Bijlage 10 In- en uitvoergegevens slagschaduw

CONCEPT

Alternatief A – Maximaal gedimensioneerde windturbine

Project:
20250423 WP Oude Buurserdijk

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Amsterdamseweg 13
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Timo / timo.van.arkel@rhdhv.com
Calculated:
13/10/2025 13:55/4.1.273

SHADOW - Main Result

Calculation: 20250521 Ref toetspunten Opstelling A

Assumptions for shadow calculations

Maximum distance for influence 1. WTG distance circle radius

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

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

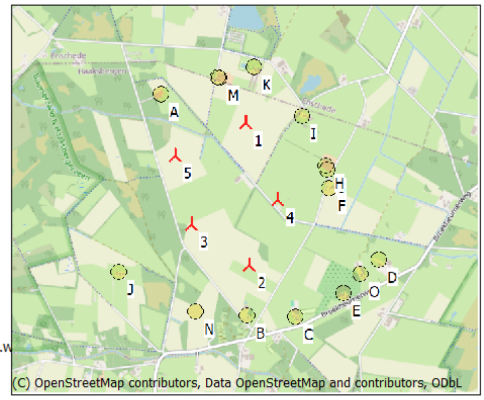
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.20	0.37	0.42	0.50	0.47	0.47	0.44	0.47	0.47	0.35	0.28	0.19

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
382	509	779	466	535	609	1,034	1,753	1,113	623	522	428	8,753

Monthly aggregation of real case reduction
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:
DHM: Elevation Grid Data Object: 20250423 WP Oude Buurserdijk_EMDGrid_0.w
Receptor grid resolution: 1.0 m

All coordinates are in
Dutch Stereo-RD/NAP 2008



Scale 1:40,000
New WTG Shadow receptor

WTGs

	X (east)	Y (north)	Z [m]	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Shadow data Calculation distance [m]	RPM [RPM]
1	254,209	465,299	30.0	Pondera RD200HH130 12000 200...	No	Pondera	RD200HH130-12,000	12,000	200.0	180.0	2,400	-
2	254,254	464,234	32.6	Pondera RD200HH130 12000 200...	No	Pondera	RD200HH130-12,000	12,000	200.0	180.0	2,400	-
3	253,815	464,529	31.7	Pondera RD200HH130 12000 200...	No	Pondera	RD200HH130-12,000	12,000	200.0	180.0	2,400	-
4	254,458	464,732	31.6	Pondera RD200HH130 12000 200...	No	Pondera	RD200HH130-12,000	12,000	200.0	180.0	2,400	-
5	253,680	465,046	32.0	Pondera RD200HH130 12000 200...	No	Pondera	RD200HH130-12,000	12,000	200.0	180.0	2,400	-

Shadow receptor-Input

No.	Name	X (east)	Y (north)	Z [m]	Width [m]	Height [m]	Elevation a.g.l. [m]	Slope of window [°]	Direction mode	Eye height (ZVI) a.g.l. [m]
A	13	253,565	465,500	32.3	8.0	5.0	0.0	90.0	"Green house mode"	5.0
B	2	254,242	463,857	34.7	8.0	5.0	0.0	90.0	"Green house mode"	5.0
C	3	254,608	463,852	36.1	8.0	5.0	0.0	90.0	"Green house mode"	5.0
D	5	255,226	464,292	33.7	8.0	5.0	0.0	90.0	"Green house mode"	5.0
E	4	254,968	464,042	34.2	8.0	5.0	0.0	90.0	"Green house mode"	5.0
F	6	254,843	464,818	37.0	8.0	5.0	0.0	90.0	"Green house mode"	5.0
G	7	254,828	464,959	35.5	8.0	5.0	0.0	90.0	"Green house mode"	5.0
H	8	254,815	464,988	36.0	8.0	5.0	0.0	90.0	"Green house mode"	5.0
I	9	254,631	465,354	37.6	8.0	5.0	0.0	90.0	"Green house mode"	5.0
J	1	253,272	464,167	30.1	8.0	5.0	0.5	90.0	"Green house mode"	5.5
K	10	254,257	465,716	33.2	8.0	5.0	0.0	90.0	"Green house mode"	5.0
L	12	253,990	465,634	33.1	8.0	5.0	0.0	90.0	"Green house mode"	5.0
M	11	254,001	465,632	33.2	8.0	5.0	0.0	90.0	"Green house mode"	5.0
N	14	253,858	463,877	31.4	8.0	5.0	0.0	90.0	"Green house mode"	5.0
O	15	255,089	464,184	35.4	8.0	5.0	0.0	90.0	"Green house mode"	5.0

Calculation Results

Shadow receptor

No.	Name	Shadow, expected values Shadow hours per year [h/year]
A	13	65:17
B	2	0:00
C	3	0:00

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Calculated:
13/10/2025 13:55/4.1.273

SHADOW - Main Result

Calculation: 20250521 Ref toetspunten Opstelling A

...continued from previous page

No.	Name	Shadow, expected values Shadow hours per year [h/year]
D	5	28:37
E	4	38:42
F	6	104:21
G	7	87:37
H	8	89:48
I	9	106:26
J	1	27:40
K	10	69:21
L	12	76:09
M	11	78:04
N	14	0:00
O	15	30:33

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

No.	Name	Expected [h/year]
1	Pondera RD200HH130 12000 200.0 !-! hub: 180.0 m (TOT: 280.0 m) (20)	204:29
2	Pondera RD200HH130 12000 200.0 !-! hub: 180.0 m (TOT: 280.0 m) (21)	90:15
3	Pondera RD200HH130 12000 200.0 !-! hub: 180.0 m (TOT: 280.0 m) (22)	57:25
4	Pondera RD200HH130 12000 200.0 !-! hub: 180.0 m (TOT: 280.0 m) (23)	183:32
5	Pondera RD200HH130 12000 200.0 !-! hub: 180.0 m (TOT: 280.0 m) (24)	117:41

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.

The calculation of the total expected values for a given receptor assumes a weighted average directional reduction for all WTGs contributing to shadow flicker within the same day. In the case where shadow flicker from different WTGs is not concurrent within the day, the total expected time at a given receptor may deviate marginally from the individual flicker time caused by each turbine separately.

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Calculated:
13/10/2025 13:55/4.1.273

SHADOW - Main Result

Calculation: 20250521 Ref toetspunten Opstelling B

Assumptions for shadow calculations

Maximum distance for influence 1. WTG distance circle radius

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

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

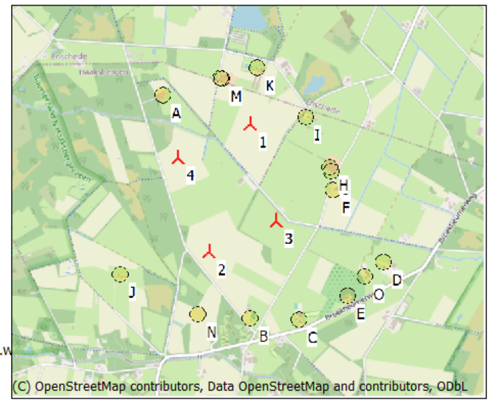
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.20	0.37	0.42	0.50	0.47	0.47	0.44	0.47	0.47	0.35	0.28	0.19

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
382	509	779	466	535	609	1,034	1,753	1,113	623	522	428	8,753

Monthly aggregation of real case reduction
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:
DHM: Elevation Grid Data Object: 20250423 WP Oude Buurserdijk_EMDGrid_0.w
Receptor grid resolution: 1.0 m

All coordinates are in
Dutch Stereo-RD/NAP 2008



Scale 1:40,000
New WTG Shadow receptor

WTGs

	X (east)	Y (north)	Z [m]	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Shadow data Calculation distance [m]	RPM [RPM]
1	254,213	465,297	30.1	Pondera RD200HH130 12000 200...	No	Pondera	RD200HH130-12,000	12,000	200.0	180.0	2,400	-
2	253,925	464,347	32.0	Pondera RD200HH130 12000 200...	No	Pondera	RD200HH130-12,000	12,000	200.0	180.0	2,400	-
3	254,424	464,583	30.1	Pondera RD200HH130 12000 200...	No	Pondera	RD200HH130-12,000	12,000	200.0	180.0	2,400	-
4	253,686	465,038	32.0	Pondera RD200HH130 12000 200...	No	Pondera	RD200HH130-12,000	12,000	200.0	180.0	2,400	-

Shadow receptor-Input

No.	Name	X (east)	Y (north)	Z [m]	Width [m]	Height [m]	Elevation a.g.l. [m]	Slope of window [°]	Direction mode	Eye height (ZVI) a.g.l. [m]
A	13	253,565	465,500	32.3	8.0	5.0	0.0	90.0	"Green house mode"	5.0
B	2	254,242	463,857	34.7	8.0	5.0	0.0	90.0	"Green house mode"	5.0
C	3	254,608	463,852	36.1	8.0	5.0	0.0	90.0	"Green house mode"	5.0
D	5	255,226	464,292	33.7	8.0	5.0	0.0	90.0	"Green house mode"	5.0
E	4	254,968	464,042	34.2	8.0	5.0	0.0	90.0	"Green house mode"	5.0
F	6	254,843	464,818	37.0	8.0	5.0	0.0	90.0	"Green house mode"	5.0
G	7	254,828	464,959	35.5	8.0	5.0	0.0	90.0	"Green house mode"	5.0
H	8	254,815	464,988	36.0	8.0	5.0	0.0	90.0	"Green house mode"	5.0
I	9	254,631	465,354	37.6	8.0	5.0	0.0	90.0	"Green house mode"	5.0
J	1	253,272	464,167	30.1	8.0	5.0	0.5	90.0	"Green house mode"	5.5
K	10	254,257	465,716	33.2	8.0	5.0	0.0	90.0	"Green house mode"	5.0
L	12	253,990	465,634	33.1	8.0	5.0	0.0	90.0	"Green house mode"	5.0
M	11	254,001	465,632	33.2	8.0	5.0	0.0	90.0	"Green house mode"	5.0
N	14	253,858	463,877	31.4	8.0	5.0	0.0	90.0	"Green house mode"	5.0
O	15	255,089	464,184	35.4	8.0	5.0	0.0	90.0	"Green house mode"	5.0

Calculation Results

Shadow receptor

No.	Name	Shadow, expected values Shadow hours per year [h/year]
A	13	62:53
B	2	0:00
C	3	0:00
D	5	35:14

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SHADOW - Main Result

Calculation: 20250521 Ref toetspunten Opstelling B

...continued from previous page

No.	Name	Shadow, expected values Shadow hours per year [h/year]
E	4	14:09
F	6	52:28
G	7	55:52
H	8	59:11
I	9	96:19
J	1	42:06
K	10	64:50
L	12	73:59
M	11	75:45
N	14	0:00
O	15	18:19

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

No.	Name	Expected [h/year]
1	Pondera RD200HH130 12000 200.0 !-! hub: 180.0 m (TOT: 280.0 m) (46)	203:42
2	Pondera RD200HH130 12000 200.0 !-! hub: 180.0 m (TOT: 280.0 m) (47)	86:34
3	Pondera RD200HH130 12000 200.0 !-! hub: 180.0 m (TOT: 280.0 m) (48)	126:39
4	Pondera RD200HH130 12000 200.0 !-! hub: 180.0 m (TOT: 280.0 m) (49)	116:39

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.

The calculation of the total expected values for a given receptor assumes a weighted average directional reduction for all WTGs contributing to shadow flicker within the same day. In the case where shadow flicker from different WTGs is not concurrent within the day, the total expected time at a given receptor may deviate marginally from the individual flicker time caused by each turbine separately.

Alternatief C – Maximaal gedimensioneerde windturbine

Project:
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Timo / timo.van.arkel@rhdhv.com
Calculated:
13/10/2025 13:56/4.1.273

SHADOW - Main Result

Calculation: 20250521 Ref toetspunten Opstelling C

Assumptions for shadow calculations

Maximum distance for influence 1. WTG distance circle radius

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

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

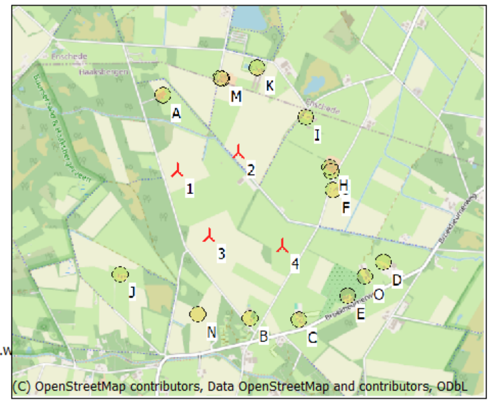
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.20	0.37	0.42	0.50	0.47	0.47	0.44	0.47	0.47	0.35	0.28	0.19

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
382	509	779	466	535	609	1,034	1,753	1,113	623	522	428	8,753

Monthly aggregation of real case reduction
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:
DHM: Elevation Grid Data Object: 20250423 WP Oude Buurserdijk_EMDGrid_0.w
Receptor grid resolution: 1.0 m

All coordinates are in
Dutch Stereo-RD/NAP 2008



Scale 1:40,000
New WTG Shadow receptor

WTGs

	X (east)	Y (north)	Z [m]	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Shadow data Calculation distance [m]	RPM [RPM]
1	253,679	464,946	31.0	Pondera RD200HH130 12000 200...	No	Pondera	RD200HH130-12,000	12,000	200.0	180.0	2,400	-
2	254,137	465,088	32.0	Pondera RD200HH130 12000 200...	No	Pondera	RD200HH130-12,000	12,000	200.0	180.0	2,400	-
3	253,928	464,464	30.1	Pondera RD200HH130 12000 200...	No	Pondera	RD200HH130-12,000	12,000	200.0	180.0	2,400	-
4	254,473	464,396	34.0	Pondera RD200HH130 12000 200...	No	Pondera	RD200HH130-12,000	12,000	200.0	180.0	2,400	-

Shadow receptor-Input

No.	Name	X (east)	Y (north)	Z [m]	Width [m]	Height [m]	Elevation a.g.l. [m]	Slope of window [°]	Direction mode	Eye height (ZVI) a.g.l. [m]
A	13	253,565	465,500	32.3	8.0	5.0	0.0	90.0	"Green house mode"	5.0
B	2	254,242	463,857	34.7	8.0	5.0	0.0	90.0	"Green house mode"	5.0
C	3	254,608	463,852	36.1	8.0	5.0	0.0	90.0	"Green house mode"	5.0
D	5	255,226	464,292	33.7	8.0	5.0	0.0	90.0	"Green house mode"	5.0
E	4	254,968	464,042	34.2	8.0	5.0	0.0	90.0	"Green house mode"	5.0
F	6	254,843	464,818	37.0	8.0	5.0	0.0	90.0	"Green house mode"	5.0
G	7	254,828	464,959	35.5	8.0	5.0	0.0	90.0	"Green house mode"	5.0
H	8	254,815	464,988	36.0	8.0	5.0	0.0	90.0	"Green house mode"	5.0
I	9	254,631	465,354	37.6	8.0	5.0	0.0	90.0	"Green house mode"	5.0
J	1	253,272	464,167	30.1	8.0	5.0	0.5	90.0	"Green house mode"	5.5
K	10	254,257	465,716	33.2	8.0	5.0	0.0	90.0	"Green house mode"	5.0
L	12	253,990	465,634	33.1	8.0	5.0	0.0	90.0	"Green house mode"	5.0
M	11	254,001	465,632	33.2	8.0	5.0	0.0	90.0	"Green house mode"	5.0
N	14	253,858	463,877	31.4	8.0	5.0	0.0	90.0	"Green house mode"	5.0
O	15	255,089	464,184	35.4	8.0	5.0	0.0	90.0	"Green house mode"	5.0

Calculation Results

Shadow receptor

No.	Name	Shadow, expected values Shadow hours per year [h/year]
A	13	48:27
B	2	0:00
C	3	0:00
D	5	33:17

To be continued on next page...

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SHADOW - Main Result

Calculation: 20250521 Ref toetspunten Opstelling C

...continued from previous page

No.	Name	**Shadow, expected values** Shadow hours per year [h/year]
E	4	17:38
F	6	71:19
G	7	73:40
H	8	73:08
I	9	46:53
J	1	33:51
K	10	33:34
L	12	43:46
M	11	44:24
N	14	0:00
O	15	40:19

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

No.	Name	Expected [h/year]
1	Pondera RD200HH130 12000 200.0 !-! hub: 180.0 m (TOT: 280.0 m) (50)	97:09
2	Pondera RD200HH130 12000 200.0 !-! hub: 180.0 m (TOT: 280.0 m) (51)	145:25
3	Pondera RD200HH130 12000 200.0 !-! hub: 180.0 m (TOT: 280.0 m) (52)	84:50
4	Pondera RD200HH130 12000 200.0 !-! hub: 180.0 m (TOT: 280.0 m) (53)	108:03

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.

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Alternatief D – Maximaal gedimensioneerde windturbine

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Calculated:
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SHADOW - Main Result

Calculation: 20250521 Ref toetspunten Opstelling D

Assumptions for shadow calculations

Maximum distance for influence 1. WTG distance circle radius

Minimum sun height over horizon for influence 3 °
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
0.20	0.37	0.42	0.50	0.47	0.47	0.44	0.47	0.47	0.35	0.28	0.19

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
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Receptor grid resolution: 1.0 m

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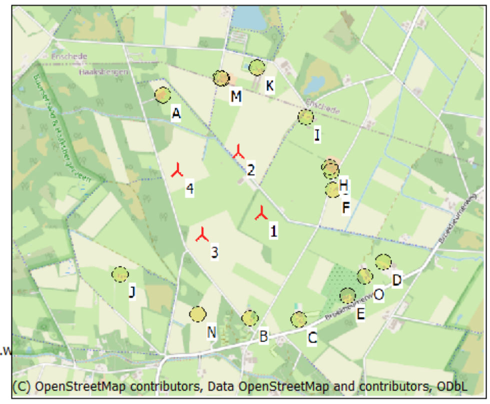

Scale 1:40,000
New WTG Shadow receptor

WTGs

	X (east)	Y (north)	Z [m]	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Shadow data Calculation distance [m]	RPM [RPM]
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3	253,879	464,475	30.9	Pondera RD200HH130 12000 200...	No	Pondera	RD200HH130-12,000	12,000	200.0	180.0	2,400	-
4	253,679	464,946	31.0	Pondera RD200HH130 12000 200...	No	Pondera	RD200HH130-12,000	12,000	200.0	180.0	2,400	-

Shadow receptor-Input

No.	Name	X (east)	Y (north)	Z [m]	Width [m]	Height [m]	Elevation a.g.l. [m]	Slope of window [°]	Direction mode	Eye height (ZVI) a.g.l. [m]
A	13	253,565	465,500	32.3	8.0	5.0	0.0	90.0	"Green house mode"	5.0
B	2	254,242	463,857	34.7	8.0	5.0	0.0	90.0	"Green house mode"	5.0
C	3	254,608	463,852	36.1	8.0	5.0	0.0	90.0	"Green house mode"	5.0
D	5	255,226	464,292	33.7	8.0	5.0	0.0	90.0	"Green house mode"	5.0
E	4	254,968	464,042	34.2	8.0	5.0	0.0	90.0	"Green house mode"	5.0
F	6	254,843	464,818	37.0	8.0	5.0	0.0	90.0	"Green house mode"	5.0
G	7	254,828	464,959	35.5	8.0	5.0	0.0	90.0	"Green house mode"	5.0
H	8	254,815	464,988	36.0	8.0	5.0	0.0	90.0	"Green house mode"	5.0
I	9	254,631	465,354	37.6	8.0	5.0	0.0	90.0	"Green house mode"	5.0
J	1	253,272	464,167	30.1	8.0	5.0	0.5	90.0	"Green house mode"	5.5
K	10	254,257	465,716	33.2	8.0	5.0	0.0	90.0	"Green house mode"	5.0
L	12	253,990	465,634	33.1	8.0	5.0	0.0	90.0	"Green house mode"	5.0
M	11	254,001	465,632	33.2	8.0	5.0	0.0	90.0	"Green house mode"	5.0
N	14	253,858	463,877	31.4	8.0	5.0	0.0	90.0	"Green house mode"	5.0
O	15	255,089	464,184	35.4	8.0	5.0	0.0	90.0	"Green house mode"	5.0

Calculation Results

Shadow receptor

No.	Name	Shadow, expected values Shadow hours per year [h/year]
A	13	50:52
B	2	0:00
C	3	0:00
D	5	27:08

To be continued on next page...

Project:
20250423 WP Oude Buurserdijk

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Timo / timo.van.arkel@rhdhv.com
Calculated:
13/10/2025 13:56/4.1.273

SHADOW - Main Result

Calculation: 20250521 Ref toetspunten Opstelling D

...continued from previous page

No. Name	Shadow, expected values Shadow hours per year [h/year]
E 4	16:54
F 6	64:42
G 7	68:22
H 8	69:50
I 9	58:28
J 1	24:19
K 10	34:01
L 12	43:41
M 11	44:19
N 14	0:00
O 15	18:36

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

No.	Name	Expected [h/year]
1	Pondera RD200HH130 12000 200.0 !-! hub: 180.0 m (TOT: 280.0 m) (54)	125:31
2	Pondera RD200HH130 12000 200.0 !-! hub: 180.0 m (TOT: 280.0 m) (55)	145:34
3	Pondera RD200HH130 12000 200.0 !-! hub: 180.0 m (TOT: 280.0 m) (56)	76:37
4	Pondera RD200HH130 12000 200.0 !-! hub: 180.0 m (TOT: 280.0 m) (57)	97:09

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.

The calculation of the total expected values for a given receptor assumes a weighted average directional reduction for all WTGs contributing to shadow flicker within the same day. In the case where shadow flicker from different WTGs is not concurrent within the day, the total expected time at a given receptor may deviate marginally from the individual flicker time caused by each turbine separately.

Alternatief A – Kleinere windturbine

Project:
20250423 WP Oude Buurserdijk

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Timo / timo.van.arkel@rhdhv.com
Calculated:
13/10/2025 14:10/4.1.273

SHADOW - Main Result

Calculation: 20251008 Ref toetspunten Opstelling A V150

Assumptions for shadow calculations

Maximum distance for influence   1. WTG distance circle radius

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

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

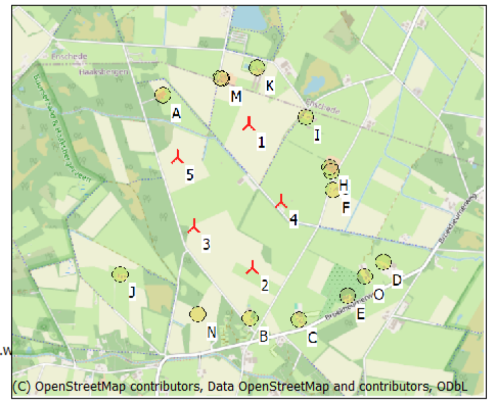
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.20	0.37	0.42	0.50	0.47	0.47	0.44	0.47	0.47	0.35	0.28	0.19

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
382	509	779	466	535	609	1,034	1,753	1,113	623	522	428	8,753

Monthly aggregation of real case reduction
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:
DHM: Elevation Grid Data Object: 20250423 WP Oude Buurserdijk_EMDGrid_0.w
Receptor grid resolution: 1.0 m

All coordinates are in
Dutch Stereo-RD/NAP 2008



Scale 1:40,000
New WTG   Shadow receptor

WTGs

	X (east)	Y (north)	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
			[m]					[kW]	[m]	[m]	[m]	[RPM]
1	254,209	465,299	30.0	VESTAS V150-4.2 4200 150.0 !O! hub: ...	Yes	VESTAS	V150-4.2-4,200	4,200	150.0	155.0	1,800	10.4
2	254,254	464,234	32.6	VESTAS V150-4.2 4200 150.0 !O! hub: ...	Yes	VESTAS	V150-4.2-4,200	4,200	150.0	155.0	1,800	10.4
3	253,815	464,529	31.7	VESTAS V150-4.2 4200 150.0 !O! hub: ...	Yes	VESTAS	V150-4.2-4,200	4,200	150.0	155.0	1,800	10.4
4	254,458	464,732	31.6	VESTAS V150-4.2 4200 150.0 !O! hub: ...	Yes	VESTAS	V150-4.2-4,200	4,200	150.0	155.0	1,800	10.4
5	253,680	465,046	32.0	VESTAS V150-4.2 4200 150.0 !O! hub: ...	Yes	VESTAS	V150-4.2-4,200	4,200	150.0	155.0	1,800	10.4

Shadow receptor-Input

No.	Name	X (east)	Y (north)	Z	Width	Height	Elevation a.g.l.	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
				[m]	[m]	[m]	[m]	[°]		[m]
A	13	253,565	465,500	32.3	8.0	5.0	0.0	90.0	"Green house mode"	5.0
B	2	254,242	463,857	34.7	8.0	5.0	0.0	90.0	"Green house mode"	5.0
C	3	254,608	463,852	36.1	8.0	5.0	0.0	90.0	"Green house mode"	5.0
D	5	255,226	464,292	33.7	8.0	5.0	0.0	90.0	"Green house mode"	5.0
E	4	254,968	464,042	34.2	8.0	5.0	0.0	90.0	"Green house mode"	5.0
F	6	254,843	464,818	37.0	8.0	5.0	0.0	90.0	"Green house mode"	5.0
G	7	254,828	464,959	35.5	8.0	5.0	0.0	90.0	"Green house mode"	5.0
H	8	254,815	464,988	36.0	8.0	5.0	0.0	90.0	"Green house mode"	5.0
I	9	254,631	465,354	37.6	8.0	5.0	0.0	90.0	"Green house mode"	5.0
J	1	253,272	464,167	30.1	8.0	5.0	0.5	90.0	"Green house mode"	5.5
K	10	254,257	465,716	33.2	8.0	5.0	0.0	90.0	"Green house mode"	5.0
L	12	253,990	465,634	33.1	8.0	5.0	0.0	90.0	"Green house mode"	5.0
M	11	254,001	465,632	33.2	8.0	5.0	0.0	90.0	"Green house mode"	5.0
N	14	253,858	463,877	31.4	8.0	5.0	0.0	90.0	"Green house mode"	5.0
O	15	255,089	464,184	35.4	8.0	5.0	0.0	90.0	"Green house mode"	5.0

Calculation Results

Shadow receptor

No.	Name	Shadow, expected values Shadow hours per year
		[h/year]
A	13	38:00
B	2	0:00
C	3	0:00

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windPRO 4.1.273 by EMD International A/S, Tel. +45 69 16 48 50, www.emd-international.com, support@emd.dk   13/10/2025 15:32 / 1   windPRO

Project:
20250423 WP Oude Buurserdijk

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Calculated:
13/10/2025 14:10/4.1.273

SHADOW - Main Result

Calculation: 20251008 Ref toetspunten Opstelling A V150

...continued from previous page

No.	Name	Shadow, expected values Shadow hours per year [h/year]
D	5	18:36
E	4	27:51
F	6	56:24
G	7	53:40
H	8	55:24
I	9	56:59
J	1	16:03
K	10	39:51
L	12	46:02
M	11	47:18
N	14	0:00
O	15	18:19

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

No.	Name	Expected [h/year]
1	VESTAS V150-4.2 4200 150.0 !O! hub: 155.0 m (TOT: 230.0 m) (25)	120:11
2	VESTAS V150-4.2 4200 150.0 !O! hub: 155.0 m (TOT: 230.0 m) (26)	58:07
3	VESTAS V150-4.2 4200 150.0 !O! hub: 155.0 m (TOT: 230.0 m) (27)	31:11
4	VESTAS V150-4.2 4200 150.0 !O! hub: 155.0 m (TOT: 230.0 m) (28)	105:48
5	VESTAS V150-4.2 4200 150.0 !O! hub: 155.0 m (TOT: 230.0 m) (29)	73:12

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.

The calculation of the total expected values for a given receptor assumes a weighted average directional reduction for all WTGs contributing to shadow flicker within the same day. In the case where shadow flicker from different WTGs is not concurrent within the day, the total expected time at a given receptor may deviate marginally from the individual flicker time caused by each turbine separately.

Alternatief B – Kleinere windturbine

Project:
20250423 WP Oude Buurserdijk

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Timo / timo.van.arkel@rhdhv.com
Calculated:
13/10/2025 14:10/4.1.273

SHADOW - Main Result

Calculation: 20251008 Ref toetspunten Opstelling B V150

Assumptions for shadow calculations

Maximum distance for influence 1. WTG distance circle radius

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

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

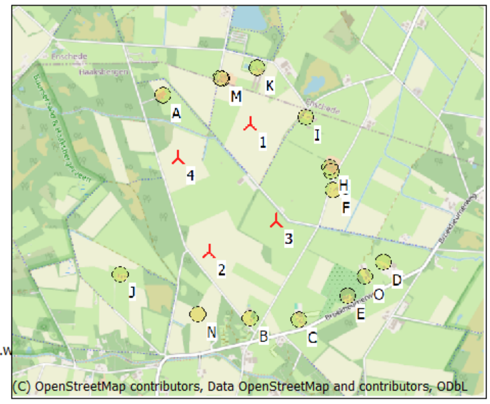
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.20	0.37	0.42	0.50	0.47	0.47	0.44	0.47	0.47	0.35	0.28	0.19

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
382	509	779	466	535	609	1,034	1,753	1,113	623	522	428	8,753

Monthly aggregation of real case reduction
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:
DHM: Elevation Grid Data Object: 20250423 WP Oude Buurserdijk_EMDGrid_0.w
Receptor grid resolution: 1.0 m

All coordinates are in
Dutch Stereo-RD/NAP 2008



Scale 1:40,000
New WTG Shadow receptor

WTGs

	X (east)	Y (north)	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
			[m]					[kW]	[m]	[m]	[m]	[RPM]
1	254,213	465,297	30.1	VESTAS V150-4.2 4200 150.0 !O! hub: ...	Yes	VESTAS	V150-4.2-4,200	4,200	150.0	155.0	1,800	10.4
2	253,925	464,347	32.0	VESTAS V150-4.2 4200 150.0 !O! hub: ...	Yes	VESTAS	V150-4.2-4,200	4,200	150.0	155.0	1,800	10.4
3	254,424	464,583	30.1	VESTAS V150-4.2 4200 150.0 !O! hub: ...	Yes	VESTAS	V150-4.2-4,200	4,200	150.0	155.0	1,800	10.4
4	253,686	465,038	32.0	VESTAS V150-4.2 4200 150.0 !O! hub: ...	Yes	VESTAS	V150-4.2-4,200	4,200	150.0	155.0	1,800	10.4

Shadow receptor-Input

No.	Name	X (east)	Y (north)	Z	Width	Height	Elevation a.g.l.	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
				[m]	[m]	[m]	[m]	[°]		[m]
A	13	253,565	465,500	32.3	8.0	5.0	0.0	90.0	"Green house mode"	5.0
B	2	254,242	463,857	34.7	8.0	5.0	0.0	90.0	"Green house mode"	5.0
C	3	254,608	463,852	36.1	8.0	5.0	0.0	90.0	"Green house mode"	5.0
D	5	255,226	464,292	33.7	8.0	5.0	0.0	90.0	"Green house mode"	5.0
E	4	254,968	464,042	34.2	8.0	5.0	0.0	90.0	"Green house mode"	5.0
F	6	254,843	464,818	37.0	8.0	5.0	0.0	90.0	"Green house mode"	5.0
G	7	254,828	464,959	35.5	8.0	5.0	0.0	90.0	"Green house mode"	5.0
H	8	254,815	464,988	36.0	8.0	5.0	0.0	90.0	"Green house mode"	5.0
I	9	254,631	465,354	37.6	8.0	5.0	0.0	90.0	"Green house mode"	5.0
J	1	253,272	464,167	30.1	8.0	5.0	0.5	90.0	"Green house mode"	5.5
K	10	254,257	465,716	33.2	8.0	5.0	0.0	90.0	"Green house mode"	5.0
L	12	253,990	465,634	33.1	8.0	5.0	0.0	90.0	"Green house mode"	5.0
M	11	254,001	465,632	33.2	8.0	5.0	0.0	90.0	"Green house mode"	5.0
N	14	253,858	463,877	31.4	8.0	5.0	0.0	90.0	"Green house mode"	5.0
O	15	255,089	464,184	35.4	8.0	5.0	0.0	90.0	"Green house mode"	5.0

Calculation Results

Shadow receptor

No.	Name	Shadow, expected values Shadow hours per year
		[h/year]
A	13	37:34
B	2	0:00
C	3	0:00
D	5	23:54

To be continued on next page...

Project:
20250423 WP Oude Buurserdijk

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Calculated:
13/10/2025 14:10/4.1.273

SHADOW - Main Result

Calculation: 20251008 Ref toetspunten Opstelling B V150

...continued from previous page

No.	Name	Shadow, expected values Shadow hours per year [h/year]
E	4	7:00
F	6	30:57
G	7	35:32
H	8	38:11
I	9	50:02
J	1	29:30
K	10	39:45
L	12	42:59
M	11	44:29
N	14	0:00
O	15	12:18

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

No.	Name	Expected [h/year]
1	VESTAS V150-4.2 4200 150.0 !O! hub: 155.0 m (TOT: 230.0 m) (30)	119:33
2	VESTAS V150-4.2 4200 150.0 !O! hub: 155.0 m (TOT: 230.0 m) (31)	55:15
3	VESTAS V150-4.2 4200 150.0 !O! hub: 155.0 m (TOT: 230.0 m) (32)	79:14
4	VESTAS V150-4.2 4200 150.0 !O! hub: 155.0 m (TOT: 230.0 m) (33)	72:18

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.

The calculation of the total expected values for a given receptor assumes a weighted average directional reduction for all WTGs contributing to shadow flicker within the same day. In the case where shadow flicker from different WTGs is not concurrent within the day, the total expected time at a given receptor may deviate marginally from the individual flicker time caused by each turbine separately.

Project:
20250423 WP Oude Buurserdijk

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Timo / timo.van.arkel@rhdhv.com
Calculated:
13/10/2025 14:10/4.1.273

SHADOW - Main Result

Calculation: 20251008 Ref toetspunten Opstelling C V150

Assumptions for shadow calculations

Maximum distance for influence 1. WTG distance circle radius

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

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

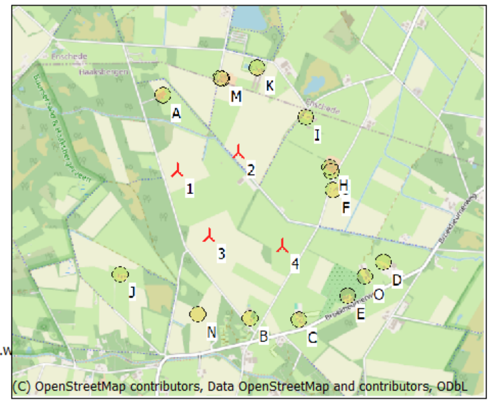
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.20	0.37	0.42	0.50	0.47	0.47	0.44	0.47	0.47	0.35	0.28	0.19

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
382	509	779	466	535	609	1,034	1,753	1,113	623	522	428	8,753

Monthly aggregation of real case reduction
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:
DHM: Elevation Grid Data Object: 20250423 WP Oude Buurserdijk_EMDGrid_0.w
Receptor grid resolution: 1.0 m

All coordinates are in
Dutch Stereo-RD/NAP 2008



Scale 1:40,000
New WTG   Shadow receptor

WTGs

	X (east)	Y (north)	Z [m]	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Shadow data Calculation distance [m]	RPM [RPM]
1	253,679	464,946	31.0	VESTAS V150-4.2 4200 150.0 !O! hub: ...	Yes	VESTAS	V150-4.2-4,200	4,200	150.0	155.0	1,800	10.4
2	254,137	465,088	32.0	VESTAS V150-4.2 4200 150.0 !O! hub: ...	Yes	VESTAS	V150-4.2-4,200	4,200	150.0	155.0	1,800	10.4
3	253,928	464,464	30.1	VESTAS V150-4.2 4200 150.0 !O! hub: ...	Yes	VESTAS	V150-4.2-4,200	4,200	150.0	155.0	1,800	10.4
4	254,473	464,396	34.0	VESTAS V150-4.2 4200 150.0 !O! hub: ...	Yes	VESTAS	V150-4.2-4,200	4,200	150.0	155.0	1,800	10.4

Shadow receptor-Input

No.	Name	X (east)	Y (north)	Z [m]	Width [m]	Height [m]	Elevation a.g.l. [m]	Slope of window [°]	Direction mode	Eye height (ZVI) a.g.l. [m]
A	13	253,565	465,500	32.3	8.0	5.0	0.0	90.0	"Green house mode"	5.0
B	2	254,242	463,857	34.7	8.0	5.0	0.0	90.0	"Green house mode"	5.0
C	3	254,608	463,852	36.1	8.0	5.0	0.0	90.0	"Green house mode"	5.0
D	5	255,226	464,292	33.7	8.0	5.0	0.0	90.0	"Green house mode"	5.0
E	4	254,968	464,042	34.2	8.0	5.0	0.0	90.0	"Green house mode"	5.0
F	6	254,843	464,818	37.0	8.0	5.0	0.0	90.0	"Green house mode"	5.0
G	7	254,828	464,959	35.5	8.0	5.0	0.0	90.0	"Green house mode"	5.0
H	8	254,815	464,988	36.0	8.0	5.0	0.0	90.0	"Green house mode"	5.0
I	9	254,631	465,354	37.6	8.0	5.0	0.0	90.0	"Green house mode"	5.0
J	1	253,272	464,167	30.1	8.0	5.0	0.5	90.0	"Green house mode"	5.5
K	10	254,257	465,716	33.2	8.0	5.0	0.0	90.0	"Green house mode"	5.0
L	12	253,990	465,634	33.1	8.0	5.0	0.0	90.0	"Green house mode"	5.0
M	11	254,001	465,632	33.2	8.0	5.0	0.0	90.0	"Green house mode"	5.0
N	14	253,858	463,877	31.4	8.0	5.0	0.0	90.0	"Green house mode"	5.0
O	15	255,089	464,184	35.4	8.0	5.0	0.0	90.0	"Green house mode"	5.0

Calculation Results

Shadow receptor

No.	Name	Shadow, expected values Shadow hours per year [h/year]
A	13	27:03
B	2	0:00
C	3	0:00
D	5	17:17

To be continued on next page...

Project:
20250423 WP Oude Buurserdijk

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Calculated:
13/10/2025 14:10/4.1.273

SHADOW - Main Result

Calculation: 20251008 Ref toetspunten Opstelling C V150

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No. Name	Shadow, expected values Shadow hours per year [h/year]
E 4	11:30
F 6	46:04
G 7	42:12
H 8	40:29
I 9	26:09
J 1	24:18
K 10	18:41
L 12	24:33
M 11	24:59
N 14	0:00
O 15	30:46

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

No.	Name	Expected [h/year]
1	VESTAS V150-4.2 4200 150.0 !O! hub: 155.0 m (TOT: 230.0 m) (38)	58:43
2	VESTAS V150-4.2 4200 150.0 !O! hub: 155.0 m (TOT: 230.0 m) (39)	90:06
3	VESTAS V150-4.2 4200 150.0 !O! hub: 155.0 m (TOT: 230.0 m) (40)	56:24
4	VESTAS V150-4.2 4200 150.0 !O! hub: 155.0 m (TOT: 230.0 m) (41)	71:54

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.

The calculation of the total expected values for a given receptor assumes a weighted average directional reduction for all WTGs contributing to shadow flicker within the same day. In the case where shadow flicker from different WTGs is not concurrent within the day, the total expected time at a given receptor may deviate marginally from the individual flicker time caused by each turbine separately.

Alternatief D – Kleinere windturbine

Project:
20250423 WP Oude Buurserdijk

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Timo / timo.van.arkel@rhdhv.com
Calculated:
13/10/2025 14:10/4.1.273

SHADOW - Main Result

Calculation: 20251008 Ref toetspunten Opstelling D V150

Assumptions for shadow calculations

Maximum distance for influence 1. WTG distance circle radius

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

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

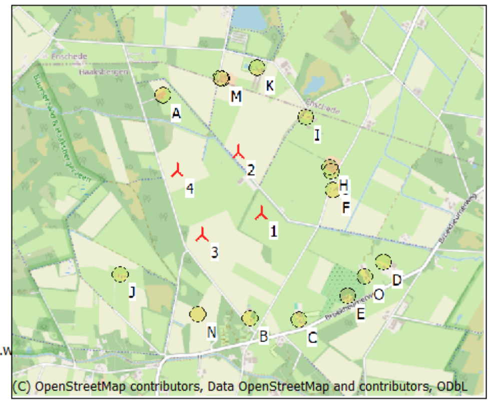
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.20	0.37	0.42	0.50	0.47	0.47	0.44	0.47	0.47	0.35	0.28	0.19

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
382	509	779	466	535	609	1,034	1,753	1,113	623	522	428	8,753

Monthly aggregation of real case reduction
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:
DHM: Elevation Grid Data Object: 20250423 WP Oude Buurserdijk_EMDGrid_0.w
Receptor grid resolution: 1.0 m

All coordinates are in
Dutch Stereo-RD/NAP 2008



Scale 1:40,000
New WTG Shadow receptor

WTGs

	X (east)	Y (north)	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
			[m]					[kW]	[m]	[m]	[m]	[RPM]
1	254,312	464,640	33.1	VESTAS V150-4.2 4200 150.0 !O! hub: ...	Yes	VESTAS	V150-4.2-4,200	4,200	150.0	155.0	1,800	10.4
2	254,137	465,089	32.0	VESTAS V150-4.2 4200 150.0 !O! hub: ...	Yes	VESTAS	V150-4.2-4,200	4,200	150.0	155.0	1,800	10.4
3	253,879	464,475	30.9	VESTAS V150-4.2 4200 150.0 !O! hub: ...	Yes	VESTAS	V150-4.2-4,200	4,200	150.0	155.0	1,800	10.4
4	253,679	464,946	31.0	VESTAS V150-4.2 4200 150.0 !O! hub: ...	Yes	VESTAS	V150-4.2-4,200	4,200	150.0	155.0	1,800	10.4

Shadow receptor-Input

No.	Name	X (east)	Y (north)	Z	Width	Height	Elevation a.g.l.	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
				[m]	[m]	[m]	[m]	[°]		[m]
A	13	253,565	465,500	32.3	8.0	5.0	0.0	90.0	"Green house mode"	5.0
B	2	254,242	463,857	34.7	8.0	5.0	0.0	90.0	"Green house mode"	5.0
C	3	254,608	463,852	36.1	8.0	5.0	0.0	90.0	"Green house mode"	5.0
D	5	255,226	464,292	33.7	8.0	5.0	0.0	90.0	"Green house mode"	5.0
E	4	254,968	464,042	34.2	8.0	5.0	0.0	90.0	"Green house mode"	5.0
F	6	254,843	464,818	37.0	8.0	5.0	0.0	90.0	"Green house mode"	5.0
G	7	254,828	464,959	35.5	8.0	5.0	0.0	90.0	"Green house mode"	5.0
H	8	254,815	464,988	36.0	8.0	5.0	0.0	90.0	"Green house mode"	5.0
I	9	254,631	465,354	37.6	8.0	5.0	0.0	90.0	"Green house mode"	5.0
J	1	253,272	464,167	30.1	8.0	5.0	0.5	90.0	"Green house mode"	5.5
K	10	254,257	465,716	33.2	8.0	5.0	0.0	90.0	"Green house mode"	5.0
L	12	253,990	465,634	33.1	8.0	5.0	0.0	90.0	"Green house mode"	5.0
M	11	254,001	465,632	33.2	8.0	5.0	0.0	90.0	"Green house mode"	5.0
N	14	253,858	463,877	31.4	8.0	5.0	0.0	90.0	"Green house mode"	5.0
O	15	255,089	464,184	35.4	8.0	5.0	0.0	90.0	"Green house mode"	5.0

Calculation Results

Shadow receptor

No.	Name	Shadow, expected values Shadow hours per year [h/year]
A	13	29:14
B	2	0:00
C	3	0:00
D	5	18:20

To be continued on next page...

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SHADOW - Main Result

Calculation: 20251008 Ref toetspunten Opstelling D V150

...continued from previous page

No. Name	Shadow, expected values Shadow hours per year [h/year]
E 4	9:50
F 6	41:59
G 7	39:09
H 8	39:06
I 9	34:38
J 1	18:59
K 10	18:44
L 12	24:35
M 11	25:03
N 14	0:00
O 15	12:29

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

No.	Name	Expected [h/year]
1	VESTAS V150-4.2 4200 150.0 !O! hub: 155.0 m (TOT: 230.0 m) (42)	79:58
2	VESTAS V150-4.2 4200 150.0 !O! hub: 155.0 m (TOT: 230.0 m) (43)	90:16
3	VESTAS V150-4.2 4200 150.0 !O! hub: 155.0 m (TOT: 230.0 m) (44)	49:25
4	VESTAS V150-4.2 4200 150.0 !O! hub: 155.0 m (TOT: 230.0 m) (45)	58:43

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.

The calculation of the total expected values for a given receptor assumes a weighted average directional reduction for all WTGs contributing to shadow flicker within the same day. In the case where shadow flicker from different WTGs is not concurrent within the day, the total expected time at a given receptor may deviate marginally from the individual flicker time caused by each turbine separately.