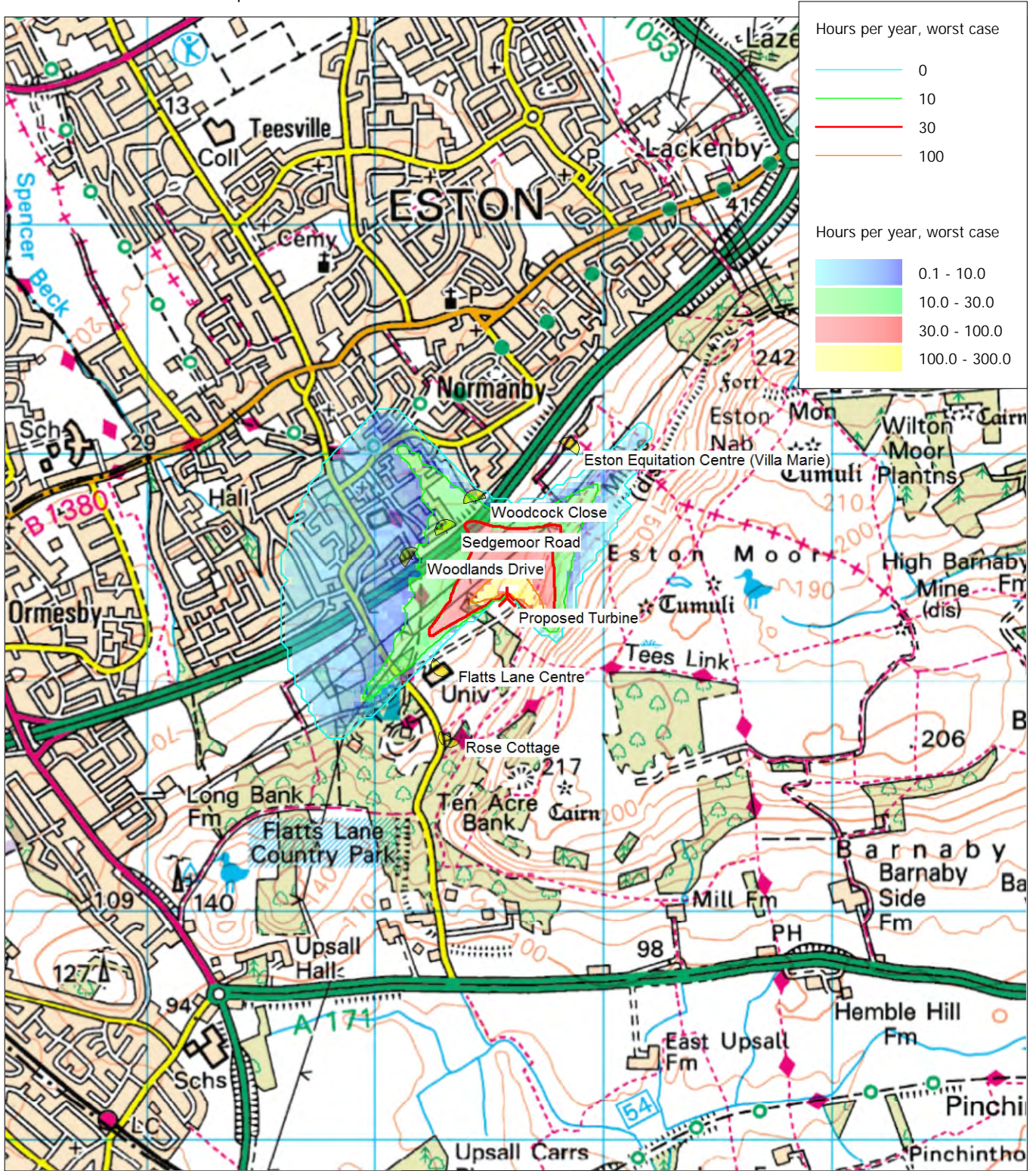


SHADOW - Map

Calculation: Eston - Desktop Shadow Flicker Assessment



Map: Eston , Print scale 1:25,000, Map center British TM-OSGB36/Airy (GB/IE) East: 455,580 North: 517,350

▲ New WTG

● Shadow receptor

Flicker map level: Elevation Grid Data Object: Eston_EMDGrid_1.wpg (6)

SHADOW - Main Result

Calculation: Eston - Desktop Shadow Flicker Assessment Assumptions for shadow calculations

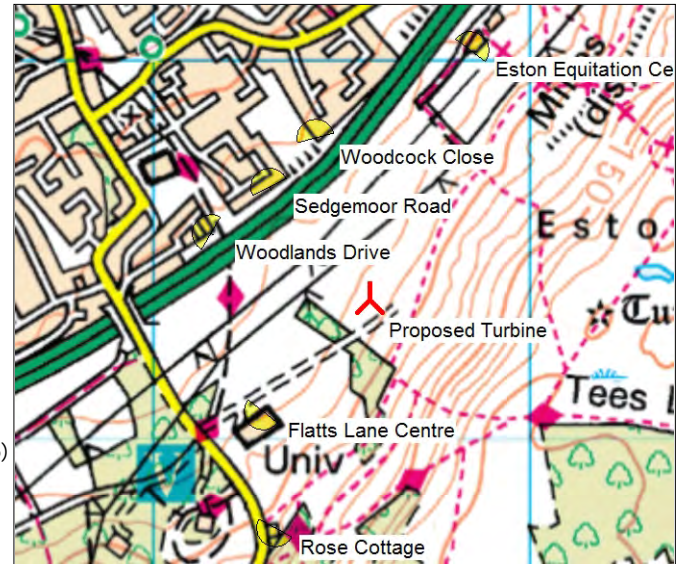
Maximum distance for influence
Calculate only when more than 20 % of sun is covered by the blade
Please look in WTG table

Minimum sun height over horizon for influence 3 °
Day step for calculation 1 days
Time step for calculation 1 minutes
The calculated times are "worst case" given by the following assumptions:
The sun is shining all the day, from sunrise to sunset
The rotor plane is always perpendicular to the line from the WTG to the sun
The WTG is always operating

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:
Height contours used: Elevation Grid Data Object: Eston_EMDGrid_1.wpg (6)
Obstacles used in calculation
Eye height: 1.5 m
Grid resolution: 10.0 m

All coordinates are in
British TM-OSGB36/Airy (GB/IE)

WTGs



Scale 1:20,000
New WTG (red triangle icon)
Shadow receptor (yellow circle icon)

	Easting	Northing	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 [RPM]
Proposed Turbine	455,578	517,364	83.2	ENERCON E-44 900 44...	Yes	ENERCON	E-44-900	900	44.0	55.0	983	34.0

Shadow receptor-Input

No.	Easting	Northing	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
	[m]	[m]	[m]	[m]	[m]	[m]	[°]	[°]	
Eston Equitation Centre (Villa Marie)	455,844	518,020	75.1	1.0	1.0	1.0	37.5	90.0	Fixed direction
Flatts Lane Centre	455,295	517,068	81.5	1.0	1.0	1.0	-139.7	90.0	Fixed direction
Rose Cottage	455,328	516,759	112.9	1.0	1.0	1.0	-151.2	90.0	Fixed direction
Sedgemoor Road	455,313	517,661	66.0	1.0	1.0	1.0	-25.3	90.0	Fixed direction
Woodcock Close	455,437	517,791	63.8	1.0	1.0	1.0	-15.1	90.0	Fixed direction
Woodlands Drive	455,158	517,538	64.9	1.0	1.0	1.0	-58.9	90.0	Fixed direction

Calculation Results

Shadow receptor

No.	Shadow, worst case		
	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
Eston Equitation Centre (Villa Marie)	0:00	0	0:00
Flatts Lane Centre	0:00	0	0:00
Rose Cottage	0:00	0	0:00
Sedgemoor Road	15:44	46	0:27
Woodcock Close	13:14	42	0:23
Woodlands Drive	8:38	29	0:23

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

No.	Name	Worst case [h/year]	Expected [h/year]
Proposed Turbine	ENERCON E-44 900 44.0 !-! hub: 55.0 m (TOT: 77.0 m) (1)	37:36	

SHADOW - Calendar

Calculation: Eston - Desktop Shadow Flicker Assessment Shadow receptor: Eston Equitation Centre (Villa Marie) - Shadow Receptor: 1.0 x 1.0 Azimuth: 37.5° Slope: 90.0° (6)

Assumptions for shadow calculations

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	08:28 15:49	07:56 16:42	06:57 17:40	06:40 19:40	05:29 20:37	04:37 21:29	04:33 21:44	05:14 21:07	06:10 18:59	07:06 18:43	07:06 16:31	08:02 15:45
2	08:27 15:51	07:54 16:44	06:54 17:42	06:37 19:42	05:26 20:39	04:36 21:30	04:34 21:44	05:16 21:06	06:12 19:56	07:07 18:41	07:08 16:29	08:04 15:44
3	08:27 15:52	07:52 16:46	06:52 17:44	06:35 19:44	05:24 20:41	04:35 21:31	04:35 21:43	05:18 21:04	06:14 19:54	07:09 18:38	07:10 16:27	08:05 15:43
4	08:27 15:53	07:50 16:48	06:49 17:46	06:32 19:46	05:22 20:43	04:35 21:33	04:35 21:43	05:20 21:02	06:16 19:52	07:11 18:36	07:12 16:25	08:07 15:43
5	08:26 15:54	07:48 16:50	06:47 17:48	06:30 19:48	05:20 20:45	04:34 21:34	04:36 21:42	05:21 21:00	06:18 19:49	07:13 18:33	07:14 16:23	08:08 15:42
6	08:26 15:56	07:47 16:53	06:45 17:50	06:27 19:50	05:18 20:47	04:33 21:35	04:37 21:42	05:23 20:58	06:20 19:47	07:15 18:31	07:16 16:21	08:10 15:42
7	08:25 15:57	07:45 16:55	06:42 17:52	06:25 19:51	05:16 20:48	04:32 21:36	04:38 21:41	05:25 20:56	06:21 19:44	07:17 18:28	07:18 16:19	08:11 15:41
8	08:25 15:59	07:43 16:57	06:40 17:54	06:22 19:53	05:14 20:50	04:32 21:37	04:39 21:40	05:27 20:54	06:23 19:42	07:19 18:26	07:20 16:17	08:12 15:41
9	08:24 16:00	07:41 16:59	06:37 17:56	06:20 19:55	05:12 20:52	04:31 21:38	04:40 21:39	05:28 20:52	06:25 19:39	07:21 18:24	07:22 16:15	08:14 15:40
10	08:24 16:02	07:39 17:01	06:35 17:58	06:17 19:57	05:10 20:54	04:30 21:39	04:41 21:38	05:30 20:50	06:27 19:37	07:22 18:21	07:24 16:14	08:15 15:40
11	08:23 16:03	07:37 17:03	06:32 18:00	06:15 19:59	05:08 20:56	04:30 21:40	04:43 21:38	05:32 20:47	06:29 19:34	07:24 18:19	07:26 16:12	08:16 15:40
12	08:22 16:05	07:35 17:05	06:30 18:01	06:12 20:01	05:07 20:58	04:30 21:40	04:44 21:37	05:34 20:45	06:31 19:31	07:26 18:16	07:28 16:10	08:17 15:39
13	08:21 16:06	07:33 17:07	06:27 18:03	06:10 20:03	05:05 20:59	04:29 21:41	04:45 21:36	05:36 20:43	06:32 19:29	07:28 18:14	07:30 16:08	08:18 15:39
14	08:20 16:08	07:30 17:09	06:25 18:05	06:08 20:05	05:03 21:01	04:29 21:42	04:46 21:34	05:38 20:41	06:34 19:26	07:30 18:11	07:32 16:07	08:19 15:39
15	08:19 16:10	07:28 17:11	06:22 18:07	06:05 20:07	05:01 21:03	04:29 21:42	04:48 21:33	05:39 20:39	06:36 19:24	07:32 18:09	07:33 16:05	08:20 15:39
16	08:18 16:11	07:26 17:13	06:20 18:09	06:03 20:09	04:59 21:05	04:28 21:43	04:49 21:32	05:41 20:37	06:38 19:21	07:34 18:07	07:35 16:03	08:21 15:39
17	08:17 16:13	07:24 17:15	06:17 18:11	06:00 20:11	04:58 21:06	04:28 21:43	04:50 21:31	05:43 20:34	06:40 19:19	07:36 18:04	07:37 16:02	08:22 15:39
18	08:16 16:15	07:22 17:17	06:15 18:13	05:58 20:12	04:56 21:08	04:28 21:44	04:52 21:30	05:45 20:32	06:42 19:16	07:38 18:02	07:39 16:00	08:23 15:40
19	08:15 16:17	07:20 17:19	06:12 18:15	05:56 20:14	04:54 21:10	04:28 21:44	04:53 21:28	05:47 20:30	06:43 19:14	07:40 18:00	07:41 15:59	08:24 15:40
20	08:14 16:19	07:17 17:21	06:10 18:17	05:53 20:16	04:53 21:11	04:28 21:45	04:55 21:27	05:48 20:28	06:45 19:11	07:42 17:57	07:43 15:57	08:24 15:40
21	08:13 16:21	07:15 17:23	06:07 18:19	05:51 20:18	04:51 21:13	04:28 21:45	04:56 21:26	05:50 20:25	06:47 19:09	07:44 17:55	07:45 15:56	08:25 15:41
22	08:11 16:22	07:13 17:26	06:05 18:21	05:49 20:20	04:50 21:15	04:29 21:45	04:58 21:24	05:52 20:23	06:49 19:06	07:46 17:53	07:47 15:55	08:26 15:41
23	08:10 16:24	07:11 17:28	06:02 18:23	05:46 20:22	04:48 21:16	04:29 21:45	04:59 21:23	05:54 20:21	06:51 19:04	07:48 17:50	07:49 15:53	08:26 15:42
24	08:08 16:26	07:08 17:30	06:00 18:25	05:44 20:24	04:47 21:18	04:29 21:45	05:01 21:21	05:56 20:18	06:53 19:01	07:50 17:48	07:50 15:52	08:26 15:42
25	08:07 16:28	07:06 17:32	05:57 18:27	05:42 20:26	04:46 21:19	04:30 21:45	05:03 21:19	05:58 20:16	06:54 18:59	07:52 16:46	07:52 15:51	08:27 15:43
26	08:06 16:30	07:04 17:34	05:55 18:29	05:40 20:28	04:44 21:21	04:30 21:45	05:04 21:18	05:59 20:13	06:56 18:56	07:54 16:44	07:54 15:50	08:27 15:44
27	08:04 16:32	07:01 17:36	05:52 18:30	05:37 20:30	04:43 21:22	04:30 21:45	05:06 21:16	06:01 20:11	06:58 18:53	07:56 16:42	07:56 15:49	08:27 15:44
28	08:02 16:34	06:59 17:38	05:50 18:32	05:35 20:32	04:42 21:24	04:31 21:45	05:07 21:14	06:03 20:09	07:00 18:51	07:58 16:39	07:57 15:48	08:27 15:45
29	08:01 16:36		06:47 19:34	05:33 20:33	04:41 21:25	04:32 21:45	05:09 21:13	06:05 20:06	07:02 18:48	07:00 16:37	07:59 15:47	08:28 15:46
30	07:59 16:38		06:45 19:36	05:31 20:35	04:39 21:26	04:32 21:45	05:11 21:11	06:07 20:04	07:04 18:46	07:02 16:35	08:01 15:46	08:28 15:47
31	07:57 16:40		06:42 19:38		04:38 21:28		05:13 21:09	06:09 20:01		07:04 16:33		08:28 15:48
Potential sun hours	246	271	367	422	498	515	517	462	383	327	256	229
Total, worst case												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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SHADOW - Calendar

Calculation: Eston - Desktop Shadow Flicker Assessment Shadow receptor: Flatts Lane Centre - Shadow Receptor: 1.0 x 1.0 Azimuth: -139.7° Slope: 90.0° (1)

Assumptions for shadow calculations

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	08:27 15:50	07:56 16:42	06:57 17:40	06:40 19:40	05:29 20:37	04:37 21:29	04:33 21:44	05:14 21:07	06:11 19:59	07:06 18:43	07:06 16:31	08:02 15:45
2	08:27 15:51	07:54 16:44	06:54 17:42	06:37 19:42	05:27 20:39	04:36 21:30	04:34 21:44	05:16 21:06	06:12 19:56	07:07 18:41	07:08 16:29	08:04 15:44
3	08:27 15:52	07:52 16:46	06:52 17:44	06:35 19:44	05:24 20:41	04:36 21:31	04:35 21:43	05:18 21:04	06:14 19:54	07:09 18:38	07:10 16:27	08:05 15:44
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9	08:24 16:00	07:41 16:59	06:37 17:56	06:20 19:55	05:12 20:52	04:31 21:38	04:40 21:39	05:29 20:52	06:25 19:39	07:21 18:24	07:22 16:15	08:14 15:40
10	08:24 16:02	07:39 17:01	06:35 17:58	06:17 19:57	05:10 20:54	04:31 21:39	04:42 21:38	05:30 20:50	06:27 19:37	07:23 18:21	07:24 16:14	08:15 15:40
11	08:23 16:03	07:37 17:03	06:32 18:00	06:15 19:59	05:09 20:56	04:30 21:40	04:43 21:37	05:32 20:47	06:29 19:34	07:24 18:19	07:26 16:12	08:16 15:40
12	08:22 16:05	07:35 17:05	06:30 18:02	06:12 20:01	05:07 20:58	04:30 21:40	04:44 21:37	05:34 20:45	06:31 19:31	07:26 18:16	07:28 16:10	08:17 15:39
13	08:21 16:06	07:33 17:07	06:27 18:03	06:10 20:03	05:05 20:59	04:29 21:41	04:45 21:36	05:36 20:43	06:32 19:29	07:28 18:14	07:30 16:08	08:18 15:39
14	08:20 16:08	07:30 17:09	06:25 18:05	06:08 20:05	05:03 21:01	04:29 21:42	04:46 21:34	05:38 20:41	06:34 19:26	07:30 18:11	07:32 16:07	08:19 15:39
15	08:19 16:10	07:28 17:11	06:22 18:07	06:05 20:07	05:01 21:03	04:29 21:42	04:48 21:33	05:39 20:39	06:36 19:24	07:32 18:09	07:33 16:05	08:20 15:39
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19	08:15 16:17	07:20 17:19	06:12 18:15	05:56 20:14	04:55 21:10	04:28 21:44	04:53 21:28	05:47 20:30	06:43 19:14	07:40 18:00	07:41 15:59	08:24 15:40
20	08:14 16:19	07:17 17:21	06:10 18:17	05:53 20:16	04:53 21:11	04:28 21:45	04:55 21:27	05:49 20:28	06:45 19:11	07:42 17:57	07:43 15:58	08:24 15:40
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22	08:11 16:23	07:13 17:26	06:05 18:21	05:49 20:20	04:50 21:15	04:29 21:45	04:58 21:24	05:52 20:23	06:49 19:06	07:46 17:53	07:47 15:55	08:26 15:41
23	08:10 16:24	07:11 17:28	06:02 18:23	05:46 20:22	04:48 21:16	04:29 21:45	04:59 21:23	05:54 20:21	06:51 19:04	07:48 17:51	07:49 15:54	08:26 15:42
24	08:08 16:26	07:08 17:30	06:00 18:25	05:44 20:24	04:47 21:18	04:29 21:45	05:01 21:21	05:56 20:18	06:53 19:01	07:50 17:48	07:50 15:52	08:26 15:42
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26	08:06 16:30	07:04 17:34	05:55 18:29	05:40 20:28	04:44 21:21	04:30 21:45	05:04 21:18	06:00 20:13	06:56 18:56	07:54 16:44	07:54 15:50	08:27 15:44
27	08:04 16:32	07:01 17:36	05:52 18:30	05:37 20:30	04:43 21:22	04:31 21:45	05:06 21:16	06:01 20:11	06:58 18:54	07:56 16:42	07:56 15:49	08:27 15:44
28	08:02 16:34	06:59 17:38	05:50 18:32	05:35 20:32	04:42 21:24	04:31 21:45	05:08 21:14	06:03 20:09	07:00 18:51	07:58 16:39	07:57 15:48	08:27 15:45
29	08:01 16:36		06:47 19:34	05:33 20:33	04:41 21:25	04:32 21:45	05:09 21:13	06:05 20:06	07:02 18:48	07:00 16:37	07:59 15:47	08:28 15:46
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31	07:57 16:40		06:42 19:38		04:38 21:28		05:13 21:09	06:09 20:01	07:04 16:33		08:28 15:48	
Potential sun hours	246	271	367	422	497	515	517	462	383	327	256	229
Total, worst case												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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SHADOW - Calendar

Calculation: Eston - Desktop Shadow Flicker Assessment Shadow receptor: Rose Cottage - Shadow Receptor: 1.0 x 1.0 Azimuth: -151.2° Slope: 90.0° (5)

Assumptions for shadow calculations

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	08:27 15:50	07:56 16:42	06:57 17:40	06:40 19:40	05:29 20:37	04:37 21:29	04:33 21:44	05:14 21:07	06:11 19:59	07:06 18:43	07:06 16:31	08:02 15:45
2	08:27 15:51	07:54 16:44	06:54 17:42	06:37 19:42	05:27 20:39	04:36 21:30	04:34 21:44	05:16 21:05	06:12 19:56	07:07 18:41	07:08 16:29	08:04 15:44
3	08:27 15:52	07:52 16:46	06:52 17:44	06:35 19:44	05:24 20:41	04:36 21:31	04:35 21:43	05:18 21:04	06:14 19:54	07:09 18:38	07:10 16:27	08:05 15:44
4	08:27 15:53	07:50 16:48	06:49 17:46	06:32 19:46	05:22 20:43	04:35 21:33	04:35 21:43	05:20 21:02	06:16 19:52	07:11 18:36	07:12 16:25	08:07 15:43
5	08:26 15:54	07:48 16:51	06:47 17:48	06:30 19:48	05:20 20:45	04:34 21:34	04:36 21:42	05:21 21:00	06:18 19:49	07:13 18:33	07:14 16:23	08:08 15:42
6	08:26 15:56	07:47 16:53	06:45 17:50	06:27 19:50	05:18 20:47	04:33 21:35	04:37 21:42	05:23 20:58	06:20 19:47	07:15 18:31	07:16 16:21	08:10 15:42
7	08:25 15:57	07:45 16:55	06:42 17:52	06:25 19:51	05:16 20:48	04:32 21:36	04:38 21:41	05:25 20:56	06:22 19:44	07:17 18:29	07:18 16:19	08:11 15:41
8	08:25 15:59	07:43 16:57	06:40 17:54	06:22 19:53	05:14 20:50	04:32 21:37	04:39 21:40	05:27 20:54	06:23 19:42	07:19 18:26	07:20 16:17	08:12 15:41
9	08:24 16:00	07:41 16:59	06:37 17:56	06:20 19:55	05:12 20:52	04:31 21:38	04:40 21:39	05:29 20:52	06:25 19:39	07:21 18:24	07:22 16:15	08:14 15:40
10	08:24 16:02	07:39 17:01	06:35 17:58	06:17 19:57	05:10 20:54	04:31 21:39	04:42 21:38	05:30 20:50	06:27 19:37	07:23 18:21	07:24 16:14	08:15 15:40
11	08:23 16:03	07:37 17:03	06:32 18:00	06:15 19:59	05:09 20:56	04:30 21:40	04:43 21:37	05:32 20:47	06:29 19:34	07:24 18:19	07:26 16:12	08:16 15:40
12	08:22 16:05	07:35 17:05	06:30 18:02	06:12 20:01	05:07 20:58	04:30 21:40	04:44 21:37	05:34 20:45	06:31 19:31	07:26 18:16	07:28 16:10	08:17 15:40
13	08:21 16:06	07:33 17:07	06:27 18:03	06:10 20:03	05:05 20:59	04:29 21:41	04:45 21:35	05:36 20:43	06:32 19:29	07:28 18:14	07:30 16:08	08:18 15:39
14	08:20 16:08	07:30 17:09	06:25 18:05	06:08 20:05	05:03 21:01	04:29 21:42	04:46 21:34	05:38 20:41	06:34 19:26	07:30 18:11	07:32 16:07	08:19 15:39
15	08:19 16:10	07:28 17:11	06:22 18:07	06:05 20:07	05:01 21:03	04:29 21:42	04:48 21:33	05:39 20:39	06:36 19:24	07:32 18:09	07:33 16:05	08:20 15:39
16	08:18 16:12	07:26 17:13	06:20 18:09	06:03 20:09	05:00 21:05	04:29 21:43	04:49 21:32	05:41 20:37	06:38 19:21	07:34 18:07	07:35 16:04	08:21 15:39
17	08:17 16:13	07:24 17:15	06:17 18:11	06:00 20:11	04:58 21:06	04:28 21:43	04:51 21:31	05:43 20:34	06:40 19:19	07:36 18:04	07:37 16:02	08:22 15:40
18	08:16 16:15	07:22 17:17	06:15 18:13	05:58 20:12	04:56 21:08	04:28 21:44	04:52 21:30	05:45 20:32	06:42 19:16	07:38 18:02	07:39 16:00	08:23 15:40
19	08:15 16:17	07:20 17:19	06:12 18:15	05:56 20:14	04:55 21:10	04:28 21:44	04:53 21:28	05:47 20:30	06:43 19:14	07:40 18:00	07:41 15:59	08:24 15:40
20	08:14 16:19	07:17 17:22	06:10 18:17	05:53 20:16	04:53 21:11	04:28 21:45	04:55 21:27	05:49 20:27	06:45 19:11	07:42 17:57	07:43 15:58	08:24 15:40
21	08:13 16:21	07:15 17:24	06:07 18:19	05:51 20:18	04:51 21:13	04:29 21:45	04:56 21:25	05:50 20:25	06:47 19:09	07:44 17:55	07:45 15:56	08:25 15:41
22	08:11 16:23	07:13 17:26	06:05 18:21	05:49 20:20	04:50 21:15	04:29 21:45	04:58 21:24	05:52 20:23	06:49 19:06	07:46 17:53	07:47 15:55	08:25 15:41
23	08:10 16:24	07:11 17:28	06:02 18:23	05:46 20:22	04:48 21:16	04:29 21:45	04:59 21:23	05:54 20:21	06:51 19:04	07:48 17:51	07:49 15:54	08:26 15:42
24	08:08 16:26	07:08 17:30	06:00 18:25	05:44 20:24	04:47 21:18	04:29 21:45	05:01 21:21	05:56 20:18	06:53 19:01	07:50 17:48	07:50 15:52	08:26 15:42
25	08:07 16:28	07:06 17:32	05:57 18:27	05:42 20:26	04:46 21:19	04:30 21:45	05:03 21:19	05:58 20:16	06:54 18:59	07:52 16:46	07:52 15:51	08:27 15:43
26	08:06 16:30	07:04 17:34	05:55 18:29	05:40 20:28	04:44 21:21	04:30 21:45	05:04 21:18	06:00 20:13	06:56 18:56	07:54 16:44	07:54 15:50	08:27 15:44
27	08:04 16:32	07:01 17:36	05:52 18:30	05:37 20:30	04:43 21:22	04:31 21:45	05:06 21:16	06:01 20:11	06:58 18:54	07:56 16:42	07:56 15:49	08:27 15:44
28	08:02 16:34	06:59 17:38	05:50 18:32	05:35 20:32	04:42 21:24	04:31 21:45	05:08 21:14	06:03 20:09	07:00 18:51	07:57 16:40	07:57 15:48	08:27 15:45
29	08:01 16:36		06:47 19:34	05:33 20:33	04:41 21:25	04:32 21:45	05:09 21:13	06:05 20:06	07:02 18:48	07:00 16:37	07:59 15:47	08:28 15:46
30	07:59 16:38		06:45 19:36	05:31 20:35	04:40 21:26	04:32 21:44	05:11 21:11	06:07 20:04	07:04 18:46	07:02 16:35	08:01 15:46	08:28 15:47
31	07:57 16:40		06:42 19:38		04:38 21:28		05:13 21:09	06:09 20:01		07:04 16:33		08:28 15:48
Potential sun hours	246	271	367	422	497	515	517	462	383	327	256	229
Total, worst case												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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SHADOW - Calendar

Calculation: Eston - Desktop Shadow Flicker Assessment Shadow receptor: Sedgemoor Road - Shadow Receptor: 1.0 × 1.0 Azimuth: -25.3° Slope: 90.0° (2)

Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

	January	February	March	April	May	June	
1	08:28 15:50	07:56 16:42	09:14 (Proposed Turbine)	06:57 17:40	06:40 19:40	05:29 20:37	04:37 21:29
2	08:27 15:51	07:54 16:44	09:14 (Proposed Turbine)	06:54 17:42	06:37 19:42	05:27 20:39	04:36 21:30
3	08:27 15:52	07:52 16:46	09:14 (Proposed Turbine)	06:52 17:44	06:35 19:44	05:24 20:41	04:35 21:31
4	08:27 15:53	07:50 16:48	09:14 (Proposed Turbine)	06:49 17:46	06:32 19:46	05:22 20:43	04:35 21:33
5	08:26 15:54	07:49 16:51	09:15 (Proposed Turbine)	06:47 17:48	06:30 19:48	05:20 20:45	04:34 21:34
6	08:26 15:56	07:47 16:53	09:15 (Proposed Turbine)	06:45 17:50	06:27 19:50	05:18 20:47	04:33 21:35
7	08:26 15:57	07:45 16:55	09:16 (Proposed Turbine)	06:42 17:52	06:25 19:52	05:16 20:48	04:32 21:36
8	08:25 15:59	07:43 16:57	09:17 (Proposed Turbine)	06:40 17:54	06:22 19:53	05:14 20:50	04:32 21:37
9	08:24 16:00	07:41 16:59	09:18 (Proposed Turbine)	06:37 17:56	06:20 19:55	05:12 20:52	04:31 21:38
10	08:24 16:02	07:39 17:01	09:20 (Proposed Turbine)	06:35 17:58	06:17 19:57	05:10 20:54	04:31 21:39
11	08:23 16:03	07:37 17:03	09:22 (Proposed Turbine)	06:32 18:00	06:15 19:59	05:08 20:56	04:30 21:40
12	08:22 16:05	07:35 17:05	09:26 (Proposed Turbine)	06:30 18:02	06:12 20:01	05:07 20:58	04:30 21:40
13	08:21 16:06	07:33 17:07	09:31 (Proposed Turbine)	06:27 18:03	06:10 20:03	05:05 20:59	04:29 21:41
14	08:20 16:08	07:30 17:09		06:25 18:05	06:08 20:05	05:03 21:01	04:29 21:42
15	08:19 16:10	07:28 17:11		06:22 18:07	06:05 20:07	05:01 21:03	04:29 21:42
16	08:18 16:11	07:26 17:13		06:20 18:09	06:03 20:09	04:59 21:05	04:29 21:43
17	08:17 16:13	07:24 17:15		06:17 18:11	06:00 20:11	04:58 21:06	04:28 21:43
18	08:16 16:15	07:22 17:17		06:15 18:13	05:58 20:13	04:56 21:08	04:28 21:44
19	08:15 16:17	07:20 17:19		06:12 18:15	05:56 20:14	04:55 21:10	04:28 21:44
20	08:14 16:19	07:17 17:21		06:10 18:17	05:53 20:16	04:53 21:11	04:28 21:45
21	08:13 16:21	07:15 17:24	09:22 (Proposed Turbine)	06:07 18:19	05:51 20:18	04:51 21:13	04:29 21:45
22	08:11 16:22	07:13 17:26	09:27 (Proposed Turbine)	06:05 18:21	05:49 20:20	04:50 21:15	04:29 21:45
23	08:10 16:24	07:11 17:28	09:31 (Proposed Turbine)	06:02 18:23	05:46 20:22	04:48 21:16	04:29 21:45
24	08:08 16:26	07:08 17:30	09:32 (Proposed Turbine)	06:00 18:25	05:44 20:24	04:47 21:18	04:29 21:45
25	08:07 16:28	07:06 17:32	09:17 (Proposed Turbine)	05:57 18:27	05:42 20:26	04:46 21:19	04:30 21:45
26	08:06 16:30	07:04 17:34	09:36 (Proposed Turbine)	05:55 18:29	05:40 20:28	04:44 21:21	04:30 21:45
27	08:04 16:32	07:01 17:36	09:15 (Proposed Turbine)	05:52 18:30	05:37 20:30	04:43 21:22	04:31 21:45
28	08:02 16:34	06:59 17:38	09:38 (Proposed Turbine)	05:50 18:32	05:35 20:32	04:42 21:24	04:31 21:45
29	08:01 16:36	09:14 (Proposed Turbine)	09:39 (Proposed Turbine)	06:47 19:34	05:33 20:33	04:41 21:25	04:32 21:45
30	07:59 16:38	09:14 (Proposed Turbine)	09:14 (Proposed Turbine)	06:45 19:36	05:31 20:35	04:39 21:26	04:32 21:45
31	07:57 16:40	09:14 (Proposed Turbine)	09:14 (Proposed Turbine)	06:42 19:38		04:38 21:28	
Potential sun hours	246	271		367	422	498	515
Total, worst case	213	257					

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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SHADOW - Calendar

Calculation: Eston - Desktop Shadow Flicker Assessment Shadow receptor: Sedgemoor Road - Shadow Receptor: 1.0 x 1.0 Azimuth: -25.3° Slope: 90.0° (2)

Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

	July	August	September	October		November	December
1	04:33 21:44	05:14 21:07	06:11 19:59	07:06 18:43		07:06 16:31	08:49 (Proposed Turbine) 08:02 09:07 (Proposed Turbine) 15:45
2	04:34 21:44	05:16 21:06	06:12 19:56	07:07 18:41		07:08 16:29	08:48 (Proposed Turbine) 08:04 09:08 (Proposed Turbine) 15:44
3	04:35 21:43	05:18 21:04	06:14 19:54	07:09 18:38		07:10 16:27	08:46 (Proposed Turbine) 08:05 09:09 (Proposed Turbine) 15:43
4	04:35 21:43	05:20 21:02	06:16 19:52	07:11 18:36		07:12 16:25	08:46 (Proposed Turbine) 08:07 09:09 (Proposed Turbine) 15:43
5	04:36 21:42	05:21 21:00	06:18 19:49	07:13 18:33		07:14 16:23	08:46 (Proposed Turbine) 08:08 09:11 (Proposed Turbine) 15:42
6	04:37 21:42	05:23 20:58	06:20 19:47	07:15 18:31		07:16 16:21	08:45 (Proposed Turbine) 08:10 09:11 (Proposed Turbine) 15:42
7	04:38 21:41	05:25 20:56	06:22 19:44	07:17 18:29		07:18 16:19	08:45 (Proposed Turbine) 08:11 09:11 (Proposed Turbine) 15:41
8	04:39 21:40	05:27 20:54	06:23 19:42	07:19 18:26		07:20 16:17	08:45 (Proposed Turbine) 08:13 09:11 (Proposed Turbine) 15:41
9	04:40 21:39	05:28 20:52	06:25 19:39	07:21 18:24		07:22 16:15	08:45 (Proposed Turbine) 08:14 09:11 (Proposed Turbine) 15:40
10	04:42 21:38	05:30 20:50	06:27 19:37	07:23 18:21		07:24 16:14	08:45 (Proposed Turbine) 08:15 09:11 (Proposed Turbine) 15:40
11	04:43 21:38	05:32 20:47	06:29 19:34	07:24 18:19		07:26 16:12	08:46 (Proposed Turbine) 08:16 09:12 (Proposed Turbine) 15:40
12	04:44 21:37	05:34 20:45	06:31 19:32	07:26 18:16		07:28 16:10	08:46 (Proposed Turbine) 08:17 09:12 (Proposed Turbine) 15:39
13	04:45 21:36	05:36 20:43	06:32 19:29	07:28 18:14		07:30 16:08	08:46 (Proposed Turbine) 08:18 09:11 (Proposed Turbine) 15:39
14	04:46 21:34	05:38 20:41	06:34 19:26	07:30 18:11		07:32 16:07	08:47 (Proposed Turbine) 08:19 09:11 (Proposed Turbine) 15:39
15	04:48 21:33	05:39 20:39	06:36 19:24	07:32 18:09		07:33 16:05	08:47 (Proposed Turbine) 08:20 09:10 (Proposed Turbine) 15:39
16	04:49 21:32	05:41 20:37	06:38 19:21	07:34 18:07		07:35 16:03	08:48 (Proposed Turbine) 08:21 09:09 (Proposed Turbine) 15:39
17	04:51 21:31	05:43 20:34	06:40 19:19	07:36 18:04		07:37 16:02	08:50 (Proposed Turbine) 08:22 09:10 (Proposed Turbine) 15:39
18	04:52 21:30	05:45 20:32	06:42 19:16	07:38 18:02		07:39 16:00	08:51 (Proposed Turbine) 08:23 09:09 (Proposed Turbine) 15:40
19	04:53 21:28	05:47 20:30	06:43 19:14	07:40 18:00		07:41 15:59	08:53 (Proposed Turbine) 08:24 09:07 (Proposed Turbine) 15:40
20	04:55 21:27	05:49 20:28	06:45 19:11	07:42 17:57		07:43 15:58	08:55 (Proposed Turbine) 08:24 09:06 (Proposed Turbine) 15:40
21	04:56 21:26	05:50 20:25	06:47 19:09	07:44 17:55		07:45 15:56	08:58 (Proposed Turbine) 08:25 09:03 (Proposed Turbine) 15:41
22	04:58 21:24	05:52 20:23	06:49 19:06	07:46 17:53		07:47 15:55	08:26 15:41
23	04:59 21:23	05:54 20:21	06:51 19:04	07:48 17:51		07:49 15:54	08:26 15:42
24	05:01 21:21	05:56 20:18	06:53 19:01	07:50 17:48		07:50 15:52	08:26 15:42
25	05:03 21:19	05:58 20:16	06:54 18:59	07:52 17:46		07:52 15:51	08:27 15:43
26	05:04 21:18	06:00 20:13	06:56 18:56	07:54 16:44		07:54 15:50	08:27 15:44
27	05:06 21:16	06:01 20:11	06:58 18:54	07:56 16:42		07:56 15:49	08:27 15:44
28	05:08 21:15	06:03 20:09	07:00 18:51	06:58 16:39		07:57 15:48	08:28 15:45
29	05:09 21:13	06:05 20:06	07:02 18:48	07:00 16:37		07:59 15:47	08:28 15:46
30	05:11 21:11	06:07 20:04	07:04 18:46	07:02 16:35	8	08:01 15:46	08:28 15:47
31	05:13 21:09	06:09 20:01	07:04 18:44	07:04 16:33	14	08:51 (Proposed Turbine) 15:46 09:05 (Proposed Turbine) 15:48	08:28 15:48
Potential sun hours	517	462	383	327		256	229
Total, worst case				22		452	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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SHADOW - Calendar

Calculation: Eston - Desktop Shadow Flicker Assessment Shadow receptor: Woodcock Close - Shadow Receptor: 1.0 x 1.0 Azimuth: -15.1° Slope: 90.0° (4)
Assumptions for shadow calculations

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

	January	February	March	April	May	June	July	August	September	October	November	December		
1	08:28 15:50	10:40 (Proposed Turbine) 11:01 (Proposed Turbine)	07:56 16:42	06:57 17:40	06:40 19:40	05:29 20:37	04:37 21:29	04:33 21:44	05:14 21:07	06:11 19:59	07:06 18:43	07:06 16:31	08:02 15:45	
2	08:27 15:51	10:41 (Proposed Turbine) 11:01 (Proposed Turbine)	07:54 16:44	06:54 17:42	06:37 19:42	05:27 20:39	04:36 21:30	04:34 21:44	05:16 21:06	06:12 19:56	07:07 18:41	07:08 16:29	08:04 15:44	4
3	08:27 15:52	10:41 (Proposed Turbine) 11:01 (Proposed Turbine)	07:52 16:46	06:52 17:44	06:35 19:44	05:24 20:41	04:35 21:31	04:35 21:43	05:18 21:04	06:14 19:54	07:10 18:38	07:10 16:27	08:05 15:43	10
4	08:27 15:53	10:42 (Proposed Turbine) 11:02 (Proposed Turbine)	07:50 16:48	06:49 17:46	06:32 19:46	05:22 20:43	04:35 21:33	04:35 21:43	05:20 21:02	06:16 19:52	07:11 18:36	07:12 16:25	08:07 15:43	12
5	08:26 15:54	10:43 (Proposed Turbine) 11:01 (Proposed Turbine)	07:49 16:50	06:47 17:48	06:30 19:48	05:20 20:45	04:34 21:34	04:36 21:42	05:21 21:00	06:18 19:49	07:13 18:33	07:14 16:23	08:08 15:42	15
6	08:26 15:56	10:43 (Proposed Turbine) 11:01 (Proposed Turbine)	07:47 16:53	06:45 17:50	06:27 19:50	05:18 20:47	04:33 21:35	04:37 21:42	05:23 21:08	06:20 19:47	07:15 18:31	07:16 16:21	08:10 15:42	16
7	08:26 15:57	10:45 (Proposed Turbine) 11:01 (Proposed Turbine)	07:45 16:55	06:42 17:52	06:25 19:52	05:16 20:48	04:32 21:36	04:38 21:41	05:25 21:06	06:21 19:44	07:17 18:29	07:18 16:19	08:11 15:41	17
8	08:25 15:59	10:46 (Proposed Turbine) 11:00 (Proposed Turbine)	07:43 16:57	06:40 17:54	06:22 19:53	05:14 20:50	04:32 21:37	04:39 21:40	05:27 21:04	06:23 19:42	07:19 18:26	07:20 16:17	08:13 15:41	18
9	08:24 16:00	10:47 (Proposed Turbine) 11:00 (Proposed Turbine)	07:41 16:59	06:37 17:56	06:20 19:55	05:12 20:52	04:31 21:38	04:40 21:39	05:28 20:52	06:25 19:39	07:21 18:24	07:22 16:15	08:14 15:40	19
10	08:24 16:02	10:49 (Proposed Turbine) 10:59 (Proposed Turbine)	07:39 17:01	06:35 17:58	06:17 19:57	05:10 20:54	04:31 21:39	04:42 21:38	05:30 20:50	06:27 19:37	07:23 18:21	07:24 16:14	08:15 15:40	20
11	08:23 16:03	10:52 (Proposed Turbine) 10:56 (Proposed Turbine)	07:37 17:03	06:32 18:00	06:15 19:59	05:08 20:56	04:30 21:40	04:43 21:38	05:32 20:47	06:29 19:34	07:24 18:19	07:26 16:12	08:16 15:40	21
12	08:22 16:05	10:56 (Proposed Turbine)	07:35 17:05	06:30 18:02	06:12 20:01	05:07 20:58	04:30 21:40	04:44 21:37	05:34 20:45	06:31 19:31	07:26 18:16	07:28 16:10	08:17 15:39	21
13	08:21 16:06		07:33 17:07	06:27 18:03	06:10 20:03	05:05 20:59	04:29 21:41	04:45 21:36	05:36 20:43	06:32 19:29	07:28 18:14	07:30 16:08	08:18 15:39	22
14	08:20 16:08		07:30 17:09	06:25 18:05	06:08 20:05	05:03 21:01	04:29 21:42	04:46 21:34	05:38 20:41	06:34 19:26	07:30 18:11	07:32 16:07	08:19 15:39	22
15	08:19 16:10		07:28 17:11	06:22 18:07	06:05 20:07	05:01 21:03	04:29 21:42	04:48 21:33	05:39 20:39	06:36 19:24	07:32 18:09	07:33 16:05	08:20 15:39	22
16	08:18 16:11		07:26 17:13	06:20 18:09	06:03 20:09	04:59 21:05	04:29 21:43	04:49 21:32	05:41 20:37	06:38 19:21	07:34 18:07	07:35 16:03	08:21 15:39	23
17	08:17 16:13		07:24 17:15	06:17 18:11	06:00 20:11	04:58 21:06	04:28 21:43	04:50 21:31	05:43 20:34	06:40 19:19	07:36 18:04	07:37 16:02	08:22 15:39	22
18	08:16 16:15		07:22 17:17	06:15 18:13	05:58 20:13	04:56 21:08	04:28 21:44	04:52 21:30	05:45 20:32	06:42 19:16	07:38 18:02	07:39 16:00	08:23 15:40	23
19	08:15 16:17		07:20 17:19	06:12 18:15	05:56 20:14	04:55 21:10	04:28 21:44	04:53 21:28	05:47 20:30	06:43 19:14	07:40 18:00	07:41 15:59	08:24 15:40	23
20	08:14 16:19		07:17 17:21	06:10 18:17	05:53 20:16	04:53 21:11	04:28 21:45	04:55 21:27	05:49 20:28	06:45 19:11	07:42 17:57	07:43 15:58	08:24 15:40	23
21	08:13 16:21		07:15 17:24	06:07 18:19	05:51 20:18	04:51 21:13	04:29 21:45	04:56 21:26	05:50 20:25	06:47 19:09	07:44 17:55	07:45 15:56	08:25 15:41	23
22	08:11 16:22		07:13 17:26	06:05 18:21	05:49 20:20	04:50 21:15	04:29 21:45	04:58 21:24	05:52 20:23	06:49 19:06	07:46 17:53	07:47 15:55	08:26 15:41	23
23	08:10 16:24		07:11 17:28	06:02 18:23	05:46 20:22	04:48 21:16	04:29 21:45	04:59 21:23	05:54 20:21	06:51 19:04	07:48 17:51	07:49 15:54	08:26 15:42	23
24	08:08 16:26		07:08 17:30	06:00 18:25	05:44 20:24	04:47 21:18	04:29 21:45	05:01 21:21	05:56 20:18	06:53 19:01	07:50 17:48	07:50 15:52	08:26 15:42	23
25	08:07 16:28		07:06 17:32	05:57 18:27	05:42 20:26	04:46 21:19	04:30 21:45	05:03 21:19	05:58 20:16	06:54 18:59	07:52 16:46	07:52 15:51	08:27 15:43	23
26	08:06 16:30		07:04 17:34	05:55 18:29	05:40 20:28	04:44 21:21	04:30 21:45	05:04 21:18	06:00 20:13	06:56 18:56	07:54 16:44	07:54 15:50	08:27 15:44	22
27	08:04 16:32		07:01 17:36	05:52 18:30	05:37 20:30	04:43 21:22	04:31 21:45	05:06 21:16	06:01 20:11	06:58 18:54	07:56 16:42	07:56 15:49	08:27 15:44	23
28	08:02 16:34		06:59 17:38	05:50 18:32	05:35 20:32	04:42 21:24	04:31 21:45	05:08 21:15	06:03 20:09	07:00 18:51	07:58 16:39	07:57 15:48	08:28 15:45	22
29	08:01 16:36			06:47 19:34	05:33 20:33	04:41 21:25	04:32 21:45	05:09 21:13	06:05 20:06	07:02 18:48	07:00 16:37	07:59 15:47	08:28 15:46	22
30	07:59 16:38			06:45 19:36	05:31 20:35	04:39 21:26	04:32 21:45	05:11 21:11	06:07 20:04	07:04 18:46	07:02 16:35	08:01 15:46	08:28 15:47	22
31	07:57 16:40			06:42 19:38	05:30 20:35	04:38 21:28	04:32 21:45	05:13 21:09	06:09 20:01	07:04 18:33	07:04 16:33	08:02 15:48	08:28 15:48	21
Potential sun hours	246		271	367	422	498	515	517	462	383	327	256	229	620
Total, worst case	174													

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

SHADOW - Calendar

Calculation: Eston - Desktop Shadow Flicker Assessment Shadow receptor: Woodlands Drive - Shadow Receptor: 1.0 x 1.0 Azimuth: -58.9° Slope: 90.0° (3)

Assumptions for shadow calculations

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

	January	February	March	April	May	June	
1	08:28 15:50	07:56 16:42	06:57 17:40	07:46 (Proposed Turbine) 08:03 (Proposed Turbine)	06:40 19:40	05:29 20:37	04:37 21:29
2	08:27 15:51	07:54 16:44	06:54 17:42	07:44 (Proposed Turbine) 08:03 (Proposed Turbine)	06:37 19:42	05:27 20:39	04:36 21:30
3	08:27 15:52	07:52 16:46	06:52 17:44	07:43 (Proposed Turbine) 08:04 (Proposed Turbine)	06:35 19:44	05:24 20:41	04:35 21:31
4	08:27 15:53	07:50 16:48	06:49 17:46	07:42 (Proposed Turbine) 08:04 (Proposed Turbine)	06:32 19:46	05:22 20:43	04:35 21:33
5	08:26 15:54	07:49 16:51	06:47 17:48	07:42 (Proposed Turbine) 08:05 (Proposed Turbine)	06:30 19:48	05:20 20:45	04:34 21:34
6	08:26 15:56	07:47 16:53	06:45 17:50	07:41 (Proposed Turbine) 08:04 (Proposed Turbine)	06:27 19:50	05:18 20:47	04:33 21:35
7	08:26 15:57	07:45 16:55	06:42 17:52	07:42 (Proposed Turbine) 08:04 (Proposed Turbine)	06:25 19:52	05:16 20:48	04:32 21:36
8	08:25 15:59	07:43 16:57	06:40 17:54	07:41 (Proposed Turbine) 08:03 (Proposed Turbine)	06:22 19:53	05:14 20:50	04:32 21:37
9	08:24 16:00	07:41 16:59	06:37 17:56	07:42 (Proposed Turbine) 08:03 (Proposed Turbine)	06:20 19:55	05:12 20:52	04:31 21:38
10	08:24 16:02	07:39 17:01	06:35 17:58	07:42 (Proposed Turbine) 08:01 (Proposed Turbine)	06:17 19:57	05:10 20:54	04:31 21:39
11	08:23 16:03	07:37 17:03	06:32 18:00	07:44 (Proposed Turbine) 08:00 (Proposed Turbine)	06:15 19:59	05:08 20:56	04:30 21:40
12	08:22 16:05	07:35 17:05	06:30 18:02	07:45 (Proposed Turbine) 07:57 (Proposed Turbine)	06:12 20:01	05:07 20:58	04:30 21:40
13	08:21 16:06	07:33 17:07	06:27 18:03	07:49 (Proposed Turbine) 07:53 (Proposed Turbine)	06:10 20:03	05:05 20:59	04:29 21:41
14	08:20 16:08	07:30 17:09	06:25 18:05		06:08 20:05	05:03 21:01	04:29 21:42
15	08:19 16:10	07:28 17:11	06:22 18:07		06:05 20:07	05:01 21:03	04:29 21:42
16	08:18 16:12	07:26 17:13	06:20 18:09		06:03 20:09	05:00 21:05	04:29 21:43
17	08:17 16:13	07:24 17:15	06:17 18:11		06:00 20:11	04:58 21:06	04:28 21:43
18	08:16 16:15	07:22 17:17	06:15 18:13		05:58 20:13	04:56 21:08	04:28 21:44
19	08:15 16:17	07:20 17:19	06:12 18:15		05:56 20:14	04:55 21:10	04:28 21:44
20	08:14 16:19	07:17 17:21	06:10 18:17		05:53 20:16	04:53 21:11	04:28 21:45
21	08:13 16:21	07:15 17:24	06:07 18:19		05:51 20:18	04:51 21:13	04:29 21:45
22	08:11 16:22	07:13 17:26	06:05 18:21		05:49 20:20	04:50 21:15	04:29 21:45
23	08:10 16:24	07:11 17:28	06:02 18:23		05:46 20:22	04:48 21:16	04:29 21:45
24	08:08 16:26	07:08 17:30	06:00 18:25		05:44 20:24	04:47 21:18	04:29 21:45
25	08:07 16:28	07:06 17:32	05:57 18:27		05:42 20:26	04:46 21:19	04:30 21:45
26	08:06 16:30	07:04 17:34	05:55 18:29		05:40 20:28	04:44 21:21	04:30 21:45
27	08:04 16:32	07:01 17:36	05:52 18:30	07:51 (Proposed Turbine) 07:58 (Proposed Turbine)	05:37 20:30	04:43 21:22	04:31 21:45
28	08:02 16:34	06:59 17:38	05:50 18:32	07:48 (Proposed Turbine) 08:01 (Proposed Turbine)	05:35 20:32	04:42 21:24	04:31 21:45
29	08:01 16:36		06:47 19:34		05:33 20:33	04:41 21:25	04:32 21:45
30	07:59 16:38		06:45 19:36		05:31 20:35	04:40 21:26	04:32 21:45
31	07:57 16:40		06:42 19:38			04:38 21:28	
Potential sun hours	246	271	367		422	497	515
Total, worst case		20		241			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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SHADOW - Calendar

Calculation: Eston - Desktop Shadow Flicker Assessment Shadow receptor: Woodlands Drive - Shadow Receptor: 1.0 x 1.0 Azimuth: -58.9° Slope: 90.0° (3)

Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

	July	August	September	October		November	December
1	04:33 21:44	05:14 21:07	06:11 19:59	07:06 18:43		08:25 (Proposed Turbine)	07:06 15:45
2	04:34 21:44	05:16 21:06	06:12 19:56	07:07 18:41	10	08:35 (Proposed Turbine)	16:31 08:04
3	04:35 21:43	05:18 21:04	06:14 19:54	07:09 18:38	14	08:37 (Proposed Turbine)	16:29 08:05
4	04:35 21:43	05:20 21:02	06:16 19:52	07:11 18:36	17	08:39 (Proposed Turbine)	16:25 08:07
5	04:36 21:42	05:21 21:00	06:18 19:49	07:13 18:33	19	08:19 (Proposed Turbine)	07:14 15:43
6	04:37 21:42	05:23 20:58	06:20 19:47	07:15 18:31	21	08:40 (Proposed Turbine)	16:23 08:10
7	04:38 21:41	05:25 20:56	06:22 19:44	07:17 18:29	22	08:40 (Proposed Turbine)	16:21 08:11
8	04:39 21:40	05:27 20:54	06:23 19:42	07:19 18:26	23	08:17 (Proposed Turbine)	07:18 15:41
9	04:40 21:39	05:29 20:52	06:25 19:39	07:21 18:24	23	08:40 (Proposed Turbine)	16:17 08:14
10	04:42 21:38	05:30 20:50	06:27 19:37	07:23 18:21	22	08:17 (Proposed Turbine)	07:22 15:40
11	04:43 21:38	05:32 20:47	06:29 19:34	07:24 18:19	20	08:39 (Proposed Turbine)	16:14 08:15
12	04:44 21:37	05:34 20:45	06:31 19:32	07:26 18:16	18	08:18 (Proposed Turbine)	07:26 15:40
13	04:45 21:36	05:36 20:43	06:32 19:29	07:28 18:14	20	08:38 (Proposed Turbine)	16:12 08:17
14	04:46 21:34	05:38 20:41	06:34 19:26	07:30 18:11	18	08:19 (Proposed Turbine)	07:28 15:39
15	04:48 21:33	05:39 20:39	06:36 19:24	07:32 18:09	15	08:20 (Proposed Turbine)	07:30 15:39
16	04:49 21:32	05:41 20:37	06:38 19:21	07:34 18:07	11	08:35 (Proposed Turbine)	16:08 08:19
17	04:51 21:31	05:43 20:34	06:40 19:19	07:36 18:04		08:22 (Proposed Turbine)	07:32 15:39
18	04:52 21:30	05:45 20:32	06:42 19:16	07:38 18:02		08:33 (Proposed Turbine)	16:07 15:39
19	04:53 21:28	05:47 20:30	06:43 19:14	07:40 18:00			07:33 08:20
20	04:55 21:27	05:49 20:28	06:45 19:11	07:42 17:57			16:05 08:21
21	04:56 21:26	05:50 20:25	06:47 19:09	07:44 17:55			07:35 15:39
22	04:58 21:24	05:52 20:23	06:49 19:06	07:46 17:53			16:03 08:22
23	04:59 21:23	05:54 20:21	06:51 19:04	07:48 17:51			07:37 15:39
24	05:01 21:21	05:56 20:18	06:53 19:01	07:50 17:48			16:02 08:23
25	05:03 21:19	05:58 20:16	06:54 18:59	07:52 16:46			07:39 08:23
26	05:04 21:18	06:00 20:13	06:56 18:56	07:54 16:44			16:00 15:40
27	05:06 21:16	06:01 20:11	06:58 18:54	07:56 16:42			07:41 08:24
28	05:08 21:15	06:03 20:09	07:00 18:51	07:58 16:39			15:59 15:40
29	05:09 21:13	06:05 20:06	07:02 18:48	08:00 16:37			07:43 08:24
30	05:11 21:11	06:07 20:04	07:04 18:46	08:02 16:35			15:58 15:40
31	05:13 21:09	06:09 20:01		08:04 16:33			07:45 08:25
Potential sun hours	517	462	383	327			15:56 15:41
Total, worst case				257			07:47 08:26

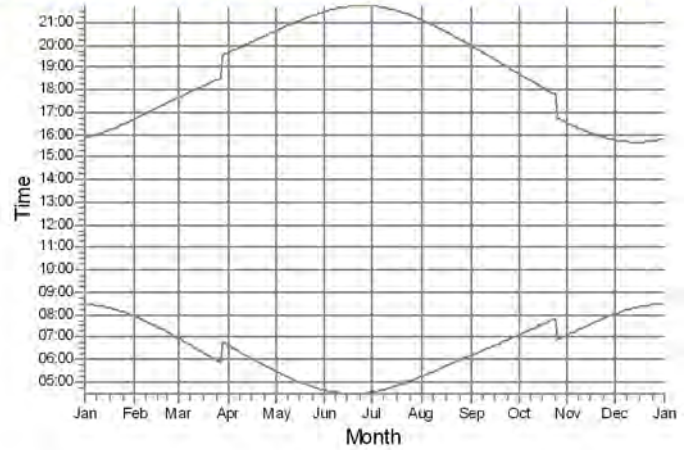
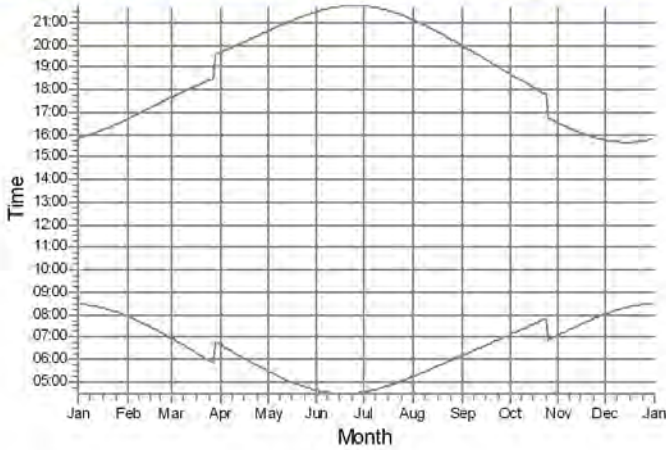
Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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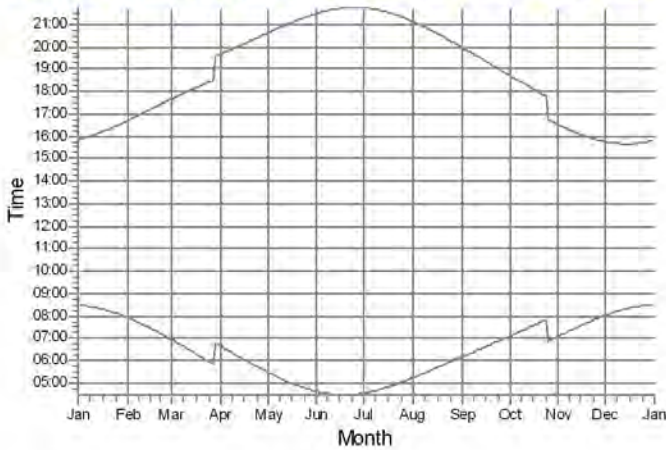
SHADOW - Calendar, graphical

Calculation: Eston - Desktop Shadow Flicker Assessment

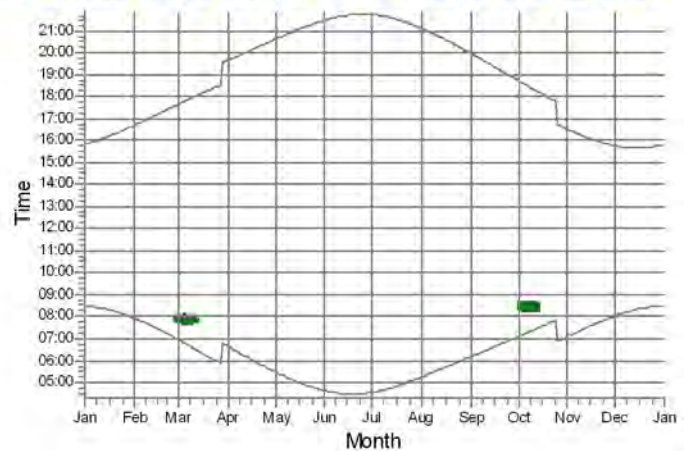
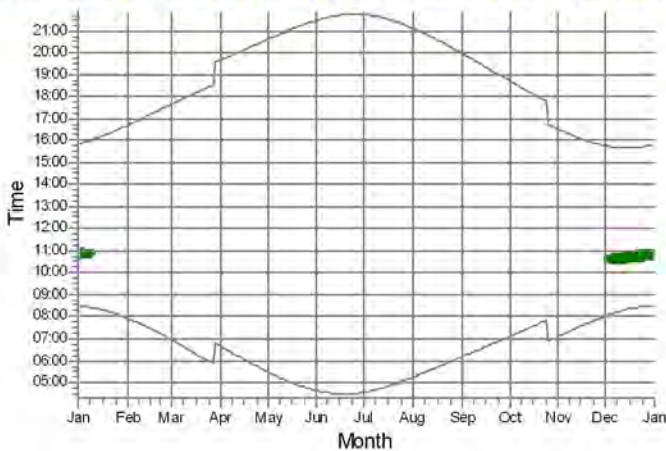
ation Centre (Villa Marie): Shadow Receptor: 1.0 × 1.0 Azimuth: 37.5° Slopts Lane Centre: Shadow Receptor: 1.0 × 1.0 Azimuth: -139.7° Slope: 90.0°




lose Cottage: Shadow Receptor: 1.0 × 1.0 Azimuth: -151.2° Slope: 90.0° (Edgemoor Road: Shadow Receptor: 1.0 × 1.0 Azimuth: -25.3° Slope: 90.0°)



oodcock Close: Shadow Receptor: 1.0 × 1.0 Azimuth: -15.1° Slope: 90.0° (oodlands Drive: Shadow Receptor: 1.0 × 1.0 Azimuth: -58.9° Slope: 90.0°)



WTGs

 Proposed Turbine: ENERCON E-44 900 44.0 !-! hub: 55.0 m (TOT: 77.0 m) (1)

SHADOW - Calendar per WTG

Calculation: Eston - Desktop Shadow Flicker Assessment WTG: Proposed Turbine - ENERCON E-44 900 44.0 !-! hub: 55.0 m (TOT: 77.0 m) (1)
Assumptions for shadow calculations

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

	January	February	March	April	May	June
1	08:27 10:40-11:01/21 15:50	07:56 09:14-09:40/26 16:42	06:57 07:46-08:03/17 17:40	06:40 19:40	05:29 20:37	04:37 21:29
2	08:27 10:41-11:01/20 15:51	07:54 09:14-09:40/26 16:44	06:54 07:44-08:03/19 17:42	06:37 19:42	05:27 20:39	04:36 21:30
3	08:27 10:41-11:01/20 15:52	07:52 09:14-09:41/27 16:46	06:52 07:43-08:04/21 17:44	06:35 19:44	05:24 20:41	04:35 21:31
4	08:27 10:42-11:02/20 15:53	07:50 09:14-09:41/27 16:48	06:49 07:42-08:04/22 17:46	06:32 19:46	05:22 20:43	04:35 21:33
5	08:26 10:43-11:01/18 15:54	07:48 09:15-09:40/25 16:50	06:47 07:42-08:05/23 17:48	06:30 19:48	05:20 20:45	04:34 21:34
6	08:26 10:43-11:01/18 15:56	07:47 09:15-09:40/25 16:53	06:45 07:41-08:04/23 17:50	06:27 19:50	05:18 20:47	04:33 21:35
7	08:25 10:45-11:01/16 15:57	07:45 09:16-09:40/24 16:55	06:42 07:42-08:04/22 17:52	06:25 19:51	05:16 20:48	04:32 21:36
8	08:25 10:46-11:00/14 15:59	07:43 09:17-09:39/22 16:57	06:40 07:41-08:03/22 17:54	06:22 19:53	05:14 20:50	04:32 21:37
9	08:24 10:47-11:00/13 16:00	07:41 09:18-09:38/20 16:59	06:37 07:42-08:03/21 17:56	06:20 19:55	05:12 20:52	04:31 21:38
10	08:24 10:49-10:59/10 16:02	07:39 09:20-09:37/17 17:01	06:35 07:42-08:01/19 17:58	06:17 19:57	05:10 20:54	04:31 21:39
11	08:23 10:52-10:56/4 16:03	07:37 09:22-09:35/13 17:03	06:32 07:44-08:00/16 18:00	06:15 19:59	05:08 20:56	04:30 21:40
12	08:22 16:05	07:35 09:26-09:31/5 17:05	06:30 07:45-07:57/12 18:02	06:12 20:01	05:07 20:58	04:30 21:40
13	08:21 16:06	07:33 17:07	06:27 07:49-07:53/4 18:03	06:10 20:03	05:05 20:59	04:29 21:41
14	08:20 16:08	07:30 17:09	06:25 18:05	06:08 20:05	05:03 21:01	04:29 21:42
15	08:19 16:10	07:28 17:11	06:22 18:07	06:05 20:07	05:01 21:03	04:29 21:42
16	08:18 16:11	07:26 17:13	06:20 18:09	06:03 20:09	04:59 21:05	04:29 21:43
17	08:17 16:13	07:24 17:15	06:17 18:11	06:00 20:11	04:58 21:06	04:28 21:43
18	08:16 16:15	07:22 17:17	06:15 18:13	05:58 20:12	04:56 21:08	04:28 21:44
19	08:15 16:17	07:20 17:19	06:12 18:15	05:56 20:14	04:55 21:10	04:28 21:44
20	08:14 16:19	07:17 17:21	06:10 18:17	05:53 20:16	04:53 21:11	04:28 21:45
21	08:13 09:22-09:27/5 16:21	07:15 17:24	06:07 18:19	05:51 20:18	04:51 21:13	04:29 21:45
22	08:11 09:20-09:31/11 16:22	07:13 17:26	06:05 18:21	05:49 20:20	04:50 21:15	04:29 21:45
23	08:10 09:18-09:32/14 16:24	07:11 17:28	06:02 18:23	05:46 20:22	04:48 21:16	04:29 21:45
24	08:08 09:17-09:35/18 16:26	07:08 17:30	06:00 18:25	05:44 20:24	04:47 21:18	04:29 21:45
25	08:07 09:16-09:36/20 16:28	07:06 17:32	05:57 18:27	05:42 20:26	04:46 21:19	04:30 21:45
26	08:06 09:15-09:36/21 16:30	07:04 17:34	05:55 18:29	05:40 20:28	04:44 21:21	04:30 21:45
27	08:04 09:15-09:38/23 16:32	07:01 07:51-07:58/7 17:36	05:52 18:30	05:37 20:30	04:43 21:22	04:31 21:45
28	08:02 09:15-09:39/24 16:34	06:59 07:48-08:01/13 17:38	05:50 18:32	05:35 20:32	04:42 21:24	04:31 21:45
29	08:01 09:14-09:39/25 16:36		06:47 19:34	05:33 20:33	04:41 21:25	04:32 21:45
30	07:59 09:14-09:40/26 16:38		06:45 19:36	05:31 20:35	04:39 21:26	04:32 21:44
31	07:57 09:14-09:40/26 16:40		06:42 19:38		04:38 21:28	
Potential sun hours	246	271	367	422	497	515
Sum of minutes with flicker	387	277	241	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker

SHADOW - Calendar per WTG

Calculation: Eston - Desktop Shadow Flicker Assessment WTG: Proposed Turbine - ENERCON E-44 900 44.0 !-! hub: 55.0 m (TOT: 77.0 m) (1)
Assumptions for shadow calculations

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

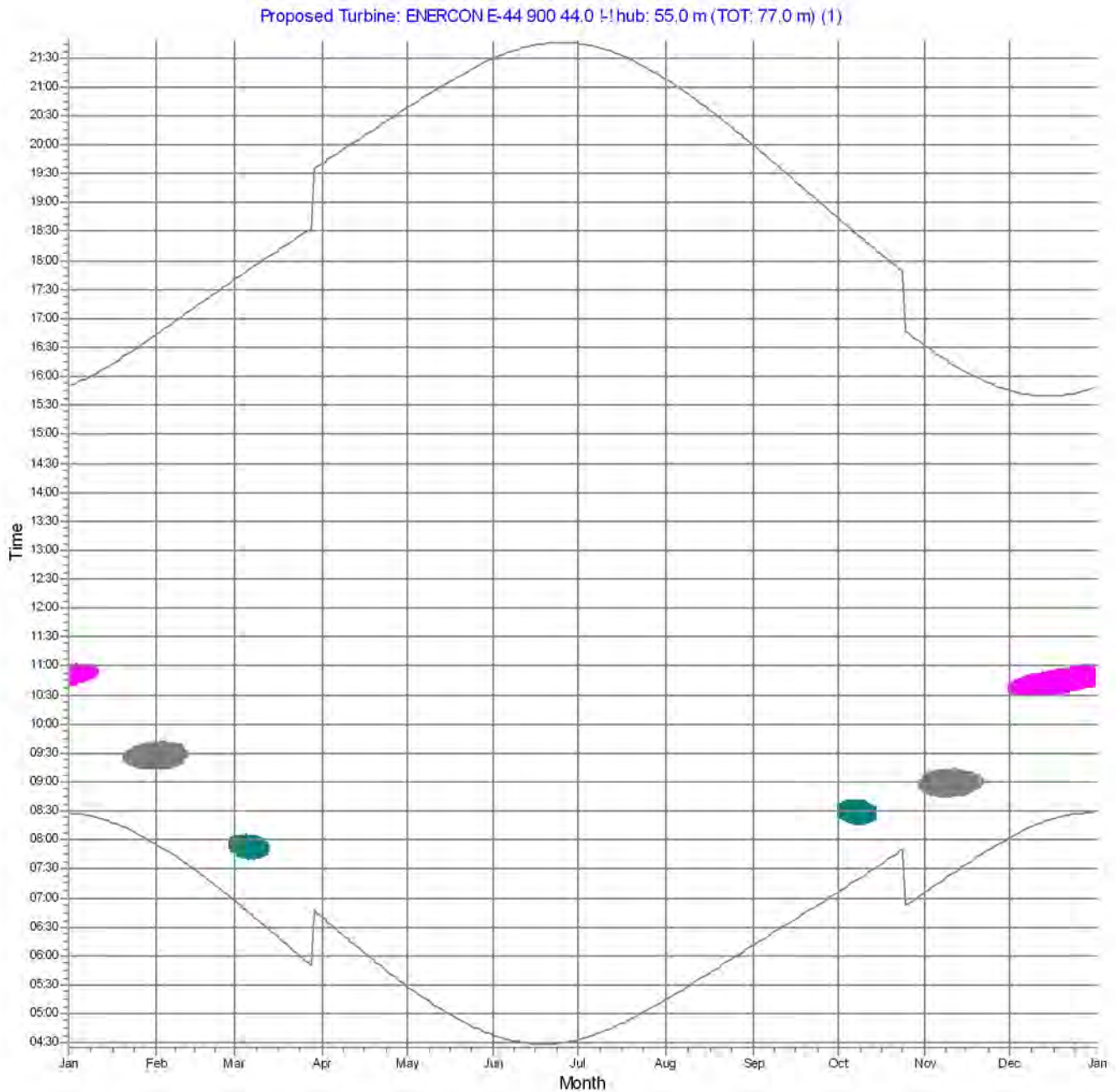
	July	August	September	October	November	December
1	04:33 21:44	05:14 21:07	06:11 19:59	07:06 18:43	08:25-08:35/10 16:31	08:02 15:45
2	04:34 21:44	05:16 21:06	06:12 19:56	07:07 18:41	08:23-08:37/14 16:29	08:04 15:44
3	04:35 21:43	05:18 21:04	06:14 19:54	07:09 18:38	08:21-08:38/17 16:27	08:05 15:43
4	04:35 21:43	05:20 21:02	06:16 19:52	07:11 18:36	08:20-08:39/19 16:25	08:07 15:43
5	04:36 21:42	05:21 21:00	06:18 19:49	07:13 18:33	08:19-08:40/21 16:23	08:08 15:42
6	04:37 21:42	05:23 20:58	06:20 19:47	07:15 18:31	08:18-08:40/22 16:21	08:10 15:42
7	04:38 21:41	05:25 20:56	06:21 19:44	07:17 18:29	08:17-08:40/23 16:19	08:11 15:41
8	04:39 21:40	05:27 20:54	06:23 19:42	07:19 18:26	08:17-08:40/23 16:17	08:12 15:41
9	04:40 21:39	05:28 20:52	06:25 19:39	07:21 18:24	08:17-08:39/22 16:15	08:14 15:40
10	04:42 21:38	05:30 20:50	06:27 19:37	07:22 18:21	08:17-08:39/22 16:14	08:15 15:40
11	04:43 21:37	05:32 20:47	06:29 19:34	07:24 18:19	08:18-08:38/20 16:12	08:16 15:40
12	04:44 21:37	05:34 20:45	06:31 19:31	07:26 18:16	08:19-08:37/18 16:10	08:17 15:39
13	04:45 21:35	05:36 20:43	06:32 19:29	07:28 18:14	08:20-08:35/15 16:08	08:18 15:39
14	04:46 21:34	05:38 20:41	06:34 19:26	07:30 18:11	08:22-08:33/11 16:07	08:19 15:39
15	04:48 21:33	05:39 20:39	06:36 19:24	07:32 18:09	08:47-09:10/23 16:05	08:20 15:39
16	04:49 21:32	05:41 20:37	06:38 19:21	07:34 18:07	08:48-09:09/21 16:03	08:21 15:39
17	04:50 21:31	05:43 20:34	06:40 19:19	07:36 18:04	08:50-09:10/20 16:02	08:22 15:39
18	04:52 21:30	05:45 20:32	06:42 19:16	07:38 18:02	08:51-09:09/18 16:00	08:23 15:40
19	04:53 21:28	05:47 20:30	06:43 19:14	07:40 18:00	08:53-09:07/14 15:59	08:24 15:40
20	04:55 21:27	05:49 20:27	06:45 19:11	07:42 17:57	08:55-09:06/11 15:58	08:24 15:40
21	04:56 21:26	05:50 20:25	06:47 19:09	07:44 17:55	08:58-09:03/5 15:56	08:25 15:41
22	04:58 21:24	05:52 20:23	06:49 19:06	07:46 17:53	07:47 15:55	08:25 15:41
23	04:59 21:23	05:54 20:21	06:51 19:04	07:48 17:51	07:49 15:54	08:26 15:42
24	05:01 21:21	05:56 20:18	06:53 19:01	07:50 17:48	07:50 15:52	08:26 15:42
25	05:03 21:19	05:58 20:16	06:54 18:59	06:52 16:46	07:52 15:51	08:27 15:43
26	05:04 21:18	06:00 20:13	06:56 18:56	06:54 16:44	07:54 15:50	08:27 15:44
27	05:06 21:16	06:01 20:11	06:58 18:53	06:56 16:42	07:56 15:49	08:27 15:44
28	05:08 21:14	06:03 20:09	07:00 18:51	06:58 16:39	07:57 15:48	08:27 15:45
29	05:09 21:13	06:05 20:07	07:02 18:48	07:00 16:37	07:59 15:47	08:28 15:46
30	05:11 21:11	06:07 20:04	07:04 18:46	07:02 16:35	08:53-09:01/8 15:46	08:28 15:47
31	05:13 21:09	06:09 20:01		07:04 16:33	08:51-09:05/14 15:46	08:28 15:48
Potential sun hours	517	462	383	327	256	229
Sum of minutes with flicker	0	0	0	279	452	620

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker

SHADOW - Calendar per WTG, graphical

Calculation: Eston - Desktop Shadow Flicker Assessment WTG: Proposed Turbine - ENERCON E-44 900 44.0 !-! hub: 55.0 m (TOT: 77.0 m) (1)



Shadow receptors

- Sedgemoor Road: Shadow Receptor: 1.0 × 1.0 Azimuth: -25.3° Slope: 90.0° (2)
- Woodcock Close: Shadow Receptor: 1.0 × 1.0 Azimuth: -15.1° Slope: 90.0° (4)
- Woodlands Drive: Shadow Receptor: 1.0 × 1.0 Azimuth: -58.9° Slope: 90.0° (3)