BL	19:29	80	0:23	4:27

To be continued on next page...

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Welbergweg 49
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12-5-2015 17:20/3.0.578

SHADOW - Main Result

Calculation: Variant 1 - 10 x V110 op 135m

...continued from previous page

No.	Shadow, worst case		Max shadow hours per day [h/day]	Shadow, expected values	
	Shadow hours per year [h/year]	Shadow days per year [days/year]		Shadow hours per year [h/year]	
BM	21:39	84	0:24	4:56	
BO	15:52	68	0:22	3:33	
BP	23:29	82	0:26	5:14	
BQ	5:35	26	0:20	1:09	
BR	19:42	73	0:24	4:18	
BT	167:15	223	1:22	32:57	
BU	0:00	0	0:00	0:00	
BV	27:55	89	0:27	6:10	
BW	0:00	0	0:00	0:00	
BX	63:07	184	0:33	13:26	
C	0:00	0	0:00	0:00	
CA	131:39	222	0:59	26:01	
CB	34:46	92	0:31	7:14	
CC	0:00	0	0:00	0:00	
CE	153:27	243	1:17	30:16	
CF	149:08	242	1:15	29:16	
CH	0:00	0	0:00	0:00	
CI	67:31	179	0:34	12:51	
CJ	27:14	76	0:29	5:18	
CM	0:00	0	0:00	0:00	
CO	96:46	214	0:52	18:22	
CP	0:00	0	0:00	0:00	
CQ	10:47	53	0:20	2:06	
CT	0:00	0	0:00	0:00	
CU	5:01	24	0:20	0:51	
CV	0:00	0	0:00	0:00	
CW	0:00	0	0:00	0:00	
CZ	0:00	0	0:00	0:00	
D	0:00	0	0:00	0:00	
DA	0:00	0	0:00	0:00	
DB	108:12	195	0:59	14:24	
DD	94:18	180	0:56	11:52	
DF	19:12	71	0:26	2:31	
DH	84:37	167	1:00	10:13	
DI	82:10	167	0:58	13:11	
DJ	98:23	190	1:06	16:02	
DK	14:22	57	0:24	2:40	
DL	95:10	161	1:04	11:12	
DM	0:00	0	0:00	0:00	
DO	62:30	149	0:35	7:17	
DP	67:21	155	0:42	10:31	
DQ	14:59	60	0:24	2:45	
DR	52:11	144	0:33	7:57	
DS	79:15	146	0:58	9:01	
DU	0:00	0	0:00	0:00	
DV	38:58	139	0:30	6:06	
DW	0:00	0	0:00	0:00	
DX	22:34	72	0:28	3:57	
DY	18:08	67	0:27	3:13	
DZ	6:13	27	0:22	1:08	
E	0:00	0	0:00	0:00	
EA	12:14	54	0:23	2:14	
EB	5:29	25	0:21	1:00	
EC	0:00	0	0:00	0:00	
ED	49:46	134	0:33	5:41	
EE	42:16	125	0:31	4:49	
EF	0:00	0	0:00	0:00	
EG	39:25	109	0:30	4:18	
EH	10:19	47	0:24	1:21	
EI	0:00	0	0:00	0:00	
EJ	9:47	35	0:25	1:17	
EK	0:00	0	0:00	0:00	
EL	7:59	33	0:23	1:01	

To be continued on next page...

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Pondera Consult B.V.
Welbergweg 49
NL-7556 PE Hengelo
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Calculated:
12-5-2015 17:20/3.0.578

SHADOW - Main Result

Calculation: Variant 1 - 10 x V110 op 135m

...continued from previous page

No.	Shadow, worst case		Shadow, expected values	
	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow hours per year [h/year]
EM	9:33	37	0:24	1:08
EN	7:50	33	0:23	0:56
EO	0:00	0	0:00	0:00
EP	0:00	0	0:00	0:00
EQ	0:00	0	0:00	0:00
ER	0:00	0	0:00	0:00
ES	0:00	0	0:00	0:00
F	0:00	0	0:00	0:00
G	0:00	0	0:00	0:00
H	0:00	0	0:00	0:00
I	0:00	0	0:00	0:00
J	0:00	0	0:00	0:00
K	0:00	0	0:00	0:00
M	0:00	0	0:00	0:00
N	0:00	0	0:00	0:00
O	0:00	0	0:00	0:00
P	0:00	0	0:00	0:00
Q	0:00	0	0:00	0:00
R	0:00	0	0:00	0:00
T	7:42	41	0:16	1:22
V	0:00	0	0:00	0:00
X	0:00	0	0:00	0:00
Y	0:00	0	0:00	0:00
Z	0:00	0	0:00	0:00

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	VESTAS V110-2.0 2000 110.0 !O! hub: 135,0 m (TOT: 190,0 m) (31)	215:31	38:37
2	VESTAS V110-2.0 2000 110.0 !O! hub: 135,0 m (TOT: 190,0 m) (32)	241:59	45:32
3	VESTAS V110-2.0 2000 110.0 !O! hub: 135,0 m (TOT: 190,0 m) (33)	431:16	65:19
4	VESTAS V110-2.0 2000 110.0 !O! hub: 135,0 m (TOT: 190,0 m) (34)	211:39	35:35
5	VESTAS V110-2.0 2000 110.0 !O! hub: 135,0 m (TOT: 190,0 m) (35)	319:58	53:51
6	VESTAS V110-2.0 2000 110.0 !O! hub: 135,0 m (TOT: 190,0 m) (36)	220:00	32:32
7	VESTAS V110-2.0 2000 110.0 !O! hub: 135,0 m (TOT: 190,0 m) (37)	189:21	29:41
8	VESTAS V110-2.0 2000 110.0 !O! hub: 135,0 m (TOT: 190,0 m) (38)	441:21	82:13
9	VESTAS V110-2.0 2000 110.0 !O! hub: 135,0 m (TOT: 190,0 m) (39)	199:23	38:50
10	VESTAS V110-2.0 2000 110.0 !O! hub: 135,0 m (TOT: 190,0 m) (40)	371:04	68:13

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Pondera Consult B.V.
Welbergweg 49
NL-7556 PE Hengelo
0031742489940
Dion Oude Lansink / d.oudelansink@ponderaconsult.com
Calculated:
15-5-2015 15:17/3.0.578

SHADOW - Main Result

Calculation: Variant 2 - 16 x V110 op 135m

Assumptions for shadow calculations

Maximum distance for influence 1. WTG distance circle radius
Minimum sun height over horizon for influence 5 °
Day step for calculation 1 days
Time step for calculation 1 minutes

Sunshine probability S/50 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0,21	0,30	0,33	0,41	0,42	0,37	0,40	0,41	0,36	0,34	0,23	0,19

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
304	385	547	603	447	405	728	1.237	1.048	771	487	397	7.359

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: Elevation Grid Data Object: 714068_EMDGrid_0.wpg (1
Obstacles used in calculation
Eye height: 1,5 m
Grid resolution: 10,0 m

All coordinates are in
Dutch Stereo-RD/NAP 2000

WTGs

X (east)	Y (north)	Z [m]	Row data/Description	WTG type				Shadow data			
				Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM [RPM]
1	227.827	510.044	4,0 VESTAS V110-2.0 2000 110.0 !O! hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	135,0	1.320	0,0
2	228.370	510.044	4,9 VESTAS V110-2.0 2000 110.0 !O! hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	135,0	1.320	0,0
3	227.015	509.738	4,0 VESTAS V110-2.0 2000 110.0 !O! hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	135,0	1.320	0,0
4	227.555	509.738	4,3 VESTAS V110-2.0 2000 110.0 !O! hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	135,0	1.320	0,0
5	228.089	509.738	4,5 VESTAS V110-2.0 2000 110.0 !O! hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	135,0	1.320	0,0
6	228.635	509.738	4,0 VESTAS V110-2.0 2000 110.0 !O! hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	135,0	1.320	0,0
7	226.745	509.430	4,0 VESTAS V110-2.0 2000 110.0 !O! hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	135,0	1.320	0,0
8	227.285	509.430	4,4 VESTAS V110-2.0 2000 110.0 !O! hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	135,0	1.320	0,0
9	227.825	509.430	4,9 VESTAS V110-2.0 2000 110.0 !O! hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	135,0	1.320	0,0
10	228.365	509.430	4,0 VESTAS V110-2.0 2000 110.0 !O! hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	135,0	1.320	0,0
11	227.553	509.124	5,0 VESTAS V110-2.0 2000 110.0 !O! hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	135,0	1.320	0,0
12	228.093	509.124	3,5 VESTAS V110-2.0 2000 110.0 !O! hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	135,0	1.320	0,0
13	228.633	509.124	2,0 VESTAS V110-2.0 2000 110.0 !O! hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	135,0	1.320	0,0
14	227.823	508.817	5,1 VESTAS V110-2.0 2000 110.0 !O! hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	135,0	1.320	0,0
15	228.363	508.817	3,6 VESTAS V110-2.0 2000 110.0 !O! hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	135,0	1.320	0,0
16	228.631	508.511	2,5 VESTAS V110-2.0 2000 110.0 !O! hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	135,0	1.320	0,0

Shadow receptor-Input

No.	X (east)	Y (north)	Z	Width	Height	Height a.g.l. [m]	Degrees from south cw [°]	Slope of window [°]	Direction mode
01	228.696	510.451	6,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
02	228.721	510.389	6,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
03	228.836	510.303	6,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
04	228.938	510.082	4,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
05	228.796	509.627	7,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
06	228.787	509.517	8,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
07	228.825	509.471	8,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
08	228.819	509.380	4,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
09	228.833	509.286	5,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
10	228.914	509.007	6,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
11	228.906	508.969	6,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
12	228.927	508.859	4,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
13	228.948	508.721	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
14	228.943	508.690	7,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
15	229.079	508.559	4,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"

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Project:
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Pondera Consult B.V.
Welbergweg 49
NL-7556 PE Hengelo
0031742489940
Dion Oude Lansink / d.oudelansink@ponderaconsult.com
Calculated:
15-5-2015 15:17/3.0.578

SHADOW - Main Result

Calculation: Variant 2 - 16 x V110 op 135m

...continued from previous page

No.	X (east)	Y (north)	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
16	229.002	508.461	7,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
17	228.817	508.294	4,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
18	227.789	508.640	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
19	227.303	508.949	5,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
20	227.225	508.961	7,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
21	227.201	508.969	6,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
22	226.524	509.481	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
23	226.487	509.520	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
24	226.458	509.626	6,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
25	226.603	509.674	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
26	226.658	509.820	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
27	226.793	509.857	5,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
28	226.879	510.092	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
29	226.919	510.246	8,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
30	227.225	510.187	4,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
A	229.172	507.810	9,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AC	228.959	508.723	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AD	226.081	508.770	6,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AE	225.615	508.777	7,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AF	225.675	508.821	6,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AH	226.879	508.867	7,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AI	225.746	508.899	6,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AJ	225.751	508.908	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AK	225.840	508.913	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AL	225.860	508.930	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AN	225.884	508.950	7,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AO	225.890	508.954	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AQ	225.784	508.963	5,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AR	229.169	508.964	4,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AU	229.138	508.970	5,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AV	225.926	508.991	6,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AX	226.025	509.011	7,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AY	225.973	509.040	8,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AZ	225.900	509.063	5,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
B	229.360	507.824	7,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BA	226.028	509.086	7,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BB	226.043	509.094	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BC	226.066	509.100	7,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BD	225.951	509.102	6,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BE	226.055	509.124	7,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BF	229.166	509.152	5,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BG	225.991	509.161	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BH	226.038	509.203	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BI	225.689	509.207	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BJ	225.738	509.211	7,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BK	229.282	509.214	5,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BL	226.168	509.228	6,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BM	226.207	509.266	5,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BO	226.141	509.307	8,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BP	226.268	509.351	8,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BQ	226.040	509.357	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BR	226.210	509.380	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BT	228.832	509.388	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BU	225.610	509.390	7,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BV	226.323	509.390	6,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BW	225.802	509.400	5,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BX	226.505	509.453	7,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
C	227.770	507.932	3,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CA	228.873	509.492	5,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CB	226.425	509.495	7,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CC	225.493	509.502	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CE	228.791	509.518	8,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CF	228.809	509.521	8,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CH	225.806	509.596	6,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"

To be continued on next page...

Project:
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Licensed user:
Pondera Consult B.V.
Welbergweg 49
NL-7556 PE Hengelo
0031742489940
Dion Oude Lansink / d.oudelansink@ponderaconsult.com
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SHADOW - Main Result

Calculation: Variant 2 - 16 x V110 op 135m

...continued from previous page

No.	X (east)	Y (north)	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
CI	229.170	509.602	5,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CJ	226.372	509.622	4,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CM	229.698	509.662	5,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CO	229.034	509.695	3,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CP	225.958	509.804	5,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CQ	229.649	509.805	4,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CT	225.555	509.869	5,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CU	226.040	509.900	8,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CV	229.858	510.067	4,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CW	225.742	510.072	7,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CZ	225.962	510.116	6,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
D	226.952	507.939	7,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DA	229.836	510.117	5,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DB	226.857	510.150	8,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DD	226.848	510.232	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DF	226.373	510.261	7,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DH	226.838	510.310	6,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DI	228.980	510.315	4,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DJ	228.890	510.318	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DK	229.452	510.318	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DL	226.900	510.340	7,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DM	229.728	510.364	7,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DO	226.819	510.429	7,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DP	228.986	510.431	5,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DQ	229.411	510.438	5,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DR	229.111	510.440	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DS	226.895	510.441	8,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DU	229.681	510.451	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DV	229.205	510.459	6,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DW	229.680	510.459	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DX	229.247	510.465	6,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DY	229.319	510.484	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DZ	229.502	510.485	7,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
E	227.805	507.991	6,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EA	229.460	510.488	7,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EB	229.554	510.493	5,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EC	226.144	510.521	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
ED	226.806	510.525	8,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EE	226.804	510.583	6,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EF	229.632	510.586	3,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EG	227.031	510.681	5,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EH	226.793	510.735	10,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EI	226.341	510.739	7,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EJ	226.842	510.742	8,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EK	226.374	510.783	8,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EL	226.787	510.787	9,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EM	226.840	510.800	7,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EN	226.780	510.837	7,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EO	227.347	511.343	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EP	227.471	511.359	7,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EQ	227.524	511.364	6,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
ER	227.678	511.383	7,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
ES	227.884	511.412	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
F	226.869	508.148	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
G	226.896	508.158	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
H	227.229	508.234	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
I	227.290	508.253	6,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
J	227.091	508.260	6,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
K	227.201	508.293	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
M	227.368	508.317	7,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
N	229.088	508.317	6,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
O	229.296	508.358	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
P	229.577	508.378	4,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
Q	229.662	508.388	6,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"

To be continued on next page...

Project:
714068

Licensed user:
Pondera Consult B.V.
Welbergweg 49
NL-7556 PE Hengelo
0031742489940
Dion Oude Lansink / d.oudelansink@ponderaconsult.com
Calculated:
15-5-2015 15:17/3.0.578

SHADOW - Main Result

Calculation: Variant 2 - 16 x V110 op 135m

...continued from previous page

No.	X (east)	Y (north)	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
R	227.637	508.396	7,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
T	229.337	508.543	2,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
V	225.978	508.633	6,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
X	225.969	508.649	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
Y	225.702	508.665	6,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
Z	225.730	508.689	5,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"

Calculation Results

Shadow receptor

No.	Shadow, worst case		Shadow, expected values	
	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow hours per year [h/year]
01	98:42	155	0:54	14:51
02	108:54	167	1:02	17:02
03	136:50	183	1:15	20:56
04	147:45	222	1:19	26:40
05	232:57	339	1:24	38:46
06	328:24	350	1:34	56:02
07	305:03	348	1:29	54:08
08	327:34	325	1:45	61:53
09	317:26	321	2:25	61:52
10	172:31	292	1:09	29:13
11	158:03	268	1:12	26:41
12	154:36	261	0:59	29:27
13	162:46	241	1:08	32:18
14	175:49	236	1:11	34:44
15	132:15	174	1:10	26:27
16	161:31	125	1:38	31:26
17	23:12	67	0:27	4:18
18	111:47	149	1:07	23:44
19	86:28	156	1:14	16:43
20	84:23	172	1:07	16:32
21	105:28	191	1:04	21:14
22	318:37	215	2:10	61:37
23	237:55	229	1:54	46:29
24	172:08	215	1:44	31:15
25	302:51	279	2:02	55:14
26	262:46	253	1:32	39:44
27	334:45	272	2:17	52:59
28	246:45	200	2:08	30:53
29	124:48	178	1:18	14:59
30	252:54	197	2:11	33:34
A	0:00	0	0:00	0:00
AC	155:58	239	1:06	30:57
AD	0:00	0	0:00	0:00
AE	16:48	64	0:21	3:46
AF	19:31	67	0:23	4:23
AH	93:25	166	0:57	20:16
AI	24:30	76	0:26	5:32
AJ	24:56	77	0:26	5:38
AK	24:52	66	0:29	5:34
AL	26:22	67	0:29	5:55
AN	28:05	69	0:30	6:18
AO	28:19	69	0:30	6:22
AQ	26:31	85	0:27	6:01
AR	149:55	238	1:14	28:12
AU	155:15	241	1:17	29:00
AV	32:27	72	0:32	7:18
AX	27:20	59	0:34	6:07
AY	44:22	78	0:46	9:57
AZ	49:07	93	0:39	11:04
B	0:00	0	0:00	0:00

To be continued on next page...

Project:
714068

Licensed user:
Pondera Consult B.V.
Welbergweg 49
NL-7556 PE Hengelo
0031742489940
Dion Oude Lansink / d.oudelansink@ponderaconsult.com
Calculated:
15-5-2015 15:17/3.0.578

SHADOW - Main Result

Calculation: Variant 2 - 16 x V110 op 135m

...continued from previous page

No.	Shadow, worst case		Max shadow hours per day [h/day]	Shadow, expected values	
	Shadow hours per year [h/year]	Shadow days per year [days/year]		Shadow hours per year [h/year]	
BA	57:50	110	0:51	12:57	
BB	58:44	109	0:52	13:09	
BC	57:32	108	0:53	12:52	
BD	55:25	97	0:43	12:27	
BE	67:18	117	0:55	15:02	
BF	153:05	310	0:55	28:20	
BG	55:41	107	0:43	12:34	
BH	68:42	140	0:47	15:24	
BI	10:46	36	0:26	2:23	
BJ	12:19	38	0:27	2:44	
BK	92:12	234	0:54	16:50	
BL	97:42	135	1:10	21:31	
BM	111:41	142	1:14	24:29	
BO	84:11	158	0:51	18:48	
BP	135:10	185	1:14	29:31	
BQ	46:49	114	0:39	10:19	
BR	97:18	168	0:53	21:24	
BT	296:49	324	1:41	56:00	
BU	7:50	30	0:23	1:34	
BV	165:20	193	1:22	35:42	
BW	20:34	70	0:29	4:19	
BX	289:46	211	2:04	58:28	
C	7:20	38	0:16	1:37	
CA	241:48	339	1:20	42:54	
CB	198:27	216	1:36	39:16	
CC	5:26	24	0:20	0:57	
CE	322:51	351	1:34	55:03	
CF	306:54	352	1:29	52:14	
CH	18:57	65	0:28	3:27	
CI	172:03	289	1:12	31:56	
CJ	122:42	177	1:31	22:20	
CM	16:48	62	0:26	3:17	
CO	271:29	337	1:28	49:41	
CP	25:48	73	0:31	4:15	
CQ	23:32	92	0:27	4:29	
CT	5:30	25	0:20	0:52	
CU	30:24	81	0:33	4:37	
CV	5:19	25	0:20	0:58	
CW	12:30	55	0:23	1:51	
CZ	23:09	78	0:27	2:55	
D	0:00	0	0:00	0:00	
DA	5:20	24	0:20	0:58	
DB	193:33	192	2:03	23:13	
DD	129:12	162	1:27	14:51	
DF	40:41	122	0:34	4:55	
DH	87:08	147	1:09	9:57	
DI	114:23	178	0:56	17:12	
DJ	128:16	180	1:10	19:23	
DK	21:06	69	0:28	3:48	
DL	75:37	141	0:46	8:51	
DM	5:53	27	0:21	1:05	
DO	47:15	128	0:34	5:23	
DP	84:30	156	0:55	12:37	
DQ	22:36	76	0:27	3:36	
DR	70:31	146	0:42	10:13	
DS	47:40	123	0:30	5:32	
DU	6:29	28	0:21	1:08	
DV	48:04	121	0:32	6:52	
DW	6:30	28	0:22	1:07	
DX	40:59	121	0:31	5:56	
DY	29:38	96	0:29	4:25	
DZ	16:28	64	0:25	2:39	
E	16:00	51	0:26	3:33	

To be continued on next page...

windPRO 3.0.619 by EMD International A/S, Tel. +45 96 35 44 44, www.emd.dk, windpro@emd.dk

8-6-2015 15:54 / 5



Project:
714068

Licensed user:
Pondera Consult B.V.
Welbergweg 49
NL-7556 PE Hengelo
0031742489940
Djon Oude Lansink / d.oudelansink@ponderaconsult.com
Calculated:
15-5-2015 15:17/3.0.578

SHADOW - Main Result

Calculation: Variant 2 - 16 x V110 op 135m

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No.	Shadow, worst case		Max shadow hours per day	Shadow, expected values	
	Shadow hours per year [h/year]	Shadow days per year [days/year]		Shadow hours per year [h/year]	
EA	18:43	70	0:26	2:57	
EB	14:28	62	0:24	2:22	
EC	10:58	42	0:24	1:08	
ED	26:36	102	0:27	3:08	
EE	28:55	104	0:26	3:19	
EF	7:00	32	0:21	1:00	
EG	20:26	70	0:28	2:18	
EH	21:55	76	0:23	2:22	
EI	9:48	36	0:21	0:56	
EJ	19:57	73	0:23	2:10	
EK	1:41	14	0:09	0:09	
EL	16:53	68	0:21	1:48	
EM	13:52	62	0:22	1:30	
EN	6:24	30	0:20	0:45	
EO	0:00	0	0:00	0:00	
EP	0:00	0	0:00	0:00	
EQ	0:00	0	0:00	0:00	
ER	0:00	0	0:00	0:00	
ES	0:00	0	0:00	0:00	
F	2:35	27	0:08	0:34	
G	1:38	22	0:06	0:21	
H	13:11	58	0:22	3:03	
I	19:32	77	0:23	4:26	
J	0:00	0	0:00	0:00	
K	9:40	42	0:21	2:15	
M	29:20	108	0:26	6:37	
N	51:17	70	0:54	9:34	
O	67:58	122	0:47	13:02	
P	22:22	76	0:29	4:28	
Q	11:03	37	0:26	2:13	
R	39:50	98	0:35	8:49	
T	40:35	97	0:38	8:12	
V	0:00	0	0:00	0:00	
X	0:00	0	0:00	0:00	
Y	0:00	0	0:00	0:00	
Z	0:05	5	0:01	0:01	

Total amount of flickering on the shadow receptors caused by each WTG
No. Name

No.	Name	Worst case [h/year]	Expected [h/year]
1	VESTAS V110-2.0 2000 110.0 !O! hub: 135,0 m (TOT: 190,0 m) (41)	206:12	36:29
2	VESTAS V110-2.0 2000 110.0 !O! hub: 135,0 m (TOT: 190,0 m) (42)	255:54	47:04
3	VESTAS V110-2.0 2000 110.0 !O! hub: 135,0 m (TOT: 190,0 m) (43)	797:43	134:59
4	VESTAS V110-2.0 2000 110.0 !O! hub: 135,0 m (TOT: 190,0 m) (44)	254:29	37:13
5	VESTAS V110-2.0 2000 110.0 !O! hub: 135,0 m (TOT: 190,0 m) (45)	250:27	44:24
6	VESTAS V110-2.0 2000 110.0 !O! hub: 135,0 m (TOT: 190,0 m) (46)	486:52	79:03
7	VESTAS V110-2.0 2000 110.0 !O! hub: 135,0 m (TOT: 190,0 m) (47)	1148:16	202:55
8	VESTAS V110-2.0 2000 110.0 !O! hub: 135,0 m (TOT: 190,0 m) (48)	212:00	32:25
9	VESTAS V110-2.0 2000 110.0 !O! hub: 135,0 m (TOT: 190,0 m) (49)	204:54	34:30
10	VESTAS V110-2.0 2000 110.0 !O! hub: 135,0 m (TOT: 190,0 m) (50)	445:54	83:26
11	VESTAS V110-2.0 2000 110.0 !O! hub: 135,0 m (TOT: 190,0 m) (51)	166:45	29:59
12	VESTAS V110-2.0 2000 110.0 !O! hub: 135,0 m (TOT: 190,0 m) (52)	235:37	45:25
13	VESTAS V110-2.0 2000 110.0 !O! hub: 135,0 m (TOT: 190,0 m) (53)	606:03	107:13
14	VESTAS V110-2.0 2000 110.0 !O! hub: 135,0 m (TOT: 190,0 m) (54)	158:30	29:04
15	VESTAS V110-2.0 2000 110.0 !O! hub: 135,0 m (TOT: 190,0 m) (55)	494:20	91:49
16	VESTAS V110-2.0 2000 110.0 !O! hub: 135,0 m (TOT: 190,0 m) (56)	625:27	114:11

Project:
714068

Licensed user:
Pondera Consult B.V.
Welbergweg 49
NL-7556 PE Hengelo
0031742489940
Dion Oude Lansink / d.oudelansink@ponderaconsult.com
Calculated:
15-5-2015 14:39/3.0.578

SHADOW - Main Result

Calculation: Variant 3 - 8 x N100 op 100m

Assumptions for shadow calculations

Maximum distance for influence 1. WTG distance circle radius
Minimum sun height over horizon for influence 5 °
Day step for calculation 1 days
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0,21	0,30	0,33	0,41	0,42	0,37	0,40	0,41	0,36	0,34	0,23	0,19

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
304	385	547	603	447	405	728	1.237	1.048	771	487	397	7.359

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: Elevation Grid Data Object: 714068_EMDGrid_0.wpg (1
Obstacles used in calculation
Eye height: 1,5 m
Grid resolution: 10,0 m

All coordinates are in
Dutch Stereo-RD/NAP 2000

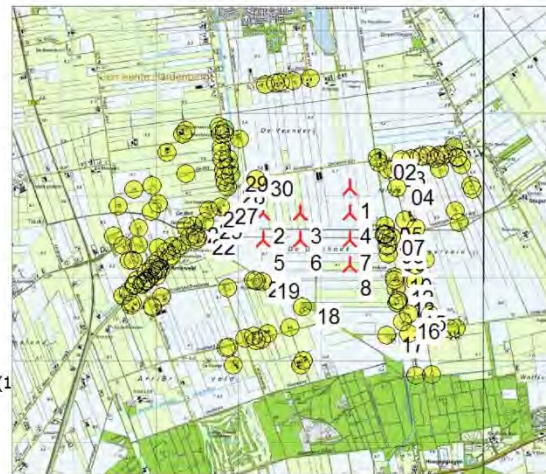
WTGs

X (east)	Y (north)	Z	Row data/Description	WTG type			Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Shadow data	
				Valid	Manufact.	Type-generator				Calculation distance [m]	RPM
1	228.369	510.087	4,5 NORDEX N100/2500 2500 99.8 !O! hub...	Yes	NORDEX	N100/2500-2.500	2.500	99,8	100,0	1.198	14,9
2	227.313	509.779	5,0 NORDEX N100/2500 2500 99.8 !O! hub...	Yes	NORDEX	N100/2500-2.500	2.500	99,8	100,0	1.198	14,9
3	227.765	509.779	3,0 NORDEX N100/2500 2500 99.8 !O! hub...	Yes	NORDEX	N100/2500-2.500	2.500	99,8	100,0	1.198	14,9
4	228.369	509.777	3,4 NORDEX N100/2500 2500 99.8 !O! hub...	Yes	NORDEX	N100/2500-2.500	2.500	99,8	100,0	1.198	14,9
5	227.313	509.457	4,8 NORDEX N100/2500 2500 99.8 !O! hub...	Yes	NORDEX	N100/2500-2.500	2.500	99,8	100,0	1.198	14,9
6	227.765	509.457	4,3 NORDEX N100/2500 2500 99.8 !O! hub...	Yes	NORDEX	N100/2500-2.500	2.500	99,8	100,0	1.198	14,9
7	228.369	509.457	4,0 NORDEX N100/2500 2500 99.8 !O! hub...	Yes	NORDEX	N100/2500-2.500	2.500	99,8	100,0	1.198	14,9
8	228.369	509.147	3,3 NORDEX N100/2500 2500 99.8 !O! hub...	Yes	NORDEX	N100/2500-2.500	2.500	99,8	100,0	1.198	14,9

Shadow receptor-Input

No.	X (east)	Y (north)	Z	Width [m]	Height [m]	Height a.g.l. [m]	Degrees from south cw [°]	Slope of window [°]	Direction mode
01	228.696	510.451	6,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
02	228.721	510.389	6,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
03	228.836	510.303	6,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
04	228.938	510.082	4,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
05	228.796	509.627	7,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
06	228.787	509.517	8,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
07	228.825	509.471	8,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
08	228.819	509.380	4,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
09	228.833	509.286	5,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
10	228.914	509.007	6,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
11	228.906	508.969	6,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
12	228.927	508.859	4,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
13	228.948	508.721	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
14	228.943	508.690	7,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
15	229.079	508.559	4,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
16	229.002	508.461	7,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
17	228.817	508.294	4,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
18	227.789	508.640	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
19	227.303	508.949	5,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
20	227.225	508.961	7,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
21	227.201	508.969	6,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
22	226.524	509.481	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
23	226.487	509.520	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"

To be continued on next page...



Scale 1:75.000
New WTG Shadow receptor

Project:
714068

Licensed user:
Pondera Consult B.V.
Welbergweg 49
NL-7556 PE Hengelo
0031742489940
Dion Oude Lansink / d.oudelansink@ponderaconsult.com
Calculated:
15-5-2015 14:39/3.0.578

SHADOW - Main Result

Calculation: Variant 3 - 8 x N100 op 100m

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No.	X (east)	Y (north)	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
24	226.458	509.626	6,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
25	226.603	509.674	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
26	226.658	509.820	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
27	226.793	509.857	5,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
28	226.879	510.092	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
29	226.919	510.246	8,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
30	227.225	510.187	4,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
A	229.172	507.810	9,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AC	228.959	508.723	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AD	226.081	508.770	6,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AE	225.615	508.777	7,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AF	225.675	508.821	6,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AH	226.879	508.867	7,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AI	225.746	508.899	6,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AJ	225.751	508.908	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AK	225.840	508.913	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AL	225.860	508.930	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AN	225.884	508.950	7,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AO	225.890	508.954	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AQ	225.784	508.963	5,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AR	229.169	508.964	4,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AU	229.138	508.970	5,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AV	225.926	508.991	6,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AX	226.025	509.011	7,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AY	225.973	509.040	8,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AZ	225.900	509.063	5,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
B	229.360	507.824	7,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BA	226.028	509.086	7,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BB	226.043	509.094	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BC	226.066	509.100	7,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BD	225.951	509.102	6,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BE	226.055	509.124	7,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BF	229.166	509.152	5,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BG	225.991	509.161	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BH	226.038	509.203	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BI	225.689	509.207	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BJ	225.738	509.211	7,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BK	229.282	509.214	5,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BL	226.168	509.228	6,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BM	226.207	509.266	5,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BO	226.141	509.307	8,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BP	226.268	509.351	8,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BQ	226.040	509.357	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BR	226.210	509.380	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BT	228.832	509.388	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BU	225.610	509.390	7,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BV	226.323	509.390	6,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BW	225.802	509.400	5,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BX	226.505	509.453	7,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
C	227.770	507.932	3,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CA	228.873	509.492	5,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CB	226.425	509.495	7,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CC	225.493	509.502	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CE	228.791	509.518	8,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CF	228.809	509.521	8,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CH	225.806	509.596	6,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CI	229.170	509.602	5,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CJ	226.372	509.622	4,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CM	229.698	509.662	5,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CO	229.034	509.695	3,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CP	225.958	509.804	5,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CQ	229.649	509.805	4,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CT	225.555	509.869	5,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CU	226.040	509.900	8,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"

To be continued on next page...

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714068

Licensed user:
Pondera Consult B.V.
Welbergweg 49
NL-7556 PE Hengelo
0031742489940
Dion Oude Lansink / d.oudelansink@ponderaconsult.com
Calculated:
15-5-2015 14:39/3.0.578

SHADOW - Main Result

Calculation: Variant 3 - 8 x N100 op 100m

...continued from previous page

No.	X (east)	Y (north)	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
CV	229.858	510.067	4,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CW	225.742	510.072	7,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CZ	225.962	510.116	6,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
D	226.952	507.939	7,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DA	229.836	510.117	5,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DB	226.857	510.150	8,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DD	226.848	510.232	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DF	226.373	510.261	7,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DH	226.838	510.310	6,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DI	228.980	510.315	4,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DJ	228.890	510.318	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DK	229.452	510.318	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DL	226.900	510.340	7,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DM	229.728	510.364	7,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DO	226.819	510.429	7,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DP	228.986	510.431	5,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DQ	229.411	510.438	5,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DR	229.111	510.440	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DS	226.895	510.441	8,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DU	229.681	510.451	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DV	229.205	510.459	6,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DW	229.680	510.459	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DX	229.247	510.465	6,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DY	229.319	510.484	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DZ	229.502	510.485	7,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
E	227.805	507.991	6,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EA	229.460	510.488	7,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EB	229.554	510.493	5,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EC	226.144	510.521	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
ED	226.806	510.525	8,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EE	226.804	510.583	6,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EF	229.632	510.586	3,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EG	227.031	510.681	5,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EH	226.793	510.735	10,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EI	226.341	510.739	7,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EJ	226.842	510.742	8,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EK	226.374	510.783	8,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EL	226.787	510.787	9,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EM	226.840	510.800	7,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EN	226.780	510.837	7,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EO	227.347	511.343	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EP	227.471	511.359	7,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EQ	227.524	511.364	6,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
ER	227.678	511.383	7,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
ES	227.884	511.412	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
F	226.869	508.148	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
G	226.896	508.158	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
H	227.229	508.234	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
I	227.290	508.253	6,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
J	227.091	508.260	6,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
K	227.201	508.293	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
M	227.368	508.317	7,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
N	229.088	508.317	6,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
O	229.296	508.358	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
P	229.577	508.378	4,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
Q	229.662	508.388	6,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
R	227.637	508.396	7,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
T	229.337	508.543	2,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
V	225.978	508.633	6,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
X	225.969	508.649	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
Y	225.702	508.665	6,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
Z	225.730	508.689	5,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"

Project:
714068

Licensed user:
Pondera Consult B.V.
Welbergweg 49
NL-7556 PE Hengelo
0031742489940
Dion Oude Lansink / d.oudelansink@ponderaconsult.com
Calculated:
15-5-2015 14:39/3.0.578

SHADOW - Main Result

Calculation: Variant 3 - 8 x N100 op 100m

Calculation Results

Shadow receptor

No.	Shadow, worst case		Max shadow hours per day [h/day]	Shadow, expected values
	Shadow hours per year [h/year]	Shadow days per year [days/year]		Shadow hours per year [h/year]
01	80:12	123	1:07	11:27
02	89:01	138	1:11	13:53
03	71:41	159	0:48	11:36
04	76:25	179	0:43	13:49
05	186:00	300	1:04	33:34
06	123:18	216	1:11	23:01
07	97:13	179	0:54	19:05
08	119:04	185	1:08	23:30
09	129:15	192	1:06	24:40
10	47:36	87	0:46	9:18
11	64:37	112	0:46	12:25
12	40:44	74	0:43	7:35
13	0:00	0	0:00	0:00
14	0:00	0	0:00	0:00
15	0:00	0	0:00	0:00
16	0:00	0	0:00	0:00
17	0:00	0	0:00	0:00
18	0:00	0	0:00	0:00
19	10:35	60	0:18	2:25
20	3:23	22	0:14	0:44
21	3:07	20	0:14	0:40
22	29:40	91	0:31	6:15
23	24:17	79	0:29	4:55
24	20:52	71	0:27	4:02
25	38:47	97	0:39	7:23
26	41:59	105	0:40	7:07
27	70:27	139	0:59	10:58
28	77:37	143	0:47	9:52
29	67:17	127	1:00	7:18
30	128:39	145	1:34	14:35
A	0:00	0	0:00	0:00
AC	0:00	0	0:00	0:00
AD	0:00	0	0:00	0:00
AE	0:00	0	0:00	0:00
AF	0:00	0	0:00	0:00
AH	6:39	43	0:13	1:28
AI	0:00	0	0:00	0:00
AJ	0:00	0	0:00	0:00
AK	0:00	0	0:00	0:00
AL	0:00	0	0:00	0:00
AN	0:00	0	0:00	0:00
AO	0:00	0	0:00	0:00
AQ	0:00	0	0:00	0:00
AR	24:15	93	0:30	4:35
AU	23:58	91	0:31	4:33
AV	0:00	0	0:00	0:00
AX	0:00	0	0:00	0:00
AY	0:00	0	0:00	0:00
AZ	0:00	0	0:00	0:00
B	0:00	0	0:00	0:00
BA	0:00	0	0:00	0:00
BB	0:00	0	0:00	0:00
BC	0:00	0	0:00	0:00
BD	0:00	0	0:00	0:00
BE	0:00	0	0:00	0:00
BF	31:26	97	0:30	6:14
BG	0:00	0	0:00	0:00
BH	0:00	0	0:00	0:00
BI	0:00	0	0:00	0:00
BJ	0:00	0	0:00	0:00
BK	24:33	113	0:25	4:39
BL	3:37	22	0:15	0:48

To be continued on next page...

Project:
714068

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Pondera Consult B.V.
Welbergweg 49
NL-7556 PE Hengelo
0031742489940
Dion Oude Lansink / d.oudelansink@ponderaconsult.com
Calculated:
15-5-2015 14:39/3.0.578

SHADOW - Main Result

Calculation: Variant 3 - 8 x N100 op 100m

...continued from previous page

No.	Shadow, worst case		Max shadow hours per day [h/day]	Shadow, expected values
	Shadow hours per year [h/year]	Shadow days per year [days/year]		Shadow hours per year [h/year]
BM	4:18	24	0:17	0:56
BO	3:00	22	0:13	0:38
BP	10:38	57	0:19	2:21
BQ	0:00	0	0:00	0:00
BR	8:56	52	0:17	1:56
BT	107:03	170	1:03	21:14
BU	0:00	0	0:00	0:00
BV	13:49	63	0:21	3:01
BW	0:00	0	0:00	0:00
BX	28:27	91	0:30	6:07
C	0:00	0	0:00	0:00
CA	104:20	205	0:53	20:04
CB	19:34	71	0:26	4:01
CC	0:00	0	0:00	0:00
CE	123:39	217	1:10	23:05
CF	123:52	222	1:08	23:10
CH	0:00	0	0:00	0:00
CI	46:00	164	0:30	8:41
CJ	15:31	61	0:24	3:00
CM	0:00	0	0:00	0:00
CO	73:01	196	0:38	13:36
CP	0:00	0	0:00	0:00
CQ	0:00	0	0:00	0:00
CT	0:00	0	0:00	0:00
CU	0:00	0	0:00	0:00
CV	0:00	0	0:00	0:00
CW	0:00	0	0:00	0:00
CZ	0:00	0	0:00	0:00
D	0:00	0	0:00	0:00
DA	0:00	0	0:00	0:00
DB	61:35	136	0:45	7:27
DD	46:10	129	0:40	5:13
DF	5:21	26	0:20	0:49
DH	43:52	116	0:37	4:43
DI	52:38	141	0:38	8:14
DJ	59:43	144	0:43	9:38
DK	3:48	22	0:17	0:42
DL	48:49	102	0:39	5:08
DM	0:00	0	0:00	0:00
DO	34:55	88	0:33	3:33
DP	35:13	104	0:36	5:39
DQ	4:09	23	0:18	0:45
DR	21:27	75	0:30	3:34
DS	27:30	78	0:32	2:48
DU	0:00	0	0:00	0:00
DV	14:16	62	0:26	2:26
DW	0:00	0	0:00	0:00
DX	11:58	56	0:24	2:03
DY	8:35	48	0:20	1:29
DZ	0:00	0	0:00	0:00
E	0:00	0	0:00	0:00
EA	2:59	20	0:14	0:33
EB	0:00	0	0:00	0:00
EC	0:00	0	0:00	0:00
ED	15:38	43	0:27	1:30
EE	6:59	28	0:19	0:39
EF	0:00	0	0:00	0:00
EG	11:17	44	0:20	1:03
EH	0:00	0	0:00	0:00
EI	0:00	0	0:00	0:00
EJ	0:00	0	0:00	0:00
EK	0:00	0	0:00	0:00
EL	0:00	0	0:00	0:00

To be continued on next page...

Project:
714068

Licensed user:
Pondera Consult B.V.
Welbergweg 49
NL-7556 PE Hengelo
0031742489940
Dion Oude Lansink / d.oudelansink@ponderaconsult.com
Calculated:
15-5-2015 14:39/3.0.578

SHADOW - Main Result

Calculation: Variant 3 - 8 x N100 op 100m

...continued from previous page

No.	Shadow, worst case		Max shadow hours per day [h/day]	Shadow, expected values	
	Shadow hours per year [h/year]	Shadow days per year [days/year]		Shadow hours per year [h/year]	
EM	0:00	0	0:00	0:00	
EN	0:00	0	0:00	0:00	
EO	0:00	0	0:00	0:00	
EP	0:00	0	0:00	0:00	
EQ	0:00	0	0:00	0:00	
ER	0:00	0	0:00	0:00	
ES	0:00	0	0:00	0:00	
F	0:00	0	0:00	0:00	
G	0:00	0	0:00	0:00	
H	0:00	0	0:00	0:00	
I	0:00	0	0:00	0:00	
J	0:00	0	0:00	0:00	
K	0:00	0	0:00	0:00	
M	0:00	0	0:00	0:00	
N	0:00	0	0:00	0:00	
O	0:00	0	0:00	0:00	
P	0:00	0	0:00	0:00	
Q	0:00	0	0:00	0:00	
R	0:00	0	0:00	0:00	
T	5:21	40	0:11	0:57	
V	0:00	0	0:00	0:00	
X	0:00	0	0:00	0:00	
Y	0:00	0	0:00	0:00	
Z	0:00	0	0:00	0:00	

Total amount of flickering on the shadow receptors caused by each WTG
No. Name

Worst case [h/year]	Expected [h/year]
210:11	37:05
310:00	43:16
100:50	15:54
254:51	43:14
126:50	18:40
74:07	11:08
330:32	62:12
307:02	55:33

1	NORDEX N100/2500 2500 99.8 !O! hub: 100,0 m (TOT: 149,9 m) (57)
2	NORDEX N100/2500 2500 99.8 !O! hub: 100,0 m (TOT: 149,9 m) (58)
3	NORDEX N100/2500 2500 99.8 !O! hub: 100,0 m (TOT: 149,9 m) (59)
4	NORDEX N100/2500 2500 99.8 !O! hub: 100,0 m (TOT: 149,9 m) (60)
5	NORDEX N100/2500 2500 99.8 !O! hub: 100,0 m (TOT: 149,9 m) (61)
6	NORDEX N100/2500 2500 99.8 !O! hub: 100,0 m (TOT: 149,9 m) (62)
7	NORDEX N100/2500 2500 99.8 !O! hub: 100,0 m (TOT: 149,9 m) (63)
8	NORDEX N100/2500 2500 99.8 !O! hub: 100,0 m (TOT: 149,9 m) (64)

Project:
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Welbergweg 49
NL-7556 PE Hengelo
0031742489940
Dion Oude Lansink / d.oudelansink@ponderaconsult.com
Calculated:
15-5-2015 17:09/3.0.578

SHADOW - Main Result

Calculation: Variant 4 - 15 x G90 op 80m

Assumptions for shadow calculations

Maximum distance for influence 1. WTG distance circle radius
Minimum sun height over horizon for influence 5 °
Day step for calculation 1 days
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0,21	0,30	0,33	0,41	0,42	0,37	0,40	0,41	0,36	0,34	0,23	0,19

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
304	385	547	603	447	405	728	1.237	1.048	771	487	397	7.359

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: Elevation Grid Data Object: 714068_EMDGrid_0.wpg (1
Obstacles used in calculation
Eye height: 1,5 m
Grid resolution: 10,0 m

All coordinates are in
Dutch Stereo-RD/NAP 2000

WTGs

X (east)	Y (north)	Z	Row data/Description	WTG type				Shadow data			
				Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM
1	227.309	509.874	5,1 GAMESA G90/2000 2000 90.0 !O! hub: ... Yes	Yes	GAMESA	G90/2000-2.000	2.000	90,0	80,0	1.080	16,7
2	227.727	509.872	4,0 GAMESA G90/2000 2000 90.0 !O! hub: ... Yes	Yes	GAMESA	G90/2000-2.000	2.000	90,0	80,0	1.080	16,7
3	228.047	509.871	3,4 GAMESA G90/2000 2000 90.0 !O! hub: ... Yes	Yes	GAMESA	G90/2000-2.000	2.000	90,0	80,0	1.080	16,7
4	228.367	509.870	3,4 GAMESA G90/2000 2000 90.0 !O! hub: ... Yes	Yes	GAMESA	G90/2000-2.000	2.000	90,0	80,0	1.080	16,7
5	227.308	509.554	4,7 GAMESA G90/2000 2000 90.0 !O! hub: ... Yes	Yes	GAMESA	G90/2000-2.000	2.000	90,0	80,0	1.080	16,7
6	227.726	509.552	5,3 GAMESA G90/2000 2000 90.0 !O! hub: ... Yes	Yes	GAMESA	G90/2000-2.000	2.000	90,0	80,0	1.080	16,7
7	228.046	509.551	3,9 GAMESA G90/2000 2000 90.0 !O! hub: ... Yes	Yes	GAMESA	G90/2000-2.000	2.000	90,0	80,0	1.080	16,7
8	228.366	509.550	4,0 GAMESA G90/2000 2000 90.0 !O! hub: ... Yes	Yes	GAMESA	G90/2000-2.000	2.000	90,0	80,0	1.080	16,7
9	227.307	509.234	4,9 GAMESA G90/2000 2000 90.0 !O! hub: ... Yes	Yes	GAMESA	G90/2000-2.000	2.000	90,0	80,0	1.080	16,7
10	227.725	509.232	4,0 GAMESA G90/2000 2000 90.0 !O! hub: ... Yes	Yes	GAMESA	G90/2000-2.000	2.000	90,0	80,0	1.080	16,7
11	228.045	509.231	3,0 GAMESA G90/2000 2000 90.0 !O! hub: ... Yes	Yes	GAMESA	G90/2000-2.000	2.000	90,0	80,0	1.080	16,7
12	228.365	509.230	1,7 GAMESA G90/2000 2000 90.0 !O! hub: ... Yes	Yes	GAMESA	G90/2000-2.000	2.000	90,0	80,0	1.080	16,7
13	227.724	508.912	3,4 GAMESA G90/2000 2000 90.0 !O! hub: ... Yes	Yes	GAMESA	G90/2000-2.000	2.000	90,0	80,0	1.080	16,7
14	228.044	508.911	4,5 GAMESA G90/2000 2000 90.0 !O! hub: ... Yes	Yes	GAMESA	G90/2000-2.000	2.000	90,0	80,0	1.080	16,7
15	228.364	508.910	4,3 GAMESA G90/2000 2000 90.0 !O! hub: ... Yes	Yes	GAMESA	G90/2000-2.000	2.000	90,0	80,0	1.080	16,7

Shadow receptor-Input

No.	X (east)	Y (north)	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
01	228.696	510.451	6,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
02	228.721	510.389	6,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
03	228.836	510.303	6,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
04	228.938	510.082	4,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
05	228.796	509.627	7,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
06	228.787	509.517	8,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
07	228.825	509.471	8,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
08	228.819	509.380	4,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
09	228.833	509.286	5,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
10	228.914	509.007	6,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
11	228.906	508.969	6,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
12	228.927	508.859	4,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
13	228.948	508.721	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
14	228.943	508.690	7,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
15	229.079	508.559	4,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
16	229.002	508.461	7,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"

To be continued on next page...

Project:
714068

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Pondera Consult B.V.
Welbergweg 49
NL-7556 PE Hengelo
0031742489940
Dion Oude Lansink / d.oudelansink@ponderaconsult.com
Calculated:
15-5-2015 17:09/3.0.578

SHADOW - Main Result

Calculation: Variant 4 - 15 x G90 op 80m

...continued from previous page

No.	X (east)	Y (north)	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
17	228.817	508.294	4,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
18	227.789	508.640	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
19	227.303	508.949	5,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
20	227.225	508.961	7,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
21	227.201	508.969	6,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
22	226.524	509.481	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
23	226.487	509.520	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
24	226.458	509.626	6,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
25	226.603	509.674	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
26	226.658	509.820	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
27	226.793	509.857	5,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
28	226.879	510.092	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
29	226.919	510.246	8,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
30	227.225	510.187	4,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
A	229.172	507.810	9,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AC	228.959	508.723	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AD	226.081	508.770	6,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AE	225.615	508.777	7,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AF	225.675	508.821	6,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AH	226.879	508.867	7,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AI	225.746	508.899	6,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AJ	225.751	508.908	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AK	225.840	508.913	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AL	225.860	508.930	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AN	225.884	508.950	7,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AO	225.890	508.954	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AQ	225.784	508.963	5,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AR	229.169	508.964	4,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AU	229.138	508.970	5,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AV	225.926	508.991	6,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AX	226.025	509.011	7,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AY	225.973	509.040	8,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AZ	225.900	509.063	5,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
B	229.360	507.824	7,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BA	226.028	509.086	7,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BB	226.043	509.094	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BC	226.066	509.100	7,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BD	225.951	509.102	6,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BE	226.055	509.124	7,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BF	229.166	509.152	5,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BG	225.991	509.161	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BH	226.038	509.203	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BI	225.689	509.207	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BJ	225.738	509.211	7,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BK	229.282	509.214	5,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BL	226.168	509.228	6,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BM	226.207	509.266	5,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BO	226.141	509.307	8,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BP	226.268	509.351	8,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BQ	226.040	509.357	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BR	226.210	509.380	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BT	228.832	509.388	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BU	225.610	509.390	7,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BV	226.323	509.390	6,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BW	225.802	509.400	5,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BX	226.505	509.453	7,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
C	227.770	507.932	3,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CA	228.873	509.492	5,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CB	226.425	509.495	7,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CC	225.493	509.502	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CE	228.791	509.518	8,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CF	228.809	509.521	8,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CH	225.806	509.596	6,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CI	229.170	509.602	5,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"

To be continued on next page...

Project:

714068

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Welbergweg 49

NL-7556 PE Hengelo

0031742489940

Dion Oude Lansink / d.oudelansink@ponderaconsult.com

Calculated:

15-5-2015 17:09/3.0.578

SHADOW - Main Result**Calculation:** Variant 4 - 15 x G90 op 80m

...continued from previous page

No.	X (east)	Y (north)	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
CJ	226.372	509.622	4,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CM	229.698	509.662	5,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CO	229.034	509.695	3,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CP	225.958	509.804	5,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CQ	229.649	509.805	4,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CT	225.555	509.869	5,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CU	226.040	509.900	8,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CV	229.858	510.067	4,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CW	225.742	510.072	7,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CZ	225.962	510.116	6,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
D	226.952	507.939	7,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DA	229.836	510.117	5,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DB	226.857	510.150	8,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DD	226.848	510.232	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DF	226.373	510.261	7,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DH	226.838	510.310	6,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DI	228.980	510.315	4,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DJ	228.890	510.318	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DK	229.452	510.318	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DL	226.900	510.340	7,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DM	229.728	510.364	7,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DO	226.819	510.429	7,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DP	228.986	510.431	5,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DQ	229.411	510.438	5,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DR	229.111	510.440	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DS	226.895	510.441	8,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DU	229.681	510.451	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DV	229.205	510.459	6,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DW	229.680	510.459	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DX	229.247	510.465	6,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DY	229.319	510.484	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DZ	229.502	510.485	7,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
E	227.805	507.991	6,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EA	229.460	510.488	7,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EB	229.554	510.493	5,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EC	226.144	510.521	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
ED	226.806	510.525	8,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EE	226.804	510.583	6,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EF	229.632	510.586	3,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EG	227.031	510.681	5,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EH	226.793	510.735	10,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EI	226.341	510.739	7,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EJ	226.842	510.742	8,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EK	226.374	510.783	8,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EL	226.787	510.787	9,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EM	226.840	510.800	7,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EN	226.780	510.837	7,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EO	227.347	511.343	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EP	227.471	511.359	7,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EQ	227.524	511.364	6,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
ER	227.678	511.383	7,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
ES	227.884	511.412	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
F	226.869	508.148	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
G	226.896	508.158	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
H	227.229	508.234	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
I	227.290	508.253	6,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
J	227.091	508.260	6,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
K	227.201	508.293	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
M	227.368	508.317	7,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
N	229.088	508.317	6,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
O	229.296	508.358	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
P	229.577	508.378	4,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
Q	229.662	508.388	6,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
R	227.637	508.396	7,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"

To be continued on next page...

Project:

714068

Licensed user:

Pondera Consult B.V.

Welbergweg 49

NL-7556 PE Hengelo

0031742489940

Dion Oude Lansink / d.oudelansink@ponderaconsult.com

Calculated:

15-5-2015 17:09/3.0.578

SHADOW - Main Result**Calculation:** Variant 4 - 15 x G90 op 80m

...continued from previous page

No.	X (east)	Y (north)	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
T	229.337	508.543	2,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
V	225.978	508.633	6,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
X	225.969	508.649	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
Y	225.702	508.665	6,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
Z	225.730	508.689	5,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"

Calculation Results

Shadow receptor

No.	Shadow, worst case			Shadow, expected values	
	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow hours per year [h/year]	
01	25:43	77	0:31	3:10	
02	48:13	99	0:49	6:06	
03	29:32	101	0:37	4:22	
04	37:13	113	0:43	6:19	
05	121:49	286	1:02	22:01	
06	129:09	289	0:54	23:38	
07	125:10	313	0:50	22:36	
08	152:02	287	1:01	27:47	
09	102:51	245	0:52	19:09	
10	76:51	173	0:46	14:40	
11	72:00	168	0:44	13:44	
12	37:23	132	0:40	7:23	
13	40:57	134	0:37	7:56	
14	42:37	127	0:38	8:15	
15	24:33	80	0:26	4:37	
16	4:18	43	0:11	0:50	
17	0:00	0	0:00	0:00	
18	40:33	95	0:37	9:10	
19	73:49	166	0:56	14:55	
20	79:48	171	0:48	16:39	
21	81:24	175	0:46	17:04	
22	26:05	113	0:24	5:23	
23	20:08	94	0:22	4:02	
24	16:52	84	0:20	3:09	
25	32:02	111	0:29	5:52	
26	37:25	124	0:33	6:08	
27	75:26	183	0:44	11:40	
28	74:27	150	0:48	9:43	
29	43:16	108	0:48	4:58	
30	157:55	149	1:42	18:07	
A	0:00	0	0:00	0:00	
AC	38:22	134	0:37	7:26	
AD	0:00	0	0:00	0:00	
AE	0:00	0	0:00	0:00	
AF	0:00	0	0:00	0:00	
AH	12:51	64	0:20	2:48	
AI	0:00	0	0:00	0:00	
AJ	0:00	0	0:00	0:00	
AK	0:00	0	0:00	0:00	
AL	0:00	0	0:00	0:00	
AN	0:00	0	0:00	0:00	
AO	0:00	0	0:00	0:00	
AQ	0:00	0	0:00	0:00	
AR	15:42	67	0:23	3:03	
AU	17:49	72	0:25	3:27	
AV	0:00	0	0:00	0:00	
AX	0:00	0	0:00	0:00	
AY	0:00	0	0:00	0:00	
AZ	0:00	0	0:00	0:00	
B	0:00	0	0:00	0:00	
BA	0:00	0	0:00	0:00	

To be continued on next page...

Project:
714068

Licensed user:
Pondera Consult B.V.
Welbergweg 49
NL-7556 PE Hengelo
0031742489940
Dion Oude Lansink / d.oudelansink@ponderaconsult.com
Calculated:
15-5-2015 17:09/3.0.578

SHADOW - Main Result

Calculation: Variant 4 - 15 x G90 op 80m

...continued from previous page

No.	Shadow, worst case		Shadow, expected values	
	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow hours per year [h/year]
BB	0:00	0	0:00	0:00
BC	0:00	0	0:00	0:00
BD	0:00	0	0:00	0:00
BE	0:00	0	0:00	0:00
BF	27:47	125	0:22	5:21
BG	0:00	0	0:00	0:00
BH	0:00	0	0:00	0:00
BI	0:00	0	0:00	0:00
BJ	0:00	0	0:00	0:00
BK	12:20	73	0:16	2:24
BL	0:00	0	0:00	0:00
BM	0:00	0	0:00	0:00
BO	0:00	0	0:00	0:00
BP	4:14	35	0:11	0:49
BQ	0:00	0	0:00	0:00
BR	0:00	0	0:00	0:00
BT	144:37	283	0:59	26:31
BU	0:00	0	0:00	0:00
BV	6:00	39	0:13	1:09
BW	0:00	0	0:00	0:00
BX	24:53	110	0:23	5:10
C	0:00	0	0:00	0:00
CA	92:36	268	0:45	16:51
CB	15:10	82	0:19	3:03
CC	0:00	0	0:00	0:00
CE	126:22	283	0:53	23:05
CF	115:33	270	0:51	21:00
CH	0:00	0	0:00	0:00
CI	23:47	115	0:23	4:26
CJ	11:34	68	0:17	2:09
CM	0:00	0	0:00	0:00
CO	49:41	188	0:35	8:58
CP	0:00	0	0:00	0:00
CQ	0:00	0	0:00	0:00
CT	0:00	0	0:00	0:00
CU	0:00	0	0:00	0:00
CV	0:00	0	0:00	0:00
CW	0:00	0	0:00	0:00
CZ	0:00	0	0:00	0:00
D	0:00	0	0:00	0:00
DA	0:00	0	0:00	0:00
DB	57:01	132	0:44	7:15
DD	38:28	112	0:40	4:41
DF	2:45	19	0:13	0:25
DH	27:46	84	0:37	3:07
DI	25:32	109	0:28	3:46
DJ	28:43	103	0:33	4:10
DK	0:00	0	0:00	0:00
DL	43:00	108	0:39	4:32
DM	0:00	0	0:00	0:00
DO	27:55	92	0:32	2:52
DP	11:34	56	0:25	1:32
DQ	0:00	0	0:00	0:00
DR	5:10	28	0:18	0:47
DS	30:54	80	0:35	3:06
DU	0:00	0	0:00	0:00
DV	2:54	21	0:14	0:27
DW	0:00	0	0:00	0:00
DX	2:13	18	0:11	0:22
DY	0:00	0	0:00	0:00
DZ	0:00	0	0:00	0:00
E	0:00	0	0:00	0:00
EA	0:00	0	0:00	0:00

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Project:
714068

Licensed user:
Pondera Consult B.V.
Welbergweg 49
NL-7556 PE Hengelo
0031742489940
Dion Oude Lansink / d.oudelansink@ponderaconsult.com
Calculated:
15-5-2015 17:09/3.0.578

SHADOW - Main Result

Calculation: Variant 4 - 15 x G90 op 80m

...continued from previous page

No.	Shadow, worst case			Shadow, expected values	
	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow hours per year [h/year]	
EB	0:00	0	0:00	0:00	
EC	0:00	0	0:00	0:00	
ED	19:03	50	0:28	1:49	
EE	10:23	35	0:23	0:59	
EF	0:00	0	0:00	0:00	
EG	7:58	44	0:15	0:45	
EH	0:00	0	0:00	0:00	
EI	0:00	0	0:00	0:00	
EJ	0:00	0	0:00	0:00	
EK	0:00	0	0:00	0:00	
EL	0:00	0	0:00	0:00	
EM	0:00	0	0:00	0:00	
EN	0:00	0	0:00	0:00	
EO	0:00	0	0:00	0:00	
EP	0:00	0	0:00	0:00	
EQ	0:00	0	0:00	0:00	
ER	0:00	0	0:00	0:00	
ES	0:00	0	0:00	0:00	
F	0:00	0	0:00	0:00	
G	0:00	0	0:00	0:00	
H	0:00	0	0:00	0:00	
I	0:00	0	0:00	0:00	
J	0:00	0	0:00	0:00	
K	0:00	0	0:00	0:00	
M	0:00	0	0:00	0:00	
N	0:00	0	0:00	0:00	
O	0:00	0	0:00	0:00	
P	0:00	0	0:00	0:00	
Q	0:00	0	0:00	0:00	
R	2:41	31	0:07	0:35	
T	4:04	28	0:14	0:48	
V	0:00	0	0:00	0:00	
X	0:00	0	0:00	0:00	
Y	0:00	0	0:00	0:00	
Z	0:00	0	0:00	0:00	

Total amount of flickering on the shadow receptors caused by each WTG
No. Name

		Worst case [h/year]	Expected [h/year]
1	GAMESA G90/2000 2000 90.0 !O! hub: 80,0 m (TOT: 125,0 m) (65)	297:42	41:04
2	GAMESA G90/2000 2000 90.0 !O! hub: 80,0 m (TOT: 125,0 m) (66)	49:00	7:09
3	GAMESA G90/2000 2000 90.0 !O! hub: 80,0 m (TOT: 125,0 m) (67)	71:26	12:50
4	GAMESA G90/2000 2000 90.0 !O! hub: 80,0 m (TOT: 125,0 m) (68)	150:03	24:01
5	GAMESA G90/2000 2000 90.0 !O! hub: 80,0 m (TOT: 125,0 m) (69)	99:15	14:17
6	GAMESA G90/2000 2000 90.0 !O! hub: 80,0 m (TOT: 125,0 m) (70)	37:26	4:28
7	GAMESA G90/2000 2000 90.0 !O! hub: 80,0 m (TOT: 125,0 m) (71)	61:43	11:12
8	GAMESA G90/2000 2000 90.0 !O! hub: 80,0 m (TOT: 125,0 m) (72)	236:48	43:57
9	GAMESA G90/2000 2000 90.0 !O! hub: 80,0 m (TOT: 125,0 m) (73)	58:10	7:15
10	GAMESA G90/2000 2000 90.0 !O! hub: 80,0 m (TOT: 125,0 m) (74)	53:45	12:11
11	GAMESA G90/2000 2000 90.0 !O! hub: 80,0 m (TOT: 125,0 m) (75)	71:39	14:09
12	GAMESA G90/2000 2000 90.0 !O! hub: 80,0 m (TOT: 125,0 m) (76)	206:42	38:04
13	GAMESA G90/2000 2000 90.0 !O! hub: 80,0 m (TOT: 125,0 m) (77)	50:16	9:25
14	GAMESA G90/2000 2000 90.0 !O! hub: 80,0 m (TOT: 125,0 m) (78)	55:23	9:58
15	GAMESA G90/2000 2000 90.0 !O! hub: 80,0 m (TOT: 125,0 m) (79)	246:44	44:52

Project:
714068

Licensed user:
Pondera Consult B.V.
Welbergweg 49
NL-7556 PE Hengelo
0031742489940
Dion Oude Lansink / d.oudelansink@ponderaconsult.com
Calculated:
3-6-2015 15:13/3.0.619

SHADOW - Main Result

Calculation: Variant 5 - 10 x V110 op 99m

Assumptions for shadow calculations

Maximum distance for influence 1. WTG distance circle radius
Minimum sun height over horizon for influence 5 °
Day step for calculation 1 days
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0,21	0,30	0,33	0,41	0,42	0,37	0,40	0,41	0,36	0,34	0,23	0,19

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
304	385	547	603	447	405	728	1.237	1.048	771	487	397	7.359

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: Elevation Grid Data Object: 714068_EMDGrid_0.wpg (1
Obstacles used in calculation
Eye height: 1,5 m
Grid resolution: 10,0 m

All coordinates are in
Dutch Stereo-RD/NAP 2000

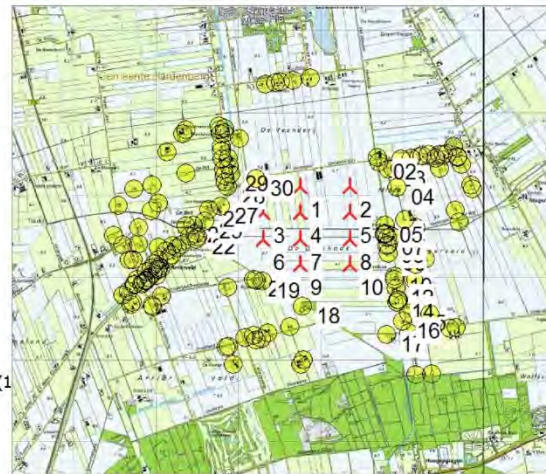
WTGs

X (east)	Y (north)	Z	Row data/Description	WTG type				Shadow data			
				Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM
1	227.765	510.093	4,0 VESTAS V110-2.0 2000 110.0 !O! hub: ... Yes	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	99,0	1.320	0,0
2	228.362	510.093	4,5 VESTAS V110-2.0 2000 110.0 !O! hub: ... Yes	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	99,0	1.320	0,0
3	227.313	509.779	5,0 VESTAS V110-2.0 2000 110.0 !O! hub: ... Yes	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	99,0	1.320	0,0
4	227.765	509.779	3,0 VESTAS V110-2.0 2000 110.0 !O! hub: ... Yes	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	99,0	1.320	0,0
5	228.362	509.777	3,5 VESTAS V110-2.0 2000 110.0 !O! hub: ... Yes	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	99,0	1.320	0,0
6	227.313	509.457	4,8 VESTAS V110-2.0 2000 110.0 !O! hub: ... Yes	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	99,0	1.320	0,0
7	227.765	509.457	4,3 VESTAS V110-2.0 2000 110.0 !O! hub: ... Yes	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	99,0	1.320	0,0
8	228.363	509.457	4,0 VESTAS V110-2.0 2000 110.0 !O! hub: ... Yes	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	99,0	1.320	0,0
9	227.765	509.147	4,0 VESTAS V110-2.0 2000 110.0 !O! hub: ... Yes	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	99,0	1.320	0,0
10	228.363	509.147	3,4 VESTAS V110-2.0 2000 110.0 !O! hub: ... Yes	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	99,0	1.320	0,0

Shadow receptor-Input

No.	X (east)	Y (north)	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
01	228.696	510.451	6,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
02	228.721	510.389	6,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
03	228.836	510.303	6,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
04	228.938	510.082	4,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
05	228.796	509.627	7,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
06	228.787	509.517	8,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
07	228.825	509.471	8,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
08	228.819	509.380	4,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
09	228.833	509.286	5,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
10	228.914	509.007	6,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
11	228.906	508.969	6,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
12	228.927	508.859	4,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
13	228.948	508.721	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
14	228.943	508.690	7,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
15	229.079	508.559	4,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
16	229.002	508.461	7,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
17	228.817	508.294	4,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
18	227.789	508.640	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
19	227.303	508.949	5,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
20	227.225	508.961	7,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
21	227.201	508.969	6,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"

To be continued on next page...



Scale 1:75.000
New WTG Shadow receptor

Project:

714068

Licensed user:

Pondera Consult B.V.

Welbergweg 49

NL-7556 PE Hengelo

0031742489940

Dion Oude Lansink / d.oudelansink@ponderaconsult.com

Calculated:

3-6-2015 15:13/3.0.619

SHADOW - Main Result**Calculation:** Variant 5 - 10 x V110 op 99m

...continued from previous page

No.	X (east)	Y (north)	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
22	226.524	509.481	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
23	226.487	509.520	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
24	226.458	509.626	6,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
25	226.603	509.674	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
26	226.658	509.820	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
27	226.793	509.857	5,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
28	226.879	510.092	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
29	226.919	510.246	8,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
30	227.225	510.187	4,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
A	229.172	507.810	9,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AC	228.959	508.723	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AD	226.081	508.770	6,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AE	225.615	508.777	7,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AF	225.675	508.821	6,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AH	226.879	508.867	7,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AI	225.746	508.899	6,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AJ	225.751	508.908	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AK	225.840	508.913	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AL	225.860	508.930	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AN	225.884	508.950	7,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AO	225.890	508.954	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AQ	225.784	508.963	5,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AR	229.169	508.964	4,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AU	229.138	508.970	5,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AV	225.926	508.991	6,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AX	226.025	509.011	7,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AY	225.973	509.040	8,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AZ	225.900	509.063	5,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
B	229.360	507.824	7,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BA	226.028	509.086	7,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BB	226.043	509.094	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BC	226.066	509.100	7,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BD	225.951	509.102	6,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BE	226.055	509.124	7,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BF	229.166	509.152	5,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BG	225.991	509.161	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BH	226.038	509.203	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BI	225.689	509.207	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BJ	225.738	509.211	7,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BK	229.282	509.214	5,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BL	226.168	509.228	6,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BM	226.207	509.266	5,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BO	226.141	509.307	8,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BP	226.268	509.351	8,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BQ	226.040	509.357	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BR	226.210	509.380	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BT	228.832	509.388	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BU	225.610	509.390	7,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BV	226.323	509.390	6,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BW	225.802	509.400	5,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BX	226.505	509.453	7,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
C	227.770	507.932	3,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CA	228.873	509.492	5,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CB	226.425	509.495	7,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CC	225.493	509.502	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CE	228.791	509.518	8,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CF	228.809	509.521	8,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CH	225.806	509.596	6,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CI	229.170	509.602	5,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CJ	226.372	509.622	4,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CM	229.698	509.662	5,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CO	229.034	509.695	3,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CP	225.958	509.804	5,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CQ	229.649	509.805	4,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"

To be continued on next page...

Project:
714068

Licensed user:
Pondera Consult B.V.
Welbergweg 49
NL-7556 PE Hengelo
0031742489940
Dion Oude Lansink / d.oudelansink@ponderaconsult.com
Calculated:
3-6-2015 15:13/3.0.619

SHADOW - Main Result

Calculation: Variant 5 - 10 x V110 op 99m

...continued from previous page

No.	X (east)	Y (north)	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
CT	225.555	509.869	5,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CU	226.040	509.900	8,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CV	229.858	510.067	4,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CW	225.742	510.072	7,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CZ	225.962	510.116	6,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
D	226.952	507.939	7,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DA	229.836	510.117	5,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DB	226.857	510.150	8,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DD	226.848	510.232	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DF	226.373	510.261	7,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DH	226.838	510.310	6,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DI	228.980	510.315	4,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DJ	228.890	510.318	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DK	229.452	510.318	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DL	226.900	510.340	7,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DM	229.728	510.364	7,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DO	226.819	510.429	7,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DP	228.986	510.431	5,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DQ	229.411	510.438	5,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DR	229.111	510.440	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DS	226.895	510.441	8,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DU	229.681	510.451	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DV	229.205	510.459	6,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DW	229.680	510.459	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DX	229.247	510.465	6,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DY	229.319	510.484	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DZ	229.502	510.485	7,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
E	227.805	507.991	6,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EA	229.460	510.488	7,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EB	229.554	510.493	5,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EC	226.144	510.521	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
ED	226.806	510.525	8,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EE	226.804	510.583	6,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EF	229.632	510.586	3,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EG	227.031	510.681	5,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EH	226.793	510.735	10,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EI	226.341	510.739	7,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EJ	226.842	510.742	8,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EK	226.374	510.783	8,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EL	226.787	510.787	9,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EM	226.840	510.800	7,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EN	226.780	510.837	7,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EO	227.347	511.343	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EP	227.471	511.359	7,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EQ	227.524	511.364	6,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
ER	227.678	511.383	7,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
ES	227.884	511.412	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
F	226.869	508.148	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
G	226.896	508.158	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
H	227.229	508.234	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
I	227.290	508.253	6,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
J	227.091	508.260	6,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
K	227.201	508.293	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
M	227.368	508.317	7,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
N	229.088	508.317	6,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
O	229.296	508.358	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
P	229.577	508.378	4,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
Q	229.662	508.388	6,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
R	227.637	508.396	7,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
T	229.337	508.543	2,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
V	225.978	508.633	6,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
X	225.969	508.649	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
Y	225.702	508.665	6,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
Z	225.730	508.689	5,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"

Project:
714068

Licensed user:
Pondera Consult B.V.
Welbergweg 49
NL-7556 PE Hengelo
0031742489940
Dion Oude Lansink / d.oudelansink@ponderaconsult.com
Calculated:
3-6-2015 15:13/3.0.619

SHADOW - Main Result

Calculation: Variant 5 - 10 x V110 op 99m

Calculation Results

Shadow receptor

No.	Shadow, worst case		Shadow, expected values	
	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow hours per year [h/year]
01	101:15	156	1:13	14:55
02	110:11	166	1:17	17:30
03	87:52	166	0:56	14:18
04	90:49	217	0:47	16:22
05	214:16	325	1:15	38:51
06	148:40	266	1:13	27:52
07	119:13	230	0:59	23:17
08	140:58	212	1:12	27:45
09	149:11	204	1:10	28:29
10	61:58	114	1:00	12:08
11	78:13	139	1:00	15:04
12	49:52	104	0:47	9:20
13	3:38	25	0:13	0:43
14	3:35	26	0:12	0:42
15	0:00	0	0:00	0:00
16	0:00	0	0:00	0:00
17	0:00	0	0:00	0:00
18	0:00	0	0:00	0:00
19	89:23	128	1:00	19:58
20	76:21	142	0:59	16:55
21	59:38	122	0:58	13:19
22	39:02	137	0:33	8:09
23	30:14	101	0:31	6:11
24	25:47	83	0:33	4:58
25	50:32	140	0:43	9:40
26	53:34	141	0:43	9:20
27	89:23	185	1:01	14:28
28	106:03	188	0:52	13:59
29	86:08	165	1:05	10:01
30	185:59	208	1:42	23:28
A	0:00	0	0:00	0:00
AC	4:18	43	0:12	0:50
AD	0:00	0	0:00	0:00
AE	0:00	0	0:00	0:00
AF	0:00	0	0:00	0:00
AH	19:40	88	0:27	4:24
AI	0:00	0	0:00	0:00
AJ	0:00	0	0:00	0:00
AK	0:00	0	0:00	0:00
AL	0:00	0	0:00	0:00
AN	0:00	0	0:00	0:00
AO	0:00	0	0:00	0:00
AQ	0:00	0	0:00	0:00
AR	27:54	100	0:33	5:16
AU	27:46	98	0:34	5:16
AV	0:00	0	0:00	0:00
AX	0:00	0	0:00	0:00
AY	0:00	0	0:00	0:00
AZ	0:00	0	0:00	0:00
B	0:00	0	0:00	0:00
BA	0:00	0	0:00	0:00
BB	0:00	0	0:00	0:00
BC	2:34	21	0:11	0:34
BD	0:00	0	0:00	0:00
BE	2:27	20	0:11	0:32
BF	35:26	104	0:32	7:01
BG	0:00	0	0:00	0:00
BH	2:30	20	0:11	0:33
BI	0:00	0	0:00	0:00
BJ	0:00	0	0:00	0:00
BK	28:21	122	0:26	5:23
BL	8:53	57	0:16	2:01

To be continued on next page...

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714068

Licensed user:
Pondera Consult B.V.
Welbergweg 49
NL-7556 PE Hengelo
0031742489940
Dion Oude Lansink / d.oudelansink@ponderaconsult.com
Calculated:
3-6-2015 15:13/3.0.619

SHADOW - Main Result

Calculation: Variant 5 - 10 x V110 op 99m

...continued from previous page

No.	Shadow, worst case		Max shadow hours per day [h/day]	Shadow, expected values
	Shadow hours per year [h/year]	Shadow days per year [days/year]		Shadow hours per year [h/year]
BM	10:40	59	0:18	2:25
BO	7:14	48	0:15	1:36
BP	12:32	62	0:20	2:46
BQ	2:30	18	0:12	0:30
BR	10:33	56	0:19	2:17
BT	127:18	207	1:07	25:10
BU	0:00	0	0:00	0:00
BV	16:10	69	0:23	3:32
BW	0:00	0	0:00	0:00
BX	37:06	134	0:32	7:52
C	0:00	0	0:00	0:00
CA	122:39	238	0:55	23:36
CB	22:32	79	0:28	4:38
CC	0:00	0	0:00	0:00
CE	148:18	265	1:13	27:48
CF	146:20	264	1:10	27:29
CH	0:00	0	0:00	0:00
CI	50:59	173	0:32	9:38
CJ	17:52	68	0:25	3:27
CM	0:00	0	0:00	0:00
CO	83:31	215	0:41	15:36
CP	0:00	0	0:00	0:00
CQ	4:30	36	0:11	0:52
CT	0:00	0	0:00	0:00
CU	2:10	17	0:11	0:22
CV	0:00	0	0:00	0:00
CW	0:00	0	0:00	0:00
CZ	0:00	0	0:00	0:00
D	0:00	0	0:00	0:00
DA	0:00	0	0:00	0:00
DB	80:26	179	0:49	10:15
DD	65:20	166	0:53	7:50
DF	10:35	54	0:21	1:23
DH	61:11	151	0:54	7:01
DI	62:59	150	0:43	9:58
DJ	73:35	165	0:49	11:56
DK	7:30	44	0:18	1:23
DL	71:18	145	0:54	8:03
DM	0:00	0	0:00	0:00
DO	46:03	122	0:37	5:06
DP	43:24	138	0:39	6:59
DQ	7:57	44	0:19	1:27
DR	34:02	120	0:32	5:12
DS	48:02	116	0:43	5:21
DU	0:00	0	0:00	0:00
DV	22:49	114	0:27	3:34
DW	0:00	0	0:00	0:00
DX	13:41	60	0:25	2:21
DY	9:53	51	0:21	1:43
DZ	2:59	20	0:15	0:32
E	0:00	0	0:00	0:00
EA	5:42	39	0:15	1:02
EB	2:34	18	0:13	0:28
EC	0:00	0	0:00	0:00
ED	28:31	99	0:30	3:10
EE	19:15	84	0:22	2:12
EF	0:00	0	0:00	0:00
EG	25:23	88	0:28	2:39
EH	4:13	25	0:17	0:33
EI	0:00	0	0:00	0:00
EJ	5:25	28	0:19	0:40
EK	0:00	0	0:00	0:00
EL	3:59	24	0:16	0:29

To be continued on next page...

Project:
714068

Licensed user:
Pondera Consult B.V.
Welbergweg 49
NL-7556 PE Hengelo
0031742489940
Dion Oude Lansink / d.oudelansink@ponderaconsult.com
Calculated:
3-6-2015 15:13/3.0.619

SHADOW - Main Result

Calculation: Variant 5 - 10 x V110 op 99m

...continued from previous page

No.	Shadow, worst case		Max shadow hours per day [h/day]	Shadow, expected values	
	Shadow hours per year [h/year]	Shadow days per year [days/year]		Shadow hours per year [h/year]	
EM	5:12	28	0:19	0:36	
EN	3:53	24	0:16	0:27	
EO	0:00	0	0:00	0:00	
EP	0:00	0	0:00	0:00	
EQ	0:00	0	0:00	0:00	
ER	0:00	0	0:00	0:00	
ES	0:00	0	0:00	0:00	
F	0:00	0	0:00	0:00	
G	0:00	0	0:00	0:00	
H	0:00	0	0:00	0:00	
I	0:00	0	0:00	0:00	
J	0:00	0	0:00	0:00	
K	0:00	0	0:00	0:00	
M	0:00	0	0:00	0:00	
N	0:00	0	0:00	0:00	
O	0:00	0	0:00	0:00	
P	0:00	0	0:00	0:00	
Q	0:00	0	0:00	0:00	
R	0:00	0	0:00	0:00	
T	6:33	44	0:13	1:10	
V	0:00	0	0:00	0:00	
X	0:00	0	0:00	0:00	
Y	0:00	0	0:00	0:00	
Z	0:00	0	0:00	0:00	

Total amount of flickering on the shadow receptors caused by each WTG
No. Name

	Worst case [h/year]	Expected [h/year]
1 VESTAS V110-2.0 2000 110.0 !O! hub: 99,0 m (TOT: 154,0 m) (112)	137:25	24:02
2 VESTAS V110-2.0 2000 110.0 !O! hub: 99,0 m (TOT: 154,0 m) (113)	233:48	41:29
3 VESTAS V110-2.0 2000 110.0 !O! hub: 99,0 m (TOT: 154,0 m) (114)	343:37	48:34
4 VESTAS V110-2.0 2000 110.0 !O! hub: 99,0 m (TOT: 154,0 m) (115)	124:09	20:02
5 VESTAS V110-2.0 2000 110.0 !O! hub: 99,0 m (TOT: 154,0 m) (116)	283:37	48:06
6 VESTAS V110-2.0 2000 110.0 !O! hub: 99,0 m (TOT: 154,0 m) (117)	144:43	21:23
7 VESTAS V110-2.0 2000 110.0 !O! hub: 99,0 m (TOT: 154,0 m) (118)	109:47	16:43
8 VESTAS V110-2.0 2000 110.0 !O! hub: 99,0 m (TOT: 154,0 m) (119)	359:03	67:19
9 VESTAS V110-2.0 2000 110.0 !O! hub: 99,0 m (TOT: 154,0 m) (120)	156:30	31:58
10 VESTAS V110-2.0 2000 110.0 !O! hub: 99,0 m (TOT: 154,0 m) (121)	325:47	58:59

Project:
714068

Licensed user:
Pondera Consult B.V.
Welbergweg 49
NL-7556 PE Hengelo
0031742489940
Dion Oude Lansink / d.oudelansink@ponderaconsult.com
Calculated:
15-5-2015 13:04/3.0.578

SHADOW - Main Result

Calculation: Variant 5 - 10 x V110 op 100m

Assumptions for shadow calculations

Maximum distance for influence 1. WTG distance circle radius
Minimum sun height over horizon for influence 5 °
Day step for calculation 1 days
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0,21	0,30	0,33	0,41	0,42	0,37	0,40	0,41	0,36	0,34	0,23	0,19

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
304	385	547	603	447	405	728	1.237	1.048	771	487	397	7.359

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: Elevation Grid Data Object: 714068_EMDGrid_0.wpg (1
Obstacles used in calculation
Eye height: 1,5 m
Grid resolution: 10,0 m

All coordinates are in
Dutch Stereo-RD/NAP 2000

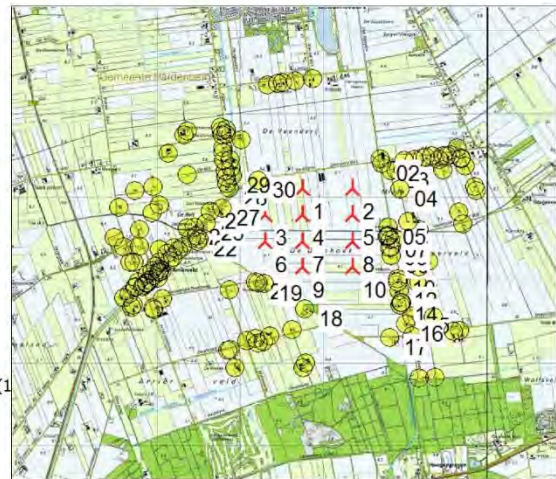
WTGs

X (east)	Y (north)	Z	Row data/Description	WTG type					Shadow data		
				Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM [RPM]
1	227.765	510.093	4,0 VESTAS V110-2.0 2000 110.0 !O! hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	100,0	1.320	0,0
2	228.362	510.093	4,5 VESTAS V110-2.0 2000 110.0 !O! hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	100,0	1.320	0,0
3	227.313	509.779	5,0 VESTAS V110-2.0 2000 110.0 !O! hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	100,0	1.320	0,0
4	227.765	509.779	3,0 VESTAS V110-2.0 2000 110.0 !O! hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	100,0	1.320	0,0
5	228.362	509.777	3,5 VESTAS V110-2.0 2000 110.0 !O! hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	100,0	1.320	0,0
6	227.313	509.457	4,8 VESTAS V110-2.0 2000 110.0 !O! hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	100,0	1.320	0,0
7	227.765	509.457	4,3 VESTAS V110-2.0 2000 110.0 !O! hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	100,0	1.320	0,0
8	228.363	509.457	4,0 VESTAS V110-2.0 2000 110.0 !O! hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	100,0	1.320	0,0
9	227.765	509.147	4,0 VESTAS V110-2.0 2000 110.0 !O! hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	100,0	1.320	0,0
10	228.363	509.147	3,4 VESTAS V110-2.0 2000 110.0 !O! hub: ...	Yes	VESTAS	V110-2.0-2.000	2.000	110,0	100,0	1.320	0,0

Shadow receptor-Input

No.	X (east)	Y (north)	Z	Width [m]	Height [m]	Height a.g.l. [m]	Degrees from south cw [°]	Slope of window [°]	Direction mode
01	228.696	510.451	6,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
02	228.721	510.389	6,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
03	228.836	510.303	6,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
04	228.938	510.082	4,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
05	228.796	509.627	7,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
06	228.787	509.517	8,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
07	228.825	509.471	8,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
08	228.819	509.380	4,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
09	228.833	509.286	5,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
10	228.914	509.007	6,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
11	228.906	508.969	6,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
12	228.927	508.859	4,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
13	228.948	508.721	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
14	228.943	508.690	7,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
15	229.079	508.559	4,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
16	229.002	508.461	7,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
17	228.817	508.294	4,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
18	227.789	508.640	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
19	227.303	508.949	5,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
20	227.225	508.961	7,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
21	227.201	508.969	6,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"

To be continued on next page...



▲ New WTG

● Shadow receptor

Project:
714068

Licensed user:
Pondera Consult B.V.
Welbergweg 49
NL-7556 PE Hengelo
0031742489940
Dion Oude Lansink / d.oudelansink@ponderaconsult.com
Calculated:
15-5-2015 13:04/3.0.578

SHADOW - Main Result

Calculation: Variant 5 - 10 x V110 op 100m

...continued from previous page

No.	X (east)	Y (north)	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
22	226.524	509.481	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
23	226.487	509.520	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
24	226.458	509.626	6,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
25	226.603	509.674	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
26	226.658	509.820	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
27	226.793	509.857	5,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
28	226.879	510.092	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
29	226.919	510.246	8,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
30	227.225	510.187	4,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
A	229.172	507.810	9,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AC	228.959	508.723	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AD	226.081	508.770	6,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AE	225.615	508.777	7,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AF	225.675	508.821	6,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AH	226.879	508.867	7,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AI	225.746	508.899	6,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AJ	225.751	508.908	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AK	225.840	508.913	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AL	225.860	508.930	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AN	225.884	508.950	7,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AQ	225.890	508.954	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AQ	225.784	508.963	5,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AR	229.169	508.964	4,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AU	229.138	508.970	5,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AV	225.926	508.991	6,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AX	226.025	509.011	7,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AY	225.973	509.040	8,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
AZ	225.900	509.063	5,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
B	229.360	507.824	7,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BA	226.028	509.086	7,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BB	226.043	509.094	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BC	226.066	509.100	7,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BD	225.951	509.102	6,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BE	226.055	509.124	7,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BF	229.166	509.152	5,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BG	225.991	509.161	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BH	226.038	509.203	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BI	225.689	509.207	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BJ	225.738	509.211	7,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BK	229.282	509.214	5,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BL	226.168	509.228	6,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BM	226.207	509.266	5,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BO	226.141	509.307	8,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BP	226.268	509.351	8,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BQ	226.040	509.357	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BR	226.210	509.380	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BT	228.832	509.388	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BU	225.610	509.390	7,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BV	226.323	509.390	6,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BW	225.802	509.400	5,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
BX	226.505	509.453	7,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
C	227.770	507.932	3,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CA	228.873	509.492	5,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CB	226.425	509.495	7,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CC	225.493	509.502	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CE	228.791	509.518	8,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CF	228.809	509.521	8,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CH	225.806	509.596	6,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CI	229.170	509.602	5,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CJ	226.372	509.622	4,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CM	229.698	509.662	5,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CO	229.034	509.695	3,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CP	225.958	509.804	5,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CQ	229.649	509.805	4,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"

To be continued on next page...

Project:
714068

Licensed user:
Pondera Consult B.V.
Welbergweg 49
NL-7556 PE Hengelo
0031742489940
Dion Oude Lansink / d.oudelansink@ponderaconsult.com
Calculated:
15-5-2015 13:04/3.0.578

SHADOW - Main Result

Calculation: Variant 5 - 10 x V110 op 100m

...continued from previous page

No.	X (east)	Y (north)	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
CT	225.555	509.869	5,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CU	226.040	509.900	8,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CV	229.858	510.067	4,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CW	225.742	510.072	7,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
CZ	225.962	510.116	6,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
D	226.952	507.939	7,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DA	229.836	510.117	5,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DB	226.857	510.150	8,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DD	226.848	510.232	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DF	226.373	510.261	7,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DH	226.838	510.310	6,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DI	228.980	510.315	4,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DJ	228.890	510.318	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DK	229.452	510.318	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DL	226.900	510.340	7,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DM	229.728	510.364	7,6	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DO	226.819	510.429	7,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DP	228.986	510.431	5,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DQ	229.411	510.438	5,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DR	229.111	510.440	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DS	226.895	510.441	8,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DU	229.681	510.451	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DV	229.205	510.459	6,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DW	229.680	510.459	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DX	229.247	510.465	6,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DY	229.319	510.484	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
DZ	229.502	510.485	7,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
E	227.805	507.991	6,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EA	229.460	510.488	7,7	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EB	229.554	510.493	5,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EC	226.144	510.521	8,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
ED	226.806	510.525	8,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EE	226.804	510.583	6,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EF	229.632	510.586	3,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EG	227.031	510.681	5,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EH	226.793	510.735	10,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EI	226.341	510.739	7,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EJ	226.842	510.742	8,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EK	226.374	510.783	8,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EL	226.787	510.787	9,8	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EM	226.840	510.800	7,2	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EN	226.780	510.837	7,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EO	227.347	511.343	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EP	227.471	511.359	7,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
EQ	227.524	511.364	6,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
ER	227.678	511.383	7,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
ES	227.884	511.412	7,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
F	226.869	508.148	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
G	226.896	508.158	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
H	227.229	508.234	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
I	227.290	508.253	6,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
J	227.091	508.260	6,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
K	227.201	508.293	6,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
M	227.368	508.317	7,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
N	229.088	508.317	6,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
O	229.296	508.358	5,0	8,0	4,5	0,5	0,0	90,0	"Green house mode"
P	229.577	508.378	4,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
Q	229.662	508.388	6,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
R	227.637	508.396	7,9	8,0	4,5	0,5	0,0	90,0	"Green house mode"
T	229.337	508.543	2,3	8,0	4,5	0,5	0,0	90,0	"Green house mode"
V	225.978	508.633	6,5	8,0	4,5	0,5	0,0	90,0	"Green house mode"
X	225.969	508.649	6,1	8,0	4,5	0,5	0,0	90,0	"Green house mode"
Y	225.702	508.665	6,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"
Z	225.730	508.689	5,4	8,0	4,5	0,5	0,0	90,0	"Green house mode"

Project:
714068

Licensed user:
Pondera Consult B.V.
Welbergweg 49
NL-7556 PE Hengelo
0031742489940
Dion Oude Lansink / d.oudelansink@ponderaconsult.com
Calculated:
15-5-2015 13:04/3.0.578

SHADOW - Main Result

Calculation: Variant 5 - 10 x V110 op 100m

Calculation Results

Shadow receptor

No.	Shadow, worst case		Max shadow hours per day [h/day]	Shadow, expected values	
	Shadow hours per year [h/year]	Shadow days per year [days/year]		Shadow hours per year [h/year]	
01	101:55	157	1:13	15:02	
02	111:16	166	1:18	17:41	
03	89:01	168	0:57	14:28	
04	92:07	219	0:47	16:36	
05	215:27	326	1:15	39:05	
06	149:45	264	1:14	28:06	
07	120:08	230	0:58	23:29	
08	142:30	215	1:13	28:03	
09	149:42	204	1:10	28:36	
10	62:50	115	1:00	12:18	
11	78:55	140	1:01	15:12	
12	49:59	104	0:47	9:22	
13	3:48	25	0:13	0:45	
14	3:44	26	0:13	0:44	
15	0:00	0	0:00	0:00	
16	0:00	0	0:00	0:00	
17	0:00	0	0:00	0:00	
18	0:00	0	0:00	0:00	
19	89:26	128	1:00	19:59	
20	77:16	142	1:00	17:06	
21	60:42	123	0:59	13:33	
22	39:39	137	0:33	8:17	
23	30:29	102	0:31	6:14	
24	26:12	84	0:33	5:03	
25	51:19	140	0:44	9:49	
26	54:16	144	0:43	9:28	
27	90:07	185	1:01	14:37	
28	106:55	187	0:51	14:07	
29	86:54	164	1:06	10:07	
30	187:50	208	1:42	23:43	
A	0:00	0	0:00	0:00	
AC	4:29	44	0:13	0:52	
AD	0:00	0	0:00	0:00	
AE	0:00	0	0:00	0:00	
AF	0:00	0	0:00	0:00	
AH	19:58	88	0:27	4:28	
AI	0:00	0	0:00	0:00	
AJ	0:00	0	0:00	0:00	
AK	0:00	0	0:00	0:00	
AL	0:00	0	0:00	0:00	
AN	0:00	0	0:00	0:00	
AO	0:00	0	0:00	0:00	
AQ	0:00	0	0:00	0:00	
AR	28:13	100	0:32	5:20	
AU	28:07	99	0:34	5:20	
AV	0:00	0	0:00	0:00	
AX	0:00	0	0:00	0:00	
AY	0:00	0	0:00	0:00	
AZ	0:00	0	0:00	0:00	
B	0:00	0	0:00	0:00	
BA	0:00	0	0:00	0:00	
BB	0:00	0	0:00	0:00	
BC	2:43	22	0:12	0:36	
BD	0:00	0	0:00	0:00	
BE	2:33	21	0:11	0:34	
BF	36:12	105	0:32	7:11	
BG	0:00	0	0:00	0:00	
BH	2:38	20	0:12	0:35	
BI	0:00	0	0:00	0:00	
BJ	0:00	0	0:00	0:00	
BK	28:38	121	0:26	5:26	
BL	9:19	58	0:17	2:07	

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Project:
714068

Licensed user:
Pondera Consult B.V.
Welbergweg 49
NL-7556 PE Hengelo
0031742489940
Dion Oude Lansink / d.oudelansink@ponderaconsult.com
Calculated:
15-5-2015 13:04/3.0.578

SHADOW - Main Result

Calculation: Variant 5 - 10 x V110 op 100m

...continued from previous page

No.	Shadow, worst case		Max shadow hours per day	Shadow, expected values	
	Shadow hours per year [h/year]	Shadow days per year [days/year]		Shadow hours per year [h/year]	
BM	10:57	60	0:18	2:29	
BO	7:26	48	0:15	1:39	
BP	12:50	62	0:20	2:50	
BQ	2:30	18	0:12	0:30	
BR	10:45	56	0:19	2:20	
BT	128:25	209	1:09	25:24	
BU	0:00	0	0:00	0:00	
BV	16:30	69	0:23	3:36	
BW	0:00	0	0:00	0:00	
BX	37:52	136	0:32	8:02	
C	0:00	0	0:00	0:00	
CA	123:22	237	0:56	23:45	
CB	22:58	80	0:28	4:43	
CC	0:00	0	0:00	0:00	
CE	148:54	265	1:13	27:56	
CF	147:06	263	1:10	27:38	
CH	0:00	0	0:00	0:00	
CI	51:38	173	0:32	9:45	
CJ	18:12	68	0:26	3:31	
CM	0:00	0	0:00	0:00	
CO	84:12	216	0:41	15:44	
CP	0:00	0	0:00	0:00	
CQ	4:41	37	0:11	0:54	
CT	0:00	0	0:00	0:00	
CU	2:10	17	0:11	0:22	
CV	0:00	0	0:00	0:00	
CW	0:00	0	0:00	0:00	
CZ	0:00	0	0:00	0:00	
D	0:00	0	0:00	0:00	
DA	0:00	0	0:00	0:00	
DB	81:41	179	0:49	10:26	
DD	66:16	166	0:53	7:57	
DF	10:49	54	0:22	1:25	
DH	61:53	151	0:54	7:07	
DI	63:55	151	0:44	10:07	
DJ	74:46	165	0:50	12:07	
DK	7:44	44	0:18	1:26	
DL	72:13	145	0:55	8:10	
DM	0:00	0	0:00	0:00	
DO	46:58	124	0:36	5:13	
DP	44:25	139	0:39	7:08	
DQ	8:10	46	0:19	1:29	
DR	34:43	121	0:32	5:18	
DS	49:09	116	0:44	5:28	
DU	0:00	0	0:00	0:00	
DV	23:21	115	0:28	3:38	
DW	0:00	0	0:00	0:00	
DX	13:54	60	0:25	2:23	
DY	10:08	52	0:21	1:45	
DZ	3:07	20	0:15	0:34	
E	0:00	0	0:00	0:00	
EA	5:53	39	0:16	1:04	
EB	2:36	18	0:13	0:28	
EC	0:00	0	0:00	0:00	
ED	29:16	100	0:30	3:15	
EE	19:51	86	0:23	2:16	
EF	0:00	0	0:00	0:00	
EG	25:47	88	0:29	2:42	
EH	4:27	26	0:17	0:35	
EI	0:00	0	0:00	0:00	
EJ	5:36	28	0:20	0:41	
EK	0:00	0	0:00	0:00	
EL	4:04	24	0:16	0:29	

To be continued on next page...

Project:

714068

Licensed user:

Pondera Consult B.V.

Welbergweg 49

NL-7556 PE Hengelo

0031742489940

Dion Oude Lansink / d.oudelansink@ponderaconsult.com

Calculated:

15-5-2015 13:04/3.0.578

SHADOW - Main Result**Calculation:** Variant 5 - 10 x V110 op 100m

...continued from previous page

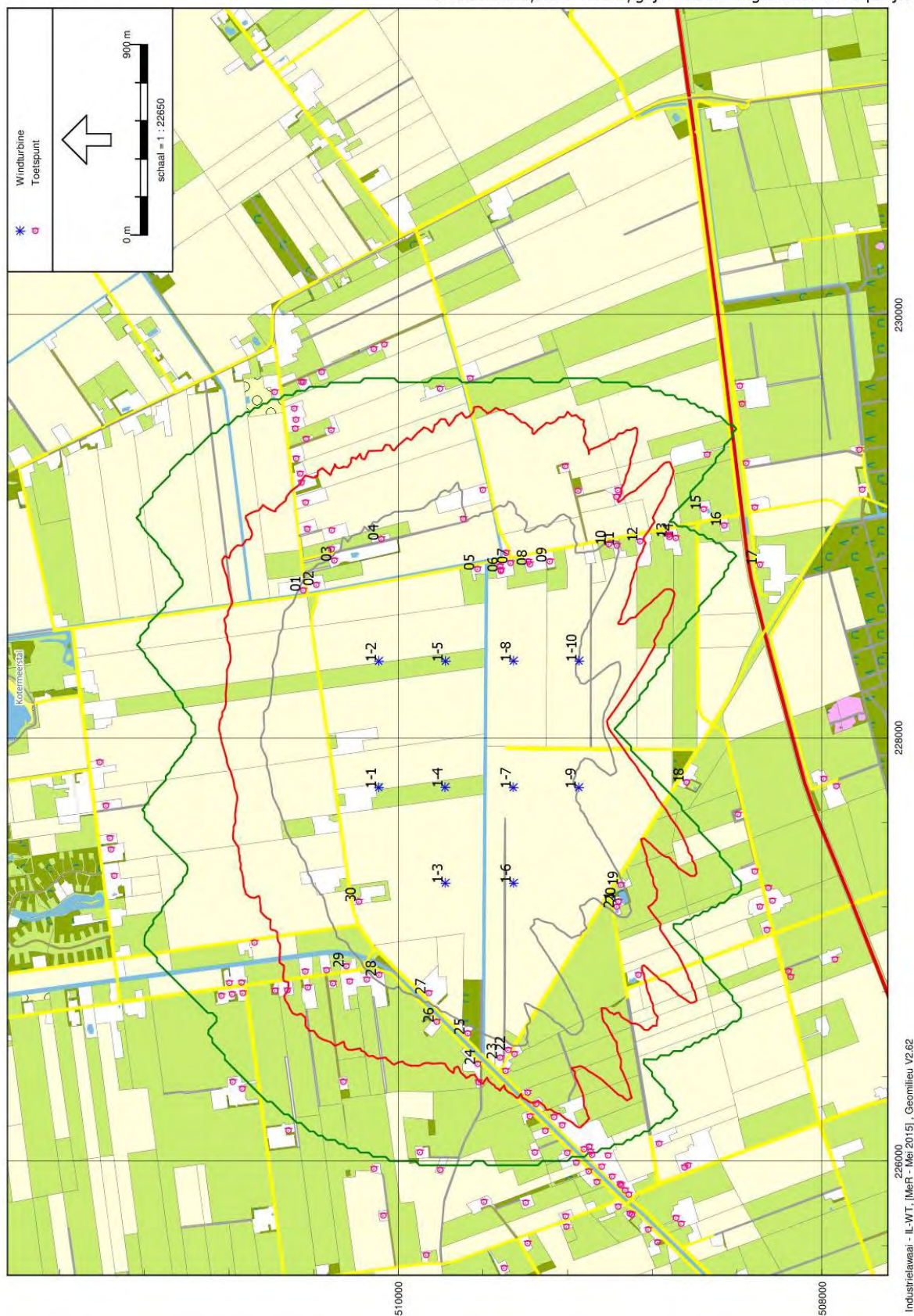
No.	Shadow, worst case			Shadow, expected values
	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow hours per year [h/year]
EM	5:19	28	0:19	0:37
EN	3:58	24	0:16	0:27
EO	0:00	0	0:00	0:00
EP	0:00	0	0:00	0:00
EQ	0:00	0	0:00	0:00
ER	0:00	0	0:00	0:00
ES	0:00	0	0:00	0:00
F	0:00	0	0:00	0:00
G	0:00	0	0:00	0:00
H	0:00	0	0:00	0:00
I	0:00	0	0:00	0:00
J	0:00	0	0:00	0:00
K	0:00	0	0:00	0:00
M	0:00	0	0:00	0:00
N	0:00	0	0:00	0:00
O	0:00	0	0:00	0:00
P	0:00	0	0:00	0:00
Q	0:00	0	0:00	0:00
R	0:00	0	0:00	0:00
T	6:37	44	0:13	1:11
V	0:00	0	0:00	0:00
X	0:00	0	0:00	0:00
Y	0:00	0	0:00	0:00
Z	0:00	0	0:00	0:00

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	VESTAS V110-2.0 2000 110.0 !O! hub: 100,0 m (TOT: 155,0 m) (80)	139:50	24:29
2	VESTAS V110-2.0 2000 110.0 !O! hub: 100,0 m (TOT: 155,0 m) (81)	235:11	41:48
3	VESTAS V110-2.0 2000 110.0 !O! hub: 100,0 m (TOT: 155,0 m) (82)	346:57	49:05
4	VESTAS V110-2.0 2000 110.0 !O! hub: 100,0 m (TOT: 155,0 m) (83)	126:34	20:28
5	VESTAS V110-2.0 2000 110.0 !O! hub: 100,0 m (TOT: 155,0 m) (84)	285:53	48:29
6	VESTAS V110-2.0 2000 110.0 !O! hub: 100,0 m (TOT: 155,0 m) (85)	146:30	21:41
7	VESTAS V110-2.0 2000 110.0 !O! hub: 100,0 m (TOT: 155,0 m) (86)	111:49	17:04
8	VESTAS V110-2.0 2000 110.0 !O! hub: 100,0 m (TOT: 155,0 m) (87)	362:46	68:00
9	VESTAS V110-2.0 2000 110.0 !O! hub: 100,0 m (TOT: 155,0 m) (88)	158:06	32:15
10	VESTAS V110-2.0 2000 110.0 !O! hub: 100,0 m (TOT: 155,0 m) (89)	328:21	59:28

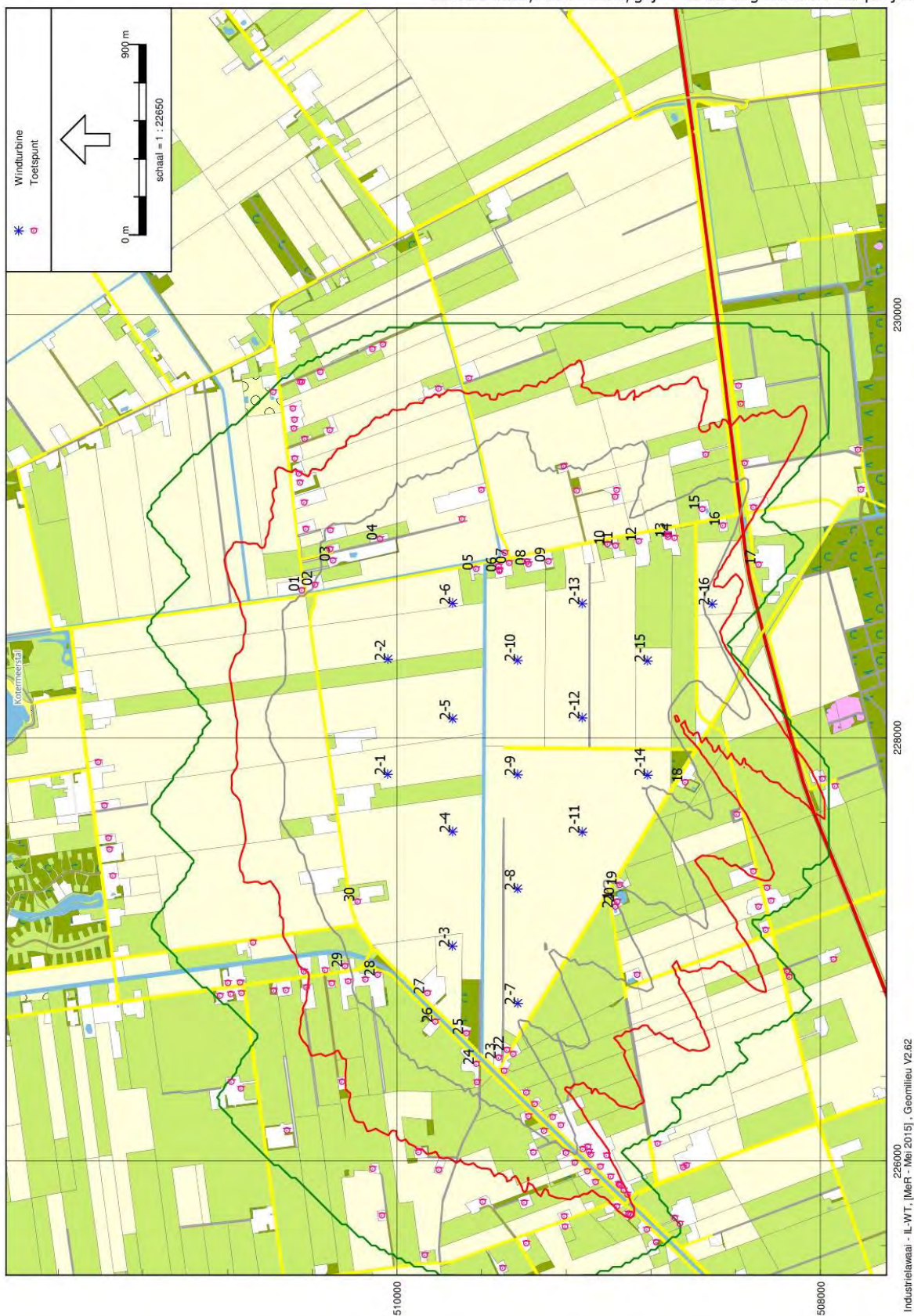
BIJLAGE 22 SLAGSCHADUWCONTOUREN ALT 1

Groen = 0 uur, rood = 5 uur, grijs = 15 uur slagschaduwinder per jaar



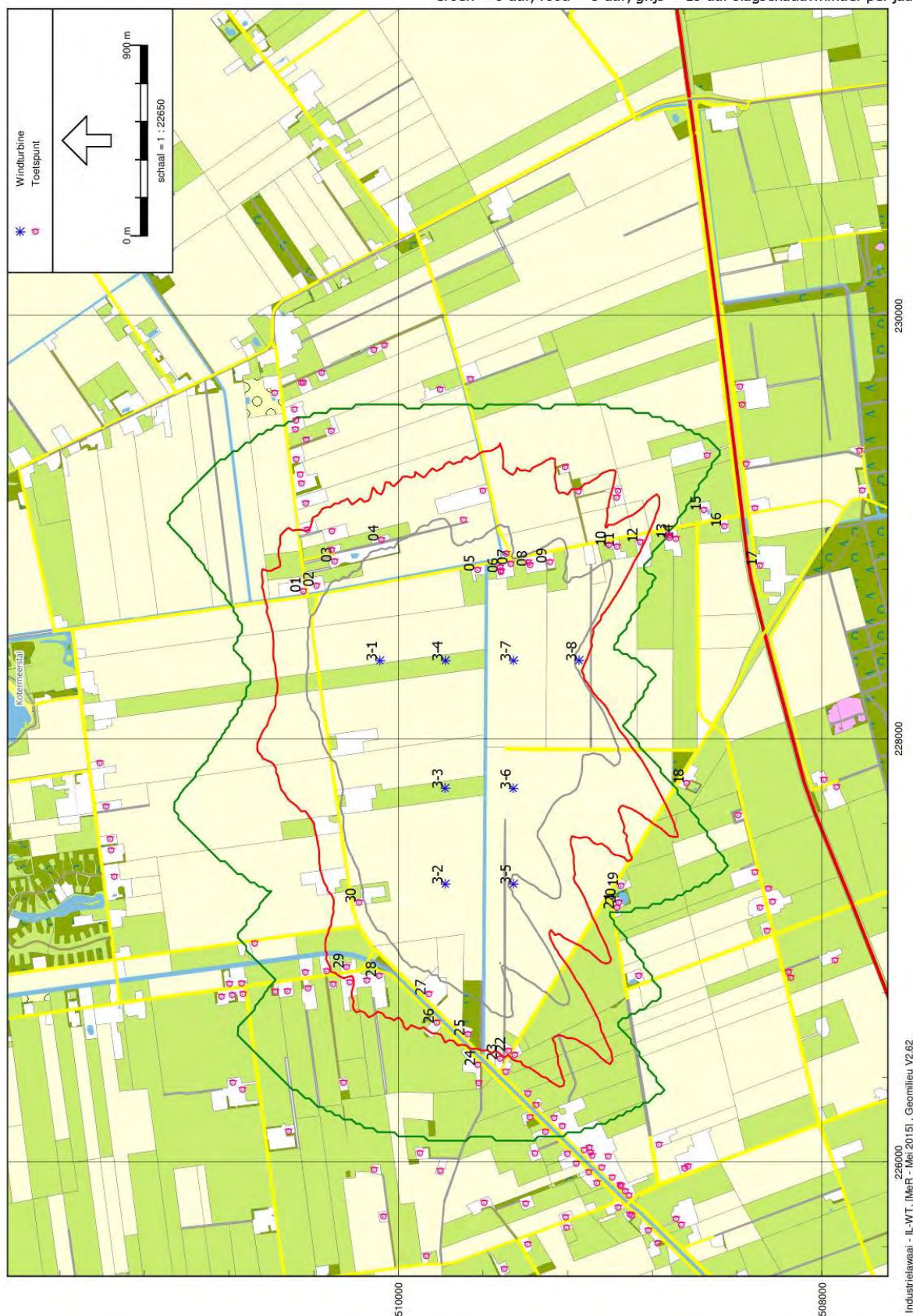
BIJLAGE 23 SLAGSCHADUWCOMTOUREN ALT 2

Groen = 0 uur, rood = 5 uur, grijs = 15 uur slagschaduwinder per jaar



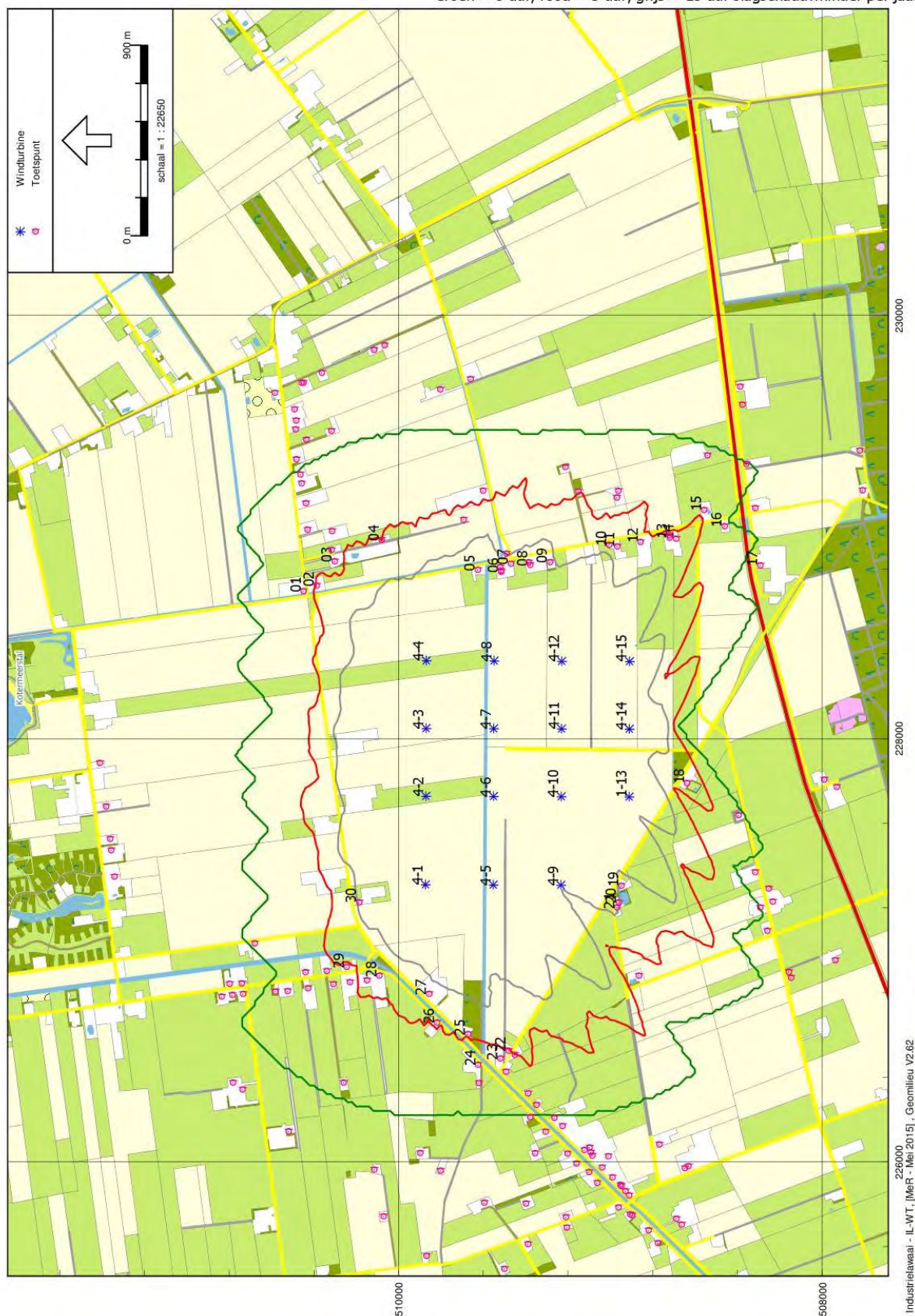
BIJLAGE 24 SLAGSCHADUWCONTOUREN ALT 3

Groen = 0 uur, rood = 5 uur, grijs = 15 uur slagschaduwinder per jaar



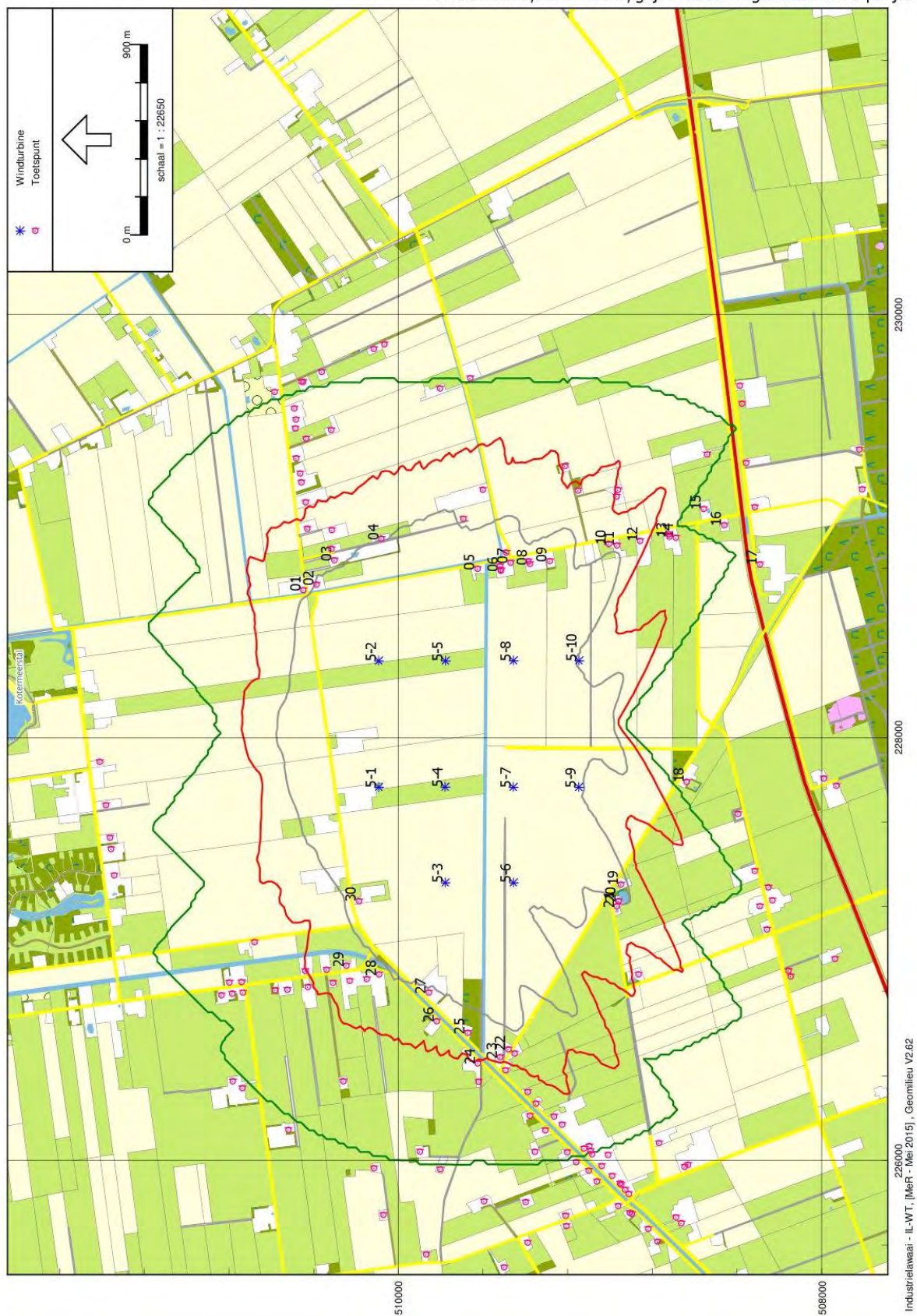
BIJLAGE 25 SLAGSCHADUWCONTOUREN ALT 4

Groen = 0 uur, rood = 5 uur, grijs = 15 uur slagschaduwinder per jaar



BIJLAGE 26 SLAGSCHADUWCONTOUREN ALT 5 AS 99M

Groen = 0 uur, rood = 5 uur, grijs = 15 uur slagschaduwhinder per jaar



BIJLAGE 27 SLAGSCHADUWCONTOUREN ALT 5 AS 100M

Groen = 0 uur, rood = 5 uur, grijs = 15 uur slagschaduwinder per jaar

