

**APPENDIX E.4**  
**CUMULATIVE SHADOW FLICKER**  
**CALCULATIONS**  
**70 m TOWERS & 56 m BLADES**

## SHADOW - Main Result

Calculation: Shadow Flicker\_38 x Vestas V112\_Includes Adjacent Developments\_126m Tips\_44 Properties\_16th July 2015

### Assumptions for shadow calculations

Maximum distance for influence	1,120 m
Minimum sun height over horizon for influence	3 °
Day step for calculation	1 days
Time step for calculation	1 minutes

Sunshine probability S (Average daily sunshine hours) [VALENTIA OBS.]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1.30	2.04	2.89	4.92	5.79	4.99	4.32	4.35	3.60	2.54	1.64	1.06

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

Mast G1\_80m\_FDT

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
483	258	215	373	640	505	714	1,034	1,119	1,364	649	779	8,131

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: Grousemount Contours with Spot Heights

Obstacles used in calculation

Eye height: 1.5 m

Grid resolution: 10.0 m

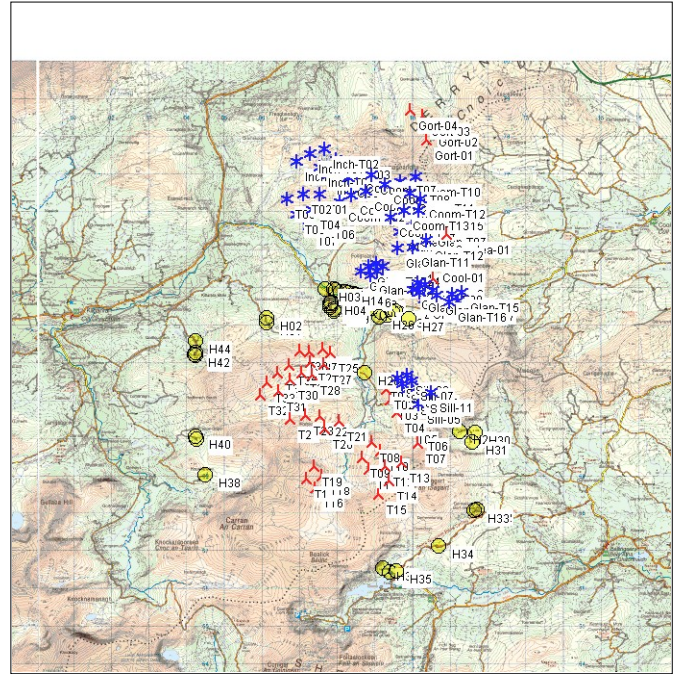
All coordinates are in

IG

### WTGs

	X(East)	Y(North)	Z	Row data/Description	WTG type				RPM			
					Valid	Manufact.	Type-generator	Power, rated		Rotor diameter	Hub height	
			[m]									
Cool-01	110,570	74,659	390.0	VESTAS V90 3000 90.0 !O! hub: 80.0 ... Yes	Yes	VESTAS	V90-3,000	3,000	90.0	80.0	16.1	
Cool-02	110,544	74,242	410.0	VESTAS V90 3000 90.0 !O! hub: 80.0 ... Yes	Yes	VESTAS	V90-3,000	3,000	90.0	80.0	16.1	
Coollea-01	110,909	75,391	377.8	VESTAS V90 3000 90.0 !O! hub: 80.0 ... Yes	Yes	VESTAS	V90-3,000	3,000	90.0	80.0	16.1	
Coom-T01	109,327	76,372	363.1	VESTAS V90 3000 90.0 !O! hub: 80.0 ... Yes	Yes	VESTAS	V90-3,000	3,000	90.0	80.0	16.1	
Coom-T02	108,076	76,273	355.7	VESTAS V90 3000 90.0 !O! hub: 80.0 ... Yes	Yes	VESTAS	V90-3,000	3,000	90.0	80.0	16.1	
Coom-T03	108,374	76,445	376.8	VESTAS V90 3000 90.0 !O! hub: 80.0 ... Yes	Yes	VESTAS	V90-3,000	3,000	90.0	80.0	16.1	
Coom-T04	108,295	76,921	392.2	VESTAS V90 3000 90.0 !O! hub: 80.0 ... Yes	Yes	VESTAS	V90-3,000	3,000	90.0	80.0	16.1	
Coom-T05	108,533	77,027	411.4	VESTAS V90 3000 90.0 !O! hub: 80.0 ... Yes	Yes	VESTAS	V90-3,000	3,000	90.0	80.0	16.1	
Coom-T06	108,764	76,564	371.4	VESTAS V90 3000 90.0 !O! hub: 80.0 ... Yes	Yes	VESTAS	V90-3,000	3,000	90.0	80.0	16.1	
Coom-T07	108,910	76,994	425.8	VESTAS V90 3000 90.0 !O! hub: 80.0 ... Yes	Yes	VESTAS	V90-3,000	3,000	90.0	80.0	16.1	
Coom-T08	109,261	76,736	413.8	VESTAS V90 3000 90.0 !O! hub: 80.0 ... Yes	Yes	VESTAS	V90-3,000	3,000	90.0	80.0	16.1	
Coom-T09	109,668	76,807	425.0	VESTAS V90 3000 90.0 !O! hub: 80.0 ... Yes	Yes	VESTAS	V90-3,000	3,000	90.0	80.0	16.1	
Coom-T10	110,081	76,939	437.1	VESTAS V90 3000 90.0 !O! hub: 80.0 ... Yes	Yes	VESTAS	V90-3,000	3,000	90.0	80.0	16.1	
Coom-T11	109,919	76,508	402.6	VESTAS V90 3000 90.0 !O! hub: 80.0 ... Yes	Yes	VESTAS	V90-3,000	3,000	90.0	80.0	16.1	
Coom-T12	110,216	76,336	430.8	VESTAS V90 3000 90.0 !O! hub: 80.0 ... Yes	Yes	VESTAS	V90-3,000	3,000	90.0	80.0	16.1	
Coom-T13	109,766	76,042	398.1	VESTAS V90 3000 90.0 !O! hub: 80.0 ... Yes	Yes	VESTAS	V90-3,000	3,000	90.0	80.0	16.1	
Coom-T14	109,409	75,860	382.7	VESTAS V90 3000 90.0 !O! hub: 80.0 ... Yes	Yes	VESTAS	V90-3,000	3,000	90.0	80.0	16.1	
Coom-T15	110,170	76,040	419.6	VESTAS V90 3000 90.0 !O! hub: 80.0 ... Yes	Yes	VESTAS	V90-3,000	3,000	90.0	80.0	16.1	
Glan-T01	109,028	74,638	344.3	VESTAS V52 850 52.0 !O! hub: 60.0 ... Yes	Yes	VESTAS	V52-850	850	52.0	60.0	26.0	
Glan-T02	108,838	74,559	350.0	VESTAS V52 850 52.0 !O! hub: 60.0 ... Yes	Yes	VESTAS	V52-850	850	52.0	60.0	26.0	
Glan-T03	108,626	74,425	333.5	VESTAS V52 850 52.0 !O! hub: 60.0 ... Yes	Yes	VESTAS	V52-850	850	52.0	60.0	26.0	
Glan-T04	109,206	74,562	345.9	VESTAS V52 850 52.0 !O! hub: 60.0 ... Yes	Yes	VESTAS	V52-850	850	52.0	60.0	26.0	
Glan-T05	109,064	74,430	346.5	VESTAS V52 850 52.0 !O! hub: 60.0 ... Yes	Yes	VESTAS	V52-850	850	52.0	60.0	26.0	
Glan-T06	108,878	74,327	330.2	VESTAS V52 850 52.0 !O! hub: 60.0 ... Yes	Yes	VESTAS	V52-850	850	52.0	60.0	26.0	
Glan-T07	110,449	75,619	396.5	VESTAS V90 3000 90.0 !O! hub: 80.0 ... Yes	Yes	VESTAS	V90-3,000	3,000	90.0	80.0	16.1	
Glan-T08	109,652	75,467	374.7	VESTAS V90 3000 90.0 !O! hub: 80.0 ... Yes	Yes	VESTAS	V90-3,000	3,000	90.0	80.0	16.1	
Glan-T09	109,983	75,606	410.3	VESTAS V90 3000 90.0 !O! hub: 80.0 ... Yes	Yes	VESTAS	V90-3,000	3,000	90.0	80.0	16.1	
Glan-T10	109,603	75,034	329.6	VESTAS V90 3000 90.0 !O! hub: 80.0 ... Yes	Yes	VESTAS	V90-3,000	3,000	90.0	80.0	16.1	
Glan-T11	110,000	75,084	355.2	VESTAS V90 3000 90.0 !O! hub: 80.0 ... Yes	Yes	VESTAS	V90-3,000	3,000	90.0	80.0	16.1	
Glan-T12	110,352	75,243	380.8	VESTAS V90 3000 90.0 !O! hub: 80.0 ... Yes	Yes	VESTAS	V90-3,000	3,000	90.0	80.0	16.1	
Glan-T13	110,183	73,876	376.7	VESTAS V52 850 52.0 !O! hub: 60.0 ... Yes	Yes	VESTAS	V52-850	850	52.0	60.0	26.0	
Glan-T14	111,062	73,832	372.8	VESTAS V52 850 52.0 !O! hub: 60.0 ... Yes	Yes	VESTAS	V52-850	850	52.0	60.0	26.0	

To be continued on next page...



Scale 1:200,000  
 ▲ New WTG  
 ★ Existing WTG  
 ● Shadow receptor

## SHADOW - Main Result

Calculation: Shadow Flicker\_38 x Vestas V112\_Includes Adjacent Developments\_126m Tips\_44 Properties\_16th July 2015

...continued from previous page

	X(East)	Y(North)	Z	Row data/Description	WTG type		Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	RPM [RPM]
					Valid	Manufact.					
			[m]								
Glan-T15	111,308	73,885	383.4	VESTAS V52 850 52.0 !O! hub: 60.0 ...	Yes	VESTAS	V52-850	850	52.0	60.0	26.0
Glan-T16	110,977	73,622	358.5	VESTAS V52 850 52.0 !O! hub: 60.0 ...	Yes	VESTAS	V52-850	850	52.0	60.0	26.0
Glan-T17	111,214	73,636	368.4	VESTAS V52 850 52.0 !O! hub: 60.0 ...	Yes	VESTAS	V52-850	850	52.0	60.0	26.0
Glan-T18	110,653	73,789	387.1	VESTAS V52 850 52.0 !O! hub: 60.0 ...	Yes	VESTAS	V52-850	850	52.0	60.0	26.0
Glan-T19	110,539	73,931	401.8	VESTAS V52 850 52.0 !O! hub: 60.0 ...	Yes	VESTAS	V52-850	850	52.0	60.0	26.0
Glan-T20	110,346	74,072	401.6	VESTAS V52 850 52.0 !O! hub: 60.0 ...	Yes	VESTAS	V52-850	850	52.0	60.0	26.0
Glan-T21	110,315	73,703	363.0	VESTAS V52 850 52.0 !O! hub: 60.0 ...	Yes	VESTAS	V52-850	850	52.0	60.0	26.0
Glan-T22	110,126	74,121	396.6	VESTAS V52 850 52.0 !O! hub: 60.0 ...	Yes	VESTAS	V52-850	850	52.0	60.0	26.0
Glan-T23	110,010	73,954	372.6	VESTAS V52 850 52.0 !O! hub: 60.0 ...	Yes	VESTAS	V52-850	850	52.0	60.0	26.0
Gort-01	110,366	77,908	423.1	VESTAS V90 3000 90.0 !O! hub: 80.0 ...	Yes	VESTAS	V90-3,000	3,000	90.0	80.0	16.1
Gort-02	110,474	78,249	400.5	VESTAS V90 3000 90.0 !O! hub: 80.0 ...	Yes	VESTAS	V90-3,000	3,000	90.0	80.0	16.1
Gort-03	110,269	78,535	361.9	VESTAS V90 3000 90.0 !O! hub: 80.0 ...	Yes	VESTAS	V90-3,000	3,000	90.0	80.0	16.1
Gort-04	109,938	78,695	322.6	VESTAS V90 3000 90.0 !O! hub: 80.0 ...	Yes	VESTAS	V90-3,000	3,000	90.0	80.0	16.1
Inch-T01	107,266	77,540	328.2	NORDEX N90/2500 HS 2500 90.0 !O! ...	Yes	NORDEX	N90/2500 HS-2,500	2,500	90.0	80.0	16.9
Inch-T02	107,661	77,681	353.6	NORDEX N90/2500 HS 2500 90.0 !O! ...	Yes	NORDEX	N90/2500 HS-2,500	2,500	90.0	80.0	16.9
Inch-T03	107,975	77,395	400.0	NORDEX N90/2500 HS 2500 90.0 !O! ...	Yes	NORDEX	N90/2500 HS-2,500	2,500	90.0	80.0	16.9
Inch-T04	107,530	77,202	362.9	NORDEX N90/2500 HS 2500 90.0 !O! ...	Yes	NORDEX	N90/2500 HS-2,500	2,500	90.0	80.0	16.9
Inch-T05	106,922	77,350	304.7	NORDEX N90/2500 HS 2500 90.0 !O! ...	Yes	NORDEX	N90/2500 HS-2,500	2,500	90.0	80.0	16.9
Inch-T06	107,764	76,981	368.2	NORDEX N90/2500 HS 2500 90.0 !O! ...	Yes	NORDEX	N90/2500 HS-2,500	2,500	90.0	80.0	16.9
Sill-01	109,600	71,603	390.0	VESTAS V52 850 52.0 !O! hub: 55.0 ...	Yes	VESTAS	V52-850	850	52.0	55.0	26.0
Sill-02	109,726	71,448	390.1	VESTAS V52 850 52.0 !O! hub: 55.0 ...	Yes	VESTAS	V52-850	850	52.0	55.0	26.0
Sill-03	109,852	71,292	392.1	VESTAS V52 850 52.0 !O! hub: 55.0 ...	Yes	VESTAS	V52-850	850	52.0	55.0	26.0
Sill-04	109,977	71,136	393.3	VESTAS V52 850 52.0 !O! hub: 55.0 ...	Yes	VESTAS	V52-850	850	52.0	55.0	26.0
Sill-05	110,164	70,905	390.0	VESTAS V52 850 52.0 !O! hub: 55.0 ...	Yes	VESTAS	V52-850	850	52.0	55.0	26.0
Sill-06	109,854	71,669	387.1	VESTAS V52 850 52.0 !O! hub: 55.0 ...	Yes	VESTAS	V52-850	850	52.0	55.0	26.0
Sill-07	109,980	71,514	387.7	VESTAS V52 850 52.0 !O! hub: 55.0 ...	Yes	VESTAS	V52-850	850	52.0	55.0	26.0
Sill-09	110,106	71,358	391.3	VESTAS V52 850 52.0 !O! hub: 55.0 ...	Yes	VESTAS	V52-850	850	52.0	55.0	26.0
Sill-10	110,232	71,202	400.0	VESTAS V52 850 52.0 !O! hub: 55.0 ...	Yes	VESTAS	V52-850	850	52.0	55.0	26.0
Sill-11	110,499	71,228	393.0	VESTAS V52 850 52.0 !O! hub: 55.0 ...	Yes	VESTAS	V52-850	850	52.0	55.0	26.0
T01	109,198	71,536	314.9	VESTAS V112 3000 112.0 !O! hub: 70...No	No	VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T01	107,536	76,484	360.0	NORDEX N90/2500 HS 2500 90.0 !O! ...	Yes	NORDEX	N90/2500 HS-2,500	2,500	90.0	80.0	16.9
T02	109,303	71,293	338.8	VESTAS V112 3000 112.0 !O! hub: 70...No	No	VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T02	107,103	76,476	366.9	NORDEX N90/2500 HS 2500 90.0 !O! ...	Yes	NORDEX	N90/2500 HS-2,500	2,500	90.0	80.0	16.9
T03	109,391	71,027	325.0	VESTAS V112 3000 112.0 !O! hub: 70...No	No	VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T03	106,676	76,344	341.8	NORDEX N90/2500 HS 2500 90.0 !O! ...	Yes	NORDEX	N90/2500 HS-2,500	2,500	90.0	80.0	16.9
T04	109,584	70,682	309.1	VESTAS V112 3000 112.0 !O! hub: 70...No	No	VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T04	107,338	76,079	320.5	NORDEX N90/2500 HS 2500 90.0 !O! ...	Yes	NORDEX	N90/2500 HS-2,500	2,500	90.0	80.0	16.9
T05	109,901	70,374	390.0	VESTAS V112 3000 112.0 !O! hub: 70...No	No	VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T05	106,913	75,938	305.5	NORDEX N90/2500 HS 2500 90.0 !O! ...	Yes	NORDEX	N90/2500 HS-2,500	2,500	90.0	80.0	16.9
T06	110,195	70,193	407.3	VESTAS V112 3000 112.0 !O! hub: 70...No	No	VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T06	107,701	75,805	276.8	NORDEX N90/2500 HS 2500 90.0 !O! ...	Yes	NORDEX	N90/2500 HS-2,500	2,500	90.0	80.0	16.9
T07	110,128	69,868	373.6	VESTAS V112 3000 112.0 !O! hub: 70...No	No	VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T07	107,263	75,622	241.9	NORDEX N90/2500 HS 2500 90.0 !O! ...	Yes	NORDEX	N90/2500 HS-2,500	2,500	90.0	80.0	16.9
T08	108,900	69,894	390.0	VESTAS V112 3000 112.0 !O! hub: 70...No	No	VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T09	108,666	69,493	383.2	VESTAS V112 3000 112.0 !O! hub: 70...No	No	VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T10	109,145	69,655	390.0	VESTAS V112 3000 112.0 !O! hub: 70...No	No	VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T11	108,836	69,186	405.7	VESTAS V112 3000 112.0 !O! hub: 70...No	No	VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T12	109,270	69,265	460.3	VESTAS V112 3000 112.0 !O! hub: 70...No	No	VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T13	109,691	69,348	490.7	VESTAS V112 3000 112.0 !O! hub: 70...No	No	VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T14	109,379	68,878	468.7	VESTAS V112 3000 112.0 !O! hub: 70...No	No	VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T15	109,095	68,482	456.0	VESTAS V112 3000 112.0 !O! hub: 70...No	No	VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T16	107,411	68,657	406.3	VESTAS V112 3000 112.0 !O! hub: 70...No	No	VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T17	107,185	68,919	459.6	VESTAS V112 3000 112.0 !O! hub: 70...No	No	VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T18	107,579	69,008	407.3	VESTAS V112 3000 112.0 !O! hub: 70...No	No	VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T19	107,369	69,254	460.0	VESTAS V112 3000 112.0 !O! hub: 70...No	No	VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T20	107,650	70,250	370.5	VESTAS V112 3000 112.0 !O! hub: 70...No	No	VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T21	108,033	70,450	350.8	VESTAS V112 3000 112.0 !O! hub: 70...No	No	VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T22	107,524	70,570	390.0	VESTAS V112 3000 112.0 !O! hub: 70...No	No	VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T23	107,157	70,609	386.0	VESTAS V112 3000 112.0 !O! hub: 70...No	No	VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T24	106,741	70,496	404.2	VESTAS V112 3000 112.0 !O! hub: 70...No	No	VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T25	107,817	72,261	327.6	VESTAS V112 3000 112.0 !O! hub: 70...No	No	VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T26	107,284	72,015	381.8	VESTAS V112 3000 112.0 !O! hub: 70...No	No	VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T27	107,646	71,952	343.2	VESTAS V112 3000 112.0 !O! hub: 70...No	No	VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T28	107,337	71,667	343.1	VESTAS V112 3000 112.0 !O! hub: 70...No	No	VESTAS	V112-3,000	3,000	112.0	70.0	12.8

To be continued on next page...

## SHADOW - Main Result

Calculation: Shadow Flicker\_38 x Vestas V112\_Includes Adjacent Developments\_126m Tips\_44 Properties\_16th July 2015

...continued from previous page

	X(East)	Y(North)	Z	Row data/Description	WTG type			Power, rated [kW]	Rotor diameter [m]	Hub height [m]	RPM [RPM]
					Valid	Manufact.	Type-generator				
T29	107,046	71,734	351.0	VESTAS V112 3000 112.0 !O! hub: 70....No		VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T30	106,731	71,551	349.6	VESTAS V112 3000 112.0 !O! hub: 70....No		VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T31	106,426	71,233	345.8	VESTAS V112 3000 112.0 !O! hub: 70....No		VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T32	105,944	71,141	369.0	VESTAS V112 3000 112.0 !O! hub: 70....No		VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T33	106,136	71,463	390.9	VESTAS V112 3000 112.0 !O! hub: 70....No		VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T34	106,407	71,717	391.0	VESTAS V112 3000 112.0 !O! hub: 70....No		VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T35	106,704	71,934	391.4	VESTAS V112 3000 112.0 !O! hub: 70....No		VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T36	107,609	72,376	361.1	VESTAS V112 3000 112.0 !O! hub: 70....No		VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T37	107,257	72,283	392.8	VESTAS V112 3000 112.0 !O! hub: 70....No		VESTAS	V112-3,000	3,000	112.0	70.0	12.8
T38	106,996	72,310	394.2	VESTAS V112 3000 112.0 !O! hub: 70....No		VESTAS	V112-3,000	3,000	112.0	70.0	12.8

## 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]	[°]	[°]	
H01	106,128	73,058	244.1	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H02	106,116	73,190	237.9	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H03	107,688	73,959	160.8	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H04	107,849	73,595	178.2	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H05	107,802	73,554	184.1	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H06	107,823	73,522	185.4	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H07	107,805	73,465	190.0	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H08	107,913	73,406	190.0	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H09	107,908	73,365	192.4	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H10	107,916	73,939	167.4	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H11	107,954	73,925	168.5	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H12	108,097	73,869	175.7	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H13	108,216	73,874	183.9	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H14	108,298	73,850	184.7	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H15	108,450	73,818	193.1	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H16	108,514	73,800	196.8	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H17	108,602	73,763	200.2	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H18	108,656	73,736	201.6	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H19	108,825	73,644	206.6	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H20	108,856	73,591	205.0	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H21	108,922	73,450	191.4	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H22	109,176	73,330	205.6	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H23	109,333	73,253	210.0	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H24	109,470	73,341	223.1	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H25	109,550	73,367	231.4	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H26	109,108	73,207	197.4	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H27	109,912	73,169	236.5	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H28	108,721	71,736	224.1	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H29	111,255	70,179	243.7	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H30	111,674	70,135	216.9	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H31	111,595	69,894	233.9	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H32	111,706	68,081	242.7	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H33	111,646	68,050	244.0	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H34	110,696	67,099	246.8	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H35	109,565	66,446	180.0	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H36	109,399	66,427	173.1	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H37	109,219	66,516	183.8	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H38	104,506	69,022	274.6	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H39	104,278	69,977	239.1	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H40	104,234	70,052	240.0	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H41	104,241	72,200	192.3	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H42	104,208	72,218	184.4	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H43	104,229	72,260	183.1	2.0	1.0	4.0	0.0	90.0	"Green house mode"
H44	104,248	72,574	160.0	2.0	1.0	4.0	0.0	90.0	"Green house mode"

## SHADOW - Main Result

Calculation: Shadow Flicker\_38 x Vestas V112\_Includes Adjacent Developments\_126m Tips\_44 Properties\_16th July 2015

### 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]
H01	0:00	0	0:00	0:00
H02	0:00	0	0:00	0:00
H03	0:00	0	0:00	0:00
H04	0:00	0	0:00	0:00
H05	0:00	0	0:00	0:00
H06	0:00	0	0:00	0:00
H07	6:02	26	0:17	0:28
H08	15:49	46	0:25	1:16
H09	19:22	52	0:27	1:35
H10	7:26	41	0:13	1:20
H11	1:47	18	0:07	0:19
H12	0:00	0	0:00	0:00
H13	0:00	0	0:00	0:00
H14	0:00	0	0:00	0:00
H15	0:00	0	0:00	0:00
H16	0:00	0	0:00	0:00
H17	0:00	0	0:00	0:00
H18	0:00	0	0:00	0:00
H19	0:00	0	0:00	0:00
H20	0:00	0	0:00	0:00
H21	0:00	0	0:00	0:00
H22	0:00	0	0:00	0:00
H23	3:09	25	0:09	0:34
H24	4:58	30	0:12	0:54
H25	0:56	12	0:06	0:10
H26	0:00	0	0:00	0:00
H27	0:00	0	0:00	0:00
H28	107:26	245	1:00	16:15
H29	0:00	0	0:00	0:00
H30	0:00	0	0:00	0:00
H31	0:00	0	0:00	0:00
H32	0:00	0	0:00	0:00
H33	0:00	0	0:00	0:00
H34	0:00	0	0:00	0:00
H35	0:00	0	0:00	0:00
H36	0:00	0	0:00	0:00
H37	0:00	0	0:00	0:00
H38	0:00	0	0:00	0:00
H39	0:00	0	0:00	0:00
H40	0:00	0	0:00	0:00
H41	0:00	0	0:00	0:00
H42	0:00	0	0:00	0:00
H43	0:00	0	0:00	0:00
H44	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]
	Cool-01 VESTAS V90 3000 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (258)	0:00	0:00
	Cool-02 VESTAS V90 3000 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (259)	0:00	0:00
	Coolea-01 VESTAS V90 3000 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (260)	0:00	0:00
	Coom-T01 VESTAS V90 3000 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (27)	0:00	0:00
	Coom-T02 VESTAS V90 3000 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (28)	0:00	0:00
	Coom-T03 VESTAS V90 3000 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (29)	0:00	0:00
	Coom-T04 VESTAS V90 3000 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (30)	0:00	0:00
	Coom-T05 VESTAS V90 3000 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (31)	0:00	0:00
	Coom-T06 VESTAS V90 3000 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (32)	0:00	0:00
	Coom-T07 VESTAS V90 3000 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (33)	0:00	0:00
	Coom-T08 VESTAS V90 3000 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (34)	0:00	0:00
	Coom-T09 VESTAS V90 3000 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (35)	0:00	0:00
	Coom-T10 VESTAS V90 3000 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (36)	0:00	0:00

To be continued on next page...

## SHADOW - Main Result

Calculation: Shadow Flicker\_38 x Vestas V112\_Includes Adjacent Developments\_126m Tips\_44 Properties\_16th July 2015

...continued from previous page

No.	Name	Worst case [h/year]	Expected [h/year]
Coom-T11	VESTAS V90 3000 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (37)	0:00	0:00
Coom-T12	VESTAS V90 3000 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (38)	0:00	0:00
Coom-T13	VESTAS V90 3000 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (39)	0:00	0:00
Coom-T14	VESTAS V90 3000 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (40)	0:00	0:00
Coom-T15	VESTAS V90 3000 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (41)	0:00	0:00
Glan-T01	VESTAS V52 850 52.0 !O! hub: 60.0 m (TOT: 86.0 m) (42)	0:00	0:00
Glan-T02	VESTAS V52 850 52.0 !O! hub: 60.0 m (TOT: 86.0 m) (43)	0:00	0:00
Glan-T03	VESTAS V52 850 52.0 !O! hub: 60.0 m (TOT: 86.0 m) (44)	0:00	0:00
Glan-T04	VESTAS V52 850 52.0 !O! hub: 60.0 m (TOT: 86.0 m) (45)	0:00	0:00
Glan-T05	VESTAS V52 850 52.0 !O! hub: 60.0 m (TOT: 86.0 m) (46)	0:00	0:00
Glan-T06	VESTAS V52 850 52.0 !O! hub: 60.0 m (TOT: 86.0 m) (47)	7:43	1:23
Glan-T07	VESTAS V90 3000 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (48)	0:00	0:00
Glan-T08	VESTAS V90 3000 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (49)	0:00	0:00
Glan-T09	VESTAS V90 3000 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (50)	0:00	0:00
Glan-T10	VESTAS V90 3000 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (51)	0:00	0:00
Glan-T11	VESTAS V90 3000 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (52)	0:00	0:00
Glan-T12	VESTAS V90 3000 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (53)	0:00	0:00
Glan-T13	VESTAS V52 850 52.0 !O! hub: 60.0 m (TOT: 86.0 m) (54)	0:00	0:00
Glan-T14	VESTAS V52 850 52.0 !O! hub: 60.0 m (TOT: 86.0 m) (55)	0:00	0:00
Glan-T15	VESTAS V52 850 52.0 !O! hub: 60.0 m (TOT: 86.0 m) (56)	0:00	0:00
Glan-T16	VESTAS V52 850 52.0 !O! hub: 60.0 m (TOT: 86.0 m) (57)	0:00	0:00
Glan-T17	VESTAS V52 850 52.0 !O! hub: 60.0 m (TOT: 86.0 m) (58)	0:00	0:00
Glan-T18	VESTAS V52 850 52.0 !O! hub: 60.0 m (TOT: 86.0 m) (59)	0:00	0:00
Glan-T19	VESTAS V52 850 52.0 !O! hub: 60.0 m (TOT: 86.0 m) (60)	0:00	0:00
Glan-T20	VESTAS V52 850 52.0 !O! hub: 60.0 m (TOT: 86.0 m) (61)	0:00	0:00
Glan-T21	VESTAS V52 850 52.0 !O! hub: 60.0 m (TOT: 86.0 m) (62)	7:23	1:21
Glan-T22	VESTAS V52 850 52.0 !O! hub: 60.0 m (TOT: 86.0 m) (63)	0:00	0:00
Glan-T23	VESTAS V52 850 52.0 !O! hub: 60.0 m (TOT: 86.0 m) (64)	0:00	0:00
Gort-01	VESTAS V90 3000 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (261)	0:00	0:00
Gort-02	VESTAS V90 3000 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (262)	0:00	0:00
Gort-03	VESTAS V90 3000 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (263)	0:00	0:00
Gort-04	VESTAS V90 3000 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (264)	0:00	0:00
Inch-T01	NORDEX N90/2500 HS 2500 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (14)	0:00	0:00
Inch-T02	NORDEX N90/2500 HS 2500 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (15)	0:00	0:00
Inch-T03	NORDEX N90/2500 HS 2500 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (16)	0:00	0:00
Inch-T04	NORDEX N90/2500 HS 2500 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (17)	0:00	0:00
Inch-T05	NORDEX N90/2500 HS 2500 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (18)	0:00	0:00
Inch-T06	NORDEX N90/2500 HS 2500 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (19)	0:00	0:00
Sill-01	VESTAS V52 850 52.0 !O! hub: 55.0 m (TOT: 81.0 m) (65)	3:11	0:36
Sill-02	VESTAS V52 850 52.0 !O! hub: 55.0 m (TOT: 81.0 m) (66)	2:12	0:20
Sill-03	VESTAS V52 850 52.0 !O! hub: 55.0 m (TOT: 81.0 m) (67)	0:00	0:00
Sill-04	VESTAS V52 850 52.0 !O! hub: 55.0 m (TOT: 81.0 m) (68)	0:00	0:00
Sill-05	VESTAS V52 850 52.0 !O! hub: 55.0 m (TOT: 81.0 m) (69)	0:00	0:00
Sill-06	VESTAS V52 850 52.0 !O! hub: 55.0 m (TOT: 81.0 m) (70)	0:00	0:00
Sill-07	VESTAS V52 850 52.0 !O! hub: 55.0 m (TOT: 81.0 m) (71)	0:00	0:00
Sill-09	VESTAS V52 850 52.0 !O! hub: 55.0 m (TOT: 81.0 m) (72)	0:00	0:00
Sill-10	VESTAS V52 850 52.0 !O! hub: 55.0 m (TOT: 81.0 m) (73)	0:00	0:00
Sill-11	VESTAS V52 850 52.0 !O! hub: 55.0 m (TOT: 81.0 m) (74)	0:00	0:00
T01	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (418)	37:35	5:59
T01	NORDEX N90/2500 HS 2500 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (75)	0:00	0:00
T02	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (419)	21:19	2:50
T02	NORDEX N90/2500 HS 2500 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (76)	0:00	0:00
T03	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (420)	17:46	1:48
T03	NORDEX N90/2500 HS 2500 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (77)	0:00	0:00
T04	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (421)	0:00	0:00
T04	NORDEX N90/2500 HS 2500 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (78)	0:00	0:00
T05	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (422)	0:00	0:00
T05	NORDEX N90/2500 HS 2500 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (79)	0:00	0:00
T06	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (423)	0:00	0:00
T06	NORDEX N90/2500 HS 2500 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (80)	0:00	0:00
T07	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (424)	0:00	0:00
T07	NORDEX N90/2500 HS 2500 90.0 !O! hub: 80.0 m (TOT: 125.0 m) (81)	0:00	0:00
T08	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (425)	0:00	0:00
T09	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (426)	0:00	0:00
T10	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (427)	0:00	0:00

To be continued on next page...

## SHADOW - Main Result

Calculation: Shadow Flicker\_38 x Vestas V112\_Includes Adjacent Developments\_126m Tips\_44 Properties\_16th July 2015

...continued from previous page

No.	Name	Worst case [h/year]	Expected [h/year]
T11	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (428)	0:00	0:00
T12	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (429)	0:00	0:00
T13	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (430)	0:00	0:00
T14	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (431)	0:00	0:00
T15	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (432)	0:00	0:00
T16	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (433)	0:00	0:00
T17	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (434)	0:00	0:00
T18	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (435)	0:00	0:00
T19	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (436)	0:00	0:00
T20	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (437)	0:00	0:00
T21	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (438)	0:00	0:00
T22	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (439)	0:00	0:00
T23	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (440)	0:00	0:00
T24	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (441)	0:00	0:00
T25	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (442)	13:41	2:23
T26	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (443)	0:00	0:00
T27	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (444)	11:42	2:18
T28	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (445)	0:00	0:00
T29	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (446)	0:00	0:00
T30	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (447)	0:00	0:00
T31	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (448)	0:00	0:00
T32	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (449)	0:00	0:00
T33	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (450)	0:00	0:00
T34	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (451)	0:00	0:00
T35	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (452)	0:00	0:00
T36	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (453)	25:32	2:04
T37	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (454)	0:00	0:00
T38	VESTAS V112 3000 112.0 !O! hub: 70.0 m (TOT: 126.0 m) (455)	0:00	0:00