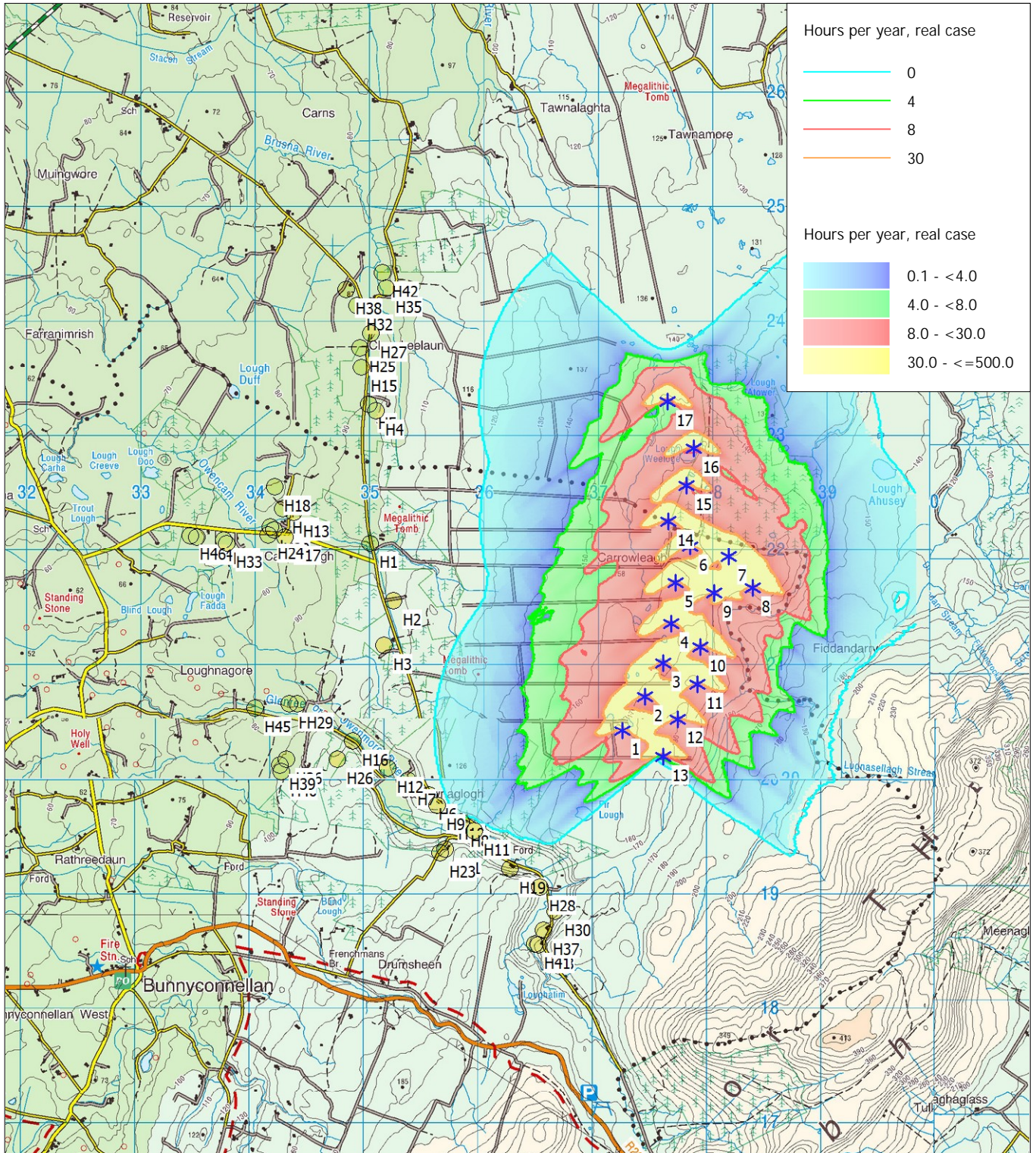


SHADOW - Map

Calculation: 6129 Carrowleagh baseline real



0 500 1000 1500 2000 m

Map: OSI Basemap(1) , Print scale 1:50,000, Map center Irish ITM-IRENET95 (IE), geocentric, GRS80 East: 536,290 North: 821,750

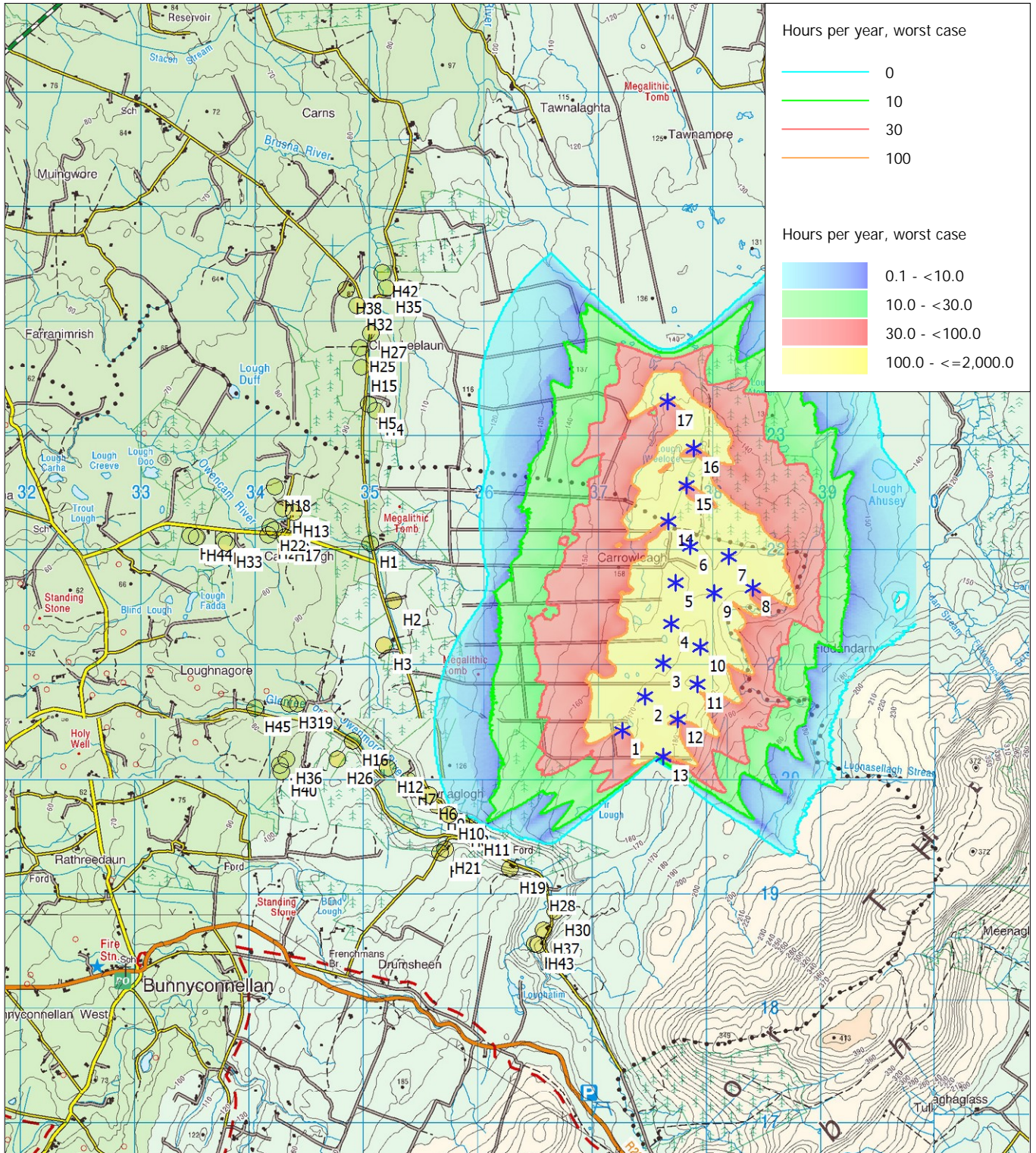
* Existing WTG Shadow receptor

Flicker map level: Height Contours: CONTOURLINE_6129 Firlough WF PID Shadow F_7.wpo (8)

Time step: 2 minutes, Day step: 3 days, Map resolution: 10 m, Visibility resolution: 5 m, Eye height: 1.5 m

SHADOW - Map

Calculation: 6129 Carrowleagh baseline worst



0 500 1000 1500 2000 m

Map: OSI Basemap(1) , Print scale 1:50,000, Map center Irish ITM-IRENET95 (IE), geocentric, GRS80 East: 536,290 North: 821,750

* Existing WTG Shadow receptor

Flicker map level: Height Contours: CONTOURLINE_6129 Firlough WF PID Shadow F_7.wpo (8)

Time step: 2 minutes, Day step: 3 days, Map resolution: 10 m, Visibility resolution: 5 m, Eye height: 1.5 m

SHADOW - Main Result

Calculation: 6129 Carrowleagh baseline worst
Assumptions for shadow calculations

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

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

Sunshine probability S (Average daily sunshine hours) [BELMULLET]
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
1.36 2.16 2.65 4.82 5.79 4.41 4.42 4.07 3.73 2.48 1.71 0.89

Operational time
N NNE NE ENE E ESE SE SSE S SSW SW WSW
424 378 265 294 296 469 549 535 778 860 982 872

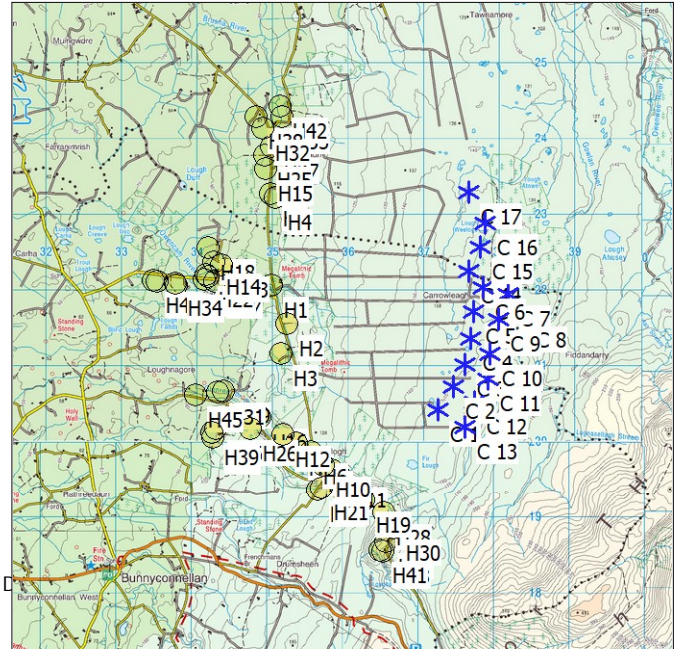
W WNW NW NNW Sum
756 512 428 362 8,760

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:
Height contours used: Height Contours: CONTOURLINE_6129 Firlough WF PID
Receptor grid resolution: 1.0 m

All coordinates are in
Irish ITM-IRENET95 (IE), geocentric, GRS80

WTGs

Easting	Northing	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	537,266	820,457	172.2 C 1	Yes	ENERCON	E-70 E4 2,3 MW-2,300	2,300	71.0	64.0	1,644	20.0
2	537,467	820,755	173.0 C 2	Yes	ENERCON	E-70 E4 2,3 MW-2,300	2,300	71.0	64.0	1,644	20.0
3	537,629	821,048	169.3 C 3	Yes	ENERCON	E-70 E4 2,3 MW-2,300	2,300	71.0	64.0	1,644	20.0
4	537,698	821,389	167.7 C 4	Yes	ENERCON	E-70 E4 2,3 MW-2,300	2,300	71.0	64.0	1,644	20.0
5	537,742	821,743	160.6 C 5	Yes	ENERCON	E-70 E4 2,3 MW-2,300	2,300	71.0	64.0	1,644	20.0
6	537,870	822,063	149.7 C 6	Yes	ENERCON	E-70 E4 2,3 MW-2,300	2,300	71.0	64.0	1,644	20.0
7	538,206	821,972	150.7 C 7	Yes	ENERCON	E-70 E4 2,3 MW-2,300	2,300	71.0	64.0	1,644	20.0
8	538,414	821,700	154.7 C 8	Yes	ENERCON	E-70 E4 2,3 MW-2,300	2,300	71.0	64.0	1,644	20.0
9	538,075	821,652	156.7 C 9	Yes	ENERCON	E-70 E4 2,3 MW-2,300	2,300	71.0	64.0	1,644	20.0
10	537,953	821,185	164.2 C 10	Yes	ENERCON	E-70 E4 2,3 MW-2,300	2,300	71.0	64.0	1,644	20.0
11	537,924	820,857	174.5 C 11	Yes	ENERCON	E-70 E4 2,3 MW-2,300	2,300	71.0	64.0	1,644	20.0
12	537,750	820,554	178.1 C 12	Yes	ENERCON	E-70 E4 2,3 MW-2,300	2,300	71.0	64.0	1,644	20.0
13	537,624	820,227	182.3 C 13	Yes	ENERCON	E-70 E4 2,3 MW-2,300	2,300	71.0	64.0	1,644	20.0
14	537,681	822,289	157.4 C 14	Yes	ENERCON	E-70 E4 2,3 MW-2,300	2,300	71.0	64.0	1,644	20.0
15	537,838	822,595	151.3 C 15	Yes	ENERCON	E-70 E4 2,3 MW-2,300	2,300	71.0	64.0	1,644	20.0
16	537,902	822,923	149.4 C 16	Yes	ENERCON	E-70 E4 2,3 MW-2,300	2,300	71.0	64.0	1,644	20.0
17	537,679	823,331	139.9 C 17	Yes	ENERCON	E-70 E4 2,3 MW-2,300	2,300	71.0	64.0	1,644	20.0



Scale 1:100,000
* Existing WTG Shadow receptor

Shadow receptor-Input

No.	Name	Easting	Northing	Z	Width	Height	Elevation a.g.l.	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
				[m]	[m]	[m]	[m]	[°]		[m]
A	H1	535,070	822,103	96.9	2.0	2.0	0.5	90.0	"Green house mode"	2.5
B	H2	535,267	821,598	109.3	2.0	2.0	0.5	90.0	"Green house mode"	2.5
C	H3	535,188	821,210	107.3	2.0	2.0	0.5	90.0	"Green house mode"	2.5
D	H4	535,124	823,263	102.7	2.0	2.0	0.5	90.0	"Green house mode"	2.5
E	H5	535,061	823,316	97.9	2.0	2.0	0.5	90.0	"Green house mode"	2.5
F	H6	535,574	819,899	128.1	2.0	2.0	0.5	90.0	"Green house mode"	2.5
G	H7	535,387	820,024	125.9	2.0	2.0	0.5	90.0	"Green house mode"	2.5
H	H8	535,857	819,660	114.4	2.0	2.0	0.5	90.0	"Green house mode"	2.5
I	H9	535,644	819,809	127.2	2.0	2.0	0.5	90.0	"Green house mode"	2.5
J	H10	535,747	819,724	119.9	2.0	2.0	0.5	90.0	"Green house mode"	2.5
K	H11	535,966	819,584	109.6	2.0	2.0	0.5	90.0	"Green house mode"	2.5

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SHADOW - Main Result

Calculation: 6129 Carrowleagh baseline worst

...continued from previous page

No.	Name	Easting	Northing	Z	Width	Height	Elevation a.g.l.	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
				[m]	[m]	[m]	[m]	[°]		[m]
L	H12	535,210	820,136	101.1	2.0	2.0	0.5	90.0	"Green house mode"	2.5
M	H13	534,401	822,381	84.2	2.0	2.0	0.5	90.0	"Green house mode"	2.5
N	H14	534,306	822,410	78.7	2.0	2.0	0.5	90.0	"Green house mode"	2.5
O	H15	534,999	823,644	94.2	2.0	2.0	0.5	90.0	"Green house mode"	2.5
P	H16	534,907	820,371	97.1	2.0	2.0	0.5	90.0	"Green house mode"	2.5
Q	H17	534,321	822,162	82.0	2.0	2.0	0.5	90.0	"Green house mode"	2.5
R	H18	534,233	822,602	79.2	2.0	2.0	0.5	90.0	"Green house mode"	2.5
S	H19	536,282	819,253	117.6	2.0	2.0	0.5	90.0	"Green house mode"	2.5
T	H20	534,230	822,231	76.3	2.0	2.0	0.5	90.0	"Green house mode"	2.5
U	H21	535,711	819,425	128.9	2.0	2.0	0.5	90.0	"Green house mode"	2.5
V	H22	534,198	822,255	75.4	2.0	2.0	0.5	90.0	"Green house mode"	2.5
W	H23	535,670	819,393	128.7	2.0	2.0	0.5	90.0	"Green house mode"	2.5
X	H24	534,175	822,187	77.3	2.0	2.0	0.5	90.0	"Green house mode"	2.5
Y	H25	534,988	823,817	92.4	2.0	2.0	0.5	90.0	"Green house mode"	2.5
Z	H26	534,775	820,212	97.6	2.0	2.0	0.5	90.0	"Green house mode"	2.5
AA	H27	535,082	823,941	90.2	2.0	2.0	0.5	90.0	"Green house mode"	2.5
AB	H28	536,542	819,091	122.8	2.0	2.0	0.5	90.0	"Green house mode"	2.5
AC	H29	534,421	820,709	89.1	2.0	2.0	0.5	90.0	"Green house mode"	2.5
AD	H30	536,673	818,878	127.7	2.0	2.0	0.5	90.0	"Green house mode"	2.5
AE	H31	534,352	820,705	87.6	2.0	2.0	0.5	90.0	"Green house mode"	2.5
AF	H32	534,961	824,183	86.4	2.0	2.0	0.5	90.0	"Green house mode"	2.5
AG	H33	533,812	822,112	73.6	2.0	2.0	0.5	90.0	"Green house mode"	2.5
AH	H34	533,788	822,143	73.5	2.0	2.0	0.5	90.0	"Green house mode"	2.5
AI	H35	535,220	824,333	93.9	2.0	2.0	0.5	90.0	"Green house mode"	2.5
AJ	H36	534,326	820,215	104.3	2.0	2.0	0.5	90.0	"Green house mode"	2.5
AK	H37	536,569	818,707	133.9	2.0	2.0	0.5	90.0	"Green house mode"	2.5
AL	H38	534,868	824,326	86.6	2.0	2.0	0.5	90.0	"Green house mode"	2.5
AM	H39	534,270	820,167	102.1	2.0	2.0	0.5	90.0	"Green house mode"	2.5
AN	H40	534,280	820,106	104.4	2.0	2.0	0.5	90.0	"Green house mode"	2.5
AO	H41	536,492	818,590	140.0	2.0	2.0	0.5	90.0	"Green house mode"	2.5
AP	H42	535,188	824,469	92.8	2.0	2.0	0.5	90.0	"Green house mode"	2.5
AQ	H43	536,527	818,584	145.0	2.0	2.0	0.5	90.0	"Green house mode"	2.5
AR	H44	533,553	822,169	70.9	2.0	2.0	0.5	90.0	"Green house mode"	2.5
AS	H45	534,052	820,668	77.5	2.0	2.0	0.5	90.0	"Green house mode"	2.5
AT	H46	533,495	822,184	70.1	2.0	2.0	0.5	90.0	"Green house mode"	2.5

Calculation Results

Shadow receptor

No.	Name	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]
A	H1	0:00	0	0:00	0:00
B	H2	0:00	0	0:00	0:00
C	H3	0:00	0	0:00	0:00
D	H4	0:00	0	0:00	0:00
E	H5	0:00	0	0:00	0:00
F	H6	0:00	0	0:00	0:00
G	H7	0:00	0	0:00	0:00
H	H8	0:00	0	0:00	0:00
I	H9	0:00	0	0:00	0:00
J	H10	0:00	0	0:00	0:00
K	H11	0:00	0	0:00	0:00
L	H12	0:00	0	0:00	0:00
M	H13	0:00	0	0:00	0:00
N	H14	0:00	0	0:00	0:00
O	H15	0:00	0	0:00	0:00
P	H16	0:00	0	0:00	0:00
Q	H17	0:00	0	0:00	0:00
R	H18	0:00	0	0:00	0:00
S	H19	0:00	0	0:00	0:00
T	H20	0:00	0	0:00	0:00
U	H21	0:00	0	0:00	0:00

To be continued on next page...

SHADOW - Main Result

Calculation: 6129 Carrowleagh baseline worst

...continued from previous page

No.	Name	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]
V	H22	0:00	0	0:00	0:00
W	H23	0:00	0	0:00	0:00
X	H24	0:00	0	0:00	0:00
Y	H25	0:00	0	0:00	0:00
Z	H26	0:00	0	0:00	0:00
AA	H27	0:00	0	0:00	0:00
AB	H28	0:00	0	0:00	0:00
AC	H29	0:00	0	0:00	0:00
AD	H30	0:00	0	0:00	0:00
AE	H31	0:00	0	0:00	0:00
AF	H32	0:00	0	0:00	0:00
AG	H33	0:00	0	0:00	0:00
AH	H34	0:00	0	0:00	0:00
AI	H35	0:00	0	0:00	0:00
AJ	H36	0:00	0	0:00	0:00
AK	H37	0:00	0	0:00	0:00
AL	H38	0:00	0	0:00	0:00
AM	H39	0:00	0	0:00	0:00
AN	H40	0:00	0	0:00	0:00
AO	H41	0:00	0	0:00	0:00
AP	H42	0:00	0	0:00	0:00
AQ	H43	0:00	0	0:00	0:00
AR	H44	0:00	0	0:00	0:00
AS	H45	0:00	0	0:00	0:00
AT	H46	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	C 1	0:00	0:00
2	C 2	0:00	0:00
3	C 3	0:00	0:00
4	C 4	0:00	0:00
5	C 5	0:00	0:00
6	C 6	0:00	0:00
7	C 7	0:00	0:00
8	C 8	0:00	0:00
9	C 9	0:00	0:00
10	C 10	0:00	0:00
11	C 11	0:00	0:00
12	C 12	0:00	0:00
13	C 13	0:00	0:00
14	C 14	0:00	0:00
15	C 15	0:00	0:00
16	C 16	0:00	0:00
17	C 17	0:00	0:00

Total times in Receptor wise and WTG wise tables can differ, as a WTG can lead to flicker at 2 or more receptors simultaneously and/or receptors may receive flicker from 2 or more WTGs simultaneously.